ADDENDUM TO THE CERTIFIED FINAL ENVIRONMENTAL IMPACT REPORT FOR THE SAN LUIS RANCH PROJECT

JUNE 2018

A. INTRODUCTION

This document is an Addendum to the Final Environmental Impact Report (FEIR) prepared for the San Luis Ranch Project (State Clearinghouse Number 2015101083). The FEIR was certified by the City of San Luis Obispo on July 18, 2017, pursuant to City Council Resolution No. 10822 (2017 Series). The Addendum is intended to bring the existing CEQA documentation up to date as appropriate. Because there are no new significant impacts or mitigation measures as a result of this updated analysis, an Addendum is the appropriate CEQA document.

B. ADDENDUM REQUIREMENTS

The Addendum has been prepared in accordance with the relevant provisions of the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines as implemented by the SSLOCSD. According to §15164(b) of the State CEQA Guidelines, an Addendum to an Environmental Impact Report (EIR) is the appropriate environmental document in instances when "only minor technical changes or additions are necessary or none of the conditions described in Section 15162 calling for the preparation of a subsequent EIR have occurred". Section 15162(a) of the State CEQA Guidelines states that no subsequent Negative Declaration shall be prepared for a project unless the lead agency determines, on the basis of substantial evidence in the light of the whole record, one or more of the following:

> *(1) Substantial changes are proposed in the project which will require major revisions of the previous EIR or Negative Declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;*
>
> *(2) Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or Negative Declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or*
>
> *(3) New information of substantial importance, which was not known and could*

not have been known with the exercise of reasonable diligence at the time the previous EIR or Negative Declaration was adopted, shows any of the following:

> *(A) The project will have one or more significant effects not discussed in the previous EIR or Negative Declaration;*
> *(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR or Negative Declaration;*
> *(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or*
> *(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR or Negative Declaration would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.*

This Addendum does not require circulation because it does not provide significant new information that changes the certified FEIR in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect.

This Addendum includes this introduction and a description of the proposed actions addressed in the Addendum as they related to the previously-approved project. The technical analysis in support of this Addendum is included as an appendix to this document for reference (**Appendix A**).

The City shall consider this Addendum with the certified Final EIR as part of the approval of the updated project.

The CEQA documentation for this project, including this Addendum and certified FEIR, is available for review at City Hall, located at 990 Palm Street, San Luis Obispo, California. It is also available on the City's website at www.slocity.org.

C. PREVIOUS CEQA DOCUMENTATION

The City Council unanimously certified a Final EIR and approved the project on July 18, 2017, pursuant to City Council Resolution No. 10822 (2017 Series). A Notice of Determination (NOD) was prepared, and there were no legal challenges to the adequacy of the Final EIR during the 30-day statute of limitations associated with the NOD, pursuant to CEQA (PRC Section 21167 and CEQA Guidelines Section 15094).

D. REASONS WHY AN ADDENDUM IS APPROPRIATE

Subsequent to the approval of the San Luis Ranch project in July 2017, the City of San Luis Obispo conducted additional analysis of traffic operations along the U.S. Highway 101 corridor in the vicinity of Prado Road as a part of on-going work for the *US 101/ Prado Road Interchange Project. The Study Report-Project Development Support* (PSR-PDS) approved by Caltrans in April 2018 and the Project Approval – Environmental Determination (PAED) for the interchange is currently underway. This Addendum incorporates the additional analysis for inclusion in the environmental record. The updated analysis does not materially change the findings and conclusions of the FEIR, making a Subsequent EIR unnecessary pursuant to Section 15162 of the CEQA guidelines.

E. UPDATED PROJECT ELEMENTS

The setting and project description for the purpose of the updated traffic report remain unchanged from those included in the certified Final EIR. Please refer to that document for setting information related to analyzing project impacts.

F. UPDATED ENVIRONMENTAL IMPACT ANALYSIS

This section addresses transportation-related information that has been prepared since the FEIR was certified in July 2017. Except as noted below, none of the analysis or discussion included in the certified FEIR has changed. None of the conclusions, including required mitigation measures, change as a result of this updated analysis.

Updated Analysis

Several commenters on the Draft EIR raised questions and concerns regarding construction of the Prado Road Overcrossing with Northbound US 101 Ramps (Mitigation Measures T-1, T-2, and T-3). Master Response 2 of the FEIR describes the analysis of the Prado Road Overcrossing/ Interchange in detail. In April 2018, after FEIR certification, Caltrans approved the US 101/ Prado Road Interchange Project Study Report-Project Development Support (PSR-PDS) which identifies and evaluates viable build alternatives for the interchange. Operational results in the *San Luis Ranch Specific Plan Multimodal Transportation Impact Study Addendum* (TIS Addendum, 2018) prepared by Omni-Means, a GHD Company is included as **Appendix A** to this Addendum.

The Supplemental TIS describes traffic operations for mainline, ramp merge and diverge, and weaving sections along US 101 from south of the Los Osos Valley Road interchange to north of the Marsh Street interchange. It reports existing, near term (2025), and cumulative (2035) conditions both with and without the San Luis Ranch project.

The Supplemental TIS concludes that "*This updated analysis does not materially change the findings and conclusions of the May 2017 San Luis Ranch Specific Plan Multimodal Transportation Impact Study."* The referenced May 2017 study was the primary source document for the FEIR.

G. DETERMINATION

In accordance with Section 15164 of the CEQA Guidelines, the City of San Luis Obispo (City) has determined that this Addendum to the certified FEIR is necessary to document changes or additions that have occurred in the project description since the FEIR was originally certified. The City has reviewed and considered the information contained in this Addendum and finds that the preparation of subsequent CEQA analysis that would require public circulation is not necessary.

Appendix A

Multimodal Transportation Impact Analysis Report Addendum (April 2018)

San Luis Ranch Specific Plan

Supplemental Multimodal Transportation Impact Analysis Report

US 101 Mainline, Ramps and Weave Operations

Prepared for:

City of San Luis Obispo

Prepared by:

omni·means
A GHD Company

GHD

SAN LUIS RANCH SPECIFIC PLAN
SUPPLEMENTAL MULTIMODALTRANSPORTATION IMPACT ANALYSIS REPORT
US 101 MAINLINE, RAMPS AND WEAVE OPERATIONS

Prepared For:
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April 2018

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Introduction

The City of San Luis Obispo retained Omni-Means, A GHD Company, to perform a Multimodal Transportation Impact Study (TIS) for the proposed San Luis Ranch Specific Plan. The proposed mixed-use development is located on a 131.3-acre site in unincorporated San Luis Obispo County, adjacent to the City of San Luis Obispo, and within the City's Sphere of Influence (SOI). The site is generally bounded by Madonna Road, Dalidio Drive, and US Highway 101. The site is part of an agricultural reserve that has historically been used as farmland. Figure 1 presents the study area and vicinity map. Consistent with the requirements of the General Plan, the San Luis Ranch Specific Plan must be adopted by the City Council prior to annexation of the Plan Area. The City would annex the Plan Area with project approval. The San Luis Ranch Specific Plan is proposing a mix of residential, commercial, hotel, and office uses while preserving substantial areas of open and agricultural space. Figure 1 presents the study area and vicinity map.

The final *San Luis Ranch Specific Plan Multimodal Transportation Impact Study (May 2017) (Final TIS)* evaluated the proposed 580-Unit Alternative of the San Luis Ranch Specific Plan to determine any operational or safety impacts to the surrounding infrastructure. This *San Luis Ranch Specific Plan Supplemental Multimodal Transportation Impact Study* (Supplemental TIS) presents the projected transportation operations and impacts to US 101 mainline, ramp junctions (merge and diverge) and weaving segments associated with development of the project under *Existing*, *Near Term*, and *Cumulative Conditions* for vehicular related impacts, and the mitigation measures required to mitigate impacts to less than significant.

In the adopted EIR, mainline Level of Service (LOS) was provided and merge, diverge, & weave analysis was included by referenced in the response to comments, since then this technical analysis has been updated as part of on-going work for the Prado Road Interchange project therefore this Supplemental TIS is recommended to be included in the EIR record. This updated analysis does not materially change the findings and conclusions of the May 2017 San Luis Ranch Specific Plan Multimodal Transportation Impact Study.

Highway Segments

Four highway mainline segments and three interchanges have been identified by the City of San Luis Obispo and Caltrans for analysis. The mainline segments include:

1. US 101 South of Los Osos Valley Road
2. US 101 between Los Osos Valley Road and Prado Road
3. US 101 between Prado Road and Madonna Road
4. US 101 between Madonna Road and Marsh Street

The interchanges include:

1. US 101 / Los Osos Valley Road
2. US 101 / Prado Road
3. US 101 / Madonna Road

The study locations above were analyzed for weekday AM and PM peak hours for mainline, ramp merge and diverge and weave segments using vehicular counts obtained either from the City's on-line traffic counts database or from Caltrans Performance Measurement System (PeMS).

San Luis Ranch Specific Plan Multimodal TIS

Figure 1

Study Area Map

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The following traffic scenarios were analyzed as part of this study:

- Existing Conditions
- Existing Plus Project Conditions
- Near Term (Year 2025) Conditions
- Near Term Plus Project Conditions
- Cumulative (Year 2035) Full Build Prado Road Interchange Conditions
- Cumulative Full Build Prado Road Interchange Plus Project Conditions
- Cumulative (Year 2035) Prado Road Overcrossing Conditions
- Cumulative Prado Road Overcrossing Plus Project Conditions

Existing conditions establishes the baseline conditions for the year 2014 traffic operations, when the City traffic counts were collected, at the study locations. Existing Plus Project conditions is an analysis scenario in which project-related traffic impacts are examined in comparison to the Existing conditions. The Near Term conditions is an analysis scenario in which the City's approved, pending and potential land development projects are assumed to be in place, in roughly 10 years (Year 2025). The Near Term Plus Project conditions is an analysis scenario in which project-related traffic impacts are examined in comparison to the Near Term conditions.

Cumulative conditions establish the conditions that would exist at build-out of the City's General Plan, representing approximately twenty years out (Year 2035). Cumulative Plus Project conditions is an analysis scenario in which project-related traffic impacts are examined in comparison to Cumulative conditions. Two cumulative scenarios have been included in this study. The Cumulative Full Build Prado Road Interchange analysis scenarios consider a full access diamond interchange to be constructed at Prado Road, in addition to all other City roadway improvements. The Cumulative Year 2035 Prado Road Overcrossing scenarios consider an overcrossing to be constructed over US 101 connecting Prado Road to Dalidio Drive and the existing US 101 Northbound ramps to be removed, in addition to all other City roadway improvements in place. In both cumulative scenarios, improvements to the City's transportation infrastructure system are assumed to be constructed, consistent with the General Plan Circulation.

Multimodal Analysis Methodology and Technical Parameters

The following section outlines the analysis methodology and technical parameters used to quantify US 101 mainline, ramp merge and diverge, and weave operations for vehicular traffic in this Supplemental TIS.

Applicable Level of Service Policies

Caltrans Policy

Caltrans has established the measure of effectiveness (MOE) for the evaluation of impacts in CEQA level projects on State facilities. Caltrans' Guide for the Preparation of Traffic Impact Studies (December 2002) contains the following policy pertaining to the LOS standards within Caltrans jurisdiction:

The Level of Service (LOS) for operating State highway facilities is based upon measures of effectiveness (MOEs). These MOEs describe the measures best suited for analyzing State highway facilities (i.e., freeway segments, signalized intersections, on- or off-ramps, etc.) Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on State highway facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than the appropriate target LOS, the existing MOE should be maintained.

Consistent with Caltrans policy and the LOS threshold identified in the final *San Luis Ranch Specific Plan Multimodal Transportation Impact Study (May 2017),* this supplemental study considers LOS D as the standard acceptable threshold for State highway facilities.

Significance Thresholds

Caltrans Significance Threshold

Based on standard industry practice, the project is considered to have a significant impact if it would:

- Result in a facility that will operate at an acceptable LOS in the *No Project* condition to deteriorate to an unacceptable LOS in the *Plus Project* condition; or,
- Increase the density by more than 5% at a facility that will operate at an unacceptable LOS.

Table 1 presents the LOS thresholds for the basic freeway segments.

TABLE 1:
BASIC FREEWAY SEGMENTS LOS CRITERIA

Segment Type	Density (pc/mi/ln)				
	A	B	C	D	E
Freeway	11	18	26	35	45
Merge	10	20	28	35	45
Diverge	10	20	28	35	45
Weave	10	20	28	35	45

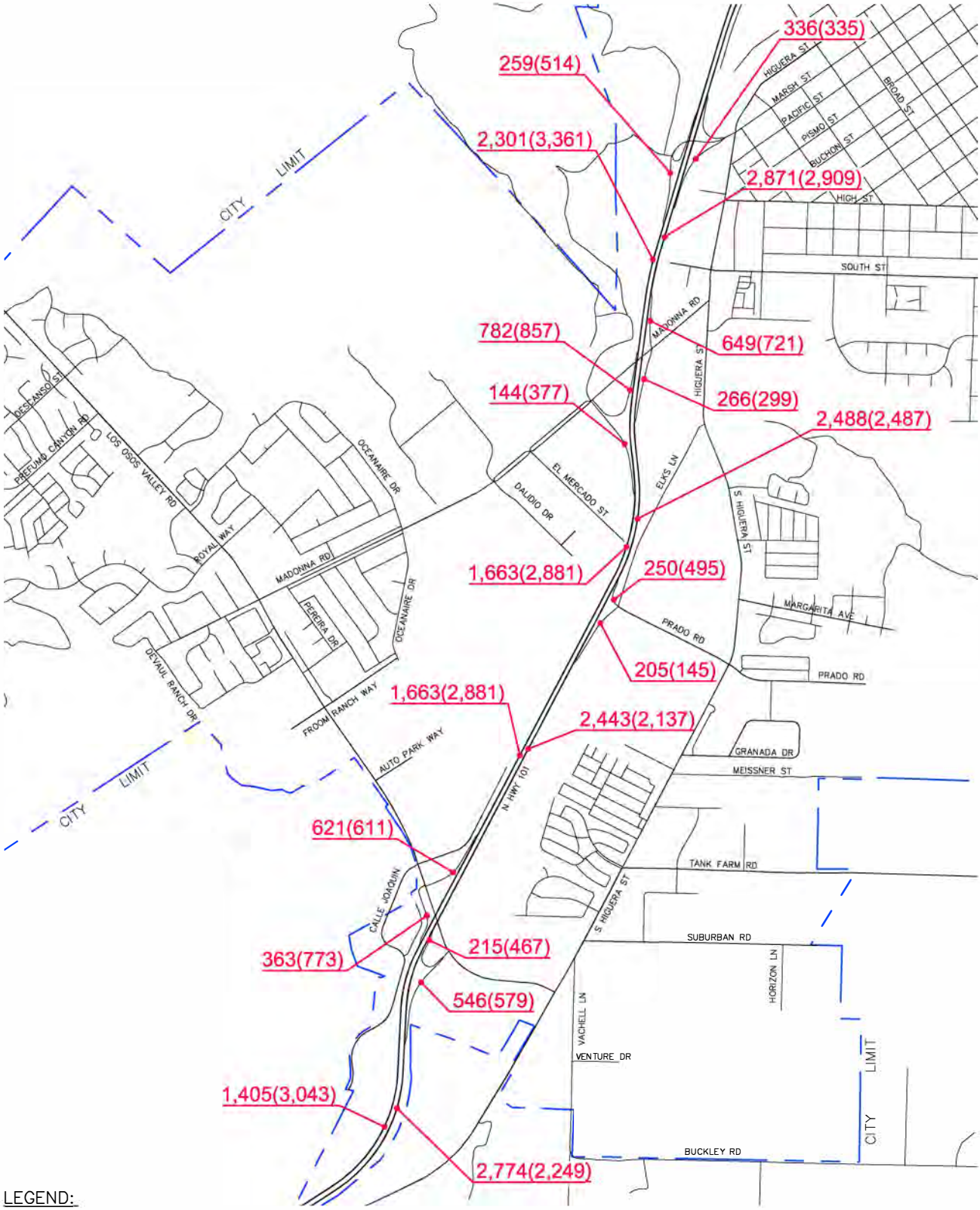
Notes: 1. Based on Highway Capacity Manual, Fifth Edition , Transportation Research Board, 2010.

Technical Analysis Parameters

The Transportation Research Board Publication *Highway Capacity Manual, Fifth Edition, 2010* (HCM 2010) methodologies for basic freeway segments, ramp junctions and weaving sections were implemented using Highway Capacity Software (*HCS 2010, McTrans*). Weaving section operations are also evaluated using the Leisch Method.

Existing Conditions

Existing conditions establish baseline traffic conditions that currently exist on US 101 mainline, the individual ramp junctions (merge and diverge), and within weaving segments within the study area. Figure 2 presents the existing peak hour volumes.



LEGEND:

xx – AM PEAK HOUR TRAFFIC VOLUMES
(xx) – PM PEAK HOUR TRAFFIC VOLUMES

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 2

Existing US 101 Peak Hour Traffic Volumes

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Existing Conditions Analysis

Table 2 provides a summary of the existing US 101 mainline, ramp junction and weaving section operations during the AM and PM peak hour conditions. As shown in the table, all US 101 mainline, ramp merge and diverge, and weave sections currently operate at LOS D or better during both the AM and PM peak hours.

TABLE 2:
EXISTING CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

			AM Peak Hour			PM Peak Hour		
Interchange Location	Segment Type	No. of Lanes	Volume	Density (pc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
US 101 Northbound								
US 101 NB South of Los Osos Valley Road	Freeway	2	2,774	24.5	C	2,249	19.7	C
US 101 NB Los Osos Valley Road Off Ramp	Diverge	1	**546**	**29.4**	**D**	579	24.3	C
US 101 NB Los Osos Valley Road On Ramp	Merge	1	215	23.2	C	467	20.4	C
US 101 NB South of Prado Road	Freeway	2	2,443	21.4	C	2,137	18.8	C
US 101 NB Prado Road Off Ramp	Diverge	1	205	26.7	C	145	23.7	C
US 101 NB South of Madonna Road	Weave	2	2,779	23.8	C	2,778	23.8	C
US 101 NB South of Marsh Street	Weave	3	3,207	17.9	B	3,251	18.2	B
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,570	14.2	B	3,754	21.3	C
US 101 SB Madonna Road On Ramp	Merge	1	144	14.6	B	377	25.3	C
US 101 SB South of Madonna Road	Freeway	2	1,663	14.6	B	2,881	25.6	C
US 101 SB Los Osos Valley Road Off Ramp	Diverge	1	621	15.8	B	611	27.8	C
US 101 SB Los Osos Valley Road On Ramp	Merge	1	363	15.3	B	**773**	**29.7**	**D**
US 101 SB South of Los Osos Valley Road	Freeway	2	1,405	12.3	B	**3,043**	**27.4**	**D**

There are three existing weaving sections, between the NB on-ramp from Prado Road and the off-ramp to Madonna Road, the northbound (NB) on-ramp from Madonna Road and the off-ramp to Marsh Street, and between the southbound (SB) on-ramp from Marsh Street and the off-ramp to Madonna Road. Caltrans noted that, though an auxiliary lane currently does not exist on NB US 101 between Prado Road and Madonna Road, this segment essentially operates as a weaving section and should be evaluated as such. Table 2 shows that each weaving section currently experiences LOS D or better operations during both the AM and PM peak hours.

To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 3. As shown in this table, the NB weave between Prado Road and Madonna Road currently operates at LOS D/E during both the AM and PM peak hours.

TABLE 3:
EXISTING CONDITIONS WEAVING SECTIONS – LEISCH METHOD

			AM Peak Hour			PM Peak Hour		
Interchange Location	Segment Type	No. of Lanes	Length	Total Volume	LOS	Length	Total Volume	LOS
US 101 Northbound								
US 101 NB North of Prado Road	Weave	2	**2,140**	**2,779**	**D/E**	**2,140**	**2,778**	**D/E**
US 101 NB North of Madonna Road	Weave	3	1,330	3,207	C	1,330	3,251	C
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,065	2,570	B/C	**2,065**	**3,754**	**D**

Existing Plus Project Conditions

The Existing Plus Project conditions include development of the proposed San Luis Ranch Specific Plan per the "Project Description" provided in the Final TIS. The Final TIS also provided the estimated project trip generation and trip distribution to the study area intersections, roadway segments and mainline US 101. Figure 3 presents the Existing Plus Project conditions peak hour volumes on US 101 mainline, the ramp junctions and within the weaving segments based on information provided in the Final TIS.

Existing Plus Project Conditions Analysis

Table 4 provides a summary of the Existing Plus Project conditions US 101 mainline, ramp junction and weaving section operations during the AM and PM peak hour conditions. As shown in the table, all US 101 mainline, ramp merge and diverge, and weave sections are projected to operate at LOS D or better during both the AM and PM peak hours.

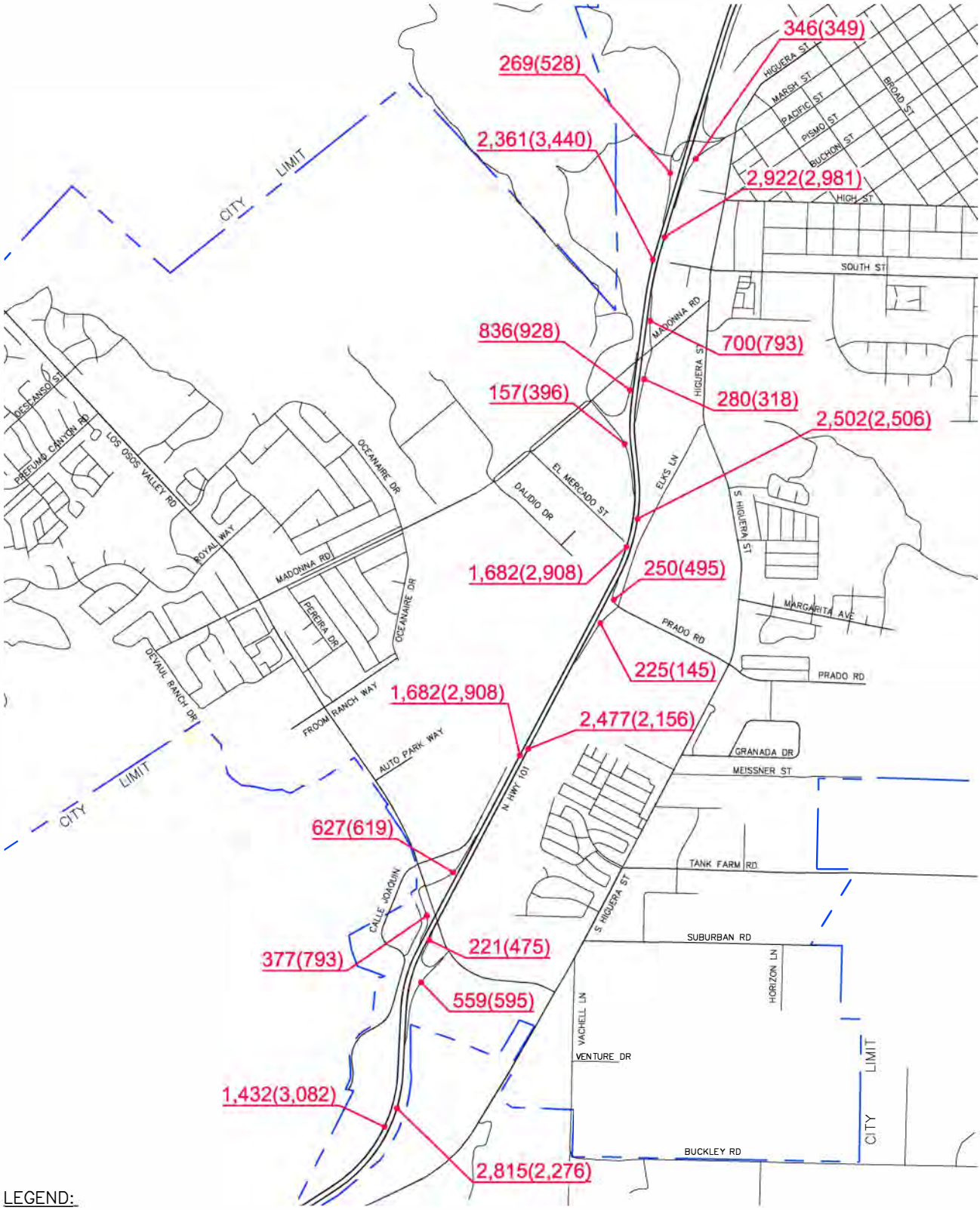
TABLE 4:
EXISTING PLUS PROJECT CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Volume	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Volume	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
US 101 Northbound								
US 101 NB South of Los Osos Valley Road	Freeway	2	2,815	24.9	C	2,276	20.0	C
US 101 NB Los Osos Valley Road Off Ramp	Diverge	1	**559**	**29.8**	**D**	595	24.5	C
US 101 NB Los Osos Valley Road On Ramp	Merge	1	221	23.5	C	475	20.5	C
US 101 NB South of Prado Road	Freeway	2	2,477	21.8	C	2,156	18.9	C
US 101 NB Prado Road Off Ramp	Diverge	1	225	27.0	C	145	23.8	C
US 101 NB South of Madonna Road	Weave	2	2,795	24.0	C	2,800	24.0	C
US 101 NB South of Marsh Street	Weave	3	3,264	18.3	B	3,330	18.7	B
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,637	14.6	B	3,842	21.8	C
US 101 SB Madonna Road On Ramp	Merge	1	157	14.7	B	396	25.5	C
US 101 SB South of Madonna Road	Freeway	2	1,682	14.8	B	2,908	25.9	C
US 101 SB Los Osos Valley Road Off Ramp	Diverge	1	627	16.0	B	**619**	**28.0**	**D**
US 101 SB Los Osos Valley Road On Ramp	Merge	1	377	15.5	B	**793**	**30.0**	**D**
US 101 SB South of Los Osos Valley Road	Freeway	2	1,432	12.6	B	**3,082**	**27.8**	**D**

To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 5. As shown in this table, the NB weave between Prado Road and Madonna Road is projected to operate at LOS D/E during both the AM and PM peak hours. This is consistent with the current peak hour operations reported in Table 3.

