ATTACHMENT 5E

*FINAL TECHNICAL APPENDICES*
*VOLUME III*

# *NORTH VINEYARD STATION SPECIFIC PLAN*

## *ENVIRONMENTAL IMPACT REPORT*

- ***SUPPLEMENTAL TRANSPORTATION ANALYSIS***
- ***TRANSPORTATION ANALYSIS***

*County Control Number:* ***93-SFB-0238***
*State Clearinghouse Number: SCH #96032057*

*Sacramento County*
*Department of Environmental*
*Review and Assessment*

***FEBRUARY 1998***

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# VOLUME III

## FINAL TECHNICAL APPENDICES

## NORTH VINEYARD STATION SPECIFIC PLAN

Technical Appendices Volume III for the North Vineyard Station Specific Plan EIR contains the following technical studies: Final Transportation Analysis and the Final Supplemental Transportation Analysis.

These technical studies were prepared by consultants with expertise in the appropriate area. The Law Offices of George E. Phillips served as the coordinator for this work. All phases of the technical study work have been monitored by the Sacramento County Planning Department. Scoping of all technical issues and report review has been conducted by county staff of the Planning Department, the Transportation Division and the Department of Environmental Review and Assessment.

Technical issues were identified during the early scoping process. Administrative drafts of each technical study was prepared by consultants and reviewed by County staff. Revisions were made as needed. The technical studies contained herein are a result of this process.

Please note: Participating property owners have changed since the technical studies were originally conducted. These studies contain technical data for some properties that are no longer considered participating properties however, the technical data is not affected by these changes. The Specific Plan Proponents for the project now include: Winncrest Homes, US Home, Florin Investors, and Cal Maple Development. The Saca Properties, Morvai and East Bradshaw Gerber Associates are no longer participating owners. For a map of the current participating properties see Plate PRF-A in the Preface of the Final EIR.

# VOLUME III

# FINAL TECHNICAL APPENDICES

# NORTH VINEYARD STATION SPECIFIC PLAN

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ATTACHMENT 5E

# APPENDIX A-1

NVSSP FEIR: Final Technical Appendices Vol. III

**FINAL REPORT**

# SUPPLEMENTAL TRANSPORTATION ANALYSIS FOR THE NORTH VINEYARD STATION SPECIFIC PLAN:

## Alternatives to Relocate Commercial Core

**Prepared for:**
**North Vineyard Station Property Owners**



**February 6, 1998**

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**Final Report**

# SUPPLEMENTAL TRANSPORTATION ANALYSIS FOR THE NORTH VINEYARD STATION SPECIFIC PLAN: Alternatives to Relocate Commercial Core

**Prepared for:**
**North Vineyard Station Property Owners**

**Prepared by:**
**Fehr & Peers Associates, Inc.**

**February 6, 1998**

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# I. INTRODUCTION

## BACKGROUND

The *Transportation Analysis for the North Vineyard Station Specific Plan* was originally prepared by Fehr & Peers Associates on October 2, 1996. That document presented the traffic impacts of the preferred project and presented a trip generation comparison of two reduced-density alternatives. Since that time, two additional alternatives have been prepared, both of which involve the transfer of uses from the original commercial core area to other locations with the specific plan area. The two new alternatives are known as the Alternate Core and Dispersed Core alternatives. Detailed descriptions of these alternatives are presented below.

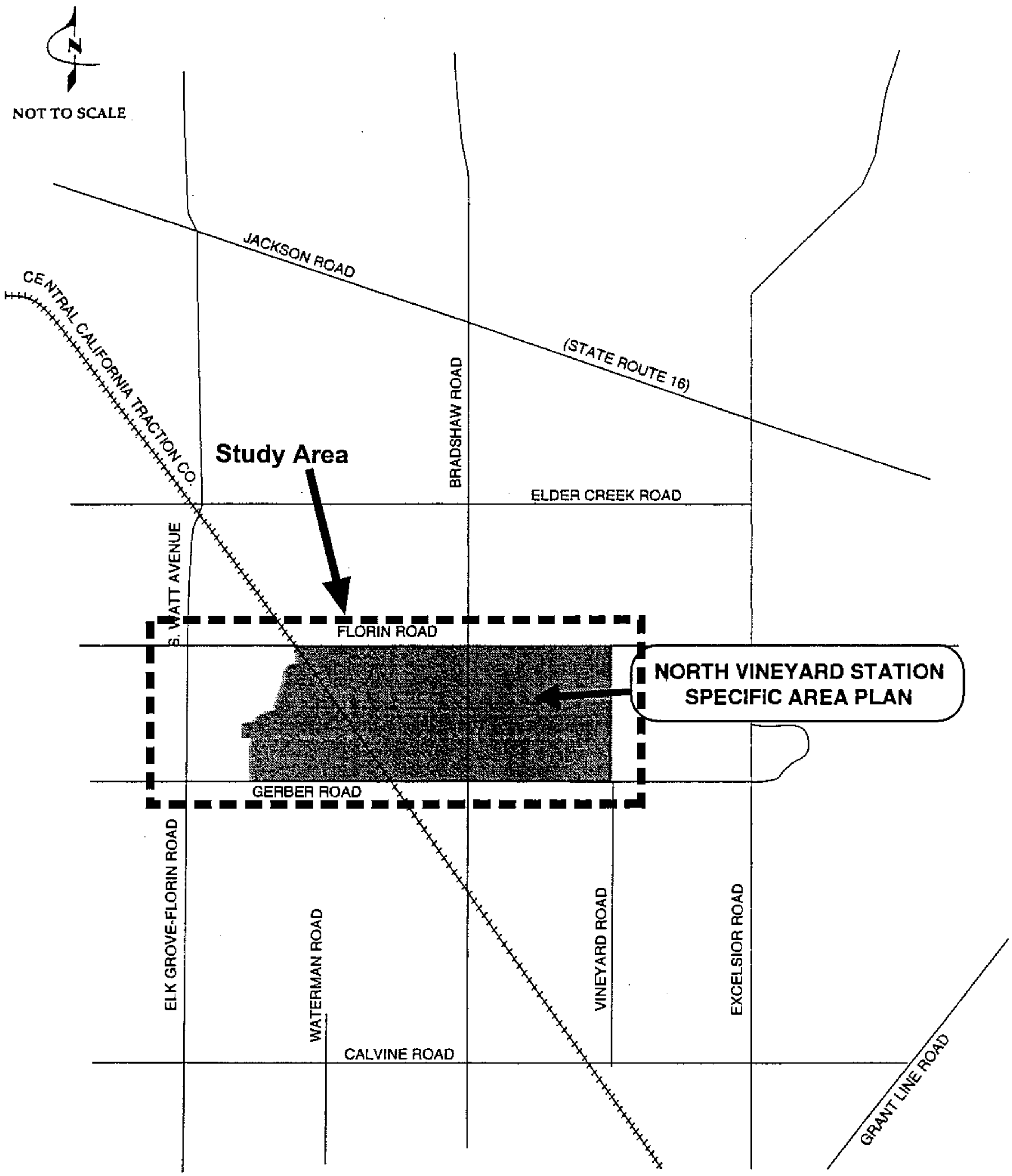
## STUDY PURPOSE

The purpose of this study is to analyze the impacts of the two new North Vineyard Station Specific Plan land use alternatives on the adjacent transportation system. This study assesses the short- and long-term impacts of the alternatives on the local circulation network and describes the improvements required to mitigate operational deficiencies of the transportation system. The results of this alternatives analysis are also compared to the impacts and mitigation measures of the preferred plan.

## DESCRIPTION OF PROJECT ALTERNATIVES

The North Vineyard Station Specific Plan area is located in southeastern Sacramento County and is bounded by Florin Road to the north, Elder Creek to the west, the planned Vineyard Road extension to the east, and Gerber Road to the south. Figure 1 shows the location of the plan area and the adjacent roadway network.

The plan area is a 1,595-acre residential development with a total of 6,339 dwelling units and approximately 38 acres of retail and office uses. Public facilities include neighborhood parks, a community park, a library, and elementary schools. Under the preferred project, the commercial core is located near the intersection of Waterman Road and Gerber Road. The two alternatives to the preferred project analyzed in this document are described below:




| Figure 1 | STUDY AREA | |
|---|---|---|
| 612-18-01 | | |

Alternate Core Alternative - The commercial core is completely relocated from the Waterman Road/Gerber Road intersection to the Bradshaw Road/Florin Road intersection. This alternative involves the relocation of all of the retail commercial and business-professional uses to the southwest and southeast quadrants of the Bradshaw Road/Florin Road intersection, as well as the transfer of approximately 300 multi-family dwelling units to Florin Road west of Bradshaw Road. Under this alternative, the amount of business-professional uses is approximately 50 percent of the amount planned under the preferred project. The relocated uses will be replaced by single-family residential dwelling units. The total number of dwelling units (6,339) is the same as the preferred project.

Dispersed Core Alternative - This alternative involves the relocation of 13.4 acres of retail commercial uses from the Waterman Road/Gerber Road intersection to the southwest quadrant of the Bradshaw Road/Florin Road intersection. The relocated retail commercial uses will be replaced by single-family residential dwelling units. All other land uses are essentially similar to the preferred project including the total number of dwelling units (6,339).

The proposed on-site street system for the preferred project and all alternatives consists of a network of two-lane collector and local streets interconnected by several major collector roadways that will provide access to the existing and future arterial roadways: Florin Road, Gerber Road, Bradshaw Road and the extensions of Vineyard Road and Waterman Road. As part of the, improvements to the existing transit, bicycle, and pedestrian facilities, as well as new facilities, will be implemented to encourage the use of alternative travel modes.

Both alternatives including the elimination of a collector roadway that was proposed under the preferred project. This roadway extended from Waterman Road (south of the proposed new Central Traction Railroad crossing) to Gerber Road (approximately halfway between Waterman Road and Bradshaw Road) and included a crossing of Gerber Creek.

## STUDY AREA

Since the proposed alternatives result in a negligible change in net land use intensity, the study area for the alternatives analysis is focused on transportation facilities immediately adjacent to the project site. In consultation with Sacramento County Public Works staff, the following intersections selected for analysis:

1. Elk-Grove Florin Road/Florin Road
2. Florin Road/Waterman Road
3. Florin Road/Bradshaw Road
4. Florin Road/Vineyard Road
5. Elk-Grove Florin Road/Gerber Road
6. Gerber Road/Waterman Road

7. Gerber Road/Bradshaw Road
8. Gerber Road/Vineyard Road

These intersections are shown on Figure 1. In addition, the roadway segments immediately adjacent to the study intersections were analyzed according to Sacramento County traffic impact analysis guidelines.

## IMPACT EVALUATION CRITERIA

Criteria for evaluating impacts were established for roadways (including segments and intersections), transit facilities, and bicycle/pedestrian facilities as documented in the original transportation analysis for the North Vineyard Station Specific Plan. These criteria were maintained for this alternatives analysis and are described below.

### Arterial Roadway Segments

For purposes of this study, roadway segments were analyzed by comparing average daily traffic volumes to capacity thresholds that were developed for the Sacramento County General Plan Update. These thresholds are used as guidelines by the County to master plan the transportation network by projecting the need for new or upgraded facilities.

The effect of substandard roadway cross-sections was also used to identify deficiencies. Some of the study roadways, including Elk Grove-Florin Road, Jackson Road, and Bradshaw Road, include 12-foot travel lanes and minimum 6-foot usable shoulders. Other roadways such as Gerber Road and Excelsior Road provide 10- or 11-foot travel lanes and usable shoulders that are less than two-feet wide.

#### *Operational Deficiencies*

According to the Sacramento County General Plan, the streets within the study area are ultimately planned to be medium-access arterial roadways, with two to four intersections per mile, a limited number of driveways, and a speed limit between 35 and 55 miles per hour. For this type of facility, the daily roadway capacity is approximately 18,000, 36,000, and 54,000 VPD for streets with two lanes, four lanes and six lanes, respectively. These capacities were applied to all facilities under existing and cumulative conditions.

An alternative results in an operational deficiency if the addition of project-generated traffic causes the demand on a facility to exceed its ultimate capacity, thus requiring additional travel lanes beyond those delineated in the Transportation Plan of the *General Plan Circulation Element* dated December 15, 1993.

*Physical Deficiencies*

As noted above, several study roadways include substandard cross-sections. According to standards set forth in *A Policy on Geometric Design of Highways and Streets* (1994) published by the American Association of State Highway and Transportation Officials (AASHTO), the minimum lane width and shoulder width is 12 feet and 6 feet, respectively, for rural arterials serving more than 400 VPD. Thus, a physical deficiency is defined to occur when a substandard roadway segment serves more than 400 VPD.

Signalized Intersections

Level of service (LOS) is a term which qualitatively describes operating conditions for intersections. There are six levels of service, A through F, which represent driving conditions from best to worst, respectively. In general, LOS A represents free-flow conditions with no congestion and LOS F represents severe congestion or delay under stop-and-go conditions.

The County of Sacramento has defined the level of service standard for urban area roadways to be LOS E (i.e., LOS F is considered unacceptable). For intersections of rural collector roadways, the minimum acceptable LOS is D. These standards have been set forth in Policy CI-22 in the County's *General Plan Circulation Element*. As set forth in Policy CI-23, if implementation of a project results in a level of service worse than those specified in Policy CI-22, traffic impacts must be mitigated by enhancing the capacity of the roadway and transit system or reducing the demand generated by an alternative.

Analysis of signalized intersections was completed using the methods described in *Interim Materials on Highway Capacity* (Circular No. 212, Transportation Research Board, January 1980) and the interim *Traffic Impact Guidelines* (County of Sacramento Public Works, July 30, 1996). The characteristics of traffic operations for each LOS with respect to signalized intersections are shown in Table 1. Corresponding to each LOS is a volume-to-capacity (V/C) ratio. This is the ratio of the existing or projected volume to the theoretical capacity of the intersection. An intersection is defined to be "at capacity" at LOS E when the V/C ratio is 1.00.

**Table 1**
**Signalized Intersection Level of Service Descriptions**

| *Level of Service* | *Interpretation* | *Volume-to-Capacity Ratio* |
|---|---|---|
| A | Uncongested operations; all queues clear in a single cycle. | Less than 0.61 |
| B | Very light congestion; an occasional phase is fully utilized. | 0.61-0.70 |
| C | Light congestion; occasional queues on approaches. | 0.71-0.80 |
| D | Significant congestion on critical approaches, but intersection is functional. Cars required to wait through more than one cycle during short peaks. No longstanding queues formed. | 0.81-0.90 |
| E | Severe congestion with some longstanding queues on critical approaches. Traffic queue may block nearby intersection(s) upstream of critical approach(es). | 0.91-1.00 |
| F | Total breakdown, stop-and-go operation. | Greater than 1.00 |

Source: *Interim Materials on Highway Capacity* (Circular 212, Transportation Research Board, 1980).

A land use alternative results in an operational deficiency when the addition of traffic from the plan area changes the intersection LOS from E or better to LOS F. For intersections operating at LOS F without a specific plan alternative, an operational deficiency is identified if the addition of plan area traffic increases the V/C ratio by 0.05 or more.

Unsignalized Intersections

For those intersections that are controlled by stop signs, two methodologies were used to analyze operating conditions. For those intersections with stop sign control on the minor street only (two-way stops), the methods described in Chapter 10 of the *Highway Capacity Manual* (Special Report 209, Transportation Research Board, 1985) were applied. Level of service is calculated for each movement based on the reserve capacity available. Reserve capacity is a function of demand and the critical gaps in traffic on the major street. The criteria for LOS at two-way stop controlled intersections is shown in Table 2.

**Table 2**
**Intersection Level of Service Definitions for Two-Way Stop Controlled Intersections**

| *Level of Service* | *Interpretation* | *Reserve Capacity (vehicles)* |
|---|---|---|
| A | Little or no delay. | ≥ 400 |
| B | Short traffic delays. | 300 to 399 |
| C | Average traffic delays. | 200 to 299 |
| D | Long traffic delays. | 100 to 199 |
| E | Very long traffic delays. | 0 to 99 |
| F | Stop-and-go conditions. | < 0 |

Source: *Highway Capacity Manual* (Special Report 209, Transportation Research Board, 1985).

At intersections with all-way stop control (i.e., all traffic stops), procedures described in Interim Materials on Unsignalized Intersection Capacity (Circular No. 373, Transportation Research Board, 1991) were used. This method determines an overall LOS based on the estimated delay for traffic on each of the approaches. The ranges of delay for each level of service is presented in Table 3.

**Table 3**
**Intersection Level of Service Definitions for All-Way Stop Controlled Intersections**

| *Level of Service* | *Interpretation* | *Average Vehicle Delay (in seconds)* |
|---|---|---|
| A | Little or no delay. | ≤5 |
| B | Short traffic delays. | >5 and ≤10 |
| C | Average traffic delays. | >10 and ≤20 |
| D | Long traffic delays. | >20 and ≤30 |
| E | Very long traffic delays. | >30 and ≤45 |
| F | Stop-and-go conditions. | >45 |

Source: *Interim Materials on Unsignalized Intersection Capacity* (Circular No. 373, Transportation Research Board, 1991).

An alternative results in an operational deficiency when the addition of traffic from the plan area changes the LOS from E or better to LOS F. For those intersections that are affected, an analysis of peak hour volumes was conducted to determine if a traffic signal would be warranted.

Since the proposed alternatives generally involve the relocation of land uses within the plan area and do not alter the overall character of the plan, the change in impacts to transit system and bicycle/pedestrian systems is considered negligible. Thus, these modes were not evaluated in this supplemental analysis.

## REPORT ORGANIZATION

Chapter II presents the operating characteristics of the transportation system under existing conditions with and without the preferred project, the Alternate Core and the Dispersed Core Alternatives. The impact of the preferred project and the alternatives under cumulative conditions is presented in Chapter III, and Chapter IV presents the projected traffic volumes on internal roadways for these scenarios. Chapter V summarizes the difference in mitigation measures between the various project alternatives.

# II. IMPACTS UNDER EXISTING CONDITIONS

The existing condition of the transportation system within the study area was described in detail in Chapter II of the original transportation analysis prepared for the plan area in October 1996. Chapter III of that report described the traffic impacts of the preferred project and the improvements required to mitigate impacts. This chapter describes the effect that trips generated by the proposed alternatives would have on the operation of the existing local transportation system and its users. The impacts and mitigation measures for the preferred project and the Alternate Core and Dispersed Core alternatives are presented in this chapter.

## VEHICLE TRIPS FROM PROJECT ALTERNATIVES

The three-step process of trip generation, distribution, and assignment used in the original transportation analysis for the North Vineyard Station Specific Plan was employed for this study. This process is described below.

### Project Trip Generation

Traffic from the North Vineyard Station Specific Plan area was estimated using the following process:

- Estimate vehicle trip ends for various land uses using standard trip generation rates;
- Adjust the total number of trips to account for internal and pass-by trips;
- Estimate transit utilization; and
- Determine net project trip generation.

Each step is explained in detail below.

### Estimation Of Vehicle Trip Ends

The number of trips generated for each land use was estimated by applying trip rates from *Trip Generation,* Institute of Transportation Engineers, 5th Edition, 1991. These rates were applied to the proposed land uses to yield the total number of trips generated by each land use. The daily, a.m. peak hour, and p.m. peak hour trip rates are shown in Table 4 for each land use.

| Table 4<br>Trip Generation Rates For Various Land Uses | | | | |
|---|---|---|---|---|
| Land Use | Units | Daily | AM Peak Hour | PM Peak Hour |
| Low Density Residential | d.u. | 9.55 | 0.74 | 1.01 |
| Medium Density Residential | d.u. | 9.45 | 0.74 | 1.01 |
| High-Density (Multi-Family) Residential | d.u. | 6.47 | 0.56 | 0.69 |
| Elementary School | students | 1.09 | 0.28 | 0.25 |
| Business Park | ksf GFA | Depends on Size of Parcel | | |
| Commercial | ksf GLA | Depends on Size of Parcel | | |

Internalization and Pass-By Adjustments

The total number of trips generated by each land use was adjusted to account for internal and pass-by trips. Internal trips are those which begin and end within the project boundary. An example is a trip from home to the neighborhood supermarket. Since these trips do not leave the project area, they do not affect operation of the external street system. The following set of internalization rates were developed for the North Vineyard Station Specific Plan:

- Residential 14%
- Neighborhood Commercial 40%
- Community Commercial 30%
- Business Park 15%
- Elementary School 90%

For residential trips, the internalization rate was determined by assuming 80 percent of all non-residential internal trips would be home-based. This equates to a 14 percent internalization rate for residential areas of the project.

Pass-by trips reflect those trips that are attracted from passing traffic already on the external street system. These types of trips occur for retail and commercial land uses. According to *Trip Generation* (Fifth Edition, Institute of Transportation Engineers, 1991), pass-by trip percentages vary based on the size of a retail or commercial land use and the daily traffic volume on the adjacent street. Given the types of retail and commercial land use proposed for the North

Vineyard Station Specific Plan and the expected daily traffic volumes on the adjacent streets, pass-by factors of 20 percent for neighborhood commercial and 30 percent for community commercial were applied to the gross trip generation. These factors are consistent with values used in other traffic studies in the Sacramento region.

Transit Utilization

Transit utilization for the project was estimated using a two-step process. First, the number of vehicle-trips was converted to person-trips using a ratio of 1.15 persons per vehicle. The second step involved projecting the percentage of person-trips that would utilize transit. For previous studies in this part of the County, up to five percent of all person-trips would be completed using transit. This same percentage is considered applicable for the North Vineyard Station Specific Plan.

Net Project Trip Generation

Tables A-1 through A-3 in Appendix A summarize the trip generation under daily, AM peak hour, and PM peak hour conditions for the preferred project. Tables A-4 through A-6 and Tables A-7 through A-9 illustrate the trip generation for the Alternate Core and Dispersed Core alternatives, respectively. Trip generation is presented in the following categories:

- Total vehicle-trips;
- External and internal vehicle-trips;
- External person-trips; and
- Total transit trips.

Table 5 shows the trip generation for the preferred project and the two alternatives.

**Table 5**
**Comparison of Total Trip Generation by Land Use Alternative**

| Land Use Alternative | Net External Vehicle Trips | | |
|---|---|---|---|
| | Daily | AM Peak Hour | PM Peak Hour |
| Preferred Project | 62,989 | 4,359 | 6,523 |
| Alternate Core Alternative | 63,389 | 4,407 | 6,584 |
| Dispersed Core Alternative | 64,075 | 4,511 | 6,669 |

Source: Fehr & Peers Associates, Inc. based on land use plans prepared by Donn C. Reiners, Inc. (1998)

As shown in Table 5, all of the land use alternatives result in total daily and peak hour trips that are within three (3) percent of one another. These variations are caused by minor changes to the size of commercial and business-professional parcels and differences in total intensity. For, example, the Alternate Core alternative includes only half as much acreage designated for business-professional uses as compared to the other two alternatives.

In general, residential trips represent just over 70 percent of the total gross daily vehicle trips with neighborhood and community commercial uses representing 29 percent. Because of internalization and pass-by trips, commercial uses represent only 20 percent of the net external vehicle-trips, whereas, residential, school, and park uses comprise 80 percent of this total.

Project Traffic Distribution

The directional distribution of plan area traffic under existing conditions presented in the October 1996 transportation analysis was used to distribute trips generated by the proposed alternatives. The distribution favored areas to the north and west of the project site given the current location of residential and employment centers in Sacramento County.

Project Traffic Assignment

Based on the plan area trip distribution, trips generated by were added to the existing traffic counts at the study intersections listed in Chapter II. Figure 2 presents daily traffic volumes for existing conditions with and without the preferred project and the Alternate Core and Dispersed Core alternatives. Figures 3 and 4 present the peak hour intersection volumes for the Alternate and Dispersed Core alternatives, respectively. The resulting existing plus project volumes were analyzed to determine the impact of adding plan area traffic to the roadway network. Impacts to each component of the transportation system by the alternatives and how these results compare to the preferred project are presented below.

## ROADWAY SYSTEM OPERATIONS

Arterial Roadway Segments

Daily traffic volumes shown on Figure 2 were compared to the capacity criteria for arterial roadway segments presented in Chapter I. The result of this comparison shows that the operation of several study roadway segments would be affected with the addition of traffic from the preferred project and from the plan alternatives.

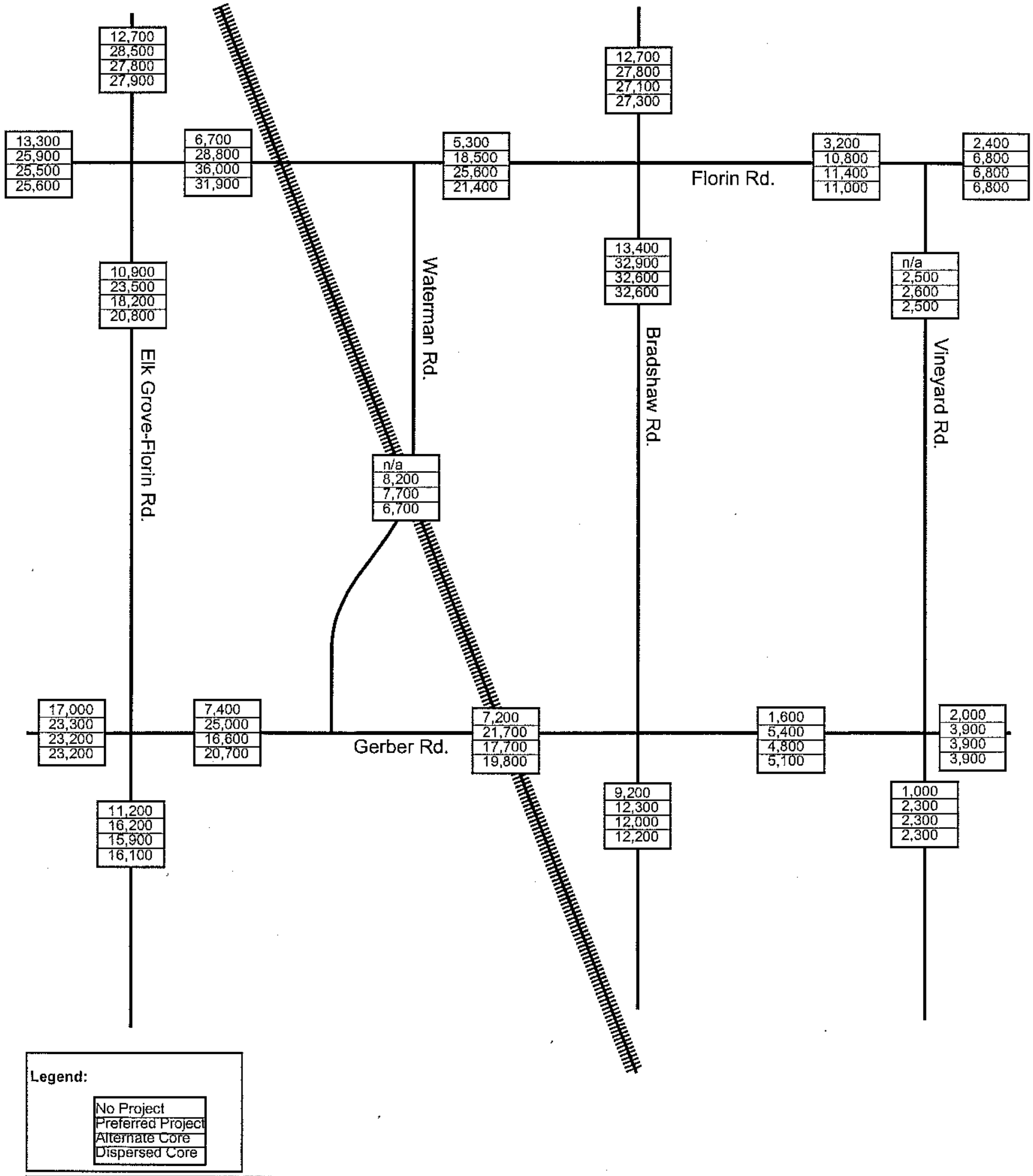
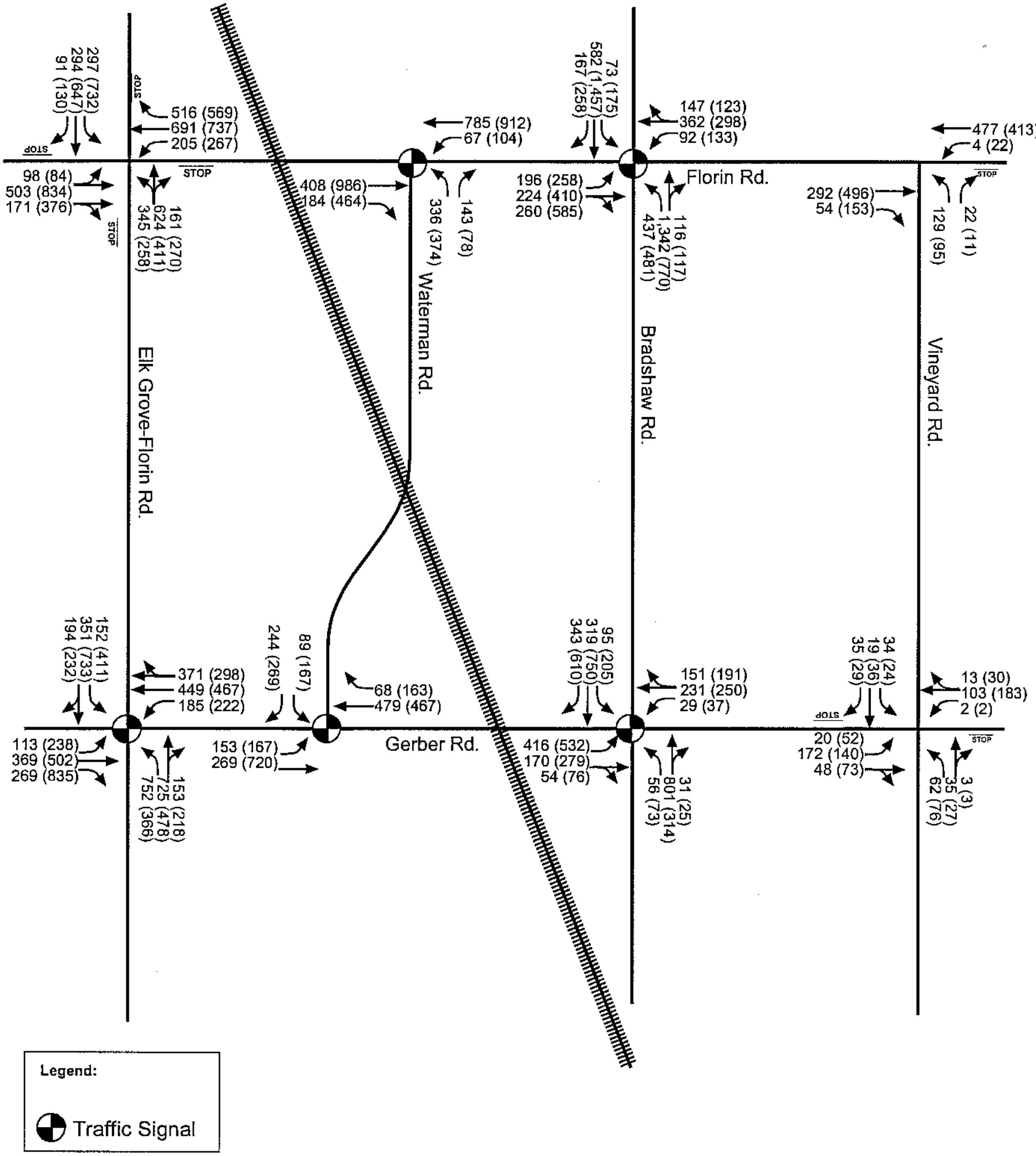


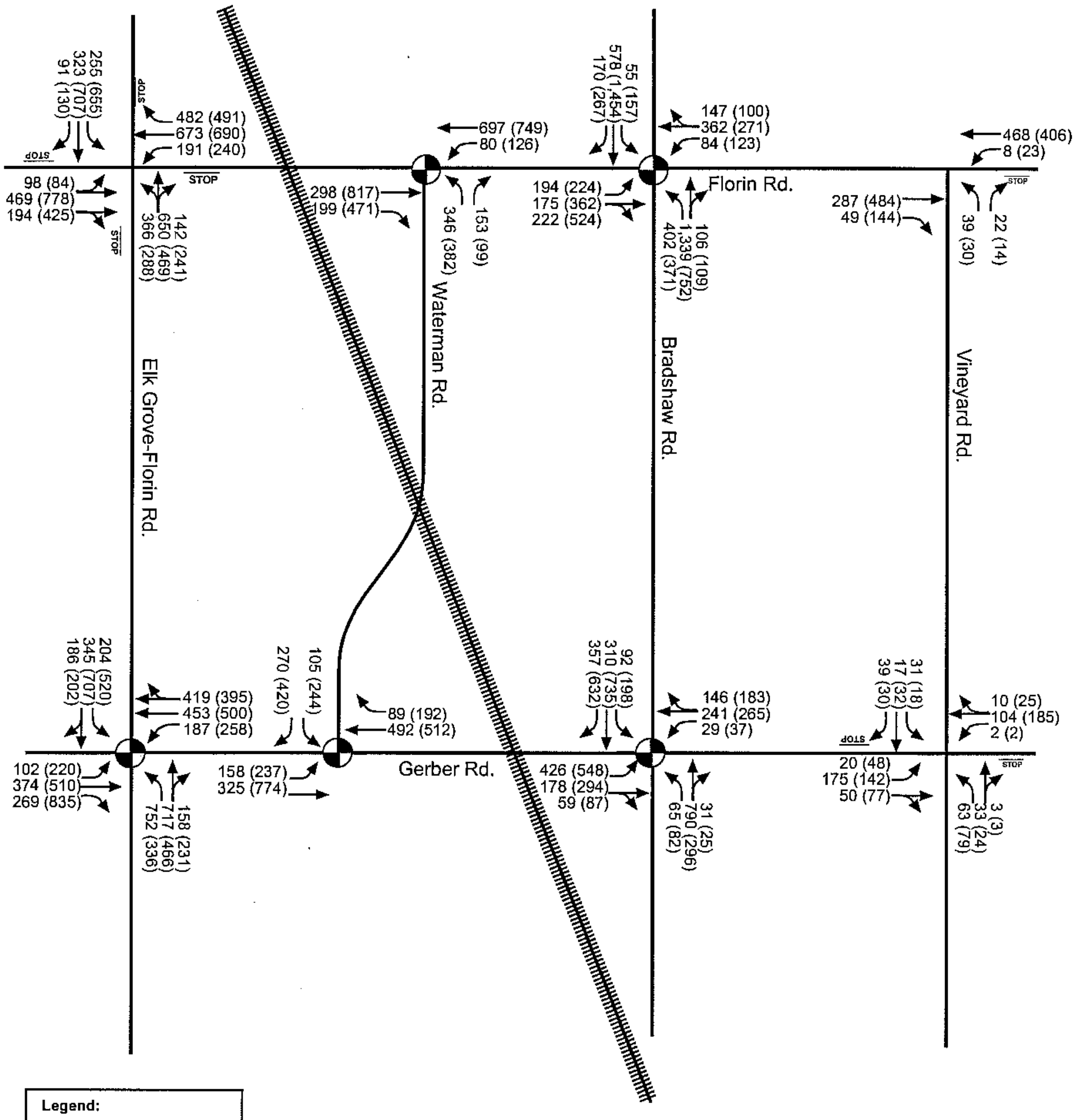

**Figure 2**

812-12-01

**EXISTING PLUS ALTERNATIVES-**
**DAILY TRAFFIC VOLUMES**




| **Figure 3** 812-16-01 | **EXISTING PLUS ALTERNATE CORE PEAK HOUR TRAFFIC VOLUMES** | fp |
|---|---|---|




| **Figure 4**<br>812-18-01 | **EXISTING PLUS DISPERSED CORE PEAK HOUR TRAFFIC VOLUMES** | fp |
|---|---|---|

Except for one roadway segment, all of the operational and physical deficiencies identified for the preferred project would occur under both of the proposed alternatives. However, implementation of the Alternate Core alternative would not result in Impact EP-4, which requires the widening of Gerber Road between Elk Grove-Florin Road and Bradshaw Road from two to four lanes. The projected daily volumes on this segment range between 16,600 and 17,700 VPD under the Alternate Core alternative and are slightly less than the 18,000 VPD capacity for urban two lane roadways.

Study Intersections

Existing plus project traffic volumes shown on Figure 3 and 4 were used to calculate peak hour levels of service at the study intersections for the Alternate Core and Dispersed Core alternatives, respectively. Intersection levels of service for existing conditions with and without the preferred project and these alternatives is presented in Table 6. The corresponding calculation worksheets are included in Appendices B and C.

With one exception, implementation of either alternative will not change the intersection impacts identified for the preferred project. The only additional impact would occur at the Florin Road/Waterman Road intersection under the Alternate Core alternative (identified as Impact EP-20A). This intersection is projected to operate at LOS F during the PM peak hour with complete relocation of the commercial core. Under the preferred project and Dispersed Core alternative, this intersection would operate at an acceptable level according to County standards.

Each of the unsignalized intersections operating at LOS C or worse were analyzed to determine if traffic signals would be warranted under existing conditions with development of the plan area. Based on the Caltrans Peak Hour Signal Warrant criteria, this analysis showed that traffic signals would be warranted at the Elk Grove-Florin Road/Florin Road intersection. This location was already determined to warrant signals under existing conditions and the addition of plan area traffic would further degrade operations.

## PROPOSED IMPROVEMENTS

Improvements required to eliminate roadway deficiencies with the preferred project were identified in the October 1996 transportation analysis. Changes to these improvements or the need for additional improvements under each plan alternative are presented below.

**Table 6**
**Existing Plus Plan Area Alternative Intersection Levels of Service**

| Intersection | Existing AM (PM) | | Existing Plus Preferred Project AM (PM) | | Existing Plus Alternate Core Alt. AM (PM) | | Existing Plus Dispersed Core Alt. AM (PM) | |
|---|---|---|---|---|---|---|---|---|
| | V/C, Delay or RC[1] | LOS[2] | V/C, Delay or RC | LOS | V/C, Delay or RC | LOS | V/C, Delay or RC | LOS |
| Elk Grove-Florin Rd./ Florin Road[3] | 36.0 s (66.0 s) | E (F) | See Note 4 | F (F) | See Note 4 | F (F) | See Note 4 | F (F) |
| Florin Rd./ Waterman Rd. | N/A | N/A | 0.75 (0.92) | C (E) | 0.79 (1.03) | C (F) | 0.73 (0.93) | C (E) |
| Bradshaw Rd./ Florin Rd. | 0.89 (0.82) | D (D) | 1.61 (2.02) | F (F) | 1.63 (2.23) | F (F) | 1.60 (2.06) | F (F) |
| Vineyard Rd./ Florin Rd.[5] | N/A | N/A | 209 (215) | C (C) | 217 (191) | C (D) | 240 (223) | C (C) |
| Elk Grove-Florin Rd./ Gerber Rd. | 1.05 (1.30) | F (F) | 1.36 (1.58) | F (F) | 1.35 (1.53) | F (F) | 1.34 (1.52) | F (F) |
| Gerber Rd./ Waterman Rd. | N/A | N/A | 0.66 (0.86) | B (D) | 0.56 (0.64) | A (B) | 0.59 (0.75) | A (C) |
| Bradshaw Rd./ Gerber Rd. | 0.82 (0.66) | D (B) | 1.26 (1.37) | F (F) | 1.25 (1.31) | F (F) | 1.26 (1.26) | F (F) |
| Vineyard Rd./ Gerber Rd.[5] | 567 (596) | A (A) | 501 (406) | A (A) | 592 (516) | A (A) | 599 (520) | A (A) |

Notes: [1] V/C Ratio = Volume-to-Capacity Ratio (0.00 applies to signalized control); Delay = Average Total Delay (0.0 seconds applies to all-way stop control); and RC= Reserve Capacity (000 vehicles applies to two-way stop control).
[2] LOS = Level of Service.
[3] All-way stop controlled intersection.
[4] Intersection is substantially over capacity and delay calculation is meaningless.
[5] Two-way stop controlled intersection.
N/A = Not applicable.

*Alternate Core Alternative*

Improvements EP-1 through EP-3, EP-5 through EP-14, and EP-16 through EP-19 (identified for the preferred project) would all be required for this alternative. Improvement EP-15A would replace EP-15, and EP-20A is a new required improvement.

Improvement EP-15A: Modify the Bradshaw Road/Florin Road intersection to include the following lane configurations:

- Dual left turn lanes, two through lanes, and a separate right turn lane on the northbound approach;
- Dual left turn lanes, *three* through lanes, and a separate right turn lane on the southbound approach; and
- One left turn lane, two through lanes, and a separate right-turn lane on the eastbound and westbound approaches.

The provision of southbound dual left turn lanes will require widening of the eastbound departure legs on Florin Road to two lanes before merging to a single travel lane. The length and merging distance for these lanes will be approved by Sacramento County Transportation Division staff. The westbound departure leg will be widened as part of Improvement EP-3.

Provision of three southbound lanes will require widening of Bradshaw Road to its ultimate width immediately south of Florin Road. The third southbound lane could be converted to an exclusive right-turn lane at the next downstream intersection or it could be designed to merge into the second through lane. The final configuration will be approved by Sacramento County Transportation Division staff.

These improvements would improve operations at this intersection to LOS C and LOS E in the a.m. and p.m. peak hours, respectively. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

Improvement EP-20A: Modify the Florin Road/Waterman Road intersection to include the following lane configurations:

- Two through lanes and a separate right-turn lane on the eastbound approach; and
- Two through lanes and a separate left-turn lane on the westbound approach.

The provision of two through lanes in the east-west direction is consistent with Improvement EP-3 (widening of Florin Road between Elk Grove-Florin Road and Bradshaw Road from two to four lanes).

These improvements would improve operations at this intersection to LOS A and LOS B in the a.m. and p.m. peak hours, respectively. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

*Dispersed Core Alternative*

Improvements EP-1 through EP-14, and EP-17 through EP-19 (identified for the preferred project) would all be required for this alternative. Improvements EP-15D and EP-16D would replace EP-15 and EP-16, respectively.

Improvement EP-15D: Modify the Bradshaw Road/Florin Road intersection to include the following lane configurations:

- Dual left turn lanes, two through lanes, and a separate right turn lane on the northbound approach;
- Dual left turn lanes, *three* through lanes, and a separate right turn lane on the southbound approach; and
- One left turn lane, two through lanes, and a separate right-turn lane on the eastbound and westbound approaches.

The provision of southbound dual left turn lanes will require widening of the eastbound departure legs on Florin Road to two lanes before merging to a single travel lane. The length and merging distance for these lanes will be approved by Sacramento County Transportation Division staff. The westbound departure leg will be widened as part of Improvement EP-3.

Provision of three southbound lanes will require widening of Bradshaw Road to its ultimate width immediately south of Florin

Road. The third southbound lane could be converted to an exclusive right-turn lane at the next downstream intersection or it could be designed to merge into the second through lane. The final configuration will be approved by Sacramento County Transportation Division staff. (This is the same as Improvement EP-15A).

These modifications would improve operations at this intersection to LOS C and LOS D in the a.m. and p.m. peak hours, respectively. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

Improvement EP-16: Modify the Elk Grove-Florin Road/Gerber Road intersection to include the following lane configurations:

- Dual left turn lanes, two through lanes, and a separate right turn lane on the northbound and southbound approaches;
- One left turn lane, one through lane, and *dual right-turn lanes* on the eastbound approach; and
- One left turn lane, one through lane, and a shared through/right-turn lane on the westbound approach.

The provision of northbound dual left turn lanes and two westbound through lanes will require widening of the westbound departure leg on Gerber Road to two lanes before merging to a single travel lane in each direction. The length and merging distance for these lanes will be approved by Sacramento County Transportation Division staff.

These improvements would improve operations at this intersection to LOS D in both the a.m. and p.m. peak hours. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

## OPERATIONS WITH PROPOSED IMPROVEMENTS

Following implementation of the proposed improvements, the associated operational deficiencies would be eliminated. Table 7 shows the LOS at the study intersections after implementation of the proposed improvements.

**Table 7**
**Mitigated Existing Plus Plan Area Alternative Intersection Levels of Service**

| Intersection | Existing Plus Preferred Project AM (PM) | | Existing Plus Alternate Core Alt. AM (PM) | | Existing Plus Dispersed Core Alt. AM (PM) | |
|---|---|---|---|---|---|---|
| | V/C, Delay or RC[1] | LOS[2] | V/C, Delay or RC | LOS | V/C, Delay or RC | LOS |
| Elk Grove-Florin Rd./ Florin Road | 0.67 (0.89) | B (D) | 0.68 (0.94) | B (E) | 0.66 (0.89) | B (D) |
| Florin Rd./ Waterman Rd. | 0.51 (0.56) | A (A) | 0.51 (0.68) | A (B) | 0.73 (0.93) | C (E) |
| Bradshaw Rd./ Florin Rd. | 0.78 (0.99) | C (E) | 0.79 (0.94) | C (E) | 0.78 (0.86) | C (D) |
| Vineyard Rd./ Florin Rd.[3] | 209 (215) | C (C) | 217 (191) | C (D) | 240 (223) | C (C) |
| Elk Grove-Florin Rd./ Gerber Rd. | 0.85 (1.00) | D (E) | 0.83 (0.99) | D (E) | 0.83 (0.95) | D (E) |
| Gerber Rd./ Waterman Rd. | 0.66 (0.86) | B (D) | 0.56 (0.64) | A (B) | 0.59 (0.75) | A (C) |
| Bradshaw Rd./ Gerber Rd. | 0.85 (0.72) | D (C) | 0.70 (0.76) | B (C) | 0.70 (0.73) | B (C) |
| Vineyard Rd./ Gerber Rd.[3] | 501 (406) | A (A) | 592 (516) | A (A) | 599 (520) | A (A) |

Notes: [1] V/C Ratio = Volume-to-Capacity Ratio (0.00 applies to signalized control); Delay = Average Total Delay (0.0 seconds applies to all-way stop control); and RC= Reserve Capacity (000 vehicles applies to two-way stop control).
[2] LOS = Level of Service.
[3] Two-way stop controlled intersection.

# IV. CUMULATIVE OPERATING CONDITIONS

The purpose of the cumulative analysis is to determine if implementation of the proposed plan alternatives, in addition to planned cumulative growth, will adversely affect the planned transportation system.

## PLANNED TRANSPORTATION IMPROVEMENTS

Figure 5 illustrates the planned number of lanes on each roadway segment under cumulative conditions. All of the study intersections are assumed to be signalized under this future scenario.

## ROADWAY SYSTEM OPERATIONS

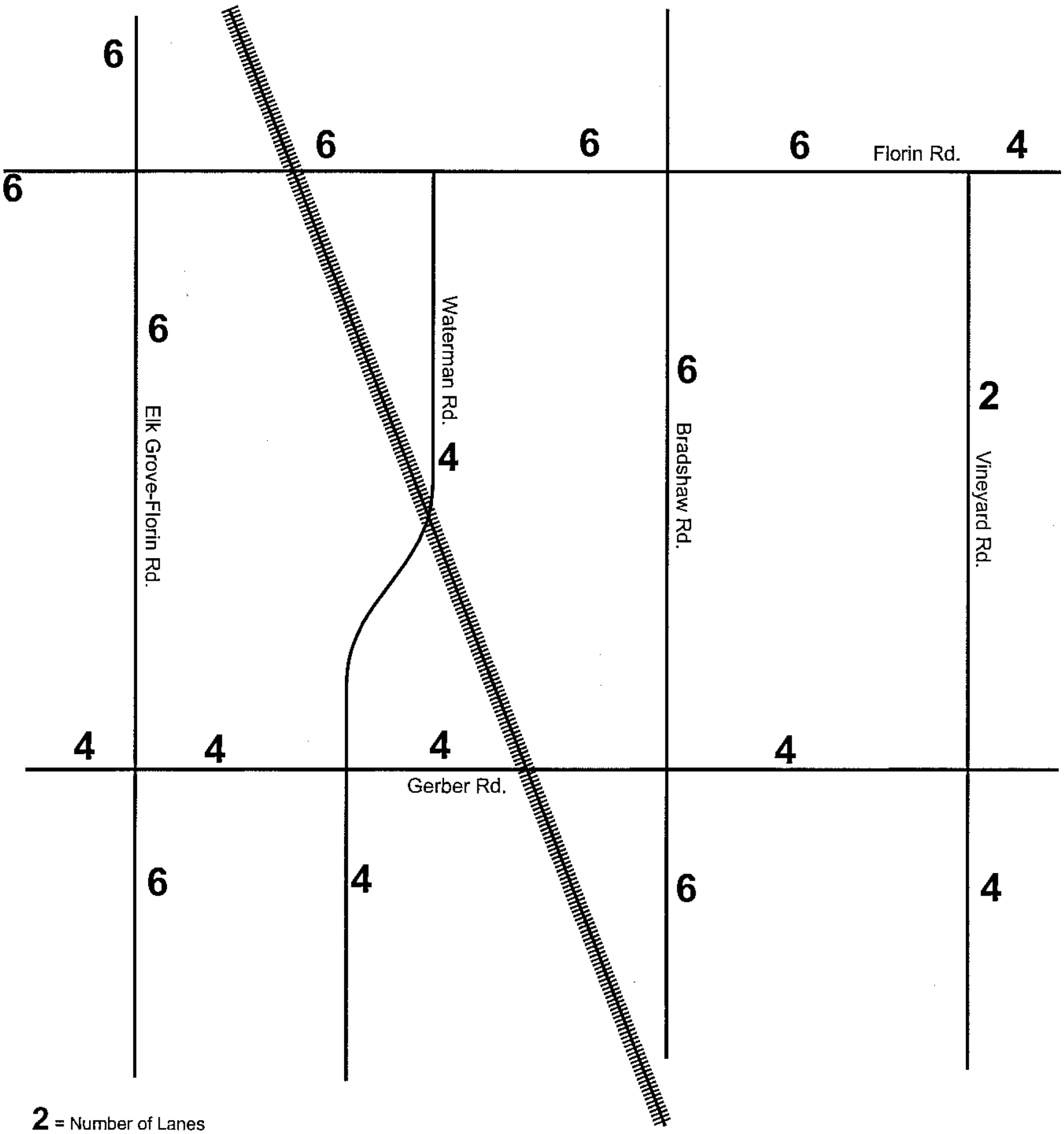
### Cumulative Traffic Volumes

The Sacramento County General Plan traffic model was used to generate daily and peak hour traffic volumes for both of the plan area alternatives under cumulative conditions. Volumes were developed by adding the proposed land uses for each alternative to the traffic model and preparing a new set of traffic forecasts. The same peak hour factors used to develop the cumulative forecasts with and without the preferred project were applied for the alternatives analysis.

At the direction of County Transportation Division staff, the daily and peak hour trips generated by each alternative were factored to match the trip generation information presented in Tables B-4 through B-9. This process provided a conservative trip generation estimate for purposes of identifying project-related impacts and is more consistent with standard trip rates.

The trip distribution of project-generated trips on the study roadway network was obtained from the traffic model output. The distribution used in the October 1996 transportation analysis can also be applied to the alternatives analysis. This information will be used primarily to identify project impacts for roadway segments.

Figure 6 presents the daily traffic volumes for the Alternate Core and Dispersed Core Alternatives. Data for cumulative conditions with and without the preferred project are also shown on this figure for comparison purposes. Figures 7 and 8 present the peak hour turning movement volumes for the Alternate and Dispersed Core alternatives, respectively. Impacts to each element of the study roadway system are presented below.




**2** = Number of Lanes

Note : All Intersections assumed to be signalized
Source: Sacramento County General Plan - Transportation Plan Map (December 15, 1993).

| | |
|---|---|
| **Figure 5** 812-18-01 | **PLANNED CUMULATIVE ROADWAY NETWORK** |

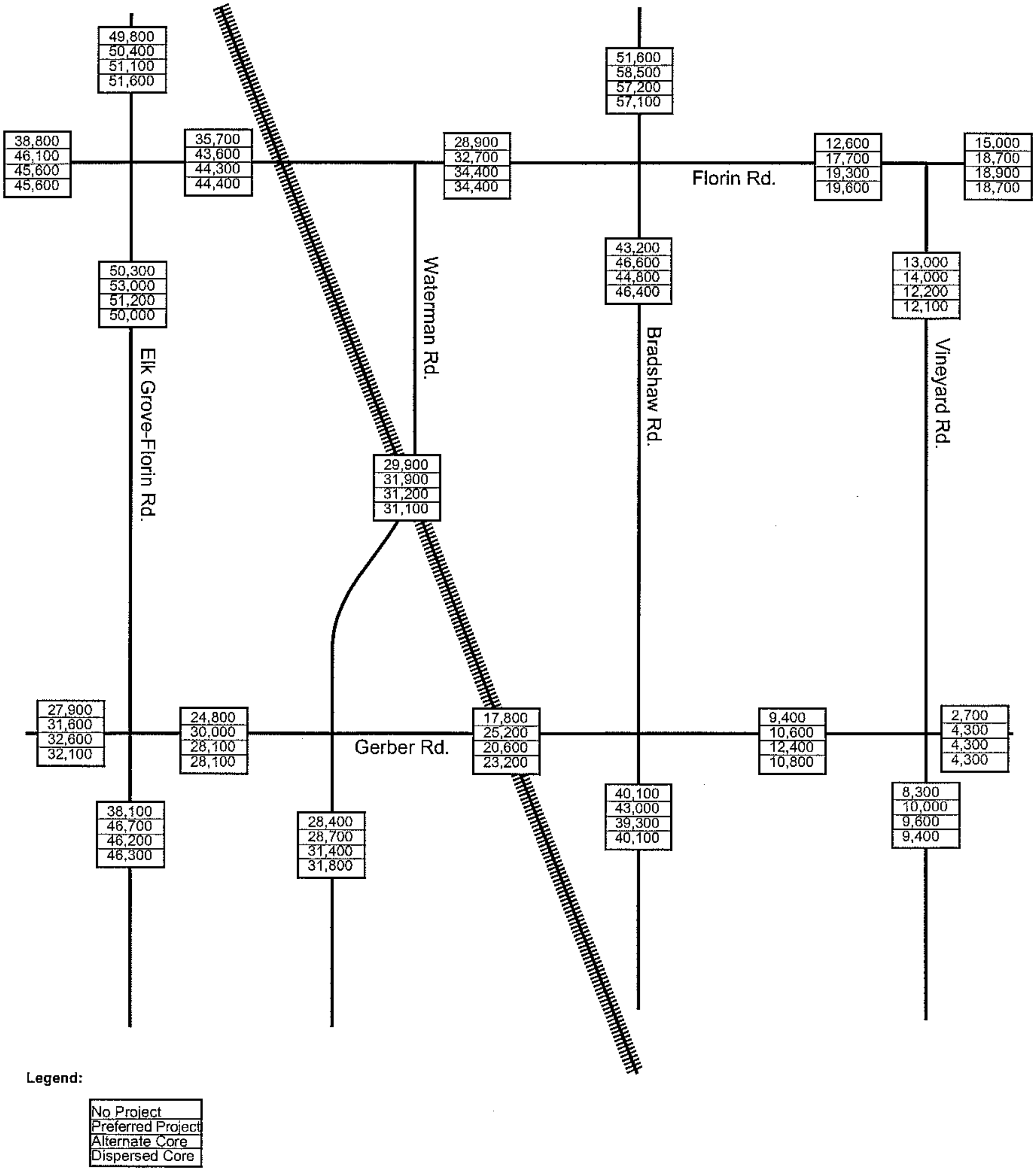
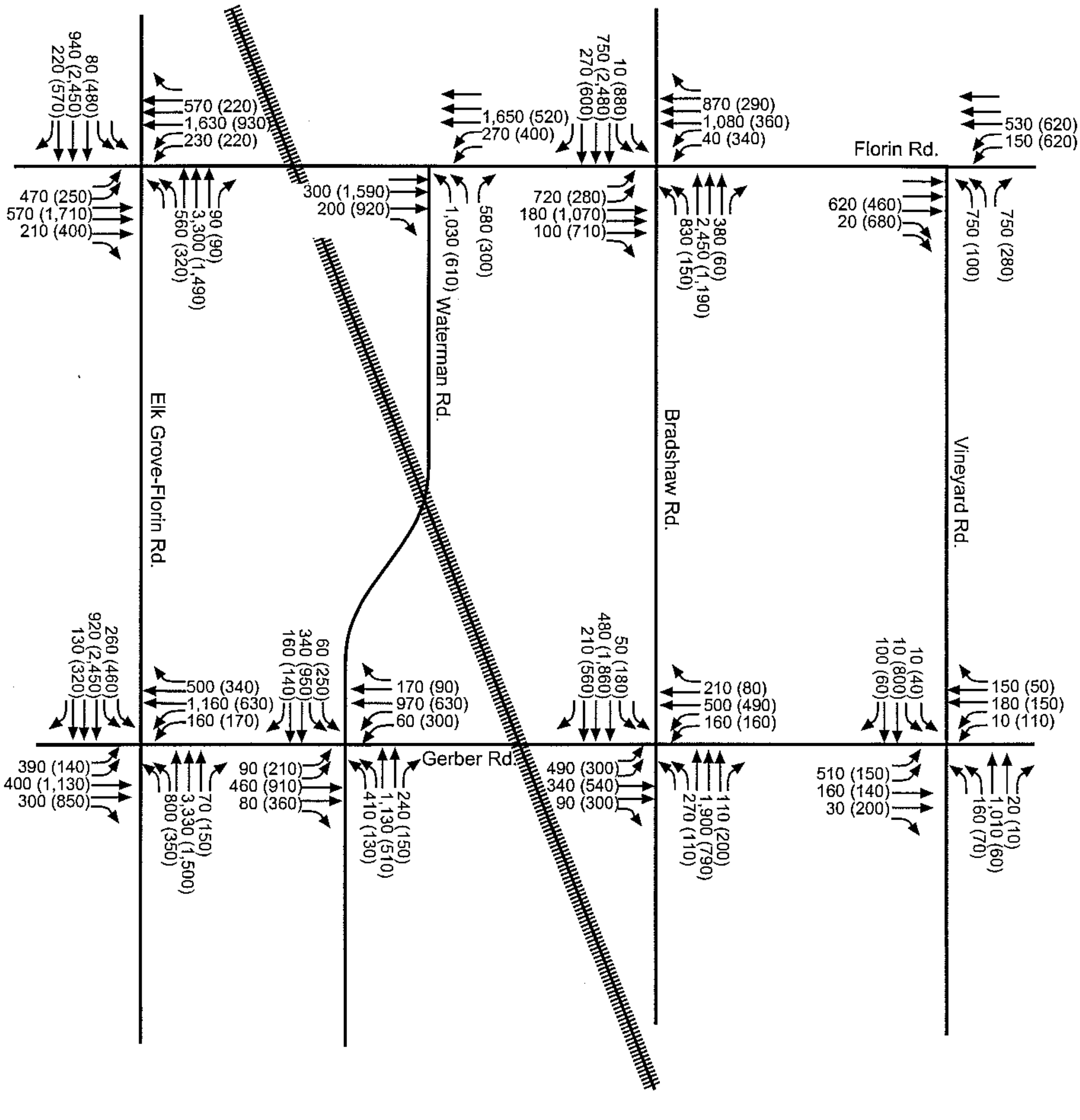



**Figure 6**

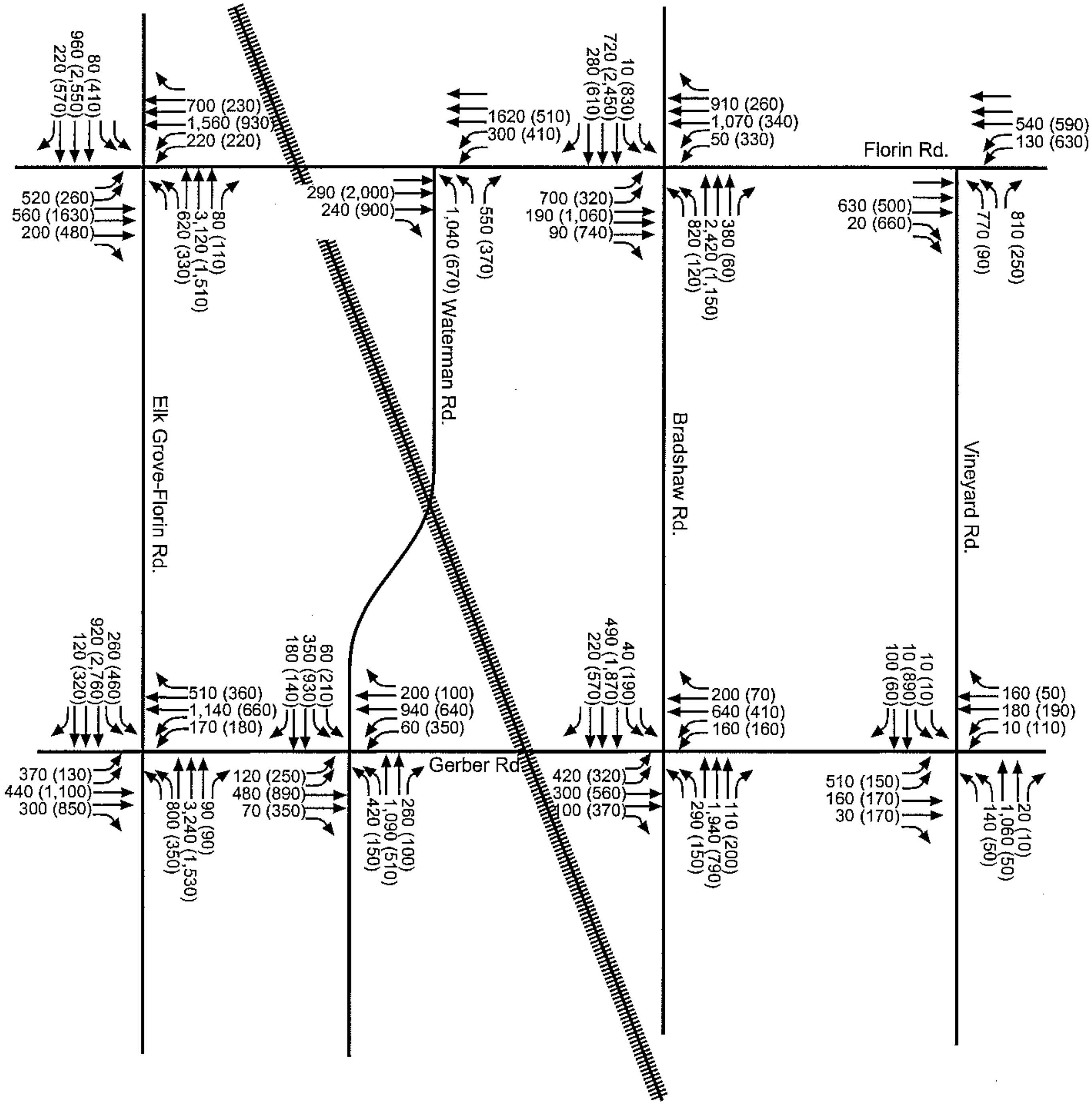
812-12-01

**CUMULATIVE PLUS PLAN AREA ALTERNATIVES-DAILY TRAFFIC VOLUMES**




Note: All Intersections assumed to be signalized

| Figure 7<br>812-18-01 | CUMULATIVE PLUS ALTERNATE CORE PEAK HOUR TRAFFIC VOLUMES | fp |
|---|---|---|




Note: All Intersections assumed to be signalized

| Figure 8<br>812-18-01 | CUMULATIVE PLUS DISPERSED CORE<br>PEAK HOUR TRAFFIC VOLUMES | fp |
|---|---|---|

Arterial Roadway Segments

The volumes on Figure 6 were compared to the arterial roadway capacities presented in Chapter I. Figure 6 shows that the all of the plan alternatives would increase traffic on most roadway segments in the study area. All of the operational and physical roadway segment deficiencies identified for the preferred project would also occur with either of the proposed alternatives.

Study Intersections

The peak hour volumes presented on Figures 7 and 8 were used to determine the level of service for the Alternate and Dispersed Core alternatives under cumulative conditions. The results of the peak hour analyses are shown in Table 8 and the corresponding technical calculations are contained in Appendices D and E.

**Table 8**
**Cumulative Intersection Levels of Service**

| Intersection | Cumulative No Project AM (PM) | | Cumulative Plus Preferred Project AM (PM) | | Cumulative Plus Alternate Core AM (PM) | | Cumulative Plus Dispersed Core AM (PM) | |
|---|---|---|---|---|---|---|---|---|
| | V/C Ratio[1] | LOS[2] | V/C Ratio | LOS | V/C Ratio | LOS | V/C Ratio | LOS |
| Elk Grove-Florin Rd./ Florin Rd. | 1.28 (1.04) | F (F) | 1.40 (1.25) | F (F) | 1.42 (1.22) | F (F) | 1.37 (1.23) | F (F) |
| Florin Rd./ Waterman Rd. | 0.62 (0.89) | B (D) | 0.83 (0.99) | D (E) | 0.78 (0.84) | C (D) | 0.78 (0.89) | C (D) |
| Bradshaw Rd./ Florin Rd. | 1.17 (1.10) | F (F) | 1.27 (1.16) | F (F) | 1.33 (1.16) | F (F) | 1.33 (1.15) | F (F) |
| Florin Rd./ Vineyard Rd. | 0.59 (0.53) | A (A) | 0.59 (0.69) | A (B) | 0.57 (0.71) | A (C) | 0.60 (0.69) | A (B) |
| Elk Grove-Florin Rd./ Gerber Rd. | 1.31 (1.20) | F (F) | 1.47 (1.29) | F (F) | 1.49 (1.24) | F (F) | 1.45 (1.31) | F (F) |
| Waterman Rd./ Gerber Rd. | 0.87 (0.81) | D (D) | 0.70 (0.87) | B (D) | 0.82 (0.85) | D (D) | 0.81 (0.86) | D (D) |
| Bradshaw Rd./ Gerber Rd. | 0.84 (0.88) | D (D) | 0.80 (0.82) | C (D) | 0.86 (0.79) | D (C) | 0.89 (0.79) | D (C) |
| Vineyard Rd./ Gerber Rd. | 0.72 (0.32) | C (A) | 0.69 (0.41) | B (A) | 0.65 (0.47) | B (A) | 0.68 (0.45) | B (A) |

Notes: [1] V/C Ratio = Volume-to-Capacity Ratio.
[2] LOS = Level of Service.

Under cumulative conditions, implementation of either the Alternate Core or Dispersed Core alternative is projected to cause the same impacts that were identified with the preferred project. Although the alternatives result in slightly different V/C ratios, operations at each of the study intersections are expected to be similar under any of the three development scenarios.

## PROPOSED IMPROVEMENTS

Based on the projected roadway segment and intersection operations, all of the proposed improvements recommended for the preferred project will be required for both the Alternate Core and Dispersed Core alternatives. No modifications to the proposed improvements are required for either alternative.

## OPERATIONS WITH PROPOSED IMPROVEMENTS

Table 9 shows the LOS at the study intersections after implementation of the proposed improvements included in the October 1996 transportation analysis of the preferred project. With implementation of the proposed improvements, the following three intersections would continue to operate at LOS F under cumulative conditions regardless of the plan alternative:

- Elk Grove-Florin Rd./Florin Rd.
- Bradshaw Rd./Florin Rd.
- Elk Grove-Florin Rd./Gerber Rd.

**Table 9**
**Mitigated Cumulative Intersection Levels of Service**

| Intersection | Cumulative No Project AM (PM) | | Cumulative Plus Preferred Project AM (PM) | | Cumulative Plus Alternate Core AM (PM) | | Cumulative Plus Dispersed Core AM (PM) | |
|---|---|---|---|---|---|---|---|---|
| | V/C Ratio[1] | LOS[2] | V/C Ratio | LOS | V/C Ratio | LOS | V/C Ratio | LOS |
| Elk Grove-Florin Rd./ Florin Rd. | 1.28 (1.04) | F (F) | 1.40 (1.25) | F (F) | 1.42 (1.22) | F (F) | 1.37 (1.23) | F (F) |
| Florin Rd./ Waterman Rd. | 0.62 (0.89) | B (D) | 0.83 (0.99) | D (E) | 0.78 (0.84) | C (D) | 0.78 (0.89) | C (D) |
| Bradshaw Rd./ Florin Rd. | 1.17 (1.10) | F (F) | 1.15 (1.16) | F (F) | 1.15 (1.16) | F (F) | 1.13 (1.15) | F (F) |
| Florin Rd./ Vineyard Rd. | 0.59 (0.53) | A (A) | 0.59 (0.69) | A (B) | 0.57 (0.71) | A (C) | 0.60 (0.69) | A (B) |
| Elk Grove-Florin Rd./ Gerber Rd. | 1.31 (1.20) | F (F) | 1.47 (1.29) | F (F) | 1.49 (1.24) | F (F) | 1.45 (1.31) | F (F) |
| Waterman Rd./ Gerber Rd. | 0.87 (0.81) | D (D) | 0.70 (0.87) | B (D) | 0.82 (0.85) | D (D) | 0.81 (0.86) | D (D) |
| Bradshaw Rd./ Gerber Rd. | 0.84 (0.88) | D (D) | 0.80 (0.82) | C (D) | 0.86 (0.79) | D (C) | 0.89 (0.79) | D (C) |
| Vineyard Rd./ Gerber Rd. | 0.72 (0.32) | C (A) | 0.69 (0.41) | B (A) | 0.65 (0.47) | B (A) | 0.68 (0.45) | B (A) |

Notes: [1] V/C Ratio = Volume-to-Capacity Ratio.
[2] LOS = Level of Service.

# IV. INTERNAL ROADWAY SYSTEM

As part of the specific plan alternatives analysis, the projected traffic volumes on the internal roadway system were also estimated to evaluate the effect of relocating part or all of the commercial core within the plan area. This chapter presents cumulative traffic volumes on the internal street system for the Alternate Core and Dispersed Core alternatives.

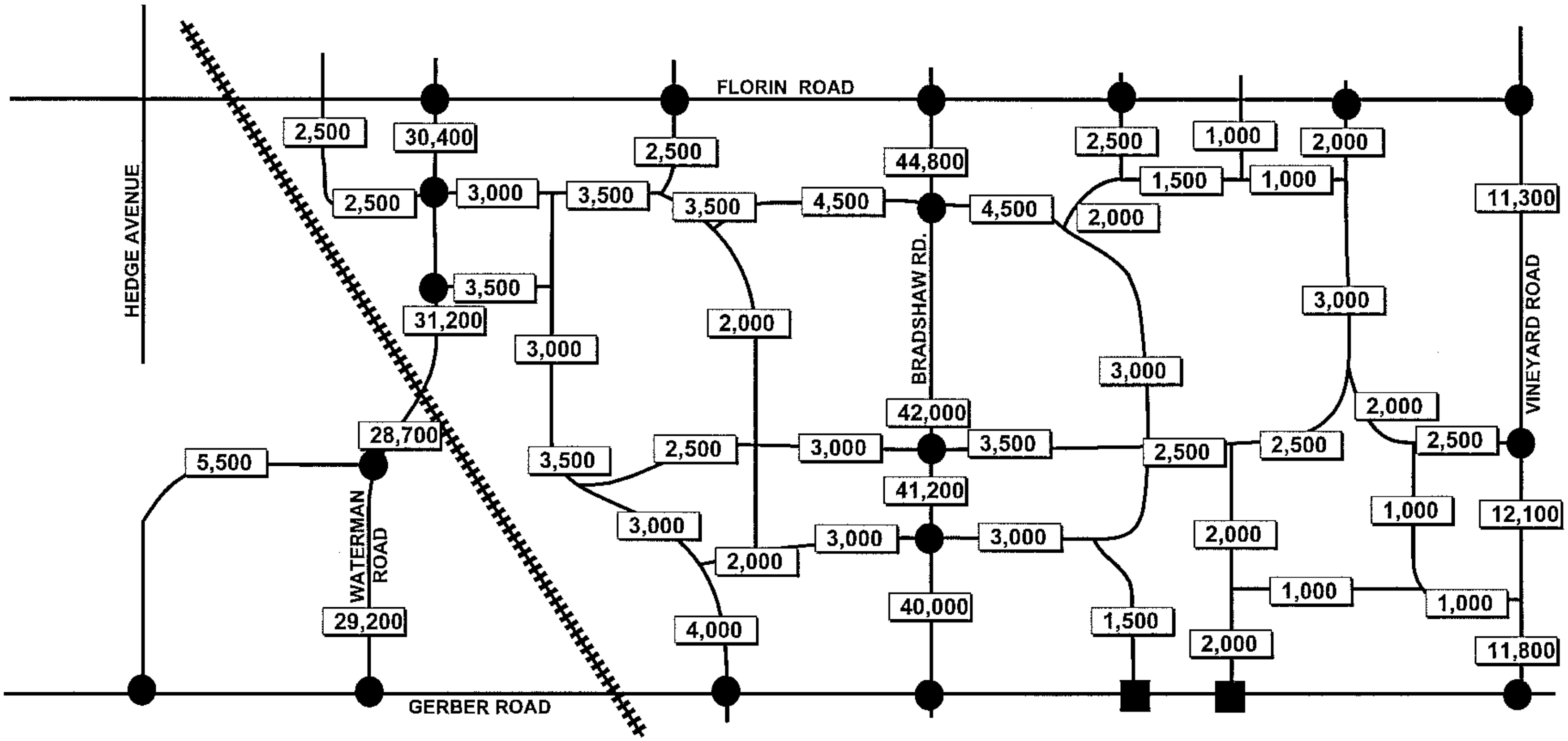
## PROPOSED CIRCULATION SYSTEM

The proposed circulation system includes a variety of transportation facilities designed to encourage a balanced use of travel modes serving automobile, bicycle, pedestrian, and transit trips. The layout of these facilities is designed to evenly distribute trips to the arterials along the boundaries of the plan area and to limit the need for major roadways within the project.

Figures 9 and 10 show the projected daily traffic volumes on the internal roadway network under cumulative conditions for the Alternate Core and Dispersed Core alternatives, respectively. Based on these volumes and Sacramento County guidelines, the only facilities within the plan area with more than two travel lanes will be the sections of Waterman Road and Bradshaw Road between Florin Road and Gerber Road with four and six lanes, respectively.

Waterman Road is expected to serve approximately 31,000 vehicles per day (VPD), while Bradshaw Road is projected to serve approximately 46,000 VPD. All other roadways within the plan area are projected to serve fewer than 5,500 VPD, which can be accommodated on a two-lane roadway. For those streets serving residential areas with projected volumes between 4,500 and 5,500 VPD, special landscape and access treatments may be required, and in some cases, front-on housing may be precluded. Vineyard Road, which forms the eastern boundary of the site, is planned to be a four-lane facility and would accommodate a projected daily volume of approximately 12,000 VPD.

The only substantial change in the internal roadway system between the preferred project and the alternatives is the elimination of a street between Waterman Road (south of the Central California Traction Railroad) and Gerber Road (approximately halfway between Waterman Road and Bradshaw Road). This connection included a crossing of Gerber Creek and was projected to serve a volume of 5,500 VPD. With the relocation of part or all of the commercial core to the Bradshaw Road /Florin Road corridor, this roadway is not necessary to adequately serve the replacement residential uses and can be eliminated.




| 4,000 | = CUMULATIVE DAILY TRAFFIC VOLUMES |
|---|---|

■ = POTENTIAL LOCATION FOR ADDITIONAL SIGNALS

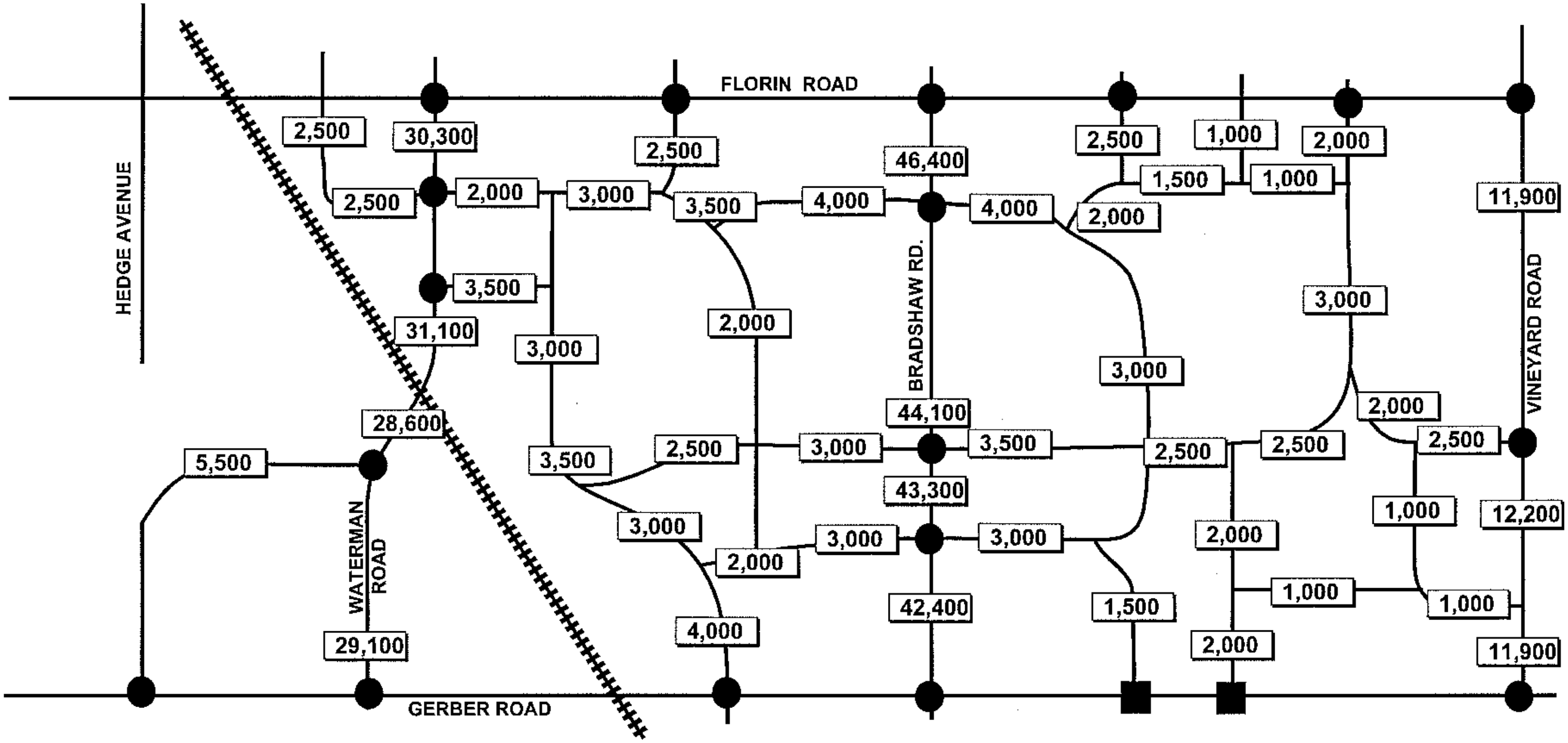
● = EXPECTED TO MEET URBAN PEAK HOUR WARRANTS. IF CRITICAL SPEED ON MAJOR STREET IS GREATER THAN 40 MPH, RURAL WARRANTS WOULD APPLY.

N
Not to Scale

**Figure 9**
921-11-03

**CUMULATIVE DAILY TRAFFIC VOLUMES ON INTERNAL ROADWAYS (ALTERNATE CORE)**

*Fehr & Peers Associates*




4,000 = CUMULATIVE DAILY TRAFFIC VOLUMES

■ = POTENTIAL LOCATION FOR ADDITIONAL SIGNALS

● = EXPECTED TO MEET URBAN PEAK HOUR WARRANTS. IF CRITICAL SPEED ON MAJOR STREET IS GREATER THAN 40 MPH, RURAL WARRANTS WOULD APPLY.

N

Not to Scale

| Figure 10<br>921-11-03 | CUMULATIVE DAILY TRAFFIC VOLUMES ON INTERNAL ROADWAYS (DISPERSED CORE) |
|---|---|

The only significant increases in traffic under either alternative will occur on the east-west collector street crossing Bradshaw road south of Florin Road. The development of retail commercial and/or business-professional uses will increase traffic on this street in the immediate vicinity of Bradshaw Road. However, most of the access points to these uses will be on Bradshaw and Florin Roads thereby limiting the amount of traffic on internal streets.

Figures 9 and 10 also show the location of signalized intersections that are projected to meet signal warrants under cumulative conditions. Implementation of either the Alternate Core or Dispersed Core alternative is not expected to change the need for traffic signals. When tentative maps are produced, the location of traffic signals will be finalized.

# V. CONCLUSIONS

The two proposed plan area alternatives for the North Vineyard Station Specific Plan involve the relocation of part or all of the commercial core from near the Gerber Road/Waterman Road intersection to the southwest and southeast quadrants of the Bradshaw Road/Florin Road intersection. Specifically, the Alternate Core alternative includes the relocation of all of the commercial and business-professional uses, as well as the relocation of approximately 300 multi-family dwelling units to Florin Road west of Bradshaw Road. The Dispersed Core alternative only involves relocation of approximately 13 acres of retail commercial uses to the Bradshaw Road/Florin Road intersection. All of the relocated uses will be replaced by single-family residential dwelling units at varying densities, and the total number of residential units for all plan alternatives is 6,339.

The Alternate Core and Dispersed Core alternatives will generate total numbers of daily and peak hour external vehicle trips that are within three percent of the number of trips generated by the preferred project. Slight variations result from differences in the size of commercial and business-professional parcels and differences in dwelling unit intensity. In paricular, the Alternate Core alternative includes only half as much acreage designated for business-professional uses as compared to the Dispersed Core and preferred project.

## IMPACTS UNDER EXISTING CONDITIONS

Analysis of the proposed alternatives under existing conditions shows that each alternative will result in the same impacts and mitigation measures as the preferred project except for the following:

*Alternate Core*

- Impact EP-4 would not occur and Improvement EP-4 (widening of Gerber Road between Elk Grove-Florin Road and Bradshaw Road) would not be required;
- Improvement EP-15 would have to be modified to include three southbound lanes on Bradshaw Road instead of two (referred to as Improvement EP-15A); and
- A new impact at the Florin Road/Waterman Road intersection would occur (Impact EP-20A) and would require two though lanes on the eastbound and westbound approaches (referred to as Improvement EP-20A). This is consistent with Improvement EP-3 which widens Florin Road between Elk Grove-Florin Road and Bradshaw Road from two to four lanes.

*Dispersed Core*

- Improvement EP-15 would have to be modified to include three southbound lanes at the Bradshaw Road/Florin road intersection instead of two (referred to as Improvement EP-15D); and
- Improvement EP-16 would have to be modified to include dual right-turn lanes on the eastbound approach of the Elk Grove-Florin Road/Gerber Road intersection (referred to as Improvement EP-16D).

## IMPACTS UNDER CUMULATIVE CONDITIONS

Implementation of the either the Alternate Core or Dispersed Core alternatives under cumulative conditions will result in exactly the same roadway segment and intersection impacts as the preferred project. Therefore, no changes to the mitigation measures presented in the October 1996 transportation analysis would be required for either alternative.

The projected traffic volumes on roadways within the plan area will vary less than 3,000 vehicles per day in the vicinity of the relocated land uses. Except for major arterials, the east-west collector street crossing Bradshaw Road south of Florin Road would experience the highest increases in traffic since the relocated retail commercial and business-professional uses will likely include driveways on this roadway. No additional special street treatments (i.e., landscape and access restrictions) or additional collector streets will be required to adequately serve traffic within the plan area.

# APPENDIX A

## Trip Generation Tables:
## Preferred Project and Alternatives

**Table A-1**
**DAILY TRIP GENERATION - PREFERRED PROJECT**

| Land Use | Quantity | Units | Daily Trip Rate | Daily Vehicle Trips | Internal-ization | Internal Trips | External Trips | Pass-By Factor | Net External Trips | External Person Trips | Transit Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,259 | D.U. | 9.55 | 50,223 | 14% | 7,031 | 43,192 | 0% | 43,192 | 49,671 | 2,484 |
| Medium Density Residential | 442 | D.U. | 9.45 | 4,177 | 14% | 585 | 3,592 | 0% | 3,592 | 4,131 | 207 |
| High Density Residential | 637 | D.U. | 6.47 | 4,121 | 14% | 577 | 3,544 | 0% | 3,544 | 4,076 | 204 |
| Neighborhood Commercial | 49 | ksf GLA | varies | 6,555 | 40% | 2,622 | 3,933 | 20% | 3,925 | 4,514 | 226 |
| Community Commercial | 262 | ksf GLA | varies | 16,603 | 30% | 4,981 | 11,622 | 30% | 11,587 | 13,325 | 666 |
| Professional/ Offices | 103 | ksf GFA | 14.37 | 1,480 | 15% | 222 | 1,258 | 0% | 1,258 | 1,447 | 72 |
| Elementary School | 600 | Students | 1.09 | 654 | 90% | 589 | 65 | 0% | 65 | 75 | 4 |
| Neighborhood Park | 64 | Acres | 2.23 | 143 | 90% | 128 | 14 | 0% | 14 | 16 | 1 |
| Community Park | 27 | Acres | 2.99 | 81 | 50% | 40 | 40 | 0% | 40 | 46 | 2 |
| | | | Totals: | 84,037 | 20% | 16,775 | 67,262 | N/A | 67,219 | 77,302 | 3,865 |

**Table A-2**
**A.M. PEAK HOUR TRIP GENERATION - PREFERRED PROJECT**

| Land Use | Quantity | Units | A.M. Peak Trip Rate | Daily Vehicle Trips | Internal-ization | Internal Trips | External Trips | Pass-By Factor | Net External Trips | External Person Trips | Transit Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,259 | D.U. | 0.74 | 3,892 | 14% | 545 | 3,347 | 0% | 3,347 | 3,849 | 192 |
| Medium Density Residential | 442 | D.U. | 0.74 | 327 | 14% | 46 | 281 | 0% | 281 | 323 | 16 |
| High Density Residential | 637 | D.U. | 0.56 | 357 | 14% | 50 | 307 | 0% | 307 | 353 | 18 |
| Neighborhood Commercial | 49 | ksf GLA | varies | 161 | 40% | 64 | 97 | 20% | 96 | 111 | 6 |
| Community Commercial | 262 | ksf GLA | varies | 378 | 30% | 113 | 265 | 30% | 264 | 303 | 15 |
| Professional/ Offices | 103 | ksf GFA | 1.62 | 167 | 15% | 25 | 142 | 0% | 142 | 163 | 8 |
| Elementary School | 600 | Students | 0.28 | 168 | 90% | 151 | 17 | 0% | 17 | 19 | 1 |
| Neighborhood Park | 64 | Acres | 0.11 | 7 | 90% | 6 | 1 | 0% | 1 | 1 | 0 |
| Community Park | 27 | Acres | 0.15 | 4 | 50% | 2 | 2 | 0% | 2 | 2 | 0 |
| | | | Totals: | 5,460 | 18% | 1,003 | 4,457 | N/A | 4,456 | 5,125 | 256 |

**Table A-3**
**P.M. PEAK HOUR TRIP GENERATION - PREFERRED PROJECT**

| Land Use | Quantity | Units | P.M. Peak Trip Rate | Daily Vehicle Trips | Internal-ization | Internal Trips | External Trips | Pass-By Factor | Net External Trips | External Person Trips | Transit Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,259 | D.U. | 1.01 | 5,312 | 14% | 744 | 4,568 | 0% | 4,568 | 5,253 | 263 |
| Medium Density Residential | 442 | D.U. | 1.01 | 446 | 14% | 62 | 384 | 0% | 384 | 442 | 22 |
| High Density Residential | 637 | D.U. | 0.69 | 440 | 14% | 62 | 378 | 0% | 378 | 435 | 22 |
| Neighborhood Commercial | 49 | ksf GLA | varies | 595 | 40% | 238 | 357 | 20% | 356 | 410 | 20 |
| Community Commercial | 262 | ksf GLA | varies | 1,546 | 30% | 464 | 1,082 | 30% | 1,079 | 1,241 | 62 |
| Professional/ Offices | 103 | ksf GFA | 1.48 | 152 | 15% | 23 | 130 | 0% | 130 | 149 | 7 |
| Elementary School | 600 | Students | 0.25 | 150 | 90% | 135 | 15 | 0% | 15 | 17 | 1 |
| Neighborhood Park | 64 | Acres | 0.22 | 14 | 90% | 13 | 1 | 0% | 1 | 2 | 0 |
| Community Park | 27 | Acres | 0.30 | 8 | 50% | 4 | 4 | 0% | 4 | 5 | 0 |
| | | | Totals: | 8,663 | 20% | 1,744 | 6,919 | N/A | 6,915 | 7,952 | 398 |

**Table A-4**
**DAILY TRIP GENERATION -- ALTERNATE CORE ALTERNATIVE**

| *Land Use* | *Quantity* | *Units* | *Daily Trip Rate* | *Daily Vehicle Trips* | *Internal-ization* | *Internal Trips* | *External Trips* | *Pass-By Factor* | *Net External Trips* | *External Person Trips* | *Transit Trips* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,467 | D.U. | 9.55 | 52,210 | 14% | 7,309 | 44,900 | 0% | 44,900 | 51,636 | 2,582 |
| Medium Density Residential | 199 | D.U. | 9.45 | 1,881 | 14% | 263 | 1,617 | 0% | 1,617 | 1,860 | 93 |
| High Density Residential | 673 | D.U. | 6.47 | 4,354 | 14% | 610 | 3,745 | 0% | 3,745 | 4,306 | 215 |
| Neighborhood Commercial | 70 | ksf GLA | varies | 7,955 | 40% | 3,182 | 4,773 | 20% | 3,818 | 4,391 | 220 |
| Community Commercial | 258 | ksf GLA | varies | 16,539 | 30% | 4,962 | 11,577 | 30% | 8,104 | 9,320 | 466 |
| Professional/ Offices | 78 | ksf GFA | 16.90 | 1,318 | 15% | 198 | 1,120 | 0% | 1,120 | 1,289 | 64 |
| Elementary School | 600 | Students | 1.09 | 654 | 90% | 589 | 65 | 0% | 65 | 75 | 4 |
| Neighborhood Park | 83 | Acres | 2.23 | 185 | 90% | 167 | 19 | 0% | 19 | 21 | 1 |
| Community Park | 0 | Acres | 2.99 | 0 | 50% | 0 | 0 | 0% | 0 | 0 | 0 |
| | | | Totals: | 85,096 | 2031% | 17,279 | 67,817 | N/A | 63,389 | 72,898 | 3,645 |

**Table A-5**
**A.M. PEAK HOUR TRIP GENERATION -- ALTERNATE CORE ALTERNATIVE**

| *Land Use* | *Quantity* | *Units* | *Daily Trip Rate* | *Daily Vehicle Trips* | *Internal-ization* | *Internal Trips* | *External Trips* | *Pass-By Factor* | *Net External Trips* | *External Person Trips* | *Transit Trips* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,467 | D.U. | 0.74 | 4,046 | 14% | 566 | 3,479 | 0% | 3,479 | 4,001 | 200 |
| Medium Density Residential | 199 | D.U. | 0.74 | 147 | 14% | 21 | 127 | 0% | 127 | 146 | 7 |
| High Density Residential | 673 | D.U. | 0.56 | 377 | 14% | 53 | 324 | 0% | 324 | 373 | 19 |
| Neighborhood Commercial | 70 | ksf GLA | varies | 192 | 40% | 77 | 115 | 20% | 92 | 106 | 5 |
| Community Commercial | 258 | ksf GLA | varies | 377 | 30% | 113 | 264 | 30% | 185 | 212 | 11 |
| Professional/ Offices | 78 | ksf GFA | 2.75 | 215 | 15% | 32 | 182 | 0% | 182 | 210 | 10 |
| Elementary School | 600 | Students | 0.28 | 168 | 90% | 151 | 17 | 0% | 17 | 19 | 1 |
| Neighborhood Park | 83 | Acres | 0.11 | 9 | 90% | 8 | 1 | 0% | 1 | 1 | 0 |
| Community Park | 0 | Acres | 0.15 | 0 | 50% | 0 | 0 | 0% | 0 | 0 | 0 |
| | | | Totals: | 5,530 | 18% | 1,021 | 4,509 | N/A | 4,407 | 5,068 | 253 |

**Table A-6**
**P.M. PEAK HOUR TRIP GENERATION -- ALTERNATE CORE ALTERNATIVE**

| *Land Use* | *Quantity* | *Units* | *Daily Trip Rate* | *Daily Vehicle Trips* | *Internal-ization* | *Internal Trips* | *External Trips* | *Pass-By Factor* | *Net External Trips* | *External Person Trips* | *Transit Trips* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,467 | D.U. | 1.01 | 5,522 | 14% | 773 | 4,749 | 0% | 4,749 | 5,461 | 273 |
| Medium Density Residential | 199 | D.U. | 1.01 | 201 | 14% | 28 | 173 | 0% | 173 | 199 | 10 |
| High Density Residential | 673 | D.U. | 0.69 | 464 | 14% | 65 | 399 | 0% | 399 | 459 | 23 |
| Neighborhood Commercial | 70 | ksf GLA | varies | 726 | 40% | 290 | 436 | 20% | 348 | 401 | 20 |
| Community Commercial | 258 | ksf GLA | varies | 1,540 | 30% | 462 | 1,078 | 30% | 755 | 868 | 43 |
| Professional/ Offices | 78 | ksf GFA | 2.16 | 168 | 15% | 25 | 143 | 0% | 143 | 165 | 8 |
| Elementary School | 600 | Students | 0.25 | 150 | 90% | 135 | 15 | 0% | 15 | 17 | 1 |
| Neighborhood Park | 83 | Acres | 0.22 | 18 | 90% | 16 | 2 | 0% | 2 | 2 | 0 |
| Community Park | 0 | Acres | 0.30 | 0 | 50% | 0 | 0 | 0% | 0 | 0 | 0 |
| | | | Totals: | 8,790 | 20% | 1,795 | 6,994 | N/A | 6,584 | 7,572 | 379 |

**Table A-7**
**DAILY TRIP GENERATION -- DISPERSED CORE ALTERNATIVE**

| *Land Use* | *Quantity* | *Units* | *Daily Trip Rate* | *Daily Vehicle Trips* | *Internal-ization* | *Internal Trips* | *External Trips* | *Pass-By Factor* | *Net External Trips* | *External Person Trips* | *Transit Trips* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,467 | D.U. | 9.55 | 52,210 | 14% | 7,309 | 44,900 | 0% | 44,900 | 51,636 | 2,582 |
| Medium Density Residential | 199 | D.U. | 9.45 | 1,881 | 14% | 263 | 1,617 | 0% | 1,617 | 1,860 | 93 |
| High Density Residential | 673 | D.U. | 6.47 | 4,354 | 14% | 610 | 3,745 | 0% | 3,745 | 4,306 | 215 |
| Neighborhood Commercial | 70 | ksf GLA | varies | 7,955 | 40% | 3,182 | 4,773 | 20% | 3,818 | 4,391 | 220 |
| Community Commercial | 258 | ksf GLA | varies | 16,539 | 30% | 4,962 | 11,577 | 30% | 8,104 | 9,320 | 466 |
| Professional/ Offices | 158 | ksf GFA | 13.45 | 2,125 | 15% | 319 | 1,806 | 0% | 1,806 | 2,077 | 104 |
| Elementary School | 600 | Students | 1.09 | 654 | 90% | 589 | 65 | 0% | 65 | 75 | 4 |
| Neighborhood Park | 83 | Acres | 2.23 | 185 | 90% | 167 | 19 | 0% | 19 | 21 | 1 |
| Community Park | 0 | Acres | 2.99 | 0 | 50% | 0 | 0 | 0% | 0 | 0 | 0 |
| | | | Totals: | 85,903 | 2026% | 17,400 | 68,503 | N/A | 64,075 | 73,686 | 3,684 |

**Table A-8**
**A.M. PEAK HOUR TRIP GENERATION -- DISPERSED CORE ALTERNATIVE**

| *Land Use* | *Quantity* | *Units* | *Daily Trip Rate* | *Daily Vehicle Trips* | *Internal-ization* | *Internal Trips* | *External Trips* | *Pass-By Factor* | *Net External Trips* | *External Person Trips* | *Transit Trips* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,467 | D.U. | 0.74 | 4,046 | 14% | 566 | 3,479 | 0% | 3,479 | 4,001 | 200 |
| Medium Density Residential | 199 | D.U. | 0.74 | 147 | 14% | 21 | 127 | 0% | 127 | 146 | 7 |
| High Density Residential | 673 | D.U. | 0.56 | 377 | 14% | 53 | 324 | 0% | 324 | 373 | 19 |
| Neighborhood Commercial | 70 | ksf GLA | varies | 192 | 40% | 77 | 115 | 20% | 92 | 106 | 5 |
| Community Commercial | 258 | ksf GLA | varies | 377 | 30% | 113 | 264 | 30% | 185 | 212 | 11 |
| Professional/ Offices | 158 | ksf GFA | 2.13 | 337 | 15% | 50 | 286 | 0% | 286 | 329 | 16 |
| Elementary School | 600 | Students | 0.28 | 168 | 90% | 151 | 17 | 0% | 17 | 19 | 1 |
| Neighborhood Park | 83 | Acres | 0.11 | 9 | 90% | 8 | 1 | 0% | 1 | 1 | 0 |
| Community Park | 0 | Acres | 0.15 | 0 | 50% | 0 | 0 | 0% | 0 | 0 | 0 |
| | | | Totals: | 5,652 | 18% | 1,040 | 4,613 | N/A | 4,511 | 5,187 | 259 |

**Table A-9**
**P.M. PEAK HOUR TRIP GENERATION -- DISPERSED CORE ALTERNATIVE**

| *Land Use* | *Quantity* | *Units* | *Daily Trip Rate* | *Daily Vehicle Trips* | *Internal-ization* | *Internal Trips* | *External Trips* | *Pass-By Factor* | *Net External Trips* | *External Person Trips* | *Transit Trips* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,467 | D.U. | 1.01 | 5,522 | 14% | 773 | 4,749 | 0% | 4,749 | 5,461 | 273 |
| Medium Density Residential | 199 | D.U. | 1.01 | 201 | 14% | 28 | 173 | 0% | 173 | 199 | 10 |
| High Density Residential | 673 | D.U. | 0.69 | 464 | 14% | 65 | 399 | 0% | 399 | 459 | 23 |
| Neighborhood Commercial | 70 | ksf GLA | varies | 726 | 40% | 290 | 436 | 20% | 348 | 401 | 20 |
| Community Commercial | 258 | ksf GLA | varies | 1,540 | 30% | 462 | 1,078 | 30% | 755 | 868 | 43 |
| Professional/ Offices | 158 | ksf GFA | 1.70 | 269 | 15% | 40 | 228 | 0% | 228 | 263 | 13 |
| Elementary School | 600 | Students | 0.25 | 150 | 90% | 135 | 15 | 0% | 15 | 17 | 1 |
| Neighborhood Park | 83 | Acres | 0.22 | 18 | 90% | 16 | 2 | 0% | 2 | 2 | 0 |
| Community Park | 0 | Acres | 0.30 | 0 | 50% | 0 | 0 | 0% | 0 | 0 | 0 |
| | | | Totals: | 8,890 | 20% | 1,810 | 7,080 | N/A | 6,669 | 7,669 | 383 |

# APPENDIX B

## Existing Plus Alternate Core Alternative
## Level of Service Calculations

Level Of Service Computation Report
1994 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #3 ELK GROVE FLORIN/FLORIN ROAD ALTA E P AM

| | | | |
|---|---|---|---|
| Cycle (sec): | 1 | Critical Vol./Cap. (X): | 4.737 |
| Loss Time (sec): | 0 | Average Delay (sec/veh): | OVERFLOW |
| Optimal Cycle: | 0 | Level Of Service: | F |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L | T | R | L | T | R | L | T | R | L | T | R |
| Control: | Stop Sign | | | Stop Sign | | | Stop Sign | | | Stop Sign | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Lanes: | 0 0 1! 0 0 | | | 1 0 1 0 1 | | | 0 1 0 1 0 | | | 1 0 1 0 1 | | |
| **Volume Module:** | | | | | | | | | | | | |
| Base Vol: | 345 | 624 | 161 | 297 | 294 | 91 | 98 | 503 | 171 | 205 | 691 | 516 |
| Growth Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Bse: | 345 | 624 | 161 | 297 | 294 | 91 | 98 | 503 | 171 | 205 | 691 | 516 |
| User Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PHF Adj: | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PHF Volume: | 363 | 657 | 169 | 313 | 309 | 96 | 103 | 529 | 180 | 216 | 727 | 543 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 363 | 657 | 169 | 313 | 309 | 96 | 103 | 529 | 180 | 216 | 727 | 543 |
| PCE Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| MLF Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Final Vol.: | 363 | 657 | 169 | 313 | 309 | 96 | 103 | 529 | 180 | 216 | 727 | 543 |
| **Saturation Flow Module:** | | | | | | | | | | | | |
| Sat/Lane: | 251 | 251 | 251 | 286 | 286 | 286 | 253 | 253 | 253 | 277 | 277 | 277 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 0.31 | 0.55 | 0.14 | 1.00 | 1.00 | 1.00 | 0.25 | 1.31 | 0.44 | 1.00 | 1.00 | 1.00 |
| Final Sat.: | 77 | 139 | 36 | 286 | 286 | 286 | 64 | 330 | 112 | 277 | 277 | 277 |
| **Capacity Analysis Module:** | | | | | | | | | | | | |
| Vol/Sat: | 4.74 | 4.74 | 4.74 | 1.09 | 1.08 | 0.34 | 1.60 | 1.60 | 1.60 | 0.78 | 2.62 | 1.96 |
| Crit Moves: | | **** | | **** | | | | | **** | | **** | |
| **Level Of Service Module:** | | | | | | | | | | | | |
| Delay/Veh: | xxxxx | xxxx | xxxxx | 64.0 | 60.7 | 3.6 | 445.0 | 445 | 445.0 | 19.4 | xxxx | 1718 |
| Delay Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| AdjDel/Veh: | xxxxx | xxxx | xxxxx | 64.0 | 60.7 | 3.6 | 445.0 | 445 | 445.0 | 19.4 | xxxx | 1718 |
| LOS by Move: | F | F | F | F | F | A | F | F | F | C | F | F |

Level Of Service Computation Report
1994 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #3 ELK GROVE FLORIN/FLORIN ROAD    ALT A EPAM

| | | | |
|---|---|---|---|
| Cycle (sec): | 1 | Critical Vol./Cap. (X): | 4.732 |
| Loss Time (sec): | 0 | Average Delay (sec/veh): | OVERFLOW |
| Optimal Cycle: | 0 | Level Of Service: | F |

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L | T | R | L | T | R | L | T | R | L | T | R |
| Control: | Stop Sign | | | Stop Sign | | | Stop Sign | | | Stop Sign | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Lanes: | 0 0 | 1! | 0 0 | 1 0 | 1 | 0 1 | 0 1 | 0 | 1 0 | 1 0 | 1 | 0 1 |
| **Volume Module:** | | | | | | | | | | | | |
| Base Vol: | 258 | 411 | 270 | 732 | 647 | 130 | 84 | 834 | 376 | 267 | 737 | 569 |
| Growth Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Bse: | 258 | 411 | 270 | 732 | 647 | 130 | 84 | 834 | 376 | 267 | 737 | 569 |
| User Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PHF Adj: | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PHF Volume: | 272 | 433 | 284 | 771 | 681 | 137 | 88 | 878 | 396 | 281 | 776 | 599 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced Vol: | 272 | 433 | 284 | 771 | 681 | 137 | 88 | 878 | 396 | 281 | 776 | 599 |
| PCE Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| MLF Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Final Vol.: | 272 | 433 | 284 | 771 | 681 | 137 | 88 | 878 | 396 | 281 | 776 | 599 |
| **Saturation Flow Module:** | | | | | | | | | | | | |
| Sat/Lane: | 209 | 209 | 209 | 315 | 315 | 315 | 250 | 250 | 250 | 278 | 278 | 278 |
| Adjustment: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Lanes: | 0.27 | 0.44 | 0.29 | 1.00 | 1.00 | 1.00 | 0.13 | 1.29 | 0.58 | 1.00 | 1.00 | 1.00 |
| Final Sat.: | 57 | 92 | 60 | 315 | 315 | 315 | 32 | 322 | 145 | 278 | 278 | 278 |
| **Capacity Analysis Module:** | | | | | | | | | | | | |
| Vol/Sat: | 4.73 | 4.73 | 4.73 | 2.45 | 2.16 | 0.43 | 2.72 | 2.72 | 2.72 | 1.01 | 2.79 | 2.15 |
| Crit Moves: | | **** | | **** | | | | | **** | | **** | |
| **Level Of Service Module:** | | | | | | | | | | | | |
| Delay/Veh: | xxxxx | xxxx | xxxxx | 10948 | 3697 | 5.2 | 31295 | xxxx | 31295 | 46.6 | xxxx | 3597 |
| Delay Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| AdjDel/Veh: | xxxxx | xxxx | xxxxx | 10948 | 3697 | 5.2 | 31295 | xxxx | 31295 | 46.6 | xxxx | 3597 |
| LOS by Move: | F | F | F | F | F | B | F | F | F | F | F | F |

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                Design Hour: AM
Problem Statement: ALTA EXIST PLUS PROJECT
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR        |
             | Approach 3:WATERMAN RD  |                    -------Approach-----|         MULTIPHASE SIGNAL OVERLAP     |
             |            |      ^     |                    : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
             |   R   L    |      N     |a.No. of change     :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L  |            | intervals/hour     :                   |able    Volume    to next    Volume |
------------  T H H H T  -------------|b.LT capacity on     :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT        | change (vph)       :                   |-------------------------------------|
     LT--^     v v v     <^-RTH        |c.G/C ratio         :  0    0    1    0|A2B1    67(B1)  785-  67= 718(A2)    67|
    LTH-^>               <--TH   1     |d.Opposing volume   :  0    0    0    0|A1A2   718(A2) OR  408(A1)          718|
  1  TH-->               <v-LTH        | in vph             :                   |A4B3   336(B3) OR  100(A4)          336|
    RTH-v>     ^ ^ ^      v--LT  1     |e.LT capacity on    :  0    0    0    0|                                     |
  1 RT--v     < < | > >   Approach 2   | green (vph)        :                   |                                     |
------------  L L T R R  -------------|f.LT capacity in     :  0    0    0    0|                                     |
             | T T H T T  |FLORIN RD   | vph (b+e)          :                   |                                     |
             |   H   H    |            |g.Left turn volume  :  0    0    0    0|                                     |
             | 1       1  |            | in vph             :                   |                                     |
             | Approach 4:WATERMAN RD  |h.Is volume > cap.  :                  :|                                     |
                                       | (g>f) ?            :                   |                                     |
=======================================+========================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph    | Step 7. SUM OF CRITICAL VOLUMES     |
                                       |       |                       |        |                                     |
                                       |       |                       |        |785(B1A2)+336(B3)+0()+0()            |
             | Approach 3|             |-------                         -------|                                     |
 3:  LT=   0 | |         | 2:RT=   0   |                               <- 785 |           = 1121 vph                |
   TH=   0   | |         |   TH= 785   |                               v-   67 |=====================================|
  RT=   0    | v         |   LT=  67   |                                        | Step 8. INTERSECTION LEVEL OF       |
------------              -------------|                                        |         SERVICE                     |
                          <--Approach 2|                                        |    (compare step 7 with table 6)    |
                                       |                                        |               -------               |
                                       |                                        |               |  C  |               |
 Approach 1-->                         |                                        |               -------               |
------------              -------------|                        < >             |=====================================|
 1:LT=   0   |          ^ | 4: RT= 143 | 408 ->                 | |             | Step 9. RECALCULATE                 |
   TH= 408   |          | |    TH=   0 | 184 -v                                 |                                     |
   RT= 184   |          | |   LT= 336  |-------                 3 1    -------|Geometric Change:                    |
             | Approach 4|             |       |                3 4 |          |Signal Change:                       |
                                       |       |                6 3 |          |Volume Change:                       |
=======================================+========================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph      | COMMENTS                            |
                                       |         (two phase signal)             |                                     |
             <--  A2B1                 |            | Approach 3|               |                                     |
             v--                       |            |           |               |                                     |
         --> <--  A1A2                 |            |           |               |                                     |
                                       |            |           |               |                                     |
           <   ^  A4B3                 |------------             ------------|                                     |
           |   |                       | Approach 1                             |                                     |
                                       |                                        |                                     |
                                       |          See Step 6b.                  |                                     |
                                       |                                        |                                     |
                                       |                          Approach 2    |                                     |
                                       |------------             ------------|                                     |
                                       |            |           |               |                                     |
---------------------------------------|            |           |               |                                     |
 A1 -->   A3 |      B1 v--    B3    <| |            |           |               |                                     |
             v ^                    | | |           | Approach 4|               | Exclusive right turns reduced  30 % |
 A2 <--   A4   |    B2 --^    B4 |>    |                                        | V/C Ratio = .79                     |
=================================================================================================
```

ATTACHMENT 5E

```
                                    Critical Movement Analysis: PLANNING
                                              Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                          Design Hour: PM
Problem Statement: ALTA EXIST PLUS PROJECT
=====================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:WATERMAN RD  |                  -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
             |           |       ^     |                  : -1-  -2-  -3-  -4-|       Possible   Volume     Adjusted|
             |  R   L    |       N     |a.No. of change   :   0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |             | intervals/hour   :                   |able   Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on   :   0    0    0    0|Phase  in vph   phase      in vph |
  Approach 1  < < | > >    ^--RT       | change (vph)     :                   |------------------------------------|
     LT--^     v v v     <^-RTH        |c.G/C ratio       :   0    0    1    0|A2B1  104(B1)  912- 104= 808(A2)  104|
     LTH-^>              <--TH   1     |d.Opposing volume : 912    0   78    0|A1A2  986(A1) OR  808(A2)          986|
  1   TH-->              <v-LTH        | in vph           :                   |A4B3  374(B3) OR   55(A4)          374|
     RTH-v>    ^ ^ ^      v--LT  1     |e.LT capacity on  :   0    0 1122    0|                                    |
  1  RT--v    < < | > >   Approach 2   | green (vph)      :                   |                                    |
------------- L L T R R  -------------|f.LT capacity in  :   0    0 1122    0|                                    |
             | T T H T T |FLORIN RD    | vph (b+e)        :                   |                                    |
             |   H   H   |             |g.Left turn volume :  0    0    0    0|                                    |
             | 1       1 |             | in vph           :                   |                                    |
             | Approach 4:WATERMAN RD  |h.Is volume > cap. :  NO        NO    :                                    |
                                       | (g>f) ?          :                   |                                    |
=======================================+==============================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                       |       |                      |      |                                    |
                                       |       |                      |      |1090(B1A1)+374(B3)+0()+0()          |
             | Approach 3|             |-------                        -------|                                    |
 3:  LT=   0 | |         | 2:RT=   0   |                     406   <- 912    |        = 1464 vph                  |
   TH=   0   | |         |   TH= 912   |                           v- 104    |====================================|
  RT=   0    | v         |   LT= 104   |                                      | Step 8. INTERSECTION LEVEL OF      |
-------------             -------------|                                      |        SERVICE                     |
                          <--Approach 2 |                                     |     (compare step 7 with table 6)  |
                                       |                                      |              -------               |
                                       |                                      |              | F |                 |
 Approach 1-->                         |                                      |              -------               |
-------------             -------------|                         < >          |====================================|
 1:LT=   0   |           ^ | 4: RT=  78 | 986 ->                 | |          | Step 9. RECALCULATE                |
   TH= 986   |           | |    TH=   0 | 464 -v                               |                                    |
   RT= 464   |           | |   LT= 374  |-------                 3     -------|Geometric Change:                   |
             | Approach 4|             |       |                 7 7 |        |Signal Change:                      |
                                       |       |                 4 8 |        |Volume Change:                      |
=======================================+==============================+======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                       |          (two phase signal)         |                                    |
              <--  A2B1                |          | Approach 3|              |                                    |
              v--                      |          |           |              |                                    |
          --> <--  A1A2                |          |           |              |                                    |
                                       |          |           |              |                                    |
           <   ^   A4B3                |-------------          ------------|                                    |
           |   |                       | Approach 1                          |                                    |
                                       |                                      |                                    |
                                       |          See Step 6b.               |                                    |
                                       |                                      |                                    |
                                       |                        Approach 2   |                                    |
                                       |-------------          ------------|                                    |
                                       |          |           |              |                                    |
---------------------------------------|          |           |              |                                    |
 A1 -->    A3 |     B1 v--     B3   <| |          |           |              |                                    |
             v ^                   | | |          | Approach 4|              | Exclusive right turns reduced  30 % |
 A2 <--    A4  |    B2 --^     B4 |>   |                                      | V/C Ratio = 1.03                   |
=====================================================================================================
```

ALT A

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN AND BRADSHAW                                  Design Hour: AM
Problem Statement: ALTA -EXIST PLUS PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR     |
             | Approach 3:BRADSHAW RD |              -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
             | 1   1   1 |     ^    |              : -1-  -2-  -3-  -4-|       Possible   Volume   Adjusted|
             |   R   L   |     N    |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover Critical|
FLORIN ROAD  | R T T T L |          |  intervals/hour :                 |able   Volume   to next   Volume |
------------- T H H H T  -----------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
  Approach 1   < < | > >   ^--RT    |  change (vph)   :                 |------------------------------------|
   1  LT--^      v v v    <^-RTH  1 |c.G/C ratio      :  0    0    0    0|B4B3   73(B4)  437-  73= 364(B3)   73|
      LTH-^>              <--TH     |d.Opposing volume:  0    0    0    0|A4B3  364(B3) 1458- 364=1094(A4)  364|
       TH-->              <v-LTH    |  in vph         :                 |A3A4  1094(A4) OR  582(A3)       1094|
   1  RTH-v>     ^ ^ ^     v--LT  1 |e.LT capacity on :  0    0    0    0|B2B1   92(B1)  196-  92= 104(B2)   92|
      RT--v    < < | > >   Approach 2|  green (vph)    :                 |A1B2  104(B2)  484- 104= 380(A1)  104|
-------------  L L T R R  ----------|f.LT capacity in :  0    0    0    0|A1A2  509(A2) OR  380(A1)        509|
             | T T H T T |FLORIN ROAD|  vph (b+e)      :                 |                                    |
             |   H   H   |          |g.Left turn volume:  0    0    0    0|                                    |
             | 1     1   |          |  in vph         :                 |                                    |
             | Approach 4:BRADSHAW RD|h.Is volume > cap.:                 :                                    |
                                    |  (g>f) ?        :                 |                                    |
====================================+==================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                    |        |                   |      |                                    |
                                    |        | 1 5               |      |437(B4B3)+1094(A4)+196(B1B2)+509(A2)|
             | Approach 3|          |-------  6 8 7              -------|                                    |
3:  LT=  73  | |         | 2:RT= 147|         7 2 3              ^+ 147 |          = 2236 vph                |
   TH= 582   | |         |   TH= 362|         | | |              <+ 362 |====================================|
   RT= 167   | v         |   LT=  92|         < v >              v-  92 | Step 8. INTERSECTION LEVEL OF      |
-------------            -----------|                                   |        SERVICE                     |
                       <--Approach 2|                                   |    (compare step 7 with table 6)   |
                                    |                                   |            -------                 |
                                    |                                   |            |  F  |                 |
Approach 1-->                       |                                   |            -------                 |
-------------            -----------| 196 -^             < ^ >          |====================================|
1:LT= 196    |         ^ | 4: RT= 116| 224 +>             | + +          | Step 9. RECALCULATE               |
  TH= 224    |         | |   TH=1342| 260 +v               1            |                                    |
  RT= 260    |         | |  LT= 437 |-------             4 3 1   -------|Geometric Change:                   |
             | Approach 4|          |       |            3 4 1 |        |Signal Change:                      |
                                    |       |            7 2 6 |        |Volume Change:                      |
====================================+==================================+====================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                    |          (two phase signal)      |                                    |
        |  <    B4B3                |           | Approach 3|          |                                    |
        >  |                        |           |           |          |                                    |
    | | AND < ^     A3B4 AND        |           |           |          |                                    |
    v > OR  | |     /OR A4B3        |           |           |          |                                    |
        |  ^    A3A4                |------------           -----------|                                    |
        v  |                        | Approach 1                       |                                    |
       --^ v--  B2B1                |                                  |                                    |
                                    |           See Step 6b.           |                                    |
    --^ AND <--     A1B2 AND        |                                  |                                    |
    --> OR  v--     /OR A2B1        |                       Approach 2 |                                    |
       --> <--  A1A2                |------------           -----------|                                    |
                                    |           |           |          |                                    |
------------------------------------|           |           |          |                                    |
A1 -->   A3 |     B1 v--    B3   <| |           |           |          |                                    |
           v ^                   | ||           | Approach 4|          | Exclusive right turns reduced  30 %|
A2 <--   A4  |    B2 --^    B4 |>   |                                  | V/C Ratio = 1.63                   |
=============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN AND BRADSHAW                                    Design Hour: PM
Problem Statement: ALTA -EXIST PLUS PROJECT
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR |
             | Approach 3:BRADSHAW RD |                 -------Approach-----|         MULTIPHASE SIGNAL OVERLAP |
             | 1   1   1 |    ^    |                : -1-  -2-  -3-  -4-|       Possible    Volume     Adjusted|
             |  R   L    |    N    |a.No. of change  :   0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN ROAD  | R T T T L |         | intervals/hour  :                  |able    Volume    to next    Volume |
------------  T H H H T  ------------|b.LT capacity on :   0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT    | change (vph)    :                  |------------------------------------|
   1  LT--^    v v v    <^-RTH  1  |c.G/C ratio      :   0    0    0    0|B4B3   175(B4)  481- 175= 306(B3)   175|
      LTH-^>            <--TH      |d.Opposing volume :  0    0    0    0|A4B3   306(B3)  887- 306= 581(A4)   306|
       TH-->            <v-LTH     | in vph          :                  |A3A4  1457(A3) OR  581(A4)         1457|
   1  RTH-v>   ^ ^ ^     v--LT  1  |e.LT capacity on  :  0    0    0    0|B2B1   133(B1)  258- 133= 125(B2)   133|
      RT--v   < < | > >  Approach 2 | green (vph)     :                  |A1B2   125(B2)  995- 125= 870(A1)   125|
------------  L L T R R  ------------|f.LT capacity in :   0    0    0    0|A1A2   870(A1) OR  421(A2)          870|
             | T T H T T |FLORIN ROAD | vph (b+e)       :                  |                                    |
             |  H   H    |         |g.Left turn volume :  0    0    0    0|                                    |
             | 1    1    |         | in vph          :                  |                                    |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :                  :                                    |
                                   | (g>f) ?         :                  |                                    |
===================================+==================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                   |        |  1                 |     |                                    |
                                   |        | 2 4 1              |     |481(B4B3)+1457(A3)+258(B1B2)+870(A1)|
             | Approach 3|         |-------  5 5 7            -------|                                    |
 3:  LT= 175 | |         | 2:RT= 123 |        8 7 5            ^+ 123 |          = 3066 vph                |
   TH=1457   | |         |   TH= 298 |        | | |            <+ 298 |====================================|
   RT= 258   | v         |   LT= 133 |        < v >            v- 133 | Step 8. INTERSECTION LEVEL OF      |
------------              ------------|                                  |         SERVICE                    |
                          <--Approach 2 |                                  |    (compare step 7 with table 6)   |
                                   |                                  |               -------              |
                                   |                                  |               |  F  |              |
 Approach 1-->                     |                                  |               -------              |
------------              ------------| 258 -^              < ^ >        |====================================|
 1:LT= 258   |           ^ | 4: RT= 117 | 410 +>              | + +        | Step 9. RECALCULATE                |
   TH= 410   |           | |   TH= 770 | 585 +v                           |                                    |
   RT= 585   |           | |   LT= 481 |-------              4 7 1  -------|Geometric Change:                   |
             | Approach 4|         |        |            8 7 1 |     |Signal Change:                      |
                                   |        |            1 0 7 |     |Volume Change:                      |
===================================+==================================+====================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                   |         (two phase signal)       |                                    |
          |   <   B4B3             |             | Approach 3|        |                                    |
         >    |                    |             |           |        |                                    |
     | | AND < ^     A3B4 AND      |             |           |        |                                    |
     v > OR  | |     /OR A4B3      |             |           |        |                                    |
          |   ^   A3A4             |-------------             ------------|                                    |
          v   |                    | Approach 1                       |                                    |
        --^ v--   B2B1             |                                  |                                    |
                                   |            See Step 6b.          |                                    |
     --^ AND <--     A1B2 AND      |                                  |                                    |
     --> OR  v--     /OR A2B1      |                     Approach 2   |                                    |
        --> <--   A1A2             |-------------             ------------|                                    |
                                   |             |           |        |                                    |
-----------------------------------|             |           |        |                                    |
 A1 -->   A3 |      B1 v--    B3   <|            |           |        |                                    |
            v ^                  | |             | Approach 4|        | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |>  |                                  | V/C Ratio = 2.23                   |
==================================================================================================
```

```
---------------------------------------------------------------------------
---------------------------------------------------------------------------
                     Level Of Service Computation Report
          1985 HCM Unsignalized Method (Base Volume Alternative)
***************************************************************************
Intersection #2 FLORIN/VINEYARD                            [illegible]
***************************************************************************
                                        Level Of Service:             D
***************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        1  0  0  0  1    0  0  0  0  0    0  0  1  0  1    1  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     129    0    22     0    0     0     0  292    54     4  477     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Bse:  129    0    22     0    0     0     0  292    54     4  477     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:   136    0    23     0    0     0     0  307    57     4  502     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:   136    0    23     0    0     0     0  307    57     4  502     0
------------|---------------||---------------||---------------||---------------|
Adjusted Volume Module:
Grade:             0%               0%               0%               0%
% Cycle/Cars:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
% Truck/Comb:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
PCE Adj:     1.10 1.10  1.10  1.10 1.10  1.10  1.10 1.00  1.00  1.10 1.00  1.00
Cycl/Car PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Trck/Cmb PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Adj Vol.:     149    0    25     0    0     0     0  307    57     5  502     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module: >> Population: 0 << >> Run Speed(E/W): 30 MPH <<
RT Rad/Ang:  20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg
Critical Gp:  7.0 xxxx   5.5 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   5.5 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  814 xxxx   307  xxxx xxxx xxxxx  xxxx xxxx xxxxx   364 xxxx xxxxx
Potent Cap.:  260 xxxx   778  xxxx xxxx xxxxx  xxxx xxxx xxxxx   729 xxxx xxxxx
% Used Cap.: 57.6 xxxx   3.3 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   0.6 xxxx xxxxx
Impedance:   xxxx xxxx  0.98  xxxx xxxx xxxxx  xxxx xxxx xxxxx  1.00 xxxx xxxxx
Actual Cap.:  260 xxxx   778  xxxx xxxx xxxxx  xxxx xxxx xxxxx   729 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Unused Cap.:  110 xxxx   753  xxxx xxxx xxxxx  xxxx xxxx xxxxx   724 xxxx xxxxx
LOS by Move:    D    *     A     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Unused Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
```

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MITIG8                  Wed Jan 14, 1998 16:53:53                 Page 1-1
---------------------------------------------------------------------------
---------------------------------------------------------------------------
                     Level Of Service Computation Report
            1985 HCM Unsignalized Method (Base Volume Alternative)
***************************************************************************
Intersection #2 FLORIN/VINEYARD                                   ALT A EPPM
***************************************************************************
                                       Level Of Service:              E
***************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        1  0  0  0  1    0  0  0  0  0    0  0  1  0  1    1  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      95    0    11     0    0     0     0  496   153    22  413     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Bse:   95    0    11     0    0     0     0  496   153    22  413     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:   100    0    12     0    0     0     0  522   161    23  435     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:   100    0    12     0    0     0     0  522   161    23  435     0
------------|---------------||---------------||---------------||---------------|
Adjusted Volume Module:
Grade:             0%               0%               0%               0%
% Cycle/Cars:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
% Truck/Comb:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
PCE Adj:     1.10 1.10  1.10  1.10 1.10  1.10  1.10 1.00  1.00  1.10 1.00  1.00
Cycl/Car PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Trck/Cmb PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Adj Vol.:     110    0    13     0    0     0     0  522   161    25  435     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module: >> Population: 0 << >> Run Speed(E/W): 30 MPH <<
RT Rad/Ang:  20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg
Critical Gp:  7.0 xxxx   5.5 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   5.5 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  980 xxxx   522  xxxx xxxx xxxxx  xxxx xxxx xxxxx   683 xxxx xxxxx
Potent Cap.:  196 xxxx   610  xxxx xxxx xxxxx  xxxx xxxx xxxxx   497 xxxx xxxxx
% Used Cap.: 56.1 xxxx   2.1 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   5.1 xxxx xxxxx
Impedance:   xxxx xxxx  0.99  xxxx xxxx xxxxx  xxxx xxxx xxxxx  0.97 xxxx xxxxx
Actual Cap.:  190 xxxx   610  xxxx xxxx xxxxx  xxxx xxxx xxxxx   497 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Unused Cap.:   80 xxxx   597  xxxx xxxx xxxxx  xxxx xxxx xxxxx   471 xxxx xxxxx
LOS by Move:    E    *     A     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Unused Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
```

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                                     Critical Movement Analysis: PLANNING
                                              Calculation Form 1
Intersection: ELK GROVE FLORIN AND GERBER                               Design Hour: AM
Problem Statement: ALTA EXIST PLUS PROJECT
=======================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR     |
              | Approach 3:ELK GROVE FLO|                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
              |  1     1 |     ^       |                 : -1-  -2-  -3-  -4-|       Possible   Volume      Adjusted|
              |  R   L   |     N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover   Critical|
GERBER RD     | R T T T L |             | intervals/hour  :                   |able    Volume    to next     Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase      in vph |
 Approach 1   < < | > >    ^--RT       | change (vph)    :                   |------------------------------------|
   1  LT--^    v v v     <^-RTH  1    |c.G/C ratio      :  0    0    0    0|B4B3   152(B4)  752- 152= 600(B3)  152|
     LTH-^>              <--TH   1    |d.Opposing volume :  0    0    0    0|A4B3   600(B3)  878- 600= 278(A4)  600|
   1  TH-->              <v-LTH        | in vph          :                   |A3A4   545(A3) OR  278(A4)          545|
     RTH-v>    ^ ^ ^      v--LT  1    |e.LT capacity on :  0    0    0    0|B2B1   113(B2)  185- 113=  72(B1)  113|
   1  RT--v   < < | > >   Approach 2  | green (vph)     :                   |A2B1    72(B1)  410-  72= 338(A2)   72|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A1A2   369(A1) OR  338(A2)          369|
              | T T H T T |GERBER RD   | vph (b+e)       :                   |                                    |
              |  H   H   |             |g.Left turn volume :  0    0    0    0|                                    |
              | 1    1   |             | in vph          :                   |                                    |
              | Approach 4:ELK GROVE FLO|h.Is volume > cap. :                  :                                    |
                                       | (g>f) ?         :                   |                                    |
======================================+===================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                       |       |                    |       |                                    |
                                       |       | 1 3 1              |       |752(B4B3)+545(A3)+185(B2B1)+369(A1) |
              | Approach 3|             |-------  9 5 5              -------|                                    |
 3:  LT= 152 | |          | 2:RT= 371  |         4 1 2             ^+ 371 |           = 1851 vph               |
    TH= 351  | |          |   TH= 449  |         + + |             <+  39 |====================================|
   RT= 194   | v          |   LT= 185  |         < v >             <- 410 | Step 8. INTERSECTION LEVEL OF      |
-------------              -------------|                            v- 185 |        SERVICE                     |
                          <--Approach 2 |                                   |    (compare step 7 with table 6)   |
                                       |                                   |              -------               |
                                       |                                   |              |  F  |               |
 Approach 1-->                         |                                   |              -------               |
-------------              -------------| 113 -^              < ^ >        |====================================|
 1:LT= 113   |           ^ | 4: RT= 153 | 369 ->              | + +        | Step 9. RECALCULATE                |
   TH= 369   |           | |   TH= 725  | 269 -v                           |                                    |
   RT= 269   |           | |  LT= 752   |-------              7 7 1 -------|Geometric Change:                   |
              | Approach 4|             |       |              5 2 5 |      |Signal Change:                      |
                                       |       |              2 5 3 |      |Volume Change:                      |
======================================+===================================+====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                           |
                                       |         (two phase signal)        |                                    |
        |  <   B4B3                    |              | Approach 3|        |                                    |
        >  |                           |              |           |        |                                    |
    | | AND < ^    A3B4 AND            |              |           |        |                                    |
    v > OR  | |    /OR A4B3            |              |           |        |                                    |
        |  ^   A3A4                    |-------------             ---------|                                    |
        v  |                           | Approach 1                        |                                    |
      --^ v--  B2B1                    |                                   |                                    |
                                       |           See Step 6b.            |                                    |
    --^ AND <--    A1B2 AND            |                                   |                                    |
    --> OR  v--    /OR A2B1            |                        Approach 2 |                                    |
      --> <--  A1A2                    |-------------             ---------|                                    |
--------------------------------------|              |           |        |                                    |
                                       |              |           |        |                                    |
 A1 -->    A3 |      B1 v--     B3   <| |              |           |        |                                    |
             v ^                     | | |            | Approach 4|        | Exclusive right turns reduced  30 % |
 A2 <--    A4  |      B2 --^     B4 |>  |                                   | V/C Ratio = 1.35                   |
=======================================================================================================
```

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                                   Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: ELK GROVE FLORIN AND GERBER                                    Design Hour: PM
Problem Statement: ALTA EXIST PLUS PROJECT
========================================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY           | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR        |
              | Approach 3:ELK GROVE FLO|                  -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
              |  1     1 |       ^      |                  : -1-  -2-  -3-  -4-|        Possible    Volume     Adjusted|
              |  R   L   |       N      |a.No. of change   :  0    0    0    0|Prob-   Critical   Carryover   Critical|
GERBER RD     | R T T T L |              | intervals/hour   :                   |able    Volume     to next     Volume |
------------- T H H H T   -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph      phase      in vph |
  Approach 1   < < | > >    ^--RT       | change (vph)     :                   |-------------------------------------|
   1  LT--^     v v v      <^-RTH  1    |c.G/C ratio       :  0    0    0    0|B4B3   336(B3)  411- 336=  75(B4)   336|
      LTH-^>               <--TH   1    |d.Opposing volume :  0    0    0    0|A3B4    75(B4)  965-  75= 890(A3)    75|
   1   TH-->               <v-LTH       | in vph           :                   |A3A4   890(A3) OR  696(A4)           890|
      RTH-v>    ^ ^ ^      v--LT   1    |e.LT capacity on  :  0    0    0    0|B2B1   222(B1)  238- 222=  16(B2)   222|
   1  RT--v    < < | > >  Approach 2    | green (vph)      :                   |A1B2    16(B2)  585-  16= 569(A1)    16|
------------- L L T R R   -------------|f.LT capacity in  :  0    0    0    0|A1A2   569(A1) OR  383(A2)           569|
              | T T H T T |GERBER RD     | vph (b+e)        :                   |                                     |
              |  H   H   |              |g.Left turn volume :  0    0    0    0|                                     |
              | 1     1  |              | in vph           :                   |                                     |
              | Approach 4:ELK GROVE FLO|h.Is volume > cap. :                  :                                     |
                                        | (g>f) ?          :                   |                                     |
=========================================+======================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph         | Step 5. ASSIGN LANE VOLUMES, in vph    | Step 7. SUM OF CRITICAL VOLUMES       |
                                        |        |                      |      |                                     |
                                        |        | 2 7 4                |      |411(B3B4)+890(A3)+238(B1B2)+569(A1)   |
              | Approach 3|              |-------  3 3 1                 -------|                                     |
 3:  LT= 411 | |          | 2:RT= 298   |         2 3 1                ^+ 298 |           = 2108 vph                |
   TH= 733   | |          |   TH= 467   |         + + |                <+  85 |=====================================|
   RT= 232   | v          |   LT= 222   |         < v >                <- 383 | Step 8. INTERSECTION LEVEL OF       |
-------------             -------------|                               v- 222 |         SERVICE                     |
                        <--Approach 2  |                                      |     (compare step 7 with table 6)   |
                                        |                                      |               -------               |
                                        |                                      |               |  F  |               |
 Approach 1-->                          |                                      |               -------               |
-------------             -------------| 238 -^                <^>            |=====================================|
 1:LT= 238   |          ^ | 4: RT= 218  | 502 ->                | + +          | Step 9. RECALCULATE                 |
   TH= 502   |          | |   TH= 478   | 835 -v                               |                                     |
   RT= 835   |          | |  LT= 336    |-------                3 4 2  -------|Geometric Change:                    |
             | Approach 4|              |        |              3 7 1 |        |Signal Change:                       |
                                        |        |              6 8 8 |        |Volume Change:                       |
=========================================+======================================+=====================================|
 Step 3. IDENTIFY PHASING                 | Step 6a. CRITICAL VOLUMES, in vph      | COMMENTS                            |
                                        |         (two phase signal)           |                                     |
         |  <   B4B3                      |              | Approach 3|           |                                     |
         >  |                             |              |           |           |                                     |
     | | AND < ^     A3B4 AND             |              |           |           |                                     |
     v > OR  | |     /OR A4B3             |              |           |           |                                     |
         |  ^   A3A4                      |-------------            ------------|                                     |
         v  |                             | Approach 1                           |                                     |
         --^ v--  B2B1                    |                                      |                                     |
                                        |            See Step 6b.              |                                     |
     --^ AND <--     A1B2 AND             |                                      |                                     |
     --> OR  v--     /OR A2B1             |                         Approach 2   |                                     |
         --> <--  A1A2                    |-------------            ------------|                                     |
                                        |              |           |           |                                     |
-----------------------------------------|              |           |           |                                     |
 A1 -->    A3 |      B1 v--     B3   <|   |              |           |           |                                     |
             v ^                    | |   |              | Approach 4|           | Exclusive right turns reduced  30 % |
 A2 <--    A4  |     B2 --^     B4 |>     |                                      | V/C Ratio = 1.53                    |
========================================================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                            Design Hour: AM
Problem Statement: ALTA EXIST PLUS PROJECT
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:WATERMAN RD |                   -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
             | 1       1 |      ^     |                   : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R   L    |      N     |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |            | intervals/hour    :                   |able   Volume   to next    Volume |
------------- T H H H T  ------------|b.LT capacity on   :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1   < < | > >   ^--RT  1   | change (vph)      :                   |---------------------------------|
  1  LT--^     v v v     <^-RTH      |c.G/C ratio        :  0    0    0    0|A1B2  153(B2)  269- 153= 116(A1)  153|
     LTH-^>              <--TH   1   |d.Opposing volume  :  0  269    0  244|A1A2  479(A2) OR  116(A1)          479|
  1  TH-->               <v-LTH      | in vph            :                   |A3B4  171(A3) OR   89(B4)          171|
     RTH-v>    ^ ^ ^      v--LT      |e.LT capacity on   :  0    0    0    0|                                 |
     RT--v    < < | > >   Approach 2 | green (vph)       :                   |                                 |
------------- L L T R R  ------------|f.LT capacity in   :  0    0    0    0|                                 |
             | T T H T T |GERBER RD  | vph (b+e)         :                   |                                 |
             |   H   H   |           |g.Left turn volume :  0    0    0    0|                                 |
             |           |           | in vph            :                   |                                 |
             | Approach 4:WATERMAN RD |h.Is volume > cap. :      NO        NO:                                 |
                                     | (g>f) ?           :                   |                                 |
=====================================+===================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |       |                     |     |                                 |
                                     |       | 2                   |     |632(B2A2)+171(A3)+0()+0()        |
             | Approach 3|           |-------  4 8                -------|                                 |
 3:  LT=  89 | |         | 2:RT=  68 |         4 9               ^-  68 |                                 |
   TH=   0   | |         |   TH= 479 |         | |               <- 479 |        = 803 vph                |
  RT= 244    | v         |   LT=   0 |         < >                      |=================================|
-------------             ------------|                                  | Step 8. INTERSECTION LEVEL OF   |
                        <--Approach 2 |                                  |         SERVICE                 |
                                     |                                   |    (compare step 7 with table 6)|
                                     |                                   |             -------             |
                                     |                                   |             | A |             |
 Approach 1-->                       |                                   |             -------             |
-------------             ------------|                                  |=================================|
 1:LT= 153   |         ^ | 4: RT=  0 | 153 -^                            | Step 9. RECALCULATE             |
   TH= 269   |         | |   TH=   0 | 269 ->                            |                                 |
   RT=   0   |         | |   LT=   0 |-------                     -------|Geometric Change:                |
             | Approach 4|           |       |                     |     |Signal Change:                   |
                                     |       |                     |     |Volume Change:                   |
=====================================+===================================+=================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                     |        (two phase signal)         |                                 |
        --^      A1B2                |           | Approach 3|           |                                 |
        -->                          |           |           |           |                                 |
        --> <--  A1A2                |           |           |           |                                 |
                                     |           |           |           |                                 |
         |  |    A3B4                |------------            -----------|                                 |
         v  >                        | Approach 1                        |                                 |
                                     |                                   |                                 |
                                     |           See Step 6b.            |                                 |
                                     |                                   |                                 |
                                     |                        Approach 2 |                                 |
                                     |------------            -----------|                                 |
                                     |           |           |           |                                 |
-------------------------------------|           |           |           |                                 |
 A1 -->   A3 |     B1 v--    B3   <| |           |           |           |                                 |
           v ^                     | | |         | Approach 4|           | Exclusive right turns reduced 30 %|
 A2 <--   A4  |    B2 --^    B4 |>   |                                   | V/C Ratio = .56                 |
===============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                               Design Hour: PM
Problem Statement: ALTA EXIST PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR        |
            | Approach 3:WATERMAN RD   |                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP      |
            | 1       1 |      ^       |                 : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
            |  R   L    |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD   | R T T T L |              | intervals/hour  :                  |able    Volume   to next    Volume |
------------  T H H H T  ------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1     | change (vph)    :                  |---------------------------------------|
   1  LT--^    v v v     <^-RTH        |c.G/C ratio      :  0    0    0    0|A1B2   167(B2)  720- 167= 553(A1)  167|
      LTH-^>             <--TH   1     |d.Opposing volume :  0    0    0    0|A1A2   553(A1) OR  467(A2)           553|
   1   TH-->             <v-LTH        | in vph          :                  |A3B4   188(A3) OR  167(B4)           188|
      RTH-v>   ^ ^ ^      v--LT        |e.LT capacity on  :  0    0    0    0|                                       |
      RT--v   < < | > >   Approach 2   | green (vph)     :                  |                                       |
------------  L L T R R  ------------|f.LT capacity in  :  0    0    0    0|                                       |
            | T T H T T |GERBER RD     | vph (b+e)       :                  |                                       |
            |  H   H    |              |g.Left turn volume :  0    0    0    0|                                       |
            |           |              | in vph          :                  |                                       |
            | Approach 4:WATERMAN RD   |h.Is volume > cap. :                 :|                                       |
                                       | (g>f) ?          :                  |                                       |
=======================================+====================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                       |        |                    |      |                                       |
                                       |        | 2 1                |      |720(B2A1)+188(A3)+0()+0()              |
            | Approach 3|              |-------   6 6              -------|                                       |
 3:  LT= 167 | |        | 2:RT= 163    |          9 7              ^- 163  |          = 908 vph                    |
   TH=   0  | |         |   TH= 467    |          | |              <- 467  |=======================================|
  RT= 269   | v         |   LT=   0    |          < >                      | Step 8. INTERSECTION LEVEL OF         |
------------             ------------|                                    |        SERVICE                        |
                         <--Approach 2 |                                    |    (compare step 7 with table 6)      |
                                       |                                    |              -------                  |
                                       |                                    |              |  B  |                  |
 Approach 1-->                         |                                    |              -------                  |
------------             ------------|                                    |=======================================|
 1:LT= 167  |           ^ | 4: RT=   0 | 167 -^                             | Step 9. RECALCULATE                   |
   TH= 720  |           | |   TH=    0 | 720 ->                             |                                       |
   RT=   0  |           | |  LT=    0  |-------                     -------|Geometric Change:                      |
            | Approach 4|              |        |                    |      |Signal Change:                         |
                                       |        |                    |      |Volume Change:                         |
=======================================+====================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                              |
                                       |         (two phase signal)         |                                       |
         --^      A1B2                 |              | Approach 3|         |                                       |
         -->                           |              |           |         |                                       |
         --> <--  A1A2                 |              |           |         |                                       |
                                       |              |           |         |                                       |
          |   |   A3B4                 |------------              ------------|                                       |
          v   >                        | Approach 1                         |                                       |
                                       |                                    |                                       |
                                       |            See Step 6b.            |                                       |
                                       |                                    |                                       |
                                       |                         Approach 2 |                                       |
                                       |------------              ------------|                                       |
---------------------------------------|              |           |         |                                       |
 A1 -->   A3 |      B1 v--     B3   <| |              |           |         |                                       |
              v ^                    | |              | Approach 4|         | Exclusive right turns reduced  30 %   |
 A2 <--   A4  |     B2 --^     B4  |>  |                                    | V/C Ratio = .64                       |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER AND BRADSHAW                                       Design Hour: AM
Problem Statement: ALTA EXIST PLUS PROJECT
=========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR        |
             | Approach 3:BRADSHAW RD  |                  -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
             | 1   1   1 |      ^      |                  : -1-  -2-  -3-  -4-|        Possible    Volume     Adjusted|
             |   R   L   |      N      |a.No. of change   :  0    0    0     0|Prob-   Critical   Carryover   Critical|
GERBER RD    | R T T T L |             |  intervals/hour  :                   |able     Volume    to next     Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0     0|Phase    in vph     phase      in vph |
 Approach 1   < < | > >   ^--RT        |  change (vph)    :                   |---------------------------------------|
  1  LT--^     v v v    <^-RTH  1      |c.G/C ratio       :  0    0    0     0|B4B3    56(B3)   95-  56= 39(B4)     56|
     LTH-^>             <--TH          |d.Opposing volume :  0    0    0     0|A3B4    39(B4)  319-  39= 280(A3)    39|
      TH-->             <v-LTH         |  in vph          :                   |A3A4   832(A4) OR  280(A3)           832|
  1  RTH-v>    ^ ^ ^     v--LT  1      |e.LT capacity on  :  0    0    0     0|B2B1    29(B1)  416-  29= 387(B2)    29|
     RT--v    < < | > >  Approach 2    |  green (vph)     :                   |A1B2   387(B2)  224- 387=   0(A1)   387|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0     0|A1A2   382(A2) OR    0(A1)           382|
             | T T H T T |GERBER RD    |  vph (b+e)       :                   |                                       |
             |   H   H   |             |g.Left turn volume:  0    0    0     0|                                       |
             | 1     1   |             |  in vph          :                   |                                       |
             | Approach 4:BRADSHAW RD  |h.Is volume > cap.:                   :                                       |
                                       |  (g>f) ?         :                   |                                       |
=======================================+======================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES       |
                                       |       |                      |       |                                       |
                                       |       | 3 3                  |       |95(B3B4)+832(A4)+416(B1B2)+382(A2)     |
             | Approach 3|             |-------  4 1 9                 -------|                                       |
 3:  LT=  95 | |         | 2:RT= 151   |         3 9 5               ^+ 151 |                                       |
   TH= 319   | |         |   TH= 231   |         | | |               <+ 231 |              = 1725 vph               |
   RT= 343   | v         |   LT=  29   |         < v >               v-  29 |=======================================|
-------------              ------------|                                      | Step 8. INTERSECTION LEVEL OF         |
                          <--Approach 2|                                      |         SERVICE                       |
                                       |                                      |    (compare step 7 with table 6)      |
                                       |                                      |               -------                 |
                                       |                                      |               |  F  |                 |
 Approach 1-->                         |                                      |               -------                 |
-------------              ------------| 416 -^                    < ^ >      |=======================================|
 1:LT= 416   |          ^ | 4: RT=  31 | 170 +>                    | + +      | Step 9. RECALCULATE                   |
   TH= 170   |          | |   TH= 801  |  54 +v                               |                                       |
   RT=  54   |          | |   LT=  56  |-------                     8  -------|Geometric Change:                      |
             | Approach 4|             |       |                  5 0 3 |     |Signal Change:                         |
                                       |       |                  6 1 1 |     |Volume Change:                         |
=======================================+======================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                              |
                                       |         (two phase signal)           |                                       |
          |  <    B4B3                 |             | Approach 3|            |                                       |
          >   |                        |             |           |            |                                       |
     | | AND < ^     A3B4 AND          |             |           |            |                                       |
     v > OR  | |     /OR A4B3          |             |           |            |                                       |
          |  ^    A3A4                 |-------------             ------------|                                       |
          v  |                         | Approach 1                           |                                       |
         --^ v--  B2B1                 |                                      |                                       |
                                       |           See Step 6b.               |                                       |
     --^ AND <--     A1B2 AND          |                                      |                                       |
     --> OR  v--     /OR A2B1          |                          Approach 2  |                                       |
         --> <--  A1A2                 |-------------              -----------|                                       |
                                       |             |           |            |                                       |
---------------------------------------|             |           |            |                                       |
 A1 -->   A3 |      B1 v--    B3   <|  |             |           |            |                                       |
            v ^                     | | |             |           |            |                                       |
 A2 <--   A4  |     B2 --^    B4  |>   |             | Approach 4|            | Exclusive right turns reduced  30 %   |
                                       |                                      | V/C Ratio = 1.25                      |
=========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER AND BRADSHAW                                       Design Hour: PM
Problem Statement: ALTA EXIST PLUS PROJECT
=========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR    |
              | Approach 3:BRADSHAW RD |                  -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
              | 1   1   1 |      ^     |                 : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |  R   L    |      N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD     | R T T T L |            | intervals/hour  :                  |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1   < < | > >    ^--RT      | change (vph)     :                  |-----------------------------------|
  1  LT--^      v v v     <^-RTH  1   |c.G/C ratio       :  0    0    0    0|B4B3    73(B3)  205-  73= 132(B4)   73|
    LTH-^>                <--TH       |d.Opposing volume :  0    0    0    0|A3B4   132(B4)  750- 132= 618(A3)  132|
     TH-->                <v-LTH      | in vph           :                  |A3A4   618(A3) OR  339(A4)        618|
  1  RTH-v>    ^ ^ ^      v--LT  1    |e.LT capacity on  :  0    0    0    0|B2B1    37(B1)  532-  37= 495(B2)   37|
    RT--v     < < | > >   Approach 2  | green (vph)      :                  |A1B2   495(B2)  355- 495=   0(A1)  495|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A1A2   441(A2) OR    0(A1)        441|
              | T T H T T |GERBER RD   | vph (b+e)        :                  |                                   |
              |   H   H   |            |g.Left turn volume:  0    0    0    0|                                   |
              | 1     1   |            | in vph           :                  |                                   |
              | Approach 4:BRADSHAW RD |h.Is volume > cap.:                  :                                   |
                                       | (g>f) ?          :                  |                                   |
======================================+====================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                      |       |                     |      |                                   |
                                      |       | 6 7 2               |      |205(B3B4)+618(A3)+532(B1B2)+441(A2)|
              | Approach 3|           |-------  1 5 0                -------|                                   |
 3:  LT= 205 | |          | 2:RT= 191 |         0 0 5               ^+ 191 |           = 1796 vph              |
    TH= 750  | |          |   TH= 250 |         | | |               <+ 250 |===================================|
   RT= 610   | v          |   LT=  37 |         < v >               v-  37 | Step 8. INTERSECTION LEVEL OF     |
-------------              -----------|                                    |         SERVICE                   |
                            <--Approach 2|                                 |    (compare step 7 with table 6)  |
                                      |                                    |             -------               |
                                      |                                    |             |  F  |               |
 Approach 1-->                        |                                    |             -------               |
-------------              -----------| 532 -^              < ^ >          |===================================|
1:LT= 532    |          ^ | 4: RT=  25| 279 +>              | + +          | Step 9. RECALCULATE               |
  TH= 279    |          | |    TH= 314|  76 +v                             |                                   |
  RT=  76    |          | |    LT=  73|-------                 3    -------|Geometric Change:                  |
             | Approach 4|            |       |              7 1 2 |       |Signal Change:                     |
                                      |       |              3 4 5 |       |Volume Change:                     |
======================================+====================================+===================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                          |
                                      |          (two phase signal)        |                                   |
          |   <    B4B3               |             | Approach 3|          |                                   |
          >   |                       |             |           |          |                                   |
    | | AND < ^     A3B4 AND          |             |           |          |                                   |
    v > OR  | |     /OR A4B3          |             |           |          |                                   |
          |   ^    A3A4               |-------------             ----------|                                   |
          v   |                       | Approach 1                         |                                   |
        --^ v--    B2B1               |                                    |                                   |
                                      |         See Step 6b.               |                                   |
    --^ AND <--     A1B2 AND          |                                    |                                   |
    --> OR  v--     /OR A2B1          |                        Approach 2  |                                   |
        --> <--    A1A2               |-------------             ----------|                                   |
                                      |             |           |          |                                   |
--------------------------------------|             |           |          |                                   |
A1 -->    A3 |      B1 v--    B3   <| |             |           |          |                                   |
           v ^                      | | |           |           |          |                                   |
A2 <--    A4  |     B2 --^    B4  |>  |             | Approach 4|          | Exclusive right turns reduced  30 %|
                                      |                                    | V/C Ratio = 1.31                  |
=========================================================================================================
```

ATTACHMENT 5E



Level Of Service Computation Report
1985 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1 GERBER ROAD/VINEYARD ROAD ALT AEP AM

Level Of Service: B

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L | T | R | L | T | R | L | T | R | L | T | R |
| Control: | | Stop Sign | | | Stop Sign | | | Uncontrolled | | | Uncontrolled | |
| Rights: | | Include | | | Include | | | Include | | | Include | |
| Lanes: | 1 0 | 0 | 1 0 | 1 0 | 1 | 0 1 | 1 0 | 0 | 1 0 | 1 0 | 0 | 1 0 |
| **Volume Module:** | | | | | | | | | | | | |
| Base Vol: | 62 | 35 | 3 | 34 | 19 | 35 | 20 | 172 | 48 | 2 | 103 | 13 |
| Growth Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Bse: | 62 | 35 | 3 | 34 | 19 | 35 | 20 | 172 | 48 | 2 | 103 | 13 |
| User Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PHF Adj: | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PHF Volume: | 65 | 37 | 3 | 36 | 20 | 37 | 21 | 181 | 51 | 2 | 108 | 14 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Final Vol.: | 65 | 37 | 3 | 36 | 20 | 37 | 21 | 181 | 51 | 2 | 108 | 14 |
| **Adjusted Volume Module:** | | | | | | | | | | | | |
| Grade: | | 0% | | | 0% | | | 0% | | | 0% | |
| % Cycle/Cars: | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | |
| % Truck/Comb: | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | |
| PCE Adj: | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.00 | 1.00 | 1.10 | 1.00 | 1.00 |
| Cycl/Car PCE: | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | |
| Trck/Cmb PCE: | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | |
| Adj Vol.: | 72 | 41 | 3 | 39 | 22 | 41 | 23 | 181 | 51 | 2 | 108 | 14 |
| **Critical Gap Module: >> Population: 0 << >> Run Speed(E/W): 30 MPH <<** | | | | | | | | | | | | |
| RT Rad/Ang: | | 20.0 ft/90.0 deg | | | 20.0 ft/90.0 deg | | | 20.0 ft/90.0 deg | | | 20.0 ft/90.0 deg | |
| Critical Gp: | 7.0 | 6.5 | 5.5 | 7.0 | 6.5 | 5.5 | 5.5 | xxxx | xxxxx | 5.5 | xxxx | xxxxx |
| **Capacity Module:** | | | | | | | | | | | | |
| Cnflict Vol: | 408 | 352 | 206 | 410 | 370 | 115 | 122 | xxxx | xxxxx | 232 | xxxx | xxxxx |
| Potent Cap.: | 494 | 589 | 884 | 493 | 576 | 982 | 973 | xxxx | xxxxx | 858 | xxxx | xxxxx |
| % Used Cap.: | 14.5 | 6.9 | 0.4 | 8.0 | 3.8 | 4.1 | 2.4 | xxxx | xxxxx | 0.3 | xxxx | xxxxx |
| Impedance: | xxxx | 0.96 | 1.00 | xxxx | 0.98 | 0.98 | 0.99 | xxxx | xxxxx | 1.00 | xxxx | xxxxx |
| Actual Cap.: | 464 | 580 | 884 | 466 | 568 | 982 | 973 | xxxx | xxxxx | 858 | xxxx | xxxxx |
| **Level Of Service Module:** | | | | | | | | | | | | |
| Unused Cap.: | 392 | 540 | 880 | 427 | 546 | 941 | 950 | xxxx | xxxxx | 856 | xxxx | xxxxx |
| LOS by Move: | B | * | * | A | A | A | A | * | * | A | * | * |
| Movement: | LT | LTR | RT | LT | LTR | RT | LT | LTR | RT | LT | LTR | RT |
| Shared Cap.: | xxxx | xxxx | 597 | xxxx | xxxx | xxxxx | xxxx | xxxx | xxxxx | xxxx | xxxx | xxxxx |
| Unused Cap.: | xxxx | xxxx | 553 | xxxx | xxxx | xxxxx | xxxx | xxxx | xxxxx | xxxx | xxxx | xxxxx |
| Shared LOS: | * | * | A | * | * | * | * | * | * | * | * | * |

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
            1985 HCM Unsignalized Method (Base Volume Alternative)
********************************************************************************
Intersection #1 GERBER ROAD/VINEYARD ROAD                               ACTAEPPM
********************************************************************************
                                        Level Of Service:                 C
********************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        1  0  0  1  0    1  0  1  0  1    1  0  0  1  0    1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       76   27     3    24   36    29    52  140    73     2  183    30
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Bse:    76   27     3    24   36    29    52  140    73     2  183    30
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:     80   28     3    25   38    31    55  147    77     2  193    32
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:     80   28     3    25   38    31    55  147    77     2  193    32
------------|---------------||---------------||---------------||---------------|
Adjusted Volume Module:
Grade:             0%               0%               0%               0%
% Cycle/Cars:   xxxx xxxx        xxxx xxxx        xxxx xxxx        xxxx xxxx
% Truck/Comb:   xxxx xxxx        xxxx xxxx        xxxx xxxx        xxxx xxxx
PCE Adj:      1.10 1.10  1.10  1.10 1.10  1.10  1.10 1.00  1.00  1.10 1.00  1.00
Cycl/Car PCE:   xxxx xxxx        xxxx xxxx        xxxx xxxx        xxxx xxxx
Trck/Cmb PCE:   xxxx xxxx        xxxx xxxx        xxxx xxxx        xxxx xxxx
Adj Vol.:       88   31     3    28   42    34    60  147    77     2  193    32
------------|---------------||---------------||---------------||---------------|
Critical Gap Module: >> Population: 0 << >> Run Speed(E/W): 30 MPH <<
RT Rad/Ang:  20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg
Critical Gp:  7.0  6.5   5.5   7.0  6.5   5.5   5.5 xxxx xxxxx   5.5 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  535  467   186   521  489   208   224 xxxx xxxxx   224 xxxx xxxxx
Potent Cap.:  410  510   904   420  496   882   866 xxxx xxxxx   866 xxxx xxxxx
% Used Cap.: 21.4  6.1   0.4   6.6  8.4   3.8   7.0 xxxx xxxxx   0.3 xxxx xxxxx
Impedance:   xxxx 0.96  1.00  xxxx 0.95  0.98  0.96 xxxx xxxxx  1.00 xxxx xxxxx
Actual Cap.:  365  489   904   388  476   882   866 xxxx xxxxx   866 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Unused Cap.:  277  457   901   360  434   848   806 xxxx xxxxx   863 xxxx xxxxx
LOS by Move:    C    *     *     B    A     A     A    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx   512  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Unused Cap.: xxxx xxxx   477  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shared LOS:     *    *     A     *    *     *     *    *     *     *    *     *
```