TABLE 5:
EXISTING PLUS PROJECT CONDITIONS WEAVING SECTIONS – LEISCH METHOD

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Length	AM Peak Hour Total Volume	AM Peak Hour LOS	PM Peak Hour Length	PM Peak Hour Total Volume	PM Peak Hour LOS
US 101 Northbound								
US 101 NB North of Prado Road	Weave	2	**2,140**	**2,795**	**D/E**	**2,140**	**2,800**	**D/E**
US 101 NB North of Madonna Road	Weave	3	1,330	3,264	C	1,330	3,330	C
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,065	2,637	B/C	**2,065**	**3,842**	**D**



LEGEND:

xx – AM PEAK HOUR TRAFFIC VOLUMES
(xx) – PM PEAK HOUR TRAFFIC VOLUMES

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 3

Existing Plus Project US 101 Peak Hour Traffic Volumes

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Near Term (Year 2025) Conditions

The Near Term conditions is a scenario in which the City's approved, pending and potential land development projects are assumed to be in place. As noted in the Final TIS, based on direction from the City, a volume growth increment for all travel modes was developed for the 2025 conditions. Vehicular trips are determined utilizing the *Avila Ranch* study completed by Central Coast Transportation Consulting. The volume growth between the Avila Ranch's *Existing* volumes and the *Near Term Plus Project No Business Park* volumes were utilized as a baseline to estimate a growth increment which was added to the Existing volumes provided in the Final TIS. Roadway improvements assumed to be in place for the Near Term conditions are as follows:

- Los Osos Valley Road interchange improvements and widening to 4 Lanes between Calle Joaquin and S. Higuera Street with Class II Bike Lanes
- Prado Road widening to 4 lanes between US 101 and S. Higuera Street with Class II Bike Lanes and an additional westbound left turn lane at S. Higuera Street
- Horizon Lane extension between Avila Ranch and Suburban Drive
- Southbound left turn pocket at Prado Road/S. Higuera Street is extended 250' with addition of pedestrian countdown heads with audible/tactile pushbuttons.
- Buckley Road extension to S. Higuera Street

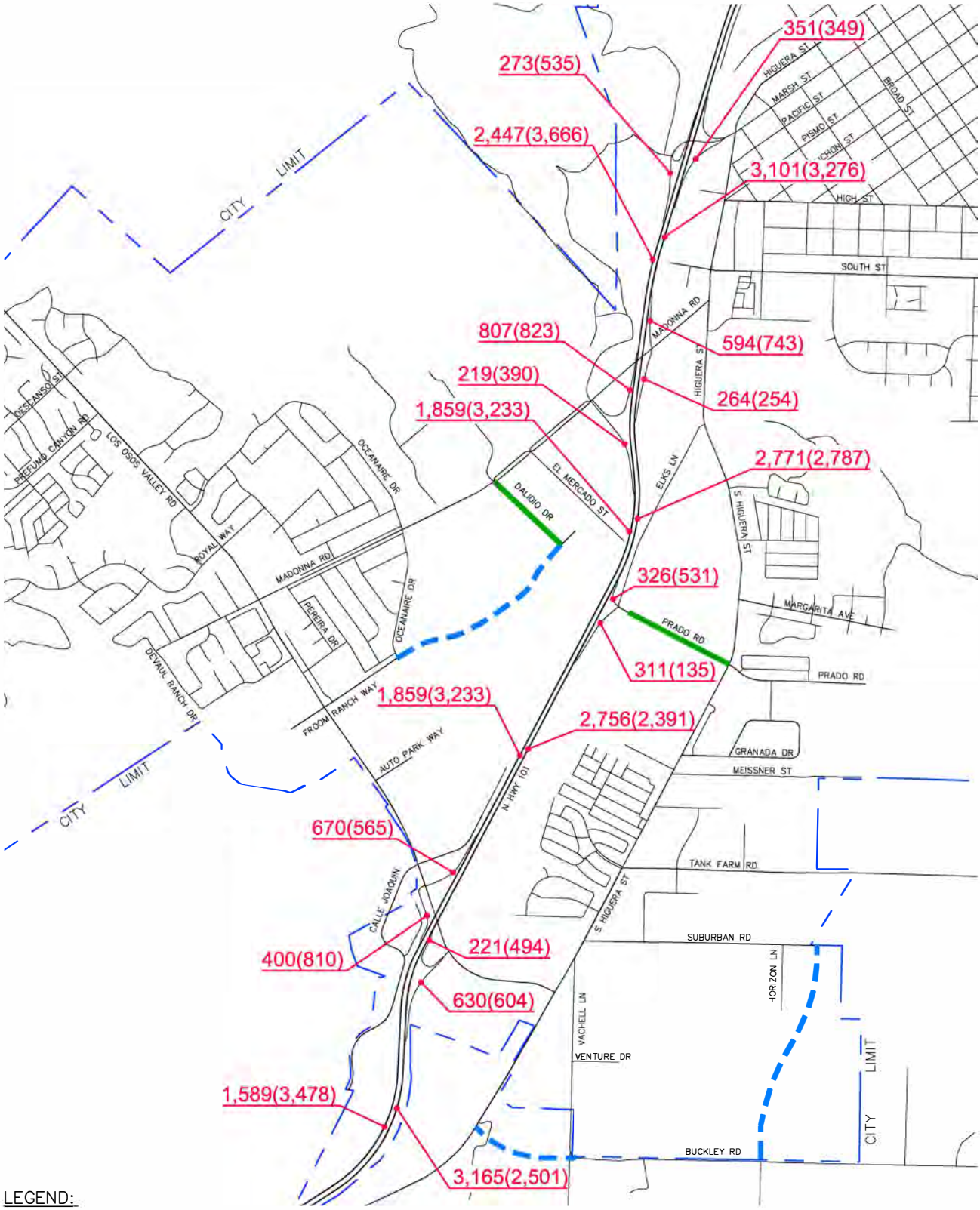
Figure 4 presents the Year 2025 Near Term US 101 mainline, ramp junctions, and weave sections peak hour traffic volumes assuming the above roadway improvements are in place, and with buildout of the Near Term Approved and Pending Projects reported in the Final TIS.

Near Term No Project Conditions Analysis

Table 6 provides a summary of the Near Term No Project conditions US 101 mainline, ramp junction and weaving section operations during the AM and PM peak hour conditions. As shown in the table, all US 101 mainline, ramp merge and diverge, and weave sections are projected to operate at LOS D or better during both the AM and PM peak hours.

TABLE 6:
YEAR 2025 NEAR TERM CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Volume	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Volume	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
US 101 Northbound								
US 101 NB South of Los Osos Valley Road	Freeway	2	**3,165**	**28.8**	**D**	2,501	22.0	C
US 101 NB Los Osos Valley Road Off Ramp	Diverge	1	**630**	**33.2**	**D**	604	26.7	C
US 101 NB Los Osos Valley Road On Ramp	Merge	1	221	26.0	C	494	22.6	C
US 101 NB South of Prado Road	Freeway	2	2,756	24.4	C	2,391	21.0	C
US 101 NB Prado Road Off Ramp	Diverge	1	**311**	**29.7**	**D**	135	26.1	C
US 101 NB South of Madonna Road	Weave	2	3,096	26.8	C	3,113	27.0	C
US 101 NB South of Marsh Street	Weave	3	3,464	19.5	B	3,660	20.7	C
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,733	15.2	B	4,096	24.4	C
US 101 SB Madonna Road On Ramp	Merge	1	219	16.3	B	**390**	**28.4**	**D**
US 101 SB South of Madonna Road	Freeway	2	1,859	16.3	B	**3,233**	**29.7**	**D**
US 101 SB Los Osos Valley Road Off Ramp	Diverge	1	670	17.7	B	**565**	**31.2**	**D**
US 101 SB Los Osos Valley Road On Ramp	Merge	1	400	16.9	B	**810**	**33.5**	**D**
US 101 SB South of Los Osos Valley Road	Freeway	2	1,589	14.0	B	**3,478**	**33.0**	**D**



LEGEND:

xx – AM PEAK HOUR TRAFFIC VOLUMES
(xx) – PM PEAK HOUR TRAFFIC VOLUMES
NEW ROADWAY
WIDEN TO 4 LANES

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 4

Year 2025 Near Term US 101 Peak Hour Traffic Volumes

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To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 7. As shown in this table, the NB weave between Prado Road and Madonna Road is projected to operate at LOS E during both the AM and PM peak hours. Table 7 also shows that the SB weave between Marsh Street and Madonna Road is projected to operate at LOS E during the PM peak hour.

TABLE 7:
YEAR 2025 NEAR TERM CONDITIONS WEAVING SECTIONS – LEISCH METHOD

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Length	AM Peak Hour Total Volume	AM Peak Hour LOS	PM Peak Hour Length	PM Peak Hour Total Volume	PM Peak Hour LOS
US 101 Northbound								
US 101 NB North of Prado Road	Weave	2	**2,140**	**3,096**	**E**	**2,140**	**3,113**	**E**
US 101 NB North of Madonna Road	Weave	3	**1,330**	**3,464**	**C/D**	**1,330**	**3,660**	**D**
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,065	2,733	B/C	**2,065**	**4,096**	**E**

Near Term Plus Project Conditions

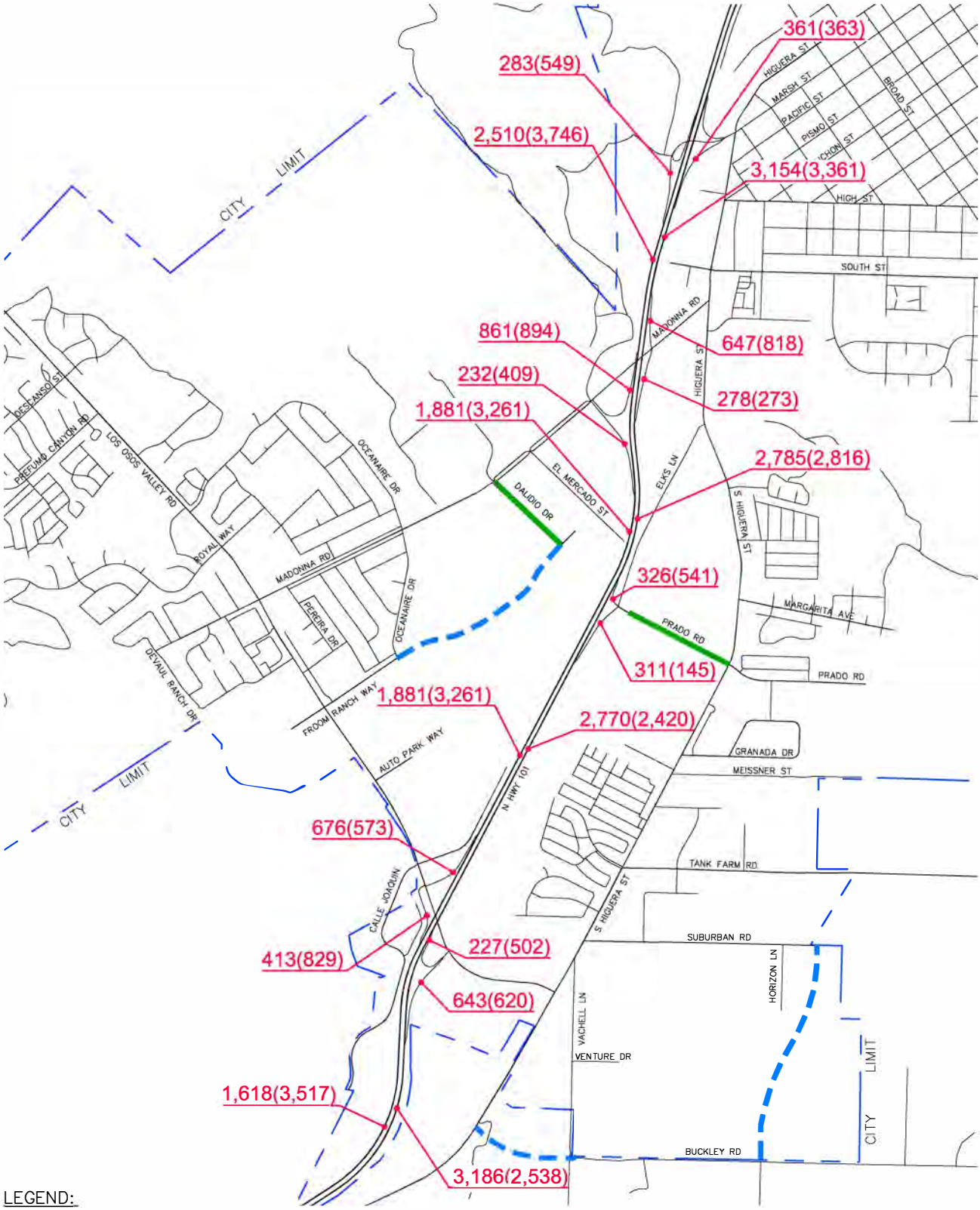
The project generated peak hour volumes have been added to the derived Near Term No Project volumes to obtain the Near Term Plus Project conditions. Figure 5 presents the Year 2025 Near Term Plus Project US 101 mainline, ramp junctions, and weave sections peak hour traffic volumes.

Near Term Plus Project Conditions Analysis

Table 8 provides a summary of the Near Term Plus Project conditions US 101 mainline, ramp junction and weaving section operations during the AM and PM peak hour conditions. As shown in the table, all US 101 mainline, ramp merge and diverge, and weave sections are projected to operate at LOS D or better during both the AM and PM peak hours.

TABLE 8:
YEAR 2025 NEAR TERM PLUS PROJECT CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Volume	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Volume	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
US 101 Northbound								
US 101 NB South of Los Osos Valley Road	Freeway	2	**3,186**	**29.1**	**D**	2,538	22.3	C
US 101 NB Los Osos Valley Road Off Ramp	Diverge	1	**643**	**33.5**	**D**	620	27.1	C
US 101 NB Los Osos Valley Road On Ramp	Merge	1	227	26.1	C	502	22.9	C
US 101 NB South of Prado Road	Freeway	2	2,770	24.5	C	2,420	21.2	C
US 101 NB Prado Road Off Ramp	Diverge	1	**311**	**29.9**	**D**	145	26.4	C
US 101 NB South of Madonna Road	Weave	2	3,112	27.0	C	3,146	27.3	C
US 101 NB South of Marsh Street	Weave	3	3,523	19.9	B	3,754	21.3	C
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,804	15.6	B	4,184	23.9	C
US 101 SB Madonna Road On Ramp	Merge	1	232	16.5	B	**409**	**28.6**	**D**
US 101 SB South of Madonna Road	Freeway	2	1,881	16.5	B	3,261	30.0	D
US 101 SB Los Osos Valley Road Off Ramp	Diverge	1	676	17.9	B	**573**	**31.5**	**D**
US 101 SB Los Osos Valley Road On Ramp	Merge	1	413	17.1	B	**829**	**33.8**	**D**
US 101 SB South of Los Osos Valley Road	Freeway	2	1,618	14.2	B	**3,517**	**33.6**	**D**



LEGEND:

xx – AM PEAK HOUR TRAFFIC VOLUMES
(xx) – PM PEAK HOUR TRAFFIC VOLUMES
NEW ROADWAY
WIDEN TO 4 LANES

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 5

Year 2025 Near Term Plus Project US 101 Peak Hour Traffic Volumes

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To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 9. As shown in this table, the NB weave between Prado Road and Madonna Road is projected to operate at LOS E during both the AM and PM peak hours. This is consistent with the Near Term No Project conditions peak hour operations reported in Table 7. Table 9 also shows that the SB weave between Marsh Street and Madonna Road is projected to operate at LOS E during the PM peak hour. This is also consistent with the Near Term No Project conditions peak hour operations reported in Table 7.

TABLE 9:
YEAR 2025 NEAR TERM PLUS PROJECT CONDITIONS WEAVING SECTIONS – LEISCH METHOD

			AM Peak Hour			PM Peak Hour		
Interchange Location	Segment Type	No. of Lanes	Length	Total Volume	LOS	Length	Total Volume	LOS
US 101 Northbound								
US 101 NB North of Prado Road	Weave	2	**2,140**	**3,112**	**E**	**2,140**	**3,146**	**E**
US 101 NB North of Madonna Road	Weave	3	**1,330**	**3,523**	**D**	**1,330**	**3,754**	**D**
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,065	2,804	C	**2,065**	**4,184**	**E**

Near Term Plus Project Impacts & Mitigation Measures

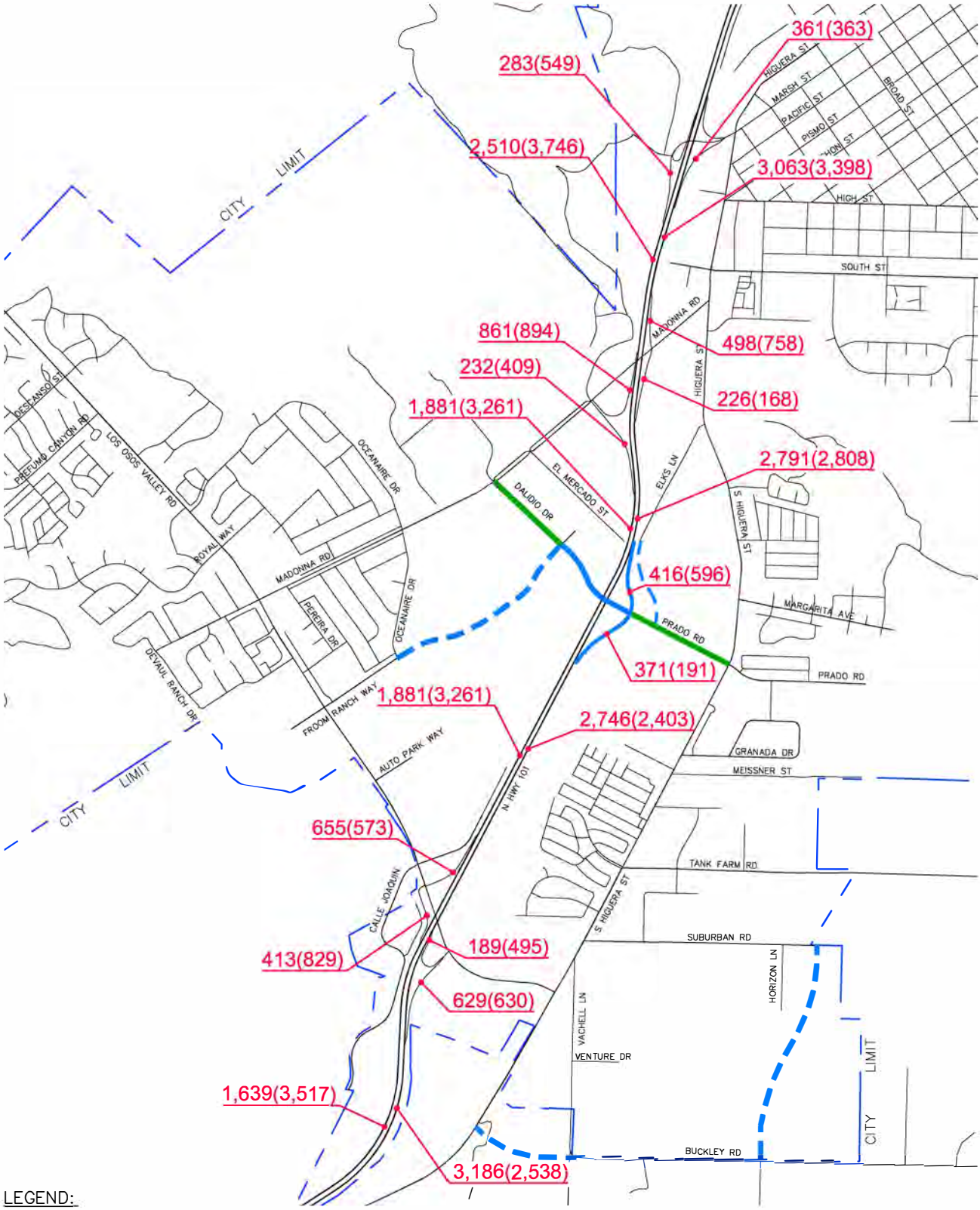
Near Term Plus Project Mitigation Measures

Based on the findings provided in the Final TIS, the Prado Road Overcrossing is required under the Existing Plus Project scenario, and the *Near Term* mitigation scenario assumes the Prado Overcrossing to be constructed. The US 101/Prado Road Interchange Project Study Report-Project Development Support (PSR-PDS) approved by Caltrans in April 2018 includes viable build alternatives each of which assumes that the Prado Road Overcrossing is constructed an open for use by the year 2025. In addition, each viable build alternative also assumes reconstruction of the northbound (NB) US 101/Prado Road on and off ramps and construction of an auxiliary lane between the NB Prado Road on-ramp and the off-ramp to Madonna Road. These additional improvements are assumed for the Near Term Plus Project Mitigation Measures conditions.

Figure 6 presents the Year 2025 Near Term Plus Project Mitigation US 101 mainline, ramp junctions, and weave sections peak hour traffic volumes.

Near Term Plus Project Mitigation Conditions Analysis

Table 10 provides a summary of the Near Term Plus Project Mitigation conditions US 101 mainline, ramp junction and weaving section operations during the AM and PM peak hour conditions. As shown in the table, all US 101 mainline, ramp merge and diverge, and weave sections are projected to operate at LOS D or better during both the AM and PM peak hours.



LEGEND:

xx – AM PEAK HOUR TRAFFIC VOLUMES
(xx) – PM PEAK HOUR TRAFFIC VOLUMES
NEW ROADWAY
WIDEN TO 4 LANES

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 6

Year 2025 Near Term Plus Project Mitigation US 101 Peak Hour Traffic Volumes

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TABLE 10:
YEAR 2025 NEAR TERM PLUS PROJECT MITIGATION CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Volume	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Volume	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
US 101 Northbound								
US 101 NB South of Los Osos Valley Road	Freeway	2	**3,186**	**29.1**	**D**	2,538	22.3	C
US 101 NB Los Osos Valley Road Off Ramp	Diverge	1	**629**	**33.5**	**D**	630	27.1	C
US 101 NB Los Osos Valley Road On Ramp	Merge	1	189	25.9	C	495	22.7	C
US 101 NB South of Prado Road	Freeway	2	2,746	24.3	C	2,403	21.1	C
US 101 NB Prado Road Off Ramp	Diverge	1	**371**	**29.6**	**D**	191	26.3	C
US 101 NB South of Madonna Road	Weave	3	3,117	17.4	B	3,137	17.5	B
US 101 NB South of Marsh Street	Weave	3	3,421	19.2	B	3,795	21.5	C
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,804	15.6	B	4,184	23.9	C
US 101 SB Madonna Road On Ramp	Merge	1	232	16.5	B	**409**	**28.6**	**D**
US 101 SB South of Madonna Road	Freeway	2	1,881	16.5	B	3,261	30.0	D
US 101 SB Los Osos Valley Road Off Ramp	Diverge	1	655	17.9	B	**573**	**31.5**	**D**
US 101 SB Los Osos Valley Road On Ramp	Merge	1	413	17.3	B	**829**	**33.8**	**D**
US 101 SB South of Los Osos Valley Road	Freeway	2	1,639	14.4	B	**3,517**	**33.6**	**D**

To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 11. As shown in this table, the NB weave between Prado Road and Madonna Road is projected to improve at LOS C during both the AM and PM peak hours with the addition of the auxiliary lane. The addition of the auxiliary lane would also improve the Near Term No Project condition peak hour operations to LOS C. Table 11 also shows that the SB weave between Marsh Street and Madonna Road is still projected to operate at LOS E during the PM peak hour. This is also consistent with the Near Term No Project conditions peak hour operations reported in Table 7 and the Near Term Plus Project conditions peak hour operations reported in Table 9.