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                                  Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: FLORIN AND ELK GROVE FLORIN                                  Design Hour: AM
Problem Statement: ALTA MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:ELK GROVE FLO|           -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
             | 1   2   2 |      ^      |           : -1-  -2-  -3-  -4-|     Possible   Volume   Adjusted|
             |  R   L    |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN       | R T T T L |             | intervals/hour  :               |able   Volume   to next   Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)    :               |---------------------------------|
   1  LT--^    v v v     <^-RTH       |c.G/C ratio      :  0    0    0    0|B4B3   164(B4)  190- 164=  26(B3)   164|
      LTH-^>             <--TH   2    |d.Opposing volume :  0    0    0    0|A4B3    26(B3)  312-  26= 286(A4)    26|
   2   TH-->             <v-LTH       | in vph          :               |A3A4   286(A4) OR  147(A3)           286|
      RTH-v>   ^ ^ ^      v--LT  1    |e.LT capacity on :  0    0    0    0|B2B1    98(B2)  205-  98= 107(B1)    98|
   1  RT--v   < < | > >   Approach 2  | green (vph)     :               |A2B1   107(B1)  361- 107= 254(A2)   107|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A1A2   254(A2) OR  252(A1)           254|
             | T T H T T |FLORIN      | vph (b+e)       :               |                                 |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                 |
             | 2   2   1 |            | in vph          :               |                                 |
             | Approach 4:ELK GROVE FLO|h.Is volume > cap. :              :                                 |
                                      | (g>f) ?         :               |                                 |
=====================================+================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                      |        |                  |     |                                 |
                                      |        |  1 1 1 1         |     |190(B4B3)+286(A4)+205(B2B1)+254(A2)|
             | Approach 3|            |------- 9 4 4 3 6      -------|                                 |
 3:  LT= 297 | |        | 2:RT= 516   |        1 7 7 4 4       ^- 516 |            = 935 vph            |
   TH= 294   | |        |   TH= 691   |        | | | | |       <- 346 |=================================|
   RT=  91   | v        |   LT= 205   |        < v v > >       <- 346 | Step 8. INTERSECTION LEVEL OF   |
-------------          ---------------|                        v- 205 |        SERVICE                  |
                       <--Approach 2  |                               |     (compare step 7 with table 6) |
                                      |                               |             -------             |
                                      |                               |             | B |             |
 Approach 1-->                        |  98 -^                        |             -------             |
-------------          ---------------| 252 ->         < < ^ ^ >      |=================================|
 1:LT=  98   |          ^ | 4: RT= 161 | 252 ->         | | | | |      | Step 9. RECALCULATE             |
   TH= 503   |          | |   TH= 624  | 171 -v                        |                                 |
   RT= 171   |          | |  LT= 345   |-------         1 1 3 3 1 -------|Geometric Change:                |
             | Approach 4|             |       |        9 5 1 1 6 |      |Signal Change:                   |
                                      |       |        0 6 2 2 1 |      |Volume Change:                   |
=====================================+================================+=================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                     |
                                      |         (two phase signal)     |                                 |
         |  <    B4B3                 |           | Approach 3|        |                                 |
         >  |                         |           |           |        |                                 |
     | | AND < ^      A3B4 AND        |           |           |        |                                 |
     v > OR  | |      /OR A4B3        |           |           |        |                                 |
         |  ^    A3A4                 |-------------          -------------|                              |
         v  |                         | Approach 1                     |                                 |
        --^ v--  B2B1                 |                                |                                 |
                                      |           See Step 6b.         |                                 |
     --^ AND <--      A1B2 AND        |                                |                                 |
     --> OR  v--      /OR A2B1        |                     Approach 2 |                                 |
        --> <--  A1A2                 |-------------          -------------|                              |
                                      |           |           |        |                                 |
--------------------------------------|           |           |        |                                 |
 A1 -->    A3 |       B1 v--     B3  <|           |           |        |                                 |
            v ^                     | |           |           |        |                                 |
 A2 <--    A4 |       B2 --^     B4 |>            | Approach 4|        | Exclusive right turns reduced  30 % |
                                      |                                | V/C Ratio = .68                 |
==========================================================================================
```

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                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: FLORIN AND ELK GROVE FLORIN                    Design Hour: PM
Problem Statement: ALTA MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR   |
             | Approach 3:ELK GROVE FLO|           -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1  2  2 |       ^     |                : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R  L   |       N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN       | R T T T L |           | intervals/hour  :                 |able   Volume    to next    Volume |
------------- T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT  1   | change (vph)    :                 |------------------------------------|
   1  LT--^    v v v     <^-RTH      |c.G/C ratio      :  0    0    0    0|B4B3  142(B3)  403- 142= 261(B4)  142|
      LTH-^>             <--TH   2   |d.Opposing volume:  0    0    0    0|A3B4  261(B4)  324- 261=  63(A3)  261|
   2  TH-->              <v-LTH      | in vph          :                 |A3A4  206(A4) OR  63(A3)          206|
      RTH-v>   ^ ^ ^      v--LT  1   |e.LT capacity on :  0    0    0    0|B2B1   84(B2)  267-  84= 183(B1)   84|
   1  RT--v   < < | > >   Approach 2 | green (vph)     :                 |A2B1  183(B1)  398- 183= 215(A2)  183|
------------- L L T R R  ------------|f.LT capacity in :  0    0    0    0|A1A2  417(A1) OR  215(A2)          417|
             | T T H T T |FLORIN     | vph (b+e)       :                 |                                    |
             |   H   H   |           |g.Left turn volume: 0    0    0    0|                                    |
             | 2   2   1 |           | in vph          :                 |                                    |
             | Approach 4:ELK GROVE FLO|h.Is volume > cap.:               :                                    |
                                     | (g>f) ?         :                 |                                    |
=====================================+===================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |      |                  |        |                                    |
                                     |      | 1 3 3 3 4        |        |403(B3B4)+206(A4)+267(B2B1)+417(A1) |
             | Approach 3|           |-------  3 2 2 2 0          -------|                                    |
 3:  LT= 732 | |          | 2:RT= 569 |        0 4 4 9 3          ^- 569 |        = 1293 vph                  |
    TH= 647  | |          |   TH= 737 |        | | | | |          <- 369 |====================================|
   RT= 130   | v          |   LT= 267 |        < v v > >          <- 369 | Step 8. INTERSECTION LEVEL OF      |
-------------             ------------|                           v- 267 |        SERVICE                     |
                         <--Approach 2|                                  |     (compare step 7 with table 6)  |
                                     |                                  |              -------               |
                                     |                                  |              |  E  |               |
 Approach 1-->                       |  84 -^                           |              -------               |
-------------             ------------| 417 ->          < < ^ ^ >        |====================================|
 1:LT=  84   |           ^ | 4: RT= 270| 417 ->          | | | | |        | Step 9. RECALCULATE                |
    TH= 834  |           | |   TH= 411| 376 -v                           |                                    |
    RT= 376  |           | |   LT= 258|-------          1 1 2 2 2 -------|Geometric Change:                   |
             | Approach 4|           |       |          4 1 0 0 7 |      |Signal Change:                      |
                                     |       |          2 6 6 6 0 |      |Volume Change:                      |
=====================================+===================================+====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                     |          (two phase signal)       |                                    |
        |   <    B4B3                |             | Approach 3|         |                                    |
        >   |                        |             |           |         |                                    |
    | | AND < ^     A3B4 AND         |             |           |         |                                    |
    v > OR  | |     /OR A4B3         |             |           |         |                                    |
        |   ^    A3A4                |-------------             ---------|                                    |
        v   |                        | Approach 1                        |                                    |
       --^ v--   B2B1                |                                   |                                    |
                                     |          See Step 6b.             |                                    |
    --^ AND <--     A1B2 AND         |                                   |                                    |
    --> OR  v--     /OR A2B1         |                       Approach 2  |                                    |
       --> <--   A1A2                |-------------            ----------|                                    |
                                     |             |           |         |                                    |
-------------------------------------|             |           |         |                                    |
 A1 -->   A3 |      B1 v--    B3   <||             |           |         |                                    |
          v ^                    | | |             | Approach 4|         | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |>  |                                   | V/C Ratio = .94                    |
==========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                       Design Hour: AM
Problem Statement: ALTA E+P MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR       |
              | Approach 3:WATERMAN RD   |                   -------Approach-----|          MULTIPHASE SIGNAL OVERLAP   |
              |           |      ^       |                   : -1-  -2-  -3-  -4-|      Possible   Volume     Adjusted|
              |  R   L    |      N       |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD     | R T T T L |              |  intervals/hour   :                  |able    Volume    to next    Volume |
------------- T H H H T  ------------- |b.LT capacity on   :  0    0    0    0|Phase   in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT          |  change (vph)     :                  |--------------------------------------|
     LT--^      v v v    <^-RTH          |c.G/C ratio        :  0    0    1    0|A2B1    67(B1)  393-  67= 326(A2)   67|
     LTH-^>              <--TH   2       |d.Opposing volume  : 785   0  143    0|A1A2   326(A2) OR  204(A1)          326|
  2   TH-->              <v-LTH          |  in vph           :                  |A4B3   336(B3) OR  100(A4)          336|
     RTH-v>    ^ ^ ^      v--LT  1       |e.LT capacity on   :  0    0 1057    0|                                      |
  1  RT--v    < < | > >   Approach 2     |  green (vph)      :                  |                                      |
------------- L L T R R  ------------- |f.LT capacity in   :  0    0 1057    0|                                      |
              | T T H T T |FLORIN RD     |  vph (b+e)        :                  |                                      |
              |   H   H   |              |g.Left turn volume :  0    0    0    0|                                      |
              | 1       1 |              |  in vph           :                  |                                      |
              | Approach 4:WATERMAN RD   |h.Is volume > cap. : NO        NO    :|                                      |
                                         |  (g>f) ?          :                  |                                      |
=========================================+=======================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES      |
                                         |       |                       |       |                                      |
                                         |       |                       |       |393(B1A2)+336(B3)+0()+0()             |
              | Approach 3|              |-------                         -------|                                      |
 3:  LT=   0  | |         | 2:RT=   0    |                          <- 393 |            = 729 vph                 |
   TH=   0    | |         |   TH= 785    |                          <- 393 |======================================|
  RT=   0     | v         |   LT=  67    |                          v-  67 | Step 8. INTERSECTION LEVEL OF        |
-------------             -------------|                                       |         SERVICE                      |
                          <--Approach 2 |                                       |    (compare step 7 with table 6)    |
                                         |                                       |             -------                  |
                                         |                                       |             |  A  |                  |
 Approach 1-->                           |                                       |             -------                  |
-------------             -------------| 204 ->                 < >            |======================================|
 1:LT=   0    |          ^ | 4: RT= 143  | 204 ->                 | |            | Step 9. RECALCULATE                  |
   TH= 408    |         | |    TH=   0   | 184 -v                                 |                                      |
   RT= 184    |         | |   LT= 336    |-------                 3 1    -------|Geometric Change:                     |
              | Approach 4|              |       |                3 4 |         |Signal Change:                        |
                                         |       |                6 3 |         |Volume Change:                        |
=========================================+=======================================+======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                             |
                                         |          (two phase signal)           |                                      |
          <--  A2B1                      |            | Approach 3|              |                                      |
          v--                            |            |           |              |                                      |
      --> <--  A1A2                      |            |           |              |                                      |
                                         |            |           |              |                                      |
        <   ^  A4B3                      |-------------              ------------|                                      |
        |   |                            |  Approach 1                           |                                      |
                                         |                                       |                                      |
                                         |          See Step 6b.                 |                                      |
                                         |                                       |                                      |
                                         |                          Approach 2   |                                      |
                                         |-------------              ------------|                                      |
                                         |            |           |              |                                      |
-----------------------------------------|            |           |              |                                      |
 A1 -->    A3 |       B1 v--      B3   <|  |            |           |              |                                      |
           v ^                        | |  |            | Approach 4|              | Exclusive right turns reduced  30 %  |
 A2 <--    A4  |      B2 --^      B4 |>    |                                       | V/C Ratio = .51                      |
==========================================================================================
```

ATTACHMENT 5E

```
                        Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                          Design Hour: PM
Problem Statement: ALTA E+P MIT
============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR   |
           | Approach 3:WATERMAN RD     |                 -------Approach-----|       MULTIPHASE SIGNAL OVERLAP  |
           |          |       ^         |                 : -1-  -2-  -3-  -4-|    Possible   Volume    Adjusted|
           |  R   L   |       N         |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD  | R T T T L |                | intervals/hour  :                 |able   Volume    to next    Volume |
-------------  T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT         | change (vph)     :                 |----------------------------------|
     LT--^    v v v     <^-RTH         |c.G/C ratio       :  0    0    1    0|A2B1  104(B1)  456- 104= 352(A2)  104|
     LTH-^>             <--TH   2      |d.Opposing volume : 912   0   78    0|A1A2  493(A1) OR  352(A2)        493|
  2   TH-->             <v-LTH         | in vph           :                 |A4B3  374(B3) OR   55(A4)        374|
     RTH-v>   ^ ^ ^      v--LT  1      |e.LT capacity on  :  0    0 1122    0|                                  |
  1  RT--v   < < | > >   Approach 2    | green (vph)      :                 |                                  |
-------------  L L T R R  -------------|f.LT capacity in  :  0    0 1122    0|                                  |
           | T T H T T |FLORIN RD       | vph (b+e)        :                 |                                  |
           |  H   H    |               |g.Left turn volume :  0    0    0    0|                                  |
           | 1      1  |               | in vph           :                 |                                  |
           | Approach 4:WATERMAN RD     |h.Is volume > cap. :  NO        NO   :|                                  |
                                        | (g>f) ?          :                 |                                  |
========================================+=================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                        |       |                   |     |                                  |
                                        |       |                   |     |597(B1A1)+374(B3)+0()+0()         |
           | Approach 3|                |-------              -------|                                  |
 3:  LT=   0 | |        | 2:RT=   0     |                      <- 456 |          = 971 vph               |
    TH=   0  | |        |   TH= 912     |                      <- 456 |==================================|
   RT=   0   | v        |   LT= 104     |                      v- 104 | Step 8. INTERSECTION LEVEL OF    |
-------------           -------------|                               |         SERVICE                  |
                       <--Approach 2    |                               |    (compare step 7 with table 6) |
                                        |                               |              -------             |
                                        |                               |             |  B  |              |
 Approach 1-->                          |                               |              -------             |
-------------           -------------| 493 ->               < >      |==================================|
 1:LT=   0   |          ^ | 4: RT=  78  | 493 ->               | |      | Step 9. RECALCULATE              |
   TH= 986   |          | |   TH=   0   | 464 -v                        |                                  |
   RT= 464   |          | |  LT= 374    |-------               3  -------|Geometric Change:                 |
           | Approach 4|                |       |              7 7 |     |Signal Change:                    |
                                        |       |              4 8 |     |Volume Change:                    |
========================================+=================================+==================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                        |         (two phase signal)      |                                  |
          <--  A2B1                     |           | Approach 3|         |                                  |
          v--                           |           |           |         |                                  |
      --> <--  A1A2                     |           |           |         |                                  |
                                        |           |           |         |                                  |
       <    ^  A4B3                     |-------------        -------------|                                  |
       |    |                           | Approach 1                      |                                  |
                                        |                                 |                                  |
                                        |           See Step 6b.          |                                  |
                                        |                                 |                                  |
                                        |                     Approach 2  |                                  |
                                        |-------------        ------------|                                  |
                                        |           |           |         |                                  |
----------------------------------------|           |           |         |                                  |
 A1 -->   A3 |     B1 v--    B3   <|    |           |           |         |                                  |
          v ^                    | |    |           | Approach 4|         | Exclusive right turns reduced  30 % |
 A2 <--   A4  |    B2 --^    B4 |>      |                                 | V/C Ratio = .68                  |
============================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN AND BRADSHAW                                       Design Hour: AM
Problem Statement: ALTA E+P MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
              | Approach 3:BRADSHAW RD |            -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
              | 1   3   2 |      ^     |                : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
              |  R   L    |      N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN ROAD   | R T T T L |            | intervals/hour  :                  |able    Volume    to next    Volume |
------------- T H H H T  ------------- |b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT  1     | change (vph)    :                  |-----------------------------------|
   1  LT--^    v v v     <^-RTH        |c.G/C ratio      :  0    0    0    0|B4B3    41(B4)  241-  41= 200(B3)   41|
      LTH-^>             <--TH   2     |d.Opposing volume:  0    0    0    0|A4B3   200(B3)  671- 200= 471(A4)  200|
   2   TH-->             <v-LTH        | in vph          :                  |A3A4   471(A4) OR  194(A3)         471|
      RTH-v>   ^ ^ ^      v--LT  1     |e.LT capacity on :  0    0    0    0|B2B1    92(B1)  196-  92= 104(B2)   92|
   1  RT--v   < < | > >   Approach 2   | green (vph)     :                  |A1B2   104(B2)  182- 104=  78(A1)  104|
------------- L L T R R  ------------- |f.LT capacity in :  0    0    0    0|A1A2   181(A2) OR   78(A1)         181|
              | T T H T T |FLORIN ROAD | vph (b+e)       :                  |                                   |
              |  H   H    |            |g.Left turn volume: 0    0    0    0|                                   |
              | 2   2   1 |            | in vph          :                  |                                   |
              | Approach 4:BRADSHAW RD |h.Is volume > cap.:                 :                                   |
                                       | (g>f) ?         :                  |                                   |
=======================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES |
                                       |       |                   |      |                                   |
                                       |       | 1 1 1 1           |      |241(B4B3)+471(A4)+196(B1B2)+181(A2)|
              | Approach 3|            |-------  6 9 9 9 3 4        -------|                                  |
 3:  LT=  73  | |         | 2:RT= 147  |         7 4 4 4 3 1        ^- 147|          = 1089 vph              |
   TH= 582    | |         |   TH= 362  |         | | | | | |        <- 181|===================================|
  RT= 167     | v         |   LT=  92  |         < v v v > >        <- 181| Step 8. INTERSECTION LEVEL OF    |
-------------            ------------- |                            v-  92|         SERVICE                  |
                         <--Approach 2 |                                  |    (compare step 7 with table 6) |
                                       |                                  |            -------               |
                                       |                                  |            |  C  |             |
 Approach 1-->                         | 196 -^                           |            -------               |
-------------            ------------- | 112 ->          < < ^ ^ >        |===================================|
 1:LT= 196    |             ^ | 4: RT= 116 | 112 ->      | | | | |        | Step 9. RECALCULATE              |
   TH= 224    |             | |   TH=1342 | 260 -v                        |                                   |
   RT= 260    |             | |  LT= 437  |-------      2 1 6 6 1  -------|Geometric Change:                 |
              | Approach 4|            |      |         4 9 7 7 1 |      |Signal Change:                     |
                                       |      |         1 7 1 1 6 |      |Volume Change:                     |
=======================================+==================================+===================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph| COMMENTS                          |
                                       |        (two phase signal)        |                                   |
          |   <   B4B3                 |          | Approach 3|           |                                   |
          >   |                        |          |           |           |                                   |
     | | AND <  ^    A3B4 AND          |          |           |           |                                   |
     v > OR  | |     /OR A4B3          |          |           |           |                                   |
          |   ^   A3A4                 |------------           -----------|                                   |
          v   |                        | Approach 1                       |                                   |
         --^ v--  B2B1                 |                                  |                                   |
                                       |         See Step 6b.             |                                   |
     --^ AND <--     A1B2 AND          |                                  |                                   |
     --> OR  v--     /OR A2B1          |                        Approach 2|                                   |
         --> <--  A1A2                 |------------           -----------|                                   |
                                       |          |           |           |                                   |
---------------------------------------|          |           |           |                                   |
 A1 -->    A3 |      B1 v--     B3   <|           |           |           |                                   |
             v ^                     | |          |           |           |                                   |
 A2 <--    A4  |      B2 --^     B4 |>            | Approach 4|           | Exclusive right turns reduced 30 %|
                                       |                                  | V/C Ratio = .79                   |
==========================================================================================
```

ATTACHMENT 5E

```
                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: FLORIN AND BRADSHAW                                 Design Hour: PM
Problem Statement: ALTA E+P MIT
============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR    |
              | Approach 3:BRADSHAW RD  |                  -------Approach-----|      MULTIPHASE SIGNAL OVERLAP    |
              | 1   3   2 |      ^      |                  : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |   R   L   |      N      |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN ROAD   | R T T T L |             | intervals/hour   :                   |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1      | change (vph)     :                   |-----------------------------------|
   1  LT--^     v v v    <^-RTH         |c.G/C ratio       :  0    0    0    0|B4B3    97(B4)  265-  97= 168(B3)   97|
      LTH-^>             <--TH   2      |d.Opposing volume :  0    0    0    0|A4B3   168(B3)  385- 168= 217(A4)  168|
   2   TH-->             <v-LTH         | in vph           :                   |A3A4   486(A3) OR  217(A4)         486|
      RTH-v>    ^ ^ ^     v--LT  1      |e.LT capacity on  :  0    0    0    0|B2B1   133(B1)  258- 133= 125(B2)  133|
   1  RT--v   < < | > >   Approach 2    | green (vph)      :                   |A1B2   125(B2)  410- 125= 285(A1)  125|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A1A2   285(A1) OR  149(A2)         285|
              | T T H T T |FLORIN ROAD  | vph (b+e)        :                   |                                   |
              |   H   H   |             |g.Left turn volume :  0    0    0    0|                                   |
              | 2   2   1 |             | in vph           :                   |                                   |
              | Approach 4:BRADSHAW RD  |h.Is volume > cap. :                  :                                   |
                                        | (g>f) ?          :                   |                                   |
========================================+======================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES   |
                                        |       |                      |       |                                   |
                                        |       | 2 4 4 4              |       |265(B4B3)+486(A3)+258(B1B2)+285(A1)|
              | Approach 3|             |-------  5 8 8 8 7 9          -------|                                   |
 3:  LT= 175  | |         | 2:RT= 123   |         8 6 6 6 9 7          ^- 123 |            = 1294 vph             |
   TH=1457    | |         |   TH= 298   |         | | | | | |          <- 149 |===================================|
  RT= 258     | v         |   LT= 133   |         < v v v > >          <- 149 | Step 8. INTERSECTION LEVEL OF     |
-------------              -------------|                              v- 133 |         SERVICE                   |
                          <--Approach 2 |                                      |    (compare step 7 with table 6)  |
                                        |                                      |             -------               |
                                        |                                      |             |  E  |               |
 Approach 1-->                          | 258 -^                               |             -------               |
-------------              -------------| 205 ->          < < ^ ^ >            |===================================|
 1:LT= 258    |         ^ | 4: RT= 117  | 205 ->          | | | | |            | Step 9. RECALCULATE               |
   TH= 410    |         | |   TH= 770   | 585 -v                               |                                   |
  RT= 585     |         | |  LT= 481    |-------          2 2 3 3 1    -------|Geometric Change:                  |
              | Approach 4|             |       |         6 1 8 8 1 |          |Signal Change:                     |
                                        |       |         5 7 5 5 7 |          |Volume Change:                     |
========================================+======================================+===================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                          |
                                        |          (two phase signal)          |                                   |
          |   <   B4B3                  |              | Approach 3|           |                                   |
          >   |                         |              |           |           |                                   |
      | | AND < ^     A3B4 AND          |              |           |           |                                   |
      v > OR  | |     /OR A4B3          |              |           |           |                                   |
          |   ^   A3A4                  |-------------              -----------|                                   |
          v   |                         | Approach 1                           |                                   |
         --^ v--   B2B1                 |                                      |                                   |
                                        |          See Step 6b.                |                                   |
      --^ AND <--     A1B2 AND          |                                      |                                   |
      --> OR  v--     /OR A2B1          |                          Approach 2  |                                   |
         --> <--   A1A2                 |-------------              -----------|                                   |
                                        |              |           |           |                                   |
----------------------------------------|              |           |           |                                   |
 A1 -->    A3 |       B1 v--     B3   <||              |           |           |                                   |
             v ^                      | ||              | Approach 4|           | Exclusive right turns reduced  30 %|
 A2 <--    A4   |     B2 --^     B4 |>  |                                      | V/C Ratio = .94                   |
============================================================================================
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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: ELK GROVE FLORIN AND GERBER                        Design Hour: AM
Problem Statement: ALTA MIT
================================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR         |
             | Approach 3:ELK GROVE FLO|                  -------Approach-----|           MULTIPHASE SIGNAL OVERLAP    |
             | 1   2   2 |      ^      |                  : -1-  -2-  -3-  -4-|          Possible    Volume    Adjusted|
             |   R   L   |      N      |a.No. of change   :  0    0    0    0|Prob-     Critical   Carryover  Critical|
GERBER RD    | R T T T L |             |  intervals/hour  :                   |able       Volume     to next    Volume |
------------   T H H H T  ------------|b.LT capacity on  :  0    0    0    0|Phase      in vph      phase     in vph |
  Approach 1   < < | > >   ^--RT       |  change (vph)    :                   |---------------------------------------|
   1  LT--^     v v v     <^-RTH  1    |c.G/C ratio       :  0    0    0    0|B4B3     84(B4)  414-  84= 330(B3)    84|
      LTH-^>              <--TH   1    |d.Opposing volume :  0    0    0    0|A4B3    330(B3)  363- 330=  33(A4)   330|
   1   TH-->              <v-LTH       |  in vph          :                   |A3A4    176(A3) OR   33(A4)          176|
      RTH-v>    ^ ^ ^      v--LT  1    |e.LT capacity on  :  0    0    0    0|B2B1    113(B2)  185- 113=  72(B1)   113|
   1  RT--v    < < | > >   Approach 2  |  green (vph)     :                   |A2B1     72(B1)  410-  72= 338(A2)    72|
------------   L L T R R  ------------|f.LT capacity in  :  0    0    0    0|A1A2    369(A1) OR  338(A2)          369|
             | T T H T T |GERBER RD    |  vph (b+e)       :                   |                                        |
             |   H   H   |             |g.Left turn volume:  0    0    0    0|                                        |
             | 2   2   1 |             |  in vph          :                   |                                        |
             | Approach 4:ELK GROVE FLO|h.Is volume > cap.:                   :                                        |
                                       |  (g>f) ?         :                   |                                        |
=======================================+======================================+========================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES        |
                                       |         |                      |     |                                        |
                                       |         | 1 1 1                |     |414(B4B3)+176(A3)+185(B2B1)+369(A1)     |
             | Approach 3|             |-------   9 7 7 6 8            -------|                                        |
 3:  LT= 152 | |         | 2:RT= 371   |          4 6 6 8 4            ^+ 371 |           = 1144 vph                   |
   TH= 351   | |         |   TH= 449   |          | | | | |            <+  39 |========================================|
   RT= 194   | v         |   LT= 185   |          < v v > >            <- 410 | Step 8. INTERSECTION LEVEL OF          |
------------              ------------|                               v- 185 |         SERVICE                        |
                          <--Approach 2 |                                     |     (compare step 7 with table 6)      |
                                       |                                      |               -------                  |
                                       |                                      |               |  D  |                  |
 Approach 1-->                         |                                      |               -------                  |
------------              ------------| 113 -^             < < ^ ^ >         |========================================|
 1:LT= 113   |          ^ | 4: RT= 153 | 369 ->             | | | | |         | Step 9. RECALCULATE                    |
   TH= 369   |          | |   TH= 725  | 269 -v                               |                                        |
   RT= 269   |          | |  LT= 752   |-------             4 3 3 3 1  -------|Geometric Change:                       |
             | Approach 4|             |        |           1 3 6 6 5 |       |Signal Change:                          |
                                       |        |           4 8 3 3 3 |       |Volume Change:                          |
=======================================+======================================+========================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                               |
                                       |         (two phase signal)           |                                        |
          |  <   B4B3                  |           | Approach 3|              |                                        |
          >  |                         |           |           |              |                                        |
      | | AND < ^     A3B4 AND         |           |           |              |                                        |
      v > OR  | |     /OR A4B3         |           |           |              |                                        |
          |   ^  A3A4                  |-------------             ------------|                                        |
          v   |                        | Approach 1                           |                                        |
         --^ v--  B2B1                 |                                      |                                        |
                                       |          See Step 6b.                |                                        |
      --^ AND <--     A1B2 AND         |                                      |                                        |
      --> OR  v--     /OR A2B1         |                          Approach 2  |                                        |
         --> <--  A1A2                 |-------------             ------------|                                        |
                                       |           |           |              |                                        |
---------------------------------------|           |           |              |                                        |
 A1 -->    A3 |      B1 v--     B3   <| |           |           |              |                                        |
            v ^                       | | |           |           |              |                                        |
 A2 <--    A4  |     B2 --^     B4 |>  |           | Approach 4|              | Exclusive right turns reduced  30 %    |
                                       |                                      | V/C Ratio = .83                        |
================================================================================================================
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                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: ELK GROVE FLORIN AND GERBER                              Design Hour: PM
Problem Statement: ALTA MIT
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:ELK GROVE FLO|            -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1  2  2 |     ^     |                  : -1- -2- -3- -4-|    Possible   Volume   Adjusted|
             |  R  L   |     N     |a.No. of change   :  0   0   0   0|Prob- Critical Carryover Critical|
GERBER RD    | R T T T L |         | intervals/hour   :               |able   Volume  to next   Volume |
------------ T H H H T  -----------|b.LT capacity on  :  0   0   0   0|Phase  in vph   phase    in vph |
 Approach 1  < < | > >   ^--RT     | change (vph)     :               |---------------------------------|
  1 LT--^     v v v    <^-RTH  1   |c.G/C ratio       :  0   0   0   0|B4B3  185(B3) 227- 185=  42(B4)  185|
    LTH-^>             <--TH   1   |d.Opposing volume :  0   0   0   0|A3B4   42(B4) 367-  42= 325(A3)   42|
  1  TH-->             <v-LTH      | in vph           :               |A3A4  325(A3) OR  239(A4)        325|
    RTH-v>    ^ ^ ^     v--LT  1   |e.LT capacity on  :  0   0   0   0|B2B1  222(B1) 238- 222=  16(B2)  222|
  1 RT--v    < < | > >  Approach 2 | green (vph)      :               |A1B2   16(B2) 585-  16= 569(A1)   16|
------------ L L T R R  -----------|f.LT capacity in  :  0   0   0   0|A1A2  569(A1) OR  383(A2)        569|
             | T T H T T |GERBER RD| vph (b+e)        :               |                                 |
             |  H   H  |           |g.Left turn volume:  0   0   0   0|                                 |
             | 2  2  1 |           | in vph           :               |                                 |
             | Approach 4:ELK GROVE FLO|h.Is volume > cap. :          :                                 |
                                   | (g>f) ?          :               |                                 |
===================================+================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |      |                   |      |                                 |
                                   |      | 2 3 3 1 2         |      |227(B3B4)+325(A3)+238(B1B2)+569(A1) |
             | Approach 3|         |-------  3 6 6 8 2      -------|                                 |
 3:  LT= 411 | |        | 2:RT= 298 |       2 7 7 5 7        ^+ 298 |          = 1359 vph             |
    TH= 733  | |        |   TH= 467 |       | | | | |        <+  85 |=================================|
   RT= 232   | v        |   LT= 222 |       < v v > >        <- 383 | Step 8. INTERSECTION LEVEL OF   |
------------            -----------|                        v- 222 |         SERVICE                 |
                    <--Approach 2  |                               |     (compare step 7 with table 6) |
                                   |                               |            -------              |
                                   |                               |            | E |                |
 Approach 1-->                     |                               |            -------              |
------------           ------------| 238 -^          < < ^ ^ >     |=================================|
 1:LT= 238   |          ^ | 4: RT= 218 | 502 ->        | | | | |     | Step 9. RECALCULATE             |
   TH= 502   |          | |   TH= 478 | 835 -v                      |                                 |
   RT= 835   |          | |  LT= 336  |-------        1 1 2 2 2  -------|Geometric Change:               |
             | Approach 4|         |       |         8 5 3 3 1 |     |Signal Change:                   |
                                   |       |         5 1 9 9 8 |     |Volume Change:                   |
===================================+================================+==================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                     |
                                   |         (two phase signal)     |                                 |
        |  <   B4B3                |            | Approach 3|       |                                 |
        >  |                       |            |           |       |                                 |
   | | AND < ^     A3B4 AND        |            |           |       |                                 |
   v > OR  | |     /OR A4B3        |            |           |       |                                 |
        |  ^   A3A4                |------------            ------------|                             |
        v  |                       | Approach 1                     |                                 |
       --^ v--   B2B1              |                                |                                 |
                                   |         See Step 6b.           |                                 |
   --^ AND <--     A1B2 AND        |                                |                                 |
   --> OR  v--     /OR A2B1        |                     Approach 2 |                                 |
       --> <--   A1A2              |------------           ------------|                             |
-----------------------------------|            |           |       |                                 |
 A1 -->   A3 |     B1 v--    B3  <|  |           |           |       |                                 |
            v ^                 | |  |           |           |       |                                 |
 A2 <--   A4  |    B2 --^    B4 |>   |         | Approach 4|        | Exclusive right turns reduced 30 % |
                                   |                                | V/C Ratio = .99                 |
==================================================================================================
```

ATTACHMENT 5E

```
                          Critical Movement Analysis: PLANNING
                                   Calculation Form 1
Intersection: GERBER AND BRADSHAW                         Design Hour: AM
Problem Statement: ALTA E+P MIT
============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR          |
            | Approach 3:BRADSHAW RD   |                   -------Approach-----|          MULTIPHASE SIGNAL OVERLAP      |
            | 1   2   1 |       ^      |                   : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
            |   R   L   |       N      |a.No. of change    :  0    0    0    0|Prob-   Critical  Carryover  Critical|
GERBER RD   | R T T T L |              |  intervals/hour   :                   |able     Volume    to next    Volume |
------------  T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase    in vph     phase     in vph |
  Approach 1   < < | > >   ^--RT  1    |  change (vph)     :                   |------------------------------------------|
   2  LT--^     v v v     <^-RTH       |c.G/C ratio        :  0    0    0    0|B4B3     56(B3)   95-  56=  39(B4)    56|
      LTH-^>              <--TH   1    |d.Opposing volume  :  0    0    0    0|A3B4     39(B4)  240-  39= 201(A3)    39|
   1   TH-->              <v-LTH       |  in vph           :                   |A3A4    401(A4)  OR  201(A3)          401|
      RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on   :  0    0    0    0|B2B1     17(B1)  229-  17= 212(B2)    17|
   1  RT--v    < < | > >   Approach 2  |  green (vph)      :                   |A1B2    212(B2)  170- 212=   0(A1)   212|
------------  L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A1A2    231(A2)  OR     0(A1)         231|
            | T T H T T |GERBER RD     |  vph (b+e)        :                   |                                          |
            |   H   H   |              |g.Left turn volume :  0    0    0    0|                                          |
            | 1   2   1 |              |  in vph           :                   |                                          |
            | Approach 4:BRADSHAW RD   |h.Is volume > cap. :                   :                                          |
                                       |  (g>f) ?          :                   |                                          |
=======================================+========================================+==========================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph    | Step 7. SUM OF CRITICAL VOLUMES          |
                                       |        |                     |         |                                          |
                                       |        | 3 1 1               |         |95(B3B4)+401(A4)+229(B1B2)+231(A2)        |
            | Approach 3|              |-------   4 6 6 9              ------- |                                          |
 3:  LT=  95 | |          | 2:RT= 151  |          3 0 0 5              ^- 151  |          = 956 vph                       |
   TH= 319  | |          |   TH= 231   |          | | | |              <- 231  |==========================================|
   RT= 343  | v          |   LT=  29   |          < v v >              v-  14  | Step 8. INTERSECTION LEVEL OF            |
------------              -------------|                               v-  17  |        SERVICE                           |
                          <--Approach 2 |                                       |     (compare step 7 with table 6)        |
                                       |                                        |               -------                    |
                                       |                                        |               | B  |                     |
 Approach 1-->                         | 229 -^                                 |               -------                    |
------------              -------------| 187 -^          < ^ ^ >                |==========================================|
 1:LT= 416   |          ^ | 4: RT=  31 | 170 ->          | | | |                | Step 9. RECALCULATE                      |
   TH= 170   |          | |    TH= 801 |  54 -v                                 |                                          |
   RT=  54   |          | |    LT=  56 |-------            4 4         -------  |Geometric Change:                         |
            | Approach 4|              |        |        5 0 0 3 |              |Signal Change:                            |
                                       |        |        6 1 1 1 |              |Volume Change:                            |
=======================================+========================================+==========================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph      | COMMENTS                                 |
                                       |         (two phase signal)             |                                          |
        |   <   B4B3                   |            | Approach 3|               |                                          |
        >   |                          |            |           |               |                                          |
   | | AND < ^     A3B4 AND            |            |           |               |                                          |
   v > OR  | |     /OR A4B3            |            |           |               |                                          |
        |   ^   A3A4                   |-------------           -------------   |                                          |
        v   |                          | Approach 1                             |                                          |
       --^ v--  B2B1                   |                                        |                                          |
                                       |          See Step 6b.                  |                                          |
   --^ AND <--     A1B2 AND            |                                        |                                          |
   --> OR  v--     /OR A2B1            |                         Approach 2     |                                          |
       --> <--  A1A2                   |-------------            ------------   |                                          |
                                       |            |           |               |                                          |
---------------------------------------|            |           |               |                                          |
 A1 -->    A3 |      B1 v--    B3   <| |            |           |               |                                          |
             v ^                   | | |            | Approach 4|               | Exclusive right turns reduced  30 %      |
 A2 <--    A4  |     B2 --^    B4 |>   |                                        | V/C Ratio = .7                           |
============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER AND BRADSHAW                                       Design Hour: PM
Problem Statement: ALTA E+P MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:BRADSHAW RD |                  -------Approach-----|    MULTIPHASE SIGNAL OVERLAP |
             | 1  2  1 |      ^   |                    : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
             |   R  L  |      N   |a.No. of change     :  0    0    0    0|Prob-  Critical  Carryover Critical|
GERBER RD    | R T T T L |        | intervals/hour     :                  |able    Volume   to next    Volume |
------------- T H H H T --------- |b.LT capacity on    :  0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1  < < | > >  ^--RT  1 | change (vph)       :                  |---------------------------------|
   2  LT--^     v v v   <^-RTH    |c.G/C ratio         :  0    0    0    0|B4B3    73(B3)  205-  73= 132(B4)    73|
      LTH-^>            <--TH   1 |d.Opposing volume   :  0    0    0    0|A3B4   132(B4)  427- 132= 295(A3)   132|
   1   TH-->            <v-LTH    | in vph             :                  |A3A4   295(A3)  OR  157(A4)         295|
      RTH-v>     ^ ^ ^   v--LT  2 |e.LT capacity on    :  0    0    0    0|B2B1    21(B1)  293-  21= 272(B2)    21|
   1  RT--v   < < | > >  Approach 2 | green (vph)      :                  |A1B2   272(B2)  279- 272=   7(A1)   272|
------------- L L T R R ------------|f.LT capacity in  :  0    0    0    0|A1A2   250(A2)  OR    7(A1)         250|
             | T T H T T |GERBER RD | vph (b+e)        :                  |                                 |
             |   H  H    |          |g.Left turn volume :  0    0    0    0|                                 |
             | 1  2  1 |            | in vph           :                  |                                 |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :               :                                 |
                                    | (g>f) ?          :                  |                                 |
===================================+==================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |      |                  |        |                                 |
                                   |      | 6 3 3 2          |        |205(B3B4)+295(A3)+293(B1B2)+250(A2)|
             | Approach 3|         |-------  1 7 7 0            -------|                                 |
 3:  LT= 205 | |        | 2:RT= 191 |        0 5 5 5           ^- 191 |           = 1043 vph            |
     TH= 750 | |        |   TH= 250 |        | | | |           <- 250 |=================================|
     RT= 610 | v        |   LT=  37 |        < v v >           v-  17 | Step 8. INTERSECTION LEVEL OF   |
-------------           ------------|                            v-  21 |         SERVICE                 |
                       <--Approach 2 |                                  |   (compare step 7 with table 6) |
                                   |                                  |            -------              |
                                   |                                  |            | C |                |
 Approach 1-->                     | 293 -^                           |            -------              |
-------------          ------------| 239 -^            < ^ ^ >        |=================================|
 1:LT= 532  |          ^ | 4: RT=  25 | 279 ->           | | | |      | Step 9. RECALCULATE             |
   TH= 279  |          | |   TH= 314 |  76 -v                         |                                 |
   RT=  76  |          | |   LT=  73 |-------              1 1  -------|Geometric Change:                |
            | Approach 4|          |      |            7 5 5 2 |      |Signal Change:                   |
                                   |      |            3 7 7 5 |      |Volume Change:                   |
===================================+==================================+=================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                   |         (two phase signal)       |                                 |
          |   <   B4B3             |            | Approach 3|         |                                 |
          >   |                    |            |           |         |                                 |
     | | AND < ^     A3B4 AND      |            |           |         |                                 |
     v > OR  | |     /OR A4B3      |            |           |         |                                 |
          |   ^   A3A4             |-------------          -----------|                                 |
          v   |                    |  Approach 1                      |                                 |
         --^ v--  B2B1             |                                  |                                 |
                                   |          See Step 6b.            |                                 |
     --^ AND <--     A1B2 AND      |                                  |                                 |
     --> OR  v--     /OR A2B1      |                     Approach 2   |                                 |
         --> <--  A1A2             |-------------          -----------|                                 |
                                   |            |           |         |                                 |
-----------------------------------|            |           |         |                                 |
 A1 -->   A3 |      B1 v--    B3  <|            |           |         |                                 |
            v ^                  | |            |           |         |                                 |
 A2 <--   A4  |     B2 --^    B4 |> |           | Approach 4|         | Exclusive right turns reduced  30 % |
                                   |                                  | V/C Ratio = .76                 |
==========================================================================================
```

# APPENDIX C

## Existing Plus Dispersed Core Alternative
## Level of Service Calculations

```
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------------------------------------------------------------------------------

------------------------------------------------------------------------------
                      Level Of Service Computation Report
             1994 HCM 4-Way Stop Method (Base Volume Alternative)
******************************************************************************
Intersection #3 ELK GROVE FLORIN/FLORIN ROAD
******************************************************************************
Cycle (sec):           1               Critical Vol./Cap. (X):        4.319
Loss Time (sec):       0               Average Delay (sec/veh):    OVERFLOW
Optimal Cycle:         0               Level Of Service:                  F
******************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    1  0  1  0  1    0  1  0  1  0    1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      366  650   142   255  323    91    98  469   194   187  673   482
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Bse:   366  650   142   255  323    91    98  469   194   187  673   482
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:    385  684   149   268  340    96   103  494   204   197  708   507
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:   385  684   149   268  340    96   103  494   204   197  708   507
PCE Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:      1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:    385  684   149   268  340    96   103  494   204   197  708   507
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:      282  282   282   287  287   287   249  249   249   275  275   275
Adjustment:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:        0.32 0.56  0.12  1.00 1.00  1.00  0.26 1.23  0.51  1.00 1.00  1.00
Final Sat.:     89  158    34   287  287   287    64  307   127   275  275   275
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:      4.32 4.32  4.32  0.93 1.18  0.33  1.61 1.61  1.61  0.72 2.57  1.84
Crit Moves:   ****                  ****                   ****        ****
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Delay/Veh:   xxxxx xxxx xxxxx  34.8 90.2   3.6 451.3  451 451.3  15.2 xxxx  1103
Delay Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh:  xxxxx xxxx xxxxx  34.8 90.2   3.6 451.3  451 451.3  15.2 xxxx  1103
LOS by Move:     F    F     F     E    F     A     F    F     F     C    F     F
******************************************************************************
```

```
MITIG8                 Thu Jan 15, 1998 09:19:06                Page 1-1
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
                      Level Of Service Computation Report
              1994 HCM 4-Way Stop Method (Base Volume Alternative)
*****************************************************************************
Intersection #3 ELK GROVE FLORIN/FLORIN ROAD
*****************************************************************************
Cycle (sec):            1                Critical Vol./Cap. (X):        4.343
Loss Time (sec):        0                Average Delay (sec/veh):    OVERFLOW
Optimal Cycle:          0                Level Of Service:                  F
*****************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign        Stop Sign        Stop Sign
Rights:          Include          Include          Include          Include
Lanes:        0  0  1! 0  0    1  0  1  0  1    0  1  0  1  0    1  0  1  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     288  469   241   655  707   130    84  778   425   250  690   491
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Bse:  288  469   241   655  707   130    84  778   425   250  690   491
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:   303  494   254   689  744   137    88  819   447   263  726   517
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Reduced Vol:  303  494   254   689  744   137    88  819   447   263  726   517
PCE Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
MLF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Final Vol.:   303  494   254   689  744   137    88  819   447   263  726   517
------------|---------------||---------------||---------------||---------------|
Saturation Flow Module:
Sat/Lane:     242  242   242   316  316   316   243  243   243   275  275   275
Adjustment:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Lanes:       0.29 0.47  0.24  1.00 1.00  1.00  0.13 1.21  0.66  1.00 1.00  1.00
Final Sat.:    70  114    58   316  316   316    32  294   160   275  275   275
------------|---------------||---------------||---------------||---------------|
Capacity Analysis Module:
Vol/Sat:     4.34 4.34  4.34  2.18 2.35  0.43  2.79 2.79  2.79  0.96 2.64  1.88
Crit Moves:       ****             ****                   ****        ****
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Delay/Veh:  xxxxx xxxx xxxxx  3966 7684   5.2 39610 xxxx 39610  37.9 xxxx  1266
Delay Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
AdjDel/Veh: xxxxx xxxx xxxxx  3966 7684   5.2 39610 xxxx 39610  37.9 xxxx  1266
LOS by Move:    F    F     F     F    F     B     F    F     F     E    F     F
*****************************************************************************
```

ALT D

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                    Design Hour: AM
Problem Statement: ALTD
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR         |
             | Approach 3:WATERMAN RD    |                  -------Approach-----|           MULTIPHASE SIGNAL OVERLAP    |
             |           |       ^       |                  : -1-  -2-  -3-  -4-|      Possible   Volume     Adjusted|
             |   R   L   |       N       |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |               |  intervals/hour  :                   |able    Volume   to next    Volume |
------------- T H H H T  ----------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1   < < | > >    ^--RT        |  change (vph)    :                   |---------------------------------------|
      LT--^     v v v      <^-RTH        |c.G/C ratio       :  0    0    1    0|A2B1    80(B1)  697-  80= 617(A2)    80|
      LTH-^>               <--TH    1    |d.Opposing volume : 697   0  153    0|A1A2   617(A2) OR  298(A1)          617|
   1   TH-->               <v-LTH        |  in vph          :                   |A4B3   346(B3) OR  107(A4)          346|
      RTH-v>    ^ ^ ^       v--LT   1    |e.LT capacity on  :  0    0 1047    0|                                       |
   1  RT--v    < < | > >    Approach 2   |  green (vph)     :                   |                                       |
-------------  L L T R R  ---------------|f.LT capacity in  :  0    0 1047    0|                                       |
             | T T H T T |FLORIN RD      |  vph (b+e)       :                   |                                       |
             |   H   H   |               |g.Left turn volume:  0    0    0    0|                                       |
             | 1       1 |               |  in vph          :                   |                                       |
             | Approach 4:WATERMAN RD    |h.Is volume > cap.:  NO        NO     :                                       |
                                         |  (g>f) ?         :                   |                                       |
=========================================+======================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES       |
                                         |        |                       |     |                                       |
                                         |        |                       |     |697(B1A2)+346(B3)+0()+0()              |
             | Approach 3|               |-------                        -------|                                       |
 3:  LT=   0 | |         | 2:RT=   0     |                               <- 697 |        = 1043 vph                     |
   TH=   0   | |         |   TH= 697     |                               v-  80 |=======================================|
  RT=   0    | v         |   LT=  80     |                                      | Step 8. INTERSECTION LEVEL OF         |
-------------              --------------|                                      |         SERVICE                       |
                         <--Approach 2   |                                      |     (compare step 7 with table 6)     |
                                         |                                      |              -------                  |
                                         |                                      |              |  C  |                  |
 Approach 1-->                           |                                      |              -------                  |
-------------              --------------|                           < >        |=======================================|
 1:LT=   0   |           ^ | 4: RT= 153  | 298 ->                    | |        | Step 9. RECALCULATE                   |
   TH= 298   |           | |    TH=   0  | 199 -v                               |                                       |
   RT= 199   |           | |   LT= 346   |-------                    3 1 -------|Geometric Change:                      |
             | Approach 4|               |        |                  4 5 |      |Signal Change:                         |
                                         |        |                  6 3 |      |Volume Change:                         |
=========================================+======================================+=======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                              |
                                         |           (two phase signal)         |                                       |
            <--   A2B1                   |            | Approach 3|             |                                       |
            v--                          |            |           |             |                                       |
        --> <--   A1A2                   |            |           |             |                                       |
                                         |            |           |             |                                       |
          <   ^   A4B3                   |-------------             ------------|                                       |
          |   |                          | Approach 1                           |                                       |
                                         |                                      |                                       |
                                         |          See Step 6b.                |                                       |
                                         |                                      |                                       |
                                         |                          Approach 2  |                                       |
                                         |-------------             ------------|                                       |
-----------------------------------------|            |           |             |                                       |
 A1 -->    A3 |       B1 v--     B3    <|  |            |           |             |                                       |
            v ^                         |  |            |           |             |                                       |
 A2 <--    A4  |      B2 --^     B4 |>     |            | Approach 4|             | Exclusive right turns reduced  30 %   |
                                         |                                      | V/C Ratio = .73                       |
==========================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                              Design Hour: PM
Problem Statement: ALTD
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:WATERMAN RD |              -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
            |        |      ^       |              : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
            |  R  L  |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |           | intervals/hour  :                 |able   Volume    to next    Volume |
------------ T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT      | change (vph)    :                 |----------------------------------|
    LT--^     v v v     <^-RTH      |c.G/C ratio      :  0    0    1    0|A2B1   126(B1)  749- 126= 623(A2)  126|
    LTH-^>              <--TH   1   |d.Opposing volume : 749   0   99    0|A1A2  817(A1) OR  623(A2)        817|
 1   TH-->              <v-LTH      | in vph          :                 |A4B3   382(B3) OR   69(A4)        382|
    RTH-v>    ^ ^ ^      v--LT  1   |e.LT capacity on :  0    0 1101    0|                                  |
 1  RT--v    < < | > >   Approach 2 | green (vph)     :                 |                                  |
------------ L L T R R  ------------|f.LT capacity in :  0    0 1101    0|                                  |
            | T T H T T |FLORIN RD  | vph (b+e)       :                 |                                  |
            |  H   H    |           |g.Left turn volume :  0    0    0    0|                                  |
            | 1      1  |           | in vph          :                 |                                  |
            | Approach 4:WATERMAN RD |h.Is volume > cap. :  NO       NO    :                                  |
                                    | (g>f) ?         :                 |                                  |
====================================+=================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                    |       |                    |    |                                  |
                                    |       |                    |    |943(B1A1)+382(B3)+0()+0()         |
            | Approach 3|           |-------                 -------|                                  |
 3:  LT=   0 | |          | 2:RT=   0 |                        <- 749 |        = 1325 vph                |
   TH=   0 | |          |   TH= 749 |                        v- 126 |==================================|
  RT=   0  | v          |   LT= 126 |                               | Step 8. INTERSECTION LEVEL OF    |
------------             -----------|                               |       SERVICE                    |
                        <--Approach 2 |                               |    (compare step 7 with table 6) |
                                    |                               |             -------              |
                                    |                               |             |  E  |              |
 Approach 1-->                      |                               |             -------              |
------------             -----------|                     < >       |==================================|
 1:LT=   0  |          ^ | 4: RT=  99 | 817 ->              | |       | Step 9. RECALCULATE              |
   TH= 817  |          | |   TH=   0 | 471 -v                         |                                  |
   RT= 471  |          | |   LT= 382 |-------               3   -------|Geometric Change:                 |
            | Approach 4|           |       |              8 9 |      |Signal Change:                    |
                                    |       |              2 9 |      |Volume Change:                    |
====================================+=================================+==================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                    |        (two phase signal)     |                                  |
          <--  A2B1                 |           | Approach 3|       |                                  |
          v--                       |           |           |       |                                  |
       --> <--  A1A2                |           |           |       |                                  |
                                    |           |           |       |                                  |
        <   ^   A4B3                |------------           ------------|                                  |
        |   |                       | Approach 1                      |                                  |
                                    |                               |                                  |
                                    |          See Step 6b.         |                                  |
                                    |                               |                                  |
                                    |                     Approach 2 |                                  |
                                    |------------           ------------|                                  |
                                    |           |           |       |                                  |
------------------------------------|           |           |       |                                  |
 A1 -->   A3 |      B1 v--     B3   <|          |           |       |                                  |
            v ^                      |  |       | Approach 4|       | Exclusive right turns reduced  30 % |
 A2 <--   A4   |      B2 --^     B4 |>          |           |       | V/C Ratio = .93                  |
==========================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN AND BRADSHAW                                         Design Hour: AM
Problem Statement: ALTD
===================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR      |
              | Approach 3:BRADSHAW RD   |                 -------Approach-----|      MULTIPHASE SIGNAL OVERLAP       |
              | 1   1   1  |       ^     |                 : -1-  -2-  -3-  -4-|        Possible   Volume     Adjusted|
              |   R   L    |       N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover   Critical|
FLORIN ROAD   | R T T T L  |             |  intervals/hour :                  |able    Volume   to next     Volume |
------------- | T H H H T  ------------- |b.LT capacity on :  0    0    0    0|Phase   in vph    phase      in vph |
 Approach 1   | < < | > >   ^--RT        |  change (vph)   :                  |--------------------------------------|
  1  LT--^    |   v v v    <^-RTH  1     |c.G/C ratio      :  0    0    0    0|B4B3     55(B4)  402-  55= 347(B3)   55|
     LTH-^>   |            <--TH         |d.Opposing volume:  0    0    0    0|A4B3    347(B3) 1445- 347=1098(A4)  347|
      TH-->   |                          |  in vph         :                  |A3A4   1098(A4) OR  578(A3)          1098|
  1  RTH-v>   |   ^ ^ ^     v--LT  1     |e.LT capacity on :  0    0    0    0|B2B1     84(B1)  194-  84= 110(B2)   84|
     RT--v    | < < | > >   Approach 2   |  green (vph)    :                  |A1B2    110(B2)  397- 110= 287(A1)  110|
------------- | L L T R R  ------------- |f.LT capacity in :  0    0    0    0|A1A2    509(A2) OR  287(A1)           509|
              | T T H T T  |FLORIN ROAD  |  vph (b+e)      :                  |                                      |
              |   H   H    |             |g.Left turn volume: 0    0    0    0|                                      |
              | 1     1    |             |  in vph         :                  |                                      |
              | Approach 4:BRADSHAW RD   |h.Is volume > cap. :               :|                                      |
                                         |  (g>f) ?        :                  |                                      |
==========================================+===================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                         |        |                  |        |                                      |
                                         |        | 1 5              |        |402(B4B3)+1098(A4)+194(B1B2)+509(A2)  |
              | Approach 3|              |-------  7 7 5              ------- |                                      |
 3:  LT=  55  | |         |  2:RT= 147   |         0 8 5              ^+ 147  |            = 2203 vph                |
    TH= 578   | |         |    TH= 362   |         | | |              <+ 362  |======================================|
   RT= 170    | v         |    LT=  84   |         < v >              v-  84  | Step 8. INTERSECTION LEVEL OF        |
-------------              ------------- |                                    |         SERVICE                      |
                          <--Approach 2  |                                    |    (compare step 7 with table 6)     |
                                         |                                    |              -------                 |
                                         |                                    |             |  F  |                 |
 Approach 1-->                           |                                    |              -------                 |
-------------              ------------- | 194 -^                 < ^ >       |======================================|
 1:LT= 194    |         ^ |  4: RT= 106  | 175 +>                 | + +       | Step 9. RECALCULATE                  |
   TH= 175    |         | |    TH=1339   | 222 +v                   1         |                                      |
   RT= 222    |         | |    LT= 402   |-------                 4 3 1 -------|Geometric Change:                     |
              | Approach 4|              |        |               0 3 0 |     |Signal Change:                        |
                                         |        |               2 9 6 |     |Volume Change:                        |
==========================================+===================================+======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                         |          (two phase signal)        |                                      |
            |   <    B4B3                |              | Approach 3|         |                                      |
            >   |                        |              |           |         |                                      |
        | | AND <  ^    A3B4 AND         |              |           |         |                                      |
        v > OR  | |     /OR A4B3         |              |           |         |                                      |
            |   ^    A3A4                |-------------           ------------|                                      |
            v   |                        | Approach 1                         |                                      |
           --^ v--   B2B1                |                                    |                                      |
                                         |           See Step 6b.             |                                      |
        --^ AND <--     A1B2 AND         |                                    |                                      |
        --> OR  v--     /OR A2B1         |                        Approach 2  |                                      |
           --> <--   A1A2                |-------------            -----------|                                      |
                                         |              |           |         |                                      |
-----------------------------------------|              |           |         |                                      |
 A1 -->    A3 |        B1 v--     B3   <|               |           |         |                                      |
              v ^                      | |              | Approach 4|         | Exclusive right turns reduced  30 %  |
 A2 <--    A4   |      B2 --^     B4  |> |                                    | V/C = 1.60                           |
===================================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN AND BRADSHAW                                  Design Hour: PM
Problem Statement: ALTD
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
           | Approach 3:BRADSHAW RD    |              -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
           | 1   1   1 |      ^        |               : -1- -2- -3- -4-|      Possible   Volume    Adjusted|
           |  R   L    |      N        |a.No. of change :  0   0   0   0|Prob- Critical  Carryover Critical|
FLORIN ROAD| R T T T L |               | intervals/hour :                |able  Volume   to next   Volume |
-----------  T H H H T  -------------  |b.LT capacity on:  0   0   0   0|Phase in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT         | change (vph)   :                |---------------------------------|
  1 LT--^     v v v     <^-RTH  1      |c.G/C ratio     :  0   0   0   0|B4B3  157(B4)  371- 157= 214(B3)  157|
    LTH-^>              <--TH          |d.Opposing volume: 0   0   0   0|A4B3  214(B3)  861- 214= 647(A4)  214|
     TH-->              <v-LTH         | in vph         :                |A3A4 1454(A3) OR 647(A4)         1454|
  1 RTH-v>    ^ ^ ^      v--LT  1      |e.LT capacity on:  0   0   0   0|B2B1  123(B1)  224- 123= 101(B2)  123|
    RT--v    < < | > >   Approach 2    | green (vph)    :                |A1B2  101(B2)  886- 101= 785(A1)  101|
-----------  L L T R R  -------------  |f.LT capacity in:  0   0   0   0|A1A2  785(A1) OR 371(A2)          785|
           | T T H T T |FLORIN ROAD    | vph (b+e)      :                |                                 |
           |   H   H   |               |g.Left turn volume: 0  0   0   0|                                 |
           | 1     1   |               | in vph         :                |                                 |
           | Approach 4:BRADSHAW RD    |h.Is volume > cap. :            :|                                 |
                                       | (g>f) ?        :                |                                 |
=======================================+=================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |       |  1              |       |                                 |
                                       |       | 2 4 1           |       |371(B4B3)+1454(A3)+224(B1B2)+785(A1)|
           | Approach 3|               |-------  6 5 5           -------|                                 |
 3:  LT= 157 | |       | 2:RT= 100     |         7 4 7           ^+ 100 |        = 2834 vph               |
   TH=1454   | |       |   TH= 271     |         | | |           <+ 271 |=================================|
   RT= 267   | v       |   LT= 123     |         < v >           v- 123 | Step 8. INTERSECTION LEVEL OF   |
-----------            -------------   |                                 |        SERVICE                  |
                      <--Approach 2    |                                 |    (compare step 7 with table 6)|
                                       |                                 |            -------              |
                                       |                                 |            |  F  |            |
 Approach 1-->                         |                                 |            -------              |
-----------            -------------   | 224 -^             < ^ >        |=================================|
 1:LT= 224   |           ^ | 4: RT= 109| 362 +>             | + +        | Step 9. RECALCULATE             |
   TH= 362   |           | |   TH= 752 | 524 +v                          |                                 |
   RT= 524   |           | |   LT= 371 |-------             3 7 1 -------|Geometric Change:                |
             | Approach 4|             |        |           7 5 0 |      |Signal Change:                   |
                                       |        |           1 2 9 |      |Volume Change:                   |
=======================================+=================================+=================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                      |
                                       |      (two phase signal)         |                                 |
        |   <    B4B3                  |          | Approach 3|          |                                 |
        >   |                          |          |           |          |                                 |
    | | AND < ^    A3B4 AND            |          |           |          |                                 |
    v > OR  | |    /OR A4B3            |          |           |          |                                 |
        |   ^    A3A4                  |-------------       -------------|                                 |
        v   |                          | Approach 1                      |                                 |
       --^ v--   B2B1                  |                                 |                                 |
                                       |        See Step 6b.             |                                 |
    --^ AND <--    A1B2 AND            |                                 |                                 |
    --> OR  v--    /OR A2B1            |                   Approach 2    |                                 |
       --> <--   A1A2                  |-------------       -------------|                                 |
                                       |          |           |          |                                 |
---------------------------------------|          |           |          |                                 |
 A1 -->   A3 |     B1 v--    B3   <|   |          |           |          |                                 |
            v ^                   | |  |          | Approach 4|          | Exclusive right turns reduced 30 % |
 A2 <--   A4  |    B2 --^    B4  |>    |                                 | V/C Ratio = 2.06                |
===============================================================================================
```

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                       Level Of Service Computation Report
             1985 HCM Unsignalized Method (Base Volume Alternative)
*******************************************************************************
Intersection #2 FLORIN/VINEYARD
*******************************************************************************
                                        Level Of Service:               D
*******************************************************************************
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:         Include          Include          Include          Include
Lanes:        1  0  0  0  1    0  0  0  0  0    0  0  1  0  1    1  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:     125    0    22    0    0     0    0  287    49    8  468     0
Growth Adj:  1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PasserByVol:    0    0     0    0    0     0    0    0     0    0    0     0
Initial Bse:  125    0    22    0    0     0    0  287    49    8  468     0
User Adj:    1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00
PHF Adj:     0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95
PHF Volume:   132    0    23    0    0     0    0  302    52    8  493     0
Reduct Vol:     0    0     0    0    0     0    0    0     0    0    0     0
Final Vol.:   132    0    23    0    0     0    0  302    52    8  493     0
------------|---------------||---------------||---------------||---------------|
Adjusted Volume Module:
Grade:              0%               0%               0%               0%
% Cycle/Cars:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
% Truck/Comb:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
PCE Adj:     1.10 1.10  1.10 1.10 1.10  1.10 1.10 1.00  1.00 1.10 1.00  1.00
Cycl/Car PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Trck/Cmb PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Adj Vol.:     145    0    25    0    0     0    0  302    52    9  493     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module: >> Population: 0 << >> Run Speed(E/W): 30 MPH <<
RT Rad/Ang:  20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg
Critical Gp:  7.0 xxxx   5.5 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   5.5 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  803 xxxx   302  xxxx xxxx xxxxx  xxxx xxxx xxxxx   354 xxxx xxxxx
Potent Cap.:  264 xxxx   783  xxxx xxxx xxxxx  xxxx xxxx xxxxx   737 xxxx xxxxx
% Used Cap.: 54.9 xxxx   3.3 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   1.3 xxxx xxxxx
Impedance:   xxxx xxxx  0.98  xxxx xxxx xxxxx  xxxx xxxx xxxxx  0.99 xxxx xxxxx
Actual Cap.:  262 xxxx   783  xxxx xxxx xxxxx  xxxx xxxx xxxxx   737 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Unused Cap.:  117 xxxx   758  xxxx xxxx xxxxx  xxxx xxxx xxxxx   728 xxxx xxxxx
LOS by Move:    D    *     A     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Unused Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
```

```
------------------------------------------------------------------------------
------------------------------------------------------------------------------
                     Level Of Service Computation Report
          1985 HCM Unsignalized Method (Base Volume Alternative)
******************************************************************************
Intersection #2 FLORIN/VINEYARD
******************************************************************************
                                        Level Of Service:                E
******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:          Include          Include          Include          Include
Lanes:        1  0  0  0  1    0  0  0  0  0    0  0  1  0  1    1  0  1  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:      88    0    14     0    0     0     0  484   144    23  406     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Bse:   88    0    14     0    0     0     0  484   144    23  406     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95  0.95 0.95  0.95
PHF Volume:    93    0    15     0    0     0     0  509   152    24  427     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
Final Vol.:    93    0    15     0    0     0     0  509   152    24  427     0
------------|---------------||---------------||---------------||---------------|
Adjusted Volume Module:
Grade:             0%               0%               0%               0%
% Cycle/Cars:  xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
% Truck/Comb:  xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
PCE Adj:     1.10 1.10  1.10  1.10 1.10  1.10  1.10 1.00  1.00  1.10 1.00  1.00
Cycl/Car PCE:  xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Trck/Cmb PCE:  xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Adj Vol.:     102    0    16     0    0     0     0  509   152    27  427     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module: >> Population: 0 << >> Run Speed(E/W): 30 MPH <<
RT Rad/Ang:  20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg
Critical Gp:  7.0 xxxx   5.5 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   5.5 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  961 xxxx   509  xxxx xxxx xxxxx  xxxx xxxx xxxxx   661 xxxx xxxxx
Potent Cap.:  202 xxxx   621  xxxx xxxx xxxxx  xxxx xxxx xxxxx   512 xxxx xxxxx
% Used Cap.: 50.5 xxxx   2.6 xxxxx xxxx xxxxx xxxxx xxxx xxxxx   5.2 xxxx xxxxx
Impedance:   xxxx xxxx  0.98  xxxx xxxx xxxxx  xxxx xxxx xxxxx  0.97 xxxx xxxxx
Actual Cap.:  196 xxxx   621  xxxx xxxx xxxxx  xxxx xxxx xxxxx   512 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Unused Cap.:   94 xxxx   605  xxxx xxxx xxxxx  xxxx xxxx xxxxx   486 xxxx xxxxx
LOS by Move:    E    *     A     *    *     *     *    *     *     A    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Unused Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
```

```
                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: ELK GROVE FLORIN AND GERBER                               Design Hour: AM
Problem Statement: ALTD
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR    |
             | Approach 3:ELK GROVE FLO|                  -------Approach-----|       MULTIPHASE SIGNAL OVERLAP   |
             |  1     1 |      ^       |                 : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R   L   |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |             | intervals/hour  :                  |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT       | change (vph)     :                  |-----------------------------------|
   1  LT--^    v v v     <^-RTH  1    |c.G/C ratio       :  0    0    0    0|B4B3  204(B4)  752- 204= 548(B3)  204|
      LTH-^>             <--TH   1    |d.Opposing volume :  0    0    0    0|A4B3  548(B3)  875- 548= 327(A4)  548|
   1   TH-->             <v-LTH       | in vph           :                  |A3A4  531(A3) OR  327(A4)          531|
      RTH-v>    ^ ^ ^     v--LT  1    |e.LT capacity on  :  0    0    0    0|B2B1  102(B2)  187- 102=  85(B1)  102|
   1  RT--v   < < | > >   Approach 2  | green (vph)      :                  |A2B1   85(B1)  436-  85= 351(A2)   85|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A1A2  374(A1) OR  351(A2)          374|
             | T T H T T |GERBER RD   | vph (b+e)        :                  |                                   |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                  |
             | 1     1   |            | in vph           :                  |                                   |
             | Approach 4:ELK GROVE FLO|h.Is volume > cap. :                 :                                   |
                                      | (g>f) ?          :                  |                                   |
======================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                      |        |                   |        |                                   |
                                      |        | 1 3 2             |        |752(B4B3)+531(A3)+187(B2B1)+374(A1) |
             | Approach 3|            |-------  8 4 0             -------|                                   |
 3:  LT= 204 | |        | 2:RT= 419   |         6 5 4             ^+ 419  |          = 1844 vph               |
    TH= 345  | |        |   TH= 453   |         + + |             <+  17  |===================================|
    RT= 186  | v        |   LT= 187   |         < v >             <- 436  | Step 8. INTERSECTION LEVEL OF     |
-------------           -------------|                            v- 187  |         SERVICE                   |
                        <--Approach 2 |                                   |    (compare step 7 with table 6)  |
                                      |                                   |              -------              |
                                      |                                   |              | F |                |
 Approach 1-->                        |                                   |              -------              |
-------------           -------------| 102 -^               < ^ >       |===================================|
 1:LT= 102   |          ^ | 4: RT= 158 | 374 ->               | + +       | Step 9. RECALCULATE               |
   TH= 374   |          | |    TH= 717 | 269 -v                           |                                   |
   RT= 269   |          | |   LT= 752  |-------               7 7 1  -------|Geometric Change:                  |
             | Approach 4|            |        |             5 1 5 |      |Signal Change:                     |
                                      |        |             2 7 8 |      |Volume Change:                     |
======================================+==================================+===================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                      |        (two phase signal)         |                                   |
         |  <   B4B3                  |            | Approach 3|          |                                   |
         >  |                         |            |           |          |                                   |
     | | AND < ^    A3B4 AND          |            |           |          |                                   |
     v > OR  | |    /OR A4B3          |            |           |          |                                   |
         |  ^   A3A4                  |-------------           -------------|                                 |
         v  |                         | Approach 1                        |                                   |
        --^ v--  B2B1                 |                                   |                                   |
                                      |          See Step 6b.             |                                   |
    --^ AND <--     A1B2 AND          |                                   |                                   |
    --> OR  v--     /OR A2B1          |                       Approach 2  |                                   |
        --> <--  A1A2                 |-------------           -------------|                                 |
                                      |            |           |          |                                   |
--------------------------------------|            |           |          |                                   |
 A1 -->   A3 |      B1 v--    B3   <| |            |           |          |                                   |
           v ^                      | | |          |           |          |                                   |
 A2 <--   A4  |     B2 --^    B4 |>   |            | Approach 4|          | Exclusive right turns reduced  30 % |
                                      |                                   | V/C Ratio = 1.34                  |
==================================================================================================
```

```
                                    Critical Movement Analysis: PLANNING
                                             Calculation Form 1
Intersection: ELK GROVE FLORIN AND GERBER                                  Design Hour: PM
Problem Statement: ALTD
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR       |
              | Approach 3:ELK GROVE FLO|               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
              |  1     1 |       ^      |               : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
              |  R   L   |       N      |a.No. of change :   0    0    0    0|Prob-  Critical   Carryover  Critical|
GERBER RD     | R T T T L |              | intervals/hour :                   |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :   0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT       | change (vph)    :                   |--------------------------------------|
   1  LT--^     v v v    <^-RTH  1    |c.G/C ratio      :   0    0    0    0|B4B3   336(B3)  520- 336= 184(B4)   336|
      LTH-^>             <--TH   1    |d.Opposing volume :  0    0    0    0|A3B4   184(B4)  909- 184= 725(A3)   184|
   1   TH-->             <v-LTH        | in vph          :                   |A3A4   725(A3) OR  697(A4)            725|
      RTH-v>    ^ ^ ^     v--LT  1    |e.LT capacity on :   0    0    0    0|B2B1   220(B2)  258- 220=  38(B1)   220|
   1  RT--v    < < | > >  Approach 2  | green (vph)     :                   |A2B1    38(B1)  448-  38= 410(A2)    38|
------------- L L T R R  -------------|f.LT capacity in :   0    0    0    0|A1A2   585(A1) OR  410(A2)            585|
              | T T H T T |GERBER RD   | vph (b+e)       :                   |                                      |
              |  H   H   |             |g.Left turn volume :  0    0    0   0|                                      |
              | 1    1   |             | in vph          :                   |                                      |
              | Approach 4:ELK GROVE FLO|h.Is volume > cap. :                 :                                      |
                                        | (g>f) ?         :                   |                                      |
========================================+=====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                        |         |                   |       |                                      |
                                        |         | 2 7 5             |       |520(B3B4)+725(A3)+258(B2B1)+585(A1)   |
              | Approach 3|             |-------   0 0 2              -------|                                      |
 3:  LT= 520  | |          | 2:RT= 395 |          2 7 0               ^+ 395 |          = 2088 vph                  |
   TH= 707    | |          |   TH= 500 |          + + |               <+  53 |======================================|
  RT= 202     | v          |   LT= 258 |          < v >               <- 448 | Step 8. INTERSECTION LEVEL OF        |
-------------              -------------|                             v- 258 |         SERVICE                      |
                          <--Approach 2 |                                    |     (compare step 7 with table 6)    |
                                        |                                    |              -------                 |
                                        |                                    |              |  F  |                 |
 Approach 1-->                          |                                    |              -------                 |
-------------              -------------| 220 -^               < ^ >         |======================================|
1:LT= 220     |           ^ | 4: RT= 231| 510 ->               | + +         | Step 9. RECALCULATE                  |
  TH= 510     |           | |   TH= 466 | 835 -v                             |                                      |
  RT= 835     |           | |  LT= 336  |-------               3 4 2  -------|Geometric Change:                     |
              | Approach 4|             |        |             3 6 3 |       |Signal Change:                        |
                                        |        |             6 6 1 |       |Volume Change:                        |
========================================+=====================================+======================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                             |
                                        |          (two phase signal)         |                                      |
          |  <   B4B3                   |            | Approach 3|           |                                      |
          >  |                          |            |           |           |                                      |
     | | AND < ^     A3B4 AND           |            |           |           |                                      |
     v > OR  | |     /OR A4B3           |            |           |           |                                      |
          |  ^   A3A4                   |-------------           -------------|                                      |
          v  |                          | Approach 1                         |                                      |
        --^ v--  B2B1                   |                                    |                                      |
                                        |          See Step 6b.              |                                      |
     --^ AND <--     A1B2 AND           |                                    |                                      |
     --> OR  v--     /OR A2B1           |                        Approach 2  |                                      |
        --> <--  A1A2                   |-------------            -----------|                                      |
                                        |            |           |           |                                      |
----------------------------------------|            |           |           |                                      |
 A1 -->    A3 |     B1 v--     B3   <|  |            |           |           |                                      |
            v ^                      | | |            | Approach 4|           | Exclusive right turns reduced  30 %  |
 A2 <--    A4  |     B2 --^     B4 |>   |                                    | V/C Ratio = 1.52                     |
===============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                                       Design Hour: AM
Problem Statement: ALTD
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:WATERMAN RD |            -------Approach-----|      MULTIPHASE SIGNAL OVERLAP  |
             | 1     1 |     ^     |              : -1- -2- -3- -4-|        Possible  Volume   Adjusted|
             |  R  L   |     N     |a.No. of change  :  0   0   0   0|Prob-  Critical Carryover Critical|
GERBER RD    | R T T T L |          | intervals/hour :                |able   Volume   to next   Volume |
------------- T H H H T -----------|b.LT capacity on :  0   0   0   0|Phase  in vph    phase    in vph |
 Approach 1   < < | > >  ^--RT  1  | change (vph)   :                |---------------------------------|
  1  LT--^     v v v    <^-RTH     |c.G/C ratio     :  0   0   0   0|A1B2  158(B2)  325- 158= 167(A1)  158|
     LTH-^>             <--TH   1  |d.Opposing volume :  0  325  0 270|A1A2  492(A2) OR  167(A1)      492|
  1   TH-->             <v-LTH     | in vph         :                |A3B4  189(A3) OR  105(B4)      189|
     RTH-v>    ^ ^ ^     v--LT     |e.LT capacity on :  0   0   0   0|                                 |
     RT--v    < < | > >  Approach 2 | green (vph)    :                |                                 |
------------- L L T R R -----------|f.LT capacity in :  0   0   0   0|                                 |
             | T T H T T |GERBER RD | vph (b+e)      :                |                                 |
             |   H   H   |          |g.Left turn volume : 0  0   0   0|                                 |
             |           |          | in vph         :                |                                 |
             | Approach 4:WATERMAN RD |h.Is volume > cap. :    NO      NO:                               |
                                    | (g>f) ?        :                |                                 |
===================================+================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |        |                 |     |                                 |
                                   |        | 2 1             |     |650(B2A2)+189(A3)+0()+0()        |
             | Approach 3|         |-------  7 0              -------|                                 |
 3:  LT= 105 | |        | 2:RT=  89 |        0 5            ^-  89 |          = 839 vph              |
   TH=   0   | |        |   TH= 492 |        | |            <- 492 |=================================|
  RT= 270    | v        |   LT=   0 |        < >                   | Step 8. INTERSECTION LEVEL OF   |
-------------            -----------|                              |         SERVICE                 |
                         <--Approach 2 |                           |   (compare step 7 with table 6) |
                                   |                               |             -------             |
                                   |                               |             | A |             |
 Approach 1-->                     |                               |             -------             |
-------------            -----------|                              |=================================|
 1:LT= 158  |         ^ | 4: RT=   0 | 158 -^                      | Step 9. RECALCULATE             |
   TH= 325  |         | |    TH=   0 | 325 ->                      |                                 |
   RT=   0  |         | |    LT=   0 |-------               -------|Geometric Change:                |
            | Approach 4|           |        |               |     |Signal Change:                   |
                                    |        |               |     |Volume Change:                   |
===================================+================================+=================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                     |
                                   |        (two phase signal)     |                                 |
        --^      A1B2              |          | Approach 3|        |                                 |
        -->                        |          |           |        |                                 |
        --> <--  A1A2              |          |           |        |                                 |
                                   |          |           |        |                                 |
         |  |    A3B4              |-----------           ---------|                                 |
         v  >                      | Approach 1                    |                                 |
                                   |                               |                                 |
                                   |        See Step 6b.           |                                 |
                                   |                               |                                 |
                                   |                   Approach 2  |                                 |
                                   |-----------          ----------|                                 |
                                   |          |           |        |                                 |
-----------------------------------|          |           |        |                                 |
 A1 -->   A3 |      B1 v--    B3  <|          |           |        |                                 |
            v ^                   | |         | Approach 4|        | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |> |                              | V/C Ratio = .59                 |
==========================================================================================
```

```
                          Critical Movement Analysis: PLANNING
                                   Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                                  Design Hour: PM
Problem Statement: ALTD
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:WATERMAN RD |           -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
             | 1       1 |     ^      |          : -1-  -2-  -3-  -4-|      Possible   Volume     Adjusted|
             |  R    L   |     N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover   Critical|
GERBER RD    | R T T T L |            | intervals/hour  :                 |able   Volume    to next     Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase      in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)    :                 |--------------------------------------|
  1  LT--^     v v v     <^-RTH       |c.G/C ratio      :  0    0    0    0|A1B2   237(B2)  774- 237= 537(A1)  237|
     LTH-^>              <--TH   1    |d.Opposing volume:  0  774    0  420|A1A2   537(A1) OR  512(A2)          537|
  1   TH-->              <v-LTH       | in vph          :                 |A3B4   294(A3) OR  244(B4)          294|
     RTH-v>    ^ ^ ^      v--LT       |e.LT capacity on :  0    0    0    0|                                      |
     RT--v    < < | > >  Approach 2   | green (vph)     :                 |                                      |
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|                                      |
             | T T H T T |GERBER RD   | vph (b+e)       :                 |                                      |
             |   H   H   |            |g.Left turn volume:  0    0    0   0|                                      |
             |           |            | in vph          :                 |                                      |
             | Approach 4:WATERMAN RD |h.Is volume > cap.:      NO       NO:                                      |
                                      | (g>f) ?         :                 |                                      |
======================================+=================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                      |       |                |        |                                      |
                                      |       | 4 2            |        |774(B2A1)+294(A3)+0()+0()             |
             | Approach 3|            |-------  2 4              -------|                                      |
 3:  LT= 244 | |         | 2:RT= 192  |         0 4              ^- 192 |          = 1068 vph                  |
    TH=   0  | |         |   TH= 512  |         | |              <- 512 |======================================|
   RT= 420   | v         |   LT=   0  |         < >                     | Step 8. INTERSECTION LEVEL OF        |
-------------            -------------|                                 |         SERVICE                      |
                         <--Approach 2|                                 |    (compare step 7 with table 6)     |
                                      |                                 |             -------                  |
                                      |                                 |             | C |                  |
 Approach 1-->                        |                                 |             -------                  |
-------------            -------------|                                 |======================================|
 1:LT= 237   |         ^ | 4: RT=   0 | 237 -^                          | Step 9. RECALCULATE                  |
   TH= 774   |         | |    TH=   0 | 774 ->                          |                                      |
   RT=   0   |         | |   LT=   0  |-------                   -------|Geometric Change:                     |
             | Approach 4|            |       |                |        |Signal Change:                        |
                                      |       |                |        |Volume Change:                        |
======================================+=================================+======================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                      |          (two phase signal)     |                                      |
         --^     A1B2                 |            | Approach 3|        |                                      |
         -->                          |            |           |        |                                      |
         --> <--  A1A2                |            |           |        |                                      |
                                      |            |           |        |                                      |
          |   |   A3B4                |------------             --------|                                      |
          v   >                       | Approach 1                      |                                      |
                                      |                                 |                                      |
                                      |        See Step 6b.             |                                      |
                                      |                                 |                                      |
                                      |                     Approach 2  |                                      |
                                      |------------          -----------|                                      |
                                      |            |           |        |                                      |
--------------------------------------|            |           |        |                                      |
 A1 -->   A3 |      B1 v--    B3   <| |            |           |        |                                      |
            v ^                     | |            | Approach 4|        | Exclusive right turns reduced  30 %  |
 A2 <--   A4  |     B2 --^    B4 |>   |                                 | V/C Ratio = .75                      |
==========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER AND BRADSHAW                                   Design Hour: AM
Problem Statement: ALTD
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
              | Approach 3:BRADSHAW RD |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
              | 1   1   1 |     ^      |              : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
              |   R   L   |     N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD     | R T T T L |            |  intervals/hour :                 |able    Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >    ^--RT      |  change (vph)   :                 |-----------------------------------|
   1  LT--^     v v v    <^-RTH  1    |c.G/C ratio      :  0    0    0    0|B4B3    65(B3)   92-  65=  27(B4)  65|
      LTH-^>             <--TH        |d.Opposing volume:  0    0    0    0|A3B4    27(B4)  310-  27= 283(A3)  27|
        TH-->            <v-LTH       |  in vph         :                 |A3A4   821(A4) OR  283(A3)         821|
   1  RTH-v>    ^ ^ ^     v--LT  1    |e.LT capacity on :  0    0    0    0|B2B1    29(B1)  426-  29= 397(B2)  29|
      RT--v   < < | > >   Approach 2  |  green (vph)    :                 |A1B2   397(B2)  237- 397=   0(A1) 397|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A1A2   387(A2) OR    0(A1)         387|
              | T T H T T |GERBER RD  |  vph (b+e)      :                 |                                   |
              |   H   H   |           |g.Left turn volume:  0    0    0   0|                                   |
              | 1     1   |           |  in vph         :                 |                                   |
              | Approach 4:BRADSHAW RD|h.Is volume > cap. :               :                                   |
                                      |  (g>f) ?        :                 |                                   |
======================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                      |       |                 |         |                                   |
                                      |       | 3 3             |         |92(B3B4)+821(A4)+426(B1B2)+387(A2) |
              | Approach 3|           |-------  5 1 9            -------  |                                   |
 3:  LT=  92  | |         | 2:RT= 146 |         7 0 2              ^+ 146 |          = 1726 vph               |
   TH= 310    | |         |   TH= 241 |         | | |              <+ 241 |===================================|
   RT= 357    | v         |   LT=  29 |         < v >              v-  29 | Step 8. INTERSECTION LEVEL OF     |
-------------              -------------|                                 |        SERVICE                    |
                           <--Approach 2|                                 |    (compare step 7 with table 6)  |
                                      |                                   |              -------              |
                                      |                                   |              |  F  |              |
 Approach 1-->                        |                                   |              -------              |
-------------              -------------| 426 -^               < ^ >      |===================================|
 1:LT= 426    |           ^ | 4: RT=  31| 178 +>               | + +      | Step 9. RECALCULATE               |
   TH= 178    |           | |   TH= 790 |  59 +v                          |                                   |
   RT=  59    |           | |   LT=  65 |-------                 7  -------|Geometric Change:                  |
              | Approach 4|           |       |                6 9 3 |    |Signal Change:                     |
                                      |       |                5 0 1 |    |Volume Change:                     |
======================================+==================================+===================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                      |        (two phase signal)         |                                   |
         |   <    B4B3                |          | Approach 3|            |                                   |
         >   |                        |          |           |            |                                   |
     | | AND < ^      A3B4 AND        |          |           |            |                                   |
     v > OR  | |      /OR A4B3        |          |           |            |                                   |
         |   ^    A3A4                |-------------         -------------|                                   |
         v   |                        | Approach 1                        |                                   |
       --^ v--    B2B1                |                                   |                                   |
                                      |         See Step 6b.              |                                   |
     --^ AND <--      A1B2 AND        |                                   |                                   |
     --> OR  v--      /OR A2B1        |                       Approach 2  |                                   |
       --> <--    A1A2                |-------------         -------------|                                   |
                                      |          |           |            |                                   |
--------------------------------------|          |           |            |                                   |
 A1 -->    A3 |      B1 v--     B3  <| |          |           |            |                                   |
            v ^                      | | |          | Approach 4|            | Exclusive right turns reduced  30 % |
 A2 <--    A4 |      B2 --^     B4 |> |                                   | V/C Ratio = 1.26                  |
=================================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER AND BRADSHAW                                     Design Hour: PM
Problem Statement: ALTD
===================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:BRADSHAW RD |                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
             | 1   1   1 |      ^     |                 : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
             |   R   L   |      N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |            | intervals/hour  :                   |able    Volume    to next    Volume |
------------ T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT       | change (vph)    :                   |-----------------------------------|
   1 LT--^     v v v    <^-RTH  1   |c.G/C ratio      :  0    0    0    0|B4B3     0(B3)  198-   0= 198(B4)    0|
     LTH-^>             <--TH       |d.Opposing volume :  0    0    0    0|A3B4   198(B4)  735- 198= 537(A3)  198|
      TH-->             <v-LTH      | in vph          :                   |A3A4   537(A3) OR  321(A4)          537|
   1 RTH-v>    ^ ^ ^     v--LT  1   |e.LT capacity on :  0    0    0    0|B2B1    37(B1)  548-  37= 511(B2)   37|
     RT--v   < < | > >  Approach 2  | green (vph)     :                   |A1B2   511(B2)  381- 511=   0(A1)  511|
------------ L L T R R  ------------|f.LT capacity in :  0    0    0    0|A1A2   448(A2) OR    0(A1)          448|
             | T T H T T |GERBER RD  | vph (b+e)       :                   |                                   |
             |   H   H   |           |g.Left turn volume :  0    0    0    0|                                   |
             | 1     1   |           | in vph          :                   |                                   |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :                  :                                   |
                                    | (g>f) ?         :                   |                                   |
====================================+===================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                    |        |                  |       |                                   |
                                    |        | 6 7 1            |       |198(B3B4)+537(A3)+548(B1B2)+448(A2) |
             | Approach 3|          |-------  3 3 9            -------|                                   |
 3:  LT= 198 | |         | 2:RT= 183 |        2 5 8             ^+ 183 |          = 1731 vph               |
   TH= 735   | |         |   TH= 265 |        | | |             <+ 265 |===================================|
  RT= 632    | v         |   LT=  37 |        < v >             v-  37 | Step 8. INTERSECTION LEVEL OF     |
------------                ---------|                                  |        SERVICE                    |
                         <--Approach 2 |                                |     (compare step 7 with table 6) |
                                    |                                   |              -------              |
                                    |                                   |              | F |                |
 Approach 1-->                      |                                   |              -------              |
------------               ---------| 548 -^               < ^ >        |===================================|
1:LT= 548    |          ^ | 4: RT=  25 | 294 +>               | + +     | Step 9. RECALCULATE               |
  TH= 294    |          | |   TH= 296 |  87 +v                          |                                   |
  RT=  87    |          | |   LT=   0 |-------               2  -------|Geometric Change:                  |
             | Approach 4|          |        |             9 2 |        |Signal Change:                     |
                                    |        |           0 6 5 |        |Volume Change:                     |
====================================+===================================+===================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                    |        (two phase signal)         |                                   |
          |  <   B4B3              |           | Approach 3|          |                                   |
          >  |                      |           |           |          |                                   |
     | | AND < ^     A3B4 AND       |           |           |          |                                   |
     v > OR  | |     /OR A4B3       |           |           |          |                                   |
          |  ^   A3A4              |-------------          ------------|                                   |
          v  |                      | Approach 1                        |                                   |
         --^ v--   B2B1             |                                   |                                   |
                                    |          See Step 6b.             |                                   |
     --^ AND <--     A1B2 AND       |                                   |                                   |
     --> OR  v--     /OR A2B1       |                       Approach 2  |                                   |
         --> <--   A1A2             |-------------          ------------|                                   |
                                    |           |           |          |                                   |
------------------------------------|           |           |          |                                   |
 A1 -->   A3 |      B1 v--    B3  <| |           |           |          |                                   |
            v ^                  | | |           | Approach 4|          | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |> |                                   | V/C Ratio = 1.26                  |
===================================================================================================
```

Level Of Service Computation Report
1985 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1 GERBER ROAD/VINEYARD ROAD

Level Of Service: B

| Approach: | North Bound | | | South Bound | | | East Bound | | | West Bound | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement: | L | T | R | L | T | R | L | T | R | L | T | R |
| Control: | Stop Sign | | | Stop Sign | | | Uncontrolled | | | Uncontrolled | | |
| Rights: | Include | | | Include | | | Include | | | Include | | |
| Lanes: | 1 0 0 1 0 | | | 1 0 1 0 1 | | | 1 0 0 1 0 | | | 1 0 0 1 0 | | |
| **Volume Module:** | | | | | | | | | | | | |
| Base Vol: | 63 | 33 | 3 | 31 | 17 | 39 | 20 | 175 | 50 | 2 | 104 | 10 |
| Growth Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PasserByVol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Initial Bse: | 63 | 33 | 3 | 31 | 17 | 39 | 20 | 175 | 50 | 2 | 104 | 10 |
| User Adj: | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| PHF Adj: | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PHF Volume: | 66 | 35 | 3 | 33 | 18 | 41 | 21 | 184 | 53 | 2 | 109 | 11 |
| Reduct Vol: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Final Vol.: | 66 | 35 | 3 | 33 | 18 | 41 | 21 | 184 | 53 | 2 | 109 | 11 |
| **Adjusted Volume Module:** | | | | | | | | | | | | |
| Grade: | 0% | | | 0% | | | 0% | | | 0% | | |
| % Cycle/Cars: | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | |
| % Truck/Comb: | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | |
| PCE Adj: | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.10 | 1.00 | 1.00 | 1.10 | 1.00 | 1.00 |
| Cycl/Car PCE: | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | |
| Trck/Cmb PCE: | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | | xxxx | xxxx | |
| Adj Vol.: | 73 | 38 | 3 | 36 | 20 | 45 | 23 | 184 | 53 | 2 | 109 | 11 |
| **Critical Gap Module: >> Population: 0 << >> Run Speed(E/W): 30 MPH <<** | | | | | | | | | | | | |
| RT Rad/Ang: | 20.0 ft/90.0 deg | | | 20.0 ft/90.0 deg | | | 20.0 ft/90.0 deg | | | 20.0 ft/90.0 deg | | |
| Critical Gp: | 7.0 | 6.5 | 5.5 | 7.0 | 6.5 | 5.5 | 5.5 | xxxx | xxxxx | 5.5 | xxxx | xxxxx |
| **Capacity Module:** | | | | | | | | | | | | |
| Cnflict Vol: | 413 | 354 | 211 | 413 | 375 | 115 | 120 | xxxx | xxxxx | 237 | xxxx | xxxxx |
| Potent Cap.: | 491 | 587 | 879 | 491 | 573 | 982 | 976 | xxxx | xxxxx | 853 | xxxx | xxxxx |
| % Used Cap.: | 14.9 | 6.5 | 0.4 | 7.3 | 3.4 | 4.6 | 2.4 | xxxx | xxxxx | 0.3 | xxxx | xxxxx |
| Impedance: | xxxx | 0.96 | 1.00 | xxxx | 0.98 | 0.97 | 0.99 | xxxx | xxxxx | 1.00 | xxxx | xxxxx |
| Actual Cap.: | 461 | 579 | 879 | 465 | 565 | 982 | 976 | xxxx | xxxxx | 853 | xxxx | xxxxx |
| **Level Of Service Module:** | | | | | | | | | | | | |
| Unused Cap.: | 388 | 541 | 876 | 429 | 545 | 937 | 953 | xxxx | xxxxx | 851 | xxxx | xxxxx |
| LOS by Move: | B | * | * | A | A | A | A | * | * | A | * | * |
| Movement: | LT | LTR | RT | LT | LTR | RT | LT | LTR | RT | LT | LTR | RT |
| Shared Cap.: | xxxx | xxxx | 596 | xxxx | xxxx | xxxxx | xxxx | xxxx | xxxxx | xxxx | xxxx | xxxxx |
| Unused Cap.: | xxxx | xxxx | 554 | xxxx | xxxx | xxxxx | xxxx | xxxx | xxxxx | xxxx | xxxx | xxxxx |
| Shared LOS: | * | * | A | * | * | * | * | * | * | * | * | * |

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---------------------------------------------------------------------------
---------------------------------------------------------------------------
                    Level Of Service Computation Report
           1985 HCM Unsignalized Method (Base Volume Alternative)
***************************************************************************
Intersection #1 GERBER ROAD/VINEYARD ROAD
***************************************************************************
                                    Level Of Service:                C
***************************************************************************
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:         1  0  0  1  0    1  0  1  0  1    1  0  0  1  0    1  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       79   24    3    18   32   30    48  142   77     2  185   25
Growth Adj:   1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PasserByVol:     0    0    0     0    0    0     0    0    0     0    0    0
Initial Bse:    79   24    3    18   32   30    48  142   77     2  185   25
User Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:      0.95 0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95  0.95 0.95 0.95
PHF Volume:     83   25    3    19   34   32    51  149   81     2  195   26
Reduct Vol:      0    0    0     0    0    0     0    0    0     0    0    0
Final Vol.:     83   25    3    19   34   32    51  149   81     2  195   26
------------|---------------||---------------||---------------||---------------|
Adjusted Volume Module:
Grade:             0%               0%               0%               0%
% Cycle/Cars:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
% Truck/Comb:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
PCE Adj:      1.10 1.10 1.10  1.10 1.10 1.10  1.10 1.00 1.00  1.10 1.00 1.00
Cycl/Car PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Trck/Cmb PCE:   xxxx  xxxx       xxxx  xxxx       xxxx  xxxx       xxxx  xxxx
Adj Vol.:       91   28    3    21   37   35    56  149   81     2  195   26
------------|---------------||---------------||---------------||---------------|
Critical Gap Module: >> Population: 0 << >> Run Speed(E/W): 30 MPH <<
RT Rad/Ang:  20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg 20.0 ft/90.0 deg
Critical Gp:  7.0  6.5  5.5   7.0  6.5  5.5   5.5 xxxx xxxxx   5.5 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  529  464  190   519  491  208   221 xxxx xxxxx   231 xxxx xxxxx
Potent Cap.:  415  512  900   421  495  882   869 xxxx xxxxx   859 xxxx xxxxx
% Used Cap.: 22.1  5.4  0.4   4.9  7.5  3.9   6.4 xxxx xxxxx   0.3 xxxx xxxxx
Impedance:   xxxx 0.97 1.00  xxxx 0.96 0.98  0.96 xxxx xxxxx  1.00 xxxx xxxxx
Actual Cap.:  372  492  900   393  476  882   869 xxxx xxxxx   859 xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
Unused Cap.:  280  464  897   372  439  847   813 xxxx xxxxx   857 xxxx xxxxx
LOS by Move:    C    *    *     B    A    A     A    *    *     A    *    *
Movement:      LT - LTR - RT   LT - LTR - RT   LT - LTR - RT   LT - LTR - RT
Shared Cap.: xxxx xxxx  518  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Unused Cap.: xxxx xxxx  487  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Shared LOS:     *    *    A     *    *    *     *    *    *     *    *    *
```

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                                            Critical Movement Analysis: PLANNING
                                                      Calculation Form 1
Intersection: FLORIN AND ELK GROVE FLORIN                                             Design Hour: AM
Problem Statement: ALTD MIT
========================================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR       |
              | Approach 3:ELK GROVE FLO|                  -------Approach-----|          MULTIPHASE SIGNAL OVERLAP   |
              | 1   2   2 |      ^      |                  : -1-  -2-  -3-  -4-|        Possible    Volume    Adjusted|
              |  R   L    |      N      |a.No. of change   :  0    0    0    0|Prob-   Critical  Carryover  Critical|
FLORIN        | R T T T L |             | intervals/hour   :                  |able     Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase    in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1     | change (vph)     :                  |-------------------------------------|
   1  LT--^     v v v    <^-RTH        |c.G/C ratio       :  0    0    0    0|B4B3   141(B4)  201- 141=  60(B3)  141|
      LTH-^>             <--TH   2     |d.Opposing volume :  0    0    0    0|A4B3    60(B3)  325-  60= 265(A4)   60|
   2   TH-->             <v-LTH        | in vph           :                  |A3A4   265(A4) OR  162(A3)          265|
      RTH-v>    ^ ^ ^     v--LT  1     |e.LT capacity on  :  0    0    0    0|B2B1    98(B2)  191-  98=  93(B1)   98|
   1  RT--v   < < | > >   Approach 2   | green (vph)      :                  |A2B1    93(B1)  337-  93= 244(A2)   93|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A1A2   244(A2) OR  235(A1)          244|
              | T T H T T |FLORIN      | vph (b+e)        :                  |                                     |
              |   H   H   |            |g.Left turn volume :  0    0    0    0|                                     |
              | 2   2   1 |            | in vph           :                  |                                     |
              | Approach 4:ELK GROVE FLO|h.Is volume > cap. :                 :                                     |
                                        | (g>f) ?          :                  |                                     |
========================================+=======================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES      |
                                        |      |                     |          |                                      |
                                        |      |   1 1 1 1           |          |201(B4B3)+265(A4)+191(B2B1)+244(A2)   |
              | Approach 3|             |-------  9 6 6 1 4            -------|                                      |
 3:  LT= 255  | |         | 2:RT= 482   |         1 2 2 5 1            ^- 482 |          = 901 vph                   |
    TH= 323   | |         |   TH= 673   |         | | | | |            <- 337 |======================================|
   RT=  91    | v         |   LT= 191   |         < v v > >            <- 337 | Step 8. INTERSECTION LEVEL OF        |
-------------             -------------|                               v- 191 |         SERVICE                      |
                           <--Approach 2 |                                      |     (compare step 7 with table 6)    |
                                        |                                       |              -------                 |
                                        |                                       |              | B  |                  |
 Approach 1-->                          | 98 -^                                 |              -------                 |
------------             -------------| 235 ->            < < ^ ^ >           |======================================|
 1:LT=  98    |           ^ | 4: RT= 142 | 235 ->            | | | | |           | Step 9. RECALCULATE                   |
   TH= 469    |           | |   TH= 650 | 194 -v                                |                                      |
   RT= 194    |           | |   LT= 366 |-------            2 1 3 3 1  -------|Geometric Change:                     |
              | Approach 4|             |      |            0 6 2 2 4 |         |Signal Change:                        |
                                        |      |            1 5 5 5 2 |         |Volume Change:                        |
========================================+=======================================+======================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph      | COMMENTS                             |
                                        |          (two phase signal)           |                                      |
        |  <    B4B3                    |             | Approach 3|             |                                      |
        >  |                            |             |           |             |                                      |
    | | AND < ^     A3B4 AND            |             |           |             |                                      |
    v > OR  | |     /OR A4B3            |             |           |             |                                      |
        |  ^   A3A4                     |-------------             -------------|                                      |
        v  |                            | Approach 1                            |                                      |
       --^ v--  B2B1                    |                                       |                                      |
                                        |          See Step 6b.                 |                                      |
    --^ AND <--     A1B2 AND            |                                       |                                      |
    --> OR  v--     /OR A2B1            |                          Approach 2   |                                      |
       --> <--  A1A2                    |-------------             -------------|                                      |
                                        |             |           |             |                                      |
----------------------------------------|             |           |             |                                      |
 A1 -->    A3 |      B1 v--     B3    <| |             |           |             |                                      |
             v ^                       | | |             | Approach 4|             | Exclusive right turns reduced  30 %  |
 A2 <--    A4  |     B2 --^     B4 |>   |                                       | V/C Ratio = .66                      |
========================================================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN AND ELK GROVE FLORIN                               Design Hour: PM
Problem Statement: ALTD MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR     |
              | Approach 3:ELK GROVE FLO|               -------Approach-----|       MULTIPHASE SIGNAL OVERLAP   |
              | 1   2   2 |       ^    |                  : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |   R    L  |       N    |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN        | R T T T L |            |  intervals/hour  :                  |able   Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)    :                  |-----------------------------------|
  1  LT--^     v v v     <^-RTH       |c.G/C ratio       :  0    0    0    0|B4B3  158(B3)  361- 158= 203(B4)  158|
     LTH-^>              <--TH   2    |d.Opposing volume :  0    0    0    0|A3B4  203(B4)  354- 203= 151(A3)  203|
  2   TH-->              <v-LTH       |  in vph          :                  |A3A4  235(A4) OR  151(A3)        235|
     RTH-v>     ^ ^ ^     v--LT  1    |e.LT capacity on  :  0    0    0    0|B2B1   84(B2)  240-  84= 156(B1)   84|
  1  RT--v    < < | > >   Approach 2  |  green (vph)     :                  |A2B1  156(B1)  345- 156= 189(A2)  156|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A1A2  389(A1) OR  189(A2)        389|
              | T T H T T |FLORIN     |  vph (b+e)       :                  |                                   |
              |   H    H  |           |g.Left turn volume :  0    0    0    0|                                   |
              | 2    2    1 |         |  in vph          :                  |                                   |
              | Approach 4:ELK GROVE FLO|h.Is volume > cap. :               :                                   |
                                      |  (g>f) ?         :                  |                                   |
======================================+===================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                      |       |                    |      |                                   |
                                      |       | 1 3 3 2 3          |      |361(B3B4)+235(A4)+240(B2B1)+389(A1)|
              | Approach 3|           |-------  3 5 5 9 6          -------|                                   |
 3:  LT= 655  | |          | 2:RT= 491|        0 4 4 5 1          ^- 491 |           = 1225 vph              |
    TH= 707   | |          |   TH= 690|        | | | | |          <- 345 |===================================|
    RT= 130   | v          |   LT= 240|        < v v > >          <- 345 | Step 8. INTERSECTION LEVEL OF     |
-------------               ----------|                            v- 240 |        SERVICE                    |
                         <--Approach 2|                                   |     (compare step 7 with table 6) |
                                      |                                   |            -------                |
                                      |                                   |            | D |                  |
 Approach 1-->                        |  84 -^                            |            -------                |
-------------               ----------| 389 ->          < < ^ ^ >         |===================================|
 1:LT=  84    |          ^ | 4: RT= 241| 389 ->          | | | | |         | Step 9. RECALCULATE               |
   TH= 778    |          | |   TH= 469| 425 -v                            |                                   |
   RT= 425    |          | |   LT= 288|-------          1 1 2 2 2 -------|Geometric Change:                  |
              | Approach 4|           |       |         5 3 3 3 4 |      |Signal Change:                     |
                                      |       |         8 0 5 5 1 |      |Volume Change:                     |
======================================+===================================+===================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                      |        (two phase signal)         |                                   |
         |  <    B4B3                 |           | Approach 3|           |                                   |
         >  |                         |           |           |           |                                   |
    | | AND < ^      A3B4 AND         |           |           |           |                                   |
    v > OR  | |      /OR A4B3         |           |           |           |                                   |
         |  ^    A3A4                 |-------------         -------------|                                   |
         v  |                         | Approach 1                        |                                   |
        --^ v--   B2B1                |                                   |                                   |
                                      |           See Step 6b.            |                                   |
    --^ AND <--      A1B2 AND         |                                   |                                   |
    --> OR  v--      /OR A2B1         |                      Approach 2   |                                   |
        --> <--   A1A2                |-------------         -------------|                                   |
                                      |           |           |           |                                   |
--------------------------------------|           |           |           |                                   |
A1 -->   A3 |      B1 v--    B3   <|  |           |           |           |                                   |
          v ^                      | ||           | Approach 4|           | Exclusive right turns reduced  30 %|
A2 <--   A4  |     B2 --^    B4  |>   |                                   | V/C Ratio = .89                   |
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                                   Critical Movement Analysis: PLANNING
                                          Calculation Form 1
Intersection: FLORIN AND BRADSHAW                                            Design Hour: AM
Problem Statement: ALTD MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR     |
           | Approach 3:BRADSHAW RD |              -------Approach-----|         MULTIPHASE SIGNAL OVERLAP   |
           | 1   3   2 |      ^      |              : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
           |   R   L   |      N      |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN ROAD | R T T T L |            | intervals/hour :                  |able    Volume    to next    Volume |
----------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT  1    | change (vph)   :                  |------------------------------------|
   1  LT--^    v v v    <^-RTH       |c.G/C ratio     :  0    0    0    0|B4B3    31(B4)  221-  31= 190(B3)   31|
      LTH-^>            <--TH   2    |d.Opposing volume :  0   0    0    0|A4B3   190(B3)  670- 190= 480(A4)  190|
   2   TH-->            <v-LTH       | in vph         :                  |A3A4   480(A4)  OR  193(A3)        480|
      RTH-v>    ^ ^ ^    v--LT  1    |e.LT capacity on :  0    0    0    0|B2B1    84(B1)  194-  84= 110(B2)   84|
   1  RT--v  < < | > >   Approach 2  | green (vph)    :                  |A1B2   110(B2)  155- 110=  45(A1)  110|
-----------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A1A2   181(A2)  OR   45(A1)        181|
           | T T H T T |FLORIN ROAD  | vph (b+e)      :                  |                                    |
           |   H   H   |             |g.Left turn volume :  0   0    0    0|                                   |
           | 2   2   1 |             | in vph         :                  |                                    |
           | Approach 4:BRADSHAW RD  |h.Is volume > cap. :               :                                    |
                                     | (g>f) ?        :                  |                                    |
=====================================+===================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                     |        |                   |      |                                    |
                                     |        | 1 1 1 1           |      |221(B4B3)+480(A4)+194(B1B2)+181(A2) |
           | Approach 3|             |-------  7 9 9 9 2 3        -------|                                    |
 3:  LT=  55 | |        | 2:RT= 147  |         0 3 3 3 5 1        ^- 147 |           = 1076 vph               |
    TH= 578  | |        |   TH= 362  |         | | | | | |        <- 181 |====================================|
    RT= 170  | v        |   LT=  84  |         < v v v > >        <- 181 | Step 8. INTERSECTION LEVEL OF      |
-------------              ----------|                            v-  84 |        SERVICE                     |
                      <--Approach 2  |                                   |    (compare step 7 with table 6)   |
                                     |                                   |             -------                |
                                     |                                   |            |  C  |                 |
 Approach 1-->                       | 194 -^                            |             -------                |
-------------              ----------|  88 ->          < < ^ ^ >         |====================================|
 1:LT= 194   |            ^ | 4: RT= 106 | 88 ->       | | | | |         | Step 9. RECALCULATE                |
   TH= 175   |            | |   TH=1339 | 222 -v                         |                                    |
   RT= 222   |            | |   LT= 402 |-------       2 1 6 6 1  -------|Geometric Change:                   |
           | Approach 4|             |        |        2 8 7 7 0 |       |Signal Change:                      |
                                     |        |        1 1 0 0 6 |       |Volume Change:                      |
=====================================+===================================+====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                           |
                                     |          (two phase signal)        |                                    |
         |    <    B4B3              |            | Approach 3|          |                                    |
         >    |                      |            |           |          |                                    |
     | | AND <  ^     A3B4 AND       |            |           |          |                                    |
     v > OR  | |     /OR A4B3        |            |           |          |                                    |
         |    ^    A3A4              |-------------           -----------|                                    |
         v    |                      | Approach 1                        |                                    |
        --^  v--   B2B1              |                                   |                                    |
                                     |            See Step 6b.           |                                    |
     --^ AND <--      A1B2 AND       |                                   |                                    |
     --> OR  v--      /OR A2B1       |                        Approach 2 |                                    |
        --> <--    A1A2              |-------------           -----------|                                    |
                                     |            |           |          |                                    |
-------------------------------------|            |           |          |                                    |
 A1 -->    A3 |      B1 v--     B3  <|            |           |          |                                    |
              v ^                  | |            | Approach 4|          | Exclusive right turns reduced  30 % |
 A2 <--    A4  |     B2 --^     B4 |>|                                   | V/C Ratio = .78                    |
==========================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN AND BRADSHAW                                     Design Hour: PM
Problem Statement: ALTD E+P MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:BRADSHAW RD    |              -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
            | 1   3   2 |      ^        |                : -1-  -2-  -3-  -4-|         Possible   Volume    Adjusted|
            |   R   L   |      N        |a.No. of change  :   0    0    0    0|Prob-   Critical  Carryover  Critical|
FLORIN ROAD | R T T T L |               |  intervals/hour  :                  |able     Volume   to next    Volume |
------------- T H H H T  ------------- |b.LT capacity on :   0    0    0    0|Phase    in vph    phase     in vph |
  Approach 1  < < | > >  ^--RT  1       |  change (vph)    :                  |-------------------------------------|
   1  LT--^    v v v     <^-RTH         |c.G/C ratio       :   0    0    0    0|B4B3    87(B4)  205-  87= 118(B3)    87|
      LTH-^>             <--TH   2      |d.Opposing volume :   0    0    0    0|A4B3   118(B3)  376- 118= 258(A4)   118|
   2   TH-->             <v-LTH         |  in vph          :                  |A3A4   485(A3) OR  258(A4)          485|
      RTH-v>    ^ ^ ^     v--LT  1      |e.LT capacity on  :   0    0    0    0|B2B1   123(B1)  224- 123= 101(B2)   123|
   1  RT--v   < < | > >   Approach 2    |  green (vph)     :                  |A1B2   101(B2)  367- 101= 266(A1)   101|
------------- L L T R R  ------------- |f.LT capacity in  :   0    0    0    0|A1A2   266(A1) OR  136(A2)          266|
            | T T H T T |FLORIN ROAD    |  vph (b+e)       :                  |                                     |
            |   H   H   |               |g.Left turn volume :  0    0    0    0|                                     |
            | 2   2   1 |               |  in vph          :                  |                                     |
            | Approach 4:BRADSHAW RD    |h.Is volume > cap. :                 :                                     |
                                        |  (g>f) ?         :                  |                                     |
========================================+====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                        |       |                      |      |                                     |
                                        |       | 2 4 4 4              |      |205(B4B3)+485(A3)+224(B1B2)+266(A1)  |
            | Approach 3|               |-------  6 8 8 8 7 8          -------|                                     |
 3:  LT= 157 | |        | 2:RT= 100     |         7 5 5 5 1 7          ^- 100 |           = 1180 vph                |
   TH=1454  | |         |   TH= 271     |         | | | | | |          <- 136 |=====================================|
   RT= 267  | v         |   LT= 123     |         < v v v > >          <- 136 | Step 8. INTERSECTION LEVEL OF       |
-------------            -------------  |                              v- 123 |         SERVICE                     |
                         <--Approach 2  |                                     |    (compare step 7 with table 6)    |
                                        |                                     |              -------                |
                                        |                                     |              |  D  |                |
 Approach 1-->                          | 224 -^                              |              -------                |
-------------            -------------  | 181 ->            < < ^ ^ >         |=====================================|
 1:LT= 224  |           ^ | 4: RT= 109  | 181 ->            | | | | |         | Step 9. RECALCULATE                 |
   TH= 362  |           | |   TH= 752   | 524 -v                              |                                     |
   RT= 524  |           | |  LT= 371    |-------            2 1 3 3 1  -------|Geometric Change:                    |
            | Approach 4|               |       |           0 6 7 7 0 |       |Signal Change:                       |
                                        |       |           5 7 6 6 9 |       |Volume Change:                       |
========================================+====================================+=====================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                        |          (two phase signal)         |                                     |
        |   <   B4B3                    |           | Approach 3|             |                                     |
        >   |                           |           |           |             |                                     |
    | | AND < ^     A3B4 AND            |           |           |             |                                     |
    v > OR  | |     /OR A4B3            |           |           |             |                                     |
        |   ^   A3A4                    |-------------           -------------|                                     |
        v   |                           | Approach 1                          |                                     |
       --^ v--  B2B1                    |                                     |                                     |
                                        |          See Step 6b.               |                                     |
    --^ AND <--     A1B2 AND            |                                     |                                     |
    --> OR  v--     /OR A2B1            |                        Approach 2   |                                     |
       --> <--  A1A2                    |-------------            ------------|                                     |
                                        |           |           |             |                                     |
----------------------------------------|           |           |             |                                     |
 A1 -->    A3 |      B1 v--     B3   <| |           |           |             |                                     |
              v ^                     | |           | Approach 4|             | Exclusive right turns reduced  30 % |
 A2 <--    A4   |    B2 --^     B4 |>   |                                     | V/C Ratio = .86                     |
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                          Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: ELK GROVE FLORIN AND GERBER                         Design Hour: AM
Problem Statement: ALT D E+P MIT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR    |
              | Approach 3:ELK GROVE FLO|          -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
              | 1  2  2 |    ^     |                  : -1-  -2-  -3-  -4-|   Possible   Volume    Adjusted|
              |  R  L   |    N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover Critical|
GERBER RD     | R T T T L |        |  intervals/hour  :                  |able   Volume   to next    Volume |
------------- T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT    |  change (vph)    :                  |-----------------------------------|
  1  LT--^     v v v    <^-RTH  1  |c.G/C ratio       :  0    0    0    0|B4B3  112(B4)  414- 112= 302(B3)  112|
     LTH-^>             <--TH   1  |d.Opposing volume :  0    0    0    0|A4B3  302(B3)  359- 302=  57(A4)  302|
  1   TH-->             <v-LTH     |  in vph          :                  |A3A4  173(A3)  OR   57(A4)         173|
     RTH-v>   ^ ^ ^      v--LT  1  |e.LT capacity on  :  0    0    0    0|B2B1  102(B2)  187- 102=  85(B1)  102|
  2  RT--v    < < | > >  Approach 2|  green (vph)     :                  |A2B1   85(B1)  436-  85= 351(A2)   85|
------------- L L T R R -----------|f.LT capacity in  :  0    0    0    0|A1A2  374(A1)  OR  351(A2)         374|
              | T T H T T |GERBER RD|  vph (b+e)      :                  |                                   |
              |  H   H   |          |g.Left turn volume :  0    0    0    0|                                   |
              | 2  2  1  |          |  in vph          :                  |                                   |
              | Approach 4:ELK GROVE FLO|h.Is volume > cap. :             :                                   |
                                   |  (g>f) ?         :                  |                                   |
===================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |       |                    |      |                                   |
                                   |       | 1 1 1   1          |      |414(B4B3)+173(A3)+187(B2B1)+374(A1) |
              | Approach 3|        |-------  8 7 7 9 1          -------|                                   |
 3:  LT= 204 | |        | 2:RT= 419 |        6 3 3 2 2          ^+ 419 |          = 1148 vph               |
    TH= 345 | |        |   TH= 453 |        | | | | |          <+  17 |===================================|
    RT= 186 | v        |   LT= 187 |        < v v > >          <- 436 | Step 8. INTERSECTION LEVEL OF     |
-------------           ------------|                            v- 187 |         SERVICE                   |
                       <--Approach 2 |                                  |     (compare step 7 with table 6)  |
                                   |                                  |             -------                |
                                   |                                  |             | D |                  |
 Approach 1-->                     | 102 -^                           |             -------                |
-------------           ------------| 374 ->          < < ^ ^ >        |===================================|
 1:LT= 102  |          ^ | 4: RT= 158 | 135 -v          | | | | |        | Step 9. RECALCULATE              |
   TH= 374  |          | |   TH= 717 | 135 -v                           |                                   |
   RT= 269  |          | |   LT= 752 |-------          4 3 3 3 1  -------|Geometric Change:                 |
            | Approach 4|          |       |           1 3 5 5 5 |      |Signal Change:                     |
                                   |       |           4 8 9 9 8 |      |Volume Change:                     |
===================================+==================================+===================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                   |         (two phase signal)       |                                   |
         |   <   B4B3              |            | Approach 3|         |                                   |
         >   |                     |            |           |         |                                   |
     | | AND < ^     A3B4 AND      |            |           |         |                                   |
     v > OR  | |     /OR A4B3      |            |           |         |                                   |
         |   ^   A3A4              |-------------         -------------|                                   |
         v   |                     | Approach 1                       |                                   |
        --^ v--  B2B1              |                                  |                                   |
                                   |          See Step 6b.            |                                   |
     --^ AND <--     A1B2 AND      |                                  |                                   |
     --> OR  v--     /OR A2B1      |                       Approach 2 |                                   |
        --> <--  A1A2              |-------------         ------------|                                   |
                                   |            |           |         |                                   |
-----------------------------------|            |           |         |                                   |
 A1 -->   A3 |      B1 v--    B3   <|  |        |           |         |                                   |
            v ^                 |  |  |        | Approach 4|         | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |>   |                                 | V/C Ratio = .83                   |
==========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: ELK GROVE FLORIN AND GERBER                                 Design Hour: PM
Problem Statement: ALTD E+P MIT
============================================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK                  | Step 6b. VOLUME ADJUSTMENT FOR        |
              | Approach 3:ELK GROVE FLO|                  -------Approach-----|         MULTIPHASE SIGNAL OVERLAP      |
              | 1   2   2 |       ^    |                  : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
              |   R   L   |       N    |a.No. of change   :   0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD     | R T T T L |            |  intervals/hour   :                   |able    Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on   :   0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1   < < | > >   ^--RT       |  change (vph)     :                   |---------------------------------------|
   1  LT--^      v v v    <^-RTH  1    |c.G/C ratio        :   0    0    0    0|B4B3   185(B3)  286- 185= 101(B4)   185|
      LTH-^>              <--TH   1    |d.Opposing volume  :   0    0    0    0|A3B4   101(B4)  354- 101= 253(A3)   101|
   1   TH-->              <v-LTH       |  in vph           :                   |A3A4   253(A3) OR  233(A4)            253|
      RTH-v>     ^ ^ ^     v--LT  1    |e.LT capacity on   :   0    0    0    0|B2B1   220(B2)  258- 220=  38(B1)   220|
   2  RT--v    < < | > >   Approach 2  |  green (vph)      :                   |A2B1    38(B1)  448-  38= 410(A2)    38|
-------------  L L T R R  -------------|f.LT capacity in   :   0    0    0    0|A1A2   510(A1) OR  410(A2)            510|
              | T T H T T |GERBER RD   |  vph (b+e)        :                   |                                       |
              |   H   H   |            |g.Left turn volume :   0    0    0    0|                                       |
              | 2   2   1 |            |  in vph           :                   |                                       |
              | Approach 4:ELK GROVE FLO|h.Is volume > cap. :                  :|                                       |
                                       |  (g>f) ?          :                   |                                       |
=======================================+=======================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES       |
                                       |       |                     |         |                                       |
                                       |       | 2 3 3 2 2           |         |286(B3B4)+253(A3)+258(B2B1)+510(A1)    |
              | Approach 3|            |-------  0 5 5 3 8            -------|                                       |
 3:  LT= 520  | |          | 2:RT= 395 |         2 4 4 4 6            ^+ 395 |              = 1307 vph               |
    TH= 707   | |          |   TH= 500 |         | | | | |            <+  53 |=======================================|
    RT= 202   | v          |   LT= 258 |         < v v > >            <- 448 | Step 8. INTERSECTION LEVEL OF         |
-------------              -------------|                              v- 258 |         SERVICE                       |
                          <--Approach 2 |                                     |     (compare step 7 with table 6)     |
                                       |                                       |              -------                  |
                                       |                                       |              |  E  |                  |
 Approach 1-->                         | 220 -^                                |              -------                  |
-------------              -------------| 510 ->              < < ^ ^ >       |=======================================|
 1:LT= 220    |          ^ | 4: RT= 231 | 418 -v              | | | | |       | Step 9. RECALCULATE                    |
    TH= 510   |          | |    TH= 466 | 418 -v                              |                                       |
    RT= 835   |          | |    LT= 336 |-------              1 1 2 2 2 -------|Geometric Change:                      |
              | Approach 4|            |       |              8 5 3 3 3 |     |Signal Change:                          |
                                       |       |              5 1 3 3 1 |     |Volume Change:                          |
=======================================+=======================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                              |
                                       |          (two phase signal)           |                                       |
          |   <   B4B3                 |            | Approach 3|              |                                       |
          >   |                        |            |           |              |                                       |
     | | AND <  ^     A3B4 AND         |            |           |              |                                       |
     v > OR  | |      /OR A4B3         |            |           |              |                                       |
          |   ^   A3A4                 |-------------           -------------|                                       |
          v   |                        | Approach 1                            |                                       |
         --^ v--  B2B1                 |                                       |                                       |
                                       |           See Step 6b.                |                                       |
     --^ AND <--      A1B2 AND         |                                       |                                       |
     --> OR  v--      /OR A2B1         |                           Approach 2  |                                       |
         --> <--  A1A2                 |-------------            ------------|                                       |
                                       |            |           |              |                                       |
---------------------------------------|            |           |              |                                       |
 A1 -->    A3 |      B1 v--     B3   <| |            |           |              |                                       |
            v ^                       | | |          | Approach 4|              | Exclusive right turns reduced  30 %   |
 A2 <--    A4  |     B2 --^     B4 |>   |                                       | V/C Ratio = .95                       |
============================================================================================================================
```

ATTACHMENT 5E

```
                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER AND BRADSHAW                                    Design Hour: AM
Problem Statement: ALTD E+P MIT
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
              | Approach 3:BRADSHAW RD |                 -------Approach-----|           MULTIPHASE SIGNAL OVERLAP |
              | 1   2   1 |      ^   |                  : -1-  -2-  -3-  -4-|          Possible     Volume     Adjusted|
              |   R   L   |      N   |a.No. of change   :  0    0    0     0|Prob-   Critical   Carryover   Critical|
GERBER RD     | R T T T L |          | intervals/hour   :                   |able     Volume     to next     Volume |
------------- T H H H T ------------|b.LT capacity on  :  0    0    0     0|Phase    in vph      phase      in vph |
 Approach 1   < < | > >   ^--RT  1  | change (vph)     :                   |--------------------------------------|
  2  LT--^      v v v    <^-RTH     |c.G/C ratio       :  0    0    0     0|B4B3     65(B3)   92-  65=  27(B4)    65|
     LTH-^>              <--TH   1  |d.Opposing volume :  0    0    0     0|A3B4     27(B4)  250-  27= 223(A3)    27|
  1   TH-->              <v-LTH     | in vph           :                   |A3A4    395(A4) OR  223(A3)          395|
     RTH-v>     ^ ^ ^     v--LT  2  |e.LT capacity on  :  0    0    0     0|B2B1     17(B1)  234-  17= 217(B2)    17|
  1  RT--v    < < | > >  Approach 2 | green (vph)      :                   |A1B2    217(B2)  178- 217=   0(A1)   217|
------------- L L T R R ------------|f.LT capacity in  :  0    0    0     0|A1A2    241(A2) OR    0(A1)          241|
              | T T H T T |GERBER RD | vph (b+e)        :                   |                                      |
              |   H   H   |          |g.Left turn volume :  0    0    0    0|                                      |
              | 1   2   1 |          | in vph           :                   |                                      |
              | Approach 4:BRADSHAW RD |h.Is volume > cap. :                 :                                      |
                                     | (g>f) ?          :                   |                                      |
=====================================+=====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                     |       |                   |         |                                      |
                                     |       | 3 1 1             |         |92(B3B4)+395(A4)+234(B1B2)+241(A2)    |
              | Approach 3|          |-------  5 5 5 9            -------|                                      |
 3:  LT=  92  | |         | 2:RT= 146 |         7 5 5 2            ^- 146 |           = 962 vph                  |
   TH= 310    | |         |   TH= 241 |         | | | |            <- 241 |======================================|
  RT= 357     | v         |   LT=  29 |         < v v >            v-  14 | Step 8. INTERSECTION LEVEL OF        |
-------------             ------------|                            v-  17 |         SERVICE                      |
                        <--Approach 2 |                                   |    (compare step 7 with table 6)     |
                                     |                                   |              -------                 |
                                     |                                   |              |  B  |                 |
 Approach 1-->                       | 234 -^                            |              -------                 |
-------------             ------------| 192 -^            < ^ ^ >         |======================================|
 1:LT= 426    |           ^ | 4: RT=  31 | 178 ->            | | | |         | Step 9. RECALCULATE                 |
   TH= 178    |           | |   TH= 790 |  59 -v                           |                                      |
   RT=  59    |           | |  LT=  65  |-------              3 3  -------|Geometric Change:                     |
              | Approach 4|          |       |          6 9 9 3 |          |Signal Change:                        |
                                     |       |          5 5 5 1 |          |Volume Change:                        |
=====================================+=====================================+======================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                             |
                                     |          (two phase signal)         |                                      |
         |   <   B4B3                |             | Approach 3|           |                                      |
        >   |                        |             |           |           |                                      |
    | | AND < ^     A3B4 AND         |             |           |           |                                      |
    v > OR  | |     /OR A4B3         |             |           |           |                                      |
         |   ^   A3A4                |-------------             -----------|                                      |
        v   |                        | Approach 1                          |                                      |
       --^ v--   B2B1                |                                   |                                      |
                                     |          See Step 6b.             |                                      |
    --^ AND <--     A1B2 AND         |                                   |                                      |
    --> OR  v--     /OR A2B1         |                        Approach 2 |                                      |
       --> <--   A1A2                |-------------            ----------|                                      |
                                     |             |           |           |                                      |
-------------------------------------|             |           |           |                                      |
 A1 -->    A3 |       B1 v--    B3   <|            |           |           |                                      |
            v ^                    | |             | Approach 4|           | Exclusive right turns reduced  30 %  |
 A2 <--    A4  |      B2 --^    B4 |> |                                   | V/C Ratio = .7                       |
==============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER AND BRADSHAW                                       Design Hour: PM
Problem Statement: ALTD E+P MIT
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR     |
              | Approach 3:BRADSHAW RD |                -------Approach-----|       MULTIPHASE SIGNAL OVERLAP     |
              | 1  2  1 |      ^     |                  : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
              |  R  L   |      N     |a.No. of change   :  0    0    0    0|Prob-  Critical Carryover Critical|
GERBER RD     | R T T T L |          | intervals/hour   :                  |able   Volume   to next   Volume |
------------- T H H H T -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase    in vph |
  Approach 1  < < | > >  ^--RT  1    | change (vph)     :                  |-------------------------------------|
  2  LT--^     v v v    <^-RTH       |c.G/C ratio       :  0    0    0    0|B4B3     0(B3)  198-   0= 198(B4)    0|
     LTH-^>             <--TH   1    |d.Opposing volume :  0    0    0    0|A3B4   198(B4)  442- 198= 244(A3)  198|
  1   TH-->             <v-LTH       | in vph           :                  |A3A4   244(A3) OR  148(A4)          244|
     RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on  :  0    0    0    0|B2B1    21(B1)  301-  21= 280(B2)   21|
  1  RT--v    < < | > >  Approach 2  | green (vph)      :                  |A1B2   280(B2)  294- 280=  14(A1)  280|
------------- L L T R R -------------|f.LT capacity in  :  0    0    0    0|A1A2   265(A2) OR   14(A1)          265|
              | T T H T T |GERBER RD | vph (b+e)        :                  |                                     |
              |  H   H  |            |g.Left turn volume:  0    0    0    0|                                     |
              | 1  2  1 |            | in vph           :                  |                                     |
              | Approach 4:BRADSHAW RD |h.Is volume > cap. :                :                                     |
                                     | (g>f) ?          :                  |                                     |
=====================================+=================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                     |       |                    |      |                                     |
                                     |       | 6 3 3 1            |      |198(B3B4)+244(A3)+301(B1B2)+265(A2)  |
              | Approach 3|          |------- 3 6 6 9              -------|                                     |
 3:  LT= 198  | |         | 2:RT= 183 |       2 8 8 8              ^- 183 |            = 1008 vph               |
   TH= 735    | |         |   TH= 265 |       | | | |              <- 265 |=====================================|
  RT= 632     | v         |   LT=  37 |       < v v >              v-  17 | Step 8. INTERSECTION LEVEL OF       |
-------------              -------------|                          v-  21 |        SERVICE                      |
                         <--Approach 2 |                                  |     (compare step 7 with table 6)   |
                                     |                                    |              -------                |
                                     |                                    |              |  C  |                |
 Approach 1-->                       | 301 -^                             |              -------                |
-------------              ------------| 247 -^            < ^ ^ >        |=====================================|
 1:LT= 548    |          ^ | 4: RT=  25 | 294 ->           | | | |        | Step 9. RECALCULATE                 |
   TH= 294    |          | |   TH= 296  |  87 -v                          |                                     |
   RT=  87    |          | |   LT=    0 |-------             1 1  ------- |Geometric Change:                    |
              | Approach 4|          |        |               4 4 2 |      |Signal Change:                       |
                                     |        |             0 8 8 5 |      |Volume Change:                       |
=====================================+=================================+=====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                     |        (two phase signal)         |                                     |
          |   <   B4B3               |           | Approach 3|         |                                     |
          >   |                      |           |           |         |                                     |
     | | AND < ^      A3B4 AND       |           |           |         |                                     |
     v > OR  | |      /OR A4B3       |           |           |         |                                     |
          |   ^   A3A4               |-------------       -------------|                                     |
          v   |                      | Approach 1                      |                                     |
         --^ v--  B2B1               |                                 |                                     |
                                     |          See Step 6b.           |                                     |
     --^ AND <--      A1B2 AND       |                                 |                                     |
     --> OR  v--      /OR A2B1       |                      Approach 2 |                                     |
         --> <--  A1A2               |-------------       -------------|                                     |
                                     |           |           |         |                                     |
-------------------------------------|           |           |         |                                     |
 A1 -->    A3 |      B1 v--    B3  < |           |           |         |                                     |
            v ^                   |  |           | Approach 4|         | Exclusive right turns reduced  30 % |
 A2 <--    A4  |     B2 --^    B4 |> |                                 | V/C Ratio = .73                     |
==============================================================================================
```

# APPENDIX D

## Cumulative Plus Alternate Core Alternative
## Level of Service Calculations

```
                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: FLORIN RD AND ELK GROVE-FLORIN RD                          Design Hour: AM
Problem Statement: ALTA
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR       |
              | Approach 3:ELK GROVE-FLO|                -------Approach-----|          MULTIPHASE SIGNAL OVERLAP   |
              | 1   3   2 |      ^    |                    : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
              |  R    L   |      N    |a.No. of change    :  0    0    0    0|Prob-   Critical  Carryover  Critical|
FLORIN RD     | R T T T L |           |  intervals/hour   :                  |able     Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase    in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT   1   |  change (vph)     :                  |-------------------------------------|
   2  LT--^     v v v    <^-RTH       |c.G/C ratio        :  0    0    0    0|B2B1    127(B1)  259- 127= 132(B2)   127|
      LTH-^>             <--TH    3   |d.Opposing volume  :  0    0    0    0|A1B2    132(B2)  190- 132=  58(A1)   132|
   3   TH-->             <v-LTH       |  in vph           :                  |A1A2    543(A2) OR   58(A1)          543|
      RTH-v>    ^ ^ ^     v--LT   2   |e.LT capacity on   :  0    0    0    0|B4B3     44(B4)  308-  44= 264(B3)    44|
   1  RT--v   < < | > >   Approach 2  |  green (vph)      :                  |A4B3    264(B3) 1100- 264= 836(A4)   264|
------------- L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A3A4    836(A4) OR  313(A3)          836|
              | T T H T T |FLORIN RD  |  vph (b+e)        :                  |                                     |
              |   H   H   |           |g.Left turn volume :  0    0    0    0|                                     |
              | 2   3   1 |           |  in vph           :                  |                                     |
              | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                 :                                     |
                                      |  (g>f) ?          :                  |                                     |
======================================+====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                      |       |                      |    |                                     |
                                      |       | 2 3 3 3              |    |259(B1B2)+543(A2)+308(B4B3)+836(A4)  |
              | Approach 3|           |-------  2 1 1 1 3 4          -------|                                     |
 3:  LT=  80  | |         | 2:RT= 570 |         0 3 3 3 6 4          ^- 570 |           = 1946 vph                |
    TH= 940   | |         |   TH=1630 |         | | | | | |          <- 543 |=====================================|
    RT= 220   | v         |   LT= 230 |         < v v v > >          <- 543 | Step 8. INTERSECTION LEVEL OF        |
-------------              -------------|                             <- 543 |         SERVICE                     |
                         <--Approach 2|                              v- 104 |    (compare step 7 with table 6)    |
                                      | 259 -^                       v- 127 |              -------                |
                                      | 212 -^                              |              |  F  |                |
 Approach 1-->                        | 190 ->                              |              -------                |
-------------              -------------| 190 ->          < < ^ ^ ^ >        |=====================================|
 1:LT= 470    |            ^ | 4: RT=  90 | 190 ->          | | | | | |        | Step 9. RECALCULATE                  |
   TH= 570    |            | |    TH=3300 | 210 -v              1 1 1        |                                     |
   RT= 210    |            | |   LT= 560 |-------          3 2 1 1 1   -------|Geometric Change:                    |
              | Approach 4|           |       |         0 5 0 0 0 9 |     |Signal Change:                       |
                                      |       |         8 2 0 0 0 0 |     |Volume Change:                       |
======================================+====================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                             |
                                      |           (two phase signal)        |                                     |
      --^ v--  B2B1                   |              | Approach 3|          |                                     |
                                      |              |           |          |                                     |
   --^ AND <--     A1B2 AND           |              |           |          |                                     |
   --> OR  v--     /OR A2B1           |              |           |          |                                     |
      --> <--  A1A2                   |-------------              ------------|                                     |
                                      | Approach 1                          |                                     |
        |  <   B4B3                   |                                     |                                     |
        >  |                          |             See Step 6b.            |                                     |
    | | AND < ^    A3B4 AND           |                                     |                                     |
    v > OR  | |    /OR A4B3           |                          Approach 2 |                                     |
        |  ^   A3A4                   |-------------              ------------|                                     |
        v  |                          |              |           |          |                                     |
-------------------------------------|              |           |          |                                     |
 A1 -->   A3 |      B1 v--    B3   <|  |              |           |          |                                     |
             v ^                   | | |              |           |          |                                     |
 A2 <--   A4  |     B2 --^    B4 |>  |              | Approach 4|          | Exclusive right turns reduced  30 % |
                                      |                                     | V/C Ratio = 1.42                    |
=============================================================================================
```

```
                                        Critical Movement Analysis: PLANNING
                                                 Calculation Form 1
Intersection: FLORIN RD AND ELK GROVE-FLORIN RD                                    Design Hour: PM
Problem Statement: ALTA
=======================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:ELK GROVE-FLO|                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
             | 1   3   2 |      ^     |                  : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
             |  R    L   |      N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |            |  intervals/hour  :                  |able    Volume   to next    Volume |
------------  T H H H T  ------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)    :                  |-------------------------------------|
  2  LT--^     v v v     <^-RTH      |c.G/C ratio       :  0    0    0    0|B2B1   121(B1)  138- 121=  17(B2)  121|
     LTH-^>              <--TH   3    |d.Opposing volume :  0    0    0    0|A1B2    17(B2)  570-  17= 553(A1)   17|
  3   TH-->              <v-LTH      |  in vph          :                  |A1A2   553(A1) OR  310(A2)         553|
     RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on  :  0    0    0    0|B4B3   176(B3)  264- 176=  88(B4)  176|
  1  RT--v    < < | > >   Approach 2  |  green (vph)     :                  |A3B4    88(B4)  817-  88= 729(A3)   88|
------------  L L T R R  ------------|f.LT capacity in  :  0    0    0    0|A3A4   729(A3) OR  497(A4)         729|
             | T T H T T |FLORIN RD   |  vph (b+e)       :                  |                                     |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                     |
             | 2   3   1 |            |  in vph          :                  |                                     |
             | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                  :                                     |
                                      |  (g>f) ?         :                  |                                     |
======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |        |                  |        |                                     |
                                      |        | 5 8 8 8 2 2      |        |138(B1B2)+553(A1)+264(B3B4)+729(A3)  |
             | Approach 3|            |-------   7 1 1 1 1 6        -------|                                     |
 3:  LT= 480 | |          | 2:RT= 220 |          0 7 7 7 6 4        ^- 220 |          = 1684 vph                 |
   TH=2450   | |          |   TH= 930 |          | | | | | |        <- 310 |=====================================|
   RT= 570   | v          |   LT= 220 |          < v v v > >        <- 310 | Step 8. INTERSECTION LEVEL OF       |
------------               ------------|                              <- 310 |        SERVICE                      |
                        <--Approach 2 |                              v-  99 |    (compare step 7 with table 6)    |
                                      | 138 -^                       v- 121 |            -------                  |
                                      | 113 -^                              |            |  F  |                |
 Approach 1-->                        | 570 ->                              |            -------                  |
------------               ------------| 570 ->       < < ^ ^ ^ >            |=====================================|
 1:LT= 250   |            ^ | 4: RT=  90 | 570 ->      | | | | | |           | Step 9. RECALCULATE                 |
   TH=1710   |            | |   TH=1490 | 400 -v                              |                                     |
   RT= 400   |            | |   LT= 320 |-------       1 1 4 4 4    -------|Geometric Change:                    |
             | Approach 4|            |        |      7 4 9 9 9 |          |Signal Change:                       |
                                      |        |      6 4 7 7 7 0 |          |Volume Change:                       |
======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                            |
                                      |          (two phase signal)        |                                     |
       --^ v--   B2B1                 |           | Approach 3|            |                                     |
                                      |           |           |            |                                     |
    --^ AND <--     A1B2 AND          |           |           |            |                                     |
    --> OR  v--     /OR A2B1          |           |           |            |                                     |
       --> <--   A1A2                 |------------            ------------|                                     |
                                      | Approach 1                         |                                     |
        |   <    B4B3                 |                                    |                                     |
        >   |                         |          See Step 6b.              |                                     |
   | | AND < ^      A3B4 AND          |                                    |                                     |
   v > OR  | |      /OR A4B3          |                        Approach 2  |                                     |
        |   ^    A3A4                 |------------             -----------|                                     |
        v   |                         |           |           |            |                                     |
---------------------------------------|           |           |            |                                     |
 A1 -->   A3 |      B1 v--    B3   <| |           |           |            |                                     |
            v ^                     | | |           | Approach 4|            | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |>   |                                    | V/C Ratio = 1.22                    |
=======================================================================================================
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                              Design Hour: AM
Problem Statement: ALTA
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY | Step 4. LEFT TURN CHECK       | Step 6b. VOLUME ADJUSTMENT FOR |
          | Approach 3:WATERMAN RD |           -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
          |          |     ^      |                 : -1- -2- -3- -4-|      Possible   Volume    Adjusted|
          |  R  L    |     N      |a.No. of change   :  0   0   0   0|Prob-  Critical  Carryover Critical|
FLORIN RD | R T T T L |           | intervals/hour   :              |able   Volume   to next   Volume |
------------- T H H H T -------------|b.LT capacity on :  0   0   0   0|Phase  in vph   phase     in vph |
 Approach 1  < < | > >   ^--RT    | change (vph)     :              |------------------------------------|
     LT--^    v v v    <^-RTH     |c.G/C ratio       :  0   0   1   0|A2B1   149(B1)  550- 149= 401(A2)   149|
     LTH-^>            <--TH   3  |d.Opposing volume :  0   0   0   0|A1A2   401(A2) OR  140(A1)         401|
  3   TH-->            <v-LTH     | in vph           :              |A4B3   567(B3) OR  406(A4)         567|
     RTH-v>   ^ ^ ^     v--LT  2  |e.LT capacity on  :  0   0   0   0|                                    |
  1  RT--v   < < | > >  Approach 2 | green (vph)      :              |                                    |
------------- L L T R R -------------|f.LT capacity in :  0   0   0   0|                                    |
          | T T H T T |FLORIN RD  | vph (b+e)        :              |                                    |
          |  H   H    |           |g.Left turn volume :  0   0   0   0|                                    |
          | 2       1 |           | in vph           :              |                                    |
          | Approach 4:WATERMAN RD |h.Is volume > cap. :             :|                                    |
                                  | (g>f) ?          :              |                                    |
==================================+=================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                  |      |                  |        |                                    |
                                  |      |                  |        |550(B1A2)+567(B3)+0()+0()           |
            | Approach 3|         |-------            -------|                                    |
 3:  LT=   0 | |        | 2:RT=   0 |                   <- 550 |          = 1117 vph                |
    TH=   0 | |        |   TH=1650 |                   <- 550 |====================================|
   RT=   0  | v        |   LT= 270 |                   <- 550 | Step 8. INTERSECTION LEVEL OF      |
-------------          -------------|                   v- 122 |        SERVICE                     |
                   <--Approach 2  |                   v- 149 |     (compare step 7 with table 6)  |
                                  |                          |              -------               |
                                  |                          |              |  C  |               |
 Approach 1-->                    | 67 ->                    |              -------               |
-------------          -------------| 67 ->        < < >      |====================================|
 1:LT=   0    |          ^ | 4: RT= 580 | 67 ->      | | |      | Step 9. RECALCULATE               |
   TH= 200    |          | |   TH=   0 | 200 -v               |                                    |
   RT= 200    |          | |   LT=1030 |-------     5 4 5 -------|Geometric Change:                  |
             | Approach 4|         |      |       6 6 8 |      |Signal Change:                      |
                                  |      |       7 4 0 |      |Volume Change:                      |
==================================+=================================+====================================|
 Step 3. IDENTIFY PHASING         | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                  |        (two phase signal)   |                                    |
         <--  A2B1                |           | Approach 3|     |                                    |
         v--                      |           |           |     |                                    |
      --> <--  A1A2               |           |           |     |                                    |
                                  |           |           |     |                                    |
       <   ^   A4B3               |-------------       -------------|                                    |
       |   |                      | Approach 1                  |                                    |
                                  |                             |                                    |
                                  |        See Step 6b.         |                                    |
                                  |                             |                                    |
                                  |                 Approach 2  |                                    |
                                  |-------------       -------------|                                    |
----------------------------------|           |           |     |                                    |
 A1 -->   A3 |      B1 v--    B3  <| |         |           |     |                                    |
            v ^                 | | |         | Approach 4|     | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |> |                         | V/C Ratio = .78                     |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                              Design Hour: PM
Problem Statement: ALTA
=========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:WATERMAN RD    |                   -------Approach-----|       MULTIPHASE SIGNAL OVERLAP     |
             |          |      ^         |                   : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R   L   |      N         |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |               | intervals/hour    :                   |able   Volume   to next    Volume |
------------  T H H H T  ----------------|b.LT capacity on   :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1   < < | > >    ^--RT         | change (vph)      :                   |-------------------------------------|
     LT--^     v v v      <^-RTH         |c.G/C ratio        :  0    0    1    0|A2B1   220(B1)  173- 220=  0(A2)   220|
     LTH-^>               <--TH   3      |d.Opposing volume  : 520   0  300    0|A1A2   644(A1) OR   0(A2)          644|
  3   TH-->               <v-LTH         | in vph            :                   |A4B3   336(B3) OR 210(A4)          336|
     RTH-v>    ^ ^ ^       v--LT  2      |e.LT capacity on   :  0    0  900    0|                                     |
  1  RT--v    < < | > >   Approach 2     | green (vph)       :                   |                                     |
------------  L L T R R  ----------------|f.LT capacity in   :  0    0  900    0|                                     |
             | T T H T T |FLORIN RD      | vph (b+e)         :                   |                                     |
             |  H   H    |               |g.Left turn volume :  0    0    0    0|                                     |
             | 2       1 |               | in vph            :                   |                                     |
             | Approach 4:WATERMAN RD    |h.Is volume > cap. : NO        NO      :                                     |
                                         | (g>f) ?           :                   |                                     |
=========================================+=======================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES     |
                                         |       |                       |       |                                     |
                                         |       |                       |       |864(B1A1)+336(B3)+0()+0()            |
             | Approach 3|               |-------                         -------|                                     |
 3:  LT=   0 | |         | 2:RT=   0     |                               <- 173  |           = 1200 vph                |
   TH=   0   | |         |   TH= 520     |                               <- 173  |=====================================|
  RT=   0    | v         |   LT= 400     |                               <- 173  | Step 8. INTERSECTION LEVEL OF       |
------------              ---------------|                               v- 180  |         SERVICE                     |
                         <--Approach 2   |                               v- 220  |    (compare step 7 with table 6)   |
                                         |                                       |              -------                |
                                         |                                       |              | D |                  |
 Approach 1-->                           | 530 ->                                |              -------                |
------------              ---------------| 530 ->               < < >            |=====================================|
 1:LT=   0   |          ^ | 4: RT= 300   | 530 ->               | | |            | Step 9. RECALCULATE                 |
   TH=1590   |          | |    TH=   0   | 920 -v                                |                                     |
   RT= 920   |          | |   LT= 610    |-------               3 2 3   -------|Geometric Change:                    |
             | Approach 4|               |       |              3 7 0 |         |Signal Change:                       |
                                         |       |              6 5 0 |         |Volume Change:                       |
=========================================+=======================================+=====================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                            |
                                         |          (two phase signal)           |                                     |
            <--  A2B1                    |              | Approach 3|            |                                     |
            v--                          |              |           |            |                                     |
        --> <--  A1A2                    |              |           |            |                                     |
                                         |              |           |            |                                     |
         <   ^   A4B3                    |-------------              ------------|                                     |
         |   |                           | Approach 1                            |                                     |
                                         |                                       |                                     |
                                         |             See Step 6b.              |                                     |
                                         |                                       |                                     |
                                         |                          Approach 2   |                                     |
                                         |-------------              ------------|                                     |
                                         |              |           |            |                                     |
-----------------------------------------|              |           |            |                                     |
 A1 -->   A3 |     B1 v--    B3    <|    |              |           |            |                                     |
            v ^                     | |  |              | Approach 4|            | Exclusive right turns reduced  30 % |
 A2 <--   A4  |    B2 --^    B4 |>       |                                       | V/C Ratio = .84                     |
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                                    Design Hour: AM
Problem Statement: AL7A
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
          | Approach 3:BRADSHAW RD |                -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
          | 1   3   2 |     ^      |               : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
          |   R   L   |     N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD | R T T T L |            |  intervals/hour :                  |able   Volume    to next    Volume |
--------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT  1  |  change (vph)   :                  |-------------------------------------|
  2  LT--^    v v v     <^-RTH     |c.G/C ratio      :  0    0    0    0|B2B1    22(B1)  396-  22= 374(B2)   22|
     LTH-^>             <--TH   3  |d.Opposing volume:  0    0    0    0|A1B2   374(B2)   60- 374=   0(A1)  374|
  3   TH-->             <v-LTH     |  in vph         :                  |A1A2   609(A2) OR    0(A1)         609|
     RTH-v>   ^ ^ ^      v--LT  2  |e.LT capacity on :  0    0    0    0|B4B3     6(B4)  457-   6= 451(B3)    6|
  1  RT--v   < < | > >   Approach 2|  green (vph)    :                  |A4B3   451(B3)  817- 451= 366(A4)  451|
---------    L L T R R ------------|f.LT capacity in :  0    0    0    0|A3A4   366(A4) OR  189(A3)         366|
          | T T H T T |FLORIN RD   |  vph (b+e)      :                  |                                     |
          |   H   H   |            |g.Left turn volume:  0    0    0    0|                                     |
          | 2   3   1 |            |  in vph         :                  |                                     |
          | Approach 4:BRADSHAW RD |h.Is volume > cap.:                 :                                     |
                                   |  (g>f) ?        :                  |                                     |
==================================+=====================================+=====================================|
Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                   |        |                  |        |                                     |
                                   |        | 2                |        |396(B1B2)+609(A2)+457(B4B3)+366(A4)  |
          | Approach 3|            |-------  7 5 5 5          -------|                                     |
3:  LT=  10 | |       | 2:RT= 870  |         0 0 0 0 5 6      ^- 870  |           = 1828 vph                |
    TH= 150 | |       |   TH=1080  |         | | | | | |      <- 360  |=====================================|
    RT= 270 | v       |   LT=  40  |         < v v v > >      <- 360  | Step 8. INTERSECTION LEVEL OF       |
---------             -------------|                          <- 360  |         SERVICE                     |
                     <--Approach 2 |                          v-  18  |     (compare step 7 with table 6)   |
                                   | 396 -^                   v-  22  |              -------                |
                                   | 324 -^                           |              |  F  |                |
Approach 1-->                      |  60 ->                           |              -------                |
---------             -------------|  60 ->          < < ^ ^ ^ >      |=====================================|
1:LT= 720   |         ^ | 4: RT= 380|  60 ->          | | | | | |      | Step 9. RECALCULATE                 |
  TH= 180   |         | |   TH=2450|  70 -v                           |                                     |
  RT=  70   |         | |   LT= 830|-------          4 3 8 8 8 3 -------|Geometric Change:                    |
          | Approach 4|            |        |        5 7 1 1 1 8 |    |Signal Change:                       |
                                   |        |        7 4 7 7 7 0 |    |Volume Change:                       |
==================================+=====================================+=====================================|
Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                   |          (two phase signal)         |                                     |
      --^ v--  B2B1                |            | Approach 3|            |                                     |
                                   |            |           |            |                                     |
   --^ AND <--    A1B2 AND         |            |           |            |                                     |
   --> OR  v--    /OR A2B1         |            |           |            |                                     |
      --> <--  A1A2                |------------             ------------|                                     |
                                   | Approach 1                          |                                     |
       |  <    B4B3                |                                     |                                     |
       >  |                        |          See Step 6b.               |                                     |
   | | AND < ^    A3B4 AND         |                                     |                                     |
   v > OR  | |    /OR A4B3         |                         Approach 2  |                                     |
       |  ^    A3A4                |------------             ------------|                                     |
       v  |                        |            |           |            |                                     |
-----------------------------------|            |           |            |                                     |
A1 -->   A3 |      B1 v--    B3  <|  |            |           |            |                                     |
          v ^                    | | |            | Approach 4|            | Exclusive right turns reduced  30 % |
A2 <--   A4 |      B2 --^    B4 |>   |                                     | V/C Ratio = 1.33                    |
==========================================================================================
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                                          Critical Movement Analysis: PLANNING
                                                  Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                                       Design Hour: PM
Problem Statement: ALTA
=============================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR        |
            | Approach 3:BRADSHAW RD    |                -------Approach-----|         MULTIPHASE SIGNAL OVERLAP     |
            | 1   3   2 |       ^       |                : -1-  -2-  -3-  -4-|       Possible    Volume     Adjusted|
            |   R   L   |       N       |a.No. of change   :   0    0    0    0|Prob-   Critical   Carryover   Critical|
FLORIN RD   | R T T T L |               |  intervals/hour  :                   |able     Volume    to next     Volume |
------------- T H H H T  ---------------|b.LT capacity on  :   0    0    0    0|Phase    in vph     phase      in vph |
  Approach 1  < < | > >   ^--RT  1      |  change (vph)    :                   |---------------------------------------|
    2  LT--^    v v v    <^-RTH         |c.G/C ratio       :   0    0    0    0|B2B1    154(B2)  187- 154=  33(B1)   154|
       LTH-^>            <--TH   3      |d.Opposing volume :   0    0    0    0|A2B1     33(B1)  203-  33= 170(A2)    33|
    3   TH-->            <v-LTH         |  in vph          :                   |A1A2   497(A1) OR  170(A2)           497|
       RTH-v>   ^ ^ ^     v--LT  2      |e.LT capacity on  :   0    0    0    0|B4B3     83(B3)  484-  83= 401(B4)    83|
    1  RT--v  < < | > >  Approach 2     |  green (vph)     :                   |A3B4   401(B4)  827- 401= 426(A3)   401|
------------- L L T R R  ---------------|f.LT capacity in  :   0    0    0    0|A3A4   426(A3) OR  397(A4)           426|
            | T T H T T |FLORIN RD      |  vph (b+e)       :                   |                                       |
            |   H   H   |               |g.Left turn volume :  0    0    0    0|                                       |
            | 2   3   1 |               |  in vph          :                   |                                       |
            | Approach 4:BRADSHAW RD    |h.Is volume > cap. :                  :                                       |
                                        |  (g>f) ?         :                   |                                       |
========================================+====================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES       |
                                        |       |                    |        |                                       |
                                        |       | 6 8 8 8 3 4        |        |187(B2B1)+497(A1)+484(B3B4)+426(A3)    |
            | Approach 3|               |-------  0 2 2 2 9 8          -------|                                       |
 3:  LT= 880 | |        | 2:RT= 290     |         0 7 7 7 6 4          ^- 290 |          = 1594 vph                   |
   TH=2480   | |        |   TH= 360     |         | | | | | |          <- 120 |=======================================|
   RT= 600   | v        |   LT= 340     |         < v v v > >          <- 120 | Step 8. INTERSECTION LEVEL OF         |
-------------             --------------|                              <- 120 |        SERVICE                        |
                         <--Approach 2  |                              v- 153 |    (compare step 7 with table 6)      |
                                        | 154 -^                       v- 187 |              -------                  |
                                        | 126 -^                              |              |  F  |                  |
 Approach 1-->                          | 357 ->                              |              -------                  |
-------------             --------------| 357 ->        < < ^ ^ ^ >           |=======================================|
 1:LT= 280   |          ^ | 4: RT=  60  | 357 ->        | | | | | |           | Step 9. RECALCULATE                   |
   TH=1070   |          | |    TH=1190  | 710 -v                              |                                       |
   RT= 710   |          | |    LT= 150  |-------            3 3 3      -------|Geometric Change:                      |
            | Approach 4|               |       |       8 6 9 9 9 6 |         |Signal Change:                         |
                                        |       |       3 8 7 7 7 0 |         |Volume Change:                         |
========================================+====================================+=======================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                              |
                                        |          (two phase signal)        |                                       |
      --^ v--  B2B1                     |            | Approach 3|           |                                       |
                                        |            |           |           |                                       |
   --^ AND <--     A1B2 AND             |            |           |           |                                       |
   --> OR  v--     /OR A2B1             |            |           |           |                                       |
      --> <--  A1A2                     |-------------             ------------|                                     |
                                        | Approach 1                         |                                       |
        |  <   B4B3                     |                                    |                                       |
        >  |                            |           See Step 6b.             |                                       |
   | | AND < ^     A3B4 AND             |                                    |                                       |
   v > OR  | |     /OR A4B3             |                         Approach 2 |                                       |
        |  ^   A3A4                     |-------------             ------------|                                     |
        v  |                            |            |           |           |                                       |
----------------------------------------|            |           |           |                                       |
 A1 -->   A3 |      B1 v--     B3   <|  |            |           |           |                                       |
           v ^                       | ||            |           |           |                                       |
 A2 <--   A4  |     B2 --^     B4 |>    |            | Approach 4|           | Exclusive right turns reduced  30 %   |
                                        |                                    | V/C Ratio = 1.16                      |
=============================================================================================================
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                                    Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: FLORIN RD AND VINEYARD RD                              Design Hour: AM
Problem Statement: ALTA
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR       |
          | Approach 3:VINEYARD RD  |                -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
          |         |      ^        |                : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
          |   R   L |      N        |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD | R T T T L |             | intervals/hour :                  |able    Volume   to next    Volume |
------------ T H H H T ------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT      | change (vph)   :                  |------------------------------------|
    LT--^     v v v    <^-RTH       |c.G/C ratio     :  0    0    1    0|A2B1   83(B1)  177- 83=  94(A2)   83|
    LTH-^>             <--TH  3     |d.Opposing volume : 530  0  750    0|A1A2  207(A1) OR  94(A2)         207|
  3  TH-->             <v-LTH       | in vph         :                  |A4B3  525(A4) OR 413(B3)         525|
    RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0  450    0|                                    |
  1  RT--v   < < | > >   Approach 2 | green (vph)    :                  |                                    |
------------ L L T R R ------------|f.LT capacity in :  0    0  450    0|                                    |
          | T T H T T |FLORIN RD    | vph (b+e)      :                  |                                    |
          |   H   H   |             |g.Left turn volume :  0    0    0    0|                                    |
          | 2       1 |             | in vph         :                  |                                    |
          | Approach 4:VINEYARD RD  |h.Is volume > cap. : NO         NO    :                                    |
                                    | (g>f) ?        :                  |                                    |
===================================+=================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                    |       |                 |         |                                    |
                                    |       |                 |         |290(B1A1)+525(A4)+0()+0()           |
          | Approach 3|             |-------                   -------|                                    |
 3:  LT=   0 | |        | 2:RT=   0 |                          <- 177 |          = 815 vph                 |
   TH=   0 | |          |   TH= 530 |                          <- 177 |====================================|
  RT=   0  | v          |   LT= 150 |                          <- 177 | Step 8. INTERSECTION LEVEL OF      |
------------              -----------|                          v-  68 |       SERVICE                      |
                        <--Approach 2 |                          v-  83 |    (compare step 7 with table 6)   |
                                    |                                 |           -------                  |
                                    |                                 |           |  A  |                  |
 Approach 1-->                      | 207 ->                          |           -------                  |
------------              -----------| 207 ->              < < >       |====================================|
 1:LT=   0  |           ^ | 4: RT= 750 | 207 ->              | | |       | Step 9. RECALCULATE                |
  TH= 620   |           | |   TH=   0 |  20 -v                          |                                    |
  RT=  20   |           | |   LT= 750 |-------              4 3 7 -------|Geometric Change:                   |
          | Approach 4|             |       |             1 3 5 |       |Signal Change:                      |
                                    |       |             3 8 0 |       |Volume Change:                      |
===================================+=================================+======================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                    |        (two phase signal)       |                                    |
          <--  A2B1                 |          | Approach 3|          |                                    |
          v--                       |          |           |          |                                    |
      --> <--  A1A2                 |          |           |          |                                    |
                                    |          |           |          |                                    |
        <   ^  A4B3                 |-----------           -----------|                                    |
        |   |                       | Approach 1                      |                                    |
                                    |                                 |                                    |
                                    |       See Step 6b.              |                                    |
                                    |                                 |                                    |
                                    |                     Approach 2  |                                    |
                                    |-----------           -----------|                                    |
                                    |          |           |          |                                    |
------------------------------------|          |           |          |                                    |
 A1 -->   A3 |     B1 v--    B3   <| |          |           |          |                                    |
           v ^                  | | |          | Approach 4|          | Exclusive right turns reduced  30 % |
 A2 <--   A4  |    B2 --^    B4 |>  |                                 | V/C Ratio = .57                    |
===============================================================================================
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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: FLORIN RD AND VINEYARD RD                                Design Hour: PM
Problem Statement: ALTA
=======================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR     |
             | Approach 3:VINEYARD RD |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
             |         |      ^     |                 : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R   L  |      N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |          | intervals/hour  :                  |able    Volume   to next    Volume |
------------- T H H H T  -----------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT     | change (vph)    :                  |-------------------------------------|
     LT--^     v v v    <^-RTH      |c.G/C ratio      :  0    0    1    0|A2B1  341(B1) 207- 341=  0(A2)   341|
     LTH-^>             <--TH  3    |d.Opposing volume : 620   0  280    0|A1A2  476(A1) OR   0(A2)         476|
  3  TH-->              <v-LTH      | in vph          :                  |A4B3  196(A4) OR   55(B3)        196|
     RTH-v>    ^ ^ ^     v--LT  2   |e.LT capacity on :  0    0  920    0|                                     |
  1  RT--v    < < | > >  Approach 2 | green (vph)     :                  |                                     |
-------------  L L T R R -----------|f.LT capacity in :  0    0  920    0|                                     |
             | T T H T T |FLORIN RD | vph (b+e)       :                  |                                     |
             |   H   H  |           |g.Left turn volume :  0    0    0    0|                                     |
             | 2       1 |          | in vph          :                  |                                     |
             | Approach 4:VINEYARD RD |h.Is volume > cap. :  NO        NO   :                                     |
                                    | (g>f) ?         :                  |                                     |
====================================+==================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                    |       |                   |       |                                     |
                                    |       |                   |       |817(B1A1)+196(A4)+0()+0()            |
             | Approach 3|          |-------                    ------- |                                     |
 3:  LT=   0 | |         | 2:RT=   0 |                           <- 207 |        = 1013 vph                   |
   TH=   0   | |         |   TH= 620 |                           <- 207 |=====================================|
   RT=   0   | v         |   LT= 620 |                           <- 207 | Step 8. INTERSECTION LEVEL OF       |
-------------            ------------|                           v- 279 |        SERVICE                      |
                          <--Approach 2 |                        v- 341 |     (compare step 7 with table 6)   |
                                    |                                   |             -------                 |
                                    |                                   |             |  C  |                 |
 Approach 1-->                      | 153 ->                            |             -------                 |
-------------            ------------| 153 ->              < < >        |=====================================|
 1:LT=   0   |         ^ | 4: RT= 280 | 153 ->             | | |        | Step 9. RECALCULATE                 |
   TH= 460   |         | |    TH=   0 | 680 -v                          |                                     |
   RT= 680   |         | |    LT= 100 |-------                2 -------|Geometric Change:                    |
             | Approach 4|          |       |             5 4 8 |       |Signal Change:                       |
                                    |       |             5 5 0 |       |Volume Change:                       |
====================================+==================================+=====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                    |        (two phase signal)         |                                     |
            <--  A2B1               |          | Approach 3|            |                                     |
            v--                     |          |           |            |                                     |
        --> <--  A1A2               |          |           |            |                                     |
                                    |          |           |            |                                     |
          <   ^  A4B3               |------------            -----------|                                     |
          |   |                     | Approach 1                        |                                     |
                                    |                                   |                                     |
                                    |          See Step 6b.             |                                     |
                                    |                                   |                                     |
                                    |                        Approach 2 |                                     |
                                    |------------            -----------|                                     |
                                    |          |           |            |                                     |
------------------------------------|          |           |            |                                     |
 A1 -->   A3 |     B1 v--     B3   <|          |           |            |                                     |
            v ^                   | |          | Approach 4|            | Exclusive right turns reduced  30 % |
 A2 <--   A4  |    B2 --^     B4 |> |                                   | V/C Ratio = .71                     |
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER RD AND ELK GROVE-FLORIN RD                           Design Hour: AM
Problem Statement: ALTA
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
            | Approach 3:ELK GROVE-FLO|              -------Approach-----|         MULTIPHASE SIGNAL OVERLAP |
            | 1  3  2 |       ^       |              : -1-  -2-  -3- -4-|      Possible   Volume    Adjusted|
            |  R  L   |       N       |a.No. of change   :  0    0    0   0|Prob-  Critical  Carryover  Critical|
GERBER RD   | R T T T L |             | intervals/hour   :               |able   Volume    to next    Volume |
------------ T H H H T  -------------|b.LT capacity on  :  0    0    0   0|Phase  in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT  1    | change (vph)     :               |-----------------------------------|
  2  LT--^    v v v     <^-RTH       |c.G/C ratio       :  0    0    0   0|B2B1    88(B1)  215-  88= 127(B2)   88|
     LTH-^>             <--TH   2    |d.Opposing volume :  0    0    0   0|A1B2   127(B2)  210- 127=  83(A1)  127|
  2   TH-->             <v-LTH       | in vph           :               |A1A2   580(A2) OR    83(A1)       580|
     RTH-v>   ^ ^ ^      v--LT  2    |e.LT capacity on  :  0    0    0   0|B4B3   143(B4)  440- 143= 297(B3)  143|
  1  RT--v   < < | > >  Approach 2   | green (vph)      :               |A4B3   297(B3) 1110- 297= 813(A4)  297|
------------ L L T R R  -------------|f.LT capacity in  :  0    0    0   0|A3A4   813(A4) OR   307(A3)       813|
            | T T H T T |GERBER RD   | vph (b+e)        :               |                                   |
            |   H   H   |            |g.Left turn volume :  0    0    0   0|                                   |
            | 2   3   1 |            | in vph           :               |                                   |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :              :                                   |
                                     | (g>f) ?          :               |                                   |
=====================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |       |                  |        |                                   |
                                     |       | 1 3 3 3 1 1      |        |215(B1B2)+580(A2)+440(B4B3)+813(A4) |
            | Approach 3|            |-------  3 0 0 0 1 4         -------|                                   |
 3:  LT= 260 | |        | 2:RT= 500  |         0 7 7 7 7 3         ^- 500 |          = 2048 vph               |
    TH= 920 | |         |   TH=1160  |         | | | | | |         <- 580 |===================================|
    RT= 130 | v         |   LT= 160  |         < v v v > >         <- 580 | Step 8. INTERSECTION LEVEL OF     |
------------            -------------|                             v-  72 |         SERVICE                   |
                    <--Approach 2    |                             v-  88 |    (compare step 7 with table 6)  |
                                     |                                    |             -------               |
                                     | 215 -^                             |             |  F  |             |
 Approach 1-->                       | 176 -^                             |             -------               |
------------            -------------| 200 ->          < < ^ ^ ^ >        |===================================|
 1:LT= 390  |         ^ | 4: RT=  70 | 200 ->          | | | | | |        | Step 9. RECALCULATE               |
   TH= 400  |         | |   TH=3330  | 300 -v              1 1 1          |                                   |
   RT= 300  |         | |  LT= 800   |-------          4 3 1 1 1   -------|Geometric Change:                  |
            | Approach 4|            |       |         4 6 1 1 1 7 |      |Signal Change:                     |
                                     |       |         0 0 0 0 0 0 |      |Volume Change:                     |
=====================================+==================================+===================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                     |         (two phase signal)       |                                   |
       --^ v--   B2B1                |            | Approach 3|          |                                   |
                                     |            |           |          |                                   |
    --^ AND <--      A1B2 AND        |            |           |          |                                   |
    --> OR  v--      /OR A2B1        |            |           |          |                                   |
       --> <--   A1A2                |-------------           -----------|                                   |
                                     | Approach 1                        |                                   |
        |   <    B4B3                |                                   |                                   |
        >   |                        |          See Step 6b.             |                                   |
    | | AND < ^      A3B4 AND        |                                   |                                   |
    v > OR  | |      /OR A4B3        |                      Approach 2   |                                   |
        |   ^    A3A4                |-------------           -----------|                                   |
        v   |                        |            |           |          |                                   |
------------------------------------ |            |           |          |                                   |
 A1 -->   A3 |      B1 v--    B3   <| |            |           |          |                                   |
            v ^                   | | |           | Approach 4|          | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |>  |                                   | V/C Ratio = 1.49                  |
================================================================================================
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: GERBER RD AND ELK GROVE-FLORIN RD                          Design Hour: PM
Problem Statement: ALTA
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:ELK GROVE-FLO|          -------Approach-----|      MULTIPHASE SIGNAL OVERLAP     |
            | 1   3   2 |       ^     |               : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
            |   R   L   |       N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover Critical|
GERBER RD   | R T T T L |             | intervals/hour   :                   |able   Volume   to next   Volume |
------------- T H H H T -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1   | change (vph)     :                   |-------------------------------------|
   2  LT--^     v v v    <^-RTH      |c.G/C ratio       :  0    0    0    0|B2B1    77(B2)   94-  77=  17(B1)   77|
      LTH-^>             <--TH    2  |d.Opposing volume :  0    0    0    0|A2B1    17(B1)  315-  17= 298(A2)   17|
   2   TH-->             <v-LTH      | in vph           :                   |A1A2   595(A1) OR  298(A2)          595|
      RTH-v>    ^ ^ ^     v--LT   2  |e.LT capacity on  :  0    0    0    0|B4B3   193(B3)  253- 193=  60(B4)  193|
   1  RT--v   < < | > >  Approach 2  | green (vph)      :                   |A3B4    60(B4)  817-  60= 757(A3)   60|
------------- L L T R R -------------|f.LT capacity in  :  0    0    0    0|A3A4   757(A3) OR  500(A4)          757|
            | T T H T T |GERBER RD   | vph (b+e)        :                   |                                     |
            |   H   H   |             |g.Left turn volume :  0    0    0    0|                                     |
            | 2   3   1 |             | in vph           :                   |                                     |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                 : |                                     |
                                     | (g>f) ?          :                   |                                     |
=====================================+==============================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                     |         |                 |    |                                     |
                                     |         | 3 8 8 8 2 2     |    |94(B2B1)+595(A1)+253(B3B4)+757(A3)  |
            | Approach 3|            |-------   2 1 1 1 0 5      -------|                                     |
 3:  LT= 460 | |        | 2:RT= 340  |          0 7 7 7 7 3      ^- 340 |          = 1699 vph                 |
    TH=2450  | |        |   TH= 630  |          | | | | | |      <- 315 |=====================================|
    RT= 320  | v        |   LT= 170  |          < v v v > >      <- 315 | Step 8. INTERSECTION LEVEL OF       |
-------------         -------------|                           v-  77 |        SERVICE                      |
                  <--Approach 2     |                           v-  94 |    (compare step 7 with table 6)    |
                                     |                                  |            -------                  |
                                     |  77 -^                           |            |  F  |                  |
 Approach 1-->                       |  63 -^                           |            -------                  |
-------------         -------------| 565 ->        < < ^ ^ ^ >        |=====================================|
 1:LT= 140   |             ^ | 4: RT= 150 | 565 ->   | | | | | |        | Step 9. RECALCULATE                |
   TH=1130   |             | |    TH=1500 | 850 -v                      |                                     |
   RT= 850   |             | |   LT= 350  |-------     1 1 5 5 5 1 -------|Geometric Change:                  |
             | Approach 4|               |       |    9 5 0 0 0 5 |    |Signal Change:                      |
                                     |       |    3 8 0 0 0 0 |         |Volume Change:                      |
=====================================+==============================+======================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                     |         (two phase signal)        |                                     |
      --^ v--   B2B1                 |         | Approach 3|             |                                     |
                                     |         |           |             |                                     |
   --^ AND <--     A1B2 AND          |         |           |             |                                     |
   --> OR  v--     /OR A2B1          |         |           |             |                                     |
      --> <--   A1A2                 |-------------   -------------|                                     |
                                     | Approach 1                        |                                     |
      |   <    B4B3                  |                                   |                                     |
      >   |                          |        See Step 6b.               |                                     |
   | | AND < ^     A3B4 AND          |                                   |                                     |
   v > OR  | |     /OR A4B3          |                      Approach 2  |                                     |
      |   ^    A3A4                  |-------------   -------------|                                     |
      v   |                          |         |           |             |                                     |
-------------------------------------|         |           |             |                                     |
 A1 -->   A3 |      B1 v--    B3   <| |         |           |             |                                     |
             v ^                 | | |         | Approach 4|             | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |>  |                                   | V/C Ratio = 1.24                    |
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                         Critical Movement Analysis: PLANNING
                                Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                              Design Hour: AM
Problem Statement: ALTA
=========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR     |
             | Approach 3:WATERMAN RD |             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP     |
             | 1   2   2 |     ^   |                  : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
             |   R   L   |     N   |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover Critical|
GERBER RD    | R T T T L |         | intervals/hour   :                  |able   Volume   to next   Volume |
------------- T H H H T  ----------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1   < < | > >  ^--RT  1  | change (vph)     :                  |------------------------------------|
  2 LT--^      v v v    <^-RTH     |c.G/C ratio       :  0    0    0    0|B2B1   33(B1)  50-  33=  17(B2)   33|
    LTH-^>              <--TH   2  |d.Opposing volume :  0    0    0    0|A1B2   17(B2) 230-  17= 213(A1)   17|
  2  TH-->              <v-LTH     | in vph           :                  |A1A2  485(A2) OR  213(A1)        485|
    RTH-v>     ^ ^ ^     v--LT  2  |e.LT capacity on  :  0    0    0    0|B4B3   33(B4) 226-  33= 193(B3)   33|
  1 RT--v     < < | > >  Approach 2| green (vph)      :                  |A4B3  193(B3) 565- 193= 372(A4)  193|
------------- L L T R R -----------|f.LT capacity in  :  0    0    0    0|A3A4  372(A4) OR  170(A3)        372|
             | T T H T T |GERBER RD| vph (b+e)        :                  |                                    |
             |   H   H   |         |g.Left turn volume:  0    0    0    0|                                    |
             | 2   2   1 |         | in vph           :                  |                                    |
             | Approach 4:WATERMAN RD |h.Is volume > cap. :               :                                    |
                                   | (g>f) ?          :                  |                                    |
===================================+==================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                   |          |                    |     |                                    |
                                   |          | 1 1 1              |     |50(B1B2)+485(A2)+226(B4B3)+372(A4)  |
             | Approach 3|         |-------  6 7 7 2 3             -------|                                    |
 3:  LT=  60 | |         | 2:RT= 170 |        0 0 0 7 3             ^- 170 |          = 1133 vph               |
    TH= 340  | |         |   TH= 970 |        | | | | |            <- 485 |====================================|
    RT= 160  | v         |   LT=  60 |        < v v > >            <- 485 | Step 8. INTERSECTION LEVEL OF      |
-------------            ----------|                               v-  27 |        SERVICE                     |
                    <--Approach 2  |                               v-  33 |    (compare step 7 with table 6)   |
                                   |                                      |              -------               |
                                   | 50 -^                                |              | D  |               |
 Approach 1-->                     | 41 -^                                |              -------               |
-------------            ----------| 230 ->          < < ^ ^ >            |====================================|
 1:LT=  90  |          ^ | 4: RT= 240 | 230 ->       | | | | |            | Step 9. RECALCULATE                |
   TH= 460  |          | |   TH=1130 |  80 -v                            |                                    |
   RT=  80  |          | |   LT= 410 |-------         2 1 5 5 2  -------|Geometric Change:                   |
            | Approach 4|          |       |         2 8 6 6 4 |        |Signal Change:                      |
                                   |       |         6 5 5 5 0 |        |Volume Change:                      |
===================================+==================================+====================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                   |          (two phase signal)      |                                    |
      --^ v--  B2B1                |          | Approach 3|            |                                    |
                                   |          |           |            |                                    |
   --^ AND <--    A1B2 AND         |          |           |            |                                    |
   --> OR  v--    /OR A2B1         |          |           |            |                                    |
      --> <--  A1A2                |------------          ------------|                                    |
                                   | Approach 1                        |                                    |
      |  <   B4B3                  |                                   |                                    |
      >  |                         |          See Step 6b.             |                                    |
   | | AND < ^    A3B4 AND         |                                   |                                    |
   v > OR  | |    /OR A4B3         |                      Approach 2   |                                    |
      |  ^   A3A4                  |------------          ------------|                                    |
      v  |                         |          |           |            |                                    |
-----------------------------------|          |           |            |                                    |
 A1 -->   A3 |     B1 v--    B3  <|  |          |           |            |                                    |
           v ^                   | |          | Approach 4|            | Exclusive right turns reduced  30 % |
 A2 <--   A4  |    B2 --^    B4 |> |                                   | V/C Ratio = .82                    |
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                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                      Design Hour: PM
Problem Statement: ALTA
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:WATERMAN RD |                -------Approach-----|     MULTIPHASE SIGNAL OVERLAP   |
            | 1   2   2 |     ^    |                : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
            |   R   L   |     N    |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover Critical|
GERBER RD   | R T T T L |          |  intervals/hour :                  |able   Volume   to next   Volume |
-----------  T H H H T  -----------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1  < < | > >   ^--RT  1  |  change (vph)   :                  |---------------------------------|
  2  LT--^    v v v     <^-RTH     |c.G/C ratio      :  0    0    0    0|B2B1  116(B2)  165- 116=  49(B1)  116|
     LTH-^>             <--TH   2  |d.Opposing volume:  0    0    0    0|A2B1   49(B1)  315-  49= 266(A2)   49|
  2   TH-->             <v-LTH     |  in vph         :                  |A1A2  455(A1) OR  266(A2)         455|
     RTH-v>   ^ ^ ^      v--LT  2  |e.LT capacity on :  0    0    0    0|B4B3   72(B3)  138-  72=  66(B4)   72|
  1  RT--v   < < | > >  Approach 2 |  green (vph)    :                  |A3B4   66(B4)  475-  66= 409(A3)   66|
-----------  L L T R R  -----------|f.LT capacity in :  0    0    0    0|A3A4  409(A3) OR  255(A4)         409|
            | T T H T T |GERBER RD |  vph (b+e)      :                  |                                 |
            |   H   H   |          |g.Left turn volume:  0    0    0    0|                                 |
            | 2   2   1 |          |  in vph         :                  |                                 |
            | Approach 4:WATERMAN RD|h.Is volume > cap.:                 :|                                 |
                                   |  (g>f) ?        :                  |                                 |
===================================+================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |       |                  |        |                                 |
                                   |       | 1 4 4 1 1        |        |165(B2B1)+455(A1)+138(B3B4)+409(A3)|
            | Approach 3|          |-------  4 7 7 1 3         ------- |                                 |
 3:  LT= 250 | |       | 2:RT=  90 |         0 5 5 3 8         ^-  90  |          = 1167 vph             |
    TH= 950 | |        |   TH= 630 |         | | | | |         <- 315  |=================================|
    RT= 140 | v        |   LT= 300 |         < v v > >         <- 315  | Step 8. INTERSECTION LEVEL OF   |
-----------            ------------|                           v- 135  |         SERVICE                 |
                     <--Approach 2 |                           v- 165  |     (compare step 7 with table 6)|
                                   |                                   |             -------             |
                                   | 116 -^                            |             |  D  |             |
 Approach 1-->                     |  95 -^                            |             -------             |
-----------            ------------| 455 ->          < < ^ ^ >         |=================================|
 1:LT= 210  |         ^ | 4: RT= 150| 455 ->          | | | | |        | Step 9. RECALCULATE             |
   TH= 910  |        | |    TH= 510| 360 -v                            |                                 |
   RT= 360  |        | |    LT= 130|-------             2 2 1  -------|Geometric Change:                |
            | Approach 4|          |       |          7 5 5 5 5 |      |Signal Change:                   |
                                   |       |          2 9 5 5 0 |      |Volume Change:                   |
===================================+===================================+=================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                   |        (two phase signal)         |                                 |
       --^ v--  B2B1               |            | Approach 3|          |                                 |
                                   |            |           |          |                                 |
   --^ AND <--     A1B2 AND        |            |           |          |                                 |
   --> OR  v--     /OR A2B1        |            |           |          |                                 |
       --> <--  A1A2               |-----------              ----------|                                 |
                                   | Approach 1                        |                                 |
       |  <   B4B3                 |                                   |                                 |
       >  |                        |          See Step 6b.             |                                 |
   | | AND < ^     A3B4 AND        |                                   |                                 |
   v > OR  | |     /OR A4B3        |                       Approach 2  |                                 |
       |  ^   A3A4                 |-----------              ----------|                                 |
       v  |                        |            |           |          |                                 |
-----------------------------------|            |           |          |                                 |
 A1 -->   A3 |      B1 v--    B3  <|            |           |          |                                 |
             v ^                 | |            | Approach 4|          | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |>|                                   | V/C Ratio = .85                 |
==========================================================================================
```

```
                                    Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: GERBER RD AND VINEYARD RD                                   Design Hour: AM
Problem Statement: ALTA
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR        |
          | Approach 3:VINEYARD RD    |                -------Approach-----|         MULTIPHASE SIGNAL OVERLAP     |
          | 1   2   2 |      ^        |                : -1-  -2-  -3-  -4-|       Possible   Volume     Adjusted|
          |   R   L   |      N        |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD | R T T T L |               |  intervals/hour :                  |able    Volume   to next     Volume |
-------------  T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase      in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)   :                  |---------------------------------------|
   2  LT--^    v v v     <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1     6(B1)  281-   6= 275(B2)    6|
      LTH-^>             <--TH   2    |d.Opposing volume:  0    0    0    0|A1B2   275(B2)   80- 275=   0(A1)  275|
   2   TH-->             <v-LTH       |  in vph         :                  |A1A2   105(A2) OR     0(A1)        105|
      RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3     6(B4)   88-   6=  82(B3)    6|
   1  RT--v   < < | > >   Approach 2  |  green (vph)    :                  |A4B3    82(B3)  505-  82= 423(A4)   82|
-------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   423(A4) OR    70(A3)        423|
          | T T H T T |GERBER RD      |  vph (b+e)      :                  |                                       |
          |   H   H   |               |g.Left turn volume:  0    0    0    0|                                       |
          | 2   2   1 |               |  in vph         :                  |                                       |
          | Approach 4:VINEYARD RD    |h.Is volume > cap. :                 :                                       |
                                      |  (g>f) ?        :                  |                                       |
======================================+====================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                      |         |                  |       |                                       |
                                      |         | 1                |       |281(B1B2)+105(A2)+88(B4B3)+423(A4)     |
          | Approach 3|               |-------  0                 -------|                                       |
 3:  LT=  10 | |          | 2:RT= 150 |         0 5 5 5 6          ^- 150 |          = 897 vph                    |
    TH=  10 | |          |   TH= 180 |         | | | | |          <-  90 |=======================================|
   RT= 100  | v          |   LT=  10 |         < v v > >          <-  90 | Step 8. INTERSECTION LEVEL OF         |
-------------             -------------|                            v-   5 |        SERVICE                        |
                       <--Approach 2  |                            v-   6 |     (compare step 7 with table 6)     |
                                      |                                    |              -------                  |
                                      | 281 -^                             |              | B  |                   |
 Approach 1-->                        | 230 -^                             |              -------                  |
-------------             -------------|  80 ->         < < ^ ^ >          |=======================================|
 1:LT= 510   |          ^ | 4: RT=  20 |  80 ->         | | | | |          | Step 9. RECALCULATE                   |
   TH= 160   |          | |    TH=1010 |  30 -v                            |                                       |
   RT=  30   |          | |    LT= 160 |-------            5 5     -------|Geometric Change:                      |
             | Approach 4|            |         |        8 7 0 0 2 |       |Signal Change:                          |
                                      |         |        8 2 5 5 0 |       |Volume Change:                          |
======================================+====================================+=======================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                              |
                                      |          (two phase signal)        |                                       |
       --^ v--   B2B1                 |              | Approach 3|         |                                       |
                                      |              |           |         |                                       |
    --^ AND <--      A1B2 AND         |              |           |         |                                       |
    --> OR  v--      /OR A2B1         |              |           |         |                                       |
       --> <--   A1A2                 |-------------             ------------|                                     |
                                      | Approach 1                         |                                       |
         |   <   B4B3                 |                                    |                                       |
         >   |                        |          See Step 6b.              |                                       |
    | | AND < ^      A3B4 AND         |                                    |                                       |
    v > OR  | |      /OR A4B3         |                        Approach 2  |                                       |
         |   ^   A3A4                 |-------------             ------------|                                     |
         v   |                        |              |           |         |                                       |
--------------------------------------|              |           |         |                                       |
A1 -->   A3 |      B1 v--     B3   <| |              |           |         |                                       |
            v ^                    | ||              | Approach 4|         | Exclusive right turns reduced  30 %   |
A2 <--   A4  |     B2 --^     B4 |>   |                                    | V/C Ratio = .65                       |
===============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: GERBER RD AND VINEYARD RD                         Design Hour: PM
Problem Statement: ALTA
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:VINEYARD RD  |                 -------Approach-----|      MULTIPHASE SIGNAL OVERLAP     |
            | 1  2  2 |      ^        |                 : -1-  -2-  -3-  -4-|     Possible    Volume    Adjusted|
            |  R  L   |      N        |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD   | R T T T L |             |  intervals/hour :                   |able    Volume    to next    Volume |
------------  T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)   :                   |-------------------------------------|
   2  LT--^     v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1     61(B1)   83-  61=  22(B2)    61|
      LTH-^>             <--TH   2    |d.Opposing volume:  0    0    0    0|A1B2     22(B2)  140-  22= 118(A1)    22|
   2   TH-->             <v-LTH       |  in vph         :                   |A1A2    118(A1) OR   75(A2)          118|
      RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3     22(B4)   39-  22=  17(B3)    22|
   1  RT--v   < < | > >  Approach 2   |  green (vph)    :                   |A4B3     17(B3)   30-  17=  13(A4)    17|
------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4    400(A3) OR   13(A4)          400|
            | T T H T T |GERBER RD    |  vph (b+e)      :                   |                                     |
            |   H   H   |             |g.Left turn volume:  0    0    0    0|                                     |
            | 2   2   1 |             |  in vph         :                   |                                     |
            | Approach 4:VINEYARD RD  |h.Is volume > cap. :                 :                                     |
                                      |  (g>f) ?        :                   |                                     |
======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |        |                  |       |                                     |
                                      |        |  4 4             |       |83(B1B2)+118(A1)+39(B4B3)+400(A3)    |
             | Approach 3|            |-------  6 0 0 1 2          -------|                                     |
 3:  LT=  40 | |         | 2:RT=  50  |         0 0 0 8 2          ^-  50 |          = 640 vph                  |
    TH= 800  | |         |   TH= 150  |         | | | | |          <-  75 |=====================================|
    RT=  60  | v         |   LT= 110  |         < v v > >          <-  75 | Step 8. INTERSECTION LEVEL OF       |
------------              ------------|                            v-  50 |         SERVICE                     |
                          <--Approach 2                            v-  61 |      (compare step 7 with table 6)  |
                                      |                                   |               -------               |
                                      |  83 -^                            |               |  A  |               |
 Approach 1-->                        |  68 -^                            |               -------               |
------------              ------------|  70 ->          < < ^ ^ >         |=====================================|
 1:LT= 150   |          ^ | 4: RT=  10|  70 ->          | | | | |         | Step 9. RECALCULATE                 |
   TH= 140   |          | |   TH=  60 | 200 -v                            |                                     |
   RT= 200   |          | |   LT=  70 |-------                     -------|Geometric Change:                    |
             | Approach 4|            |        |        3 3 3 3 1 |       |Signal Change:                       |
                                      |        |        9 2 0 0 0 |       |Volume Change:                       |
======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                      |          (two phase signal)       |                                     |
        --^ v--   B2B1                |            | Approach 3|          |                                     |
                                      |            |           |          |                                     |
    --^ AND <--     A1B2 AND          |            |           |          |                                     |
    --> OR  v--     /OR A2B1          |            |           |          |                                     |
        --> <--   A1A2                |------------             ----------|                                     |
                                      | Approach 1                        |                                     |
         |   <    B4B3                |                                   |                                     |
         >   |                        |          See Step 6b.             |                                     |
    | | AND < ^     A3B4 AND          |                                   |                                     |
    v > OR  | |     /OR A4B3          |                       Approach 2  |                                     |
         |   ^    A3A4                |------------             ----------|                                     |
         v   |                        |            |           |          |                                     |
--------------------------------------|            |           |          |                                     |
A1 -->   A3 |      B1 v--    B3   <|  |            |           |          |                                     |
            v ^                   | | |            | Approach 4|          | Exclusive right turns reduced  30 % |
A2 <--   A4   |    B2 --^    B4  |>   |                                   | V/C Ratio = .47                     |
=============================================================================================
```

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                         Critical Movement Analysis: PLANNING              CUMULATIVE
                                  Calculation Form 1
Intersection: GERBER RD AND BRADSHAW RD                            Design Hour: AM
Problem Statement: ALTA
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR           |
              | Approach 3:BRADSHAW RD |                   -------Approach-----|          MULTIPHASE SIGNAL OVERLAP         |
              | 1   3   2 |     ^      |                   : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
              |   R   L   |     N      |a.No. of change    :  0    0    0    0|Prob-  Critical   Carryover  Critical|
GERBER RD     | R T T T L |            |  intervals/hour   :                   |able    Volume     to next    Volume |
------------- T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase   in vph      phase     in vph |
 Approach 1   < < | > >   ^--RT  1     |  change (vph)     :                   |--------------------------------------|
   2  LT--^    v v v     <^-RTH        |c.G/C ratio        :  0    0    0    0|B2B1     88(B1)  270-  88= 182(B2)    88|
      LTH-^>             <--TH   2     |d.Opposing volume  :  0    0    0    0|A1B2    182(B2)  170- 182=   0(A1)   182|
   2   TH-->             <v-LTH        |  in vph           :                   |A1A2    250(A2) OR    0(A1)          250|
      RTH-v>    ^ ^ ^     v--LT  2     |e.LT capacity on   :  0    0    0    0|B4B3     29(B4)  149-  29= 120(B3)    29|
   1  RT--v   < < | > >   Approach 2   |  green (vph)      :                   |A4B3    120(B3)  633- 120= 513(A4)   120|
------------- L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A3A4    513(A4) OR  159(A3)          513|
              | T T H T T |GERBER RD   |  vph (b+e)        :                   |                                      |
              |   H   H   |            |g.Left turn volume :  0    0    0    0|                                      |
              | 2   3   1 |            |  in vph           :                   |                                      |
              | Approach 4:BRADSHAW RD |h.Is volume > cap. :                  :|                                      |
                                       |  (g>f) ?          :                   |                                      |
=======================================+========================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES       |
                                       |         |                       |     |                                       |
                                       |         | 2 1 1 1               |     |270(B1B2)+250(A2)+149(B4B3)+513(A4)    |
              | Approach 3|            |-------   0 5 5 5 2 2          -------|                                       |
 3:  LT=  52  | |         | 2:RT= 210  |          6 9 9 9 3 9          ^- 210 |            = 1182 vph                 |
   TH= 476    | |         |   TH= 500  |          | | | | | |          <- 250 |=======================================|
   RT= 206    | v         |   LT= 160  |          < v v v > >          <- 250 | Step 8. INTERSECTION LEVEL OF         |
-------------             -------------|                               v-  72 |         SERVICE                       |
                        <--Approach 2  |                               v-  88 |    (compare step 7 with table 6)      |
                                       |                                      |                -------                |
                                       | 270 -^                               |                | D  |                 |
 Approach 1-->                         | 221 -^                               |                -------                |
-------------             -------------| 170 ->          < < ^ ^ ^ >          |=======================================|
 1:LT= 490    |         ^ | 4: RT= 160 | 170 ->          | | | | | |          | Step 9. RECALCULATE                   |
   TH= 340    |         | |   TH=1900  |  90 -v                               |                                       |
   RT=  90    |         | |   LT= 270  |-------          1 1 6 6 6 1  -------|Geometric Change:                      |
              | Approach 4|            |        |        4 2 3 3 3 6 |        |Signal Change:                          |
                                       |        |        9 2 3 3 3 0 |        |Volume Change:                          |
=======================================+========================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                              |
                                       |          (two phase signal)           |                                       |
        --^ v--   B2B1                 |           | Approach 3|               |                                       |
                                       |           |           |               |                                       |
    --^ AND <--      A1B2 AND          |           |           |               |                                       |
    --> OR  v--      /OR A2B1          |           |           |               |                                       |
        --> <--   A1A2                 |-------------           -------------|                                       |
                                       | Approach 1                            |                                       |
         |   <    B4B3                 |                                       |                                       |
         >   |                         |            See Step 6b.               |                                       |
    | | AND < ^      A3B4 AND          |                                       |                                       |
    v > OR  | |      /OR A4B3          |                          Approach 2   |                                       |
         |   ^    A3A4                 |-------------           -------------|                                       |
         v   |                         |           |           |               |                                       |
---------------------------------------|           |           |               |                                       |
A1 -->   A3 |      B1 v--     B3   <|  |           |           |               |                                       |
            v ^                     | |  |           | Approach 4|               | Exclusive right turns reduced  30 %   |
A2 <--   A4   |    B2 --^     B4  |>   |                                       | V/C Ratio = .86                       |
==================================================================================================
```

```
                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER RD AND BRADSHAW RD                              Design Hour: PM
Problem Statement: ALTA
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR       |
           | Approach 3:BRADSHAW RD   |                 -------Approach-----|      MULTIPHASE SIGNAL OVERLAP       |
           | 1  3  2 |       ^        |                 : -1-  -2-  -3-  -4-|       Possible   Volume     Adjusted|
           |  R   L  |       N        |a.No. of change  :  0    0    0     0|Prob-  Critical  Carryover  Critical|
GERBER RD  | R T T T L |              |  intervals/hour :                   |able    Volume   to next    Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0     0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1     |  change (vph)   :                   |-------------------------------------|
   2  LT--^    v v v    <^-RTH        |c.G/C ratio      :  0    0    0     0|B2B1    88(B1)  165-  88=  77(B2)  88|
      LTH-^>            <--TH   2     |d.Opposing volume:  0    0    0     0|A1B2    77(B2)  270-  77= 193(A1)  77|
   2   TH-->            <v-LTH        |  in vph         :                   |A1A2   245(A2) OR  193(A1)        245|
      RTH-v>    ^ ^ ^    v--LT  2     |e.LT capacity on :  0    0    0     0|B4B3    45(B4)   61-  45=  16(B3)  45|
   1  RT--v  < < | > >   Approach 2   |  green (vph)    :                   |A4B3    16(B3)  263-  16= 247(A4)  16|
------------ L L T R R  -------------|f.LT capacity in :  0    0    0     0|A3A4   618(A3) OR  247(A4)        618|
           | T T H T T |GERBER RD     |  vph (b+e)      :                   |                                      |
           |   H   H   |              |g.Left turn volume:  0    0    0    0|                                      |
           | 2  3   1 |               |  in vph         :                   |                                      |
           | Approach 4:BRADSHAW RD   |h.Is volume > cap. :                 :                                      |
                                      |  (g>f) ?        :                   |                                      |
===================================+====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES      |
                                      |       |                   |         |                                      |
                                      |       | 5 6 6 6           |         |165(B1B2)+245(A2)+61(B4B3)+618(A3)    |
            | Approach 3|             |-------  6 1 1 1 3 4          -------|                                      |
3:  LT=  82 | |         | 2:RT=  80   |         1 8 8 8 7 5          ^-  80 |        = 1089 vph                    |
   TH=1855  | |         |   TH= 490   |         | | | | | |          <- 245 |======================================|
   RT= 561  | v         |   LT= 160   |         < v v v > >          <- 245 | Step 8. INTERSECTION LEVEL OF        |
-------------            ------------|                               v-  72 |       SERVICE                        |
                      <--Approach 2   |                               v-  88 |   (compare step 7 with table 6)      |
                                      |                                     |            -------                   |
                                      | 165 -^                              |            | C |                     |
 Approach 1-->                        | 135 -^                              |            -------                   |
-------------            ------------| 270 ->         < < ^ ^ ^ >          |======================================|
1:LT= 300   |          ^ | 4: RT= 200 | 270 ->         | | | | | |          | Step 9. RECALCULATE                   |
  TH= 540   |          | |   TH= 790  | 300 -v                              |                                      |
  RT= 300   |          | |   LT= 110  |-------            2 2 2 2   -------|Geometric Change:                     |
            | Approach 4|             |       |        6 5 6 6 6 0 |        |Signal Change:                        |
                                      |       |        1 0 3 3 3 0 |        |Volume Change:                        |
===================================+====================================+======================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                             |
                                      |         (two phase signal)           |                                      |
      --^ v--  B2B1                   |            | Approach 3|             |                                      |
                                      |            |           |             |                                      |
   --^ AND <--    A1B2 AND            |            |           |             |                                      |
   --> OR  v--    /OR A2B1            |            |           |             |                                      |
      --> <--  A1A2                   |-------------            ------------|                                      |
                                      | Approach 1                          |                                      |
       |  <    B4B3                   |                                     |                                      |
       >  |                           |          See Step 6b.               |                                      |
   | | AND < ^    A3B4 AND            |                                     |                                      |
   v > OR  | |    /OR A4B3            |                        Approach 2   |                                      |
       |  ^    A3A4                   |-------------            ------------|                                      |
       v  |                           |            |           |             |                                      |
------------------------------------|            |           |             |                                      |
A1 -->   A3 |     B1 v--    B3   <|   |            |           |             |                                      |
          v ^                     | | |            |           |             |                                      |
A2 <--   A4  |    B2 --^    B4 |>     |            | Approach 4|             | Exclusive right turns reduced  30 %  |
                                      |                                     | V/C Ratio = .79                      |
===============================================================================================
```

# APPENDIX E

## Cumulative Plus Dispersed Core Alternative
## Level of Service Calculations

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                               Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: FLORIN RD AND ELK GROVE-FLORIN RD                          Design Hour: AM
Problem Statement: ALTD
=========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR  |
          | Approach 3:ELK GROVE-FLO|            -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
          | 1  3  2 |     ^      |                   : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
          |  R  L   |     N      |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD | R T T T L |          | intervals/hour   :                  |able   Volume   to next    Volume |
--------- T H H H T  -----------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >  ^--RT  1 | change (vph)     :                  |----------------------------------|
   2  LT--^    v v v   <^-RTH    |c.G/C ratio       :  0    0    0    0|B2B1   121(B1)  286- 121= 165(B2)   121|
      LTH-^>           <--TH  3  |d.Opposing volume :  0    0    0    0|A1B2   165(B2)  187- 165=  22(A1)   165|
   3   TH-->           <v-LTH    | in vph           :                  |A1A2   520(A2) OR   22(A1)          520|
      RTH-v>    ^ ^ ^   v--LT  2 |e.LT capacity on  :  0    0    0    0|B4B3    44(B4)  341-  44= 297(B3)    44|
   1  RT--v    < < | > > Approach 2| green (vph)     :                  |A4B3   297(B3) 1040- 297= 743(A4)   297|
---------    L L T R R  ---------|f.LT capacity in  :  0    0    0    0|A3A4   743(A4) OR  320(A3)          743|
          | T T H T T |FLORIN RD | vph (b+e)        :                  |                                  |
          |   H   H   |          |g.Left turn volume :  0    0    0    0|                                  |
          | 2   3   1 |          | in vph           :                  |                                  |
          | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :               :                                  |
                                 | (g>f) ?          :                  |                                  |
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 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                 |        |                   |        |                                  |
                                 |        | 2 3 3 3           |        |286(B1B2)+520(A2)+341(B4B3)+743(A4) |
          | Approach 3|          |-------  2 2 2 2 3 4       -------|                                  |
 3:  LT=  80 | |        | 2:RT= 700 |     0 0 0 0 6 4        ^- 700 |          = 1890 vph              |
   TH= 960 | |          |   TH=1560 |     | | | | | |        <- 520 |==================================|
   RT= 220 | v          |   LT= 220 |     < v v v > >        <- 520 | Step 8. INTERSECTION LEVEL OF    |
-----------             -----------|                           <- 520 |        SERVICE                   |
                   <--Approach 2  |                           v-  99 |     (compare step 7 with table 6)|
                                 | 286 -^                     v- 121 |          -------                 |
                                 | 234 -^                            |          |  F  |                 |
 Approach 1-->                   | 187 ->                            |          -------                 |
-----------             -----------| 187 ->       < < ^ ^ ^ >         |==================================|
 1:LT= 520  |           ^ | 4: RT=  80 | 187 ->  | | | | | |         | Step 9. RECALCULATE              |
   TH= 560  |           | |   TH=3120 | 200 -v      1 1 1            |                                  |
   RT= 200  |           | |   LT= 620 |-------   3 2 0 0 0    -------|Geometric Change:                 |
          | Approach 4|              |       |  4 7 4 4 4 8 |        |Signal Change:                    |
                                 |       |  1 9 0 0 0 0 |           |Volume Change:                    |
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 Step 3. IDENTIFY PHASING        | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                 |         (two phase signal)      |                                  |
        --^ v--   B2B1           |             | Approach 3|       |                                  |
                                 |             |           |       |                                  |
     --^ AND <--     A1B2 AND    |             |           |       |                                  |
     --> OR  v--     /OR A2B1    |             |           |       |                                  |
        --> <--   A1A2           |-------------            ---------|                                  |
                                 | Approach 1                      |                                  |
         |   <    B4B3           |                                 |                                  |
         >   |                   |         See Step 6b.            |                                  |
     | | AND < ^     A3B4 AND    |                                 |                                  |
     v > OR  | |     /OR A4B3    |                      Approach 2 |                                  |
         |   ^    A3A4           |-------------            ---------|                                  |
         v   |                   |             |           |       |                                  |
---------------------------------|             |           |       |                                  |
 A1 -->   A3 |    B1 v--    B3  <| |             |           |       |                                  |
            v ^                | | |             |           |       |                                  |
 A2 <--   A4  |    B2 --^    B4 |> |             | Approach 4|       | Exclusive right turns reduced  30 %|
                                 |                                 | V/C Ratio = 1.37                 |
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND ELK GROVE-FLORIN RD                         Design Hour: PM
Problem Statement: ALTD
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR        |
             | Approach 3:ELK GROVE-FLO|                -------Approach-----|        MULTIPHASE SIGNAL OVERLAP      |
             | 1   3   2 |      ^     |                 : -1-  -2-  -3-  -4-|        Possible   Volume     Adjusted|
             |  R   L    |      N     |a.No. of change  :  0    0    0    0|Prob-   Critical   Carryover  Critical|
FLORIN RD    | R T T T L |            | intervals/hour  :                  |able    Volume     to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase      in vph |
  Approach 1  < < | > >   ^--RT  1    | change (vph)    :                  |---------------------------------------|
   2  LT--^    v v v     <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1    121(B1)  143- 121=  22(B2)  121|
      LTH-^>             <--TH   3    |d.Opposing volume:  0    0    0    0|A1B2     22(B2)  543-  22= 521(A1)   22|
   3   TH-->             <v-LTH       | in vph          :                  |A1A2    521(A1) OR  310(A2)          521|
      RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3    182(B3)  226- 182=  44(B4)  182|
   1  RT--v   < < | > >   Approach 2  | green (vph)     :                  |A3B4     44(B4)  850-  44= 806(A3)   44|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4    806(A3) OR  503(A4)          806|
             | T T H T T |FLORIN RD   | vph (b+e)       :                  |                                       |
             |   H   H   |            |g.Left turn volume:  0    0    0   0|                                       |
             | 2   3   1 |            | in vph          :                  |                                       |
             | Approach 4:ELK GROVE-FLO|h.Is volume > cap.:                 :                                       |
                                      | (g>f) ?         :                  |                                       |
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 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                      |       |                    |        |                                      |
                                      |       | 5 8 8 8 1 2        |        |143(B1B2)+521(A1)+226(B3B4)+806(A3)   |
             | Approach 3|            |-------  7 5 5 5 8 2         ------- |                                      |
 3:  LT= 410 | |         | 2:RT= 230  |         0 0 0 0 5 6         ^- 230  |          = 1696 vph                  |
   TH=2550   | |         |   TH= 930  |         | | | | | |         <- 310  |======================================|
   RT= 570   | v         |   LT= 220  |         < v v v > >         <- 310  | Step 8. INTERSECTION LEVEL OF        |
-------------             ------------|                             <- 310  |        SERVICE                       |
                         <--Approach 2|                             v-  99  |    (compare step 7 with table 6)     |
                                      | 143 -^                      v- 121  |              -------                 |
                                      | 117 -^                              |              |  F  |                 |
 Approach 1-->                        | 543 ->                              |              -------                 |
-------------             ------------| 543 ->          < < ^ ^ ^ >         |======================================|
 1:LT= 260   |           ^ | 4: RT= 110| 543 ->          | | | | | |         | Step 9. RECALCULATE                  |
   TH=1630   |           | |   TH=1510| 480 -v                              |                                      |
   RT= 480   |           | |  LT= 330 |-------          1 1 5 5 5 1  -------|Geometric Change:                     |
             | Approach 4|            |       |         8 4 0 0 0 1 |       |Signal Change:                        |
                                      |       |         2 9 3 3 3 0 |       |Volume Change:                        |
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 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                              |
                                      |         (two phase signal)         |                                       |
        --^ v--   B2B1                |            | Approach 3|           |                                       |
                                      |            |           |           |                                       |
    --^ AND <--      A1B2 AND         |            |           |           |                                       |
    --> OR  v--      /OR A2B1         |            |           |           |                                       |
        --> <--   A1A2                |------------             ------------|                                       |
                                      | Approach 1                         |                                       |
         |   <    B4B3                |                                    |                                       |
         >   |                        |          See Step 6b.              |                                       |
    | | AND < ^      A3B4 AND         |                                    |                                       |
    v > OR  | |      /OR A4B3         |                         Approach 2 |                                       |
         |   ^    A3A4                |------------             ------------|                                       |
         v   |                        |            |           |           |                                       |
--------------------------------------|            |           |           |                                       |
 A1 -->   A3 |     B1 v--     B3   <| |            |           |           |                                       |
             v ^                    | | |            |           |           |                                       |
 A2 <--   A4  |    B2 --^     B4  |>  |            | Approach 4|           | Exclusive right turns reduced  30 %   |
                                      |                                    | V/C Ratio = 1.23                      |
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                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                   Design Hour: AM
Problem Statement: ALTD
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:WATERMAN RD   |               -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
            |         |      ^         |               : -1-  -2-  -3-  -4-|      Possible  Volume   Adjusted|
            |  R   L  |      N         |a.No. of change :  0    0    0    0|Prob- Critical Carryover Critical|
FLORIN RD   | R T T T L |              | intervals/hour :                  |able   Volume  to next  Volume |
----------- T H H H T ------------     |b.LT capacity on:  0    0    0    0|Phase  in vph   phase   in vph |
 Approach 1  < < | > >   ^--RT         | change (vph)   :                  |---------------------------------|
    LT--^     v v v    <^-RTH          |c.G/C ratio     :  0    0    1    0|A2B1  165(B1)  540- 165= 375(A2) 165|
    LTH-^>             <--TH   3       |d.Opposing volume :1620  0  550   0|A1A2  375(A2) OR  168(A1)        375|
 3   TH-->             <v-LTH          | in vph         :                  |A4B3  572(B3) OR  385(A4)        572|
    RTH-v>     ^ ^ ^    v--LT  2       |e.LT capacity on:  0    0  650    0|                                 |
 1   RT--v   < < | > >  Approach 2     | green (vph)    :                  |                                 |
-----------  L L T R R  ------------   |f.LT capacity in:  0    0  650    0|                                 |
            | T T H T T |FLORIN RD     | vph (b+e)      :                  |                                 |
            |   H   H   |              |g.Left turn volume :  0   0   0   0|                                 |
            | 2       1 |              | in vph         :                  |                                 |
            | Approach 4:WATERMAN RD   |h.Is volume > cap. : NO      NO   : |                                 |
                                       | (g>f) ?        :                  |                                 |
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 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES|
                                       |       |                    |      |                                 |
                                       |       |                    |      |540(B1A2)+572(B3)+0()+0()        |
            | Approach 3|              |-------                      ------|                                 |
 3:  LT=   0 | |        | 2:RT=   0    |                          <- 540   |          = 1112 vph             |
   TH=   0  | |        |   TH=1620     |                          <- 540   |=================================|
  RT=   0   | v        |   LT= 300     |                          <- 540   | Step 8. INTERSECTION LEVEL OF   |
------------            ------------   |                          v- 135   |        SERVICE                  |
                     <--Approach 2     |                          v- 165   |   (compare step 7 with table 6) |
                                       |                                   |             -------             |
                                       |                                   |             | C |             |
 Approach 1-->                         |  97 ->                            |             -------             |
------------            ------------   |  97 ->               < < >        |=================================|
 1:LT=   0   |         ^ | 4: RT= 550  |  97 ->               | | |        | Step 9. RECALCULATE             |
   TH= 290   |        | |    TH=   0   | 240 -v                            |                                 |
   RT= 240   |        | |    LT=1040   |-------               5 4 5 -------|Geometric Change:                |
            | Approach 4|              |       |              7 6 5 |      |Signal Change:                   |
                                       |       |              2 8 0 |      |Volume Change:                   |
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 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                       |         (two phase signal)        |                                 |
          <--  A2B1                    |            | Approach 3|          |                                 |
          v--                          |            |           |          |                                 |
       --> <--  A1A2                   |            |           |          |                                 |
                                       |            |           |          |                                 |
        <   ^   A4B3                   |------------             ----------|                                 |
        |   |                          | Approach 1                        |                                 |
                                       |                                   |                                 |
                                       |           See Step 6b.            |                                 |
                                       |                                   |                                 |
                                       |                        Approach 2 |                                 |
                                       |------------             ----------|                                 |
---------------------------------------|            |           |          |                                 |
 A1 -->   A3 |      B1 v--     B3   <| |            |           |          |                                 |
            v ^                     |  |            | Approach 4|          | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^     B4 |>   |                                   | V/C Ratio = .78                 |
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                Design Hour: PM
Problem Statement: ALTD
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:WATERMAN RD|                -------Approach-----|      MULTIPHASE SIGNAL OVERLAP |
            |        |      ^      |               : -1-  -2-  -3-  -4-|    Possible   Volume    Adjusted|
            |  R  L  |      N      |a.No. of change :  0    0    0    0|Prob- Critical Carryover Critical|
FLORIN RD   | R T T T L |           | intervals/hour :                  |able   Volume   to next   Volume |
----------- T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1  < < | > >   ^--RT      | change (vph)   :                  |---------------------------------|
    LT--^     v v v    <^-RTH      |c.G/C ratio     :  0    0    1    0|A2B1  226(B1)  170- 226=  0(A2) 226|
    LTH-^>             <--TH   3   |d.Opposing volume :  0    0    0    0|A1A2  667(A1) OR   0(A2)       667|
 3   TH-->             <v-LTH      | in vph         :                  |A4B3  369(B3) OR 259(A4)        369|
    RTH-v>    ^ ^ ^     v--LT  2   |e.LT capacity on :  0    0    0    0|                                 |
 1  RT--v  < < | > >   Approach 2  | green (vph)    :                  |                                 |
----------- L L T R R  ------------|f.LT capacity in :  0    0    0    0|                                 |
           | T T H T T |FLORIN RD   | vph (b+e)      :                  |                                 |
           |  H   H   |            |g.Left turn volume :  0    0    0    0|                                 |
           | 2      1 |            | in vph         :                  |                                 |
           | Approach 4:WATERMAN RD |h.Is volume > cap. :                 :                                 |
                                   | (g>f) ?        :                  |                                 |
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 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |      |                      |     |                                 |
                                   |      |                      |     |893(B1A1)+369(B3)+0()+0()        |
           | Approach 3|           |-------                  -------|                                 |
 3:  LT=   0 | |       | 2:RT=   0 |                         <- 170 |           = 1262 vph            |
   TH=   0 | |         |   TH= 510 |                         <- 170 |=================================|
  RT=   0  | v         |   LT= 410 |                         <- 170 | Step 8. INTERSECTION LEVEL OF   |
-----------           ------------|                         v- 185 |         SERVICE                 |
                    <--Approach 2 |                         v- 226 |   (compare step 7 with table 6) |
                                   |                                |           -------               |
                                   |                                |           |  D  |             |
 Approach 1-->                     | 667 ->                         |           -------               |
-----------           ------------| 667 ->           < < >         |=================================|
 1:LT=   0   |          ^ | 4: RT= 370 | 667 ->       | | |          | Step 9. RECALCULATE            |
   TH=2000   |          | |   TH=   0 | 900 -v                      |                                 |
   RT= 900   |          | |   LT= 670 |-------        3 3 3  -------|Geometric Change:                |
             | Approach 4|           |      |        6 0 7 |        |Signal Change:                   |
                                   |      |        9 2 0 |        |Volume Change:                   |
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 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                   |        (two phase signal)         |                                 |
        <--  A2B1                  |           | Approach 3|           |                                 |
        v--                        |           |           |           |                                 |
     --> <--  A1A2                 |           |           |           |                                 |
                                   |           |           |           |                                 |
      <   ^   A4B3                 |------------           ------------|                                 |
      |   |                        | Approach 1                        |                                 |
                                   |                                   |                                 |
                                   |         See Step 6b.              |                                 |
                                   |                                   |                                 |
                                   |                       Approach 2  |                                 |
                                   |------------           ------------|                                 |
-----------------------------------|           |           |           |                                 |
 A1 -->   A3 |     B1 v--    B3  <| |           |           |           |                                 |
          v ^                    | | |           |           |           |                                 |
 A2 <--   A4  |    B2 --^    B4 |> |           | Approach 4|           | Exclusive right turns reduced 30 % |
                                   |                                   | V/C Ratio = .89                 |
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CUMULATIVE

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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                         Design Hour: AM
Problem Statement: ALTD
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:BRADSHAW RD |                 -------Approach-----|      MULTIPHASE SIGNAL OVERLAP      |
            | 1   3   2 |      ^     |                 : -1-  -2-  -3-  -4-|     Possible   Volume     Adjusted|
            |   R   L   |      N     |a.No. of change  :  0    0    0    0|Prob- Critical  Carryover  Critical|
FLORIN RD   | R T T T L |            | intervals/hour  :                   |able   Volume   to next    Volume |
----------- T H H H T  -----------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1  < < | > >   ^--RT  1    | change (vph)    :                   |-------------------------------------|
  2  LT--^    v v v     <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1    28(B1)  385-  28= 357(B2)  28|
     LTH-^>             <--TH   3    |d.Opposing volume:  0    0    0    0|A1B2   357(B2)   63- 357=   0(A1) 357|
  3   TH-->             <v-LTH       | in vph          :                   |A1A2   637(A2) OR    0(A1)       637|
     RTH-v>   ^ ^ ^     v--LT  2     |e.LT capacity on :  0    0    0    0|B4B3     6(B4)  451-   6= 445(B3)   6|
  1  RT--v   < < | > >  Approach 2   | green (vph)     :                   |A4B3   445(B3)  807- 445= 362(A4) 445|
-----------  L L T R R  -----------|f.LT capacity in  :  0    0    0    0|A3A4   362(A4) OR  240(A3)       362|
            | T T H T T |FLORIN RD   | vph (b+e)       :                   |                                     |
            |   H   H   |            |g.Left turn volume:  0    0    0    0|                                     |
            | 2   3   1 |            | in vph          :                   |                                     |
            | Approach 4:BRADSHAW RD |h.Is volume > cap.:                  :                                     |
                                     | (g>f) ?         :                   |                                     |
=====================================+=====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                     |       |                      |      |                                     |
                                     |       | 2 2 2 2              |      |385(B1B2)+637(A2)+451(B4B3)+362(A4)  |
            | Approach 3|            |-------  8 4 4 4              -------|                                     |
 3:  LT=  10 | |         | 2:RT= 910 |         0 0 0 0 5 6           ^- 910|          = 1835 vph                 |
   TH= 720  | |         |   TH=1070 |         | | | | | |           <- 357|=====================================|
   RT= 280  | v         |   LT=  50 |         < v v v > >           <- 357| Step 8. INTERSECTION LEVEL OF       |
-----------              -----------|                               <- 357|        SERVICE                      |
                        <--Approach 2|                               v-  23|    (compare step 7 with table 6)    |
                                     | 385 -^                        v-  28|              -------                |
                                     | 315 -^                              |              |  F  |                |
 Approach 1-->                       |  63 ->                              |              -------                |
-----------              -----------|  63 ->           < < ^ ^ ^ >        |=====================================|
 1:LT= 700  |          ^ | 4: RT= 380|  63 ->           | | | | | |        | Step 9. RECALCULATE                 |
   TH= 190  |          | |   TH=2420 |  90 -v                              |                                     |
   RT=  90  |          | |  LT= 820  |-------           4 3 8 8 8 3 -------|Geometric Change:                    |
            | Approach 4|            |       |          5 6 0 0 0 8 |      |Signal Change:                       |
                                     |       |          1 9 7 7 7 0 |      |Volume Change:                       |
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 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                     |         (two phase signal)          |                                     |
        --^ v--  B2B1                |            | Approach 3|            |                                     |
                                     |            |           |            |                                     |
    --^ AND <--     A1B2 AND         |            |           |            |                                     |
    --> OR  v--     /OR A2B1         |            |           |            |                                     |
        --> <--  A1A2                |------------             ------------|                                     |
                                     | Approach 1                          |                                     |
          |  <   B4B3                |                                     |                                     |
          >  |                       |          See Step 6b.               |                                     |
    | | AND < ^     A3B4 AND         |                                     |                                     |
    v > OR  | |     /OR A4B3         |                         Approach 2  |                                     |
          |  ^   A3A4                |------------             ------------|                                     |
          v  |                       |            |           |            |                                     |
-------------------------------------|            |           |            |                                     |
 A1 -->   A3 |     B1 v--    B3  <|  |            |           |            |                                     |
           v ^                    | |             |           |            |                                     |
 A2 <--   A4  |    B2 --^    B4 |>   |            | Approach 4|            | Exclusive right turns reduced  30 % |
                                     |                                     | V/C Ratio = 1.33                    |
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                                    Critical Movement Analysis: PLANNING
                                              Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                                  Design Hour: PM
Problem Statement: ALTD
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK       | Step 6b. VOLUME ADJUSTMENT FOR |
           | Approach 3:BRADSHAW RD |          -------Approach-----|      MULTIPHASE SIGNAL OVERLAP |
           | 1  3  2 |      ^     |           : -1-  -2-  -3-  -4-|       Possible   Volume  Adjusted|
           |  R   L  |      N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD  | R T T T L |          | intervals/hour   :                 |able   Volume   to next   Volume |
---------- T H H H T  -----------|b.LT capacity on  :  0    0    0    0|Phase  in vph   phase     in vph |
 Approach 1  < < | > >   ^--RT  1 | change (vph)     :                 |-----------------------------------|
  2  LT--^    v v v     <^-RTH    |c.G/C ratio       :  0    0    0    0|B2B1  127(B2)  182- 127=  55(B1)  127|
     LTH-^>             <--TH  3  |d.Opposing volume :  0    0    0    0|A2B1   55(B1)  182-  55= 127(A2)   55|
  3   TH-->             <v-LTH    | in vph           :                 |A1A2  518(A1) OR  127(A2)          518|
     RTH-v>   ^ ^ ^      v--LT  2 |e.LT capacity on  :  0    0    0    0|B4B3   66(B3)  457-  66= 391(B4)   66|
  1  RT--v   < < | > >  Approach 2| green (vph)      :                 |A3B4  391(B4)  817- 391= 426(A3)  391|
----------  L L T R R  ----------|f.LT capacity in  :  0    0    0    0|A3A4  426(A3) OR  383(A4)          426|
           | T T H T T |FLORIN RD | vph (b+e)        :                 |                                   |
           |  H   H    |          |g.Left turn volume :  0    0    0    0|                                   |
           | 2  3  1 |            | in vph           :                 |                                   |
           | Approach 4:BRADSHAW RD|h.Is volume > cap. :               :                                   |
                                  | (g>f) ?          :                 |                                   |
==================================+===============================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                  |        |                  |   |                                   |
                                  |        | 6 8 8 8 3 4      |   |182(B2B1)+518(A1)+457(B3B4)+426(A3) |
            | Approach 3|         |-------  1 1 1 1 7 5      -------|                                   |
 3:  LT= 830 | |       | 2:RT= 260 |        0 7 7 7 4 7      ^- 260 |          = 1583 vph               |
    TH=2450 | |       |   TH= 340 |        | | | | | |      <- 113 |===================================|
    RT= 610 | v       |   LT= 330 |        < v v v > >      <- 113 | Step 8. INTERSECTION LEVEL OF     |
------------          -----------|                          <- 113 |        SERVICE                    |
                  <--Approach 2   |                          v- 149 |   (compare step 7 with table 6)   |
                                  | 127 -^                   v- 182 |            -------                |
                                  | 104 -^                          |            |  F  |              |
 Approach 1-->                    | 353 ->                          |            -------                |
------------          -----------| 353 ->        < < ^ ^ ^ >       |===================================|
 1:LT= 230  |        ^ | 4: RT=  60 | 353 ->        | | | | | |       | Step 9. RECALCULATE               |
   TH=1060  |        | |   TH=1150 | 740 -v                          |                                   |
   RT= 740  |        | |   LT= 120 |-------           3 3 3   -------|Geometric Change:                  |
            | Approach 4|         |        |      6 5 8 8 8 6 |     |Signal Change:                     |
                                  |        |      6 4 3 3 3 0 |     |Volume Change:                     |
==================================+===============================+==================================|
 Step 3. IDENTIFY PHASING         | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                      |
                                  |        (two phase signal)     |                                   |
      --^ v--   B2B1              |          | Approach 3|        |                                   |
                                  |          |           |        |                                   |
   --^ AND <--     A1B2 AND       |          |           |        |                                   |
   --> OR  v--     /OR A2B1       |          |           |        |                                   |
      --> <--   A1A2              |-------------     -------------|                                   |
                                  | Approach 1                    |                                   |
       |   <    B4B3              |                               |                                   |
       >   |                      |         See Step 6b.          |                                   |
   | | AND < ^     A3B4 AND       |                               |                                   |
   v > OR  | |     /OR A4B3       |                   Approach 2  |                                   |
       |   ^    A3A4              |-------------     -------------|                                   |
       v   |                      |          |           |        |                                   |
----------------------------------|          |           |        |                                   |
A1 -->   A3 |      B1 v--    B3  <| |        |           |        |                                   |
          v ^                     | |        |           |        |                                   |
A2 <--   A4  |     B2 --^    B4 |> |        | Approach 4|        | Exclusive right turns reduced  30 % |
                                  |                               | V/C Ratio = 1.15                  |
==============================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND VINEYARD RD                                  Design Hour: AM
Problem Statement: ALTD
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
          | Approach 3:VINEYARD RD |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
          |         |      ^       |             : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
          |   R  L  |      N       |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD | R T T T L |            |  intervals/hour  :                  |able   Volume    to next    Volume |
--------- T H H H T  ------------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT     |  change (vph)    :                  |---------------------------------|
    LT--^     v v v    <^-RTH      |c.G/C ratio       :  0    0    1    0|A2B1   72(B1)  180-  72= 108(A2)   72|
    LTH-^>             <--TH   3   |d.Opposing volume : 540   0  810    0|A1A2  210(A1) OR  108(A2)        210|
 3   TH-->             <v-LTH      |  in vph          :                  |A4B3  567(A4) OR  424(B3)        567|
    RTH-v>    ^ ^ ^     v--LT  2   |e.LT capacity on  :  0    0  390    0|                                 |
 1  RT--v   < < | > >   Approach 2 |  green (vph)     :                  |                                 |
---------  L L T R R  ------------|f.LT capacity in  :  0    0  390    0|                                 |
          | T T H T T |FLORIN RD   |  vph (b+e)       :                  |                                 |
          |   H    H  |            |g.Left turn volume :  0   0    0    0|                                 |
          | 2       1 |            |  in vph          :                  |                                 |
          | Approach 4:VINEYARD RD |h.Is volume > cap. : NO       NO    :|                                 |
                                   |  (g>f) ?         :                  |                                 |
===================================+=================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                   |       |                   |     |                                 |
                                   |       |                   |     |282(B1A1)+567(A4)+0()+0()        |
          | Approach 3|            |-------               -------|                                 |
 3:  LT=   0 | |         | 2:RT=   0 |                      <- 180 |            = 849 vph            |
   TH=   0 | |           |   TH= 540 |                      <- 180 |=================================|
  RT=   0  | v           |   LT= 130 |                      <- 180 | Step 8. INTERSECTION LEVEL OF    |
------------                ------------|                      v-  59 |          SERVICE                 |
                          <--Approach 2 |                      v-  72 |      (compare step 7 with table 6) |
                                   |                             |             -------             |
                                   |                             |             |  A  |             |
 Approach 1-->                     | 210 ->                      |             -------             |
------------                ------------| 210 ->          < < >      |=================================|
 1:LT=   0  |             ^ | 4: RT= 810 | 210 ->          | | |      | Step 9. RECALCULATE              |
   TH= 630  |             | |    TH=   0 |  20 -v                      |                                 |
   RT=  20  |             | |    LT= 770 |-------          4 3 8 -------|Geometric Change:                |
            | Approach 4|              |       |         2 4 1 |     |Signal Change:                   |
                                   |       |         4 7 0 |     |Volume Change:                   |
===================================+=================================+=================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                   |         (two phase signal)    |                                 |
        <--  A2B1                  |           | Approach 3|       |                                 |
        v--                        |           |           |       |                                 |
    --> <--  A1A2                  |           |           |       |                                 |
                                   |           |           |       |                                 |
      <    ^   A4B3                |------------           ------------|                                 |
      |    |                       | Approach 1                    |                                 |
                                   |                               |                                 |
                                   |           See Step 6b.        |                                 |
                                   |                               |                                 |
                                   |                    Approach 2 |                                 |
                                   |------------           ------------|                                 |
-----------------------------------|           |           |       |                                 |
 A1 -->   A3 |      B1 v--     B3   <| |           |           |       |                                 |
             v ^                |  | |           | Approach 4|       | Exclusive right turns reduced  30 % |
 A2 <--   A4   |    B2 --^     B4 |>   |                               | V/C Ratio = .6                  |
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                                  Critical Movement Analysis: PLANNING
                                          Calculation Form 1
Intersection: FLORIN RD AND VINEYARD RD                                    Design Hour: PM
Problem Statement: ALTD
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR |
            | Approach 3:VINEYARD RD |            -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
            |        |      ^      |                : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
            |  R   L |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |          |  intervals/hour :                  |able   Volume    to next    Volume |
------------  T H H H T  ----------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT    |  change (vph)   :                  |----------------------------------|
    LT--^      v v v     <^-RTH    |c.G/C ratio      :  0    0    1    0|A2B1   347(B1)  197- 347=  0(A2)  347|
    LTH-^>               <--TH  3  |d.Opposing volume: 590   0  250    0|A1A2   462(A1) OR   0(A2)        462|
  3  TH-->               <v-LTH    |  in vph         :                  |A4B3   175(A4) OR  50(B3)        175|
    RTH-v>     ^ ^ ^      v--LT  2 |e.LT capacity on :  0    0  950    0|                                  |
  1 RT--v     < < | > >  Approach 2|  green (vph)    :                  |                                  |
------------  L L T R R  ----------|f.LT capacity in :  0    0  950    0|                                  |
            | T T H T T |FLORIN RD |  vph (b+e)      :                  |                                  |
            |  H   H  |            |g.Left turn volume:  0    0    0    0|                                  |
            | 2      1 |           |  in vph         :                  |                                  |
            | Approach 4:VINEYARD RD |h.Is volume > cap.: NO        NO   :                                  |
                                   |  (g>f) ?        :                  |                                  |
===================================+==================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |       |                    |     |                                  |
                                   |       |                    |     |809(B1A1)+175(A4)+0()+0()         |
            | Approach 3|          |-------                   -------|                                  |
 3:  LT=   0 | |        | 2:RT=   0 |                         <- 197 |         = 984 vph                |
    TH=   0 | |         |   TH= 590 |                         <- 197 |==================================|
   RT=   0 | v          |   LT= 630 |                         <- 197 | Step 8. INTERSECTION LEVEL OF    |
------------             ----------|                         v- 284 |        SERVICE                   |
                      <--Approach 2 |                         v- 347 |    (compare step 7 with table 6) |
                                   |                                 |             -------              |
                                   |                                 |             |  B  |              |
 Approach 1-->                     | 167 ->                          |             -------              |
------------             ----------| 167 ->            < < >         |==================================|
 1:LT=   0  |          ^ | 4: RT= 250 | 167 ->           | | |        | Step 9. RECALCULATE              |
   TH= 500  |          | |    TH=   0 | 660 -v                       |                                  |
   RT= 660  |          | |    LT=  90 |-------              2  -------|Geometric Change:                 |
            | Approach 4|          |       |           5 4 5 |       |Signal Change:                    |
                                   |       |           0 1 0 |       |Volume Change:                    |
===================================+==================================+==================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                   |        (two phase signal)        |                                  |
          <--  A2B1                |          | Approach 3|           |                                  |
          v--                      |          |           |           |                                  |
      --> <--  A1A2                |          |           |           |                                  |
                                   |          |           |           |                                  |
        <   ^  A4B3                |-------------        ------------|                                  |
        |   |                      | Approach 1                       |                                  |
                                   |                                  |                                  |
                                   |          See Step 6b.            |                                  |
                                   |                                  |                                  |
                                   |                       Approach 2 |                                  |
                                   |-------------        ------------|                                  |
                                   |          |           |           |                                  |
-----------------------------------|          |           |           |                                  |
 A1 -->   A3 |     B1 v--    B3   <|          |           |           |                                  |
         v ^                   | | |          | Approach 4|           | Exclusive right turns reduced  30 % |
 A2 <--   A4  |    B2 --^    B4 |>  |                                  | V/C Ratio = .69                  |
=============================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER RD AND ELK GROVE-FLORIN RD                          Design Hour: AM
Problem Statement: ALTD
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY  | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR  |
           | Approach 3:ELK GROVE-FLO|             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
           | 1  3  2 |      ^      |             : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
           |  R   L  |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD  | R T T T L |           | intervals/hour  :                 |able   Volume   to next    Volume |
-------------  T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >  ^--RT  1 | change (vph)    :                 |----------------------------------|
  2  LT--^    v v v    <^-RTH    |c.G/C ratio      :  0    0    0    0|B2B1    94(B1)  204-  94= 110(B2)    94|
     LTH-^>            <--TH  2  |d.Opposing volume :  0    0    0    0|A1B2   110(B2)  220- 110= 110(A1)   110|
  2   TH-->            <v-LTH    | in vph          :                 |A1A2   570(A2) OR  110(A1)          570|
     RTH-v>   ^ ^ ^     v--LT  2 |e.LT capacity on :  0    0    0    0|B4B3   143(B4)  440- 143= 297(B3)   143|
  1  RT--v   < < | > >  Approach 2 | green (vph)     :                 |A4B3   297(B3) 1080- 297= 783(A4)   297|
-------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   783(A4) OR  307(A3)          783|
           | T T H T T |GERBER RD  | vph (b+e)       :                 |                                  |
           |   H   H   |           |g.Left turn volume :  0    0    0    0|                                  |
           | 2   3   1 |           | in vph          :                 |                                  |
           | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                 :                                  |
                                 | (g>f) ?         :                 |                                  |
================================+==================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                 |        |                 |        |                                  |
                                 |        | 1 3 3 3 1 1     |        |204(B1B2)+570(A2)+440(B4B3)+783(A4) |
            | Approach 3|        |-------   2 0 0 0 1 4         -------|                                  |
 3:  LT= 260 | |         | 2:RT= 510 |      0 7 7 7 7 3          ^- 510 |          = 1997 vph              |
   TH= 920 | |         |   TH=1140 |      | | | | | |          <- 570 |==================================|
   RT= 120 | v         |   LT= 170 |      < v v v > >          <- 570 | Step 8. INTERSECTION LEVEL OF    |
-------------            -------------|                           v-  77 |        SERVICE                   |
                      <--Approach 2 |                           v-  94 |    (compare step 7 with table 6) |
                                 |                                   |            -------               |
                                 | 204 -^                            |            |  F  |               |
 Approach 1-->                   | 167 -^                            |            -------               |
-------------            -------------| 220 ->        < < ^ ^ ^ >         |==================================|
 1:LT= 370  |           ^ | 4: RT=  90 | 220 ->        | | | | | |         | Step 9. RECALCULATE              |
   TH= 440  |           | |    TH=3240 | 300 -v           1 1 1          |                                  |
   RT= 300  |           | |   LT= 800 |-------        4 3 0 0 0   -------|Geometric Change:                 |
            | Approach 4|        |        |       4 6 8 8 8 9 |         |Signal Change:                    |
                                 |        |       0 0 0 0 0 0 |         |Volume Change:                    |
================================+==================================+==================================|
 Step 3. IDENTIFY PHASING        | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                         |
                                 |          (two phase signal)      |                                  |
       --^ v--  B2B1             |            | Approach 3|         |                                  |
                                 |            |           |         |                                  |
   --^ AND <--     A1B2 AND      |            |           |         |                                  |
   --> OR  v--     /OR A2B1      |            |           |         |                                  |
       --> <--  A1A2             |-------------            ------------|                                  |
                                 | Approach 1                        |                                  |
       |   <   B4B3              |                                   |                                  |
       >   |                     |          See Step 6b.             |                                  |
   | | AND < ^     A3B4 AND      |                                   |                                  |
   v > OR  | |     /OR A4B3      |                       Approach 2  |                                  |
       |   ^   A3A4              |-------------            ------------|                                  |
       v   |                     |            |           |         |                                  |
---------------------------------|            |           |         |                                  |
A1 -->  A3 |     B1 v--    B3  <| |            |           |         |                                  |
          v ^                  | | |            | Approach 4|         | Exclusive right turns reduced  30 % |
A2 <--  A4  |    B2 --^    B4 |> |                                   | V/C Ratio = 1.45                 |
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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER RD AND ELK GROVE-FLORIN RD                            Design Hour: PM
Problem Statement: ALTD
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
           | Approach 3:ELK GROVE-FLO|          -------Approach-----|      MULTIPHASE SIGNAL OVERLAP    |
           | 1  3  2 |      ^     |               : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
           |  R   L  |      N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD  | R T T T L |          | intervals/hour  :                 |able    Volume   to next    Volume |
------------ T H H H T -----------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1 | change (vph)    :                 |-----------------------------------|
  2  LT--^    v v v     <^-RTH    |c.G/C ratio      :  0    0    0    0|B2B1    72(B2)   99-  72=  27(B1)   72|
     LTH-^>             <--TH   2 |d.Opposing volume :  0    0    0    0|A2B1    27(B1)  330-  27= 303(A2)   27|
  2   TH-->             <v-LTH    | in vph          :                 |A1A2   595(A1) OR  303(A2)        595|
     RTH-v>   ^ ^ ^     v--LT   2 |e.LT capacity on :  0    0    0    0|B4B3   193(B3)  253- 193=  60(B4)  193|
  1  RT--v   < < | > >  Approach 2| green (vph)     :                 |A3B4    60(B4)  920-  60= 860(A3)   60|
------------ L L T R R -----------|f.LT capacity in :  0    0    0    0|A3A4   860(A3) OR  510(A4)        860|
           | T T H T T |GERBER RD | vph (b+e)       :                 |                                   |
           |  H   H  |            |g.Left turn volume :  0    0    0    0|                                   |
           | 2  3  1 |            | in vph          :                 |                                   |
           | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :              :                                   |
                                  | (g>f) ?         :                 |                                   |
==================================+=================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                  |       |               |         |                                   |
                                  |       | 3 9 9 9 2 2   |         |99(B2B1)+595(A1)+253(B3B4)+860(A3) |
           | Approach 3|          |-------  2 2 2 2 0 5      -------|                                   |
3:  LT= 460 | |       | 2:RT= 360 |         0 0 0 0 7 3     ^- 360 |        = 1807 vph                 |
   TH=2760 | |        |   TH= 660 |         | | | | | |     <- 330 |===================================|
   RT= 320 | v        |   LT= 180 |         < v v v > >     <- 330 | Step 8. INTERSECTION LEVEL OF     |
------------           -----------|                         v-  81 |         SERVICE                   |
                   <--Approach 2  |                         v-  99 |    (compare step 7 with table 6)  |
                                  |                                |              -------              |
                                  |  72 -^                         |              | F |                |
 Approach 1-->                    |  59 -^                         |              -------              |
------------           -----------| 550 ->        < < ^ ^ ^ >      |===================================|
1:LT= 130  |          ^ | 4: RT=  90 | 550 ->     | | | | | |      | Step 9. RECALCULATE               |
  TH=1100  |          | |   TH=1530 | 850 -v                       |                                   |
  RT= 850  |          | |  LT= 350 |-------       1 1 5 5 5   -------|Geometric Change:                  |
           | Approach 4|          |       |       9 5 1 1 1 9 |    |Signal Change:                     |
                                  |       |       3 8 0 0 0 0 |    |Volume Change:                     |
==================================+=================================+===================================|
 Step 3. IDENTIFY PHASING         | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                  |         (two phase signal)      |                                   |
      --^ v--  B2B1               |           | Approach 3|         |                                   |
                                  |           |           |         |                                   |
   --^ AND <--     A1B2 AND       |           |           |         |                                   |
   --> OR  v--     /OR A2B1       |           |           |         |                                   |
      --> <--  A1A2               |------------           ----------|                                   |
                                  | Approach 1                      |                                   |
      |   <    B4B3               |                                 |                                   |
      >   |                       |         See Step 6b.            |                                   |
   | | AND < ^     A3B4 AND       |                                 |                                   |
   v > OR  | |     /OR A4B3       |                    Approach 2   |                                   |
      |   ^    A3A4               |------------          -----------|                                   |
      v   |                       |           |           |         |                                   |
----------------------------------|           |           |         |                                   |
A1 -->   A3 |      B1 v--    B3  <| |         |           |         |                                   |
           v ^                 | | |          | Approach 4|         | Exclusive right turns reduced  30 % |
A2 <--   A4  |     B2 --^    B4 |> |                                | V/C Ratio = 1.31                  |
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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                                    Design Hour: AM
Problem Statement: ALTD
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR        |
           | Approach 3:WATERMAN RD    |              -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
           | 1   2   2 |      ^        |              : -1-  -2-  -3-  -4-|        Possible    Volume    Adjusted|
           |   R   L   |      N        |a.No. of change :  0    0    0   0|Prob-   Critical  Carryover  Critical|
GERBER RD  | R T T T L |               |  intervals/hour :                |able     Volume   to next    Volume |
------------ T H H H T  ---------------|b.LT capacity on :  0    0    0   0|Phase    in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1      |  change (vph)   :                |--------------------------------------|
  2  LT--^    v v v    <^-RTH          |c.G/C ratio      :  0    0    0   0|B2B1    33(B1)   66-  33=  33(B2)   33|
     LTH-^>            <--TH   2       |d.Opposing volume:  0    0    0   0|A1B2    33(B2)  240-  33= 207(A1)   33|
  2   TH-->            <v-LTH          |  in vph         :                |A1A2   470(A2) OR  207(A1)        470|
     RTH-v>   ^ ^ ^     v--LT  2       |e.LT capacity on :  0    0    0   0|B4B3    33(B4)  231-  33= 198(B3)   33|
  1  RT--v   < < | > >  Approach 2     |  green (vph)    :                |A4B3   198(B3)  545- 198= 347(A4)  198|
------------ L L T R R  ---------------|f.LT capacity in :  0    0    0   0|A3A4   347(A4) OR  175(A3)        347|
           | T T H T T |GERBER RD      |  vph (b+e)      :                |                                      |
           |   H   H   |               |g.Left turn volume:  0    0    0   0|                                     |
           | 2   2   1 |               |  in vph         :                |                                      |
           | Approach 4:WATERMAN RD    |h.Is volume > cap. :              :                                      |
                                       |  (g>f) ?        :                |                                      |
=======================================+================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                       |        |                 |     |                                      |
                                       |        | 1 1 1           |     |66(B1B2)+470(A2)+231(B4B3)+347(A4)    |
            | Approach 3|              |-------  8 7 7 2 3        -------|                                      |
 3:  LT=  60 | |        | 2:RT= 200    |         0 5 5 7 3        ^- 200 |         = 1114 vph                  |
   TH= 350  | |        |   TH= 940     |         | | | | |        <- 470 |======================================|
   RT= 180  | v        |   LT=  60     |         < v v > >        <- 470 | Step 8. INTERSECTION LEVEL OF        |
------------            ---------------|                          v-  27 |         SERVICE                      |
                       <--Approach 2   |                          v-  33 |    (compare step 7 with table 6)     |
                                       |                                 |              -------                 |
                                       |  66 -^                          |              | D  |                  |
 Approach 1-->                         |  54 -^                          |              -------                 |
------------            ---------------| 240 ->          < < ^ ^ >       |======================================|
 1:LT= 120  |          ^ | 4: RT= 260  | 240 ->          | | | | |       | Step 9. RECALCULATE                  |
   TH= 480  |          | |   TH=1090   |  70 -v                          |                                      |
   RT=  70  |          | |   LT= 420   |-------          2 1 5 5 2 -------|Geometric Change:                     |
            | Approach 4|              |        |        3 8 4 4 6 |     |Signal Change:                        |
                                       |        |        1 9 5 5 0 |     |Volume Change:                        |
=======================================+================================+======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                       |          (two phase signal)    |                                      |
       --^ v--   B2B1                  |            | Approach 3|       |                                      |
                                       |            |           |       |                                      |
    --^ AND <--     A1B2 AND           |            |           |       |                                      |
    --> OR  v--     /OR A2B1           |            |           |       |                                      |
       --> <--   A1A2                  |------------             -------|                                      |
                                       | Approach 1                     |                                      |
        |   <    B4B3                  |                                |                                      |
        >   |                          |          See Step 6b.          |                                      |
    | | AND < ^     A3B4 AND           |                                |                                      |
    v > OR  | |     /OR A4B3           |                    Approach 2  |                                      |
        |   ^    A3A4                  |------------             -------|                                      |
        v   |                          |            |           |       |                                      |
---------------------------------------|            |           |       |                                      |
A1 -->    A3 |      B1 v--    B3   <|  |            |           |       |                                      |
           v ^                     | | |            |           |       |                                      |
A2 <--    A4  |     B2 --^    B4 |>    |            | Approach 4|       | Exclusive right turns reduced  30 %  |
                                       |                                | V/C Ratio = .81                      |
==========================================================================================
```

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                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                             Design Hour: PM
Problem Statement: ALTD
============================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:WATERMAN RD  |                -------Approach-----|         MULTIPHASE SIGNAL OVERLAP   |
             | 1  2  2 |      ^        |                : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
             |  R  L   |      N        |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |             |  intervals/hour  :                  |able    Volume    to next   Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph     phase    in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)    :                  |-------------------------------------|
  2  LT--^      v v v     <^-RTH      |c.G/C ratio       :  0    0    0    0|B2B1   138(B2)  193- 138=  55(B1)  138|
     LTH-^>               <--TH   2   |d.Opposing volume :  0    0    0    0|A2B1    55(B1)  320-  55= 265(A2)   55|
  2   TH-->               <v-LTH      |  in vph          :                  |A1A2   445(A1) OR  265(A2)          445|
     RTH-v>     ^ ^ ^      v--LT  2   |e.LT capacity on  :  0    0    0    0|B4B3    83(B3)  116-  83=  33(B4)    83|
  1  RT--v    < < | > >   Approach 2  |  green (vph)     :                  |A3B4    33(B4)  465-  33= 432(A3)    33|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   432(A3) OR  255(A4)          432|
             | T T H T T |GERBER RD   |  vph (b+e)       :                  |                                     |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                     |
             | 2   2   1 |            |  in vph          :                  |                                     |
             | Approach 4:WATERMAN RD |h.Is volume > cap. :                 :                                     |
                                       |  (g>f) ?         :                  |                                     |
======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                       |       |                  |        |                                     |
                                       |       | 1 4 4   1        |        |193(B2B1)+445(A1)+116(B3B4)+432(A3)  |
             | Approach 3|             |-------  4 6 6 9 1        -------|                                     |
 3:  LT= 210 | |        | 2:RT= 100   |         0 5 5 5 6        ^- 100 |          = 1186 vph                 |
    TH= 930  | |        |    TH= 640   |         | | | | |        <- 320 |=====================================|
   RT= 140   | v        |    LT= 350   |         < v v > >        <- 320 | Step 8. INTERSECTION LEVEL OF       |
-------------             -------------|                          v- 158 |         SERVICE                     |
                        <--Approach 2  |                          v- 193 |     (compare step 7 with table 6)   |
                                       |                                  |              -------                |
                                       | 138 -^                           |              | D |                  |
 Approach 1-->                         | 113 -^                           |              -------                |
-------------             -------------| 445 ->          < < ^ ^ >        |=====================================|
 1:LT= 250   |          ^ | 4: RT= 100 | 445 ->          | | | | |        | Step 9. RECALCULATE                  |
   TH= 890   |          | |    TH= 510 | 350 -v                           |                                     |
   RT= 350   |          | |   LT= 150  |-------             2 2 1  -------|Geometric Change:                    |
             | Approach 4|             |       |          8 6 5 5 0 |      |Signal Change:                       |
                                       |       |          3 8 5 5 0 |      |Volume Change:                       |
======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                            |
                                       |        (two phase signal)          |                                     |
       --^ v--  B2B1                   |              | Approach 3|         |                                     |
                                       |              |           |         |                                     |
    --^ AND <--     A1B2 AND           |              |           |         |                                     |
    --> OR  v--     /OR A2B1           |              |           |         |                                     |
       --> <--  A1A2                   |-------------             ------------|                                   |
                                       | Approach 1                         |                                     |
        |  <    B4B3                   |                                    |                                     |
        >  |                           |          See Step 6b.              |                                     |
   | | AND < ^      A3B4 AND           |                                    |                                     |
   v > OR  | |      /OR A4B3           |                       Approach 2   |                                     |
        |  ^    A3A4                   |-------------             ------------|                                   |
        v  |                           |              |           |         |                                     |
---------------------------------------|              |           |         |                                     |
 A1 -->   A3 |     B1 v--     B3   <|  |              |           |         |                                     |
            v ^                   | |  |              | Approach 4|         | Exclusive right turns reduced  30 % |
 A2 <--   A4  |    B2 --^     B4 |>    |                                    | V/C Ratio = .86                     |
============================================================================================================
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                              Critical Movement Analysis: PLANNING
                                        Calculation Form 1
Intersection: GERBER RD AND BRADSHAW RD                                Design Hour: AM
Problem Statement: ALTD
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:BRADSHAW RD    |              -------Approach-----|         MULTIPHASE SIGNAL OVERLAP    |
             | 1   3   2 |      ^        |                 : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |   R   L   |      N        |a.No. of change  :   0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |               | intervals/hour  :                  |able    Volume   to next    Volume |
------------- T H H H T  -------------  |b.LT capacity on :   0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1   < < | > >   ^--RT  1      | change (vph)    :                  |--------------------------------------|
   2  LT--^     v v v     <^-RTH         |c.G/C ratio      :   0    0    0    0|B2B1    88(B1)  231-  88= 143(B2)   88|
      LTH-^>              <--TH   2      |d.Opposing volume :  0    0    0    0|A1B2   143(B2)  150- 143=   7(A1)  143|
   2   TH-->              <v-LTH         | in vph          :                  |A1A2   320(A2) OR    7(A1)         320|
      RTH-v>    ^ ^ ^      v--LT  2      |e.LT capacity on :   0    0    0    0|B4B3    22(B4)  160-  22= 138(B3)   22|
   1  RT--v    < < | > >  Approach 2     | green (vph)     :                  |A4B3   138(B3)  647- 138= 509(A4)  138|
-------------  L L T R R  -------------  |f.LT capacity in :   0    0    0    0|A3A4   509(A4) OR  163(A3)          509|
             | T T H T T |GERBER RD      | vph (b+e)       :                  |                                      |
             |   H   H   |               |g.Left turn volume :  0    0    0   0|                                      |
             | 2   3   1 |               | in vph          :                  |                                      |
             | Approach 4:BRADSHAW RD    |h.Is volume > cap. :                :|                                      |
                                         | (g>f) ?         :                  |                                      |
=========================================+===================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                         |         |                  |        |                                      |
                                         |         | 2 1 1 1          |        |231(B1B2)+320(A2)+160(B4B3)+509(A4)   |
             | Approach 3|               |-------  2 6 6 6 1 2        -------|                                      |
 3:  LT=  40 | |         | 2:RT= 200     |         0 3 3 3 8 2        ^- 200 |          = 1220 vph                  |
    TH= 490  | |         |   TH= 640     |         | | | | | |        <- 320 |======================================|
    RT= 220  | v         |   LT= 160     |         < v v v > >        <- 320 | Step 8. INTERSECTION LEVEL OF        |
-------------             -------------  |                            v-  72 |         SERVICE                      |
                         <--Approach 2   |                            v-  88 |    (compare step 7 with table 6)     |
                                         |                                   |               -------                |
                                         | 231 -^                            |               |  D  |                |
 Approach 1-->                           | 189 -^                            |               -------                |
-------------             -------------  | 150 ->          < < ^ ^ ^ >       |======================================|
 1:LT= 420   |           ^ | 4: RT= 110  | 150 ->          | | | | | |       | Step 9. RECALCULATE                  |
   TH= 300   |           | |   TH=1940   | 100 -v                            |                                      |
   RT= 100   |           | |   LT= 290   |-------          1 1 6 6 6 1 -------|Geometric Change:                     |
             | Approach 4|               |         |       6 3 4 4 4 1 |     |Signal Change:                        |
                                         |         |       0 1 7 7 7 0 |     |Volume Change:                        |
=========================================+===================================+======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                             |
                                         |         (two phase signal)        |                                      |
        --^ v--  B2B1                    |             | Approach 3|         |                                      |
                                         |             |           |         |                                      |
     --^ AND <--     A1B2 AND            |             |           |         |                                      |
     --> OR  v--     /OR A2B1            |             |           |         |                                      |
        --> <--  A1A2                    |-------------             ---------|                                      |
                                         | Approach 1                        |                                      |
         |   <   B4B3                    |                                   |                                      |
         >   |                           |          See Step 6b.             |                                      |
     | | AND < ^     A3B4 AND            |                                   |                                      |
     v > OR  | |     /OR A4B3            |                        Approach 2 |                                      |
         |   ^   A3A4                    |-------------             ---------|                                      |
         v   |                           |             |           |         |                                      |
-----------------------------------------|             |           |         |                                      |
A1 -->   A3 |       B1 v--    B3   <|    |             |           |         |                                      |
          v ^                       | |  |             | Approach 4|         | Exclusive right turns reduced  30 %  |
A2 <--   A4  |      B2 --^    B4 |>      |                                   | V/C Ratio = .89                      |
==========================================================================================
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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER RD AND BRADSHAW RD                                   Design Hour: PM
Problem Statement: ALTD
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR    |
             | Approach 3:BRADSHAW RD |                  -------Approach-----|       MULTIPHASE SIGNAL OVERLAP   |
             | 1   3   2 |      ^     |                  : -1-  -2-  -3-  -4-|    Possible   Volume   Adjusted|
             |  R    L   |      N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |            | intervals/hour   :                   |able   Volume   to next   Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)     :                   |-----------------------------------|
  2  LT--^     v v v     <^-RTH       |c.G/C ratio       :  0    0    0    0|B2B1  88(B1)  176-  88=  88(B2)  88|
     LTH-^>              <--TH   2    |d.Opposing volume :  0    0    0    0|A1B2  88(B2)  280-  88= 192(A1)  88|
  2   TH-->              <v-LTH       | in vph           :                   |A1A2  205(A2) OR  192(A1)      205|
     RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on  :  0    0    0    0|B4B3  83(B3)  105-  83=  22(B4)  83|
  1  RT--v    < < | > >  Approach 2   | green (vph)      :                   |A3B4  22(B4)  623-  22= 601(A3)  22|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4  601(A3) OR  263(A4)      601|
             | T T H T T |GERBER RD   | vph (b+e)        :                   |                                   |
             |  H   H    |            |g.Left turn volume :  0    0    0    0|                                   |
             | 2   3   1 |            | in vph           :                   |                                   |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :                  :                                   |
                                      | (g>f) ?          :                   |                                   |
=====================================+===================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                     |       |                      |      |                                   |
                                     |       | 5 6 6 6   1          |      |176(B1B2)+205(A2)+105(B3B4)+601(A3)|
              | Approach 3|          |-------  7 2 2 2 8 0         -------                                   |
 3:  LT= 190  | |         | 2:RT=  70|         0 3 3 3 6 5         ^-  70 |          = 1087 vph               |
   TH=1870    | |         |   TH= 410|         | | | | | |         <- 205 |===================================|
   RT= 570    | v         |   LT= 160|         < v v v > >         <- 205 | Step 8. INTERSECTION LEVEL OF     |
-------------              ----------|                             v-  72 |        SERVICE                    |
                   <--Approach 2     |                             v-  88 |   (compare step 7 with table 6)   |
                                     |                                    |              -------              |
                                     | 176 -^                             |              |  C  |              |
 Approach 1-->                       | 144 -^                             |              -------              |
-------------              ----------| 280 ->        < < ^ ^ ^ >          |===================================|
 1:LT= 320    |          ^ | 4: RT= 200| 280 ->      | | | | | |          | Step 9. RECALCULATE                |
   TH= 560    |          | |   TH= 790| 370 -v                            |                                   |
   RT= 370    |          | |   LT= 150|-------          2 2 2 2   -------|Geometric Change:                  |
              | Approach 4|          |       |      8 6 6 6 6 0 |        |Signal Change:                     |
                                     |       |      3 8 3 3 3 0 |        |Volume Change:                     |
=====================================+===================================+===================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                          |
                                     |         (two phase signal)         |                                   |
       --^ v--   B2B1                |            | Approach 3|           |                                   |
                                     |            |           |           |                                   |
    --^ AND <--     A1B2 AND         |            |           |           |                                   |
    --> OR  v--     /OR A2B1         |            |           |           |                                   |
       --> <--   A1A2                |-------------            ------------|                                   |
                                     | Approach 1                         |                                   |
         |   <   B4B3                |                                    |                                   |
         >   |                       |          See Step 6b.              |                                   |
    | | AND < ^     A3B4 AND         |                                    |                                   |
    v > OR  | |     /OR A4B3         |                        Approach 2  |                                   |
         |   ^   A3A4                |-------------            ------------|                                   |
         v   |                       |            |           |           |                                   |
-------------------------------------|            |           |           |                                   |
 A1 -->   A3 |     B1 v--    B3   <| |            |           |           |                                   |
            v ^                    | |            | Approach 4|           | Exclusive right turns reduced  30 %|
 A2 <--   A4  |    B2 --^    B4  |>  |                                    | V/C Ratio = .79                   |
================================================================================================
```

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                         Critical Movement Analysis: PLANNING
                                Calculation Form 1
Intersection: GERBER RD AND VINEYARD RD                              Design Hour: AM
Problem Statement: ALTD
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR     |
               | Approach 3:VINEYARD RD  |                  -------Approach-----|       MULTIPHASE SIGNAL OVERLAP   |
               | 1   2   2 |       ^     |                  : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
               |   R   L   |       N     |a.No. of change   :  0    0    0    0|Prob-  Critical   Carryover  Critical|
GERBER RD      | R T T T L |             |  intervals/hour  :                   |able   Volume    to next    Volume |
-------------  T H H H T   -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase      in vph |
  Approach 1   < < | > >    ^--RT  1     |  change (vph)    :                   |-----------------------------------|
   2  LT--^      v v v     <^-RTH        |c.G/C ratio       :  0    0    0    0|B2B1     6(B1)  281-   6= 275(B2)    6|
      LTH-^>               <--TH   2     |d.Opposing volume :  0    0    0    0|A1B2   275(B2)   80- 275=   0(A1)  275|
   2   TH-->               <v-LTH        |  in vph          :                   |A1A2   112(A2) OR     0(A1)         112|
      RTH-v>     ^ ^ ^      v--LT  2     |e.LT capacity on  :  0    0    0    0|B4B3     6(B4)   77-   6=  71(B3)    6|
   1  RT--v    < < | > >   Approach 2    |  green (vph)     :                   |A4B3    71(B3)  530-  71= 459(A4)   71|
-------------  L L T R R   -------------|f.LT capacity in  :  0    0    0    0|A3A4   459(A4) OR    70(A3)         459|
               | T T H T T |GERBER RD    |  vph (b+e)       :                   |                                   |
               |   H   H   |             |g.Left turn volume :  0    0    0    0|                                   |
               | 2   2   1 |             |  in vph          :                   |                                   |
               | Approach 4:VINEYARD RD  |h.Is volume > cap. :                  :                                   |
                                         |  (g>f) ?         :                   |                                   |
=========================================+======================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES   |
                                         |       |                         |    |                                   |
                                         |       | 1                       |    |281(B1B2)+112(A2)+77(B4B3)+459(A4) |
               | Approach 3|             |-------  0                       -------|                                   |
 3:  LT=  10 | |           | 2:RT= 160   |        0 5 5 5 6             ^- 160 |          = 929 vph                |
    TH=  10  | |           |   TH= 180   |        | | | | |             <-  90 |===================================|
   RT= 100   | v           |   LT=  10   |        < v v > >             <-  90 | Step 8. INTERSECTION LEVEL OF     |
-------------              -------------|                               v-   5 |         SERVICE                   |
                         <--Approach 2   |                               v-   6 |    (compare step 7 with table 6)  |
                                         |                                      |           -------                 |
                                         | 281 -^                               |           |  B  |                 |
 Approach 1-->                           | 230 -^                               |           -------                 |
-------------              -------------|  80 ->           < < ^ ^ >           |===================================|
 1:LT= 510   |            ^ | 4: RT=  20 |  80 ->           | | | | |           | Step 9. RECALCULATE               |
   TH= 160   |           |  |   TH=1060  |  30 -v                               |                                   |
   RT=  30   |           |  |   LT= 140  |-------              5 5       -------|Geometric Change:                  |
             | Approach 4|               |       |         7 6 3 3 2 |          |Signal Change:                     |
                                         |       |         7 3 0 0 0 |          |Volume Change:                     |
=========================================+======================================+===================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                          |
                                         |          (two phase signal)          |                                   |
        --^ v--   B2B1                   |             | Approach 3|            |                                   |
                                         |             |           |            |                                   |
    --^ AND <--      A1B2 AND            |             |           |            |                                   |
    --> OR  v--      /OR A2B1            |             |           |            |                                   |
        --> <--   A1A2                   |-------------             ------------|                                   |
                                         | Approach 1                           |                                   |
         |  <     B4B3                   |                                      |                                   |
         >  |                            |           See Step 6b.               |                                   |
    | | AND < ^      A3B4 AND            |                                      |                                   |
    v > OR  | |      /OR A4B3            |                         Approach 2   |                                   |
         |  ^     A3A4                   |-------------             ------------|                                   |
         v  |                            |             |           |            |                                   |
-----------------------------------------|             |           |            |                                   |
A1 -->   A3 |       B1 v--     B3   <|   |             |           |            |                                   |
           v ^                       | | |             |           |            |                                   |
A2 <--   A4  |      B2 --^     B4  |>    |             | Approach 4|            | Exclusive right turns reduced 30 %|
                                         |                                      | V/C Ratio = .68                   |
==================================================================================================
```