TABLE 11:
YEAR 2025 NEAR TERM PLUS PROJECT MITIGATION CONDITIONS WEAVING SECTIONS – LEISCH METHOD

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Length	AM Peak Hour Total Volume	AM Peak Hour LOS	PM Peak Hour Length	PM Peak Hour Total Volume	PM Peak Hour LOS
US 101 Northbound								
US 101 NB North of Prado Road	Weave	3	940	3,117	C	940	3,137	C
US 101 NB North of Madonna Road	Weave	3	**1,330**	**3,421**	**C/D**	**1,330**	**3,795**	**D**
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,065	2,804	C	**2,065**	**4,184**	**E**

Cumulative Conditions (Year 2035)

Cumulative conditions establish the conditions that would exist due to the build-out of the City's General Plan, which is approximately twenty years out (Year 2035). A volume growth increment for all travel modes was developed and presented in the Final TIS for the Cumulative conditions using the San Luis Obispo City Travel Demand Model projections. Vehicular trips are determined using the City's TDM and assuming build-out of the City's General Plan without the development

of the proposed project's site; i.e. the land use totals in the project's Traffic Analysis Zone were zeroed out as to not double count site trip generation.

The City's buildout circulation system was assumed to be constructed for Cumulative conditions in the Final TIS, including the improvements listed in the Near Term conditions and the following improvements:

- A new North/South Collector between Prado Road and Tank Farm Road
- Prado Road extension to Broad Street
- Prado Road widening to four lanes with bike lanes between S. Higuera Street, and remove parking
- Madonna Road at S. Higuera Street realignment to Bridge Street
- New North/South Collector between Tank Farm Road and Prado Road
- Restrict intersection of S. Higuera Street/Vachell Lane to be right-in right-out only
- Froom Ranch Way extension to Dalidio Road
- Dalidio Road widening to 4 lanes with Class II Bike Lanes
- Prado Road Interchange configuration to be determined based on PSR work

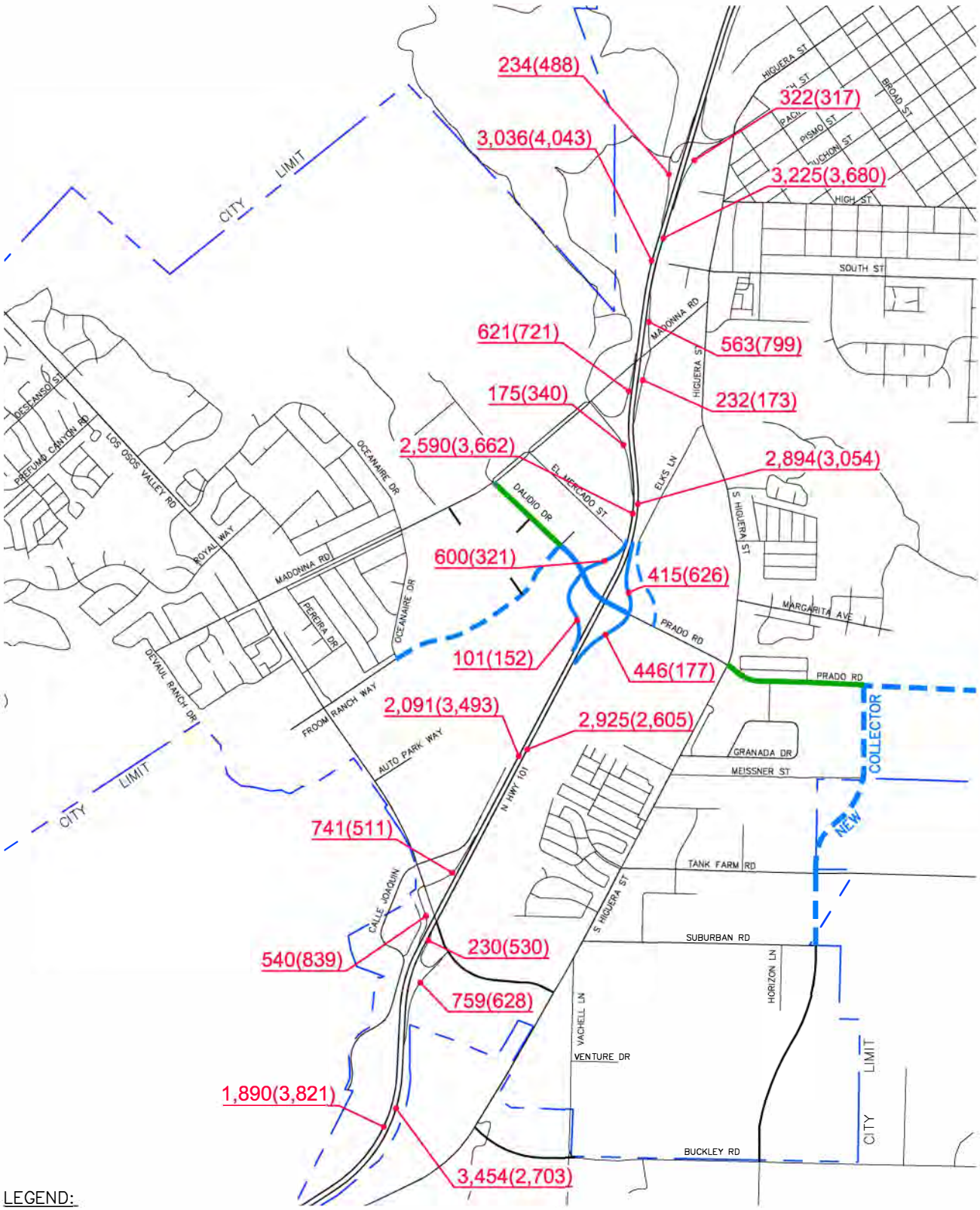
Prado Interchange and Overcrossing Scenarios

For the purposes of this Supplemental TIS, Cumulative conditions were analyzed for two different configurations for the Prado Road improvements consistent with the Final TIS: Full Build Prado Road Interchange and Prado Road Overcrossing scenarios. In addition, the Full Build Prado Road Interchange conditions assume provision of a NB US 101 auxiliary lane between the Prado Road on-ramp and the off-ramp to Madonna Road and a SB auxiliary lane between the Madonna Road on-ramp and the off-ramp to Dalidio/Prado. The peak hour traffic volumes for both scenarios were developed utilizing the City's TDM to establish the networks for the different alternatives, and used the same land use inputs for all alternatives.

As reported in the Final TIS, Cumulative traffic volume forecasts were derived for each alternative by applying the model's volume growth increment to the existing counts. The model's growth increment is based on the peak hour intersection turning outputs between the base year (2008) model and each of the 2035 buildout models, and factored to account for growth to existing conditions (2014). Based on existing travel patterns and counts, and to balance the volumes to account for midblock driveways, manual adjustments were made where necessary. This establishes the base forecasts for each alternative, without the San Luis Ranch development.

Year 2035 Full Build Prado Interchange Conditions

Consistent with the Final TIS, the base volumes (under the "Full Build" conditions analysis assume a full access diamond interchange for the purposes of this Supplemental TIS along with all other roadway improvements previously listed under the "Cumulative Conditions" section of this report. Figure 7 presents the Year 2035 Full Build Prado Road Interchange (no project) US 101 mainline, ramp junctions, and weave sections peak hour traffic volumes.



LEGEND:

xx — AM PEAK HOUR TRAFFIC VOLUMES
(xx) — PM PEAK HOUR TRAFFIC VOLUMES
NEW ROADWAY
WIDEN TO 4 LANES

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 7

Year 2035 Full Build Prado Road Interchange US 101 Peak Hour Traffic Volumes

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Year 2035 Full Build Prado Interchange Conditions Analysis

Table 12 provides a summary of the Year 2035 Full Build Prado Road Interchange conditions (no project) US 101 mainline, ramp junction and weaving section operations during the AM and PM peak hour conditions. As shown in the table, the US 101 NB diverge to Los Osos Valley Road is projected to operate at LOS E during the AM peak hour, the US 101 SB merge from Los Valley Road is projected to operate at LOS E during the PM peak Hour, and the US 101 SB mainline south of Los Osos Valley Road is projected to operate at LOS E during the PM peak hour. All other US 101 mainline, ramp merge and diverge, and weave sections are projected to operate at LOS D or better during both the AM and PM peak hours.

TABLE 12:
YEAR 2035 FULL BUILD PRADO INTERCHANGE CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

			AM Peak Hour			PM Peak Hour		
Interchange Location	Segment Type	No. of Lanes	Volume	Density (pc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
US 101 Northbound								
US 101 NB South of Los Osos Valley Road	Freeway	2	**3,454**	**32.6**	**D**	2,703	23.8	C
US 101 NB Los Osos Valley Road Off Ramp	Diverge	1	**759**	**36.1**	**E**	**628**	**28.7**	**D**
US 101 NB Los Osos Valley Road On Ramp	Merge	1	230	27.5	C	530	24.5	C
US 101 NB South of Prado Road	Freeway	2	**2,925**	**26.1**	**D**	2,605	22.9	C
US 101 NB Prado Road Off Ramp	Diverge	1	**446**	**31.7**	**D**	**177**	**28.6**	**D**
US 101 NB South of Madonna Road	Weave	2	3,233	18.1	B	3,411	19.2	B
US 101 NB South of Marsh Street	Weave	3	3,603	20.4	C	4,111	23.5	C
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	3,392	19.1	B	4,516	26.0	C
US 101 SB South of Madonna Road	Weave	3	2,892	16.0	B	4,091	23.4	C
US 101 SB Dalidio Dr On Ramp	Merge	1	101	4.1	A	152	6.0	A
US 101 SB South of Dalidio Dr	Freeway	2	2,091	18.4	C	**3,493**	**33.2**	**D**
US 101 SB Los Osos Valley Road Off Ramp	Diverge	1	741	20.0	C	**511**	**33.8**	**D**
US 101 SB Los Osos Valley Road On Ramp	Merge	1	540	19.5	B	**839**	**36.5**	**E**
US 101 SB South of Los Osos Valley Road	Freeway	2	1,890	16.6	B	**3,821**	**38.7**	**E**

To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 13. As shown in this table, the SB weave between Marsh Street and Madonna Road is projected to operate at LOS E during the PM peak hour and the SB weave between Madonna Road and Dalidio/Prado is projected to operate at LOS E during the PM peak hour.

TABLE 13:
YEAR 2035 FULL BUILD PRADO INTERCHANGE CONDITIONS WEAVING SECTIONS – LEISCH METHOD

			AM Peak Hour			PM Peak Hour		
Interchange Location	Segment Type	No. of Lanes	Length	Total Volume	LOS	Length	Total Volume	LOS
US 101 Northbound								
US 101 NB North of Prado Road	Weave	3	940	3,233	C	**940**	**3,411**	**C/D**
US 101 NB North of Madonna Road	Weave	3	**1,330**	**3,603**	**D**	**1,330**	**4,111**	**D**
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,065	3,392	C	**2,065**	**4,516**	**E**
US 101 SB South of Madonna Road	Weave	3	700	2,892	C	**700**	**4,091**	**D/E**

Year 2035 Full Build Prado Interchange Plus Project Conditions

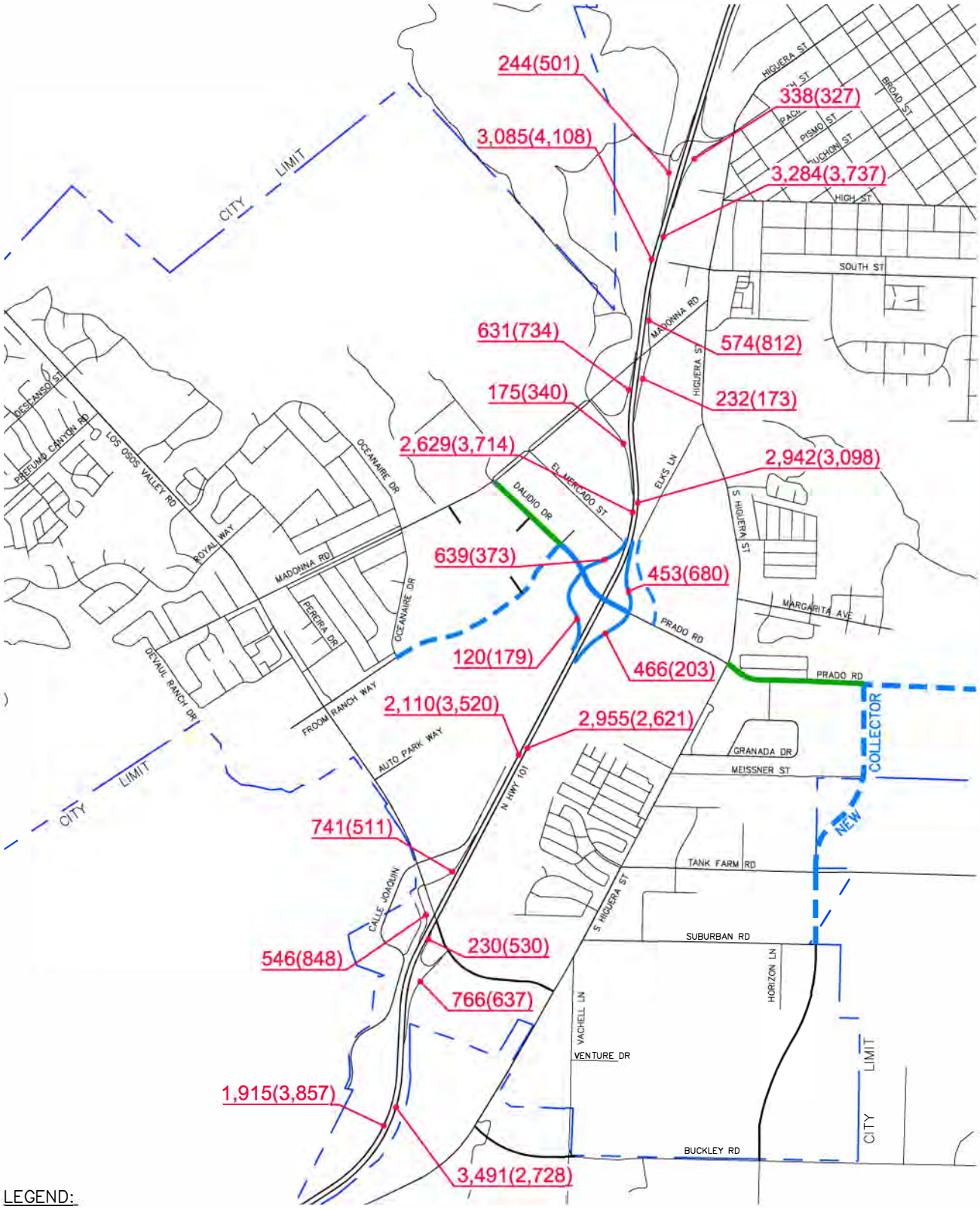
The project generated peak hour volumes have been added to the derived 2035 Full Build Prado Interchange volumes to obtain the Full Build Prado Interchange Plus Project conditions. Figure 8 presents the 2035 Full Build Prado Interchange Plus Project US 101 mainline, ramp junctions, and weave sections peak hour traffic volumes.

Year 2035 Full Build Prado Interchange Plus Project Conditions Analysis

Table 14 provides a summary of the Year 2035 Full Build Prado Interchange Plus Project US 101 mainline, ramp junction and weaving section operations during the AM and PM peak hour conditions. As shown in the table, the US 101 NB diverge to Los Osos Valley Road is projected to operate at LOS E during the AM peak hour, the US 101 SB merge from Los Valley Road is projected to operate at LOS E during the PM peak Hour, and the US 101 SB mainline south of Los Osos Valley Road is projected to operate at LOS E during the PM peak hour. The projected LOS E at these three locations and during these peak hour time periods are consistent with that reported for the Year 2035 Full Build Prado Interchange conditions. All other US 101 mainline, ramp merge and diverge, and weave sections are projected to operate at LOS D or better during both the AM and PM peak hours.

TABLE 14:
YEAR 2035 FULL BUILD PRADO INTERCHANGE PLUS PROJECT CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

				AM Peak Hour			PM Peak Hour		
Interchange Location	Target LOS	Segment Type	No. of Lanes	Volume	Density (pc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
US 101 Northbound									
US 101 NB South of Los Osos Valley Road	C	Freeway	2	**3,491**	**33.2**	**D**	2,728	24.1	C
US 101 NB Los Osos Valley Road Off Ramp	C	Diverge	1	**766**	**36.4**	**E**	**637**	**29.0**	**D**
US 101 NB Los Osos Valley Road On Ramp	C	Merge	1	230	27.8	C	530	24.6	C
US 101 NB South of Prado Road	C	Freeway	2	**2,955**	**26.4**	**D**	2,621	23.1	C
US 101 NB Prado Road Off Ramp	C	Diverge	1	**466**	**32.0**	**D**	**203**	**28.7**	**D**
US 101 NB South of Madonna Road	C	Weave	2	3,286	18.4	B	3,461	19.5	B
US 101 NB South of Marsh Street	C	Weave	3	3,669	20.8	C	4,174	23.9	C
US 101 Southbound									
US 101 SB South of Marsh Street	C	Weave	3	3,446	19.4	B	4,589	26.5	C
US 101 SB South of Madonna Road	C	Weave	3	2,936	16.3	B	4,149	23.8	C
US 101 SB Dalidio Dr On Ramp	C	Merge	1	120	4.3	A	179	6.2	A
US 101 SB South of Dalidio Dr	C	Freeway	2	2,110	18.5	C	**3,520**	**33.6**	**D**
US 101 SB Los Osos Valley Road Off Ramp	C	Diverge	1	741	20.2	C	**511**	**34.0**	**D**
US 101 SB Los Osos Valley Road On Ramp	C	Merge	1	546	19.7	B	**848**	**36.9**	**E**
US 101 SB South of Los Osos Valley Road	C	Freeway	2	1,915	16.8	B	**3,857**	**39.4**	**E**



LEGEND:

xx — AM PEAK HOUR TRAFFIC VOLUMES
(xx) — PM PEAK HOUR TRAFFIC VOLUMES
NEW ROADWAY
WIDEN TO 4 LANES

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 8

Year 2035 Full Build Prado Road Interchange Plus Project US 101 Peak Hour Traffic Volumes

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To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 15. As shown in this table, the SB weave between Marsh Street and Madonna Road is projected to operate at LOS E during the PM peak hour and the SB weave between Madonna Road and Dalidio/Prado is projected to operate at LOS E during the PM peak hour. The projected LOS E on both weave sections is consistent with that reported for the Year 2035 Full Build Prado Interchange conditions.

TABLE 15:
YEAR 2035 FULL BUILD PRADO INTERCHANGE PLUS PROJECT CONDITIONS WEAVING SECTIONS – LEISCH METHOD

				AM Peak Hour			PM Peak Hour		
Interchange Location	Target LOS	Segment Type	No. of Lanes	Length	Total Volume	LOS	Length	Total Volume	LOS
US 101 Northbound									
US 101 NB North of Prado Road	C	Weave	3	940	3,286	C	**940**	**3,461**	**C/D**
US 101 NB North of Madonna Road	C	Weave	3	**1,330**	**3,669**	**D**	**1,330**	**4,174**	**D**
US 101 Southbound									
US 101 SB South of Marsh Street	C	Weave	3	**2,065**	**3,446**	**C/D**	**2,065**	**4,589**	**E**
US 101 SB South of Madonna Road	C	Weave	3	700	2,936	C	**700**	**4,149**	**E**

Year 2035 Full Build Prado Interchange Plus Project Conditions Impacts Level of Significance

As previously noted for "Caltrans Significance Threshold", based on standard industry practice the project is considered to have a significant impact if it would:

- Result in a facility that will operate at an acceptable LOS in the *No Project* condition to deteriorate to an unacceptable LOS in the *Plus Project* condition; or,
- Increase the density by more than 5% at a facility that will operate at an unacceptable LOS.

Both the Year 2035 Full Build Prado Road Interchange conditions and the Year 2035 Full Build Prado Road Interchange Plus Project conditions identified that the US 101 NB diverge to Los Osos Valley Road is projected to operate at LOS E during the AM peak hour, the US 101 SB merge from Los Valley Road is projected to operate at LOS E during the PM peak Hour, and the US 101 SB mainline south of Los Osos Valley Road is projected to operate at LOS E during the PM peak hour. For both conditions, these represent facilities that are projected to operate at an unacceptable LOS. Table 16 shows whether the addition of project traffic is projected to increase the density by more than 5% at any of the locations. As shown in the table, the addition of the project's traffic would result in less than 1% increase in the density at any of the three locations

TABLE 16:
YEAR 2035 FULL BUILD PRADO INTERCHANGE PLUS PROJECT CONDITIONS LEVEL OF SIGNIFICANCE

		No Project Condition		Plus Project Condition		
Location	Segment Type	AM Peak Hour Density	PM Peak Hour Density	AM Peak Hour Density	PM Peak Hour Density	% Increase
US 101 NB Los Osos Valley Road Off Ramp	Diverge	36.1	---	36.4	---	0.008
US 101 SB Los Osos Valley Road On Ramp	Merge	---	36.5	---	36.9	0.011
US 101 SB South Los Osos Valley Road	Freeway	---	38.7	---	39.4	0.018

Year 2035 Prado Road Overcrossing Conditions

Consistent with the Final TIS, the base volumes under the "Overcrossing" conditions analysis assume a four-lane roadway between S. Higuera Street and Madonna Road for the purposes of this Supplemental TIS, with an overcrossing over US 101 and removal of the existing US 101 NB ramps at Prado Road, along with all other roadway improvements previously listed under the "Cumulative Conditions" section of this report. Figure 9 presents the Year 2035 Prado Road Overcrossing (no project) US 101 mainline, ramp junctions, and weave sections peak hour traffic volumes.