ATTACHMENT 5E

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                                   Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: GERBER RD AND VINEYARD RD                               Design Hour: PM
Problem Statement: ALTD
===========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:VINEYARD RD |              -------Approach-----|         MULTIPHASE SIGNAL OVERLAP    |
             | 1   2   2 |      ^     |              : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
             |  R    L   |      N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |            |  intervals/hour  :                |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)    :                |--------------------------------------|
  2  LT--^     v v v    <^-RTH        |c.G/C ratio       :  0    0    0    0|B2B1    61(B1)   83-  61=  22(B2)   61|
     LTH-^>             <--TH   2     |d.Opposing volume :  0    0    0    0|A1B2    22(B2)  119-  22=  97(A1)   22|
  2   TH-->             <v-LTH        |  in vph          :                |A1A2    97(A1) OR  95(A2)           97|
     RTH-v>    ^ ^ ^     v--LT  2     |e.LT capacity on  :  0    0    0    0|B4B3     6(B4)   28-   6=  22(B3)    6|
  1  RT--v    < < | > >  Approach 2   |  green (vph)     :                |A4B3    22(B3)   25-  22=   3(A4)   22|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   405(A3) OR   3(A4)          405|
             | T T H T T |GERBER RD   |  vph (b+e)       :                |                                      |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                      |
             | 2   2   1 |            |  in vph          :                |                                      |
             | Approach 4:VINEYARD RD |h.Is volume > cap. :               :|                                      |
                                      |  (g>f) ?         :                |                                      |
=====================================+================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |        |                    |    |                                      |
                                      |        |   4 4              |    |83(B1B2)+97(A1)+28(B4B3)+405(A3)      |
             | Approach 3|            |-------  6 0 0             -------|                                      |
 3:  LT=  10 | |         | 2:RT=  50  |         0 5 5 5 6          ^-  50 |          = 613 vph                   |
    TH= 810  | |         |   TH= 190  |         | | | | |          <-  95 |======================================|
   RT=  60   | v         |   LT= 110  |         < v v > >          <-  95 | Step 8. INTERSECTION LEVEL OF        |
-------------            -------------|                            v-  50 |         SERVICE                      |
                        <--Approach 2 |                            v-  61 |     (compare step 7 with table 6)    |
                                      |                                   |              -------                 |
                                      |  83 -^                            |              |  A  |                 |
 Approach 1-->                        |  68 -^                            |              -------                 |
-------------            -------------|  85 ->           < < ^ ^ >        |======================================|
 1:LT= 150   |          ^ | 4: RT=  10 |  85 ->           | | | | |        | Step 9. RECALCULATE                  |
   TH= 170   |          | |    TH=  50 | 170 -v                            |                                      |
   RT= 170   |          | |   LT=  50  |-------                   -------|Geometric Change:                     |
             | Approach 4|            |        |         2 2 2 2 1 |      |Signal Change:                        |
                                      |        |         8 3 5 5 0 |      |Volume Change:                        |
=====================================+===================================+======================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                             |
                                      |          (two phase signal)       |                                      |
        --^ v--   B2B1                |              | Approach 3|        |                                      |
                                      |              |           |        |                                      |
    --^ AND <--      A1B2 AND         |              |           |        |                                      |
    --> OR  v--      /OR A2B1         |              |           |        |                                      |
        --> <--   A1A2                |-------------              ------------|                                  |
                                      | Approach 1                        |                                      |
         |   <    B4B3                |                                   |                                      |
         >   |                        |          See Step 6b.             |                                      |
    | | AND < ^      A3B4 AND         |                                   |                                      |
    v > OR  | |      /OR A4B3         |                        Approach 2 |                                      |
         |   ^    A3A4                |-------------              ------------|                                  |
         v   |                        |              |           |        |                                      |
--------------------------------------|              |           |        |                                      |
A1 -->    A3 |      B1 v--     B3   <|                |           |        |                                      |
            v ^                      | |              |           |        |                                      |
A2 <--    A4  |     B2 --^     B4  |> |              | Approach 4|        | Exclusive right turns reduced  30 %  |
                                      |                                   | V/C Ratio = .45                      |
===========================================================================================================
```

# APPENDIX A-2

NVSSP FEIR: Final Technical Appendices Vol. III

FINAL REPORT

## Transportation Analysis for the North Vineyard Station Specific Plan

**Prepared for:**

**The North Vineyard Station Property Owners**

**October 2, 1996**

**Revised Pages 31/32** *(February 6, 1998)*

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# *EXECUTIVE SUMMARY*

The North Vineyard Station Specific Plan area is a 1,595-acre residential development with supporting office and commercial uses and various public facilities and amenities. A total of 6,339 dwelling units are proposed, in addition to approximately 38 acres of retail and office uses. Public facilities include neighborhood parks, a community park, a library, and elementary schools.

The transportation study analyzed the impacts of the proposed project on the existing and planned roadway, transit, bicycle, and pedestrian circulation systems. The key findings of the study are summarized below.

- Currently, fourteen of the study intersections operate at acceptable levels of service. The following intersections operate at unacceptable levels (LOS F) during the a.m. and/or p.m. peak hour.
    - South Watt Avenue at Jackson Road;
    - Bradshaw Road at Jackson Road;
    - Elk Grove-Florin Road at Florin Road; and
    - Elk Grove-Florin Road at Gerber Road.
- Five roadway segments currently experience physical deficiencies based on substandard travel lane and shoulder widths.
- The proposed project will generate 84,037 daily trips, 5,460 a.m. peak hour trips, and 8,663 p.m. peak hour trips. Approximately 20 percent of these trips are expected to remain within the project boundaries.
- Without roadway improvements, the addition of project traffic would result in operational deficiencies on five roadway segments and at eight study intersections. Improvements under existing plus project conditions include widening the following roadway segments from two to four lanes:
    - Elk Grove-Florin Road from Jackson Road (SR 16) to Gerber Road
    - Bradshaw Road from Jackson Road (SR 16) to Gerber Road
    - Florin Road from Elk Grove-Florin Road to Waterman Road
    - Gerber Road from Elk Grove-Florin Road to Bradshaw Road
    - Jackson Road (SR 16) from South Watt Avenue to Bradshaw Road

  Existing deficiencies resulting from substandard roadway cross-sections are exacerbated with the addition of project traffic.

  Intersection modifications (e.g., lane additions, traffic signal installations) would be required under existing plus project conditions at the following locations:

- South Watt Avenue at Jackson Road (SR 16);
- Bradshaw Road at Jackson Road (SR 16);
- Bradshaw Road at Elder Creek Road;
- Bradshaw Road at Florin Road;
- Elk Grove-Florin Road at Gerber Road;
- Bradshaw Road at Gerber Road;
- South Watt Avenue at Elder Creek Road; and
- Elk Grove-Florin Road at Florin Road.

- Under cumulative no project conditions, eight of the study intersections are projected to operate at LOS F during the a.m. peak hour and/or p.m. peak hour. Segments of Excelsior, Elder Creek, and Gerber Roads will experience physical deficiencies based on substandard travel lane and shoulder widths.

- Implementation of the project under cumulative conditions will degrade acceptable operations to unacceptable levels at three additional locations.

  The intersection modifications listed below are required to provide acceptable peak hour operations under cumulative plus project conditions.

  **Construct dual right turn lanes on the eastbound approach and triple left turn lanes on the northbound approach to the Bradshaw Road/Jackson Road intersection. Implementation of this improvement would result in LOS E operation at this location during the a.m. and p.m. peak hour.**

  **Construct Excelsior Road as a four-lane facility between Jackson Road and Florin Road. At the Jackson Road/Excelsior Road intersection, this modification would improve the cumulative plus project LOS from F to E during the a.m. peak hour. The p.m. peak hour LOS with this improvement would still be F; however, the V/C ratio with the project would be 1.04 or 19 percent less than the ratio of 1.24 under no project conditions. The Elder Creek Road widening should include two northbound and southbound through lanes at the Elder Creek Road/Excelsior Road intersection. Implementation of this improvement would result in LOS C or better operations during the a.m. and p.m. peak hours.**

  **Construct dual left turn lanes on the eastbound approach and two through lanes on the northbound approach at the Florin Road/Excelsior Road intersection. This modification, which would require widening of the northbound departure leg to accommodate two lanes, would result in LOS C operation during the a.m. and p.m. peak hour.**

**Construct dual right turn lanes on the westbound approach to the Bradshaw Road/Elder Creek Road intersection. Although this modification does not provide acceptable operations during the p.m. peak hour, it does improve intersection operations with the project by 25 percent.**

**Construct dual right turn lanes on the westbound approach to the Bradshaw Road/Florin Road intersection. Although this modification does not provide acceptable operations during either peak hour with the project, it does result in a.m. peak hour operations that are better than conditions without the project.**

The following study locations would require the construction of eight-lane arterial roadway segments to provide acceptable traffic operations based on either daily or peak hour volumes:

- Bradshaw Road between Florin Road and Elder Creek Road (daily);
- South Watt Avenue between Jackson Road and Florin Road (peak hour); and
- Elk Grove-Florin Road between Florin Road and Calvine Road (peak hour).

Since Sacramento County does not typically construct eight-lane arterial roadways except under special circumstances (e.g., adjacent to a freeway interchange), these improvements are not considered feasible. Thus, these locations would continue to operate at unacceptable levels under cumulative plus project conditions.

# I. INTRODUCTION

## STUDY PURPOSE

The purpose of this study is to analyze the impacts of the North Vineyard Station Specific Plan on the adjacent transportation system. This study assesses the short- and long-term impacts of the project on the local circulation network and describes the improvements required to mitigate operational deficiencies of the transportation system.

## PROJECT LOCATION AND DESCRIPTION

The North Vineyard Station Specific Plan area is located in southeastern Sacramento County and is bounded by Florin Road to the north, Elder Creek to the west, the planned Vineyard Road extension to the east, and Gerber Road to the south. Figure 1 shows the location of the plan area and the adjacent roadway network.

The plan area is a 1,595-acre residential development with supporting office and commercial uses and various public facilities and amenities. A total of 6,339 dwelling units are proposed, in addition to approximately 38 acres of retail and office uses. Public facilities include neighborhood parks, a community park, a library, and elementary schools.

The proposed on-site street system consists of a network of two-lane collector and local streets interconnected by several major collector roadways that will provide access to the existing and future arterial roadways: Florin Road, Gerber Road, Bradshaw Road and the extensions of Vineyard Road and Waterman Road. As part of the project, improvements to the existing transit, bicycle, and pedestrian facilities, as well as new facilities, will be implemented to encourage the use of alternative travel modes.

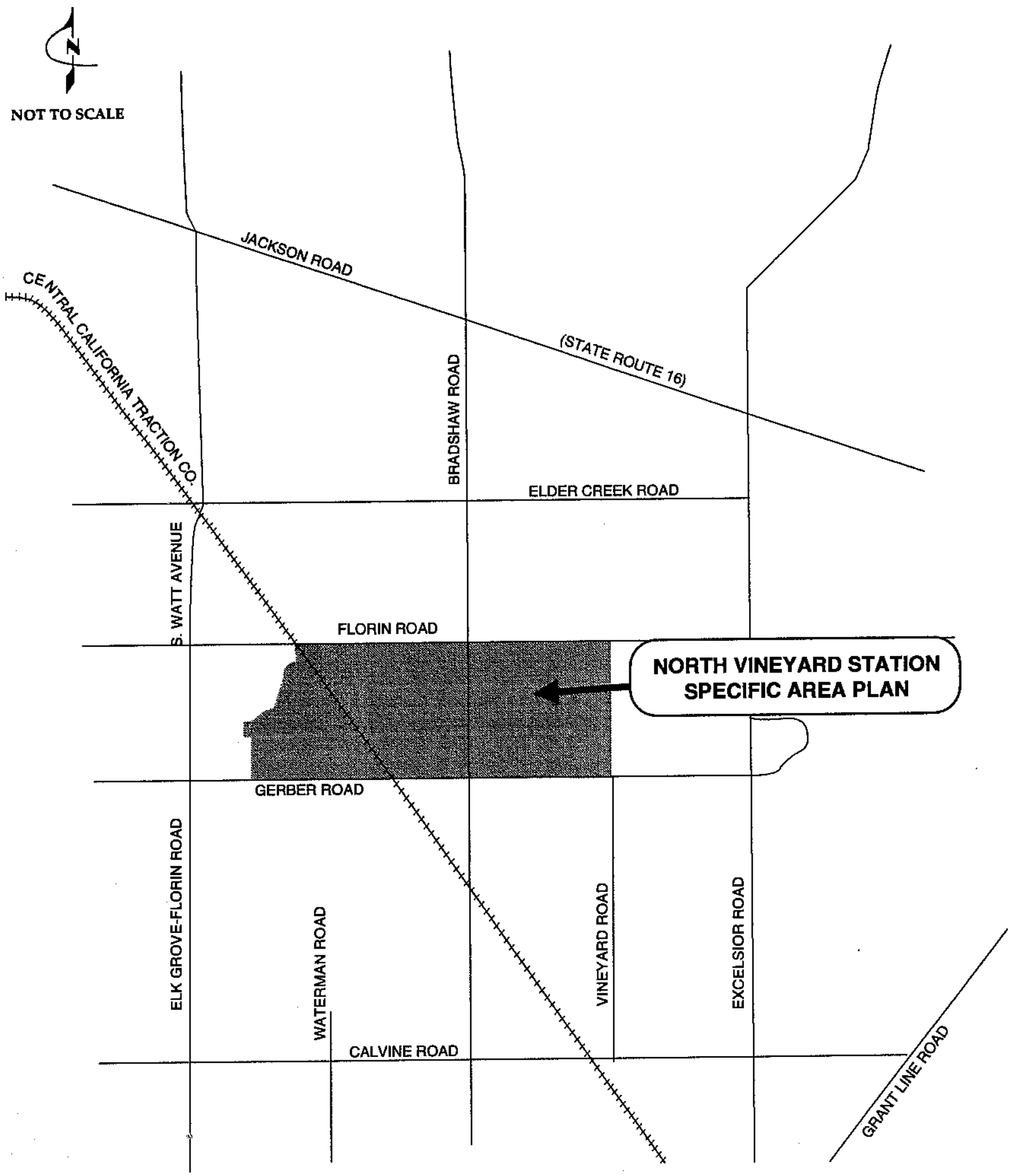
## EVALUATION CRITERIA

Criteria for evaluating project impacts were established for roadways (including segments and intersections), transit facilities, and bicycle/pedestrian facilities. Each element of the transportation system is described below.

### Arterial Roadway Segments

For purposes of this study, roadway segments were analyzed by comparing average daily traffic volumes to capacity thresholds that were developed for the Sacramento County General Plan Update. These thresholds are used as guidelines by the County to master plan the transportation network by projecting the need for new or upgraded facilities.

The effect of substandard roadway cross-sections was also used to identify deficiencies. Some of the study roadways, including Elk Grove-Florin Road, Jackson Road, and Bradshaw Road, include 12-foot travel lanes and minimum 6-foot usable shoulders. Other roadways such as Gerber Road and Excelsior Road provide 10- or 11-foot travel lanes and usable shoulders that are less than two-feet wide.




| FIGURE 1 | PROJECT LOCATION MAP | Fehr & Peers Associates, Inc. Transportation Consultants |
|---|---|---|

*Operational Deficiencies*

According to the Sacramento County General Plan, the streets within the study area are ultimately planned to be medium-access arterial roadways, with two to four intersections per mile, a limited number of driveways, and a speed limit between 35 and 55 miles per hour. For this type of facility, the daily roadway capacity is approximately 18,000, 36,000, and 54,000 VPD for streets with two lanes, four lanes and six lanes, respectively. These capacities were applied to all facilities under existing and cumulative conditions.

The project results in an operational deficiency if the addition of project-generated traffic causes the demand on a facility to exceed its ultimate capacity, thus requiring additional travel lanes beyond those delineated in the Transportation Plan of the *General Plan Circulation Element* dated December 15, 1993.

*Physical Deficiencies*

As noted above, several study roadways include substandard cross-sections. According to standards set forth in *A Policy on Geometric Design of Highways and Streets* (1994) published by the American Association of State Highway and Transportation Officials (AASHTO), the minimum lane width and shoulder width is 12 feet and 6 feet, respectively, for rural arterials serving more than 400 VPD. Thus, a physical deficiency is defined to occur when a substandard roadway segment serves more than 400 VPD.

Signalized Intersections

Level of service (LOS) is a term which qualitatively describes operating conditions for intersections. There are six levels of service, A through F, which represent driving conditions from best to worst, respectively. In general, LOS A represents free-flow conditions with no congestion and LOS F represents severe congestion or delay under stop-and-go conditions.

The County of Sacramento has defined the level of service standard for urban area roadways to be LOS E (i.e., LOS F is considered unacceptable). For intersections of rural collector roadways, the minimum acceptable LOS is D. These standards have been set forth in Policy CI-22 in the County's *General Plan Circulation Element*. As set forth in Policy CI-23, if implementation of a project results in a level of service worse than those specified in Policy CI-22, traffic impacts must be mitigated by enhancing the capacity of the roadway and transit system or reducing the demand generated by the project.

Analysis of signalized intersections was completed using the methods described in *Interim Materials on Highway Capacity* (Circular No. 212, Transportation Research Board, January 1980). The characteristics of traffic operations for each LOS with respect to signalized intersections are shown in Table 1. Corresponding to each LOS is a volume-to-capacity (V/C) ratio. This is the ratio of the existing or projected volume to the theoretical capacity of the intersection. An intersection is defined to be "at capacity" at LOS E when the V/C ratio is 1.00.

**Table 1**
**Signalized Intersection Level of Service Characteristics**

| Level of Service | Interpretation | Volume-to-Capacity Ratio |
|---|---|---|
| A | Uncongested operations; all queues clear in a single cycle. | Less than 0.61 |
| B | Very light congestion; an occasional phase is fully utilized. | 0.61-0.70 |
| C | Light congestion; occasional queues on approaches. | 0.71-0.80 |
| D | Significant congestion on critical approaches, but intersection is functional. Cars required to wait through more than one cycle during short peaks. No longstanding queues formed. | 0.81-0.90 |
| E | Severe congestion with some longstanding queues on critical approaches. Traffic queue may block nearby intersection(s) upstream of critical approach(es). | 0.91-1.00 |
| F | Total breakdown, stop-and-go operation. | Greater than 1.00 |

Source: *Interim Materials on Highway Capacity* (Circular 212, Transportation Research Board, 1980).

The project results in an operational deficiency when the addition of project-generated traffic changes the LOS from E or better to LOS F. For facilities operating at LOS F without the project, an operational deficiency is identified if the addition of project traffic increases the V/C ratio by 0.05 or more.

Unsignalized Intersections

For those intersections that are unsignalized, two methodologies were used to analyze operating conditions. For those intersections with stop sign control on the minor street approach only, the methods described in Chapter 10 of the *Highway Capacity Manual* (Special Report 209, Transportation Research Board, 1985). Level of service is determined for each movement based on the reserve capacity available. Reserve capacity is a function of demand and the critical gaps in traffic on the major street. The criteria for level of service at stop sign-controlled intersections are shown in Table 2.

| Table 2<br>Level of Service Characteristics for an<br>Unsignalized Intersection with Two-Way Stop Control | | |
|---|---|---|
| Level of Service | Interpretation | Reserve Capacity |
| A | Little or no delay. | ≥400 |
| B | Short traffic delays. | 300 to 399 |
| C | Average traffic delays. | 200 to 299 |
| D | Long traffic delays. | 100 to 199 |
| E | Very long traffic delays. | 0 to 99 |
| F | Stop-and-go conditions. | <0 |
| Source: *Highway Capacity Manual* (Special Report 209, Transportation Research Board, 1985). | | |

At intersections with all-way stop control (i.e., all traffic stops), procedures described in *Interim Materials on Unsignalized Intersection Capacity* (Circular No. 373, Transportation Research Board, 1991) were utilized. These methods determine an overall level of service based on the estimated delay for traffic on each of the approaches. The range of delay for each level of service is summarized in Table 3.

| Table 3<br>Level of Service Characteristics for an<br>Unsignalized Intersection with All-Way Stop Control | | |
|---|---|---|
| Level of Service | Interpretation | Average Vehicle Delay (in seconds) |
| A | Little or no delay. | ≤5 |
| B | Short traffic delays. | >5 and ≤10 |
| C | Average traffic delays. | >10 and ≤20 |
| D | Long traffic delays. | >20 and ≤30 |
| E | Very long traffic delays. | >30 and ≤45 |
| F | Stop-and-go conditions. | >45 |
| Source: *Interim Materials on Unsignalized Intersection Capacity* (Circular No. 373, Transportation Research Board, 1991). | | |

The project results in an operational deficiency if the addition of project traffic changes the LOS from E or better to F. For those intersections that are affected, an analysis of peak hour volumes is conducted to determine if a traffic signal is warranted.

Transit Facilities

The effect of a project on a transit system can be quantified using several different criteria including quantitative changes in ridership demand, headways, and routing, etc. Due to the general nature of this analysis and the limited existing service in proximity to the project site, the North Vineyard Station Specific Plan will result in an operational deficiency if:

- Implementation of the project disrupts or interferes with existing or planned transit operations and facilities of Regional Transit, or
- Implementation of the project conflicts with the transit-related goals, objectives and policies of the *Sacramento County General Plan* - Circulation Element, Section V - Transportation Policy Plan, (December 15, 1993).

Bicycle and Pedestrian Facilities

Impacts to bicycle and pedestrian facilities can be determined in the same manner as impacts to transit operations and facilities. Thus, the North Vineyard Station Specific Plan results in an operational deficiency if:

- Implementation of the project disrupts or interferes with existing or planned bicycle facilities of the *Sacramento City/County 2010 Bikeways Master Plan*, or
- Implementation of the project conflicts with the bicycle- and pedestrian-related goals, objectives and policies of the *Sacramento County General Plan* - Circulation Element, Section V- Transportation Policy Plan, (December 15, 1993).

## REPORT ORGANIZATION

Chapter II describes the existing transportation system serving the project site and the operating characteristics of each facility without the project. The impact of the North Vineyard Station Specific Plan on existing conditions is presented in Chapter III, "Existing Plus Project Conditions." Chapter IV presents cumulative conditions with and without the project in place and describes measures required to improve operational deficiencies. Chapter V presents a discussion of several related transportation issues including on-site circulation, Congestion Management Plan consistency, trip and emissions reduction measures, and land use alternatives analysis.

# II. EXISTING CONDITIONS

In the vicinity of the project site, the existing transportation system is almost exclusively represented by roadways. Automobiles are the primary travel mode for most trips in this area, while designated facilities for bicycles and pedestrians are limited. Each of the potentially affected travel modes is discussed in this chapter.

## ROADWAY NETWORK

Since most trips in this area are made using automobiles, the roadway system is the primary focus of this analysis. Figure 2 shows the lane configurations of the study roadway segments under existing conditions and the location of the study intersections.

The project site is located in southeastern Sacramento County. Access to the study area is provided by a system of arterial roadways including Florin Road, Elk Grove-Florin Road, Bradshaw Road, and Calvine Road. These roadways provide access to regional facilities such as State Route 99 (SR 99) four miles to the west, U.S. Highway 50 four miles to the north, and Jackson Road/SR 16 located two miles to the north.

Most of the existing roads serving the site are two-lane arterial roadways. These facilities have narrow shoulders (some unpaved), speed limits of 35 to 55 miles per hour, and in some cases, travel lanes less than 12 feet wide. These roads provide access to agricultural and low-density residential uses on the project site. According to the Sacramento-Solano-Sutter-Yolo Counties California Road System Map (1992), the following road segments are classified as urban facilities:

- SR 16 from Elk Grove-Florin Road to Bradshaw Road;
- Elk Grove-Florin Road from SR 16 to Calvine Road;
- Gerber Road from Elk Grove-Florin Road to the Central California Traction Railroad;
- Calvine Road from Elk Grove-Florin Road to Bradshaw Road; and
- Waterman Road north of Calvine Road.

Several roadway segments do not meet Sacramento County standards for roadway cross-sections that call for 12-foot travel lanes and 6-foot usable shoulders. These segments include:

- Excelsior Road from SR 16 to Calvine Road;
- Elder Creek Road from South Watt Avenue to Excelsior Road;
- Gerber Road from Vineyard Road to Excelsior Road;
- Vineyard Road from Gerber Road to Vineyard Road; and
- Calvine Road from Waterman Road to Grant Line Road.

Similar standards are presented in *A Policy on Geometric Design of Highways and Streets* (1994) published by the American Association of State Highway and Transportation Officials (AASHTO) for roadway segments serving more than 400 VPD and a design speed of 50 miles per hour or more.

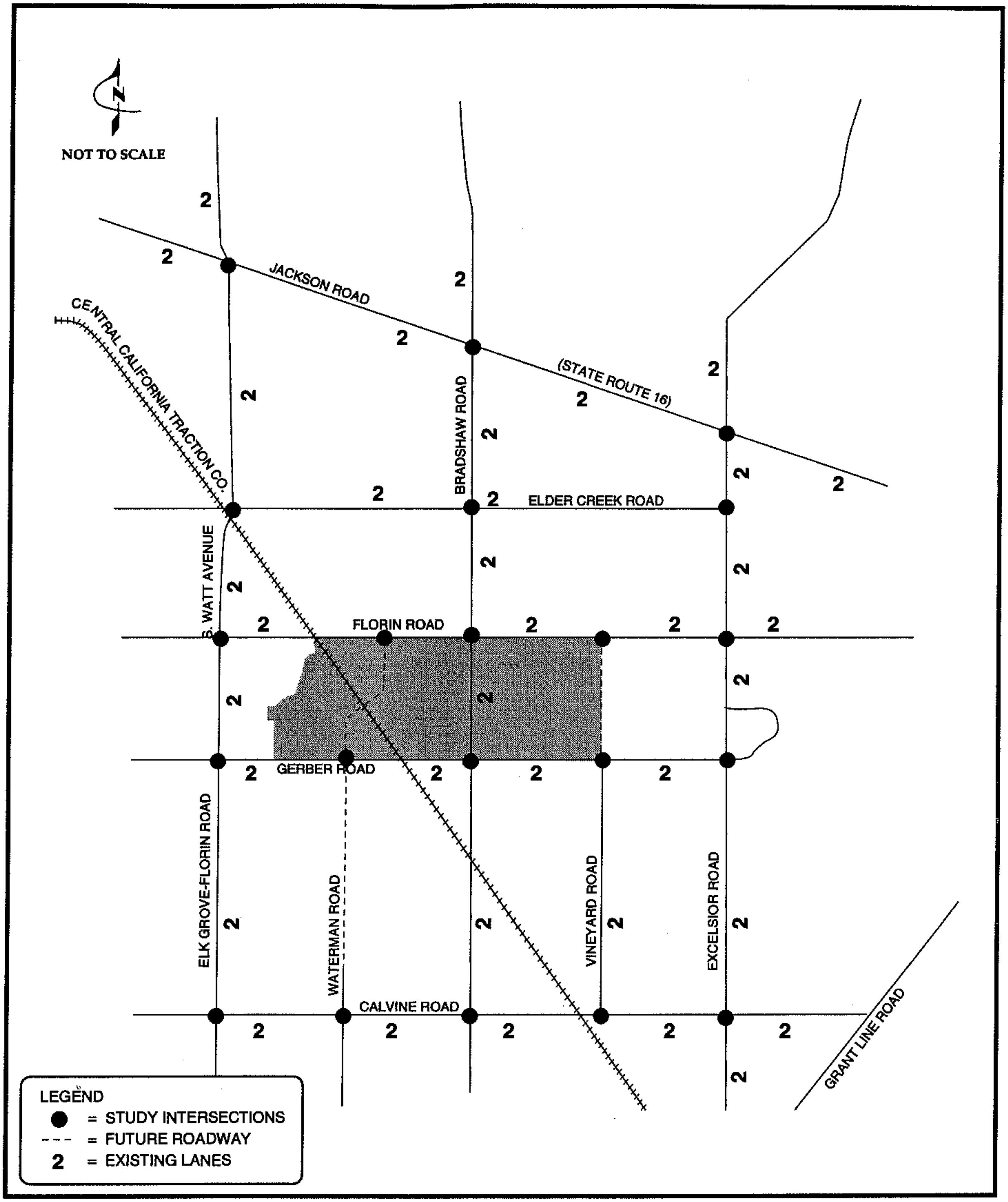



**FIGURE 2**

**STUDY INTERSECTIONS AND ROADWAYS**

Fehr & Peers Associates, Inc.
Transportation Consultants

## EXISTING TRAFFIC VOLUMES

Average daily traffic (ADT) volumes were obtained from two sources: 1) count data compiled by the County Transportation Division, and 2) estimated daily volumes based on peak hour turning movement counts. ADT volumes for roadways are shown on Figure 3.

Fehr & Peers Associates, Inc. conducted intersection turning movement counts for both the a.m. and p.m. peak periods during May, 1995. Existing peak hour volumes and lane configurations at each intersection are presented on Figure 4.

## EXISTING TRAFFIC OPERATIONS

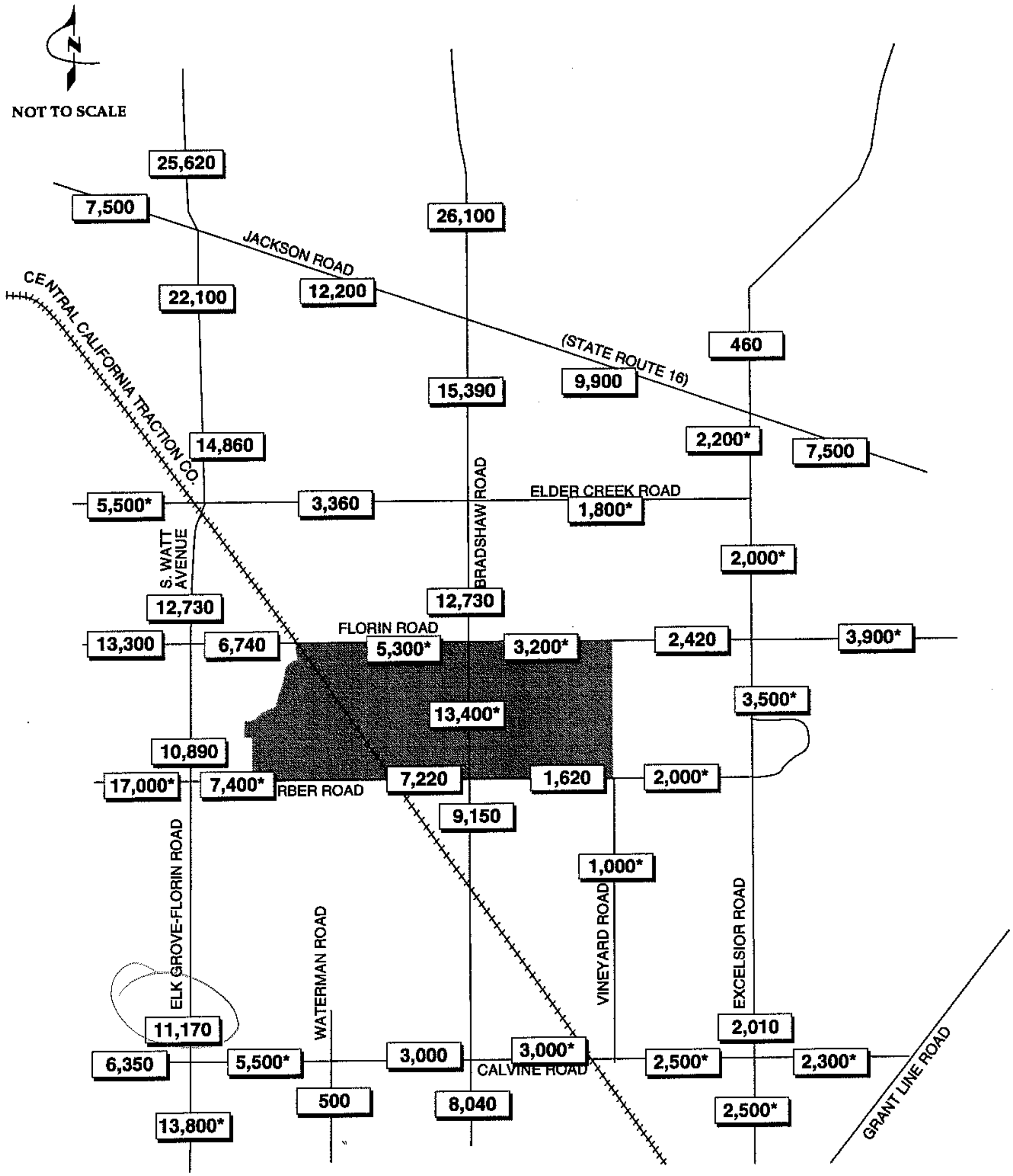
### Arterial Roadway Segments

With the exception of four roadway segments near SR 16, all of the existing roadway segments are operating at an acceptable level according to Sacramento County ADT volume guidelines. The segments of South Watt Avenue (which is designated Elk Grove-Florin Road south of Florin Road) and Bradshaw Road immediately north and south of SR 16 currently carry traffic volumes in excess of 15,000 to 18,000 VPD. Although these facilities are more urban in character, the existing volumes ranging from approximately 15,400 to 26,100 VPD exceed the theoretical capacities.

All of the roadway segments that do not meet Sacramento County/AASHTO standards for roadway cross-sections (see Page 7) currently serve more than 400 VPD. Therefore, all of these segments experience physical deficiencies under existing conditions.

### Study Intersections

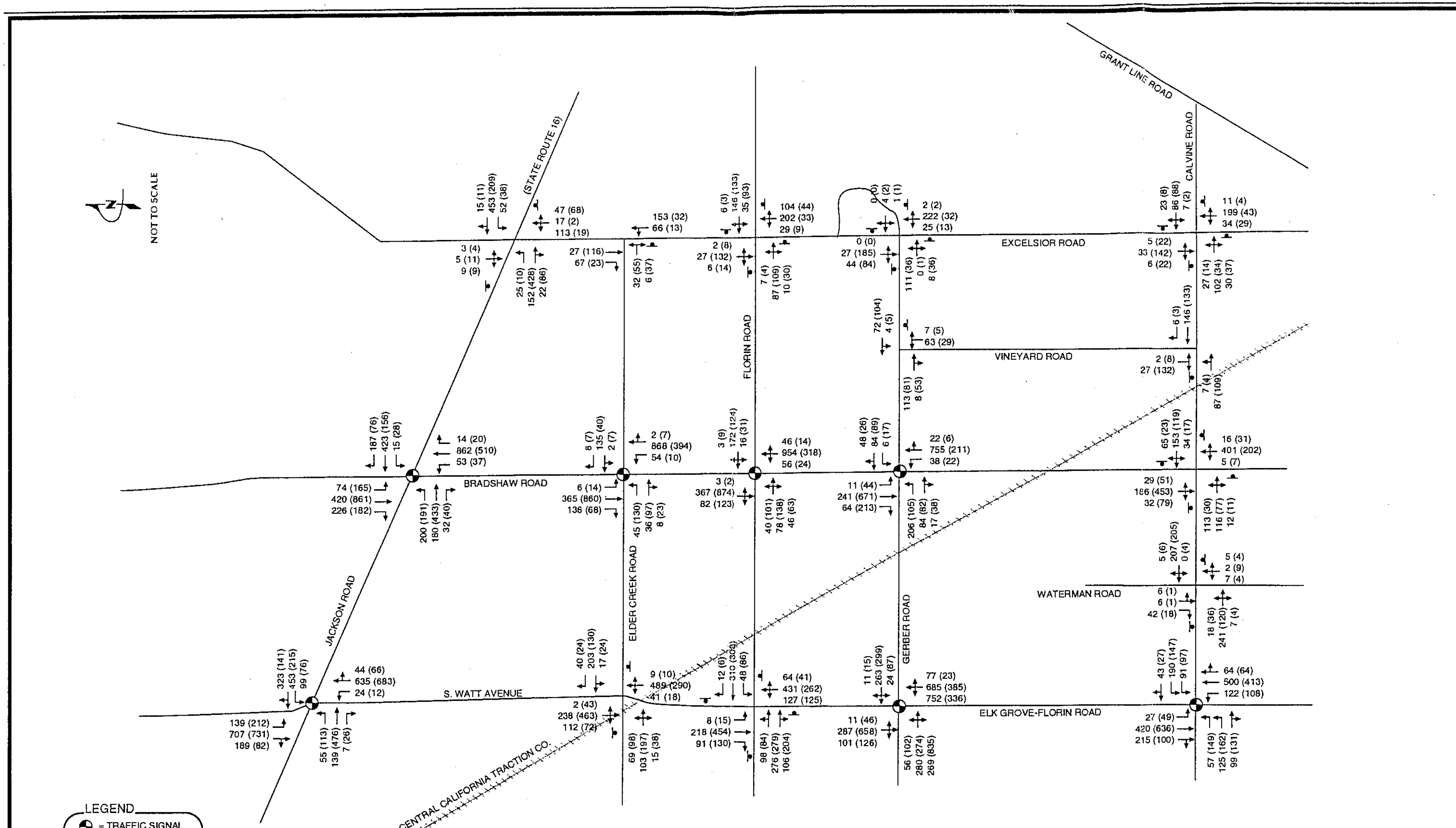
Levels of service for study intersections were determined by comparing existing peak hour traffic volumes on Figure 4 to the evaluation criteria defined in Chapter I. The results are presented in Table 4 and the calculation worksheets are included as Appendix A.




XX,XXX = Daily Volume (* Signifies estimate from peak hour counts).

Source: Sacramento County Traffic Volume Map (1994) and Fehr & Peers Associates (1995).

| FIGURE 3 | EXISTING DAILY VOLUMES | Fehr & Peers Associates, Inc. Transportation Consultants |
|---|---|---|

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**EXISTING GEOMETRICS AND PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 4**

**Table 4**
**Existing Intersection Level of Service**

| Intersection | Traffic Control | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| | | V/C Ratio, Delay or RC[1] | LOS[2] | V/C Ratio or Delay or RC | LOS |
| S. Watt Avenue/Jackson Road | Signal | 1.04 | F | 1.12 | F |
| Bradshaw Road/Jackson Road | Signal | 1.13 | F | 0.99 | E |
| Bradshaw Road/Elder Creek Road | Signal | 0.77 | C | 0.76 | C |
| Bradshaw Road/Florin Road | Signal | 0.89 | D | 0.82 | D |
| Elk Grove-Florin Road/Gerber Road | Signal | 1.05 | F | 1.30 | F |
| Bradshaw Road/Gerber Road | Signal | 0.82 | D | 0.66 | B |
| Elk Grove-Florin Road/Calvine Road | Signal | 0.52 | A | 0.60 | A |
| Excelsior Road/Jackson Road | Two-way Stop | 239 | C | 378 | B |
| Excelsior Road/Elder Creek Road | Two-way Stop | 709 | A | 616 | A |
| Vineyard Road/Gerber Road | Two-way Stop | 562 | A | 596 | A |
| Excelsior Road/Gerber Road | Two-way Stop | 432 | A | 547 | A |
| Waterman Road/Calvine Road | Two-way Stop | 489 | A | 677 | A |
| Vineyard Road/Calvine Road | Two-way Stop | 881 | A | 767 | A |
| S. Watt Avenue/Elder Creek Road | All-way Stop | 15.0 sec | C | 37.0 sec | E |
| Excelsior Road/Florin Road | All-way Stop | 6.0 sec | B | 3.0 sec | A |
| Elk Grove-Florin Road/Florin Road | All-way Stop | 36.0 sec | E | 66.0 sec | F |
| Bradshaw Road/Calvine Road | All-way Stop | 15.0 sec | C | 14.0 sec | C |
| Excelsior Road/Calvine Road | All-way Stop | 4.0 sec | A | 3.0 sec | A |

Notes: 1 V/C Ratio = Volume-to-Capacity Ratio (0.00 applies to signalized control); Delay = Average Total Delay (0.0 seconds applies to all-way stop control); and RC= Reserve Capacity (000 vehicles applies to two-way stop control).
2 LOS = Level of Service

Under existing conditions, four of the study intersections operate at unacceptable levels (LOS F) during the a.m. and/or p.m. peak hours. These locations include:

- South Watt Avenue at Jackson Road (a.m. and p.m. peak hour);
- Bradshaw Road at Jackson Road (a.m. peak hour);
- Elk Grove-Florin Road at Gerber Road (a.m. and p.m. peak hour); and
- Elk Grove-Florin Road at Florin Road (p.m. peak hour).

Of the two-way stop-controlled locations, only the intersection of Excelsior Road at Jackson Road operates at worse than LOS A. This location operates at LOS D and LOS C during a.m. and p.m. peak hours, respectively. Three of the all-way stop controlled intersections operate at LOS C or worse including the Elk Grove-Florin road/Florin road intersection.

Signal warrant analyses were conducted at all unsignalized intersections operating at LOS C or worse. Utilizing the Peak Hour Signal Warrant described in the Caltrans Traffic Manual, warrant criteria were met at the South Watt Avenue/Elder Creek Road and Elk Grove-Florin Road/Florin Road intersections.

## TRANSIT SYSTEM

In the greater Sacramento area, transit service is provided by Regional Transit (RT). The project site is located on the outskirts of the urbanized Sacramento area. At present, there are no transit services within the study area. The nearest bus routes operate on Kiefer Boulevard two miles to the north and on Power Inn Road two miles to the west of the project site.

## BICYCLE AND PEDESTRIAN SYSTEMS

Bicycle facilities in the vicinity of the project site are limited. Within the study area, the only existing bicycle facility is a Class II bikeway on Elk Grove-Florin Road from Florin Road to south of Calvine Road. Class II bikeways include a separate lane delineated for bicycles by striping and signs.

Although bicycles can legally travel on all of the study roadways, cyclists must share the travel lanes on the two-lane facilities adjacent to the project site. Since these roads typically have 11-foot to 12-foot travel lanes with narrow, unpaved shoulders and vehicles travelling at relatively high speeds, bicycle travel is not a well-utilized mode within the study area.

## OTHER TRANSPORTATION FACILITIES

A rail line operated and maintained by Central California Traction Railroad crosses the western portion of the project site between Hedge Avenue (east of Elk Grove-Florin Road) and Bradshaw Road. The railroad runs diagonally from northwest to southeast and includes existing at-grade crossings at Gerber Road and Florin Road. Current operations include one northbound train and one southbound train per day. The length of each train varies from two to 50 cars depending on demand.

# III. EXISTING PLUS PROJECT CONDITIONS

This chapter describes the effect project-generated trips would have on the operation of the existing local transportation system and its users.

## PROJECT DESCRIPTION

As described in Chapter I, the North Vineyard Station Specific Plan is a 1,595-acre residential development with supporting commercial and office uses, schools, and parks. The site for the plan area is bounded by Florin Road to the north, Gerber Road to the south, Elder Creek to the west, and the planned Vineyard Road extension to the east. The project will have access to all three roadways listed above and will be built to the east and west of the planned Waterman Road extension between Gerber and Florin Roads. The internal roadway system will include a series of interconnected collector streets to distribute traffic to the adjacent arterial roadways.

Project Trip Generation

Project-generated traffic from the North Vineyard Station Specific Plan area was estimated using the following process:

- Estimate vehicle trip ends for various land uses using standard trip generation rates;
- Adjust the total number of trips to account for internal and pass-by trips;
- Estimate transit utilization; and
- Determine net project trip generation.

Each step is explained in detail below.

Estimation Of Vehicle Trip Ends

The number of trips generated for each land use was estimated by applying trip rates from *Trip Generation,* Institute of Transportation Engineers, 5th Edition, 1991. These rates were applied to the proposed land uses to yield the total number of trips generated by each land use. It should be noted that similar rates were used in the East Elk Grove Specific Plan traffic analysis. The daily, a.m. peak hour, and p.m. peak hour trip rates are shown in Table 5 for each land use.

**Table 5**
**Trip Generation Rates For Various Land Uses**

| Land Use | Units | Daily | AM Peak Hour | PM Peak Hour |
|---|---|---|---|---|
| Low Density Residential | d.u. | 9.55 | 0.74 | 1.01 |
| Medium Density Residential | d.u. | 9.45 | 0.74 | 1.01 |
| High Density Residential | d.u. | 6.47 | 0.56 | 0.69 |
| Elementary School | students | 1.09 | 0.28 | 0.25 |
| Business Park | ksf GFA | 14.37 | 1.62 | 1.48 |
| Commercial | ksf GLA | Depends on Size of Parcel | | |

Internalization and Pass-By Adjustments

The total number of trips generated by each land use was adjusted to account for internal and pass-by trips. Internal trips are those which begin and end within the project boundary. An example is a trip from home to the neighborhood supermarket. Since these trips do not leave the project area, they do not affect operation of the external street system.

For the purposes of this study, internalization rates developed for the East Elk Grove Specific Plan were reviewed. After review and some modification, the following set of internalization rates were developed for the North Vineyard Station Specific Plan:

- Residential 14%
- Neighborhood Commercial 40%
- Community Commercial 30%
- Business Park 15%
- Elementary School 90%

For residential trips, the internalization rate was determined by assuming 80 percent of all non-residential internal trips would be home-based. This equates to a 14 percent internalization rate for residential areas of the project.

Pass-by trips reflect those trips that are attracted from passing traffic already on the external street system. These types of trips occur for retail and commercial land uses. According to *Trip Generation*, 5th Edition, Institute of Transportation Engineers, 1991, pass-by trip percentages vary based on the size of a retail or commercial land use and the daily traffic volume on the adjacent street. Given the types of retail and commercial land use proposed for the North Vineyard Station Specific Plan and the expected daily traffic volumes on the adjacent streets, pass-by factors of 20 percent for neighborhood commercial and 30 percent for community commercial were applied to the gross trip generation. These factors are consistent with values used in other traffic studies in the Sacramento region.

Transit Utilization

Transit utilization for the project was estimated using a two-step process. First, the number of vehicle-trips was converted to person-trips using a ratio of 1.15 persons per vehicle. The second step involved projecting the percentage of person-trips that would utilize transit. For the East Elk Grove Specific Plan, up to five percent of all person-trips would be completed using transit. This same percentage is considerable applicable for the North Vineyard Station Specific Plan, which will result in approximately 3,620 daily transit trips. About 250 of these trips will occur in the a.m. peak hour while about 375 will occur during the p.m. peak hour.

Net Project Trip Generation

Tables B-1 through B-3 in Appendix B summarize the project trip generation under daily, a.m. peak hour, and p.m. peak hour conditions for the following categories:

- Total vehicle-trips;
- External and internal vehicle-trips;
- External person-trips; and
- Total transit trips.

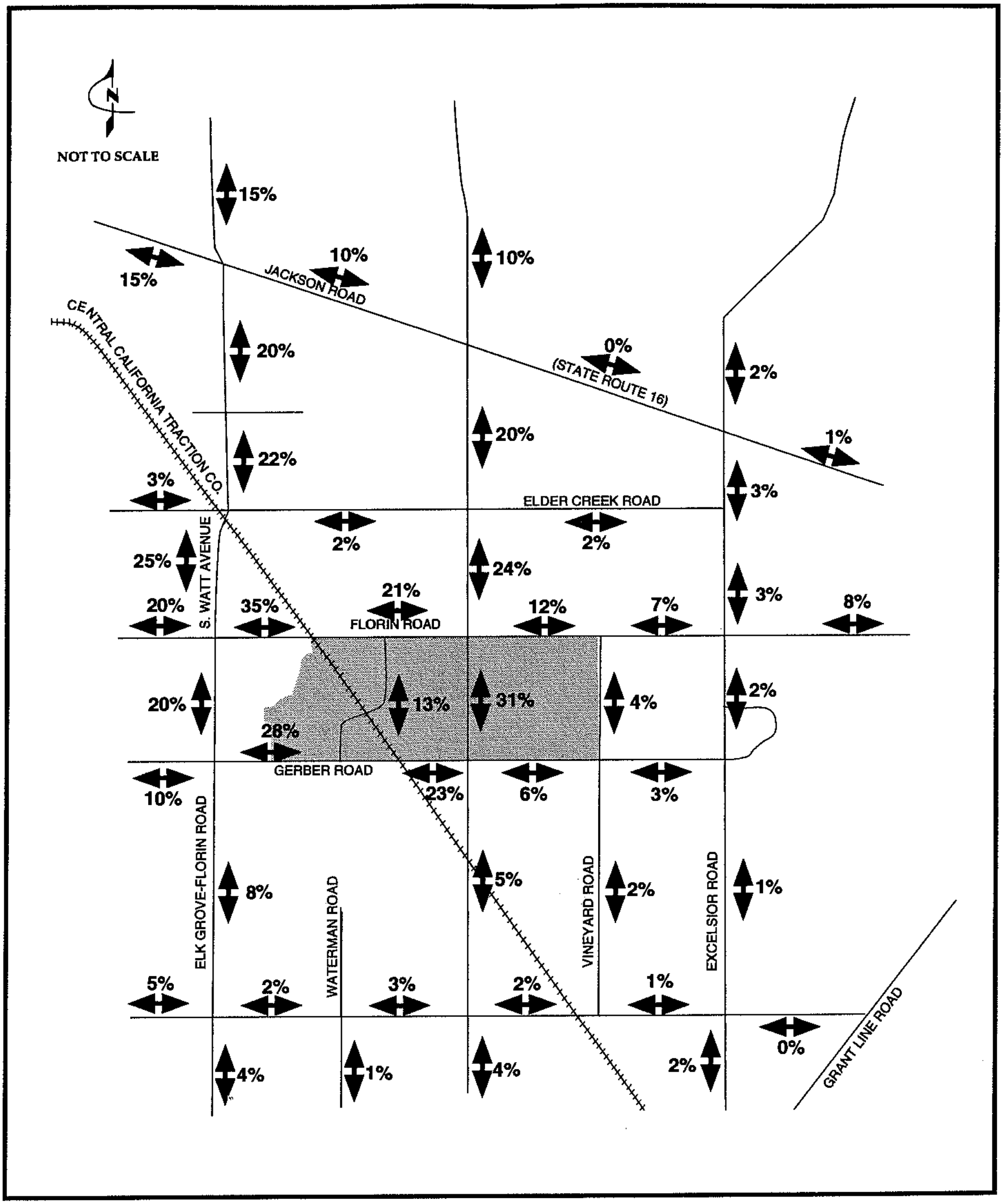
The project is expected to generate about 84,000 daily vehicle trips. About 16,780 or 20 percent of these trips will remain within the project area while about 63,000 will travel on the external street system. The single highest hour of trip generation will occur during the p.m. peak hour when about 10 percent of the total daily trips will be generated.

Residential trips represent just over 70 percent of the total gross daily vehicle trips with neighborhood and community commercial uses representing 29 percent. Because of internalization and pass-by trips, the commercial uses represent only 20 percent of the net external vehicle-trips, whereas, residential, school, and park uses comprise 80 percent of this total.

Project Traffic Distribution

The initial directional distribution of project traffic onto the surrounding road network was based on travel patterns generated by the MINUTP-based Sacramento County travel demand model. These patterns were reviewed with County Transportation Division staff and adjusted to reflect the fact that 1) some of the facilities coded in the 2010 model would not be widened to their ultimate cross-section, and 2) planned employment centers represented in the model would not be developed under existing plus project conditions. The resulting directional distribution for existing plus project conditions is shown on Figure 5.

As indicated in the figure, traffic distribution under existing conditions is generally expected to favor areas to the north. This pattern is expected given that the project site is located in the southern area of the developed Sacramento region and, more importantly, is south of the employment base in downtown Sacramento.




| | | |
|---|---|---|
| **FIGURE 5** | **EXISTING PROJECT TRIP DISTRIBUTION** | Fehr & Peers Associates, Inc. Transportation Consultants |

Project Traffic Assignment

To accurately trace the expected paths of project-generated traffic at each intersection, a computer model of the project's internal roadways and the study area roadway system was developed using the TRAFFIX software package. This mechanism provided an efficient way of accounting for traffic generated by different areas within the project and tracing these trips at each study intersection. Based on the trip distribution percentages in Figure 5, project trips were added to the existing traffic counts at the study intersections listed in Chapter II.

Figures 6 and 7 present daily and peak hour traffic volumes, respectively, under existing plus project conditions. The resulting existing plus project volumes were analyzed to determine the impact of adding project traffic to the roadway network. Impacts to each component of the transportation system are presented below.

## ROADWAY SYSTEM OPERATIONS

Arterial Roadway Segments

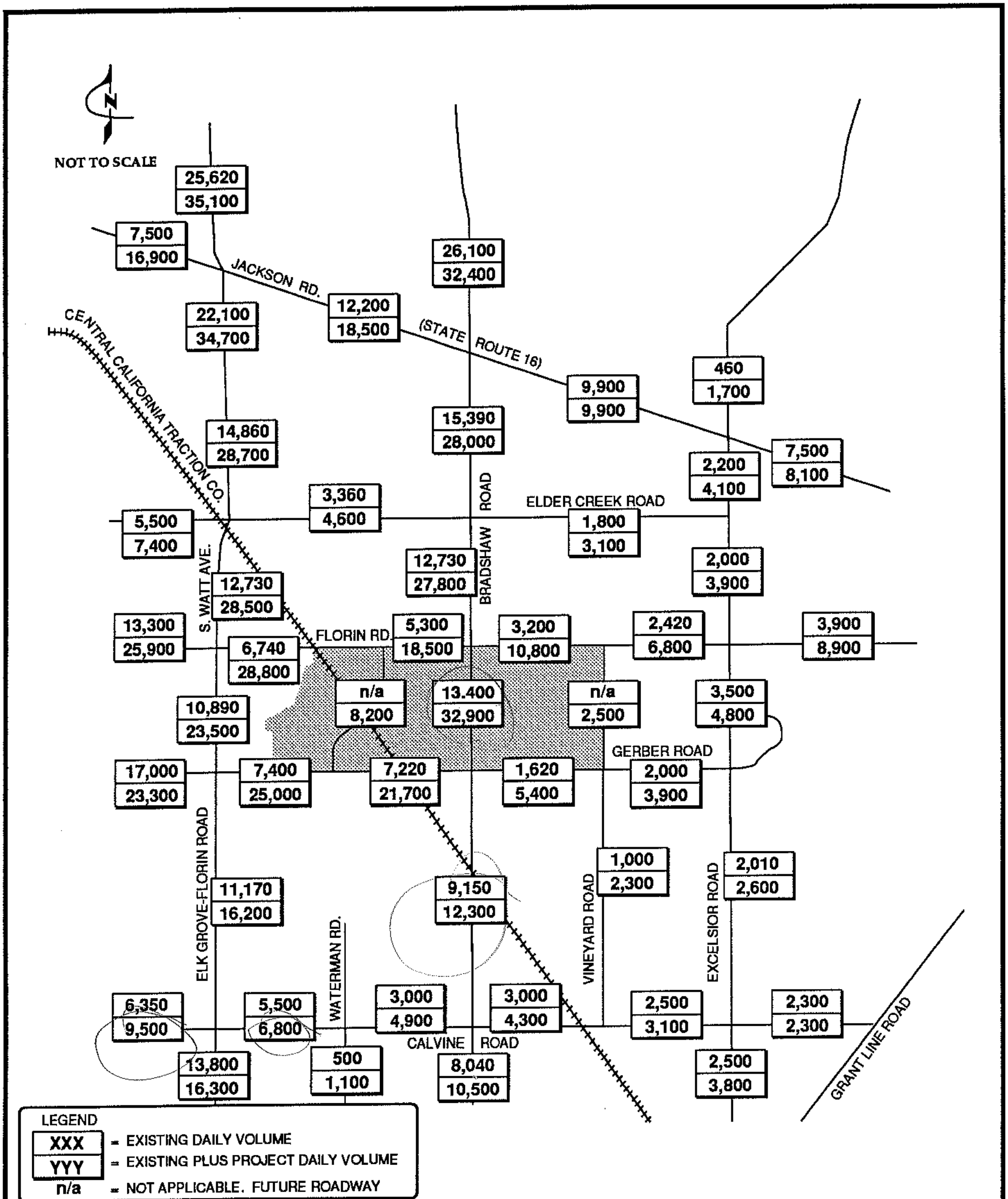
Daily traffic volumes shown on Figure 6 were compared to the capacity criteria for arterial roadway segments presented in Chapter I. The result of this comparison shows that the operation of several study roadway segments would be affected with the addition of project traffic. Each arterial roadway segment deficiency is discussed below.

EP-1: Implementation of the project would result in daily traffic volumes on the existing two-lane section Elk Grove-Florin Road between Gerber Road and SR 16 that would exceed the theoretical capacity. The projected daily volume between SR 16 and Gerber Road ranges from 23,500 to 34,700 vehicles per day (VPD) with the project. North of SR 16, the volume is projected to be 35,100 VPD. These volumes exceed both the rural and urban two-lane capacities of 15,000 and 18,000 VPD, respectively.

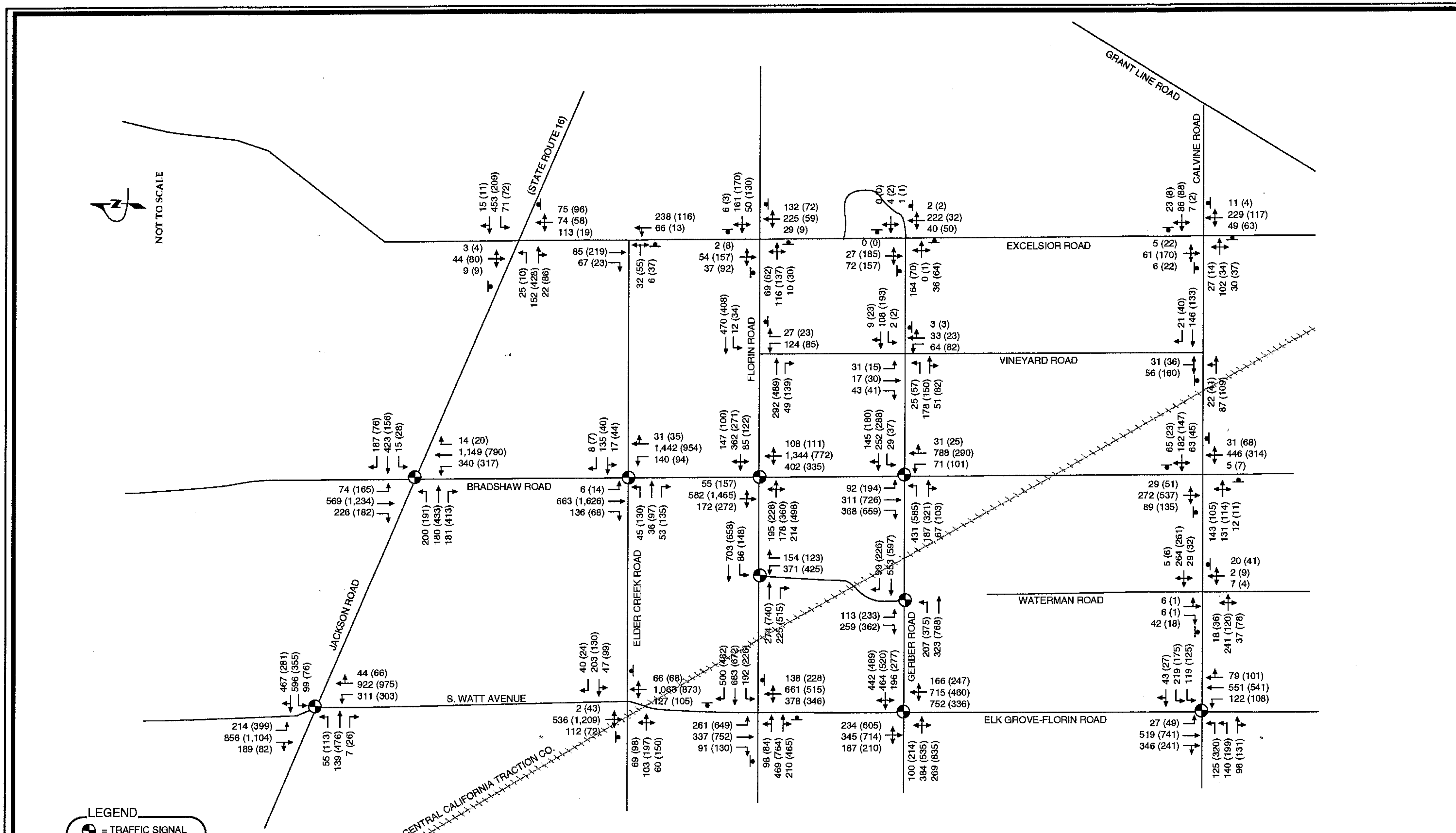
EP-2: Implementation of the project would result in daily traffic volumes on Bradshaw Road between Gerber Road and SR 16 ranging from 32,900 to 28,000 VPD. North of SR 16, the daily volume with the project is estimated to be 32,400 VPD. All volumes exceed both the rural and urban two-lane capacities of 15,000 and 18,000 VPD, respectively.

EP-3: Implementation of the project would result in a daily volume on Florin Road between Elk Grove-Florin Road (South Watt Avenue) and the proposed Waterman Road extension of 28,800 VPD. This volume exceeds both the rural and urban two-lane capacities of 15,000 and 18,000 VPD, respectively.

EP-4: Implementation of the project would result in daily volumes on Gerber Road between Elk Grove-Florin Road and Bradshaw road ranging from 21,900 to 25,000 VPD. West of Elk Grove-Florin Road, the daily volume is projected to be 23,500 VPD with the project. These volumes exceed both the rural and urban two-lane capacities of 15,000 and 18,000 VPD, respectively.




| FIGURE 6 | EXISTING PLUS PROJECT DAILY VOLUMES | Fehr & Peers Associates, Inc. Transportation Consultants |
|---|---|---|

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**EXISTING PLUS PROJECT GEOMETRICS AND PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 7**

EP-5: Implementation of the project would result in a daily volume of 18,500 VPD on SR 16 between Bradshaw Road and South Watt Avenue. Although this volume exceeds the urban roadway capacity of 18,000 VPD by only 500 vehicles, operations on this segment would be deficient under existing plus project conditions.

EP-6: Implementation of the project would add approximately 1,300 VPD to Elder Creek Road between South Watt Avenue and Excelsior Road. The addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

EP-7: Implementation of the project would add approximately 600 to 1,900 VPD to Excelsior Road between Jackson Road (SR 16) and Calvine Road. Except in the vicinity of Birch Ranch Road, the addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

EP-8: Implementation of the project would add approximately 4,400 to 7,600 VPD to Florin Road between Bradshaw Road and Excelsior Road. The addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

EP-9: Implementation of the project would add approximately 1,900 to 3,800 VPD to Gerber Road between Bradshaw Road and Excelsior Road. The addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

EP-10: Implementation of the project would add approximately 1,300 VPD to Vineyard Road between Gerber Road and Calvine Road. Except in the vicinity of the residential subdivision immediately north of Calvine Road, the addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

EP-11: Implementation of the project would add approximately 600 to 1,900 VPD to Calvine Road between Elk Grove-Florin Road and Excelsior Road. Except in the vicinity of residential subdivisions near Waterman Road and Vineyard Road, the addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

Study Intersections

Existing plus project traffic volumes shown on Figure 7 were used to calculate peak hour levels of service at the study intersections. Intersection LOS at each location is presented in Table 6. The corresponding calculation worksheets are included in Appendix C.

As shown on Figures 6 and 7, a new four-lane, north-south arterial will be constructed between Gerber and Florin Roads. The alignment for this roadway will be located approximately halfway between Elk Grove-Florin Road and Bradshaw Road and will ultimately be connected to the planned extension of Waterman Road from Vintage Park Drive north to Gerber Road. The proposed roadway will include a new at-grade crossing of the Central California Traction Railroad and will require the alignment to curve such that the roadway crosses the railroad tracks at nearly a perpendicular angle.

In addition, Vineyard Road will be extended from its current terminus at Gerber Road to Florin Road. The Vineyard Road extension will be constructed to accommodate four travel lanes according to the Sacramento County General Plan Transportation Map. All of the new intersections are included in Table 6.

**Table 6**
**Existing Plus Project Intersection Levels of Service**

| Intersection | Traffic Control | Existing AM (PM) V/C Ratio, Delay or RC[1] | Existing AM (PM) LOS[2] | Existing Plus Project AM (PM) V/C Ratio, Delay or RC | Existing Plus Project AM (PM) LOS |
|---|---|---|---|---|---|
| S. Watt Avenue/Jackson Road | Signal | 1.04 (1.12) | F (F) | 1.46 (1.91) | F (F) |
| Bradshaw Road/Jackson Road | Signal | 1.13 (0.99) | F (E) | 1.34 (1.46) | F (F) |
| Bradshaw Road/Elder Creek Road | Signal | 0.77 (0.76) | C (C) | 1.25 (1.48) | F (F) |
| Bradshaw Road/Florin Road | Signal | 0.89 (0.82) | D (D) | 1.61 (2.02) | F (F) |
| Elk Grove-Florin Road/Gerber Road | Signal | 1.05 (1.30) | F (F) | 1.36 (1.58) | F (F) |
| Bradshaw Road/Gerber Road | Signal | 0.82 (0.66) | D (B) | 1.26 (1.37) | F (F) |
| Elk Grove-Florin Road/Calvine Road | Signal | 0.52 (0.60) | A (A) | 0.64 (0.73) | B (C) |
| Florin Road/Waterman Road | Signal | N/A | N/A | 0.75 (0.92) | C (E) |
| Gerber Road/Waterman Road | Signal | N/A | N/A | 0.66 (0.86) | B (D) |
| Excelsior Road/Jackson Road | Two-way Stop | 239 (378) | C (B) | 117 (158) | D (D) |
| Excelsior Road/Elder Creek Road | Two-way Stop | 709 (616) | A (A) | 628 (467) | A (A) |
| Vineyard Road/Gerber Road | Two-way Stop | 567 (596) | A (A) | 501 (406) | A (A) |
| Vineyard Road/Florin Road | Two-way Stop | N/A | N/A | 209 (215) | C (C) |
| Excelsior Road/Gerber Road | Two-way Stop | 432 (547) | A (A) | 329 (397) | B (B) |
| Waterman Road/Calvine Road | Two-way Stop | 489 (677) | A (A) | 671 (737) | A (A) |
| Vineyard Road/Calvine Road | Two-way Stop | 881 (767) | A (A) | 658 (605) | A (A) |
| S. Watt Avenue/Elder Creek Road | All-way Stop | 15.0 s (37.0 s) | C (E) | See Note 3 | F (F) |
| Excelsior Road/Florin Road | All-way Stop | 6.0 s (3.0 s) | B (A) | 9.0 s (7.0 s) | B (B) |
| Elk Grove-Florin Road/Florin Road | All-way Stop | 36.0 s (66.0 s) | E (F) | See Note 3 | F (F) |
| Bradshaw Road/Calvine Road | All-way Stop | 15.0 s (14.0 s) | C (C) | 27.0 s (45.0 s) | D (E) |
| Excelsior Road/Calvine Road | All-way Stop | 4.0 s (3.0 s) | A (A) | 5.0 s (3.0 s) | A (A) |

Notes: 1 V/C Ratio = Volume-to-Capacity Ratio (0.00 applies to signalized control); Delay = Average Total Delay (0.0 seconds applies to all-way stop control); and RC= Reserve Capacity (000 vehicles applies to two-way stop control).
2 LOS = Level of Service.
3 Intersection is substantially over capacity and delay calculation is meaningless.
N/A = Not applicable.

Twelve of the 19 study intersections under existing plus project conditions are projected to operate at LOS E or better. The remaining seven intersections would operate at LOS F or worse under the a.m. and/or p.m. peak hour with the proposed project. All of the unsignalized intersections operating at LOS C or worse were analyzed to determine if traffic signals would be warranted under existing plus project conditions. Based on the Caltrans Peak Hour Signal Warrant criteria, this analysis showed that traffic signals would be warranted at Bradshaw Road and Calvine Road with the addition of project traffic. As presented in Chapter II, signals are already warranted without the project at the South Watt Avenue/Elder Creek Road and Elk Grove-Florin Road/Florin Road intersections and the addition of project traffic would further degrade operations.

Each intersection deficiency under existing plus project conditions is identified in detail below.

<u>EP-12:</u> Implementation of the project would cause the intersection of South Watt Avenue at Jackson Road (SR 16) to operate at LOS F during both the a.m. and p.m. peak hour.

<u>EP-13:</u> Implementation of the project would exacerbate LOS F conditions at the Bradshaw Road/Jackson Road intersection during the a.m. peak hour and would worsen conditions from LOS E to F in the p.m. peak hour.

<u>EP-14:</u> Implementation of the project would cause the intersection of Bradshaw Road at Elder Creek Road to operate at LOS F during both the a.m. and p.m. peak hour.

<u>EP-15:</u> Implementation of the project would cause operating conditions at the Bradshaw Road/Florin Road intersection to worsen from LOS D to F during both the a.m. and p.m. peak hours.

<u>EP-16:</u> Implementation of the project would exacerbate LOS F operating conditions at the Elk Grove-Florin Road/Gerber Road intersection during the a.m. and p.m. peak hours.

<u>EP-17:</u> Implementation of the project would exacerbate LOS F operating conditions at the Bradshaw Road/Gerber Road intersection during the a.m. and p.m. peak hours.

<u>EP-18:</u> Implementation of the project would result in LOS F operations at the South Watt Avenue/Elder Creek Road intersection during the a.m. and p.m. peak hours.

<u>EP-19:</u> Implementation of the project would worsen operating conditions at the Elk Grove-Florin Road/Florin Road intersection from LOS E to F in the a.m. peak hour and would exacerbate LOS F operations in the p.m. peak hour.

## TRANSIT SYSTEM OPERATIONS

Transit system operations under existing plus project conditions were analyzed by considering the potential effects of the project on existing or planned transit services and facilities. As discussed in Chapter II, there is currently no transit service in the vicinity of the project site.

Planned facilities are developed by Sacramento Regional Transit (RT), which maintains a 20-year master plan of transit facilities for the Sacramento region. This plan (last updated in April 1992), along with the County's General Plan, shows that feeder bus service (i.e., a major transit corridor) is planned for the entire length of Elk Grove-Florin Road, Bradshaw Road, and Calvine Road within the study area. Feeder service is also planned for Florin Road from west of Elk Grove-Florin Road to the planned Vineyard Road extension. Planned corridors are shown on Figure 8.

Besides providing area-wide bus service, these corridors are intended to support "trunk" transit service along the Central California Traction Railroad alignment. This corridor is currently planned for a future light rail extension, which would include stations at or near crossings of all major arterial streets; however, an interim facility on this alignment may include a high occupancy vehicle (HOV) thoroughfare for buses according to RT planning staff. RT staff recommended that bus stop locations should not be identified as part of the transportation analysis. Future planning studies will be conducted to determine transit routes and schedules.

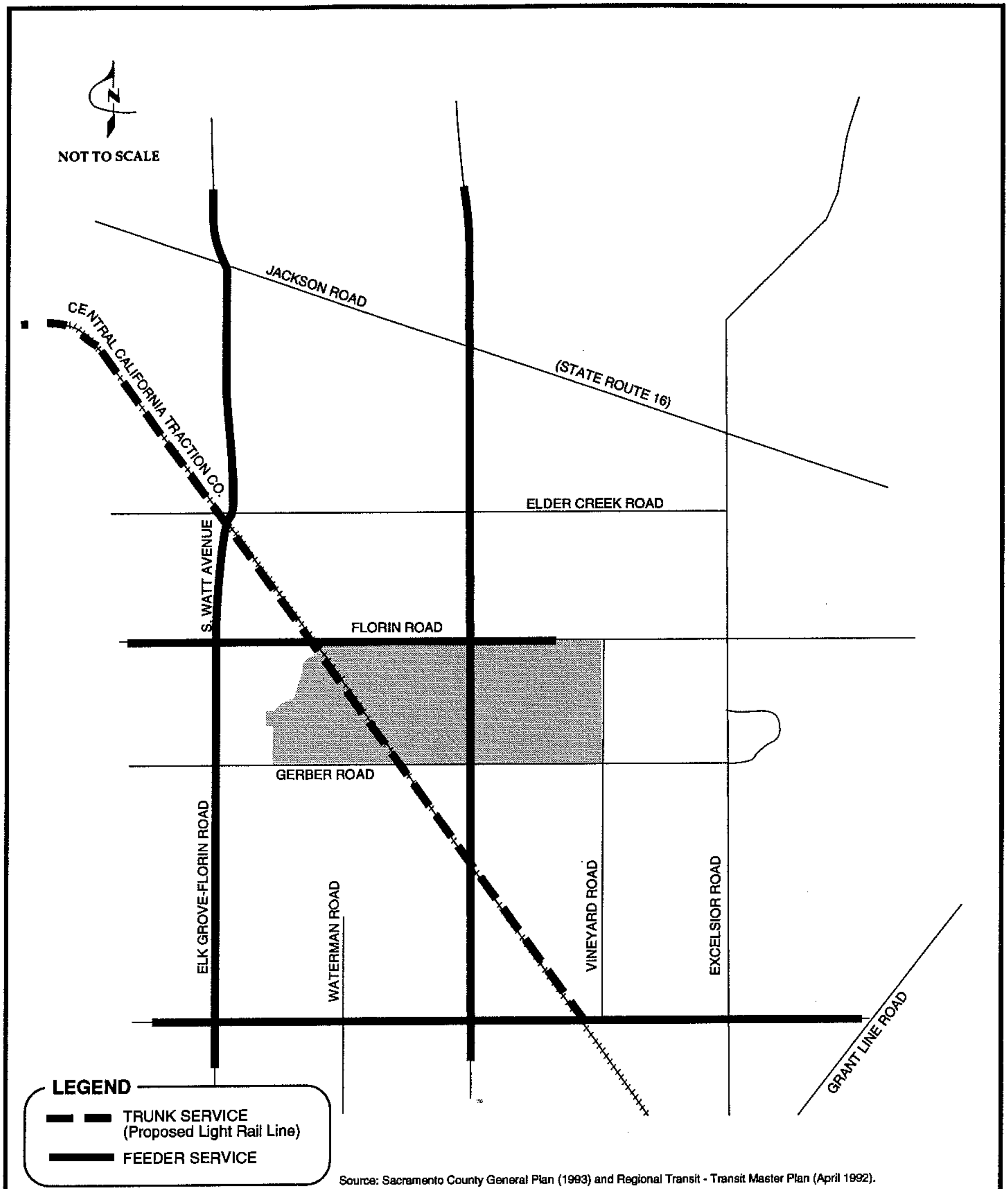
The transit facilities included as part of the NVSSP are designed to coordinate with and maximize the potential of those transit corridors identified by RT and Sacramento County. RT guidelines recommend bus stops at one-quarter mile intervals in suburban settings, and they recommend turnouts when traffic volumes, speeds, and service frequency warrant safe stopping areas for buses. Both RT guidelines and County standards recommend locating bus stops on the far side of intersections.

Roadways within the specific plan area will be designed to accommodate transit facilities such as turnouts, bus stops, and shelters should individual routes be designated on major collector streets. Thus, implementation of the proposed project will not disrupt or interfere with existing or planned transit operations in the area and no operational deficiencies were identified.

## BICYCLE AND PEDESTRIAN SYSTEM OPERATIONS

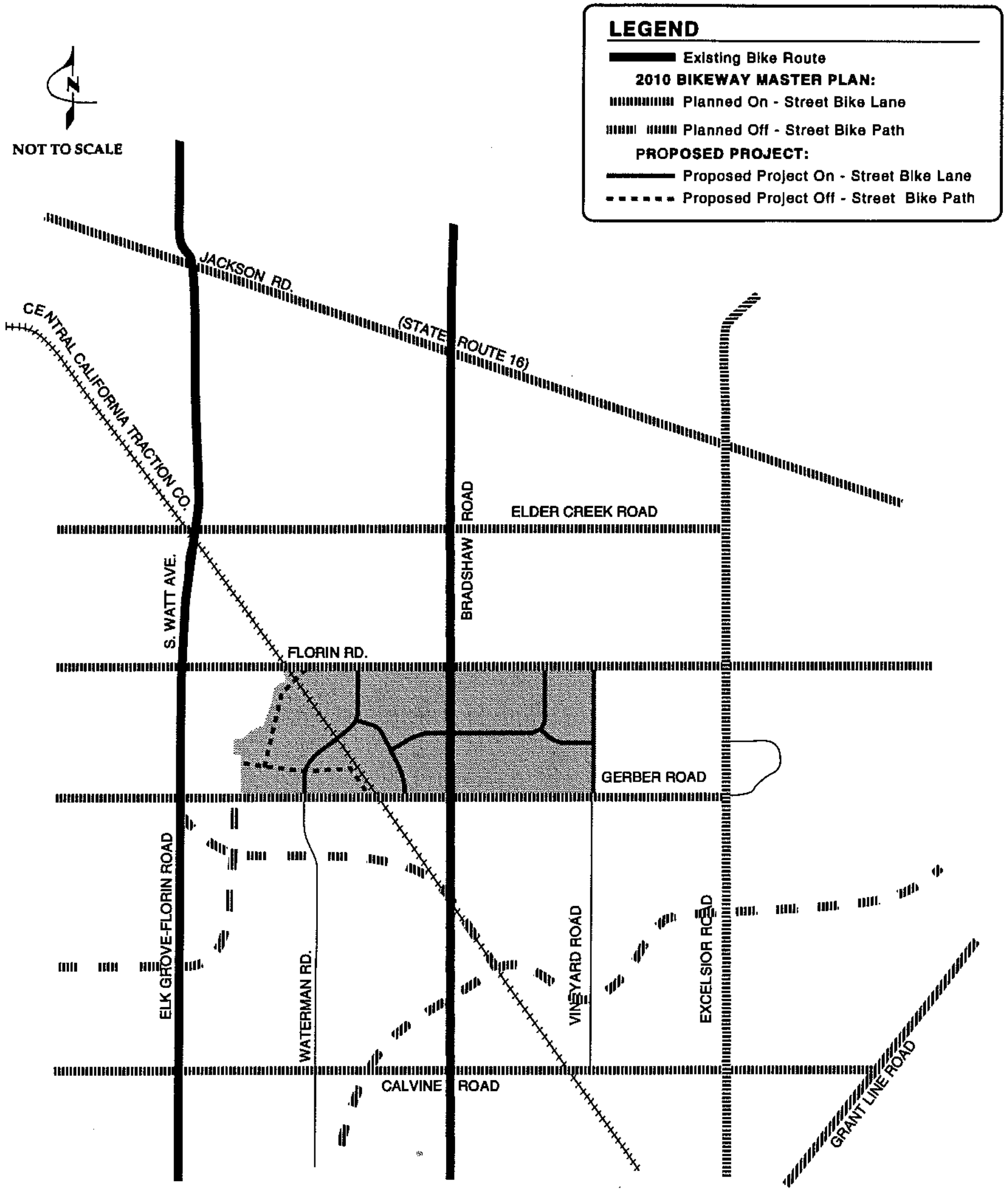
The *Draft Environmental Impact Report for the 2010 Sacramento City/County Bikeway Master Plan* (September 1992) identifies planned bicycle facilities within the study area. To maintain consistency with this document and to provide a substantive network of bikeways for alternative transportation, the circulation plan for the NVSSP proposes on-street bike lanes for all streets bordering the plan area, as well as on the major arterial and collector street segments within the project. In addition, sidewalks will be constructed on all streets within the plan area and on the roadways bordering the project site. Several off-street bicycle/pedestrian trails will be constructed within the specific plan area to encourage alternative modes of travel and to improve internal circulation. These facilities would enhance the existing bicycle and pedestrian systems and result in a beneficial impact to the study area. Planned bikeways and pedestrian paths identified in the *2010 Bikeway Master Plan* and those proposed as part of the NVSSP are illustrated on Figure 9.

Similar to the transit system, the project does not directly disrupt, interfere or conflict with existing or planned bicycle or pedestrian facilities; consequently, no operational deficiencies were identified.




Source: Sacramento County General Plan (1993) and Regional Transit - Transit Master Plan (April 1992).

| FIGURE 8 | FUTURE TRANSIT SERVICE | Fehr & Peers Associates, Inc. Transportation Consultants |
| --- | --- | --- |




Source: 2010 Sacramento City/County Bikeway Master Plan DEIR (September 1992) and Circulation Exhibit for North Vineyard Station Specific Plan (Reiners, Inc., January 1996).

**FIGURE 9** | **FUTURE BICYCLE FACILITIES** | Fehr & Peers Associates, Inc. Transportation Consultants

## PROPOSED IMPROVEMENTS

The following improvements are proposed to enhance operating conditions or to eliminate the projected deficiencies identified above. Each improvement is listed according to its reference number.

Improvement EP-1: Widen the section of Elk Grove-Florin Road/South Watt Avenue from Gerber Road to SR 16 from two to four lanes. Based on Sacramento County guidelines, this improvement would provide sufficient capacity to accommodate the projected daily volume. This improvement should be constructed when the daily volume on this segment reaches 16,200 VPD (90 percent of urban arterial capacity).

Improvement EP-2: Widen the section of Bradshaw Road from Gerber Road to SR 16 from two to four lanes. Based on Sacramento County guidelines, this improvement would provide sufficient capacity to accommodate the projected daily volume. This improvement is part of a funded project that will be constructed by year 2001 according to Sacramento County's *1996 Transportation Improvement Plan*.

Improvement EP-3: Widen the section of Florin Road from South Watt Avenue to Bradshaw Road from two to four lanes. Based on Sacramento County guidelines, this improvement would provide sufficient capacity to accommodate the projected daily volume. This improvement should be constructed when the daily volume on this segment reaches 16,200 VPD (90 percent of urban arterial capacity).

Improvement EP-4: Widen the section of Gerber Road from Elk Grove-Florin Road to Bradshaw Road from two to four lanes. Based on Sacramento County guidelines, this improvement would provide enough capacity to accommodate the projected daily volume. This improvement should be constructed when the volume on this segment reaches 16,200 VPD (90 percent of urban arterial capacity).

Improvement EP-5: Widen the section of SR 16 from South Watt Avenue to Bradshaw Road from two to four lanes. Based on Sacramento County guidelines, this improvement would provide sufficient capacity to accommodate the projected daily volume. This improvement should be constructed when the daily volume on this segment reaches 16,200 VPD or 90 percent of urban arterial capacity.

Improvement EP-6: Widen Elder Creek Road between South Watt Avenue and Excelsior Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. This improvement will eliminate the existing physical deficiency and the deficiency with the project.

Improvement EP-7: Widen Excelsior Road between Jackson Road and Calvine Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. This improvement will eliminate the existing physical deficiency and the deficiency with the project.

Improvement EP-8: Widen Florin Road between Bradshaw Road and Excelsior Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. This improvement will eliminate the existing physical deficiency and the deficiency with the project.

Improvement EP-9: Widen Gerber Road Bradshaw Road and Excelsior Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. This improvement will eliminate the existing physical deficiency and the deficiency with the project.

Improvement EP-10: Widen Vineyard Road between Gerber Road and Calvine Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. This improvement will eliminate the existing physical deficiency and the deficiency with the project. Widening of this roadway is anticipated as part of frontage improvements in the Vineyard Springs Comprehensive Planning Area.

Improvement EP-11: Widen Calvine Road between approximately 1,300 feet east of Waterman Road to Excelsior Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. The section of Calvine Road from Elk Grove-Florin Road to approximately 1,300 feet east of Waterman Road will be widened from two to four lanes as part of a funded project included in Sacramento County's *1996 Transportation Improvement Plan*. This improvement will eliminate the existing physical deficiency and the deficiency with the project.

Improvement EP-12: Modify the intersection of South Watt Avenue at Jackson Road to include a separate left turn lane, two through lanes, and a separate right turn lane on all approaches. These measures would improve operations at this intersection to LOS D and LOS E in the a.m. and p.m. peak hours, respectively. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

Improvement EP-13: Modify the Bradshaw Road/Jackson Road intersection to include the following lane configurations:

- Dual left turn lanes, two through lanes, and a separate right turn lane on the northbound and southbound approaches; and

- One left turn lane, one through lane, and a separate right-turn lane on the eastbound and westbound approaches.

The provision of northbound and southbound dual left turn lanes will require widening of the eastbound and westbound departure legs on Jackson Road to two lanes before merging to a single travel lane. The length and merging distance for these lanes will be approved by Caltrans since Jackson Road is a state highway.

These improvements would improve operations at this intersection to LOS E in the a.m. and p.m. peak hours. According to Sacramento County's *1996 Transportation Improvement Plan*, two northbound through lanes and one southbound through lane will be constructed by 1997. The remaining improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

Improvement EP-14: Modify the Bradshaw Road/Elder Creek Road intersection to include the following lane configurations:

- One left turn lane, two through lanes, and a separate right turn lane on the southbound approach;

- One left turn lane, one through lane, and a shared through/right-turn lane on the northbound approach;

- One left turn lane and one shared through/right-turn lane on the eastbound approach; and

- One shared left-turn/through lane and one separate right turn lane on the westbound approach.

These improvements would improve operations at this intersection to LOS C and LOS D in the a.m. and p.m. peak hours, respectively. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

Improvement EP-15: Modify the Bradshaw Road/Florin Road intersection to include the following lane configurations:

- Dual left turn lanes, two through lanes, and a separate right turn lane on the northbound and southbound approaches; and

The provision of southbound dual left turn lanes will require widening of the eastbound departure legs on Florin Road to two lanes before merging to a single travel lane. The length and merging distance for these lanes will be approved by Sacramento County Transportation Division staff. The westbound departure leg will be widened as part of Improvement EP-3.

These improvements would improve operations at this intersection to LOS C and LOS E in the a.m. and p.m. peak hours, respectively. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

Improvement EP-16: Modify the Elk Grove-Florin Road/Gerber Road intersection to include the following lane configurations:

- Dual left turn lanes, two through lanes, and a separate right turn lane on the northbound and southbound approaches;
- One left turn lane, one through lane, and a separate right-turn lane on the eastbound approach; and
- One left turn lane, one through lane, and a shared through/right-turn lane on the westbound approach.

The provision of northbound dual left turn lanes will require widening of the westbound departure leg on Gerber Road to two lanes before merging to a single travel lane in each direction. The length and merging distance for these lanes will be approved by Sacramento County Transportation Division staff.

These improvements would improve operations at this intersection to LOS D and LOS E in the a.m. and p.m. peak hours, respectively. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

Improvement EP-17: Modify the Bradshaw Road/Gerber Road intersection to include the following lane configurations:

- Dual left-turn lanes, ~~two~~ **one** through lane~~s~~, and a separate right-turn lane on the eastbound and westbound approaches; and
- One left-turn lane, two through lanes, and a separate right-turn lane on the northbound and southbound approaches.

The provision of **two** southbound ~~dual left-turn~~ **through** lanes **and dual westbound left-turn lanes** will require widening of the ~~eastbound~~ **southbound** departure leg on ~~Gerber Road~~ **Bradshaw Road** to two lanes before merging to a single travel lane in each direction. The length and merging distance for these lanes shall be approved by Sacramento County Transportation Division staff.

These improvements would improve operations at this intersection to LOS D and LOS C in the a.m. and p.m. peak hours, respectively. Improvements should be implemented when the intersection operates unacceptably based on Sacramento County standards.

Improvement EP-18: Install a signal at the South Watt Avenue/Elder Creek Road intersection and modify the lane configurations to include the following:

- One left turn lane, two through lanes, and a separate right turn lane on the northbound and southbound approaches; and

- One left turn lane and a shared through/right-turn lane on the eastbound and westbound approaches.

These improvements would improve operations at this intersection to LOS B and LOS D in the a.m. and p.m. peak hours, respectively. (It should be noted that a signal is warranted at this location under existing conditions without the NVSSP). Improvements should be implemented with construction of the project.

Improvement EP-19: Install a signal at the Elk Grove-Florin Road/Florin Road intersection and modify the lane configurations to include:

- Dual left-turn lanes, two through lanes, and a separate right turn lane on the northbound and southbound approaches; and

- One left-turn lane, two through lanes, and a separate right-turn lane on the eastbound and westbound approaches.

These improvements would improve operations at this intersection to LOS B and LOS D in the a.m. and p.m. peak hours, respectively. (It should be noted that a signal is warranted at this location under existing conditions without the NVSSP). The traffic signal is a funded project that will be constructed by 1998 according to Sacramento County's *1996 Transportation Improvement Plan.*

## OPERATIONS WITH PROPOSED IMPROVEMENTS

Following implementation of the proposed improvements, the associated operational deficiencies would be eliminated. Table 7 shows the LOS at the study intersections after implementation of the proposed improvements.

**Table 7**
**Existing Plus Project Intersection Levels of Service with Improvements**

| Intersection | Traffic Control | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| | | V/C Ratio, Delay or RC[1] | LOS[2] | V/C Ratio, Delay or RC | LOS |
| S. Watt Avenue/Jackson Road | Signal | 0.82 | D | 0.94 | E |
| Bradshaw Road/Jackson Road | Signal | 0.90 | E | 0.91 | E |
| Bradshaw Road/Elder Creek Road | Signal | 0.71 | C | 0.89 | D |
| Bradshaw Road/Florin Road | Signal | 0.78 | C | 0.99 | E |
| Elk Grove-Florin Road/Gerber Road | Signal | 0.85 | D | 1.00 | E |
| Bradshaw Road/Gerber Road | Signal | 0.85 | D | 0.72 | C |
| Elk Grove-Florin Road/Calvine Road | Signal | 0.64 | B | 0.73 | C |
| Florin Road/Waterman Road | Signal | 0.75 | C | 0.92 | E |
| Gerber Road/Waterman Road | Signal | 0.66 | B | 0.86 | D |
| Excelsior Road/Jackson Road | Two-way Stop | 117 | D | 158 | D |
| Excelsior Road/Elder Creek Road | Two-way Stop | 628 | A | 467 | A |
| Vineyard Road/Gerber Road | Two-way Stop | 501 | A | 406 | A |
| Vineyard Road/Florin Road | Two-way Stop | 209 | C | 215 | C |
| Excelsior Road/Gerber Road | Two-way Stop | 329 | B | 397 | B |
| Waterman Road/Calvine Road | Two-way Stop | 671 | A | 737 | A |
| Vineyard Road/Calvine Road | Two-way Stop | 658 | A | 605 | A |
| S. Watt Avenue/Elder Creek Road | Signal | 0.62 | B | 0.84 | D |
| Excelsior Road/Florin Road | All-way Stop | 9.0 s | B | 7.0 s | B |
| Elk Grove-Florin Road/Florin Road | Signal | 0.67 | B | 0.89 | D |
| Bradshaw Road/Calvine Road | All-way Stop | 27.0 s | D | 45.0 s | E |
| Excelsior Road/Calvine Road | All-way Stop | 5.0 s | A | 3.0 s | A |

Notes: 1 V/C Ratio = Volume-to-Capacity Ratio (0.00 applies to signalized control); Delay = Average Total Delay (0.0 seconds applies to all-way stop control); and RC= Reserve Capacity (000 vehicles applies to two-way stop control).
2 LOS = Level of Service.
3 Intersection is substantially over capacity and delay calculation is meaningless.
N/A = Not applicable

# IV. CUMULATIVE OPERATING CONDITIONS

The purpose of the cumulative analysis is to determine if implementation of the proposed project, in addition to planned cumulative growth, will adversely affect the planned transportation system.

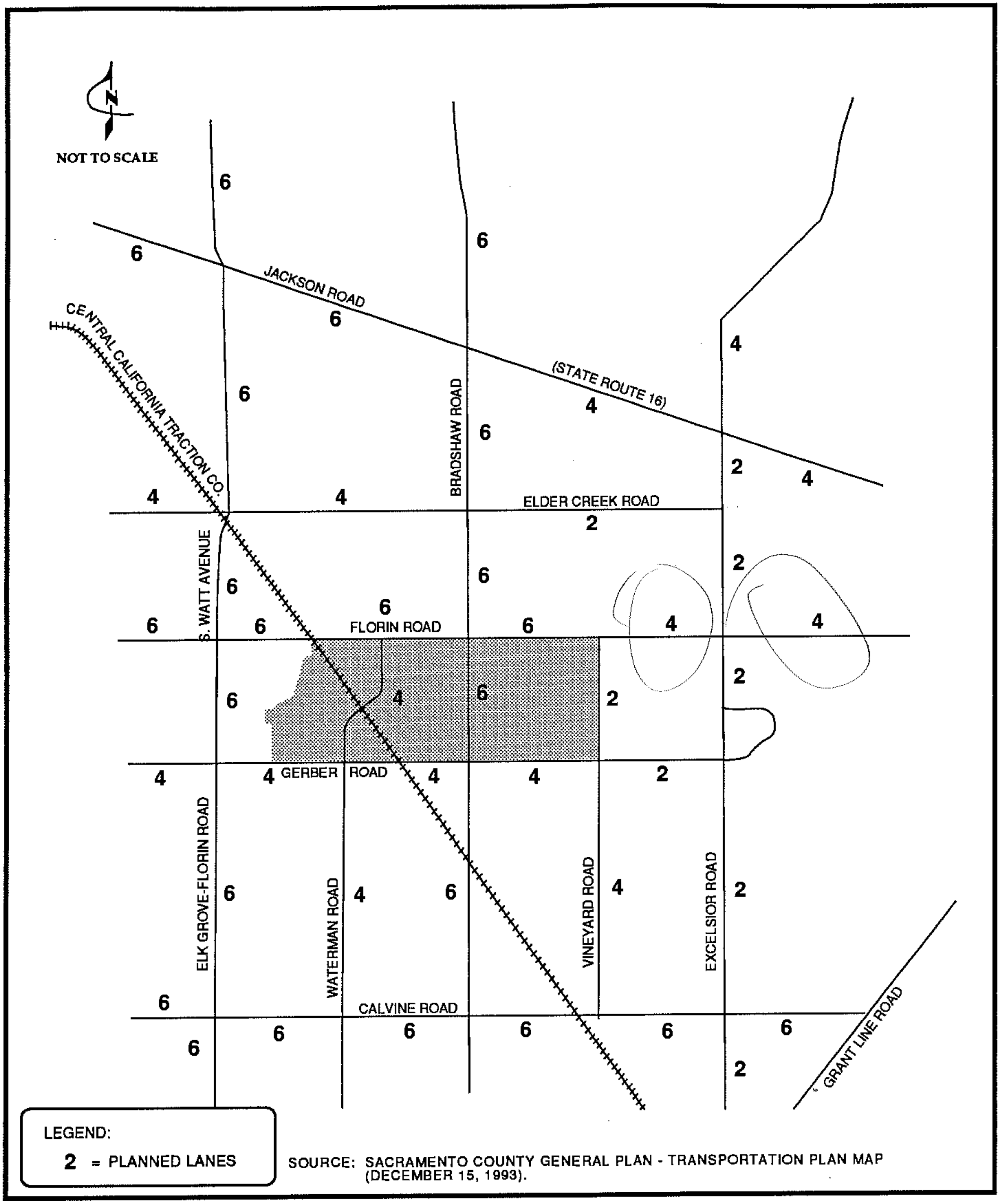
## PLANNED TRANSPORTATION IMPROVEMENTS

### Roadway Improvements

The cumulative analysis determines if planned roadway improvements in the study area are sufficient to accommodate anticipated traffic growth. The planned roadway improvements in the vicinity of the project site were obtained from the Sacramento County General Plan Transportation Map (December 15, 1993) and are listed below.

- Jackson Road/State Route (SR) 16 will be widened to six lanes from west of South Watt Avenue to Bradshaw Road. From Bradshaw Road to east of Excelsior Road, SR 16 is planned to be four lanes.
- Elk Grove-Florin Road/South Watt Avenue will be widened to six lanes from south of Calvine Road to north of Jackson Road/SR 16.
- Bradshaw Road will be widened to six lanes from Calvine Road to north of Jackson Road/SR 16. South of Calvine Road, Bradshaw Road will be a four-lane facility.
- Vineyard Road will be widened to four lanes from Calvine Road to Gerber Road. Vineyard Road will be extended to Florin Road as a four-lane facility.
- Florin Road will be widened to six lanes from west of Elk Grove-Florin Road/South Watt Avenue to the planned Vineyard Road extension. From the Vineyard Road extension to east of Excelsior Road, Florin Road will be widened to four lanes.
- Gerber Road will be widened to four lanes from west of Elk Grove-Florin Road to the planned Vineyard Road extension. From the Vineyard Road extension to east of Excelsior Road, Gerber Road will include two travel lanes. This two lane section is planned to be widened to four lanes after 2010.
- Calvine Road will be widened to six lanes from west of Elk Grove-Florin Road to Grant Line Road.
- Elder Creek Road will be widened to four lanes from west of South Watt Avenue to Bradshaw Road. East of Bradshaw Road, Elder Creek Road will continue to function as a two-lane roadway.

Figure 10 illustrates the planned number of lanes on each roadway segment under cumulative conditions. All of the study intersections are assumed to be signalized under this scenario.




SOURCE: SACRAMENTO COUNTY GENERAL PLAN - TRANSPORTATION PLAN MAP (DECEMBER 15, 1993).

| FIGURE 10 | PLANNED CUMULATIVE ROADWAY NETWORK | Fehr & Peers Associates, Inc. Transportation Consultants |
| --- | --- | --- |

Funding for most of the improvements listed above will ultimately be provided by a financing plan for the study area, other developer fees, and public sources. Public funds will be necessary for a fair share contribution to improvements that eliminate existing deficiencies.

Other Improvements

- Transit facilities will be integrated as part of the NVSSP project. The study area is expected to be served by Sacramento Regional Transit (RT) and planned facilities will include bus stops, bus shelters, and turnouts. A multimodal transfer facility and park and ride lot is planned within the project site to accommodate light rail service if it is constructed within the Central California Traction Railroad (CCTR) right-of-way.
- The NVSSP area will include various on-street bike lanes and off-street bike paths and pedestrian trails. These facilities will complement the continuous system of on-street bike lanes planned for the study area roadways shown on Figure 6. In addition, off-street pedestrian and bicycle trails will be constructed along Elder Creek and Gerber Creek west of the CCTR tracks. All bicycle and pedestrian facilities will interconnect parks, residential areas, and commercial developments.

## ROADWAY SYSTEM OPERATIONS

Cumulative No Project Volumes

The Sacramento County General Plan traffic model was used to generate background intersection traffic forecasts without the NVSSP. Forecasts were prepared using the latest version of the General Plan model, which was recently updated for the East Elk Grove Specific Plan study. Based on additional review of the traffic model, the County requested that certain areas in the immediate vicinity of the NVSSP area be updated to better reflect more recent and detailed land use data. This information was provided by the Sacramento County Planning Department for the Vineyard Springs Comprehensive Planning Area to the southeast (between Gerber Road, Calvine Road, Bradshaw Road, and Excelsior Road) and for the Florin Station Comprehensive Planning Area to the west (between Florin Road, Gerber Road, Gardner Avenue, and Elder Creek). Inclusion of this land use was necessary to better reflect potential development and to improve master planning of the ultimate roadway system. In addition, land use updates were incorporated in the traffic model for the eastern part of Sacramento County near the El Dorado County line, as well as for the Mather Field Reuse Area and Zinfandel Villages projects north of the project site.

The County's traffic model was originally developed and calibrated based on daily conditions only. However, Transportation Division staff requested that peak hour turning movement forecasts be prepared to determine if any non-standard traffic control (e.g., dual right turn lanes, triple left turn lanes) would be required under cumulative conditions. Peak hour forecasts were prepared by factoring daily trip data by trip purpose. This method is consistent with the approach used for other long-range planning studies in the vicinity of the project.

The cumulative no project daily and peak hour traffic volumes are shown on Figures 11 and 12, respectively. The intersection lane configurations shown on Figure 12 are based on Sacramento County design standards for thoroughfares, arterials, and collector streets.

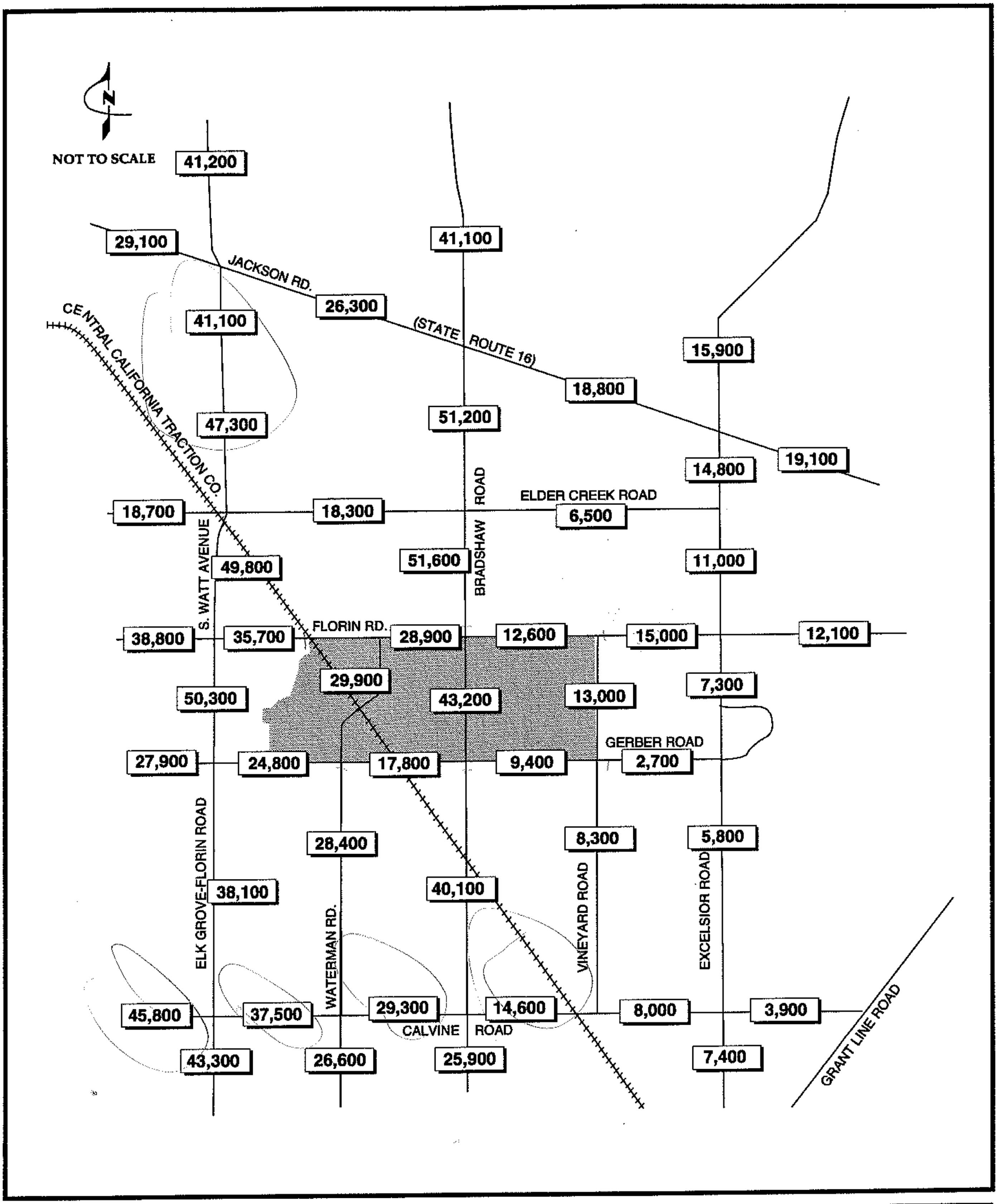



**FIGURE 11**

**CUMULATIVE NO PROJECT DAILY VOLUMES**

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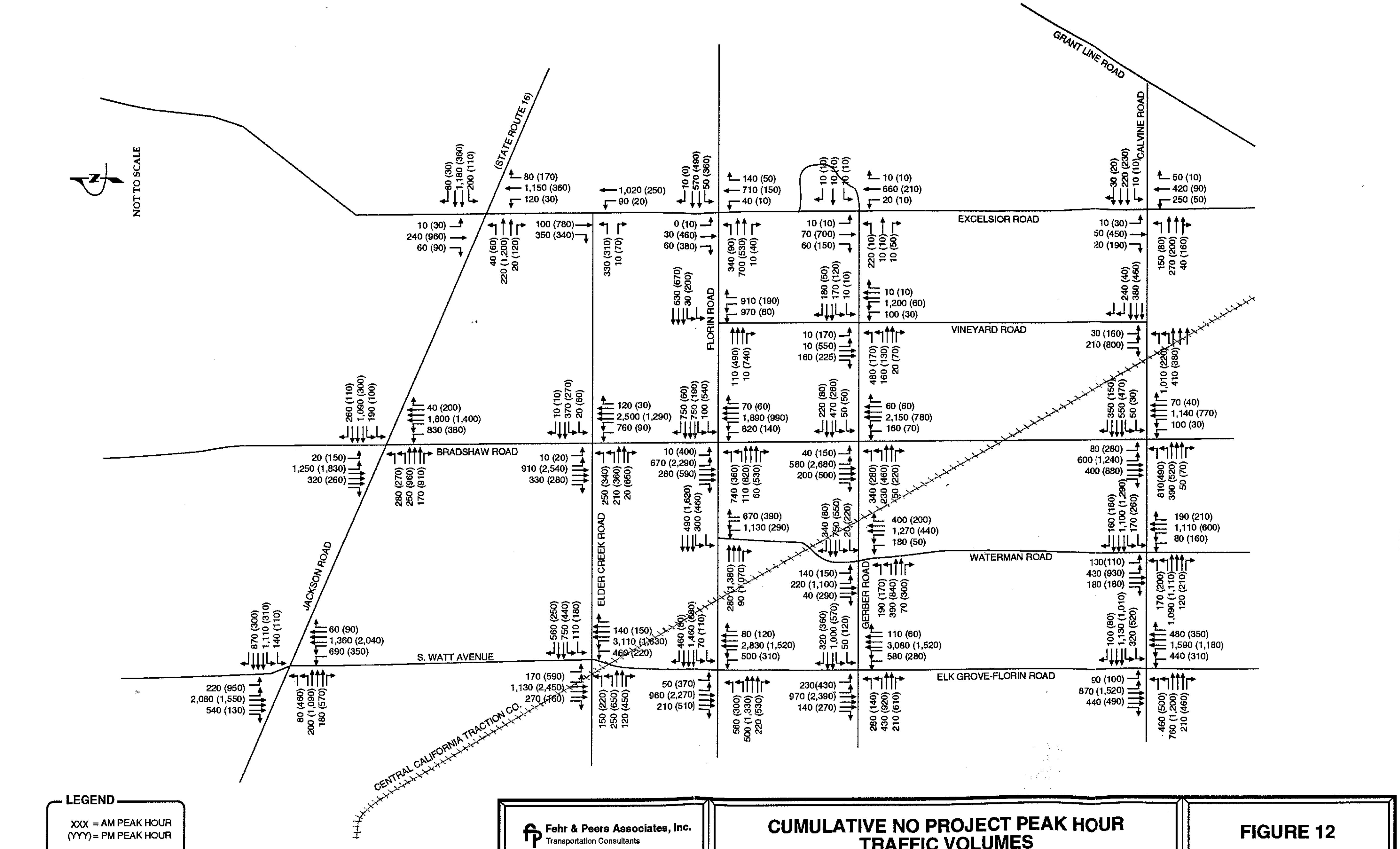
Transportation Consultants

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Transportation Consultants

**CUMULATIVE NO PROJECT PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 12**

Cumulative Plus Project Volumes

Cumulative plus project volumes were developed by adding the proposed land uses to the County's traffic model and preparing a new set of traffic forecasts. The same peak hour factors used to develop the cumulative no project forecasts were applied for this scenario.

At the direction of County Transportation Division staff, the daily and peak hour trips generated by the proposed project were factored to match the trip generation information presented in Tables A-1 through A-3. This process provided a conservative trip generation estimate for purposes of identifying project-related impacts and is more consistent with standard trip rates.

The trip distribution of project-generated trips on the study roadway network was obtained from the traffic model output. This information will be used primarily to identify project impacts for roadway segments. Figure 13 shows the project trip distribution generated by the traffic model.

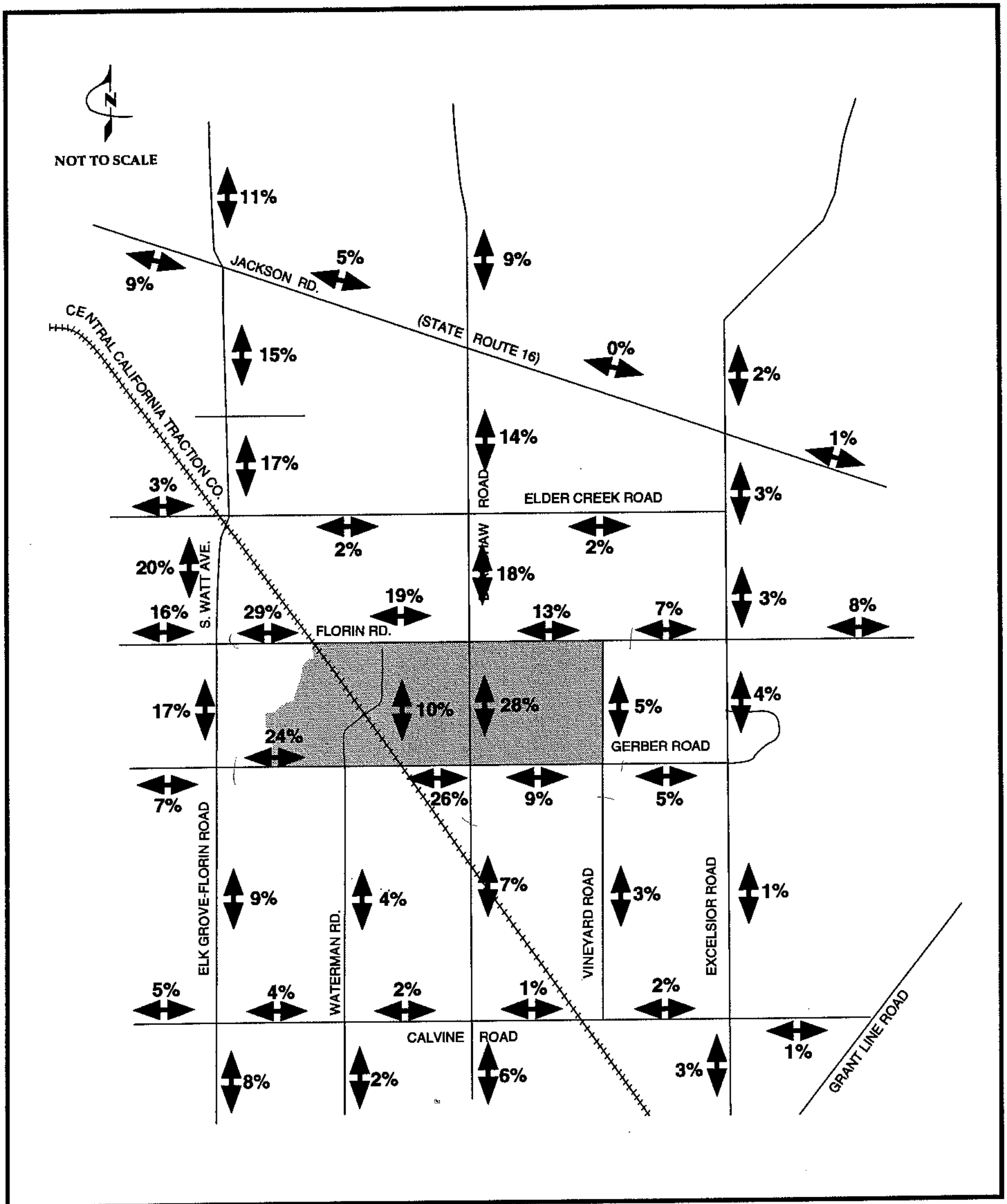
Figures 14 and 15 present the daily and peak hour traffic volumes, respectively, for cumulative conditions with the NVSSP in place. Impacts to each element of the study roadway system are presented below.

Arterial Roadway Segments

Under cumulative no project conditions, none of the study roadway segments is projected to carry volumes beyond the theoretical urban roadway capacities of 18,000 VPD, 36,000 VPD, and 54,000 VPD for two-lane, four-lane, and six-lane facilities, respectively. The highest daily volume without the project is 51,600 VPD, which is projected for the segment of Bradshaw Road between Florin Road and Elder Creek Road. Assuming a maximum threshold of 54,000 VPD according to County guidelines, this section of roadway would operate under capacity.

Figure 14 shows that the proposed project would increase traffic on most roadway segments in the study area. These increases would be caused by: 1) the addition of new trips within the study area, and 2) the displacement of traffic from some segments caused by the addition of new trips. However, only the segment of Bradshaw Road between Florin Road and Elder Creek Road is projected to serve a volume in excess of its theoretical operating capacity under cumulative plus project conditions. This deficiency is described below.

CP-1: The project volume of 58,500 VPD on Bradshaw Road between Florin Road and Elder Creek Road exceeds the theoretical capacity of 54,000 VPD for a six-lane roadway.




| | | |
|---|---|---|
| **FIGURE 13** | **CUMULATIVE PROJECT TRIP DISTRIBUTION** | Fehr & Peers Associates, Inc. Transportation Consultants |

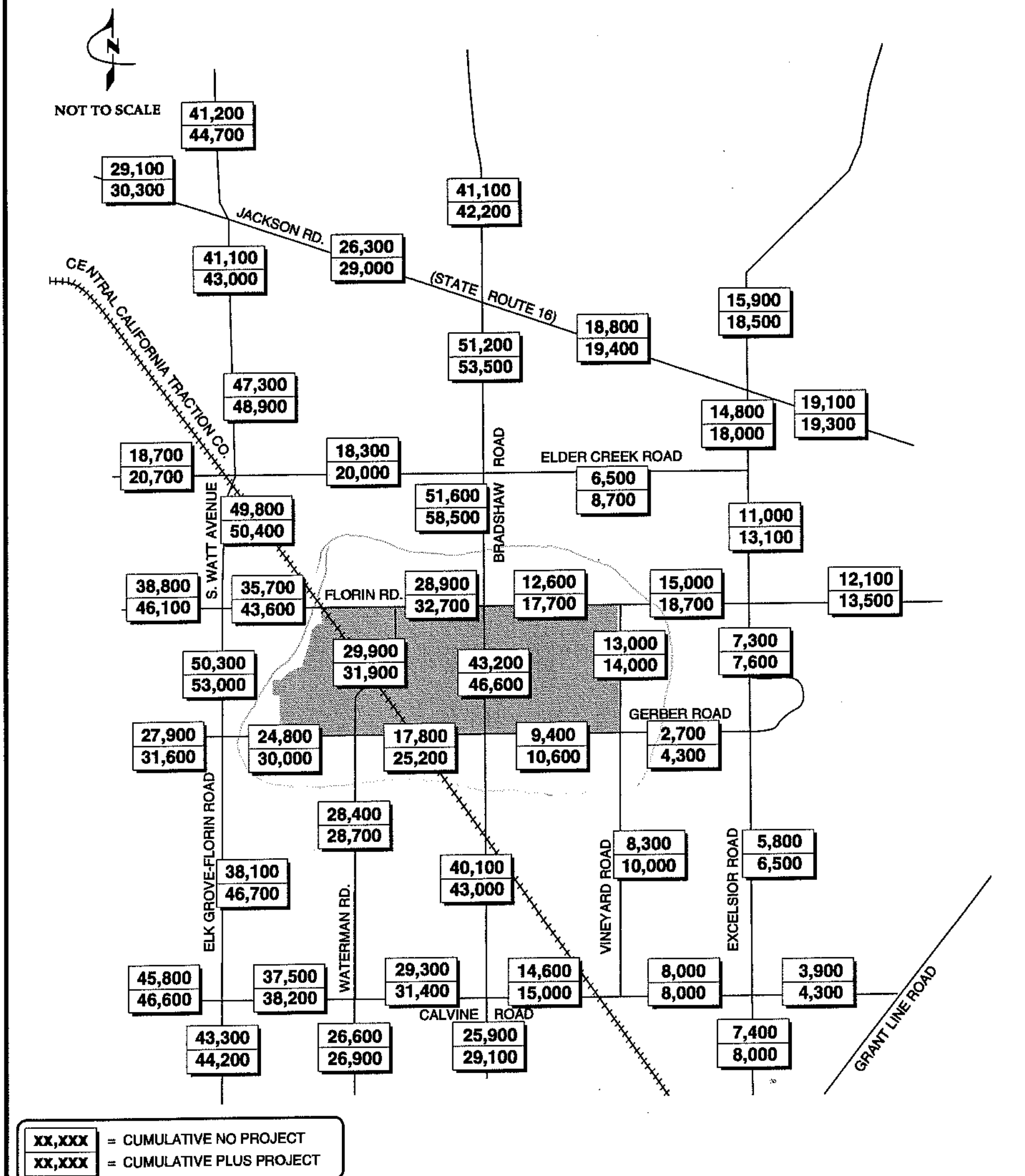



**FIGURE 14**

**CUMULATIVE PLUS PROJECT DAILY VOLUMES**

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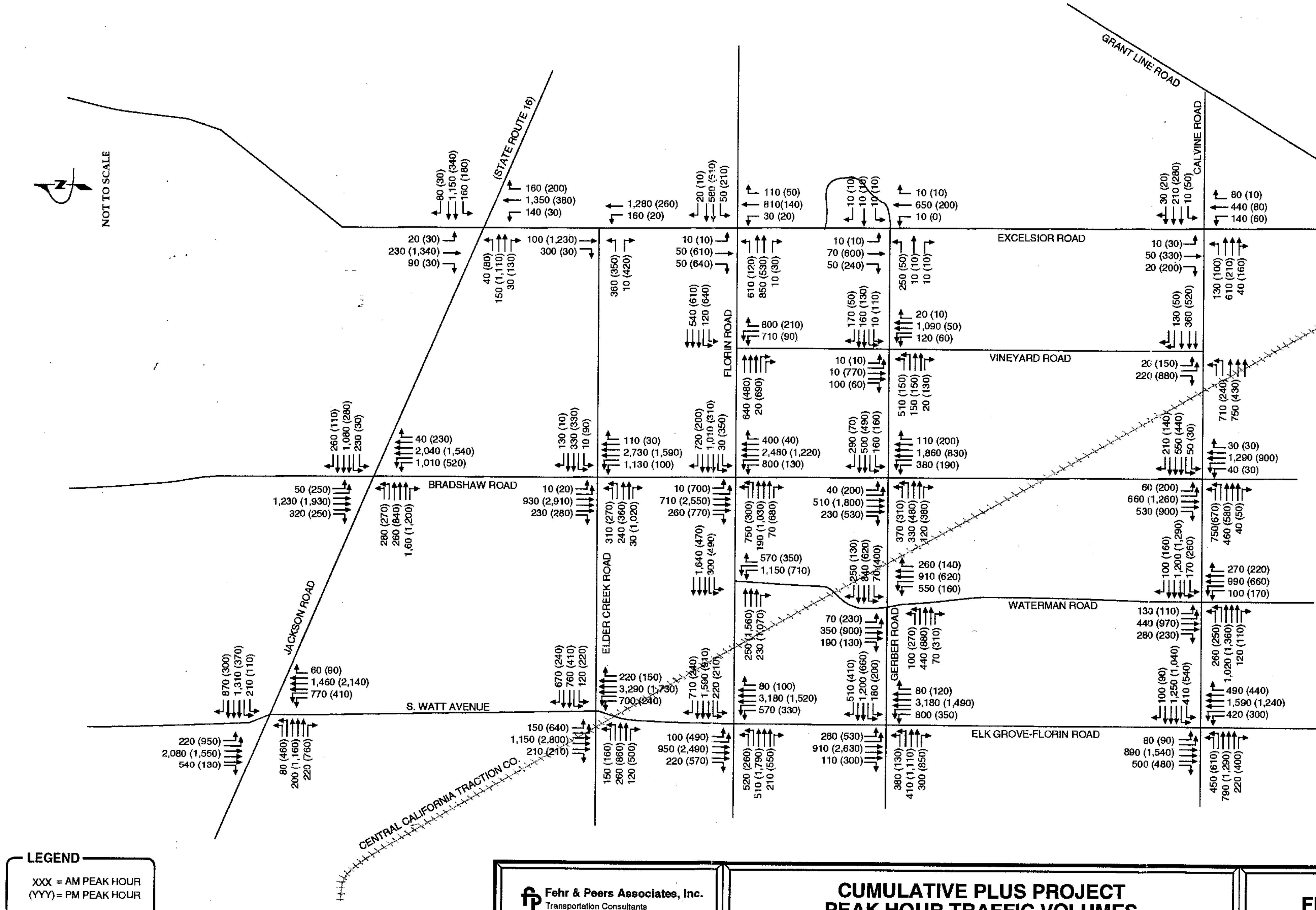
Transportation Consultants

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**CUMULATIVE PLUS PROJECT PEAK HOUR TRAFFIC VOLUMES**

**FIGURE 15**

Physical deficiencies are projected to occur on those segments that are planned to be two-lane facilities and will not be improved through 2010. These deficiencies are presented below.

CP-2: Implementation of the project would add approximately 2,200 VPD to Elder Creek Road between Bradshaw Road and Excelsior Road. The addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

CP-3: Implementation of the project would add approximately 300 to 3,200 VPD to Excelsior Road between Jackson Road (SR 16) and Calvine Road. Except in the vicinity of Birch Ranch Road, the addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

CP-4: Implementation of the project would add approximately 1,600 VPD to Gerber Road between Vineyard Road and Excelsior Road. The addition of this traffic would exacerbate the existing physical deficiency caused by the substandard travel lane and shoulder widths.

Study Intersections

The peak hour volumes presented on Figures 12 and 15 were used to determine the level of service for cumulative no project and cumulative plus project conditions, respectively. The results of the a.m. and p.m. peak hour analysis are shown in Table 8 and the corresponding technical calculations are contained in Appendices D and E.

**Table 8**
**Cumulative Intersection Levels of Service**

| Intersection | Traffic Control | Cumulative No Project AM (PM) | | Cumulative Plus Project AM (PM) | |
|---|---|---|---|---|---|
| | | V/C Ratio[1] | LOS[2] | V/C Ratio | LOS |
| S. Watt Avenue/Jackson Road | Signal | 1.26 (1.21) | F (F) | 1.29 (1.33) | F (F) |
| Bradshaw Road/Jackson Road | Signal | 1.01 (1.10) | F (F) | 1.08 (1.30) | F (F) |
| Jackson Road/Excelsior Road | Signal | 1.30 (1.24) | F (F) | 1.44 (1.53) | F (F) |
| S. Watt Avenue/Elder Creek Road | Signal | 1.17 (0.99) | F (E) | 1.26 (1.18) | F (F) |
| Bradshaw Road/Elder Creek Road | Signal | 0.85 (1.02) | D (F) | 0.92 (1.30) | E (F) |
| Excelsior Road/Elder Creek Road | Signal | 0.95 (0.78) | E (C) | 1.15 (1.12) | F (F) |
| Elk Grove-Florin Road/Florin Road | Signal | 1.28 (1.04) | F (F) | 1.40 (1.25) | F (F) |
| Florin Road/Waterman Road | Signal | 0.62 (0.89) | B (D) | 0.67 (0.99) | B (E) |
| Bradshaw Road/Florin Road | Signal | 1.17 (1.10) | F (F) | 1.27 (1.16) | F (F) |
| Florin Road/Vineyard Road | Signal | 0.59 (0.53) | A (A) | 0.59 (0.69) | A (B) |
| Florin Road/Excelsior Road | Signal | 0.97 (0.80) | E (C) | 1.25 (0.80) | F (C) |
| Elk Grove-Florin Road/Gerber Road | Signal | 1.31 (1.20) | F (F) | 1.47 (1.29) | F (F) |
| Waterman Road/Gerber Road | Signal | 0.87 (0.81) | D (D) | 0.70 (0.87) | B (D) |
| Bradshaw Road/Gerber Road | Signal | 0.84 (0.88) | D (D) | 0.80 (0.82) | C (D) |
| Vineyard Road/Gerber Road | Signal | 0.72 (0.32) | C (A) | 0.69 (0.41) | B (A) |
| Excelsior Road/Gerber Road | Signal | 0.65 (0.55) | B (A) | 0.67 (0.48) | B (A) |
| Elk Grove-Florin Road/Calvine Road | Signal[3] | 0.88 (0.99) | D (E) | 0.91 (1.02) | E (F) |
| Calvine Road/Waterman Road | Signal | 0.79 (0.79) | C (C) | 0.81 (0.85) | D (D) |
| Calvine Road/Bradshaw Road | Signal | 0.81 (0.77) | D (C) | 0.77 (0.85) | C (D) |
| Calvine Road/Vineyard Road | Signal | 0.61 (0.59) | B (A) | 0.47 (0.65) | A (B) |
| Calvine Road/Excelsior Road | Signal | 0.48 (0.49) | A (A) | 0.49 (0.44) | A (A) |

Notes: [1] V/C Ratio = Volume-to-Capacity Ratio.
[2] LOS = Level of Service.
[3] Although an urban interchange was identified at this location as part of the General Plan, intersection LOS was calculated assuming a standard arterial intersection configuration (two left turn lanes, three through lanes and a separate right turn lane on each approach).

Under cumulative conditions without the project, eight of the 21 study intersections are projected to operate at an unacceptable level (LOS F) during one or both peak hours. These locations and the affected peak hour(s) are listed below .

- South Watt Avenue at Jackson Road (a.m. and p.m. peak hour)
- Bradshaw Road/Jackson Road (a.m. and p.m. peak hour)
- Jackson Road/Excelsior Road (a.m. and p.m. peak hour)
- S. Watt Avenue/Elder Creek Road (a.m. peak hour)
- Bradshaw Road/Elder Creek Road (p.m. peak hour)
- Elk Grove-Florin Road/Florin Road (a.m. and p.m. peak hour)
- Bradshaw Road/Florin Road (a.m. and p.m. peak hour)
- Elk Grove-Florin Road/Gerber Road (a.m. and p.m. peak hour)

All other intersections operate at LOS E or better during both peak hours under cumulative conditions without the proposed project.

With the addition of project-generated traffic, three additional study intersections are projected to operate at LOS F during one or both peak hours. These locations include the following.

- Excelsior Road/Elder Creek road (a.m. and p.m. peak hour)
- Florin Road/Excelsior Road (a.m. peak hour)
- Elk Grove-Florin Road/Calvine Road (p.m. peak hour)

Each intersection deficiency under cumulative plus project conditions is detailed below.

CP-5: Implementation of the project would result in LOS F operations in the a.m. peak hour at the South Watt Avenue/Jackson Road intersection; however the volume-to-capacity ratio would be between seven and 15 percent less as compared to operations under cumulative no project conditions.

CP-6: Implementation of the project would exacerbate LOS F operations at the Bradshaw Road/Jackson Road intersection during the a.m. and p.m. peak hour.

CP-7: Implementation of the project would exacerbate LOS F operations at the Jackson Road/Excelsior Road intersection during the a.m. and p.m. peak hour.

CP-8: Implementation of the project would exacerbate LOS F operations at the South Watt Avenue/Elder Creek Road intersection during the a.m. peak hour, and would cause p.m. peak hour operations to deteriorate from LOS E to F.

CP-9: Implementation of the project would exacerbate LOS F operations at the Bradshaw Road/Elder Creek Road intersection during the p.m. peak hour.

CP-10: Implementation of the project would degrade operations at the Excelsior Road/Elder Creek Road intersection from LOS E to F during the a.m. peak hour and from LOS C to F in the p.m. peak hour.

<u>CP-11:</u> Implementation of the project would exacerbate LOS F operations at the Elk Grove-Florin Road/Florin Road intersection during the a.m. and p.m. peak hour.

<u>CP-12:</u> Implementation of the project would exacerbate LOS F operations at the Bradshaw Road/Florin Road intersection during the a.m. and p.m. peak hour.

<u>CP-13:</u> Implementation of the project would degrade operations at the Florin Road/Excelsior Road intersection from LOS E to F in the a.m. peak hour.

<u>CP-14:</u> Implementation of the project would exacerbate LOS F operations at the Elk Grove-Florin Road/Gerber Road intersection during the a.m. and p.m. peak hour.

<u>CP-15:</u> Implementation of the project would degrade operations at the Elk Grove-Florin Road/Calvine Road intersection from LOS E to F in the p.m. peak hour.

## TRANSIT SYSTEM OPERATIONS

Transit system operations under cumulative plus project conditions were analyzed by considering the potential effects of the project on planned transit services and facilities. As part of the NVSSP, various transit services will be provided by Regional Transit (RT) within the study area. Services may include peak and off-peak bus operations, express buses to downtown Sacramento, bus shelters and turnouts.

Facilities and services are anticipated on Florin, Bradshaw, Gerber, Waterman, and Vineyard Roads, as well as on major collectors within the plan area. As noted in Chapter III, the proposed circulation plan will be reviewed by RT to identify potential route corridors within the plan area, as well locations for turnouts and major transit centers. Thus, implementation of the proposed project will not disrupt or interfere with expected transit operations in the area and no cumulative deficiencies were identified.

## BIKEWAY AND PEDESTRIAN SYSTEM OPERATIONS

Bikeway and pedestrian system operations under cumulative plus project conditions were analyzed by considering the potential effects that implementation of the project could have on planned bikeway and pedestrian facilities. As previously mentioned, both on-street and off-street bikeway and pedestrian facilities are planned throughout the study area. These facilities include an off-street bicycle/pedestrian trail along Elder and Gerber Creeks west of Bradshaw Road and bicycle lanes on numerous collector and local streets providing connections to major streets adjacent to the plan area. Since these facilities enhance the bicycle and pedestrian system within the study area, no adverse cumulative bikeway and pedestrian system impacts were identified.

## PROPOSED IMPROVEMENTS

The following improvements are proposed to enhance operating conditions or to eliminate projected deficiencies discussed above. Each improvement is listed according to its reference number.

Improvement CP-1: Access on Bradshaw Road should be strictly limited between Florin Road and Elder Creek Road. With the exception of signalized intersections, limited driveway access should be permitted along this roadway segment.

Reducing the number of conflicting turning movements helps to maximize the available capacity and improve traffic flow in the corridor. Although this improvement would help to reduce the projected deficiency, this segment of Bradshaw Road would continue to serve traffic volumes that exceed County guidelines for roadway capacity.

Improvement CP-2: Widen Elder Creek Road between South Watt Avenue and Excelsior Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. This improvement will eliminate the physical deficiency under cumulative no project conditions and the deficiency with the project in place.

Improvement CP-3: Widen Excelsior Road between Jackson Road and Calvine Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. This improvement will eliminate the physical deficiency under cumulative no project conditions and the deficiency with the project in place.

Improvement CP-4: Widen Gerber Road between Vineyard Road and Excelsior Road to include 12-foot travel lanes and minimum 6-foot shoulders to meet Sacramento County design standards for rural arterials. This improvement will eliminate the physical deficiency under cumulative no project conditions and the deficiency with the project in place.

Improvement CP-5: None of the left or right turn volumes at the South Watt Avenue/Jackson Road intersection warrant non-standard traffic controls (e.g., triple left turn lanes, dual right turn lanes, "free" right turn lanes). Construction of a fourth through lane on the northbound and southbound approaches would improve the LOS to E or better; however, Sacramento County does not typically construct eight-lane roadway segments except under special circumstances (e.g., adjacent to a freeway interchange). Thus, the proposed widening of South Watt Avenue is not considered feasible.

Improvement CP-6: Construct dual right turn lanes on the eastbound approach and triple left turn lanes on the northbound approach of the Bradshaw Road/Jackson Road intersection. Construction of these improvements would result in LOS E operations during both peak hours. Installation of these improvements should occur when the V/C ratio exceeds 1.00 or the peak hour volume for either movement exceeds roughly 950 vehicles.

Improvement CP-7: Modify the northbound and southbound approaches to the Jackson Road/Excelsior Road intersection to include a second through lane. Since the northbound departure leg of this intersection is planned to accommodate two lanes, this improvement would only require modifications to Excelsior Road south of Jackson Road. The southbound departure leg would have to be widened to accommodate two lanes before merging into a single southbound lane. The length and merging distance for the second southbound lane will be approved by Sacramento County Transportation Division staff.

This intersection modification would improve the cumulative plus project LOS from F to E during the a.m. peak hour. The p.m. peak hour LOS with this improvement would still be F; however, the V/C ratio with the project would be 1.04 or 19 percent less than the ratio of 1.24 under no project conditions. These improvements should be implemented when intersection operation exceeds LOS E.

Improvement CP-8: None of the left or right turn volumes at the South Watt Avenue/Elder Creek Road intersection warrant non-standard traffic controls (e.g., triple left turn lanes, dual right turn lanes, "free" right turn lanes). Construction of a fourth through lane on the northbound and southbound approaches would improve the LOS to E or better; however, Sacramento County does not typically construct eight-lane roadway segments except under special circumstances (e.g., adjacent to a freeway interchange). Thus, the proposed widening of South Watt Avenue is not considered feasible and no improvements are recommended.

Improvement CP-9: Construct dual right turn lanes on the eastbound approach of the Bradshaw Road/Elder Creek Road intersection. Construction of this improvement would result in LOS E operations during both the a.m. and p.m. peak hour. Installation of these improvements should occur when the intersection V/C ratio exceeds 1.00 or the peak hour volume for either movement exceeds approximately 900 vehicles.

Improvement CP-10: Modify the northbound and southbound approaches to the Elder Creek Road/Excelsior Road intersection to include a second through lane. Since the projected daily volume is at the capacity of a typical two-lane roadway and the peak hour demand is over capacity, Excelsior Road should be widened to four lanes between Elder Creek Road and Jackson Road. The southbound departure leg of the Elder Creek Road/Excelsior Road intersection would have to be widened to accommodate two lanes to the Florin Road intersection (see Improvement CP-13).

This intersection modification would improve the cumulative plus project LOS from F to C in the a.m. peak hour and to B in the p.m. peak hour. These improvements should be implemented when intersection operation exceeds LOS E.

Improvement CP-11: None of the left or right turn volumes at the Elk Grove-Florin Road/Florin Road intersection warrant non-standard traffic controls (e.g., triple left turn lanes, dual right turn lanes, "free" right turn lanes). Construction of a fourth through lane on the northbound and southbound approaches would improve the LOS to E or better; however, Sacramento County does not typically construct eight-lane roadway segments except under special circumstances (e.g., adjacent to a freeway interchange). Thus, the proposed widening of Elk Grove-Florin Road is not considered feasible and no improvements are recommended.

Improvement CP-12: Construct dual right turn lanes on the eastbound approach of the Bradshaw Road/Florin Road intersection. Although this improvement does not improve the LOS to an acceptable level, the a.m. peak hour V/C ratio (1.15) would be less than the cumulative no project ratio (1.17). This improvement would not change the p.m. peak hour V/C ratio.

Construction of a fourth through lane on the northbound and southbound approaches would improve the LOS to E or better; however, Sacramento County does not typically construct eight-lane roadway segments except under special circumstances (e.g., adjacent to a freeway interchange). Thus, the proposed widening of Elk Grove-Florin Road is not considered feasible and no improvements are recommended.

Improvement CP-13: Modify the eastbound approach to include dual left turn lanes and add a second northbound through lane at the Florin Road/Excelsior Road intersection. These improvements would require widening of Excelsior Road between Florin Road and Elder Creek Road to accommodate two departure lanes. Although the daily volume on the Excelsior Road north of Florin Road does not warrant two-northbound through lanes, these improvements are necessary to provide acceptable traffic operations based on peak hour forecasts. Similarly, two southbound lanes on Excelsior Road should be constructed between Elder Creek and Florin Road (see Improvement CP-10).

This intersection modification would improve the cumulative plus project LOS from F to C in the a.m. and p.m. peak hour. These improvements should be implemented when intersection operation exceeds LOS E.

Improvement CP-14: None of the left or right turn volumes at the Elk Grove-Florin Road/Gerber Road intersection warrant non-standard traffic controls (e.g., triple left turn lanes, dual right turn lanes, "free" right turn lanes). Construction of a fourth through lane on the northbound and southbound approaches would improve the LOS to E or better; however, Sacramento County does not typically construct eight-lane roadway segments except under special circumstances (e.g., adjacent to a freeway interchange). Thus, the proposed widening of Elk Grove-Florin Road is not considered feasible and no improvements are recommended.

Improvement CP-15: None of the left or right turn volumes at the Elk Grove-Florin Road/Calvine Road intersection warrant non-standard traffic controls (e.g., triple left turn lanes, dual right turn lanes, "free" right turn lanes). Construction of a fourth through lane on either the northbound and southbound approaches or the eastbound and westbound approaches would improve the LOS to E or better; however, Sacramento County does not typically construct eight-lane roadway segments except under special circumstances (e.g., adjacent to a freeway interchange). Thus, the proposed widening of Elk Grove-Florin Road is not considered feasible and no improvements are recommended.

## OPERATIONS WITH PROPOSED IMPROVEMENTS

Following implementation of the proposed improvements, three of the twelve transportation deficiencies identified would be eliminated. However, deficiencies CP-1, CP-5, CP-7, CP-8, CP-9, CP-11, CP-12, CP-14, and CP-15 would remain under cumulative plus project conditions. Table 9 shows the LOS at the study intersections after implementation of the proposed improvements.

As shown in Table 9, the proposed improvements result in acceptable operating conditions (LOS E or better) at thirteen of the study intersections. Eight intersections are projected to operate at LOS F with the project in place under cumulative conditions. However, at the South Watt Avenue/Jackson Road intersection and the Jackson Road/Excelsior Road intersection, the proposed improvements result in operations that are better than cumulative no project conditions.

**Table 9**
**Cumulative Plus Project Intersection Levels of Service with Improvements**

| Intersection | Traffic Control | AM Peak Hour | | PM Peak Hour | |
|---|---|---|---|---|---|
| | | V/C Ratio[1] | LOS[2] | V/C Ratio | LOS |
| S. Watt Avenue/Jackson Road | Signal | 1.10 | F | 1.13 | F |
| Bradshaw Road/Jackson Road | Signal | 0.95 | E | 0.92 | E |
| Jackson Road/Excelsior Road | Signal | 0.95 | E | 1.04 | F |
| S. Watt Avenue/Elder Creek Road | Signal | 1.26 | F | 1.18 | F |
| Bradshaw Road/Elder Creek Road | Signal | 0.92 | E | 1.04 | F |
| Excelsior Road/Elder Creek Road | Signal | 0.72 | C | 0.69 | B |
| Elk Grove-Florin Road/Florin Road | Signal | 1.40 | F | 1.25 | F |
| Florin Road/Waterman Road | Signal | 0.67 | B | 0.99 | E |
| Bradshaw Road/Florin Road | Signal | 1.15 | F | 1.16 | F |
| Florin Road/Vineyard Road | Signal | 0.59 | A | 0.69 | B |
| Florin Road/Excelsior Road | Signal | 0.76 | C | 0.80 | C |
| Elk Grove-Florin Road/Gerber Road | Signal | 1.47 | F | 1.29 | F |
| Waterman Road/Gerber Road | Signal | 0.70 | B | 0.87 | D |
| Bradshaw Road/Gerber Road | Signal | 0.80 | C | 0.82 | D |
| Vineyard Road/Gerber Road | Signal | 0.69 | B | 0.41 | A |
| Excelsior Road/Gerber Road | Signal | 0.67 | B | 0.48 | A |
| Elk Grove-Florin Road/Calvine Road | Signal | 0.91 | E | 1.02 | F |
| Calvine Road/Waterman Road | Signal | 0.81 | D | 0.85 | D |
| Calvine Road/Bradshaw Road | Signal | 0.77 | C | 0.85 | D |
| Calvine Road/Vineyard Road | Signal | 0.58 | A | 0.65 | B |
| Calvine Road/Excelsior Road | Signal | 0.48 | A | 0.44 | A |

1 V/C Ratio = Volume-to-Capacity Ratio.
2 LOS = Level of Service. Shaded areas represent LOS F conditions.

# V. RELATED TRANSPORTATION ISSUES

As part of the North Vineyard Station Specific Plan transportation analysis, several related issues were evaluated. These issues included the following:

- Potential effect of the project on the Congestion Management Plan roadway network;
- Circulation within the North Vineyard Station Specific Plan area;
- Trip reduction measures to meet regional air quality goals and to reduce congestion; and
- Transportation impacts of alternatives to the proposed project.

These issues are discussed below.

## CONGESTION MANAGEMENT PROGRAM (CMP) CONFORMITY

The Sacramento County CMP was designed to "create an integrated approach to programming transportation improvements," as stated in the December 1993 document prepared by the Sacramento Transportation Authority (STA). Based on this premise, studies for new developments must be prepared in a manner consistent with operating standards and plans for regional and local transportation facilities. To this end, the CMP has identified a network of roadways and transit facilities that must maintain a minimum operating standard given an accepted level of congestion or the adoption of a deficiency plan to improve operations.

Within the study area, two roadways are included in the CMP network both of which are designated LOS D standard facilities. These segments include the following:

- Jackson Road/State Route (SR) 16 between South Watt Avenue and Excelsior Road, which is classified as an urban highway; and
- South Watt Avenue between SR 16 and Florin Road, which is classified as an urban arterial.

Under mitigated existing plus project conditions, several intersections and segments of these facilities are still projected to operate worse than LOS D. Although additional mitigation is feasible to achieve the minimum operating standard under existing conditions, CMP documentation states that mitigation measures or deficiency plans "...need only be prepared after a non-conforming LOS has been determined by the STA board to exist on a segment."

It should also be noted that existing plus project conditions are analyzed for purposes of California Environmental Quality Act compliance, and that this scenario is not likely, since the project will take several years to build out. Accordingly, on-going monitoring should be employed to determine conformity with LOS standards and all new developments should include measures to reduce trips and air emissions. Trip and emission reduction measures for the NVSSP are presented below in a subsequent section.

The cumulative analysis presented in Chapter IV also shows that several intersections and segments of CMP facilities are projected to operate worse than LOS D. However, these facilities would operate below standards with or without the proposed project based on the current plans for transportation infrastructure. Thus, revision of LOS standards, additional area-wide roadway improvements, or changes to land use may be required to achieve conformity. Since the traffic model used in this analysis estimates cumulative forecasts over approximately 20 years and deficiency plans are developed to address current deficiencies, on-going monitoring should be employed to determine conformity and master planning of transportation system elements in the study area should be periodically updated.

## INTERNAL CIRCULATION SYSTEM

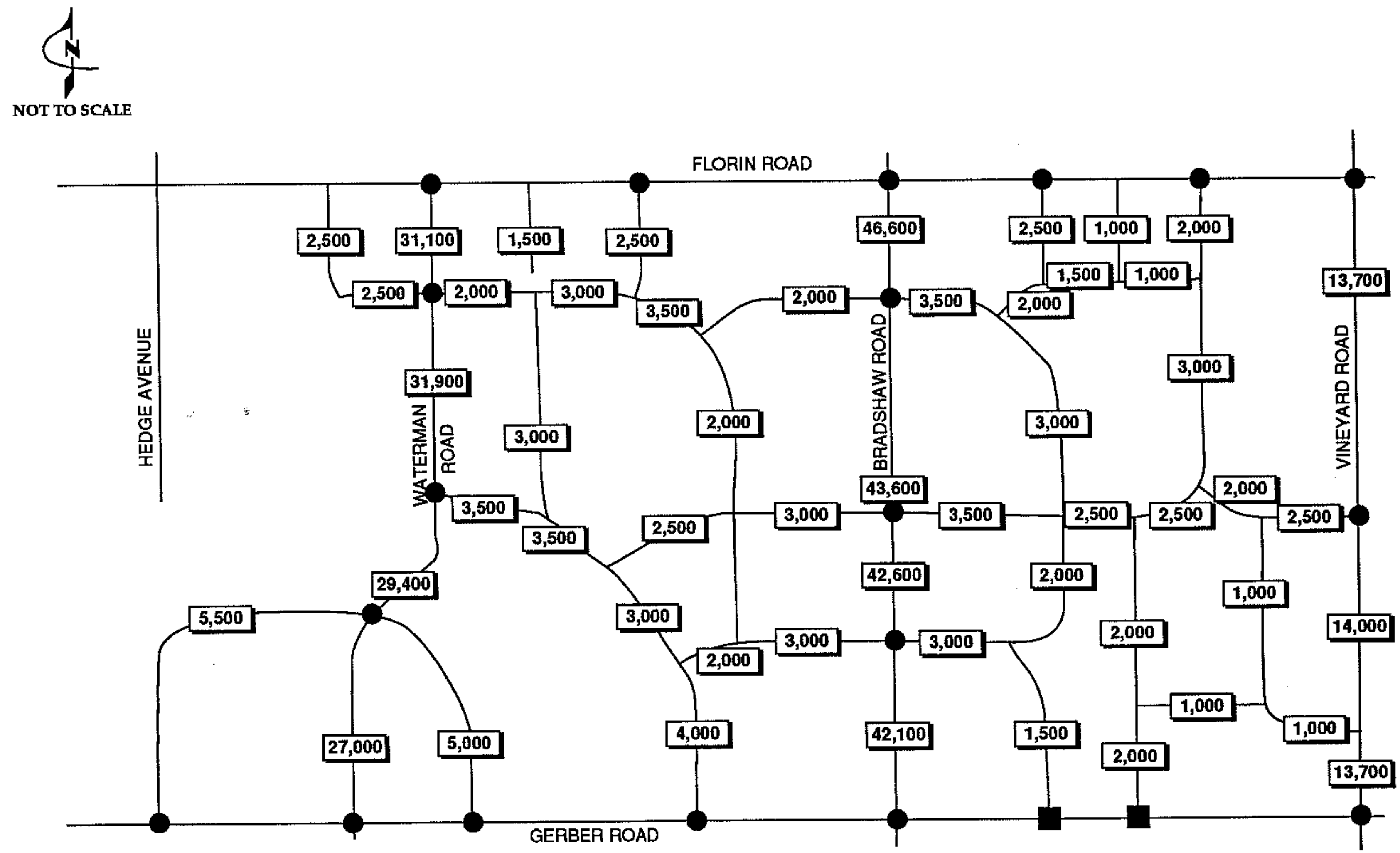
The proposed circulation system includes a variety of transportation facilities designed to encourage a balanced use of travel modes serving automobile, bicycle, pedestrian, and transit trips. The layout of these facilities is designed to evenly distribute trips to the arterials along the boundaries of the plan area and to limit the need for major roadways within the project.

Figure 16 shows the projected daily traffic volumes on the internal roadway network under cumulative conditions. Based on these volumes and Sacramento County guidelines, the only four-lane facility within the plan area will be the section of Waterman Road between Florin Road and Gerber Road, which is expected to serve 31,900 vehicles per day (VPD). All other roadways within the site (except for Bradshaw Road) are projected to serve fewer than 5,500 VPD, which can be accommodated on a two-lane roadway. For those streets serving residential areas with projected volumes between 4,500 and 5,500 VPD, special landscape and access treatments may be required, and in some cases, front-on housing may be precluded. Vineyard Road, which forms the eastern boundary of the site, is planned to be a four-lane facility and would accommodate a projected daily volume of 14,000 VPD. Bradshaw Road is planned to be a six-lane facility and is projected to serve 46,600 VPD.

Figure 16 also shows the location of signalized intersections that are projected to meet signal warrants under cumulative conditions. Signalized intersections will typically be spaced at 1,200-foot minimum intervals and traffic signals should not be implemented until warranted by standard volume warrants. Except for five locations, all of the collector streets are projected to be signalized. Since tentative maps are not available, the actual loading of traffic to collector streets may vary slightly and may require a traffic signal at one intersection on Gerber Road between Bradshaw Road and Vineyard Road.

With the exception of intersections on Waterman Road and Bradshaw Road, intersection traffic control on internal project streets is expected to be maintained through the use of stop signs. At some locations, especially close to schools and parks, signals may be installed to serve high pedestrian and bicycle traffic volumes and to enhance safety.

The proposed Waterman Road crossing of the Central California Traction Railroad will likely include crossing gates, signals, and striping to stop traffic as trains proceed through the plan area. Under existing conditions, an average of two trains travel along this railway segment each day, and train lengths vary between two and 50 cars.




■ = POTENTIAL LOCATION FOR ADDITIONAL SIGNALS

● = EXPECTED TO MEET URBAN PEAK HOUR WARRANTS. IF CRITICAL SPEED ON MAJOR STREET IS GREATER THAN 40 MPH, RURAL WARRANTS WOULD APPLY.

0,000 = CUMULATIVE DAILY TRAFFIC VOLUMES

**FIGURE 16**

**CUMULATIVE DAILY TRAFFIC VOLUMES ON INTERNAL ROADWAYS**

Fehr & Peers Associates, Inc.
Transportation Consultants

With the addition of project and background traffic at the proposed crossing, vehicles may be delayed and queues may form on the northbound and southbound approach. The circulation plan shows that the nearest collector street intersections on Waterman Road are located approximately 800 feet north and south of the proposed crossing. Once more detailed tentative maps are available, traffic circulation in the immediate vicinity of the crossing should be reviewed to ensure that temporary queues on Waterman Road will not result in adverse impacts to driveways or minor streets.

The proposed network of on-street bicycle lanes and off-street bicycle/pedestrian paths is designed to interconnect residential neighborhoods, parks, schools, and commercial areas. This system will also provide connections to planned on-street bicycle lanes on all five major roadways serving the site and will be constructed to applicable County and state standards.

The NVSSP area will be designed to accommodate transit facilities and services planned by Sacramento Regional Transit (RT). Primary transit corridors within the plan area include Bradshaw Road and Florin Road according to RT's 20-year master plan. It is anticipated that bus stops will be designated at one-quarter mile intervals along these roadways. Additional transit routes and stops will be identified by RT on other major arterial and collector streets as the area develops and service is extended to the North Vineyard Station, Florin Station Comprehensive, and Vineyard Springs Comprehensive Planning Areas.

## VEHICLE TRIP AND EMISSION REDUCTION MEASURES

The Sacramento County General Plan contains policies that are designed to improve air quality through a variety of measures that eliminate or reduce vehicle trips, reduce trip length, or change the time of day when trips are completed. Policy AQ-15 is presented as follows:

*All new major indirect sources of emissions shall be reviewed and modified or conditions to achieve a reduction in emissions. This indirect source review program will be developed in coordination with SACOG and Sacramento Metropolitan Air Quality Management District (SMAQMD), and include the following features:*

(a) A 15% reduction in emissions from the level that would be produced by a base-case project assuming full trip generation per the current Institute of Transportation Engineers (ITE) *Trip Generation* Manual.

(b) A focus on cost-effectiveness measured in terms of cost per ton of pollutant avoided.

(c) A list of cost-effective measures to be developed, maintained, and annually reviewed by SMAQMD.

(d) A maximum expenditure cap which will be computed for each indirect source on the basis of factors including, but not limited to, total emissions and project value.

(e) A process for obtaining a waiver from the 15 percent requirements if it is found that a lower level of reduction is all that can be achieved with cost-effective measures and offsets, or that achieving the full 15 percent reduction would cost more than the expenditure cap.

(f) An exception for projects which have already undergone indirect source review at some point in the development approval process.

(g) A procedure to give full credit for other measures required in a project that may also achieve a reduction in emissions.

Sacramento County has developed a preliminary list of measures and corresponding credits that can be applied to the required 15% reduction in emissions. This list is based on data originally prepared by the SMAQMD in a February 1995 report entitled *Indirect Source Review Program: Implementation Guidelines*. Sacramento County is currently developing specific requirements that will be incorporated into the Zoning Code. The following measures, which are incorporated into the NVSSP, are all contained in the preliminary list of acceptable measures:

1. The plan contains a mixture of complementary land uses (residential, commercial, parks, schools) located within the project or within one-half mile of the project boundaries. Approximately half of the plan meets the County's criteria, which allows for up to a 6% credit. NVSSP CREDIT=3%.

2. All parking areas (residential and non-residential) will include electric vehicle charging facilities. Single-family homes will include an outlet for vehicle charging in the garage, multi-family units will include charging facilities in a common area, and non-residential development will provide one electric charging facility for every 50 regular parking spaces. NVSSP CREDIT = 1%

3. The plan is designed to provide a transit stop within a reasonable distance of all land uses. Although specific locations for stops have not been identified at RT staff's recommendation, the proposed roadway network of major collectors would accommodate bus stops within one-quarter mile of all land uses. NVSSP CREDIT=2%.

4. The plan will include easements to accommodate bus stop improvements (route signs, benches, shelters and lighting) at all major transit stops. Current RT policy only requires easements for stops since a private firm provides the shelter and related improvements in exchange for advertising space. NVSSP CREDIT = 2%.

5. The plan is designed to accommodate and provide access to the planned on-street (Class II) bicycle facilities as identified in the 2010 Sacramento City/County Bikeway Master Plan (BMP). On-street facilities within one-half mile of the project site are planned on Florin, Bradshaw, and Gerber Roads and the entire plan area meets the criteria. NVSSP CREDIT = 2.0%

6. In addition to the bikeways included in the BMP, both on-street and off-street facilities are included throughout the plan area and will be located within one-half mile of all major land uses. NVSSP CREDIT = 1.5%

7. The proposed circulation system provides for direct (i.e., - minimum distance) pedestrian connections between adjacent and complementary land uses . All parks, schools, and commercial areas are connected to residential areas by interconnected roads and pathways. NVSSP CREDIT = 2%

8. The circulation system in the plan provides direct automobile access between complementary land uses to minimize the distance traveled, within the limits of physical constraints (i.e., drainage parkways). NVSSP CREDIT = 1%
9. The plan area will operate or participate in a Transportation Management Association to create, administer, and finance on-going programs to reduce vehicle trips. The Financing Plan for the project will include means to fund the TMA. NVSSP = 3%

According to the County's preliminary guidelines, the above measures result in a 16.5 percent reduction in emissions and meet the requirements of General Plan Policy AQ-15.

In addition to the above measures, the Specific Plan will include policies that encourage the use of low-emission heating/cooling measures and equipment, and the provision of child care services within the plan area. Table 10 summarizes the measures, credits, and reference information for the trip and emission reduction measures.

| Table 10<br>Summary of Vehicle Trip and Emission Reduction Measures | | | |
|---|---|---|---|
| Measure | Specific Plan Reference | Maximum[1] Credit Allowance | Credit Taken |
| 1. Complementary land uses | Land Use Exhibit | 6% | 3% |
| 2. Electrical vehicle charging facilities | MacKay & Somps | 1% | 1% |
| 3. Convenient transit stops | Circulation Plan | 2% | 2% |
| 4. Physical amenities at major transit stops | Circulation Plan and Regional Transit | 2% | 2% |
| 5. Bicycle connections to City/County Bikeway Master Plan facilities | Circulation Plan | 2% | 2% |
| 6. Bicycle lanes/paths within 1/2 mile of all major land uses | Circulation Plan | 1.5% | 1.5% |
| 7. Multiple/direct pedestrian access between complementary land uses | Circulation Plan | 2% | 1% |
| 8. Multiple/direct automobile access between complementary land uses | Circulation Plan | 1% | 1% |
| 9. Participation in Transportation Management Association | MacKay & Somps | 3% | 3% |
| | | TOTAL EMISSION REDUCTION: | 16.5% |

## TRANSPORTATION IMPACTS OF PROJECT ALTERNATIVES

Two alternatives to the preferred land use plan were evaluated as part of the transportation analysis. These alternatives include:

- 10 Percent Low Density Alternative - This alternative includes approximately 10 percent fewer dwelling units than the preferred plan. Under this alternative, medium-density housing (7 to 14 units per acre) is not proposed and low density residential uses are expanded. The net result is 5,759 dwelling units with minor changes to the total acreage for parks. All other uses (i.e., parks, schools, commercial areas, open space, etc.) are unchanged.

- 15 Percent Low Density Alternative - This alternative includes approximately 15 percent fewer dwelling units than the preferred plan. Similar to the previous alternative, medium-density housing is not included and low density residential uses are expanded. The net result is 5,384 dwelling units with minor changes to total acreage for parks. All other uses are unchanged.

Trip generation for each of the alternatives was estimated using methods described in Chapter III. Tables F-1 and F-2 in Appendix F summarize the estimated daily trip generation for the 10 Percent and 15 Percent Low Density Alternatives, respectively.

These tables show that the 10 Percent Alternative would result in a total of 78,552 total daily vehicle trips or approximately seven percent fewer trips than estimated for the Preferred Plan. The number of net external daily vehicle trips under this alternative is 58,271, or seven percent fewer trips than the Preferred Plan.

Similarly, the 15 Percent Alternative would result in 74,971 total daily vehicle trips and 55,192 net external vehicle trips. These trip generation estimates are approximately 11 percent and 12 percent fewer than the total daily and net external trip estimates for the Preferred Plan, respectively.

Based on lower trip generation, impacts to the transportation system are expected to be less than those caused by the Preferred Plan; however, the alternative land use plans would still result in operational deficiencies at the critical study locations.

# APPENDIX A

## Existing Level of Service Calculations

```
                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: JACKSON HWY AND S. WATT                          Design Hour: AM
Problem Statement: EXIST
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:S. WATT      |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
             |  1     1 |      ^       |               : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
             |  R  L    |      N       |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |             | intervals/hour    :                 |able    Volume   to next    Volume |
------------  T H H H T  ------------|b.LT capacity on   :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)      :                 |-------------------------------------|
  1  LT--^      v v v    <^-RTH       |c.G/C ratio        :  0    0    0    0|B2B1    55(B2)   99-  55=  44(B1)    55|
     LTH-^>              <--TH   1    |d.Opposing volume  :  0    0    0    0|A2B1    44(B1)  453-  44= 409(A2)    44|
      TH-->              <v-LTH       | in vph            :                 |A1A2   409(A2) OR  146(A1)          409|
  1  RTH-v>     ^ ^ ^     v--LT  1    |e.LT capacity on   :  0    0    0    0|B4B3    24(B3)  139-  24= 115(B4)    24|
     RT--v    < < | > >  Approach 2   | green (vph)       :                 |A3B4   115(B4)  896- 115= 781(A3)   115|
------------  L L T R R  ------------|f.LT capacity in   :  0    0    0    0|A3A4   781(A3) OR  679(A4)          781|
             | T T H T T |JACKSON HWY | vph (b+e)         :                 |                                     |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                     |
             | 1     1   |            | in vph            :                 |                                     |
             | Approach 4:S. WATT     |h.Is volume > cap. :                 :                                     |
                                      | (g>f) ?           :                 |                                     |
=======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |         |                  |        |                                     |
                                      |         | 1 7 1            |        |99(B2B1)+409(A2)+139(B3B4)+781(A3)   |
             | Approach 3|            |-------   8 0 3            -------|                                     |
 3:  LT= 139 | |          | 2:RT= 323 |          9 7 9            ^- 323  |          = 1428 vph                 |
    TH= 707  | |          |   TH= 453 |          + + |            <- 453  |=====================================|
    RT= 189  | v          |   LT=  99 |          < v >            v-  99  | Step 8. INTERSECTION LEVEL OF       |
------------              ------------|                                   |           SERVICE                   |
                          <--Approach 2 |                                 |     (compare step 7 with table 6)   |
                                      |                                   |              -------                |
                                      |                                   |              |  F  |                |
 Approach 1-->                        |                                   |              -------                |
------------              ------------| 55 -^                 < ^ >       |=====================================|
 1:LT=  55   |          ^ | 4: RT=  44 | 139 +>                | + +       | Step 9. RECALCULATE                 |
   TH= 139   |          | |    TH= 635 |   7 +v                            |                                     |
   RT=   7   |          | |    LT=  24 |-------                  6   -------|Geometric Change:                    |
             | Approach 4|            |        |             2 3 4 |      |Signal Change:                       |
                                      |        |             4 5 4 |      |Volume Change:                       |
=======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                            |
                                      |         (two phase signal)        |                                     |
         --^ v--   B2B1               |             | Approach 3|         |                                     |
                                      |             |           |         |                                     |
     --^ AND <--     A1B2 AND         |             |           |         |                                     |
     --> OR  v--     /OR A2B1         |             |           |         |                                     |
         --> <--   A1A2               |------------             ------------|                                     |
                                      | Approach 1                        |                                     |
          |  <     B4B3               |                                   |                                     |
          >  |                        |           See Step 6b.            |                                     |
     | | AND < ^     A3B4 AND         |                                   |                                     |
     v > OR  | |     /OR A4B3         |                        Approach 2 |                                     |
          |  ^     A3A4               |------------             ------------|                                     |
          v  |                        |             |           |         |                                     |
-------------------------------------|             |           |         |                                     |
 A1 -->   A3 |      B1 v--    B3   <| |             |           |         |                                     |
            v ^                    | | |             | Approach 4|         | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4 |>   |                                   | V/C Ratio = 1.04                    |
==========================================================================================
```

```
                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: JACKSON HWY AND S. WATT                          Design Hour: PM
Problem Statement: EXIST
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME  ADJUSTMENT FOR    |
              | Approach 3:S. WATT  |                   -------Approach-----|       MULTIPHASE SIGNAL OVERLAP     |
              |  1     1 |     ^    |                   : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
              |  R     L |     N    |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY   | R T T T L |         | intervals/hour    :                   |able   Volume    to next    Volume |
------------- T H H H T ------------|b.LT capacity on   :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1  | change (vph)      :                   |-------------------------------------|
  1  LT--^     v v v     <^-RTH     |c.G/C ratio        :  0    0    0    0|B2B1   76(B1)  113- 76= 37(B2)    76|
     LTH-^>              <--TH   1  |d.Opposing volume  :  0    0    0    0|A1B2   37(B2)  502- 37= 465(A1)   37|
      TH-->              <v-LTH     | in vph            :                   |A1A2  465(A1) OR  215(A2)          465|
  1  RTH-v>     ^ ^ ^     v--LT  1  |e.LT capacity on   :  0    0    0    0|B4B3   12(B3)  212- 12= 200(B4)    12|
     RT--v    < < | > >   Approach 2| green (vph)       :                   |A3B4  200(B4)  813- 200= 613(A3)  200|
-------------  L L T R R -----------|f.LT capacity in   :  0    0    0    0|A3A4  749(A4) OR  613(A3)          749|
              | T T H T T |JACKSON HWY| vph (b+e)       :                   |                                     |
              |   H   H   |         |g.Left turn volume :  0    0    0    0|                                     |
              | 1     1   |         | in vph            :                   |                                     |
              | Approach 4:S. WATT  |h.Is volume > cap. :                  :|                                     |
                                    | (g>f) ?           :                   |                                     |
====================================+=====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES     |
                                    |         |                    |      |                                     |
                                    |         |   7 2              |      |113(B1B2)+465(A1)+212(B3B4)+749(A4)  |
              | Approach 3|         |-------  8 3 1           ------------|                                     |
 3:  LT= 212  | |         | 2:RT= 141|        2 1 2           ^- 141      |        = 1539 vph                   |
   TH= 731    | |         |   TH= 215|        + + |           <- 215      |=====================================|
   RT=  82    | v         |   LT=  76|        < v >           v-  76      | Step 8. INTERSECTION LEVEL OF       |
-------------              ----------|                                    |         SERVICE                     |
                       <--Approach 2 |                                    |   (compare step 7 with table 6)     |
                                     |                                    |              -------                |
                                     |                                    |              |  F  |                |
 Approach 1-->                       |                                    |              -------                |
-------------              ----------| 113 -^               < ^ >         |=====================================|
 1:LT= 113    |           ^ | 4: RT=  66| 476 +>             | + +         | Step 9. RECALCULATE                 |
   TH= 476    |           | |   TH= 683|  26 +v                           |                                     |
   RT=  26    |           | |   LT=  12|-------              6    -------|Geometric Change:                    |
              | Approach 4|          |         |          1 8 6 |         |Signal Change:                       |
                                     |         |          2 3 6 |         |Volume Change:                       |
=====================================+====================================+=====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                            |
                                     |         (two phase signal)         |                                     |
       --^ v--   B2B1                |            | Approach 3|           |                                     |
                                     |            |           |           |                                     |
    --^ AND <--      A1B2 AND        |            |           |           |                                     |
    --> OR  v--      /OR A2B1        |            |           |           |                                     |
       --> <--   A1A2                |------------            ------------|                                     |
                                     | Approach 1                         |                                     |
         |   <   B4B3                |                                    |                                     |
         >   |                       |        See Step 6b.                |                                     |
    | | AND < ^      A3B4 AND        |                                    |                                     |
    v > OR  | |      /OR A4B3        |                   Approach 2       |                                     |
         |   ^   A3A4                |------------            ------------|                                     |
         v   |                       |            |           |           |                                     |
-------------------------------------|            |           |           |                                     |
 A1 -->   A3 |      B1 v--    B3  <| |            |           |           |                                     |
            v ^                   | ||            | Approach 4|           | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4 |>  |                                    | V/C Ratio = 1.12                    |
==========================================================================================
```

# APPENDIX A

## Existing Level of Service Calculations

```
                              Critical Movement Analysis: PLANNING
                                        Calculation Form 1
Intersection: JACKSON HWY AND S. WATT                                  Design Hour: AM
Problem Statement: EXIST
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:S. WATT   |              -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
            |  1     1 |     ^     |            : -1-  -2-  -3-  -4-|     Possible   Volume   Adjusted|
            |  R     L |     N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY | R T T T L |          | intervals/hour  :                  |able    Volume   to next   Volume |
------------ T H H H T ------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase    in vph |
 Approach 1  < < | > >   ^--RT  1  | change (vph)    :                  |---------------------------------|
  1  LT--^     v v v    <^-RTH     |c.G/C ratio      :  0    0    0    0|B2B1   55(B2)   99-  55=  44(B1)   55|
    LTH-^>              <--TH   1  |d.Opposing volume :  0    0    0    0|A2B1   44(B1)  453-  44= 409(A2)   44|
      TH-->             <v-LTH     | in vph          :                  |A1A2  409(A2) OR  146(A1)        409|
  1  RTH-v>    ^ ^ ^     v--LT  1  |e.LT capacity on :  0    0    0    0|B4B3   24(B3)  139-  24= 115(B4)   24|
    RT--v    < < | > >  Approach 2 | green (vph)     :                  |A3B4  115(B4)  896- 115= 781(A3)  115|
------------ L L T R R ------------|f.LT capacity in :  0    0    0    0|A3A4  781(A3) OR  679(A4)        781|
            | T T H T T |JACKSON HWY| vph (b+e)      :                  |                                 |
            |   H   H   |          |g.Left turn volume :  0    0    0    0|                                 |
            | 1     1   |          | in vph          :                  |                                 |
            | Approach 4:S. WATT   |h.Is volume > cap. :                :                                 |
                                   | (g>f) ?         :                  |                                 |
===================================+==================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |          |                 |     |                                 |
                                   |          | 1 7 1           |     |99(B2B1)+409(A2)+139(B3B4)+781(A3) |
            | Approach 3|          |-------   8 0 3            -------|                                 |
 3:  LT= 139 | |        | 2:RT= 323|          9 7 9           ^- 323 |          = 1428 vph             |
   TH= 707 | |          |  TH= 453 |          + + |           <- 453 |=================================|
   RT= 189 | v          |  LT=  99 |          < v >           v-  99 | Step 8. INTERSECTION LEVEL OF   |
------------           ------------|                                  |        SERVICE                  |
                     <--Approach 2 |                                  |   (compare step 7 with table 6) |
                                   |                                  |            -------              |
                                   |                                  |            | F |              |
 Approach 1-->                     |                                  |            -------              |
------------           ------------|  55 -^               < ^ >       |=================================|
 1:LT=  55  |        ^ | 4: RT=  44| 139 +>               | + +       | Step 9. RECALCULATE             |
   TH= 139  |        | |   TH= 635 |   7 +v                           |                                 |
   RT=   7  |        | |   LT=  24 |-------                6   -------|Geometric Change:                |
            | Approach 4|          |          |          2 3 4 |      |Signal Change:                   |
                                   |          |          4 5 4 |      |Volume Change:                   |
===================================+==================================+=================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                   |        (two phase signal)       |                                 |
      --^ v--  B2B1                |           | Approach 3|          |                                 |
                                   |           |           |          |                                 |
   --^ AND <--    A1B2 AND         |           |           |          |                                 |
   --> OR  v--    /OR A2B1         |           |           |          |                                 |
      --> <--  A1A2                |------------           ------------|                                 |
                                   | Approach 1                       |                                 |
       |  <   B4B3                 |                                  |                                 |
       >  |                        |          See Step 6b.            |                                 |
   | | AND < ^    A3B4 AND         |                                  |                                 |
   v > OR  | |    /OR A4B3         |                      Approach 2  |                                 |
       |  ^   A3A4                 |------------           ------------|                                 |
       v  |                        |           |           |          |                                 |
-----------------------------------|           |           |          |                                 |
 A1 -->  A3 |     B1 v--   B3   <| |           |           |          |                                 |
          v ^                 |  | |           | Approach 4|          | Exclusive right turns reduced 30 % |
 A2 <--  A4  |    B2 --^   B4 |>   |                                  | V/C Ratio = 1.04                |
==========================================================================================
```

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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: JACKSON HWY AND S. WATT                              Design Hour: PM
Problem Statement: EXIST
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR  |
              | Approach 3:S. WATT  |                 -------Approach-----|      MULTIPHASE SIGNAL OVERLAP  |
              |  1    1 |      ^    |                 : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
              |  R    L |      N    |a.No. of change  :  0    0    0    0|Prob- Critical  Carryover Critical|
JACKSON HWY   | R T T T L |         | intervals/hour  :                   |able   Volume   to next   Volume |
-------------  T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
  Approach 1   < < | > >   ^--RT  1 | change (vph)    :                   |---------------------------------|
   1  LT--^     v v v     <^-RTH    |c.G/C ratio      :  0    0    0    0|B2B1   76(B1)  113-  76=  37(B2)   76|
      LTH-^>              <--TH   1 |d.Opposing volume :  0    0    0    0|A1B2   37(B2)  502-  37= 465(A1)   37|
       TH-->              <v-LTH    | in vph          :                   |A1A2  465(A1) OR  215(A2)        465|
   1  RTH-v>    ^ ^ ^      v--LT  1 |e.LT capacity on :  0    0    0    0|B4B3   12(B3)  212-  12= 200(B4)   12|
      RT--v    < < | > >  Approach 2 | green (vph)     :                   |A3B4  200(B4)  813- 200= 613(A3)  200|
-------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4  749(A4) OR  613(A3)        749|
             | T T H T T |JACKSON HWY| vph (b+e)       :                   |                                 |
             |   H   H   |          |g.Left turn volume :  0    0    0    0|                                 |
             | 1     1   |          | in vph          :                   |                                 |
             | Approach 4:S. WATT   |h.Is volume > cap. :                  :                                 |
                                    | (g>f) ?         :                   |                                 |
====================================+===================================+=================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |        |                 |        |                                 |
                                    |        |  7 2            |        |113(B1B2)+465(A1)+212(B3B4)+749(A4)
              | Approach 3|         |------- 8 3 1             -------|                                 |
3:  LT= 212 | |           | 2:RT= 141 |      2 1 2             ^- 141 |         = 1539 vph              |
    TH= 731 | |           |   TH= 215 |      + + |             <- 215 |=================================|
    RT=  82 | v           |   LT=  76 |      < v >             v-  76 | Step 8. INTERSECTION LEVEL OF   |
-------------              -------------|                             |         SERVICE                 |
                           <--Approach 2 |                            |     (compare step 7 with table 6)|
                                    |                                 |             -------             |
                                    |                                 |             |  F  |             |
Approach 1-->                       |                                 |             -------             |
-------------              -------------| 113 -^            < ^ >     |=================================|
1:LT= 113  |            ^ | 4: RT=  66 | 476 +>            | + +      | Step 9. RECALCULATE             |
  TH= 476  |            | |    TH= 683 |  26 +v                       |                                 |
  RT=  26  |            | |    LT=  12 |-------             6  -------|Geometric Change:                |
           | Approach 4|            |        |        1 8 6 |         |Signal Change:                   |
                                    |        |        2 3 6 |         |Volume Change:                   |
====================================+===================================+=================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                        |
                                    |       (two phase signal)           |                                 |
        --^ v--   B2B1              |        | Approach 3|              |                                 |
                                    |        |           |              |                                 |
    --^ AND <--      A1B2 AND       |        |           |              |                                 |
    --> OR  v--      /OR A2B1       |        |           |              |                                 |
        --> <--   A1A2              |-------------       -------------|                                 |
                                    | Approach 1                          |                                 |
         |  <     B4B3              |                                   |                                 |
         >  |                       |         See Step 6b.              |                                 |
    | | AND < ^      A3B4 AND       |                                   |                                 |
    v > OR  | |      /OR A4B3       |                      Approach 2   |                                 |
         |  ^     A3A4              |-------------       -------------|                                 |
         v  |                       |        |           |              |                                 |
------------------------------------|        |           |              |                                 |
A1 -->   A3 |      B1 v--    B3  <| |        |           |              |                                 |
           v ^                   | ||        |           |              |                                 |
A2 <--   A4  |     B2 --^    B4 |>  |        | Approach 4|              | Exclusive right turns reduced 30 %
                                    |                                   | V/C Ratio = 1.12                |
================================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW                            Design Hour: AM
Problem Statement: EXIST
===================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:BRADSHAW   |                -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
             | 1   1   1 |      ^    |                : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R   L    |      N    |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |           |  intervals/hour :                  |able   Volume    to next    Volume |
------------  T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1   < < | > >   ^--RT  1   |  change (vph)   :                  |-------------------------------------|
   1  LT--^    v v v     <^-RTH      |c.G/C ratio      :  0    0    0    0|B2B1    15(B1)  200-  15= 185(B2)   15|
      LTH-^>             <--TH   1   |d.Opposing volume:  0    0    0    0|A1B2   185(B2)  180- 185=   0(A1)  185|
   1   TH-->             <v-LTH      |  in vph         :                  |A1A2   423(A2) OR    0(A1)         423|
      RTH-v>    ^ ^ ^     v--LT  1   |e.LT capacity on :  0    0    0    0|B4B3    53(B3)   74-  53=  21(B4)   53|
   1  RT--v   < < | > >   Approach 2 |  green (vph)    :                  |A3B4    21(B4)  420-  21= 399(A3)   21|
------------  L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4   862(A4) OR  399(A3)         862|
             | T T H T T |JACKSON HWY|  vph (b+e)      :                  |                                     |
             |   H   H   |           |g.Left turn volume: 0    0    0    0|                                     |
             | 1   1   1 |           |  in vph         :                  |                                     |
             | Approach 4:BRADSHAW   |h.Is volume > cap.:                 :                                     |
                                     |  (g>f) ?        :                  |                                     |
=====================================+==================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                     |      |                      |    |                                     |
                                     |      | 2 4                  |    |200(B1B2)+423(A2)+74(B3B4)+862(A4)   |
              | Approach 3|          |-------  2 2 7                -----|                                     |
 3:  LT=  74  | |         | 2:RT= 187|        6 0 4             ^- 187  |           = 1559 vph                |
    TH= 420   | |         |   TH= 423|        | | |             <- 423  |=====================================|
   RT= 226    | v         |   LT=  15|        < v >             v-  15  | Step 8. INTERSECTION LEVEL OF       |
------------              ------------|                                  |         SERVICE                     |
                          <--Approach 2|                                 |     (compare step 7 with table 6)   |
                                     |                                  |              -------                |
                                     |                                  |              |  F  |                |
 Approach 1-->                       |                                  |              -------                |
------------              ------------| 200 -^               < ^ >      |=====================================|
 1:LT= 200    |         ^ | 4: RT=  14| 180 ->               | | |      | Step 9. RECALCULATE                  |
   TH= 180    |         | |   TH= 862 |  32 -v                          |                                     |
   RT=  32    |         | |   LT=  53 |-------                8  -------|Geometric Change:                    |
              | Approach 4|          |       |              5 6 1 |     |Signal Change:                       |
                                     |       |              3 2 4 |     |Volume Change:                       |
=====================================+==================================+=====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                     |          (two phase signal)      |                                     |
      --^ v--  B2B1                  |             | Approach 3|        |                                     |
                                     |             |           |        |                                     |
   --^ AND <--     A1B2 AND          |             |           |        |                                     |
   --> OR  v--     /OR A2B1          |             |           |        |                                     |
      --> <--  A1A2                  |-------------             ------------|                                 |
                                     |  Approach 1                      |                                     |
       |   <   B4B3                  |                                  |                                     |
       >   |                         |           See Step 6b.           |                                     |
   | | AND < ^     A3B4 AND          |                                  |                                     |
   v > OR  | |     /OR A4B3          |                     Approach 2   |                                     |
       |   ^   A3A4                  |-------------          -----------|                                     |
       v   |                         |             |           |        |                                     |
-------------------------------------|             |           |        |                                     |
 A1 -->   A3 |      B1 v--    B3   <||             |           |        |                                     |
            v ^                    | |             | Approach 4|        | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4  |> |                                  | V/C Ratio = 1.13                    |
===================================================================================================
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW                          Design Hour: PM
Problem Statement: EXIST
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
            | Approach 3:BRADSHAW   |                ------Approach-----|       MULTIPHASE SIGNAL OVERLAP  |
            | 1   1   1 |     ^     |                 : -1- -2- -3- -4-|       Possible   Volume   Adjusted|
            |   R   L   |     N     |a.No. of change  :  0   0   0   0|Prob-  Critical  Carryover Critical|
JACKSON HWY | R T T T L |           |  intervals/hour :                |able   Volume    to next   Volume |
----------- T H H H T  ------------|b.LT capacity on :  0   0   0   0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1  |  change (vph)   :                |-----------------------------------|
  1  LT--^     v v v    <^-RTH     |c.G/C ratio      :  0   0   0   0|B2B1    28(B1)  191-  28= 163(B2)  28|
     LTH-^>             <--TH   1  |d.Opposing volume:  0   0   0   0|A1B2   163(B2)  433- 163= 270(A1) 163|
  1   TH-->             <v-LTH     |  in vph         :                |A1A2   270(A1) OR  156(A2)        270|
     RTH-v>    ^ ^ ^     v--LT  1  |e.LT capacity on :  0   0   0   0|B4B3    37(B3)  165-  37= 128(B4)  37|
  1  RT--v   < < | > >  Approach 2 |  green (vph)    :                |A3B4   128(B4)  861- 128= 733(A3) 128|
-----------  L L T R R ------------|f.LT capacity in :  0   0   0   0|A3A4   733(A3) OR  510(A4)        733|
            | T T H T T |JACKSON HWY|  vph (b+e)     :                |                                   |
            |   H   H   |           |g.Left turn volume: 0   0   0   0|                                   |
            | 1   1   1 |           |  in vph         :                |                                   |
            | Approach 4:BRADSHAW   |h.Is volume > cap.:               :                                   |
                                    |  (g>f) ?        :                |                                   |
===================================+==================================+===================================
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |        |                  |     |                                   |
                                    |        | 1 8 1            |     |191(B1B2)+270(A1)+165(B3B4)+733(A3)|
             | Approach 3|          |-------  8 6 6            ------|                                   |
3:  LT= 165  | |         | 2:RT=  76|         2 1 5          ^-  76  |          = 1359 vph               |
    TH= 861  | |         |   TH= 156|         | | |          <- 156  |===================================|
    RT= 182  | v         |   LT=  28|         < v >          v-  28  | Step 8. INTERSECTION LEVEL OF     |
-----------              -----------|                                  |         SERVICE                   |
                     <--Approach 2  |                                  |   (compare step 7 with table 6)   |
                                    |                                  |              -------              |
                                    |                                  |              | E |                |
 Approach 1-->                      |                                  |              -------              |
-----------              -----------| 191 -^              < ^ >        |===================================|
1:LT= 191    |           ^ | 4: RT=  20| 433 ->            | | |        | Step 9. RECALCULATE               |
  TH= 433    |           | |   TH= 510|  40 -v                         |                                   |
  RT=  40    |           | |   LT=  37|-------             5   -------|Geometric Change:                  |
             | Approach 4|          |       |            3 1 2 |       |Signal Change:                     |
                                    |       |            7 0 0 |       |Volume Change:                     |
===================================+==================================+===================================
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                    |         (two phase signal)        |                                   |
      --^ v--   B2B1                |            | Approach 3|          |                                   |
                                    |            |           |          |                                   |
   --^ AND <--     A1B2 AND         |            |           |          |                                   |
   --> OR  v--     /OR A2B1         |            |           |          |                                   |
      --> <--   A1A2                |------------            ------------|                                   |
                                    |  Approach 1                       |                                   |
        |  <    B4B3                |                                   |                                   |
        >  |                        |           See Step 6b.            |                                   |
    | | AND < ^    A3B4 AND         |                                   |                                   |
    v > OR  | |    /OR A4B3         |                   Approach 2      |                                   |
        |  ^    A3A4                |------------            ------------|                                   |
        v  |                        |            |           |          |                                   |
------------------------------------|            |           |          |                                   |
 A1 -->   A3 |      B1 v--    B3  <|            |           |          |                                   |
            v ^                   | |            | Approach 4|          | Exclusive right turns reduced 30 % |
 A2 <--   A4 |      B2 --^    B4 |> |                                   | V/C Ratio = .99                   |
===============================================================================================
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                                  Critical Movement Analysis: PLANNING
                                          Calculation Form 1
Intersection: BRADSHAW RD AND ELDER CREEK RD                      Design Hour: AM
Problem Statement: EXIST
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:BRADSHAW    |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
            | 1   1   1 |      ^     |                 : -1-  -2-  -3-  -4-|        Possible    Volume     Adjusted|
            |   R   L   |      N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover   Critical|
ELDER CREEK R| R T T T L |           | intervals/hour  :                   |able    Volume    to next     Volume |
------------- T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase      in vph |
 Approach 1   < < | > >   ^--RT  1   | change (vph)    :                   |-------------------------------------|
  1  LT--^     v v v     <^-RTH      |c.G/C ratio      :  0    0    0    0|A1B2    45(B2) OR   44(A1)          45|
     LTH-^>              <--TH       |d.Opposing volume :  0    0    0    0|A2B1   136(A2) OR    1(B1)         136|
      TH-->              <v-LTH  1   | in vph          :                   |B4B3     6(B4)   54-   6=  48(B3)     6|
  1  RTH-v>     ^ ^ ^     v--LT      |e.LT capacity on :  0    0    0    0|A4B3    48(B3)  870-  48= 822(A4)    48|
     RT--v    < < | > >  Approach 2  | green (vph)     :                   |A3A4   822(A4) OR  365(A3)         822|
------------- L L T R R  ------------|f.LT capacity in :  0    0    0    0|                                     |
            | T T H T T |ELDER CREEK R| vph (b+e)       :                   |                                     |
            |   H   H   |            |g.Left turn volume :  0    0    0    0|                                     |
            | 1     1   |            | in vph          :                   |                                     |
            | Approach 4:BRADSHAW    |h.Is volume > cap. :                 :                                     |
                                     | (g>f) ?         :                   |                                     |
=====================================+=====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES     |
                                     |      |                      |       |                                     |
                                     |      | 1 3                  |       |45(B2)+136(A2)+54(B4B3)+822(A4)      |
            | Approach 3|            |-------  3 6                 ------- |                                     |
 3:  LT=   6 | |        | 2:RT=   8  |        6 5 6              ^-    8   |          = 1057 vph                 |
   TH= 365  | |         |   TH= 135  |        | | |              <+  135   |=====================================|
   RT= 136  | v         |   LT=   2  |        < v >              v+    1   | Step 8. INTERSECTION LEVEL OF       |
-------------            ------------|                                     |         SERVICE                     |
                       <--Approach 2 |                                     |     (compare step 7 with table 6)   |
                                     |                                     |              -------                |
                                     |                                     |              | C  |                 |
 Approach 1-->                       |                                     |              -------                |
-------------            ------------|  45 -^                    < ^ >     |=====================================|
 1:LT=  45   |         ^ | 4: RT=  2 |  36 +>                   | + +      | Step 9. RECALCULATE                 |
   TH=  36   |         | |   TH= 868 |   8 +v                              |                                     |
   RT=   8   |         | |   LT=  54 |-------                     8  -------|Geometric Change:                    |
            | Approach 4|            |       |                  5 6  |     |Signal Change:                       |
                                     |       |                  4 8 2 |    |Volume Change:                       |
=====================================+=====================================+=====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                            |
                                     |         (two phase signal)          |                                     |
        --^      A1B2                |            | Approach 3|            |                                     |
        -->                          |            |           |            |                                     |
            <--  A2B1                |            |           |            |                                     |
            v--                      |            |           |            |                                     |
          |   <   B4B3               |-------------           -------------|                                     |
          >   |                      | Approach 1                          |                                     |
      | | AND < ^     A3B4 AND       |                                     |                                     |
      v > OR  | |     /OR A4B3       |          See Step 6b.               |                                     |
          |   ^   A3A4               |                                     |                                     |
          v   |                      |                        Approach 2   |                                     |
                                     |-------------           -------------|                                     |
                                     |            |           |            |                                     |
-------------------------------------|            |           |            |                                     |
 A1 -->   A3 |     B1 v--    B3   <| |            |           |            |                                     |
            v ^                  | | |            | Approach 4|            | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |    B2 --^    B4 |>   |                                     | V/C Ratio = .77                     |
==============================================================================================
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                           Critical Movement Analysis: PLANNING
                                   Calculation Form 1
ntersection: BRADSHAW RD AND ELDER CREEK RD                          Design Hour: PM
'roblem Statement: EXIST
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR    |
            | Approach 3:BRADSHAW  |                -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
            | 1   1   1 |     ^    |                : -1-  -2-  -3-  -4-|     Possible    Volume    Adjusted|
            |   R   L   |     N    |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
LDER CREEK R| R T T T L |          |  intervals/hour :                  |able    Volume   to next    Volume |
------------- T H H H T  ----------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT  1 |  change (vph)   :                  |----------------------------------|
  1  LT--^      v v v    <^-RTH    |c.G/C ratio      :  0    0    0    0|A1B2   130(B2) OR  120(A1)      130|
     LTH-^>              <--TH     |d.Opposing volume :  0    0    0    0|A2B1    46(A2) OR    6(B1)       46|
      TH-->              <v-LTH  1 |  in vph         :                  |B4B3    10(B3)   14-  10=  4(B4)  10|
  1  RTH-v>     ^ ^ ^     v--LT    |e.LT capacity on :  0    0    0    0|A3B4     4(B4)  860-   4= 856(A3)  4|
     RT--v    < < | > >  Approach 2|  green (vph)    :                  |A3A4   856(A3) OR  401(A4)      856|
------------- L L T R R  ----------|f.LT capacity in :  0    0    0    0|                                  |
            | T T H T T |ELDER CREEK R| vph (b+e)    :                  |                                  |
            |   H   H   |          |g.Left turn volume :  0    0    0    0|                                |
            | 1     1   |          |  in vph         :                  |                                  |
            | Approach 4:BRADSHAW  |h.Is volume > cap. :                :                                  |
                                   |  (g>f) ?        :                  |                                  |
===================================+================================+==================================|
Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |      |                 |       |                                  |
                                   |      |  8              |       |130(B2)+46(A2)+14(B3B4)+856(A3)   |
            | Approach 3|          |------- 6 6 1            -------|                                  |
3:  LT=  14 | |         | 2:RT=   7|        8 0 4            ^-   7 |          = 1046 vph              |
  TH= 860   | |         |   TH=  40|        | | |            <+  40 |==================================|
  RT=  68   | v         |   LT=   7|        < v >            v+   6 | Step 8. INTERSECTION LEVEL OF    |
-------------            ----------|                                |         SERVICE                  |
                         <--Approach 2 |                            |     (compare step 7 with table 6)|
                                   |                                |              -------             |
                                   |                                |              | C |               |
Approach 1-->                      |                                |              -------             |
-------------            ----------| 130 -^             < ^ >       |==================================|
1:LT= 130   |           ^ | 4: RT=   7 | 97 +>          | + +       | Step 9. RECALCULATE              |
  TH=  97   |           | |   TH= 394 | 23 +v                       |                                  |
  RT=  23   |           | |   LT=  10 |-------          3    -------|Geometric Change:                 |
            | Approach 4|          |      |           1 9    |      |Signal Change:                    |
                                   |      |           0 4 7  |      |Volume Change:                    |
===================================+================================+==================================|
Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                       |
                                   |         (two phase signal)     |                                  |
        --^       A1B2             |           | Approach 3|        |                                  |
        -->                        |           |           |        |                                  |
            <--   A2B1             |           |           |        |                                  |
            v--                    |           |           |        |                                  |
        |   <     B4B3             |-------------      -------------|                                  |
        >   |                      | Approach 1                     |                                  |
   | | AND < ^      A3B4 AND       |                                |                                  |
   v > OR  | |      /OR A4B3       |           See Step 6b.         |                                  |
        |   ^     A3A4             |                                |                                  |
        v   |                      |                     Approach 2 |                                  |
                                   |-------------      -------------|                                  |
                                   |           |           |        |                                  |
-----------------------------------|           |           |        |                                  |
A1 -->   A3 |     B1 v--    B3   <|  |           |           |        |                                  |
            v ^                  | | |           | Approach 4|        | Exclusive right turns reduced 30 %|
A2 <--   A4   |   B2 --^    B4 |>  |                                | V/C Ratio = .76                  |
==========================================================================================
```

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                          Critical Movement Analysis: PLANNING
                                   Calculation Form 1
Intersection: BRADSHAW RD AND FLORIN RD                            Design Hour: AM
Problem Statement: EXIST
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR         |
              | Approach 3:BRADSHAW RD  |                 -------Approach-----|          MULTIPHASE SIGNAL OVERLAP     |
              | 1   1   1 |      ^      |                 : -1-  -2-  -3-  -4-|        Possible    Volume     Adjusted|
              |  R   L    |      N      |a.No. of change  :  0    0    0    0|Prob-   Critical  Carryover   Critical|
FLORIN RD     | R T T T L |             |  intervals/hour  :                  |able     Volume    to next     Volume |
------------   T H H H T   -------------|b.LT capacity on  :  0    0    0    0|Phase    in vph     phase      in vph |
  Approach 1   < < | > >    ^--RT        |  change (vph)    :                  |-----------------------------------------|
   1  LT--^      v v v     <^-RTH  1     |c.G/C ratio       :  0    0    0    0|B2B1    16(B1)   40-   16=  24(B2)    16|
      LTH->                <--TH         |d.Opposing volume :  0    0    0    0|A1B2    24(B2)  124-   24= 100(A1)    24|
       TH-->               <v-LTH        |  in vph          :                  |A1A2   175(A2) OR  100(A1)             175|
   1  RTH-v>     ^ ^ ^      v--LT  1     |e.LT capacity on  :  0    0    0    0|B4B3     3(B4)   56-    3=  53(B3)     3|
      RT--v    < < | > >   Approach 2    |  green (vph)     :                  |A4B3    53(B3) 1000-   53= 947(A4)    53|
------------   L L T R R   -------------|f.LT capacity in  :  0    0    0    0|A3A4   947(A4) OR  367(A3)             947|
              | T T H T T |FLORIN RD    |  vph (b+e)       :                  |                                         |
              |   H   H   |             |g.Left turn volume :  0    0    0    0|                                         |
              | 1     1   |             |  in vph          :                  |                                         |
              | Approach 4:BRADSHAW     |h.Is volume > cap. :                 :|                                         |
                                        |  (g>f) ?         :                  |                                         |
=========================================+======================================+=========================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES         |
                                         |        |                     |       |                                         |
                                         |        |  3                  |       |40(B1B2)+175(A2)+56(B4B3)+947(A4)        |
              | Approach 3|              |-------  8 6                  -------|                                         |
 3:  LT=   3  | |         | 2:RT=   3    |         2 7 3                ^+   3 |            = 1218 vph                   |
   TH= 367    | |         |   TH= 172    |         | | |                <+ 172 |=========================================|
   RT=  82    | v         |   LT=  16    |         < v >                v-  16 | Step 8. INTERSECTION LEVEL OF           |
------------               -------------|                                      |          SERVICE                        |
                          <--Approach 2 |                                      |      (compare step 7 with table 6)      |
                                         |                                      |              -------                    |
                                         |                                      |              |  D  |                    |
 Approach 1-->                           |                                      |              -------                    |
------------               -------------|  40 -^                 < ^ >         |=========================================|
 1:LT=  40    |          ^ | 4: RT=  46  |  78 +>                 | + +         | Step 9. RECALCULATE                     |
   TH=  78    |          | |   TH= 954   |  46 +v                               |                                         |
   RT=  46    |          | |   LT=  56   |-------                  9     -------|Geometric Change:                        |
              | Approach 4|              |        |              5 5 4 |        |Signal Change:                           |
                                         |        |              6 4 6 |        |Volume Change:                           |
=========================================+======================================+=========================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                                |
                                         |          (two phase signal)          |                                         |
        --^ v--   B2B1                   |            | Approach 3|             |                                         |
                                         |            |           |             |                                         |
     --^ AND <--     A1B2 AND            |            |           |             |                                         |
     --> OR  v--     /OR A2B1            |            |           |             |                                         |
        --> <--   A1A2                   |-------------           -------------|                                         |
                                         | Approach 1                           |                                         |
         |   <    B4B3                   |                                      |                                         |
         >   |                           |           See Step 6b.               |                                         |
     | | AND < ^     A3B4 AND            |                                      |                                         |
     v > OR  | |     /OR A4B3            |                         Approach 2   |                                         |
         |   ^    A3A4                   |-------------            ------------|                                         |
         v   |                           |            |           |             |                                         |
-----------------------------------------|            |           |             |                                         |
 A1 -->    A3 |      B1 v--     B3   <|  |            |           |             |                                         |
             v ^                      | | |            | Approach 4|             | Exclusive right turns reduced 30 %      |
 A2 <--    A4   |    B2 --^     B4 |>    |                                      | V/C Ratio = .89                         |
==========================================================================================
```

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                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW                                  Design Hour: PM
Problem Statement: EXIST
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR |
            | Approach 3:BRADSHAW     |               -------Approach-----|          MULTIPHASE SIGNAL OVERLAP |
            | 1   1   1 |      ^      |               : -1-  -2-  -3-  -4-|       Possible  Volume    Adjusted|
            |  R    L   |      N      |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover Critical|
JACKSON HWY | R T T T L |             | intervals/hour   :                  |able    Volume   to next   Volume |
----------- T H H H T  ---------------|b.LT capacity on  :  0    0    0    0|Phase   in vph   phase     in vph |
 Approach 1  < < | > >   ^--RT  1     | change (vph)     :                  |------------------------------------|
  1 LT--^     v v v     <^-RTH        |c.G/C ratio       :  0    0    0    0|B2B1    28(B1)  191-  28= 163(B2)  28|
    LTH-^>              <--TH   1     |d.Opposing volume :  0    0    0    0|A1B2   163(B2)  433- 163= 270(A1) 163|
  1  TH-->              <v-LTH        | in vph           :                  |A1A2   270(A1) OR  156(A2)        270|
    RTH-v>    ^ ^ ^      v--LT  1     |e.LT capacity on  :  0    0    0    0|B4B3    37(B3)  165-  37= 128(B4)  37|
  1 RT--v    < < | > >   Approach 2   | green (vph)      :                  |A3B4   128(B4)  861- 128= 733(A3) 128|
-----------  L L T R R  --------------|f.LT capacity in  :  0    0    0    0|A3A4   733(A3) OR  510(A4)        733|
            | T T H T T |JACKSON HWY  | vph (b+e)        :                  |                                    |
            |  H   H    |             |g.Left turn volume :  0    0    0    0|                                    |
            | 1   1   1 |             | in vph           :                  |                                    |
            | Approach 4:BRADSHAW     |h.Is volume > cap. :                 :                                    |
                                      | (g>f) ?          :                  |                                    |
======================================+===================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                      |        |                    |       |                                    |
                                      |        | 1 8 1              |       |191(B1B2)+270(A1)+165(B3B4)+733(A3) |
            | Approach 3|             |-------  8 6 6             -------|                                    |
3:  LT= 165 | |          | 2:RT=  76  |         2 1 5             ^-  76  |          = 1359 vph                |
   TH= 861  | |          |   TH= 156  |         | | |             <- 156  |====================================|
   RT= 182  | v          |   LT=  28  |         < v >             v-  28  | Step 8. INTERSECTION LEVEL OF      |
-----------              -------------|                                   |         SERVICE                    |
                         <--Approach 2|                                   |     (compare step 7 with table 6)  |
                                      |                                   |              -------               |
                                      |                                   |              | E |                 |
 Approach 1-->                        |                                   |              -------               |
-----------              -------------| 191 -^                 < ^ >      |====================================|
 1:LT= 191  |            ^ | 4: RT=  20 | 433 ->                | | |      | Step 9. RECALCULATE                |
   TH= 433  |            | |   TH= 510 |  40 -v                          |                                    |
   RT=  40  |            | |   LT=  37 |-------                  5   -------|Geometric Change:                  |
            | Approach 4|             |        |              3 1 2 |     |Signal Change:                      |
                                      |        |              7 0 0 |     |Volume Change:                      |
======================================+===================================+====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                      |         (two phase signal)        |                                    |
        --^ v--  B2B1                 |            | Approach 3|          |                                    |
                                      |            |           |          |                                    |
    --^ AND <--     A1B2 AND          |            |           |          |                                    |
    --> OR  v--     /OR A2B1          |            |           |          |                                    |
        --> <--  A1A2                 |------------            -----------|                                    |
                                      | Approach 1                        |                                    |
         |  <    B4B3                 |                                   |                                    |
         >  |                         |          See Step 6b.             |                                    |
   | | AND < ^      A3B4 AND          |                                   |                                    |
   v > OR  | |      /OR A4B3          |                        Approach 2 |                                    |
         |  ^    A3A4                 |------------            -----------|                                    |
         v  |                         |            |           |          |                                    |
--------------------------------------|            |           |          |                                    |
A1 -->   A3 |     B1 v--    B3    <|  |            |           |          |                                    |
           v ^                    | | |            | Approach 4|          | Exclusive right turns reduced 30 % |
A2 <--   A4  |    B2 --^    B4  |>    |                                   | V/C Ratio = .99                    |
=================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: BRADSHAW RD AND ELDER CREEK RD                         Design Hour: AM
Problem Statement: EXIST
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:BRADSHAW  |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1   1   1 |     ^    |               : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
             |  R   L    |     N    |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover Critical|
ELDER CREEK R| R T T T L |          |  intervals/hour :                 |able   Volume   to next   Volume |
------------- T H H H T ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
  Approach 1  < < | > >   ^--RT  1  |  change (vph)   :                 |---------------------------------|
   1  LT--^     v v v    <^-RTH     |c.G/C ratio      :  0    0    0    0|A1B2   45(B2) OR   44(A1)       45|
      LTH-^>             <--TH      |d.Opposing volume:  0    0    0    0|A2B1  136(A2) OR    1(B1)      136|
       TH-->             <v-LTH  1  |  in vph         :                 |B4B3    6(B4)  54-   6=  48(B3)  6|
   1  RTH-v>    ^ ^ ^     v--LT     |e.LT capacity on :  0    0    0    0|A4B3   48(B3) 870-  48= 822(A4) 48|
      RT--v   < < | > >   Approach 2|  green (vph)    :                 |A3A4  822(A4) OR  365(A3)      822|
------------- L L T R R ------------|f.LT capacity in :  0    0    0    0|                                 |
             | T T H T T |ELDER CREEK R| vph (b+e)    :                 |                                 |
             |  H   H    |          |g.Left turn volume:  0    0    0   0|                                 |
             | 1    1    |          |  in vph         :                 |                                 |
             | Approach 4:BRADSHAW  |h.Is volume > cap.:                :                                 |
                                    |  (g>f) ?        :                 |                                 |
====================================+=================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |        |                  |     |                                 |
                                    |        | 1 3              |     |45(B2)+136(A2)+54(B4B3)+822(A4)  |
             | Approach 3|          |-------   3 6              -------|                                 |
 3:  LT=   6 | |         | 2:RT=   8|          6 5 6          ^-   8  |         = 1057 vph              |
   TH= 365   | |         |   TH= 135|          | | |          <+ 135  |=================================|
   RT= 136   | v         |   LT=   2|          < v >          v+   1  | Step 8. INTERSECTION LEVEL OF   |
-------------             -----------|                                |         SERVICE                 |
                        <--Approach 2|                                |    (compare step 7 with table 6)|
                                    |                                 |            -------              |
                                    |                                 |            |  C  |            |
 Approach 1-->                      |                                 |            -------              |
-------------             ------------|  45 -^               < ^ >      |=================================|
 1:LT=  45   |           ^ | 4: RT=   2|  36 +>               | + +      | Step 9. RECALCULATE             |
   TH=  36   |           | |   TH= 868|   8 +v                          |                                 |
   RT=   8   |           | |   LT=  54|-------              8    -------|Geometric Change:                |
             | Approach 4|          |        |           5 6  |       |Signal Change:                   |
                                    |        |           4 8 2 |      |Volume Change:                   |
====================================+=================================+=================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                      |
                                    |        (two phase signal)       |                                 |
         --^        A1B2            |           | Approach 3|         |                                 |
         -->                        |           |           |         |                                 |
             <--    A2B1            |           |           |         |                                 |
             v--                    |           |           |         |                                 |
          |   <     B4B3            |-------------        ------------|                                 |
          >   |                     |  Approach 1                     |                                 |
      | | AND < ^      A3B4 AND     |                                 |                                 |
      v > OR  | |      /OR A4B3     |          See Step 6b.           |                                 |
          |   ^     A3A4            |                                 |                                 |
          v   |                     |                      Approach 2 |                                 |
                                    |-------------        ------------|                                 |
                                    |           |           |         |                                 |
------------------------------------|           |           |         |                                 |
 A1 -->    A3 |      B1 v--     B3  <|          |           |         |                                 |
             v ^                   | ||         | Approach 4|         | Exclusive right turns reduced 30 %|
 A2 <--    A4  |     B2 --^     B4 |> |                               | V/C Ratio = .77                 |
==========================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
ntersection: BRADSHAW RD AND FLORIN RD                            Design Hour: PM
roblem Statement: EXIST
=============================================================================================
Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:BRADSHAW RD |                 -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
            | 1   1   1 |      ^     |                   : -1-  -2-  -3-  -4-|   Possible   Volume   Adjusted|
            |   R   L   |      N     |a.No. of change    :  0    0    0    0|Prob- Critical Carryover Critical|
LORIN RD    | R T T T L |            |  intervals/hour   :                  |able  Volume  to next   Volume |
----------- T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase in vph   phase    in vph |
 Approach 1   < < | > >   ^--RT     |  change (vph)     :                  |--------------------------------|
  1 LT--^      v v v     <^-RTH  1  |c.G/C ratio        :  0    0    0    0|B2B1  31(B1) 101-  31=  70(B2)  31|
    LTH-^>               <--TH      |d.Opposing volume  :  0    0    0    0|A1B2  70(B2) 201-  70= 131(A1)  70|
     TH-->               <v-LTH     |  in vph           :                  |A1A2 133(A2) OR  131(A1)        133|
  1 RTH-v>     ^ ^ ^      v--LT  1  |e.LT capacity on   :  0    0    0    0|B4B3   2(B4)  24-   2=  22(B3)   2|
    RT--v     < < | > >   Approach 2|  green (vph)      :                  |A4B3  22(B3) 332-  22= 310(A4)  22|
-----------   L L T R R  -----------|f.LT capacity in   :  0    0    0    0|A3A4 874(A3) OR  310(A4)        874|
            | T T H T T |FLORIN RD  |  vph (b+e)        :                  |                                 |
            |   H   H   |           |g.Left turn volume :  0    0    0    0|                                 |
            | 1     1   |           |  in vph           :                  |                                 |
            | Approach 4:BRADSHAW   |h.Is volume > cap. :                  :                                 |
                                    |  (g>f) ?          :                  |                                 |
====================================+===================================+=================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |       |                    |      |                                 |
                                    |       | 1 8                |      |101(B1B2)+133(A2)+24(B4B3)+874(A3)|
            | Approach 3|           |-------  2 7                -------|                                 |
3:  LT=   2 | |         | 2:RT=   9 |         3 4 2              ^+   9 |        = 1132 vph               |
   TH= 874  | |         |   TH= 124 |         | | |              <+ 124 |=================================|
  RT= 123   | v         |   LT=  31 |         < v >              v-  31 | Step 8. INTERSECTION LEVEL OF   |
-------------           ------------|                                   |        SERVICE                  |
                        <--Approach 2|                                  |     (compare step 7 with table 6)|
                                    |                                   |              -------            |
                                    |                                   |              | D |            |
Approach 1-->                       |                                   |              -------            |
------------            ------------| 101 -^               < ^ >        |=================================|
1:LT= 101   |        ^ | 4: RT=  14 | 138 +>               | + +        | Step 9. RECALCULATE             |
  TH= 138   |        | |    TH= 318 |  63 +v                            |                                 |
  RT=  63   |        | |    LT=  24 |-------                3   -------|Geometric Change:                |
            | Approach 4|           |       |              2 1 1 |      |Signal Change:                   |
                                    |       |              4 8 4 |      |Volume Change:                   |
====================================+===================================+=================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                    |         (two phase signal)        |                                 |
        --^ v--  B2B1               |           | Approach 3|           |                                 |
                                    |           |           |           |                                 |
    --^ AND <--     A1B2 AND        |           |           |           |                                 |
    --> OR  v--     /OR A2B1        |           |           |           |                                 |
        --> <--  A1A2               |-------------          ------------|                                 |
                                    | Approach 1                        |                                 |
        |   <    B4B3               |                                   |                                 |
        >   |                       |           See Step 6b.            |                                 |
    | | AND < ^     A3B4 AND        |                                   |                                 |
    v > OR  | |     /OR A4B3        |                     Approach 2    |                                 |
        |   ^    A3A4               |-------------          ------------|                                 |
        v   |                       |           |           |           |                                 |
------------------------------------|           |           |           |                                 |
A1 -->   A3 |     B1 v--     B3   <| |           |           |           |                                 |
           v ^                    | | |         | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--   A4   |   B2 --^     B4 |>  |                                   | V/C Ratio = .82                 |
=============================================================================================
```

```
                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: ELK GROVE-FLORIN AND GERBER RD                      Design Hour: AM
Problem Statement: EXIST
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
          | Approach 3:ELK GROVE-FLO|             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP  |
          |  1     1 |     ^      |             : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
          |  R   L   |     N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD | R T T T L |            |  intervals/hour  :                  |able   Volume    to next    Volume |
------------ T H H H T -----------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT     |  change (vph)    :                  |----------------------------------|
  1  LT--^    v v v    <^-RTH  1   |c.G/C ratio       :  0    0    0    0|B2B1    24(B1)   56-  24=  32(B2)   24|
     LTH-^>            <--TH   1   |d.Opposing volume :  0    0    0    0|A1B2    32(B2)  280-  32= 248(A1)   32|
  1   TH-->            <v-LTH      |  in vph          :                  |A1A2   248(A1) OR  137(A2)          248|
     RTH-v>   ^ ^ ^    v--LT   1   |e.LT capacity on  :  0    0    0    0|B4B3    11(B4)  752-  11= 741(B3)   11|
  1  RT--v   < < | > >  Approach 2 |  green (vph)     :                  |A4B3   741(B3)  762- 741=  21(A4)  741|
------------ L L T R R ------------|f.LT capacity in  :  0    0    0    0|A3A4   388(A3) OR   21(A4)          388|
          | T T H T T |GERBER RD   |  vph (b+e)       :                  |                                  |
          |   H   H   |            |g.Left turn volume :  0    0    0    0|                                  |
          | 1     1   |            |  in vph          :                  |                                  |
          | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                  :                                  |
                                   |  (g>f) ?         :                  |                                  |
===================================+==================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |         |                   |   |                                  |
                                   |         | 1 2               |   |56(B1B2)+248(A1)+752(B4B3)+388(A3)|
            | Approach 3|          |-------   0 8 1        -------|                                  |
 3:  LT=  11 | |        | 2:RT=  11 |          1 7 1            ^+  11 |          = 1444 vph            |
   TH= 287 | |        |   TH= 263 |          + + |            <+ 126 |==================================|
  RT= 101  | v        |   LT=  24 |          < v >            <- 137 | Step 8. INTERSECTION LEVEL OF    |
------------           ------------|                           v-  24 |          SERVICE                 |
                     <--Approach 2 |                                   |     (compare step 7 with table 6)|
                                   |                                   |              -------             |
                                   |                                   |              |  F  |             |
 Approach 1-->                     |                                   |              -------             |
------------           ------------|  56 -^               < ^ >        |==================================|
 1:LT=  56  |           ^ | 4: RT=  77 | 280 ->              | + +        | Step 9. RECALCULATE              |
   TH= 280  |           | |   TH= 685 | 269 -v                          |                                  |
   RT= 269  |           | |   LT= 752 |-------              7 6   -------|Geometric Change:                 |
            | Approach 4|           |        |             5 8 7 |      |Signal Change:                    |
                                   |        |             2 5 7 |      |Volume Change:                    |
===================================+==================================+==================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                   |        (two phase signal)         |                                  |
        --^ v--  B2B1              |           | Approach 3|           |                                  |
                                   |           |           |           |                                  |
    --^ AND <--     A1B2 AND       |           |           |           |                                  |
    --> OR  v--     /OR A2B1       |           |           |           |                                  |
        --> <--  A1A2              |------------           ------------|                                  |
                                   | Approach 1                        |                                  |
         |  <   B4B3               |                                   |                                  |
         >  |                      |        See Step 6b.               |                                  |
   | | AND < ^      A3B4 AND       |                                   |                                  |
   v > OR  | |      /OR A4B3       |                      Approach 2   |                                  |
         |  ^   A3A4               |------------           ------------|                                  |
         v  |                      |           |           |           |                                  |
-----------------------------------|           |           |           |                                  |
 A1 -->   A3 |      B1 v--    B3   <| |           |           |           |                                  |
            v ^                  | | |           | Approach 4|           | Exclusive right turns reduced 30 %|
 A2 <--   A4  |     B2 --^    B4 |> |                                   | V/C Ratio = 1.05                 |
===============================================================================================
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                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
ntersection: ELK GROVE-FLORIN AND GERBER RD                                  Design Hour: PM
Problem Statement: EXIST
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR     |
          | Approach 3:ELK GROVE-FLO|                -------Approach-----|       MULTIPHASE SIGNAL OVERLAP    |
          |  1     1 |     ^        |                : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
          |  R    L  |     N        |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover Critical|
ERBER RD  | R T T T L |             | intervals/hour :                 |able    Volume   to next    Volume |
------------ T H H H T  ------------|b.LT capacity on:  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT      | change (vph)   :                 |------------------------------------|
  1  LT--^     v v v    <^-RTH  1   |c.G/C ratio     :  0    0    0    0|B2B1    87(B1)  102-  87=  15(B2)  87|
     LTH-^>             <--TH   1   |d.Opposing volume:  0    0    0   0|A1B2    15(B2)  585-  15= 570(A1)  15|
  1   TH-->             <v-LTH      | in vph         :                 |A1A2   570(A1) OR  157(A2)        570|
     RTH-v>    ^ ^ ^     v--LT  1   |e.LT capacity on:  0    0    0    0|B4B3    46(B4)  336-  46= 290(B3)  46|
  1  RT--v   < < | > >   Approach 2 | green (vph)    :                 |A4B3   290(B3)  408- 290= 118(A4) 290|
------------ L L T R R  ------------|f.LT capacity in:  0    0    0    0|A3A4   784(A3) OR  118(A4)        784|
          | T T H T T |GERBER RD    | vph (b+e)      :                 |                                    |
          |   H   H   |             |g.Left turn volume: 0   0    0    0|                                    |
          | 1     1   |             | in vph         :                 |                                    |
          | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :               :                                    |
                                    | (g>f) ?        :                 |                                    |
====================================+==================================+====================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |      |                     |     |                                    |
                                    |      | 1 6                 |     |102(B1B2)+570(A1)+336(B4B3)+784(A3) |
          | Approach 3|             |-------  2 5 4             -------|                                    |
3:  LT=  46 | |       | 2:RT=  15   |         6 8 6             ^+  15 |          = 1792 vph                |
  TH= 658  | |        |   TH= 299   |         + + |             <+ 142 |====================================|
  RT= 126  | v        |   LT=  87   |         < v >             <- 157 | Step 8. INTERSECTION LEVEL OF      |
------------            ------------|                           v-  87 |        SERVICE                     |
                      <--Approach 2 |                                  |    (compare step 7 with table 6)   |
                                    |                                  |              -------               |
                                    |                                  |              |  F  |             |
Approach 1-->                       |                                  |              -------               |
------------            ------------| 102 -^               < ^ >       |====================================|
1:LT= 102  |          ^ | 4: RT=  23 | 274 ->               | + +     | Step 9. RECALCULATE                |
  TH= 274  |          | |    TH= 385 | 835 -v                          |                                    |
  RT= 835  |          | |   LT= 336 |-------               3 3  -------|Geometric Change:                   |
           | Approach 4|            |      |               3 8 2 |     |Signal Change:                      |
                                    |      |               6 5 3 |     |Volume Change:                      |
====================================+==================================+====================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                    |       (two phase signal)         |                                    |
      --^ v--  B2B1                 |          | Approach 3|           |                                    |
                                    |          |           |           |                                    |
   --^ AND <--     A1B2 AND         |          |           |           |                                    |
   --> OR  v--     /OR A2B1         |          |           |           |                                    |
      --> <--  A1A2                 |-----------           ------------|                                    |
                                    | Approach 1                       |                                    |
        |  <   B4B3                 |                                  |                                    |
        >  |                        |          See Step 6b.            |                                    |
   | | AND < ^     A3B4 AND         |                                  |                                    |
   v > OR  | |     /OR A4B3         |                      Approach 2  |                                    |
        |  ^   A3A4                 |-----------           ------------|                                    |
        v  |                        |          |           |           |                                    |
------------------------------------|          |           |           |                                    |
A1 -->  A3 |      B1 v--   B3   <|  |          |           |           |                                    |
          v ^                  | |  |          | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--  A4  |     B2 --^   B4  |>   |                                  | V/C Ratio = 1.3                    |
==========================================================================================
```

ATTACHMENT 5E

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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: BRADSHAW AND GERBER RD                                   Design Hour: AM
Problem Statement: EXIST
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR    |
              | Approach 3:BRADSHAW RD |               -------Approach-----|          MULTIPHASE SIGNAL OVERLAP |
              | 1   1   1 |      ^     |               : -1-  -2-  -3-  -4-|        Possible    Volume     Adjusted|
              |  R   L    |      N     |a.No. of change  :   0    0    0    0|Prob-   Critical  Carryover   Critical|
GERBER RD     | R T T T L |            |  intervals/hour :                  |able    Volume    to next     Volume |
------------- T H H H T  -------------|b.LT capacity on :   0    0    0    0|Phase   in vph     phase      in vph |
  Approach 1   < < | > >   ^--RT       |  change (vph)   :                  |-----------------------------------|
   1  LT--^     v v v     <^-RTH  1    |c.G/C ratio      :   0    0    0    0|B2B1     6(B1)  206-   6= 200(B2)    6|
      LTH-^>              <--TH        |d.Opposing volume:   0    0    0    0|A1B2   200(B2)  101- 200=   0(A1)  200|
       TH-->              <v-LTH       |  in vph         :                  |A1A2   132(A2) OR    0(A1)         132|
   1  RTH-v>    ^ ^ ^      v--LT  1    |e.LT capacity on :   0    0    0    0|B4B3    11(B4)   38-  11=  27(B3)   11|
      RT--v    < < | > >  Approach 2   |  green (vph)    :                  |A4B3    27(B3)  777-  27= 750(A4)   27|
------------- L L T R R  -------------|f.LT capacity in :   0    0    0    0|A3A4   750(A4) OR  241(A3)          750|
              | T T H T T |GERBER RD   |  vph (b+e)      :                  |                                   |
              |   H   H   |            |g.Left turn volume:  0    0    0    0|                                   |
              | 1     1   |            |  in vph         :                  |                                   |
              | Approach 4:BRADSHAW RD |h.Is volume > cap.:                  :                                   |
                                       |  (g>f) ?        :                  |                                   |
=======================================+===================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES   |
                                       |       |                     |     |                                   |
                                       |       |  2                  |     |206(B1B2)+132(A2)+38(B4B3)+750(A4) |
              | Approach 3|            |-------  6 4 1              -------|                                   |
 3:  LT=  11  | |         | 2:RT=  48  |         4 1 1              ^+  48 |          = 1126 vph               |
   TH= 241    | |         |   TH=  84  |         | | |              <+  84 |===================================|
   RT=  64    | v         |   LT=   6  |         < v >              v-   6 | Step 8. INTERSECTION LEVEL OF     |
-------------             -------------|                                   |         SERVICE                   |
                          <--Approach 2|                                   |      (compare step 7 with table 6)|
                                       |                                   |              -------              |
                                       |                                   |              | D |                |
 Approach 1-->                         |                                   |              -------              |
-------------             -------------| 206 -^                 < ^ >      |===================================|
 1:LT= 206    |         ^ | 4: RT=  22 |  84 +>                 | + +      | Step 9. RECALCULATE               |
   TH=  84    |         | |    TH= 755 |  17 +v                           |                                   |
   RT=  17    |         | |   LT=  38  |-------                  7  -------|Geometric Change:                  |
              | Approach 4|            |       |               3 5 2 |     |Signal Change:                     |
                                       |       |               8 5 2 |     |Volume Change:                     |
=======================================+===================================+===================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                          |
                                       |         (two phase signal)        |                                   |
          --^ v--   B2B1               |            | Approach 3|          |                                   |
                                       |            |           |          |                                   |
      --^ AND <--      A1B2 AND        |            |           |          |                                   |
      --> OR  v--      /OR A2B1        |            |           |          |                                   |
          --> <--   A1A2               |------------             ----------|                                   |
                                       | Approach 1                        |                                   |
            |  <    B4B3               |                                   |                                   |
            >  |                       |             See Step 6b.          |                                   |
      | | AND < ^      A3B4 AND        |                                   |                                   |
      v > OR  | |      /OR A4B3        |                        Approach 2 |                                   |
            |  ^    A3A4               |------------             ----------|                                   |
            v  |                       |            |           |          |                                   |
---------------------------------------|            |           |          |                                   |
 A1 -->   A3 |       B1 v--    B3  <|  |            |           |          |                                   |
            v ^                    | | |            | Approach 4|          | Exclusive right turns reduced 30 %|
 A2 <--   A4  |      B2 --^    B4 |>   |                                   | V/C Ratio = .82                   |
===========================================================================================
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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
ıtersection: BRADSHAW AND GERBER RD                                Design Hour: PM
..oblem Statement: EXIST
=================================================================================================
ʾtep 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:BRADSHAW RD |          -------Approach-----|         MULTIPHASE SIGNAL OVERLAP  |
            | 1   1   1 |    ^      |                : -1-  -2-  -3-  -4-|    Possible   Volume    Adjusted|
            |  R   L    |    N      |a.No. of change   :  0    0    0    0|Prob-  Critical Carryover Critical|
ːRBER RD    | R T T T L |           |  intervals/hour  :                  |able   Volume   to next   Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1   < < | > >   ^--RT     |  change (vph)    :                  |-----------------------------------|
  1  LT--^     v v v     <^-RTH  1  |c.G/C ratio       :  0    0    0    0|B2B1    17(B1)  105-  17=  88(B2)   17|
    LTH-^>               <--TH      |d.Opposing volume :  0    0    0    0|A1B2    88(B2)  120-  88=  32(A1)   88|
     TH-->               <v-LTH     |  in vph          :                  |A1A2   115(A2) OR    32(A1)       115|
  1  RTH-v>    ^ ^ ^      v--LT  1  |e.LT capacity on  :  0    0    0    0|B4B3    22(B3)   44-  22=  22(B4)   22|
    RT--v     < < | > >  Approach 2  |  green (vph)     :                  |A3B4    22(B4)  671-  22= 649(A3)   22|
------------ L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   649(A3) OR   217(A4)       649|
            | T T H T T |GERBER RD  |  vph (b+e)       :                  |                                   |
            |   H   H   |           |g.Left turn volume :  0    0    0    0|                                  |
            | 1     1   |           |  in vph          :                  |                                   |
            | Approach 4:BRADSHAW RD |h.Is volume > cap. :                 :                                   |
                                    |  (g>f) ?         :                  |                                   |
====================================+================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |       |                   |     |                                   |
                                    |       | 2 6               |     |105(B1B2)+115(A2)+44(B3B4)+649(A3) |
            | Approach 3|           |-------  1 7 4              -------|                                   |
3:  LT=  44 | |         | 2:RT=  26 |         3 1 4              ^+  26 |          = 913 vph               |
   TH= 671  | |         |   TH=  89 |         | | |              <+  89 |===================================|
   RT= 213  | v         |   LT=  17 |         < v >              v-  17 | Step 8. INTERSECTION LEVEL OF   |
-------------           -------------|                                |         SERVICE                  |
                        <--Approach 2|                                |     (compare step 7 with table 6) |
                                    |                                 |              -------              |
                                    |                                 |              | B |              |
Approach 1-->                       |                                 |              -------              |
-------------           -------------| 105 -^                 < ^ >   |===================================|
1:LT= 105   |             ^ | 4: RT=  6 | 82 +>               | + +   | Step 9. RECALCULATE             |
  TH=  82   |             | |   TH= 211 | 38 +v                       |                                   |
  RT=  38   |             | |   LT=  22 |-------                2  -------|Geometric Change:                |
            | Approach 4|           |       |               2 1 |     |Signal Change:                     |
                                    |       |               2 1 6 |   |Volume Change:                     |
====================================+================================+====================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                    |        (two phase signal)      |                                    |
      --^ v--  B2B1                 |           | Approach 3|         |                                    |
                                    |           |           |         |                                    |
    --^ AND <--     A1B2 AND        |           |           |         |                                    |
    --> OR  v--     /OR A2B1        |           |           |         |                                    |
      --> <--  A1A2                 |-----------             ---------|                                    |
                                    | Approach 1                      |                                    |
       |   <   B4B3                 |                                 |                                    |
       >   |                        |        See Step 6b.             |                                    |
   | | AND < ^      A3B4 AND        |                                 |                                    |
   v > OR  | |      /OR A4B3        |                   Approach 2    |                                    |
       |   ^   A3A4                 |-----------             ---------|                                    |
       v   |                        |           |           |         |                                    |
------------------------------------|           |           |         |                                    |
A1 -->   A3 |      B1 v--     B3   <|           |           |         |                                    |
           v ^                   | ||           | Approach 4|         | Exclusive right turns reduced 30 % |
A2 <--   A4   |    B2 --^     B4 |> |                                 | V/C Ratio = .66                    |
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                         Critical Movement Analysis: PLANNING
                                   Calculation Form 1
Intersection: ELK GROVE-FLORIN AND CALVINE RD                      Design Hour: AM
Problem Statement: EXISTING
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR      |
              | Approach 3:ELK GROVE-FLO|             -------Approach-----|         MULTIPHASE SIGNAL OVERLAP  |
              |  1 1   1 |      ^     |                 : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
              |  R   L   |      N     |a.No. of change  :   0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE ROAD  | R T T T L |           |  intervals/hour :                   |able    Volume   to next    Volume |
------------- T H H H T  ------------|b.LT capacity on :   0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1   < < | > >    ^--RT     |  change (vph)   :                   |-------------------------------------|
   2  LT--^     v v v    <^-RTH  1   |c.G/C ratio      :   0    0    0    0|B2B1    32(B2)   51-  32=  19(B1)   32|
     LTH-^>              <--TH        |d.Opposing volume :  0    0    0    0|A2B1    19(B1)  233-  19= 214(A2)   19|
       TH-->             <v-LTH       |  in vph         :                   |A1A2   223(A1) OR  214(A2)        223|
   1  RTH-v>    ^ ^ ^     v--LT  2   |e.LT capacity on :   0    0    0    0|B4B3    27(B4)  122-  27=  95(B3)   27|
      RT--v   < < | > >  Approach 2   |  green (vph)    :                   |A4B3    95(B3)  282-  95= 187(A4)   95|
------------- L L T R R  ------------|f.LT capacity in :   0    0    0    0|A3A4   318(A3) OR  187(A4)        318|
              | T T H T T |CALVINE ROAD|  vph (b+e)      :                   |                                     |
              |   H   H   |           |g.Left turn volume :  0    0    0    0|                                     |
              | 1   1 1   |           |  in vph         :                   |                                     |
              | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                 :                                     |
                                      |  (g>f) ?        :                   |                                     |
======================================+====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |         |                      |    |                                     |
                                      |         | 2 1 3                |    |51(B2B1)+223(A1)+122(B4B3)+318(A3)   |
              | Approach 3|           |-------  1 0 1 2            -------|                                     |
 3:  LT=  27 | |         | 2:RT=  43  |         5 3 8 7              ^+  43 |        = 714 vph                    |
    TH= 420  | |         |   TH= 190  |         + + | |              <+ 190 |=====================================|
   RT= 215   | v         |   LT=  91  |         < v v >              v-  41 | Step 8. INTERSECTION LEVEL OF       |
-------------            -------------|                              v-  51 |         SERVICE                     |
                          <--Approach 2 |                                   |      (compare step 7 with table 6)  |
                                      |                                     |              -------                |
                                      |                                     |              | A |                  |
 Approach 1-->                        |  32 -^                              |              -------                |
-------------            -------------|  26 -^            < ^ ^ >          |=====================================|
 1:LT=  57   |           ^ | 4: RT=  64 | 125 +>             | | + +        | Step 9. RECALCULATE                 |
   TH= 125   |           | |   TH= 500 |  98 +v                             |                                     |
   RT=  98   |           | |  LT= 122  |-------             1 2 2    -------|Geometric Change:                    |
             | Approach 4|            |        |           2 8 1 6 |        |Signal Change:                       |
                                      |        |           2 2 8 4 |        |Volume Change:                       |
======================================+====================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                            |
                                      |         (two phase signal)         |                                     |
        --^ v--  B2B1                 |             | Approach 3|          |                                     |
                                      |             |           |          |                                     |
    --^ AND <--     A1B2 AND          |             |           |          |                                     |
    --> OR  v--     /OR A2B1          |             |           |          |                                     |
        --> <--  A1A2                 |-------------             ------------|                                     |
                                      | Approach 1                         |                                     |
         |  <    B4B3                 |                                    |                                     |
         >  |                         |          See Step 6b.              |                                     |
    | | AND < ^     A3B4 AND          |                                    |                                     |
    v > OR  | |     /OR A4B3          |                        Approach 2  |                                     |
         |  ^    A3A4                 |-------------             ------------|                                     |
         v  |                         |             |           |          |                                     |
--------------------------------------|             |           |          |                                     |
 A1 -->   A3 |     B1 v--    B3   <|  |             |           |          |                                     |
             v ^                |  |  |             | Approach 4|          |                                     |
 A2 <--   A4   |   B2 --^    B4 |>    |                                    | V/C Ratio = .52                     |
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                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
ntersection: ELK GROVE-FLORIN AND CALVINE RD                    Design Hour: PM
.roblem Statement: EXISTING
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
          | Approach 3:ELK GROVE-FLO|             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
          |  1 1   1 |      ^       |            : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
          |  R   L   |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ALVINE ROAD | R T T T L |           | intervals/hour  :                  |able   Volume   to next    Volume |
------------ T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT      | change (vph)    :                  |---------------------------------|
 2  LT--^     v v v     <^-RTH  1   |c.G/C ratio      :  0    0    0    0|B2B1   54(B1)   83-  54=  29(B2)   54|
    LTH-^>              <--TH       |d.Opposing volume:  0    0    0    0|A1B2   29(B2)  293-  29= 264(A1)   29|
     TH-->              <v-LTH      | in vph          :                  |A1A2  264(A1) OR  174(A2)        264|
 1  RTH-v>   ^ ^ ^       v--LT  2   |e.LT capacity on :  0    0    0    0|B4B3   49(B4)  108-  49=  59(B3)   49|
    RT--v   < < | > >   Approach 2  | green (vph)     :                  |A4B3   59(B3)  239-  59= 180(A4)   59|
------------ L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4  368(A3) OR  180(A4)        368|
          | T T H T T |CALVINE ROAD | vph (b+e)       :                  |                                 |
          |   H   H   |             |g.Left turn volume:  0    0    0    0|                                 |
          | 1    1 1  |             | in vph          :                  |                                 |
          | Approach 4:ELK GROVE-FLO|h.Is volume > cap.:                 :                                 |
                                    | (g>f) ?         :                  |                                 |
====================================+==================================+=================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |       |                  |       |                                 |
                                    |       | 1 2 3            |       |83(B1B2)+264(A1)+108(B4B3)+368(A3)|
          | Approach 3|             |-------  0 6 6 4           -------|                                 |
3:  LT=  49 | |       | 2:RT=  27   |         0 8 8 9            ^+  27 |         = 823 vph               |
   TH= 636 | |        |   TH= 147   |         + + | |            <+ 147 |=================================|
   RT= 100 | v        |   LT=  97   |         < v v >            v-  44 | Step 8. INTERSECTION LEVEL OF   |
------------          ------------- |                            v-  54 |         SERVICE                 |
                      <--Approach 2 |                                  |   (compare step 7 with table 6) |
                                    |                                  |            -------              |
                                    |                                  |            |  A  |            |
Approach 1-->                       |  83 -^                           |            -------              |
------------          ------------- |  68 -^            < ^ ^ >        |=================================|
1:LT= 149  |          ^ | 4: RT=  64 | 162 +>            | | + +        | Step 9. RECALCULATE             |
  TH= 162  |          | |   TH= 413  | 131 +v                           |                                 |
  RT= 131  |          | |   LT= 108  |-------            1 2 1   -------|Geometric Change:                |
           | Approach 4|             |       |           0 3 7 6 |      |Signal Change:                   |
                                    |       |           8 9 5 4 |      |Volume Change:                   |
====================================+==================================+=================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                    |        (two phase signal)        |                                 |
      --^ v--  B2B1                 |            | Approach 3|         |                                 |
                                    |            |           |         |                                 |
   --^ AND <--    A1B2 AND          |            |           |         |                                 |
   --> OR  v--    /OR A2B1          |            |           |         |                                 |
      --> <--  A1A2                 |-------------      -------------|                                 |
                                    | Approach 1                       |                                 |
        |  <   B4B3                 |                                  |                                 |
        >  |                        |         See Step 6b.             |                                 |
   | | AND < ^    A3B4 AND          |                                  |                                 |
   v > OR  | |    /OR A4B3          |                     Approach 2   |                                 |
        |  ^   A3A4                 |-------------      -------------|                                 |
        v  |                        |            |           |         |                                 |
------------------------------------|            |           |         |                                 |
A1 -->   A3 |      B1 v--    B3   <| |            |           |         |                                 |
           v ^                  | | |            | Approach 4|         |                                 |
A2 <--   A4  |     B2 --^    B4 |>  |                                  | V/C Ratio = .6                  |
==========================================================================================
```

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR...................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... JACKSON HWY

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 25 | 52 | 113 | 3 |
| THRU | 152 | 453 | 17 | 5 |
| RIGHT | 22 | 15 | 47 | 9 |

NUMBER OF LANES AND LANE USAGE

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 2 | 2 | 1 | 1 |

LANE USAGE

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.80 | 5.80 | 0.00 | 5.80 |
| | WB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR THROUGHS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |
| MINOR LEFTS | | | | | |
| | NB | 7.90 | 7.90 | 0.00 | 7.90 |
| | SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... JACKSON HWY
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | | RESERVE CAPACITY $c_R = c_{SH} - v$ | | LOS |
|---|---|---|---|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | | | | | |
| NB LEFT | 138 | 210 | 190 | > | | 190 | > | | 52 > | E |
| THROUGH | 21 | 247 | 229 | > | 246 | 229 | > | 30 | 208 >E | C |
| RIGHT | 57 | 976 | 976 | > | | 976 | > | | 918 > | A |
| MINOR STREET | | | | | | | | | | |
| SB LEFT | 4 | 189 | 160 | > | | 160 | > | | 156 > | D |
| THROUGH | 6 | 246 | 227 | > | 328 | 227 | > | 307 | 221 >B | C |
| RIGHT | 11 | 813 | 813 | > | | 813 | > | | 802 > | A |
| MAJOR STREET | | | | | | | | | | |
| EB LEFT | 31 | 567 | 567 | | | 567 | | | 536 | A |
| WB LEFT | 64 | 840 | 840 | | | 840 | | | 776 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... JACKSON HWY
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

RC = 239 ⇒ LOS C

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IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR...................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... JACKSON HWY

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 10 | 38 | 19 | 4 |
| THRU | 428 | 209 | 2 | 11 |
| RIGHT | 86 | 11 | 68 | 9 |

NUMBER OF LANES AND LANE USAGE

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 2 | 2 | 1 | 1 |

LANE USAGE

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.80 | 5.80 | 0.00 | 5.80 |
| | WB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR THROUGHS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |
| MINOR LEFTS | | | | | |
| | NB | 7.90 | 7.90 | 0.00 | 7.90 |
| | SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... JACKSON HWY
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXIST

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| **MINOR STREET** | | | | | | |
| NB LEFT | 23 | 196 | 176 > | 176 > | 152 > | D |
| THROUGH | 2 | 233 | 219 > | 437 219 > | 328 216 >B | C |
| RIGHT | 83 | 788 | 788 > | 788 > | 705 > | A |
| **MINOR STREET** | | | | | | |
| SB LEFT | 5 | 161 | 141 > | 141 > | 136 > | D |
| THROUGH | 13 | 217 | 204 > | 261 204 > | 232 191 >C | D |
| RIGHT | 11 | 952 | 952 > | 952 > | 941 > | A |
| **MAJOR STREET** | | | | | | |
| EB LEFT | 12 | 793 | 793 | 793 | 780 | A |
| WB LEFT | 46 | 531 | 531 | 531 | 484 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... JACKSON HWY
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXIST

RC = 378 => LOS B

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... ELDER CREEK RD

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 32 | -- | 66 | 43 |
| THRU | 197 | -- | 153 | 27 |
| RIGHT | 6 | -- | 10 | 67 |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | -- | 1 | 2 |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | ----- | --- | --- | - |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | D | 0 | 0 |
| WESTBOUND | --- | --- | --- |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | EB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | NB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | | | | | |
| | EB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... ELDER CREEK RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| EB LEFT | 39 | 490 | 465 > | 465 > | 425 > | A |
| | | | > | 507 > | 461 | >A |
| RIGHT | 7 | 987 | 987 > | 987 > | 980 > | A |
| MAJOR STREET | | | | | | |
| NB LEFT | 81 | 930 | 930 | 930 | 850 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... ELDER CREEK RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

RC= 709 => LOS A

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... ELDER CREEK RD

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 55 | -- | 13 | 43 |
| THRU | 197 | -- | 32 | 116 |
| RIGHT | 37 | -- | 10 | 23 |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | -- | 1 | 2 |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | ----- | --- | --- | - |
| NORTHBOUND | D.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | --- | --- | --- |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|
| MINOR RIGHTS | | | | |
| EB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | |
| NB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | | | | |
| EB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... ELDER CREEK RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXIST

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| **MINOR STREET** | | | | | | |
| EB LEFT | 67 | 585 | 579 > | 579 > | 512 > | A |
| | | | > | 693 > | 581 | >A |
| RIGHT | 45 | 981 | 981 > | 981 > | 935 > | A |
| **MAJOR STREET** | | | | | | |
| NB LEFT | 16 | 879 | 879 | 879 | 864 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... ELDER CREEK RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXIST

RC = 616 ⇒ LOS A

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IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... GERBER RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 55 | 4 | 63 | -- |
| THRU | 113 | 72 | 32 | -- |
| RIGHT | 8 | 24 | 7 | -- |

NUMBER OF LANES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | -- |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | ----- | --- | --- | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | --- | --- | --- |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | WB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR LEFTS | NB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| NB LEFT | 77 | 608 | 607 > | 607 > | 530 > | A |
| | | | > 629 | | > 544 | >A |
| RIGHT | 9 | 944 | 944 > | 944 > | 935 > | A |
| MAJOR STREET | | | | | | |
| WB LEFT | 5 | 973 | 973 | 973 | 968 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

RC = 567 ⇒ LOS A

*****************************************************************************

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .8

AREA POPULATION...................... 150000

NAME OF THE EAST/WEST STREET......... GERBER RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD RD

NAME OF THE ANALYST.................. F & P

DATE OF THE ANALYSIS (mm/dd/yy)...... 05-17-1995

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 55 | 5 | 29 | -- |
| THRU | 81 | 104 | 32 | -- |
| RIGHT | 53 | 40 | 5 | -- |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | -- |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 90 | 20 | N |
| WESTBOUND | 0.00 | 90 | 20 | N |
| NORTHBOUND | D.00 | 90 | 20 | N |
| SOUTHBOUND | ----- | --- | --- | - |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | --- | --- | --- |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 6.10 | 0.00 | 6.10 |
| MAJOR LEFTS | | | | | |
| | WB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR LEFTS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; PM
OTHER INFORMATION.... EXISTING

ATTACHMENT 5E



| MOVEMENT | FLOW-RATE v(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| **MINOR STREET** | | | | | | |
| NB LEFT | 40 | 564 | 561 > | 561 > | 521 > | A |
| | | | > | 590 > | 544 | >A |
| RIGHT | 7 | 846 | 846 > | 846 > | 839 > | A |
| **MAJOR STREET** | | | | | | |
| WB LEFT | 7 | 950 | 950 | 950 | 944 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; PM
OTHER INFORMATION.... EXISTING

RC: 596 ⇒ LOS A

**************************************************************************

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .8

AREA POPULATION...................... 150000

NAME OF THE EAST/WEST STREET......... GERBER RD

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. F & P

DATE OF THE ANALYSIS (mm/dd/yy)...... 05-17-1995

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXISTING

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

CONTROL TYPE WESTBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 111 | 1 | 25 | 0 |
| THRU | 0 | 4 | 222 | 27 |
| RIGHT | 8 | 0 | 2 | 44 |

NUMBER OF LANES AND LANE USAGE

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | 1 |
| LANE USAGE | LTR | LTR | | |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 90 | 20 | N |
| WESTBOUND | 0.00 | 90 | 20 | N |
| NORTHBOUND | 0.00 | 90 | 20 | N |
| SOUTHBOUND | 0.00 | 90 | 20 | N |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | EB | 6.10 | 6.10 | 0.00 | 6.10 |
| | WB | 6.10 | 6.10 | 0.00 | 6.10 |
| MAJOR LEFTS | | | | | |
| | SB | 5.30 | 5.30 | 0.00 | 5.30 |
| | NB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR THROUGHS | | | | | |
| | EB | 6.90 | 6.90 | 0.00 | 6.90 |
| | WB | 6.90 | 6.90 | 0.00 | 6.90 |
| MINOR LEFTS | | | | | |
| | EB | 7.40 | 7.40 | 0.00 | 7.40 |
| | WB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; AM
OTHER INFORMATION.... EXISTING

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | | RESERVE CAPACITY $c_R = c_{SH} - v$ | | | LOS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MINOR STREET** | | | | | | | | | | | |
| EB LEFT | 153 | 481 | 468 | > | | 468 | > | | 315 | > | B |
| THROUGH | 0 | 534 | 523 | > | 484 | 523 | > | 320 | 523 | >B | A |
| RIGHT | 11 | 920 | 920 | > | | 920 | > | | 909 | > | A |
| **MINOR STREET** | | | | | | | | | | | |
| WB LEFT | 1 | 458 | 446 | > | | 446 | > | | 444 | > | A |
| THROUGH | 6 | 513 | 502 | > | 490 | 502 | > | 483 | 497 | >A | A |
| RIGHT | 0 | 713 | 713 | > | | 713 | > | | 713 | > | A |
| **MAJOR STREET** | | | | | | | | | | | |
| SB LEFT | 0 | 850 | 850 | | | 850 | | | 850 | | A |
| NB LEFT | 34 | 997 | 997 | | | 997 | | | 963 | | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; AM
OTHER INFORMATION.... EXISTING

RC = 432 ⇒ LOS A

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IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .85

AREA POPULATION...................... 150000

NAME OF THE EAST/WEST STREET......... GERBER RD

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. F & P

DATE OF THE ANALYSIS (mm/dd/yy)...... 05-17-1995

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

CONTROL TYPE WESTBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 36 | 1 | 13 | 0 |
| THRU | 1 | 2 | 32 | 185 |
| RIGHT | 36 | 0 | 2 | 84 |

NUMBER OF LANES AND LANE USAGE

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | 1 |
| LANE USAGE | LTR | LTR | | |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 90 | 20 | N |
| WESTBOUND | 0.00 | 90 | 20 | N |
| NORTHBOUND | 0.00 | 90 | 20 | N |
| SOUTHBOUND | 0.00 | 90 | 20 | N |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | EB | 6.10 | 6.10 | 0.00 | 6.10 |
| | WB | 6.10 | 6.10 | 0.00 | 6.10 |
| MAJOR LEFTS | | | | | |
| | SB | 5.30 | 5.30 | 0.00 | 5.30 |
| | NB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR THROUGHS | | | | | |
| | EB | 6.90 | 6.90 | 0.00 | 6.90 |
| | WB | 6.90 | 6.90 | 0.00 | 6.90 |
| MINOR LEFTS | | | | | |
| | EB | 7.40 | 7.40 | 0.00 | 7.40 |
| | WB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; PM
OTHER INFORMATION.... EXISTING

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY c (pcph) p | ACTUAL MOVEMENT CAPACITY c (pcph) M | | SHARED CAPACITY c (pcph) SH | | | RESERVE CAPACITY c = c - v R SH | | LOS |
|---|---|---|---|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | | | | | |
| EB LEFT | 47 | 521 | 513 | > | | 513 | > | | 467 > | A |
| THROUGH | 1 | 573 | 566 | > | 600 | 566 | > | 505 | 565 >A | A |
| RIGHT | 47 | 723 | 723 | > | | 723 | > | | 676 > | A |
| MINOR STREET | | | | | | | | | | |
| WB LEFT | 1 | 455 | 432 | > | | 432 | > | | 430 > | A |
| THROUGH | 3 | 535 | 529 | > | 492 | 529 | > | 488 | 526 >A | A |
| RIGHT | 0 | 944 | 944 | > | | 944 | > | | 944 > | A |
| MAJOR STREET | | | | | | | | | | |
| SB LEFT | 0 | 999 | 999 | | | 999 | | | 999 | A |
| NB LEFT | 17 | 815 | 815 | | | 815 | | | 798 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; PM
OTHER INFORMATION.... EXISTING

RC = 547 ⇒ LOS A

1985 HCM: UNSIGNALIZED INTERSECTIONS Page-1

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... CALVINE RD

NAME OF THE NORTH/SOUTH STREET....... WATERMAN RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 18 | 0 | 7 | 6 |
| THRU | 241 | 207 | 2 | 6 |
| RIGHT | 7 | 5 | 5 | 42 |

NUMBER OF LANES AND LANE USAGE

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | 2 |
| LANE USAGE | | | | LT + R |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.30 | 5.30 | 0.00 | 5.30 |
| | WB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR THROUGHS | | | | | |
| | NB | 6.90 | 6.90 | 0.00 | 6.90 |
| | SB | 6.90 | 6.90 | 0.00 | 6.90 |
| MINOR LEFTS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... WATERMAN RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | | RESERVE CAPACITY $c_R = c_{SH} - v$ | | LOS |
|---|---|---|---|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | | | | | |
| NB LEFT | 9 | 350 | 329 | > | | 329 | > | | 320 > | B |
| THROUGH | 2 | 429 | 422 | > | 434 | 422 | > | 417 | 420 >A | A |
| RIGHT | 6 | 801 | 801 | > | | 801 | > | | 795 > | A |
| MINOR STREET | | | | | | | | | | |
| SB LEFT | 7 | 378 | 370 | > | 394 | 370 | > | 379 | 362 >B | B |
| THROUGH | 7 | 428 | 422 | > | | 422 | > | | 414 > | A |
| RIGHT | 51 | 839 | 839 | | | 839 | | | 788 | A |
| MAJOR STREET | | | | | | | | | | |
| EB LEFT | 22 | 893 | 893 | | | 893 | | | 871 | A |
| WB LEFT | 0 | 854 | 854 | | | 854 | | | 854 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... WATERMAN RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

RC=489 ⇒ LOS A

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR...................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... CALVINE RD

NAME OF THE NORTH/SOUTH STREET....... WATERMAN RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 36 | 4 | 4 | 1 |
| THRU | 120 | 205 | 9 | 1 |
| RIGHT | 4 | 6 | 4 | 18 |

NUMBER OF LANES AND LANE USAGE

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | 2 |
| LANE USAGE | | | | LT + R |

ADJUSTMENT FACTORS



| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.30 | 5.30 | 0.00 | 5.30 |
| | WB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR THROUGHS | | | | | |
| | NB | 6.90 | 6.90 | 0.00 | 6.90 |
| | SB | 6.90 | 6.90 | 0.00 | 6.90 |
| MINOR LEFTS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... WATERMAN RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXIST

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | | RESERVE CAPACITY $c_R = c_{SH} - v$ | | LOS |
|---|---|---|---|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | | | | | |
| NB LEFT | 5 | 442 | 420 | > | | 420 | > | | 415 > | A |
| THROUGH | 11 | 503 | 486 | > | 526 | 486 | > | 506 | 475 >A | A |
| RIGHT | 5 | 938 | 938 | > | | 938 | > | | 933 > | A |
| MINOR STREET | | | | | | | | | | |
| SB LEFT | 1 | 447 | 425 | > | 454 | 425 | > | 451 | 424 >A | A |
| THROUGH | 1 | 503 | 487 | > | | 487 | > | | 486 > | A |
| RIGHT | 22 | 841 | 841 | | | 841 | | | 819 | A |
| MAJOR STREET | | | | | | | | | | |
| EB LEFT | 44 | 894 | 894 | | | 894 | | | 850 | A |
| WB LEFT | 5 | 971 | 971 | | | 971 | | | 966 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... WATERMAN RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXIST

RC = 677 LOS A

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IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR...................... .9

AREA POPULATION....................... 20000

NAME OF THE EAST/WEST STREET......... CALVINE RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 7 | 4 | -- | 2 |
| THRU | 87 | 146 | -- | 1 |
| RIGHT | 4 | 6 | -- | 27 |

NUMBER OF LANES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 2 | -- | 1 |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | ----- | --- | --- | - |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | --- | --- | --- |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | | | | | |
| | SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| SB LEFT | 2 | 522 | 519 > | 519 > | 516 > | A |
| | | | > 922 | > 887 | | >A |
| RIGHT | 33 | 979 | 979 > | 979 > | 946 > | A |
| MAJOR STREET | | | | | | |
| EB LEFT | 9 | 865 | 865 | 865 | 856 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXIST

RC = 921 ⇒ LOS A

***********************************************************************

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... CALVINE RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXIST

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 4 | 4 | -- | 8 |
| THRU | 109 | 133 | -- | 1 |
| RIGHT | 4 | 3 | -- | 132 |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 2 | -- | 1 |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | ----- | --- | --- | - |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | --- | --- | --- |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|
| MINOR RIGHTS | | | | |
| SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | |
| EB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | | | | |
| SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXIST

| MOVEMENT | FLOW-RATE v(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| SB LEFT | 10 | 518 | 516 > | 516 > | 507 > | A |
| | | | > | 933 > | 762 | >A |
| RIGHT | 161 | 981 | 981 > | 981 > | 820 > | A |
| MAJOR STREET | | | | | | |
| EB LEFT | 5 | 883 | 883 | 883 | 878 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXIST

Rc- 767 => LOS A

Existing A.M. Peak
Elder Creek Rd. and S. Watt Ave.

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 69 | 17 | 41 | 2 |
| 2 | TH Volume | 103 | 203 | 489 | 238 |
| 3 | RT Volume | 15 | 40 | 9 | 112 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 2 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 2 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 76.667 | 18.889 | 45.556 | 2.2222 |
| 8 | TH Flow Rate | 114.44 | 225.56 | 543.33 | 264.44 |
| 9 | RT Flow Rate | 16.667 | 44.444 | 10 | 124.44 |
| 10 | Approach Flow Rate | 207.78 | 288.89 | 598.89 | 391.11 |
| 11 | Proportion LT | 0.37 | 0.07 | 0.08 | 0.01 |
| 12 | Proportion RT | 0.08 | 0.15 | 0.02 | 0.32 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 207.78 | 288.89 | 598.89 | 391.11 |
| 16 | Opposing Approach Flow Rate | 260 | 187 | 352 | 539 |
| 17 | Conflicting Approaches Flow Rate | 891 | 891 | 447 | 447 |
| 18 | Total Intersection Flow Rate | 1358.8 | 1366.9 | 1397.9 | 1377.1 |
| 19 | Proportion, Subject Approach Flow Rate | 0.15 | 0.21 | 0.43 | 0.28 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.19 | 0.14 | 0.25 | 0.39 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.66 | 0.65 | 0.32 | 0.32 |
| 22 | LT, Opposing Approach | 17 | 69 | 2 | 41 |
| 23 | RT, Opposing Approach | 40 | 15 | 112 | 9 |
| 24 | LT, Conflicting Approaches | 43 | 43 | 86 | 86 |
| 25 | RT, Conflicting Approaches | 121 | 121 | 55 | 55 |
| 26 | Proportion LT, Opposing Approach | 0.07 | 0.37 | 0.01 | 0.08 |
| 27 | Proportion RT, Opposing Approach | 0.15 | 0.08 | 0.32 | 0.02 |
| 28 | Proportion LT, Conflicting Approaches | 0.05 | 0.05 | 0.19 | 0.19 |
| 29 | Proportion RT, Conflicting Approaches | 0.14 | 0.14 | 0.12 | 0.12 |
| 30 | Approach Capacity | 324 | 539 | 746 | 618 |
| 31 | Volume/Capacity Ratio | 0.64 | 0.54 | 0.80 | 0.63 |
| 32 | Delay | 11 | 8 | 21 | 11 |
| 33 | Level of Service | C | B | D | C |
| 34 | Average Delay (Intersection) | 15 | | | |
| 35 | Level of Service (Intersection) | C | | | |

Existing P.M. Peak
Elder Creek Rd. and S. Watt Ave.

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 98 | 24 | 18 | 43 |
| 2 | TH Volume | 197 | 130 | 290 | 463 |
| 3 | RT Volume | 38 | 24 | 10 | 72 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 2 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 2 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 108.89 | 26.667 | 20 | 47.778 |
| 8 | TH Flow Rate | 218.89 | 144.44 | 322.22 | 514.44 |
| 9 | RT Flow Rate | 42.222 | 26.667 | 11.111 | 80 |
| 10 | Approach Flow Rate | 370 | 197.78 | 353.33 | 642.22 |
| 11 | Proportion LT | 0.29 | 0.13 | 0.06 | 0.07 |
| 12 | Proportion RT | 0.11 | 0.13 | 0.03 | 0.12 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 370 | 197.78 | 353.33 | 642.22 |
| 16 | Opposing Approach Flow Rate | 178 | 333 | 578 | 318 |
| 17 | Conflicting Approaches Flow Rate | 896 | 896 | 511 | 511 |
| 18 | Total Intersection Flow Rate | 1444 | 1426.8 | 1442.3 | 1471.2 |
| 19 | Proportion, Subject Approach Flow Rate | 0.26 | 0.14 | 0.24 | 0.44 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.12 | 0.23 | 0.40 | 0.22 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.62 | 0.63 | 0.35 | 0.35 |
| 22 | LT, Opposing Approach | 24 | 98 | 43 | 18 |
| 23 | RT, Opposing Approach | 24 | 38 | 72 | 10 |
| 24 | LT, Conflicting Approaches | 61 | 61 | 122 | 122 |
| 25 | RT, Conflicting Approaches | 82 | 82 | 62 | 62 |
| 26 | Proportion LT, Opposing Approach | 0.13 | 0.29 | 0.07 | 0.06 |
| 27 | Proportion RT, Opposing Approach | 0.13 | 0.11 | 0.12 | 0.03 |
| 28 | Proportion LT, Conflicting Approaches | 0.07 | 0.07 | 0.24 | 0.24 |
| 29 | Proportion RT, Conflicting Approaches | 0.09 | 0.09 | 0.12 | 0.12 |
| 30 | Approach Capacity | 336 | 544 | 593 | 642 |
| 31 | Volume/Capacity Ratio | 1.10 | 0.36 | 0.60 | 1.00 |
| 32 | Delay | 66 | 4 | 10 | 45 |
| 33 | Level of Service | F | A | B | E |
| 34 | Average Delay (Intersection) | 37 | | | |
| 35 | Level of Service (Intersection) | E | | | |

Existing A.M. Peak
Excelsior Rd and Florin Rd

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 7 | 35 | 29 | 2 |
| 2 | TH Volume | 87 | 146 | 202 | 27 |
| 3 | RT Volume | 10 | 6 | 104 | 6 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 7.7778 | 38.889 | 32.222 | 2.2222 |
| 8 | TH Flow Rate | 96.667 | 162.22 | 224.44 | 30 |
| 9 | RT Flow Rate | 11.111 | 6.6667 | 115.56 | 6.6667 |
| 10 | Approach Flow Rate | 115.56 | 207.78 | 372.22 | 38.889 |
| 11 | Proportion LT | 0.07 | 0.19 | 0.09 | 0.06 |
| 12 | Proportion RT | 0.10 | 0.03 | 0.31 | 0.17 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 115.56 | 207.78 | 372.22 | 38.889 |
| 16 | Opposing Approach Flow Rate | 187 | 104 | 35 | 335 |
| 17 | Conflicting Approaches Flow Rate | 370 | 370 | 291 | 291 |
| 18 | Total Intersection Flow Rate | 672.56 | 681.78 | 698.22 | 664.89 |
| 19 | Proportion, Subject Approach Flow Rate | 0.17 | 0.30 | 0.53 | 0.06 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.28 | 0.15 | 0.05 | 0.50 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.55 | 0.54 | 0.42 | 0.44 |
| 22 | LT, Opposing Approach | 35 | 7 | 2 | 29 |
| 23 | RT, Opposing Approach | 6 | 10 | 6 | 104 |
| 24 | LT, Conflicting Approaches | 31 | 31 | 42 | 42 |
| 25 | RT, Conflicting Approaches | 110 | 110 | 16 | 16 |
| 26 | Proportion LT, Opposing Approach | 0.19 | 0.07 | 0.06 | 0.09 |
| 27 | Proportion RT, Opposing Approach | 0.03 | 0.10 | 0.17 | 0.31 |
| 28 | Proportion LT, Conflicting Approaches | 0.08 | 0.08 | 0.14 | 0.14 |
| 29 | Proportion RT, Conflicting Approaches | 0.30 | 0.30 | 0.05 | 0.05 |
| 30 | Approach Capacity | 481 | 575 | 659 | 520 |
| 31 | Volume/Capacity Ratio | 0.24 | 0.36 | 0.57 | 0.07 |
| 32 | Delay | 2 | 4 | 9 | 1 |
| 33 | Level of Service | A | A | B | A |
| 34 | Average Delay (Intersection) | 6 | | | |
| 35 | Level of Service (Intersection) | B | | | |

Existing P.M. Peak
Excelsior Rd and Florin Rd

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 4 | 93 | 9 | 8 |
| 2 | TH Volume | 109 | 133 | 33 | 132 |
| 3 | RT Volume | 30 | 3 | 44 | 14 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 4.4444 | 103.33 | 10 | 8.8889 |
| 8 | TH Flow Rate | 121.11 | 147.78 | 36.667 | 146.67 |
| 9 | RT Flow Rate | 33.333 | 3.3333 | 48.889 | 15.556 |
| 10 | Approach Flow Rate | 158.89 | 254.44 | 95.556 | 171.11 |
| 11 | Proportion LT | 0.03 | 0.41 | 0.10 | 0.05 |
| 12 | Proportion RT | 0.21 | 0.01 | 0.51 | 0.09 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 158.89 | 254.44 | 95.556 | 171.11 |
| 16 | Opposing Approach Flow Rate | 229 | 143 | 154 | 86 |
| 17 | Conflicting Approaches Flow Rate | 240 | 240 | 372 | 372 |
| 18 | Total Intersection Flow Rate | 627.89 | 637.44 | 621.56 | 629.11 |
| 19 | Proportion, Subject Approach Flow Rate | 0.25 | 0.40 | 0.15 | 0.27 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.36 | 0.22 | 0.25 | 0.14 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.38 | 0.38 | 0.60 | 0.59 |
| 22 | LT, Opposing Approach | 93 | 4 | 8 | 9 |
| 23 | RT, Opposing Approach | 3 | 30 | 14 | 44 |
| 24 | LT, Conflicting Approaches | 17 | 17 | 97 | 97 |
| 25 | RT, Conflicting Approaches | 58 | 58 | 33 | 33 |
| 26 | Proportion LT, Opposing Approach | 0.41 | 0.03 | 0.05 | 0.10 |
| 27 | Proportion RT, Opposing Approach | 0.01 | 0.21 | 0.09 | 0.51 |
| 28 | Proportion LT, Conflicting Approaches | 0.07 | 0.07 | 0.26 | 0.26 |
| 29 | Proportion RT, Conflicting Approaches | 0.24 | 0.24 | 0.09 | 0.09 |
| 30 | Approach Capacity | 540 | 741 | 378 | 487 |
| 31 | Volume/Capacity Ratio | 0.29 | 0.34 | 0.25 | 0.35 |
| 32 | Delay | 3 | 4 | 3 | 4 |
| 33 | Level of Service | A | A | A | A |
| 34 | Average Delay (Intersection) | 3 | | | |
| 35 | Level of Service (Intersection) | A | | | |

Existing A.M. Peak
Elk Grove-Florin Rd and Florin Rd

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 98 | 48 | 127 | 8 |
| 2 | TH Volume | 276 | 310 | 431 | 218 |
| 3 | RT Volume | 106 | 12 | 64 | 91 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 2 | 2 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 2 | 2 | 1 | 1 |
| 7 | LT Flow Rate | 108.89 | 53.333 | 141.11 | 8.8889 |
| 8 | TH Flow Rate | 306.67 | 344.44 | 478.89 | 242.22 |
| 9 | RT Flow Rate | 117.78 | 13.333 | 71.111 | 101.11 |
| 10 | Approach Flow Rate | 533.33 | 411.11 | 691.11 | 352.22 |
| 11 | Proportion LT | 0.20 | 0.13 | 0.20 | 0.03 |
| 12 | Proportion RT | 0.22 | 0.03 | 0.10 | 0.29 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 533.33 | 411.11 | 691.11 | 352.22 |
| 16 | Opposing Approach Flow Rate | 370 | 480 | 317 | 622 |
| 17 | Conflicting Approaches Flow Rate | 939 | 939 | 850 | 850 |
| 18 | Total Intersection Flow Rate | 1842.3 | 1830.1 | 1858.1 | 1824.2 |
| 19 | Proportion, Subject Approach Flow Rate | 0.29 | 0.22 | 0.37 | 0.19 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.20 | 0.26 | 0.17 | 0.34 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.51 | 0.51 | 0.46 | 0.47 |
| 22 | LT, Opposing Approach | 48 | 98 | 8 | 127 |
| 23 | RT, Opposing Approach | 12 | 106 | 91 | 64 |
| 24 | LT, Conflicting Approaches | 135 | 135 | 146 | 146 |
| 25 | RT, Conflicting Approaches | 155 | 155 | 118 | 118 |
| 26 | Proportion LT, Opposing Approach | 0.13 | 0.20 | 0.03 | 0.20 |
| 27 | Proportion RT, Opposing Approach | 0.03 | 0.22 | 0.29 | 0.10 |
| 28 | Proportion LT, Conflicting Approaches | 0.14 | 0.14 | 0.17 | 0.17 |
| 29 | Proportion RT, Conflicting Approaches | 0.17 | 0.17 | 0.14 | 0.14 |
| 30 | Approach Capacity | 604 | 598 | 631 | 481 |
| 31 | Volume/Capacity Ratio | 0.88 | 0.69 | 1.09 | 0.73 |
| 32 | Delay | 29 | 14 | 64 | 16 |
| 33 | Level of Service | D | C | F | C |
| 34 | Average Delay (Intersection) | 36 | | | |
| 35 | Level of Service (Intersection) | E | | | |

Existing P.M. Peak
Elk Grove-Florin Rd and Florin Rd

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 84 | 86 | 125 | 15 |
| 2 | TH Volume | 279 | 308 | 262 | 454 |
| 3 | RT Volume | 204 | 6 | 41 | 130 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 2 | 2 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 2 | 2 | 1 | 1 |
| 7 | LT Flow Rate | 93.333 | 95.556 | 138.89 | 16.667 |
| 8 | TH Flow Rate | 310 | 342.22 | 291.11 | 504.44 |
| 9 | RT Flow Rate | 226.67 | 6.6667 | 45.556 | 144.44 |
| 10 | Approach Flow Rate | 630 | 444.44 | 475.56 | 665.56 |
| 11 | Proportion LT | 0.15 | 0.22 | 0.29 | 0.03 |
| 12 | Proportion RT | 0.36 | 0.02 | 0.10 | 0.22 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 630 | 444.44 | 475.56 | 665.56 |
| 16 | Opposing Approach Flow Rate | 400 | 567 | 599 | 428 |
| 17 | Conflicting Approaches Flow Rate | 1027 | 1027 | 967 | 967 |
| 18 | Total Intersection Flow Rate | 2057 | 2038.4 | 2041.6 | 2060.6 |
| 19 | Proportion, Subject Approach Flow Rate | 0.31 | 0.22 | 0.23 | 0.32 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.19 | 0.28 | 0.29 | 0.21 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.50 | 0.50 | 0.47 | 0.47 |
| 22 | LT, Opposing Approach | 86 | 84 | 15 | 125 |
| 23 | RT, Opposing Approach | 6 | 204 | 130 | 41 |
| 24 | LT, Conflicting Approaches | 140 | 140 | 170 | 170 |
| 25 | RT, Conflicting Approaches | 171 | 171 | 210 | 210 |
| 26 | Proportion LT, Opposing Approach | 0.22 | 0.15 | 0.03 | 0.29 |
| 27 | Proportion RT, Opposing Approach | 0.02 | 0.36 | 0.22 | 0.10 |
| 28 | Proportion LT, Conflicting Approaches | 0.14 | 0.14 | 0.18 | 0.18 |
| 29 | Proportion RT, Conflicting Approaches | 0.17 | 0.17 | 0.22 | 0.22 |
| 30 | Approach Capacity | 590 | 649 | 587 | 512 |
| 31 | Volume/Capacity Ratio | 1.07 | 0.68 | 0.81 | 1.30 |
| 32 | Delay | 58 | 13 | 22 | 139 |
| 33 | Level of Service | F | C | D | F |
| 34 | Average Delay (Intersection) | 66 | | | |
| 35 | Level of Service (Intersection) | F | | | |

Existing A.M. Peak
Bradshaw and Calvine

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 113 | 34 | 5 | 29 |
| 2 | TH Volume | 116 | 153 | 401 | 186 |
| 3 | RT Volume | 12 | 65 | 16 | 32 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 125.56 | 37.778 | 5.5556 | 32.222 |
| 8 | TH Flow Rate | 128.89 | 170 | 445.56 | 206.67 |
| 9 | RT Flow Rate | 13.333 | 72.222 | 17.778 | 35.556 |
| 10 | Approach Flow Rate | 267.78 | 280 | 468.89 | 274.44 |
| 11 | Proportion LT | 0.47 | 0.13 | 0.01 | 0.12 |
| 12 | Proportion RT | 0.05 | 0.26 | 0.04 | 0.13 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 267.78 | 280 | 468.89 | 274.44 |
| 16 | Opposing Approach Flow Rate | 252 | 241 | 247 | 422 |
| 17 | Conflicting Approaches Flow Rate | 669 | 669 | 493 | 493 |
| 18 | Total Intersection Flow Rate | 1188.8 | 1190 | 1208.9 | 1189.4 |
| 19 | Proportion, Subject Approach Flow Rate | 0.23 | 0.24 | 0.39 | 0.23 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.21 | 0.20 | 0.20 | 0.35 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.56 | 0.56 | 0.41 | 0.41 |
| 22 | LT, Opposing Approach | 34 | 113 | 29 | 5 |
| 23 | RT, Opposing Approach | 65 | 12 | 32 | 16 |
| 24 | LT, Conflicting Approaches | 34 | 34 | 147 | 147 |
| 25 | RT, Conflicting Approaches | 48 | 48 | 77 | 77 |
| 26 | Proportion LT, Opposing Approach | 0.13 | 0.47 | 0.12 | 0.01 |
| 27 | Proportion RT, Opposing Approach | 0.26 | 0.05 | 0.13 | 0.04 |
| 28 | Proportion LT, Conflicting Approaches | 0.05 | 0.05 | 0.30 | 0.30 |
| 29 | Proportion RT, Conflicting Approaches | 0.07 | 0.07 | 0.16 | 0.16 |
| 30 | Approach Capacity | 491 | 353 | 579 | 541 |
| 31 | Volume/Capacity Ratio | 0.55 | 0.79 | 0.81 | 0.51 |
| 32 | Delay | 8 | 20 | 22 | 7 |
| 33 | Level of Service | B | D | D | B |
| 34 | Average Delay (Intersection) | 15 | | | |
| 35 | Level of Service (Intersection) | C | | | |

Existing P.M. Peak
Bradshaw and Calvine

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 30 | 17 | 7 | 51 |
| 2 | TH Volume | 77 | 119 | 202 | 453 |
| 3 | RT Volume | 11 | 23 | 31 | 79 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 33.333 | 18.889 | 7.7778 | 56.667 |
| 8 | TH Flow Rate | 85.556 | 132.22 | 224.44 | 503.33 |
| 9 | RT Flow Rate | 12.222 | 25.556 | 34.444 | 87.778 |
| 10 | Approach Flow Rate | 131.11 | 176.67 | 266.67 | 647.78 |
| 11 | Proportion LT | 0.25 | 0.11 | 0.03 | 0.09 |
| 12 | Proportion RT | 0.09 | 0.14 | 0.13 | 0.14 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 131.11 | 176.67 | 266.67 | 647.78 |
| 16 | Opposing Approach Flow Rate | 159 | 118 | 583 | 240 |
| 17 | Conflicting Approaches Flow Rate | 823 | 823 | 277 | 277 |
| 18 | Total Intersection Flow Rate | 1113.1 | 1117.7 | 1126.7 | 1164.8 |
| 19 | Proportion, Subject Approach Flow Rate | 0.12 | 0.16 | 0.24 | 0.56 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.14 | 0.11 | 0.52 | 0.21 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.74 | 0.74 | 0.25 | 0.24 |
| 22 | LT, Opposing Approach | 17 | 30 | 51 | 7 |
| 23 | RT, Opposing Approach | 23 | 11 | 79 | 31 |
| 24 | LT, Conflicting Approaches | 58 | 58 | 47 | 47 |
| 25 | RT, Conflicting Approaches | 110 | 110 | 34 | 34 |
| 26 | Proportion LT, Opposing Approach | 0.11 | 0.25 | 0.09 | 0.03 |
| 27 | Proportion RT, Opposing Approach | 0.14 | 0.09 | 0.14 | 0.13 |
| 28 | Proportion LT, Conflicting Approaches | 0.07 | 0.07 | 0.17 | 0.17 |
| 29 | Proportion RT, Conflicting Approaches | 0.13 | 0.13 | 0.12 | 0.12 |
| 30 | Approach Capacity | 334 | 293 | 686 | 803 |
| 31 | Volume/Capacity Ratio | 0.39 | 0.60 | 0.39 | 0.81 |
| 32 | Delay | 4 | 10 | 4 | 21 |
| 33 | Level of Service | A | B | A | D |
| 34 | Average Delay (Intersection) | 14 | | | |
| 35 | Level of Service (Intersection) | C | | | |

Existing A.M. Peak
Excelsior and Calvine

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 27 | 7 | 34 | 5 |
| 2 | TH Volume | 102 | 86 | 199 | 33 |
| 3 | RT Volume | 30 | 23 | 11 | 6 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 30 | 7.7778 | 37.778 | 5.5556 |
| 8 | TH Flow Rate | 113.33 | 95.556 | 221.11 | 36.667 |
| 9 | RT Flow Rate | 33.333 | 25.556 | 12.222 | 6.6667 |
| 10 | Approach Flow Rate | 176.67 | 128.89 | 271.11 | 48.889 |
| 11 | Proportion LT | 0.17 | 0.06 | 0.14 | 0.11 |
| 12 | Proportion RT | 0.19 | 0.20 | 0.05 | 0.14 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 176.67 | 128.89 | 271.11 | 48.889 |
| 16 | Opposing Approach Flow Rate | 116 | 159 | 44 | 244 |
| 17 | Conflicting Approaches Flow Rate | 288 | 288 | 275 | 275 |
| 18 | Total Intersection Flow Rate | 580.67 | 575.89 | 590.11 | 567.89 |
| 19 | Proportion, Subject Approach Flow Rate | 0.30 | 0.22 | 0.46 | 0.09 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.20 | 0.28 | 0.07 | 0.43 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.50 | 0.50 | 0.47 | 0.48 |
| 22 | LT, Opposing Approach | 7 | 27 | 5 | 34 |
| 23 | RT, Opposing Approach | 23 | 30 | 6 | 11 |
| 24 | LT, Conflicting Approaches | 39 | 39 | 34 | 34 |
| 25 | RT, Conflicting Approaches | 17 | 17 | 53 | 53 |
| 26 | Proportion LT, Opposing Approach | 0.06 | 0.17 | 0.11 | 0.14 |
| 27 | Proportion RT, Opposing Approach | 0.20 | 0.19 | 0.14 | 0.05 |
| 28 | Proportion LT, Conflicting Approaches | 0.14 | 0.14 | 0.12 | 0.12 |
| 29 | Proportion RT, Conflicting Approaches | 0.06 | 0.06 | 0.19 | 0.19 |
| 30 | Approach Capacity | 543 | 481 | 626 | 475 |
| 31 | Volume/Capacity Ratio | 0.33 | 0.27 | 0.43 | 0.10 |
| 32 | Delay | 3 | 3 | 5 | 1 |
| 33 | Level of Service | A | A | B | A |
| 34 | Average Delay (Intersection) | 4 | | | |
| 35 | Level of Service (Intersection) | A | | | |

Existing P.M. Peak
Excelsior and Calvine

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 14 | 2 | 26 | 22 |
| 2 | TH Volume | 34 | 88 | 43 | 142 |
| 3 | RT Volume | 37 | 8 | 4 | 22 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 15.556 | 2.2222 | 28.889 | 24.444 |
| 8 | TH Flow Rate | 37.778 | 97.778 | 47.778 | 157.78 |
| 9 | RT Flow Rate | 41.111 | 8.8889 | 4.4444 | 24.444 |
| 10 | Approach Flow Rate | 94.444 | 108.89 | 81.111 | 206.67 |
| 11 | Proportion LT | 0.16 | 0.02 | 0.36 | 0.12 |
| 12 | Proportion RT | 0.44 | 0.08 | 0.05 | 0.12 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 94.444 | 108.89 | 81.111 | 206.67 |
| 16 | Opposing Approach Flow Rate | 98 | 85 | 186 | 73 |
| 17 | Conflicting Approaches Flow Rate | 259 | 259 | 183 | 183 |
| 18 | Total Intersection Flow Rate | 451.44 | 452.89 | 450.11 | 462.67 |
| 19 | Proportion, Subject Approach Flow Rate | 0.21 | 0.24 | 0.18 | 0.45 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.22 | 0.19 | 0.41 | 0.16 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.57 | 0.57 | 0.41 | 0.40 |
| 22 | LT, Opposing Approach | 2 | 14 | 22 | 26 |
| 23 | RT, Opposing Approach | 8 | 37 | 22 | 4 |
| 24 | LT, Conflicting Approaches | 48 | 48 | 16 | 16 |
| 25 | RT, Conflicting Approaches | 26 | 26 | 45 | 45 |
| 26 | Proportion LT, Opposing Approach | 0.02 | 0.16 | 0.12 | 0.36 |
| 27 | Proportion RT, Opposing Approach | 0.08 | 0.44 | 0.12 | 0.05 |
| 28 | Proportion LT, Conflicting Approaches | 0.19 | 0.19 | 0.09 | 0.09 |
| 29 | Proportion RT, Conflicting Approaches | 0.10 | 0.10 | 0.25 | 0.25 |
| 30 | Approach Capacity | 446 | 484 | 605 | 609 |
| 31 | Volume/Capacity Ratio | 0.21 | 0.22 | 0.13 | 0.34 |
| 32 | Delay | 2 | 2 | 2 | 4 |
| 33 | Level of Service | A | A | A | A |
| 34 | Average Delay (Intersection) | 3 | | | |
| 35 | Level of Service (Intersection) | A | | | |

# APPENDIX B

## Trip Generation Tables - Preferred Plan

**Table B-1**
**NORTH VINEYARD SPECIFIC PLAN DAILY TRIP GENERATION**

| Land Use | Quantity | Units | Daily Trip Rate | Daily Vehicle Trips | Inter-nalization | Internal Trips | External Trips | Pass-By Factor | Net External Trips | External Person Trips | Transit Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,259 | D.U. | 9.55 | 50,223 | 14% | 7,031 | 43,192 | 0% | 43,192 | 49,671 | 2,484 |
| Medium Density Residential | 442 | D.U. | 9.45 | 4,177 | 14% | 585 | 3,592 | 0% | 3,592 | 4,131 | 207 |
| High Density Residential | 637 | D.U. | 6.47 | 4,121 | 14% | 577 | 3,544 | 0% | 3,544 | 4,076 | 204 |
| Neighborhood Commercial | 49 | ksf GLA | varies | 6,555 | 40% | 2,622 | 3,933 | 20% | 3,146 | 3,618 | 181 |
| Community Commercial | 262 | ksf GLA | varies | 16,603 | 30% | 4,981 | 11,622 | 30% | 8,135 | 9,356 | 468 |
| Professional/ Offices | 103 | ksf GFA | 14.37 | 1,480 | 15% | 222 | 1,258 | 0% | 1,258 | 1,447 | 72 |
| Elementary School | 600 | Students | 1.09 | 654 | 90% | 589 | 65 | 0% | 65 | 75 | 4 |
| Neighborhood Park | 64 | Acres | 2.23 | 143 | 90% | 128 | 14 | 0% | 14 | 16 | 1 |
| Community Park | 27 | Acres | 2.99 | 81 | 50% | 40 | 40 | 0% | 40 | 46 | 2 |
| | | | Totals: | 84,037 | 20% | 16,775 | 67,262 | N/A | 62,989 | 72,437 | 3,622 |

**Table B-2**
**NORTH VINEYARD SPECIFIC PLAN A.M. PEAK HOUR TRIP GENERATION**

| Land Use | Quantity | Units | A.M. Peak Trip Rate | Daily Vehicle Trips | Inter-nalization | Internal Trips | External Trips | Pass-By Factor | Net External Trips | External Person Trips | Transit Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,259 | D.U. | 0.74 | 3,892 | 14% | 545 | 3,347 | 0% | 3,347 | 3,849 | 192 |
| Medium Density Residential | 442 | D.U. | 0.74 | 327 | 14% | 46 | 281 | 0% | 281 | 323 | 16 |
| High Density Residential | 637 | D.U. | 0.56 | 357 | 14% | 50 | 307 | 0% | 307 | 353 | 18 |
| Neighborhood Commercial | 49 | ksf GLA | varies | 161 | 40% | 64 | 97 | 20% | 77 | 89 | 4 |
| Community Commercial | 262 | ksf GLA | varies | 378 | 30% | 113 | 265 | 30% | 185 | 213 | 11 |
| Professional/ Offices | 103 | ksf GFA | 1.62 | 167 | 15% | 25 | 142 | 0% | 142 | 163 | 8 |
| Elementary School | 600 | Students | 0.28 | 168 | 90% | 151 | 17 | 0% | 17 | 19 | 1 |
| Neighborhood Park | 64 | Acres | 0.11 | 7 | 90% | 6 | 1 | 0% | 1 | 1 | 0 |
| Community Park | 27 | Acres | 0.15 | 4 | 50% | 2 | 2 | 0% | 2 | 2 | 0 |
| | | | Totals: | 5,460 | 18% | 1,003 | 4,457 | N/A | 4,359 | 5,013 | 251 |

**Table B-3**
**NORTH VINEYARD SPECIFIC PLAN P.M. PEAK HOUR TRIP GENERATION**

| Land Use | Quantity | Units | P.M. Peak Trip Rate | Daily Vehicle Trips | Inter-nalization | Internal Trips | External Trips | Pass-By Factor | Net External Trips | External Person Trips | Transit Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,259 | D.U. | 1.01 | 5,312 | 14% | 744 | 4,568 | 0% | 4,568 | 5,253 | 263 |
| Medium Density Residential | 442 | D.U. | 1.01 | 446 | 14% | 62 | 384 | 0% | 384 | 442 | 22 |
| High Density Residential | 637 | D.U. | 0.69 | 440 | 14% | 62 | 378 | 0% | 378 | 435 | 22 |
| Neighborhood Commercial | 49 | ksf GLA | varies | 595 | 40% | 238 | 357 | 20% | 286 | 328 | 16 |
| Community Commercial | 262 | ksf GLA | varies | 1,546 | 30% | 464 | 1,082 | 30% | 758 | 871 | 44 |
| Professional/ Offices | 103 | ksf GFA | 1.48 | 152 | 15% | 23 | 130 | 0% | 130 | 149 | 7 |
| Elementary School | 600 | Students | 0.25 | 150 | 90% | 135 | 15 | 0% | 15 | 17 | 1 |
| Neighborhood Park | 64 | Acres | 0.22 | 14 | 90% | 13 | 1 | 0% | 1 | 2 | 0 |
| Community Park | 27 | Acres | 0.30 | 8 | 50% | 4 | 4 | 0% | 4 | 5 | 0 |
| | | | Totals: | 8,663 | 20% | 1,744 | 6,919 | N/A | 6,523 | 7,502 | 375 |

# APPENDIX C

## Existing Plus Project Level of Service Calculations

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
ntersection: JACKSON HWY AND S. WATT                                   Design Hour: AM
roblem Statement: EXISTING PLUS PROJECT
===========================================================================================
Step 1. IDENTIFY LANE GEOMETRY  | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR |
         | Approach 3:S. WATT   |              -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
         |  1    1 |      ^     |                : -1-  -2-  -3-  -4-|     Possible   Volume   Adjusted|
         |  R    L |      N     |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover Critical|
ACKSON HWY | R T T T L |         | intervals/hour :                  |able   Volume   to next   Volume |
------------ T H H H T ---------|b.LT capacity on:  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1  < < | > >  ^--RT  1 | change (vph)   :                  |-------------------------------|
  1 LT--^     v v v    <^-RTH   |c.G/C ratio     :  0    0    0    0|B2B1   55(B2)  99-  55=  44(B1)   55|
   LTH-^>              <--TH  1 |d.Opposing volume: 0    0    0    0|A2B1   44(B1) 596-  44= 552(A2)   44|
    TH-->              <v-LTH   | in vph         :                  |A1A2  552(A2) OR 369(A1)        552|
  1 RTH-v>    ^ ^ ^     v--LT  1|e.LT capacity on:  0    0    0    0|B4B3  214(B4) 311- 214=  97(B3)  214|
   RT--v     < < | > > Approach 2| green (vph)    :                  |A4B3   97(B3) 966-  97= 869(A4)   97|
------------ L L T R R ---------|f.LT capacity in:  0    0    0    0|A3A4 1045(A3) OR 869(A4)       1045|
         | T T H T T |JACKSON HWY| vph (b+e)     :                  |                               |
         |   H   H   |          |g.Left turn volume: 0   0    0    0|                               |
         | 1     1   |          | in vph         :                  |                               |
         | Approach 4:S. WATT   |h.Is volume > cap.:                 :                               |
                                | (g>f) ?        :                  |                               |
================================+===================================+===============================|
Step 2. IDENTIFY VOLUMES, in vph| Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                |        |                 |        |                               |
                                |        | 1 8 2           |        |99(B2B1)+552(A2)+311(B4B3)+1045(A3)|
         | Approach 3|          |-------   8 5 1           -------|                               |
3:  LT= 214 | |       | 2:RT= 467|         9 6 4            ^- 467 |          = 2007 vph           |
   TH= 856 | |        |   TH= 596|         + + |            <- 596 |===============================|
   RT= 189 | v        |   LT=  99|         < v >            v-  99 | Step 8. INTERSECTION LEVEL OF |
-------------       -------------|                                  |         SERVICE               |
                     <--Approach 2|                                 |    (compare step 7 with table 6)|
                                |                                   |            -------            |
                                |                                   |            |  F  |            |
Approach 1-->                   |                                   |            -------            |
------------        ------------|  55 -^              < ^ >         |===============================|
1:LT=  55 |         ^ | 4: RT=  44| 213 +>             | + +         | Step 9. RECALCULATE           |
  TH= 213 |         | |   TH= 922| 156 +v                           |                               |
  RT= 156 |         | |   LT= 311|-------             3 9   -------|Geometric Change:              |
         | Approach 4|          |        |            1 2 4 |       |Signal Change:                 |
                                |        |            1 2 4 |       |Volume Change:                 |
================================+===================================+===============================|
Step 3. IDENTIFY PHASING        | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                      |
                                |       (two phase signal)          |                               |
      --^ v--  B2B1             |          | Approach 3|            |                               |
                                |          |           |            |                               |
   --^ AND <--    A1B2 AND      |          |           |            |                               |
   --> OR  v--    /OR A2B1      |          |           |            |                               |
      --> <--  A1A2             |-----------           ------------|                               |
                                | Approach 1                        |                               |
       |  <    B4B3             |                                   |                               |
       >  |                     |        See Step 6b.               |                               |
   | | AND < ^    A3B4 AND      |                                   |                               |
   v > OR  | |    /OR A4B3      |                    Approach 2     |                               |
       |  ^    A3A4             |-----------           ------------|                               |
       v  |                     |          |           |            |                               |
--------------------------------|          |           |            |                               |
A1 -->   A3 |    B1 v--    B3  <| |        |           |            |                               |
            v ^                 | |        | Approach 4|            | Exclusive right turns reduced 30 % |
A2 <--   A4  |   B2 --^    B4 |>  |                                 | V/C Ratio = 1.46              |
===========================================================================================
```

ATTACHMENT 5E

```
                                   Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: JACKSON HWY AND S. WATT                             Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR        |
             | Approach 3:S. WATT       |                -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
             |  1     1 |     ^         |                : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
             |  R   L   |     N         |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |              |  intervals/hour :                    |able    Volume   to next    Volume |
------------- T H H H T  ---------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >  ^--RT  1       |  change (vph)   :                    |-------------------------------------|
  1 LT--^       v v v    <^-RTH         |c.G/C ratio      :  0    0    0    0|B2B1    76(B1)  113-  76=  37(B2)   76|
    LTH-^>               <--TH   1      |d.Opposing volume :  0    0    0    0|A1B2    37(B2) 1061-  37=1024(A1)   37|
     TH-->               <v-LTH         |  in vph         :                    |A1A2  1024(A1) OR  355(A2)         1024|
  1 RTH-v>      ^ ^ ^    v--LT  1       |e.LT capacity on :  0    0    0    0|B4B3   303(B3)  399- 303=  96(B4)  303|
    RT--v     < < | > >  Approach 2     |  green (vph)    :                    |A3B4    96(B4) 1186-  96=1090(A3)   96|
------------- L L T R R  ---------------|f.LT capacity in :  0    0    0    0|A3A4  1090(A3) OR 1041(A4)         1090|
             | T T H T T |JACKSON HWY   |  vph (b+e)      :                    |                                     |
             |   H   H   |              |g.Left turn volume :  0    0    0    0|                                     |
             | 1     1   |              |  in vph         :                    |                                     |
             | Approach 4:S. WATT       |h.Is volume > cap. :                  :                                     |
                                        |  (g>f) ?        :                    |                                     |
========================================+====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                        |        |  1                 |        |                                     |
                                        |        |  1 3               |        |113(B1B2)+1024(A1)+399(B3B4)+1090(A3)|
             | Approach 3|              |-------  8 0 9              -------|                                     |
 3:  LT= 399 | |          | 2:RT= 281   |         2 4 9              ^- 281  |          = 2626 vph                 |
    TH=1104  | |          |    TH= 355  |         + + |              <- 355  |=====================================|
    RT=  82  | v          |    LT=  76  |         < v >              v-  76  | Step 8. INTERSECTION LEVEL OF       |
-------------              -------------|                                    |         SERVICE                     |
                         <--Approach 2  |                                    |    (compare step 7 with table 6)    |
                                        |                                    |              -------                |
                                        |                                    |              |  F  |                |
 Approach 1-->                          |                                    |              -------                |
-------------              -------------| 113 -^             < ^ >           |=====================================|
 1:LT= 113   |          ^ | 4: RT=  66  | 662 +>             | + +           | Step 9. RECALCULATE                 |
   TH= 662   |          | |    TH= 975  | 399 +v                             |                                     |
   RT= 399   |          | |    LT= 303  |-------             3 9     -------|Geometric Change:                    |
             | Approach 4|              |       |            0 7 6 |         |Signal Change:                       |
                                        |       |            3 5 6 |         |Volume Change:                       |
========================================+====================================+=====================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                        |        (two phase signal)           |                                     |
       --^ v--  B2B1                    |           | Approach 3|              |                                     |
                                        |           |           |              |                                     |
    --^ AND <--     A1B2 AND            |           |           |              |                                     |
    --> OR  v--     /OR A2B1            |           |           |              |                                     |
       --> <--  A1A2                    |-------------           ------------|                                     |
                                        | Approach 1                          |                                     |
        |   <   B4B3                    |                                     |                                     |
        >   |                           |         See Step 6b.                |                                     |
    | | AND < ^     A3B4 AND            |                                     |                                     |
    v > OR  | |     /OR A4B3            |                       Approach 2    |                                     |
        |   ^   A3A4                    |-------------           ------------|                                     |
        v   |                           |           |           |              |                                     |
----------------------------------------|           |           |              |                                     |
 A1 -->   A3 |      B1 v--    B3   <|   |           |           |              |                                     |
            v ^                     | | |           | Approach 4|              | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4 |>     |                                     | V/C Ratio = 1.91                    |
================================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
ntersection: JACKSON HWY AND BRADSHAW                              Design Hour: AM
roblem Statement: EXISTING PLUS PROJECT
=================================================================================================
Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:BRADSHAW     |              -------Approach-----|       MULTIPHASE SIGNAL OVERLAP    |
             | 1   1   1 |      ^      |                : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
             |  R   L    |      N      |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ACKSON HWY   | R T T T L |             |  intervals/hour :                 |able    Volume    to next    Volume |
------------  T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)   :                 |-------------------------------------|
  1  LT--^     v v v     <^-RTH        |c.G/C ratio      :  0    0    0    0|B2B1    15(B1)  200-  15= 185(B2)   15|
    LTH-^>               <--TH   1     |d.Opposing volume:  0    0    0    0|A1B2   185(B2)  180- 185=   0(A1)  185|
  1  TH-->               <v-LTH        |  in vph         :                 |A1A2   423(A2) OR    0(A1)          423|
    RTH-v>    ^ ^ ^       v--LT  1     |e.LT capacity on :  0    0    0    0|B4B3    74(B4)  340-  74= 266(B3)   74|
  1  RT--v    < < | > >   Approach 2   |  green (vph)    :                 |A4B3   266(B3) 1149- 266= 883(A4)  266|
------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   883(A4) OR  569(A3)          883|
             | T T H T T |JACKSON HWY |  vph (b+e)      :                 |                                     |
             |   H   H   |             |g.Left turn volume:  0    0    0    0|                                   |
             | 1   1   1 |             |  in vph         :                 |                                     |
             | Approach 4:BRADSHAW     |h.Is volume > cap.:                :                                     |
                                       |  (g>f) ?        :                 |                                     |
=======================================+===================================+=====================================|
Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                       |      |                    |       |                                     |
                                       |      | 2 5                |       |200(B1B2)+423(A2)+340(B4B3)+883(A4)  |
             | Approach 3|             |-------  2 6 7             ------- |                                     |
3:  LT=  74 | |          | 2:RT= 187   |         6 9 4              ^- 187 |          = 1846 vph                 |
   TH= 569  | |          |   TH= 423   |         | | |              <- 423 |=====================================|
   RT= 226  | v          |   LT=  15   |         < v >              v-  15 | Step 8. INTERSECTION LEVEL OF       |
-------------            -------------|                                    |        SERVICE                      |
                          <--Approach 2|                                   |     (compare step 7 with table 6)   |
                                       |                                   |              -------                |
                                       |                                   |              |  F  |                |
Approach 1-->                          |                                   |              -------                |
-------------            -------------| 200 -^              < ^ >         |=====================================|
1:LT= 200   |          ^ | 4: RT=  14  | 180 ->              | | |         | Step 9. RECALCULATE                 |
  TH= 180   |          | |   TH=1149   | 181 -v                1           |                                     |
  RT= 181   |          | |   LT= 340   |-------               3 1   -------|Geometric Change:                    |
            | Approach 4|              |      |               4 4 1 |      |Signal Change:                       |
                                       |      |               0 9 4 |      |Volume Change:                       |
=======================================+===================================+=====================================|
Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                       |          (two phase signal)       |                                     |
       --^ v--  B2B1                   |            | Approach 3|          |                                     |
                                       |            |           |          |                                     |
    --^ AND <--    A1B2 AND            |            |           |          |                                     |
    --> OR  v--    /OR A2B1            |            |           |          |                                     |
       --> <--  A1A2                   |------------             ----------|                                     |
                                       | Approach 1                        |                                     |
       |  <     B4B3                   |                                   |                                     |
       >  |                            |           See Step 6b.            |                                     |
    | | AND < ^    A3B4 AND            |                                   |                                     |
    v > OR  | |    /OR A4B3            |                       Approach 2  |                                     |
       |  ^     A3A4                   |------------            -----------|                                     |
       v  |                            |            |           |          |                                     |
---------------------------------------|            |           |          |                                     |
A1 -->   A3 |      B1 v--     B3    <| |            |           |          |                                     |
            v ^                     | ||            | Approach 4|          | Exclusive right turns reduced 30 %  |
A2 <--   A4  |     B2 --^     B4 |>    |                                   | V/C Ratio = 1.34                    |
=================================================================================================================
```

```
                               Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW                              Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR |
             | Approach 3:BRADSHAW |              -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
             | 1   1   1 |      ^  |              : -1-  -2-  -3-  -4-|       Possible   Volume   Adjusted|
             |   R   L   |      N  |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover Critical|
JACKSON HWY  | R T T T L |         | intervals/hour :                  |able    Volume   to next   Volume |
------------- T H H H T  ----------|b.LT capacity on:  0    0    0    0|Phase   in vph    phase    in vph |
  Approach 1  < < | > >  ^--RT  1 | change (vph)   :                  |---------------------------------|
   1  LT--^     v v v    <^-RTH    |c.G/C ratio     :  0    0    0    0|B2B1   28(B1)  191-  28= 163(B2)  28|
     LTH-^>              <--TH  1  |d.Opposing volume: 0    0    0    0|A1B2  163(B2)  433- 163= 270(A1) 163|
   1   TH-->             <v-LTH    | in vph         :                  |A1A2  270(A1) OR  156(A2)        270|
     RTH-v>     ^ ^ ^     v--LT  1 |e.LT capacity on:  0    0    0    0|B4B3  165(B4)  317- 165= 152(B3) 165|
   1  RT--v   < < | > >  Approach 2| green (vph)    :                  |A4B3  152(B3)  790- 152= 638(A4) 152|
------------- L L T R R  ----------|f.LT capacity in:  0    0    0    0|A3A4 1234(A3) OR  638(A4)       1234|
             | T T H T T |JACKSON HWY| vph (b+e)    :                  |                                 |
             |   H   H   |         |g.Left turn volume: 0   0    0    0|                                 |
             | 1   1   1 |         | in vph         :                  |                                 |
             | Approach 4:BRADSHAW |h.Is volume > cap. :               :                                 |
                                   | (g>f) ?        :                  |                                 |
===================================+===============================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |         |  1              |     |                                 |
                                   |         | 1 2 1           |     |191(B1B2)+270(A1)+317(B4B3)+1234(A3)|
             | Approach 3|         |-------  8 3 6          -------|                                 |
 3:  LT= 165 | |         | 2:RT=  76 |       2 4 5          ^-  76 |          = 2012 vph             |
   TH=1234   | |         |   TH= 156 |       | | |          <- 156 |=================================|
   RT= 182   | v         |   LT=  28 |       < v >          v-  28 | Step 8. INTERSECTION LEVEL OF   |
-------------            -------------|                             |        SERVICE                 |
                         <--Approach 2 |                            |   (compare step 7 with table 6) |
                                   |                               |            -------              |
                                   |                               |            |  F  |             |
 Approach 1-->                     |                               |            -------              |
-------------            ------------| 191 -^            < ^ >     |=================================|
 1:LT= 191   |            ^ | 4: RT=  20 | 433 ->          | | |     | Step 9. RECALCULATE             |
   TH= 433   |            | |   TH= 790 | 413 -v                    |                                 |
   RT= 413   |            | |   LT= 317 |-------         3 7  -------|Geometric Change:               |
             | Approach 4|             |       |         1 9 2 |     |Signal Change:                  |
                                   |       |         7 0 0 |     |Volume Change:                   |
===================================+===============================+=================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                    |
                                   |      (two phase signal)       |                                 |
      --^ v--   B2B1               |          | Approach 3|        |                                 |
                                   |          |           |        |                                 |
   --^ AND <--     A1B2 AND        |          |           |        |                                 |
   --> OR  v--     /OR A2B1        |          |           |        |                                 |
      --> <--   A1A2               |-----------           ---------|                                 |
                                   | Approach 1                    |                                 |
       |   <    B4B3               |                               |                                 |
       >   |                       |         See Step 6b.          |                                 |
   | | AND < ^     A3B4 AND        |                               |                                 |
   v > OR  | |     /OR A4B3        |                  Approach 2   |                                 |
       |   ^    A3A4               |-----------          ----------|                                 |
       v   |                       |          |           |        |                                 |
-----------------------------------|          |           |        |                                 |
 A1 -->   A3 |      B1 v--    B3   <| |       |           |        |                                 |
             v ^                  | | |       | Approach 4|        | Exclusive right turns reduced 30 % |
 A2 <--   A4   |    B2 --^    B4 |> |                              | V/C Ratio = 1.46                |
=================================================================================================
```

```
                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: BRADSHAW RD AND ELDER CREEK RD                        Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
          | Approach 3:BRADSHAW      |                -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
          | 1   1   1 |      ^       |                  : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
          |   R   L   |      N       |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover Critical|
ELDER CREEK R| R T T T L |           |  intervals/hour  :                   |able    Volume   to next   Volume |
-------------  T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase    in vph |
 Approach 1    < < | > >   ^--RT  1  |  change (vph)    :                   |----------------------------------|
  1  LT--^       v v v    <^-RTH     |c.G/C ratio       :  0    0    0    0|A1B2   89(A1) OR   45(B2)        89|
     LTH-^>               <--TH      |d.Opposing volume :  0    0    0    0|A2B1  151(A2) OR   16(B1)       151|
      TH-->               <v-LTH  1  |  in vph          :                   |B4B3    6(B4) 140-   6= 134(B3)    6|
  1  RTH-v>      ^ ^ ^     v--LT     |e.LT capacity on  :  0    0    0    0|A4B3  134(B3) 1473- 134=1339(A4) 134|
     RT--v     < < | > >   Approach 2|  green (vph)     :                   |A3A4 1339(A4) OR  663(A3)      1339|
-------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|                                  |
          | T T H T T |ELDER CREEK R |  vph (b+e)       :                   |                                  |
          |   H   H   |              |g.Left turn volume :  0   0    0    0|                                  |
          | 1     1   |              |  in vph          :                   |                                  |
          | Approach 4:BRADSHAW      |h.Is volume > cap. :                  :                                  |
                                     |  (g>f) ?         :                   |                                  |
==========================================================================================
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |        |                   |       |                                  |
                                     |        | 1 6               |       |89(A1)+151(A2)+140(B4B3)+1339(A4) |
          | Approach 3|              |-------   3 6               -------|                                  |
 3:  LT=   6 | |          | 2:RT=   8 |        6 3 6               ^-   8 |          = 1719 vph              |
   TH= 663 | |          |   TH= 135 |        | | |               <+ 135 |==================================|
   RT= 136 | v          |   LT=  17 |        < v >               v+  16 | Step 8. INTERSECTION LEVEL OF   |
-------------              -------------|                                  |        SERVICE                   |
                     <--Approach 2 |                                     |    (compare step 7 with table 6) |
                                     |                                     |              -------             |
                                     |                                     |              |  F  |           |
 Approach 1-->                       |                                     |              -------             |
-------------              -------------|  45 -^                    < ^ >    |==================================|
 1:LT=  45  |             ^ | 4: RT=  31 |  36 +>                    | + +    | Step 9. RECALCULATE             |
   TH=  36  |             | |   TH=1442 |  53 +v                      1      |                                  |
   RT=  53  |             | |   LT= 140 |-------                    1 4    -------|Geometric Change:            |
            | Approach 4|                |        |                 4 4 3 |       |Signal Change:               |
                                     |        |                 0 2 1 |       |Volume Change:               |
==========================================================================================
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                         |
                                     |          (two phase signal)        |                                  |
        --^       A1B2               |            | Approach 3|           |                                  |
        -->                          |            |           |           |                                  |
           <--    A2B1               |            |           |           |                                  |
           v--                       |            |           |           |                                  |
       |   <      B4B3               |-------------           -------------|                                  |
       >   |                         |  Approach 1                         |                                  |
  | | AND <  ^      A3B4 AND         |                                     |                                  |
  v > OR  | |       /OR A4B3         |            See Step 6b.             |                                  |
       |   ^      A3A4               |                                     |                                  |
       v   |                         |                        Approach 2   |                                  |
                                     |-------------            ------------|                                  |
                                     |            |           |           |                                  |
-------------------------------------|            |           |           |                                  |
 A1 -->    A3 |      B1 v--     B3  <|            |           |           |                                  |
           v ^                   | |            | Approach 4|           | Exclusive right turns reduced 30 %|
 A2 <--    A4  |     B2 --^     B4 |>            |           |           | V/C Ratio = 1.25                |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: BRADSHAW RD AND ELDER CREEK RD                           Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
=========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:BRADSHAW   |             -------Approach-----|         MULTIPHASE SIGNAL OVERLAP   |
             | 1   1   1 |     ^     |             : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
             |  R    L   |     N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |           | intervals/hour  :                 |able   Volume    to next    Volume |
------------- T H H H T -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1   < < | > >   ^--RT  1   | change (vph)    :                 |-------------------------------------|
   1  LT--^     v v v    <^-RTH      |c.G/C ratio      :  0    0    0    0|A1B2   232(A1) OR  130(B2)       232|
      LTH-^>             <--TH       |d.Opposing volume:  0    0    0    0|A2B1    84(A2) OR   44(B1)        84|
       TH-->             <v-LTH  1   | in vph          :                 |B4B3    14(B4)   94-  14=  80(B3)   14|
   1  RTH-v>    ^ ^ ^     v--LT      |e.LT capacity on :  0    0    0    0|A4B3    80(B3)  989-  80= 909(A4)   80|
      RT--v   < < | > >   Approach 2 | green (vph)     :                 |A3A4  1626(A3) OR  909(A4)       1626|
------------- L L T R R -------------|f.LT capacity in :  0    0    0    0|                                     |
             | T T H T T |ELDER CREEK R| vph (b+e)     :                 |                                     |
             |  H    H   |           |g.Left turn volume: 0    0    0    0|                                     |
             | 1     1   |           | in vph          :                 |                                     |
             | Approach 4:BRADSHAW   |h.Is volume > cap. :               :                                     |
                                     | (g>f) ?         :                 |                                     |
=====================================+=================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |        |  1                   |   |                                     |
                                     |        |  6                   |   |232(A1)+84(A2)+94(B4B3)+1626(A3)     |
             | Approach 3|           |-------  6 2 1            -------  |                                     |
 3:  LT=  14 | |         | 2:RT=   7 |         8 6 4            ^-   7   |          = 2036 vph                 |
   TH=1626   | |         |   TH=  40 |         | | |            <+  40   |=====================================|
   RT=  68   | v         |   LT=  44 |         < v >            v+  44   | Step 8. INTERSECTION LEVEL OF       |
-------------            ------------|                                   |         SERVICE                     |
                         <--Approach 2|                                  |     (compare step 7 with table 6)   |
                                     |                                   |             -------                 |
                                     |                                   |             |  F  |                 |
 Approach 1-->                       |                                   |             -------                 |
-------------            ------------| 130 -^              < ^ >         |=====================================|
 1:LT= 130   |             ^ | 4: RT=  35 |  97 +>         | + +         | Step 9. RECALCULATE                 |
   TH=  97   |             | |   TH= 954 | 135 +v                        |                                     |
   RT= 135   |             | |   LT=  94 |-------          9    -------  |Geometric Change:                    |
             | Approach 4|           |         |       9 5 3 |           |Signal Change:                       |
                                     |         |       4 4 5 |           |Volume Change:                       |
=====================================+=================================+=====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                     |        (two phase signal)       |                                     |
        --^       A1B2               |           | Approach 3|         |                                     |
        -->                          |           |           |         |                                     |
            <--   A2B1               |           |           |         |                                     |
            v--                      |           |           |         |                                     |
         |   <    B4B3               |-------------        ------------|                                     |
         >   |                       | Approach 1                      |                                     |
     | | AND < ^     A3B4 AND        |                                 |                                     |
     v > OR  | |     /OR A4B3        |          See Step 6b.           |                                     |
         |   ^    A3A4               |                                 |                                     |
         v   |                       |                     Approach 2  |                                     |
                                     |-------------        ------------|                                     |
                                     |           |           |         |                                     |
--------------------------------------           |           |         |                                     |
 A1 -->   A3 |      B1 v--     B3   <|           |           |         |                                     |
            v ^                      | |         | Approach 4|         | Exclusive right turns reduced 30 %  |
 A2 <--   A4   |    B2 --^     B4  |>|                                 | V/C Ratio = 1.48                    |
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
ntersection: BRADSHAW RD AND FLORIN RD                              Design Hour: AM
roblem Statement: EXISTING PLUS PROJECT
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR    |
          | Approach 3:BRADSHAW RD |            -------Approach-----|      MULTIPHASE SIGNAL OVERLAP    |
          | 1   1   1 |     ^     |            : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
          |  R   L    |     N     |a.No. of change   :  0    0    0   0|Prob-  Critical  Carryover Critical|
LORIN RD  | R T T T L |           | intervals/hour  :               |able   Volume   to next   Volume |
------------ T H H H T ------------|b.LT capacity on  :  0    0    0   0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT    | change (vph)    :               |-----------------------------------|
  1  LT--^     v v v     <^-RTH  1 |c.G/C ratio       :  0    0    0   0|B2B1   85(B1)  195-  85= 110(B2)   85|
     LTH-^>              <--TH    |d.Opposing volume :  0    0    0   0|A1B2  110(B2)  392- 110= 282(A1)  110|
      TH-->              <v-LTH   | in vph          :               |A1A2  509(A2) OR  282(A1)         509|
  1  RTH-v>    ^ ^ ^      v--LT  1 |e.LT capacity on  :  0    0    0   0|B4B3   55(B4)  402-  55= 347(B3)   55|
     RT--v   < < | > >  Approach 2 | green (vph)     :               |A4B3  347(B3) 1452- 347=1105(A4)  347|
------------ L L T R R ------------|f.LT capacity in  :  0    0    0   0|A3A4 1105(A4) OR  582(A3)        1105|
          | T T H T T |FLORIN RD  | vph (b+e)       :               |                                   |
          |   H   H   |           |g.Left turn volume :  0    0    0   0|                                   |
          | 1     1   |           | in vph          :               |                                   |
          | Approach 4:BRADSHAW   |h.Is volume > cap. :               :                                   |
                                  | (g>f) ?         :               |                                   |
==================================+=================================+===================================|
Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                  |        |                 |       |                                   |
                                  |        | 1 5             |       |195(B1B2)+509(A2)+402(B4B3)+1105(A4)|
          | Approach 3|           |-------   7 8 5             ------- |                                   |
3:  LT=  55 | |       | 2:RT= 147 |          2 2 5              ^+ 147 |          = 2211 vph               |
    TH= 582 | |       |   TH= 362 |          | | |              <+ 362 |===================================|
    RT= 172 | v       |   LT=  85 |          < v >              v-  85 | Step 8. INTERSECTION LEVEL OF     |
-------------          ------------|                                    |         SERVICE                   |
                     <--Approach 2 |                                    |    (compare step 7 with table 6)  |
                                   |                                    |             -------               |
                                   |                                    |             |  F  |               |
Approach 1-->                      |                                    |             -------               |
-------------          ------------| 195 -^                  < ^ >      |===================================|
1:LT= 195  |         ^ | 4: RT= 108 | 178 +>                  | + +      | Step 9. RECALCULATE               |
  TH= 178  |         | |   TH=1344 | 214 +v                    1        |                                   |
  RT= 214  |         | |   LT= 402 |-------                  4 3 1 -------|Geometric Change:                  |
           | Approach 4|           |        |                0 4 0 |    |Signal Change:                     |
                                   |        |                2 4 8 |    |Volume Change:                     |
==================================+====================================+===================================|
Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                          |
                                  |     (two phase signal)             |                                   |
      --^ v--  B2B1               |          | Approach 3|             |                                   |
                                  |          |           |             |                                   |
   --^ AND <--    A1B2 AND        |          |           |             |                                   |
   --> OR  v--    /OR A2B1        |          |           |             |                                   |
      --> <--  A1A2               |-----------             ------------|                                   |
                                  | Approach 1                         |                                   |
       |  <    B4B3               |                                    |                                   |
       >  |                       |        See Step 6b.                |                                   |
   | | AND < ^    A3B4 AND        |                                    |                                   |
   v > OR  | |    /OR A4B3        |                        Approach 2  |                                   |
       |  ^    A3A4               |-----------             ------------|                                   |
       v  |                       |          |           |             |                                   |
----------------------------------|          |           |             |                                   |
A1 -->   A3 |     B1 v--   B3  <| |          |           |             |                                   |
            v ^                | ||          | Approach 4|             | Exclusive right turns reduced 30 %|
A2 <--   A4 |     B2 --^   B4 |>  |                                    | V/C Ratio = 1.61                  |
==========================================================================================================
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                                  Critical Movement Analysis: PLANNING
                                          Calculation Form 1
Intersection: BRADSHAW RD AND FLORIN RD                               Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
===================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:BRADSHAW RD    |                  -------Approach-----|         MULTIPHASE SIGNAL OVERLAP    |
             | 1   1   1 |      ^        |                  : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
             |   R   L   |      N        |a.No. of change   :   0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |               |  intervals/hour  :                   |able   Volume    to next    Volume |
------------   T H H H T   ------------- |b.LT capacity on  :   0    0    0    0|Phase  in vph     phase     in vph |
  Approach 1   < < | > >    ^--RT        |  change (vph)    :                   |--------------------------------------|
   1  LT--^      v v v     <^-RTH  1     |c.G/C ratio       :   0    0    0    0|B2B1  122(B1)  228- 122= 106(B2)   122|
      LTH-^>               <--TH         |d.Opposing volume :   0    0    0    0|A1B2  106(B2)  858- 106= 752(A1)   106|
       TH-->               <v-LTH        |  in vph          :                   |A1A2  752(A1) OR  371(A2)           752|
   1  RTH-v>     ^ ^ ^      v--LT  1     |e.LT capacity on  :   0    0    0    0|B4B3  157(B4)  335- 157= 178(B3)   157|
      RT--v    < < | > >    Approach 2   |  green (vph)     :                   |A4B3  178(B3)  883- 178= 705(A4)   178|
------------   L L T R R   ------------- |f.LT capacity in  :   0    0    0    0|A3A4 1465(A3) OR  705(A4)          1465|
             | T T H T T |FLORIN RD      |  vph (b+e)       :                   |                                      |
             |   H   H   |               |g.Left turn volume:   0    0    0    0|                                      |
             | 1     1   |               |  in vph          :                   |                                      |
             | Approach 4:BRADSHAW       |h.Is volume > cap.:                   :                                      |
                                         |  (g>f) ?         :                   |                                      |
=========================================+====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES      |
                                         |       |  1                  |      |                                      |
                                         |       | 2 4 1               |      |228(B1B2)+752(A1)+335(B4B3)+1465(A3)  |
             | Approach 3|               |-------  7 6 5                ------|                                      |
 3:  LT= 157 | |         | 2:RT= 100     |         2 5 7             ^+ 100 |                                      |
   TH=1465   | |         |   TH= 271     |         | | |             <+ 271 |           = 2780 vph                 |
  RT= 272    | v         |   LT= 122     |         < v >             v- 122 |======================================|
------------              -------------  |                                    | Step 8. INTERSECTION LEVEL OF        |
                          <--Approach 2  |                                    |         SERVICE                      |
                                         |                                    |      (compare step 7 with table 6)   |
                                         |                                    |              -------                 |
                                         |                                    |              |  F  |                 |
 Approach 1-->                           |                                    |              -------                 |
------------              -------------  | 228 -^                 < ^ >       |======================================|
 1:LT= 228   |           ^ | 4: RT= 111  | 360 +>                 | + +       | Step 9. RECALCULATE                  |
   TH= 360   |           | |   TH= 772   | 498 +v                             |                                      |
   RT= 498   |           | |   LT= 335   |-------                 3 7 1 -------|Geometric Change:                     |
             | Approach 4|               |       |                3 7 1 |      |Signal Change:                        |
                                         |       |                5 2 1 |      |Volume Change:                        |
=========================================+====================================+======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                         |          (two phase signal)        |                                      |
        --^ v--   B2B1                   |            | Approach 3|           |                                      |
                                         |            |           |           |                                      |
    --^ AND <--      A1B2 AND            |            |           |           |                                      |
    --> OR  v--      /OR A2B1            |            |           |           |                                      |
        --> <--   A1A2                   |------------             -----------|                                      |
                                         |  Approach 1                        |                                      |
         |  <     B4B3                   |                                    |                                      |
         >  |                            |             See Step 6b.           |                                      |
   | | AND < ^       A3B4 AND            |                                    |                                      |
   v > OR  | |       /OR A4B3            |                          Approach 2|                                      |
         |  ^     A3A4                   |------------             -----------|                                      |
         v  |                            |            |           |           |                                      |
-----------------------------------------|            |           |           |                                      |
 A1 -->   A3 |     B1 v--    B3    <|    |            |           |           |                                      |
            v ^                     | |  |            | Approach 4|           | Exclusive right turns reduced 30 %   |
 A2 <--   A4  |    B2 --^    B4 |>       |                                    | V/C Ratio = 2.02                     |
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: ELK GROVE-FLORIN AND GERBER RD                             Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT
=========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:ELK GROVE-FLO|             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP    |
            |  1     1 |      ^       |             : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
            |  R     L |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD   | R T T T L |              | intervals/hour  :                 |able    Volume   to next    Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT        | change (vph)    :                 |------------------------------------|
  1  LT--^    v v v     <^-RTH  1     |c.G/C ratio       :  0    0    0    0|B2B1   100(B2)  196- 100=  96(B1)   100|
     LTH-^>             <--TH   1     |d.Opposing volume :  0    0    0    0|A2B1    96(B1)  453-  96= 357(A2)    96|
  1   TH-->             <v-LTH        | in vph           :                 |A1A2   384(A1) OR  357(A2)          384|
     RTH-v>   ^ ^ ^      v--LT  1     |e.LT capacity on  :  0    0    0    0|B4B3   234(B4)  752- 234= 518(B3)   234|
  1  RT--v   < < | > >   Approach 2   | green (vph)      :                 |A4B3   518(B3)  881- 518= 363(A4)   518|
------------ L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   532(A3) OR  363(A4)          532|
            | T T H T T |GERBER RD    | vph (b+e)        :                 |                                    |
            |  H   H   |              |g.Left turn volume :  0    0    0    0|                                    |
            | 1    1   |              | in vph           :                 |                                    |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                :                                    |
                                      | (g>f) ?          :                 |                                    |
======================================+===================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                      |      |                     |      |                                    |
                                      |      | 1 3 2               |      |196(B2B1)+384(A1)+752(B4B3)+532(A3) |
            | Approach 3|             |-------  8 4 3               -------|                                    |
 3:  LT= 234 | |        | 2:RT= 442   |         7 5 4              ^+ 442 |          = 1864 vph                |
   TH= 345 | |          |   TH= 464   |         + + |              <+  11 |====================================|
   RT= 187 | v          |   LT= 196   |         < v >              <- 453 | Step 8. INTERSECTION LEVEL OF      |
------------            -------------|                             v- 196 |        SERVICE                     |
                        <--Approach 2 |                                   |     (compare step 7 with table 6)  |
                                      |                                   |              -------               |
                                      |                                   |              |  F  |               |
 Approach 1-->                        |                                   |              -------               |
------------            -------------| 100 -^               < ^ >        |====================================|
 1:LT= 100   |          ^ | 4: RT= 166 | 384 ->               | + +        | Step 9. RECALCULATE                |
   TH= 384   |          | |   TH= 715 | 269 -v                            |                                    |
   RT= 269   |          | |   LT= 752 |-------              7 7 1 -------|Geometric Change:                   |
            | Approach 4|             |      |               5 1 6 |      |Signal Change:                      |
                                      |      |               2 5 6 |      |Volume Change:                      |
======================================+===================================+====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                      |        (two phase signal)         |                                    |
       --^ v--   B2B1                 |           | Approach 3|           |                                    |
                                      |           |           |           |                                    |
    --^ AND <--     A1B2 AND          |           |           |           |                                    |
    --> OR  v--     /OR A2B1          |           |           |           |                                    |
       --> <--   A1A2                 |------------           ------------|                                    |
                                      | Approach 1                        |                                    |
        |  <    B4B3                  |                                   |                                    |
        >  |                          |          See Step 6b.             |                                    |
    | | AND < ^     A3B4 AND          |                                   |                                    |
    v > OR  | |     /OR A4B3          |                      Approach 2   |                                    |
        |  ^    A3A4                  |------------           ------------|                                    |
        v  |                          |           |           |           |                                    |
--------------------------------------|           |           |           |                                    |
A1 -->    A3 |       B1 v--    B3   <| |           |           |           |                                    |
            v ^                    | | |           | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--    A4  |      B2 --^    B4 |>  |                                   | V/C Ratio = 1.36                   |
=========================================================================================
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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: ELK GROVE-FLORIN AND GERBER RD                          Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
=========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR        |
            | Approach 3:ELK GROVE-FLO|               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP      |
            |  1    1 |     ^      |                 : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
            |  R    L |            |a.No. of change  :   0    0    0    0|Prob- Critical  Carryover Critical|
GERBER RD   | R T T T L |     N      |  intervals/hour :                   |able   Volume   to next   Volume |
------------- T H H H T ------------|b.LT capacity on :   0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >    ^--RT    |  change (vph)   :                   |---------------------------------------|
  1  LT--^      v v v     <^-RTH  1 |c.G/C ratio      :   0    0    0    0|B2B1  214(B2)  277- 214=  63(B1)   214|
     LTH-^>               <--TH   1 |d.Opposing volume:   0    0    0    0|A2B1   63(B1)  505-  63= 442(A2)    63|
  1   TH-->               <v-LTH    |  in vph         :                   |A1A2  585(A1) OR  442(A2)          585|
     RTH-v>    ^ ^ ^       v--LT  1 |e.LT capacity on :   0    0    0    0|B4B3  336(B3)  605- 336= 269(B4)   336|
  1  RT--v    < < | > >  Approach 2 |  green (vph)    :                   |A3B4  269(B4)  924- 269= 655(A3)   269|
------------- L L T R R ------------|f.LT capacity in :   0    0    0    0|A3A4  707(A4) OR  655(A3)          707|
            | T T H T T |GERBER RD  |  vph (b+e)      :                   |                                       |
            |   H   H   |           |g.Left turn volume:  0    0    0    0|                                       |
            | 1     1   |           |  in vph         :                   |                                       |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                 :                                       |
                                    |  (g>f) ?        :                   |                                       |
====================================+=================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                    |        |                   |       |                                       |
                                    |        | 2 7 6             |       |277(B2B1)+585(A1)+605(B3B4)+707(A4)    |
            | Approach 3|           |-------  1 1 0          -------|                                       |
 3:  LT= 605 | |        | 2:RT= 489 |         0 4 5          ^+ 489|            = 2174 vph                 |
   TH= 714  | |         |   TH= 520 |         + + |          <+  16|=======================================|
  RT= 210   | v         |   LT= 277 |         < v >          <- 505| Step 8. INTERSECTION LEVEL OF         |
-------------          -------------|                         v- 277|         SERVICE                       |
                        <--Approach 2 |                              |     (compare step 7 with table 6)     |
                                    |                                |             -------                   |
                                    |                                |             |  F  |                   |
 Approach 1-->                      |                                |             -------                   |
-------------          -------------| 214 -^          < ^ >          |=======================================|
 1:LT= 214  |            ^ | 4: RT= 247 | 535 ->       | + +          | Step 9. RECALCULATE                   |
   TH= 535  |            | |    TH= 460 | 835 -v                      |                                       |
   RT= 835  |            | |    LT= 336 |-------        3 4 2  -------|Geometric Change:                      |
            | Approach 4|           |        |          3 6 4 |       |Signal Change:                         |
                                    |        |          6 0 7 |       |Volume Change:                         |
====================================+=================================+=======================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                              |
                                    |         (two phase signal)        |                                       |
        --^ v--  B2B1               |           | Approach 3|         |                                       |
                                    |           |           |         |                                       |
    --^ AND <--    A1B2 AND         |           |           |         |                                       |
    --> OR  v--     /OR A2B1        |           |           |         |                                       |
        --> <--  A1A2               |-------------      ------------|                                       |
                                    | Approach 1                        |                                       |
         |  <    B4B3               |                                   |                                       |
         >  |                       |          See Step 6b.             |                                       |
    | | AND < ^    A3B4 AND         |                                   |                                       |
    v > OR  | |     /OR A4B3        |                      Approach 2   |                                       |
         |  ^    A3A4               |-------------       -----------|                                       |
         v  |                       |           |           |         |                                       |
------------------------------------|           |           |         |                                       |
 A1 -->   A3 |     B1 v--    B3   <|  |           |           |         |                                       |
            v ^                  | |  |           | Approach 4|         | Exclusive right turns reduced 30 %    |
 A2 <--   A4  |    B2 --^    B4 |>   |                                  | V/C Ratio = 1.58                      |
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
ntersection: BRADSHAW AND GERBER RD                                   Design Hour: AM
roblem Statement: EXISTING PLUS PROJECT
=============================================================================================
Step 1. IDENTIFY LANE GEOMETRY  | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
           | Approach 3:BRADSHAW RD |                   -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
           | 1   1   1 |     ^     |                   : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
           |   R   L   |     N     |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ERBER RD   | R T T T L |           | intervals/hour    :                   |able   Volume    to next    Volume |
------------ T H H H T -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT     | change (vph)      :                   |-----------------------------------|
  1  LT--^     v v v    <^-RTH  1  |c.G/C ratio        :  0    0    0    0|B2B1    29(B1)  431-  29= 402(B2)    29|
     LTH-^>             <--TH      |d.Opposing volume  :  0    0    0    0|A1B2   402(B2)  254- 402=   0(A1)   402|
      TH-->             <v-LTH     | in vph            :                   |A1A2   397(A2) OR    0(A1)          397|
  1  RTH-v>    ^ ^ ^    v--LT   1  |e.LT capacity on   :  0    0    0    0|B4B3    71(B3)   92-  71=  21(B4)    71|
     RT--v   < < | > >  Approach 2 | green (vph)       :                   |A3B4    21(B4)  311-  21= 290(A3)    21|
------------ L L T R R -------------|f.LT capacity in  :  0    0    0    0|A3A4   819(A4) OR  290(A3)          819|
           | T T H T T |GERBER RD  | vph (b+e)         :                   |                                   |
           |   H   H   |           |g.Left turn volume :  0    0    0    0|                                   |
           | 1     1   |           | in vph            :                   |                                   |
           | Approach 4:BRADSHAW RD |h.Is volume > cap. :                   :                                   |
                                   | (g>f) ?           :                   |                                   |
=================================+=================================+===================================|
Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                  |        |                    |   |                                   |
                                  |        | 3 3                |   |431(B1B2)+397(A2)+92(B3B4)+819(A4) |
           | Approach 3|          |-------  6 1 9          -------   |                                   |
3:  LT=  92 | |        | 2:RT= 145 |         8 1 2          ^+ 145   |          = 1739 vph               |
   TH= 311 | |         |   TH= 252 |         | | |          <+ 252   |===================================|
   RT= 368 | v         |   LT=  29 |         < v >          v-  29   | Step 8. INTERSECTION LEVEL OF     |
------------            -------------|                                |         SERVICE                   |
                        <--Approach 2 |                                |   (compare step 7 with table 6)   |
                                  |                                   |              -------              |
                                  |                                   |              |  F  |              |
Approach 1-->                     |                                   |              -------              |
------------            -------------| 431 -^              < ^ >      |===================================|
1:LT= 431  |          ^ | 4: RT=  31 | 187 +>              | + +      | Step 9. RECALCULATE               |
  TH= 187  |          | |   TH= 788 |  67 +v                         |                                   |
  RT=  67  |          | |   LT=  71 |-------               7  -------|Geometric Change:                  |
           | Approach 4|          |        |            7 8 3 |      |Signal Change:                      |
                                  |        |            1 8 1 |      |Volume Change:                      |
=================================+=================================+===================================|
Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                  |       (two phase signal)         |                                   |
      --^ v--   B2B1              |          | Approach 3|           |                                   |
                                  |          |           |           |                                   |
   --^ AND <--    A1B2 AND        |          |           |           |                                   |
   --> OR  v--    /OR A2B1        |          |           |           |                                   |
      --> <--   A1A2              |-------------       -------------|                                   |
                                  | Approach 1                        |                                   |
       |   <    B4B3              |                                   |                                   |
       >   |                      |        See Step 6b.               |                                   |
   | | AND < ^    A3B4 AND        |                                   |                                   |
   v > OR  | |    /OR A4B3        |                     Approach 2    |                                   |
       |   ^    A3A4              |-------------       -------------|                                   |
       v   |                      |          |           |           |                                   |
--------------------------------- |          |           |           |                                   |
A1 -->   A3 |      B1 v--     B3  <|          |           |           |                                   |
          v ^                    | | |          | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--   A4 |      B2 --^     B4 |> |                                   | V/C Ratio = 1.26                   |
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                    Critical Movement Analysis: PLANNING
                              Calculation Form 1
Intersection: BRADSHAW AND GERBER RD                        Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR        |
            | Approach 3:BRADSHAW RD |             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP       |
            | 1   1   1 |      ^     |               : -1-  -2-  -3-  -4-|       Possible    Volume     Adjusted|
            |  R   L    |      N     |a.No. of change  :  0    D    0    0|Prob-  Critical   Carryover  Critical|
GERBER RD   | R T T T L |            |  intervals/hour :                 |able   Volume    to next    Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase      in vph |
  Approach 1  < < | > >   ^--RT      |  change (vph)   :                 |--------------------------------------|
   1  LT--^    v v v    <^-RTH  1    |c.G/C ratio      :  0    0    0    0|B2B1   37(B1)  585-  37= 548(B2)    37|
      LTH-^>              <--TH      |d.Opposing volume:  0    0    0    0|A1B2  548(B2)  424- 548=   0(A1)   548|
       TH-->              <v-LTH     |  in vph         :                 |A1A2  468(A2) OR    0(A1)          468|
   1  RTH-v>   ^ ^ ^      v--LT  1   |e.LT capacity on :  0    0    0    0|B4B3  101(B3)  194- 101=  93(B4)   101|
      RT--v   < < | > >  Approach 2  |  green (vph)    :                 |A3B4   93(B4)  726-  93= 633(A3)    93|
------------ L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4  633(A3) OR  325(A4)          633|
            | T T H T T |GERBER RD   |  vph (b+e)      :                 |                                      |
            |   H   H   |            |g.Left turn volume:  0   0    0    0|                                      |
            | 1     1   |            |  in vph         :                 |                                      |
            | Approach 4:BRADSHAW RD |h.Is volume > cap. :               :|                                      |
                                     |  (g>f) ?        :                 |                                      |
=====================================+=================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                     |       |                    |    |                                      |
                                     |       | 6 7 1              |    |585(B1B2)+468(A2)+194(B3B4)+633(A3)   |
            | Approach 3|            |-------  5 2 9             -------|                                      |
 3:  LT= 194 | |         | 2:RT= 180 |         9 6 4             ^+ 180|            = 1880 vph                |
    TH= 726 | |          |   TH= 288 |         | | |             <+ 288|======================================|
   RT= 659  | v          |   LT=  37 |         < v >             v-  37| Step 8. INTERSECTION LEVEL OF        |
-------------            -------------|                                |         SERVICE                      |
                        <--Approach 2 |                                |      (compare step 7 with table 6)   |
                                     |                                 |                -------               |
                                     |                                 |                | F |                 |
 Approach 1-->                       |                                 |                -------               |
-------------            -------------| 585 -^              < ^ >      |======================================|
 1:LT= 585   |           ^ | 4: RT=  35 | 321 +>            | + +      | Step 9. RECALCULATE                  |
   TH= 321   |           | |   TH= 290 | 103 +v                        |                                      |
   RT= 103   |           | |   LT= 101 |-------             1 2  -------|Geometric Change:                     |
             | Approach 4|           |        |           0 9 3 |     |Signal Change:                        |
                                     |        |           1 0 5 |     |Volume Change:                        |
=====================================+=================================+======================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                     |       (two phase signal)        |                                      |
       --^ v--   B2B1                |           | Approach 3|         |                                      |
                                     |           |           |         |                                      |
    --^ AND <--     A1B2 AND         |           |           |         |                                      |
    --> OR  v--     /OR A2B1         |           |           |         |                                      |
       --> <--   A1A2                |-------------         ------------|                                      |
                                     | Approach 1                      |                                      |
        |  <   B4B3                  |                                 |                                      |
        >  |                         |         See Step 6b.            |                                      |
    | | AND < ^     A3B4 AND         |                                 |                                      |
    v > OR  | |     /OR A4B3         |                      Approach 2 |                                      |
        |  ^   A3A4                  |-------------         ------------|                                      |
        v  |                         |           |           |         |                                      |
-------------------------------------|           |           |         |                                      |
 A1 -->   A3 |     B1 v--    B3   <| |           |           |         |                                      |
             v ^                   | | |         | Approach 4|         | Exclusive right turns reduced 30 %   |
 A2 <--   A4   |   B2 --^    B4 |>   |                                 | V/C Ratio = 1.37                     |
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                        Critical Movement Analysis: PLANNING
                                Calculation Form 1
ntersection: ELK GROVE-FLORIN AND CALVINE RD                         Design Hour: AM
'roblem Statement: EXISTING PLUS PROJECT
==============================================================================================
Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
           | Approach 3:ELK GROVE-FLO|           -------Approach-----|      MULTIPHASE SIGNAL OVERLAP    |
           |  1 1   1 |      ^      |                : -1- -2- -3- -4-|     Possible   Volume    Adjusted|
           |  R   L   |      N      |a.No. of change  :  0   0   0   0|Prob- Critical Carryover Critical|
'ALVINE ROAD | R T T T L |          | intervals/hour  :               |able  Volume   to next   Volume |
------------ T H H H T  ------------|b.LT capacity on :  0   0   0   0|Phase in vph    phase    in vph |
 Approach 1   < < | > >   ^--RT     | change (vph)    :               |---------------------------------|
  2 LT--^      v v v     <^-RTH  1  |c.G/C ratio      :  0   0   0   0|B2B1   66(B1)  69- 66=  3(B2)  66|
    LTH-^>               <--TH      |d.Opposing volume:  0   0   0   0|A1B2    3(B2) 238-  3= 235(A1)  3|
     TH-->               <v-LTH     | in vph          :               |A1A2  262(A2) OR 235(A1)      262|
  1 RTH-v>     ^ ^ ^      v--LT  2  |e.LT capacity on :  0   0   0   0|B4B3   27(B4) 122- 27= 95(B3)  27|
    RT--v     < < | > >  Approach 2 | green (vph)     :               |A4B3   95(B3) 315- 95= 220(A4) 95|
------------  L L T R R ------------|f.LT capacity in :  0   0   0   0|A3A4  433(A3) OR 220(A4)      433|
           | T T H T T |CALVINE ROAD| vph (b+e)       :               |                                 |
           |  H   H    |            |g.Left turn volume:  0   0   0   0|                                |
           | 1   1 1   |            | in vph          :               |                                 |
           | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :             :                                 |
                                    | (g>f) ?         :               |                                 |
====================================+=================================+==================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |        |                  |   |                                  |
                                    |        | 3  4             |   |69(B1B2)+262(A2)+122(B4B3)+433(A3)|
           | Approach 3|            |-------  4 8 3 2        -------|                                  |
3:  LT=  27 | |        | 2:RT=  43  |         6 7 3 7         ^+  43 |                                 |
  TH= 519  | |         |  TH= 219   |         + + | |         <+ 219 |         = 886 vph               |
  RT= 346  | v         |  LT= 119   |         < v v >         v-  54 |=================================|
------------              ----------|                         v-  66 | Step 8. INTERSECTION LEVEL OF   |
                        <--Approach 2|                               |     SERVICE                     |
                                    |                                 |  (compare step 7 with table 6)  |
                                    |                                 |        -------                  |
Approach 1-->                       | 69 -^                           |        | B |                    |
------------              ----------| 57 -^          < ^ ^ >          |        -------                  |
1:LT= 125  |            ^ | 4: RT=  79 | 140 +>       | | + +         |=================================|
  TH= 140  |            | |   TH= 551  |  98 +v                       | Step 9. RECALCULATE             |
  RT=  98  |            | |   LT= 122  |-------       1 3 2   -------|                                 |
           | Approach 4|            |       |        2 1 3 7 |        |Geometric Change:                |
                                    |       |        2 5 6 9 |        |Signal Change:                   |
                                    |                                 |Volume Change:                   |
====================================+=================================+==================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                    |       (two phase signal)        |                                 |
      --^ v--  B2B1                 |         | Approach 3|           |                                 |
                                    |         |           |           |                                 |
   --^ AND <--    A1B2 AND          |         |           |           |                                 |
   --> OR  v--    /OR A2B1          |         |           |           |                                 |
      --> <--  A1A2                 |-----------       ---------------|                                 |
                                    | Approach 1                      |                                 |
       |  <    B4B3                 |                                 |                                 |
       >  |                         |      See Step 6b.               |                                 |
   | | AND < ^    A3B4 AND          |                                 |                                 |
   v > OR  | |    /OR A4B3          |                    Approach 2   |                                 |
       |  ^    A3A4                 |-----------       ---------------|                                 |
       v  |                         |         |           |           |                                 |
------------------------------------|         |           |           |                                 |
A1 -->   A3 |     B1 v--    B3  <|  |         |           |           |                                 |
           v ^                 | |  |         | Approach 4|           |                                 |
A2 <--   A4  |    B2 --^    B4 |>   |                                 | V/C Ratio = .64                 |
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                       Critical Movement Analysis: PLANNING
                                Calculation Form 1
Intersection: ELK GROVE-FLORIN AND CALVINE RD                  Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
              | Approach 3:ELK GROVE-FLO|              -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
              |   1 1   1 |      ^    |                : -1- -2- -3- -4-|       Possible   Volume    Adjusted|
              |   R   L   |      N    |a.No. of change   :  0   0   0   0|Prob-  Critical  Carryover Critical|
CALVINE ROAD  | R T T T L |            |  intervals/hour  :                |able   Volume   to next   Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0   0   0   0|Phase  in vph   phase     in vph |
  Approach 1  < < | > >    ^--RT       |  change (vph)    :                |-------------------------------------|
   2  LT--^     v v v     <^-RTH  1    |c.G/C ratio       :  0   0   0   0|B2B1   69(B1)  176-  69= 107(B2)    69|
      LTH-^>              <--TH        |d.Opposing volume :  0   0   0   0|A1B2  107(B2)  330- 107= 223(A1)   107|
        TH-->             <v-LTH       |  in vph          :                |A1A2  223(A1) OR  202(A2)          223|
   1  RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on  :  0   0   0   0|B4B3   49(B4)  108-  49=  59(B3)    49|
      RT--v   < < | > >   Approach 2   |  green (vph)     :                |A4B3   59(B3)  321-  59= 262(A4)    59|
------------- L L T R R  -------------|f.LT capacity in  :  0   0   0   0|A3A4  491(A3) OR  262(A4)          491|
              | T T H T T |CALVINE ROAD|  vph (b+e)       :                |                                     |
              |   H   H   |            |g.Left turn volume:  0   0   0   0|                                     |
              | 1   1 1   |            |  in vph          :                |                                     |
              | Approach 4:ELK GROVE-FLO|h.Is volume > cap.:               :                                     |
                                       |  (g>f) ?         :                |                                     |
=======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                       |        |                  |        |                                     |
                                       |        | 2 2 4            |        |176(B1B2)+223(A1)+108(B4B3)+491(A3)  |
              | Approach 3|             |-------  4 5 9 4           -------|                                     |
 3:  LT=  49 | |          | 2:RT=  27  |         1 0 1 9           ^+  27 |          = 998 vph                  |
    TH= 741  | |          |    TH= 175 |         + + | |           <+ 175 |=====================================|
    RT= 241  | v          |    LT= 125 |         < v v >           v-  57 | Step 8. INTERSECTION LEVEL OF       |
-------------              -------------|                            v-  69 |        SERVICE                      |
                          <--Approach 2 |                                   |     (compare step 7 with table 6)   |
                                       |                                   |              -------                |
                                       |                                   |              | C  |                 |
 Approach 1-->                         | 176 -^                            |              -------                |
-------------              -------------| 144 -^            < ^ ^ >        |=====================================|
 1:LT= 320   |              ^ | 4: RT= 101 | 199 +>         | | + +          | Step 9. RECALCULATE                 |
   TH= 199   |              | |    TH= 541 | 131 +v                         |                                     |
   RT= 131   |              | |   LT= 108  |-------         1 3 2 1  -------|Geometric Change:                    |
             | Approach 4|             |        |         0 2 2 0 |        |Signal Change:                       |
                                       |        |         8 1 0 1 |        |Volume Change:                       |
=======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                       |        (two phase signal)         |                                     |
        --^ v--  B2B1                  |            | Approach 3|          |                                     |
                                       |            |           |          |                                     |
     --^ AND <--     A1B2 AND          |            |           |          |                                     |
     --> OR  v--     /OR A2B1          |            |           |          |                                     |
        --> <--  A1A2                  |-------------            ----------|                                     |
                                       | Approach 1                        |                                     |
         |   <   B4B3                  |                                   |                                     |
         >   |                         |           See Step 6b.            |                                     |
     | | AND < ^     A3B4 AND          |                                   |                                     |
     v > OR  | |     /OR A4B3          |                       Approach 2  |                                     |
         |   ^   A3A4                  |-------------            ----------|                                     |
         v   |                         |            |           |          |                                     |
---------------------------------------|            |           |          |                                     |
 A1 -->   A3 |      B1 v--    B3    <| |            |           |          |                                     |
             v ^                  | |  |            | Approach 4|          |                                     |
 A2 <--   A4   |    B2 --^    B4 |>    |                                   | V/C Ratio = .73                     |
===========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
ntersection: FLORIN RD AND WATERMAN RD                              Design Hour: AM
roblem Statement: EXISTING PLUS PROJECT
==============================================================================================
Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR    |
          | Approach 3:WATERMAN RD |                 -------Approach-----|     MULTIPHASE SIGNAL OVERLAP     |
          |         |       ^      |                  : -1-  -2-  -3-  -4-|   Possible   Volume    Adjusted|
          |  R   L  |       N      |a.No. of change   :  0    0    0    0|Prob- Critical Carryover Critical|
LORIN RD  | R T T T L |            | intervals/hour   :                   |able  Volume   to next   Volume |
------------ T H H H T -------------|b.LT capacity on :  0    0    0    0|Phase in vph    phase    in vph |
 Approach 1  < < | > >  ^--RT       | change (vph)     :                   |-----------------------------------|
    LT--^     v v v    <^-RTH       |c.G/C ratio       :  0    0    1    0|A2B1   86(B1)  703-  86= 617(A2)   86|
    LTH-^>             <--TH   1    |d.Opposing volume : 703   0  154    0|A1A2  617(A2) OR  274(A1)         617|
  1  TH-->             <v-LTH       | in vph           :                   |A4B3  371(B3) OR  108(A4)         371|
    RTH-v>    ^ ^ ^     v--LT  1    |e.LT capacity on  :  0    0 1046    0|                                   |
  1  RT--v   < < | > >  Approach 2  | green (vph)      :                   |                                   |
------------ L L T R R -------------|f.LT capacity in  :  0    0 1046    0|                                   |
          | T T H T T |FLORIN RD    | vph (b+e)        :                   |                                   |
          |  H   H  |               |g.Left turn volume :  0    0    0    0|                                   |
          | 1      1 |              | in vph           :                   |                                   |
          | Approach 4:WATERMAN RD  |h.Is volume > cap. : NO        NO     :                                   |
                                    | (g>f) ?          :                   |                                   |
=====================================+======================================+===================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                    |      |                        |      |                                   |
                                    |      |                        |      |703(B1A2)+371(B3)+0()+0()          |
          | Approach 3|             |-------                   -------     |                                   |
3:  LT=   0 | |        | 2:RT=   0  |                          <- 703     |          = 1074 vph               |
   TH=   0  | |        |   TH= 703  |                          v-  86     |===================================|
  RT=   0   | v        |   LT=  86  |                                      | Step 8. INTERSECTION LEVEL OF     |
------------           -------------|                                      |          SERVICE                  |
                       <--Approach 2|                                      |    (compare step 7 with table 6)  |
                                    |                                      |            -------                |
                                    |                                      |            | C |                  |
Approach 1-->                       |                                      |            -------                |
------------           -------------|                           < >        |===================================|
1:LT=   0   |          ^ | 4: RT= 154 | 274 ->                   | |        | Step 9. RECALCULATE               |
  TH= 274   |          | |    TH=   0 | 225 -v                            |                                   |
  RT= 225   |          | |   LT= 371 |-------                   3 1 -------|Geometric Change:                 |
            | Approach 4|           |      |                    7 5 |      |Signal Change:                     |
                                    |      |                    1 4 |      |Volume Change:                     |
=====================================+======================================+===================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                          |
                                    |        (two phase signal)            |                                   |
          <--  A2B1                 |           | Approach 3|              |                                   |
          v--                       |           |           |              |                                   |
      --> <--  A1A2                 |           |           |              |                                   |
                                    |           |           |              |                                   |
        <   ^  A4B3                 |-------------        -------------    |                                   |
        |   |                       | Approach 1                           |                                   |
                                    |                                      |                                   |
                                    |          See Step 6b.                |                                   |
                                    |                                      |                                   |
                                    |                         Approach 2   |                                   |
                                    |-------------        -------------    |                                   |
                                    |           |           |              |                                   |
------------------------------------|           |           |              |                                   |
A1 -->   A3 |     B1 v--     B3   <| |           |           |              |                                   |
          v ^                     | | |           | Approach 4|              | Exclusive right turns reduced 30 % |
A2 <--   A4   |   B2 --^     B4 |> |                                      | V/C Ratio = .75                   |
==============================================================================================
```

```
                                   Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                 Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:WATERMAN RD |          -------Approach-----|         MULTIPHASE SIGNAL OVERLAP |
            |         |        ^     |                : -1- -2- -3- -4-|      Possible   Volume    Adjusted|
            |  R   L  |        N     |a.No. of change   :  0   0   0   0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |            | intervals/hour  :                |able    Volume   to next   Volume |
------------- T H H H T -------------|b.LT capacity on  :  0   0   0   0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT      | change (vph)    :                |----------------------------------|
     LT--^     v v v     <^-RTH      |c.G/C ratio      :  0   0   1   0|A2B1  148(B1)  658- 148= 510(A2)  148|
     LTH-^>              <--TH   1   |d.Opposing volume : 658  0  123  0|A1A2  740(A1) OR  510(A2)          740|
  1   TH-->              <v-LTH      | in vph          :                |A4B3  425(B3) OR   86(A4)          425|
     RTH-v>    ^ ^ ^      v--LT  1   |e.LT capacity on  :  0   0 1077  0|                                  |
  1  RT--v    < < | > >   Approach 2 | green (vph)     :                |                                  |
------------- L L T R R -------------|f.LT capacity in  :  0   0 1077  0|                                  |
            | T T H T T |FLORIN RD   | vph (b+e)       :                |                                  |
            |   H   H   |            |g.Left turn volume :  0   0   0   0|                                  |
            | 1       1 |            | in vph          :                |                                  |
            | Approach 4:WATERMAN RD |h.Is volume > cap. : NO      NO   :                                  |
                                     | (g>f) ?         :                |                                  |
=====================================+================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |        |                   |     |                                  |
                                     |        |                   |     |888(B1A1)+425(B3)+0()+0()         |
            | Approach 3|            |-------                   -------|                                  |
 3:  LT=   0 | |          | 2:RT=   0 |                          <- 658 |          = 1313 vph              |
    TH=   0 | |          |   TH= 658 |                          v- 148 |==================================|
   RT=   0  | v          |   LT= 148 |                                 | Step 8. INTERSECTION LEVEL OF    |
-------------           -------------|                                 |        SERVICE                   |
                        <--Approach 2 |                                |     (compare step 7 with table 6) |
                                     |                                 |             -------              |
                                     |                                 |             |  E  |              |
 Approach 1-->                       |                                 |             -------              |
-------------           -------------|                          < >    |==================================|
 1:LT=   0  |          ^ | 4: RT= 123 | 740 ->                   | |    | Step 9. RECALCULATE              |
   TH= 740  |          | |    TH=   0 | 515 -v                          |                                  |
   RT= 515  |          | |    LT= 425 |-------                  4 1 -------|Geometric Change:              |
            | Approach 4|            |       |                  2 2 |   |Signal Change:                    |
                                     |       |                  5 3 |   |Volume Change:                    |
=====================================+================================+==================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                      |
                                     |         (two phase signal)     |                                  |
          <--  A2B1                  |           | Approach 3|        |                                  |
          v--                        |           |           |        |                                  |
      --> <--  A1A2                  |           |           |        |                                  |
                                     |           |           |        |                                  |
       <   ^   A4B3                  |------------           ------------|                               |
       |   |                         | Approach 1                     |                                  |
                                     |                                |                                  |
                                     |           See Step 6b.         |                                  |
                                     |                                |                                  |
                                     |                     Approach 2 |                                  |
                                     |------------           ------------|                               |
                                     |           |           |        |                                  |
-------------------------------------|           |           |        |                                  |
 A1 -->   A3 |     B1 v--    B3   <| |           |           |        |                                  |
            v ^              |  |  |           | Approach 4|        | Exclusive right turns reduced 30 % |
 A2 <--   A4   |   B2 --^    B4 |>   |                                | V/C Ratio = .92                  |
===============================================================================================
```

```
                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
ntersection: GERBER RD AND WATERMAN RD                                   Design Hour: AM
roblem Statement: EXISTING PLUS PROJECT
=====================================================================================================
Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR    |
             | Approach 3:WATERMAN RD |           -------Approach-----|     MULTIPHASE SIGNAL OVERLAP      |
             | 1     1 |    ^     |                  : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R   L  |    N     |a.No. of change   :  D    0    0    0|Prob-  Critical  Carryover  Critical|
ERBER RD     | R T T T L |        |  intervals/hour  :                 |able   Volume   to next    Volume |
------------ T H H H T -----------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >  ^--RT  1  |  change (vph)    :                 |------------------------------------|
  1  LT--^    v v v    <^-RTH     |c.G/C ratio       :  0    0    0    0|A1B2  207(B2)  323- 207= 116(A1)  207|
    LTH-^>             <--TH   1  |d.Opposing volume :  0  323    0  259|A1A2  553(A2) OR  116(A1)         553|
  1  TH-->             <v-LTH     |  in vph          :                 |A3B4  181(A3) OR  113(B4)         181|
    RTH-v>    ^ ^ ^     v--LT     |e.LT capacity on  :  0    0    0    0|                                    |
    RT--v    < < | > >  Approach 2|  green (vph)     :                 |                                    |
------------ L L T R R -----------|f.LT capacity in  :  0    0    0    0|                                    |
             | T T H T T |GERBER RD|  vph (b+e)      :                 |                                    |
             |  H   H  |          |g.Left turn volume:  0    0    0    0|                                    |
             |         |          |  in vph          :                 |                                    |
             | Approach 4:WATERMAN RD|h.Is volume > cap.:    NO        NO:                                    |
                                  |  (g>f) ?         :                 |                                    |
=====================================+===================================+====================================|
Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                  |        |                    |     |                                    |
                                  |        | 2 1                |     |760(B2A2)+181(A3)+0()+0()           |
             | Approach 3|        |-------  5 1                 -------|                                    |
3:  LT= 113 | |          | 2:RT=  99 |     9 3              ^-  99 |        = 941 vph                   |
   TH=   0  | |          |   TH= 553 |     | |              <- 553 |====================================|
  RT= 259   | v          |   LT=   0 |     < >                     | Step 8. INTERSECTION LEVEL OF      |
-------------              ------------|                           |        SERVICE                     |
                         <--Approach 2 |                           |   (compare step 7 with table 6)    |
                                       |                           |             -------                |
                                       |                           |             |  B  |                |
Approach 1-->                          |                           |             -------                |
-------------              ------------|                           |====================================|
1:LT= 207  |          ^ | 4: RT=   0 | 207 -^                      | Step 9. RECALCULATE                |
  TH= 323  |          | |    TH=   0 | 323 ->                      |                                    |
  RT=   0  |          | |    LT=   0 |-------               -------|Geometric Change:                   |
           | Approach 4|             |       |              |      |Signal Change:                      |
                                     |       |              |      |Volume Change:                      |
=====================================+===================================+====================================|
Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                     |         (two phase signal)        |                                    |
        --^      A1B2                |          | Approach 3|            |                                    |
        -->                          |          |           |            |                                    |
        --> <--  A1A2                |          |           |            |                                    |
                                     |          |           |            |                                    |
         |  |    A3B4                |------------          ------------|                                    |
         v  >                        | Approach 1                        |                                    |
                                     |                                   |                                    |
                                     |         See Step 6b.              |                                    |
                                     |                                   |                                    |
                                     |                       Approach 2  |                                    |
                                     |------------          ------------|                                    |
                                     |          |           |            |                                    |
-------------------------------------|          |           |            |                                    |
A1 -->   A3 |    B1 v--    B3   <|   |          |           |            |                                    |
          v ^                  ^  |  |          | Approach 4|            | Exclusive right turns reduced 30 % |
A2 <--   A4  |   B2 --^    B4 |>     |                                   | V/C Ratio = .66                    |
=====================================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                           Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK       | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:WATERMAN RD  |            -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1      1 |      ^       |            : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R   L   |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |             | intervals/hour  :              |able   Volume   to next    Volume |
------------  T H H H T  ------------- |b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1     | change (vph)    :              |--------------------------------|
  1  LT--^     v v v     <^-RTH        |c.G/C ratio      :  0    0    0    0|A1B2  375(B2)  768- 375= 393(A1)  375|
     LTH-^>              <--TH   1     |d.Opposing volume :  0  768    0  362|A1A2  597(A2) OR  393(A1)       597|
  1   TH-->              <v-LTH        | in vph          :              |A3B4  253(A3) OR  233(B4)       253|
     RTH-v>    ^ ^ ^      v--LT        |e.LT capacity on :  0    0    0    0|                                |
     RT--v    < < | > >  Approach 2    | green (vph)     :              |                                |
------------  L L T R R  ------------- |f.LT capacity in :  0    0    0    0|                                |
             | T T H T T |GERBER RD    | vph (b+e)       :              |                                |
             |  H   H   |              |g.Left turn volume :  0    0    0    0|                                |
             |          |              | in vph          :              |                                |
             | Approach 4:WATERMAN RD  |h.Is volume > cap. :      NO        NO:                                |
                                       | (g>f) ?         :              |                                |
=======================================+===============================+================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |       |                  |     |                                |
                                       |       | 3 2              |     |972(B2A2)+253(A3)+0()+0()        |
             | Approach 3|             |-------  6 3              ------|                                |
 3:  LT= 233 | |         | 2:RT= 226   |         2 3          ^- 226 |       = 1225 vph               |
    TH=   0  | |         |   TH= 597   |         | |          <- 597 |================================|
   RT= 362   | v         |   LT=   0   |         < >                  | Step 8. INTERSECTION LEVEL OF   |
------------              -------------|                              |        SERVICE                  |
                      <--Approach 2    |                              |    (compare step 7 with table 6)|
                                       |                              |            -------             |
                                       |                              |            | D |               |
 Approach 1-->                         |                              |            -------             |
------------              -------------|                              |================================|
 1:LT= 375   |         ^ | 4: RT=   0  | 375 -^                       | Step 9. RECALCULATE             |
   TH= 768   |         | |   TH=   0   | 768 ->                       |                                |
   RT=   0   |         | |  LT=   0    |-------                ------|Geometric Change:                |
             | Approach 4|             |       |                  |  |Signal Change:                   |
                                       |       |                  |  |Volume Change:                   |
=======================================+===============================+================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                     |
                                       |        (two phase signal)     |                                |
         --^      A1B2                 |          | Approach 3|        |                                |
         -->                           |          |           |        |                                |
         --> <--  A1A2                 |          |           |        |                                |
                                       |          |           |        |                                |
          |  |    A3B4                 |-------------   -------------|                                |
          v  >                         | Approach 1                    |                                |
                                       |                               |                                |
                                       |         See Step 6b.          |                                |
                                       |                               |                                |
                                       |                   Approach 2  |                                |
                                       |-------------   -------------|                                |
                                       |          |           |        |                                |
---------------------------------------|          |           |        |                                |
 A1 -->   A3 |     B1 v--    B3   <|   |          |           |        |                                |
            v ^                  | |   |          | Approach 4|        | Exclusive right turns reduced 30 % |
 A2 <--   A4  |    B2 --^    B4 |>     |                               | V/C Ratio = .86                 |
==========================================================================================
```

1985 HCM: UNSIGNALIZED INTERSECTIONS Page-1

***************************************************************************

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR...................... .9

AREA POPULATION....................... 20000

NAME OF THE EAST/WEST STREET......... JACKSON HWY

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 25 | 71 | 113 | 3 |
| THRU | 152 | 453 | 74 | 44 |
| RIGHT | 22 | 15 | 75 | 9 |

NUMBER OF LANES AND LANE USAGE

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 2 | 2 | 1 | 1 |

LANE USAGE

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|
| MINOR RIGHTS | | | | |
| NB | 6.10 | 5.60 | 0.00 | 5.60 |
| SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | |
| EB | 5.80 | 5.80 | 0.00 | 5.80 |
| WB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR THROUGHS | | | | |
| NB | 7.40 | 7.40 | 0.00 | 7.40 |
| SB | 7.40 | 7.40 | 0.00 | 7.40 |
| MINOR LEFTS | | | | |
| NB | 7.90 | 7.90 | 0.00 | 7.90 |
| SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... JACKSON HWY
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE $v$(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | | RESERVE CAPACITY $c_R = c_{SH} - v$ | | LOS |
|---|---|---|---|---|---|---|---|---|---|---|
| **MINOR STREET** | | | | | | | | | | |
| NB LEFT | 138 | 187 | 141 | > | | 141 | > | | 3 > | E |
| THROUGH | 90 | 238 | 216 | > | 215 | 216 | > | -105 | 126 >F | D |
| RIGHT | 92 | 976 | 976 | > | | 976 | > | | 884 > | A |
| **MINOR STREET** | | | | | | | | | | |
| SB LEFT | 4 | 148 | 87 | > | | 87 | > | | 84 > | E |
| THROUGH | 54 | 237 | 215 | > | 224 | 215 | > | 155 | 161 >D | D |
| RIGHT | 11 | 813 | 813 | > | | 813 | > | | 802 > | A |
| **MAJOR STREET** | | | | | | | | | | |
| EB LEFT | 31 | 567 | 567 | | | 567 | | | 536 | A |
| WB LEFT | 87 | 840 | 840 | | | 840 | | | 753 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... JACKSON HWY
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC = 117 ⇒ LOS D

***********************************************************************

IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... JACKSON HWY

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 10 | 72 | 19 | 4 |
| THRU | 428 | 209 | 58 | 80 |
| RIGHT | 86 | 11 | 96 | 9 |

NUMBER OF LANES AND LANE USAGE

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 2 | 2 | 1 | 1 |

LANE USAGE

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.80 | 5.80 | 0.00 | 5.80 |
| | WB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR THROUGHS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |
| MINOR LEFTS | | | | | |
| | NB | 7.90 | 7.90 | 0.00 | 7.90 |
| | SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... JACKSON HWY
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | RESERVE CAPACITY $c_R = c_{SH} - v$ | | LOS |
|---|---|---|---|---|---|---|---|---|---|
| **MINOR STREET** | | | | | | | | | |
| NB LEFT | 23 | 155 | 81 | > | 81 | > | 58 | > | E |
| THROUGH | 71 | 219 | 192 | > | 263 192 | > | 52 122 | >E | D |
| RIGHT | 117 | 788 | 788 | > | 788 | > | 671 | > | A |
| **MINOR STREET** | | | | | | | | | |
| SB LEFT | 5 | 124 | 73 | > | 73 | > | 68 | > | E |
| THROUGH | 98 | 203 | 179 | > | 182 179 | > | 68 81 | >E | E |
| RIGHT | 11 | 952 | 952 | > | 952 | > | 941 | > | A |
| **MAJOR STREET** | | | | | | | | | |
| EB LEFT | 12 | 793 | 793 | | 793 | | 780 | | A |
| WB LEFT | 88 | 531 | 531 | | 531 | | 443 | | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... JACKSON HWY
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC = 158 => LOS D

1985 HCM: UNSIGNALIZED INTERSECTIONS 

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... ELDER CREEK RD

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 32 | -- | 66 | 43 |
| THRU | 197 | -- | 238 | 85 |
| RIGHT | 6 | -- | 10 | 67 |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | -- | 1 | 2 |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | ----- | --- | --- | - |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | --- | --- | --- |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|
| MINOR RIGHTS | | | | |
| EB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | |
| NB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | | | | |
| EB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... ELDER CREEK RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | | | |
| EB LEFT | 39 | 381 | 360 | > | 360 | > | 321 > | B |
| | | | | > 400 | | > 353 | | >B |
| RIGHT | 7 | 979 | 979 | > | 979 | > | 972 > | A |
| MAJOR STREET | | | | | | | | |
| NB LEFT | 81 | 865 | 865 | | 865 | | 784 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... ELDER CREEK RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC=628 ⇒ LOS A

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR...................... .9

AREA POPULATION....................... 20000

NAME OF THE EAST/WEST STREET......... ELDER CREEK RD

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 55 | -- | 13 | 43 |
| THRU | 197 | -- | 116 | 219 |
| RIGHT | 37 | -- | 10 | 23 |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | -- | 1 | 2 |

ADJUSTMENT FACTORS



| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | ----- | --- | --- | - |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | --- | --- | --- |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|
| MINOR RIGHTS | | | | |
| EB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | |
| NB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | | | | |
| EB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... ELDER CREEK RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE $v$(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| EB LEFT | 67 | 423 | 418 > | 418 > | 351 > | B |
| | | | > | 538 > | 426 | >A |
| RIGHT | 45 | 939 | 939 > | 939 > | 894 > | A |
| MAJOR STREET | | | | | | |
| NB LEFT | 16 | 770 | 770 | 770 | 754 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... ELDER CREEK RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC = 467 ⇒ LOS A

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... GERBER RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 25 | 2 | 64 | 21 |
| THRU | 178 | 108 | 33 | 17 |
| RIGHT | 51 | 9 | 3 | 43 |

NUMBER OF LANES AND LANE USAGE

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 2 | 2 | 2 | 2 |
| LANE USAGE | | | L + TR | L + TR |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.80 | 5.80 | 0.00 | 5.80 |
| | WB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR THROUGHS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |
| MINOR LEFTS | | | | | |
| | NB | 7.90 | 7.90 | 0.00 | 7.90 |
| | SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| NB LEFT | 78 | 391 | 360 | 360 | 282 | C |
| THROUGH | 40 | 475 | 464 > | 464 > | 424 > | A |
| RIGHT | 4 | 947 | 947 > | 485 947 > | 441 943 >A | A |
| MINOR STREET | | | | | | |
| SB LEFT | 26 | 393 | 364 | 364 | 338 | B |
| THROUGH | 21 | 458 | 448 > | 448 > | 427 > | A |
| RIGHT | 53 | 984 | 984 > | 735 984 > | 661 931 >A | A |
| MAJOR STREET | | | | | | |
| EB LEFT | 31 | 904 | 904 | 904 | 874 | A |
| WB LEFT | 2 | 783 | 783 | 783 | 781 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC = 501 ⇒ LOS A

1985 HCM: UNSIGNALIZED INTERSECTIONS Page-1

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IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... GERBER RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 57 | 2 | 82 | 15 |
| THRU | 150 | 193 | 23 | 30 |
| RIGHT | 82 | 23 | 3 | 41 |

NUMBER OF LANES AND LANE USAGE

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 2 | 2 | 2 | 2 |
| LANE USAGE | | | L + TR | L + TR |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.80 | 5.80 | 0.00 | 5.80 |
| | WB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR THROUGHS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |
| MINOR LEFTS | | | | | |
| | NB | 7.90 | 7.90 | 0.00 | 7.90 |
| | SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | | | |
| NB LEFT | 100 | 304 | 262 | | 262 | | 162 | D |
| THROUGH | 28 | 390 | 369 | > | 369 | > | 341 > | B |
| RIGHT | 4 | 945 | 945 | > 397 | 945 | > 365 | 941 >B | A |
| MINOR STREET | | | | | | | | |
| SB LEFT | 18 | 314 | 284 | | 284 | | 266 | C |
| THROUGH | 37 | 369 | 349 | > | 349 | > | 312 > | B |
| RIGHT | 50 | 954 | 954 | > 551 | 954 | > 464 | 904 >A | A |
| MAJOR STREET | | | | | | | | |
| EB LEFT | 70 | 797 | 797 | | 797 | | 727 | A |
| WB LEFT | 2 | 780 | 780 | | 780 | | 778 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC=406 ⇒ LOS A

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR...................... .9

AREA POPULATION....................... 20000

NAME OF THE EAST/WEST STREET......... FLORIN RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 36 | 12 | 124 | -- |
| THRU | 292 | 470 | 9 | -- |
| RIGHT | 49 | 6 | 27 | -- |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 2 | 2 | 2 | -- |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | ----- | --- | --- | - |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | --- | --- | --- |

CRITICAL GAPS

| | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|
| MINOR RIGHTS | | | | |
| NB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | |
| WB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | | | | |
| NB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... FLORIN RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| NB LEFT | 152 | 180 | 178 | 178 | 26 | E |
| RIGHT | 33 | 882 | 882 | 882 | 849 | A |
| MAJOR STREET | | | | | | |
| WB LEFT | 15 | 671 | 671 | 671 | 656 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... FLORIN RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC = 209 ⇒ LOS C

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IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... FLORIN RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 36 | 34 | 85 | -- |
| THRU | 489 | 408 | 9 | -- |
| RIGHT | 139 | 6 | 23 | -- |

NUMBER OF LANES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 2 | 2 | 2 | -- |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | ----- | --- | --- | - |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | --- | --- | --- |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | WB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | NB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... FLORIN RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| NB LEFT | 104 | 115 | 109 | 109 | 5 | E |
| RIGHT | 28 | 730 | 730 | 730 | 702 | A |
| MAJOR STREET | | | | | | |
| WB LEFT | 42 | 451 | 451 | 451 | 409 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... FLORIN RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC= 215 => LOS C

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .8

AREA POPULATION...................... 150000

NAME OF THE EAST/WEST STREET......... GERBER RD

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. F & P

DATE OF THE ANALYSIS (mm/dd/yy)...... 05-17-1995

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

CONTROL TYPE WESTBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 164 | 1 | 40 | 0 |
| THRU | 0 | 4 | 222 | 27 |
| RIGHT | 36 | 0 | 2 | 72 |

NUMBER OF LANES AND LANE USAGE

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | 1 |
| LANE USAGE | LTR | LTR | | |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 90 | 20 | N |
| WESTBOUND | 0.00 | 90 | 20 | N |
| NORTHBOUND | 0.00 | 90 | 20 | N |
| SOUTHBOUND | 0.00 | 90 | 20 | N |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | EB | 6.10 | 6.10 | 0.00 | 6.10 |
| | WB | 6.10 | 6.10 | 0.00 | 6.10 |
| MAJOR LEFTS | | | | | |
| | SB | 5.30 | 5.30 | 0.00 | 5.30 |
| | NB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR THROUGHS | | | | | |
| | EB | 6.90 | 6.90 | 0.00 | 6.90 |
| | WB | 6.90 | 6.90 | 0.00 | 6.90 |
| MINOR LEFTS | | | | | |
| | EB | 7.40 | 7.40 | 0.00 | 7.40 |
| | WB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| **MINOR STREET** | | | | | | |
| EB LEFT | 226 | 455 | 437 > | 437 > | 211 > | C |
| THROUGH | 0 | 506 | 489 > 482 | 489 > 207 | 489 >C | A |
| RIGHT | 50 | 902 | 902 > | 902 > | 853 > | A |
| **MINOR STREET** | | | | | | |
| WB LEFT | 1 | 403 | 376 > | 376 > | 375 > | B |
| THROUGH | 6 | 478 | 462 > 442 | 462 > 435 | 456 >A | A |
| RIGHT | 0 | 713 | 713 > | 713 > | 713 > | A |
| **MAJOR STREET** | | | | | | |
| SB LEFT | 0 | 850 | 850 | 850 | 850 | A |
| NB LEFT | 55 | 981 | 981 | 981 | 926 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC = 329 => LOS B

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IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .85

AREA POPULATION...................... 150000

NAME OF THE EAST/WEST STREET......... GERBER RD

NAME OF THE NORTH/SOUTH STREET....... EXCELSIOR RD

NAME OF THE ANALYST.................. F & P

DATE OF THE ANALYSIS (mm/dd/yy)...... 05-17-1995

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

CONTROL TYPE WESTBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 90 | 1 | 50 | 0 |
| THRU | 1 | 2 | 32 | 185 |
| RIGHT | 64 | 0 | 2 | 157 |

NUMBER OF LANES AND LANE USAGE

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | 1 |
| LANE USAGE | LTR | LTR | | |

ADJUSTMENT FACTORS

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 90 | 20 | N |
| WESTBOUND | 0.00 | 90 | 20 | N |
| NORTHBOUND | 0.00 | 90 | 20 | N |
| SOUTHBOUND | 0.00 | 90 | 20 | N |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | EB | 6.10 | 6.10 | 0.00 | 6.10 |
| | WB | 6.10 | 6.10 | 0.00 | 6.10 |
| MAJOR LEFTS | | | | | |
| | SB | 5.30 | 5.30 | 0.00 | 5.30 |
| | NB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR THROUGHS | | | | | |
| | EB | 6.90 | 6.90 | 0.00 | 6.90 |
| | WB | 6.90 | 6.90 | 0.00 | 6.90 |
| MINOR LEFTS | | | | | |
| | EB | 7.40 | 7.40 | 0.00 | 7.40 |
| | WB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE $v$(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | | RESERVE CAPACITY $c_R = c_{SH} - v$ | | LOS |
|---|---|---|---|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | | | | | |
| EB LEFT | 116 | 457 | 431 | > | | 431 | > | | 315 > | B |
| THROUGH | 1 | 506 | 480 | > | 510 | 480 | > | 309 | 478 >B | A |
| RIGHT | 83 | 686 | 686 | > | | 686 | > | | 603 > | A |
| MINOR STREET | | | | | | | | | | |
| WB LEFT | 1 | 353 | 308 | > | | 308 | > | | 307 > | B |
| THROUGH | 3 | 447 | 423 | > | 376 | 423 | > | 372 | 420 >B | A |
| RIGHT | 0 | 944 | 944 | > | | 944 | > | | 944 > | A |
| MAJOR STREET | | | | | | | | | | |
| SB LEFT | 0 | 999 | 999 | | | 999 | | | 999 | A |
| NB LEFT | 65 | 736 | 736 | | | 736 | | | 671 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... GERBER RD
NAME OF THE NORTH/SOUTH STREET.... EXCELSIOR RD
DATE AND TIME OF THE ANALYSIS..... 05-17-1995 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC = 397 ⇒ LOS B

1985 HCM: UNSIGNALIZED INTERSECTIONS Page-1

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IDENTIFYING INFORMATION

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AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... CALVINE RD

NAME OF THE NORTH/SOUTH STREET....... WATERMAN RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

---

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 18 | 29 | 7 | 6 |
| THRU | 241 | 264 | 2 | 6 |
| RIGHT | 37 | 5 | 20 | 42 |

NUMBER OF LANES AND LANE USAGE

---

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | 2 |
| LANE USAGE | | | | LT + R |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.30 | 5.30 | 0.00 | 5.30 |
| | WB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR THROUGHS | | | | | |
| | NB | 6.90 | 6.90 | 0.00 | 6.90 |
| | SB | 6.90 | 6.90 | 0.00 | 6.90 |
| MINOR LEFTS | | | | | |
| | NB | 7.4D | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... WATERMAN RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | | | | |
| NB LEFT | 9 | 293 | 266 | > | | 266 | > | 258 > | C |
| THROUGH | 2 | 360 | 345 | > | 504 | 345 | > 469 | 343 >A | B |
| RIGHT | 24 | 785 | 785 | > | | 785 | > | 761 > | A |
| MINOR STREET | | | | | | | | | |
| SB LEFT | 7 | 298 | 280 | > | 305 | 280 | > 290 | 272 >C | C |
| THROUGH | 7 | 350 | 336 | > | | 336 | > | 329 > | B |
| RIGHT | 51 | 778 | 778 | | | 778 | | 726 | A |
| MAJOR STREET | | | | | | | | | |
| EB LEFT | 22 | 831 | 831 | | | 831 | | 809 | A |
| WB LEFT | 35 | 822 | 822 | | | 822 | | 786 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... WATERMAN RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC=671 ⇒ LOS A

1985 HCM: UNSIGNALIZED INTERSECTIONS Page-1


IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... CALVINE RD

NAME OF THE NORTH/SOUTH STREET....... WATERMAN RD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: 4-LEG

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE NORTHBOUND: STOP SIGN

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 36 | 32 | 4 | 1 |
| THRU | 120 | 261 | 9 | 1 |
| RIGHT | 78 | 6 | 41 | 18 |

NUMBER OF LANES AND LANE USAGE

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 1 | 1 | 2 |
| LANE USAGE | | | | LT + R |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | 0.00 | 90 | 100 | |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | 0 | 0 | 0 |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | | | | | |
| | NB | 6.10 | 5.60 | 0.00 | 5.60 |
| | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | | |
| | EB | 5.30 | 5.30 | 0.00 | 5.30 |
| | WB | 5.30 | 5.30 | 0.00 | 5.30 |
| MINOR THROUGHS | | | | | |
| | NB | 6.90 | 6.90 | 0.00 | 6.90 |
| | SB | 6.90 | 6.90 | 0.00 | 6.90 |
| MINOR LEFTS | | | | | |
| | NB | 7.40 | 7.40 | 0.00 | 7.40 |
| | SB | 7.40 | 7.40 | 0.00 | 7.40 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... WATERMAN RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

## CAPACITY AND LEVEL-OF-SERVICE



| MOVEMENT | FLOW-RATE v(pcph) | POTENTIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | | SHARED CAPACITY $c_{SH}$ (pcph) | | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|---|---|
| **MINOR STREET** | | | | | | | | |
| NB LEFT | 5 | 357 | 330 | > | 330 | > | 325 > | B |
| THROUGH | 11 | 414 | 391 | > 667 | 391 | > 601 | 380 >A | B |
| RIGHT | 50 | 895 | 895 | > | 895 | > | 845 > | A |
| **MINOR STREET** | | | | | | | | |
| SB LEFT | 1 | 316 | 284 | > 320 | 284 | > 317 | 283 >B | C |
| THROUGH | 1 | 388 | 366 | > | 366 | > | 365 > | B |
| RIGHT | 22 | 780 | 780 | | 780 | | 758 | A |
| **MAJOR STREET** | | | | | | | | |
| EB LEFT | 44 | 833 | 833 | | 833 | | 789 | A |
| WB LEFT | 39 | 908 | 908 | | 908 | | 869 | A |

## IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... WATERMAN RD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC=737 = LOS A

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR..................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... CALVINE RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. AM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 22 | 4 | -- | 31 |
| THRU | 87 | 146 | -- | 1 |
| RIGHT | 4 | 21 | -- | 56 |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 2 | -- | 1 |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | ----- | --- | --- | - |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | --- | --- | --- |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|---|
| MINOR RIGHTS | SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | EB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| SB LEFT | 38 | 502 | 492 > | 492 > | 455 > | A |
| | | | > | 723 | > 617 | >A |
| RIGHT | 68 | 977 | 977 > | 977 > | 908 > | A |
| MAJOR STREET | | | | | | |
| EB LEFT | 27 | 848 | 848 | 848 | 821 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; AM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC=658 LOS A

1985 HCM: UNSIGNALIZED INTERSECTIONS Page-1

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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 45

PEAK HOUR FACTOR...................... .9

AREA POPULATION...................... 20000

NAME OF THE EAST/WEST STREET......... CALVINE RD

NAME OF THE NORTH/SOUTH STREET....... VINEYARD

NAME OF THE ANALYST.................. FP

DATE OF THE ANALYSIS (mm/dd/yy)...... 02-22-1996

TIME PERIOD ANALYZED................. PM

OTHER INFORMATION.... EXISTING PLUS PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LEFT | 41 | 4 | -- | 36 |
| THRU | 109 | 133 | -- | 1 |
| RIGHT | 4 | 40 | -- | 160 |

NUMBER OF LANES

| | EB | WB | NB | SB |
|---|---|---|---|---|
| LANES | 1 | 2 | -- | 1 |

ADJUSTMENT FACTORS 

| | PERCENT GRADE | RIGHT TURN ANGLE | CURB RADIUS (ft) FOR RIGHT TURNS | ACCELERATION LANE FOR RIGHT TURNS |
|---|---|---|---|---|
| EASTBOUND | 0.00 | 0 | 0 | |
| WESTBOUND | 0.00 | 0 | 0 | |
| NORTHBOUND | ----- | --- | --- | - |
| SOUTHBOUND | 0.00 | 90 | 100 | |

VEHICLE COMPOSITION

| | % SU TRUCKS AND RV'S | % COMBINATION VEHICLES | % MOTORCYCLES |
|---|---|---|---|
| EASTBOUND | 0 | 0 | 0 |
| WESTBOUND | 0 | 0 | 0 |
| NORTHBOUND | --- | --- | --- |
| SOUTHBOUND | 0 | 0 | 0 |

CRITICAL GAPS

| | TABULAR VALUES (Table 10-2) | ADJUSTED VALUE | SIGHT DIST. ADJUSTMENT | FINAL CRITICAL GAP |
|---|---|---|---|---|
| MINOR RIGHTS | | | | |
| SB | 6.10 | 5.60 | 0.00 | 5.60 |
| MAJOR LEFTS | | | | |
| EB | 5.80 | 5.80 | 0.00 | 5.80 |
| MINOR LEFTS | | | | |
| SB | 7.90 | 7.90 | 0.00 | 7.90 |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

CAPACITY AND LEVEL-OF-SERVICE 

| MOVEMENT | FLOW-RATE v(pcph) | POTEN-TIAL CAPACITY $c_p$ (pcph) | ACTUAL MOVEMENT CAPACITY $c_M$ (pcph) | SHARED CAPACITY $c_{SH}$ (pcph) | RESERVE CAPACITY $c_R = c_{SH} - v$ | LOS |
|---|---|---|---|---|---|---|
| MINOR STREET | | | | | | |
| SB LEFT | 44 | 470 | 454 | > 454 > | 410 > | A |
| | | | | > 806 > | 566 | >A |
| RIGHT | 196 | 976 | 976 | > 976 > | 780 > | A |
| MAJOR STREET | | | | | | |
| EB LEFT | 50 | 841 | 841 | 841 | 791 | A |

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET...... CALVINE RD
NAME OF THE NORTH/SOUTH STREET.... VINEYARD
DATE AND TIME OF THE ANALYSIS..... 02-22-1996 ; PM
OTHER INFORMATION.... EXISTING PLUS PROJECT

RC=605 => LOS A

Existing Plus Project A.M. Peak
Elder Creek Rd. and S. Watt Ave.

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 69 | 47 | 127 | 2 |
| 2 | TH Volume | 103 | 203 | 1063 | 536 |
| 3 | RT Volume | 60 | 40 | 66 | 112 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 2 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 2 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 76.667 | 52.222 | 141.11 | 2.2222 |
| 8 | TH Flow Rate | 114.44 | 225.56 | 1181.1 | 595.56 |
| 9 | RT Flow Rate | 66.667 | 44.444 | 73.333 | 124.44 |
| 10 | Approach Flow Rate | 257.78 | 322.22 | 1395.6 | 722.22 |
| 11 | Proportion LT | 0.30 | 0.16 | 0.10 | 0.00 |
| 12 | Proportion RT | 0.26 | 0.14 | 0.05 | 0.17 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 257.78 | 322.22 | 1395.6 | 722.22 |
| 16 | Opposing Approach Flow Rate | 290 | 232 | 650 | 1256 |
| 17 | Conflicting Approaches Flow Rate | 1906 | 1906 | 522 | 522 |
| 18 | Total Intersection Flow Rate | 2453.8 | 2460.2 | 2567.6 | 2500.2 |
| 19 | Proportion, Subject Approach Flow Rate | 0.11 | 0.13 | 0.54 | 0.29 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.12 | 0.09 | 0.25 | 0.50 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.78 | 0.77 | 0.20 | 0.21 |
| 22 | LT, Opposing Approach | 47 | 69 | 2 | 127 |
| 23 | RT, Opposing Approach | 40 | 60 | 112 | 66 |
| 24 | LT, Conflicting Approaches | 129 | 129 | 116 | 116 |
| 25 | RT, Conflicting Approaches | 178 | 178 | 100 | 100 |
| 26 | Proportion LT, Opposing Approach | 0.16 | 0.30 | 0.00 | 0.10 |
| 27 | Proportion RT, Opposing Approach | 0.14 | 0.26 | 0.17 | 0.05 |
| 28 | Proportion LT, Conflicting Approaches | 0.07 | 0.07 | 0.22 | 0.22 |
| 29 | Proportion RT, Conflicting Approaches | 0.09 | 0.09 | 0.19 | 0.19 |
| 30 | Approach Capacity | 174 | 467 | 845 | 711 |
| 31 | Volume/Capacity Ratio | 1.48 | 0.69 | 1.65 | 1.02 |
| 32 | Delay | 274 | 14 | 531 | 47 |
| 33 | Level of Service | F | C | F | F |
| 34 | Average Delay (Intersection) | 315 | | | |
| 35 | Level of Service (Intersection) | F | | | |

Existing Plus Project P.M. Peak
Elder Creek Rd. and S. Watt Ave.