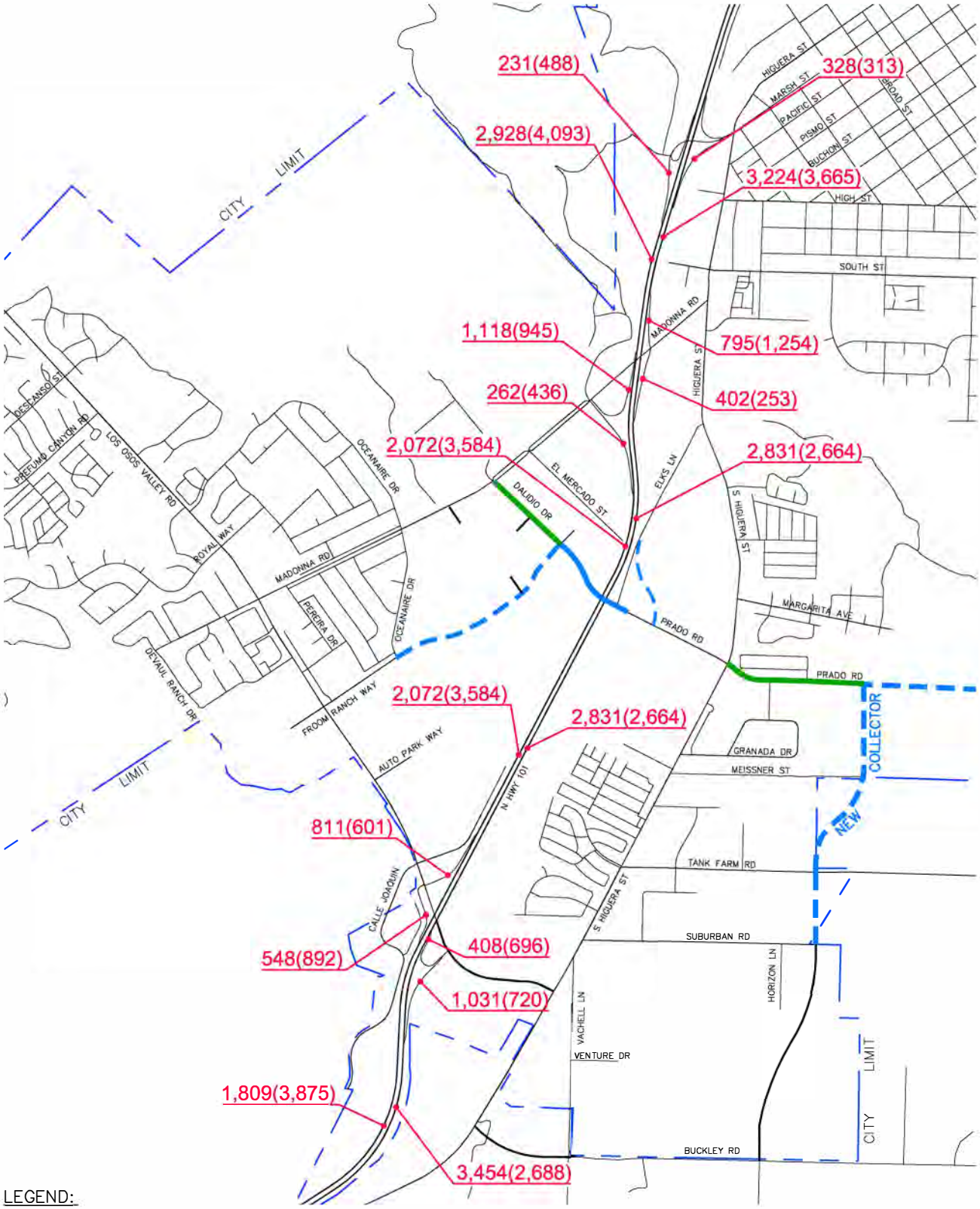
Year 2035 Prado Road Overcrossing Conditions Analysis

Table 17 provides a summary of the Year 2035 Prado Road Overcrossing US 101 mainline, ramp junction and weaving section operations during the AM and PM peak hour conditions. As shown in the table, the US 101 NB diverge to Los Osos Valley Road is projected to operate at LOS E during the AM peak hour, the US 101 SB merge from Los Valley Road is projected to operate at LOS E during the PM peak Hour, and the US 101 SB mainline south of Los Osos Valley Road is projected to operate at LOS E during the PM peak hour. The projected LOS E at these three locations and during these peak hour time periods are consistent with that reported for the Year 2035 Full Build Prado Interchange conditions. All other US 101 mainline, ramp merge and diverge, and weave sections are projected to operate at LOS D or better during both the AM and PM peak hours.

TABLE 17:
YEAR 2035 PRADO ROAD OVERCROSSING CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

			AM Peak Hour			PM Peak Hour		
Interchange Location	Segment Type	No. of Lanes	Volume	Density (pc/mi/ln)	LOS	Volume	Density (pc/mi/ln)	LOS
US 101 Northbound								
US 101 NB South of Los Osos Valley Road	Freeway	2	**3,454**	**32.6**	**D**	2,688	23.7	C
US 101 NB Los Osos Valley Road Off Ramp	Diverge	1	**1,031**	**36.1**	**E**	**720**	**28.6**	**D**
US 101 NB Los Osos Valley Road On Ramp	Merge	1	408	26.6	C	696	24.9	C
US 101 NB South of Madonna Road	Freeway	2	2,831	25.1	C	2,664	23.5	C
US 101 NB Madonna Road Off Ramp	Diverge	1	**402**	**30.2**	**D**	**253**	**28.6**	**D**
US 101 NB South of Marsh Street	Weave	3	3,601	20.3	C	4,093	23.4	C
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	3,270	18.3	B	4,572	26.4	C
US 101 SB Madonna Road On Ramp	Merge	1	262	18.1	B	**436**	**31.5**	**D**
US 101 SB South of Madonna Road	Freeway	2	2,072	18.2	C	**3,584**	**34.6**	**D**
US 101 SB Los Osos Valley Road Off Ramp	Diverge	1	811	19.8	B	**601**	**34.7**	**D**
US 101 SB Los Osos Valley Road On Ramp	Merge	1	548	18.8	B	**892**	**37.0**	**E**
US 101 SB South of Los Osos Valley Road	Freeway	2	1,809	15.9	B	**3,875**	**39.7**	**E**

To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 18. As shown in this table, the SB weave between Marsh Street and Madonna Road is projected to operate at LOS E during the PM peak hour. The projected LOS E is consistent with that reported for the Year 2035 Full Build Prado Interchange conditions.



LEGEND:

xx – AM PEAK HOUR TRAFFIC VOLUMES
(xx) – PM PEAK HOUR TRAFFIC VOLUMES

NEW ROADWAY
WIDEN TO 4 LANES

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 9

Year 2035 Overcrossing US 101 Peak Hour Traffic Volumes

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TABLE 18:
YEAR 2035 PRADO ROAD OVERCROSSING CONDITIONS WEAVING SECTIONS – LEISCH METHOD

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Length	AM Peak Hour Total Volume	AM Peak Hour LOS	PM Peak Hour Length	PM Peak Hour Total Volume	PM Peak Hour LOS
US 101 Northbound								
US 101 NB North of Madonna Road	Weave	3	**1,330**	**3,601**	**C/D**	**1,330**	**4,093**	**D**
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,065	3,270	C	**2,065**	**4,572**	**E**

Year 2035 Prado Road Overcrossing Plus Project Conditions

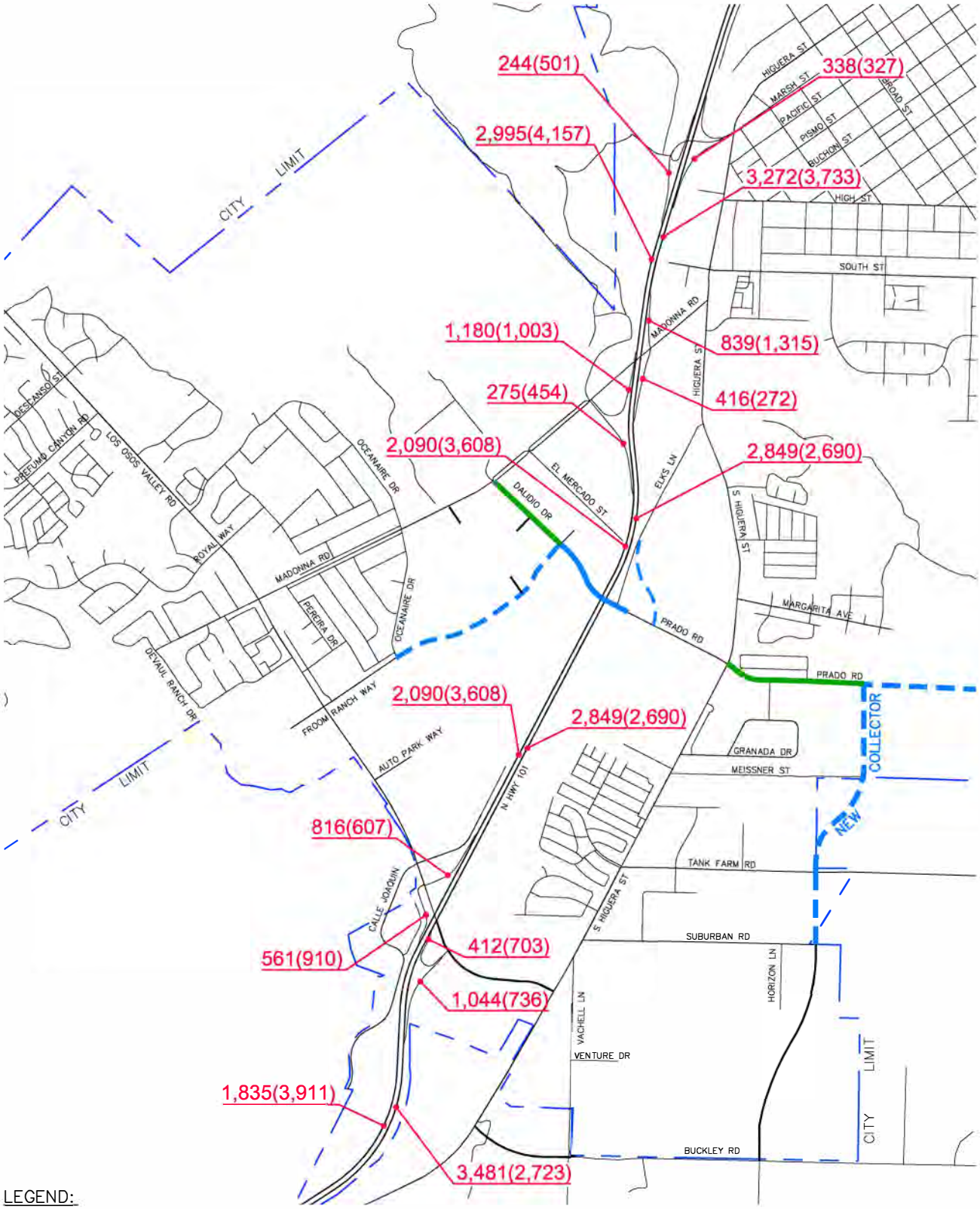
Consistent with the Final TIS, the project generated peak hour volume has been added to the derived 2035 Prado Road Overcrossing volumes to obtain the Year 2035 Prado Road Overcrossing Plus Project conditions. Figure 10 presents the Year 2035 Prado Road Overcrossing Plus Project US 101 mainline, ramp junctions, and weave sections peak hour traffic volumes.

Year 2035 Prado Road Overcrossing Plus Project Conditions Analysis

Table 19 provides a summary of the Year 2035 Prado Road Overcrossing freeway segments analysis for AM and PM peak hour conditions for the study segments along US 101. As shown in the table, the US 101 NB diverge to Los Osos Valley Road is projected to operate at LOS E during the AM peak hour, the US 101 SB merge from Los Valley Road is projected to operate at LOS E during the PM peak Hour, and the US 101 SB mainline south of Los Osos Valley Road is projected to operate at LOS E during the PM peak hour. The projected LOS E at these three locations and during these peak hour time periods are consistent with that reported for the Year 2035 Full Build Prado Interchange conditions. All other US 101 mainline, ramp merge and diverge, and weave sections are projected to operate at LOS D or better during both the AM and PM peak hours.

TABLE 19:
YEAR 2035 PRADO ROAD OVERCROSSING PLUS PROJECT CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

Interchange Location	Segment Type	No. of Lanes	AM Peak Hour Volume	AM Peak Hour Density (pc/mi/ln)	AM Peak Hour LOS	PM Peak Hour Volume	PM Peak Hour Density (pc/mi/ln)	PM Peak Hour LOS
US 101 Northbound								
US 101 NB South of Los Osos Valley Road	Freeway	2	**3,481**	**33.0**	**D**	2,723	24.0	C
US 101 NB Los Osos Valley Road Off Ramp	Diverge	1	**1,044**	**36.3**	**E**	**736**	**28.9**	**D**
US 101 NB Los Osos Valley Road On Ramp	Merge	1	412	26.7	C	703	25.2	C
US 101 NB South of Madonna Road	Freeway	2	2,849	25.3	C	2,690	23.7	C
US 101 NB Madonna Road Off Ramp	Diverge	1	**416**	**30.4**	**D**	**272**	**28.9**	**D**
US 101 NB South of Marsh Street	Weave	3	3,656	20.7	C	4,170	23.8	C
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	3,346	18.8	B	4,644	26.8	C
US 101 SB Madonna Road On Ramp	Merge	1	275	18.3	B	**454**	**31.7**	**D**
US 101 SB South of Madonna Road	Freeway	2	2,090	18.4	C	3,608	**35.0**	**D**
US 101 SB Los Osos Valley Road Off Ramp	Diverge	1	816	20.0	B	**607**	**34.9**	**D**
US 101 SB Los Osos Valley Road On Ramp	Merge	1	561	19.0	B	**910**	**37.3**	**E**
US 101 SB South of Los Osos Valley Road	Freeway	2	1,835	16.1	B	**3,911**	**40.4**	**E**



SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 10

Year 2035 Overcrossing Plus Project US 101 Peak Hour Traffic Volumes

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To supplement the HCS analysis, peak hour weaving section operations were also evaluated using the Leisch Method with these results provided in Table 20. As shown in this table, the SB weave between Marsh Street and Madonna Road is projected to operate at LOS E during the PM peak hour. The projected LOS E is consistent with that reported for the Year 2035 Full Build Prado Interchange conditions.

TABLE 20:
YEAR 2035 PRADO ROAD OVERCROSSING PLUS PROJECT CONDITIONS WEAVING SECTIONS – LEISCH METHOD

			AM Peak Hour			PM Peak Hour		
Interchange Location	Segment Type	No. of Lanes	Length	Total Volume	LOS	Length	Total Volume	LOS
US 101 Northbound								
US 101 NB North of Madonna Road	Weave	3	**1,330**	**3,656**	**C/D**	**1,330**	**4,170**	**D**
US 101 Southbound								
US 101 SB South of Marsh Street	Weave	3	2,065	3,346	C	**2,065**	**4,644**	**E**

Year 2035 Prado Road Overcrossing Plus Project Conditions Impacts Level of Significance

As previously noted for "Caltrans Significance Threshold", based on standard industry practice the project is considered to have a significant impact if it would:

- Result in a facility that will operate at an acceptable LOS in the *No Project* condition to deteriorate to an unacceptable LOS in the *Plus Project* condition; or,
- Increase the density by more than 5% at a facility that will operate at an unacceptable LOS.

Both the Year 2035 Prado Road Overcrossing conditions and the Year 2035 Prado Road Overcrossing Plus Project conditions identified that the US 101 NB diverge to Los Osos Valley Road is projected to operate at LOS E during the AM peak hour, the US 101 SB merge from Los Valley Road is projected to operate at LOS E during the PM peak Hour, and the US 101 SB mainline south of Los Osos Valley Road is projected to operate at LOS E during the PM peak hour. For both conditions, these represent facilities that are projected to operate at an unacceptable LOS. Table 21 shows whether the addition of project traffic is projected to increase the density by more than 5% at any of the locations. As shown in the table, the addition of the project's traffic would result in less than 1% increase in the density at any of the three locations

TABLE 21:
YEAR 2035 FULL BUILD PRADO INTERCHANGE PLUS PROJECT CONDITIONS LEVEL OF SIGNIFICANCE

		No Project Condition		Plus Project Condition		
Location	Segment Type	AM Peak Hour Density	PM Peak Hour Density	AM Peak Hour Density	PM Peak Hour Density	% Increase
US 101 NB Los Osos Valley Road Off Ramp	Diverge	36.1	---	36.3	---	0.006
US 101 SB Los Osos Valley Road On Ramp	Merge	---	37.0	---	37.3	0.008
US 101 SB South Los Osos Valley Road	Freeway	---	39.7	---	40.4	0.018

TECHNICAL APPENDIX

Existing Conditions .....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
- Leisch Method Worksheets.....

Existing Plus Project Conditions .....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
- Leisch Method Worksheets.....

Year 2025 Near Term Conditions .....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
- Leisch Method Worksheets.....

Year 2025 Near Term Plus Project Conditions .....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
- Leisch Method Worksheets.....

Year 2025 Near Term Plus Project Mitigation Conditions.....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
- Leisch Method Worksheets.....

Year 2035 Full Build Prado Interchange Conditions.....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
- Leisch Method Worksheets.....

Year 2035 Full Build Prado Interchange Plus Project Conditions.....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
- Leisch Method Worksheets.....

Year 2035 Prado Road Overcrossing Conditions.....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
- Leisch Method Worksheets.....

“Year 2035 Prado Road Overcrossing Plus Project Conditions.....

- US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets.....
  - Leisch Method Worksheets

Existing Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Existing Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2774	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	754	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1583	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1583	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	2	
Density, D	24.5	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2249	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	611	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1283	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1283	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.7	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2774	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	546	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	215	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2774	546	215	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	754	148	58	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3166	623	245	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3166 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3166	4700	No
$v_{FO} = v_F - v_R$	2543	4700	No
v_R	623	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3166 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3166	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 29.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.484

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2249	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	579	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	467	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2249	579	467	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	611	157	127	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2567	661	533	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2567 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2567	4700	No
$v_{FO} = v_F - v_R$	1906	4700	No
v_R	661	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2567 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2567	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 24.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.487

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2228	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	215	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	546	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2228	215	546	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	605	58	148	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2543	245	623	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2543 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2788	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2543 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2788	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 23.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.341

Space mean speed in ramp influence area, S_R = 57.2 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 57.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1670	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	467	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	579	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1670	467	579	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	454	127	157	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1906	533	661	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1906 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2439	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	

If yes, v_{12A} = 1906 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2439	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.322	
Space mean speed in ramp influence area,	S_R = 57.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2443	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	664	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1394	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1394	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.4	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2137	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	581	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1219	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1219	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.8	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/12/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2443	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	205	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	215	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2443	205	215	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	664	56	58	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, f_{HV}	0.952	0.952	0.952	
Driver population factor, f_P	1.00	1.00	1.00	
Flow rate, v_p	2788	234	245	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2788 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2788	4700	No
$v_{FO} = v_F - v_R$	2554	4700	No
v_R	234	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2788 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2788	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 26.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.449

Space mean speed in ramp influence area, S_R = 54.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.50

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/12/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2137	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	145	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	467	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2137	145	467	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	581	39	127	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, f_{HV}	0.952	0.952	0.952	
Driver population factor, f_P	1.00	1.00	1.00	
Flow rate, v_p	2439	165	533	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2439 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2439	4700	No
$v_{FO} = v_F - v_R$	2274	4700	No
v_R	165	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2439 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2439	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 23.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.443

Space mean speed in ramp influence area, S_R = 54.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.8 mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	2140	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2022	200	216	50	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	538	53	57	13	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2259	223	241	56	pc/h

Volume ratio, VR	0.167	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	67	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1252	lc/h
Total lane changes, LCALL	1319	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.154

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	58.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.3	mi/h
Weaving segment density, D	23.8	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.634	
Weaving segment flow rate, v	2779	pc/h
Weaving segment capacity, cW	4175	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4201	2140	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2192	c
		Maximum	Analyzed	
v/c ratio		1.00	0.634	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	2140	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1792	396	200	99	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	477	105	53	26	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2002	442	223	111	pc/h

Volume ratio, VR	0.239	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	67	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1210	lc/h
Total lane changes, LCALL	1277	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.150

Average weaving speed, SW	58.5	mi/h
Average non-weaving speed, SNW	58.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.4	mi/h
Weaving segment density, D	23.8	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.650	
Weaving segment flow rate, v	2778	pc/h
Weaving segment capacity, cW	4069	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4943	2140	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2136	c
		Maximum	Analyzed	
v/c ratio		1.00	0.650	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.50

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/12/18
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2022	513	200	136	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	538	136	53	36	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2259	573	223	152	pc/h

Volume ratio, VR	0.248	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.0	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	640	lc/h
Total lane changes, LCALL	753	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.144

Average weaving speed, SW	58.7	mi/h
Average non-weaving speed, SNW	59.9	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.6	mi/h
Weaving segment density, D	17.9	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.517	
Weaving segment flow rate, v	3055	veh/h
Weaving segment capacity, cW	5906	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5035	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2067	c
		Maximum	Analyzed	
v/c ratio		1.00	0.517	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1953	621	235	100	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	519	165	63	27	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2182	694	263	112	pc/h

Volume ratio, VR	0.294	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	616	lc/h
Total lane changes, LCALL	729	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.141

Average weaving speed, SW	58.8	mi/h
Average non-weaving speed, SNW	59.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.5	mi/h
Weaving segment density, D	18.2	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.534	
Weaving segment flow rate, v	3251	pc/h
Weaving segment capacity, cW	5797	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5524	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2029	c
		Maximum	Analyzed	
v/c ratio		1.00	0.534	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/12/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1311	208	731	51	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	349	55	194	14	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1464	232	817	57	pc/h

Volume ratio, VR	0.408	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	855	lc/h
Total lane changes, LCALL	1002	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.128

Average weaving speed, SW	59.3	mi/h
Average non-weaving speed, SNW	60.9	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	60.2	mi/h
Weaving segment density, D	14.2	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.437	
Weaving segment flow rate, v	2570	pc/h
Weaving segment capacity, cW	5600	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6773	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1990	c
		Maximum	Analyzed	
v/c ratio		1.00	0.437	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/12/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2093	411	754	103	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	557	109	201	27	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2338	459	842	115	pc/h

Volume ratio, VR	0.347	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1047	lc/h
Total lane changes, LCALL	1194	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.147

Average weaving speed, SW	58.6	mi/h
Average non-weaving speed, SNW	59.0	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.9	mi/h
Weaving segment density, D	21.3	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.613	
Weaving segment flow rate, v	3754	pc/h
Weaving segment capacity, cW	5834	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6089	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2042	c
		Maximum	Analyzed	
v/c ratio		1.00	0.613	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1519	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	144	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	782	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1690	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1519	144	782	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	413	39	212	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1734	164	892	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1734 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1898	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1734 (Equation 13-15, 13-16, 18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1898	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 14.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.284	
Space mean speed in ramp influence area,	S_R = 58.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.5	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2504	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	377	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	857	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1690	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2504	377	857	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	680	102	233	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2858	430	978	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2858 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3288	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2858 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3288	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 25.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.362

Space mean speed in ramp influence area, S_R = 56.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 56.7 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2881	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	783	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1644	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1644	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.2	mi/h
Number of lanes, N	2	
Density, D	25.6	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1663	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	452	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	949	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	949	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.6	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1663	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	621	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	363	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1663	621	363	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	452	169	99	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1898	709	414	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1898 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1898	4700	No
$v_{FO} = v_F - v_R$	1189	4700	No
v_R	709	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 1898 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1898	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 15.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.492

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2881	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	611	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	773	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2881	611	773	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	783	166	210	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3288	697	882	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3288 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3288	4700	No
$v_{FO} = v_F - v_R$	2591	4700	No
v_R	697	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3288 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3288	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 27.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.491

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.50

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/12/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1042	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	363	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	621	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1042	363	621	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	283	99	169	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1189	414	709	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1189 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1603	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 1189 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1603	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 15.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.312	
Space mean speed in ramp influence area,	S_R = 57.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.8	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.50

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/12/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2270	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	773	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	611	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2270	773	611	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	617	210	166	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2591	882	697	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2591 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3473	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2591 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3473	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 29.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.419	
Space mean speed in ramp influence area,	S_R = 55.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 55.4	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/12/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1405	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	382	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	802	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	802	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	12.3	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/12/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	Existing 2014
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3043	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	827	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1736	pc/h/ln

Speed Inputs and Adjustments

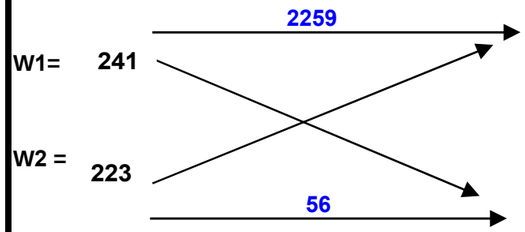
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1736	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.4	mi/h
Number of lanes, N	2	
Density, D	27.4	pc/mi/ln
Level of service, LOS	D	