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 98 | 99 | 105 | 43 |
| 2 | TH Volume | 197 | 130 | 873 | 1209 |
| 3 | RT Volume | 150 | 24 | 68 | 72 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 2 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 2 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 108.89 | 110 | 116.67 | 47.778 |
| 8 | TH Flow Rate | 218.89 | 144.44 | 970 | 1343.3 |
| 9 | RT Flow Rate | 166.67 | 26.667 | 75.556 | 80 |
| 10 | Approach Flow Rate | 494.44 | 281.11 | 1162.2 | 1471.1 |
| 11 | Proportion LT | 0.22 | 0.39 | 0.10 | 0.03 |
| 12 | Proportion RT | 0.34 | 0.09 | 0.07 | 0.05 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 494.44 | 281.11 | 1162.2 | 1471.1 |
| 16 | Opposing Approach Flow Rate | 253 | 445 | 1324 | 1046 |
| 17 | Conflicting Approaches Flow Rate | 2370 | 2370 | 698 | 698 |
| 18 | Total Intersection Flow Rate | 3117.4 | 3096.1 | 3184.2 | 3215.1 |
| 19 | Proportion, Subject Approach Flow Rate | 0.16 | 0.09 | 0.36 | 0.46 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.08 | 0.14 | 0.42 | 0.33 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.76 | 0.77 | 0.22 | 0.22 |
| 22 | LT, Opposing Approach | 99 | 98 | 43 | 105 |
| 23 | RT, Opposing Approach | 24 | 150 | 72 | 68 |
| 24 | LT, Conflicting Approaches | 148 | 148 | 197 | 197 |
| 25 | RT, Conflicting Approaches | 140 | 140 | 174 | 174 |
| 26 | Proportion LT, Opposing Approach | 0.39 | 0.22 | 0.03 | 0.10 |
| 27 | Proportion RT, Opposing Approach | 0.09 | 0.34 | 0.05 | 0.07 |
| 28 | Proportion LT, Conflicting Approaches | 0.06 | 0.06 | 0.28 | 0.28 |
| 29 | Proportion RT, Conflicting Approaches | 0.06 | 0.06 | 0.25 | 0.25 |
| 30 | Approach Capacity | 116 | 492 | 747 | 758 |
| 31 | Volume/Capacity Ratio | 4.26 | 0.57 | 1.56 | 1.94 |
| 32 | Delay | ###### | 9 | 369 | 1591 |
| 33 | Level of Service | F | B | F | F |
| 34 | Average Delay (Intersection) | ###### | | | |
| 35 | Level of Service (Intersection) | F | | | |

Existing Plus Project A.M. Peak
Excelsior Rd and Florin Rd

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 69 | 50 | 29 | 2 |
| 2 | TH Volume | 116 | 161 | 225 | 54 |
| 3 | RT Volume | 10 | 6 | 132 | 37 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 76.667 | 55.556 | 32.222 | 2.2222 |
| 8 | TH Flow Rate | 128.89 | 178.89 | 250 | 60 |
| 9 | RT Flow Rate | 11.111 | 6.6667 | 146.67 | 41.111 |
| 10 | Approach Flow Rate | 216.67 | 241.11 | 428.89 | 103.33 |
| 11 | Proportion LT | 0.35 | 0.23 | 0.08 | 0.02 |
| 12 | Proportion RT | 0.05 | 0.03 | 0.34 | 0.40 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 216.67 | 241.11 | 428.89 | 103.33 |
| 16 | Opposing Approach Flow Rate | 217 | 195 | 93 | 386 |
| 17 | Conflicting Approaches Flow Rate | 479 | 479 | 412 | 412 |
| 18 | Total Intersection Flow Rate | 912.67 | 915.11 | 933.89 | 901.33 |
| 19 | Proportion, Subject Approach Flow Rate | 0.24 | 0.26 | 0.46 | 0.11 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.24 | 0.21 | 0.10 | 0.43 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.52 | 0.52 | 0.44 | 0.46 |
| 22 | LT, Opposing Approach | 50 | 69 | 2 | 29 |
| 23 | RT, Opposing Approach | 6 | 10 | 37 | 132 |
| 24 | LT, Conflicting Approaches | 31 | 31 | 119 | 119 |
| 25 | RT, Conflicting Approaches | 169 | 169 | 16 | 16 |
| 26 | Proportion LT, Opposing Approach | 0.23 | 0.35 | 0.02 | 0.08 |
| 27 | Proportion RT, Opposing Approach | 0.03 | 0.05 | 0.40 | 0.34 |
| 28 | Proportion LT, Conflicting Approaches | 0.06 | 0.06 | 0.29 | 0.29 |
| 29 | Proportion RT, Conflicting Approaches | 0.35 | 0.35 | 0.04 | 0.04 |
| 30 | Approach Capacity | 527 | 503 | 627 | 485 |
| 31 | Volume/Capacity Ratio | 0.41 | 0.48 | 0.68 | 0.21 |
| 32 | Delay | 5 | 6 | 13 | 2 |
| 33 | Level of Service | A | B | C | A |
| 34 | Average Delay (Intersection) | 9 | | | |
| 35 | Level of Service (Intersection) | B | | | |

Existing Plus Project P.M. Peak
Excelsior Rd and Florin Rd

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 62 | 130 | 9 | 8 |
| 2 | TH Volume | 137 | 170 | 59 | 157 |
| 3 | RT Volume | 30 | 3 | 72 | 92 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 68.889 | 144.44 | 10 | 8.8889 |
| 8 | TH Flow Rate | 152.22 | 188.89 | 65.556 | 174.44 |
| 9 | RT Flow Rate | 33.333 | 3.3333 | 80 | 102.22 |
| 10 | Approach Flow Rate | 254.44 | 336.67 | 155.56 | 285.56 |
| 11 | Proportion LT | 0.27 | 0.43 | 0.06 | 0.03 |
| 12 | Proportion RT | 0.13 | 0.01 | 0.51 | 0.36 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 254.44 | 336.67 | 155.56 | 285.56 |
| 16 | Opposing Approach Flow Rate | 303 | 229 | 257 | 140 |
| 17 | Conflicting Approaches Flow Rate | 397 | 397 | 532 | 532 |
| 18 | Total Intersection Flow Rate | 954.44 | 962.67 | 944.56 | 957.56 |
| 19 | Proportion, Subject Approach Flow Rate | 0.27 | 0.35 | 0.16 | 0.30 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.32 | 0.24 | 0.27 | 0.15 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.42 | 0.41 | 0.56 | 0.56 |
| 22 | LT, Opposing Approach | 130 | 62 | 8 | 9 |
| 23 | RT, Opposing Approach | 3 | 30 | 92 | 72 |
| 24 | LT, Conflicting Approaches | 17 | 17 | 192 | 192 |
| 25 | RT, Conflicting Approaches | 164 | 164 | 33 | 33 |
| 26 | Proportion LT, Opposing Approach | 0.43 | 0.27 | 0.03 | 0.06 |
| 27 | Proportion RT, Opposing Approach | 0.01 | 0.13 | 0.36 | 0.51 |
| 28 | Proportion LT, Conflicting Approaches | 0.04 | 0.04 | 0.36 | 0.36 |
| 29 | Proportion RT, Conflicting Approaches | 0.41 | 0.41 | 0.06 | 0.06 |
| 30 | Approach Capacity | 573 | 672 | 428 | 494 |
| 31 | Volume/Capacity Ratio | 0.44 | 0.50 | 0.36 | 0.58 |
| 32 | Delay | 5 | 7 | 4 | 9 |
| 33 | Level of Service | B | B | A | B |
| 34 | Average Delay (Intersection) | 7 | | | |
| 35 | Level of Service (Intersection) | B | | | |

Existing Plus Project A.M. Peak
Elk Grove-Florin Rd and Florin Rd

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 98 | 192 | 328 | 261 |
| 2 | TH Volume | 469 | 683 | 661 | 337 |
| 3 | RT Volume | 210 | 500 | 138 | 91 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 2 | 2 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 2 | 2 | 1 | 1 |
| 7 | LT Flow Rate | 108.89 | 213.33 | 364.44 | 290 |
| 8 | TH Flow Rate | 521.11 | 758.89 | 734.44 | 374.44 |
| 9 | RT Flow Rate | 233.33 | 555.56 | 153.33 | 101.11 |
| 10 | Approach Flow Rate | 863.33 | 1527.8 | 1252.2 | 765.56 |
| 11 | Proportion LT | 0.13 | 0.14 | 0.29 | 0.38 |
| 12 | Proportion RT | 0.27 | 0.36 | 0.12 | 0.13 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 863.33 | 1527.8 | 1252.2 | 765.56 |
| 16 | Opposing Approach Flow Rate | 1375 | 777 | 689 | 1127 |
| 17 | Conflicting Approaches Flow Rate | 1816 | 1816 | 2152 | 2152 |
| 18 | Total Intersection Flow Rate | 4054.3 | 4120.8 | 4093.2 | 4044.6 |
| 19 | Proportion, Subject Approach Flow Rate | 0.21 | 0.37 | 0.31 | 0.19 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.34 | 0.19 | 0.17 | 0.28 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.45 | 0.44 | 0.53 | 0.53 |
| 22 | LT, Opposing Approach | 192 | 98 | 261 | 328 |
| 23 | RT, Opposing Approach | 500 | 210 | 91 | 138 |
| 24 | LT, Conflicting Approaches | 589 | 589 | 290 | 290 |
| 25 | RT, Conflicting Approaches | 229 | 229 | 710 | 710 |
| 26 | Proportion LT, Opposing Approach | 0.14 | 0.13 | 0.38 | 0.29 |
| 27 | Proportion RT, Opposing Approach | 0.36 | 0.27 | 0.13 | 0.12 |
| 28 | Proportion LT, Conflicting Approaches | 0.32 | 0.32 | 0.13 | 0.13 |
| 29 | Proportion RT, Conflicting Approaches | 0.13 | 0.13 | 0.33 | 0.33 |
| 30 | Approach Capacity | 622 | 659 | 495 | 480 |
| 31 | Volume/Capacity Ratio | 1.39 | 2.32 | 2.53 | 1.59 |
| 32 | Delay | 196 | 6655 | 14936 | 428 |
| 33 | Level of Service | F | F | F | F |
| 34 | Average Delay (Intersection) | 6661 | | | |
| 35 | Level of Service (Intersection) | F | | | |

Existing Plus Project P.M. Peak
Elk Grove-Florin Rd and Florin Rd

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 84 | 226 | 346 | 649 |
| 2 | TH Volume | 764 | 672 | 515 | 752 |
| 3 | RT Volume | 465 | 482 | 228 | 130 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 2 | 2 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 2 | 2 | 1 | 1 |
| 7 | LT Flow Rate | 93.333 | 251.11 | 384.44 | 721.11 |
| 8 | TH Flow Rate | 848.89 | 746.67 | 572.22 | 835.56 |
| 9 | RT Flow Rate | 516.67 | 535.56 | 253.33 | 144.44 |
| 10 | Approach Flow Rate | 1458.9 | 1533.3 | 1210 | 1701.1 |
| 11 | Proportion LT | 0.06 | 0.16 | 0.32 | 0.42 |
| 12 | Proportion RT | 0.35 | 0.35 | 0.21 | 0.08 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 1458.9 | 1533.3 | 1210 | 1701.1 |
| 16 | Opposing Approach Flow Rate | 1380 | 1313 | 1531 | 1089 |
| 17 | Conflicting Approaches Flow Rate | 2620 | 2620 | 2693 | 2693 |
| 18 | Total Intersection Flow Rate | 5458.9 | 5466.3 | 5434 | 5483.1 |
| 19 | Proportion, Subject Approach Flow Rate | 0.27 | 0.28 | 0.22 | 0.31 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.25 | 0.24 | 0.28 | 0.20 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.48 | 0.48 | 0.50 | 0.49 |
| 22 | LT, Opposing Approach | 226 | 84 | 649 | 346 |
| 23 | RT, Opposing Approach | 482 | 465 | 130 | 228 |
| 24 | LT, Conflicting Approaches | 995 | 995 | 310 | 310 |
| 25 | RT, Conflicting Approaches | 358 | 358 | 947 | 947 |
| 26 | Proportion LT, Opposing Approach | 0.16 | 0.06 | 0.42 | 0.32 |
| 27 | Proportion RT, Opposing Approach | 0.35 | 0.35 | 0.08 | 0.21 |
| 28 | Proportion LT, Conflicting Approaches | 0.38 | 0.38 | 0.12 | 0.12 |
| 29 | Proportion RT, Conflicting Approaches | 0.14 | 0.14 | 0.35 | 0.35 |
| 30 | Approach Capacity | 592 | 627 | 481 | 567 |
| 31 | Volume/Capacity Ratio | 2.46 | 2.44 | 2.52 | 3.00 |
| 32 | Delay | 11668 | 10806 | 14270 | 89765 |
| 33 | Level of Service | F | F | F | F |
| 34 | Average Delay (Intersection) | 34482 | | | |
| 35 | Level of Service (Intersection) | F | | | |

Existing Plus Project A.M. Peak
Bradshaw and Calvine

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 143 | 63 | 5 | 29 |
| 2 | TH Volume | 131 | 182 | 446 | 272 |
| 3 | RT Volume | 12 | 65 | 31 | 89 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 158.89 | 70 | 5.5556 | 32.222 |
| 8 | TH Flow Rate | 145.56 | 202.22 | 495.56 | 302.22 |
| 9 | RT Flow Rate | 13.333 | 72.222 | 34.444 | 98.889 |
| 10 | Approach Flow Rate | 317.78 | 344.44 | 535.56 | 433.33 |
| 11 | Proportion LT | 0.50 | 0.20 | 0.01 | 0.07 |
| 12 | Proportion RT | 0.04 | 0.21 | 0.06 | 0.23 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 317.78 | 344.44 | 535.56 | 433.33 |
| 16 | Opposing Approach Flow Rate | 310 | 286 | 390 | 482 |
| 17 | Conflicting Approaches Flow Rate | 872 | 872 | 596 | 596 |
| 18 | Total Intersection Flow Rate | 1499.8 | 1502.4 | 1521.6 | 1511.3 |
| 19 | Proportion, Subject Approach Flow Rate | 0.21 | 0.23 | 0.35 | 0.29 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.21 | 0.19 | 0.26 | 0.32 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.58 | 0.58 | 0.39 | 0.39 |
| 22 | LT, Opposing Approach | 63 | 143 | 29 | 5 |
| 23 | RT, Opposing Approach | 65 | 12 | 89 | 31 |
| 24 | LT, Conflicting Approaches | 34 | 34 | 206 | 206 |
| 25 | RT, Conflicting Approaches | 120 | 120 | 77 | 77 |
| 26 | Proportion LT, Opposing Approach | 0.20 | 0.50 | 0.07 | 0.01 |
| 27 | Proportion RT, Opposing Approach | 0.21 | 0.04 | 0.23 | 0.06 |
| 28 | Proportion LT, Conflicting Approaches | 0.04 | 0.04 | 0.35 | 0.35 |
| 29 | Proportion RT, Conflicting Approaches | 0.14 | 0.14 | 0.13 | 0.13 |
| 30 | Approach Capacity | 467 | 350 | 590 | 555 |
| 31 | Volume/Capacity Ratio | 0.68 | 0.98 | 0.91 | 0.78 |
| 32 | Delay | 13 | 42 | 32 | 19 |
| 33 | Level of Service | C | E | E | C |
| 34 | Average Delay (Intersection) | 27 | | | |
| 35 | Level of Service (Intersection) | D | | | |

Existing Plus Project P.M. Peak
Bradshaw and Calvine

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 105 | 45 | 7 | 51 |
| 2 | TH Volume | 114 | 147 | 314 | 537 |
| 3 | RT Volume | 11 | 23 | 68 | 135 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 116.67 | 50 | 7.7778 | 56.667 |
| 8 | TH Flow Rate | 126.67 | 163.33 | 348.89 | 596.67 |
| 9 | RT Flow Rate | 12.222 | 25.556 | 75.556 | 150 |
| 10 | Approach Flow Rate | 255.56 | 238.89 | 432.22 | 803.33 |
| 11 | Proportion LT | 0.46 | 0.21 | 0.02 | 0.07 |
| 12 | Proportion RT | 0.05 | 0.11 | 0.17 | 0.19 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 255.56 | 238.89 | 432.22 | 803.33 |
| 16 | Opposing Approach Flow Rate | 215 | 230 | 723 | 389 |
| 17 | Conflicting Approaches Flow Rate | 1112 | 1112 | 445 | 445 |
| 18 | Total Intersection Flow Rate | 1582.6 | 1580.9 | 1600.2 | 1637.3 |
| 19 | Proportion, Subject Approach Flow Rate | 0.16 | 0.15 | 0.27 | 0.49 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.14 | 0.15 | 0.45 | 0.24 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.70 | 0.70 | 0.28 | 0.27 |
| 22 | LT, Opposing Approach | 45 | 105 | 51 | 7 |
| 23 | RT, Opposing Approach | 23 | 11 | 135 | 68 |
| 24 | LT, Conflicting Approaches | 58 | 58 | 150 | 150 |
| 25 | RT, Conflicting Approaches | 203 | 203 | 34 | 34 |
| 26 | Proportion LT, Opposing Approach | 0.21 | 0.46 | 0.07 | 0.02 |
| 27 | Proportion RT, Opposing Approach | 0.11 | 0.05 | 0.19 | 0.17 |
| 28 | Proportion LT, Conflicting Approaches | 0.05 | 0.05 | 0.34 | 0.34 |
| 29 | Proportion RT, Conflicting Approaches | 0.18 | 0.18 | 0.08 | 0.08 |
| 30 | Approach Capacity | 354 | 265 | 624 | 708 |
| 31 | Volume/Capacity Ratio | 0.72 | 0.90 | 0.69 | 1.13 |
| 32 | Delay | 16 | 31 | 14 | 74 |
| 33 | Level of Service | C | E | C | F |
| 34 | Average Delay (Intersection) | 45 | | | |
| 35 | Level of Service (Intersection) | E | | | |

```
                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: BRADSHAW RD AND FLORIN RD                        Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT (M)
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR    |
           | Approach 3:BRADSHAW RD |                -------Approach-----|        MULTIPHASE SIGNAL OVERLAP   |
           | 1  2  2 |      ^       |                : -1-  -2-  -3-  -4-|       Possible   Volume   Adjusted|
           |  R  L   |      N       |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover Critical|
FLORIN RD  | R T T T L |            |  intervals/hour :                  |able    Volume   to next   Volume |
------------- T H H H T ------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase    in vph |
 Approach 1  < < | > >   ^--RT  1   |  change (vph)   :                  |-----------------------------------|
   1  LT--^   v v v     <^-RTH      |c.G/C ratio      :  0    0    0    0|B2B1    85(B1)  195-  85= 110(B2)   85|
   LTH-^>               <--TH   2   |d.Opposing volume :  0    0    0    0|A1B2   110(B2)  150- 110=  40(A1)  110|
   2  TH-->             <v-LTH      |  in vph          :                  |A1A2   181(A2) OR   40(A1)          181|
   RTH-v>     ^ ^ ^     v--LT   1   |e.LT capacity on :  0    0    0    0|B4B3    31(B4)  221-  31= 190(B3)   31|
   1  RT--v  < < | > >  Approach 2  |  green (vph)    :                  |A4B3   190(B3)  672- 190= 482(A4)  190|
------------- L L T R R ------------|f.LT capacity in :  0    0    0    0|A3A4   482(A4) OR  291(A3)          482|
           | T T H T T |FLORIN RD   |  vph (b+e)      :                  |                                   |
           |   H   H   |            |g.Left turn volume :  0    0    0    0|                                 |
           | 2   2   1 |            |  in vph         :                  |                                   |
           | Approach 4:BRADSHAW    |h.Is volume > cap. :                :                                   |
                                    |  (g>f) ?        :                  |                                   |
==========================================================================================
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                    |        |                  |        |                                  |
                                    |        | 1 2 2            |        |195(B1B2)+181(A2)+221(B4B3)+482(A4)|
           | Approach 3|            |-------  7 9 9 2 3         -------  |                                  |
 3:  LT=  55 | |       | 2:RT= 147  |         2 1 1 5 1          ^- 147  |       = 1079 vph                 |
    TH= 582  | |       |   TH= 362  |         | | | | |          <- 181  |==================================|
    RT= 172  | v       |   LT=  85  |         < v v > >          <- 181  | Step 8. INTERSECTION LEVEL OF    |
-------------           ------------|                            v-  85  |         SERVICE                  |
                       <--Approach 2|                                    |   (compare step 7 with table 6)  |
                                    |                                    |            -------               |
                                    |                                    |            |  C  |             |
 Approach 1-->                      | 195 -^                             |            -------               |
-------------           ------------|  89 ->            < < ^ ^ >        |==================================|
 1:LT= 195  |          ^ | 4: RT= 108 |  89 ->          | | | | |        | Step 9. RECALCULATE              |
   TH= 178  |          | |   TH=1344 | 214 -v                            |                                  |
   RT= 214  |          | |   LT= 402 |-------           2 1 6 6 1 -------|Geometric Change:                 |
            | Approach 4|           |        |          2 8 7 7 0 |      |Signal Change:                    |
                                    |        |          1 1 2 2 8 |      |Volume Change:                    |
==========================================================================================
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                         |
                                    |        (two phase signal)          |                                  |
       --^ v--  B2B1                |          | Approach 3|             |                                  |
                                    |          |           |             |                                  |
   --^ AND <--     A1B2 AND         |          |           |             |                                  |
   --> OR  v--     /OR A2B1         |          |           |             |                                  |
       --> <--  A1A2                |-------------          -------------|                                  |
                                    | Approach 1                         |                                  |
        |  <    B4B3                |                                    |                                  |
        >  |                        |           See Step 6b.             |                                  |
   | | AND < ^     A3B4 AND         |                                    |                                  |
   v > OR  | |     /OR A4B3         |                        Approach 2  |                                  |
        |  ^    A3A4                |-------------          -------------|                                  |
        v  |                        |          |           |             |                                  |
------------------------------------|          |           |             |                                  |
 A1 -->   A3 |     B1 v--     B3  <|  |          |           |             |                                  |
            v ^                | |  |          | Approach 4|             | Exclusive right turns reduced 30 %|
 A2 <--   A4  |    B2 --^     B4 |> |                                    | V/C Ratio = .78                  |
==========================================================================================
```

```
                          Critical Movement Analysis: PLANNING
                                   Calculation Form 1
Intersection: BRADSHAW RD AND FLORIN RD                          Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT (M)
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR        |
            | Approach 3:BRADSHAW RD     |                -------Approach-----|         MULTIPHASE SIGNAL OVERLAP     |
            | 1   2   2 |      ^         |                : -1-  -2-  -3-  -4-|        Possible   Volume      Adjusted|
            |   R   L   |      N         |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |                |  intervals/hour :                  |able    Volume    to next    Volume |
------------  T H H H T  ----------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >    ^--RT  1      |  change (vph)   :                  |--------------------------------------|
   1  LT--^     v v v     <^-RTH         |c.G/C ratio      :  0    0    0    0|B2B1   122(B1)  228- 122= 106(B2)  122|
      LTH-^>              <--TH   2      |d.Opposing volume :  0    0    0    0|A1B2   106(B2)  299- 106= 193(A1)  106|
   2   TH-->              <v-LTH         |  in vph         :                  |A1A2   193(A1) OR  136(A2)          193|
      RTH-v>    ^ ^ ^      v--LT  1      |e.LT capacity on :  0    0    0    0|B4B3    87(B4)  185-  87=  98(B3)   87|
   1  RT--v   < < | > >    Approach 2    |  green (vph)    :                  |A4B3    98(B3)  386-  98= 288(A4)   98|
------------  L L T R R  ----------------|f.LT capacity in :  0    0    0    0|A3A4   733(A3) OR  288(A4)          733|
            | T T H T T |FLORIN RD       |  vph (b+e)      :                  |                                      |
            |   H   H   |                |g.Left turn volume :  0    0    0    0|                                      |
            | 2   2   1 |                |  in vph         :                  |                                      |
            | Approach 4:BRADSHAW        |h.Is volume > cap. :                 :                                      |
                                         |  (g>f) ?        :                  |                                      |
========================================+==================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                         |        |                  |        |                                      |
                                         |        | 2 7 7            |        |228(B1B2)+193(A1)+185(B4B3)+733(A3)   |
            | Approach 3|                |-------  7 3 3 7 8          -------|                                      |
 3:  LT= 157 | |         | 2:RT= 100     |         2 3 3 1 7          ^- 100 |             = 1339 vph               |
    TH=1465  | |         |   TH= 271     |         | | | | |          <- 136 |======================================|
    RT= 272  | v         |   LT= 122     |         < v v > >          <- 136 | Step 8. INTERSECTION LEVEL OF        |
------------              ---------------|                            v- 122 |         SERVICE                      |
                          <--Approach 2  |                                   |    (compare step 7 with table 6)     |
                                         |                                   |              -------                 |
                                         |                                   |              | E |                   |
 Approach 1-->                           | 228 -^                            |              -------                 |
------------              ---------------| 180 ->        < < ^ ^ >           |======================================|
 1:LT= 228   |             ^ | 4: RT= 111| 180 ->        | | | | |           | Step 9. RECALCULATE                  |
   TH= 360   |             | |   TH= 772 | 498 -v                            |                                      |
   RT= 498   |             | |   LT= 335 |-------        1 1 3 3 1   -------|Geometric Change:                     |
             | Approach 4|               |        |      8 5 8 8 1 |        |Signal Change:                        |
                                         |        |      5 1 6 6 1 |        |Volume Change:                        |
========================================+==================================+======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                             |
                                         |         (two phase signal)        |                                      |
        --^ v--   B2B1                   |          | Approach 3|            |                                      |
                                         |          |           |            |                                      |
     --^ AND <--     A1B2 AND            |          |           |            |                                      |
     --> OR  v--     /OR A2B1            |          |           |            |                                      |
        --> <--   A1A2                   |-------------         -------------|                                      |
                                         | Approach 1                        |                                      |
         |   <    B4B3                   |                                   |                                      |
         >   |                           |          See Step 6b.             |                                      |
     | | AND < ^     A3B4 AND            |                                   |                                      |
     v > OR  | |     /OR A4B3            |                      Approach 2   |                                      |
         |   ^    A3A4                   |-------------         ------------|                                      |
         v   |                           |          |           |            |                                      |
-----------------------------------------|          |           |            |                                      |
 A1 -->   A3 |      B1 v--     B3    <|  |          |           |            |                                      |
            v ^                     | |  |          | Approach 4|            | Exclusive right turns reduced 40 %   |
 A2 <--   A4  |     B2 --^     B4 |>     |                                   | V/C Ratio = .971                     |
==============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: BRADSHAW RD AND ELDER CREEK RD                              Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT (M)
==========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR      |
              | Approach 3:BRADSHAW    |                -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
              | 1  2   1 |      ^      |                  : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |  R   L   |      N      |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |             | intervals/hour   :                   |able   Volume   to next    Volume |
------------- T H H H T   -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase      in vph |
  Approach 1  < < | > >    ^--RT  1    | change (vph)     :                   |-------------------------------------|
   1  LT--^    v v v      <^-RTH       |c.G/C ratio       :  0    0    0    0|A1B2    89(A1) OR   45(B2)        89|
      LTH-^>              <--TH        |d.Opposing volume :  0    0    0    0|A2B1   151(A2) OR   16(B1)       151|
       TH-->              <v-LTH  1    | in vph           :                   |B4B3     6(B4)  140-   6= 134(B3)   6|
   1  RTH-v>   ^ ^ ^       v--LT       |e.LT capacity on  :  0    0    0    0|A4B3   134(B3)  737- 134= 603(A4) 134|
      RT--v   < < | > >   Approach 2   | green (vph)      :                   |A3A4   603(A4) OR  332(A3)        603|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|                                     |
             | T T H T T |ELDER CREEK R| vph (b+e)        :                   |                                     |
             |  H    H   |             |g.Left turn volume :  0    0    0    0|                                     |
             | 1    1 1  |             | in vph           :                   |                                     |
             | Approach 4:BRADSHAW     |h.Is volume > cap. :                  :                                     |
                                       | (g>f) ?          :                   |                                     |
=======================================+====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES     |
                                       |       |                      |     |                                     |
                                       |       | 1 3 3                |     |89(A1)+151(A2)+140(B4B3)+603(A4)     |
              | Approach 3|            |-------  3 3 3                ------|                                     |
 3:  LT=   6 | |          | 2:RT=   8  |         6 2 2 6              ^-   8|          = 983 vph                  |
   TH= 663   | |          |   TH= 135  |         | | | |              <+ 135|=====================================|
  RT= 136    | v          |   LT=  17  |         < v v >              v+  16| Step 8. INTERSECTION LEVEL OF       |
-------------              ------------|                                    |         SERVICE                     |
                          <--Approach 2|                                    |      (compare step 7 with table 6)  |
                                       |                                    |              -------                |
                                       |                                    |              |  C  |                |
 Approach 1-->                         |                                    |              -------                |
-------------              ------------|  45 -^             < ^ ^ >         |=====================================|
 1:LT=  45   |             ^ | 4: RT=  31 |  36 +>          | | + +          | Step 9. RECALCULATE                 |
   TH=  36   |             | |   TH=1442  |  53 +v                           |                                     |
   RT=  53   |             | |  LT= 140   |-------          1 7 7     -------|Geometric Change:                    |
             | Approach 4|             |       |          4 3 0 3 |         |Signal Change:                       |
                                       |       |          0 7 6 1 |         |Volume Change:                       |
=======================================+====================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                            |
                                       |          (two phase signal)        |                                     |
        --^      A1B2                  |           | Approach 3|            |                                     |
        -->                            |           |           |            |                                     |
            <--  A2B1                  |           |           |            |                                     |
            v--                        |           |           |            |                                     |
          |  <   B4B3                  |-------------          ------------|                                     |
          >  |                         | Approach 1                         |                                     |
    | | AND < ^     A3B4 AND           |                                    |                                     |
    v > OR  | |     /OR A4B3           |          See Step 6b.              |                                     |
          |  ^   A3A4                  |                                    |                                     |
          v  |                         |                       Approach 2   |                                     |
                                       |-------------          ------------|                                     |
                                       |           |           |            |                                     |
---------------------------------------|           |           |            |                                     |
 A1 -->   A3 |    B1 v--    B3   <|    |           |           |            |                                     |
            v ^                   | |  |           | Approach 4|            | Exclusive right turns reduced  30 % |
 A2 <--   A4  |   B2 --^    B4 |>      |                                    | V/C Ratio = .71                     |
==========================================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: BRADSHAW RD AND ELDER CREEK RD                          Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT (M)
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR    |
         | Approach 3:BRADSHAW  |            -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
         | 1  2  1 |      ^     |                   : -1-  -2-  -3-  -4-|     Possible    Volume    Adjusted|
         |   R  L  |      N     |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |      | intervals/hour   :                   |able    Volume   to next    Volume |
------------- T H H H T -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1 | change (vph)     :                   |-----------------------------------|
  1  LT--^      v v v    <^-RTH    |c.G/C ratio       :  0    0    0    0|A1B2   232(A1) OR  130(B2)       232|
     LTH-^>              <--TH     |d.Opposing volume :  0    0    0    0|A2B1    84(A2) OR   44(B1)        84|
       TH-->             <v-LTH  1 | in vph           :                   |B4B3    14(B4)   94-  14=  80(B3)  14|
  1  RTH-v>      ^ ^ ^    v--LT    |e.LT capacity on  :  0    0    0    0|A4B3    80(B3)  495-  80= 415(A4)  80|
     RT--v    < < | > >  Approach 2 | green (vph)      :                   |A3A4   813(A3) OR  415(A4)       813|
------------- L L T R R -------------|f.LT capacity in  :  0    0    0    0|                                   |
             | T T H T T |ELDER CREEK R| vph (b+e)        :                   |                                   |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                   |
             | 1    1 1  |            | in vph           :                   |                                   |
             | Approach 4:BRADSHAW    |h.Is volume > cap. :                   :                                   |
                                      | (g>f) ?          :                   |                                   |
===============================================================================================|
 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                  |      |                    |         |                                   |
                                  |      |  8 8               |         |232(A1)+84(A2)+94(B4B3)+813(A3)    |
              | Approach 3|       |-------  6 1 1 1                -------|                                   |
 3:  LT=  14  | |         | 2:RT=   7 |    8 3 3 4           ^-   7 |          = 1223 vph               |
   TH=1626   | |         |   TH=  40 |    | | | |           <+  40 |===================================|
   RT=  68   | v         |   LT=  44 |    < v v >           v+  44 | Step 8. INTERSECTION LEVEL OF     |
-------------              -------------|                              |         SERVICE                   |
                        <--Approach 2 |                              |     (compare step 7 with table 6) |
                                  |                                  |              -------              |
                                  |                                  |              |  D  |              |
 Approach 1-->                    |                                  |              -------              |
-------------              -------------| 130 -^           < ^ ^ >      |===================================|
 1:LT= 130   |           ^ | 4: RT=  35 |  97 +>          | | + +      | Step 9. RECALCULATE               |
   TH=  97   |           | |   TH= 954 | 135 +v                      |                                   |
   RT= 135   |           | |   LT=  94 |-------           4 4  -------|Geometric Change:                  |
             | Approach 4|            |       |         9 9 6 3 |     |Signal Change:                     |
                                  |       |         4 5 0 5 |     |Volume Change:                     |
===============================================================================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                          |
                                  |      (two phase signal)          |                                   |
        --^      A1B2             |          | Approach 3|            |                                   |
        -->                       |          |           |            |                                   |
           <--   A2B1             |          |           |            |                                   |
           v--                    |          |           |            |                                   |
         |  <    B4B3             |-------------      -------------|                                   |
         >  |                     | Approach 1                       |                                   |
   | | AND < ^     A3B4 AND       |                                  |                                   |
   v > OR  | |     /OR A4B3       |        See Step 6b.              |                                   |
         |  ^    A3A4             |                                  |                                   |
         v  |                     |                   Approach 2     |                                   |
                                  |-------------      -------------|                                   |
                                  |          |           |            |                                   |
---------------------------------|          |           |            |                                   |
 A1 -->   A3 |     B1 v--    B3  <|  |          |           |            |                                   |
             v ^                |  |  |          | Approach 4|         | Exclusive right turns reduced / %  |
 A2 <--   A4  |    B2 --^    B4 |> |                                  | V/C Ratio = .89                    |
===============================================================================================
```

Existing Plus Project A.M. Peak
Excelsior and Calvine

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 27 | 7 | 49 | 5 |
| 2 | TH Volume | 102 | 86 | 229 | 61 |
| 3 | RT Volume | 59 | 23 | 11 | 6 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 30 | 7.7778 | 54.444 | 5.5556 |
| 8 | TH Flow Rate | 113.33 | 95.556 | 254.44 | 67.778 |
| 9 | RT Flow Rate | 65.556 | 25.556 | 12.222 | 6.6667 |
| 10 | Approach Flow Rate | 208.89 | 128.89 | 321.11 | 80 |
| 11 | Proportion LT | 0.14 | 0.06 | 0.17 | 0.07 |
| 12 | Proportion RT | 0.31 | 0.20 | 0.04 | 0.08 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 208.89 | 128.89 | 321.11 | 80 |
| 16 | Opposing Approach Flow Rate | 116 | 188 | 72 | 289 |
| 17 | Conflicting Approaches Flow Rate | 361 | 361 | 304 | 304 |
| 18 | Total Intersection Flow Rate | 685.89 | 677.89 | 697.11 | 673 |
| 19 | Proportion, Subject Approach Flow Rate | 0.30 | 0.19 | 0.46 | 0.12 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.17 | 0.28 | 0.10 | 0.43 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.53 | 0.53 | 0.44 | 0.45 |
| 22 | LT, Opposing Approach | 7 | 27 | 5 | 49 |
| 23 | RT, Opposing Approach | 23 | 59 | 6 | 11 |
| 24 | LT, Conflicting Approaches | 54 | 54 | 34 | 34 |
| 25 | RT, Conflicting Approaches | 17 | 17 | 82 | 82 |
| 26 | Proportion LT, Opposing Approach | 0.06 | 0.14 | 0.07 | 0.17 |
| 27 | Proportion RT, Opposing Approach | 0.20 | 0.31 | 0.08 | 0.04 |
| 28 | Proportion LT, Conflicting Approaches | 0.15 | 0.15 | 0.11 | 0.11 |
| 29 | Proportion RT, Conflicting Approaches | 0.05 | 0.05 | 0.27 | 0.27 |
| 30 | Approach Capacity | 514 | 473 | 676 | 524 |
| 31 | Volume/Capacity Ratio | 0.41 | 0.27 | 0.47 | 0.15 |
| 32 | Delay | 5 | 3 | 6 | 2 |
| 33 | Level of Service | A | A | B | A |
| 34 | Average Delay (Intersection) | 5 | | | |
| 35 | Level of Service (Intersection) | A | | | |

Existing Plus Project P.M. Peak
Excelsior and Calvine

| | | EB | WB | NB | SB |
|---|---|---|---|---|---|
| 1 | LT Volume | 14 | 2 | 63 | 22 |
| 2 | TH Volume | 34 | 88 | 117 | 170 |
| 3 | RT Volume | 65 | 8 | 4 | 22 |
| 4 | Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 |
| 5 | Lanes on Subject Approach | 1 | 1 | 1 | 1 |
| 6 | Lanes on Opposing Approach | 1 | 1 | 1 | 1 |
| 7 | LT Flow Rate | 15.556 | 2.2222 | 70 | 24.444 |
| 8 | TH Flow Rate | 37.778 | 97.778 | 130 | 188.89 |
| 9 | RT Flow Rate | 72.222 | 8.8889 | 4.4444 | 24.444 |
| 10 | Approach Flow Rate | 125.56 | 108.89 | 204.44 | 237.78 |
| 11 | Proportion LT | 0.12 | 0.02 | 0.34 | 0.10 |
| 12 | Proportion RT | 0.58 | 0.08 | 0.02 | 0.10 |
| 13 | Opposing Approach (Direction) | WB | EB | SB | NB |
| 14 | Conflicting Approaches (Directions) | NB, SB | NB, SB | EB, WB | EB, WB |
| 15 | Subject Approach Flow Rate | 125.56 | 108.89 | 204.44 | 237.78 |
| 16 | Opposing Approach Flow Rate | 98 | 113 | 214 | 184 |
| 17 | Conflicting Approaches Flow Rate | 398 | 398 | 211 | 211 |
| 18 | Total Intersection Flow Rate | 621.56 | 619.89 | 629.44 | 632.78 |
| 19 | Proportion, Subject Approach Flow Rate | 0.20 | 0.18 | 0.32 | 0.38 |
| 20 | Proportion, Opposing Approach Flow Rate | 0.16 | 0.18 | 0.34 | 0.29 |
| 21 | Proportion, Conflicting Approaches Flow Rate | 0.64 | 0.64 | 0.34 | 0.33 |
| 22 | LT, Opposing Approach | 2 | 14 | 22 | 63 |
| 23 | RT, Opposing Approach | 8 | 65 | 22 | 4 |
| 24 | LT, Conflicting Approaches | 85 | 85 | 16 | 16 |
| 25 | RT, Conflicting Approaches | 26 | 26 | 73 | 73 |
| 26 | Proportion LT, Opposing Approach | 0.02 | 0.12 | 0.10 | 0.34 |
| 27 | Proportion RT, Opposing Approach | 0.08 | 0.58 | 0.10 | 0.02 |
| 28 | Proportion LT, Conflicting Approaches | 0.21 | 0.21 | 0.08 | 0.08 |
| 29 | Proportion RT, Conflicting Approaches | 0.07 | 0.07 | 0.35 | 0.35 |
| 30 | Approach Capacity | 378 | 437 | 734 | 662 |
| 31 | Volume/Capacity Ratio | 0.33 | 0.25 | 0.28 | 0.36 |
| 32 | Delay | 4 | 3 | 3 | 4 |
| 33 | Level of Service | A | A | A | A |
| 34 | Average Delay (Intersection) | 3 | | | |
| 35 | Level of Service (Intersection) | A | | | |

# Critical Movement Analysis: PLANNING
## Calculation Form 1

Intersection: JACKSON HWY AND BRADSHAW
Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT (M)

### Step 1. IDENTIFY LANE GEOMETRY

```
             | Approach 3:BRADSHAW
             | 1   2   2 |       ^
             |   R   L   |       N
JACKSON HWY  | R T T T L |
------------- T H H H T  -------------
  Approach 1  < < | > >    ^--RT   1
   1  LT--^    v v v      <^-RTH
      LTH-^>              <--TH    1
   1   TH-->              <v-LTH
      RTH-v>    ^ ^ ^      v--LT   1
   1  RT--v   < < | > >   Approach 2
------------- L L T R R  -------------
             | T T H T T |JACKSON HWY
             |   H   H   |
             | 2   2   1 |
             | Approach 4:BRADSHAW
```

### Step 4. LEFT TURN CHECK

| | Approach -1- | -2- | -3- | -4- |
|---|---|---|---|---|
| a. No. of change intervals/hour | 0 | 0 | 0 | 0 |
| b. LT capacity on change (vph) | 0 | 0 | 0 | 0 |
| c. G/C ratio | 0 | 0 | 0 | 0 |
| d. Opposing volume in vph | 0 | 0 | 0 | 0 |
| e. LT capacity on green (vph) | 0 | 0 | 0 | 0 |
| f. LT capacity in vph (b+e) | 0 | 0 | 0 | 0 |
| g. Left turn volume in vph | 0 | 0 | 0 | 0 |
| h. Is volume > cap. (g>f) ? | | | | |

### Step 6b. VOLUME ADJUSTMENT FOR MULTIPHASE SIGNAL OVERLAP

| Probable Phase | Possible Critical Volume in vph | Volume Carryover to next phase | Adjusted Critical Volume in vph |
|---|---|---|---|
| B2B1 | 15(B1) | 200- 15= 185(B2) | 15 |
| A1B2 | 185(B2) | 180- 185= 0(A1) | 185 |
| A1A2 | 423(A2) OR | 0(A1) | 423 |
| B4B3 | 41(B4) | 187- 41= 146(B3) | 41 |
| A4B3 | 146(B3) | 575- 146= 429(A4) | 146 |
| A3A4 | 429(A4) OR | 285(A3) | 429 |

### Step 2. IDENTIFY VOLUMES, in vph

```
             | Approach 3|
3:  LT=  74  | |         | 2:RT= 187
    TH= 569  | |         |   TH= 423
    RT= 226  | v         |   LT=  15
-------------             -------------
                          <--Approach 2

Approach 1-->
-------------             -------------
1:LT= 200    |         ^ | 4: RT=  14
  TH= 180    |         | |   TH=1149
  RT= 181    |         | |   LT= 340
             | Approach 4|
```

### Step 5. ASSIGN LANE VOLUMES, in vph

```
         | 2 2 2                  |
-------    2 8 8 3 4              -------
           6 5 5 3 1              ^- 187
           | | | | |              <- 423
           < v v > >              v-  15

 200 -^             < < ^ ^ >
 180 ->             | | | | |
 181 -v
-------             1 1 5 5      -------
        |           8 5 7 7 1 |
        |           7 3 5 5 4 |
```

### Step 7. SUM OF CRITICAL VOLUMES

200(B1B2)+423(A2)+187(B4B3)+429(A4)

= 1239 vph

### Step 8. INTERSECTION LEVEL OF SERVICE

(compare step 7 with table 6)

| E |

### Step 9. RECALCULATE

Geometric Change:
Signal Change:
Volume Change:

### Step 3. IDENTIFY PHASING

```
     --^ v--   B2B1

  --^ AND <--     A1B2 AND
  --> OR  v--     /OR A2B1
     --> <--   A1A2

      |   <    B4B3
      >   |
  | | AND < ^     A3B4 AND
  v > OR  | |     /OR A4B3
      |   ^    A3A4
      v   |
-----------------------------------
A1 -->    A3 |      B1 v--    B3  <|
             v ^                 | |
A2 <--    A4  |     B2 --^    B4 |>
```

### Step 6a. CRITICAL VOLUMES, in vph (two phase signal)

```
            | Approach 3|
-------------            -------------
 Approach 1

           See Step 6b.

                          Approach 2
-------------            -------------
            | Approach 4|
```

### COMMENTS

Exclusive right turns reduced 30 %
V/C Ratio = .9

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW                                    Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT (M)
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR |
             | Approach 3:BRADSHAW      |            -------Approach-----|         MULTIPHASE SIGNAL OVERLAP |
             | 1   2   2 |      ^       |             : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |   R   L   |      N       |a.No. of change  :   0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |              |  intervals/hour :                 |able   Volume    to next    Volume |
-------------  T H H H T  --------------|b.LT capacity on :   0    0    0    0|Phase  in vph     phase      in vph |
  Approach 1   < < | > >   ^--RT  1     |  change (vph)   :                 |----------------------------------|
   1  LT--^      v v v    <^-RTH        |c.G/C ratio      :   0    0    0    0|B2B1    28(B1)  191-  28= 163(B2)    28|
      LTH-^>              <--TH   1     |d.Opposing volume:   0    0    0    0|A1B2   163(B2)  433- 163= 270(A1)   163|
   1   TH-->              <v-LTH        |  in vph         :                 |A1A2   270(A1) OR  156(A2)          270|
      RTH-v>     ^ ^ ^     v--LT  1     |e.LT capacity on :   0    0    0    0|B4B3    91(B4)  175-  91=  84(B3)    91|
   1  RT--v    < < | > >   Approach 2   |  green (vph)    :                 |A4B3    84(B3)  395-  84= 311(A4)    84|
-------------  L L T R R  --------------|f.LT capacity in :   0    0    0    0|A3A4   617(A3) OR  311(A4)          617|
             | T T H T T |JACKSON HWY   |  vph (b+e)      :                 |                                  |
             |   H   H   |              |g.Left turn volume:  0    0    0    0|                                  |
             | 2   2   1 |              |  in vph         :                 |                                  |
             | Approach 4:BRADSHAW      |h.Is volume > cap. :               :                                  |
                                        |  (g>f) ?        :                 |                                  |
=============================================================================================
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                        |         |                    |      |                                  |
                                        |         | 1 6 6              |      |191(B1B2)+270(A1)+175(B4B3)+617(A3)|
             | Approach 3|              |-------   8 1 1 7 9           -------|                                  |
 3:  LT= 165 | |         | 2:RT=  76    |          2 7 7 5 1           ^-  76 |        = 1253 vph                |
   TH=1234   | |         |   TH= 156    |          | | | | |           <- 156 |==================================|
   RT= 182   | v         |   LT=  28    |          < v v > >           v-  28 | Step 8. INTERSECTION LEVEL OF    |
-------------             --------------|                                     |         SERVICE                  |
                         <--Approach 2  |                                     |    (compare step 7 with table 6) |
                                        |                                     |             -------              |
                                        |                                     |             | E |                |
 Approach 1-->                          |                                     |             -------              |
-------------             --------------| 191 -^           < < ^ ^ >          |==================================|
 1:LT= 191   |          ^ | 4: RT=  20  | 433 ->           | | | | |          | Step 9. RECALCULATE              |
   TH= 433   |          | |   TH= 790   | 413 -v                              |                                  |
   RT= 413   |          | |   LT= 317   |-------           1 1 3 3    -------|Geometric Change:                 |
             | Approach 4|              |         |        7 4 9 9 2 |        |Signal Change:                    |
                                        |         |        5 3 5 5 0 |        |Volume Change:                    |
=============================================================================================
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                         |
                                        |         (two phase signal)          |                                  |
       --^ v--   B2B1                   |           | Approach 3|             |                                  |
                                        |           |           |             |                                  |
    --^ AND <--     A1B2 AND            |           |           |             |                                  |
    --> OR  v--     /OR A2B1            |           |           |             |                                  |
       --> <--   A1A2                   |-------------         -------------|                                  |
                                        | Approach 1                          |                                  |
        |   <    B4B3                   |                                     |                                  |
        >   |                           |         See Step 6b.                |                                  |
    | | AND < ^     A3B4 AND            |                                     |                                  |
    v > OR  | |     /OR A4B3            |                       Approach 2    |                                  |
        |   ^    A3A4                   |-------------         -------------|                                  |
        v   |                           |           |           |             |                                  |
----------------------------------------|           |           |             |                                  |
 A1 -->   A3 |      B1 v--     B3   <|  |           |           |             |                                  |
             v ^                    | | |           | Approach 4|             | Exclusive right turns reduced 30 % |
 A2 <--   A4   |    B2 --^     B4 |>    |                                     | V/C Ratio = .91                  |
=============================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: BRADSHAW AND GERBER RD                                     Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT (M)
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR     |
            | Approach 3:BRADSHAW RD    |                 -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
            | 1   2   1 |      ^        |                 : -1-  -2-  -3-  -4-|        Possible   Volume     Adjusted|
            |  R    L   |      N        |a.No. of change  :   0    0    0    0|Prob-   Critical  Carryover   Critical|
GERBER RD   | R T T T L |               |  intervals/hour  :                   |able     Volume   to next     Volume |
------------  T H H H T  ---------------|b.LT capacity on  :   0    0    0    0|Phase    in vph    phase      in vph |
  Approach 1  < < | > >   ^--RT  1      |  change (vph)    :                   |-------------------------------------|
   2  LT--^    v v v     <^-RTH         |c.G/C ratio       :   0    0    0    0|B2B1    21(B1)  322-  21= 301(B2)   21|
      LTH-^>             <--TH   1      |d.Opposing volume :   0    0    0    0|A1B2   301(B2)  321- 301=  20(A1)  301|
   1   TH-->             <v-LTH         |  in vph          :                   |A1A2   288(A2) OR   20(A1)         288|
      RTH-v>   ^ ^ ^      v--LT  2      |e.LT capacity on  :   0    0    0    0|B4B3   101(B3)  194- 101=  93(B4)  101|
   1  RT--v   < < | > >  Approach 2     |  green (vph)     :                   |A3B4    93(B4)  461-  93= 368(A3)   93|
------------  L L T R R  ---------------|f.LT capacity in  :   0    0    0    0|A3A4   368(A3) OR  145(A4)         368|
            | T T H T T |GERBER RD      |  vph (b+e)       :                   |                                     |
            |   H   H   |               |g.Left turn volume :  0    0    0    0|                                     |
            | 1   2   1 |               |  in vph          :                   |                                     |
            | Approach 4:BRADSHAW RD    |h.Is volume > cap. :                  :                                     |
                                        |  (g>f) ?         :                   |                                     |
========================================+==================================+======================================|
Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph |Step 7. SUM OF CRITICAL VOLUMES      |
                                        |       |                     |      |                                     |
                                        |       | 6 3 3 1             |      |322(B1B2)+288(A2)+194(B3B4)+368(A3)  |
            | Approach 3|               |-------  5 6 6 9              ------|                                     |
3:  LT= 194 | |         | 2:RT= 180     |         9 3 3 4            ^- 180 |           = 1172 vph                |
    TH= 726 | |         |   TH= 288     |         | | | |            <- 288 |=====================================|
    RT= 659 | v         |   LT=  37     |         < v v >            v-  17 | Step 8. INTERSECTION LEVEL OF       |
------------             ---------------|                            v-  21 |        SERVICE                      |
                        <--Approach 2   |                                   |     (compare step 7 with table 6)   |
                                        |                                   |              -------                |
                                        |                                   |              |  D  |                |
Approach 1-->                           | 322 -^                            |              -------                |
------------             ---------------| 264 -^          < ^ ^ >           |=====================================|
1:LT= 585   |             ^ | 4: RT=  35| 321 ->          | | | |           | Step 9. RECALCULATE                 |
  TH= 321   |             | |   TH= 290 | 103 -v                            |                                     |
  RT= 103   |             | |   LT= 101 |-------          1 1 1      -------|Geometric Change:                    |
            | Approach 4|               |       |        0 4 4 3 |         |Signal Change:                        |
                                        |       |        1 5 5 5 |         |Volume Change:                        |
========================================+==================================+======================================|
Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph |COMMENTS                              |
                                        |       (two phase signal)          |                                      |
      --^ v--   B2B1                    |            | Approach 3|          |                                      |
                                        |            |           |          |                                      |
   --^ AND <--     A1B2 AND             |            |           |          |                                      |
   --> OR  v--     /OR A2B1             |            |           |          |                                      |
      --> <--   A1A2                    |-------------           -----------|                                      |
                                        | Approach 1                        |                                      |
       |  <   B4B3                      |                                   |                                      |
       >  |                             |        See Step 6b.               |                                      |
   | | AND < ^     A3B4 AND             |                                   |                                      |
   v > OR  | |     /OR A4B3             |                      Approach 2   |                                      |
       |  ^   A3A4                      |-------------          ------------|                                      |
       v  |                             |            |           |          |                                      |
----------------------------------------|            |           |          |                                      |
A1 -->   A3 |      B1 v--     B3    <|  |            |           |          |                                      |
          v ^                       | | |            | Approach 4|          | Exclusive right turns reduced  30 %  |
A2 <--   A4  |     B2 --^     B4 |>     |                                   | V/C Ratio = .854                     |
==========================================================================================
```

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                               Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: BRADSHAW AND GERBER RD                                      Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT (M)
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR         |
             | Approach 3:BRADSHAW RD  |                   -------Approach-----|          MULTIPHASE SIGNAL OVERLAP      |
             | 1   2   1 |      ^      |                   : -1-  -2-  -3-  -4-|       Possible    Volume     Adjusted|
             |   R   L   |      N      |a.No. of change    :  0    0    0    0|Prob-  Critical   Carryover   Critical|
GERBER RD    | R T T T L |             |  intervals/hour   :                   |able    Volume    to next     Volume |
------------- T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase   in vph     phase      in vph |
  Approach 1  < < | > >   ^--RT  1    |  change (vph)     :                   |-----------------------------------------|
   2  LT--^     v v v    <^-RTH       |c.G/C ratio        :  0    0    0    0|B2B1    17(B1)  238-  17= 221(B2)     17|
      LTH-^>             <--TH   1    |d.Opposing volume  :  0    0    0    0|A1B2   221(B2)  187- 221=   0(A1)    221|
   1   TH-->    ^ ^ ^    <v-LTH       |  in vph           :                   |A1A2   252(A2) OR    0(A1)            252|
      RTH-v>             v--LT  2     |e.LT capacity on   :  0    0    0    0|B4B3    71(B3)   92-  71=  21(B4)     71|
   1  RT--v   < < | > >  Approach 2   |  green (vph)      :                   |A3B4    21(B4)  258-  21= 237(A3)     21|
------------- L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A3A4   394(A4) OR  237(A3)            394|
             | T T H T T |GERBER RD    |  vph (b+e)        :                   |                                         |
             |   H   H   |             |g.Left turn volume :  0    0    0    0|                                         |
             | 1   2   1 |             |  in vph           :                   |                                         |
             | Approach 4:BRADSHAW RD  |h.Is volume > cap. :                  :|                                         |
                                       |  (g>f) ?          :                   |                                         |
=======================================+=======================================+=========================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES         |
                                       |        |                      |       |                                         |
                                       |        | 3 1 1                |       |238(B1B2)+252(A2)+92(B3B4)+394(A4)       |
             | Approach 3|             |-------   6 5 5 9               -------|                                         |
 3:  LT=  92 | |         | 2:RT= 145   |          8 6 6 2               ^- 145 |           = 976 vph                     |
    TH= 311  | |         |   TH= 252   |          | | | |               <- 252 |=========================================|
   RT= 368   | v         |   LT=  29   |          < v v >               v-  14 | Step 8. INTERSECTION LEVEL OF           |
-------------            -------------|                                 v-  17 |         SERVICE                         |
                         <--Approach 2 |                                       |      (compare step 7 with table 6)      |
                                       |                                       |               -------                   |
                                       |                                       |               |  C  |                   |
 Approach 1-->                         | 238 -^                                |               -------                   |
-------------            -------------| 194 -^           < ^ ^ >              |=========================================|
 1:LT= 431   |            ^ | 4: RT=  31 | 187 ->        | | | |              | Step 9. RECALCULATE                     |
   TH= 187   |            | |   TH= 788 |  67 -v                               |                                         |
   RT=  67   |            | |   LT=  71 |-------           3 3        -------|Geometric Change:                        |
             | Approach 4|             |        |        7 9 9 3 |           |Signal Change:                           |
                                       |        |        1 4 4 1 |           |Volume Change:                           |
=======================================+=======================================+=========================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                                |
                                       |        (two phase signal)             |                                         |
       --^ v--  B2B1                   |             | Approach 3|             |                                         |
                                       |             |           |             |                                         |
    --^ AND <--     A1B2 AND           |             |           |             |                                         |
    --> OR  v--     /OR A2B1           |             |           |             |                                         |
       --> <--  A1A2                   |-------------             -------------|                                         |
                                       |  Approach 1                           |                                         |
        |  <    B4B3                   |                                       |                                         |
        >  |                           |            See Step 6b.               |                                         |
    | | AND < ^     A3B4 AND           |                                       |                                         |
    v > OR  | |     /OR A4B3           |                          Approach 2   |                                         |
        |  ^    A3A4                   |-------------             -------------|                                         |
        v  |                           |             |           |             |                                         |
---------------------------------------|             |           |             |                                         |
A1 -->   A3 |      B1 v--     B3   <|  |             |           |             |                                         |
           v ^                     | | |             | Approach 4|             | Exclusive right turns reduced  30 %     |
A2 <--   A4  |     B2 --^     B4 |>    |                                       | V/C Ratio = .716                        |
===============================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: ELK GROVE-FLORIN AND FLORIN                                   Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT MITIGATED
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR     |
              | Approach 3:ELK GROVE-FLO|                  -------Approach-----|          MULTIPHASE SIGNAL OVERLAP |
              | 1   2   2 |      ^     |                  : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |   R   L   |      N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD     | R T T T L |            | intervals/hour   :                   |able   Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    D    0|Phase  in vph    phase     in vph |
 Approach 1    < < | > >   ^--RT  1    | change (vph)     :                   |------------------------------------|
  1  LT--^      v v v    <^-RTH        |c.G/C ratio       :  0    0    0    0|B4B3  144(B4)  180- 144=  36(B3)  144|
     LTH-^>              <--TH   2     |d.Opposing volume :  0    0    0    0|A4B3   36(B3)  331-  36= 295(A4)   36|
  2   TH-->              <v-LTH        | in vph           :                   |A3A4  295(A4) OR  169(A3)         295|
     RTH-v>     ^ ^ ^     v--LT   1    |e.LT capacity on  :  0    0    0    0|B2B1   98(B2)  192-  98=  94(B1)   98|
  1  RT--v     < < | > >  Approach 2   | green (vph)      :                   |A2B1   94(B1)  350-  94= 256(A2)   94|
-------------  L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A1A2  256(A2) OR  235(A1)         256|
              | T T H T T |FLORIN RD   | vph (b+e)        :                   |                                    |
              |   H   H   |            |g.Left turn volume :  0    0    0    0|                                    |
              | 2   2   1 |            | in vph           :                   |                                    |
              | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                  :                                    |
                                       | (g>f) ?          :                   |                                    |
=======================================+======================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES    |
                                       |        |                     |       |                                    |
                                       |        |   1 1 1 1           |       |180(B4B3)+295(A4)+192(B2B1)+256(A2) |
              | Approach 3|            |-------  9 6 6 1 4            -------|                                    |
 3:  LT= 261  | |         | 2:RT= 500  |         1 9 9 8 4         ^- 500   |          = 923 vph                 |
    TH= 337   | |         |   TH= 683  |         | | | | |         <- 342   |====================================|
    RT=  91   | v         |   LT= 192  |         < v v > >         <- 342   | Step 8. INTERSECTION LEVEL OF      |
-------------              -------------|                                   v- 192   |         SERVICE                    |
                          <--Approach 2 |                                      |     (compare step 7 with table 6)  |
                                       |                                      |               -------              |
                                       |                                      |               |  B  |              |
 Approach 1-->                         |  98 -^                               |               -------              |
-------------              -------------| 235 ->            < < ^ ^ >         |====================================|
 1:LT=  98    |            ^ | 4: RT= 138 | 235 ->            | | | | |         | Step 9. RECALCULATE                 |
   TH= 469    |            | |   TH= 661 | 210 -v                               |                                    |
   RT= 210    |            | |   LT= 328 |-------            1 1 3 3 1  -------|Geometric Change:                   |
              | Approach 4|            |        |          8 4 3 3 3 |        |Signal Change:                      |
                                       |        |          0 8 1 1 8 |        |Volume Change:                      |
=======================================+======================================+====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                           |
                                       |         (two phase signal)           |                                    |
          |   <    B4B3                |            | Approach 3|             |                                    |
          >   |                        |            |           |             |                                    |
      | | AND < ^      A3B4 AND        |            |           |             |                                    |
      v > OR  | |      /OR A4B3        |            |           |             |                                    |
          |   ^    A3A4                |------------             ------------|                                    |
          v   |                        | Approach 1                           |                                    |
         --^ v--   B2B1                |                                      |                                    |
                                       |           See Step 6b.               |                                    |
      --^ AND <--      A1B2 AND        |                                      |                                    |
      --> OR  v--      /OR A2B1        |                          Approach 2  |                                    |
         --> <--   A1A2                |------------             ------------|                                    |
                                       |            |           |             |                                    |
---------------------------------------|            |           |             |                                    |
 A1 -->    A3 |      B1 v--     B3   <||            |           |             |                                    |
            v ^                      | ||            | Approach 4|             | Exclusive right turns reduced  30 %|
 A2 <--    A4 |      B2 --^     B4 |> |                                      | V/C Ratio = .67                    |
===============================================================================================
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: ELK GROVE-FLORIN AND FLORIN                            Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT MITIGATED
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:ELK GROVE-FLO|               -------Approach-----|         MULTIPHASE SIGNAL OVERLAP   |
            | 1   2   2 |      ^      |               : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
            |   R   L   |      N      |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |             | intervals/hour :                  |able    Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >    ^--RT  1   | change (vph)   :                  |-------------------------------------|
   1  LT--^     v v v     <^-RTH      |c.G/C ratio     :  0    0    0    0|B4B3  190(B3)  358- 190= 168(B4)  190|
      LTH-^>              <--TH   2   |d.Opposing volume :  0    0    0    0|A3B4  168(B4)  376- 168= 208(A3)  168|
   2   TH-->              <v-LTH      | in vph         :                  |A3A4  258(A4) OR  208(A3)          258|
      RTH-v>    ^ ^ ^      v--LT  1   |e.LT capacity on :  0    0    0    0|B2B1   84(B2)  226-  84= 142(B1)   84|
   1  RT--v   < < | > >   Approach 2  | green (vph)    :                  |A2B1  142(B1)  337- 142= 195(A2)  142|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A1A2  382(A1) OR  195(A2)          382|
            | T T H T T |FLORIN RD    | vph (b+e)      :                  |                                     |
            |   H   H   |             |g.Left turn volume :  0    0    0    0|                                     |
            | 2   2   1 |             | in vph         :                  |                                     |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                :                                     |
                                      | (g>f) ?        :                  |                                     |
======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                      |          |                  |     |                                     |
                                      |          | 1 3 3 2 3        |     |358(B3B4)+258(A4)+226(B2B1)+382(A1)  |
            | Approach 3|             |-------   3 7 7 9 5          -------|                                     |
 3:  LT= 649 | |         | 2:RT= 482  |          0 6 6 3 8         ^- 482 |           = 1224 vph                |
   TH= 752  | |         |   TH= 672   |          | | | | |         <- 336 |=====================================|
  RT= 130   | v         |   LT= 226   |          < v v > >         <- 336 | Step 8. INTERSECTION LEVEL OF       |
-------------            -------------|                             v- 226 |         SERVICE                     |
                       <--Approach 2  |                                    |    (compare step 7 with table 6)    |
                                      |                                    |              -------                |
                                      |                                    |              | D |                  |
 Approach 1-->                        |  84 -^                             |              -------                |
-------------            -------------| 382 ->          < < ^ ^ >          |=====================================|
 1:LT=  84  |             ^ | 4: RT= 228 | 382 ->       | | | | |          | Step 9. RECALCULATE                 |
   TH= 764  |             | |   TH= 515  | 465 -v                          |                                     |
   RT= 465  |             | |   LT= 346  |-------        1 1 2 2 2  -------|Geometric Change:                    |
            | Approach 4|             |        |       9 5 5 5 2 |         |Signal Change:                       |
                                      |        |       0 6 8 8 8 |         |Volume Change:                       |
======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                      |       (two phase signal)          |                                     |
          |   <    B4B3               |          | Approach 3|            |                                     |
          >   |                       |          |           |            |                                     |
      | | AND < ^     A3B4 AND        |          |           |            |                                     |
      v > OR  | |     /OR A4B3        |          |           |            |                                     |
          |   ^    A3A4               |-------------         -------------|                                     |
          v   |                       | Approach 1                        |                                     |
         --^ v--   B2B1               |                                   |                                     |
                                      |          See Step 6b.             |                                     |
      --^ AND <--     A1B2 AND        |                                   |                                     |
      --> OR  v--     /OR A2B1        |                      Approach 2   |                                     |
         --> <--   A1A2               |-------------         -------------|                                     |
                                      |          |           |            |                                     |
--------------------------------------|          |           |            |                                     |
 A1 -->    A3 |      B1 v--    B3   <|          |           |            |                                     |
           v ^                       | |        | Approach 4|            | Exclusive right turns reduced  30 %  |
 A2 <--    A4  |     B2 --^    B4 |> |                                   | V/C Ratio = .89                     |
===========================================================================================
```

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                    Critical Movement Analysis: PLANNING
                           Calculation Form 1
Intersection: ELK GROVE-FLORIN AND GERBER RD                    Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT (M)
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR     |
                | Approach 3:ELK GROVE-FLO|              -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
                | 1   2   2 |      ^    |                   : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
                |  R   L    |      N    |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD       | R T T T L |           |  intervals/hour  :                 |able   Volume    to next    Volume |
-------------   T H H H T   -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase     in vph |
  Approach 1    < < | > >    ^--RT       |  change (vph)    :                 |-----------------------------------|
   1  LT--^      v v v     <^-RTH  1     |c.G/C ratio       :  0    0    0    0|B2B1  100(B2)  196- 100=  96(B1)   100|
      LTH-^>               <--TH   1     |d.Opposing volume :  0    0    0    0|A2B1   96(B1)  453-  96= 357(A2)    96|
   1   TH-->               <v-LTH        |  in vph          :                 |A1A2  384(A1) OR  357(A2)          384|
      RTH-v>    ^ ^ ^       v--LT  1     |e.LT capacity on  :  0    0    0    0|B4B3  129(B4)  414- 129= 285(B3)   129|
   1  RT--v     < < | > >   Approach 2   |  green (vph)     :                 |A4B3  285(B3)  358- 285=  73(A4)   285|
-------------   L L T R R   -------------|f.LT capacity in  :  0    0    0    0|A3A4  173(A3) OR   73(A4)           173|
                | T T H T T |GERBER RD   |  vph (b+e)       :                 |                                   |
                |   H   H   |            |g.Left turn volume :  0    0    0    0|                                   |
                | 2   2   1 |            |  in vph          :                 |                                   |
                | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                :                                   |
                                         |  (g>f) ?         :                 |                                   |
=========================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                         |        |                  |       |                                   |
                                         |        | 1 1 1 1 1        |       |196(B2B1)+384(A1)+414(B4B3)+173(A3)|
                | Approach 3|            |-------   8 7 7 0 2          -------|                                   |
 3:  LT= 234    | |         | 2:RT= 442  |          7 3 3 5 9          ^+ 442 |         = 1167 vph                |
     TH= 345    | |         |   TH= 464  |          | | | | |          <+  11 |===================================|
     RT= 187    | v         |   LT= 196  |          < v v > >          <- 453 | Step 8. INTERSECTION LEVEL OF     |
-------------               -------------|                             v- 196 |         SERVICE                   |
                             <--Approach 2|                                   |    (compare step 7 with table 6)  |
                                         |                                   |             -------               |
                                         |                                   |             |  D  |               |
 Approach 1-->                           |                                   |             -------               |
-------------               -------------| 100 -^          < < ^ ^ >          |===================================|
 1:LT= 100      |         ^ | 4: RT= 166 | 384 ->          | | | | |          | Step 9. RECALCULATE               |
   TH= 384      |         | |    TH= 715 | 269 -v                             |                                   |
   RT= 269      |         | |    LT= 752 |-------          4 3 3 3 1   -------|Geometric Change:                  |
                | Approach 4|            |        |        1 3 5 5 6 |        |Signal Change:                     |
                                         |        |        4 8 8 8 6 |        |Volume Change:                     |
=========================================+==================================+===================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                          |
                                         |          (two phase signal)        |                                   |
          --^ v--   B2B1                 |          | Approach 3|             |                                   |
                                         |          |           |             |                                   |
      --^ AND <--      A1B2 AND          |          |           |             |                                   |
      --> OR  v--      /OR A2B1          |          |           |             |                                   |
          --> <--   A1A2                 |-------------       -------------|                                   |
                                         | Approach 1                         |                                   |
           |   <    B4B3                 |                                    |                                   |
           >   |                         |          See Step 6b.              |                                   |
      | | AND < ^      A3B4 AND          |                                    |                                   |
      v > OR  | |      /OR A4B3          |                       Approach 2   |                                   |
           |   ^    A3A4                 |-------------        -------------|                                   |
           v   |                         |          |           |             |                                   |
-----------------------------------------|          |           |             |                                   |
 A1 -->    A3 |      B1 v--      B3   <| |          |           |             |                                   |
              v ^                      | | |        | Approach 4|             | Exclusive right turns reduced  30 %|
 A2 <--    A4   |    B2 --^      B4  |>  |                                    | V/C Ratio = .85                   |
==========================================================================================
```

Critical Movement Analysis: PLANNING
Calculation Form 1

```
Intersection: ELK GROVE-FLORIN AND GERBER RD                          Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT (M)
===========================================================================================
Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR       |
            | Approach 3:ELK GROVE-FLO|                -------Approach-----|      MULTIPHASE SIGNAL OVERLAP       |
            | 1   2   2 |      ^      |                : -1-  -2-  -3-  -4-|      Possible   Volume     Adjusted  |
            |  R    L   |      N      |a.No. of change :  0    0    0    0|Prob- Critical  Carryover  Critical  |
GERBER RD   | R T T T L |             |  intervals/hour :                  |able  Volume   to next    Volume    |
------------- T H H H T --------------|b.LT capacity on :  0    0    0    0|Phase in vph   phase      in vph    |
 Approach 1   < < | > >   ^--RT       |  change (vph)   :                  |--------------------------------------|
  1  LT--^     v v v     <^-RTH  1    |c.G/C ratio      :  0    0    0    0|B2B1  214(B2)  277- 214=  63(B1)  214|
     LTH-^>              <--TH   1    |d.Opposing volume:  0    0    0    0|A2B1   63(B1)  505-  63= 442(A2)   63|
  1   TH-->              <v-LTH       |  in vph         :                  |A1A2  535(A1) OR  442(A2)         535|
     RTH-v>    ^ ^ ^      v--LT  1    |e.LT capacity on :  0    0    0    0|B4B3  185(B3)  333- 185= 148(B4)  185|
  1  RT--v    < < | > >   Approach 2  |  green (vph)    :                  |A3B4  148(B4)  357- 148= 209(A3)  148|
------------- L L T R R --------------|f.LT capacity in :  0    0    0    0|A3A4  230(A4) OR  209(A3)         230|
            | T T H T T |GERBER RD    |  vph (b+e)      :                  |                                      |
            |   H   H   |             |g.Left turn volume:  0    0    0   0|                                      |
            | 2   2   1 |             |  in vph         :                  |                                      |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                :                                      |
                                      |  (g>f) ?        :                  |                                      |
======================================+====================================+======================================|
Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES      |
                                      |        |                  |        |                                      |
                                      |        | 2 3 3 2 3        |        |277(B2B1)+535(A1)+333(B3B4)+230(A4)   |
            | Approach 3|             |-------  1 5 5 7 3          ------- |                                      |
 3:  LT= 605 | |        | 2:RT= 489   |         0 7 7 3 3          ^+ 489 |          = 1375 vph                  |
    TH= 714 | |         |   TH= 520   |         | | | | |          <+  16 |======================================|
    RT= 210 | v         |   LT= 277   |         < v v > >          <- 505 | Step 8. INTERSECTION LEVEL OF        |
-------------            -------------|                            v- 277 |        SERVICE                       |
                       <--Approach 2  |                                   |     (compare step 7 with table 6)    |
                                      |                                   |              -------                 |
                                      |                                   |              | E |                   |
 Approach 1-->                        |                                   |              -------                 |
-------------            -------------| 214 -^          < < ^ ^ >         |======================================|
 1:LT= 214  |           ^ | 4: RT= 247| 535 ->          | | | | |         | Step 9. RECALCULATE                  |
   TH= 535  |           | |   TH= 460 | 835 -v                            |                                      |
   RT= 835  |           | |   LT= 336 |-------          1 1 2 2 2  -------|Geometric Change:                     |
            | Approach 4|             |        |        8 5 3 3 4 |       |Signal Change:                        |
                                      |        |        5 1 0 0 7 |       |Volume Change:                        |
======================================+===================================+======================================|
Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                      |       (two phase signal)           |                                      |
       --^ v--   B2B1                 |            | Approach 3|           |                                      |
                                      |            |           |           |                                      |
    --^ AND <--     A1B2 AND          |            |           |           |                                      |
    --> OR  v--     /OR A2B1          |            |           |           |                                      |
       --> <--   A1A2                 |-------------           ------------|                                      |
                                      | Approach 1                         |                                      |
        |   <    B4B3                 |                                    |                                      |
        >   |                         |         See Step 6b.               |                                      |
    | | AND < ^     A3B4 AND          |                                    |                                      |
    v > OR  | |     /OR A4B3          |                        Approach 2  |                                      |
        |   ^    A3A4                 |-------------           ------------|                                      |
        v   |                         |            |           |           |                                      |
--------------------------------------|            |           |           |                                      |
A1 -->   A3 |      B1 v--    B3    <| |            |           |           |                                      |
           v ^                     | ||            | Approach 4|           | Exclusive right turns reduced 40 %   |
A2 <--   A4   |    B2 --^    B4 |>    |                                    | V/C Ratio = 1.04                     |
=============================================================================================================
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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: ELDER CREEK AND S. WATT                          Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT MITIGATED
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR     |
              | Approach 3:S. WATT |               -------Approach-----|       MULTIPHASE SIGNAL OVERLAP    |
              | 1   2   1 |     ^  |                : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |  R   L    |     N  |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK   | R T T T L |        | intervals/hour :                  |able   Volume   to next    Volume |
------------- T H H H T  ----------|b.LT capacity on:  0    0    0    0|Phase  in vph    phase      in vph |
  Approach 1  < < | > >   ^--RT    | change (vph)   :                  |------------------------------------|
   1  LT--^     v v v    <^-RTH  1 |c.G/C ratio     :  0    0    0    0|B2B1   47(B1)   69-  47=  22(B2)  47|
      LTH-^>             <--TH     |d.Opposing volume:  0    0    0    0|A1B2   22(B2)  163-  22= 141(A1)  22|
       TH-->             <v-LTH    | in vph         :                  |A1A2  243(A2) OR  141(A1)        243|
   1  RTH-v>   ^ ^ ^     v--LT   1 |e.LT capacity on:  0    0    0    0|B4B3    2(B4)  127-   2= 125(B3)   2|
      RT--v   < < | > >  Approach 2| green (vph)    :                  |A4B3  125(B3)  532- 125= 407(A4) 125|
------------- L L T R R  ----------|f.LT capacity in:  0    0    0    0|A3A4  407(A4) OR  268(A3)        407|
              | T T H T T |ELDER CREEK| vph (b+e)   :                  |                                    |
              |   H   H   |        |g.Left turn volume:  0    0    0   0|                                    |
              | 1   2   1 |        | in vph         :                  |                                    |
              | Approach 4:S. WATT |h.Is volume > cap. :               :                                    |
                                   | (g>f) ?        :                  |                                    |
===================================+===============================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |        |                  |       |                                  |
                                   |        | 1 2 2            |       |69(B1B2)+243(A2)+127(B4B3)+407(A4)|
              | Approach 3|        |-------   1 6 6             -------|                                  |
 3:  LT=   2  | |         | 2:RT=  40 |     2 8 8 2             ^+  40 |          = 846 vph               |
    TH= 536   | |         |   TH= 203 |     | | | |             <+ 203 |==================================|
    RT= 112   | v         |   LT=  47 |     < v v >             v-  47 | Step 8. INTERSECTION LEVEL OF    |
-------------              ------------|                               |        SERVICE                   |
                          <--Approach 2|                               |     (compare step 7 with table 6)|
                                   |                                   |             -------              |
                                   |                                   |             |  B  |              |
 Approach 1-->                     |                                   |             -------              |
-------------              ------------| 69 -^          < ^ ^ >        |==================================|
 1:LT=  69    |            ^ | 4: RT=  66 | 103 +>      | | | |        | Step 9. RECALCULATE              |
   TH= 103    |            | |   TH=1063 |  60 +v                      |                                  |
   RT=  60    |            | |   LT= 127 |-------       1 5 5   -------|Geometric Change:                 |
              | Approach 4|            |        |       2 3 3 6 |      |Signal Change:                    |
                                   |        |       7 2 2 6 |          |Volume Change:                    |
===================================+===============================+====================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                       |
                                   |       (two phase signal)          |                                |
        --^ v--   B2B1             |        | Approach 3|              |                                |
                                   |        |           |              |                                |
     --^ AND <--      A1B2 AND     |        |           |              |                                |
     --> OR  v--      /OR A2B1     |        |           |              |                                |
        --> <--   A1A2             |------------        ------------   |                                |
                                   | Approach 1                        |                                |
         |   <    B4B3             |                                   |                                |
         >   |                     |        See Step 6b.               |                                |
     | | AND < ^      A3B4 AND     |                                   |                                |
     v > OR  | |      /OR A4B3     |                     Approach 2    |                                |
         |   ^    A3A4             |------------        ------------   |                                |
         v   |                     |        |           |              |                                |
-----------------------------------|        |           |              |                                |
 A1 -->    A3 |     B1 v--     B3   <| |    |           |              |                                |
            v ^                    | |    | Approach 4|                | Exclusive right turns reduced  30 % |
 A2 <--    A4   |   B2 --^     B4 |>  |                                | V/C Ratio = .62                |
==========================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: ELDER CREEK AND S. WATT                                  Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT MITIGATED
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR   |
             | Approach 3:S. WATT      |              -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1   2   1 |      ^      |              : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
             |  R   L    |      N      |a.No. of change  :  0    0    0    0|Prob- Critical  Carryover Critical|
ELDER CREEK  | R T T T L |             | intervals/hour  :                  |able   Volume   to next   Volume |
------------- T H H H T  ------------- |b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
  Approach 1  < < | > >   ^--RT        | change (vph)    :                  |-----------------------------------|
   1  LT--^     v v v    <^-RTH  1     |c.G/C ratio      :  0    0    0    0|B2B1    98(B2)  99-  98=  1(B1)   98|
     LTH-^>              <--TH         |d.Opposing volume:  0    0    0    0|A2B1     1(B1) 154-   1= 153(A2)    1|
      TH-->              <v-LTH        | in vph          :                  |A1A2   347(A1) OR  153(A2)        347|
   1  RTH-v>    ^ ^ ^     v--LT  1     |e.LT capacity on :  0    0    0    0|B4B3    43(B4) 105-  43=  62(B3)   43|
     RT--v    < < | > >   Approach 2   | green (vph)     :                  |A4B3    62(B3) 437-  62= 375(A4)   62|
------------- L L T R R  ------------- |f.LT capacity in :  0    0    0    0|A3A4   605(A3) OR  375(A4)        605|
             | T T H T T |ELDER CREEK  | vph (b+e)       :                  |                                   |
             |  H   H    |             |g.Left turn volume:  0    0    0    0|                                   |
             | 1   2   1 |             | in vph          :                  |                                   |
             | Approach 4:S. WATT      |h.Is volume > cap. :                 :                                   |
                                       | (g>f) ?         :                  |                                   |
=======================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES  |
                                       |       |                    |      |                                   |
                                       |       |   6 6              |      |99(B2B1)+347(A1)+105(B4B3)+605(A3) |
             | Approach 3|             |------- 7 0 0 4            -------|                                   |
 3:  LT=  43 | |         | 2:RT=  24   |        2 5 5 3           ^+  24  |          = 1156 vph               |
   TH=1209   | |         |   TH= 130   |        | | | |           <+ 130  |===================================|
   RT=  72   | v         |   LT=  99   |        < v v >           v-  99  | Step 8. INTERSECTION LEVEL OF     |
-------------             -------------|                                  |         SERVICE                   |
                          <--Approach 2|                                  |      (compare step 7 with table 6)|
                                       |                                  |              -------              |
                                       |                                  |              |  D  |              |
 Approach 1-->                         |                                  |              -------              |
-------------             -------------|  98 -^           < ^ ^ >         |===================================|
 1:LT=  98   |          ^ | 4: RT=  68 | 197 +>           | | | |         | Step 9. RECALCULATE               |
   TH= 197   |          | |    TH= 873 | 150 +v                           |                                   |
   RT= 150   |          | |    LT= 105 |-------           1 4 4   -------|Geometric Change:                  |
             | Approach 4|             |       |          0 3 3 6 |      |Signal Change:                     |
                                       |       |          5 7 7 8 |      |Volume Change:                     |
=======================================+==================================+===================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                       |        (two phase signal)        |                                   |
        --^ v--   B2B1                 |         | Approach 3|            |                                   |
                                       |         |           |            |                                   |
    --^ AND <--      A1B2 AND          |         |           |            |                                   |
    --> OR  v--      /OR A2B1          |         |           |            |                                   |
        --> <--   A1A2                 |-------------       -------------|                                   |
                                       | Approach 1                       |                                   |
         |   <    B4B3                 |                                  |                                   |
         >   |                         |          See Step 6b.            |                                   |
     | | AND < ^     A3B4 AND          |                                  |                                   |
     v > OR  | |     /OR A4B3          |                      Approach 2  |                                   |
         |   ^    A3A4                 |-------------       -------------|                                   |
         v   |                         |         |           |            |                                   |
---------------------------------------|         |           |            |                                   |
 A1 -->   A3 |      B1 v--    B3   <|  |         |           |            |                                   |
            v ^                    |  |  |         | Approach 4|            | Exclusive right turns reduced  30 %|
 A2 <--   A4  |     B2 --^    B4 |>    |                                  | V/C Ratio = .84                   |
==========================================================================================
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                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: JACKSON HWY AND S. WATT                          Design Hour: AM
Problem Statement: EXISTING PLUS PROJECT (M)
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR       |
            | Approach 3:S. WATT    |                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
            | 1   2   1 |     ^     |                 : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
            |   R   L   |     N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY | R T T T L |           |  intervals/hour :                   |able   Volume   to next    Volume |
------------ T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1   |  change (vph)   :                   |--------------------------------------|
  1 LT--^      v v v    <^-RTH      |c.G/C ratio      :  0    0    0    0|B2B1   55(B2)  99- 55= 44(B1)      55|
    LTH-^>              <--TH   2   |d.Opposing volume:  0    0    0    0|A2B1   44(B1) 327- 44= 283(A2)     44|
  2  TH-->              <v-LTH      |  in vph         :                   |A1A2  283(A2) OR 109(A1)           283|
    RTH-v>    ^ ^ ^      v--LT  1   |e.LT capacity on :  0    0    0    0|B4B3  214(B4) 311- 214= 97(B3)    214|
  1 RT--v    < < | > >  Approach 2  |  green (vph)    :                   |A4B3   97(B3) 461- 97= 364(A4)     97|
------------ L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4  428(A3) OR  364(A4)          428|
            | T T H T T |JACKSON HWY|  vph (b+e)      :                   |                                      |
            |   H   H   |           |g.Left turn volume:  0    0    0    0|                                      |
            | 1   2   1 |           |  in vph         :                   |                                      |
            | Approach 4:S. WATT    |h.Is volume > cap.:                  :                                      |
                                    |  (g>f) ?        :                   |                                      |
====================================+=====================================+======================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                    |       |                     |       |                                      |
                                    |       | 1 4 4 2             |       |99(B2B1)+283(A2)+311(B4B3)+428(A3)    |
            | Approach 3|           |-------  8 2 2 1              -------|                                      |
3:  LT= 214 | |         | 2:RT= 467 |         9 8 8 4             ^- 467 |          = 1121 vph                  |
    TH= 856 | |         |   TH= 596 |         | | | |             <- 298 |======================================|
    RT= 189 | v         |   LT=  99 |         < v v >             <- 298 | Step 8. INTERSECTION LEVEL OF        |
------------             -----------|                             v-  99 |        SERVICE                       |
                        <--Approach 2|                                   |     (compare step 7 with table 6)    |
                                    |                                     |              -------                 |
                                    |                                     |              |  D  |                 |
Approach 1-->                       | 55 -^                               |              -------                 |
------------             -----------| 107 ->              < ^ ^ >         |======================================|
1:LT=  55   |          ^| 4: RT=  44| 107 ->              | | | |         | Step 9. RECALCULATE                  |
  TH= 213   |          || |  TH= 922| 156 -v                              |                                      |
  RT= 156   |          || |  LT= 311|-------              3 4 4   -------|Geometric Change:                     |
            | Approach 4|           |       |             1 6 6 4 |       |Signal Change:                        |
                                    |       |             1 1 1 4 |       |Volume Change:                        |
====================================+=====================================+======================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                             |
                                    |         (two phase signal)          |                                      |
      --^ v--  B2B1                 |            | Approach 3|            |                                      |
                                    |            |           |            |                                      |
   --^ AND <--    A1B2 AND          |            |           |            |                                      |
   --> OR  v--    /OR A2B1          |            |           |            |                                      |
       --> <--  A1A2                |------------             ------------|                                      |
                                    | Approach 1                          |                                      |
       |  <    B4B3                 |                                     |                                      |
       >  |                         |           See Step 6b.              |                                      |
   | | AND < ^    A3B4 AND          |                                     |                                      |
   v > OR  | |    /OR A4B3          |                         Approach 2  |                                      |
       |  ^    A3A4                 |------------              -----------|                                      |
       v  |                         |            |           |            |                                      |
------------------------------------|            |           |            |                                      |
A1 -->   A3 |     B1 v--    B3   <| |            |           |            |                                      |
           v ^                  | | |            | Approach 4|            | Exclusive right turns reduced  30 %  |
A2 <--   A4  |    B2 --^    B4 |>   |                                     | V/C Ratio = .82                      |
==========================================================================================
```

```
                                Critical Movement Analysis: PLANNING
                                         Calculation Form 1
Intersection: JACKSON HWY AND S. WATT                                     Design Hour: PM
Problem Statement: EXISTING PLUS PROJECT (M)
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:S. WATT      |              -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
            | 1   2   1 |      ^      |              : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
            |   R   L   |      N      |a.No. of change  :   0    0    0    0|Prob-   Critical  Carryover  Critical|
JACKSON HWY | R T T T L |             |  intervals/hour :                  |able     Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :   0    0    0    0|Phase    in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT  1    |  change (vph)    :                  |-------------------------------------|
   1  LT--^     v v v    <^-RTH       |c.G/C ratio      :   0    0    0    0|B2B1    76(B1)  113-  76=  37(B2)    76|
      LTH-^>             <--TH   2    |d.Opposing volume:   0    0    0    0|A1B2    37(B2)  331-  37= 294(A1)    37|
   2   TH-->             <v-LTH       |  in vph         :                  |A1A2   294(A1) OR  197(A2)          294|
      RTH-v>    ^ ^ ^     v--LT  1    |e.LT capacity on :   0    0    0    0|B4B3   303(B3)  399- 303=  96(B4)   303|
   1  RT--v   < < | > >   Approach 2  |  green (vph)    :                  |A3B4    96(B4)  552-  96= 456(A3)    96|
------------- L L T R R  -------------|f.LT capacity in :   0    0    0    0|A3A4   488(A4) OR  456(A3)          488|
            | T T H T T |JACKSON HWY  |  vph (b+e)      :                  |                                     |
            |   H   H   |             |g.Left turn volume:  0    0    0    0|                                     |
            | 1   2   1 |             |  in vph         :                  |                                     |
            | Approach 4:S. WATT      |h.Is volume > cap. :                :                                     |
                                      |  (g>f) ?        :                  |                                     |
======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES     |
                                      |       |                 |          |                                     |
                                      |       |  5 5 3          |          |113(B1B2)+294(A1)+399(B3B4)+488(A4)  |
            | Approach 3|             |-------  8 5 5 9          -------   |                                     |
 3:  LT= 399 | |         | 2:RT= 281  |         2 2 2 9          ^- 281   |          = 1294 vph                 |
    TH=1104 | |          |   TH= 355  |         | | | |          <- 178   |=====================================|
    RT=  82 | v          |   LT=  76  |         < v v >          <- 178   | Step 8. INTERSECTION LEVEL OF       |
-------------              -----------|                          v-  76   |          SERVICE                    |
                          <--Approach 2|                                  |     (compare step 7 with table 6)   |
                                      |                                   |              -------                |
                                      |                                   |              | E |                  |
 Approach 1-->                        | 113 -^                            |              -------                |
-------------              -----------| 331 ->          < ^ ^ >           |=====================================|
 1:LT= 113  |            ^ | 4: RT= 66| 331 ->          | | | |           | Step 9. RECALCULATE                 |
   TH= 662  |            | |   TH= 975| 399 -v                            |                                     |
   RT= 399  |            | |   LT= 303|-------          3 4 4     -------|Geometric Change:                    |
            | Approach 4|             |        |        0 8 8 6 |        |Signal Change:                        |
                                      |        |        3 8 8 6 |        |Volume Change:                        |
======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                      |         (two phase signal)        |                                     |
        --^ v--   B2B1                |            | Approach 3|          |                                     |
                                      |            |           |          |                                     |
    --^ AND <--     A1B2 AND          |            |           |          |                                     |
    --> OR  v--     /OR A2B1          |            |           |          |                                     |
        --> <--   A1A2                |-------------            -----------|                                     |
                                      | Approach 1                        |                                     |
         |  <   B4B3                  |                                   |                                     |
         >  |                         |          See Step 6b.             |                                     |
   | | AND < ^      A3B4 AND          |                                   |                                     |
   v > OR  | |      /OR A4B3          |                        Approach 2 |                                     |
         |  ^   A3A4                  |-------------            -----------|                                     |
         v  |                         |            |           |          |                                     |
--------------------------------------|            |           |          |                                     |
 A1 -->   A3 |     B1 v--     B3   <| |            |           |          |                                     |
            v ^                     | | |          |           |          | Exclusive right turns reduced  30 % |
 A2 <--   A4  |    B2 --^     B4 |>   |            | Approach 4|          | V/C Ratio = .94                     |
=============================================================================================
```

# APPENDIX D

## Cumulative No Project Level of Service Calculations

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: JACKSON HWY AND S. WATT AVE.                               Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR   |
           | Approach 3:S. WATT AVE. |              -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
           | 1   3   2 |      ^      |              : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
           |  R    L   |      N      |a.No. of change :  0    0    0    0|Prob- Critical  Carryover  Critical|
JACKSON HWY | R T T T L |             | intervals/hour :                  |able   Volume   to next    Volume |
------------- T H H H T -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1   | change (vph)   :                  |------------------------------------|
  2  LT--^     v v v    <^-RTH       |c.G/C ratio     :  0    0    0    0|B2B1   44(B2)  77-  44=  33(B1)   44|
     LTH-^>             <--TH   3    |d.Opposing volume :  0   0    0    0|A2B1   33(B1)  609-  33= 576(A2)   33|
  3   TH-->             <v-LTH       | in vph         :                  |A1A2  576(A2) OR  126(A1)        576|
     RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3  121(B4)  380- 121= 259(B3)  121|
  1  RT--v    < < | > >  Approach 2  | green (vph)    :                  |A4B3  259(B3)  453- 259= 194(A4)  259|
------------- L L T R R -------------|f.LT capacity in :  0    0    0    0|A3A4  693(A3) OR  194(A4)        693|
           | T T H T T |JACKSON HWY  | vph (b+e)      :                  |                                    |
           |   H   H   |             |g.Left turn volume :  0   0    0    0|                                   |
           | 2   3   1 |             | in vph         :                  |                                    |
           | Approach 4:S. WATT AVE. |h.Is volume > cap. :                :                                    |
                                     | (g>f) ?        :                  |                                    |
=====================================+==================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                     |        |                   |     |                                    |
                                     |        | 5 6 6 6   1       |     |77(B2B1)+576(A2)+380(B4B3)+693(A3)  |
           | Approach 3|             |-------  4 9 9 9 9 2        -------|                                    |
 3:  LT= 220 | |          | 2:RT= 870 |         0 3 3 3 9 1      ^- 870 |         = 1726 vph                 |
   TH=2080 | |          |   TH=1110 |         | | | | | |      <- 370 |====================================|
   RT= 540 | v          |   LT= 140 |         < v v v > >      <- 370 | Step 8. INTERSECTION LEVEL OF     |
-------------            -------------|                          <- 370 |        SERVICE                     |
                        <--Approach 2 |                          v-  63 |   (compare step 7 with table 6)    |
                                     |  44 -^                   v-  77 |           -------                  |
                                     |  36 -^                          |           |  F  |                  |
 Approach 1-->                       |  67 ->                          |           -------                  |
-------------            -------------|  67 ->       < < ^ ^ ^ >        |====================================|
 1:LT=  80  |           ^ | 4: RT=  60 |  67 ->       | | | | | |      | Step 9. RECALCULATE                |
   TH= 200  |           | |   TH=1360 | 180 -v                          |                                    |
   RT= 180  |           | |   LT= 690 |-------       3 3 4 4 4   -------|Geometric Change:                   |
           | Approach 4|             |        |     8 1 5 5 5 6 |      |Signal Change:                      |
                                     |        |     0 1 3 3 3 0 |      |Volume Change:                      |
=====================================+==================================+====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                     |         (two phase signal)       |                                    |
        --^ v--  B2B1                |           | Approach 3|          |                                    |
                                     |           |           |          |                                    |
    --^ AND <--     A1B2 AND         |           |           |          |                                    |
    --> OR  v--     /OR A2B1         |           |           |          |                                    |
        --> <--  A1A2                |------------           ------------|                                   |
                                     | Approach 1                       |                                    |
         |  <   B4B3                 |                                  |                                    |
         >  |                        |          See Step 6b.            |                                    |
    | | AND < ^     A3B4 AND         |                                  |                                    |
    v > OR  | |     /OR A4B3         |                       Approach 2 |                                    |
         |  ^   A3A4                 |------------           ------------|                                   |
         v  |                        |           |           |          |                                    |
-------------------------------------|           |           |          |                                    |
 A1 -->    A3 |      B1 v--    B3  <| |           |           |          |                                   |
            v ^                    | | |           | Approach 4|          | Exclusive right turns reduced 30 % |
 A2 <--    A4  |     B2 --^    B4 |> |                                  | V/C Ratio = 1.26                   |
=================================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: JACKSON HWY AND S. WATT AVE.                               Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR |
              | Approach 3:S. WATT AVE. |          -------Approach-----|    MULTIPHASE SIGNAL OVERLAP   |
              | 1   3   2 |      ^      |          : -1-  -2-  -3-  -4-|     Possible   Volume   Adjusted|
              |  R    L   |      N      |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY   | R T T T L |             |  intervals/hour :                |able   Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT  1    |  change (vph)   :                |--------------------------------------|
   2  LT--^     v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1    61(B1)  253-  61= 192(B2)   61|
      LTH-^>              <--TH   3   |d.Opposing volume :  0    0    0    0|A1B2   192(B2)  399- 192= 207(A1)  192|
   3   TH-->              <v-LTH      |  in vph         :                |A1A2   210(A2) OR  207(A1)          210|
      RTH-v>    ^ ^ ^      v--LT  2   |e.LT capacity on :  0    0    0    0|B4B3   193(B3)  523- 193= 330(B4)  193|
   1  RT--v   < < | > >   Approach 2  |  green (vph)    :                |A3B4   330(B4)  517- 330= 187(A3)  330|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   680(A4) OR  187(A3)          680|
              | T T H T T |JACKSON HWY|  vph (b+e)      :                |                                      |
              |   H   H   |           |g.Left turn volume :  0    0    0    0|                                   |
              | 2   3   1 |           |  in vph         :                |                                      |
              | Approach 4:S. WATT AVE.|h.Is volume > cap. :               :                                      |
                                      |  (g>f) ?        :                |                                      |
===================================================================================================
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                      |        |                   |     |                                  |
                                      |        | 1 5 5 5 4 5       |     |253(B1B2)+210(A2)+523(B3B4)+680(A4)|
              | Approach 3|           |-------  3 1 1 1 2 2      -------|                                  |
 3:  LT= 950 | |          | 2:RT= 300 |         0 7 7 7 8 3        ^- 300 |        = 1666 vph              |
    TH=1550  | |          |   TH= 310 |         | | | | | |        <- 103 |==================================|
   RT= 130   | v          |   LT= 110 |         < v v v > >        <- 103 | Step 8. INTERSECTION LEVEL OF  |
-------------            -------------|                            <- 103 |        SERVICE                 |
                         <--Approach 2|                            v-  50 |   (compare step 7 with table 6) |
                                      | 253 -^                     v-  61 |          -------               |
                                      | 207 -^                            |          |  F  |              |
 Approach 1-->                        | 363 ->                            |          -------               |
-------------            -------------| 363 ->          < < ^ ^ ^ >       |==================================|
 1:LT= 460    |          ^ | 4: RT= 90 | 363 ->          | | | | | |       | Step 9. RECALCULATE            |
   TH=1090    |          | |   TH=2040 | 570 -v                            |                                  |
   RT= 570    |          | |   LT= 350 |-------          1 1 6 6 6   -------|Geometric Change:               |
              | Approach 4|           |        |        9 5 8 8 8 9 |     |Signal Change:                  |
                                      |        |        3 8 0 0 0 0 |     |Volume Change:                  |
===================================================================================================
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                       |
                                      |         (two phase signal)         |                                  |
        --^ v--  B2B1                 |           | Approach 3|            |                                  |
                                      |           |           |            |                                  |
     --^ AND <--     A1B2 AND         |           |           |            |                                  |
     --> OR  v--     /OR A2B1         |           |           |            |                                  |
        --> <--  A1A2                 |-------------         ------------|                                  |
                                      | Approach 1                         |                                  |
         |  <   B4B3                  |                                    |                                  |
         >  |                         |          See Step 6b.              |                                  |
    | | AND < ^     A3B4 AND          |                                    |                                  |
    v > OR  | |     /OR A4B3          |                        Approach 2  |                                  |
         |  ^   A3A4                  |-------------         ------------|                                  |
         v  |                         |           |           |            |                                  |
--------------------------------------|           |           |            |                                  |
 A1 -->   A3 |      B1 v--    B3   <| |           |           |            |                                  |
            v ^                   | | |           | Approach 4|            | Exclusive right turns reduced 30 % |
 A2 <--   A4  |     B2 --^    B4 |>   |                                    | V/C Ratio = 1.21                |
===================================================================================================
```

```
                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW RD                           Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
=====================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
              | Approach 3:BRADSHAW RD |              -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
              | 1   3   2 |     ^      |             : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |  R    L   |     N      |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover Critical|
JACKSON HWY   | R T T T L |            |  intervals/hour :                 |able   Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT  1     |  change (vph)   :                 |----------------------------------|
  2  LT--^     v v v     <^-RTH        |c.G/C ratio      :  0    0    0    0|B2B1   105(B1) 154- 105=  49(B2)  105|
     LTH-^>              <--TH   3     |d.Opposing volume:  0    0    0    0|A1B2    49(B2) 119-  49=  70(A1)   49|
  3   TH-->              <v-LTH        |  in vph         :                 |A1A2   363(A2) OR   70(A1)        363|
     RTH-v>    ^ ^ ^      v--LT  2     |e.LT capacity on :  0    0    0    0|B4B3    11(B4) 457-  11= 446(B3)   11|
  1  RT--v    < < | > >   Approach 2   |  green (vph)    :                 |A4B3   446(B3) 600- 446= 154(A4)  446|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   417(A3) OR  154(A4)        417|
              | T T H T T |JACKSON HWY |  vph (b+e)      :                 |                                  |
              |   H   H   |            |g.Left turn volume:  0    0    0   0|                                  |
              | 2   3   1 |            |  in vph         :                 |                                  |
              | Approach 4:BRADSHAW RD |h.Is volume > cap. :               :|                                  |
                                       |  (g>f) ?        :                 |                                  |
=======================================+===================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |        |                    |     |                                  |
                                       |        | 3 4 4 4            |     |154(B1B2)+363(A2)+457(B4B3)+417(A3)|
              | Approach 3|            |-------  2 1 1 1   1       ------- |                                  |
 3:  LT=  20 | |         | 2:RT= 260   |         0 7 7 7 9 1       ^- 260  |           = 1391 vph             |
    TH=1250  | |         |   TH=1090   |         | | | | | |       <- 363  |==================================|
    RT= 320  | v         |   LT= 190   |         < v v v > >       <- 363  | Step 8. INTERSECTION LEVEL OF    |
-------------             -------------|                           <- 363  |          SERVICE                 |
                          <--Approach 2 |                          v-  86  |     (compare step 7 with table 6)|
                                       | 154 -^                    v- 105  |            -------               |
                                       | 126 -^                            |            |  F  |              |
 Approach 1-->                         |  83 ->                            |            -------               |
-------------             -------------|  83 ->         < < ^ ^ ^ >        |==================================|
 1:LT= 280   |           ^ | 4: RT=  40 |  83 ->         | | | | | |        | Step 9. RECALCULATE              |
   TH= 250   |           | |   TH=1800 | 170 -v                            |                                  |
   RT= 170   |           | |  LT= 830  |-------         4 3 6 6 6   -------|Geometric Change:                 |
             | Approach 4|             |        |       5 7 0 0 0 4 |      |Signal Change:                    |
                                       |        |       7 4 0 0 0 0 |      |Volume Change:                    |
=======================================+===================================+==================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                       |         (two phase signal)        |                                  |
        --^ v--   B2B1                 |            | Approach 3|          |                                  |
                                       |            |           |          |                                  |
    --^ AND <--     A1B2 AND           |            |           |          |                                  |
    --> OR  v--     /OR A2B1           |            |           |          |                                  |
        --> <--   A1A2                 |-------------           -----------|                                  |
                                       | Approach 1                        |                                  |
        |   <    B4B3                  |                                   |                                  |
        >   |                          |          See Step 6b.             |                                  |
    | | AND < ^     A3B4 AND           |                                   |                                  |
    v > OR  | |     /OR A4B3           |                        Approach 2 |                                  |
        |   ^    A3A4                  |-------------           -----------|                                  |
        v   |                          |            |           |          |                                  |
---------------------------------------|            |           |          |                                  |
 A1 -->   A3 |     B1 v--    B3   <|   |            |           |          |                                  |
            v ^                  | |   |            | Approach 4|          | Exclusive right turns reduced 30 %|
 A2 <--   A4  |    B2 --^    B4 |>     |                                   | V/C Ratio = 1.01                 |
=====================================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                        Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW RD                                   Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR     |
              | Approach 3:BRADSHAW RD  |                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
              | 1   3   2 |     ^       |                 : -1-  -2-  -3-  -4-|       Possible     Volume    Adjusted|
              |  R    L   |     N       |a.No. of change  :   0    0    0    0|Prob-   Critical   Carryover  Critical|
JACKSON HWY   | R T T T L |             | intervals/hour  :                   |able    Volume     to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :   0    0    0    0|Phase   in vph     phase      in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)    :                   |------------------------------------|
  2  LT--^     v v v     <^-RTH       |c.G/C ratio      :   0    0    0    0|B2B1     55(B1)  149-  55=  94(B2)    55|
     LTH-^>              <--TH   3    |d.Opposing volume :  0    0    0    0|A1B2     94(B2)  637-  94= 543(A1)    94|
  3   TH-->              <v-LTH       | in vph          :                   |A1A2    543(A1) OR  100(A2)          543|
     RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on :   0    0    0    0|B4B3     83(B4)  209-  83= 126(B3)    83|
  1  RT--v    < < | > >   Approach 2  | green (vph)     :                   |A4B3    126(B3)  467- 126= 341(A4)   126|
------------- L L T R R  -------------|f.LT capacity in :   0    0    0    0|A3A4    610(A3) OR  341(A4)          610|
              | T T H T T |JACKSON HWY | vph (b+e)       :                   |                                    |
              |   H   H   |             |g.Left turn volume : 0    0    0    0|                                    |
              | 2   3   1 |             | in vph          :                   |                                    |
              | Approach 4:BRADSHAW RD  |h.Is volume > cap. :                 :                                    |
                                        | (g>f) ?         :                   |                                    |
========================================+===================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                        |       |                   |         |                                    |
                                        |       | 2 6 6 6           |         |149(B1B2)+543(A1)+209(B4B3)+610(A3) |
              | Approach 3|             |-------  6 1 1 1 6 8        -------|                                    |
 3:  LT= 150  | |         | 2:RT= 110   |         0 0 0 0 8 3        ^- 110 |          = 1511 vph               |
    TH=1830   | |         |    TH= 300  |         | | | | | |        <- 100 |====================================|
    RT= 260   | v         |    LT= 100  |         < v v v > >        <- 100 | Step 8. INTERSECTION LEVEL OF      |
-------------              -------------|                            <- 100 |        SERVICE                     |
                          <--Approach 2 |                            v-  45 |   (compare step 7 with table 6)    |
                                        | 149 -^                     v-  55 |            -------                 |
                                        | 122 -^                            |            |  F  |                |
 Approach 1-->                          | 320 ->                            |            -------                 |
-------------              -------------| 320 ->         < < ^ ^ ^ >        |====================================|
 1:LT= 270    |            ^ | 4: RT= 200 | 320 ->       | | | | | |        | Step 9. RECALCULATE                |
   TH= 960    |            | |   TH=1400  | 910 -v                            |                                    |
   RT= 910    |            | |   LT= 380  |-------       2 1 4 4 4 2  -------|Geometric Change:                   |
              | Approach 4|             |       |      0 7 6 6 6 0 |        |Signal Change:                      |
                                        |       |      9 1 7 7 7 0 |        |Volume Change:                      |
========================================+===================================+====================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                        |         (two phase signal)        |                                    |
        --^ v--   B2B1                  |           | Approach 3|           |                                    |
                                        |           |           |           |                                    |
    --^ AND <--      A1B2 AND           |           |           |           |                                    |
    --> OR  v--      /OR A2B1           |           |           |           |                                    |
        --> <--   A1A2                  |-------------           ------------|                                    |
                                        | Approach 1                        |                                    |
         |   <    B4B3                  |                                   |                                    |
         >   |                          |          See Step 6b.             |                                    |
    | | AND < ^      A3B4 AND           |                                   |                                    |
    v > OR  | |      /OR A4B3           |                       Approach 2  |                                    |
         |   ^    A3A4                  |-------------           ------------|                                    |
         v   |                          |           |           |           |                                    |
----------------------------------------|           |           |           |                                    |
 A1 -->   A3 |       B1 v--    B3    <| |           |           |           |                                    |
            v ^                      | | |           | Approach 4|           | Exclusive right turns reduced 30 % |
 A2 <--   A4   |     B2 --^    B4 |>    |                                   | V/C Ratio = 1.1                    |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: JACKSON HWY AND EXCELSIOR RD                            Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:EXCELSIOR RD |                 -------Approach-----|         MULTIPHASE SIGNAL OVERLAP     |
             | 1   1   1 |      ^      |                 : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
             |   R   L   |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |             |  intervals/hour :                   |able    Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)   :                   |--------------------------------------|
   1  LT--^     v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1    40(B2)  200-  40= 160(B1)   40|
      LTH-^>             <--TH   2    |d.Opposing volume :  0    0    0    0|A2B1   160(B1)  590- 160= 430(A2)  160|
   2   TH-->             <v-LTH       |  in vph          :                   |A1A2   430(A2) OR  110(A1)          430|
      RTH-v>     ^ ^ ^    v--LT  1    |e.LT capacity on :  0    0    0    0|B4B3    10(B4)  120-  10= 110(B3)   10|
   1  RT--v     < < | > >  Approach 2  |  green (vph)     :                   |A4B3   110(B3) 1150- 110=1040(A4)  110|
-------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4  1040(A4) OR  240(A3)         1040|
             | T T H T T |JACKSON HWY  |  vph (b+e)       :                   |                                      |
             |   H   H   |             |g.Left turn volume :  0    0    0    0|                                      |
             | 1   1   1 |             |  in vph          :                   |                                      |
             | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                 :                                      |
                                       |  (g>f) ?         :                   |                                      |
=======================================+=====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                        |        |                    |       |                                      |
                                        |        |   2                |       |200(B2B1)+430(A2)+120(B4B3)+1040(A4)  |
             | Approach 3|              |-------  6 4 1               ------- |                                      |
 3:  LT=  10 | |         | 2:RT=  80    |         0 0 0                ^-  80 |          = 1790 vph                  |
   TH= 240   | |         |   TH=1180    |         | | |                <- 590 |======================================|
   RT=  60   | v         |   LT= 200    |         < v >                <- 590 | Step 8. INTERSECTION LEVEL OF        |
-------------             -------------|                               v- 200 |         SERVICE                      |
                         <--Approach 2  |                                      |   (compare step 7 with table 6)      |
                                        |                                      |              -------                 |
                                        |                                      |              |  F  |                 |
 Approach 1-->                          |  40 -^                               |              -------                 |
-------------             -------------| 110 ->                 < ^ >          |======================================|
 1:LT=  40   |          ^ | 4: RT=  80  | 110 ->                 | | |          | Step 9. RECALCULATE                  |
   TH= 220   |          | |   TH=1150   |  20 -v                   1            |                                      |
   RT=  20   |          | |   LT= 120   |-------                 1 1   -------|Geometric Change:                      |
             | Approach 4|              |        |               2 5 8 |      |Signal Change:                         |
                                        |        |               0 0 0 |      |Volume Change:                         |
=======================================+=====================================+======================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                             |
                                        |        (two phase signal)            |                                      |
       --^ v--  B2B1                    |           | Approach 3|              |                                      |
                                        |           |           |              |                                      |
    --^ AND <--     A1B2 AND            |           |           |              |                                      |
    --> OR  v--     /OR A2B1            |           |           |              |                                      |
       --> <--  A1A2                    |-------------           ------------|                                      |
                                        | Approach 1                           |                                      |
        |   <   B4B3                    |                                      |                                      |
        >   |                           |           See Step 6b.               |                                      |
    | | AND < ^     A3B4 AND            |                                      |                                      |
    v > OR  | |     /OR A4B3            |                        Approach 2    |                                      |
        |   ^   A3A4                    |-------------            ------------|                                      |
        v   |                           |           |           |              |                                      |
----------------------------------------|           |           |              |                                      |
 A1 -->   A3 |     B1 v--    B3   <|    |           |           |              |                                      |
           v ^                    | |   |           | Approach 4|              | Exclusive right turns reduced 30 %   |
 A2 <--   A4  |    B2 --^    B4 |>      |                                      | V/C Ratio = 1.3                      |
==========================================================================================
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                                 Critical Movement Analysis: PLANNING
                                        Calculation Form 1
Intersection: JACKSON HWY AND EXCELSIOR RD                                   Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR        |
             | Approach 3:EXCELSIOR RD  |               -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
             | 1   1   1 |      ^       |               : -1-  -2-  -3-  -4-|        Possible   Volume     Adjusted|
             |   R   L   |      N       |a.No. of change  :   0    0    0   0|Prob-   Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |              | intervals/hour  :                 |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :   0    0    0   0|Phase   in vph    phase      in vph |
  Approach 1  < < | > >   ^--RT  1    | change (vph)    :                 |---------------------------------------|
   1  LT--^     v v v    <^-RTH       |c.G/C ratio      :   0    0    0   0|B2B1    60(B2)  110-  60=  50(B1)    60|
      LTH-^>             <--TH   2    |d.Opposing volume:   0    0    0   0|A2B1    50(B1)  180-  50= 130(A2)    50|
   2   TH-->             <v-LTH       | in vph          :                 |A1A2   600(A1) OR  130(A2)           600|
      RTH-v>    ^ ^ ^     v--LT  1    |e.LT capacity on :   0    0    0   0|B4B3    30(B4)   30-  30=   0(B3)    30|
   1  RT--v   < < | > >   Approach 2  | green (vph)     :                 |A4B3     0(B3)  360-   0= 360(A4)     0|
------------- L L T R R  -------------|f.LT capacity in :   0    0    0   0|A3A4   960(A3) OR  360(A4)           960|
             | T T H T T |JACKSON HWY | vph (b+e)       :                 |                                       |
             |   H   H   |            |g.Left turn volume:  0    0    0   0|                                       |
             | 1   1   1 |            | in vph          :                 |                                       |
             | Approach 4:EXCELSIOR RD|h.Is volume > cap.:                :                                       |
                                      | (g>f) ?         :                 |                                       |
=======================================+===================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES      |
                                       |         |                  |     |                                       |
                                       |         |  9               |     |110(B2B1)+600(A1)+30(B4B3)+960(A3)     |
             | Approach 3|             |-------  9 6 3              -------|                                       |
 3:  LT=  30 | |         | 2:RT=  30   |         0 0 0              ^-  30|          = 1700 vph                   |
    TH= 960  | |         |   TH= 360   |         | | |              <- 180|=======================================|
   RT=  90   | v         |   LT= 110   |         < v >              <- 180| Step 8. INTERSECTION LEVEL OF         |
-------------             -------------|                            v- 110|        SERVICE                        |
                         <--Approach 2 |                                  |     (compare step 7 with table 6)    |
                                       |                                  |              -------                  |
                                       |                                  |              |  F  |                  |
 Approach 1-->                         | 60 -^                            |              -------                  |
-------------             -------------| 600 ->          < ^ >            |=======================================|
 1:LT=  60   |         ^ | 4: RT= 170  | 600 ->          | | |            | Step 9. RECALCULATE                   |
   TH=1200   |         | |   TH= 360   | 120 -v                           |                                       |
   RT= 120   |         | |   LT=  30   |-------             3 1    -------|Geometric Change:                      |
             | Approach 4|             |       |          3 6 7 |         |Signal Change:                          |
                                       |       |          0 0 0 |         |Volume Change:                          |
=======================================+===================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                       |        (two phase signal)         |                                       |
        --^ v--   B2B1                 |           | Approach 3|           |                                       |
                                       |           |           |           |                                       |
    --^ AND <--     A1B2 AND           |           |           |           |                                       |
    --> OR  v--     /OR A2B1           |           |           |           |                                       |
        --> <--   A1A2                 |-------------     -------------   |                                       |
                                       | Approach 1                        |                                       |
         |  <     B4B3                 |                                   |                                       |
         >  |                          |          See Step 6b.             |                                       |
    | | AND < ^     A3B4 AND           |                                   |                                       |
    v > OR  | |     /OR A4B3           |                        Approach 2 |                                       |
         |  ^     A3A4                 |-------------        ------------|                                       |
         v  |                          |           |           |           |                                       |
---------------------------------------|           |           |           |                                       |
 A1 -->   A3 |      B1 v--    B3   <|  |           |           |           |                                       |
            v ^                     | | |           | Approach 4|           | Exclusive right turns reduced 30 %    |
 A2 <--   A4  |     B2 --^    B4 |>    |                                   | V/C Ratio = 1.24                      |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: ELDER CREEK RD AND S. WATT AVE.                        Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:S. WATT AVE. |                 -------Approach-----|         MULTIPHASE SIGNAL OVERLAP   |
            | 1   3   2 |      ^      |                 : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
            |  R    L   |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |            |  intervals/hour  :                  |able    Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase      in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)    :                  |-------------------------------------|
  2  LT--^     v v v     <^-RTH       |c.G/C ratio       :  0    0    0    0|B2B1    61(B1)   83-  61=  22(B2)   61|
     LTH-^>              <--TH   2    |d.Opposing volume :  0    0    0    0|A1B2    22(B2)  125-  22= 103(A1)   22|
  2   TH-->              <v-LTH       |  in vph          :                  |A1A2   392(A2) OR  103(A1)         392|
     RTH-v>     ^ ^ ^     v--LT  2    |e.LT capacity on  :  0    0    0    0|B4B3    94(B4)  253-  94= 159(B3)   94|
  1  RT--v    < < | > >   Approach 2  |  green (vph)     :                  |A4B3   159(B3) 1037- 159= 878(A4)  159|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   878(A4) OR  377(A3)         878|
            | T T H T T |ELDER CREEK R|  vph (b+e)       :                  |                                     |
            |   H   H   |             |g.Left turn volume:  0    0    0    0|                                     |
            | 2   3   1 |             |  in vph          :                  |                                     |
            | Approach 4:S. WATT AVE. |h.Is volume > cap.:                  :                                     |
                                      |  (g>f) ?         :                  |                                     |
======================================+=================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |       |                   |         |                                     |
                                      |       | 2 3 3 3           |         |83(B1B2)+392(A2)+253(B4B3)+878(A4)   |
            | Approach 3|             |-------  7 7 7 7 7 9         ------- |                                     |
 3:  LT= 170 | |          | 2:RT= 560 |         0 7 7 7 7 4          ^- 560 |           = 1606 vph                |
   TH=1130  | |          |   TH= 750 |         | | | | | |          <- 375 |=====================================|
  RT= 270   | v          |   LT= 110 |         < v v v > >          <- 375 | Step 8. INTERSECTION LEVEL OF       |
-------------             -------------|                              v-  50 |         SERVICE                     |
                          <--Approach 2 |                              v-  61 |    (compare step 7 with table 6)    |
                                      |                                     |              -------                |
                                      |  83 -^                              |              |  F  |                |
 Approach 1-->                        |  68 -^                              |              -------                |
-------------             -------------| 125 ->          < < ^ ^ ^ >         |=====================================|
 1:LT= 150   |           ^ | 4: RT= 140 | 125 ->          | | | | | |         | Step 9. RECALCULATE                 |
   TH= 250   |           | |   TH=3110 | 120 -v            1 1 1             |                                     |
   RT= 120   |           | |   LT= 460 |-------          2 2 0 0 0 1  -------|Geometric Change:                    |
            | Approach 4|             |        |        5 0 3 3 3 4 |       |Signal Change:                       |
                                      |        |        3 7 7 7 7 0 |       |Volume Change:                       |
======================================+=================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                      |         (two phase signal)          |                                     |
        --^ v--   B2B1                |             | Approach 3|           |                                     |
                                      |             |           |           |                                     |
    --^ AND <--     A1B2 AND          |             |           |           |                                     |
    --> OR  v--     /OR A2B1          |             |           |           |                                     |
        --> <--   A1A2                |-------------             -----------|                                     |
                                      | Approach 1                          |                                     |
         |   <    B4B3                |                                     |                                     |
         >   |                        |           See Step 6b.              |                                     |
    | | AND < ^     A3B4 AND          |                                     |                                     |
    v > OR  | |     /OR A4B3          |                         Approach 2  |                                     |
         |   ^    A3A4                |-------------             -----------|                                     |
         v   |                        |             |           |           |                                     |
--------------------------------------|             |           |           |                                     |
 A1 -->    A3 |     B1 v--     B3   <| |             |           |           |                                     |
            v ^                     | | |             | Approach 4|           | Exclusive right turns reduced 30 %  |
 A2 <--    A4  |    B2 --^     B4  |> |                                     | V/C Ratio = 1.17                    |
==========================================================================================
```

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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
'ntersection: ELDER CREEK RD AND S. WATT AVE.                          Design Hour: PM
'roblem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
              | Approach 3:S. WATT AVE. |                  -------Approach-----|         MULTIPHASE SIGNAL OVERLAP    |
              | 1   3   2 |      ^     |                   : -1-  -2-  -3-  -4-|        Possible    Volume     Adjusted|
              |   R   L   |      N     |a.No. of change    :  0    0    0    0|Prob-   Critical  Carryover   Critical|
ELDER CREEK R| R T T T L |              |  intervals/hour   :                   |able     Volume    to next     Volume |
-------------  T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase    in vph     phase      in vph |
  Approach 1   < < | > >   ^--RT  1    |  change (vph)     :                   |-------------------------------------|
   2  LT--^      v v v     <^-RTH      |c.G/C ratio        :  0    0    0    0|B2B1    99(B1)  121-  99=  22(B2)    99|
      LTH->                <--TH   2   |d.Opposing volume  :  0    0    0    0|A1B2    22(B2)  325-  22= 303(A1)    22|
   2   TH-->               <v-LTH      |  in vph           :                   |A1A2   303(A1) OR  220(A2)          303|
      RTH-v>     ^ ^ ^      v--LT  2   |e.LT capacity on   :  0    0    0    0|B4B3   121(B3)  325- 121= 204(B4)   121|
   1  RT--v    < < | > >   Approach 2  |  green (vph)      :                   |A3B4   204(B4)  817- 204= 613(A3)   204|
-------------  L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A3A4   613(A3) OR  543(A4)          613|
              | T T H T T |ELDER CREEK R|  vph (b+e)        :                   |                                     |
              |   H   H   |              |g.Left turn volume :  0    0    0    0|                                     |
              | 2   3   1 |              |  in vph           :                   |                                     |
              | Approach 4:S. WATT AVE. |h.Is volume > cap. :                  :|                                     |
                                         |  (g>f) ?          :                   |                                     |
=======================================+==================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                        |         |                  |       |                                     |
                                        |         | 1 8 8 8 2 3      |       |121(B1B2)+303(A1)+325(B3B4)+613(A3)  |
              | Approach 3|             |-------   6 1 1 1 6 2      -------|                                     |
 3:  LT= 590 | |           | 2:RT= 250  |          0 7 7 7 6 5     ^- 250 |          = 1362 vph                 |
    TH=2450 | |           |   TH= 440  |          | | | | | |     <- 220 |=====================================|
    RT= 160 | v           |   LT= 180  |          < v v v > >     <- 220 | Step 8. INTERSECTION LEVEL OF       |
-------------             -------------|                          v-  81 |         SERVICE                     |
                          <--Approach 2 |                          v-  99 |     (compare step 7 with table 6)   |
                                        |                                  |               -------               |
                                        | 121 -^                           |               | E |                 |
 Approach 1-->                          |  99 -^                           |               -------               |
-------------             -------------| 325 ->          < < ^ ^ ^ >      |=====================================|
 1:LT= 220   |             ^ | 4: RT= 150 | 325 ->          | | | | | |      | Step 9. RECALCULATE                 |
   TH= 650   |             | |   TH=1630 | 450 -v                           |                                     |
   RT= 450   |             | |   LT= 220 |-------          1   5 5 5 1  -------|Geometric Change:                    |
             | Approach 4|              |         |       2 9 4 4 4 5 |      |Signal Change:                       |
                                        |         |       1 9 3 3 3 0 |      |Volume Change:                       |
=======================================+==================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                            |
                                        |        (two phase signal)          |                                     |
      --^ v--   B2B1                    |            | Approach 3|           |                                     |
                                        |            |           |           |                                     |
   --^ AND <--     A1B2 AND             |            |           |           |                                     |
   --> OR  v--     /OR A2B1             |            |           |           |                                     |
      --> <--   A1A2                    |------------             -----------|                                     |
                                        | Approach 1                         |                                     |
       |   <    B4B3                    |                                    |                                     |
       >   |                            |          See Step 6b.              |                                     |
   | | AND < ^     A3B4 AND             |                                    |                                     |
   v > OR  | |     /OR A4B3             |                      Approach 2    |                                     |
       |   ^    A3A4                    |------------             -----------|                                     |
       v   |                            |            |           |           |                                     |
----------------------------------------|            |           |           |                                     |
 A1 -->    A3 |      B1 v--    B3   <|  |            |           |           |                                     |
            v ^                      | | |           | Approach 4|           | Exclusive right turns reduced 30 %  |
 A2 <--    A4  |     B2 --^    B4  |>   |                                    | V/C Ratio = .99                     |
==========================================================================================
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                                  Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: ELDER CREEK RD AND BRADSHAW RD                                    Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR       |
              | Approach 3:BRADSHAW RD  |             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP     |
              | 1   3   2 |      ^      |             : -1-  -2-  -3-  -4-|      Possible    Volume      Adjusted|
              |   R   L   |      N      |a.No. of change  :   0    0    0    0|Prob-  Critical   Carryover   Critical|
ELDER CREEK R| R T T T L |              |  intervals/hour :                  |able    Volume    to next     Volume |
------------- T H H H T  -------------|b.LT capacity on  :   0    0    0    0|Phase   in vph     phase      in vph |
  Approach 1   < < | > >   ^--RT  1   |  change (vph)    :                  |-------------------------------------|
   2  LT--^      v v v    <^-RTH      |c.G/C ratio       :   0    0    0    0|B2B1     11(B1)  138-  11= 127(B2)    11|
      LTH-^>              <--TH   2   |d.Opposing volume :   0    0    0    0|A1B2    127(B2)  105- 127=   0(A1)   127|
   2   TH-->              <v-LTH      |  in vph          :                  |A1A2    185(A2) OR    0(A1)          185|
      RTH-v>     ^ ^ ^     v--LT  2   |e.LT capacity on  :   0    0    0    0|B4B3      6(B4)  418-   6= 412(B3)     6|
   1  RT--v    < < | > >   Approach 2 |  green (vph)     :                  |A4B3    412(B3)  833- 412= 421(A4)   412|
------------- L L T R R  -------------|f.LT capacity in  :   0    0    0    0|A3A4    421(A4) OR  303(A3)          421|
             | T T H T T |ELDER CREEK R|  vph (b+e)       :                  |                                     |
             |   H   H   |            |g.Left turn volume :   0    0    0    0|                                     |
             | 2   3   1 |            |  in vph          :                  |                                     |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :                 :                                     |
                                      |  (g>f) ?         :                  |                                     |
=======================================+====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                      |        |                    |      |                                      |
                                      |        | 3 3 3 3            |      |138(B1B2)+185(A2)+418(B4B3)+421(A4)   |
             | Approach 3|             |-------  3 0 0 0            -------|                                      |
3:  LT=  10  | |         | 2:RT=  10  |         0 3 3 3 5 6       ^-  10 |           = 1162 vph                 |
   TH= 910   | |         |   TH= 370  |         | | | | | |       <- 185 |======================================|
   RT= 330   | v         |   LT=  20  |         < v v v > >       <- 185 | Step 8. INTERSECTION LEVEL OF        |
-------------            -------------|                            v-   9 |         SERVICE                      |
                         <--Approach 2 |                            v-  11 |      (compare step 7 with table 6)   |
                                      |                                    |             -------                  |
                                      | 138 -^                             |             | D |                    |
 Approach 1-->                        | 113 -^                             |             -------                  |
-------------            -------------| 105 ->        < < ^ ^ ^ >          |======================================|
1:LT= 250    |             ^ | 4: RT= 120 | 105 ->    | | | | | |          | Step 9. RECALCULATE                   |
  TH= 210    |             | |   TH=2500 |  20 -v                          |                                      |
  RT=  20    |             | |   LT= 760 |-------     4 3 8 8 8 1  -------|Geometric Change:                     |
             | Approach 4|                |        |  1 4 3 3 3 2 |       |Signal Change:                        |
                                      |        |    8 2 3 3 3 0 |       |Volume Change:                        |
=======================================+====================================+======================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                      |          (two phase signal)        |                                      |
         --^ v--   B2B1               |            | Approach 3|           |                                      |
                                      |            |           |           |                                      |
      --^ AND <--     A1B2 AND        |            |           |           |                                      |
      --> OR  v--     /OR A2B1        |            |           |           |                                      |
         --> <--   A1A2               |-------------           ------------|                                      |
                                      | Approach 1                         |                                      |
          |  <    B4B3                |                                    |                                      |
          >  |                        |            See Step 6b.            |                                      |
      | | AND < ^     A3B4 AND        |                                    |                                      |
      v > OR  | |     /OR A4B3        |                         Approach 2 |                                      |
          |   ^   A3A4                |-------------           ------------|                                      |
          v   |                       |            |           |           |                                      |
--------------------------------------|            |           |           |                                      |
A1 -->    A3 |      B1 v--     B3   <| |            |           |           |                                      |
             v ^                   | | |            | Approach 4|           | Exclusive right turns reduced 30 %   |
A2 <--    A4   |    B2 --^     B4 |>  |                                    | V/C Ratio = .85                      |
========================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: ELDER CREEK RD AND BRADSHAW RD                              Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:BRADSHAW RD |                  -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
             | 1   3   2 |      ^     |                  : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
             |   R   L   |      N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |            |  intervals/hour  :                   |able    Volume   to next    Volume |
------------  T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)    :                   |-------------------------------------|
   2  LT--^     v v v    <^-RTH       |c.G/C ratio       :  0    0    0    0|B2B1     44(B1)  187-  44= 143(B2)   44|
      LTH-^>             <--TH   2    |d.Opposing volume :  0    0    0    0|A1B2    143(B2)  455- 143= 312(A1)  143|
   2   TH-->             <v-LTH       |  in vph          :                   |A1A2    312(A1) OR  135(A2)          312|
      RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on  :  0    0    0    0|B4B3     11(B4)   50-  11=  39(B3)   11|
   1  RT--v   < < | > >   Approach 2  |  green (vph)     :                   |A4B3     39(B3)  430-  39= 391(A4)   39|
------------  L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4    847(A3) OR  391(A4)          847|
             | T T H T T |ELDER CREEK R|  vph (b+e)      :                   |                                     |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                     |
             | 2   3   1 |            |  in vph          :                   |                                     |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :                  :                                     |
                                      |  (g>f) ?         :                   |                                     |
======================================+=====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |       |                     |       |                                     |
                                      |       | 2 8 8 8             |       |187(B1B2)+312(A1)+50(B4B3)+847(A3)   |
             | Approach 3|            |-------  8 4 4 4   1          -------|                                     |
 3:  LT=  20 | |         | 2:RT=  10  |         0 7 7 7 9 1          ^-  10 |           = 1396 vph                |
   TH=2540   | |         |   TH= 270  |         | | | | | |          <- 135 |=====================================|
   RT= 280   | v         |   LT=  80  |         < v v v > >          <- 135 | Step 8. INTERSECTION LEVEL OF       |
------------              ------------|                              v-  36 |         SERVICE                     |
                         <--Approach 2|                              v-  44 |    (compare step 7 with table 6)    |
                                      |                                     |              -------                |
                                      | 187 -^                              |              |  F  |                |
 Approach 1-->                        | 153 -^                              |              -------                |
------------              ------------| 180 ->           < < ^ ^ ^ >        |=====================================|
 1:LT= 340   |           ^ | 4: RT=  30 | 180 ->         | | | | | |        | Step 9. RECALCULATE                 |
   TH= 360   |           | |   TH=1290 | 650 -v                             |                                     |
   RT= 650   |           | |   LT=  90 |-------            4 4 4    -------|Geometric Change:                    |
             | Approach 4|            |       |        5 4 3 3 3 3 |        |Signal Change:                        |
                                      |       |        0 1 0 0 0 0 |        |Volume Change:                        |
======================================+=====================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                      |        (two phase signal)           |                                     |
        --^ v--  B2B1                 |             | Approach 3|           |                                     |
                                      |             |           |           |                                     |
     --^ AND <--     A1B2 AND         |             |           |           |                                     |
     --> OR  v--     /OR A2B1         |             |           |           |                                     |
        --> <--  A1A2                 |-------------            ------------|                                     |
                                      | Approach 1                          |                                     |
         |  <    B4B3                 |                                     |                                     |
         >  |                         |                                     |                                     |
     | | AND < ^     A3B4 AND         |            See Step 6b.             |                                     |
     v > OR  | |     /OR A4B3         |                          Approach 2 |                                     |
         |  ^    A3A4                 |-------------            ------------|                                     |
         v  |                         |             |           |           |                                     |
--------------------------------------|             |           |           |                                     |
 A1 -->    A3 |      B1 v--     B3   <| |           |           |           |                                     |
            v ^                      | ||             | Approach 4|         | Exclusive right turns reduced 30 %  |
 A2 <--    A4  |     B2 --^     B4 |>  |                                    | V/C Ratio = 1.02                    |
=============================================================================================
```

ATTACHMENT 5E

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                                Critical Movement Analysis: PLANNING
                                         Calculation Form 1
Intersection: ELDER CREEK RD AND EXCELSIOR RD                           Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
             | Approach 3:EXCELSIOR RD |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP   |
             | 1   1     |      ^   |                  : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
             |   R   L   |      N   |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |          |  intervals/hour  :                   |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT     |  change (vph)    :                   |-----------------------------------|
  1  LT--^      v v v    <^-RTH     |c.G/C ratio       :  0    0    1    0|A4B3    90(B3) 1020-  90= 930(A4)   90|
     LTH-^>              <--TH      |d.Opposing volume :  0   10 1020    0|A3A4   930(A4) OR  245(A3)         930|
      TH-->              <v-LTH     |  in vph          :                   |A1B2   330(B2) OR    7(A1)         330|
     RTH-v>     ^ ^ ^     v--LT     |e.LT capacity on  :  0    0  180    0|                                   |
  1  RT--v    < < | > >  Approach 2 |  green (vph)     :                   |                                   |
-------------  L L T R R  -------------|f.LT capacity in  :  0    0  180    0|                                   |
             | T T H T T |ELDER CREEK R|  vph (b+e)       :                   |                                   |
             |   H   H   |          |g.Left turn volume :  0    0    0    0|                                   |
             | 1   1     |          |  in vph          :                   |                                   |
             | Approach 4:.         |h.Is volume > cap. :      NO   NO     :                                   |
                                    |  (g>f) ?         :                   |                                   |
====================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |        |                   |     |                                   |
                                    |        | 3 1               |     |1020(B3A4)+330(B2)+0()+0()         |
             | Approach 3|          |-------  5 0               -------|                                   |
 3:  LT=   0 | |         | 2:RT=   0 |        0 0                       |          = 1350 vph               |
   TH= 100   | |         |   TH=   0 |        | |                       |===================================|
  RT= 350    | v         |   LT=   0 |        < v                       | Step 8. INTERSECTION LEVEL OF     |
-------------             -------------|                                  |          SERVICE                  |
                         <--Approach 2 |                                  |    (compare step 7 with table 6)  |
                                    |                                  |              -------              |
                                    |                                  |              | E |              |
 Approach 1-->                      |                                  |              -------              |
-------------             -------------|                          < ^     |===================================|
 1:LT= 330   |          ^ | 4: RT=   0 | 330 -^                   | |     | Step 9. RECALCULATE               |
   TH=   0   |          | |   TH=1020  |  10 -v                    1      |                                   |
   RT=  10   |          | |   LT=  90  |-------                    0 -------|Geometric Change:                  |
             | Approach 4|          |        |                9 2 |      |Signal Change:                     |
                                    |        |                0 0 |      |Volume Change:                     |
====================================+==================================+===================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                    |         (two phase signal)       |                                   |
         <   ^   A4B3               |            | Approach 3|         |                                   |
         |   |                      |            |           |         |                                   |
         |   ^   A3A4               |            |           |         |                                   |
         v   |                      |            |           |         |                                   |
        --^      A1B2               |------------             ------------|                                   |
        -->                         | Approach 1                       |                                   |
                                    |                                  |                                   |
                                    |          See Step 6b.            |                                   |
                                    |                                  |                                   |
                                    |                       Approach 2 |                                   |
                                    |------------             ------------|                                   |
                                    |            |           |         |                                   |
------------------------------------|            |           |         |                                   |
 A1 -->    A3 |      B1 v--     B3   <|  |            |           |         |                                   |
             v ^                    | |  |            | Approach 4|         | Exclusive right turns reduced 30 % |
 A2 <--    A4  |     B2 --^     B4 |>   |                                  | V/C Ratio = .95                   |
===============================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: ELDER CREEK RD AND EXCELSIOR RD                          Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR        |
            | Approach 3:EXCELSIOR RD |                 -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
            | 1   1    |      ^       |                 : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
            |  R   L   |      N       |a.No. of change  :  0    0    0     0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |             |  intervals/hour :                   |able    Volume   to next    Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0     0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT        |  change (vph)   :                   |---------------------------------------|
   1  LT--^    v v v    <^-RTH        |c.G/C ratio      :  0    0    1     0|A4B3    20(B3)  250-  20= 230(A4)   20|
      LTH-^>            <--TH         |d.Opposing volume :  0   70  250     0|A3A4   780(A3) OR  230(A4)         780|
       TH-->            <v-LTH        |  in vph         :                   |A1B2   310(B2) OR   49(A1)         310|
      RTH-v>    ^ ^ ^    v--LT        |e.LT capacity on :  0    0  950     0|                                       |
   1  RT--v  < < | > >   Approach 2   |  green (vph)    :                   |                                       |
------------ L L T R R  -------------|f.LT capacity in :  0    0  950     0|                                       |
            | T T H T T |ELDER CREEK R|  vph (b+e)      :                   |                                       |
            |  H   H    |             |g.Left turn volume :  0  0    0     0|                                       |
            | 1   1     |             |  in vph         :                   |                                       |
            | Approach 4:.            |h.Is volume > cap. :     NO   NO     :                                       |
                                      |  (g>f) ?        :                   |                                       |
======================================+=====================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES       |
                                      |       |                      |      |                                       |
                                      |       | 3 7                  |      |800(B3A3)+310(B2)+0()+0()              |
            | Approach 3|             |-------  4 8                   ------|                                       |
 3:  LT=   0 | |         | 2:RT=   0   |         0 0                         |          = 1110 vph                   |
   TH= 780  | |         |   TH=   0   |         | |                         |=======================================|
  RT= 340   | v         |   LT=   0   |         < v                         | Step 8. INTERSECTION LEVEL OF         |
------------             -------------|                                     |         SERVICE                       |
                        <--Approach 2 |                                     |     (compare step 7 with table 6)     |
                                      |                                     |               -------                 |
                                      |                                     |               |  C  |                 |
 Approach 1-->                        |                                     |               -------                 |
------------             -------------|                             < ^     |=======================================|
 1:LT= 310  |            ^ | 4: RT=   0 | 310 -^                      | |     | Step 9. RECALCULATE                   |
   TH=   0  |            | |   TH= 250  |  70 -v                              |                                       |
   RT=  70  |            | |   LT=  20  |-------                        2  ---|Geometric Change:                      |
            | Approach 4|             |        |                     2 5 |   |Signal Change:                         |
                                      |        |                     0 0 |   |Volume Change:                         |
======================================+=====================================+=======================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                              |
                                      |         (two phase signal)          |                                       |
        <   ^    A4B3                 |            | Approach 3|            |                                       |
        |   |                         |            |           |            |                                       |
        |   ^    A3A4                 |            |           |            |                                       |
        v   |                         |            |           |            |                                       |
       --^       A1B2                 |-------------             ------------|                                       |
       -->                            | Approach 1                          |                                       |
                                      |                                     |                                       |
                                      |           See Step 6b.              |                                       |
                                      |                                     |                                       |
                                      |                         Approach 2  |                                       |
                                      |-------------             ------------|                                       |
                                      |            |           |            |                                       |
--------------------------------------|            |           |            |                                       |
 A1 -->   A3 |      B1 v--     B3   <| |            |           |            |                                       |
            v ^                    | | |            | Approach 4|            | Exclusive right turns reduced 30 %    |
 A2 <--   A4   |    B2 --^     B4 |>  |                                     | V/C Ratio = .78                       |
==========================================================================================
```

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                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: FLORIN RD AND ELK GROVE-FLORIN RD                       Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR         |
            | Approach 3:ELK GROVE-FLO|                  -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
            | 1   3   2 |       ^      |                  : -1-  -2-  -3-  -4-|         Possible    Volume    Adjusted|
            |   R   L   |       N      |a.No. of change   :   0    0    0    0|Prob-    Critical   Carryover  Critical|
FLORIN RD   | R T T T L |              |  intervals/hour  :                   |able      Volume    to next    Volume |
----------- T H H H T  -------------|b.LT capacity on  :   0    0    0    0|Phase    in vph     phase      in vph |
 Approach 1  < < | > >   ^--RT  1    |  change (vph)    :                   |---------------------------------------|
  2  LT--^     v v v    <^-RTH       |c.G/C ratio       :   0    0    0    0|B2B1    39(B1)  308-  39= 269(B2)    39|
     LTH-^>             <--TH   3    |d.Opposing volume :   0    0    0    0|A1B2   269(B2)  167- 269=   0(A1)   269|
  3   TH-->             <v-LTH       |  in vph          :                   |A1A2   487(A2) OR    0(A1)          487|
     RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on  :   0    0    0    0|B4B3    28(B4)  275-  28= 247(B3)    28|
  1  RT--v   < < | > >   Approach 2  |  green (vph)     :                   |A4B3   247(B3)  943- 247= 696(A4)   247|
-----------  L L T R R  -------------|f.LT capacity in  :   0    0    0    0|A3A4   696(A4) OR  320(A3)          696|
            | T T H T T |FLORIN RD   |  vph (b+e)       :                   |                                        |
            |   H   H   |            |g.Left turn volume :   0    0    0    0|                                        |
            | 2   3   1 |            |  in vph          :                   |                                        |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                  :                                        |
                                     |  (g>f) ?         :                   |                                        |
=====================================+===================================+========================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES         |
                                     |      |                     |      |                                        |
                                     |      | 2 3 3 3             |      |308(B1B2)+487(A2)+275(B4B3)+696(A4)     |
            | Approach 3|            |-------  1 2 2 2 2 2       -------|                                        |
 3:  LT=  50 | |        | 2:RT= 460  |         0 0 0 0 3 8        ^- 460 |           = 1766 vph                   |
    TH= 960 | |         |   TH=1460  |         | | | | | |        <- 487 |========================================|
    RT= 210 | v         |   LT=  70  |         < v v v > >        <- 487 | Step 8. INTERSECTION LEVEL OF          |
-----------             -------------|                            <- 487 |         SERVICE                        |
                       <--Approach 2 |                            v-  32 |     (compare step 7 with table 6)      |
                                     | 308 -^                     v-  39 |              -------                   |
                                     | 252 -^                            |              |  F  |                  |
 Approach 1-->                       | 167 ->                            |              -------                   |
-----------             -------------| 167 ->        < < ^ ^ ^ >         |========================================|
 1:LT= 560  |              ^ | 4: RT=  80 | 167 ->   | | | | | |        | Step 9. RECALCULATE                    |
   TH= 500  |              | |    TH=2830 | 220 -v                      |                                        |
   RT= 220  |              | |   LT= 500  |-------   2 2 9 9 9   -------|Geometric Change:                       |
            | Approach 4|            |      |      7 2 4 4 4 8 |        |Signal Change:                          |
                                     |      |      5 5 3 3 3 0 |        |Volume Change:                          |
=====================================+===================================+========================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                               |
                                     |         (two phase signal)        |                                        |
        --^ v--   B2B1               |            | Approach 3|          |                                        |
                                     |            |           |          |                                        |
    --^ AND <--      A1B2 AND        |            |           |          |                                        |
    --> OR  v--      /OR A2B1        |            |           |          |                                        |
        --> <--   A1A2               |-------------            ------------|                                        |
                                     | Approach 1                        |                                        |
        |   <     B4B3               |                                   |                                        |
        >   |                        |            See Step 6b.           |                                        |
    | | AND < ^      A3B4 AND        |                                   |                                        |
    v > OR  | |      /OR A4B3        |                        Approach 2 |                                        |
        |   ^     A3A4               |-------------            ------------|                                        |
        v   |                        |            |           |          |                                        |
-------------------------------------|            |           |          |                                        |
 A1 -->    A3 |       B1 v--    B3   <|           |           |          |                                        |
             v ^                   | |           | Approach 4|          | Exclusive right turns reduced 30 %      |
 A2 <--    A4   |     B2 --^    B4 |>|                                   | V/C Ratio = 1.28                        |
============================================================================================
```

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                            Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN RD AND ELK GROVE-FLORIN RD                     Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
===============================================================================================
Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR        |
           | Approach 3:ELK GROVE-FLO|                   -------Approach-----|        MULTIPHASE SIGNAL OVERLAP      |
           | 1   3   2 |      ^      |                   : -1-  -2-  -3-  -4-|       Possible   Volume     Adjusted|
           |   R   L   |      N      |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD  | R T T T L |             |  intervals/hour   :                   |able    Volume    to next   Volume |
-----------  T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase   in vph     phase    in vph |
 Approach 1  < < | > >   ^--RT   1   |  change (vph)     :                   |---------------------------------------|
  2  LT--^     v v v    <^-RTH       |c.G/C ratio        :  0    0    0    0|B2B1    61(B1)  165-  61= 104(B2)   61|
     LTH-^>             <--TH    3   |d.Opposing volume  :  0    0    0    0|A1B2   104(B2)  443- 104= 339(A1)  104|
  3   TH-->             <v-LTH       |  in vph           :                   |A1A2   339(A1) OR  227(A2)          339|
     RTH-v>    ^ ^ ^     v--LT   2   |e.LT capacity on   :  0    0    0    0|B4B3   171(B3)  204- 171=  33(B4)  171|
  1  RT--v   < < | > >  Approach 2   |  green (vph)      :                   |A3B4    33(B4)  757-  33= 724(A3)   33|
------------ L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A3A4   724(A3) OR  507(A4)          724|
           | T T H T T |FLORIN RD    |  vph (b+e)        :                   |                                       |
           |   H   H   |             |g.Left turn volume :  0    0    0    0|                                       |
           | 2   3   1 |             |  in vph           :                   |                                       |
           | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                   :                                       |
                                     |  (g>f) ?          :                   |                                       |
=====================================+===================================+=====================================|
Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES       |
                                     |       |                       |     |                                       |
                                     |       | 5 7 7 7 1 2           |     |165(B1B2)+339(A1)+204(B3B4)+724(A3)    |
             | Approach 3|           |-------  1 5 5 5 6 0          -------|                                       |
3:  LT= 370  | |         | 2:RT=  80 |         0 7 7 7 7 4          ^-  80 |          = 1432 vph                   |
   TH=2270   | |         |   TH= 680 |         | | | | | |          <- 227 |=======================================|
   RT= 510   | v         |   LT= 110 |         < v v v > >          <- 227 | Step 8. INTERSECTION LEVEL OF         |
-------------             -----------|                              <- 227 |          SERVICE                      |
                        <--Approach 2|                              v-  50 |      (compare step 7 with table 6)    |
                                     | 165 -^                       v-  61 |              -------                  |
                                     | 135 -^                              |              |  F  |                  |
Approach 1-->                        | 443 ->                              |              -------                  |
-------------             -----------| 443 ->          < < ^ ^ ^ >         |=======================================|
1:LT= 300    |           ^ | 4: RT= 120| 443 ->        | | | | | |         | Step 9. RECALCULATE                   |
  TH=1330    |           | |   TH=1520 | 530 -v                            |                                       |
  RT= 530    |           | |   LT= 310 |-------        1 1 5 5 5 1  -------|Geometric Change:                      |
             | Approach 4|           |       |         7 4 0 0 0 2 |       |Signal Change:                         |
                                     |       |         1 0 7 7 7 0 |       |Volume Change:                         |
=====================================+===================================+=====================================|
Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                              |
                                     |        (two phase signal)           |                                       |
      --^ v--   B2B1                 |            | Approach 3|            |                                       |
                                     |            |           |            |                                       |
   --^ AND <--     A1B2 AND          |            |           |            |                                       |
   --> OR  v--     /OR A2B1          |            |           |            |                                       |
      --> <--   A1A2                 |-------------           -------------|                                       |
                                     | Approach 1                          |                                       |
       |   <    B4B3                 |                                     |                                       |
       >   |                         |          See Step 6b.               |                                       |
   | | AND < ^     A3B4 AND          |                                     |                                       |
   v > OR  | |     /OR A4B3          |                        Approach 2   |                                       |
       |   ^    A3A4                 |-------------           -------------|                                       |
       v   |                         |            |           |            |                                       |
-------------------------------------|            |           |            |                                       |
A1 -->   A3 |     B1 v--    B3   <|  |            |           |            |                                       |
           v ^                  | |  |            | Approach 4|            | Exclusive right turns reduced 30 %    |
A2 <--   A4  |    B2 --^    B4 |>    |                                     | V/C Ratio = 1.04                      |
===============================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                  Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:WATERMAN RD  |              -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
             |           |      ^      |              : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
             |  R   L    |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |             | intervals/hour  :                 |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT        | change (vph)     :                 |--------------------------------------|
     LT--^     v v v     <^-RTH        |c.G/C ratio       :  0    0    1    0|A2B1   165(B1)  163- 165=  0(A2)   165|
     LTH-^>              <--TH   3     |d.Opposing volume : 490   0  670    0|A1A2    93(A1) OR   0(A2)           93|
  3  TH-->               <v-LTH        | in vph           :                 |A4B3   622(B3) OR 469(A4)          622|
     RTH-v>    ^ ^ ^      v--LT  2     |e.LT capacity on  :  0    0  530    0|                                      |
  1  RT--v    < < | > >   Approach 2   | green (vph)      :                 |                                      |
------------- L L T R R  -------------|f.LT capacity in  :  0    0  530    0|                                      |
             | T T H T T |FLORIN RD    | vph (b+e)        :                 |                                      |
             |   H   H   |             |g.Left turn volume :  0    0    0    0|                                      |
             | 2       1 |             | in vph           :                 |                                      |
             | Approach 4:WATERMAN RD  |h.Is volume > cap. : NO        NO    :                                      |
                                       | (g>f) ?          :                 |                                      |
=======================================+===================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                       |      |                       |     |                                      |
                                       |      |                       |     |258(B1A1)+622(B3)+0()+0()             |
             | Approach 3|             |-------                 -------|                                      |
 3:  LT=   0 | |         | 2:RT=   0   |                       <- 163 |           = 880 vph                  |
    TH=   0  | |         |   TH= 490   |                       <- 163 |======================================|
   RT=   0   | v         |   LT= 300   |                       <- 163 | Step 8. INTERSECTION LEVEL OF        |
-------------             -------------|                       v- 135 |         SERVICE                      |
                        <--Approach 2  |                       v- 165 |     (compare step 7 with table 6)    |
                                       |                              |               -------                |
                                       |                              |               | B |                  |
 Approach 1-->                         |  93 ->                       |               -------                |
-------------             -------------|  93 ->            < < >      |======================================|
 1:LT=   0   |          ^ | 4: RT= 670 |  93 ->            | | |      | Step 9. RECALCULATE                  |
   TH= 280   |          | |   TH=   0  |  90 -v                       |                                      |
   RT=  90   |          | |   LT=1130  |-------            6 5 6 -------|Geometric Change:                     |
             | Approach 4|             |      |            2 0 7 |    |Signal Change:                        |
                                       |      |            2 9 0 |    |Volume Change:                        |
=======================================+===================================+======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                       |          (two phase signal)        |                                      |
            <--  A2B1                  |           | Approach 3|            |                                      |
            v--                        |           |           |            |                                      |
        --> <--  A1A2                  |           |           |            |                                      |
                                       |           |           |            |                                      |
         <   ^   A4B3                  |-------------       -------------|                                      |
         |   |                         | Approach 1                         |                                      |
                                       |                                    |                                      |
                                       |          See Step 6b.              |                                      |
                                       |                                    |                                      |
                                       |                      Approach 2    |                                      |
                                       |-------------        ------------|                                      |
                                       |           |           |            |                                      |
---------------------------------------|           |           |            |                                      |
 A1 -->   A3 |      B1 v--    B3   <|  |           |           |            |                                      |
            v ^                    | | |           | Approach 4|            | Exclusive right turns reduced 30 %   |
 A2 <--   A4  |     B2 --^    B4 |>    |                                    | V/C Ratio = .62                      |
===========================================================================================
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                                    Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                      Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================================
Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR      |
           | Approach 3:WATERMAN RD |                  -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
           |             |    ^      |                 : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
           |  R  L       |    N      |a.No. of change  :  0    0    0    0|Prob- Critical  Carryover  Critical|
FLORIN RD  | R T T T L   |           |  intervals/hour :                   |able  Volume    to next    Volume  |
-----------  T H H H T   ------------|b.LT capacity on :  0    0    0    0|Phase in vph     phase     in vph  |
 Approach 1  < < | > >    ^--RT      |  change (vph)   :                   |-------------------------------------|
     LT--^    v v v      <^-RTH      |c.G/C ratio      :  0    0    1    0|A2B1  253(B1)  540- 253= 287(A2)  253|
     LTH-^>              <--TH   3   |d.Opposing volume :1620   0  390   0|A1A2  749(A1) OR  287(A2)         749|
  3  TH-->               <v-LTH      |  in vph         :                   |A4B3  273(A4) OR  160(B3)         273|
     RTH-v>   ^ ^ ^       v--LT  2   |e.LT capacity on :  0    0  810    0|                                     |
  1  RT--v   < < | > >    Approach 2 |  green (vph)    :                   |                                     |
-----------  L L T R R   ------------|f.LT capacity in :  0    0  810    0|                                     |
           | T T H T T |FLORIN RD    |  vph (b+e)      :                   |                                     |
           |   H   H   |             |g.Left turn volume :  0   0    0   0|                                     |
           | 2       1 |             |  in vph         :                   |                                     |
           | Approach 4:WATERMAN RD  |h.Is volume > cap. : NO      NO     :|                                     |
                                     |  (g>f) ?        :                   |                                     |
=====================================+=====================================+=====================================|
Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                     |        |                     |      |                                     |
                                     |        |                     |      |1002(B1A1)+273(A4)+0()+0()           |
           | Approach 3|             |-------                -------|                                     |
3:  LT=   0 | |        | 2:RT=   0   |                        <- 540 |           = 1275 vph                |
   TH=   0 | |         |   TH=1620   |                        <- 540 |=====================================|
   RT=   0 | v         |   LT= 460   |                        <- 540 | Step 8. INTERSECTION LEVEL OF       |
-----------             -------------|                        v- 207 |          SERVICE                    |
                     <--Approach 2   |                        v- 253 |      (compare step 7 with table 6)  |
                                     |                               |               -------               |
                                     |                               |               | D |                 |
Approach 1-->                        | 460 ->                        |               -------               |
-----------             -------------| 460 ->            < < >       |=====================================|
1:LT=   0   |        ^ | 4: RT= 390  | 460 ->            | | |       | Step 9. RECALCULATE                 |
  TH=1380   |        | |    TH=   0  |1070 -v                        |                                     |
  RT=1070   |        | |    LT= 290  |-------            1 1 3 -------|Geometric Change:                   |
            | Approach 4|            |        |          6 3 9 |      |Signal Change:                       |
                                     |        |          0 1 0 |      |Volume Change:                       |
=====================================+=====================================+=====================================|
Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                     |        (two phase signal)           |                                     |
        <--  A2B1                    |           | Approach 3|             |                                     |
        v--                          |           |           |             |                                     |
    --> <--  A1A2                    |           |           |             |                                     |
                                     |           |           |             |                                     |
      <  ^   A4B3                    |------------           ------------|                                     |
      |  |                           | Approach 1                          |                                     |
                                     |                                     |                                     |
                                     |          See Step 6b.               |                                     |
                                     |                                     |                                     |
                                     |                        Approach 2   |                                     |
                                     |------------           ------------|                                     |
                                     |           |           |             |                                     |
--------------------------------------           |           |             |                                     |
A1 -->   A3 |     B1 v--     B3   <| |           |           |             |                                     |
            v ^                   | ||           | Approach 4|             | Exclusive right turns reduced 30 %  |
A2 <--   A4  |     B2 --^    B4 |>   |                                     | V/C Ratio = .89                     |
==========================================================================================================
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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                                      Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR   |
             | Approach 3:BRADSHAW RD  |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
             | 1  3  2 |       ^       |             : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
             |  R   L  |       N       |a.No. of change  :  0    0    0   0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |             | intervals/hour  :                 |able   Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0   0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1     | change (vph)    :                 |-----------------------------------|
   2  LT--^     v v v    <^-RTH        |c.G/C ratio      :  0    0    0   0|B2B1   55(B1)  407-  55= 352(B2)   55|
      LTH-^>             <--TH   3     |d.Opposing volume :  0   0    0   0|A1B2  352(B2)   42- 352=   0(A1)  352|
   3   TH-->             <v-LTH        | in vph          :                 |A1A2  525(A2) OR    0(A1)         525|
      RTH-v>     ^ ^ ^    v--LT  2     |e.LT capacity on :  0    0    0   0|B4B3    6(B4)  451-   6= 445(B3)    6|
   1  RT--v    < < | > >  Approach 2   | green (vph)     :                 |A4B3  445(B3)  630- 445= 185(A4)  445|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0   0|A3A4  223(A3) OR  185(A4)         223|
             | T T H T T |FLORIN RD    | vph (b+e)       :                 |                                   |
             |   H   H   |             |g.Left turn volume :  0   0    0   0|                                   |
             | 2   3   1 |             | in vph          :                 |                                   |
             | Approach 4:BRADSHAW RD  |h.Is volume > cap. :               :                                   |
                                       | (g>f) ?         :                 |                                   |
=======================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |        |                  |       |                                   |
                                       |        | 2 2 2 2          |       |407(B1B2)+525(A2)+451(B4B3)+223(A3)|
             | Approach 3|             |-------  8 2 2 2           ------- |                                   |
 3:  LT=  10 | |         | 2:RT= 750   |         0 3 3 3 5 6         ^- 750 |         = 1606 vph               |
    TH= 670  | |         |   TH= 750   |         | | | | | |         <- 250 |===================================|
    RT= 280  | v         |   LT= 100   |         < v v v > >         <- 250 | Step 8. INTERSECTION LEVEL OF    |
-------------            -------------|                              <- 250 |         SERVICE                   |
                       <--Approach 2   |                              v-  45 |   (compare step 7 with table 6)  |
                                       | 407 -^                       v-  55 |          -------                 |
                                       | 333 -^                              |          |  F  |                 |
 Approach 1-->                         |  37 ->                              |          -------                 |
-------------            -------------|  37 ->          < < ^ ^ ^ >          |===================================|
 1:LT= 740   |             ^ | 4: RT=  70 |  37 ->        | | | | | |        | Step 9. RECALCULATE              |
   TH= 110   |             | |   TH=1890 |  60 -v                            |                                   |
   RT=  60   |             | |   LT= 820 |-------        4 3 6 6 6   -------|Geometric Change:                  |
             | Approach 4|             |        |       5 6 3 3 3 7 |      |Signal Change:                     |
                                       |        |       1 9 0 0 0 0 |      |Volume Change:                     |
=======================================+==================================+===================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                       |     (two phase signal)            |                                   |
         --^ v--  B2B1                 |          | Approach 3|            |                                   |
                                       |          |           |            |                                   |
     --^ AND <--     A1B2 AND          |          |           |            |                                   |
     --> OR  v--     /OR A2B1          |          |           |            |                                   |
         --> <--  A1A2                 |------------          ------------|                                   |
                                       | Approach 1                        |                                   |
          |  <    B4B3                 |                                   |                                   |
          >  |                         |          See Step 6b.             |                                   |
     | | AND < ^     A3B4 AND          |                                   |                                   |
     v > OR  | |     /OR A4B3          |                      Approach 2   |                                   |
          |  ^    A3A4                 |------------           -----------|                                   |
          v  |                         |          |           |            |                                   |
--------------------------------------|          |           |            |                                   |
 A1 -->   A3 |      B1 v--    B3   <|  |          |           |            |                                   |
            v ^                    | | |          | Approach 4|            | Exclusive right turns reduced 30 % |
 A2 <--   A4  |     B2 --^    B4 |>    |                                   | V/C Ratio = 1.17                 |
==========================================================================================
```

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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
ntersection: FLORIN RD AND BRADSHAW RD                          Design Hour: PM
'roblem Statement: CUMULATIVE NO PROJECT
=========================================================================================
Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR     |
          | Approach 3:BRADSHAW RD  |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP   |
          | 1   3   2 |     ^       |             : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
          |   R   L   |     N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD | R T T T L |             |  intervals/hour  :                 |able    Volume   to next    Volume |
------------ T H H H T -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1   |  change (vph)    :                 |------------------------------------|
  2  LT--^     v v v    <^-RTH      |c.G/C ratio       :  0    0    0    0|B2B1   198(B2)  297- 198=  99(B1)  198|
     LTH-^>             <--TH   3   |d.Opposing volume :  0    0    0    0|A2B1    99(B1)   63-  99=   0(A2)   99|
  3   TH-->             <v-LTH      |  in vph          :                 |A1A2   371(A1) OR   0(A2)          371|
     RTH-v>    ^ ^ ^     v--LT  2   |e.LT capacity on  :  0    0    0    0|B4B3    77(B3)  220-  77= 143(B4)   77|
  1  RT--v   < < | > >  Approach 2  |  green (vph)     :                 |A3B4   143(B4)  763- 143= 620(A3)  143|
------------ L L T R R -------------|f.LT capacity in  :  0    0    0    0|A3A4   620(A3) OR 330(A4)          620|
          | T T H T T |FLORIN RD    |  vph (b+e)       :                 |                                    |
          |   H   H   |             |g.Left turn volume :  0    0    0    0|                                    |
          | 2   3   1 |             |  in vph          :                 |                                    |
          | Approach 4:BRADSHAW RD  |h.Is volume > cap. :                 :                                    |
                                    |  (g>f) ?         :                 |                                    |
====================================+==================================+====================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                    |       |                  |        |                                    |
                                    |       | 5 7 7 7 1 2      |        |297(B2B1)+371(A1)+220(B3B4)+620(A3) |
          | Approach 3|             |-------  9 6 6 6 8 2      -------  |                                    |
3:  LT= 400 | |        | 2:RT=  60  |         0 3 3 3 0 0      ^-  60  |          = 1508 vph                |
   TH=2290  | |        |   TH= 190  |         | | | | | |      <-  63  |====================================|
  RT= 590   | v        |   LT= 540  |         < v v v > >      <-  63  | Step 8. INTERSECTION LEVEL OF      |
------------           -------------|                          <-  63  |         SERVICE                    |
                       <--Approach 2|                          v- 243  |    (compare step 7 with table 6)   |
                                    | 198 -^                   v- 297  |            -------                 |
                                    | 162 -^                           |            |  F  |               |
Approach 1-->                       | 273 ->                           |            -------                 |
-----------            -------------| 273 ->          < < ^ ^ ^ >      |====================================|
1:LT= 360   |            ^ | 4: RT=  60 | 273 ->        | | | | | |      | Step 9. RECALCULATE                |
  TH= 820   |            | |   TH= 990  | 530 -v                         |                                    |
  RT= 530   |            | |   LT= 140  |-------          3 3 3   -------|Geometric Change:                   |
          | Approach 4|             |       |       7 6 3 3 3 6 |      |Signal Change:                      |
                                    |       |       7 3 0 0 0 0 |      |Volume Change:                      |
====================================+==================================+====================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                    |        (two phase signal)        |                                    |
      --^ v--   B2B1                |            | Approach 3|         |                                    |
                                    |            |           |         |                                    |
   --^ AND <--     A1B2 AND         |            |           |         |                                    |
   --> OR  v--     /OR A2B1         |            |           |         |                                    |
      --> <--   A1A2                |-------------          -----------|                                    |
                                    | Approach 1                       |                                    |
      |   <   B4B3                  |                                  |                                    |
      >   |                         |          See Step 6b.            |                                    |
   | | AND < ^     A3B4 AND         |                                  |                                    |
   v > OR  | |     /OR A4B3         |                      Approach 2  |                                    |
      |   ^   A3A4                  |-------------          -----------|                                    |
      v   |                         |            |           |         |                                    |
------------------------------------|            |           |         |                                    |
A1 -->   A3 |      B1 v--    B3   <|  |            |           |         |                                    |
           v ^                    | | |            | Approach 4|         | Exclusive right turns reduced 30 % |
A2 <--   A4   |    B2 --^    B4 |>  |                                  | V/C Ratio = 1.1                    |
=========================================================================================
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                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: FLORIN RD AND VINEYARD RD                                  Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:VINEYARD RD |              -------Approach-----|       MULTIPHASE SIGNAL OVERLAP  |
             |          |     ^       |              : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
             |  R  L    |     N       |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |             | intervals/hour  :                  |able   Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT       | change (vph)    :                  |----------------------------------|
     LT--^     v v v     <^-RTH       |c.G/C ratio       :  0    0    1    0|A2B1    17(B1)  210-  17= 193(A2)   17|
     LTH-^>              <--TH   3    |d.Opposing volume : 630   0  910    0|A1A2   193(A2) OR   37(A1)        193|
  3   TH-->              <v-LTH       | in vph          :                  |A4B3   637(A4) OR  534(B3)        637|
     RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on  :  0    0  290    0|                                  |
  1  RT--v    < < | > >   Approach 2  | green (vph)     :                  |                                  |
------------- L L T R R  -------------|f.LT capacity in  :  0    0  290    0|                                  |
             | T T H T T |FLORIN RD   | vph (b+e)       :                  |                                  |
             |  H   H    |            |g.Left turn volume :  0    0    0    0|                                  |
             | 2      1  |            | in vph          :                  |                                  |
             | Approach 4:VINEYARD RD |h.Is volume > cap. :  NO        NO    :                                  |
                                      | (g>f) ?         :                  |                                  |
======================================+==================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                      |       |                  |       |                                  |
                                      |       |                  |       |210(B1A2)+637(A4)+0()+0()         |
             | Approach 3|            |-------                   -------|                                  |
3:  LT=   0 | |          | 2:RT=   0  |                          <- 210 |           = 847 vph              |
   TH=   0  | |          |   TH= 630  |                          <- 210 |==================================|
  RT=   0   | v          |   LT=  30  |                          <- 210 | Step 8. INTERSECTION LEVEL OF    |
-------------             ------------|                          v-  14 |         SERVICE                  |
                         <--Approach 2 |                          v-  17 |     (compare step 7 with table 6)|
                                      |                                  |              -------             |
                                      |                                  |              | A |             |
 Approach 1-->                        | 37 ->                            |              -------             |
-------------             ------------| 37 ->              < < >         |==================================|
1:LT=   0   |            ^ | 4: RT= 910 | 37 ->              | | |         | Step 9. RECALCULATE             |
  TH= 110   |            | |   TH=   0 | 10 -v                            |                                  |
  RT=  10   |            | |   LT= 970 |-------              5 4 9 -------|Geometric Change:                 |
            | Approach 4|             |       |              3 3 1 |     |Signal Change:                    |
                                      |       |              4 7 0 |     |Volume Change:                    |
======================================+==================================+==================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                      |         (two phase signal)        |                                  |
          <--  A2B1                   |          | Approach 3|            |                                  |
          v--                         |          |           |            |                                  |
      --> <--  A1A2                   |          |           |            |                                  |
                                      |          |           |            |                                  |
       <   ^   A4B3                   |------------           ------------|                                  |
       |   |                          | Approach 1                        |                                  |
                                      |                                   |                                  |
                                      |          See Step 6b.             |                                  |
                                      |                                   |                                  |
                                      |                       Approach 2  |                                  |
                                      |------------           ------------|                                  |
                                      |          |           |            |                                  |
--------------------------------------|          |           |            |                                  |
A1 -->   A3 |      B1 v--    B3    <| |          |           |            |                                  |
           v ^                      | | |          | Approach 4|            | Exclusive right turns reduced 30 %|
A2 <--   A4   |    B2 --^    B4 |>    |                                   | V/C Ratio = .59                  |
============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN RD AND VINEYARD RD                            Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:VINEYARD RD   |                -------Approach-----|         MULTIPHASE SIGNAL OVERLAP   |
            |          |      ^        |                : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
            |  R   L   |      N        |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |               | intervals/hour :                   |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT        | change (vph)   :                   |------------------------------------|
     LT--^     v v v     <^-RTH        |c.G/C ratio     :  0    0    1    0|A2B1   110(B1)  223- 110= 113(A2)  110|
     LTH-^>              <--TH   3     |d.Opposing volume : 670  0  190    0|A1A2   518(A1) OR  113(A2)          518|
  3   TH-->              <v-LTH        | in vph         :                   |A4B3   133(A4) OR   44(B3)          133|
     RTH-v>    ^ ^ ^      v--LT  2     |e.LT capacity on :  0    0 1010    0|                                    |
  1  RT--v    < < | > >   Approach 2   | green (vph)    :                   |                                    |
------------- L L T R R  -------------|f.LT capacity in :  0    0 1010    0|                                    |
            | T T H T T |FLORIN RD     | vph (b+e)      :                   |                                    |
            |   H   H   |              |g.Left turn volume :  0  0    0    0|                                    |
            | 2       1 |              | in vph         :                   |                                    |
            | Approach 4:VINEYARD RD   |h.Is volume > cap. : NO       NO    :                                    |
                                       | (g>f) ?        :                   |                                    |
=======================================+=====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                       |        |                    |       |                                    |
                                       |        |                    |       |628(B1A1)+133(A4)+0()+0()           |
            | Approach 3|              |-------                      -------|                                    |
 3:  LT=   0 | |        | 2:RT=   0    |                            <- 223 |           = 761 vph                |
    TH=   0  | |        |   TH= 670    |                            <- 223 |=====================================|
   RT=   0   | v        |   LT= 200    |                            <- 223 | Step 8. INTERSECTION LEVEL OF       |
-------------           -------------|                            v-  90 |          SERVICE                   |
                       <--Approach 2   |                            v- 110 |     (compare step 7 with table 6)  |
                                       |                                   |              -------               |
                                       |                                   |              | A |                 |
 Approach 1-->                         | 163 ->                            |              -------               |
-------------           -------------| 163 ->              < < >         |=====================================|
 1:LT=   0   |           ^ | 4: RT= 190 | 163 ->              | | |         | Step 9. RECALCULATE                 |
   TH= 490   |           | |   TH=   0 | 740 -v                            |                                    |
   RT= 740   |           | |   LT=  80 |-------                1  -------|Geometric Change:                   |
             | Approach 4|              |        |           4 3 9 |       |Signal Change:                      |
                                       |        |           4 6 0 |       |Volume Change:                      |
=======================================+=====================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                           |
                                       |          (two phase signal)         |                                    |
          <--  A2B1                    |            | Approach 3|            |                                    |
          v--                          |            |           |            |                                    |
      --> <--  A1A2                    |            |           |            |                                    |
                                       |            |           |            |                                    |
        <   ^  A4B3                    |------------            ------------|                                    |
        |   |                          | Approach 1                          |                                    |
                                       |                                     |                                    |
                                       |          See Step 6b.               |                                    |
                                       |                                     |                                    |
                                       |                        Approach 2   |                                    |
                                       |------------            ------------|                                    |
                                       |            |           |            |                                    |
---------------------------------------|            |           |            |                                    |
 A1 -->   A3 |     B1 v--    B3    <|  |            |           |            |                                    |
             v ^                  | |  |            | Approach 4|            | Exclusive right turns reduced 30 % |
 A2 <--   A4  |    B2 --^    B4 |>     |                                     | V/C Ratio = .53                    |
===============================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND EXCELSIOR RD                               Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:EXCELSIOR RD |              -------Approach-----|      MULTIPHASE SIGNAL OVERLAP |
            | 1   1   1 |      ^    |                : -1-  -2-  -3-  -4-|   Possible    Volume   Adjusted|
            |   R   L   |      N    |a.No. of change  :   0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |           | intervals/hour  :                  |able   Volume   to next    Volume |
----------- T H H H T  -------------|b.LT capacity on :   0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1   | change (vph)    :                  |---------------------------------|
   1  LT--^    v v v    <^-RTH      |c.G/C ratio      :   0    0    0    0|B2B1   50(B1)  340-  50= 290(B2)  50|
      LTH-^>            <--TH   2   |d.Opposing volume :  0    0    0    0|A1B2  290(B2)  350- 290=  60(A1) 290|
   2   TH-->            <v-LTH      | in vph          :                  |A1A2  285(A2) OR   60(A1)        285|
      RTH-v>   ^ ^ ^     v--LT  1   |e.LT capacity on :   0    0    0    0|B4B3    0(B4)   40-   0=  40(B3)   0|
   1  RT--v  < < | > >  Approach 2  | green (vph)     :                  |A4B3   40(B3)  710-  40= 670(A4)  40|
-----------  L L T R R -------------|f.LT capacity in :   0    0    0    0|A3A4  670(A4) OR   42(A3)        670|
            | T T H T T |FLORIN RD  | vph (b+e)       :                  |                                 |
            |   H   H   |           |g.Left turn volume : 0    0    0    0|                                 |
            | 1   1   1 |           | in vph          :                  |                                 |
            | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                :                                 |
                                    | (g>f) ?         :                  |                                 |
====================================+==================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |      |                     |     |                                 |
                                    |      |                     |     |340(B1B2)+285(A2)+40(B4B3)+670(A4)|
            | Approach 3|           |-------  6 3             -------  |                                 |
3:  LT=   0 | |         | 2:RT=  10 |         0 0 0            ^-  10  |         = 1335 vph              |
    TH=  30 | |         |   TH= 570 |         | | |            <- 285  |=================================|
    RT=  60 | v         |   LT=  50 |         < v >            <- 285  | Step 8. INTERSECTION LEVEL OF   |
-----------              -----------|                          v-  50  |         SERVICE                 |
                       <--Approach 2 |                                 |    (compare step 7 with table 6) |
                                    |                                  |           -------               |
                                    |                                  |           |  E  |             |
 Approach 1-->                      | 340 -^                           |           -------               |
-----------              -----------| 350 ->              < ^ >        |=================================|
1:LT= 340   |           ^ | 4: RT= 140 | 350 ->              | | |     | Step 9. RECALCULATE             |
  TH= 700   |           | |    TH= 710 |  10 -v                        |                                 |
  RT=  10   |           | |    LT=  40 |-------               7 1 -------|Geometric Change:               |
            | Approach 4|           |       |               4 1 4 |     |Signal Change:                   |
                                    |       |               0 0 0 |     |Volume Change:                   |
====================================+==================================+=================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                       |
                                    |         (two phase signal)       |                                 |
       --^ v--  B2B1                |            | Approach 3|         |                                 |
                                    |            |           |         |                                 |
   --^ AND <--     A1B2 AND         |            |           |         |                                 |
   --> OR  v--     /OR A2B1         |            |           |         |                                 |
       --> <--  A1A2                |------------            ----------|                                 |
                                    | Approach 1                       |                                 |
        |   <   B4B3                |                                  |                                 |
        >   |                       |          See Step 6b.            |                                 |
   | | AND < ^     A3B4 AND         |                                  |                                 |
   v > OR  | |     /OR A4B3         |                     Approach 2   |                                 |
        |   ^   A3A4                |------------            ----------|                                 |
        v   |                       |            |           |         |                                 |
------------------------------------|            |           |         |                                 |
 A1 -->   A3 |      B1 v--    B3  <| |            |           |         |                                 |
            v ^                 | | |            | Approach 4|         | Exclusive right turns reduced 30 % |
 A2 <--   A4  |     B2 --^    B4 |> |                                  | V/C Ratio = .97                 |
==========================================================================================
```

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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: FLORIN RD AND EXCELSIOR RD                           Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
              | Approach 3:EXCELSIOR RD |             -------Approach-----|          MULTIPHASE SIGNAL OVERLAP |
              | 1   1   1 |      ^      |             : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
              |  R   L    |      N      |a.No. of change  :  0    0    0    0|Prob-   Critical  Carryover  Critical|
FLORIN RD     | R T T T L |             | intervals/hour  :                  |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase      in vph |
 Approach 1   < < | > >    ^--RT  1   | change (vph)    :                  |-------------------------------------|
   1  LT--^     v v v     <^-RTH      |c.G/C ratio      :  0    0    0    0|B2B1    90(B2)  360-  90= 270(B1)    90|
     LTH-^>               <--TH   2   |d.Opposing volume :  0    0    0    0|A2B1   270(B1)  245- 270=   0(A2)   270|
   2   TH-->              <v-LTH      | in vph          :                  |A1A2   265(A1) OR    0(A2)          265|
     RTH-v>     ^ ^ ^      v--LT  1   |e.LT capacity on :  0    0    0    0|B4B3    10(B4)   10-  10=   0(B3)    10|
   1  RT--v   < < | > >   Approach 2  | green (vph)     :                  |A4B3     0(B3)  150-   0= 150(A4)     0|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   460(A3) OR  150(A4)           460|
              | T T H T T |FLORIN RD  | vph (b+e)       :                  |                                     |
              |   H   H   |           |g.Left turn volume :  0    0    0    0|                                     |
              | 1   1   1 |           | in vph          :                  |                                     |
              | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                :                                     |
                                      | (g>f) ?         :                  |                                     |
======================================+==================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                      |       |                     |    |                                     |
                                      |       | 3 4                 |    |360(B2B1)+265(A1)+10(B4B3)+460(A3)   |
              | Approach 3|           |-------  8 6 1              -------|                                     |
 3:  LT=  10  | |          | 2:RT=   0 |        0 0 0              ^-   0 |         = 1095 vph                  |
    TH= 460   | |          |   TH= 490 |        | | |              <- 245 |=====================================|
   RT= 380    | v          |   LT= 360 |        < v >              <- 245 | Step 8. INTERSECTION LEVEL OF       |
------------              -------------|                           v- 360 |        SERVICE                      |
                         <--Approach 2 |                                   |     (compare step 7 with table 6)   |
                                      |                                   |             -------                 |
                                      |                                   |             |  C  |                 |
 Approach 1-->                        |  90 -^                            |             -------                 |
-------------              -------------| 265 ->            < ^ >          |=====================================|
 1:LT=  90    |              ^ | 4: RT=  50 | 265 ->            | | |          | Step 9. RECALCULATE                 |
   TH= 530    |              | |   TH= 150  |  40 -v                         |                                     |
   RT=  40    |              | |   LT=  10  |-------             1    -------|Geometric Change:                    |
              | Approach 4|           |       |            1 5 5 |    |Signal Change:                       |
                                      |       |            0 0 0 |    |Volume Change:                       |
======================================+==================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                      |        (two phase signal)        |                                     |
        --^ v--  B2B1                 |          | Approach 3|           |                                     |
                                      |          |           |           |                                     |
     --^ AND <--    A1B2 AND          |          |           |           |                                     |
     --> OR  v--    /OR A2B1          |          |           |           |                                     |
        --> <--  A1A2                 |-------------         ------------|                                     |
                                      | Approach 1                        |                                     |
         |   <   B4B3                 |                                   |                                     |
         >   |                        |          See Step 6b.             |                                     |
     | | AND < ^    A3B4 AND          |                                   |                                     |
     v > OR  | |    /OR A4B3          |                      Approach 2   |                                     |
         |   ^   A3A4                 |-------------         ------------|                                     |
         v   |                        |          |           |           |                                     |
--------------------------------------|          |           |           |                                     |
 A1 -->   A3 |      B1 v--    B3   <| |          |           |           |                                     |
             v ^                   | | |          | Approach 4|           | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4 |>  |                                   | V/C Ratio = .8                      |
=============================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER RD AND ELK GROVE-FLORIN RD                          Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR     |
            | Approach 3:ELK GROVE-FLO|         -------Approach-----|        MULTIPHASE SIGNAL OVERLAP   |
            | 1   3   2 |      ^      |         : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
            |   R   L   |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD   | R T T T L |             | intervals/hour  :               |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)    :               |------------------------------------|
   2  LT--^     v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1    28(B1)  154-  28= 126(B2)    28|
      LTH-^>             <--TH   2    |d.Opposing volume :  0    0    0    0|A1B2   126(B2)  215- 126=  89(A1)   126|
   2   TH-->             <v-LTH       | in vph          :               |A1A2   500(A2) OR   89(A1)         500|
      RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3   127(B4)  440- 127= 313(B3)   127|
   1  RT--v   < < | > >  Approach 2   | green (vph)     :               |A4B3   313(B3) 1027- 313= 714(A4)   313|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   714(A4) OR  323(A3)          714|
            | T T H T T |GERBER RD    | vph (b+e)       :               |                                    |
            |   H   H   |             |g.Left turn volume :  0    0    0    0|                                    |
            | 2   3   1 |             | in vph          :               |                                    |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :               :                                    |
                                      | (g>f) ?         :               |                                    |
======================================+=================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                      |       |                   |     |                                    |
                                      |       | 1 3 3 3 1 1       |     |154(B1B2)+500(A2)+440(B4B3)+714(A4) |
            | Approach 3|             |-------  4 2 2 2 0 2        -------|                                    |
 3:  LT= 230 | |         | 2:RT= 320  |         0 3 3 3 4 7        ^- 320 |          = 1808 vph                |
    TH= 970 | |          |   TH=1000  |         | | | | | |        <- 500 |====================================|
    RT= 140 | v          |   LT=  50  |         < v v v > >        <- 500 | Step 8. INTERSECTION LEVEL OF      |
-------------             ------------|                            v-  23 |         SERVICE                    |
                          <--Approach 2 |                          v-  28 |      (compare step 7 with table 6) |
                                      |                                 |             -------                |
                                      | 154 -^                          |             |  F  |                |
 Approach 1-->                        | 126 -^                          |             -------                |
-------------             ------------| 215 ->         < < ^ ^ ^ >      |====================================|
 1:LT= 280  |            ^ | 4: RT= 110 | 215 ->         | | | | | |      | Step 9. RECALCULATE                |
    TH= 430 |            | |   TH=3080 | 300 -v             1 1 1        |                                    |
    RT= 300 |            | |   LT= 800 |-------         4 3 0 0 0 1 -------|Geometric Change:                   |
            | Approach 4|             |       |        4 6 2 2 2 1 |     |Signal Change:                      |
                                      |       |        0 0 7 7 7 0 |     |Volume Change:                      |
======================================+=================================+====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                      |         (two phase signal)      |                                    |
       --^ v--  B2B1                  |           | Approach 3|         |                                    |
                                      |           |           |         |                                    |
    --^ AND <--     A1B2 AND          |           |           |         |                                    |
    --> OR  v--     /OR A2B1          |           |           |         |                                    |
       --> <--  A1A2                  |------------            ------------|                                    |
                                      | Approach 1                      |                                    |
        |  <    B4B3                  |                                 |                                    |
        >  |                          |          See Step 6b.           |                                    |
    | | AND < ^     A3B4 AND          |                                 |                                    |
    v > OR  | |     /OR A4B3          |                     Approach 2  |                                    |
        |  ^    A3A4                  |------------            ------------|                                    |
        v  |                          |           |           |         |                                    |
--------------------------------------|           |           |         |                                    |
A1 -->   A3 |      B1 v--    B3   <|  |           |           |         |                                    |
            v ^                  | |  |           | Approach 4|         | Exclusive right turns reduced 30 % |
A2 <--   A4  |     B2 --^    B4 |>    |                                 | V/C Ratio = 1.31                   |
============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: GERBER RD AND ELK GROVE-FLORIN RD                         Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
              | Approach 3:ELK GROVE-FLO|          -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
              | 1   3   2 |      ^      |          : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
              |  R   L    |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD     | R T T T L |             | intervals/hour  :                   |able    Volume   to next    Volume |
------------- T H H H T  ------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1   | change (vph)    :                   |---------------------------------|
  2  LT--^     v v v     <^-RTH      |c.G/C ratio      :  0    0    0    0|B2B1   66(B1)  77-  66=  11(B2)   66|
     LTH-^>               <--TH   2  |d.Opposing volume :  0    0    D    0|A1B2   11(B2) 595-  11= 584(A1)   11|
  2   TH-->               <v-LTH     | in vph          :                   |A1A2  584(A1) OR  285(A2)         584|
     RTH-v>    ^ ^ ^      v--LT  2   |e.LT capacity on  :  0    0    0    0|B4B3  193(B3) 237- 193=  44(B4)  193|
  1  RT--v    < < | > >   Approach 2 | green (vph)     :                   |A3B4   44(B4) 800-  44= 756(A3)   44|
------------- L L T R R  ------------|f.LT capacity in  :  0    0    0    0|A3A4  756(A3) OR  507(A4)         756|
              | T T H T T |GERBER RD  | vph (b+e)       :                   |                                 |
              |   H   H   |           |g.Left turn volume :  0    0    0    0|                                 |
              | 2   3   1 |           | in vph          :                   |                                 |
              | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                   :                                 |
                                     | (g>f) ?         :                   |                                 |
=====================================+===================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |        |                   |       |                                 |
                                     |        | 2 8 8 8 1 2       |       |77(B1B2)+584(A1)+237(B3B4)+756(A3)|
              | Approach 3|          |-------   7 0 0 0 9 3        -------|                                 |
 3:  LT= 430 | |          | 2:RT= 360 |         0 0 0 0 4 7     ^- 360   |          = 1654 vph             |
   TH=2400   | |          |   TH= 570 |         | | | | | |     <- 285   |=================================|
   RT= 270   | v          |   LT= 120 |         < v v v > >     <- 285   | Step 8. INTERSECTION LEVEL OF   |
-------------              ------------|                         v-  54   |          SERVICE                |
                        <--Approach 2 |                         v-  66   |     (compare step 7 with table 6)|
                                     |                                   |            -------              |
                                     | 77 -^                             |            | F |                |
 Approach 1-->                       | 63 -^                             |            -------              |
-------------              ------------| 460 ->        < < ^ ^ ^ >         |=================================|
 1:LT= 140   |            ^ | 4: RT=  60 | 460 ->        | | | | | |         | Step 9. RECALCULATE              |
   TH= 920   |            | |   TH=1520 | 850 -v                            |                                 |
   RT= 850   |            | |   LT= 350 |-------        1 1 5 5 5   -------|Geometric Change:                |
             | Approach 4|           |       |       9 5 0 0 0 6 |       |Signal Change:                   |
                                     |       |       3 8 7 7 7 0 |       |Volume Change:                   |
=====================================+===================================+=================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                        |
                                     |        (two phase signal)          |                                 |
       --^ v--   B2B1                |           | Approach 3|            |                                 |
                                     |           |           |            |                                 |
   --^ AND <--     A1B2 AND          |           |           |            |                                 |
   --> OR  v--     /OR A2B1          |           |           |            |                                 |
       --> <--   A1A2                |-------------           ------------|                                 |
                                     | Approach 1                         |                                 |
        |  <     B4B3                |                                   |                                 |
        >  |                         |          See Step 6b.              |                                 |
   | | AND < ^     A3B4 AND          |                                   |                                 |
   v > OR  | |     /OR A4B3          |                       Approach 2  |                                 |
        |  ^     A3A4                |-------------           ------------|                                 |
        v  |                         |           |           |            |                                 |
-------------------------------------|           |           |            |                                 |
A1 -->    A3 |     B1 v--     B3   <| |           |           |            |                                 |
            v ^                    | | |           | Approach 4|            | Exclusive right turns reduced 30 %|
A2 <--    A4  |    B2 --^     B4  |> |                                   | V/C Ratio = 1.2                 |
=============================================================================================
```

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                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                                 Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR          |
              | Approach 3:WATERMAN RD |                 -------Approach-----|          MULTIPHASE SIGNAL OVERLAP     |
              | 1   2   2 |      ^     |                  : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
              |   R   L   |      N     |a.No. of change   :   0    0    0    0|Prob-  Critical   Carryover  Critical|
GERBER RD     | R T T T L |            | intervals/hour   :                   |able    Volume     to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :   0    0    0    0|Phase   in vph      phase     in vph |
 Approach 1   < < | > >   ^--RT  1     | change (vph)     :                   |-----------------------------------------|
   2  LT--^     v v v    <^-RTH        |c.G/C ratio       :   0    0    0    0|B2B1    11(B1)  105-  11=  94(B2)     11|
      LTH-^>             <--TH   2     |d.Opposing volume :   0    0    0    0|A1B2    94(B2)  195-  94= 101(A1)     94|
   2   TH-->             <v-LTH        | in vph           :                   |A1A2   375(A2) OR  101(A1)            375|
      RTH-v>    ^ ^ ^     v--LT  2     |e.LT capacity on  :   0    0    0    0|B4B3    77(B4)   99-  77=  22(B3)     77|
   1  RT--v   < < | > >   Approach 2   | green (vph)      :                   |A4B3    22(B3)  635-  22= 613(A4)     22|
------------- L L T R R  -------------|f.LT capacity in  :   0    0    0    0|A3A4   613(A4) OR  110(A3)            613|
              | T T H T T |GERBER RD   | vph (b+e)        :                   |                                         |
              |   H   H   |            |g.Left turn volume :  0    0    0    0|                                         |
              | 2   2   1 |            | in vph           :                   |                                         |
              | Approach 4:WATERMAN RD |h.Is volume > cap. :                  :                                         |
                                       | (g>f) ?          :                   |                                         |
=======================================+========================================+=========================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES         |
                                       |        |                        |     |                                         |
                                       |        |   1 1                  |     |105(B1B2)+375(A2)+99(B4B3)+613(A4)       |
              | Approach 3|            |-------  4 1 1 6 7              -------|                                         |
 3:  LT= 140  | |         | 2:RT= 340  |         0 0 0 3 7              ^- 340 |            = 1192 vph                   |
     TH= 220  | |         |   TH= 750  |         | | | | |              <- 375 |=========================================|
     RT=  40  | v         |   LT=  20  |         < v v > >              <- 375 | Step 8. INTERSECTION LEVEL OF           |
-------------              ------------|                                v-   9 |         SERVICE                         |
                          <--Approach 2|                                v-  11 |      (compare step 7 with table 6)      |
                                       |                                       |               -------                   |
                                       | 105 -^                                |               |  D  |                   |
 Approach 1-->                         |  86 -^                                |               -------                   |
-------------              ------------| 195 ->           < < ^ ^ >            |=========================================|
 1:LT= 190    |          ^ | 4: RT= 400| 195 ->           | | | | |            | Step 9. RECALCULATE                     |
   TH= 390    |          | |   TH=1270 |  70 -v                                |                                         |
   RT=  70    |          | |   LT= 180 |-------               6 6 4   -------|Geometric Change:                       |
              | Approach 4|            |        |          9 8 3 3 D |         |Signal Change:                           |
                                       |        |          9 1 5 5 0 |         |Volume Change:                           |
=======================================+========================================+=========================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                                |
                                       |        (two phase signal)             |                                         |
        --^ v--   B2B1                 |             | Approach 3|             |                                         |
                                       |             |           |             |                                         |
     --^ AND <--     A1B2 AND          |             |           |             |                                         |
     --> OR  v--     /OR A2B1          |             |           |             |                                         |
        --> <--   A1A2                 |------------              -------------|                                         |
                                       | Approach 1                            |                                         |
         |  <    B4B3                  |                                       |                                         |
         >  |                          |          See Step 6b.                 |                                         |
     | | AND < ^     A3B4 AND          |                                       |                                         |
     v > OR  | |     /OR A4B3          |                           Approach 2  |                                         |
         |  ^    A3A4                  |------------              ------------|                                         |
         v  |                          |             |           |             |                                         |
---------------------------------------|             |           |             |                                         |
 A1 -->   A3 |      B1 v--    B3   <|  |             |           |             |                                         |
             v ^                    | |  |             | Approach 4|             | Exclusive right turns reduced 30 %      |
 A2 <--   A4  |     B2 --^    B4 |>    |                                       | V/C Ratio = .87                         |
==========================================================================================
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
ntersection: GERBER RD AND WATERMAN RD                          Design Hour: PM
.roblem Statement: CUMULATIVE NO PROJECT
=========================================================================================
Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR    |
           | Approach 3:WATERMAN RD |            -------Approach-----|       MULTIPHASE SIGNAL OVERLAP   |
           | 1  2  2 |     ^       |                 : -1- -2- -3- -4-|       Possible   Volume   Adjusted|
           |  R  L   |     N       |a.No. of change  :  0   0   0   0|Prob-  Critical  Carryover Critical|
ERBER RD   | R T T T L |           | intervals/hour  :                |able    Volume   to next   Volume |
------------ T H H H T ------------|b.LT capacity on :  0   0   0   0|Phase   in vph    phase    in vph |
 Approach 1  < < | > >  ^--RT  1   | change (vph)    :                |-----------------------------------|
  2  LT--^    v v v    <^-RTH      |c.G/C ratio      :  0   0   0   0|B2B1   94(B2)  121-  94=  27(B1)  94|
   LTH-^>              <--TH   2   |d.Opposing volume:  0   0   0   0|A2B1   27(B1)  275-  27= 248(A2)  27|
  2  TH-->             <v-LTH      | in vph          :                |A1A2  420(A1) OR  248(A2)        420|
   RTH-v>     ^ ^ ^     v--LT  2   |e.LT capacity on :  0   0   0   0|B4B3   28(B3)   83-  28=  55(B4)  28|
  1  RT--v   < < | > >  Approach 2 | green (vph)     :                |A3B4   55(B4)  550-  55= 495(A3)  55|
------------ L L T R R ------------|f.LT capacity in :  0   0   0   0|A3A4  495(A3) OR  220(A4)        495|
           | T T H T T |GERBER RD  | vph (b+e)       :                |                                   |
           |   H   H   |           |g.Left turn volume:  0   0   0   0|                                   |
           | 2   2   1 |           | in vph          :                |                                   |
           | Approach 4:WATERMAN RD|h.Is volume > cap.:               :                                   |
                                   | (g>f) ?         :                |                                   |
===================================+=================================+===================================|
Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |       |                     |   |                                   |
                                   |       | 2 5 5               |   |121(B2B1)+420(A1)+83(B3B4)+495(A3) |
           | Approach 3|           |-------  9 5 5 6 8          -------|                                   |
3:  LT= 150 | |        | 2:RT=  80 |         0 0 0 8 3          ^-  80|         = 1119 vph               |
  TH=1100  | |         |   TH= 550 |         | | | | |          <- 275|===================================|
  RT= 290  | v         |   LT= 220 |         < v v > >          <- 275| Step 8. INTERSECTION LEVEL OF    |
------------            -----------|                            v-  99|         SERVICE                  |
                     <--Approach 2 |                            v- 121|     (compare step 7 with table 6) |
                                   |                                  |             -------               |
                                   |  94 -^                           |             | D |                 |
Approach 1-->                      |  77 -^                           |             -------               |
------------            -----------| 420 ->          < < ^ ^ >        |===================================|
1:LT= 170  |          ^ | 4: RT= 200| 420 ->          | | | | |        | Step 9. RECALCULATE              |
  TH= 840  |          | |   TH= 440| 300 -v                           |                                   |
  RT= 300  |          | |   LT=  50|-------              2 2 2 -------|Geometric Change:                  |
           | Approach 4|           |        |        2 2 2 2 0 |      |Signal Change:                     |
                                   |        |        8 3 0 0 0 |      |Volume Change:                     |
===================================+=================================+===================================|
Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph| COMMENTS                          |
                                   |      (two phase signal)         |                                   |
      --^ v--  B2B1                |           | Approach 3|         |                                   |
                                   |           |           |         |                                   |
   --^ AND <--    A1B2 AND         |           |           |         |                                   |
   --> OR  v--    /OR A2B1         |           |           |         |                                   |
      --> <--  A1A2                |------------          -----------|                                   |
                                   | Approach 1                      |                                   |
      |  <   B4B3                  |                                 |                                   |
      >  |                         |          See Step 6b.           |                                   |
  | | AND < ^    A3B4 AND          |                                 |                                   |
  v > OR  | |    /OR A4B3          |                     Approach 2  |                                   |
      |  ^   A3A4                  |------------          -----------|                                   |
      v  |                         |           |           |         |                                   |
-----------------------------------|           |           |         |                                   |
A1 -->  A3 |     B1 v--    B3  <|  |           |           |         |                                   |
          v ^                  | | |           | Approach 4|         | Exclusive right turns reduced 30 %|
A2 <--  A4  |    B2 --^    B4 |>   |                                 | V/C Ratio = .81                   |
=========================================================================================
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                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER RD AND BRADSHAW RD                             Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR   |
           | Approach 3:BRADSHAW RD  |          -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
           | 1   3   2 |      ^      |          : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
           |   R   L   |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover Critical|
GERBER RD  | R T T T L |             | intervals/hour :                  |able   Volume   to next   Volume |
-----------  T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1    | change (vph)   :                  |----------------------------------|
   2  LT--^    v v v    <^-RTH       |c.G/C ratio     :  0    0    0    0|B2B1    28(B1)  187-  28= 159(B2)  28|
      LTH-^>            <--TH   2    |d.Opposing volume :  0    0    0    0|A1B2   159(B2)  115- 159=   0(A1) 159|
   2  TH-->             <v-LTH       | in vph         :                  |A1A2   235(A2) OR   0(A1)        235|
      RTH-v>   ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3    22(B4)   88-  22=  66(B3)  22|
   1  RT--v  < < | > >  Approach 2   | green (vph)    :                  |A4B3    66(B3)  717-  66= 651(A4)  66|
-----------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   651(A4) OR  193(A3)        651|
           | T T H T T |GERBER RD    | vph (b+e)      :                  |                                  |
           |   H   H   |             |g.Left turn volume :  0    0    0    0|                                  |
           | 2   3   1 |             | in vph         :                  |                                  |
           | Approach 4:BRADSHAW RD  |h.Is volume > cap. :                 :                                  |
                                     | (g>f) ?        :                  |                                  |
=====================================+================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |       |                    |    |                                  |
                                     |       | 2 1 1 1            |    |187(B1B2)+235(A2)+88(B4B3)+651(A4) |
           | Approach 3|             |-------  0 9 9 9 1 2       -------|                                  |
3:  LT=  40 | |        | 2:RT= 220   |         0 3 3 3 8 2       ^- 220 |          = 1161 vph              |
   TH= 580 | |         |   TH= 470   |         | | | | | |       <- 235 |==================================|
   RT= 200 | v         |   LT=  50   |         < v v v > >       <- 235 | Step 8. INTERSECTION LEVEL OF    |
-----------             -------------|                           v-  23 |         SERVICE                  |
                        <--Approach 2|                           v-  28 |    (compare step 7 with table 6) |
                                     |                                  |              -------             |
                                     | 187 -^                           |              | D |               |
Approach 1-->                        | 153 -^                           |              -------             |
-----------             -------------| 115 ->         < < ^ ^ ^ >       |==================================|
1:LT= 340   |            ^ | 4: RT=  60 | 115 ->      | | | | | |       | Step 9. RECALCULATE              |
  TH= 230   |           | |   TH=2150 |  50 -v                          |                                  |
  RT=  50   |           | |   LT= 160 |-------           7 7 7  -------|Geometric Change:                 |
            | Approach 4|             |       |      8 7 1 1 1 6 |     |Signal Change:                    |
                                     |       |      8 2 7 7 7 0 |     |Volume Change:                    |
=====================================+================================+==================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                     |        (two phase signal)        |                                  |
      --^ v--  B2B1                  |          | Approach 3|           |                                  |
                                     |          |           |           |                                  |
   --^ AND <--    A1B2 AND           |          |           |           |                                  |
   --> OR  v--    /OR A2B1           |          |           |           |                                  |
      --> <--  A1A2                  |-------------         ------------|                                  |
                                     | Approach 1                       |                                  |
       |  <    B4B3                  |                                  |                                  |
       >  |                          |          See Step 6b.            |                                  |
   | | AND < ^    A3B4 AND           |                                  |                                  |
   v > OR  | |    /OR A4B3           |                      Approach 2  |                                  |
       |  ^    A3A4                  |-------------         ------------|                                  |
       v  |                          |          |           |           |                                  |
-------------------------------------|          |           |           |                                  |
A1 -->  A3 |     B1 v--    B3   <|   |          |           |           |                                  |
          v ^                 | |    |          | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--  A4   |   B2 --^    B4 |>     |                                  | V/C Ratio = .84                  |
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                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: GERBER RD AND BRADSHAW RD                                 Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==============================================================================================
Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR |
            | Approach 3:BRADSHAW RD |                -------Approach-----|         MULTIPHASE SIGNAL OVERLAP |
            | 1   3   2 |    ^     |                : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
            |  R    L   |    N     |a.No. of change :   0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD   | R T T T L |          | intervals/hour :                   |able   Volume    to next    Volume |
------------- T H H H T -----------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1 |  change (vph)  :                   |-----------------------------------|
   2  LT--^    v v v     <^-RTH    |c.G/C ratio     :   0    0    0    0|B2B1    28(B1)  154-  28= 126(B2)   28|
      LTH-^>             <--TH   2 |d.Opposing volume :  0    0    0    0|A1B2   126(B2)  230- 126= 104(A1)  126|
   2   TH-->             <v-LTH    | in vph         :                   |A1A2   130(A2) OR  104(A1)        130|
      RTH-v>   ^ ^ ^      v--LT  2 |e.LT capacity on :  0    0    0    0|B4B3    39(B3)   83-  39=  44(B4)   39|
   1  RT--v   < < | > >  Approach 2|  green (vph)   :                   |A3B4    44(B4)  893-  44= 849(A3)   44|
------------- L L T R R -----------|f.LT capacity in :  0    0    0    0|A3A4   849(A3) OR  260(A4)        849|
            | T T H T T |GERBER RD |  vph (b+e)     :                   |                                   |
            |   H    H  |          |g.Left turn volume : 0    0    0    0|                                   |
            | 2   3   1 |          |  in vph        :                   |                                   |
            | Approach 4:BRADSHAW RD |h.Is volume > cap. :               :|                                   |
                                   |  (g>f) ?       :                   |                                   |
===================================+================================+===================================|
Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |       |                        |   |                                   |
                                   |       | 5 8 8 8                |   |154(B1B2)+130(A2)+83(B3B4)+849(A3) |
            | Approach 3|          |-------  0 9 9 9 6 8          -------|                                   |
3:  LT= 150 | |          | 2:RT=  80 |       0 3 3 3 8 3          ^-  80 |         = 1216 vph               |
   TH=2680  | |          |   TH= 260 |       | | | | | |          <- 130 |===================================|
   RT= 500  | v          |   LT=  50 |       < v v v > >          <- 130 | Step 8. INTERSECTION LEVEL OF     |
-------------             -----------|                            v-  23 |       SERVICE                     |
                         <--Approach 2 |                          v-  28 |   (compare step 7 with table 6)   |
                                   |                                    |             -------               |
                                   | 154 -^                             |             |  D  |               |
Approach 1-->                      | 126 -^                             |             -------               |
-------------             ---------| 230 ->          < < ^ ^ ^ >        |===================================|
1:LT= 280   |           ^ | 4: RT=  60 | 230 ->      | | | | | |        | Step 9. RECALCULATE               |
  TH= 460   |           | |   TH= 780 | 220 -v                          |                                   |
  RT= 220   |           | |   LT=  70 |-------         2 2 2    -------|Geometric Change:                   |
            | Approach 4|          |       |       3 3 6 6 6 6 |        |Signal Change:                     |
                                   |       |       9 2 0 0 0 0 |        |Volume Change:                     |
===================================+================================+===================================|
Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                   |        (two phase signal)      |                                   |
      --^ v--  B2B1                |           | Approach 3|        |                                   |
                                   |           |           |        |                                   |
   --^ AND <--     A1B2 AND        |           |           |        |                                   |
   --> OR  v--     /OR A2B1        |           |           |        |                                   |
      --> <--  A1A2                |-----------             ------------|                                   |
                                   | Approach 1                         |                                   |
      |  <   B4B3                  |                                    |                                   |
      >  |                         |          See Step 6b.              |                                   |
   | | AND < ^     A3B4 AND        |                                    |                                   |
   v > OR  | |     /OR A4B3        |                      Approach 2    |                                   |
      |  ^   A3A4                  |-----------             ------------|                                   |
      v  |                         |           |           |        |                                   |
-----------------------------------|           |           |        |                                   |
A1 -->   A3 |      B1 v--    B3  <| |          |           |        |                                   |
           v ^                   | | |         | Approach 4|        | Exclusive right turns reduced 30 %|
A2 <--   A4  |     B2 --^    B4 |> |                                  | V/C Ratio = .88                   |
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                                         Critical Movement Analysis: PLANNING
                                                   Calculation Form 1
Intersection: GERBER RD AND VINEYARD RD                                              Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
=======================================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:VINEYARD RD |                -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
             | 1   2   2 |       ^    |                : -1-  -2-  -3-  -4-|        Possible    Volume    Adjusted|
             |   R   L   |       N    |a.No. of change  :  0    0    0    0|Prob-   Critical  Carryover  Critical|
GERBER RD    | R T T T L |            |  intervals/hour :                  |able     Volume    to next     Volume |
-------------  T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase    in vph     phase      in vph |
  Approach 1   < < | > >   ^--RT  1   |  change (vph)   :                  |-------------------------------------|
   2  LT--^     v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1     6(B1)  264-   6= 258(B2)    6|
      LTH-^>             <--TH    2   |d.Opposing volume:  0    0    0    0|A1B2   258(B2)   80- 258=   0(A1)  258|
   2   TH-->             <v-LTH       |  in vph         :                  |A1A2   126(A2) OR    0(A1)          126|
      RTH-v>    ^ ^ ^     v--LT   2   |e.LT capacity on :  0    0    0    0|B4B3     6(B4)   55-   6=  49(B3)    6|
   1  RT--v    < < | > >  Approach 2  |  green (vph)    :                  |A4B3    49(B3)  600-  49= 551(A4)   49|
-------------  L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4   551(A4) OR  112(A3)          551|
             | T T H T T |GERBER RD   |  vph (b+e)      :                  |                                     |
             |   H   H   |            |g.Left turn volume:  0    0    0    0|                                     |
             | 2   2   1 |            |  in vph         :                  |                                     |
             | Approach 4:VINEYARD RD |h.Is volume > cap.:                 :                                     |
                                      |  (g>f) ?        :                  |                                     |
======================================+====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |       |                      |     |                                     |
                                      |       | 1                    |     |264(B1B2)+126(A2)+55(B4B3)+551(A4)   |
             | Approach 3|            |-------  6                    ------|                                     |
 3:  LT=  10 | |         | 2:RT= 180  |         0 5 5 5 6         ^- 180   |          = 996 vph                  |
    TH=  10  | |         |   TH= 170  |         | | | | |         <-  85   |=====================================|
   RT= 160   | v         |   LT=  10  |         < v v > >         <-  85   | Step 8. INTERSECTION LEVEL OF       |
------------             -------------|                           v-   5   |         SERVICE                     |
                         <--Approach 2|                           v-   6   |     (compare step 7 with table 6)   |
                                      |                                    |              -------                |
                                      | 264 -^                             |              | C |                  |
 Approach 1-->                        | 216 -^                             |              -------                |
------------             -------------|  80 ->             < < ^ ^ >       |=====================================|
 1:LT= 480   |          ^ | 4: RT=  10|  80 ->             | | | | |       | Step 9. RECALCULATE                 |
   TH= 160   |          | |   TH=1200 |  20 -v                             |                                     |
   RT=  20   |          | |   LT= 100 |-------                6 6  ------|Geometric Change:                     |
             | Approach 4|            |       |           5 4 0 0 1 |      |Signal Change:                        |
                                      |       |           5 5 0 0 0 |      |Volume Change:                        |
======================================+====================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                            |
                                      |          (two phase signal)        |                                     |
        --^ v--   B2B1                |             | Approach 3|          |                                     |
                                      |             |           |          |                                     |
    --^ AND <--     A1B2 AND          |             |           |          |                                     |
    --> OR  v--     /OR A2B1          |             |           |          |                                     |
        --> <--   A1A2                |-------------             ----------|                                     |
                                      | Approach 1                         |                                     |
         |  <     B4B3                |                                    |                                     |
         >  |                         |           See Step 6b.             |                                     |
    | | AND < ^     A3B4 AND          |                                    |                                     |
    v > OR  | |     /OR A4B3          |                         Approach 2 |                                     |
         |  ^    A3A4                 |-------------             ----------|                                     |
         v  |                         |             |           |          |                                     |
--------------------------------------|             |           |          |                                     |
 A1 -->   A3 |      B1 v--     B3   <||             |           |          |                                     |
            v ^                     | ||            | Approach 4|          | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^     B4 |>  |                                    | V/C Ratio = .72                     |
=======================================================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER RD AND VINEYARD RD                         Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR |
            | Approach 3:VINEYARD RD |             -------Approach-----|      MULTIPHASE SIGNAL OVERLAP  |
            | 1   2   2 |      ^     |             : -1-  -2-  -3-  -4-|     Possible    Volume   Adjusted|
            |   R   L   |      N     |a.No. of change  :  0    0    D    0|Prob-  Critical  Carryover Critical|
GERBER RD   | R T T T L |            |  intervals/hour :               |able   Volume    to next   Volume |
------------  T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT  1   |  change (vph)   :               |-----------------------------------|
   2  LT--^     v v v    <^-RTH      |c.G/C ratio      :  0    0    0    0|B2B1    6(B1)  94-  6=  88(B2)    6|
      LTH-^>             <--TH   2   |d.Opposing volume :  0    0    0    0|A1B2   88(B2)  65- 88=   0(A1)   88|
   2   TH-->             <v-LTH      |  in vph         :               |A1A2   60(A2) OR   0(A1)          60|
      RTH-v>    ^ ^ ^     v--LT  2   |e.LT capacity on :  0    0    0    0|B4B3   17(B3)  94- 17=  77(B4)   17|
   1  RT--v   < < | > >  Approach 2  |  green (vph)    :               |A3B4   77(B4) 275- 77= 198(A3)   77|
------------  L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4  198(A3) OR  30(A4)         198|
            | T T H T T |GERBER RD   |  vph (b+e)      :               |                                   |
            |   H   H   |            |g.Left turn volume :  0    0    0    0|                                   |
            | 2   2   1 |            |  in vph         :               |                                   |
            | Approach 4:VINEYARD RD |h.Is volume > cap. :               :                                   |
                                     |  (g>f) ?        :               |                                   |
=====================================+================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |        |                |     |                                   |
                                     |        | 2 2 2          |     |94(B1B2)+60(A2)+94(B3B4)+198(A3)   |
            | Approach 3|            |-------   2 7 7 7 9       -------|                                   |
 3:  LT= 170 | |        | 2:RT=  50  |          5 5 5 7 4       ^-  50 |          = 446 vph                |
    TH= 550 | |         |   TH= 120  |          | | | | |       <-  60 |===================================|
    RT= 225 | v         |   LT=  10  |          < v v > >       <-  60 | Step 8. INTERSECTION LEVEL OF     |
------------             ------------|                          v-   5 |        SERVICE                    |
                        <--Approach 2|                          v-   6 |    (compare step 7 with table 6)  |
                                     |                                 |            -------                |
                                     |  94 -^                          |            | A |                  |
 Approach 1-->                       |  77 -^                          |            -------                |
------------             ------------|  65 ->         < < ^ ^ >        |===================================|
 1:LT= 170  |          ^ | 4: RT=  10|  65 ->         | | | | |        | Step 9. RECALCULATE               |
   TH= 130  |          | |   TH=  60 |  70 -v                          |                                   |
   RT=  70  |          | |   LT=  30 |-------                   -------|Geometric Change:                  |
            | Approach 4|            |        |       1 1 3 3 1 |      |Signal Change:                     |
                                     |        |       7 4 0 0 0 |      |Volume Change:                     |
=====================================+================================+===================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                       |
                                     |        (two phase signal)       |                                   |
        --^ v--   B2B1               |            | Approach 3|        |                                   |
                                     |            |           |        |                                   |
    --^ AND <--     A1B2 AND         |            |           |        |                                   |
    --> OR  v--     /OR A2B1         |            |           |        |                                   |
        --> <--   A1A2               |-------------           ---------|                                   |
                                     | Approach 1                      |                                   |
          |   <   B4B3               |                                 |                                   |
          >   |                      |         See Step 6b.            |                                   |
    | | AND < ^     A3B4 AND         |                                 |                                   |
    v > OR  | |     /OR A4B3         |                     Approach 2  |                                   |
          |   ^   A3A4               |-------------       ------------|                                   |
          v   |                      |            |           |        |                                   |
-------------------------------------|            |           |        |                                   |
 A1 -->    A3 |     B1 v--     B3   <|            |           |        |                                   |
           v ^                      ||            | Approach 4|        | Exclusive right turns reduced 30 %|
 A2 <--    A4  |    B2 --^     B4  |>|                                 | V/C Ratio = .32                   |
==========================================================================================
```

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                               Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER RD AND EXCELSIOR RD                                  Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR    |
              | Approach 3:EXCELSIOR RD |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP   |
              | 1   1   1 |     ^       |               : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |   R   L   |     N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover Critical|
GERBER RD     | R T T T L |             | intervals/hour  :                 |able   Volume   to next   Volume  |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph  |
 Approach 1   < < | > >   ^--RT  1    | change (vph)     :                 |-----------------------------------|
  1  LT--^     v v v     <^-RTH       |c.G/C ratio       :  0    0    0    0|B2B1   10(B1)  220-  10= 210(B2)  10|
     LTH-^>               <--TH  1    |d.Opposing volume :  0    0    0    0|A1B2  210(B2)   10- 210=   0(A1) 210|
  1   TH-->              <v-LTH       | in vph           :                 |A1A2   10(A2) OR    0(A1)         10|
     RTH-v>    ^ ^ ^      v--LT  1    |e.LT capacity on  :  0    0    0    0|B4B3   10(B4)   20-  10=  10(B3)  10|
  1  RT--v    < < | > >   Approach 2  | green (vph)      :                 |A4B3   10(B3)  660-  10= 650(A4)  10|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4  650(A4) OR   70(A3)         650|
              | T T H T T |GERBER RD  | vph (b+e)        :                 |                                   |
              |   H   H   |           |g.Left turn volume :  0    0    0    0|                                   |
              | 1   1   1 |           | in vph           :                 |                                   |
              | Approach 4:EXCELSIOR RD |h.Is volume > cap. :               :                                   |
                                      | (g>f) ?          :                 |                                   |
==============================================================================================
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                      |        |                      |     |                                 |
                                      |        |                      |     |220(B1B2)+10(A2)+20(B4B3)+650(A4)|
              | Approach 3|           |-------  6 7 1          -------|                                 |
 3:  LT=  10  | |         | 2:RT=  10 |         0 0 0          ^-  10 |           = 900 vph             |
    TH=  70   | |         |   TH=  10 |         | | |          <-  10 |=================================|
    RT=  60   | v         |   LT=  10 |         < v >          v-  10 | Step 8. INTERSECTION LEVEL OF   |
-------------              -----------|                               |        SERVICE                  |
                           <--Approach 2 |                            |     (compare step 7 with table 6)|
                                      |                               |             -------             |
                                      |                               |             |  B  |             |
 Approach 1-->                        |                               |             -------             |
-------------              -----------| 220 -^            < ^ >       |=================================|
 1:LT= 220    |          ^ | 4: RT=  10 |  10 ->          | | |       | Step 9. RECALCULATE             |
    TH=  10   |          | |   TH= 660 |  10 -v                       |                                 |
    RT=  10   |          | |   LT=  20 |-------            6   -------|Geometric Change:                |
              | Approach 4|           |        |        2 6 1 |       |Signal Change:                   |
                                      |        |        0 0 0 |       |Volume Change:                   |
==============================================================================================
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                       |
                                      |         (two phase signal)    |                                 |
        --^ v--   B2B1                |          | Approach 3|        |                                 |
                                      |          |           |        |                                 |
    --^ AND <--      A1B2 AND         |          |           |        |                                 |
    --> OR  v--      /OR A2B1         |          |           |        |                                 |
        --> <--   A1A2                |-------------   ------------|                                 |
                                      | Approach 1                    |                                 |
         |  <    B4B3                 |                               |                                 |
         >  |                         |           See Step 6b.        |                                 |
    | | AND < ^     A3B4 AND          |                               |                                 |
    v > OR  | |     /OR A4B3          |                    Approach 2 |                                 |
         |  ^    A3A4                 |-------------   ------------|                                 |
         v  |                         |          |           |        |                                 |
-------------------------------------|          |           |        |                                 |
 A1 -->    A3 |      B1 v--    B3  <| |          |           |        |                                 |
            v ^                  | | |          | Approach 4|        | Exclusive right turns reduced 30 % |
 A2 <--    A4  |     B2 --^    B4 |> |                               | V/C Ratio = .65                 |
==============================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: GERBER RD AND EXCELSIOR RD                              Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR   |
           | Approach 3:EXCELSIOR RD |             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP  |
           | 1   1   1 |      ^      |                : -1- -2- -3- -4-|     Possible   Volume    Adjusted|
           |  R   L    |      N      |a.No. of change  :  0   0   0   0|Prob- Critical Carryover Critical|
GERBER RD  | R T T T L |             | intervals/hour :                |able   Volume  to next   Volume |
-----------  T H H H T  -------------|b.LT capacity on :  0   0   0   0|Phase  in vph   phase    in vph |
 Approach 1  < < | > >  ^--RT  1     | change (vph)   :                |----------------------------------|
  1  LT--^    v v v    <^-RTH        |c.G/C ratio     :  0   0   0   0|B2B1  10(B2)  10-  10=  0(B1)   10|
     LTH-^>            <--TH   1     |d.Opposing volume :  0   0   0   0|A2B1   0(B1)  10-   0= 10(A2)    0|
  1   TH-->            <v-LTH        | in vph         :                |A1A2  35(A1) OR  10(A2)          35|
     RTH-v>   ^ ^ ^     v--LT  1     |e.LT capacity on :  0   0   0   0|B4B3  10(B4)  10-  10=  0(B3)   10|
  1  RT--v   < < | > >  Approach 2   | green (vph)    :                |A4B3   0(B3) 210-   0= 210(A4)   0|
-----------  L L T R R  -------------|f.LT capacity in :  0   0   0   0|A3A4 700(A3) OR 210(A4)        700|
           | T T H T T |GERBER RD    | vph (b+e)      :                |                                  |
           |   H   H   |             |g.Left turn volume :  0   0   0   0|                                  |
           | 1   1   1 |             | in vph         :                |                                  |
           | Approach 4:EXCELSIOR RD |h.Is volume > cap. :              :                                  |
                                     | (g>f) ?        :                |                                  |
=====================================+=================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |        |                 |      |                                  |
                                     |        | 1 7             |      |10(B2B1)+35(A1)+10(B4B3)+700(A3)  |
           | Approach 3|             |-------  5 0 1           -------|                                  |
 3:  LT=  10 | |        | 2:RT=  10  |         0 0 0          ^-  10  |          = 755 vph               |
    TH= 700  | |        |   TH=  10  |         | | |          <-  10  |==================================|
    RT= 150  | v        |   LT=  10  |         < v >          v-  10  | Step 8. INTERSECTION LEVEL OF    |
-----------             -------------|                                 |        SERVICE                   |
                        <--Approach 2|                                 |    (compare step 7 with table 6) |
                                     |                                 |          -------                 |
                                     |                                 |          | A |                   |
 Approach 1-->                       |                                 |          -------                 |
-----------             -------------|  10 -^              < ^ >       |==================================|
 1:LT=  10   |            ^ | 4: RT=  10 |  10 ->          | | |       | Step 9. RECALCULATE              |
   TH=  10   |            | |   TH= 210  |  50 -v                      |                                  |
   RT=  50   |            | |   LT=  10  |-------          2    -------|Geometric Change:                 |
           | Approach 4|             |        |          1 1 1 |       |Signal Change:                    |
                                     |        |          0 0 0 |       |Volume Change:                    |
=====================================+=================================+==================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                       |
                                     |       (two phase signal)        |                                  |
      --^ v--   B2B1                 |        | Approach 3|            |                                  |
                                     |        |           |            |                                  |
   --^ AND <--    A1B2 AND           |        |           |            |                                  |
   --> OR  v--    /OR A2B1           |        |           |            |                                  |
      --> <--   A1A2                 |------------      ------------   |                                  |
                                     | Approach 1                      |                                  |
      |  <   B4B3                    |                                 |                                  |
      >  |                           |          See Step 6b.           |                                  |
   | | AND < ^    A3B4 AND           |                                 |                                  |
   v > OR  | |    /OR A4B3           |                     Approach 2  |                                  |
      |  ^   A3A4                    |------------      ------------   |                                  |
      v  |                           |        |           |            |                                  |
-------------------------------------|        |           |            |                                  |
 A1 -->   A3 |     B1 v--    B3   <| |        |           |            |                                  |
            v ^                | | |        | Approach 4|            | Exclusive right turns reduced 30 %|
 A2 <--   A4  |    B2 --^    B4 |>   |                                 | V/C Ratio = .55                  |
==========================================================================================
```

```
                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: ELK GROVE FLORIN AND CALVINE                              Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR     |
             | Approach 3:ELK GROVE FLO|                -------Approach-----|         MULTIPHASE SIGNAL OVERLAP  |
             | 1   3   2 |      ^      |                : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
             |   R   L   |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE RD   | R T T T L |             | intervals/hour  :                  |able    Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)     :                  |------------------------------------|
  2  LT--^      v v v    <^-RTH       |c.G/C ratio       :  0    0    0    0|B2B1   176(B1)  253- 176=  77(B2)  176|
     LTH-^>              <--TH   3    |d.Opposing volume :  0    0    0    0|A1B2    77(B2)  253-  77= 176(A1)   77|
  3   TH-->              <v-LTH       | in vph           :                  |A1A2   377(A2) OR  176(A1)         377|
     RTH-v>     ^ ^ ^     v--LT  2    |e.LT capacity on  :  0    0    0    0|B4B3    50(B4)  242-  50= 192(B3)   50|
  1  RT--v    < < | > >   Approach 2  | green (vph)      :                  |A4B3   192(B3)  530- 192= 338(A4)  192|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   338(A4) OR  308(A3)         338|
             | T T H T T |CALVINE RD  | vph (b+e)        :                  |                                    |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                    |
             | 2   3   1 |            | in vph           :                  |                                    |
             | Approach 4:ELK GROVE FLO|h.Is volume > cap. :                 :                                    |
                                      | (g>f) ?          :                  |                                    |
======================================+====================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                      |       |                       |    |                                    |
                                      |       | 4 2 2 2               |    |253(B1B2)+377(A2)+242(B4B3)+338(A4) |
             | Approach 3|            |-------  4 9 9 9 4 5          -------|                                    |
 3:  LT=  90 | |         | 2:RT= 100  |         0 0 0 0 1 0          ^- 100 |            = 1210 vph              |
    TH= 870  | |         |   TH=1130  |         | | | | | |          <- 377 |====================================|
   RT= 440   | v         |   LT= 320  |         < v v v > >          <- 377 | Step 8. INTERSECTION LEVEL OF      |
-------------            -------------|                              <- 377 |         SERVICE                    |
                       <--Approach 2  |                              v- 144 |     (compare step 7 with table 6)  |
                                      | 253 -^                       v- 176 |              -------               |
                                      | 207 -^                              |              | D |                 |
 Approach 1-->                        | 253 ->                              |              -------               |
-------------            -------------| 253 ->           < < ^ ^ ^ >        |====================================|
 1:LT= 460   |            ^ | 4: RT= 480 | 253 ->          | | | | | |        | Step 9. RECALCULATE                |
   TH= 760   |            | |   TH=1590  | 210 -v                           |                                    |
   RT= 210   |            | |  LT= 440   |-------          2 1 5 5 5 4 -------|Geometric Change:                   |
             | Approach 4|            |       |          4 9 3 3 3 8 |      |Signal Change:                      |
                                      |       |          2 8 0 0 0 0 |      |Volume Change:                      |
======================================+====================================+====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                           |
                                      |         (two phase signal)         |                                    |
       --^ v--   B2B1                 |            | Approach 3|           |                                    |
                                      |            |           |           |                                    |
    --^ AND <--     A1B2 AND          |            |           |           |                                    |
    --> OR  v--     /OR A2B1          |            |           |           |                                    |
       --> <--   A1A2                 |-------------        ------------|                                    |
                                      | Approach 1                         |                                    |
         |   <   B4B3                 |                                    |                                    |
         >   |                        |          See Step 6b.              |                                    |
    | | AND < ^     A3B4 AND          |                                    |                                    |
    v > OR  | |     /OR A4B3          |                        Approach 2  |                                    |
         |   ^   A3A4                 |-------------         ------------|                                    |
         v   |                        |            |           |           |                                    |
--------------------------------------|            |           |           |                                    |
 A1 -->   A3 |     B1 v--    B3   <|  |            |           |           |                                    |
             v ^                   | | |           | Approach 4|           | Exclusive right turns reduced 30 % |
 A2 <--   A4   |   B2 --^    B4 |>    |                                    | V/C Ratio = .88                    |
===========================================================================================
```

ATTACHMENT 5E

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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
ntersection: ELK GROVE FLORIN AND CALVINE                          Design Hour: PM
.roblem Statement: CUMULATIVE NO PROJECT
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
            | Approach 3:ELK GROVE FLO|          -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
            | 1   3   2 |     ^      |           : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
            |   R   L   |     N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ALVINE RD   | R T T T L |            | intervals/hour  :                  |able   Volume   to next    Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1   | change (vph)    :                  |-----------------------------------|
  2 LT--^      v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1  275(B2)  286- 275=  11(B1)  275|
    LTH-^>              <--TH   3    |d.Opposing volume:  0    0    0    0|A2B1   11(B1)  337-  11= 326(A2)   11|
  3  TH-->              <v-LTH       | in vph          :                  |A1A2  400(A1) OR  326(A2)          400|
    RTH-v>     ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3   55(B4)  171-  55= 116(B3)   55|
  1  RT--v    < < | > >  Approach 2  | green (vph)     :                  |A4B3  116(B3)  393- 116= 277(A4)  116|
------------ L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4  507(A3) OR  277(A4)          507|
            | T T H T T |CALVINE RD  | vph (b+e)       :                  |                                   |
            |   H   H   |            |g.Left turn volume:  0    0    0    0|                                   |
            | 2   3   1 |            | in vph          :                  |                                   |
            | Approach 4:ELK GROVE FLO|h.Is volume > cap.:                 :                                   |
                                     | (g>f) ?         :                  |                                   |
=====================================+===================================+===================================|
Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                     |        |                   |      |                                   |
                                     |        | 4 5 5 5           |      |286(B2B1)+400(A1)+171(B4B3)+507(A3)|
            | Approach 3|            |-------  9 0 0 0 4 5          -------|                                   |
3:  LT= 100 | |         | 2:RT=  80  |         0 7 7 7 5 5          ^-  80 |          = 1364 vph               |
   TH=1520  | |         |   TH=1010  |         | | | | | |          <- 337 |===================================|
  RT= 490   | v         |   LT= 520  |         < v v v > >          <- 337 | Step 8. INTERSECTION LEVEL OF     |
-------------            ------------|                              <- 337 |         SERVICE                   |
                        <--Approach 2|                              v- 234 |   (compare step 7 with table 6)   |
                                     | 275 -^                       v- 286 |            -------                |
                                     | 225 -^                              |            |  E  |              |
Approach 1-->                        | 400 ->                              |            -------                |
-------------            ------------| 400 ->        < < ^ ^ ^ >           |===================================|
1:LT= 500   |           ^ | 4: RT= 350 | 400 ->      | | | | | |           | Step 9. RECALCULATE                |
  TH=1200   |           | |   TH=1180  | 460 -v                            |                                   |
  RT= 460   |           | |  LT= 310   |-------      1 1 3 3 3 3   -------|Geometric Change:                  |
            | Approach 4|            |        |    7 4 9 9 9 5 |         |Signal Change:                     |
                                     |        |    1 0 3 3 3 0 |         |Volume Change:                     |
=====================================+===================================+===================================|
Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                     |        (two phase signal)         |                                   |
        --^ v--  B2B1                |          | Approach 3|            |                                   |
                                     |          |           |            |                                   |
    --^ AND <--     A1B2 AND         |          |           |            |                                   |
    --> OR  v--     /OR A2B1         |          |           |            |                                   |
        --> <--  A1A2                |-------------         ------------|                                   |
                                     | Approach 1                        |                                   |
        |  <     B4B3                |                                   |                                   |
        >  |                         |          See Step 6b.             |                                   |
    | | AND < ^     A3B4 AND         |                                   |                                   |
    v > OR  | |     /OR A4B3         |                     Approach 2    |                                   |
        |  ^     A3A4                |-------------         ------------|                                   |
        v  |                         |          |           |            |                                   |
-------------------------------------|          |           |            |                                   |
A1 -->   A3 |      B1 v--    B3   <| |          |           |            |                                   |
            v ^                   | | |          | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--   A4   |    B2 --^    B4  |>  |                                   | V/C Ratio = .99                   |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: WATERMAN AND CALVINE                                  Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR          |
            | Approach 3:WATERMAN RD     |                -------Approach-----|            MULTIPHASE SIGNAL OVERLAP     |
            | 1   2   2 |      ^         |                : -1-  -2-  -3-  -4-|        Possible    Volume      Adjusted|
            |   R   L   |      N         |a.No. of change :  0    0    0    0|Prob-   Critical   Carryover   Critical|
CALVINE RD  | R T T T L |                |  intervals/hour :                  |able     Volume     to next     Volume |
----------- T H H H T   -------------|b.LT capacity on :  0    0    0    0|Phase    in vph      phase      in vph |
 Approach 1   < < | > >    ^--RT  1      |  change (vph)   :                  |---------------------------------------|
   2  LT--^     v v v     <^-RTH         |c.G/C ratio      :  0    0    0    0|B2B1    94(B2)   94-  94=   0(B1)     94|
      LTH-^>              <--TH    3     |d.Opposing volume :  0    0    0    0|A2B1     0(B1)  367-   0= 367(A2)      0|
   3   TH-->              <v-LTH         |  in vph         :                  |A1A2   367(A2) OR  363(A1)            367|
      RTH-v>    ^ ^ ^      v--LT  2      |e.LT capacity on :  0    0    0    0|B4B3    44(B3)   72-  44=  28(B4)     44|
   1  RT--v   < < | > >   Approach 2     |  green (vph)    :                  |A3B4    28(B4)  215-  28= 187(A3)     28|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   555(A4) OR  187(A3)            555|
            | T T H T T |CALVINE RD      |  vph (b+e)      :                  |                                       |
            |   H   H   |                |g.Left turn volume :  0    0    0    0|                                     |
            | 2   2   1 |                |  in vph         :                  |                                       |
            | Approach 4:WATERMAN RD     |h.Is volume > cap. :                :                                       |
                                         |  (g>f) ?        :                  |                                       |
=========================================+====================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES         |
                                         |          |                    |    |                                       |
                                         |          | 1 2 2              |    |94(B2B1)+367(A2)+72(B3B4)+555(A4)      |
            | Approach 3|                |-------     8 1 1 5 7         -------|                                      |
 3:  LT= 130 | |        | 2:RT= 160      |            0 5 5 9 2          ^- 160 |          = 1088 vph                  |
    TH= 430 | |         |    TH=1100     |            | | | | |          <- 367 |======================================|
    RT= 180 | v         |    LT= 170     |            < v v > >          <- 367 | Step 8. INTERSECTION LEVEL OF        |
-------------           -------------|                                   <- 367 |         SERVICE                      |
                      <--Approach 2      |                               v-  77 |     (compare step 7 with table 6)    |
                                         |  94 -^                        v-  94 |             -------                  |
                                         |  77 -^                               |             |  C  |                  |
 Approach 1-->                           | 363 ->                               |             -------                  |
-------------           -------------| 363 ->          < < ^ ^ >            |======================================|
 1:LT= 170    |           ^ | 4: RT= 190 | 363 ->          | | | | |            | Step 9. RECALCULATE                  |
   TH=1090    |           | |    TH=1110 | 120 -v                               |                                      |
   RT= 120    |           | |    LT=  80 |-------               5 5 1   -------|Geometric Change:                     |
             | Approach 4|               |        |          4 3 5 5 9 |      |Signal Change:                         |
                                         |        |          4 6 5 5 0 |      |Volume Change:                         |
=========================================+====================================+=======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                                |
                                         |          (two phase signal)        |                                       |
       --^ v--    B2B1                   |           | Approach 3|            |                                       |
                                         |           |           |            |                                       |
    --^ AND <--      A1B2 AND            |           |           |            |                                       |
    --> OR  v--      /OR A2B1            |           |           |            |                                       |
       --> <--    A1A2                   |-------------           -------------|                                      |
                                         | Approach 1                         |                                       |
        |  <      B4B3                   |                                    |                                       |
        >  |                             |           See Step 6b.             |                                       |
    | | AND < ^      A3B4 AND            |                                    |                                       |
    v > OR  | |      /OR A4B3            |                         Approach 2 |                                       |
        |  ^      A3A4                   |-------------           ------------|                                       |
        v  |                             |           |           |            |                                       |
-----------------------------------------|           |           |            |                                       |
 A1 -->    A3 |      B1 v--     B3    <| |           |           |            |                                       |
            v ^                        | |           | Approach 4|            | Exclusive right turns reduced 30 %    |
 A2 <--    A4  |     B2 --^     B4 |>    |                                    | V/C Ratio = .79                       |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: WATERMAN AND CALVINE                                   Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR    |
        | Approach 3:WATERMAN RD |              -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
        | 1  2  2 |     ^        |              : -1-  -2-  -3-  -4-|     Possible   Volume   Adjusted|
        |  R  L   |     N        |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover Critical|
CALVINE RD | R T T T L |         |  intervals/hour :                  |able   Volume   to next   Volume |
------------ T H H H T ----------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
  Approach 1  < < | > >  ^--RT 1 |  change (vph)   :                  |------------------------------------|
   2 LT--^     v v v    <^-RTH   |c.G/C ratio      :  0    0    0    0|B2B1  110(B2)  143- 110=  33(B1)   110|
     LTH-^>             <--TH  3 |d.Opposing volume:  0    0    0    0|A2B1   33(B1)  430-  33= 397(A2)    33|
   3  TH-->             <v-LTH   |  in vph         :                  |A1A2  397(A2) OR  370(A1)           397|
     RTH-v>    ^ ^ ^     v--LT 2 |e.LT capacity on :  0    0    0    0|B4B3   61(B4)   88-  61=  27(B3)    61|
   1  RT--v   < < | > > Approach 2| green (vph)     :                  |A4B3   27(B3)  300-  27= 273(A4)    27|
------------ L L T R R ----------|f.LT capacity in :  0    0    0    0|A3A4  465(A3) OR  273(A4)           465|
        | T T H T T |CALVINE RD  |  vph (b+e)      :                  |                                    |
        |   H   H   |            |g.Left turn volume: 0    0    0    0|                                    |
        | 2   2   1 |            |  in vph         :                  |                                    |
        | Approach 4:WATERMAN RD |h.Is volume > cap.:                 :                                    |
                                 |  (g>f) ?        :                  |                                    |
=================================+==================================+====================================|
Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES    |
                                 |        |                 |       |                                    |
                                 |        | 1 4 4           |       |143(B2B1)+397(A2)+88(B4B3)+465(A3)  |
          | Approach 3|          |-------  8 6 6 5 6          -------|                                    |
3:  LT= 110 | |      | 2:RT= 160 |         0 5 5 0 1         ^- 160 |          = 1093 vph                |
    TH= 930 | |      |   TH=1290 |         | | | | |         <- 430 |====================================|
    RT= 180 | v      |   LT= 260 |         < v v > >         <- 430 | Step 8. INTERSECTION LEVEL OF      |
-------------        -------------|                            <- 430 |       SERVICE                      |
                  <--Approach 2  |                            v- 117 |    (compare step 7 with table 6)   |
                                 | 110 -^                     v- 143 |              -------               |
                                 |  90 -^                            |              | C |                |
Approach 1-->                    | 370 ->                            |              -------               |
------------         ------------| 370 ->         < < ^ ^ >          |====================================|
1:LT= 200  |        ^ | 4: RT= 210| 370 ->        | | | | |          | Step 9. RECALCULATE                |
  TH=1110  |      | | |   TH= 600| 210 -v                            |                                    |
  RT= 210  |      | | |   LT= 160|-------          3 3 2      -------|Geometric Change:                   |
           | Approach 4|         |        |      8 7 0 0 1 |        |Signal Change:                      |
                                 |        |      8 2 0 0 0 |        |Volume Change:                      |
=================================+==================================+====================================|
Step 3. IDENTIFY PHASING         | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                 |        (two phase signal)         |                                    |
      --^ v--  B2B1              |           | Approach 3|           |                                    |
                                 |           |           |           |                                    |
   --^ AND <--    A1B2 AND       |           |           |           |                                    |
   --> OR  v--    /OR A2B1       |           |           |           |                                    |
      --> <--  A1A2              |------------            -----------|                                    |
                                 | Approach 1                        |                                    |
       |  <    B4B3              |                                   |                                    |
       >  |                      |         See Step 6b.              |                                    |
   | | AND < ^    A3B4 AND       |                                   |                                    |
   v > OR  | |    /OR A4B3       |                      Approach 2   |                                    |
       |  ^    A3A4              |------------            -----------|                                    |
       v  |                      |           |           |           |                                    |
---------------------------------|           |           |           |                                    |
A1 -->   A3 |      B1 v--    B3  <|          |           |           |                                    |
           v ^                 | ||          | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--   A4  |     B2 --^    B4 |>|                                  | V/C Ratio = .79                    |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: CALVINE RD AND BRADSHAW RD                          Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:BRADSHAW   |              -------Approach-----|       MULTIPHASE SIGNAL OVERLAP  |
             | 1   3   2 |     ^     |              : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
             |   R   L   |     N     |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE RD   | R T T T L |           | intervals/hour  :                  |able   Volume   to next    Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1   | change (vph)    :                  |----------------------------------|
   2  LT--^    v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1    28(B1)  446-  28= 418(B2)   28|
      LTH-^>            <--TH   3    |d.Opposing volume:  0    0    0    0|A1B2   418(B2)  130- 418=   0(A1)  418|
   3   TH-->            <v-LTH       | in vph          :                  |A1A2   245(A2) OR    0(A1)         245|
      RTH-v>   ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3    44(B4)   55-  44=  11(B3)   44|
   1  RT--v  < < | > >   Approach 2  | green (vph)     :                  |A4B3    11(B3)  380-  11= 369(A4)   11|
------------ L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   369(A4) OR  280(A3)         369|
             | T T H T T |CALVINE RD | vph (b+e)       :                  |                                  |
             |   H   H   |           |g.Left turn volume:  0    0    0   0|                                  |
             | 2   3   1 |           | in vph          :                  |                                  |
             | Approach 4:BRADSHAW   |h.Is volume > cap. :                :|                                  |
                                     | (g>f) ?         :                  |                                  |
=====================================+================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |        |                  |      |                                  |
                                     |        | 4 2 2 2          |      |446(B1B2)+245(A2)+55(B4B3)+369(A4)|
             | Approach 3|           |-------   0 0 0 0 3 4       -------|                                  |
 3:  LT=  80 | |       | 2:RT= 350   |          0 0 0 0 6 4       ^- 350|          = 1115 vph              |
    TH= 600  | |       |    TH= 550  |          | | | | | |      <- 183|==================================|
   RT= 400   | v       |    LT=  50  |          < v v v > >      <- 183| Step 8. INTERSECTION LEVEL OF    |
------------            -------------|                           <- 183|         SERVICE                  |
                        <--Approach 2|                           v-  23|     (compare step 7 with table 6)|
                                     | 446 -^                    v-  28|              -------             |
                                     | 365 -^                          |              | D |              |
 Approach 1-->                       | 130 ->                          |              -------             |
------------            -------------| 130 ->        < < ^ ^ ^ >       |==================================|
 1:LT= 810   |          ^ | 4: RT=  70| 130 ->        | | | | | |       | Step 9. RECALCULATE               |
   TH= 390   |          | |   TH=1140| 50 -v                            |                                  |
   RT=  50   |          | |   LT= 100|-------          3 3 3   -------|Geometric Change:                 |
             | Approach 4|           |        |      5 4 8 8 8 7 |     |Signal Change:                    |
                                     |        |      5 5 0 0 0 0 |     |Volume Change:                    |
=====================================+================================+==================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                     |         (two phase signal)     |                                  |
        --^ v--   B2B1               |            | Approach 3|       |                                  |
                                     |            |           |       |                                  |
     --^ AND <--      A1B2 AND       |            |           |       |                                  |
     --> OR  v--      /OR A2B1       |            |           |       |                                  |
        --> <--   A1A2               |-------------      -------------|                                  |
                                     | Approach 1                     |                                  |
         |   <    B4B3               |                                |                                  |
         >   |                       |         See Step 6b.           |                                  |
     | | AND < ^      A3B4 AND       |                                |                                  |
     v > OR  | |      /OR A4B3       |                    Approach 2  |                                  |
         |   ^    A3A4               |-------------      -------------|                                  |
         v   |                       |            |           |       |                                  |
-------------------------------------|            |           |       |                                  |
 A1 -->   A3 |      B1 v--     B3   <|            |           |       |                                  |
           v ^                  |   |            | Approach 4|       | Exclusive right turns reduced 30 %|
 A2 <--   A4   |    B2 --^     B4 |>  |                                | V/C Ratio = .81                  |
=============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: CALVINE RD AND BRADSHAW RD                                Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
              | Approach 3:BRADSHAW  |                -------Approach-----|       MULTIPHASE SIGNAL OVERLAP  |
              | 1   3   2 |    ^     |                : -1-  -2-  -3-  -4-|       Possible   Volume   Adjusted|
              |  R    L   |    N     |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover Critical|
CALVINE RD    | R T T T L |          |  intervals/hour :                  |able   Volume   to next   Volume |
------------- T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1   < < | > >   ^--RT  1   |  change (vph)   :                  |----------------------------------|
  2  LT--^     v v v     <^-RTH      |c.G/C ratio      :  0    0    0    0|B2B1   17(B1)  270-  17= 253(B2)  17|
     LTH-^>              <--TH   3   |d.Opposing volume:  0    0    0    0|A1B2  253(B2)  173- 253=   0(A1) 253|
  3   TH-->              <v-LTH      |  in vph         :                  |A1A2  157(A2) OR    0(A1)       157|
     RTH-v>    ^ ^ ^      v--LT  2   |e.LT capacity on :  0    0    0    0|B4B3   17(B3)  154-  17= 137(B4)  17|
  1  RT--v    < < | > >   Approach 2 |  green (vph)    :                  |A3B4  137(B4)  616- 137= 479(A3) 137|
------------- L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4  479(A3) OR  257(A4)       479|
             | T T H T T |CALVINE RD |  vph (b+e)      :                  |                                  |
             |   H   H   |           |g.Left turn volume:  0    0    0    0|                                  |
             | 2   3   1 |           |  in vph         :                  |                                  |
             | Approach 4:BRADSHAW   |h.Is volume > cap.:                  :                                  |
                                     |  (g>f) ?        :                  |                                  |
=====================================+==================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                     |        |                  |        |                                  |
              | Approach 3|          |        | 8 4 4 4 1 1      |        |270(B1B2)+157(A2)+154(B3B4)+479(A3)|
 3:  LT= 280 | |          | 2:RT= 150 |-------  8 1 1 1 2 5     -------|                                  |
   TH=1240   | |          |   TH= 470 |         0 3 3 3 6 4    ^- 150  |        = 1060 vph                |
   RT= 880   | v          |   LT=  30 |         | | | | | |    <- 157  |==================================|
-------------             ------------|         < v v v > >    <- 157  | Step 8. INTERSECTION LEVEL OF   |
                                     |                          <- 157  |         SERVICE                  |
                       <--Approach 2 |                          v-  14  |    (compare step 7 with table 6) |
                                     | 270 -^                   v-  17  |            -------               |
                                     | 221 -^                           |            |  C  |             |
 Approach 1-->                       | 173 ->                           |            -------               |
-------------             ------------| 173 ->        < < ^ ^ ^ >        |==================================|
 1:LT= 490   |          ^ | 4: RT=  40 | 173 ->        | | | | | |        | Step 9. RECALCULATE              |
   TH= 520   |          | |    TH= 770 |  70 -v                           |                                  |
   RT=  70   |          | |    LT=  30 |-------          2 2 2    -------|Geometric Change:                 |
             | Approach 4|           |        |      1 1 5 5 5 4 |       |Signal Change:                    |
                                     |        |      7 4 7 7 7 0 |       |Volume Change:                    |
=====================================+==================================+==================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                     |       (two phase signal)         |                                  |
        --^ v--   B2B1               |           | Approach 3|          |                                  |
                                     |           |           |          |                                  |
    --^ AND <--     A1B2 AND         |           |           |          |                                  |
    --> OR  v--     /OR A2B1         |           |           |          |                                  |
        --> <--   A1A2               |-------------         ------------|                                  |
                                     | Approach 1                       |                                  |
         |  <     B4B3               |                                  |                                  |
         >  |                        |           See Step 6b.           |                                  |
    | | AND < ^     A3B4 AND         |                                  |                                  |
    v > OR  | |     /OR A4B3         |                      Approach 2  |                                  |
         |  ^     A3A4               |-------------         ------------|                                  |
         v  |                        |           |           |          |                                  |
-------------------------------------|           |           |          |                                  |
A1 -->   A3 |      B1 v--     B3   <| |           |           |          |                                  |
            v ^                    | | |           | Approach 4|          | Exclusive right turns reduced 30 % |
A2 <--   A4  |     B2 --^     B4 |>  |                                  | V/C Ratio = .77                  |
===============================================================================================
```

ATTACHMENT 5E

```
                                 Critical Movement Analysis: PLANNING
                                          Calculation Form 1
Intersection: CALVINE RD AND VINEYARD RD                                  Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:VINEYARD        |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
             | 1      2 |      ^          |                : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |   R   L  |      N          |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE RD   | R T T T L |                | intervals/hour  :                    |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)     :                    |-------------------------------------|
  2  LT--^     v v v     <^-RTH       |c.G/C ratio       :  0    0    0    0|A1B2  556(B2)  137- 556=  0(A1)   556|
     LTH-^>              <--TH   3    |d.Opposing volume :  0  410    0  210|A1A2  168(A2) OR   0(A1)          168|
  3   TH-->              <v-LTH       | in vph           :                    |A3B4  147(A3) OR  17(B4)          147|
     RTH-v>    ^ ^ ^      v--LT       |e.LT capacity on  :  0    0    0    0|                                     |
     RT--v   < < | > >  Approach 2    | green (vph)      :                    |                                     |
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|                                     |
             | T T H T T |CALVINE RD  | vph (b+e)        :                    |                                     |
             |   H   H                |g.Left turn volume :  0    0    0    0|                                     |
             |           |            | in vph           :                    |                                     |
             | Approach 4:VINEYARD    |h.Is volume > cap. :     NO        NO:                                     |
                                      | (g>f) ?          :                    |                                     |
=====================================+====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |        |                    |        |                                     |
                                      |        | 2                  |        |724(B2A2)+147(A3)+0()+0()            |
             | Approach 3|            |-------   1 1 1             -------|                                     |
 3:  LT=  30 | |         | 2:RT= 240  |          0 4 7             ^- 240 |          = 871 vph                  |
    TH=   0  | |         |   TH= 380  |          | | |             <- 127 |=====================================|
  RT= 210    | v         |   LT=   0  |          < > >             <- 127 | Step 8. INTERSECTION LEVEL OF       |
-------------            -------------|                            <- 127 |         SERVICE                     |
                         <--Approach 2 |                                    |   (compare step 7 with table 6)     |
                                      |                                    |            -------                  |
                                      | 556 -^                             |            |  B  |                  |
 Approach 1-->                        | 455 -^                             |            -------                  |
-------------            -------------| 137 ->                             |=====================================|
 1:LT=1010   |         ^ | 4: RT=   0 | 137 ->                             | Step 9. RECALCULATE                 |
   TH= 410   |         | |   TH=   0  | 137 ->                             |                                     |
   RT=   0   |         | |   LT=   0  |-------                     -------|Geometric Change:                    |
             | Approach 4|            |        |                    |      |Signal Change:                       |
                                      |        |                    |      |Volume Change:                       |
=====================================+====================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                      |          (two phase signal)         |                                     |
          --^      A1B2               |            | Approach 3|             |                                     |
          -->                         |            |           |             |                                     |
          --> <--  A1A2               |            |           |             |                                     |
                                      |            |           |             |                                     |
           |  |    A3B4               |-------------           -------------|                                     |
           v  >                       | Approach 1                           |                                     |
                                      |                                      |                                     |
                                      |          See Step 6b.                |                                     |
                                      |                                      |                                     |
                                      |                         Approach 2   |                                     |
                                      |-------------           -------------|                                     |
                                      |            |           |             |                                     |
-------------------------------------|            |           |             |                                     |
 A1 -->   A3 |      B1 v--    B3   <| |            |           |             |                                     |
            v ^                    | | |            | Approach 4|             | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4  |> |            |           |             | V/C Ratio = .61                     |
==========================================================================================================
```

```
                                    Critical Movement Analysis: PLANNING
                                             Calculation Form 1
Intersection: CALVINE RD AND VINEYARD RD                                     Design Hour: PM
Problem Statement: CUMULATIVE NO PROJECT
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR        |
              | Approach 3:VINEYARD      |              -------Approach-----|          MULTIPHASE SIGNAL OVERLAP   |
              | 1       2 |       ^      |                 : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
              |   R   L   |       N      |a.No. of change  :   0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE RD    | R T T T L |              |  intervals/hour :                  |able    Volume   to next    Volume |
------------- T H H H T  ----------------|b.LT capacity on :   0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1   < < | > >   ^--RT  1      |  change (vph)   :                  |--------------------------------------|
    2  LT--^     v v v    <^-RTH         |c.G/C ratio      :   0    0    0    0|A1B2   121(B2)  127- 121=  6(A1)  121|
       LTH-^>             <--TH   3      |d.Opposing volume:   0  380    0  800|A1A2   153(A2) OR   6(A1)          153|
    3   TH-->             <v-LTH         |  in vph         :                  |A3B4   560(A3) OR  88(B4)          560|
       RTH-v>    ^ ^ ^     v--LT         |e.LT capacity on :   0    0    0    0|                                      |
       RT--v   < < | > >   Approach 2    |  green (vph)    :                  |                                      |
------------- L L T R R  ----------------|f.LT capacity in :   0    0    0    0|                                      |
              | T T H T T |CALVINE RD    |  vph (b+e)      :                  |                                      |
              |   H   H   |              |g.Left turn volume:  0    0    0    0|                                      |
              |           |              |  in vph         :                  |                                      |
              | Approach 4:VINEYARD      |h.Is volume > cap. :     NO        NO:                                      |
                                         |  (g>f) ?        :                  |                                      |
=========================================+================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                         |        |                      |    |                                      |
                                         |        | 8                    |    |274(B2A2)+560(A3)+0()+0()             |
              | Approach 3|              |-------  0 7 8              -------|                                      |
 3:  LT= 160 | |         | 2:RT=  40     |         0 2 8              ^-  40|          = 834 vph                   |
     TH=   0 | |         |   TH= 460     |         | | |              <- 153|======================================|
     RT= 800 | v         |   LT=   0     |         < > >              <- 153| Step 8. INTERSECTION LEVEL OF        |
-------------            -------------   |                            <- 153|         SERVICE                      |
                        <--Approach 2    |                                  |    (compare step 7 with table 6)     |
                                         |                                  |              -------                 |
                                         | 121 -^                           |              |  A  |                 |
 Approach 1-->                           |  99 -^                           |              -------                 |
-------------            -------------   | 127 ->                           |======================================|
 1:LT= 220   |          ^ | 4: RT=   0   | 127 ->                           | Step 9. RECALCULATE                  |
   TH= 380   |          | |    TH=   0   | 127 ->                           |                                      |
   RT=   0   |          | |    LT=   0   |-------                    -------|Geometric Change:                     |
             | Approach 4|               |        |                      |   |Signal Change:                        |
                                         |        |                      |   |Volume Change:                        |
=========================================+================================+=======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                             |
                                         |         (two phase signal)       |                                      |
          --^      A1B2                  |            | Approach 3|         |                                      |
          -->                            |            |           |         |                                      |
          --> <--  A1A2                  |            |           |         |                                      |
                                         |            |           |         |                                      |
           |   |   A3B4                  |-------------        -------------|                                      |
           v   >                         | Approach 1                       |                                      |
                                         |                                  |                                      |
                                         |        See Step 6b.              |                                      |
                                         |                                  |                                      |
                                         |                      Approach 2  |                                      |
                                         |-------------        -------------|                                      |
                                         |            |           |         |                                      |
-----------------------------------------|            |           |         |                                      |
 A1 -->   A3 |       B1 v--     B3    <| |            |           |         |                                      |
            v ^                     | |  |            | Approach 4|         | Exclusive right turns reduced 30 %   |
 A2 <--   A4   |     B2 --^     B4 |>    |                                  | V/C Ratio = .59                      |
==================================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: CALVINE RD AND EXCELSIOR RD                               Design Hour: AM
Problem Statement: CUMULATIVE NO PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:EXCELSIOR   |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1   1   1 |      ^     |             : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |   R   L   |      N     |a.No. of change   :  0    D    0    0|Prob-  Critical  Carryover  Critical|
CALVINE RD   | R T T T L |            | intervals/hour   :                  |able   Volume   to next    Volume |
------------- T H H H T  ------------|b.LT capacity on   :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT       | change (vph)     :                  |----------------------------------|
   1  LT--^     v v v    <^-RTH  1    |c.G/C ratio       :  0    0    0    0|B2B1    10(B1)  150-  10= 140(B2)   10|
      LTH-^>             <--TH   2    |d.Opposing volume :  0    0    0    0|A1B2   140(B2)  103- 140=   0(A1)  140|
   2  TH-->              <v-LTH       | in vph           :                  |A1A2    83(A2) OR    0(A1)          83|
   1  RTH-v>    ^ ^ ^     v--LT  1    |e.LT capacity on  :  0    0    0    0|B4B3    10(B4)  250-  10= 240(B3)   10|
      RT--v   < < | > >  Approach 2   | green (vph)      :                  |A4B3   240(B3)  420- 240= 180(A4)  240|
------------- L L T R R  ------------|f.LT capacity in   :  0    0    0    0|A3A4   180(A4) OR   50(A3)         180|
             | T T H T T |CALVINE RD  | vph (b+e)        :                  |                                  |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                  |
             | 1   1   1 |            | in vph           :                  |                                  |
             | Approach 4:EXCELSIOR   |h.Is volume > cap. :                 :                                  |
                                      | (g>f) ?          :                  |                                  |
======================================+==================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                      |        |                      |  |                                  |
                                      |        |                      |  |150(B1B2)+83(A2)+250(B4B3)+180(A4)|
             | Approach 3|            |-------   2 5 1         -------|                                  |
 3:  LT=  10 | |         | 2:RT=  30  |          0 0 0         ^+  30 |           = 663 vph              |
    TH=  50  | |         |   TH= 220  |          | | |         <+  53 |==================================|
   RT=  20   | v         |   LT=  10  |          < v >         <-  83 | Step 8. INTERSECTION LEVEL OF   |
-------------            -------------|                        <-  83 |         SERVICE                  |
                         <--Approach 2 |                        v-  10 |    (compare step 7 with table 6) |
                                      |                               |               -------            |
                                      | 150 -^                        |               | A |              |
 Approach 1-->                        | 103 ->                        |               -------            |
-------------            -------------| 103 ->            < ^ >      |==================================|
 1:LT= 150   |         ^ | 4: RT=  50 |  63 +>            | | |      | Step 9. RECALCULATE              |
   TH= 270   |         | |   TH= 420  |  40 +v                        |                                  |
   RT=  40   |         | |   LT= 250  |-------            2 4  -------|Geometric Change:                 |
             | Approach 4|            |        |          5 2 5 |      |Signal Change:                    |
                                      |        |          0 0 0 |      |Volume Change:                    |
======================================+==================================+==================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                      |        (two phase signal)        |                                  |
        --^ v--  B2B1                 |           | Approach 3|          |                                  |
                                      |           |           |          |                                  |
     --^ AND <--    A1B2 AND          |           |           |          |                                  |
     --> OR  v--    /OR A2B1          |           |           |          |                                  |
        --> <--  A1A2                 |-------------        ------------|                                  |
                                      | Approach 1                       |                                  |
         |  <   B4B3                  |                                  |                                  |
         >  |                         |          See Step 6b.            |                                  |
     | | AND < ^    A3B4 AND          |                                  |                                  |
     v > OR  | |    /OR A4B3          |                      Approach 2  |                                  |
         |  ^   A3A4                  |-------------         -----------|                                  |
         v  |                         |           |           |          |                                  |
--------------------------------------|           |           |          |                                  |
 A1 -->   A3 |     B1 v--    B3   <|  |           |           |          |                                  |
            v ^                   | | |           | Approach 4|          | Exclusive right turns reduced 30 % |
 A2 <--   A4  |    B2 --^    B4 |>    |                                  | V/C Ratio = .48                  |
==========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
ntersection: CALVINE RD AND EXCELSIOR RD                         Design Hour: PM
roblem Statement: CUMULATIVE NO PROJECT
==============================================================================================
Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR    |
            | Approach 3:EXCELSIOR  |              -------Approach-----|         MULTIPHASE SIGNAL OVERLAP   |
            | 1   1   1 |     ^     |              : -1-  -2-  -3-  -4-|      Possible   Volume     Adjusted|
            |  R   L    |     N     |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ALVINE RD   | R T T T L |           | intervals/hour :                 |able    Volume   to next    Volume |
------------ T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT      | change (vph)   :                 |-----------------------------------|
  1  LT--^     v v v    <^-RTH  1   |c.G/C ratio     :  0    0    0    0|B2B1    10(B1)  80-  10=  70(B2)    10|
     LTH-^>             <--TH   2   |d.Opposing volume :  0    0    0    0|A1B2   70(B2) 160-  70=  90(A1)    70|
  2   TH-->             <v-LTH      | in vph         :                 |A1A2    90(A1) OR   83(A2)          90|
  1  RTH-v>    ^ ^ ^     v--LT  1   |e.LT capacity on :  0    0    0    0|B4B3    30(B4)  50-  30=  20(B3)    30|
     RT--v   < < | > >  Approach 2  | green (vph)    :                 |A4B3    20(B3)  90-  20=  70(A4)    20|
------------ L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4  450(A3) OR   70(A4)          450|
            | T T H T T |CALVINE RD | vph (b+e)      :                 |                                   |
            |  H   H    |           |g.Left turn volume :  0    0    0    0|                                   |
            | 1   1   1 |           | in vph         :                 |                                   |
            | Approach 4:EXCELSIOR  |h.Is volume > cap. :                :                                   |
                                    | (g>f) ?        :                 |                                   |
===================================+=================================+===================================|
Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                    |       |                  |       |                                   |
                                    |       | 1 4              |       |80(B1B2)+90(A1)+50(B4B3)+450(A3)   |
            | Approach 3|           |-------  9 5 3            ------- |                                   |
3:  LT=  30 | |         | 2:RT=  20 |         0 0 0            ^+  20 |          = 670 vph                |
  TH= 450   | |         |   TH= 230 |         | | |            <+  63 |===================================|
  RT= 190   | v         |   LT=  10 |         < v >            <-  83 | Step 8. INTERSECTION LEVEL OF     |
------------             -----------|                          <-  83 |         SERVICE                   |
                        <--Approach 2 |                          v-  10 |    (compare step 7 with table 6)  |
                                    |                                 |              -------              |
                                    |  80 -^                          |              |  A  |              |
Approach 1-->                       | 100 ->                          |              -------              |
------------             -----------| 100 ->             < ^ >        |===================================|
1:LT=  80   |          ^ | 4: RT=  10 |   0 +>             | | |        | Step 9. RECALCULATE               |
  TH= 200   |          | |   TH=  90 | 160 +v                          |                                   |
  RT= 160   |          | |   LT=  50 |-------                   -------|Geometric Change:                  |
            | Approach 4|           |       |            5 9 1 |      |Signal Change:                     |
                                    |       |            0 0 0 |      |Volume Change:                     |
===================================+=================================+===================================|
Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                          |
                                    |         (two phase signal)      |                                   |
       --^ v--  B2B1                |           | Approach 3|         |                                   |
                                    |           |           |         |                                   |
    --^ AND <--     A1B2 AND        |           |           |         |                                   |
    --> OR  v--     /OR A2B1        |           |           |         |                                   |
       --> <--  A1A2                |-----------             ---------|                                   |
                                    | Approach 1                      |                                   |
         |   <    B4B3              |                                 |                                   |
         >   |                      |         See Step 6b.            |                                   |
    | | AND < ^     A3B4 AND        |                                 |                                   |
    v > OR  | |     /OR A4B3        |                      Approach 2 |                                   |
         |   ^    A3A4              |-----------             ---------|                                   |
         v   |                      |           |           |         |                                   |
-----------------------------------|           |           |         |                                   |
 1 -->    A3 |      B1 v--    B3  <|           |           |         |                                   |
            v ^                 | |           | Approach 4|         | Exclusive right turns reduced 30 %|
 2 <--    A4  |     B2 --^    B4 |>|                                 | V/C Ratio = .49                   |
==============================================================================================
```

# APPENDIX E

## Cumulative Plus Project Level of Service Calculations

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: JACKSON HWY AND S. WATT AVE.                          Design Hour: AM
'roblem Statement: CUMULATIVE PLUS PROJECT
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK       | Step 6b. VOLUME ADJUSTMENT FOR |
             | Approach 3:S. WATT AVE.|              -------Approach-----|     MULTIPHASE SIGNAL OVERLAP  |
             | 1   3   2 |     ^      |                   : -1-  -2-  -3-  -4-|   Possible   Volume    Adjusted|
             |   R   L   |     N      |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |            | intervals/hour    :                 |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)      :                 |----------------------------------------|
  2  LT--^     v v v     <^-RTH       |c.G/C ratio        :  0    0    0    0|B2B1    44(B2)  116-  44=  72(B1)    44|
     LTH-^>              <--TH   3    |d.Opposing volume  :  D    0    D    0|A2B1    72(B1)  437-  72= 365(A2)    72|
  3   TH-->              <v-LTH       | in vph            :                 |A1A2   365(A2) OR  154(A1)          365|
     RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on   :  0    0    0    0|B4B3    83(B4)  424-  83= 341(B3)    83|
  1  RT--v    < < | > >   Approach 2  | green (vph)       :                 |A4B3   341(B3)  453- 341= 112(A4)   341|
------------- L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A3A4   607(A3) OR  112(A4)          607|
             | T T H T T |JACKSON HWY | vph (b+e)         :                 |                                        |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                        |
             | 2   3   1 |            | in vph            :                 |                                        |
             | Approach 4:S. WATT AVE.|h.Is volume > cap. :                 :                                        |
                                      | (g>f) ?           :                 |                                        |
======================================+==================================+========================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                      |       |                    |      |                                        |
                                      |       | 4 6 6 6            |      |116(B2B1)+365(A2)+424(B4B3)+6D7(A3)     |
             | Approach 3|            |-------  5 0 0 0 6 8        -------|                                        |
 3:  LT= 150 | |         | 2:RT= 610  |         0 7 7 7 8 3        ^- 610 |          = 1512 vph                    |
   TH=1820   | |         |   TH=1310  |         | | | | | |        <- 437 |========================================|
   RT= 450   | v         |   LT= 210  |         < v v v > >        <- 437 | Step 8. INTERSECTION LEVEL OF          |
-------------             ------------|                            <- 437 |      SERVICE                           |
                      <--Approach 2   |                            v-  95 |   (compare step 7 with table 6)        |
                                      | 44 -^                      v- 116 |           -------                      |
                                      | 36 -^                             |           |  F  |                      |
 Approach 1-->                        | 67 ->                             |           -------                      |
-------------             ------------| 67 ->         < < ^ ^ ^ >         |========================================|
 1:LT=  80   |          ^ | 4: RT=  6D| 67 ->         | | | | | |         | Step 9. RECALCULATE                    |
   TH= 200   |          | |   TH=1360 | 220 -v                            |                                        |
   RT= 220   |          | |   LT= 770 |-------        4 3 4 4 4    -------|Geometric Change:                       |
             | Approach 4|            |       |       2 4 5 5 5 6 |       |Signal Change:                          |
                                      |       |       4 7 3 3 3 0 |       |Volume Change:                          |
======================================+==================================+========================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                              |
                                      |          (two phase signal)       |                                        |
        --^ v--   B2B1                |              | Approach 3|        |                                        |
                                      |              |           |        |                                        |
    --^ AND <--      A1B2 AND         |              |           |        |                                        |
    --> OR  v--      /OR A2B1         |              |           |        |                                        |
        --> <--   A1A2                |-------------              ------------|                                    |
                                      | Approach 1                        |                                        |
          |  <    B4B3                |                                   |                                        |
          >  |                        |          See Step 6b.             |                                        |
    | | AND < ^      A3B4 AND         |                                   |                                        |
    v > OR  | |      /OR A4B3         |                        Approach 2 |                                        |
          |  ^    A3A4                |-------------              ------------|                                    |
          v  |                        |              |           |        |                                        |
--------------------------------------|              |           |        |                                        |
 A1 -->   A3 |      B1 v--    B3   <| |              |           |        |                                        |
           v ^                     | || |            | Approach 4|        | Exclusive right turns reduced 30 %     |
 A2 <--   A4  |     B2 --^    B4 |>   |                                   | V/C Ratio = 1.1                        |
===========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: JACKSON HWY AND S. WATT AVE.                               Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR      |
              | Approach 3:S. WATT AVE. |                -------Approach-----|          MULTIPHASE SIGNAL OVERLAP     |
              | 1   3   2 |       ^ |                   : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
              |   R   L   |       N |a.No. of change     :  0    0    0    0|Prob-  Critical   Carryover  Critical|
JACKSON HWY   | R T T T L |         |  intervals/hour    :                  |able    Volume    to next     Volume |
------------- T H H H T   ------------|b.LT capacity on    :  0    0    0    0|Phase   in vph     phase      in vph |
  Approach 1  < < | > >   ^--RT  1  |  change (vph)      :                  |--------------------------------------|
   2  LT--^     v v v    <^-RTH     |c.G/C ratio         :  0    0    0    0|B2B1    61(B1)  143-  61=  82(B2)    61|
      LTH-^>             <--TH   3  |d.Opposing volume   :  0    0    0    0|A1B2    82(B2)  532-  82= 450(A1)    82|
   3   TH-->             <v-LTH     |  in vph            :                  |A1A2   450(A1) OR  175(A2)           450|
      RTH-v>    ^ ^ ^     v--LT  2  |e.LT capacity on    :  0    0    0    0|B4B3   226(B3)  341- 226= 115(B4)   226|
   1  RT--v   < < | > >   Approach 2|  green (vph)       :                  |A3B4   115(B4)  477- 115= 362(A3)   115|
------------- L L T R R   ------------|f.LT capacity in    :  0    0    0    0|A3A4   613(A4) OR  362(A3)           613|
              | T T H T T |JACKSON HWY|  vph (b+e)         :                  |                                      |
              |   H   H   |         |g.Left turn volume  :  0    0    0    0|                                      |
              | 2   3   1 |         |  in vph            :                  |                                      |
              | Approach 4:S. WATT AVE. |h.Is volume > cap.  :                  :                                      |
                                    |  (g>f) ?           :                  |                                      |
====================================+=====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES      |
                                    |       |                     |        |                                      |
                                    |       |  4 4 4 2 3          |        |143(B1B2)+450(A1)+341(B3B4)+613(A4)   |
              | Approach 3|         |-------  9 7 7 7 7 4          -------|                                      |
 3:  LT= 620  | |         | 2:RT= 250 |        0 7 7 7 9 1          ^- 250 |          = 1547 vph                  |
     TH=1430  | |         |   TH= 370 |        | | | | | |          <- 123 |======================================|
     RT=  90  | v         |   LT= 110 |        < v v v > >          <- 123 | Step 8. INTERSECTION LEVEL OF        |
-------------                ------------|                              <- 123 |          SERVICE                     |
                          <--Approach 2 |                              v-  50 |     (compare step 7 with table 6)    |
                                    | 143 -^                        v-  61 |             -------                  |
                                    | 117 -^                               |             |  F  |                  |
 Approach 1-->                      | 420 ->                               |             -------                  |
-------------                ------------| 420 ->          < < ^ ^ ^ >         |======================================|
 1:LT= 260    |          ^ | 4: RT=  90 | 420 ->          | | | | | |         | Step 9. RECALCULATE                  |
   TH=1260    |          | |   TH=1840 | 760 -v                               |                                      |
   RT= 760    |          | |   LT= 410 |-------          2 1 6 6 6    -------|Geometric Change:                     |
              | Approach 4|         |       |          2 8 1 1 1 9 |        |Signal Change:                        |
                                    |       |          6 5 3 3 3 0 |        |Volume Change:                        |
====================================+=====================================+======================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                             |
                                    |          (two phase signal)          |                                      |
        --^ v--   B2B1              |           | Approach 3|              |                                      |
                                    |           |           |              |                                      |
     --^ AND <--      A1B2 AND      |           |           |              |                                      |
     --> OR  v--      /OR A2B1      |           |           |              |                                      |
        --> <--   A1A2              |-------------         -------------|                                      |
                                    | Approach 1                           |                                      |
          |   <   B4B3              |                                      |                                      |
          >   |                     |          See Step 6b.                |                                      |
     | | AND < ^      A3B4 AND      |                                      |                                      |
     v > OR  | |      /OR A4B3      |                          Approach 2  |                                      |
          |   ^   A3A4              |-------------         -------------|                                      |
          v   |                     |           |           |              |                                      |
------------------------------------|           |           |              |                                      |
A1 -->    A3 |     B1 v--     B3   <| |           |           |              |                                      |
            v ^                 | | |           | Approach 4|              | Exclusive right turns reduced  30 %  |
A2 <--    A4  |    B2 --^     B4 |> |                                      | V/C Ratio = 1.13                     |
==============================================================================================
```

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                                  Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW RD                                Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:BRADSHAW RD    |                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
             | 1   3   2 |      ^        |                 : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
             |  R    L   |      N        |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |               | intervals/hour  :                    |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT  1     | change (vph)    :                    |--------------------------------------|
   2  LT--^    v v v    <^-RTH        |c.G/C ratio      :  0    0    0    0|B2B1   127(B1)  154- 127=  27(B2)   127|
      LTH-^>            <--TH   3     |d.Opposing volume :  0    0    0    0|A1B2    27(B2)  112-  27=  85(A1)    27|
   3   TH-->            <v-LTH        | in vph          :                    |A1A2   360(A2) OR   85(A1)         360|
      RTH-v>    ^ ^ ^    v--LT  2     |e.LT capacity on :  0    0    0    0|B4B3    28(B4)  556-  28= 528(B3)    28|
   1  RT--v   < < | > >  Approach 2   | green (vph)     :                    |A4B3   528(B3)  680- 528= 152(A4)   528|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   411(A3) OR  152(A4)          411|
             | T T H T T |JACKSON HWY  | vph (b+e)       :                    |                                      |
             |   H   H   |             |g.Left turn volume :  0    0    0    0|                                      |
             | 2   3   1 |             | in vph          :                    |                                      |
             | Approach 4:BRADSHAW RD  |h.Is volume > cap. :                   :                                      |
                                       | (g>f) ?         :                    |                                      |
=======================================+======================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES      |
                                       |       |                       |      |                                      |
                                       |       | 3 4 4 4               |      |154(B1B2)+360(A2)+556(B4B3)+411(A3)   |
             | Approach 3|             |-------  2 1 1 1 2 2          -------|                                      |
 3:  LT=  50 | |         | 2:RT= 260   |         0 1 1 1 3 8          ^- 260 |         = 1481 vph                   |
   TH=1232   | |         |   TH=1080   |         | | | | | |          <- 360 |======================================|
   RT= 320   | v         |   LT= 230   |         < v v v > >          <- 360 | Step 8. INTERSECTION LEVEL OF        |
-------------             -------------|                              <- 360 |         SERVICE                      |
                          <--Approach 2                               v- 104 |      (compare step 7 with table 6)   |
                                       | 154 -^                       v- 127 |              -------                 |
                                       | 126 -^                              |              |  F  |                 |
 Approach 1-->                         |  87 ->                              |              -------                 |
-------------             -------------|  87 ->         < < ^ ^ ^ >          |======================================|
 1:LT= 280   |         ^ | 4: RT=  40  |  87 ->         | | | | | |          | Step 9. RECALCULATE                  |
   TH= 260   |         | |   TH=2040   | 160 -v                              |                                      |
   RT= 160   |         | |   LT=1010   |-------         5 4 6 6 6    -------|Geometric Change:                     |
             | Approach 4|             |       |        5 5 8 8 8 4 |        |Signal Change:                        |
                                       |       |        6 5 0 0 0 0 |        |Volume Change:                        |
=======================================+======================================+======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                             |
                                       |          (two phase signal)          |                                      |
        --^ v--  B2B1                  |            | Approach 3|             |                                      |
                                       |            |           |             |                                      |
    --^ AND <--     A1B2 AND           |            |           |             |                                      |
    --> OR  v--     /OR A2B1           |            |           |             |                                      |
        --> <--  A1A2                  |-------------           -------------|                                      |
                                       | Approach 1                           |                                      |
        |   <    B4B3                  |                                      |                                      |
        >   |                          |          See Step 6b.                |                                      |
    | | AND < ^     A3B4 AND           |                                      |                                      |
    v > OR  | |     /OR A4B3           |                        Approach 2    |                                      |
        |   ^    A3A4                  |-------------           -------------|                                      |
        v   |                          |            |           |             |                                      |
---------------------------------------|            |           |             |                                      |
A1 -->   A3 |     B1 v--    B3   <|    |            |           |             |                                      |
           v ^                    | |  |            | Approach 4|             | Exclusive right turns reduced 30 %   |
A2 <--   A4  |    B2 --^    B4 |>      |                                      | V/C Ratio = 1.08                     |
=================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW RD                                Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR |
           | Approach 3:BRADSHAW RD |             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
           | 1  3  2 |      ^       |             : -1-  -2-  -3-  -4-|     Possible    Volume    Adjusted|
           |  R   L  |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY | R T T T L |            |  intervals/hour :                   |able   Volume    to next    Volume |
-------------  T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1  |  change (vph)   :                   |-----------------------------------|
  2  LT--^      v v v    <^-RTH     |c.G/C ratio      :  0    0    0    0|B2B1   17(B1)  149-  17= 132(B2)   17|
     LTH-^>               <--TH   3 |d.Opposing volume :  0    0    0    0|A1B2  132(B2)  840- 132= 708(A1)  132|
  3   TH-->               <v-LTH    |  in vph         :                   |A1A2  708(A1) OR   93(A2)        708|
     RTH-v>     ^ ^ ^      v--LT  2 |e.LT capacity on :  0    0    0    0|B4B3  138(B4)  286- 138= 148(B3)  138|
  1  RT--v    < < | > >   Approach 2 |  green (vph)    :                   |A4B3  148(B3)  513- 148= 365(A4)  148|
-------------  L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4  644(A3) OR  365(A4)         644|
           | T T H T T |JACKSON HWY |  vph (b+e)      :                   |                                   |
           |   H   H   |            |g.Left turn volume :  0    0    0   0|                                   |
           | 2   3   1 |            |  in vph         :                   |                                   |
           | Approach 4:BRADSHAW RD |h.Is volume > cap. :                 :                                   |
                                    |  (g>f) ?        :                   |                                   |
=====================================+=================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |        |                   |     |                                   |
                                    |        | 2 6 6 6 1 1       |     |149(B1B2)+708(A1)+286(B4B3)+644(A3)|
           | Approach 3|            |-------   5 4 4 4 1 3        -------|                                   |
 3:  LT= 250 | |        | 2:RT= 110 |          0 4 4 4 3 8      ^- 110 |          = 1787 vph              |
    TH=1933 | |         |   TH= 280 |          | | | | | |      <-  93 |===================================|
    RT= 250 | v         |   LT=  30 |          < v v v > >      <-  93 | Step 8. INTERSECTION LEVEL OF     |
-------------           ------------|                           <-  93 |        SERVICE                    |
                        <--Approach 2                              v-  14 |    (compare step 7 with table 6)  |
                                    | 149 -^                     v-  17 |           -------                 |
                                    | 122 -^                            |           |  F  |               |
 Approach 1-->                      | 280 ->                            |           -------                 |
-------------           ------------| 280 ->       < < ^ ^ ^ >          |===================================|
 1:LT= 270  |        ^ | 4: RT= 230 | 280 ->       | | | | | |          | Step 9. RECALCULATE               |
   TH= 840  |        | |   TH=1540  |1200 -v                            |                                   |
   RT=1200  |        | |   LT= 520  |-------       2 2 5 5 5 2  -------|Geometric Change:                  |
           | Approach 4|            |        |     8 3 1 1 1 3 |       |Signal Change:                     |
                                    |        |     6 4 3 3 3 0 |       |Volume Change:                     |
=====================================+=================================+===================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                    |         (two phase signal)       |                                   |
       --^ v--  B2B1                |            | Approach 3|         |                                   |
                                    |            |           |         |                                   |
    --^ AND <--     A1B2 AND        |            |           |         |                                   |
    --> OR  v--     /OR A2B1        |            |           |         |                                   |
       --> <--  A1A2                |-------------            ------------|                                   |
                                    | Approach 1                        |                                   |
        |  <    B4B3                |                                   |                                   |
        >  |                        |           See Step 6b.           |                                   |
    | | AND < ^     A3B4 AND        |                                   |                                   |
    v > OR  | |     /OR A4B3        |                       Approach 2 |                                   |
        |  ^    A3A4                |-------------            ------------|                                   |
        v  |                        |            |           |         |                                   |
------------------------------------|            |           |         |                                   |
A1 -->   A3 |     B1 v--    B3   <| |            |           |         |                                   |
          v ^                     | | |          | Approach 4|         | Exclusive right turns reduced 30 %|
A2 <--   A4  |    B2 --^    B4  |>  |                                   | V/C Ratio = 1.3                   |
=============================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                        Calculation Form 1
Intersection: JACKSON HWY AND EXCELSIOR RD                            Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR       |
            | Approach 3:EXCELSIOR RD    |                   -------Approach-----|         MULTIPHASE SIGNAL OVERLAP    |
            | 1   1   1 |       ^        |                   : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
            |  R   L    |       N        |a.No. of change    :  0    0    0    0|Prob-  Critical   Carryover  Critical|
JACKSON HWY | R T T T L |                | intervals/hour    :                   |able    Volume    to next    Volume |
------------  T H H H T  ----------------|b.LT capacity on   :  0    0    0    0|Phase   in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT  1       | change (vph)      :                   |--------------------------------------|
   1  LT--^     v v v    <^-RTH          |c.G/C ratio        :  0    0    0    0|B2B1    40(B2)  160-  40= 120(B1)    40|
      LTH-^>             <--TH   2       |d.Opposing volume  :  0    0    0    0|A2B1   120(B1)  575- 120= 455(A2)   120|
   2   TH-->             <v-LTH          | in vph            :                   |A1A2   455(A2) OR   75(A1)          455|
      RTH-v>    ^ ^ ^     v--LT  1       |e.LT capacity on   :  0    0    0    0|B4B3    20(B4)  140-  20= 120(B3)    20|
   1  RT--v   < < | > >   Approach 2     | green (vph)       :                   |A4B3   120(B3) 1350- 120=1230(A4)   120|
------------  L L T R R  ----------------|f.LT capacity in   :  0    0    0    0|A3A4  1230(A4) OR  230(A3)         1230|
            | T T H T T |JACKSON HWY     | vph (b+e)         :                   |                                      |
            |  H   H    |                |g.Left turn volume :  0    0    0    0|                                      |
            | 1   1   1 |                | in vph            :                   |                                      |
            | Approach 4:EXCELSIOR RD    |h.Is volume > cap. :                   :                                      |
                                         | (g>f) ?           :                   |                                      |
=========================================+=======================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES      |
                                         |       |                        |      |                                      |
                                         |       |  2                     |      |160(B2B1)+455(A2)+140(B4B3)+1230(A4)  |
            | Approach 3|                |-------  9 3 2                  -------|                                      |
3:  LT=  20 | |         | 2:RT=  80      |         0 0 0               ^-  80  |           = 1985 vph                 |
   TH= 230  | |         |   TH=1150      |         | | |               <- 575  |======================================|
   RT=  90  | v         |   LT= 160      |         < v >               <- 575  | Step 8. INTERSECTION LEVEL OF        |
------------             ----------------|                             v- 160  |         SERVICE                      |
                          <--Approach 2  |                                     |     (compare step 7 with table 6)    |
                                         |                                     |               -------                |
                                         |                                     |               |  F  |                |
Approach 1-->                            |  40 -^                              |               -------                |
------------             ----------------|  75 ->               < ^ >          |======================================|
1:LT=  40   |             ^ | 4: RT= 160 |  75 ->               | | |          | Step 9. RECALCULATE                  |
  TH= 150   |             | |   TH=1350  |  30 -v                 1            |                                      |
  RT=  30   |             | |   LT= 140  |-------               1 3 1  -------|Geometric Change:                     |
            | Approach 4|                |       |              4 5 6 |        |Signal Change:                        |
                                         |       |              0 0 0 |        |Volume Change:                        |
=========================================+=======================================+======================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                             |
                                         |         (two phase signal)            |                                      |
        --^ v--  B2B1                    |            | Approach 3|              |                                      |
                                         |            |           |              |                                      |
    --^ AND <--     A1B2 AND             |            |           |              |                                      |
    --> OR  v--     /OR A2B1             |            |           |              |                                      |
        --> <--  A1A2                    |------------             ------------|                                      |
                                         | Approach 1                            |                                      |
         |  <    B4B3                    |                                       |                                      |
         >  |                            |          See Step 6b.                 |                                      |
    | | AND < ^     A3B4 AND             |                                       |                                      |
    v > OR  | |     /OR A4B3             |                          Approach 2   |                                      |
         |  ^    A3A4                    |------------              ------------|                                      |
         v  |                            |            |           |              |                                      |
-----------------------------------------|            |           |              |                                      |
A1 -->   A3 |      B1 v--     B3    <|   |            |           |              |                                      |
           v ^                      | |  |            | Approach 4|              | Exclusive right turns reduced 30 %   |
A2 <--   A4  |     B2 --^     B4 |>      |                                       | V/C Ratio = 1.44                     |
==================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: JACKSON HWY AND EXCELSIOR RD                         Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR    |
           | Approach 3:EXCELSIOR RD |              -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
           | 1   1   1 |     ^       |              : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
           |  R   L    |     N       |a.No. of change :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY | R T T T L |            | intervals/hour :                  |able    Volume   to next    Volume |
------------ T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1   | change (vph)   :                  |-----------------------------------|
  1  LT--^    v v v    <^-RTH       |c.G/C ratio     :  0    0    0    0|B2B1    80(B2)  180-  80= 100(B1)   80|
     LTH-^>            <--TH   2    |d.Opposing volume :  0    0    0    0|A2B1   100(B1)  170- 100=  70(A2)  100|
  2   TH-->            <v-LTH       | in vph         :                  |A1A2   555(A1) OR   70(A2)         555|
     RTH-v>   ^ ^ ^     v--LT  1    |e.LT capacity on :  0    0    0    0|B4B3    30(B4)   30-  30=   0(B3)   30|
  1  RT--v   < < | > >  Approach 2  | green (vph)    :                  |A4B3     0(B3)  380-   0= 380(A4)    0|
------------ L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4  1340(A3) OR  380(A4)        1340|
           | T T H T T |JACKSON HWY | vph (b+e)      :                  |                                   |
           |   H   H   |            |g.Left turn volume :  0    0    0    0|                                   |
           | 1   1   1 |            | in vph         :                  |                                   |
           | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                :                                   |
                                    | (g>f) ?        :                  |                                   |
==========================================================================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                    |        |  1               |       |                                   |
                                    |        |  3               |       |180(B2B1)+555(A1)+30(B4B3)+1340(A3)|
           | Approach 3|            |------- 3 4 3              -------|                                   |
 3:  LT=  30 | |        | 2:RT=  30 |        0 0 0             ^-  30 |           = 2105 vph              |
   TH=1340 | |          |   TH= 340 |        | | |             <- 170 |===================================|
   RT=  30 | v          |   LT= 180 |        < v >             <- 170 | Step 8. INTERSECTION LEVEL OF     |
------------            ------------|                          v- 180 |         SERVICE                   |
                      <--Approach 2 |                                 |    (compare step 7 with table 6)  |
                                    |                                 |             -------               |
                                    |                                 |             |  F  |               |
 Approach 1-->                      | 80 -^                           |             -------               |
------------            ------------| 555 ->               < ^ >      |===================================|
 1:LT=  80  |              ^ | 4: RT= 200 | 555 ->         | | |      | Step 9. RECALCULATE               |
   TH=1110  |              | |   TH= 380  | 130 -v                   |                                   |
   RT= 130  |              | |   LT=  30  |-------          3 2 -------|Geometric Change:                  |
           | Approach 4|            |        |             3 8 0 |    |Signal Change:                     |
                                    |        |             0 0 0 |    |Volume Change:                     |
==========================================================================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                    |         (two phase signal)      |                                   |
      --^ v--  B2B1                 |           | Approach 3|         |                                   |
                                    |           |           |         |                                   |
   --^ AND <--    A1B2 AND          |           |           |         |                                   |
   --> OR  v--    /OR A2B1          |           |           |         |                                   |
      --> <--  A1A2                 |------------           ------------|                                 |
                                    | Approach 1                      |                                   |
      |  <   B4B3                   |                                 |                                   |
      >  |                          |          See Step 6b.           |                                   |
   | | AND < ^    A3B4 AND          |                                 |                                   |
   v > OR  | |    /OR A4B3          |                     Approach 2  |                                   |
      |  ^   A3A4                   |------------           ------------|                                 |
      v  |                          |           |           |         |                                   |
------------------------------------|           |           |         |                                   |
 A1 -->   A3 |     B1 v--    B3   <| |           |           |         |                                   |
            v ^                 | | |           | Approach 4|         | Exclusive right turns reduced 30 %|
 A2 <--   A4  |    B2 --^    B4 |>  |                                 | V/C Ratio = 1.53                  |
==========================================================================================
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                         Critical Movement Analysis: PLANNING
                                Calculation Form 1
ntersection: ELDER CREEK RD AND S. WATT AVE.                      Design Hour: AM
roblem Statement: CUMULATIVE PLUS PROJECT
========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
           | Approach 3:S. WATT AVE.  |              -------Approach-----|        MULTIPHASE SIGNAL OVERLAP    |
           | 1   3   2 |       ^      |             : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
           |   R   L   |       N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
LDER CREEK R| R T T T L |             | intervals/hour  :                 |able   Volume    to next    Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT  1    | change (vph)    :                 |-------------------------------------|
   2  LT--^    v v v    <^-RTH        |c.G/C ratio      :  0    0    0    0|B2B1    66(B1)   83-  66=  17(B2)   66|
      LTH-^>            <--TH   2     |d.Opposing volume :  0    0    0    0|A1B2    17(B2)  130-  17= 113(A1)   17|
   2   TH-->            <v-LTH        | in vph          :                 |A1A2   469(A2) OR  113(A1)         469|
      RTH-v>    ^ ^ ^    v--LT  2     |e.LT capacity on :  0    0    0    0|B4B3    83(B4)  385-  83= 302(B3)   83|
   1  RT--v  < < | > >   Approach 2   | green (vph)     :                 |A4B3   302(B3) 1100- 302= 798(A4)  302|
------------ L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   798(A4) OR  383(A3)         798|
           | T T H T T |ELDER CREEK R| vph (b+e)       :                 |                                     |
           |   H   H   |              |g.Left turn volume :  0    0    0    0|                                     |
           | 2   3   1 |              | in vph          :                 |                                     |
           | Approach 4:S. WATT AVE.  |h.Is volume > cap. :                 :                                     |
                                      | (g>f) ?         :                 |                                     |
======================================+==================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                      |      |                   |       |                                     |
                                      |      | 2 3 3 3           |       |83(B1B2)+469(A2)+385(B4B3)+798(A4)   |
           | Approach 3|              |-------  1 8 8 8 6 8        -------|                                     |
3:  LT= 150 | |          | 2:RT= 670  |         0 3 3 3 8 3        ^- 670 |          = 1735 vph                 |
   TH=1150 | |          |   TH= 760  |         | | | | | |        <- 380 |=====================================|
   RT= 210 | v          |   LT= 120  |         < v v v > >        <- 380 | Step 8. INTERSECTION LEVEL OF       |
-------------           -------------|                            v-  54 |        SERVICE                      |
                        <--Approach 2 |                            v-  66 |    (compare step 7 with table 6)    |
                                      |                                   |              -------                |
                                      |  83 -^                            |              |  F  |                |
Approach 1-->                         |  68 -^                            |              -------                |
------------            -------------| 130 ->         < < ^ ^ ^ >         |=====================================|
1:LT= 150   |         ^ | 4: RT= 220 | 130 ->         | | | | | |         | Step 9. RECALCULATE                 |
  TH= 260   |         | |    TH=3300 | 120 -v             1 1 1         |                                     |
  RT= 120   |         | |   LT= 700  |-------         3 3 1 1 1 2 -------|Geometric Change:                    |
           | Approach 4|              |       |        8 1 0 0 0 2 |     |Signal Change:                       |
                                      |       |        5 5 0 0 0 0 |     |Volume Change:                       |
======================================+==================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                      |         (two phase signal)       |                                     |
       --^ v--  B2B1                  |           | Approach 3|          |                                     |
                                      |           |           |          |                                     |
    --^ AND <--     A1B2 AND          |           |           |          |                                     |
    --> OR  v--     /OR A2B1          |           |           |          |                                     |
       --> <--  A1A2                  |------------           -----------|                                     |
                                      | Approach 1                       |                                     |
        |  <    B4B3                  |                                  |                                     |
        >  |                          |           See Step 6b.           |                                     |
    | | AND < ^     A3B4 AND          |                                  |                                     |
    v > OR  | |     /OR A4B3          |                      Approach 2  |                                     |
        |  ^    A3A4                  |------------           -----------|                                     |
        v  |                          |           |           |          |                                     |
--------------------------------------|           |           |          |                                     |
1 -->   A3 |     B1 v--    B3   <|    |           |           |          |                                     |
         v ^                    | |   |           | Approach 4|          | Exclusive right turns reduced 30 %  |
A2 <--   A4  |   B2 --^    B4 |>      |                                  | V/C Ratio = 1.26                    |
========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: ELDER CREEK RD AND S. WATT AVE.                              Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR    |
              | Approach 3:S. WATT AVE. |             -------Approach-----|         MULTIPHASE SIGNAL OVERLAP |
              | 1   3   2 |     ^      |                 : -1-  -2-  -3-  -4-|     Possible    Volume     Adjusted|
              |   R   L   |     N      |a.No. of change  :   0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |             |  intervals/hour  :                  |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :   0    0    0    0|Phase   in vph     phase     in vph |
  Approach 1   < < | > >   ^--RT  1   |  change (vph)     :                  |-----------------------------------|
   2  LT--^     v v v     <^-RTH      |c.G/C ratio        :   0    0    0    0|B2B1   88(B2)  121-  88=  33(B1)   88|
     LTH-^>               <--TH   2   |d.Opposing volume  :   0    0    0    0|A2B1   33(B1)  205-  33= 172(A2)   33|
   2   TH-->              <v-LTH      |  in vph           :                  |A1A2  430(A1) OR  172(A2)         430|
     RTH-v>     ^ ^ ^      v--LT  2   |e.LT capacity on   :   0    0    0    0|B4B3  132(B3)  352- 132= 220(B4)  132|
   1  RT--v    < < | > >  Approach 2  |  green (vph)      :                  |A3B4  220(B4)  933- 220= 713(A3)  220|
-------------  L L T R R  -------------|f.LT capacity in   :   0    0    0    0|A3A4  713(A3) OR  577(A4)         713|
              | T T H T T |ELDER CREEK R|  vph (b+e)        :                  |                                   |
              |   H   H   |             |g.Left turn volume :  0    0    0    0|                                   |
              | 2   3   1 |             |  in vph           :                  |                                   |
              | Approach 4:S. WATT AVE.  |h.Is volume > cap. :                  :                                   |
                                      |  (g>f) ?          :                  |                                   |
=====================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                      |        |                     |     |                                   |
                                      |        | 2 9 9 9 2 3         |     |121(B2B1)+430(A1)+352(B3B4)+713(A3) |
              | Approach 3|           |-------  1 3 3 3 8 5       -------|                                   |
 3:  LT= 640 | |          | 2:RT= 240 |         0 3 3 3 8 2       ^- 240 |            = 1616 vph             |
    TH=2800  | |          |   TH= 410 |         | | | | | |       <- 205 |===================================|
    RT= 210  | v          |   LT= 220 |         < v v v > >       <- 205 | Step 8. INTERSECTION LEVEL OF     |
-------------              -----------|                           v-  99 |         SERVICE                   |
                         <--Approach 2 |                           v- 121 |    (compare step 7 with table 6)  |
                                      |                                  |           -------                 |
                                      | 88 -^                            |           |  F  |                 |
 Approach 1-->                        | 72 -^                            |           -------                 |
-------------              -----------| 430 ->         < < ^ ^ ^ >       |===================================|
 1:LT= 160   |            ^ | 4: RT= 150 | 430 ->      | | | | | |       | Step 9. RECALCULATE               |
   TH= 860   |            | |  TH=1730 | 500 -v                          |                                   |
   RT= 500   |            | |  LT= 240 |-------         1 1 5 5 5 1 -------|Geometric Change:                  |
             | Approach 4|            |         |       3 0 7 7 7 5 |    |Signal Change:                     |
                                      |         |       2 8 7 7 7 0 |    |Volume Change:                     |
=====================================+==================================+===================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                      |         (two phase signal)        |                                   |
        --^ v--  B2B1                 |          | Approach 3|            |                                   |
                                      |          |           |            |                                   |
    --^ AND <--     A1B2 AND          |          |           |            |                                   |
    --> OR  v--     /OR A2B1          |          |           |            |                                   |
        --> <--  A1A2                 |-------------           -----------|                                   |
                                      | Approach 1                        |                                   |
         |  <    B4B3                 |                                   |                                   |
         >  |                         |        See Step 6b.               |                                   |
    | | AND < ^     A3B4 AND          |                                   |                                   |
    v > OR  | |     /OR A4B3          |                       Approach 2  |                                   |
         |  ^    A3A4                 |-------------           -----------|                                   |
         v  |                         |          |           |            |                                   |
--------------------------------------|          |           |            |                                   |
A1 -->   A3 |      B1 v--     B3   <| |          |           |            |                                   |
          v ^                  |   |  |          | Approach 4|            | Exclusive right turns reduced 30 %|
A2 <--   A4  |     B2 --^     B4 |>   |                                   | V/C Ratio = 1.18                  |
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                                     Critical Movement Analysis: PLANNING
                                              Calculation Form 1
Intersection: ELDER CREEK RD AND BRADSHAW RD                                  Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR    |
              | Approach 3:BRADSHAW RD |                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
              | 1  3  2 |      ^    |                 : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
              |  R   L  |      N    |a.No. of change  :   0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |          |  intervals/hour  :                   |able    Volume   to next    Volume |
------------- T H H H T  -----------|b.LT capacity on  :   0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1    < < | > >   ^--RT  1  |  change (vph)    :                   |-----------------------------------|
   2  LT--^      v v v    <^-RTH    |c.G/C ratio       :   0    0    0    0|B2B1     6(B1)  171-   6= 165(B2)    6|
      LTH-^>              <--TH  2  |d.Opposing volume :   0    0    0    0|A1B2   165(B2)  120- 165=   0(A1)  165|
   2   TH-->              <v-LTH    |  in vph          :                   |A1A2   165(A2) OR     0(A1)        165|
      RTH-v>    ^ ^ ^     v--LT  2  |e.LT capacity on  :   0    0    0    0|B4B3     6(B4)  622-   6= 616(B3)    6|
   1  RT--v    < < | > >  Approach 2 |  green (vph)     :                   |A4B3   616(B3)  910- 616= 294(A4)  616|
-------------  L L T R R  -----------|f.LT capacity in  :   0    0    0    0|A3A4   310(A3) OR   294(A4)        310|
              | T T H T T |ELDER CREEK R|  vph (b+e)      :                   |                                   |
              |   H   H   |         |g.Left turn volume :   0    0    0    0|                                   |
              | 2   3   1 |         |  in vph          :                   |                                   |
              | Approach 4:BRADSHAW RD |h.Is volume > cap. :                 :                                   |
                                    |  (g>f) ?         :                   |                                   |
====================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                    |        |                    |      |                                   |
                                    |        | 2 3 3 3            |      |171(B1B2)+165(A2)+622(B4B3)+310(A3) |
              | Approach 3|         |-------  3 1 1 1             -------|                                   |
 3:  LT=  10  | |          | 2:RT= 130 |        0 0 0 0 5 6          ^- 130 |          = 1268 vph               |
   TH= 930    | |          |   TH= 330 |        | | | | | |          <- 165 |===================================|
   RT= 230    | v          |   LT=  10 |        < v v v > >          <- 165 | Step 8. INTERSECTION LEVEL OF     |
-------------               -----------|                             v-   5 |        SERVICE                    |
                        <--Approach 2 |                             v-   6 |    (compare step 7 with table 6)  |
                                    |                                    |           -------                 |
                                    | 171 -^                             |           | E |                   |
 Approach 1-->                      | 140 -^                             |           -------                 |
-------------               -----------| 120 ->          < < ^ ^ ^ >     |===================================|
 1:LT= 310    |          ^ | 4: RT= 110 | 120 ->          | | | | | |     | Step 9. RECALCULATE               |
   TH= 240    |          | |   TH=2730 |  30 -v                          |                                   |
   RT=  30    |          | |   LT=1130 |-------          6 5 9 9 9 1 -------|Geometric Change:                  |
              | Approach 4|         |        |         2 0 1 1 1 1 |     |Signal Change:                     |
                                    |        |         2 9 0 0 0 0 |     |Volume Change:                     |
====================================+==================================+===================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                    |          (two phase signal)       |                                   |
        --^ v--   B2B1              |              | Approach 3|        |                                   |
                                    |              |           |        |                                   |
     --^ AND <--     A1B2 AND       |              |           |        |                                   |
     --> OR  v--     /OR A2B1       |              |           |        |                                   |
        --> <--   A1A2              |-------------              -------------|                             |
                                    | Approach 1                        |                                   |
          |  <    B4B3              |                                   |                                   |
          >  |                      |         See Step 6b.              |                                   |
     | | AND < ^     A3B4 AND       |                                   |                                   |
     v > OR  | |     /OR A4B3       |                       Approach 2  |                                   |
          |  ^    A3A4              |-------------              -------------|                             |
          v  |                      |              |           |        |                                   |
-----------------------------------|              |           |        |                                   |
 A1 -->   A3 |     B1 v--    B3  <| |              |           |        |                                   |
            v ^                 | | |              | Approach 4|        | Exclusive right turns reduced 30 % |
 A2 <--   A4 |     B2 --^    B4 |>  |                                   | V/C Ratio = .92                   |
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                                Critical Movement Analysis: PLANNING
                                        Calculation Form 1
Intersection: ELDER CREEK RD AND BRADSHAW RD                                 Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK                 | Step 6b. VOLUME ADJUSTMENT FOR          |
               | Approach 3:BRADSHAW RD  |                      -------Approach-----|          MULTIPHASE SIGNAL OVERLAP      |
               | 1   3   2 |      ^      |                      : -1-  -2-  -3-  -4-|     Possible     Volume      Adjusted|
               |   R   L   |      N      |a.No. of change       :  0    0    0    0|Prob-  Critical   Carryover   Critical|
ELDER CREEK R| R T T T L |               |  intervals/hour      :                   |able    Volume    to next     Volume |
-------------  T H H H T  ---------------|b.LT capacity on      :  0    0    0    0|Phase   in vph     phase      in vph |
 Approach 1    < < | > >   ^--RT  1      | change (vph)         :                   |-----------------------------------------|
  2  LT--^       v v v    <^-RTH         |c.G/C ratio           :  0    0    0    0|B2B1    50(B1)  149-  50=  99(B2)    50|
     LTH-^>               <--TH   2      |d.Opposing volume     :  0    0    0    0|A1B2    99(B2)  714-  99= 615(A1)    99|
  2   TH-->               <v-LTH         | in vph               :                   |A1A2   615(A1) OR  165(A2)           615|
     RTH-v>      ^ ^ ^     v--LT  2      |e.LT capacity on      :  0    0    0    0|B4B3    11(B4)   55-  11=  44(B3)    11|
  1  RT--v     < < | > >  Approach 2     | green (vph)          :                   |A4B3    44(B3)  530-  44= 486(A4)    44|
-------------  L L T R R  ---------------|f.LT capacity in      :  0    0    0    0|A3A4   970(A3) OR  486(A4)           970|
             | T T H T T |ELDER CREEK R| vph (b+e)            :                   |                                         |
             |   H   H   |               |g.Left turn volume    :  0    0    0    0|                                         |
             | 2   3   1 |               | in vph               :                   |                                         |
             | Approach 4:BRADSHAW RD    |h.Is volume > cap.    :                  :                                          |
                                         | (g>f) ?              :                   |                                         |
=========================================+=========================================+=========================================|
 Step 2. IDENTIFY VOLUMES, in vph        | Step 5. ASSIGN LANE VOLUMES, in vph     | Step 7. SUM OF CRITICAL VOLUMES         |
                                         |       |                        |        |                                         |
                                         |       | 2 9 9 9                |        |149(B1B2)+615(A1)+55(B4B3)+970(A3)       |
             | Approach 3|               |-------  8 7 7 7   1              -------|                                         |
 3:  LT=  20 | |         | 2:RT=  10     |         0 0 0 0 9 1            ^-  10 |           = 1789 vph                    |
   TH=2910   | |         |   TH= 330     |         | | | | | |            <- 165 |=========================================|
  RT= 280    | v         |   LT=  90     |         < v v v > >            <- 165 | Step 8. INTERSECTION LEVEL OF           |
-------------            ----------------|                                v-  41 |         SERVICE                         |
                         <--Approach 2   |                                v-  50 |     (compare step 7 with table 6)       |
                                         |                                       |              -------                    |
                                         | 149 -^                                |              | F |                      |
 Approach 1-->                           | 122 -^                                |              -------                    |
-------------            ----------------| 180 ->        < < ^ ^ ^ >             |=========================================|
 1:LT= 270   |             ^ | 4: RT=  30| 180 ->        | | | | | |             | Step 9. RECALCULATE                      |
   TH= 360   |             | |   TH=1590 |1020 -v                                |                                         |
  RT=1020    |             | |  LT= 100  |-------            5 5 5        -------|Geometric Change:                        |
             | Approach 4|               |       |       5 4 3 3 3 3 |          |Signal Change:                            |
                                         |       |       5 5 0 0 0 0 |          |Volume Change:                            |
=========================================+=========================================+=========================================|
 Step 3. IDENTIFY PHASING                | Step 6a. CRITICAL VOLUMES, in vph       | COMMENTS                                |
                                         |         (two phase signal)              |                                         |
        --^ v--   B2B1                   |              | Approach 3|              |                                         |
                                         |              |           |              |                                         |
    --^ AND <--     A1B2 AND             |              |           |              |                                         |
    --> OR  v--     /OR A2B1             |              |           |              |                                         |
        --> <--   A1A2                   |-------------              ------------|                                         |
                                         | Approach 1                              |                                         |
         |   <    B4B3                   |                                         |                                         |
         >   |                           |          See Step 6b.                   |                                         |
    | | AND < ^     A3B4 AND             |                                         |                                         |
    v > OR  | |     /OR A4B3             |                          Approach 2     |                                         |
         |   ^    A3A4                   |-------------              ------------|                                         |
         v   |                           |              |           |              |                                         |
-----------------------------------------|              |           |              |                                         |
A1 -->    A3 |      B1 v--     B3   <|   |              |           |              |                                         |
            v ^                      | | |              | Approach 4|              | Exclusive right turns reduced 30 %      |
A2 <--    A4  |     B2 --^     B4  |>    |                                         | V/C Ratio = 1.3                         |
==============================================================================================
```

ATTACHMENT 5E

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                                   Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: ELDER CREEK RD AND EXCELSIOR RD                               Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR        |
            | Approach 3:EXCELSIOR RD  |              -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
            | 1   1     |       ^      |                : -1-  -2-  -3-  -4-|        Possible    Volume    Adjusted|
            |  R   L    |       N      |a.No. of change  :  0    0    0    0|Prob-   Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |             |  intervals/hour :                  |able    Volume    to next    Volume |
-------------  T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1    < < | > >   ^--RT       |  change (vph)   :                  |---------------------------------------|
   1  LT--^     v v v     <^-RTH       |c.G/C ratio      :  0    0    1    0|A4B3   160(B3) 1280- 160=1120(A4)   160|
      LTH-^>              <--TH        |d.Opposing volume:  0   10 1280    0|A3A4  1120(A4) OR  210(A3)         1120|
       TH-->              <v-LTH       |  in vph         :                  |A1B2   360(B2) OR    7(A1)          360|
      RTH-v>    ^ ^ ^      v--LT       |e.LT capacity on :  0    0    0    0|                                       |
   1  RT--v    < < | > >   Approach 2  |  green (vph)    :                  |                                       |
-------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|                                       |
            | T T H T T |ELDER CREEK R |  vph (b+e)      :                  |                                       |
            |   H   H   |              |g.Left turn volume :  0  0    0    0|                                       |
            | 1   1     |              |  in vph         :                  |                                       |
            | Approach 4:.             |h.Is volume > cap. :    NO   NO    :                                       |
                                       |  (g>f) ?        :                  |                                       |
=======================================+====================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph| Step 7. SUM OF CRITICAL VOLUMES       |
                                       |       |                     |      |                                       |
                                       |       | 3 1                 |      |1280(B3A4)+360(B2)+0()+0()             |
            | Approach 3|              |-------  0 0                  ------|                                       |
 3:  LT=   0 | |        | 2:RT=   0    |         0 0                        |          = 1640 vph                   |
   TH= 100  | |         |   TH=   0    |         | |                        |=======================================|
  RT= 300   | v         |   LT=   0    |         < v                        | Step 8. INTERSECTION LEVEL OF         |
-------------            --------------|                                    |        SERVICE                        |
                        <--Approach 2  |                                    |     (compare step 7 with table 6)     |
                                       |                                    |              -------                  |
                                       |                                    |              |  F  |                  |
 Approach 1-->                         |                                    |              -------                  |
-------------            --------------|                          < ^       |=======================================|
 1:LT= 360  |           ^ | 4: RT=   0 | 360 -^                   | |       | Step 9. RECALCULATE                   |
   TH=   0  |           | |   TH=1280  |  10 -v                     1       |                                       |
   RT=  10  |           | |   LT= 160  |-------                   1 2 -------|Geometric Change:                      |
            | Approach 4|              |       |                  6 8 |     |Signal Change:                         |
                                       |       |                  0 0 |     |Volume Change:                         |
=======================================+====================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                              |
                                       |         (two phase signal)         |                                       |
          <   ^   A4B3                 |            | Approach 3|           |                                       |
          |   |                        |            |           |           |                                       |
          |   ^   A3A4                 |            |           |           |                                       |
          v   |                        |            |           |           |                                       |
         --^      A1B2                 |-------------           ------------|                                       |
         -->                           | Approach 1                         |                                       |
                                       |                                    |                                       |
                                       |          See Step 6b.              |                                       |
                                       |                                    |                                       |
                                       |                        Approach 2  |                                       |
                                       |-------------           ------------|                                       |
                                       |            |           |           |                                       |
---------------------------------------|            |           |           |                                       |
 A1 -->    A3 |       B1 v--      B3  <|            |           |           |                                       |
             v ^                     | |            | Approach 4|           | Exclusive right turns reduced 30 %    |
 A2 <--    A4  |      B2 --^      B4 |>|                                    | V/C Ratio = 1.15                      |
==============================================================================================
```

```
                                   Critical Movement Analysis: PLANNING
                                          Calculation Form 1
Intersection: ELDER CREEK RD AND EXCELSIOR RD                              Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR |
             | Approach 3:EXCELSIOR RD |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1   1     |       ^     |                 : -1-  -2-  -3-  -4-|     Possible   Volume     Adjusted|
             |  R   L    |       N     |a.No. of change  :  0    0    0    0|Prob-  Critical   Carryover  Critical|
ELDER CREEK R| R T T T L |             | intervals/hour  :                 |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1   < < | > >   ^--RT       | change (vph)     :                 |---------------------------------------|
   1  LT--^     v v v    <^-RTH       |c.G/C ratio       :  0    0    1    0|A4B3    20(B3)  260-  20= 240(A4)    20|
      LTH-^>             <--TH        |d.Opposing volume :  0  420  260    0|A3A4  1230(A3) OR  240(A4)         1230|
       TH-->             <v-LTH       | in vph           :                 |A1B2   350(B2) OR  294(A1)          350|
      RTH-v>    ^ ^ ^     v--LT       |e.LT capacity on  :  0    0  940    0|                                       |
   1  RT--v   < < | > >   Approach 2  | green (vph)      :                 |                                       |
------------- L L T R R  -------------|f.LT capacity in  :  0    0  940    0|                                       |
             | T T H T T |ELDER CREEK R| vph (b+e)       :                 |                                       |
             |  H   H    |             |g.Left turn volume :  0    0    0    0|                                       |
             | 1   1     |             | in vph          :                 |                                       |
             | Approach 4:.            |h.Is volume > cap. :      NO   NO   :                                       |
                                       | (g>f) ?         :                 |                                       |
=======================================+=================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                       |        |  1                  |    |                                       |
                                       |        |  2                  |    |1250(B3A3)+350(B2)+0()+0()             |
             | Approach 3|             |-------  3 3              -------|                                       |
 3:  LT=   0 | |         | 2:RT=    0  |         0 0                     |           = 1600 vph                  |
    TH=1230  | |         |   TH=    0  |         | |                     |=======================================|
   RT=  30   | v         |   LT=    0  |         < v                     | Step 8. INTERSECTION LEVEL OF         |
-------------             -------------|                                 |         SERVICE                       |
                         <--Approach 2 |                                 |      (compare step 7 with table 6)    |
                                       |                                 |              -------                  |
                                       |                                 |              |  F  |                 |
 Approach 1-->                         |                                 |              -------                  |
-------------             -------------|                         < ^     |=======================================|
 1:LT= 350   |         ^ | 4: RT=   0  | 350 -^                  | |     | Step 9. RECALCULATE                   |
   TH=   0   |         | |   TH= 260   | 420 -v                          |                                       |
   RT= 420   |         | |   LT=  20   |-------                   2 -------|Geometric Change:                     |
             | Approach 4|             |        |                2 6 |   |Signal Change:                         |
                                       |        |                0 0 |   |Volume Change:                         |
=======================================+=================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                       |         (two phase signal)      |                                       |
           <    ^    A4B3              |           | Approach 3|         |                                       |
           |    |                      |           |           |         |                                       |
           |    ^    A3A4              |           |           |         |                                       |
           v    |                      |           |           |         |                                       |
          --^        A1B2              |-------------           ---------|                                       |
          -->                          | Approach 1                      |                                       |
                                       |                                 |                                       |
                                       |          See Step 6b.           |                                       |
                                       |                                 |                                       |
                                       |                     Approach 2  |                                       |
                                       |-------------          ----------|                                       |
                                       |           |           |         |                                       |
---------------------------------------|           |           |         |                                       |
 A1 -->    A3 |       B1 v--    B3   <|           |           |         |                                       |
             v ^                    | |           | Approach 4|         | Exclusive right turns reduced 30 %    |
 A2 <--    A4  |      B2 --^    B4 |> |                                 | V/C Ratio = 1.12                      |
============================================================================================
```