Existing Conditions

Leisch Method Worksheets



LOS weave = A

Compo. LOS = D/E

V = 2779 pcph

L = 2140 feet

W1 = 241 pcph

W2 = 223 pcph

V_w = 464 pcph

R = 0.48

Direction : North

Project: Existing

Year: 2014 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd

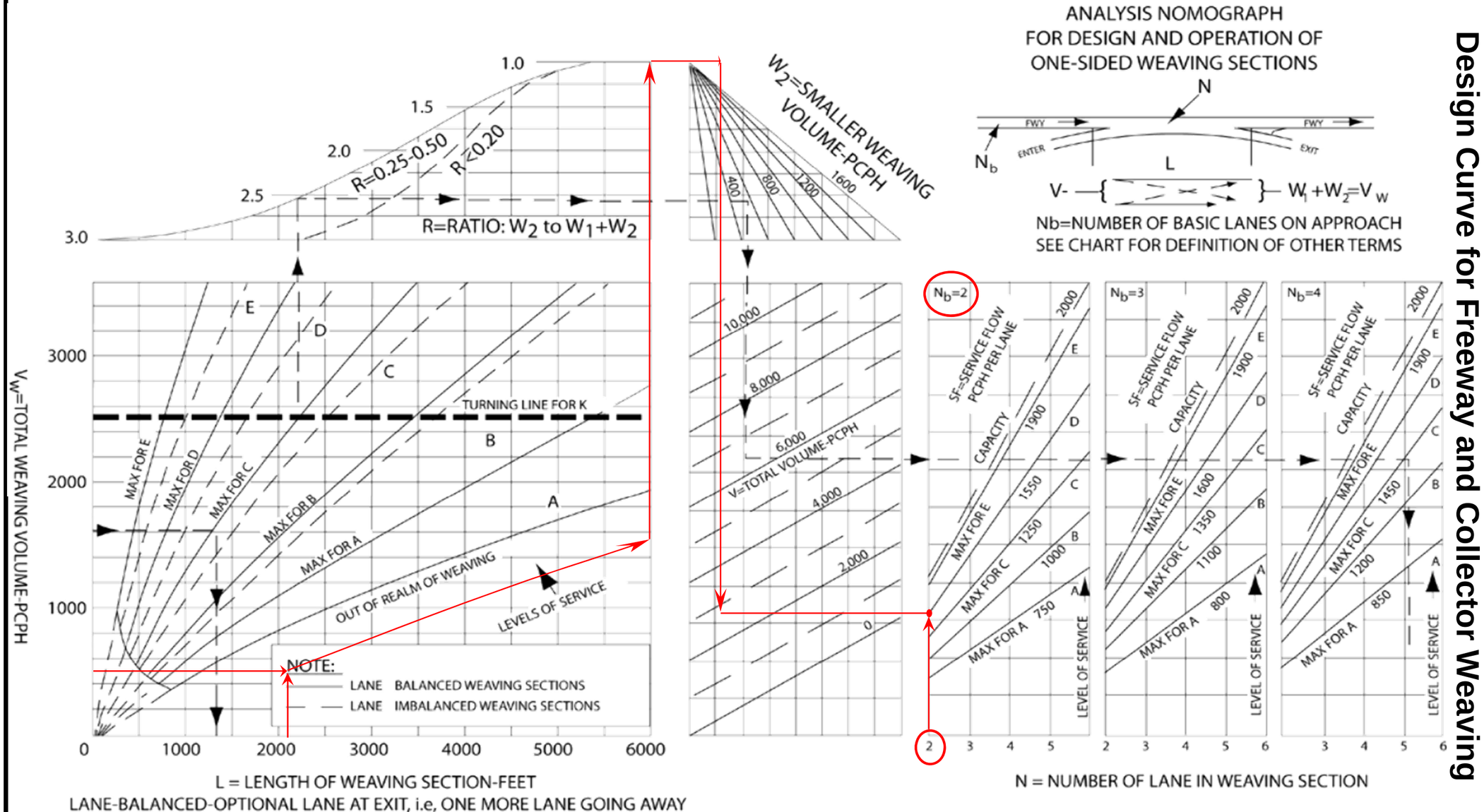
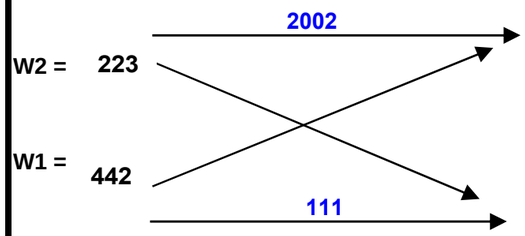


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = D/E

V = 2778 pcph

L = 2140 feet

W1 = 442 pcph

W2 = 223 pcph

V_w = 665 pcph

R = 0.34

Direction : North

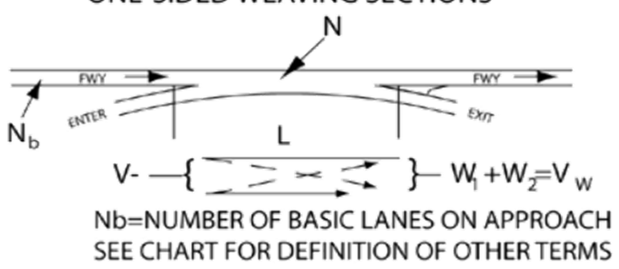
Project: Existing

Year: 2014 Peak Hour: PM Peak

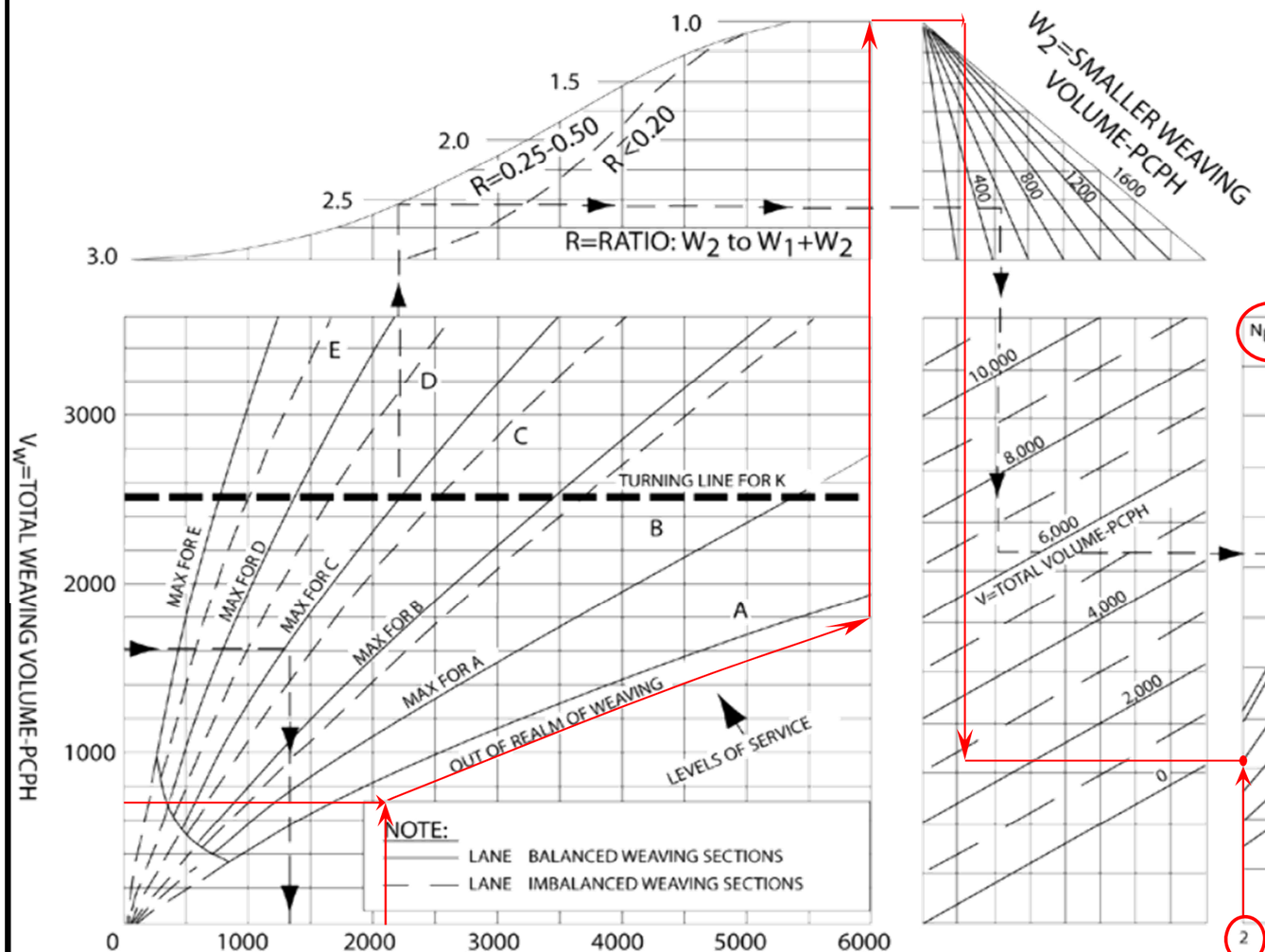
On Ramp: Prado Rd

Off Ramp: Madonna Rd

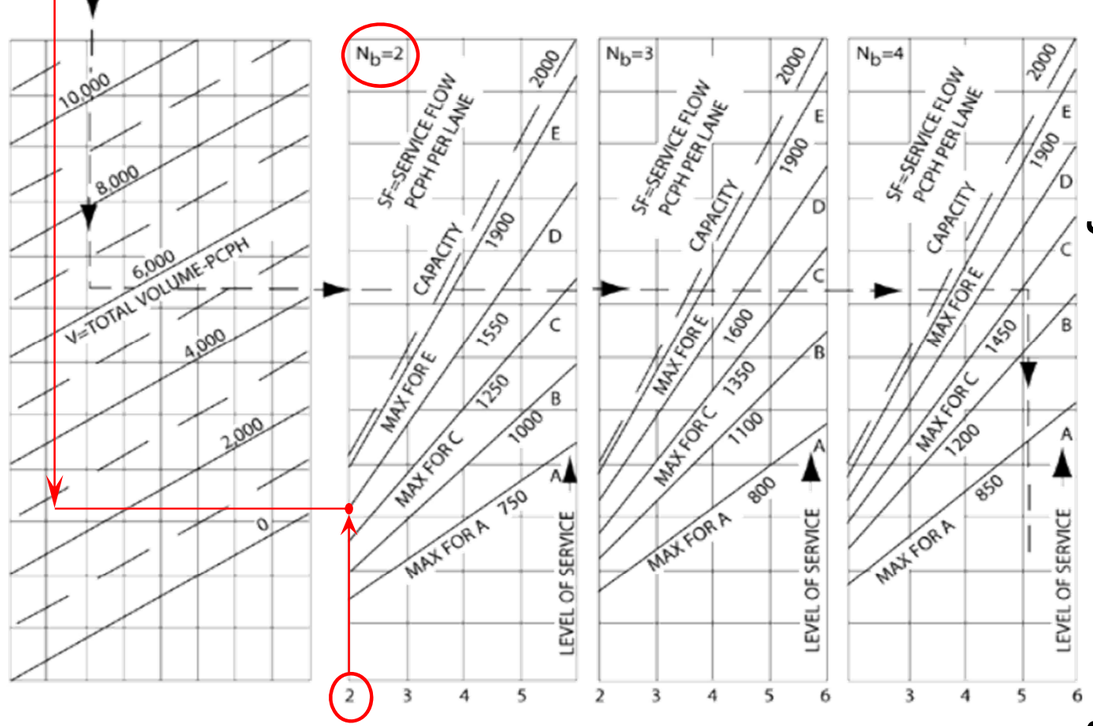
ANALYSIS NOMOGRAPH
FOR DESIGN AND OPERATION OF
ONE-SIDED WEAVING SECTIONS



Nb=NUMBER OF BASIC LANES ON APPROACH
SEE CHART FOR DEFINITION OF OTHER TERMS

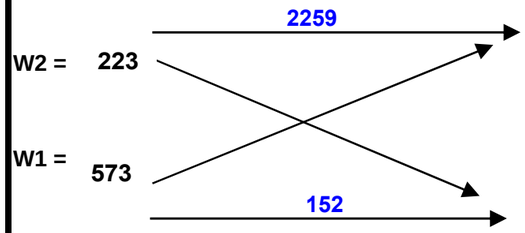


L = LENGTH OF WEAVING SECTION-FEET
LANE-BALANCED-OPTIONAL LANE AT EXIT, i.e, ONE MORE LANE GOING AWAY



N = NUMBER OF LANE IN WEAVING SECTION

Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3207 pcph

L = 1330 feet

W1 = 573 pcph

W2 = 223 pcph

V_w = 796 pcph

R = 0.28

Direction : North

Project: Existing

Year: 2014 Peak Hour: AM Peak

On Ramp: Madonna Rd

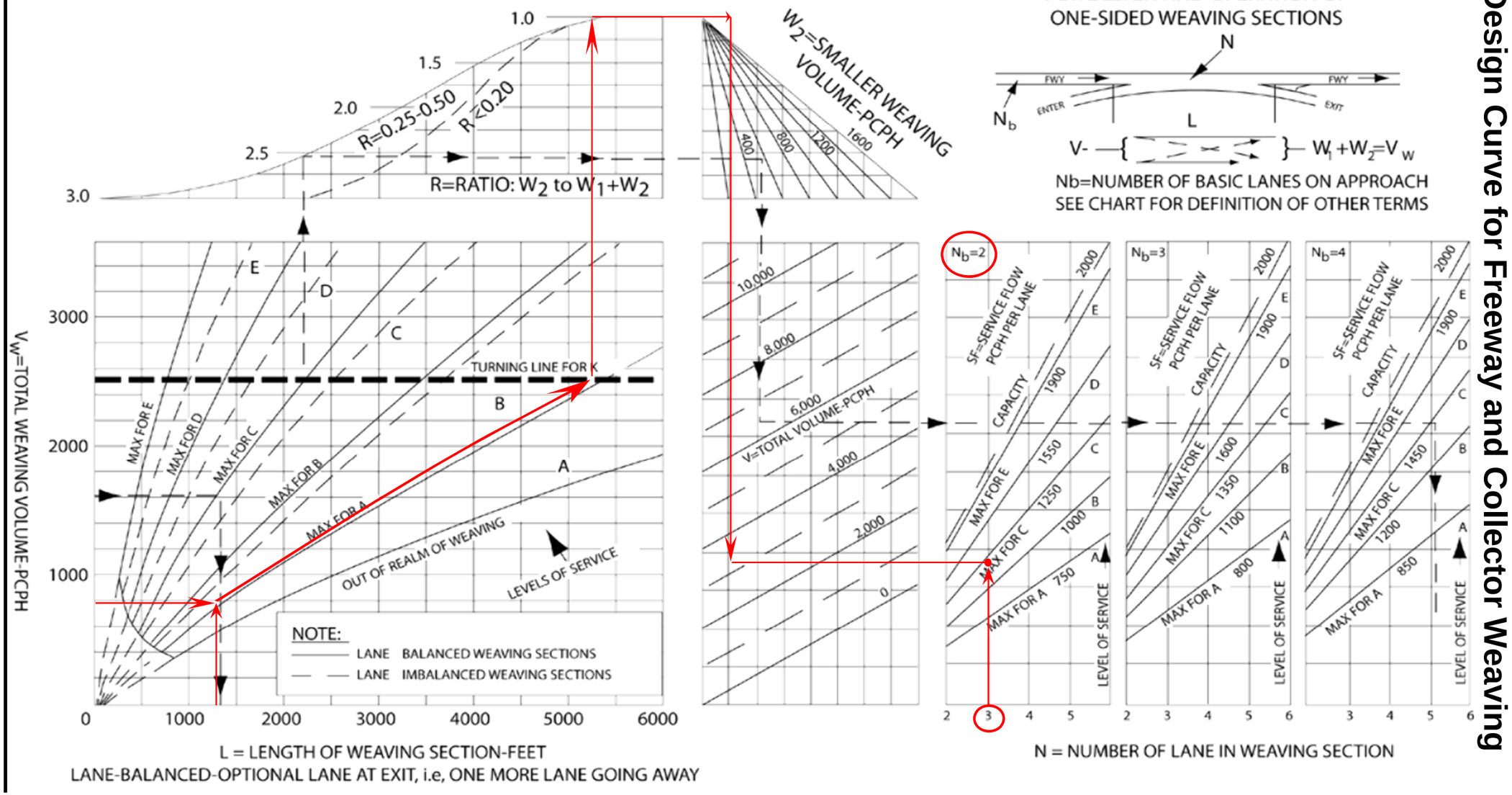
Off Ramp: Marsh St

LOS weave = B

Compo. LOS = C

ANALYSIS NOMOGRAPH
FOR DESIGN AND OPERATION OF
ONE-SIDED WEAVING SECTIONS

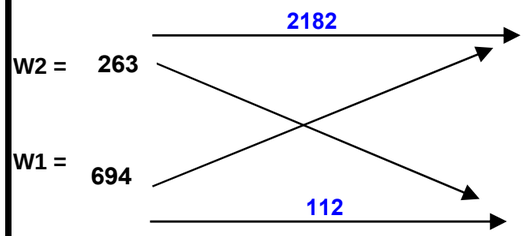
Nb=NUMBER OF BASIC LANES ON APPROACH
SEE CHART FOR DEFINITION OF OTHER TERMS



L = LENGTH OF WEAVING SECTION-FEET
LANE-BALANCED-OPTIONAL LANE AT EXIT, i.e, ONE MORE LANE GOING AWAY

N = NUMBER OF LANE IN WEAVING SECTION

Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3251 pcph

L = 1330 feet

W1 = 694 pcph

W2 = 263 pcph

V_w = 957 pcph

R = 0.27

Direction : North

Project: Existing

Year: 2014 Peak Hour: PM Peak

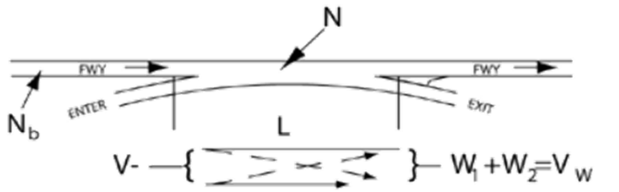
On Ramp: Madonna Rd

Off Ramp: Marsh St

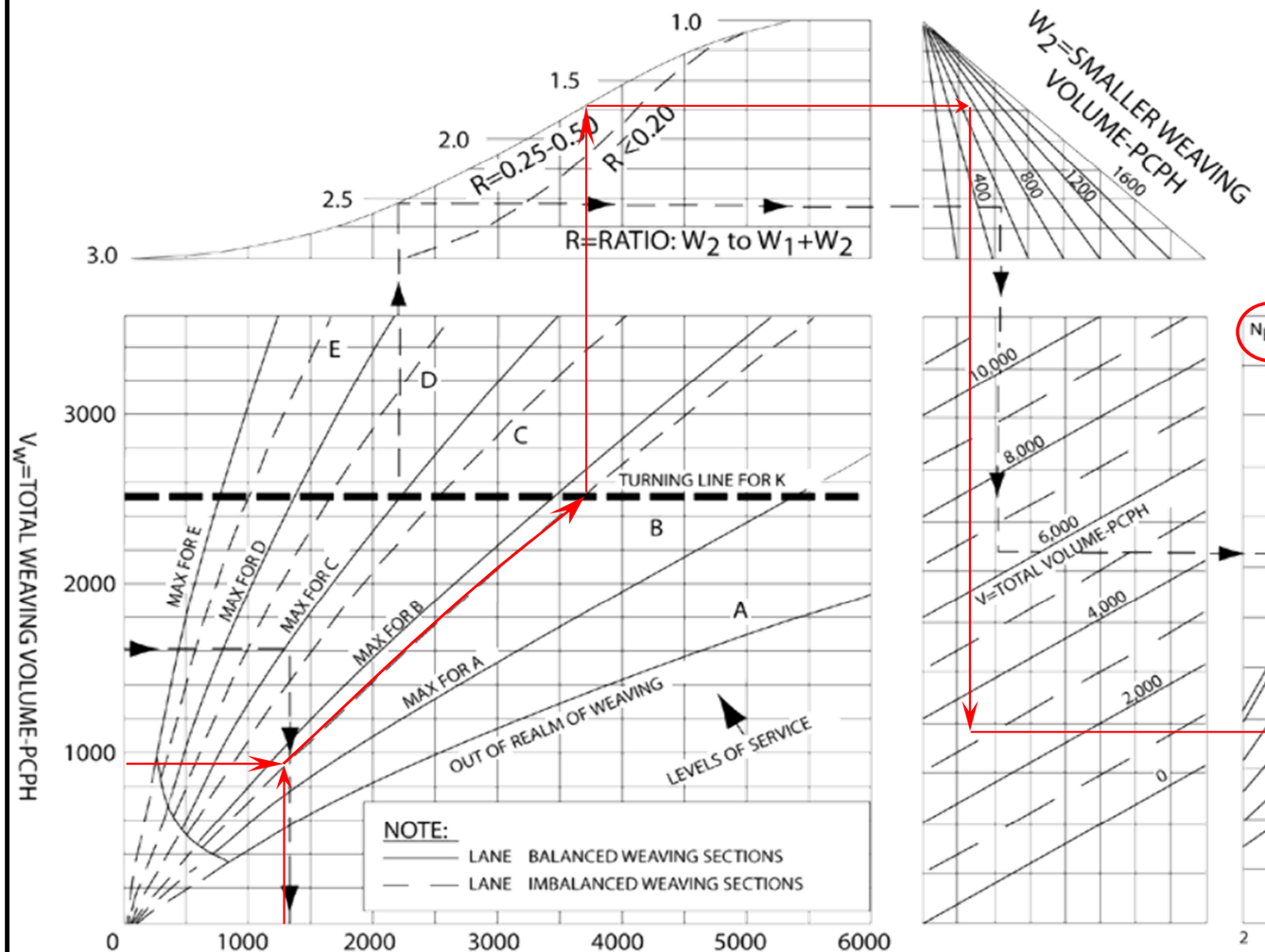
LOS weave = B

Compo. LOS = C

ANALYSIS NOMOGRAPH
FOR DESIGN AND OPERATION OF
ONE-SIDED WEAVING SECTIONS



Nb=NUMBER OF BASIC LANES ON APPROACH
SEE CHART FOR DEFINITION OF OTHER TERMS



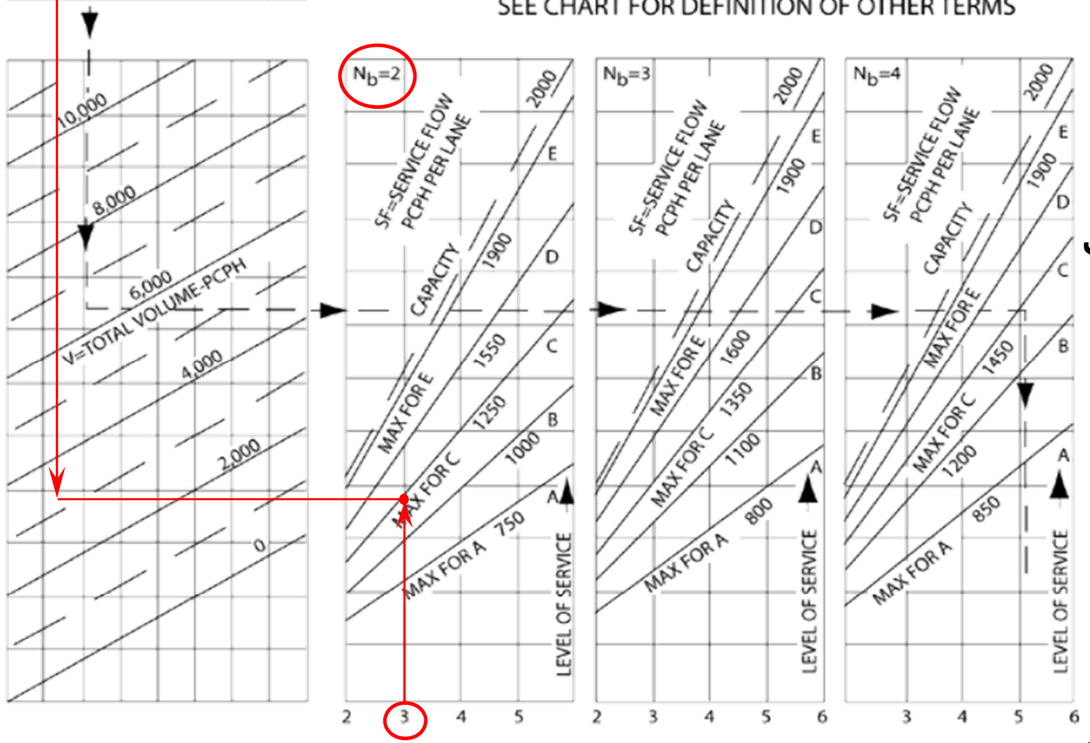
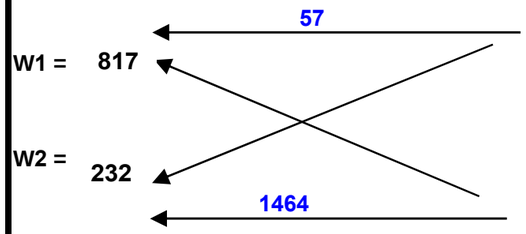


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = B/C

V = 2570 pcph

L = 2065 feet

W1 = 817 pcph

W2 = 232 pcph

V_w = 1049 pcph

R = 0.22

Direction : South

Project: Existing

Year: *2014* Peak Hour: AM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

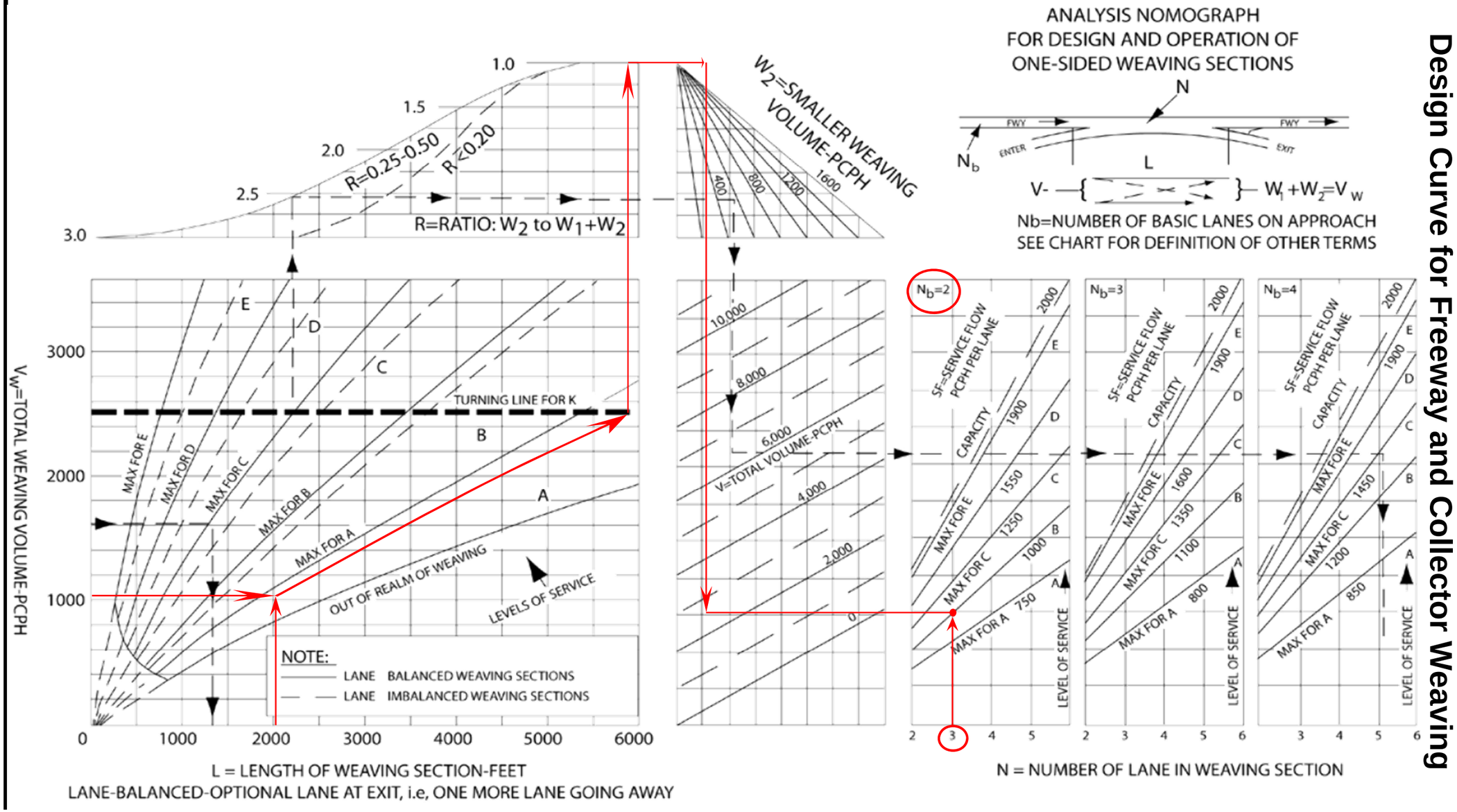
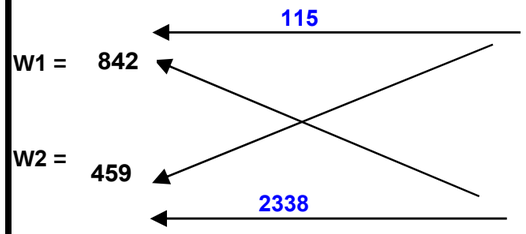


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = D

V = 3754 pcph

L = 2065 feet

W1 = 842 pcph

W2 = 459 pcph

V_w = 1301 pcph

R = 0.35

Direction : South

Project: Existing

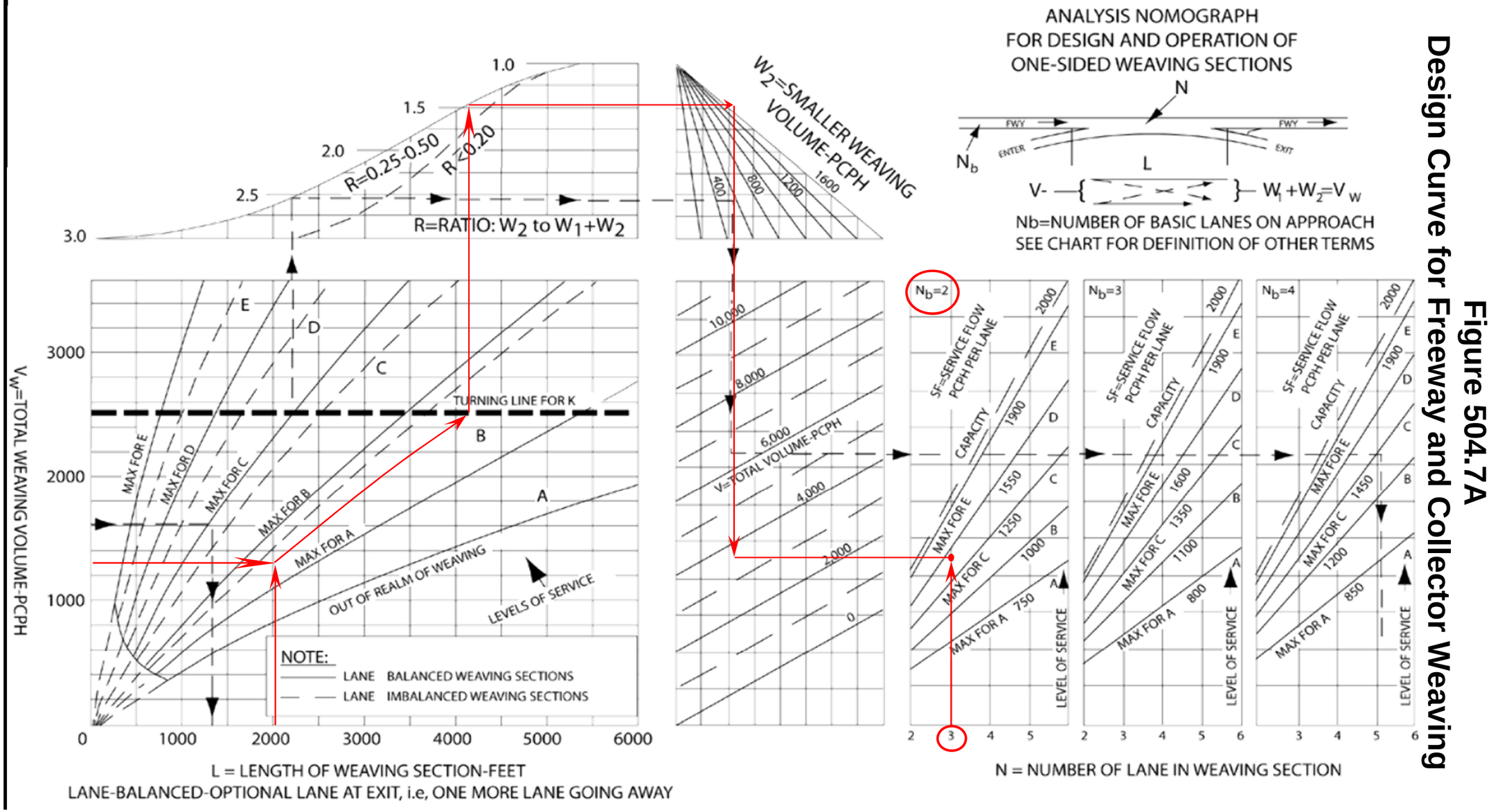
Year: 2014 Peak Hour: PM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

Design Curve for Freeway and Collector Weaving

Figure 504.7A



Existing Plus Project Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Existing Plus Project Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2815	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	765	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1606	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1606	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.4	mi/h
Number of lanes, N	2	
Density, D	24.9	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2276	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	618	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1299	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1299	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.0	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2815	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	559	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	221	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2815	559	221	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	765	152	60	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3213	638	252	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3213 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3213	4700	No
$v_{FO} = v_F - v_R$	2575	4700	No
v_R	638	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3213 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3213	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 29.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.485

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR OFF RAMP
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2276	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	595	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	475	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2276	595	475	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	618	162	129	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2598	679	542	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2598 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2598	4700	No
$v_{FO} = v_F - v_R$	1919	4700	No
v_R	679	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2598 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2598	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 24.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.489

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2256	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	221	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	559	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2256	221	559	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	613	60	152	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2575	252	638	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2575 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2827	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2575 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2827	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 23.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.343

Space mean speed in ramp influence area, S_R = 57.1 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 57.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1681	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	475	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	595	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1681	475	595	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	457	129	162	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1919	542	679	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1919 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2461	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1919 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2461	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.323	
Space mean speed in ramp influence area,	S_R = 57.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2477	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	673	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1414	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1414	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.8	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan TIS

Flow Inputs and Adjustments

Volume, V	2156	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	586	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1230	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1230	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.9	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2477	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	225	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	221	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2477	225	221	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	673	61	60	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2827	257	252	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2827 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2827	4700	No
$v_{FO} = v_F - v_R$	2570	4700	No
v_R	257	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2827 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2827	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 27.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.451

Space mean speed in ramp influence area, S_R = 54.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.6 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2156	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	145	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	475	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2156	145	475	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	586	39	129	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2461	165	542	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2461 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2461	4700	No
$v_{FO} = v_F - v_R$	2296	4700	No
v_R	165	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2461 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2461	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 23.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.443

Space mean speed in ramp influence area, S_R = 54.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.8 mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	2140	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2022	200	230	50	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	538	53	61	13	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2259	223	257	56	pc/h

Volume ratio, VR	0.172	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	67	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1252	lc/h
Total lane changes, LCALL	1319	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.154

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	58.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.3	mi/h
Weaving segment density, D	24.0	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.638	
Weaving segment flow rate, v	2795	pc/h
Weaving segment capacity, cW	4170	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4249	2140	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2189	c
		Maximum	Analyzed	
v/c ratio		1.00	0.638	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	2140	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1792	396	219	99	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	477	105	58	26	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2002	442	245	111	pc/h

Volume ratio, VR	0.245	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	67	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1210	lc/h
Total lane changes, LCALL	1277	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.150

Average weaving speed, SW	58.5	mi/h
Average non-weaving speed, SNW	58.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.3	mi/h
Weaving segment density, D	24.0	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.657	
Weaving segment flow rate, v	2800	pc/h
Weaving segment capacity, cW	4059	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5005	2140	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2131	c
		Maximum	Analyzed	
v/c ratio		1.00	0.657	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2023	553	199	147	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	538	147	53	39	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2260	618	222	164	pc/h

Volume ratio, VR	0.257	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	642	lc/h
Total lane changes, LCALL	755	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.145	

Average weaving speed, SW	58.7	mi/h
Average non-weaving speed, SNW	59.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.5	mi/h
Weaving segment density, D	18.3	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.528	
Weaving segment flow rate, v	3264	pc/h
Weaving segment capacity, cW	5883	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5131	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2059	c
		Maximum	Analyzed	
v/c ratio		1.00	0.528	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1949	683	239	110	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	518	182	64	29	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2177	763	267	123	pc/h

Volume ratio, VR	0.309	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	617	lc/h
Total lane changes, LCALL	730	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.141

Average weaving speed, SW	58.8	mi/h
Average non-weaving speed, SNW	59.7	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.4	mi/h
Weaving segment density, D	18.7	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.550	
Weaving segment flow rate, v	3330	pc/h
Weaving segment capacity, cW	5763	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5684	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2017	c
		Maximum	Analyzed	
v/c ratio		1.00	0.550	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1309	216	783	53	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	348	57	208	14	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1462	241	875	59	pc/h

Volume ratio, VR	0.423	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	855	lc/h
Total lane changes, LCALL	1002	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.128

Average weaving speed, SW	59.3	mi/h
Average non-weaving speed, SNW	60.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	60.2	mi/h
Weaving segment density, D	14.6	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.465	
Weaving segment flow rate, v	2637	pc/h
Weaving segment capacity, cW	5401	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6943	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1977	c
		Maximum	Analyzed	
v/c ratio		1.00	0.465	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2090	422	822	106	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	556	112	219	28	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2335	471	918	118	pc/h

Volume ratio, VR	0.362	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1047	lc/h
Total lane changes, LCALL	1194	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.147

Average weaving speed, SW	58.6	mi/h
Average non-weaving speed, SNW	58.9	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.8	mi/h
Weaving segment density, D	21.8	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.631	
Weaving segment flow rate, v	3842	pc/h
Weaving segment capacity, cW	5800	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6253	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2030	c
		Maximum	Analyzed	
v/c ratio		1.00	0.631	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1525	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	157	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	836	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1690	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1525	157	836	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	414	43	227	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1740	179	954	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1740 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1919	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1740 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1919	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 14.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.285	
Space mean speed in ramp influence area,	S_R = 58.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.5	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2512	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	396	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	928	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1690	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2512	396	928	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	683	108	252	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2867	452	1059	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2867 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3319	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2867 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3319	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 25.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.366	
Space mean speed in ramp influence area,	S_R = 56.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1682	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	457	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	960	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	960	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.8	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, A GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2908	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	790	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1659	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1659	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.0	mi/h
Number of lanes, N	2	
Density, D	25.9	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1682	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	627	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	377	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1682	627	377	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	457	170	102	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1920	716	430	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1920 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1920	4700	No
$v_{FO} = v_F - v_R$	1204	4700	No
v_R	716	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 1920 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1920	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 16.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.492

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2908	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	619	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	793	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2908	619	793	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	790	168	215	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3319	706	905	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3319 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3319	4700	No
$v_{FO} = v_F - v_R$	2613	4700	No
v_R	706	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3319 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3319	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 28.0+ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.492	
Space mean speed in ramp influence area,	S_R = 53.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.7	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1055	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	377	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	627	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1055	377	627	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	287	102	170	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1204	430	716	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1204 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1634	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 1204 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1634	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 15.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.313	
Space mean speed in ramp influence area,	S_R = 57.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.8	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/13/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2289	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	793	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	619	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2289	793	619	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	622	215	168	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2612	905	706	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2612 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3517	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2612 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3517	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 30.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.424	
Space mean speed in ramp influence area,	S_R = 55.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 55.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1432	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	389	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	817	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	817	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	12.6	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/13/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	Existing Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3082	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	837	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1759	pc/h/ln

Speed Inputs and Adjustments

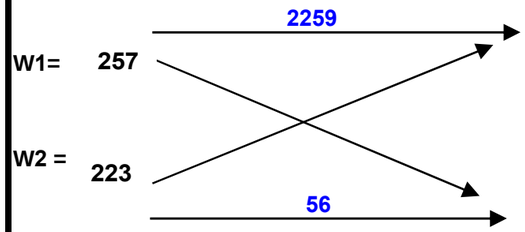
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1759	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.2	mi/h
Number of lanes, N	2	
Density, D	27.8	pc/mi/ln
Level of service, LOS	D	

Existing Plus Project Conditions

Leisch Method Worksheets



LOS weave = A

Compo. LOS = D/E

V = 2795 pcph

L = 2140 feet

W1 = 257 pcph

W2 = 223 pcph

V_w = 480 pcph

R = 0.46

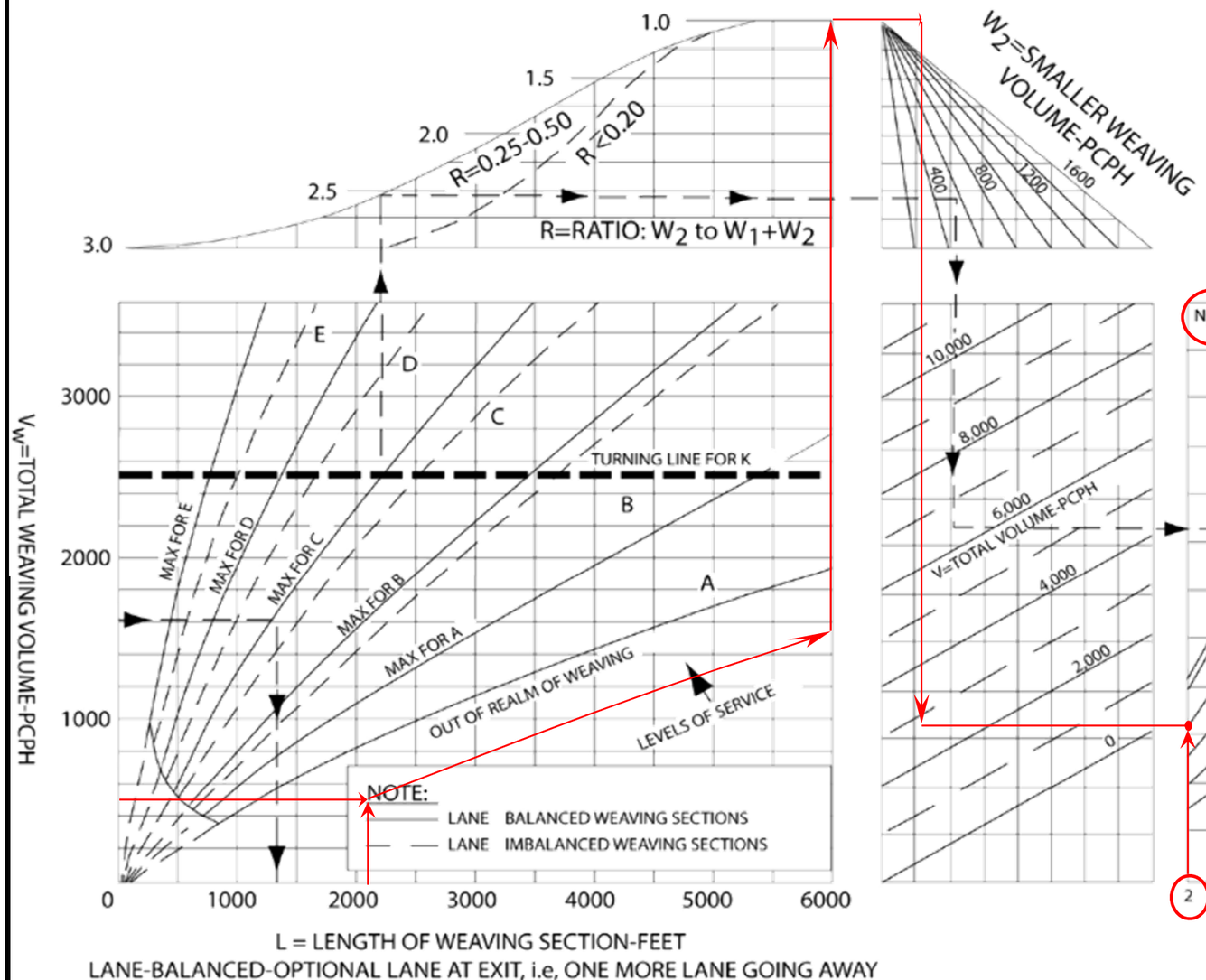
Direction : North

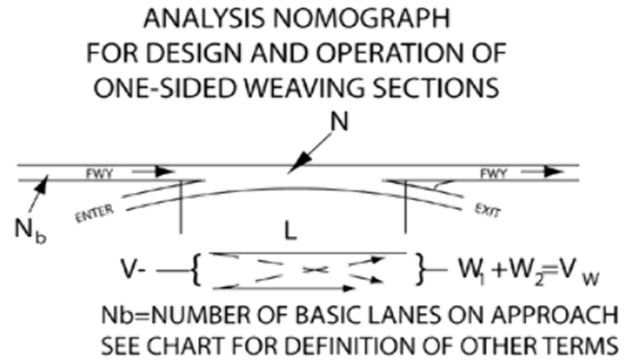
Project: Existing Plus Project

Year: 2014 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





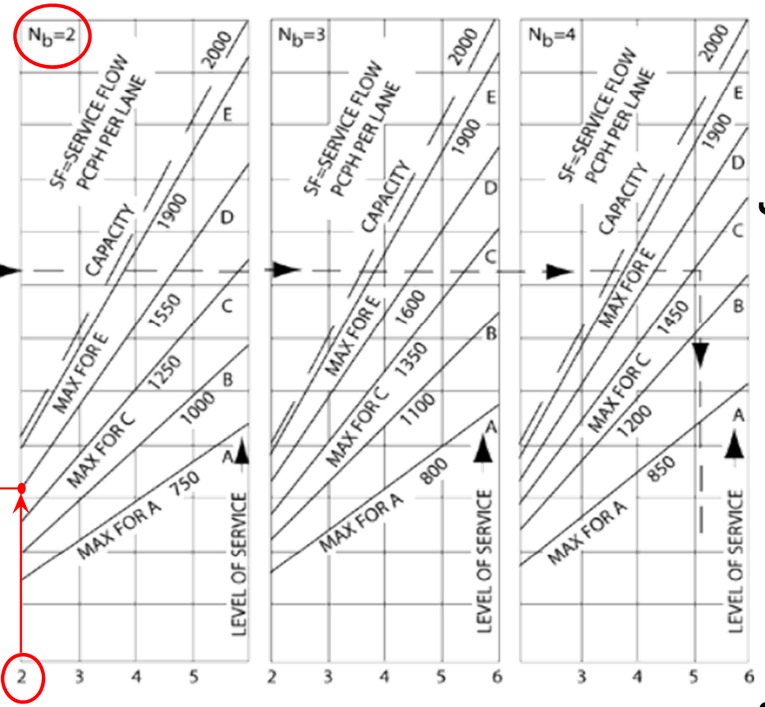
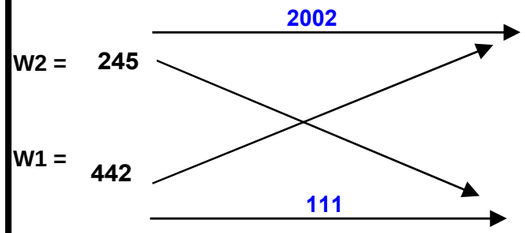