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                                Critical Movement Analysis: PLANNING
                                         Calculation Form 1
Intersection: FLORIN RD AND ELK GROVE-FLORIN RD                         Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR       |
            | Approach 3:ELK GROVE-FLO|             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP       |
            | 1  3  2 |      ^       |                 : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
            |  R  L   |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |            | intervals/hour  :                 |able    Volume    to next    Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1  < < | > >   ^--RT  1    | change (vph)    :                 |-------------------------------------|
  2  LT--^    v v v     <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1   121(B1)  286- 121= 165(B2)   121|
     LTH-^>             <--TH   3    |d.Opposing volume:  0    0    0    0|A1B2   165(B2)  170- 165=   5(A1)   165|
  3  TH-->              <v-LTH       | in vph          :                 |A1A2   530(A2) OR   5(A1)           530|
     RTH-v>   ^ ^ ^      v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3    55(B4)  314-  55= 259(B3)    55|
  1  RT--v   < < | > >  Approach 2   | green (vph)     :                 |A4B3   259(B3) 1060- 259= 801(A4)   259|
------------ L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   801(A4) OR  317(A3)           801|
            | T T H T T |FLORIN RD   | vph (b+e)       :                 |                                     |
            |   H   H   |            |g.Left turn volume:  0    0    0    0|                                     |
            | 2   3   1 |            | in vph          :                 |                                     |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap.:                 :                                     |
                                     | (g>f) ?         :                 |                                     |
=====================================+=================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                     |       |                    |     |                                     |
                                     |       | 2 3 3 3            |     |286(B1B2)+530(A2)+314(B4B3)+801(A4)  |
            | Approach 3|            |-------  2 1 1 1 4 5        -------|                                     |
3:  LT= 100 | |          | 2:RT= 710 |         0 7 7 7 5 5         ^- 710 |           = 1931 vph                |
    TH= 950 | |          |   TH=1590 |         | | | | | |         <- 530 |=====================================|
    RT= 220 | v          |   LT= 220 |         < v v v > >         <- 530 | Step 8. INTERSECTION LEVEL OF       |
-------------            -------------|                             <- 530 |         SERVICE                     |
                      <--Approach 2  |                             v-  99 |    (compare step 7 with table 6)    |
                                     | 286 -^                      v- 121 |              -------                |
                                     | 234 -^                             |              |  F  |               |
Approach 1-->                        | 170 ->                             |              -------                |
------------            -------------| 170 ->       < < ^ ^ ^ >           |=====================================|
1:LT= 520   |           ^ | 4: RT=  80| 170 ->       | | | | | |           | Step 9. RECALCULATE                 |
  TH= 510   |           | |   TH=3180| 210 -v          1 1 1              |                                     |
  RT= 210   |           | |   LT= 570|-------       3 2 0 0 0      -------|Geometric Change:                    |
            | Approach 4|            |       |      1 5 6 6 6 8 |         |Signal Change:                       |
                                     |       |      4 7 0 0 0 0 |         |Volume Change:                       |
=====================================+=================================+=====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                     |        (two phase signal)       |                                     |
       --^ v--   B2B1                |           | Approach 3|         |                                     |
                                     |           |           |         |                                     |
    --^ AND <--     A1B2 AND         |           |           |         |                                     |
    --> OR  v--     /OR A2B1         |           |           |         |                                     |
       --> <--   A1A2                |------------           ------------|                                     |
                                     | Approach 1                      |                                     |
        |  <   B4B3                  |                                 |                                     |
        >  |                         |          See Step 6b.           |                                     |
    | | AND < ^     A3B4 AND         |                                 |                                     |
    v > OR  | |     /OR A4B3         |                      Approach 2 |                                     |
        |  ^   A3A4                  |------------           ------------|                                     |
        v  |                         |           |           |         |                                     |
-------------------------------------|           |           |         |                                     |
A1 -->   A3 |     B1 v--     B3   <| |           |           |         |                                     |
          v ^                     | | |           | Approach 4|         | Exclusive right turns reduced 30 %  |
A2 <--   A4 |     B2 --^     B4  |>  |                                 | V/C Ratio = 1.4                     |
==========================================================================================================
```

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                                   Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: FLORIN RD AND ELK GROVE-FLORIN RD                        Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:ELK GROVE-FLO|             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
             | 1   3   2 |      ^      |             : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
             |   R   L   |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |             | intervals/hour  :                  |able    Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT  1    | change (vph)    :                  |-------------------------------------|
   2  LT--^     v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1   116(B1)  143- 116=  27(B2)  116|
      LTH-^>             <--TH   3    |d.Opposing volume :  0    0    0    0|A1B2    27(B2)  597-  27= 570(A1)   27|
   3   TH-->             <v-LTH       | in vph          :                  |A1A2   570(A1) OR  303(A2)          570|
      RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3   182(B3)  270- 182=  88(B4)  182|
   1  RT--v   < < | > >   Approach 2  | green (vph)     :                  |A3B4    88(B4)  830-  88= 742(A3)   88|
-------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   742(A3) OR  507(A4)          742|
             | T T H T T |FLORIN RD   | vph (b+e)       :                  |                                     |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                     |
             | 2   3   1 |            | in vph          :                  |                                     |
             | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                :                                     |
                                      | (g>f) ?         :                  |                                     |
=======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |       |                    |       |                                     |
                                      |       | 5 8 8 8 2 2        |       |143(B1B2)+570(A1)+270(B3B4)+742(A3)  |
             | Approach 3|            |-------  7 3 3 3 2 7         -------|                                     |
 3:  LT= 490 | |         | 2:RT= 240  |         0 0 0 0 1 0         ^- 240 |          = 1725 vph                 |
   TH=2490   | |         |   TH= 910  |         | | | | | |         <- 303 |=====================================|
   RT= 570   | v         |   LT= 210  |         < v v v > >         <- 303 | Step 8. INTERSECTION LEVEL OF       |
-------------             -------------|                             <- 303 |        SERVICE                      |
                          <--Approach 2|                             v-  95 |    (compare step 7 with table 6)    |
                                      | 143 -^                      v- 116 |           -------                   |
                                      | 117 -^                             |           |  F  |                   |
 Approach 1-->                        | 597 ->                             |           -------                   |
-------------             -------------| 597 ->          < < ^ ^ ^ >        |=====================================|
 1:LT= 260   |           ^ | 4: RT= 100| 597 ->          | | | | | |        | Step 9. RECALCULATE                 |
   TH=1790   |           | |   TH=1520 | 550 -v                             |                                     |
   RT= 550   |           | |   LT= 330 |-------          1 1 5 5 5 1 -------|Geometric Change:                    |
             | Approach 4|            |       |         8 4 0 0 0 0 |      |Signal Change:                       |
                                      |       |         2 9 7 7 7 0 |      |Volume Change:                       |
=======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                      |         (two phase signal)         |                                     |
       --^ v--  B2B1                  |           | Approach 3|            |                                     |
                                      |           |           |            |                                     |
    --^ AND <--     A1B2 AND          |           |           |            |                                     |
    --> OR  v--     /OR A2B1          |           |           |            |                                     |
       --> <--  A1A2                  |------------           ------------|                                     |
                                      | Approach 1                         |                                     |
        |  <    B4B3                  |                                    |                                     |
        >  |                          |          See Step 6b.              |                                     |
    | | AND < ^     A3B4 AND          |                                    |                                     |
    v > OR  | |     /OR A4B3          |                       Approach 2   |                                     |
        |  ^    A3A4                  |------------           ------------|                                     |
        v  |                          |           |           |            |                                     |
--------------------------------------|           |           |            |                                     |
 A1 -->   A3 |     B1 v--    B3   <|  |           |           |            |                                     |
            v ^                  | |  |           | Approach 4|            | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |    B2 --^    B4 |>    |                                    | V/C Ratio = 1.25                    |
================================================================================================
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                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                     Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR   |
            | Approach 3:WATERMAN RD   |           -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
            |          |      ^        |           : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
            |  R   L   |      N        |a.No. of change  :  0    0    0   0|Prob-  Critical  Carryover Critical|
FLORIN RD   | R T T T L |              |  intervals/hour :               |able   Volume   to next   Volume |
-------------  T H H H T  -------------|b.LT capacity on :  0    0    0   0|Phase  in vph    phase    in vph |
  Approach 1   < < | > >   ^--RT       |  change (vph)   :               |-------------------------------------|
     LT--^      v v v     <^-RTH       |c.G/C ratio      :  0    0    1   0|A2B1  165(B1)  53- 165=  0(A2)  165|
     LTH-^>               <--TH   3    |d.Opposing volume : 160  0  570   0|A1A2  161(A1) OR  0(A2)         161|
  3   TH-->               <v-LTH       |  in vph         :               |A4B3  633(B3) OR 399(A4)         633|
     RTH-v>      ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0  630   0|                                  |
  1  RT--v     < < | > >   Approach 2  |  green (vph)    :               |                                  |
-------------  L L T R R  -------------|f.LT capacity in :  0    0  630   0|                                  |
            | T T H T T |FLORIN RD     |  vph (b+e)      :               |                                  |
            |   H   H   |              |g.Left turn volume :  0    0    0   0|                                  |
            | 2       1 |              |  in vph         :               |                                  |
            | Approach 4:WATERMAN RD   |h.Is volume > cap. : NO       NO   :|                                  |
                                       |  (g>f) ?        :               |                                  |
=======================================+=================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |        |                 |      |                                  |
                                       |        |                 |      |326(B1A1)+633(B3)+0()+0()         |
          | Approach 3|                |-------                  ------- |                                  |
3:  LT=   0 | |        | 2:RT=   0     |                         <-  53  |          = 959 vph               |
   TH=   0 | |         |   TH= 160     |                         <-  53  |==================================|
  RT=   0  | v         |   LT= 300     |                         <-  53  | Step 8. INTERSECTION LEVEL OF    |
-------------           -------------  |                         v- 135  |        SERVICE                   |
                      <--Approach 2    |                         v- 165  |    (compare step 7 with table 6) |
                                       |                                 |           -------                |
Approach 1-->                          |                                 |           | B |                |
-------------                          | 83 ->                           |           -------                |
                        -------------  | 83 ->              < < >        |==================================|
1:LT=   0  |              ^ | 4: RT= 570 | 83 ->            | | |        | Step 9. RECALCULATE              |
  TH= 250  |              | |    TH=   0 | 230 -v                        |                                  |
  RT= 230  |              | |   LT=1150  |-------          6 5 5  -------|Geometric Change:                 |
           | Approach 4|               |        |          3 1 7 |      |Signal Change:                    |
                                       |        |          3 8 0 |      |Volume Change:                    |
=======================================+=================================+==================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                       |
                                       |          (two phase signal)     |                                  |
          <--  A2B1                    |            | Approach 3|        |                                  |
          v--                          |            |           |        |                                  |
      --> <--  A1A2                    |            |           |        |                                  |
                                       |            |           |        |                                  |
       <   ^   A4B3                    |-------------             -------|                                  |
       |   |                           | Approach 1                      |                                  |
                                       |                                 |                                  |
                                       |         See Step 6b.            |                                  |
                                       |                                 |                                  |
                                       |                     Approach 2  |                                  |
                                       |-------------        ------------|                                  |
--------------------------------------- |          |           |         |                                  |
A1 -->   A3 |     B1 v--    B3   <|    |          |           |         |                                  |
            v ^                  | |   |          |           |         |                                  |
 2 <--   A4  |    B2 --^    B4 |>      |          | Approach 4|         | Exclusive right turns reduced 30 % |
                                       |                                 | V/C Ratio = .67                  |
==================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: FLORIN RD AND WATERMAN RD                                Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR |
           | Approach 3:WATERMAN RD   |             -------Approach-----|          MULTIPHASE SIGNAL OVERLAP |
           |          |      ^        |                 : -1- -2- -3- -4-|      Possible   Volume    Adjusted|
           |  R   L   |      N        |a.No. of change  :  0   0   0   0|Prob- Critical  Carryover Critical|
FLORIN RD  | R T T T L |              | intervals/hour  :               |able   Volume   to next   Volume |
---------- T H H H T  ----------------|b.LT capacity on :  0   0   0   0|Phase  in vph    phase    in vph |
 Approach 1  < < | > >   ^--RT        | change (vph)    :               |---------------------------------|
     LT--^    v v v    <^-RTH         |c.G/C ratio      :  0   0   1   0|A2B1  270(B1) 157- 270=  0(A2)  270|
     LTH-^>            <--TH   3      |d.Opposing volume: 470  0  350  0|A1A2  749(A1) OR   0(A2)         749|
  3   TH-->            <v-LTH         | in vph          :               |A4B3  391(B3) OR 245(A4)         391|
     RTH-v>     ^ ^ ^   v--LT  2      |e.LT capacity on :  0   0  850  0|                                 |
  1  RT--v   < < | > >  Approach 2    | green (vph)     :               |                                 |
----------   L L T R R  --------------|f.LT capacity in :  0   0  850  0|                                 |
           | T T H T T |FLORIN RD     | vph (b+e)       :               |                                 |
           |   H   H   |              |g.Left turn volume :  0  0   0  0|                                 |
           | 2       1 |              | in vph          :               |                                 |
           | Approach 4:WATERMAN RD   |h.Is volume > cap. : NO     NO   :                                 |
                                      | (g>f) ?         :               |                                 |
======================================+=================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                      |      |                    |      |                                 |
                                      |      |                    |      |1019(B1A1)+391(B3)+0()+0()       |
           | Approach 3|              |-------              -------|                                 |
 3:  LT=   0 | |         | 2:RT=   0  |                       <- 157 |          = 1410 vph             |
    TH=   0  | |         |   TH= 470  |                       <- 157 |=================================|
   RT=   0   | v         |   LT= 490  |                       <- 157 | Step 8. INTERSECTION LEVEL OF   |
----------              --------------|                       v- 221 |        SERVICE                  |
                        <--Approach 2 |                       v- 270 |    (compare step 7 with table 6)|
                                      |                              |             -------             |
                                      |                              |             |  E  |             |
 Approach 1-->                        | 520 ->                       |             -------             |
----------              --------------| 520 ->          < < >        |=================================|
 1:LT=   0   |           ^ | 4: RT= 350 | 520 ->        | | |        | Step 9. RECALCULATE             |
   TH=1560   |           | |    TH=   0 |1070 -v                     |                                 |
   RT=1070   |           | |   LT= 710  |-------          3 3 3 -------|Geometric Change:               |
             | Approach 4|              |      |          9 2 5 |      |Signal Change:                   |
                                      |      |          1 0 0 |      |Volume Change:                   |
======================================+==============================+=================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                  |
                                      |          (two phase signal)  |                                 |
            <--  A2B1                 |           | Approach 3|      |                                 |
            v--                       |           |           |      |                                 |
        --> <--  A1A2                 |           |           |      |                                 |
                                      |           |           |      |                                 |
         <   ^   A4B3                 |------------        ------------|                               |
         |   |                        | Approach 1                   |                                 |
                                      |                              |                                 |
                                      |        See Step 6b.          |                                 |
                                      |                              |                                 |
                                      |                  Approach 2  |                                 |
                                      |------------        ------------|                               |
                                      |           |           |      |                                 |
--------------------------------------|           |           |      |                                 |
 A1 -->    A3 |      B1 v--      B3  <| |         |           |      |                                 |
            v ^                      | | |        | Approach 4|      | Exclusive right turns reduced 30 % |
 A2 <--    A4  |     B2 --^      B4 |>  |                            | V/C Ratio = .99                 |
===========================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                                  Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
=========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
               | Approach 3:BRADSHAW RD |              -------Approach-----|       MULTIPHASE SIGNAL OVERLAP     |
               | 1   3   2 |      ^     |                    : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
               |   R   L   |      N     |a.No. of change     :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD      | R T T T L |            |  intervals/hour    :                   |able    Volume   to next    Volume |
-------------  T H H H T  -------------|b.LT capacity on    :  0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1   < < | > >   ^--RT  1     |  change (vph)      :                   |-----------------------------------|
   2  LT--^      v v v    <^-RTH        |c.G/C ratio         :  0    0    0    0|B2B1    17(B1)  413-  17= 396(B2)  17|
      LTH-^>              <--TH   3     |d.Opposing volume   :  0    0    0    0|A1B2   396(B2)   63- 396=   0(A1) 396|
   3   TH-->              <v-LTH        |  in vph            :                   |A1A2   504(A2) OR    0(A1)         504|
      RTH-v>     ^ ^ ^     v--LT  2     |e.LT capacity on    :  0    0    0    0|B4B3     6(B4)  440-   6= 434(B3)   6|
   1  RT--v    < < | > >   Approach 2   |  green (vph)       :                   |A4B3   434(B3)  827- 434= 393(A4) 434|
-------------  L L T R R  -------------|f.LT capacity in    :  0    0    0    0|A3A4   393(A4) OR  237(A3)         393|
              | T T H T T |FLORIN RD    |  vph (b+e)         :                   |                                    |
              |   H   H   |             |g.Left turn volume  :  0    0    0    0|                                    |
              | 2   3   1 |             |  in vph            :                   |                                    |
              | Approach 4:BRADSHAW RD  |h.Is volume > cap.  :                   :                                    |
                                        |  (g>f) ?           :                   |                                    |
========================================+=====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES     |
                                        |         |                   |        |                                     |
                                        |         | 2 2 2 2           |        |413(B1B2)+504(A2)+440(B4B3)+393(A4)  |
              | Approach 3|             |-------    6 3 3 3             -------|                                     |
 3:  LT=  10  | |          | 2:RT= 720  |           0 7 7 7 5 6          ^- 720 |          = 1750 vph                 |
    TH= 710   | |          |   TH=1010  |           | | | | | |          <- 337 |=====================================|
   RT= 260    | v          |   LT=  30  |           < v v v > >          <- 337 | Step 8. INTERSECTION LEVEL OF       |
-------------               ------------|                                <- 337 |        SERVICE                      |
                           <--Approach 2|                                v-  14 |     (compare step 7 with table 6)   |
                                        | 413 -^                         v-  17 |            -------                  |
                                        | 338 -^                                |            |  F  |                  |
 Approach 1-->                          |  63 ->                                |            -------                  |
 ------------               ------------|  63 ->          < < ^ ^ ^ >           |=====================================|
 1:LT= 750    |           ^ | 4: RT= 400|  63 ->          | | | | | |           | Step 9. RECALCULATE                 |
   TH= 190    |           | |   TH=2480 |  70 -v                                |                                     |
   RT=  70    |           | |   LT= 800 |-------          4 3 8 8 8 4   -------|Geometric Change:                    |
              | Approach 4|             |        |        4 6 2 2 2 0 |         |Signal Change:                       |
                                        |        |        0 0 7 7 7 0 |         |Volume Change:                       |
========================================+=====================================+======================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                            |
                                        |          (two phase signal)          |                                     |
         --^ v--   B2B1                 |              | Approach 3|           |                                     |
                                        |              |           |           |                                     |
      --^ AND <--     A1B2 AND          |              |           |           |                                     |
      --> OR  v--     /OR A2B1          |              |           |           |                                     |
         --> <--   A1A2                 |-------------              -----------|                                     |
                                        | Approach 1                           |                                     |
           |  <    B4B3                 |                                      |                                     |
           >  |                         |              See Step 6b.            |                                     |
      | | AND < ^     A3B4 AND          |                                      |                                     |
      v > OR  | |     /OR A4B3          |                          Approach 2  |                                     |
           |  ^    A3A4                 |-------------              -----------|                                     |
           v  |                         |              |           |           |                                     |
----------------------------------------|              |           |           |                                     |
A1 -->   A3 |      B1 v--     B3    <|  |              |           |           |                                     |
           v ^                      | | |              | Approach 4|           | Exclusive right turns reduced 30 %  |
A2 <--   A4  |     B2 --^     B4   |>   |                                      | V/C Ratio = 1.27                    |
=========================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                              Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
=========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR        |
             | Approach 3:BRADSHAW RD  |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP      |
             | 1   3   2 |     ^       |             : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
             |   R   L   |     N       |a.No. of change   :  0    0    0    0|Prob-  Critical   Carryover  Critical|
FLORIN RD    | R T T T L |             |  intervals/hour  :              |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph     phase      in vph |
 Approach 1   < < | > >   ^--RT  1    |  change (vph)    :              |---------------------------------------|
   2  LT--^     v v v     <^-RTH      |c.G/C ratio       :  0    0    0    0|B2B1   165(B2)  193- 165=  28(B1)   165|
      LTH-^>              <--TH   3   |d.Opposing volume :  0    0    0    0|A2B1    28(B1)  140-  28= 112(A2)    28|
   3   TH-->              <v-LTH      |  in vph          :              |A1A2   476(A1) OR  112(A2)          476|
      RTH-v>    ^ ^ ^      v--LT  2   |e.LT capacity on  :  0    0    0    0|B4B3    72(B3)  385-  72= 313(B4)    72|
   1  RT--v   < < | > >   Approach 2  |  green (vph)     :              |A3B4   313(B4)  850- 313= 537(A3)   313|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   537(A3) OR  407(A4)          537|
             | T T H T T |FLORIN RD   |  vph (b+e)       :              |                                       |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                       |
             | 2   3   1 |            |  in vph          :              |                                       |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :              :                                       |
                                      |  (g>f) ?         :              |                                       |
=======================================+================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                       |        |                  |     |                                       |
                                       |        | 7 8 8 8 3 3      |     |193(B2B1)+476(A1)+385(B3B4)+537(A3)   |
             | Approach 3|             |-------  7 5 5 5 1 8          -------|                                   |
 3:  LT= 700 | |         | 2:RT= 200   |         0 0 0 0 5 5          ^- 200 |          = 1591 vph              |
   TH=2550   | |         |   TH= 310   |         | | | | | |          <- 103 |===================================|
  RT= 770    | v         |   LT= 350   |         < v v v > >          <- 103 | Step 8. INTERSECTION LEVEL OF     |
-------------             -------------|                              <- 103 |         SERVICE                   |
                       <--Approach 2   |                              v- 158 |    (compare step 7 with table 6)  |
                                       | 165 -^                       v- 193 |            -------                |
                                       | 135 -^                             |            |  F  |                |
 Approach 1-->                         | 343 ->                             |            -------                |
-------------             -------------| 343 ->          < < ^ ^ ^ >        |===================================|
 1:LT= 300   |          ^ | 4: RT=  40 | 343 ->          | | | | | |        | Step 9. RECALCULATE               |
   TH=1030   |          | |   TH=1220  | 680 -v                             |                                   |
  RT= 680    |          | |   LT= 130  |-------              4 4 4  -------|Geometric Change:                  |
             | Approach 4|             |        |        7 5 0 0 0 4 |     |Signal Change:                     |
                                       |        |        2 9 7 7 7 0 |     |Volume Change:                     |
=======================================+================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                       |        (two phase signal)       |                                    |
        --^ v--  B2B1                  |             | Approach 3|       |                                    |
                                       |             |           |       |                                    |
    --^ AND <--     A1B2 AND           |             |           |       |                                    |
    --> OR  v--     /OR A2B1           |             |           |       |                                    |
        --> <--  A1A2                  |-------------             -------|                                    |
                                       | Approach 1                       |                                    |
         |   <   B4B3                  |                                  |                                    |
         >   |                         |           See Step 6b.           |                                    |
    | | AND < ^     A3B4 AND           |                                  |                                    |
    v > OR  | |     /OR A4B3           |                       Approach 2 |                                    |
         |   ^   A3A4                  |-------------         ------------|                                    |
         v   |                         |             |           |        |                                    |
---------------------------------------|             |           |        |                                    |
 A1 -->    A3 |      B1 v--     B3   <||             |           |        |                                    |
            v ^                      | |             | Approach 4|        | Exclusive right turns reduced 30 % |
 A2 <--    A4  |     B2 --^     B4  |> |                                  | V/C Ratio = 1.16                   |
=========================================================================================================
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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: FLORIN RD AND VINEYARD RD                                 Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
           | Approach 3:VINEYARD RD |         -------Approach-----|         MULTIPHASE SIGNAL OVERLAP    |
           |         |      ^       |                : -1- -2- -3- -4-|      Possible   Volume    Adjusted|
           |  R   L  |      N       |a.No. of change  :  0   0   0   0|Prob-  Critical Carryover  Critical|
FLORIN RD  | R T T T L |            |  intervals/hour :               |able   Volume   to next    Volume |
------------ T H H H T  ------------|b.LT capacity on :  0   0   0   0|Phase  in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT     |  change (vph)   :               |------------------------------------|
     LT--^     v v v     <^-RTH     |c.G/C ratio      :  0   0   1   0|A2B1    66(B1)  180- 66= 114(A2)  66|
     LTH-^>              <--TH  3   |d.Opposing volume: 540  0  800  0|A1A2   213(A1) OR 114(A2)         213|
  3  TH-->               <v-LTH     |  in vph         :               |A4B3   560(A4) OR 391(B3)         560|
     RTH-v>    ^ ^ ^      v--LT  2  |e.LT capacity on :  0   0  400  0|                                    |
  1  RT--v    < < | > >  Approach 2 |  green (vph)    :               |                                    |
------------  L L T R R ------------|f.LT capacity in :  0   0  400  0|                                    |
           | T T H T T |FLORIN RD   |  vph (b+e)      :               |                                    |
           |   H   H   |            |g.Left turn volume:  0  0   0   0|                                    |
           | 2       1 |            |  in vph         :               |                                    |
           | Approach 4:VINEYARD RD |h.Is volume > cap. : NO     NO   :|                                    |
                                    |  (g>f) ?        :               |                                    |
====================================+=================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                    |       |               |         |                                    |
                                    |       |               |         |279(B1A1)+560(A4)+0()+0()           |
           | Approach 3|            |-------                  -------|                                    |
 3:  LT=   0 | |      | 2:RT=   0   |                        <- 180 |          = 839 vph                 |
   TH=   0 | |        |   TH= 540   |                        <- 180 |=====================================|
  RT=   0  | v        |   LT= 120   |                        <- 180 | Step 8. INTERSECTION LEVEL OF      |
-------------          ------------|                        v-  54 |        SERVICE                      |
                     <--Approach 2  |                        v-  66 |    (compare step 7 with table 6)   |
                                    |                               |              -------               |
                                    |                               |              | A |                 |
 Approach 1-->                      | 213 ->                        |              -------               |
-------------          ------------| 213 ->              < < >     |=====================================|
 1:LT=   0   |          ^ | 4: RT= 800 | 213 ->          | | |     | Step 9. RECALCULATE                |
   TH= 640   |         | |   TH=   0 |  20 -v                       |                                    |
   RT=  20   |         | |   LT= 710 |-------           3 3 8 -------|Geometric Change:                   |
           | Approach 4|            |       |           9 2 0 |     |Signal Change:                      |
                                    |       |           1 0 0 |     |Volume Change:                      |
====================================+=================================+=====================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                    |       (two phase signal)      |                                    |
          <--  A2B1                 |          | Approach 3|        |                                    |
          v--                       |          |           |        |                                    |
       --> <--  A1A2                |          |           |        |                                    |
                                    |          |           |        |                                    |
        <   ^   A4B3                |------------          ------------|                                 |
        |   |                       | Approach 1                    |                                    |
                                    |                               |                                    |
                                    |         See Step 6b.          |                                    |
                                    |                               |                                    |
                                    |                   Approach 2  |                                    |
                                    |------------          ------------|                                 |
------------------------------------|          |           |        |                                    |
                                    |          |           |        |                                    |
A1 -->    A3 |     B1 v--     B3  <|  |          |           |        |                                    |
            v ^                  | |  |          | Approach 4|        | Exclusive right turns reduced 30 % |
A2 <--    A4  |    B2 --^     B4 |>   |                               | V/C Ratio = .59                    |
==========================================================================================
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                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: FLORIN RD AND VINEYARD RD                        Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:VINEYARD RD |         -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
            |          |      ^      |                  : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
            |  R   L   |      N      |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |            | intervals/hour   :                  |able    Volume    to next    Volume |
------------- T H H H T -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT      | change (vph)     :                  |-----------------------------------|
    LT--^      v v v     <^-RTH      |c.G/C ratio       :  0    0    1    0|A2B1   352(B1)  203- 352=  0(A2)  352|
    LTH-^>               <--TH   3   |d.Opposing volume : 610   0  210    0|A1A2   483(A1) OR    0(A2)         483|
 3  TH-->                <v-LTH      | in vph           :                  |A4B3   147(A4) OR   50(B3)         147|
    RTH-v>     ^ ^ ^      v--LT  2   |e.LT capacity on  :  0    0  990    0|                                   |
 1  RT--v     < < | > >  Approach 2  | green (vph)      :                  |                                   |
------------- L L T R R -------------|f.LT capacity in  :  0    0  990    0|                                   |
            | T T H T T |FLORIN RD   | vph (b+e)        :                  |                                   |
            |   H   H   |            |g.Left turn volume :  0    0    0    0|                                   |
            | 2       1 |            | in vph           :                  |                                   |
            | Approach 4:VINEYARD RD |h.Is volume > cap. : NO        NO     :                                   |
                                     | (g>f) ?          :                  |                                   |
=====================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |      |                    |       |                                   |
                                     |      |                    |       |835(B1A1)+147(A4)+0()+0()          |
            | Approach 3|            |-------                     -------|                                   |
3:  LT=   0 | |         | 2:RT=   0  |                             <- 203 |        = 982 vph                  |
    TH=   0 | |         |   TH= 610  |                             <- 203 |===================================|
    RT=   0 | v         |   LT= 640  |                             <- 203 | Step 8. INTERSECTION LEVEL OF     |
-------------                -------------|                        v- 288 |         SERVICE                   |
                          <--Approach 2 |                          v- 352 |   (compare step 7 with table 6)   |
                                     |                                    |              -------              |
                                     |                                    |              | B |                |
Approach 1-->                        | 160 ->                             |              -------              |
-------------                -------------| 160 ->          < < >         |===================================|
1:LT=   0   |           ^ | 4: RT= 210 | 160 ->           | | |         | Step 9. RECALCULATE               |
  TH= 480   |           | |    TH=   0 | 690 -v                         |                                   |
  RT= 690   |           | |    LT=  90 |-------               2  -------|Geometric Change:                  |
            | Approach 4|            |      |               5 4 1 |      |Signal Change:                      |
                                     |      |               0 1 0 |      |Volume Change:                      |
=====================================+==================================+===================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                     |        (two phase signal)        |                                   |
         <--  A2B1                   |            | Approach 3|         |                                   |
         v--                         |            |           |         |                                   |
     --> <--  A1A2                   |            |           |         |                                   |
                                     |            |           |         |                                   |
      <   ^   A4B3                   |-------------       ------------|                                   |
      |   |                          | Approach 1                       |                                   |
                                     |                                  |                                   |
                                     |        See Step 6b.              |                                   |
                                     |                                  |                                   |
                                     |                     Approach 2   |                                   |
                                     |-------------       ------------|                                   |
-------------------------------------|            |           |         |                                   |
A1 -->   A3 |     B1 v--     B3    <| |            |           |         |                                   |
          v ^                    | | |            | Approach 4|         | Exclusive right turns reduced 30 % |
A2 <--   A4  |    B2 --^     B4 |>   |                                  | V/C Ratio = .69                    |
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND EXCELSIOR RD                                    Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:EXCELSIOR RD |               -------Approach-----|         MULTIPHASE SIGNAL OVERLAP      |
             | 1   1   1 |      ^  |                   : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
             |   R   L   |      N  |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD    | R T T T L |         | intervals/hour    :                   |able    Volume   to next    Volume |
------------- T H H H T  ----------|b.LT capacity on   :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1 | change (vph)      :                   |-------------------------------------|
   1  LT--^     v v v    <^-RTH    |c.G/C ratio        :  0    0    0    0|B2B1    50(B1)  610-  50= 560(B2)   50|
     LTH-^>              <--TH   2 |d.Opposing volume  :  0    0    0    0|A1B2   560(B2)  425- 560=   0(A1)  560|
   2  TH-->              <v-LTH    | in vph            :                   |A1A2   290(A2) OR    0(A1)         290|
     RTH-v>     ^ ^ ^     v--LT  1 |e.LT capacity on   :  0    0    0    0|B4B3    10(B4)   30-  10=  20(B3)   10|
   1  RT--v   < < | > >  Approach 2| green (vph)       :                   |A4B3    20(B3)  810-  20= 790(A4)   20|
-------------  L L T R R  ---------|f.LT capacity in   :  0    0    0    0|A3A4   790(A4) OR   50(A3)         790|
             | T T H T T |FLORIN RD| vph (b+e)         :                   |                                     |
             |   H   H   |         |g.Left turn volume :  0    0    0    0|                                     |
             | 1   1   1 |         | in vph            :                   |                                     |
             | Approach 4:EXCELSIOR RD |h.Is volume > cap. :               :                                     |
                                   | (g>f) ?           :                   |                                     |
===================================+===================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                   |       |                     |     |                                      |
                                   |       |                     |     |610(B1B2)+290(A2)+30(B4B3)+790(A4)    |
             | Approach 3|         |-------  5 5 1               -------|                                      |
 3:  LT=  10 | |         | 2:RT= 20|         0 0 0               ^-  20 |            = 1720 vph                |
    TH=  50  | |         |   TH=580|         | | |               <- 290 |======================================|
    RT=  50  | v         |   LT= 50|         < v >               <- 290 | Step 8. INTERSECTION LEVEL OF        |
-------------             ---------|                             v-  50 |         SERVICE                      |
                      <--Approach 2|                                    |     (compare step 7 with table 6)    |
                                   |                                    |             -------                  |
                                   |                                    |             |  F  |                  |
 Approach 1-->                     | 610 -^                             |             -------                  |
-------------             ---------| 425 ->              < ^ >          |======================================|
 1:LT= 610   |          ^ | 4: RT=110| 425 ->            | | |          | Step 9. RECALCULATE                  |
   TH= 850   |          | |   TH=810|  10 -v                            |                                      |
   RT=  10   |          | |   LT= 30|-------               8 1  -------|Geometric Change:                     |
             | Approach 4|         |       |            3 1 1 |        |Signal Change:                        |
                                   |       |            0 0 0 |        |Volume Change:                        |
===================================+====================================+======================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                   |         (two phase signal)         |                                      |
       --^ v--  B2B1               |            | Approach 3|           |                                      |
                                   |            |           |           |                                      |
   --^ AND <--     A1B2 AND        |            |           |           |                                      |
   --> OR  v--     /OR A2B1        |            |           |           |                                      |
       --> <--  A1A2               |-------------           ------------|                                      |
                                   | Approach 1                         |                                      |
       |  <   B4B3                 |                                    |                                      |
       >  |                        |           See Step 6b.             |                                      |
   | | AND < ^     A3B4 AND        |                                    |                                      |
   v > OR  | |     /OR A4B3        |                         Approach 2 |                                      |
       |  ^   A3A4                 |-------------           ------------|                                      |
       v  |                        |            |           |           |                                      |
---------------------------------- |            |           |           |                                      |
A1 -->   A3 |     B1 v--    B3   <||            |           |           |                                      |
          v ^                    | ||            | Approach 4|           | Exclusive right turns reduced 30 %   |
A2 <--   A4 |     B2 --^    B4   |>|                                    | V/C Ratio = 1.25                     |
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: FLORIN RD AND EXCELSIOR RD                                   Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR  |
          | Approach 3:EXCELSIOR RD |             -------Approach-----|     MULTIPHASE SIGNAL OVERLAP   |
          | 1   1   1 |     ^      |             : -1-  -2-  -3-  -4-|   Possible   Volume    Adjusted|
          |  R   L    |     N      |a.No. of change  :  0    0    0    0|Prob-  Critical Carryover Critical|
FLORIN RD | R T T T L |            | intervals/hour  :                 |able   Volume   to next   Volume |
--------- T H H H T  ----------  |b.LT capacity on  :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1  < < | > >  ^--RT  1 | change (vph)     :                 |---------------------------------|
  1  LT--^    v v v    <^-RTH    |c.G/C ratio       :  0    0    0    0|B2B1  120(B2)  210- 120=  90(B1)  120|
     LTH-^>            <--TH   2 |d.Opposing volume :  0    0    0    0|A2B1   90(B1)  305-  90= 215(A2)   90|
  2   TH-->            <v-LTH    | in vph           :                 |A1A2  265(A1) OR  215(A2)        265|
     RTH-v>   ^ ^ ^    v--LT  1  |e.LT capacity on  :  0    0    0    0|B4B3   10(B4)   20-  10=  10(B3)   10|
  1  RT--v   < < | > >  Approach 2| green (vph)      :                 |A4B3   10(B3)  140-  10= 130(A4)   10|
--------- L L T R R  ----------  |f.LT capacity in  :  0    0    0    0|A3A4  610(A3) OR  130(A4)        610|
          | T T H T T |FLORIN RD  | vph (b+e)        :                 |                                 |
          |   H   H   |           |g.Left turn volume :  0    0    0    0|                                 |
          | 1   1   1 |           | in vph           :                 |                                 |
          | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                :                                 |
                                   | (g>f) ?          :                 |                                 |
==========================================================================================
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                   |       |                    |      |                                 |
                                   |       | 6 6                |      |210(B2B1)+265(A1)+20(B4B3)+610(A3)|
          | Approach 3|            |-------  4 1 1              -------|                                 |
3:  LT=  10 | |       | 2:RT=  10  |         0 0 0               ^-  10 |          = 1105 vph             |
   TH= 610  | |       |   TH= 610  |         | | |               <- 305 |=================================|
   RT= 640  | v       |   LT= 210  |         < v >               <- 305 | Step 8. INTERSECTION LEVEL OF   |
-----------          ------------  |                             v- 210 |         SERVICE                 |
                    <--Approach 2  |                                    |    (compare step 7 with table 6)|
                                   |                                    |            -------              |
                                   |                                    |            | D |                |
Approach 1-->                      | 120 -^                             |            -------              |
-----------          ------------  | 265 ->             < ^ >           |=================================|
1:LT= 120   |          ^ | 4: RT=  50 | 265 ->            | | |           | Step 9. RECALCULATE             |
  TH= 530   |          | |   TH= 140 |  30 -v                           |                                 |
  RT=  30   |          | |   LT=  20 |-------              1     -------|Geometric Change:                |
            | Approach 4|          |       |            2 4 5 |       |Signal Change:                   |
                                   |       |            0 0 0 |       |Volume Change:                   |
==========================================================================================
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                        |
                                   |          (two phase signal)        |                                 |
      --^ v--   B2B1               |            | Approach 3|           |                                 |
                                   |            |           |           |                                 |
   --^ AND <--     A1B2 AND        |            |           |           |                                 |
   --> OR  v--     /OR A2B1        |            |           |           |                                 |
      --> <--   A1A2               |------------             -----------|                                 |
                                   | Approach 1                         |                                 |
       |  <     B4B3               |                                    |                                 |
       >  |                        |            See Step 6b.            |                                 |
   | | AND < ^     A3B4 AND        |                                    |                                 |
   v > OR  | |     /OR A4B3        |                         Approach 2 |                                 |
       |  ^     A3A4               |------------             -----------|                                 |
       v  |                        |            |           |           |                                 |
-----------------------------------|            |           |           |                                 |
A1 -->   A3 |     B1 v--    B3   <|  |            |           |           |                                 |
           v ^                  | |  |            | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--   A4  |    B2 --^    B4 |>   |                                    | V/C Ratio = .8                  |
==========================================================================================
```

```
                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: GERBER RD AND ELK GROVE-FLORIN RD                        Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY          | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:ELK GROVE-FLO|                -------Approach-----|         MULTIPHASE SIGNAL OVERLAP   |
             | 1   3   2 |      ^      |                : -1-  -2-  -3-  -4-|      Possible   Volume     Adjusted|
             |   R   L   |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |             | intervals/hour  :                   |able   Volume   to next    Volume |
-------------  T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1    < < | > >   ^--RT  1    | change (vph)    :                   |-------------------------------------|
  2  LT--^      v v v     <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1    99(B1)  209-  99= 110(B2)  99|
     LTH-^>               <--TH   2    |d.Opposing volume :  0    0    0    0|A1B2   110(B2)  210- 110= 100(A1) 110|
  2   TH-->               <v-LTH       | in vph          :                   |A1A2   600(A2) OR  100(A1)        600|
     RTH-v>    ^ ^ ^       v--LT  2    |e.LT capacity on  :  0    0    0    0|B4B3   154(B4)  440- 154= 286(B3) 154|
  1  RT--v     < < | > >   Approach 2  | green (vph)     :                   |A4B3   286(B3) 1060- 286= 774(A4) 286|
-------------  L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   774(A4) OR  303(A3)        774|
             | T T H T T |GERBER RD    | vph (b+e)       :                   |                                     |
             |   H   H   |             |g.Left turn volume :  0    0    0    0|                                     |
             | 2   3   1 |             | in vph          :                   |                                     |
             | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                 :                                     |
                                       | (g>f) ?         :                   |                                     |
=======================================+=====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                       |        |                 |          |                                      |
                                       |        | 1 3 3 3 1 1     |          |209(B1B2)+600(A2)+440(B4B3)+774(A4)  |
             | Approach 3|             |-------   1 0 0 0 2 5        -------|                                      |
 3:  LT= 280 | |         | 2:RT= 510   |          0 3 3 3 6 4        ^- 510 |                                      |
   TH= 910   | |         |   TH=1200   |          | | | | | |        <- 600 |          = 2023 vph                 |
   RT= 110   | v         |   LT= 180   |          < v v v > >        <- 600 |======================================|
-------------            -------------|                             v-  81 | Step 8. INTERSECTION LEVEL OF        |
                          <--Approach 2|                             v-  99 |          SERVICE                     |
                                       |                                     |     (compare step 7 with table 6)   |
                                       | 209 -^                              |              -------                 |
 Approach 1-->                         | 171 -^                              |              |  F  |                 |
                                       | 205 ->                              |              -------                 |
-------------            -------------| 205 ->       < < ^ ^ ^ >            |======================================|
 1:LT= 380   |           ^ | 4: RT=  80 | 300 -v       | | | | | |          | Step 9. RECALCULATE                  |
   TH= 410   |           | |   TH=3180 |-------          1 1 1              |                                      |
   RT= 300   |           | |   LT= 800 |               4 3 0 0 0   -------|Geometric Change:                    |
             | Approach 4|             |        |      4 6 6 6 6 8 |       |Signal Change:                        |
                                       |        |      0 0 0 0 0 0 |       |Volume Change:                        |
=======================================+=====================================+======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                             |
                                       |          (two phase signal)         |                                      |
        --^ v--  B2B1                  |            | Approach 3|            |                                      |
                                       |            |           |            |                                      |
    --^ AND <--     A1B2 AND           |            |           |            |                                      |
    --> OR  v--     /OR A2B1           |            |           |            |                                      |
        --> <--  A1A2                  |-------------           ------------|                                      |
                                       | Approach 1                          |                                      |
         |  <    B4B3                  |                                     |                                      |
         >  |                          |          See Step 6b.               |                                      |
    | | AND < ^     A3B4 AND           |                                     |                                      |
    v > OR  | |     /OR A4B3           |                        Approach 2   |                                      |
         |  ^    A3A4                  |-------------           ------------|                                      |
         v  |                          |            |           |            |                                      |
---------------------------------------|            |           |            |                                      |
 A1 -->   A3 |     B1 v--    B3   <|   |            |           |            |                                      |
            v ^                    | | |            | Approach 4|            | Exclusive right turns reduced 30 %   |
 A2 <--   A4  |    B2 --^    B4 |>     |                                     | V/C Ratio = 1.47                     |
=============================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: GERBER RD AND ELK GROVE-FLORIN RD                          Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR     |
             | Approach 3:ELK GROVE-FLO|         -------Approach-----|        MULTIPHASE SIGNAL OVERLAP   |
             | 1  3  2 |     ^      |                 : -1-  -2-  -3-  -4-|      Possible    Volume    Adjusted|
             |   R  L  |     N      |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |          | intervals/hour  :                  |able    Volume    to next    Volume |
------------- T H H H T  -----------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1  | change (vph)    :                  |------------------------------------|
  2  LT--^     v v v     <^-RTH     |c.G/C ratio      :  0    0    0    0|B2B1    72(B2)  110-  72=  38(B1)   72|
     LTH-^>              <--TH   2  |d.Opposing volume :  0    0    0    0|A2B1    38(B1)  330-  38= 292(A2)   38|
  2   TH-->              <v-LTH     | in vph          :                  |A1A2   595(A1) OR  292(A2)         595|
     RTH-v>    ^ ^ ^      v--LT  2  |e.LT capacity on :  0    0    0    0|B4B3   193(B3)  292- 193=  99(B4)  193|
  1  RT--v    < < | > >  Approach 2 | green (vph)     :                  |A3B4    99(B4)  877-  99= 778(A3)   99|
------------- L L T R R  -----------|f.LT capacity in :  0    0    0    0|A3A4   778(A3) OR  497(A4)         778|
             | T T H T T |GERBER RD | vph (b+e)       :                  |                                    |
             |   H   H   |          |g.Left turn volume :  0    0    0    0|                                    |
             | 2   3   1 |          | in vph          :                  |                                    |
             | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :              :                                    |
                                    | (g>f) ?         :                  |                                    |
===================================+==================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                   |       |                     |     |                                    |
                                   |       | 3 8 8 8 2 2         |     |110(B2B1)+595(A1)+292(B3B4)+778(A3) |
             | Approach 3|         |-------  0 7 7 7 3 9      -------|                                    |
3:  LT= 530  | |        | 2:RT= 410|          0 7 7 7 9 2       ^- 410 |          = 1775 vph                |
   TH=2630   | |        |   TH= 660|          | | | | | |       <- 330 |====================================|
   RT= 300   | v        |   LT= 200|          < v v v > >       <- 330 | Step 8. INTERSECTION LEVEL OF      |
-------------          ------------|                            v-  90 |          SERVICE                   |
                       <--Approach 2|                           v- 110 |      (compare step 7 with table 6) |
                                   |                                   |            -------                 |
                                   |  72 -^                            |            | F |                   |
Approach 1-->                      |  59 -^                            |            -------                 |
-------------          ------------| 555 ->          < < ^ ^ ^ >       |====================================|
1:LT= 130    |            ^ | 4: RT= 120| 555 ->     | | | | | |       | Step 9. RECALCULATE                |
  TH=1110    |            | |   TH=1490| 850 -v                          |                                    |
  RT= 850    |            | |   LT= 350|-------      1 1 4 4 4 1 -------|Geometric Change:                   |
             | Approach 4|             |      |      9 5 9 9 9 2 |      |Signal Change:                      |
                                   |      |      3 8 7 7 7 0 |      |Volume Change:                      |
===================================+==================================+====================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                          |
                                   |        (two phase signal)        |                                    |
      --^ v--  B2B1                |          | Approach 3|           |                                    |
                                   |          |           |           |                                    |
   --^ AND <--    A1B2 AND         |          |           |           |                                    |
   --> OR  v--    /OR A2B1         |          |           |           |                                    |
      --> <--  A1A2                |------------          ------------|                                    |
                                   | Approach 1                       |                                    |
       |  <    B4B3                |                                  |                                    |
       >  |                        |          See Step 6b.            |                                    |
   | | AND < ^    A3B4 AND         |                                  |                                    |
   v > OR  | |    /OR A4B3         |                       Approach 2 |                                    |
       |  ^    A3A4                |------------          ------------|                                    |
       v  |                        |          |           |           |                                    |
-----------------------------------|          |           |           |                                    |
A1 -->   A3 |     B1 v--    B3   <| |          |           |           |                                    |
           v ^               | |  |          | Approach 4|           | Exclusive right turns reduced  30 % |
A2 <--   A4 |     B2 --^    B4 |> |                                   | V/C Ratio = 1.29                   |
==========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                                      Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
====================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
              | Approach 3:WATERMAN RD |                   -------Approach-----|       MULTIPHASE SIGNAL OVERLAP  |
              | 1   2   2 |        ^   |                   : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
              |   R   L   |        N   |a.No. of change    :   0    0    0    0|Prob-  Critical   Carryover  Critical|
GERBER RD     | R T T T L |            | intervals/hour    :                   |able    Volume    to next    Volume |
------------- T H H H T  ------------- |b.LT capacity on   :   0    0    0    0|Phase   in vph     phase      in vph |
 Approach 1   < < | > >   ^--RT   1    | change (vph)      :                   |-----------------------------------|
  2  LT--^     v v v     <^-RTH        |c.G/C ratio        :   0    0    0    0|B2B1    39(B1)   55-  39=  16(B2)  39|
     LTH-^>              <--TH    2    |d.Opposing volume  :   0    0    0    0|A1B2    16(B2)  220-  16= 204(A1)  16|
  2  TH-->               <v-LTH        | in vph            :                   |A1A2   420(A2) OR  204(A1)         420|
     RTH-v>    ^ ^ ^      v--LT   2    |e.LT capacity on   :   0    0    0    0|B4B3    39(B4)  303-  39= 264(B3)  39|
  1  RT--v    < < | > >   Approach 2   | green (vph)       :                   |A4B3   264(B3)  455- 264= 191(A4) 264|
------------- L L T R R  ------------- |f.LT capacity in   :   0    0    0    0|A3A4   191(A4) OR  175(A3)         191|
             | T T H T T |GERBER RD    | vph (b+e)         :                   |                                   |
             |   H   H   |             |g.Left turn volume :   0    0    0    0|                                   |
             | 2   2   1 |             | in vph            :                   |                                   |
             | Approach 4:WATERMAN RD  |h.Is volume > cap. :                   :                                   |
                                       | (g>f) ?           :                   |                                   |
=======================================+===================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                       |       |                     |     |                                   |
                                       |       | 1 1 1               |     |55(B1B2)+420(A2)+303(B4B3)+191(A4) |
             | Approach 3|             |-------  9 7 7 3 3          -------|                                   |
 3:  LT=  70 | |         | 2:RT= 250   |         0 5 5 2 9          ^- 250 |          = 969 vph                |
   TH= 350   | |         |   TH= 840   |         | | | | |          <- 420 |===================================|
   RT= 190   | v         |   LT=  70   |         < v v > >          <- 420 | Step 8. INTERSECTION LEVEL OF     |
-------------            --------------|                            v-  32 |        SERVICE                    |
                       <--Approach 2   |                            v-  39 |     (compare step 7 with table 6)|
                                       |                                   |              -------              |
                                       | 55 -^                             |              | C |                |
 Approach 1-->                         | 45 -^                             |              -------              |
-------------            --------------| 220 ->          < < ^ ^ >         |===================================|
 1:LT= 100   |          ^ | 4: RT= 260 | 220 ->          | | | | |         | Step 9. RECALCULATE               |
   TH= 440   |          | |    TH= 910 |  70 -v                            |                                   |
   RT=  70   |          | |   LT= 550  |-------          3 2 4 4 2  -------|Geometric Change:                  |
             | Approach 4|             |       |         0 4 5 5 6 |       |Signal Change:                     |
                                       |       |         3 8 5 5 0 |       |Volume Change:                     |
=======================================+===================================+===================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                       |          (two phase signal)       |                                   |
       --^ v--  B2B1                   |            | Approach 3|          |                                   |
                                       |            |           |          |                                   |
    --^ AND <--     A1B2 AND           |            |           |          |                                   |
    --> OR  v--     /OR A2B1           |            |           |          |                                   |
       --> <--  A1A2                   |------------             ------------|                                 |
                                       | Approach 1                        |                                   |
        |  <    B4B3                   |                                   |                                   |
        >  |                           |          See Step 6b.             |                                   |
    | | AND < ^     A3B4 AND           |                                   |                                   |
    v > OR  | |     /OR A4B3           |                       Approach 2  |                                   |
        |  ^    A3A4                   |------------             ------------|                                 |
        v  |                           |            |           |          |                                   |
---------------------------------------|            |           |          |                                   |
 A1 -->   A3 |      B1 v--     B3   <| |            |           |          |                                   |
           v ^                       | |            |           |          |                                   |
 A2 <--   A4 |      B2 --^     B4  |>  |            | Approach 4|          | Exclusive right turns reduced 30 %|
                                       |                                   | V/C Ratio = .7                    |
====================================================================================================
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                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER RD AND WATERMAN RD                                  Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR     |
             | Approach 3:WATERMAN RD  |            -------Approach----- |      MULTIPHASE SIGNAL OVERLAP    |
             | 1   2   2 |      ^      |            : -1-  -2-  -3-  -4-|     Possible   Volume    Adjusted|
             |  R   L    |      N      |a.No. of change  :  0   0   0   0|Prob-  Critical  Carryover  Critical|
GERBER RD    | R T T T L |             |  intervals/hour :               |able   Volume    to next    Volume |
------------- T H H H T  ------------- |b.LT capacity on:  0   0   0   0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1     |  change (vph)   :               |-----------------------------------|
   2 LT--^     v v v     <^-RTH        |c.G/C ratio      :  0   0   0   0|B2B1   149(B2)  220- 149=  71(B1)  149|
     LTH-^>              <--TH   2     |d.Opposing volume:  0   0   0   0|A2B1    71(B1)  310-  71= 239(A2)   71|
   2  TH-->              <v-LTH        |  in vph         :               |A1A2   440(A1) OR  239(A2)        440|
     RTH-v>    ^ ^ ^      v--LT  2     |e.LT capacity on :  0   0   0   0|B4B3    88(B3)  127-  88=  39(B4)   88|
   1 RT--v    < < | > >   Approach 2   |  green (vph)    :               |A3B4    39(B4)  450-  39= 411(A3)   39|
------------- L L T R R  ------------- |f.LT capacity in :  0   0   0   0|A3A4   411(A3) OR  310(A4)        411|
             | T T H T T |GERBER RD    |  vph (b+e)      :               |                                   |
             |   H   H   |             |g.Left turn volume: 0   0   0   0|                                   |
             | 2   2   1 |             |  in vph         :               |                                   |
             | Approach 4:WATERMAN RD  |h.Is volume > cap.:              :                                   |
                                       |  (g>f) ?        :               |                                   |
=======================================+=================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                       |       |                   |     |                                   |
                                       |       | 1 4 4 1 1         |     |220(B2B1)+440(A1)+127(B3B4)+411(A3)|
             | Approach 3|             |-------  3 5 5 0 2          -----|                                   |
 3:  LT= 230 | |         | 2:RT= 130   |         0 0 0 4 7      ^- 130   |          = 1198 vph               |
    TH= 900  | |         |   TH= 620   |         | | | | |      <- 310   |===================================|
    RT= 130  | v         |   LT= 400   |         < v v > >      <- 310   | Step 8. INTERSECTION LEVEL OF     |
-------------              ------------|                        v- 180   |         SERVICE                   |
                          <--Approach 2|                        v- 220   |    (compare step 7 with table 6)  |
                                       |                                 |            -------                |
                                       | 149 -^                          |            |  D  |              |
 Approach 1-->                         | 122 -^                          |            -------                |
-------------              ------------| 440 ->          < < ^ ^ >       |===================================|
 1:LT= 270   |           ^ | 4: RT= 140| 440 ->          | | | | |       | Step 9. RECALCULATE               |
   TH= 880   |           | |   TH= 620 | 310 -v                          |                                   |
   RT= 310   |           | |   LT= 160 |-------              3 3 1 -------|Geometric Change:                  |
             | Approach 4|             |       |           8 7 1 1 4 |   |Signal Change:                     |
                                       |       |           8 2 0 0 0 |   |Volume Change:                     |
=======================================+=================================+===================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                       |         (two phase signal)      |                                   |
        --^ v--   B2B1                 |            | Approach 3|        |                                   |
                                       |            |           |        |                                   |
    --^ AND <--      A1B2 AND          |            |           |        |                                   |
    --> OR  v--      /OR A2B1          |            |           |        |                                   |
        --> <--   A1A2                 |------------             --------|                                   |
                                       | Approach 1                      |                                   |
         |   <    B4B3                 |                                 |                                   |
         >   |                         |          See Step 6b.           |                                   |
    | | AND < ^      A3B4 AND          |                                 |                                   |
    v > OR  | |      /OR A4B3          |                      Approach 2 |                                   |
         |   ^    A3A4                 |------------            -------- |                                   |
         v   |                         |            |           |        |                                   |
---------------------------------------|            |           |        |                                   |
A1 -->    A3 |     B1 v--     B3   <|  |            |           |        |                                   |
            v ^                    | | |            |           |        | Exclusive right turns reduced 30 %|
A2 <--    A4  |    B2 --^     B4  |>   |            | Approach 4|        | V/C Ratio = .87                   |
==========================================================================================
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                         Critical Movement Analysis: PLANNING
                                Calculation Form 1
ntersection: GERBER RD AND BRADSHAW RD                            Design Hour: AM
'roblem Statement: CUMULATIVE PLUS PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY | Step 4. LEFT TURN CHECK       | Step 6b. VOLUME ADJUSTMENT FOR   |
           | Approach 3:BRADSHAW RD |          -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
           | 1  3  2 |    ^       |                 : -1- -2- -3- -4-|     Possible   Volume   Adjusted|
           |  R  L   |    N       |a.No. of change  :  0   0   0   0|Prob-  Critical  Carryover  Critical|
'ERBER RD  | R T T T L |          | intervals/hour  :               |able   Volume   to next    Volume |
------------ T H H H T ------------|b.LT capacity on :  0   0   0   0|Phase  in vph    phase    in vph |
 Approach 1  < < | > >  ^--RT  1  | change (vph)    :               |------------------------------------|
  2 LT--^     v v v   <^-RTH      |c.G/C ratio      :  0   0   0   0|B2B1   88(B1)  204-  88= 116(B2)   88|
    LTH-^>            <--TH  2    |d.Opposing volume :  0   0   0   0|A1B2  116(B2)  165- 116=  49(A1)  116|
  2  TH-->            <v-LTH      | in vph          :               |A1A2  250(A2) OR  49(A1)        250|
    RTH-v>    ^ ^ ^    v--LT  2   |e.LT capacity on :  0   0   0   0|B4B3   22(B4)  209-  22= 187(B3)   22|
  1 RT--v    < < | > >  Approach 2 | green (vph)     :               |A4B3  187(B3)  620- 187= 433(A4)  187|
------------ L L T R R ------------|f.LT capacity in :  0   0   0   0|A3A4  433(A4) OR 170(A3)        433|
           | T T H T T |GERBER RD | vph (b+e)       :               |                                    |
           |  H   H    |          |g.Left turn volume :  0   0   0   0|                                  |
           | 2   3   1 |          | in vph          :               |                                    |
           | Approach 4:BRADSHAW RD |h.Is volume > cap. :            :                                    |
                                  | (g>f) ?         :               |                                    |
=====================================+=================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                  |      |                   |      |                                    |
                                  |      | 2 1 1 1           |      |204(B1B2)+250(A2)+209(B4B3)+433(A4) |
          | Approach 3|           |-------  3 7 7 7 1 2         -------|                                  |
 3:  LT=  40 | |        | 2:RT= 290 |         0 0 0 0 8 2         ^- 290 |                                |
   TH= 510 | |        |   TH= 500 |         | | | | | |         <- 250 |        = 1096 vph              |
   RT= 230 | v        |   LT= 160 |         < v v v > >         <- 250 |====================================|
-------------          ------------|                              v-  72 | Step 8. INTERSECTION LEVEL OF |
                     <--Approach 2 |                              v-  88 |        SERVICE                |
                                  |                                    |    (compare step 7 with table 6) |
                                  | 204 -^                             |            -------              |
 Approach 1-->                    | 167 -^                             |            | C |                |
------------          ------------| 165 ->          < < ^ ^ ^ >        |            -------              |
 1:LT= 370  |          ^ | 4: RT= 110 | 165 ->          | | | | | |        |====================================|
   TH= 330  |          | |   TH=1860 | 120 -v                          | Step 9. RECALCULATE            |
   RT= 120  |          | |   LT= 380 |-------          2 1 6 6 6 1 -------|                                |
          | Approach 4|           |      |          0 7 2 2 2 1 |      |Geometric Change:                 |
                                  |      |          9 1 0 0 0 0 |      |Signal Change:                    |
                                  |      |                      |      |Volume Change:                    |
=====================================+=================================+====================================|
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                          |
                                  |         (two phase signal)       |                                    |
       --^ v--  B2B1              |          | Approach 3|            |                                    |
                                  |          |           |            |                                    |
   --^ AND <--    A1B2 AND        |          |           |            |                                    |
   --> OR  v--    /OR A2B1        |          |           |            |                                    |
       --> <--  A1A2              |-------------         -------------|                                    |
                                  | Approach 1                        |                                    |
        |  <  B4B3                |                                   |                                    |
        >  |                      |                                   |                                    |
   | | AND < ^    A3B4 AND        |        See Step 6b.               |                                    |
   v > OR  | |    /OR A4B3        |                                   |                                    |
        |  ^  A3A4                |                      Approach 2   |                                    |
        v  |                      |-------------         -------------|                                    |
-----------------------------------|          |           |            |                                    |
.1 -->   A3 |    B1 v--    B3  <| |          |           |            |                                    |
            v ^               | | |          | Approach 4|            | Exclusive right turns reduced 30 % |
A2 <--   A4 |    B2 --^    B4 |> |                                    | V/C Ratio = .8                     |
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                          Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER RD AND BRADSHAW RD                                  Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY    | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR |
             | Approach 3:BRADSHAW RD |           -------Approach-----|      MULTIPHASE SIGNAL OVERLAP |
             | 1   3   2 |     ^    |                 : -1-  -2-  -3-  -4-|      Possible   Volume   Adjusted|
             |  R   L    |.    N    |a.No. of change  :  0    0    0    0|Prob- Critical Carryover Critical|
GERBER RD    | R T T T L |          | intervals/hour  :                 |able  Volume   to next   Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase in vph   phase    in vph |
  Approach 1  < < | > >   ^--RT  1  | change (vph)    :                 |------------------------------|
   2  LT--^    v v v     <^-RTH     |c.G/C ratio      :  0    0    0    0|B2B1   88(B1)  171-  88=  83(B2)  88|
      LTH-^>             <--TH   2  |d.Opposing volume :  0    0    0    0|A1B2   83(B2)  266-  83= 183(A1)  83|
   2  TH-->              <v-LTH     | in vph          :                 |A1A2  245(A2) OR  183(A1)     245|
      RTH-v>   ^ ^ ^      v--LT  2  |e.LT capacity on :  0    0    0    0|B4B3  105(B3)  110-.105=   5(B4)  105|
   1  RT--v   < < | > >  Approach 2 | green (vph)     :                 |A3B4    5(B4)  600-   5= 595(A3)   5|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4  595(A3) OR  277(A4)     595|
             | T T H T T |GERBER RD | vph (b+e)       :                 |                              |
             |   H   H   |          |g.Left turn volume :  0    0    0    0|                              |
             | 2   3   1 |          | in vph          :                 |                              |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :               :                              |
                                    | (g>f) ?         :                 |                              |
===========================================================================================
 Step 2. IDENTIFY VOLUMES, in vph  | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                    |       |                  |        |                              |
                                    |       | 5 6 6 6  1       |        |171(B1B2)+245(A2)+110(B3B4)+595(A3) |
             | Approach 3|          |-------  3 0 0 0 9 1        -------|                              |
 3:  LT= 200 | |         | 2:RT=  70 |        0 0 0 0 0 0       ^-  70 |       = 1121 vph             |
   TH=1800   | |         |   TH= 490 |        | | | | | |       <- 245 |==============================|
   RT= 530   | v         |   LT= 160 |        < v v v > >       <- 245 | Step 8. INTERSECTION LEVEL OF |
-------------             -------------|                          v-  72 |        SERVICE               |
                       <--Approach 2 |                          v-  88 |    (compare step 7 with table 6) |
                                    |                                   |          -------             |
                                    | 171 -^                            |          | D |               |
 Approach 1-->                      | 140 -^                            |          -------             |
-------------             -------------| 240 ->        < < ^ ^ ^ >       |==============================|
 1:LT= 310   |           ^ | 4: RT= 200 | 240 ->        | | | | | |       | Step 9. RECALCULATE          |
   TH= 480   |           | |   TH= 830 | 380 -v                          |                              |
   RT= 380   |           | |   LT= 190 |-------       1   2 2 2 2 -------|Geometric Change:             |
             | Approach 4|          |       |       0 8 7 7 7 0 |      |Signal Change:                |
                                    |       |       5 6 7 7 7 0 |      |Volume Change:                |
===========================================================================================
 Step 3. IDENTIFY PHASING          | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                     |
                                    |        (two phase signal)         |                              |
      --^ v--  B2B1                 |           | Approach 3|           |                              |
                                    |           |           |           |                              |
   --^ AND <--     A1B2 AND         |           |           |           |                              |
   --> OR  v--     /OR A2B1         |           |           |           |                              |
      --> <--  A1A2                 |------------           ------------|                              |
                                    | Approach 1                        |                              |
       |   <   B4B3                 |                                   |                              |
       >   |                        |          See Step 6b.             |                              |
   | | AND < ^     A3B4 AND         |                                   |                              |
   v > OR  | |     /OR A4B3         |                       Approach 2  |                              |
       |   ^   A3A4                 |------------           ------------|                              |
       v   |                        |           |           |           |                              |
------------------------------------|           |           |           |                              |
 A1 -->   A3 |      B1 v--    B3   <| |         |           |           |                              |
            v ^                    | | |        | Approach 4|           | Exclusive right turns reduced 30 % |
 A2 <--   A4  |     B2 --^    B4  |> |                                  | V/C Ratio = .82              |
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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
ntersection: GERBER RD AND VINEYARD RD                                  Design Hour: AM
roblem Statement: CUMULATIVE PLUS PROJECT
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:VINEYARD RD |             -------Approach-----|       MULTIPHASE SIGNAL OVERLAP |
            | 1   2   2 |       ^    |            : -1-  -2-  -3-  -4-|       Possible   Volume   Adjusted|
            |   R   L   |       N    |a.No. of change  :  0    0    0    0|Prob-  Critical Carryover Critical|
ERBER RD    | R T T T L |            | intervals/hour  :               |able   Volume   to next   Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1  < < | > >   ^--RT  1    | change (vph)    :               |---------------------------------|
   2 LT--^     v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1    6(B1)  281-   6= 275(B2)   6|
     LTH-^>             <--TH   2    |d.Opposing volume :  0    0    0   0|A1B2  275(B2)  75- 275=   0(A1)  275|
   2  TH-->             <v-LTH       | in vph          :               |A1A2  119(A2) OR    0(A1)         119|
     RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on :  0    0    0    0|B4B3    6(B4)   66-   6=  60(B3)   6|
   1 RT--v   < < | > >  Approach 2   | green (vph)     :               |A4B3   60(B3)  545-  60= 485(A4)  60|
------------ L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4  485(A4) OR   70(A3)         485|
            | T T H T T |GERBER RD   | vph (b+e)       :               |                                 |
            |   H   H   |            |g.Left turn volume :  0   0    0   0|                                 |
            | 2   2   1 |            | in vph          :               |                                 |
            | Approach 4:VINEYARD RD |h.Is volume > cap. :             :                                 |
                                     | (g>f) ?         :               |                                 |
=====================================+================================+=================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |       |                   |    |                                 |
                                     |       | 1                 |    |281(B1B2)+119(A2)+66(B4B3)+485(A4)|
            | Approach 3|            |-------  0                ------|                                 |
3:  LT=  10 | |         | 2:RT= 170  |         0 5 5 5 6        ^- 170|             = 951 vph           |
   TH=  10  | |         |   TH= 160  |         | | | | |        <-  80|=================================|
  RT= 100   | v         |   LT=  10  |         < v v > >        <-  80| Step 8. INTERSECTION LEVEL OF   |
-------------           -------------|                          v-   5|        SERVICE                  |
                        <--Approach 2|                          v-   6|    (compare step 7 with table 6) |
                                     |                                |           -------               |
                                     | 281 -^                         |           | B |               |
 Approach 1-->                       | 230 -^                         |           -------               |
------------            -------------|  75 ->         < < ^ ^ >       |=================================|
1:LT= 510   |         ^ | 4: RT=  20 |  75 ->         | | | | |       | Step 9. RECALCULATE             |
  TH= 150   |         | |   TH=1090  |  20 -v                         |                                 |
  RT=  20   |         | |   LT= 120  |-------           5 5    -------|Geometric Change:                |
            | Approach 4|            |       |        6 5 4 4 2 |     |Signal Change:                   |
                                     |       |        6 4 5 5 0 |     |Volume Change:                   |
=====================================+================================+=================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                     |
                                     |          (two phase signal)    |                                 |
        --^ v--  B2B1                |           | Approach 3|        |                                 |
                                     |           |           |        |                                 |
    --^ AND <--    A1B2 AND          |           |           |        |                                 |
    --> OR  v--    /OR A2B1          |           |           |        |                                 |
        --> <--  A1A2                |------------            --------|                                 |
                                     | Approach 1                     |                                 |
         |  <    B4B3                |                                |                                 |
         >  |                        |          See Step 6b.          |                                 |
     | | AND < ^   A3B4 AND          |                                |                                 |
     v > OR  | |   /OR A4B3          |                     Approach 2 |                                 |
         |  ^    A3A4                |------------           ---------|                                 |
         v  |                        |           |           |        |                                 |
-------------------------------------|           |           |        |                                 |
1 -->    A3 |     B1 v--    B3    <| |           |           |        |                                 |
           v ^                    | | |          | Approach 4|        | Exclusive right turns reduced 30 % |
A2 <--   A4  |    B2 --^    B4 |>    |                                | V/C Ratio = .69                  |
================================================================================================
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                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER RD AND VINEYARD RD                               Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
=================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
              | Approach 3:VINEYARD RD |              -------Approach-----|          MULTIPHASE SIGNAL OVERLAP |
              | 1   2   2 |      ^     |                  : -1- -2- -3- -4-|       Possible   Volume    Adjusted|
              |   R   L   |      N     |a.No. of change   :  0   0   0   0|Prob-  Critical  Carryover  Critical|
GERBER RD     | R T T T L |            |  intervals/hour  :               |able    Volume    to next    Volume |
------------- | T H H H T  ------------|b.LT capacity on  :  0   0   0   0|Phase   in vph     phase     in vph |
  Approach 1    < < | > >   ^--RT  1   |  change (vph)    :               |----------------------------------|
    2  LT--^     v v v     <^-RTH      |c.G/C ratio       :  0   0   0   0|B2B1    61(B1)  83-  61=  22(B2)   61|
       LTH-^>              <--TH   2   |d.Opposing volume :  0   0   0   0|A1B2    22(B2)  91-  22=  69(A1)   22|
    2   TH-->              <v-LTH      |  in vph          :               |A1A2    69(A1) OR  65(A2)          69|
       RTH-v>    ^ ^ ^      v--LT  2   |e.LT capacity on  :  0   0   0   0|B4B3     6(B4)  33-   6=  27(B3)    6|
    1  RT--v    < < | > >  Approach 2  |  green (vph)     :               |A4B3    27(B3)  25-  27=   0(A4)   27|
-------------  L L T R R  -------------|f.LT capacity in  :  0   0   0   0|A3A4   385(A3) OR   0(A4)         385|
              | T T H T T |GERBER RD   |  vph (b+e)       :               |                                  |
              |   H   H   |            |g.Left turn volume :  0   0   0   0|                                  |
              | 2   2   1 |            |  in vph          :               |                                  |
              | Approach 4:VINEYARD RD |h.Is volume > cap. :              :                                  |
                                       |  (g>f) ?         :               |                                  |
======================================+===================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |       |                    |     |                                  |
                                       |       |  3 3               |     |83(B1B2)+69(A1)+33(B4B3)+385(A3)  |
              | Approach 3|            |-------  6 8 8              ------|                                  |
 3:  LT=  10 | |          | 2:RT=  50  |         0 5 5 5 6          ^-  50 |          = 570 vph               |
   TH= 770   | |          |   TH= 130  |         | | | | |          <-  65 |==================================|
   RT=  60   | v          |   LT= 110  |         < v v > >          <-  65 | Step 8. INTERSECTION LEVEL OF    |
-------------              ------------|                            v-  50 |         SERVICE                  |
                          <--Approach 2 |                           v-  61 |    (compare step 7 with table 6) |
                                       |                                   |            -------               |
                                       |  83 -^                            |            | A |                 |
 Approach 1-->                         |  68 -^                            |            -------               |
-------------              ------------|  75 ->          < < ^ ^ >         |==================================|
 1:LT= 150   |          ^ | 4: RT=  10 |  75 ->          | | | | |         | Step 9. RECALCULATE              |
   TH= 150   |          | |    TH=  50 | 130 -v                            |                                  |
   RT= 130   |          | |    LT=  60 |-------                     -------|Geometric Change:                 |
              | Approach 4|            |       |         3 2 2 2 1 |      |Signal Change:                    |
                                       |       |         3 7 5 5 0 |      |Volume Change:                    |
======================================+===================================+==================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                       |        (two phase signal)         |                                  |
        --^ v--  B2B1                  |          | Approach 3|            |                                  |
                                       |          |           |            |                                  |
     --^ AND <--     A1B2 AND          |          |           |            |                                  |
     --> OR  v--     /OR A2B1          |          |           |            |                                  |
        --> <--  A1A2                  |-------------       ------------- |                                  |
                                       | Approach 1                        |                                  |
         |   <   B4B3                  |                                   |                                  |
         >   |                         |          See Step 6b.             |                                  |
     | | AND < ^     A3B4 AND          |                                   |                                  |
     v > OR  | |     /OR A4B3          |                       Approach 2  |                                  |
         |   ^   A3A4                  |-------------       ------------- |                                  |
         v   |                         |          |           |            |                                  |
-------------------------------------|           |           |            |                                  |
 A1 -->   A3 |      B1 v--    B3    <| |          |           |            |                                  |
            v ^                     | | |         | Approach 4|            | Exclusive right turns reduced 30 % |
 A2 <--   A4   |    B2 --^    B4 |>    |                                   | V/C Ratio = .41                  |
=================================================================================================
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ATTACHMENT 5E

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                                    Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: GERBER RD AND EXCELSIOR RD                                      Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:EXCELSIOR RD  |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
            | 1   1   1 |      ^       |                : -1-  -2-  -3-  -4-|       Possible   Volume    Adjusted|
            |  R    L   |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
GERBER RD   | R T T T L |              | intervals/hour  :                  |able    Volume   to next    Volume |
----------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1 < < | > >  ^--RT  1     | change (vph)     :                  |-------------------------------------|
  1 LT--^    v v v    <^-RTH        |c.G/C ratio       :  0    0    0    0|B2B1    10(B1)  250-  10= 240(B2)   10|
    LTH-^>            <--TH   1     |d.Opposing volume :  0    0    0    0|A1B2   240(B2)   10- 240=   0(A1)  240|
  1  TH-->            <v-LTH        | in vph           :                  |A1A2    10(A2) OR    0(A1)          10|
    RTH-v>    ^ ^ ^   v--LT  1      |e.LT capacity on  :  0    0    0    0|B4B3    10(B4)   10-  10=   0(B3)   10|
  1 RT--v   < < | > > Approach 2    | green (vph)      :                  |A4B3     0(B3)  650-   0= 650(A4)    0|
----------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   650(A4) OR   70(A3)          650|
            | T T H T T |GERBER RD  | vph (b+e)        :                  |                                     |
            |   H   H   |           |g.Left turn volume :  0    0    0    0|                                     |
            | 1   1   1 |           | in vph           :                  |                                     |
            | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                 :                                     |
                                    | (g>f) ?          :                  |                                     |
=====================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                     |       |                        |    |                                     |
                                     |       |                        |    |250(B1B2)+10(A2)+10(B4B3)+650(A4)    |
            | Approach 3|            |-------  5 7 1           -------|                                     |
 3:  LT=  10 | |        | 2:RT=  10  |         0 0 0              ^-  10 |          = 920 vph                  |
    TH=  70 | |         |   TH=  10  |         | | |              <-  10 |=====================================|
    RT=  50 | v         |   LT=  10  |         < v >              v-  10 | Step 8. INTERSECTION LEVEL OF       |
-------------           -------------|                                   |        SERVICE                      |
                        <--Approach 2|                                   |    (compare step 7 with table 6)    |
                                     |                                   |             -------                 |
                                     |                                   |             |  B  |                 |
 Approach 1-->                       |                                   |             -------                 |
-----------             -------------| 250 -^               < ^ >        |=====================================|
 1:LT= 250  |              ^ | 4: RT=  10 |  10 ->           | | |        | Step 9. RECALCULATE                 |
   TH=  10  |              | |   TH= 650 |  10 -v                        |                                     |
   RT=  10  |              | |   LT=  10 |-------            6    -------|Geometric Change:                    |
            | Approach 4|            |        |          1 5 1 |         |Signal Change:                       |
                                     |        |          0 0 0 |         |Volume Change:                       |
=====================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                     |          (two phase signal)       |                                     |
       --^ v--  B2B1                 |           | Approach 3|           |                                     |
                                     |           |           |           |                                     |
    --^ AND <--    A1B2 AND          |           |           |           |                                     |
    --> OR  v--    /OR A2B1          |           |           |           |                                     |
       --> <--  A1A2                 |-----------             -----------|                                     |
                                     | Approach 1                        |                                     |
        |  <    B4B3                 |                                   |                                     |
        >  |                         |          See Step 6b.             |                                     |
    | | AND < ^    A3B4 AND          |                                   |                                     |
    v > OR  | |    /OR A4B3          |                      Approach 2   |                                     |
        |  ^   A3A4                  |-----------             -----------|                                     |
        v  |                         |           |           |           |                                     |
-------------------------------------|           |           |           |                                     |
 A1 -->   A3 |      B1 v--    B3  <| |           |           |           |                                     |
            v ^                   | | |           | Approach 4|           | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4 |>  |                                   | V/C Ratio = .67                     |
==============================================================================================
```

```
                         Critical Movement Analysis: PLANNING
                                  Calculation Form 1
Intersection: GERBER RD AND EXCELSIOR RD                        Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR        |
              | Approach 3:EXCELSIOR RD |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP      |
              | 1   1   1 |      ^      |             : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
              |   R   L   |      N      |a.No. of change  :   0    0    0    0|Prob-  Critical   Carryover  Critical|
GERBER RD     | R T T T L |             | intervals/hour  :                   |able   Volume     to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :   0    0    0    0|Phase  in vph     phase      in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)    :                   |---------------------------------------|
   1  LT--^     v v v     <^-RTH      |c.G/C ratio      :   0    0    0    0|B2B1    10(B1)   50-  10=  40(B2)    10|
      LTH-^>              <--TH   1   |d.Opposing volume :  0    0    0    0|A1B2    40(B2)   10-  40=   0(A1)    40|
   1   TH-->              <v-LTH      | in vph          :                   |A1A2    10(A2) OR    0(A1)             10|
      RTH-v>    ^ ^ ^      v--LT  1   |e.LT capacity on :   0    0    0    0|B4B3     0(B3)   10-   0=  10(B4)     0|
   1  RT--v   < < | > >   Approach 2  | green (vph)     :                   |A3B4    10(B4)  600-  10= 590(A3)    10|
------------- L L T R R  -------------|f.LT capacity in :   0    0    0    0|A3A4   590(A3) OR  200(A4)           590|
              | T T H T T |GERBER RD  | vph (b+e)       :                   |                                       |
              |   H   H   |           |g.Left turn volume :  0    0    0    0|                                       |
              | 1   1   1 |           | in vph          :                   |                                       |
              | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                :                                       |
                                      | (g>f) ?         :                   |                                       |
=======================================+=====================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES       |
                                       |         |                    |       |                                       |
                                       |         | 2 6                |       |50(B1B2)+10(A2)+10(B3B4)+590(A3)       |
              | Approach 3|            |-------   4 0 1               -------|                                       |
 3:  LT=  10 | |          | 2:RT=  10  |          0 0 0               ^-  10 |            = 660 vph                  |
    TH= 600  | |          |   TH=  10  |          | | |               <-  10 |=======================================|
    RT= 240  | v          |   LT=  10  |          < v >               v-  10 | Step 8. INTERSECTION LEVEL OF         |
-------------             -------------|                                      |         SERVICE                       |
                         <--Approach 2 |                                      |      (compare step 7 with table 6)    |
                                       |                                      |              -------                  |
                                       |                                      |              | A |                    |
 Approach 1-->                         |                                      |              -------                  |
-------------             -------------| 50 -^                  < ^ >         |=======================================|
 1:LT=  50   |            ^ | 4: RT=  10 | 10 ->                  | | |         | Step 9. RECALCULATE                   |
   TH=  10   |            | |   TH= 200  | 10 -v                                |                                       |
   RT=  10   |            | |   LT=   0  |-------                  2    -------|Geometric Change:                      |
             | Approach 4|             |         |               0 1 |        |Signal Change:                         |
                                       |         |             0 0 0 |        |Volume Change:                         |
=======================================+=====================================+=======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                              |
                                       |         (two phase signal)            |                                       |
        --^ v--  B2B1                  |            | Approach 3|              |                                       |
                                       |            |           |              |                                       |
    --^ AND <--     A1B2 AND           |            |           |              |                                       |
    --> OR  v--     /OR A2B1           |            |           |              |                                       |
        --> <--  A1A2                  |-------------           -------------|                                       |
                                       | Approach 1                            |                                       |
         |   <   B4B3                  |                                       |                                       |
         >   |                         |            See Step 6b.               |                                       |
    | | AND < ^     A3B4 AND           |                                       |                                       |
    v > OR  | |     /OR A4B3           |                        Approach 2     |                                       |
         |   ^   A3A4                  |-------------           -------------|                                       |
         v   |                         |            |           |              |                                       |
---------------------------------------|            |           |              |                                       |
 A1 -->   A3 |      B1 v--    B3   <|  |            |           |              |                                       |
            v ^                    | | |            | Approach 4|              | Exclusive right turns reduced 30 %    |
 A2 <--   A4  |     B2 --^    B4 |>    |                                       | V/C Ratio = .48                       |
=============================================================================================
```

ATTACHMENT 5E

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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: CALVINE ROAD AND ELK GROVE-FLORIN RD                       Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
=========================================================================================
Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:ELK GROVE-FLO|                  -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
            | 1   3   2 |      ^      |                  : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
            |  R    L   |      N      |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE ROAD | R T T T L |            | intervals/hour   :                   |able    Volume   to next    Volume |
------------  T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)     :                   |-------------------------------------|
  2  LT--^     v v v     <^-RTH       |c.G/C ratio       :  0    0    0    0|B2B1   226(B1)  248- 226=  22(B2)  226|
     LTH-^>              <--TH   3    |d.Opposing volume :  0    0    0    0|A1B2    22(B2)  263-  22= 241(A1)   22|
  3   TH-->              <v-LTH       | in vph           :                   |A1A2   417(A2) OR  241(A1)          417|
     RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on  :  0    0    0    0|B4B3    44(B4)  231-  44= 187(B3)   44|
  1  RT--v    < < | > >   Approach 2  | green (vph)      :                   |A4B3   187(B3)  530- 187= 343(A4)  187|
------------  L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   350(A3) OR  343(A4)          350|
            | T T H T T |CALVINE ROAD | vph (b+e)        :                   |                                     |
            |   H   H   |             |g.Left turn volume :  0    0    0    0|                                     |
            | 2   3   1 |             | in vph           :                   |                                     |
            | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :                  :                                     |
                                      | (g>f) ?          :                   |                                     |
======================================+=====================================+=====================================|
Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |       |                      |      |                                     |
                                      |       | 5 2 2 2              |      |248(B1B2)+417(A2)+231(B4B3)+350(A3)  |
            | Approach 3|             |-------  0 9 9 9 3 4          -------|                                     |
3:  LT=  80 | |         | 2:RT= 100   |         0 7 7 7 6 4          ^- 100 |            = 1246 vph               |
   TH= 890  | |         |   TH=1250   |         | | | | | |          <- 417 |=====================================|
   RT= 500  | v         |   LT= 410   |         < v v v > >          <- 417 | Step 8. INTERSECTION LEVEL OF       |
------------             -------------|                              <- 417 |         SERVICE                     |
                        <--Approach 2 |                              v- 185 |     (compare step 7 with table 6)   |
                                      | 248 -^                       v- 226 |              -------                |
                                      | 203 -^                              |              |  E  |                |
Approach 1-->                         | 263 ->                              |              -------                |
------------             -------------| 263 ->            < < ^ ^ ^ >       |=====================================|
1:LT= 450   |             ^ | 4: RT= 490 | 263 ->         | | | | | |       | Step 9. RECALCULATE                 |
  TH= 790   |             | |   TH=1590 | 220 -v                            |                                     |
  RT= 220   |             | |   LT= 420 |-------            2 1 5 5 5 4  -------|Geometric Change:                  |
            | Approach 4|             |       |           3 8 3 3 3 9 |     |Signal Change:                       |
                                      |       |           1 9 0 0 0 0 |     |Volume Change:                       |
======================================+=====================================+=====================================|
Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                      |          (two phase signal)         |                                     |
          --^ v--  B2B1               |            | Approach 3|            |                                     |
                                      |            |           |            |                                     |
      --^ AND <--     A1B2 AND        |            |           |            |                                     |
      --> OR  v--     /OR A2B1        |            |           |            |                                     |
          --> <--  A1A2               |-------------           -------------|                                     |
                                      | Approach 1                          |                                     |
          |  <   B4B3                 |                                     |                                     |
          >  |                        |          See Step 6b.               |                                     |
      | | AND < ^     A3B4 AND        |                                     |                                     |
      v > OR  | |     /OR A4B3        |                         Approach 2  |                                     |
          |  ^   A3A4                 |-------------           -------------|                                     |
          v  |                        |            |           |            |                                     |
--------------------------------------|            |           |            |                                     |
A1 -->   A3 |      B1 v--    B3   <|  |            |           |            |                                     |
            v ^                   | | |            | Approach 4|            | Exclusive right turns reduced 30 %  |
A2 <--   A4  |     B2 --^    B4 |>    |                                     | V/C Ratio = .91                     |
=========================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: CALVINE ROAD AND ELK GROVE-FLORIN RD                          Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR    |
              | Approach 3:ELK GROVE-FLO|              -------Approach-----|      MULTIPHASE SIGNAL OVERLAP     |
              | 1  3  2 |     ^   |                  : -1-  -2-  -3-  -4-|        Possible    Volume    Adjusted|
              |  R   L  |     N   |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE ROAD  | R T T T L |        |  intervals/hour  :                   |able    Volume    to next    Volume |
------------- T H H H T  ---------|b.LT capacity on  :  D    0    0    0|Phase   in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  1 |  change (vph)    :                  |-----------------------------------|
   2  LT--^     v v v    <^-RTH    |c.G/C ratio       :  0    0    0    0|B2B1   297(B1)  336- 297=  39(B2)   297|
      LTH-^>             <--TH   3 |d.Opposing volume :  0    0    0    0|A1B2    39(B2)  430-  39= 391(A1)    39|
   3   TH-->             <v-LTH    |  in vph          :                  |A1A2   391(A1) OR  347(A2)           391|
      RTH-v>    ^ ^ ^     v--LT  2 |e.LT capacity on  :  0    0    0    0|B4B3    50(B4)  165-  50= 115(B3)    50|
   1  RT--v   < < | > >   Approach 2|  green (vph)    :                  |A4B3   115(B3)  413- 115= 298(A4)   115|
------------- L L T R R  ---------|f.LT capacity in  :  0    0    0    0|A3A4   513(A3) OR  298(A4)           513|
              | T T H T T |CALVINE ROAD|  vph (b+e)   :                  |                                   |
              |   H   H   |        |g.Left turn volume :  0    0    0    0|                                   |
              | 2   3   1 |        |  in vph          :                  |                                   |
              | Approach 4:ELK GROVE-FLO|h.Is volume > cap. :             :                                   |
                                  |  (g>f) ?          :                  |                                   |
==================================+====================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                  |        |                 |          |                                  |
                                  |        | 4 5 5 5         |          |336(B1B2)+391(A1)+165(B4B3)+513(A3)|
             | Approach 3|        |------- 8 1 1 1 4 5        -------|                                  |
 3:  LT=  90 | |          | 2:RT=  90 |    0 3 3 3 1 0        ^-  90 |        = 1405 vph                |
   TH=1540   | |          |   TH=1040 |    | | | | | |        <- 347 |==================================|
   RT= 480   | v          |   LT= 540 |    < v v v > >        <- 347 | Step 8. INTERSECTION LEVEL OF    |
-------------              -------------|                     <- 347 |         SERVICE                  |
                        <--Approach 2 |                       v- 243 |    (compare step 7 with table 6) |
                                  | 336 -^                    v- 297 |            -------               |
                                  | 275 -^                           |            |  F  |              |
 Approach 1-->                    | 430 ->                           |            -------               |
-------------              -------------| 430 ->     < < ^ ^ ^ >      |==================================|
 1:LT= 610   |           ^ | 4: RT= 440 | 430 ->     | | | | | |     | Step 9. RECALCULATE              |
   TH=1290   |           | |   TH=1240  | 400 -v                      |                                  |
   RT= 400   |           | |   LT= 300  |-------     1 1 4 4 4 4 -------|Geometric Change:                 |
             | Approach 4|            |       |      6 3 1 1 1 4 |     |Signal Change:                    |
                                  |       |          5 5 3 3 3 0 |     |Volume Change:                    |
==================================+====================================+===================================|
 Step 3. IDENTIFY PHASING         | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                          |
                                  |          (two phase signal)         |                                   |
       --^ v--   B2B1             |           | Approach 3|             |                                   |
                                  |           |           |             |                                   |
    --^ AND <--     A1B2 AND      |           |           |             |                                   |
    --> OR  v--     /OR A2B1      |           |           |             |                                   |
       --> <--   A1A2             |-------------           ------------|                                   |
                                  | Approach 1                          |                                   |
        |   <    B4B3             |                                     |                                   |
        >   |                     |          See Step 6b.               |                                   |
    | | AND < ^     A3B4 AND      |                                     |                                   |
    v > OR  | |     /OR A4B3      |                        Approach 2   |                                   |
        |   ^    A3A4             |-------------           ------------|                                   |
        v   |                     |           |           |             |                                   |
-----------------------------------|           |           |             |                                   |
A1 -->   A3 |      B1 v--    B3  <|           |           |             |                                   |
          v ^                   | | |         | Approach 4|             | Exclusive right turns reduced 30 % |
A2 <--   A4  |     B2 --^    B4 |> |                                    | V/C Ratio = 1.02                  |
===============================================================================================
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                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: WATERMAN AND CALVINE                                     Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:WATERMAN RD  |                   -------Approach-----|          MULTIPHASE SIGNAL OVERLAP  |
             | 1   2   2 |       ^     |                   : -1-  -2-  -3-  -4-|        Possible    Volume    Adjusted|
             |   R   L   |       N     |a.No. of change    :  0    0    0    0|Prob-  Critical   Carryover  Critical|
CALVINE RD   | R T T T L |             | intervals/hour    :                 |able    Volume    to next    Volume |
------------  T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase   in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT  1     | change (vph)      :                 |-------------------------------------|
   2  LT--^     v v v    <^-RTH        |c.G/C ratio        :  0    0    0    0|B2B1     94(B1)  143-  94=  49(B2)   94|
      LTH-^>             <--TH   3     |d.Opposing volume  :  0    0    0    0|A1B2     49(B2)  340-  49= 291(A1)   49|
   3   TH-->             <v-LTH        | in vph            :                 |A1A2    400(A2) OR  291(A1)         400|
      RTH-v>    ^ ^ ^     v--LT  2     |e.LT capacity on   :  0    0    0    0|B4B3     55(B3)   72-  55=  17(B4)   55|
   1  RT--v   < < | > >  Approach 2    | green (vph)       :                 |A3B4     17(B4)  220-  17= 203(A3)   17|
------------  L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A3A4    495(A4) OR  203(A3)         495|
             | T T H T T |CALVINE RD   | vph (b+e)         :                 |                                     |
             |   H   H   |             |g.Left turn volume :  0    0    0    0|                                     |
             | 2   2   1 |             | in vph            :                 |                                     |
             | Approach 4:WATERMAN RD  |h.Is volume > cap. :                 :                                     |
                                       | (g>f) ?           :                 |                                     |
=======================================+=====================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                       |       |                      |      |                                     |
                                       |       | 2 2 2                |      |143(B1B2)+400(A2)+72(B3B4)+495(A4)   |
             | Approach 3|             |-------  8 2 2 5 7            -------|                                     |
 3:  LT= 130 | |         | 2:RT= 100   |         0 0 0 9 2            ^- 100 |          = 1110 vph                 |
   TH= 440   | |         |   TH=1200   |         | | | | |            <- 400 |=====================================|
   RT= 280   | v         |   LT= 170   |         < v v > >            <- 400 | Step 8. INTERSECTION LEVEL OF       |
------------              -------------|                              <- 400 |       SERVICE                       |
                         <--Approach 2 |                              v-  77 |    (compare step 7 with table 6)    |
                                       | 143 -^                       v-  94 |            -------                  |
                                       | 117 -^                              |            | D |                  |
 Approach 1-->                         | 340 ->                              |            -------                  |
------------              -------------| 340 ->          < < ^ ^ >           |=====================================|
 1:LT= 260   |           ^ | 4: RT= 270| 340 ->          | | | | |           | Step 9. RECALCULATE                 |
   TH=1020   |           | |   TH= 990 | 120 -v                              |                                     |
   RT= 120   |           | |   LT= 100 |-------              4 4 2   -------|Geometric Change:                    |
             | Approach 4|             |       |         5 4 9 9 7 |        |Signal Change:                       |
                                       |       |         5 5 5 5 0 |        |Volume Change:                       |
=======================================+=====================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                       |        (two phase signal)           |                                     |
          --^ v--  B2B1                |            | Approach 3|            |                                     |
                                       |            |           |            |                                     |
      --^ AND <--     A1B2 AND         |            |           |            |                                     |
      --> OR  v--     /OR A2B1         |            |           |            |                                     |
          --> <--  A1A2                |------------             ------------|                                     |
                                       | Approach 1                          |                                     |
           |  <    B4B3                |                                     |                                     |
           >  |                        |            See Step 6b.             |                                     |
      | | AND < ^     A3B4 AND         |                                     |                                     |
      v > OR  | |     /OR A4B3         |                          Approach 2 |                                     |
           |  ^    A3A4                |------------              -----------|                                     |
           v  |                        |            |           |            |                                     |
---------------------------------------|            |           |            |                                     |
 A1 -->    A3 |       B1 v--    B3   <|  |            |           |            |                                     |
            v ^                      | | |            | Approach 4|            | Exclusive right turns reduced  30 % |
 A2 <--    A4  |      B2 --^    B4  |>   |                                     | V/C Ratio = .81                     |
========================================================================================================
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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: WATERMAN AND CALVINE                                      Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY     | Step 4. LEFT TURN CHECK               | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:WATERMAN RD |              -------Approach-----|          MULTIPHASE SIGNAL OVERLAP    |
             | 1  2  2 |       ^      |                 : -1-  -2-  -3-  -4-|        Possible    Volume     Adjusted|
             |  R   L  |       N      |a.No. of change  :  0    0    0    0|Prob-   Critical   Carryover   Critical|
CALVINE RD   | R T T T L |            | intervals/hour  :                  |able     Volume     to next     Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase    in vph     phase      in vph |
 Approach 1   < < | > >   ^--RT  1    | change (vph)    :                  |-------------------------------------|
  2  LT--^     v v v    <^-RTH        |c.G/C ratio      :  0    0    0    0|B2B1   138(B2)  143- 138=   5(B1)   138|
     LTH-^>             <--TH   3     |d.Opposing volume:  0    0    0    0|A2B1     5(B1)  430-   5= 425(A2)     5|
  3   TH-->             <v-LTH        | in vph          :                  |A1A2   453(A1) OR  425(A2)           453|
     RTH-v>    ^ ^ ^     v--LT  2     |e.LT capacity on :  0    0    0    0|B4B3    61(B4)   94-  61=  33(B3)    61|
  1  RT--v    < < | > >  Approach 2   | green (vph)     :                  |A4B3    33(B3)  330-  33= 297(A4)    33|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   485(A3) OR  297(A4)           485|
             | T T H T T |CALVINE RD  | vph (b+e)       :                  |                                     |
             |   H   H   |            |g.Left turn volume:  0    0    0    0|                                     |
             | 2   2   1 |            | in vph          :                  |                                     |
             | Approach 4:WATERMAN RD |h.Is volume > cap. :                :|                                     |
                                      | (g>f) ?         :                  |                                     |
======================================+===================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |       |                     |     |                                     |
                                      |       | 2 4 4               |     |143(B2B1)+453(A1)+94(B4B3)+485(A3)   |
             | Approach 3|            |-------  3 8 8 5 6           -------|                                     |
 3:  LT= 110 | |         | 2:RT= 160  |         0 5 5 0 1           ^- 160 |           = 1175 vph                |
     TH= 970 | |         |   TH=1290  |         | | | | |           <- 430 |=====================================|
     RT= 230 | v         |   LT= 260  |         < v v > >           <- 430 | Step 8. INTERSECTION LEVEL OF       |
-------------            -------------|                             <- 430 |         SERVICE                     |
                        <--Approach 2 |                             v- 117 |    (compare step 7 with table 6)    |
                                      | 138 -^                      v- 143 |             -------                 |
                                      | 113 -^                             |             | D |                 |
 Approach 1-->                        | 453 ->                             |             -------                 |
-------------            -------------| 453 ->         < < ^ ^ >           |=====================================|
 1:LT= 250   |         ^ | 4: RT= 220 | 453 ->         | | | | |           | Step 9. RECALCULATE                 |
   TH=1360   |         | |    TH= 660 | 110 -v                             |                                     |
   RT= 110   |         | |    LT= 170 |-------             3 3 2   -------|Geometric Change:                    |
             | Approach 4|            |       |          9 7 3 3 2 |       |Signal Change:                       |
                                      |       |          4 7 0 0 0 |       |Volume Change:                       |
======================================+===================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                            |
                                      |         (two phase signal)        |                                     |
         --^ v--   B2B1               |            | Approach 3|           |                                     |
                                      |            |           |           |                                     |
     --^ AND <--     A1B2 AND         |            |           |           |                                     |
     --> OR  v--     /OR A2B1         |            |           |           |                                     |
         --> <--   A1A2               |-------------           ------------|                                     |
                                      | Approach 1                         |                                     |
          |  <     B4B3               |                                    |                                     |
          >  |                        |            See Step 6b.            |                                     |
     | | AND < ^     A3B4 AND         |                                    |                                     |
     v > OR  | |     /OR A4B3         |                       Approach 2   |                                     |
          |  ^     A3A4               |-------------           ------------|                                     |
          v  |                        |            |           |           |                                     |
--------------------------------------|            |           |           |                                     |
 A1 -->   A3 |      B1 v--    B3   <| |            |           |           |                                     |
            v ^                     | | |          |           |           | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4 |>   |            | Approach 4|           | V/C Ratio = .85                     |
===============================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: CALVINE RD AND BRADSHAW RD                          Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR   |
            | Approach 3:BRADSHAW    |               -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
            | 1   3   2 |     ^      |               : -1-  -2-  -3-  -4-|     Possible   Volume   Adjusted|
            |   R   L   |     N      |a.No. of change  :  0    0    0    0|Prob- Critical  Carryover Critical|
CALVINE RD  | R T T T L |            |  intervals/hour  :                  |able   Volume   to next   Volume |
------------ T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase    in vph |
 Approach 1  < < | > >   ^--RT  1    |  change (vph)    :                  |----------------------------------|
  2  LT--^     v v v    <^-RTH       |c.G/C ratio       :  0    0    0    0|B2B1   28(B1)  413-  28= 385(B2)   28|
     LTH-^>             <--TH   3    |d.Opposing volume :  0    0    0    0|A1B2  385(B2)  153- 385=   0(A1)  385|
  3   TH-->             <v-LTH       |  in vph          :                  |A1A2  183(A2) OR      0(A1)       183|
     RTH-v>    ^ ^ ^     v--LT  2    |e.LT capacity on  :  0    0    0    0|B4B3   22(B3)   33-  22=  11(B4)   22|
  1  RT--v   < < | > >  Approach 2   |  green (vph)     :                  |A3B4   11(B4)  371-  11= 360(A3)   11|
------------ L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4  430(A4) OR    360(A3)       430|
            | T T H T T |CALVINE RD  |  vph (b+e)       :                  |                                  |
            |   H   H   |            |g.Left turn volume :  0    0    0    0|                                  |
            | 2   3   1 |            |  in vph          :                  |                                  |
            | Approach 4:BRADSHAW    |h.Is volume > cap. :                 :|                                  |
                                     |  (g>f) ?         :                  |                                  |
=====================================+=================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |       |                   |      |                                  |
                                     |       | 5 2 2 2           |      |413(B1B2)+183(A2)+33(B3B4)+430(A4)|
            | Approach 3|            |-------  3 2 2 2 2 3       -------|                                  |
 3:  LT=  60 | |         | 2:RT= 210  |         0 0 0 0 7 3        ^- 210 |          = 1059 vph              |
    TH= 660 | |         |   TH= 550  |         | | | | | |        <- 183 |==================================|
    RT= 530 | v         |   LT=  50  |         < v v v > >        <- 183 | Step 8. INTERSECTION LEVEL OF   |
------------             ------------|                            <- 183 |        SERVICE                   |
                      <--Approach 2  |                            v-  23 |   (compare step 7 with table 6)  |
                                     | 413 -^                     v-  28 |           -------                |
                                     | 338 -^                            |           |  C  |                |
 Approach 1-->                       | 153 ->                            |           -------                |
------------             ------------| 153 ->          < < ^ ^ ^ >       |==================================|
 1:LT= 750  |          ^ | 4: RT=  30 | 153 ->          | | | | | |       | Step 9. RECALCULATE             |
   TH= 460  |          | |    TH=1290 |  40 -v                           |                                  |
   RT=  40  |          | |   LT=  40  |-------            4 4 4   -------|Geometric Change:                 |
            | Approach 4|            |       |          2 1 3 3 3 3 |   |Signal Change:                    |
                                     |       |          2 8 0 0 0 0 |   |Volume Change:                    |
=====================================+=================================+==================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                     |        (two phase signal)         |                                  |
        --^ v--   B2B1               |            | Approach 3|          |                                  |
                                     |            |           |          |                                  |
    --^ AND <--      A1B2 AND        |            |           |          |                                  |
    --> OR  v--      /OR A2B1        |            |           |          |                                  |
        --> <--   A1A2               |-------------           -----------|                                  |
                                     | Approach 1                        |                                  |
          |  <    B4B3               |                                   |                                  |
          >  |                       |        See Step 6b.               |                                  |
    | | AND < ^      A3B4 AND        |                                   |                                  |
    v > OR  | |      /OR A4B3        |                       Approach 2  |                                  |
          |  ^    A3A4               |-------------           -----------|                                  |
          v  |                       |            |           |          |                                  |
-------------------------------------|            |           |          |                                  |
 A1 -->   A3 |       B1 v--    B3  <|  |            |           |          |                                  |
            v ^                     | |  |            | Approach 4|          | Exclusive right turns reduced 30 %|
 A2 <--   A4  |      B2 --^    B4 |>   |                                   | V/C Ratio = .77                  |
==========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: CALVINE RD AND BRADSHAW RD                            Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
=============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR   |
             | Approach 3:BRADSHAW   |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1  3  2 |      ^      |             : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R  L   |      N      |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE RD   | R T T T L |           | intervals/hour  :                 |able    Volume   to next    Volume |
------------- T H H H T  ------------|b.LT capacity on  :  0    0    0    0|Phase   in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1   | change (vph)    :                 |----------------------------------|
   2  LT--^     v v v    <^-RTH      |c.G/C ratio       :  0    0    0    0|B2B1    17(B1)  369-  17= 352(B2)    17|
      LTH-^>              <--TH   3  |d.Opposing volume :  0    0    0    0|A1B2   352(B2)  193- 352=   0(A1)   352|
   3   TH-->              <v-LTH     | in vph          :                 |A1A2   147(A2) OR    0(A1)          147|
      RTH-v>    ^ ^ ^      v--LT  2  |e.LT capacity on  :  0    0    0    0|B4B3    17(B3)  110-  17=  93(B4)    17|
   1  RT--v   < < | > >  Approach 2  | green (vph)     :                 |A3B4    93(B4)  630-  93= 537(A3)    93|
------------- L L T R R  ------------|f.LT capacity in  :  0    0    0    0|A3A4   537(A3) OR  300(A4)          537|
             | T T H T T |CALVINE RD | vph (b+e)       :                 |                                  |
             |   H   H   |           |g.Left turn volume :  0    0    0    0|                                  |
             | 2   3   1 |           | in vph          :                 |                                  |
             | Approach 4:BRADSHAW   |h.Is volume > cap. :               :                                  |
                                     | (g>f) ?         :                 |                                  |
=====================================+=================================+==================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                     |        |                     |    |                                  |
                                     |        | 9 4 4 4   1         |    |369(B1B2)+147(A2)+110(B3B4)+537(A3)|
             | Approach 3|           |-------  0 2 2 2 9 1          -------|                                  |
 3:  LT= 200 | |         | 2:RT= 140 |         0 0 0 0 0 0          ^- 140 |         = 1163 vph               |
    TH=1260  | |         |   TH= 440 |         | | | | | |          <- 147 |==================================|
    RT= 900  | v         |   LT=  30 |         < v v v > >          <- 147 | Step 8. INTERSECTION LEVEL OF    |
-------------            ------------|                              <- 147 |        SERVICE                   |
                       <--Approach 2 |                              v-  14 |   (compare step 7 with table 6)  |
                                     | 369 -^                       v-  17 |           -------                |
                                     | 302 -^                              |           | D |                  |
 Approach 1-->                       | 193 ->                              |           -------                |
-------------            ------------| 193 ->          < < ^ ^ ^ >         |==================================|
 1:LT= 670  |           ^ | 4: RT= 30 | 193 ->          | | | | | |         | Step 9. RECALCULATE              |
   TH= 580  |           | |   TH= 900 |  50 -v                             |                                  |
   RT=  50  |           | |   LT=  30 |-------              3 3 3   -------|Geometric Change:                 |
            | Approach 4|            |        |         1 1 0 0 0 3 |      |Signal Change:                    |
                                     |        |         7 4 0 0 0 0 |      |Volume Change:                    |
=====================================+=====================================+==================================|
 Step 3. IDENTIFY PHASING            | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                         |
                                     |        (two phase signal)           |                                  |
       --^ v--  B2B1                 |           | Approach 3|             |                                  |
                                     |           |           |             |                                  |
   --^ AND <--    A1B2 AND           |           |           |             |                                  |
   --> OR  v--    /OR A2B1           |           |           |             |                                  |
       --> <--  A1A2                 |-------------          -------------|                                  |
                                     | Approach 1                          |                                  |
        |  <    B4B3                 |                                     |                                  |
        >  |                         |          See Step 6b.               |                                  |
   | | AND < ^    A3B4 AND           |                                     |                                  |
   v > OR  | |    /OR A4B3           |                        Approach 2   |                                  |
        |  ^    A3A4                 |-------------          -------------|                                  |
        v  |                         |           |           |             |                                  |
-------------------------------------|           |           |             |                                  |
 A1 -->    A3 |      B1 v--     B3  <| |           |           |             |                                  |
            v ^                     | | |           | Approach 4|             | Exclusive right turns reduced  30 % |
 A2 <--    A4  |     B2 --^     B4 |> |                                     | V/C Ratio = .85                  |
=============================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
ntersection: CALVINE RD AND VINEYARD RD                                  Design Hour: AM
roblem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY      | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR    |
            | Approach 3:VINEYARD    |               -------Approach-----|          MULTIPHASE SIGNAL OVERLAP |
            | 1      2 |     ^       |               : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
            |  R  L    |     N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE RD  | R T T T L |             |  intervals/hour  :                  |able   Volume   to next    Volume |
------------  T H H H T   ------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >    ^--RT  1  |  change (vph)    :                  |-----------------------------------|
  2  LT--^     v v v      <^-RTH     |c.G/C ratio       :  0    0    0    0|A1B2  391(B2)  250- 391=  0(A1)  391|
     LTH-^>              <--TH   3   |d.Opposing volume :  0  750    0  220|A1A2  120(A2) OR   0(A1)          120|
  3   TH-->              <v-LTH      |  in vph          :                  |A3B4  154(A3) OR  11(B4)          154|
     RTH-v>    ^ ^ ^      v--LT      |e.LT capacity on  :  0    0    0    0|                                   |
     RT--v    < < | > >  Approach 2  |  green (vph)     :                  |                                   |
------------  L L T R R  ------------|f.LT capacity in  :  0    0    0    0|                                   |
            | T T H T T |CALVINE RD  |  vph (b+e)       :                  |                                   |
            |   H   H   |            |g.Left turn volume :  0   0    0    0|                                   |
            |           |            |  in vph          :                  |                                   |
            | Approach 4:VINEYARD    |h.Is volume > cap. :     NO       NO:                                   |
                                     |  (g>f) ?         :                  |                                   |
=====================================+=====================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph    | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES   |
                                     |       |                    |        |                                   |
                                     |       | 2                  |        |511(B2A2)+154(A3)+0()+0()          |
            | Approach 3|            |-------  2  1               -------|                                   |
3:  LT=  20 | |         | 2:RT= 130  |         0 9 1              ^- 130 |          = 665 vph                |
   TH=   0  | |         |   TH= 360  |         | | |              <- 120 |===================================|
  RT= 220   | v         |   LT=   0  |         < > >              <- 120 | Step 8. INTERSECTION LEVEL OF     |
-------------            ------------|                            <- 120 |         SERVICE                   |
                        <--Approach 2 |                                     |      (compare step 7 with table 6) |
                                     |                                     |              -------              |
                                     | 391 -^                              |              | A |              |
 Approach 1-->                       | 320 -^                              |              -------              |
------------             ------------| 250 ->                              |===================================|
1:LT= 710   |          ^ | 4: RT=   0 | 250 ->                              | Step 9. RECALCULATE               |
  TH= 750   |          | |    TH=   0 | 250 ->                              |                                   |
  RT=   0   |          | |   LT=    0 |-------                      -------|Geometric Change:                  |
            | Approach 4|            |       |                    |        |Signal Change:                     |
                                     |       |                    |        |Volume Change:                     |
=====================================+=====================================+===================================|
Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph   | COMMENTS                          |
                                     |          (two phase signal)         |                                   |
         --^       A1B2              |              | Approach 3|          |                                   |
         -->                         |              |           |          |                                   |
         --> <--   A1A2              |              |           |          |                                   |
                                     |              |           |          |                                   |
          |   |    A3B4              |-------------              ------------|                                   |
          v   >                      | Approach 1                          |                                   |
                                     |                                     |                                   |
                                     |           See Step 6b.              |                                   |
                                     |                                     |                                   |
                                     |                          Approach 2 |                                   |
                                     |-------------              ------------|                                   |
                                     |              |           |          |                                   |
-------------------------------------|              |           |          |                                   |
A1 -->    A3 |      B1 v--    B3   <|  |              |           |          |                                   |
            v ^                     | | |              | Approach 4|          | Exclusive right turns reduced 30 % |
A2 <--    A4  |     B2 --^    B4  |>  |                                     | V/C Ratio = .47                   |
==========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                        Calculation Form 1
Intersection: CALVINE RD AND VINEYARD RD                                Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR    |
            | Approach 3:VINEYARD       |              -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
            | 1       2 |      ^        |               : -1-  -2-  -3-  -4-|       Possible   Volume   Adjusted|
            |   R   L   |      N        |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover Critical|
CALVINE RD  | R T T T L |               | intervals/hour  :                 |able   Volume   to next   Volume |
----------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1  | change (vph)     :                 |-----------------------------------|
  2  LT--^     v v v     <^-RTH     |c.G/C ratio       :  0    0    0    0|A1B2  132(B2) 143- 132= 11(A1)  132|
     LTH-^>              <--TH  3   |d.Opposing volume :  0  430    0  880|A1A2  173(A2) OR  11(A1)         173|
  3   TH-->              <v-LTH     | in vph           :                 |A3B4  616(A3) OR  83(B4)         616|
     RTH-v>    ^ ^ ^     v--LT      |e.LT capacity on  :  0    0    0    0|                                   |
     RT--v    < < | > >  Approach 2 | green (vph)      :                 |                                   |
-----------  L L T R R  ------------|f.LT capacity in  :  0    0    0    0|                                   |
            | T T H T T |CALVINE RD | vph (b+e)        :                 |                                   |
            |   H   H   |           |g.Left turn volume :  0    0    0    0|                                   |
            |           |           | in vph           :                 |                                   |
            | Approach 4:VINEYARD   |h.Is volume > cap. :      NO        NO:                                   |
                                    | (g>f) ?          :                 |                                   |
=====================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph   | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES  |
                                    |        |                  |       |                                   |
                                    |        | 8                |       |305(B2A2)+616(A3)+0()+0()          |
            | Approach 3|           |-------  8 6 8              -------|                                   |
 3:  LT= 150 | |        | 2:RT=  50 |         0 8 3             ^-  50 |        = 921 vph                  |
    TH=   0  | |        |   TH= 520 |         | | |             <- 173 |===================================|
    RT= 880  | v        |   LT=   0 |         < > >             <- 173 | Step 8. INTERSECTION LEVEL OF     |
-----------             ------------|                           <- 173 |         SERVICE                   |
                       <--Approach 2 |                                  |    (compare step 7 with table 6)  |
                                    |                                  |           -------                 |
                                    | 132 -^                           |           | B |                   |
 Approach 1-->                      | 108 -^                           |           -------                 |
-----------             ------------| 143 ->                           |===================================|
 1:LT= 240  |              ^ | 4: RT=  0 | 143 ->                      | Step 9. RECALCULATE               |
   TH= 430  |              | |   TH=   0 | 143 ->                      |                                   |
   RT=   0  |              | |   LT=   0 |-------              -------|Geometric Change:                  |
            | Approach 4|           |        |                  |       |Signal Change:                     |
                                    |        |                  |       |Volume Change:                     |
=====================================+==================================+===================================|
 Step 3. IDENTIFY PHASING           | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                    |        (two phase signal)        |                                   |
        --^      A1B2               |           | Approach 3|          |                                   |
        -->                         |           |           |          |                                   |
        --> <--  A1A2               |           |           |          |                                   |
                                    |           |           |          |                                   |
         |  |    A3B4               |-----------             ----------|                                   |
         v  >                       | Approach 1                       |                                   |
                                    |                                  |                                   |
                                    |        See Step 6b.              |                                   |
                                    |                                  |                                   |
                                    |                       Approach 2 |                                   |
                                    |-----------             ----------|                                   |
                                    |           |           |          |                                   |
------------------------------------|           |           |          |                                   |
A1 -->   A3 |      B1 v--    B3   <| |           |           |          |                                   |
           v ^                      | |         | Approach 4|          | Exclusive right turns reduced 30 % |
A2 <--   A4  |     B2 --^    B4  |> |                                  | V/C Ratio = .65                   |
==========================================================================================
```

```
                                    Critical Movement Analysis: PLANNING
                                            Calculation Form 1
Intersection: CALVINE RD AND EXCELSIOR RD                                   Design Hour: AM
'roblem Statement: CUMULATIVE PLUS PROJECT
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR    |
             | Approach 3:EXCELSIOR     |                 -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
             | 1   1   1 |      ^       |                 : -1-  -2-  -3-  -4-|       Possible    Volume    Adjusted|
             |  R   L    |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
CALVINE RD   | R T T T L |              | intervals/hour  :                   |able    Volume    to next    Volume |
------------  T H H H T   -------------|b.LT capacity on  :  0    0    0    0|Phase   in vph     phase     in vph |
  Approach 1  < < | > >    ^--RT       | change (vph)     :                   |------------------------------------|
   1  LT--^     v v v     <^-RTH  1    |c.G/C ratio       :  0    0    0    0|B2B1    10(B1)  130-  10= 120(B2)   10|
      LTH-^>              <--TH   2    |d.Opposing volume :  0    0    0    0|A1B2   120(B2)  217- 120=  97(A1)  120|
   2   TH-->              <v-LTH       | in vph           :                   |A1A2    97(A1) OR   80(A2)          97|
   1  RTH-v>    ^ ^ ^      v--LT  1    |e.LT capacity on  :  0    0    0    0|B4B3    10(B4)  140-  10= 130(B3)   10|
      RT--v   < < | > >   Approach 2   | green (vph)      :                   |A4B3   130(B3)  440- 130= 310(A4)  130|
------------  L L T R R   -------------|f.LT capacity in  :  0    0    0    0|A3A4   310(A4) OR   50(A3)         310|
             | T T H T T |CALVINE RD    | vph (b+e)        :                   |                                    |
             |   H   H   |              |g.Left turn volume :  0    0    0    0|                                    |
             | 1   1   1 |              | in vph           :                   |                                    |
             | Approach 4:EXCELSIOR     |h.Is volume > cap. :                  :                                    |
                                        | (g>f) ?          :                   |                                    |
========================================+==================================+====================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                        |       |                    |     |                                    |
                                        |       |                    |     |130(B1B2)+97(A1)+140(B4B3)+310(A4)  |
             | Approach 3|              |-------  2 5 1              -------|                                    |
 3:  LT=  10 | |         | 2:RT=  30    |         0 0 0              ^+ 30 |        = 677 vph                   |
    TH=  50  | |         |   TH= 210    |         | | |              <+ 50 |====================================|
    RT=  20  | v         |   LT=  10    |         < v >              <- 80 | Step 8. INTERSECTION LEVEL OF      |
------------              -------------|                             <- 80 |         SERVICE                    |
                          <--Approach 2 |                            v- 10 |    (compare step 7 with table 6)   |
                                        |                                  |              -------               |
                                        | 130 -^                           |              |  A  |               |
 Approach 1-->                          | 217 ->                           |              -------               |
------------              -------------| 217 ->              < ^ >        |====================================|
 1:LT= 130   |          ^ | 4: RT=  80  | 177 +>              | | |        | Step 9. RECALCULATE                |
   TH= 610   |          | |    TH= 440  |  40 +v                           |                                    |
   RT=  40   |          | |    LT= 140  |-------              1 4   -------|Geometric Change:                   |
             | Approach 4|              |       |             4 4 8 |      |Signal Change:                      |
                                        |       |             0 0 0 |      |Volume Change:                      |
========================================+==================================+====================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                           |
                                        |          (two phase signal)       |                                    |
       --^ v--  B2B1                    |            | Approach 3|          |                                    |
                                        |            |           |          |                                    |
    --^ AND <--    A1B2 AND             |            |           |          |                                    |
    --> OR  v--    /OR A2B1             |            |           |          |                                    |
       --> <--  A1A2                    |------------             ----------|                                    |
                                        | Approach 1                        |                                    |
        |  <    B4B3                    |                                   |                                    |
        >  |                            |          See Step 6b.             |                                    |
    | | AND < ^    A3B4 AND             |                                   |                                    |
    v > OR  | |    /OR A4B3             |                        Approach 2 |                                    |
        |  ^    A3A4                    |------------             ----------|                                    |
        v  |                            |            |           |          |                                    |
----------------------------------------|            |           |          |                                    |
 A1 -->   A3 |      B1 v--     B3    <| |            |           |          |                                    |
           v ^                    | |   |            | Approach 4|          | Exclusive right turns reduced 30 % |
 A2 <--   A4  |     B2 --^     B4 |>    |                                   | V/C Ratio = .49                    |
================================================================================================
```

```
                        Critical Movement Analysis: PLANNING
                                 Calculation Form 1
Intersection: CALVINE RD AND EXCELSIOR RD                        Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT
===========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:EXCELSIOR    |             -------Approach-----|          MULTIPHASE SIGNAL OVERLAP   |
             | 1   1   1 |      ^      |                 : -1-  -2-  -3-  -4-|       Possible    Volume     Adjusted|
             |   R   L   |      N      |a.No. of change  :  0    0    0    0|Prob-  Critical   Carryover  Critical|
CALVINE RD   | R T T T L |             | intervals/hour  :                  |able   Volume    to next    Volume |
------------- T H H H T  --------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1   < < | > >   ^--RT        | change (vph)    :                  |------------------------------------|
   1  LT--^    v v v     <^-RTH  1     |c.G/C ratio      :  0    0    0    0|B2B1   50(B1)  100-  50=  50(B2)   50|
      LTH-^>             <--TH   2     |d.Opposing volume :  0    0    0    0|A1B2   50(B2)  160-  50= 110(A1)   50|
  2   TH-->              <v-LTH        | in vph          :                  |A1A2  110(A1) OR  100(A2)          110|
   1  RTH-v>    ^ ^ ^     v--LT  1     |e.LT capacity on :  0    0    0    0|B4B3   30(B4)   60- 30=  30(B3)    30|
      RT--v   < < | > >  Approach 2    | green (vph)     :                  |A4B3   30(B3)   80-  30=  50(A4)   30|
-------------  L L T R R --------------|f.LT capacity in :  0    0    0    0|A3A4  330(A3) OR   50(A4)          330|
             | T T H T T |CALVINE RD   | vph (b+e)       :                  |                                    |
             |   H   H   |             |g.Left turn volume :  0    0    0    0|                                  |
             | 1   1   1 |             | in vph          :                  |                                    |
             | Approach 4:EXCELSIOR    |h.Is volume > cap. :                :                                    |
                                       | (g>f) ?         :                  |                                    |
=======================================+==================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES    |
                                       |        |                      |    |                                    |
                                       |        | 2 3                  |    |100(B1B2)+110(A1)+60(B4B3)+330(A3)  |
             | Approach 3|             |-------  0 3 3               -------|                                    |
 3:  LT=  30 | |         | 2:RT=  20   |         0 0 0               ^+  20 |          = 600 vph                 |
   TH= 330   | |         |   TH= 280   |         | | |               <+  80 |====================================|
  RT= 200    | v         |   LT=  50   |         < v >               <- 100 | Step 8. INTERSECTION LEVEL OF      |
-------------            --------------|                             <- 100 |         SERVICE                    |
                         <--Approach 2 |                             v-  50 |     (compare step 7 with table 6)  |
                                       |                                    |              -------               |
                                       | 100 -^                             |              | A |                 |
 Approach 1-->                         | 105 ->                             |              -------               |
-------------            --------------| 105 ->             < ^ >           |====================================|
 1:LT= 100   |              ^ | 4: RT=  10 |  0 +>          | | |         | Step 9. RECALCULATE                 |
   TH= 210   |              | |   TH=  80 | 160 +v                          |                                    |
   RT= 160   |              | |  LT=  60  |-------                   -------|Geometric Change:                   |
             | Approach 4|             |        |           6 8 1 |         |Signal Change:                      |
                                       |        |           0 0 0 |         |Volume Change:                      |
=======================================+==================================+=====================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                            |
                                       |         (two phase signal)       |                                     |
        --^ v--  B2B1                  |            | Approach 3|         |                                     |
                                       |            |           |         |                                     |
    --^ AND <--     A1B2 AND           |            |           |         |                                     |
    --> OR  v--     /OR A2B1           |            |           |         |                                     |
        --> <--  A1A2                  |-------------           ----------|                                     |
                                       | Approach 1                       |                                     |
         |  <    B4B3                  |                                  |                                     |
         >  |                          |           See Step 6b.           |                                     |
    | | AND < ^     A3B4 AND           |                                  |                                     |
    v > OR  | |     /OR A4B3           |                       Approach 2 |                                     |
         |  ^    A3A4                  |-------------           ----------|                                     |
         v  |                          |            |           |         |                                     |
---------------------------------------|            |           |         |                                     |
 A1 -->   A3 |      B1 v--    B3   <|  |            |           |         |                                     |
            v ^                     | | |           | Approach 4|         | Exclusive right turns reduced 30 %  |
 A2 <--   A4  |     B2 --^    B4 |>   |                                  | V/C Ratio = .44                     |
===========================================================================================
```

```
                         Critical Movement Analysis: PLANNING
                                 Calculation Form 1
ntersection: JACKSON HWY AND BRADSHAW RD                              Design Hour: AM
'roblem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
=========================================================================================================
Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK            | Step 6b. VOLUME ADJUSTMENT FOR         |
             | Approach 3:BRADSHAW RD |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP       |
             | 1   3   2 |     ^      |                  : -1-  -2-  -3-  -4-|      Possible    Volume     Adjusted|
             |  R   L    |     N      |a.No. of change    :  0    0    0    0|Prob-  Critical  Carryover  Critical|
'ACKSON HWY  | R T T T L |            | intervals/hour    :                  |able   Volume    to next    Volume |
------------ T H H H T  -------------|b.LT capacity on   :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1  < < | > >  ^--RT  1     | change (vph)      :                  |--------------------------------------|
  2  LT--^    v v v    <^-RTH        |c.G/C ratio        :  0    0    0    0|B2B1  127(B1)  154- 127=  27(B2)   127|
     LTH-^>            <--TH   3     |d.Opposing volume  :  0    0    0    0|A1B2   27(B2)   87-  27=  60(A1)    27|
  3   TH-->            <v-LTH        | in vph            :                  |A1A2  360(A2) OR   60(A1)          360|
     RTH-v>   ^ ^ ^    v--LT  2      |e.LT capacity on   :  0    0    0    0|B4B3   28(B4)  371-  28= 343(B3)    28|
  2  RT--v   < < | > >  Approach 2   | green (vph)       :                  |A4B3  343(B3)  680- 343= 337(A4)   343|
------------ L L T R R  -------------|f.LT capacity in   :  0    0    0    0|A3A4  411(A3) OR  337(A4)          411|
             | T T H T T |JACKSON HWY | vph (b+e)         :                  |                                      |
             |   H   H   |            |g.Left turn volume :  0    0    0    0|                                      |
             | 3   3   1 |            | in vph            :                  |                                      |
             | Approach 4:BRADSHAW RD |h.Is volume > cap. :                  :                                      |
                                      | (g>f) ?           :                  |                                      |
======================================+====================================+======================================|
Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                      |      |                        |    |                                      |
                                      |      | 3 4 4 4                |    |154(B1B2)+360(A2)+371(B4B3)+411(A3)   |
             | Approach 3|            |-------  2 1 1 1 2 2           -------|                                      |
3:  LT=  50 | |         | 2:RT= 260   |         0 1 1 1 3 8        ^- 260  |            = 1296 vph                |
   TH=1232  | |         |   TH=1080   |         | | | | | |        <- 360  |======================================|
   RT= 320  | v         |   LT= 230   |         < v v v > >        <- 360  | Step 8. INTERSECTION LEVEL OF        |
------------             -------------|                            <- 360  |         SERVICE                      |
                      <--Approach 2   | 154 -^                     v- 104  |    (compare step 7 with table 6)     |
                                      | 126 -^                     v- 127  |              -------                 |
                                      |  87 ->                             |              |  E  |                 |
Approach 1-->                         |  87 ->                             |              -------                 |
------------             -------------|  87 ->        < < < ^ ^ ^ >        |======================================|
1:LT= 280   |           ^ | 4: RT=  40|  80 -v        | | | | | | |        | Step 9. RECALCULATE                  |
  TH= 260   |           | |   TH=2040 |  80 -v                             |                                      |
  RT= 160   |           | |   LT=1010 |-------        3 3 3 6 6 6   -------|Geometric Change:                     |
            | Approach 4|             |      |        7 3 0 8 8 8 4 |      |Signal Change:                        |
                                      |      |        1 7 3 0 0 0 0 |      |Volume Change:                        |
======================================+====================================+======================================|
Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                      |          (two phase signal)        |                                      |
         --^ v--   B2B1               |           | Approach 3|            |                                      |
                                      |           |           |            |                                      |
     --^ AND <--      A1B2 AND        |           |           |            |                                      |
     --> OR  v--      /OR A2B1        |           |           |            |                                      |
         --> <--   A1A2               |-------------           ------------|                                      |
                                      | Approach 1                         |                                      |
          |  <   B4B3                 |                                    |                                      |
          >  |                        |           See Step 6b.             |                                      |
     | | AND < ^      A3B4 AND        |                                    |                                      |
     v > OR  | |      /OR A4B3        |                        Approach 2  |                                      |
          |  ^   A3A4                 |-------------           ------------|                                      |
          v  |                        |           |           |            |                                      |
--------------------------------------|           |           |            |                                      |
A1 -->    A3 |      B1 v--    B3   <| |           |           |            |                                      |
            v ^                    | ||           | Approach 4|            | Exclusive right turns reduced 30 %   |
A2 <--    A4  |     B2 --^    B4  |>  |                                    | V/C Ratio = .948                     |
=========================================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                             Calculation Form 1
Intersection: JACKSON HWY AND BRADSHAW RD                                 Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR   |
              | Approach 3:BRADSHAW RD |               -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
              | 1  3  2 |      ^       |               : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
              |  R   L  |      N       |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY   | R T T T L |            |  intervals/hour :                  |able    Volume   to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph    phase     in vph |
  Approach 1  < < | > >   ^--RT  1     |  change (vph)   :                  |-----------------------------------|
    2  LT--^     v v v    <^-RTH       |c.G/C ratio      :  0    0    0    0|B2B1     17(B1)  149-  17= 132(B2)    17|
       LTH-^>             <--TH   3    |d.Opposing volume :  0    0    0    0|A1B2    132(B2)  420- 132= 288(A1)   132|
    3   TH-->             <v-LTH       |  in vph         :                  |A1A2    288(A1) OR   93(A2)          288|
       RTH-v>    ^ ^ ^    v--LT  2     |e.LT capacity on :  0    0    0    0|B4B3    138(B4)  190- 138=  52(B3)   138|
    2  RT--v    < < | > >  Approach 2  |  green (vph)    :                  |A4B3     52(B3)  513-  52= 461(A4)    52|
-------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4    644(A3) OR  461(A4)          644|
              | T T H T T |JACKSON HWY |  vph (b+e)      :                  |                                   |
              |   H   H   |            |g.Left turn volume :  0    0    0   0|                                   |
              | 3   3   1 |            |  in vph         :                  |                                   |
              | Approach 4:BRADSHAW RD |h.Is volume > cap. :                :|                                   |
                                       |  (g>f) ?        :                  |                                   |
=======================================+==================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |        |                   |      |                                   |
                                       |        | 2 6 6 6 1 1       |      |149(B1B2)+288(A1)+190(B4B3)+644(A3) |
              | Approach 3|            |-------  5 4 4 4 1 3        -------|                                   |
 3:  LT= 250  | |          | 2:RT= 110 |         0 4 4 4 3 8         ^- 110|           = 1271 vph              |
    TH=1933   | |          |   TH= 280 |         | | | | | |         <-  93|===================================|
   RT= 250    | v          |   LT=  30 |         < v v v > >         <-  93| Step 8. INTERSECTION LEVEL OF     |
-------------              ------------|                             <-  93|         SERVICE                   |
                         <--Approach 2 | 149 -^                      v-  14|     (compare step 7 with table 6) |
                                       | 122 -^                      v-  17|             -------               |
                                       | 280 ->                            |             |  E  |             |
 Approach 1-->                         | 280 ->                            |             -------               |
-------------              ------------| 280 ->        < < < ^ ^ ^ >       |===================================|
 1:LT= 270    |            ^ | 4: RT= 230 | 600 -v       | | | | | | |      | Step 9. RECALCULATE               |
   TH= 840    |            | |   TH=1540  | 600 -v                        |                                   |
   RT=1200    |            | |   LT= 520  |-------       1 1 1 5 5 5 2 -------|Geometric Change:                |
              | Approach 4|            |        |       9 7 5 1 1 1 3 |    |Signal Change:                     |
                                       |        |       0 3 6 3 3 3 0 |    |Volume Change:                     |
=======================================+==================================+===================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                         |
                                       |         (two phase signal)        |                                   |
         --^ v--  B2B1                 |            | Approach 3|          |                                   |
                                       |            |           |          |                                   |
     --^ AND <--     A1B2 AND          |            |           |          |                                   |
     --> OR  v--     /OR A2B1          |            |           |          |                                   |
         --> <--  A1A2                 |------------             ----------|                                   |
                                       | Approach 1                        |                                   |
          |  <    B4B3                 |                                   |                                   |
          >  |                         |          See Step 6b.             |                                   |
     | | AND < ^     A3B4 AND          |                                   |                                   |
     v > OR  | |     /OR A4B3          |                       Approach 2  |                                   |
          |  ^    A3A4                 |------------            -----------|                                   |
          v  |                         |            |           |          |                                   |
---------------------------------------|            |           |          |                                   |
 A1 -->    A3 |     B1 v--    B3   <|  |            |           |          |                                   |
            v ^                    | | |            | Approach 4|          | Exclusive right turns reduced 30 %|
 A2 <--    A4  |    B2 --^    B4  |>   |                                   | V/C Ratio = .92                   |
==================================================================================================
```

# Critical Movement Analysis: PLANNING
## Calculation Form 1

ntersection: JACKSON HWY AND EXCELSIOR RD                                Design Hour: AM
'roblem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)

```
=====================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
             | Approach 3:EXCELSIOR RD |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP |
             | 1  2  1 |      ^        |            : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
             |  R   L  |      N        |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY  | R T T T L |             | intervals/hour  :                |able   Volume   to next    Volume |
-----------  T H H H T  ------------- |b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  1      | change (vph)    :                |---------------------------------|
   1  LT--^   v v v     <^-RTH         |c.G/C ratio      :  0    0    0    0|B2B1   40(B2)  160-  40= 120(B1)   40|
      LTH-^>            <--TH   2      |d.Opposing volume:  0    0    0    0|A2B1  120(B1)  575- 120= 455(A2)  120|
   2   TH-->            <v-LTH         | in vph          :                |A1A2  455(A2) OR  75(A1)           455|
      RTH-v>   ^ ^ ^     v--LT  1      |e.LT capacity on :  0    0    0    0|B4B3   20(B4)  140-  20= 120(B3)   20|
   1  RT--v  < < | > >   Approach 2    | green (vph)     :                |A4B3  120(B3)  675- 120= 555(A4)  120|
-----------  L L T R R  ------------- |f.LT capacity in :  0    0    0    0|A3A4  555(A4) OR  115(A3)          555|
             | T T H T T |JACKSON HWY  | vph (b+e)       :                |                                 |
             |   H   H   |             |g.Left turn volume:  0    0    0    0|                                 |
             | 1  2  1 |               | in vph          :                |                                 |
             | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                :|                                 |
                                       | (g>f) ?         :                |                                 |
=====================================================================================================
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |          |                |        |                                 |
                                       |          |   1 1          |        |160(B2B1)+455(A2)+140(B4B3)+555(A4)|
             | Approach 3|             |-------  9 1 1 2        -------|                                 |
 3:  LT=  20 | |         | 2:RT=  80   |         0 5 5 0          ^-  80 |          = 1310 vph             |
     TH= 230 | |         |   TH=1150   |         | | | |          <- 575 |=================================|
     RT=  90 | v         |   LT= 160   |         < v v >          <- 575 | Step 8. INTERSECTION LEVEL OF   |
------------              ------------|                           v- 160 |         SERVICE                 |
                          <--Approach 2 |                                  |    (compare step 7 with table 6) |
                                       |                                  |             -------             |
                                       |                                  |             | E |             |
 Approach 1-->                         |  40 -^                           |             -------             |
------------              ------------|  75 ->          < ^ ^ >          |=================================|
 1:LT=  40   |            ^ | 4: RT= 160 |  75 ->          | | | |          | Step 9. RECALCULATE             |
   TH= 150   |            | |   TH=1350 |  30 -v                           |                                 |
   RT=  30   |            | |   LT= 140 |-------          1 6 6 1  -------|Geometric Change:                |
             | Approach 4|             |        |        4 7 7 6 |        |Signal Change:                   |
                                       |        |        0 5 5 0 |        |Volume Change:                   |
=====================================================================================================
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                       |      (two phase signal)         |                                 |
        --^ v--   B2B1                 |         | Approach 3|            |                                 |
                                       |         |           |            |                                 |
    --^ AND <--      A1B2 AND          |         |           |            |                                 |
    --> OR  v--      /OR A2B1          |         |           |            |                                 |
        --> <--   A1A2                 |-------------      -------------|                                 |
                                       | Approach 1                       |                                 |
         |   <    B4B3                 |                                  |                                 |
         >   |                         |         See Step 6b.             |                                 |
    | | AND < ^      A3B4 AND          |                                  |                                 |
    v > OR  | |      /OR A4B3          |                      Approach 2  |                                 |
         |   ^    A3A4                 |-------------      -------------|                                 |
         v   |                         |         |           |            |                                 |
---------------------------------------|         |           |            |                                 |
 A1 -->   A3 |      B1 v--     B3   <| |         |           |            |                                 |
            v ^                     | | |         | Approach 4|            | Exclusive right turns reduced 30 % |
 A2 <--   A4  |     B2 --^     B4 |>   |                                  | V/C Ratio = .954                |
=====================================================================================================
```

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                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: JACKSON HWY AND EXCELSIOR RD                                Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT  (MITIGATED)
===============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK                | Step 6b. VOLUME ADJUSTMENT FOR       |
              | Approach 3:EXCELSIOR RD |           -------Approach-----|      MULTIPHASE SIGNAL OVERLAP     |
              | 1  2  1 |       ^     |                 : -1-  -2-  -3-  -4-|     Possible    Volume    Adjusted|
              |  R   L  |       N     |a.No. of change   :  0    0    0    0|Prob-  Critical  Carryover  Critical|
JACKSON HWY   | R T T T L |           |  intervals/hour  :                  |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on  :  0    0    0    0|Phase  in vph     phase     in vph |
  Approach 1   < < | > >   ^--RT  1   |  change (vph)    :                  |------------------------------------|
   1  LT--^     v v v     <^-RTH      |c.G/C ratio       :  0    0    0    0|B2B1    80(B2)  180-  80= 100(B1)    80|
      LTH-^>              <--TH   2   |d.Opposing volume :  0    0    0    0|A2B1   100(B1)  170- 100=  70(A2)   100|
   2   TH-->              <v-LTH      |  in vph          :                  |A1A2   555(A1) OR   70(A2)          555|
      RTH-v>    ^ ^ ^      v--LT  1   |e.LT capacity on  :  0    0    0    0|B4B3    30(B4)   30-  30=   0(B3)    30|
   1  RT--v    < < | > >   Approach 2 |  green (vph)     :                  |A4B3     0(B3)  190-   0= 190(A4)     0|
------------- L L T R R  -------------|f.LT capacity in  :  0    0    0    0|A3A4   670(A3) OR  190(A4)          670|
              | T T H T T |JACKSON HWY |  vph (b+e)       :                  |                                    |
              |   H   H  |            |g.Left turn volume :  0    0    0    0|                                    |
              | 1  2  1 |             |  in vph          :                  |                                    |
              | Approach 4:EXCELSIOR RD |h.Is volume > cap. :                :                                    |
                                      |  (g>f) ?         :                  |                                    |
======================================+=======================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph   | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |        |                    |       |                                     |
                                      |        |  6 6               |       |180(B2B1)+555(A1)+30(B4B3)+670(A3)   |
              | Approach 3|           |-------  3 7 7 3             -------|                                     |
 3:  LT=  30  | |          | 2:RT=  30 |         0 0 0 0              ^-  30 |          = 1435 vph                 |
    TH=1340   | |          |   TH= 340 |         | | | |              <- 170 |=====================================|
    RT=  30   | v          |   LT= 180 |         < v v >              <- 170 | Step 8. INTERSECTION LEVEL OF       |
-------------              -------------|                               v- 180 |        SERVICE                      |
                           <--Approach 2 |                                     |    (compare step 7 with table 6)    |
                                      |                                       |             -------                 |
                                      |                                       |             |  F  |                 |
 Approach 1-->                        | 80 -^                                 |             -------                 |
-------------              -------------| 555 ->              < ^ ^ >          |=====================================|
 1:LT=  80    |          ^ | 4: RT= 200 | 555 ->              | | | |          | Step 9. RECALCULATE                 |
   TH=1110    |          | |   TH= 380 | 130 -v                                |                                     |
   RT= 130    |          | |   LT=  30 |-------               1 1 2   -------|Geometric Change:                    |
              | Approach 4|           |        |            3 9 9 0 |         |Signal Change:                       |
                                      |        |            0 0 0 0 |         |Volume Change:                       |
======================================+=======================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph     | COMMENTS                            |
                                      |          (two phase signal)           |                                     |
       --^ v--  B2B1                  |            | Approach 3|              |                                     |
                                      |            |           |              |                                     |
    --^ AND <--    A1B2 AND           |            |           |              |                                     |
    --> OR  v--    /OR A2B1           |            |           |              |                                     |
       --> <--  A1A2                  |-------------           -------------|                                     |
                                      | Approach 1                            |                                     |
        |   <   B4B3                  |                                       |                                     |
        >   |                         |          See Step 6b.                 |                                     |
    | | AND < ^    A3B4 AND           |                                       |                                     |
    v > OR  | |    /OR A4B3           |                          Approach 2   |                                     |
        |   ^   A3A4                  |-------------           -------------|                                     |
        v   |                         |            |           |              |                                     |
--------------------------------------|            |           |              |                                     |
 A1 -->   A3 |      B1 v--    B3   <| |            |           |              |                                     |
            v ^                   | | |            | Approach 4|              | Exclusive right turns reduced  30 % |
 A2 <--   A4  |     B2 --^    B4 |>   |                                       | V/C Ratio = 1.04                    |
===============================================================================================
```

ATTACHMENT 5E

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
'ntersection: ELDER CREEK RD AND BRADSHAW RD                          Design Hour: AM
'roblem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
=======================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK           | Step 6b. VOLUME ADJUSTMENT FOR      |
             | Approach 3:BRADSHAW RD   |          -------Approach-----|        MULTIPHASE SIGNAL OVERLAP     |
             | 1   3   2 |     ^        |          : -1-  -2-  -3-  -4-|       Possible   Volume     Adjusted|
             |   R   L   |     N        |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |              | intervals/hour  :                 |able   Volume   to next    Volume |
------------  T H H H T  ------------- |b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1   < < | > >   ^--RT  1      | change (vph)    :                 |--------------------------------------|
   2  LT--^     v v v    <^-RTH         |c.G/C ratio      :  0    0    0    0|B2B1     6(B1)  171-   6= 165(B2)    6|
      LTH-^>             <--TH   2      |d.Opposing volume :  0    0    0    0|A1B2   165(B2)  120- 165=   0(A1)   165|
   2   TH-->             <v-LTH         | in vph          :                 |A1A2   165(A2) OR   0(A1)          165|
      RTH-v>    ^ ^ ^     v--LT  2      |e.LT capacity on :  0    0    0    0|B4B3     6(B4)  622-   6= 616(B3)    6|
   2  RT--v   < < | > >   Approach 2    | green (vph)     :                 |A4B3   616(B3)  910- 616= 294(A4)   616|
------------  L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   310(A3) OR  294(A4)          310|
             | T T H T T |ELDER CREEK R| vph (b+e)       :                 |                                      |
             |   H   H   |              |g.Left turn volume :  0    0    0    0|                                      |
             | 2   3   1 |              | in vph          :                 |                                      |
             | Approach 4:BRADSHAW RD   |h.Is volume > cap. :               :                                      |
                                        | (g>f) ?         :                 |                                      |
=======================================+===================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES     |
                                        |        |                  |       |                                      |
                                        |        | 2 3 3 3          |       |171(B1B2)+165(A2)+622(B4B3)+310(A3)   |
             | Approach 3|              |-------   3 1 1 1          -------|                                      |
 3:  LT=  10 | |         | 2:RT= 130    |        0 0 0 0 5 6       ^- 130 |          = 1268 vph                  |
   TH= 930   | |         |   TH= 330    |        | | | | | |       <- 165 |======================================|
   RT= 230   | v         |   LT=  10    |        < v v v > >       <- 165 | Step 8. INTERSECTION LEVEL OF        |
------------              -------------|                          v-   5 |         SERVICE                      |
                          <--Approach 2 |                          v-   6 |     (compare step 7 with table 6)    |
                                        | 171 -^                          |             -------                  |
                                        | 140 -^                          |             |  E  |                |
 Approach 1-->                          | 120 ->                          |             -------                  |
 -----------              -------------| 120 ->          < < ^ ^ ^ >     |======================================|
 1:LT= 310   |           ^ | 4: RT= 110 |  15 -v          | | | | | |     | Step 9. RECALCULATE                  |
   TH= 240   |           | |   TH=2730  |  15 -v                          |                                      |
   RT=  30   |           | |   LT=1130  |-------          6 5 9 9 9 1 -------|Geometric Change:                    |
             | Approach 4|              |        |        2 0 1 1 1 1 |     |Signal Change:                        |
                                        |        |        2 9 0 0 0 0 |     |Volume Change:                        |
=======================================+===================================+======================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                             |
                                        |       (two phase signal)         |                                      |
        --^ v--  B2B1                   |           | Approach 3|          |                                      |
                                        |           |           |          |                                      |
    --^ AND <--     A1B2 AND            |           |           |          |                                      |
    --> OR  v--     /OR A2B1            |           |           |          |                                      |
        --> <--  A1A2                   |------------           ------------|                                      |
                                        | Approach 1                        |                                      |
         |  <    B4B3                   |                                   |                                      |
         >  |                           |          See Step 6b.             |                                      |
    | | AND < ^     A3B4 AND            |                                   |                                      |
    v > OR  | |     /OR A4B3            |                      Approach 2   |                                      |
         |  ^    A3A4                   |------------           ------------|                                      |
         v  |                           |           |           |          |                                      |
----------------------------------------|           |           |          |                                      |
 A1 -->   A3 |     B1 v--    B3   <|    |           |           |          |                                      |
            v ^                   | |   |           | Approach 4|          | Exclusive right turns reduced  30 %  |
 A2 <--   A4  |    B2 --^    B4 |>      |                                   | V/C Ratio = .92                      |
=======================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
Intersection: ELDER CREEK RD AND BRADSHAW RD                          Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
==========================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR       |
             | Approach 3:BRADSHAW RD  |               -------Approach-----|      MULTIPHASE SIGNAL OVERLAP       |
             | 1   3   2 |      ^      |               : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
             |   R   L   |      N      |a.No. of change  :  0    0    0    0|Prob-   Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |             |  intervals/hour :                   |able    Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0    0    0    0|Phase   in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT  1     |  change (vph)   :                   |--------------------------------------|
   2  LT--^     v v v    <^-RTH        |c.G/C ratio      :  0    0    0    0|B2B1    50(B1)  149-  50=  99(B2)   50|
      LTH-^>             <--TH   2     |d.Opposing volume:  0    0    0    0|A1B2    99(B2)  357-  99= 258(A1)   99|
   2   TH-->             <v-LTH        |  in vph         :                   |A1A2   258(A1) OR  165(A2)          258|
      RTH-v>    ^ ^ ^     v--LT  2     |e.LT capacity on :  0    0    0    0|B4B3    11(B4)   55-  11=  44(B3)   11|
   2  RT--v   < < | > >   Approach 2   |  green (vph)    :                   |A4B3    44(B3)  530-  44= 486(A4)   44|
------------- L L T R R  -------------|f.LT capacity in :  0    0    0    0|A3A4   970(A3) OR  486(A4)          970|
             | T T H T T |ELDER CREEK R|  vph (b+e)      :                   |                                      |
             |   H   H   |             |g.Left turn volume:  0    0    0    0|                                      |
             | 2   3   1 |             |  in vph         :                   |                                      |
             | Approach 4:BRADSHAW RD  |h.Is volume > cap. :                 :|                                      |
                                       |  (g>f) ?        :                   |                                      |
=======================================+====================================+======================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES      |
                                       |        |                     |      |                                      |
                                       |        | 2 9 9 9             |      |149(B1B2)+258(A1)+55(B4B3)+970(A3)    |
             | Approach 3|             |-------  8 7 7 7   1          -------|                                      |
 3:  LT=  20 | |         | 2:RT=  10   |         0 0 0 0 9 1          ^-  10 |           = 1432 vph                 |
   TH=2910   | |         |   TH= 330   |         | | | | | |          <- 165 |======================================|
   RT= 280   | v         |   LT=  90   |         < v v v > >          <- 165 | Step 8. INTERSECTION LEVEL OF        |
-------------             -------------|                              v-  41 |        SERVICE                       |
                          <--Approach 2|                              v-  50 |    (compare step 7 with table 6)     |
                                       | 149 -^                              |               -------                |
                                       | 122 -^                              |               |  F  |                |
 Approach 1-->                         | 180 ->                              |               -------                |
-------------             -------------| 180 ->            < < ^ ^ ^ >       |======================================|
 1:LT= 270   |          ^ | 4: RT=  30 | 510 -v            | | | | | |       | Step 9. RECALCULATE                  |
   TH= 360   |          | |   TH=1590  | 510 -v                              |                                      |
   RT=1020   |          | |   LT= 100  |-------                 5 5 5  -------|Geometric Change:                     |
             | Approach 4|             |        |         5 4 3 3 3 3 |      |Signal Change:                        |
                                       |        |         5 5 0 0 0 0 |      |Volume Change:                        |
=======================================+====================================+======================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                             |
                                       |         (two phase signal)          |                                      |
         --^ v--   B2B1                |            | Approach 3|            |                                      |
                                       |            |           |            |                                      |
     --^ AND <--     A1B2 AND          |            |           |            |                                      |
     --> OR  v--     /OR A2B1          |            |           |            |                                      |
         --> <--   A1A2                |-------------           -------------|                                      |
                                       | Approach 1                          |                                      |
          |   <    B4B3                |                                     |                                      |
          >   |                        |           See Step 6b.              |                                      |
     | | AND < ^     A3B4 AND          |                                     |                                      |
     v > OR  | |     /OR A4B3          |                         Approach 2  |                                      |
          |   ^    A3A4                |-------------           -------------|                                      |
          v   |                        |            |           |            |                                      |
---------------------------------------|            |           |            |                                      |
 A1 -->   A3 |      B1 v--    B3   <|  |            |           |            |                                      |
            v ^                    | | |            | Approach 4|            | Exclusive right turns reduced  30 %  |
 A2 <--   A4 |      B2 --^    B4 |>    |                                     | V/C Ratio = 1.04                     |
==========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                      Calculation Form 1
'ntersection: ELDER CREEK RD AND EXCELSIOR RD                                  Design Hour: AM
'roblem Statement: CUMULATIVE PLUS PROJECT  (MITIGATED)
==========================================================================================
Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR  |
            | Approach 3:EXCELSIOR RD |             -------Approach-----|      MULTIPHASE SIGNAL OVERLAP   |
            | 1  2     |     ^        |                 : -1- -2- -3- -4-|    Possible   Volume    Adjusted|
            |  R   L   |     N        |a.No. of change  :  0   0   0   0|Prob- Critical Carryover Critical|
ELDER CREEK R| R T T T L |            | intervals/hour  :                |able  Volume   to next   Volume |
------------ T H H H T  --------------|b.LT capacity on :  0   0   0   0|Phase in vph   phase     in vph |
 Approach 1  < < | > >   ^--RT        | change (vph)    :                |---------------------------------|
  1 LT--^      v v v     <^-RTH       |c.G/C ratio      :  0   0   1   0|A4B3  160(B3) 640- 160= 480(A4) 160|
   LTH-^>                <--TH        |d.Opposing volume:  0  10 1280  0|A3A4  480(A4) OR  210(A3)       480|
    TH-->                <v-LTH       | in vph          :                |A1B2  360(B2) OR    7(A1)       360|
   RTH-v>      ^ ^ ^      v--LT       |e.LT capacity on :  0   0   0   0|                                 |
  1 RT--v    < < | > >   Approach 2   | green (vph)     :                |                                 |
------------ L L T R R  --------------|f.LT capacity in :  0   0   0   0|                                 |
            | T T H T T |ELDER CREEK R| vph (b+e)       :                |                                 |
            |  H   H   |              |g.Left turn volume: 0   0   0   0|                                 |
            | 1  2     |              | in vph          :                |                                 |
            | Approach 4:.            |h.Is volume > cap.:     NO  NO   :                                 |
                                      | (g>f) ?         :                |                                 |
======================================+=================================+=================================|
Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                      |        |                 |      |                                 |
                                      |        | 3               |      |640(B3A4)+360(B2)+0()+0()        |
            | Approach 3|             |-------  0 5 5           -------|                                 |
3:  LT=   0 | |          | 2:RT=   0  |         0 0 0                  |        = 1000 vph               |
   TH= 100  | |          |   TH=   0  |         | | |                  |=================================|
   RT= 300  | v          |   LT=   0  |         < v v                  | Step 8. INTERSECTION LEVEL OF   |
-------------             -------------|                                |         SERVICE                 |
                          <--Approach 2|                                |   (compare step 7 with table 6) |
                                      |                                 |            -------              |
                                      |                                 |            | B |                |
Approach 1-->                         |                                 |            -------              |
-------------             -------------|                   < ^ ^        |=================================|
1:LT= 360   |            ^ | 4: RT=   0 | 360 -^            | | |        | Step 9. RECALCULATE             |
  TH=   0   |            | |   TH=1280 |  10 -v                          |                                 |
  RT=  10   |            | |   LT= 160 |-------            1 6 6 -------|Geometric Change:                |
            | Approach 4|             |       |            6 4 4 |      |Signal Change:                   |
                                      |       |            0 0 0 |      |Volume Change:                   |
======================================+=================================+=================================|
Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                      |
                                      |        (two phase signal)        |                                 |
      <   ^    A4B3                   |           | Approach 3|          |                                 |
      |   |                           |           |           |          |                                 |
      |   ^    A3A4                   |           |           |          |                                 |
      v   |                           |           |           |          |                                 |
     --^       A1B2                   |-------------          -----------|                                 |
     -->                              | Approach 1                       |                                 |
                                      |                                  |                                 |
                                      |          See Step 6b.            |                                 |
                                      |                                  |                                 |
                                      |                     Approach 2   |                                 |
                                      |-------------         ------------|                                 |
                                      |           |           |          |                                 |
--------------------------------------|           |           |          |                                 |
A1 -->   A3 |     B1 v--    B3    <|  |           |           |          |                                 |
           v ^                   | |  |           | Approach 4|          | Exclusive right turns reduced 30 % |
A2 <--   A4  |    B2 --^    B4 |>     |                                  | V/C Ratio = .715                |
==========================================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                     Calculation Form 1
Intersection: ELDER CREEK RD AND EXCELSIOR RD                              Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY        | Step 4. LEFT TURN CHECK          | Step 6b. VOLUME ADJUSTMENT FOR    |
             | Approach 3:EXCELSIOR RD |           -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
             | 1   2     |      ^      |                 : -1- -2- -3- -4-|      Possible   Volume    Adjusted|
             |   R   L   |      N      |a.No. of change  :  0   0   0   0|Prob-  Critical  Carryover  Critical|
ELDER CREEK R| R T T T L |             |  intervals/hour :               |able   Volume    to next    Volume |
------------- T H H H T  -------------|b.LT capacity on :  0   0   0   0|Phase  in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT        | change (vph)    :               |-----------------------------------|
   1  LT--^     v v v    <^-RTH        |c.G/C ratio      :  0   0   1   0|A4B3   20(B3)  130-  20= 110(A4)  20|
     LTH-^>              <--TH         |d.Opposing volume:  0 420 260   0|A3A4  615(A3) OR  110(A4)        615|
      TH-->              <v-LTH        | in vph          :               |A1B2  350(B2) OR  294(A1)        350|
     RTH-v>     ^ ^ ^     v--LT        |e.LT capacity on :  0   0 940   0|                                   |
   1  RT--v   < < | > >  Approach 2    | green (vph)     :               |                                   |
------------- L L T R R  -------------|f.LT capacity in :  0   0 940   0|                                   |
             | T T H T T |ELDER CREEK R| vph (b+e)       :               |                                   |
             |   H   H   |             |g.Left turn volume:  0   0   0  0|                                   |
             | 1   2     |             | in vph          :               |                                   |
             | Approach 4:.            |h.Is volume > cap.:     NO  NO   :|                                   |
                                       | (g>f) ?         :               |                                   |
=======================================+=================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph      | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                       |       |                    |    |                                   |
                                       |       |  6 6               |    |635(B3A3)+350(B2)+0()+0()          |
             | Approach 3|             |-------  3 1 1          -------  |                                   |
 3:  LT=   0 | |         | 2:RT=   0   |         0 5 5                   |          = 985 vph                |
    TH=1230  | |         |   TH=   0   |         | | |                   |===================================|
    RT=  30  | v         |   LT=   0   |         < v v                   | Step 8. INTERSECTION LEVEL OF     |
-------------            -------------|                                  |         SERVICE                   |
                        <--Approach 2  |                                 |   (compare step 7 with table 6)   |
                                       |                                 |            -------                |
                                       |                                 |            | B |                |
 Approach 1-->                         |                                 |            -------                |
-------------            -------------|                        < ^ ^    |===================================|
 1:LT= 350   |         ^ | 4: RT=   0  | 350 -^                 | | |    | Step 9. RECALCULATE               |
   TH=   0   |         | |   TH= 260   | 420 -v                          |                                   |
   RT= 420   |         | |   LT=  20   |-------                 1 1 -------|Geometric Change:                 |
             | Approach 4|             |       |               2 3 3 |   |Signal Change:                     |
                                       |       |               0 0 0 |   |Volume Change:                     |
=======================================+=================================+===================================|
 Step 3. IDENTIFY PHASING              | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                       |        (two phase signal)       |                                   |
         <   ^    A4B3                 |           | Approach 3|         |                                   |
         |   |                         |           |           |         |                                   |
         |   ^    A3A4                 |           |           |         |                                   |
         v   |                         |           |           |         |                                   |
        --^       A1B2                 |-------------           ---------|                                   |
        -->                            | Approach 1                      |                                   |
                                       |                                 |                                   |
                                       |          See Step 6b.           |                                   |
                                       |                                 |                                   |
                                       |                     Approach 2  |                                   |
                                       |-------------         -----------|                                   |
                                       |           |           |         |                                   |
---------------------------------------|           |           |         |                                   |
 A1 -->   A3 |     B1 v--    B3   <|   |           |           |         |                                   |
            v ^                   | |  |           | Approach 4|         | Exclusive right turns reduced 30 %|
 A2 <--   A4 |     B2 --^    B4 |>     |                                 | V/C Ratio = .692                  |
================================================================================================
```

```
                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                                          Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
==============================================================================================
 Step 1. IDENTIFY LANE GEOMETRY       | Step 4. LEFT TURN CHECK             | Step 6b. VOLUME ADJUSTMENT FOR      |
            | Approach 3:BRADSHAW RD  |                  -------Approach-----|       MULTIPHASE SIGNAL OVERLAP     |
            | 1   3   2 |      ^      |                  : -1-  -2-  -3-  -4-|      Possible   Volume    Adjusted|
            |  R   L    |      N      |a.No. of change   :   0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |             |  intervals/hour  :                   |able   Volume    to next    Volume |
------------  T H H H T  -------------|b.LT capacity on  :   0    0    0    0|Phase  in vph     phase     in vph |
 Approach 1   < < | > >   ^--RT  2    |  change (vph)    :                   |-------------------------------------|
  2  LT--^     v v v     <^-RTH       |c.G/C ratio       :   0    0    0    0|B2B1    17(B1)  413-  17= 396(B2)  17|
     LTH-^>              <--TH   3    |d.Opposing volume :   0    0    0    0|A1B2   396(B2)   63- 396=   0(A1) 396|
  3   TH-->              <v-LTH       |  in vph          :                   |A1A2   337(A2) OR    0(A1)        337|
     RTH-v>    ^ ^ ^      v--LT  2    |e.LT capacity on  :   0    0    0    0|B4B3     6(B4)  440-   6= 434(B3)   6|
  1  RT--v    < < | > >   Approach 2  |  green (vph)     :                   |A4B3   434(B3)  827- 434= 393(A4) 434|
------------  L L T R R  -------------|f.LT capacity in  :   0    0    0    0|A3A4   393(A4) OR  237(A3)        393|
            | T T H T T |FLORIN RD    |  vph (b+e)       :                   |                                     |
            |   H   H   |             |g.Left turn volume:   0    0    0    0|                                     |
            | 2   3   1 |             |  in vph          :                   |                                     |
            | Approach 4:BRADSHAW RD  |h.Is volume > cap.:                   :                                     |
                                      |  (g>f) ?         :                   |                                     |
======================================+======================================+=====================================|
 Step 2. IDENTIFY VOLUMES, in vph     | Step 5. ASSIGN LANE VOLUMES, in vph  | Step 7. SUM OF CRITICAL VOLUMES     |
                                      |        |                       |     |                                     |
                                      |        | 2 2 2 2               |     |413(B1B2)+337(A2)+440(B4B3)+393(A4)  |
            | Approach 3|             |-------  6 3 3 3                 -------|                                     |
 3:  LT=  10 | |        | 2:RT= 720   |         0 7 7 7 5 6         ^- 360 |          = 1583 vph                 |
    TH= 710  | |        |   TH=1010   |         | | | | | |         ^- 360 |=====================================|
   RT= 260   | v        |   LT=  30   |         < v v v > >         <- 337 | Step 8. INTERSECTION LEVEL OF       |
-------------            -------------|                             <- 337 |         SERVICE                     |
                         <--Approach 2|                             <- 337 |     (compare step 7 with table 6)   |
                                      | 413 -^                      v-  14 |             -------                 |
                                      | 338 -^                      v-  17 |             | F |                   |
 Approach 1-->                        |  63 ->                             |             -------                 |
------------              ------------|  63 ->          < < ^ ^ ^ >        |=====================================|
 1:LT= 750  |            ^ | 4: RT= 400|  63 ->          | | | | | |        | Step 9. RECALCULATE                 |
   TH= 190  |            | |    TH=2480|  70 -v                             |                                     |
   RT=  70  |            | |   LT= 800 |-------          4 3 8 8 8 4 -------|Geometric Change:                    |
            | Approach 4|             |        |        4 6 2 2 2 0 |       |Signal Change:                        |
                                      |        |        0 0 7 7 7 0 |       |Volume Change:                        |
======================================+======================================+=====================================|
 Step 3. IDENTIFY PHASING             | Step 6a. CRITICAL VOLUMES, in vph    | COMMENTS                            |
                                      |        (two phase signal)            |                                     |
        --^ v--   B2B1                |           | Approach 3|              |                                     |
                                      |           |           |              |                                     |
    --^ AND <--      A1B2 AND         |           |           |              |                                     |
    --> OR  v--      /OR A2B1         |           |           |              |                                     |
        --> <--   A1A2                |-----------             ------------  |                                     |
                                      | Approach 1                           |                                     |
         |   <    B4B3                |                                      |                                     |
         >   |                        |          See Step 6b.                |                                     |
    | | AND < ^      A3B4 AND         |                                      |                                     |
    v > OR  | |      /OR A4B3         |                         Approach 2   |                                     |
         |   ^    A3A4                |-----------             ------------  |                                     |
         v   |                        |           |           |              |                                     |
--------------------------------------|           |           |              |                                     |
 1 -->   A3 |      B1 v--     B3  <|  |           |           |              |                                     |
           v ^                     | ||           |           |              |                                     |
A2 <--   A4  |     B2 --^     B4 |>   |           | Approach 4|              | Exclusive right turns reduced 30 %  |
                                      |                                      | V/C Ratio = 1.15                    |
==============================================================================================
```

```
                     Critical Movement Analysis: PLANNING
                            Calculation Form 1
Intersection: FLORIN RD AND BRADSHAW RD                        Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
===============================================================================
 Step 1. IDENTIFY LANE GEOMETRY  | Step 4. LEFT TURN CHECK        | Step 6b. VOLUME ADJUSTMENT FOR |
           | Approach 3:BRADSHAW RD |             -------Approach-----|      MULTIPHASE SIGNAL OVERLAP  |
           | 1  3  2 |     ^      |                : -1-  -2-  -3-  -4-|    Possible    Volume    Adjusted|
           |  R  L   |     N      |a.No. of change :  0    0    0    0|Prob- Critical Carryover Critical|
FLORIN RD  | R T T T L |          | intervals/hour :                  |able   Volume   to next    Volume |
-------------  T H H H T  ------------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase     in vph |
 Approach 1  < < | > >   ^--RT  2 | change (vph)   :                  |---------------------------------|
  2  LT--^    v v v     <^-RTH    |c.G/C ratio     :  0    0    0    0|B2B1  165(B2)  193- 165=  28(B1)  165|
     LTH-^>             <--TH   3 |d.Opposing volume :  0    0    0    0|A2B1   28(B1)  103-  28=  75(A2)   28|
  3   TH-->             <v-LTH    | in vph         :                  |A1A2  476(A1) OR   75(A2)         476|
     RTH-v>    ^ ^ ^    v--LT  2  |e.LT capacity on :  0    0    0    0|B4B3   72(B3)  385-  72= 313(B4)   72|
  1  RT--v   < < | > >  Approach 2 | green (vph)    :                  |A3B4  313(B4)  850- 313= 537(A3)  313|
-------------  L L T R R  ------------|f.LT capacity in :  0    0    0    0|A3A4  537(A3) OR  407(A4)         537|
           | T T H T T |FLORIN RD  | vph (b+e)      :                  |                                 |
           |  H   H    |           |g.Left turn volume :  0    0    0    0|                                 |
           | 2  3  1   |           | in vph         :                  |                                 |
           | Approach 4:BRADSHAW RD |h.Is volume > cap. :                 :                                 |
                                  | (g>f) ?        :                  |                                 |
===============================================================================
 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                  |        |                    |      |                                 |
                                  |        | 7 8 8 8 3 3        |      |193(B2B1)+476(A1)+385(B3B4)+537(A3)|
           | Approach 3|          |-------  7 5 5 5 1 8         -------|                                 |
3:  LT= 700 | |        | 2:RT= 200 |        0 0 0 0 5 5         ^- 100 |         = 1591 vph              |
   TH=2550 | |         |   TH= 310 |        | | | | | |         ^- 100 |=================================|
   RT= 770 | v         |   LT= 350 |        < v v v > >         <- 103 | Step 8. INTERSECTION LEVEL OF   |
-------------             ------------|                            <- 103 |         SERVICE                 |
                   <--Approach 2  |                            <- 103 |   (compare step 7 with table 6) |
                                  | 165 -^                     v- 158 |            -------              |
                                  | 135 -^                     v- 193 |            |  F  |             |
 Approach 1-->                    | 343 ->                            |            -------              |
-------------             ------------| 343 ->         < < ^ ^ ^ >        |=================================|
1:LT= 300  |          ^ | 4: RT=  40 | 343 ->         | | | | | |        | Step 9. RECALCULATE             |
  TH=1030  |          | |   TH=1220 | 680 -v                            |                                 |
  RT= 680  |          | |   LT= 130 |-------           4 4 4    -------|Geometric Change:                |
           | Approach 4|          |        |      7 5 0 0 0 4 |       |Signal Change:                   |
                                  |        |      2 9 7 7 7 0 |       |Volume Change:                   |
===============================================================================
 Step 3. IDENTIFY PHASING         | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                  |       (two phase signal)          |                                 |
      --^ v--  B2B1               |           | Approach 3|           |                                 |
                                  |           |           |           |                                 |
   --^ AND <--    A1B2 AND        |           |           |           |                                 |
   --> OR  v--    /OR A2B1        |           |           |           |                                 |
      --> <--  A1A2               |-------------           -----------|                                 |
                                  | Approach 1                        |                                 |
       |  <    B4B3               |                                   |                                 |
       >  |                       |           See Step 6b.            |                                 |
   | | AND < ^    A3B4 AND        |                                   |                                 |
   v > OR  | |    /OR A4B3        |                        Approach 2 |                                 |
       |  ^    A3A4               |-------------            ----------|                                 |
       v  |                       |           |           |           |                                 |
----------------------------------|           |           |           |                                 |
A1 -->  A3 |     B1 v--   B3  <|  |           |           |           |                                 |
          v ^                 | | |           | Approach 4|           | Exclusive right turns reduced 30 % |
A2 <--  A4  |    B2 --^   B4 |>   |                                   | V/C Ratio = 1.16                |
===============================================================================
```

```
                              Critical Movement Analysis: PLANNING
                                       Calculation Form 1
Intersection: FLORIN RD AND EXCELSIOR RD                                  Design Hour: AM
Problem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
==================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY   | Step 4. LEFT TURN CHECK         | Step 6b. VOLUME ADJUSTMENT FOR   |
            | Approach 3:EXCELSIOR RD |             -------Approach-----|        MULTIPHASE SIGNAL OVERLAP  |
            | 1   1   1 |     ^   |                 : -1-  -2-  -3-  -4-|    Possible    Volume    Adjusted|
            |  R   L    |     N   |a.No. of change  :  0    0    0    0|Prob-  Critical  Carryover  Critical|
FLORIN RD   | R T T T L |         | intervals/hour  :                 |able   Volume    to next    Volume |
------------ T H H H T  ----------|b.LT capacity on :  0    0    0    0|Phase  in vph    phase      in vph |
 Approach 1  < < | > >  ^--RT  1  | change (vph)    :                 |-----------------------------------|
  2  LT--^    v v v    <^-RTH     |c.G/C ratio      :  0    0    0    0|B2B1    50(B1)  336-  50= 286(B2)  50|
     LTH-^>            <--TH   2  |d.Opposing volume:  0    0    0    0|A1B2   286(B2)  425- 286= 139(A1) 286|
  2  TH-->             <v-LTH     | in vph          :                 |A1A2   290(A2) OR  139(A1)       290|
     RTH-v>   ^ ^ ^    v--LT   1  |e.LT capacity on :  0    0    0    0|B4B3    10(B4)   30-  10=  20(B3)  10|
  1  RT--v   < < | > >  Approach 2| green (vph)     :                 |A4B3    20(B3)  405-  20= 385(A4)  20|
------------ L L T R R -----------|f.LT capacity in :  0    0    0    0|A3A4   385(A4) OR   50(A3)       385|
            | T T H T T |FLORIN RD| vph (b+e)       :                 |                                   |
            |   H   H   |         |g.Left turn volume: 0    0    0    0|                                   |
            | 1   2   1 |         | in vph          :                 |                                   |
            | Approach 4:EXCELSIOR RD |h.Is volume > cap. :           :                                   |
                                  | (g>f) ?         :                 |                                   |
==================================+=================================+===================================|
 Step 2. IDENTIFY VOLUMES, in vph | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES |
                                  |       |                 |       |                                   |
                                  |       |                 |       |336(B1B2)+290(A2)+30(B4B3)+385(A4)  |
           | Approach 3|          |-------  5 5 1            -------|                                   |
 3:  LT=  10 | |        | 2:RT=  20|        0 0 0            ^-  20 |         = 1041 vph                |
    TH=  50 | |        |   TH= 580|        | | |            <- 290 |===================================|
    RT=  50 | v        |   LT=  50|        < v >            <- 290 | Step 8. INTERSECTION LEVEL OF     |
-------------          -----------|                         v-  50 |        SERVICE                    |
                      <--Approach 2|                                |     (compare step 7 with table 6) |
                                  |                                 |            -------                |
                                  | 336 -^                          |            |  C  |              |
 Approach 1-->                    | 275 -^                          |            -------                |
------------           -----------| 425 ->            < ^ ^ >       |===================================|
 1:LT= 610  |          ^ | 4: RT= 110| 425 ->          | | | |       | Step 9. RECALCULATE               |
   TH= 850  |          | |    TH= 810| 10 -v                         |                                   |
   RT=  10  |          | |    LT=  30|-------           4 4 1 -------|Geometric Change:                  |
            | Approach 4|         |       |         3 0 0 1 |       |Signal Change:                     |
                                  |       |         0 5 5 0 |       |Volume Change:                     |
==================================+=================================+===================================|
 Step 3. IDENTIFY PHASING         | Step 6a. CRITICAL VOLUMES, in vph | COMMENTS                        |
                                  |        (two phase signal)       |                                   |
       --^ v--  B2B1              |          | Approach 3|          |                                   |
                                  |          |           |          |                                   |
    --^ AND <--    A1B2 AND       |          |           |          |                                   |
    --> OR  v--    /OR A2B1       |          |           |          |                                   |
       --> <--  A1A2              |------------           ------------|                                 |
                                  | Approach 1                      |                                   |
        |  <   B4B3               |                                 |                                   |
        >  |                      |        See Step 6b.             |                                   |
    | | AND < ^    A3B4 AND       |                                 |                                   |
    v > OR  | |    /OR A4B3       |                      Approach 2 |                                   |
        |  ^   A3A4               |------------           ------------|                                 |
        v  |                      |          |           |          |                                   |
----------------------------------|          |           |          |                                   |
 A1 -->   A3 |    B1 v--    B3  <| |          |           |          |                                  |
            v ^                | | |          |           |          |                                  |
 A2 <--   A4  |   B2 --^    B4 |> |          | Approach 4|          | Exclusive right turns reduced  30 % |
                                  |                                 | V/C Ratio = .76                   |
==================================================================================================
```

```
                                   Critical Movement Analysis: PLANNING
                                           Calculation Form 1
Intersection: FLORIN RD AND EXCELSIOR RD                                     Design Hour: PM
Problem Statement: CUMULATIVE PLUS PROJECT (MITIGATED)
==========================================================================================================
 Step 1. IDENTIFY LANE GEOMETRY         | Step 4. LEFT TURN CHECK              | Step 6b. VOLUME ADJUSTMENT FOR        |
              | Approach 3:EXCELSIOR RD |              -------Approach-----|         MULTIPHASE SIGNAL OVERLAP     |
              | 1   1   1 |       ^     |                : -1-  -2-  -3-  -4-|        Possible   Volume    Adjusted|
              |  R   L    |       N     |a.No. of change :  0    0    0    0|Prob-   Critical  Carryover  Critical|
FLORIN RD     | R T T T L |             |  intervals/hour :                 |able     Volume    to next    Volume |
------------- T H H H T   ------------- |b.LT capacity on :  0    0    0    0|Phase    in vph     phase     in vph |
  Approach 1  < < | > >   ^--RT  1      |  change (vph)   :                 |---------------------------------------|
   2  LT--^     v v v     <^-RTH        |c.G/C ratio      :  0    0    0    0|B2B1    66(B2)  210-  66= 144(B1)    66|
      LTH-^>              <--TH   2     |d.Opposing volume:  0    0    0    0|A2B1   144(B1)  305- 144= 161(A2)   144|
   2   TH-->              <v-LTH        |  in vph         :                 |A1A2   265(A1) OR  161(A2)           265|
      RTH-v>    ^ ^ ^     v--LT   1     |e.LT capacity on :  0    0    0    0|B4B3    10(B4)   20-  10=  10(B3)    10|
   1  RT--v   < < | > >   Approach 2    |  green (vph)    :                 |A4B3    10(B3)   70-  10=  60(A4)    10|
------------- L L T R R   ------------- |f.LT capacity in :  0    0    0    0|A3A4   610(A3) OR   60(A4)           610|
              | T T H T T |FLORIN RD    |  vph (b+e)      :                 |                                       |
              |   H   H   |             |g.Left turn volume: 0    0    0    0|                                       |
              | 1   2   1 |             |  in vph         :                 |                                       |
              | Approach 4:EXCELSIOR RD |h.Is volume > cap. :               :                                       |
                                        |  (g>f) ?        :                 |                                       |
========================================+===================================+=======================================|
 Step 2. IDENTIFY VOLUMES, in vph       | Step 5. ASSIGN LANE VOLUMES, in vph | Step 7. SUM OF CRITICAL VOLUMES       |
                                        |       |                    |      |                                       |
                                        |       | 6 6                |      |210(B2B1)+265(A1)+20(B4B3)+610(A3)     |
              | Approach 3|             |-------  4 1 1               -------|                                       |
 3:  LT=  10  | |          | 2:RT=  10  |         0 0 0               ^-  10 |           = 1105 vph                  |
    TH= 610   | |          |   TH= 610  |         | | |               <- 305 |=======================================|
    RT= 640   | v          |   LT= 210  |         < v >               <- 305 | Step 8. INTERSECTION LEVEL OF         |
-------------              -------------|                             v- 210 |         SERVICE                       |
                         <--Approach 2  |                                    |     (compare step 7 with table 6)     |
                                        |                                    |              -------                  |
                                        |   66 -^                            |              | D |                    |
 Approach 1-->                          |   54 -^                            |              -------                  |
-------------              -------------|  265 ->          < ^ ^ >           |=======================================|
 1:LT= 120    |           ^ | 4: RT=  50|  265 ->          | | | |           | Step 9. RECALCULATE                   |
   TH= 530    |           | |   TH= 140 |   30 -v                            |                                       |
   RT=  30    |           | |   LT=  20 |-------                      -------|Geometric Change:                      |
              | Approach 4|             |       |          2 7 7 5 |         |Signal Change:                         |
                                        |       |          0 0 0 0 |         |Volume Change:                         |
========================================+====================================+=======================================|
 Step 3. IDENTIFY PHASING               | Step 6a. CRITICAL VOLUMES, in vph  | COMMENTS                              |
                                        |         (two phase signal)         |                                       |
        --^ v--   B2B1                  |             | Approach 3|          |                                       |
                                        |             |           |          |                                       |
    --^ AND <--     A1B2 AND            |             |           |          |                                       |
    --> OR  v--     /OR A2B1            |             |           |          |                                       |
        --> <--   A1A2                  |-------------             ------------|                                     |
                                        | Approach 1                         |                                       |
         |  <     B4B3                  |                                    |                                       |
         >  |                           |          See Step 6b.              |                                       |
    | | AND < ^     A3B4 AND            |                                    |                                       |
    v > OR  | |     /OR A4B3            |                        Approach 2  |                                       |
         |  ^     A3A4                  |-------------             ------------|                                     |
         v  |                           |             |           |          |                                       |
----------------------------------------|             |           |          |                                       |
 A1 -->   A3 |      B1 v--     B3   <|  |             |           |          |                                       |
            v ^                      | ||             | Approach 4|          | Exclusive right turns reduced  30 %   |
 A2 <--   A4  |     B2 --^     B4  |>   |                                    | V/C Ratio = .8                        |
==========================================================================================================
```

# APPENDIX F

## Trip Generation Tables - Proposed Alternatives

**Table F-1**
**NORTH VINEYARD SPECIFIC PLAN DAILY TRIP GENERATION FOR 10 PERCENT LOW DENSITY ALTERNATIVE**

| Land Use | Quantity | Units | Daily Trip Rate | Daily Vehicle Trips | Inter-nalization | Internal Trips | External Trips | Pass-By Factor | Net External Trips | External Person Trips | Transit Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 5,122 | D.U. | 9.55 | 48,915 | 14% | 6,848 | 42,067 | 0% | 42,067 | 48,377 | 2,419 |
| Medium Density Residential | 0 | D.U. | 9.45 | 0 | 14% | 0 | 0 | 0% | 0 | 0 | 0 |
| High Density Residential | 637 | D.U. | 6.47 | 4,121 | 14% | 577 | 3,544 | 0% | 3,544 | 4,076 | 204 |
| Neighborhood Commercial | 49 | ksf GLA | varies | 6,555 | 40% | 2,622 | 3,933 | 20% | 3,146 | 3,618 | 181 |
| Community Commercial | 262 | ksf GLA | varies | 16,603 | 30% | 4,981 | 11,622 | 30% | 8,135 | 9,356 | 468 |
| Professional/ Offices | 103 | ksf GFA | 14.37 | 1,480 | 15% | 222 | 1,258 | 0% | 1,258 | 1,447 | 72 |
| Elementary School | 600 | Students | 1.09 | 654 | 90% | 589 | 65 | 0% | 65 | 75 | 4 |
| Neighborhood Park | 64 | Acres | 2.23 | 143 | 90% | 128 | 14 | 0% | 14 | 16 | 1 |
| Community Park | 27 | Acres | 2.99 | 81 | 50% | 40 | 40 | 0% | 40 | 46 | 2 |
| | | | Totals: | 78,552 | 20% | 16,007 | 62,545 | N/A | 58,271 | 67,012 | 3,351 |

**Table F-2**
**NORTH VINEYARD SPECIFIC PLAN DAILY TRIP GENERATION FOR 15 PERCENT LOW DENSITY ALTERNATIVE**

| Land Use | Quantity | Units | Daily Trip Rate | Daily Vehicle Trips | Inter-nalization | Internal Trips | External Trips | Pass-By Factor | Net External Trips | External Person Trips | Transit Trips |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Low Density Residential | 4,747 | D.U. | 9.55 | 45,334 | 14% | 6,347 | 38,987 | 0% | 38,987 | 44,835 | 2,242 |
| Medium Density Residential | 0 | D.U. | 9.45 | 0 | 14% | 0 | 0 | 0% | 0 | 0 | 0 |
| High Density Residential | 637 | D.U. | 6.47 | 4,121 | 14% | 577 | 3,544 | 0% | 3,544 | 4,076 | 204 |
| Neighborhood Commercial | 49 | ksf GLA | varies | 6,555 | 40% | 2,622 | 3,933 | 20% | 3,146 | 3,618 | 181 |
| Community Commercial | 262 | ksf GLA | varies | 16,603 | 30% | 4,981 | 11,622 | 30% | 8,135 | 9,356 | 468 |
| Professional/ Offices | 103 | ksf GFA | 14.37 | 1,480 | 15% | 222 | 1,258 | 0% | 1,258 | 1,447 | 72 |
| Elementary School | 600 | Students | 1.09 | 654 | 90% | 589 | 65 | 0% | 65 | 75 | 4 |
| Neighborhood Park | 64 | Acres | 2.23 | 143 | 90% | 128 | 14 | 0% | 14 | 16 | 1 |
| Community Park | 27 | Acres | 2.99 | 81 | 50% | 40 | 40 | 0% | 40 | 46 | 2 |
| | | | Totals: | 74,971 | 21% | 15,506 | 59,465 | N/A | 55,192 | 63,470 | 3,174 |

*DEPARTMENT OF ENVIRONMENTAL REVIEW & ASSESSMENT*

*VOLUME III TECHNICAL STUDY PREPARERS*

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