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = D/E

V = 2800 pcph

L = 2140 feet

W1 = 442 pcph

W2 = 245 pcph

V_w = 687 pcph

R = 0.36

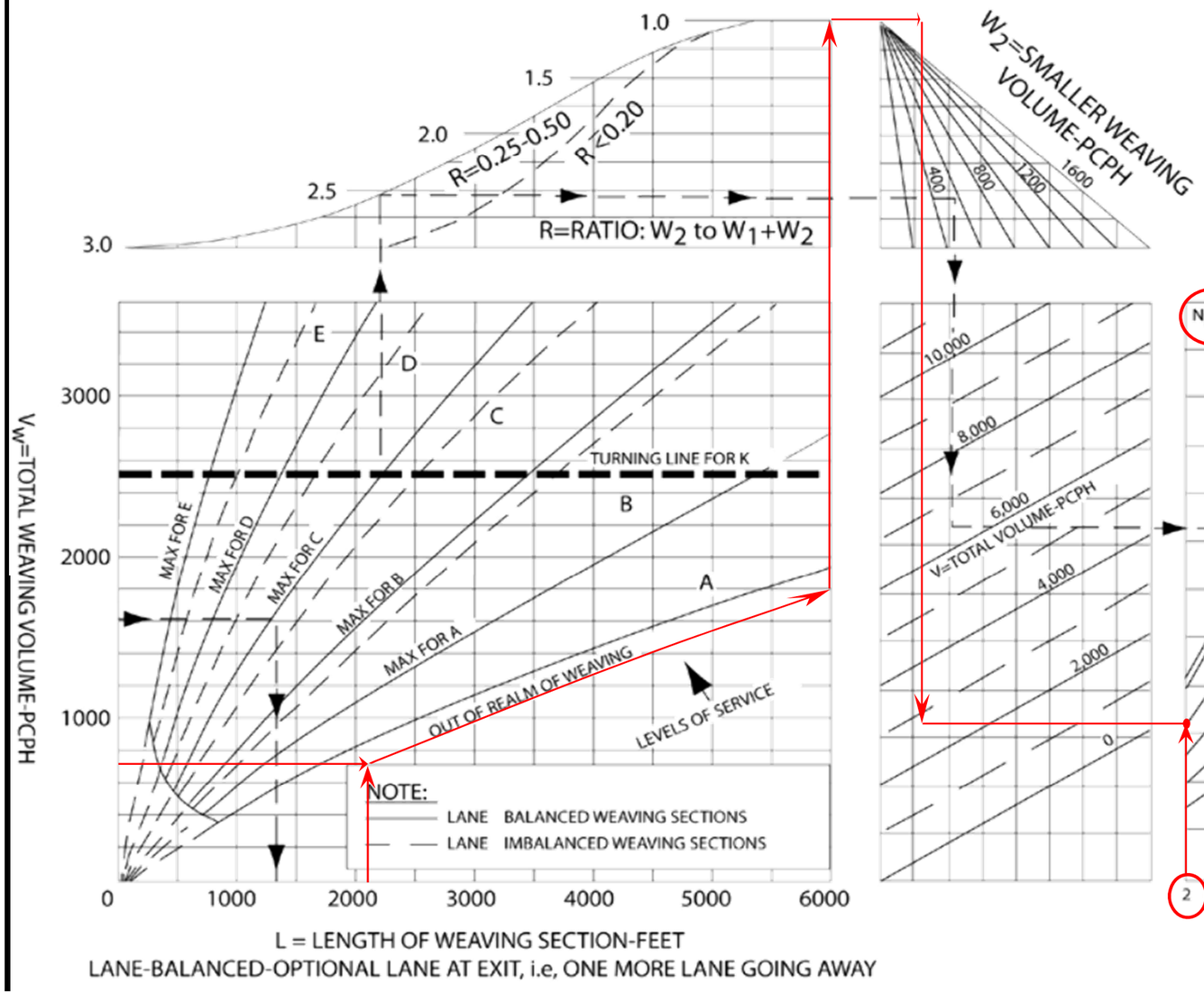
Direction : North

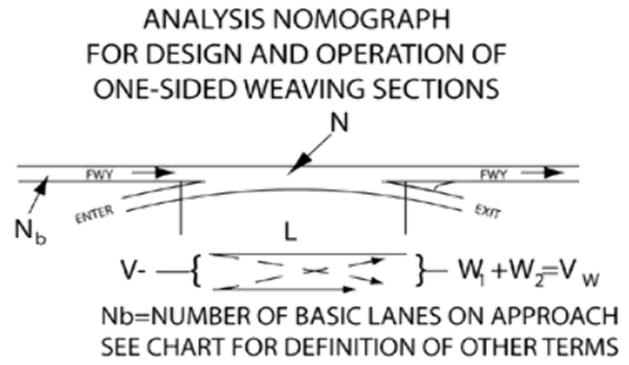
Project: Existing Plus Project

Year: 2014 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





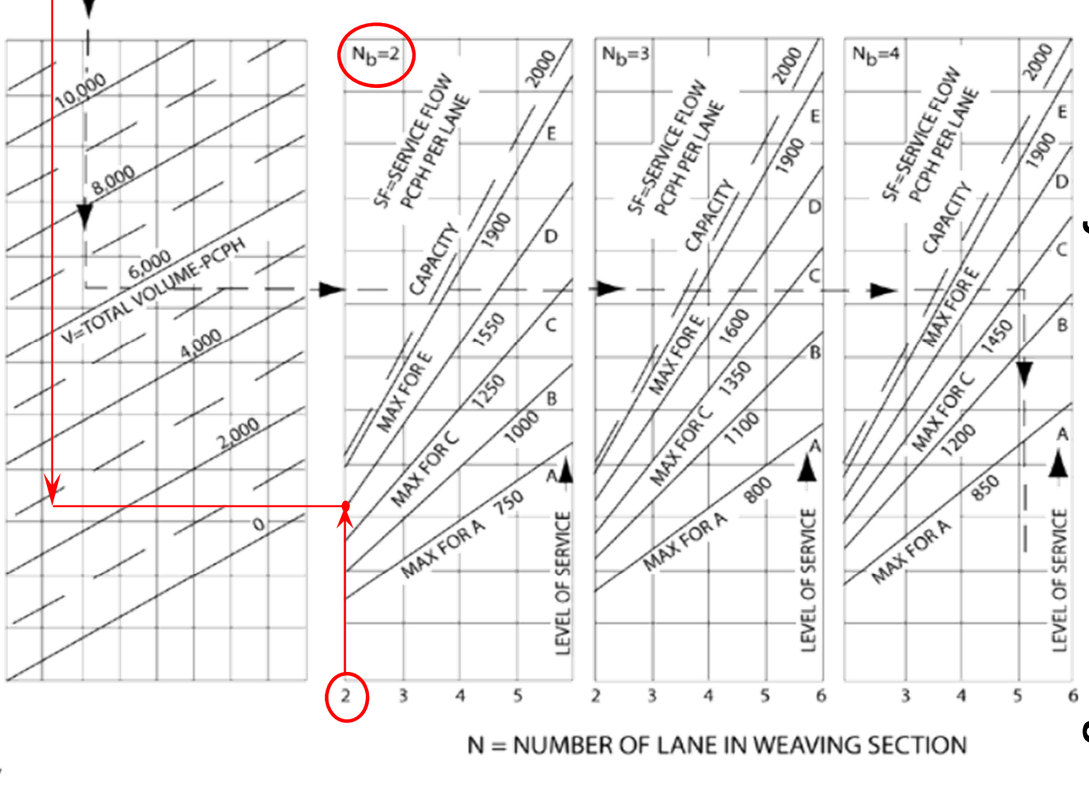
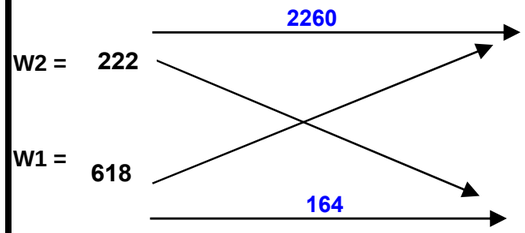


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3264 pcph

L = 1330 feet

W1 = 618 pcph

W2 = 222 pcph

V_w = 840 pcph

R = 0.26

Direction : North

Project: Existing Plus Project

Year: 2014 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

LOS weave = B

Compo. LOS = C

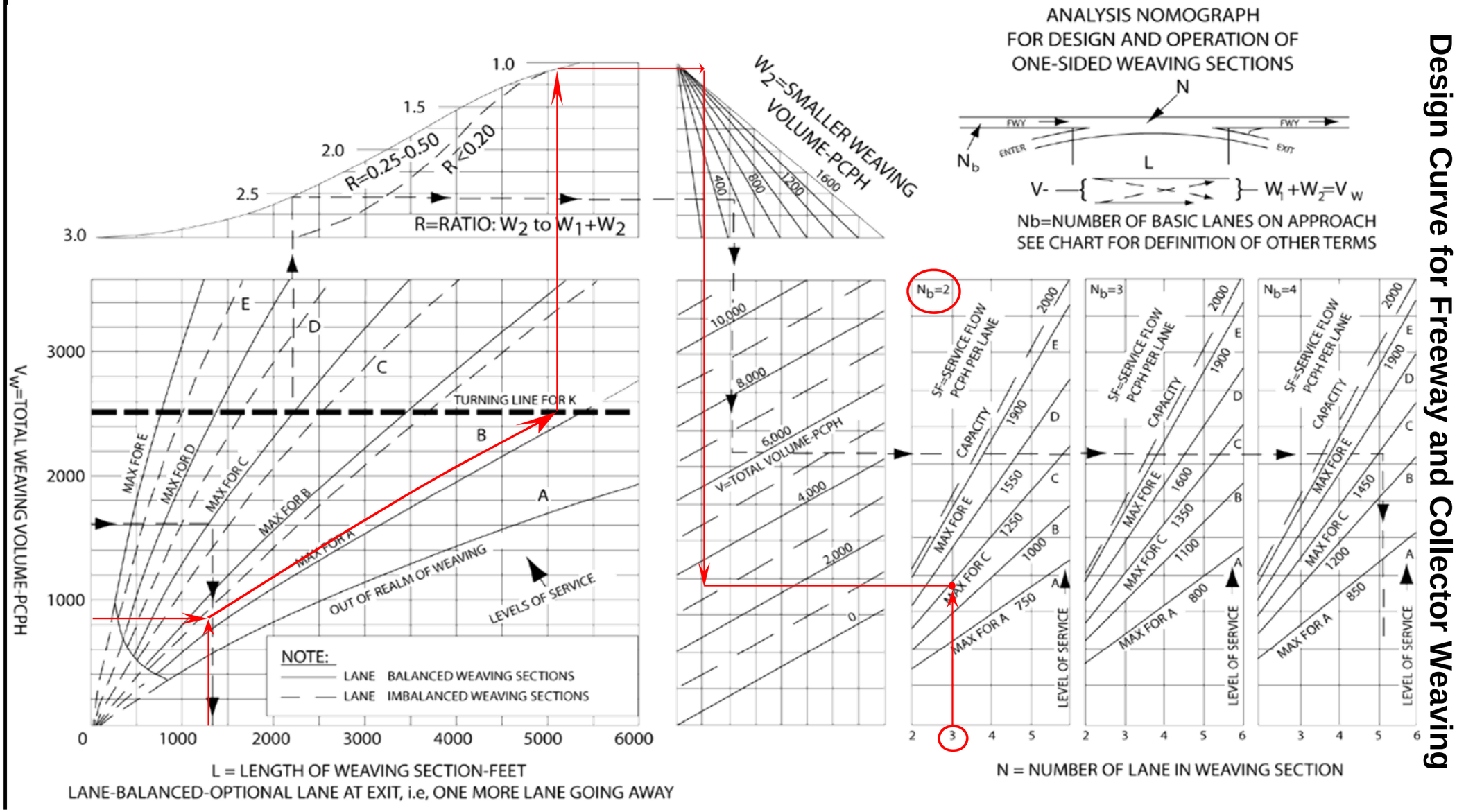
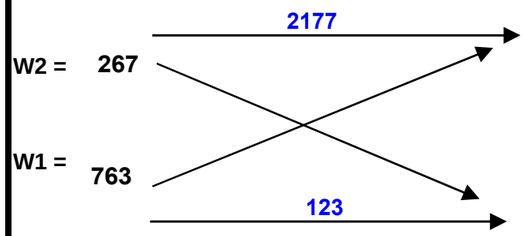


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3330 pcph

L = 1330 feet

W1 = 763 pcph

W2 = 267 pcph

V_w = 1030 pcph

R = 0.26

Direction : North

Project: Existing Plus Project

Year: 2014 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

LOS weave = B

Compo. LOS = C

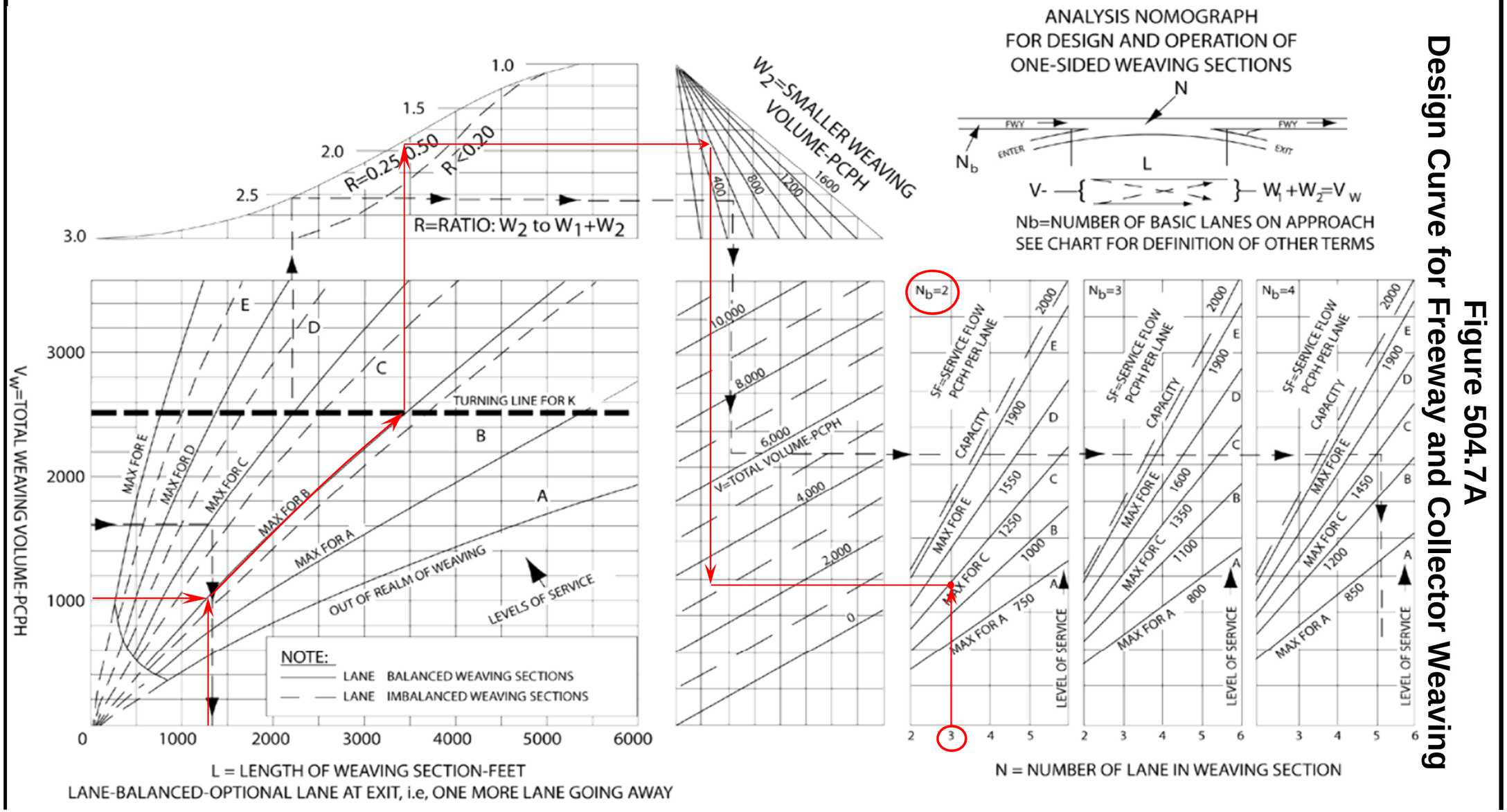
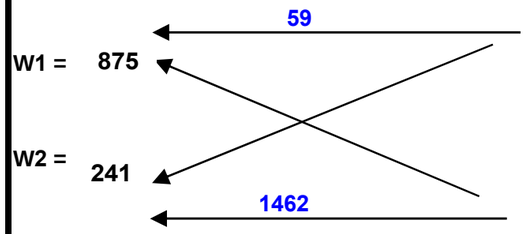


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = B/C

V = 2637 pcph

L = 2065 feet

W1 = 875 pcph

W2 = 241 pcph

V_w = 1116 pcph

R = 0.22

Direction : South

Project: Existing Plus Project

Year: 2014 Peak Hour: AM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

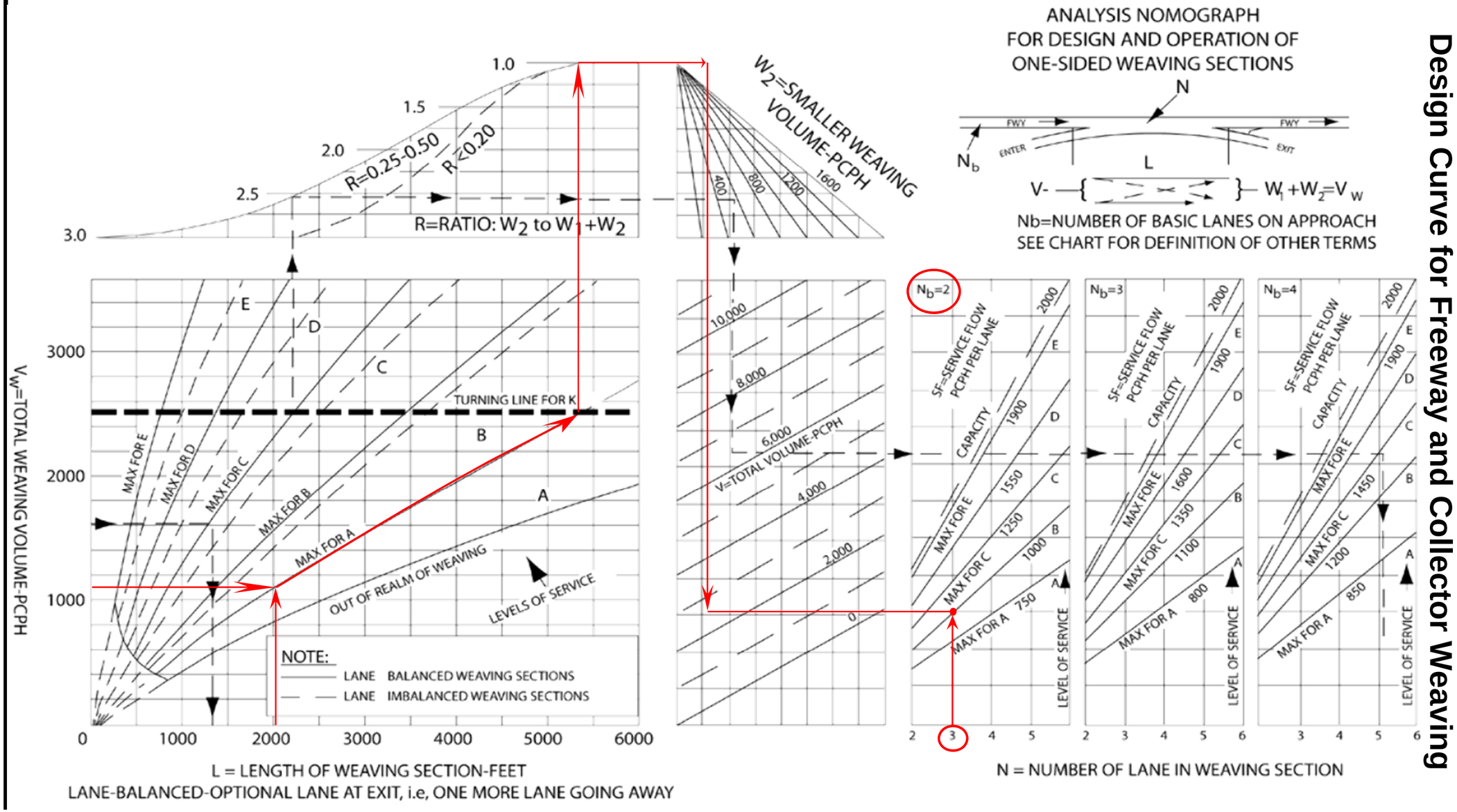
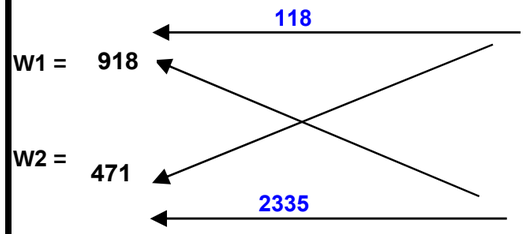


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3842 pcph V_w = 1389 pcph

L = 2065 feet R = 0.34

W1 = 918 pcph

W2 = 471 pcph Direction : South

Project: Existing Plus Project

Year: 2014 Peak Hour: PM Peak

On Ramp: Marsh St

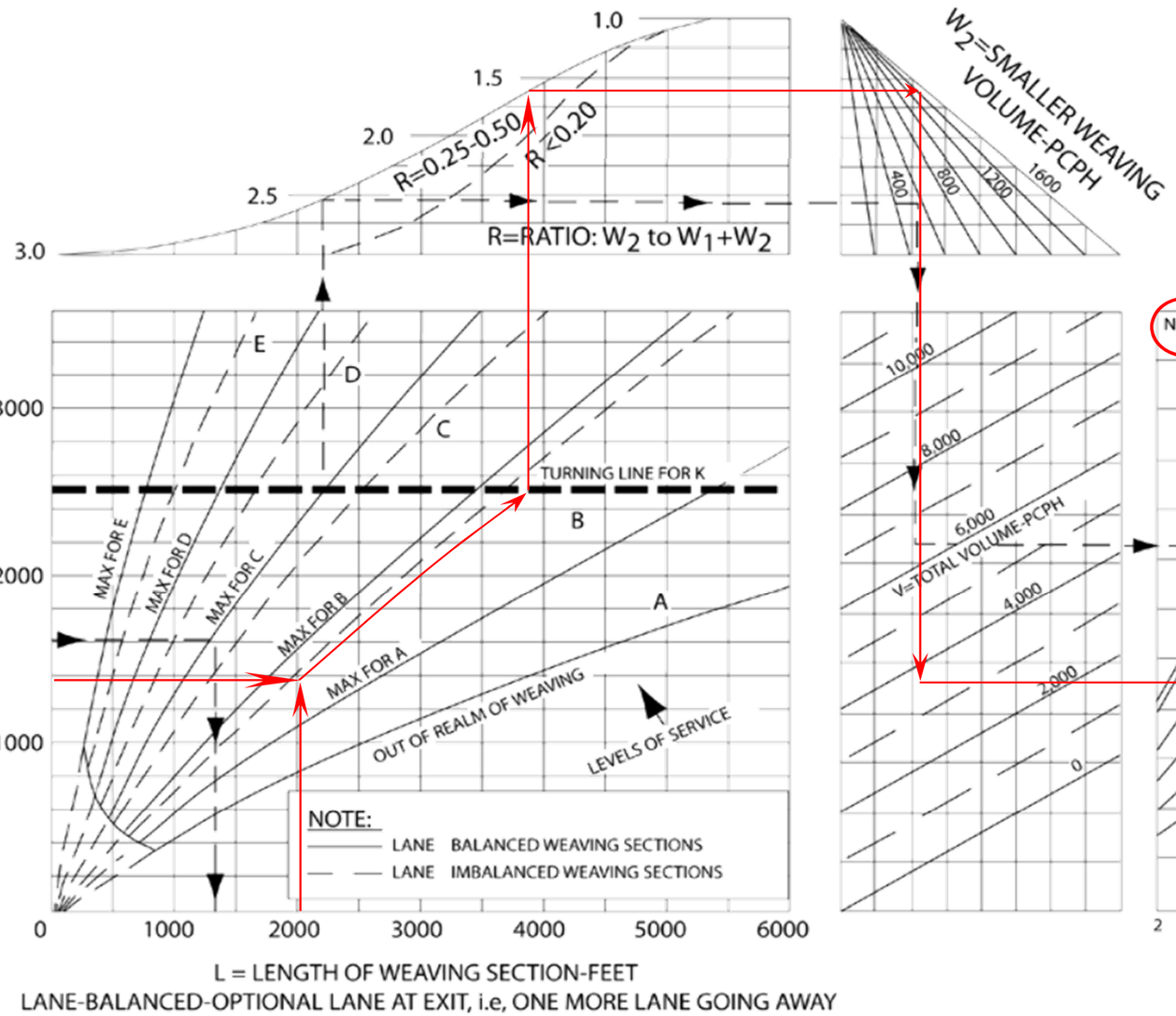
Off Ramp: Madonna Rd

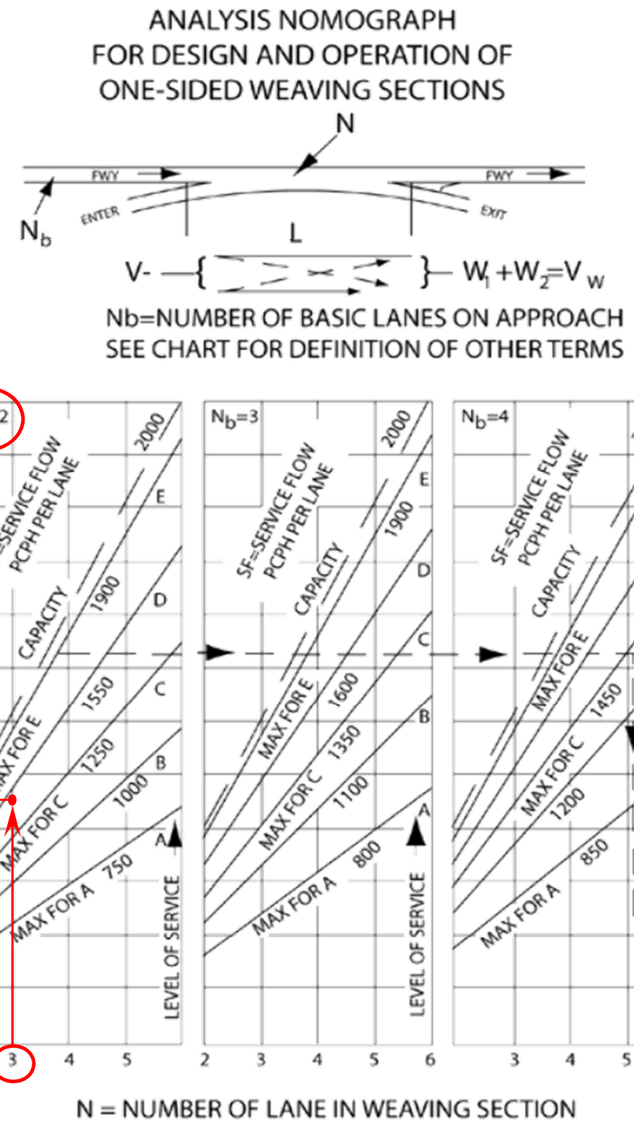
LOS weave = B

Compo. LOS = D

Design Curve for Freeway and Collector Weaving

Figure 504.7A





Year 2025 Near Term Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Year 2025 Near Term Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3165	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	860	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1806	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1806	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.7	mi/h
Number of lanes, N	2	
Density, D	28.8	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2501	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	680	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1427	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1427	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.0	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3165	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	630	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	221	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3165	630	221	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	860	171	60	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3612	719	252	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3612 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3612	4700	No
$v_{FO} = v_F - v_R$	2893	4700	No
v_R	719	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3612 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3612	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 33.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.493

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR OFF RAMP
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2501	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	604	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	494	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2501	604	494	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	680	164	134	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2854	689	564	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2854 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2854	4700	No
$v_{FO} = v_F - v_R$	2165	4700	No
v_R	689	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2854 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2854	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 26.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.490

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2535	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	221	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	630	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2535	221	630	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	689	60	171	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2893	252	719	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2893 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3145	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2893 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3145	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 26.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.368	
Space mean speed in ramp influence area,	S_R = 56.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.5	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1897	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	494	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	604	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1897	494	604	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	515	134	164	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2165	564	689	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2165 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2729	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2165 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2729	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 22.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.337	
Space mean speed in ramp influence area,	S_R = 57.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2756	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	749	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1573	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1573	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	24.4	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2391	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	650	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1364	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1364	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.0	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2756	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	311	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	221	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2756	311	221	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	749	85	60	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3145	355	252	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3145 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3145	4700	No
$v_{FO} = v_F - v_R$	2790	4700	No
v_R	355	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3145 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3145	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 29.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.460

Space mean speed in ramp influence area, S_R = 54.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.4 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2391	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	135	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	494	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2391	135	494	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	650	37	134	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2729	154	564	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2729 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2729	4700	No
$v_{FO} = v_F - v_R$	2575	4700	No
v_R	154	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2729 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2729	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 26.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.442

Space mean speed in ramp influence area, S_R = 54.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.8 mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	2140	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2246	261	199	65	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	597	69	53	17	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2509	292	222	73	pc/h

Volume ratio, VR	0.166	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	67	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1307	lc/h
Total lane changes, LCALL	1374	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.159

Average weaving speed, SW	58.1	mi/h
Average non-weaving speed, SNW	57.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.7	mi/h
Weaving segment density, D	26.8	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.706	
Weaving segment flow rate, v	3096	pc/h
Weaving segment capacity, cW	4177	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4192	2140	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2193	c
		Maximum	Analyzed	
v/c ratio		1.00	0.706	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	2140	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2108	425	148	106	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	561	113	39	28	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2355	475	165	118	pc/h

Volume ratio, VR	0.206	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	67	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1284	lc/h
Total lane changes, LCALL	1351	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.157

Average weaving speed, SW	58.2	mi/h
Average non-weaving speed, SNW	57.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.7	mi/h
Weaving segment density, D	27.0	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.720	
Weaving segment flow rate, v	3113	pc/h
Weaving segment capacity, cW	4118	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4593	2140	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2162	c
		Maximum	Analyzed	
v/c ratio		1.00	0.720	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2281	469	226	125	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	607	125	60	33	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2548	524	252	140	pc/h

Volume ratio, VR	0.224	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	697	lc/h
Total lane changes, LCALL	810	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.153

Average weaving speed, SW	58.4	mi/h
Average non-weaving speed, SNW	59.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.2	mi/h
Weaving segment density, D	19.5	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.554	
Weaving segment flow rate, v	3464	pc/h
Weaving segment capacity, cW	5960	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4783	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2086	c
		Maximum	Analyzed	
v/c ratio		1.00	0.554	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2287	640	246	103	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	608	170	65	27	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2555	715	275	115	pc/h

Volume ratio, VR	0.270	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	693	lc/h
Total lane changes, LCALL	806	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.152

Average weaving speed, SW	58.4	mi/h
Average non-weaving speed, SNW	59.1	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.9	mi/h
Weaving segment density, D	20.7	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.595	
Weaving segment flow rate, v	3660	pc/h
Weaving segment capacity, cW	5854	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5270	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2049	c
		Maximum	Analyzed	
v/c ratio		1.00	0.595	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1421	219	753	54	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	378	58	200	14	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1587	245	841	60	pc/h

Volume ratio, VR	0.397	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	881	lc/h
Total lane changes, LCALL	1028	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.130

Average weaving speed, SW	59.2	mi/h
Average non-weaving speed, SNW	60.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	60.1	mi/h
Weaving segment density, D	15.2	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.456	
Weaving segment flow rate, v	2733	pc/h
Weaving segment capacity, cW	5711	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6652	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1999	c
		Maximum	Analyzed	
v/c ratio		1.00	0.456	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	Two-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2416	427	715	108	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	643	114	190	29	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2699	477	799	121	pc/h

Volume ratio, VR	0.030	

Configuration Characteristics

Number of maneuver lanes, NWL	0	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF		lc/pc
Minimum FR lane changes, LCFR		lc/pc
Minimum RR lane changes, LCRR	3	lc/pc
Minimum weaving lane changes, LCMIN	363	lc/h
Weaving lane changes, LCW	510	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1360	lc/h
Total lane changes, LCALL	1870	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.209

Average weaving speed, SW	56.4	mi/h
Average non-weaving speed, SNW	55.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	55.8	mi/h
Weaving segment density, D	24.4	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.666	
Weaving segment flow rate, v	4096	pc/h
Weaving segment capacity, cW	5854	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6001	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2049	c
		Maximum	Analyzed	
v/c ratio		1.00	0.666	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1640	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	219	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1640	219		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	446	60		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1872	250	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1872 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2122	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1872 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2122	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 16.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.291	
Space mean speed in ramp influence area,	S_R = 58.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.3	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2843	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	390	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2843	390		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	773	106		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3245	445	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3245 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3690	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3245 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3690	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 28.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.414	
Space mean speed in ramp influence area,	S_R = 55.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 55.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1859	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	505	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1061	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1061	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.3	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3233	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	879	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1845	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1845	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.2	mi/h
Number of lanes, N	2	
Density, D	29.7	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1859	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	670	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	400	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1859	670	400	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	505	182	109	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2122	765	457	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2122 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2122	4700	No
$v_{FO} = v_F - v_R$	1357	4700	No
v_R	765	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2122 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2122	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 17.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.497

Space mean speed in ramp influence area, S_R = 53.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.6 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3233	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	565	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	810	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3233	565	810	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	879	154	220	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3690	645	924	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3690 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3690	4700	No
$v_{FO} = v_F - v_R$	3045	4700	No
v_R	645	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3690 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3690	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 31.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.486	
Space mean speed in ramp influence area,	S_R = 53.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.8	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1189	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	400	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	670	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1189	400	670	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	323	109	182	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1357	457	765	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1357 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1814	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1357 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1814	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 16.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.317	
Space mean speed in ramp influence area,	S_R = 57.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.7	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2668	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	810	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	565	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2668	810	565	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	725	220	154	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3045	924	645	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3045 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3969	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3045 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3969	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 33.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.499	
Space mean speed in ramp influence area,	S_R = 53.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.5	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1589	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	432	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	907	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	907	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.0	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Near Term
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3478	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	945	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1985	pc/h/ln

Speed Inputs and Adjustments

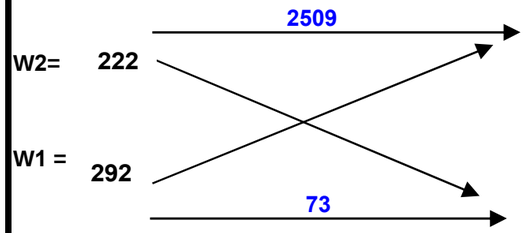
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1985	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.1	mi/h
Number of lanes, N	2	
Density, D	33.0	pc/mi/ln
Level of service, LOS	D	

Year 2025 Near Term Conditions

Leisch Method Worksheets



LOS weave = A

Compo. LOS = E

V = 3096 pcph

L = 2140 feet

W1 = 292 pcph

W2 = 222 pcph

V_w = 514 pcph

R = 0.43

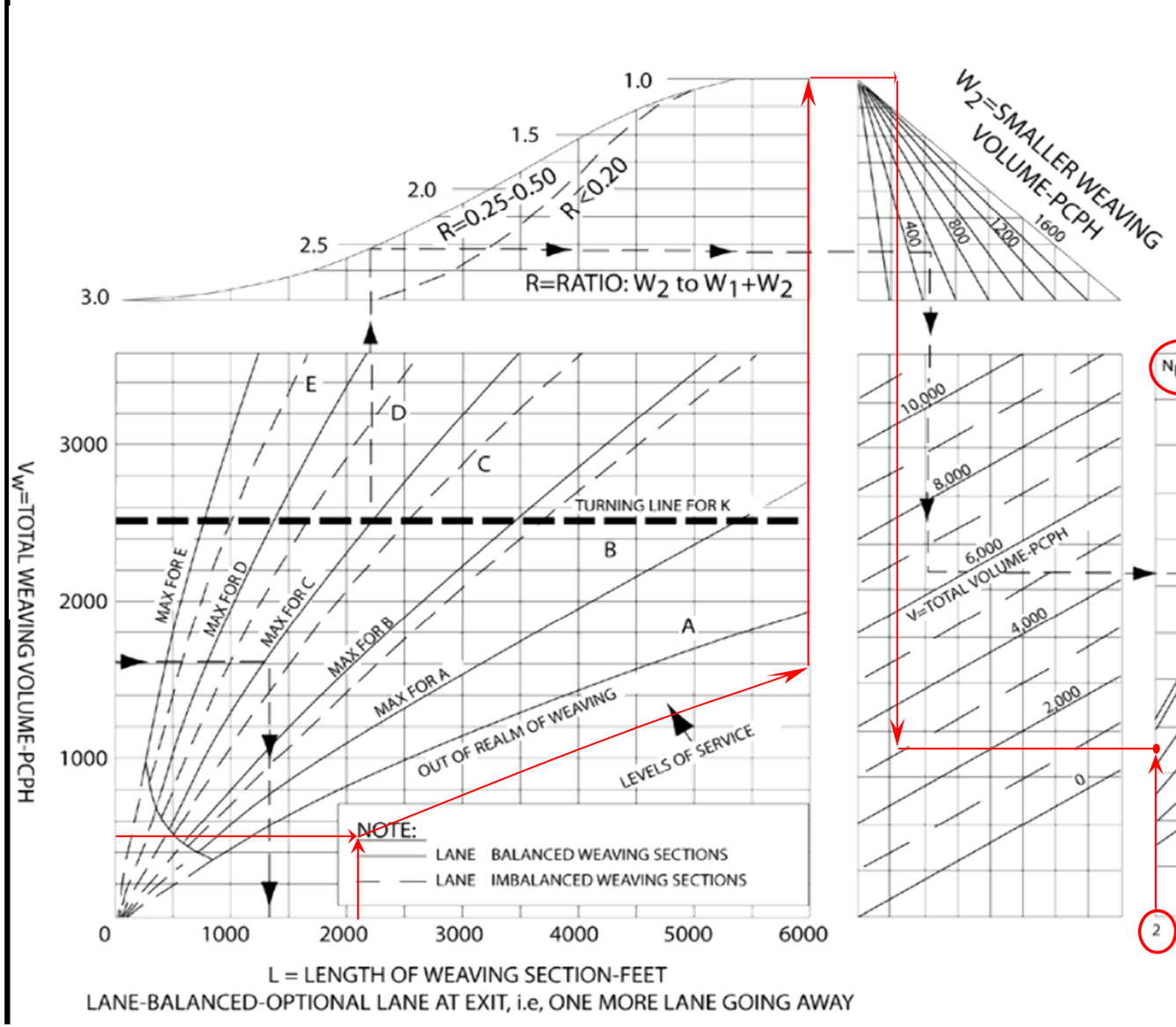
Direction : North

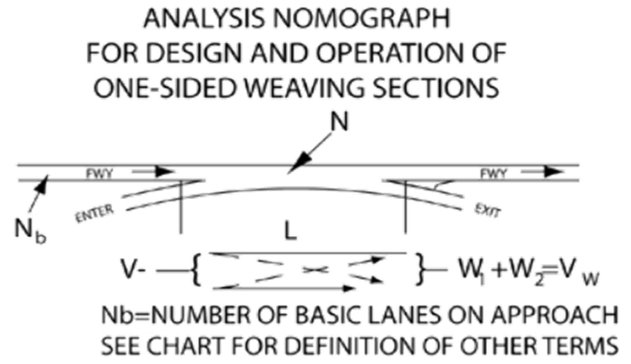
Project: 2025 Near Term

Year: 2025 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





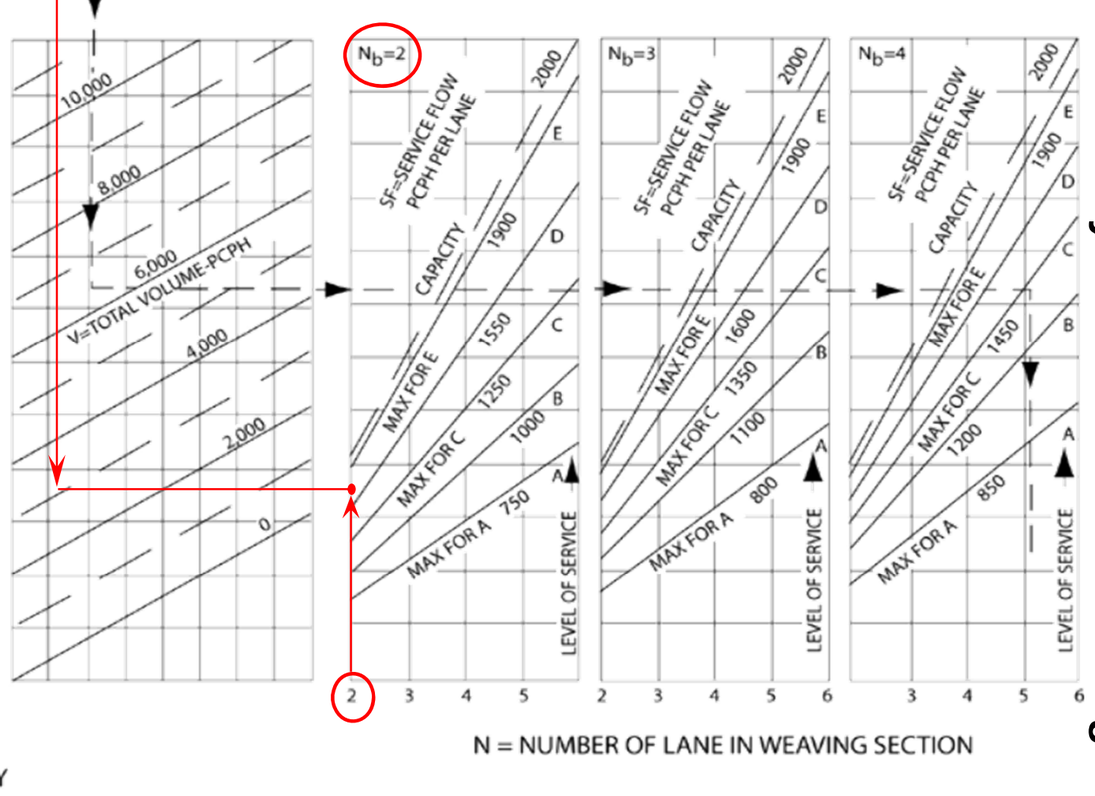
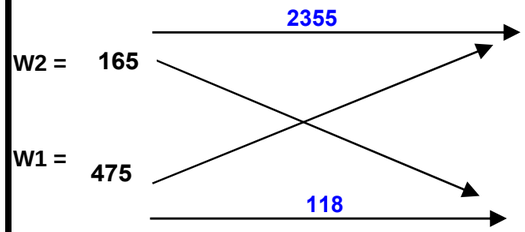


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = E

V = 3113 pcph

L = 2140 feet

W1 = 475 pcph

W2 = 165 pcph

V_w = 640 pcph

R = 0.26

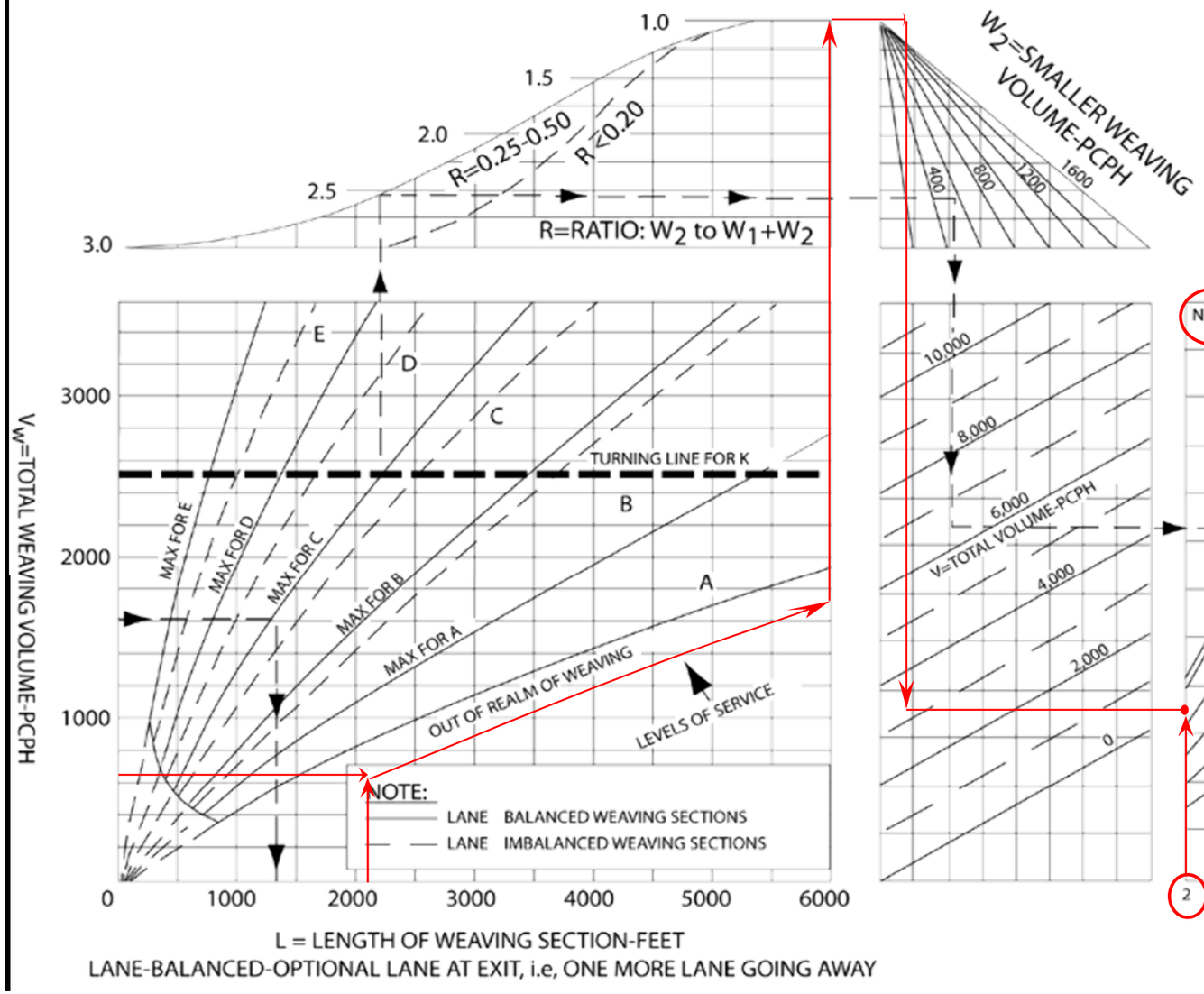
Direction : North

Project: 2025 Near Term

Year: 2025 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd



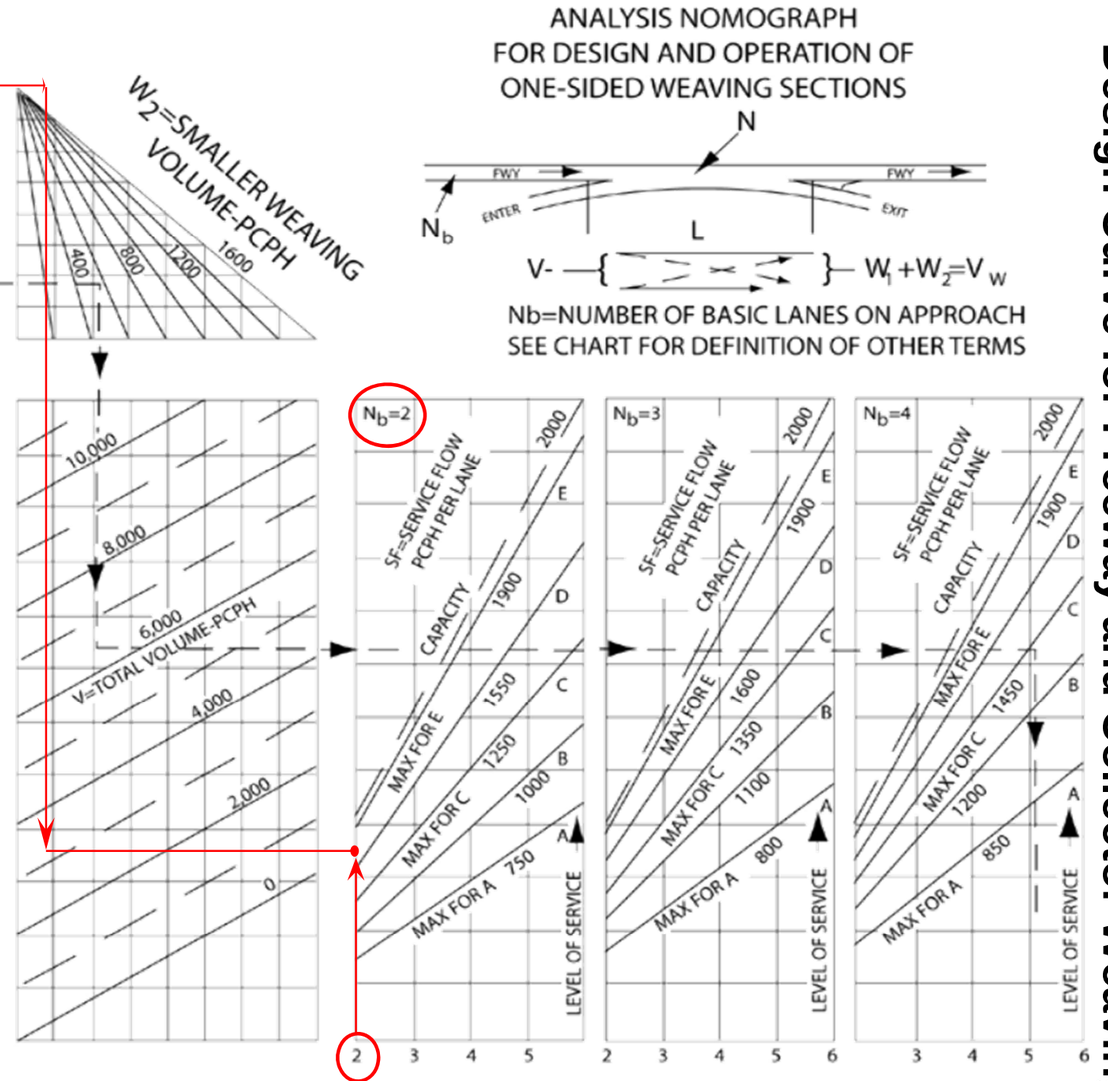
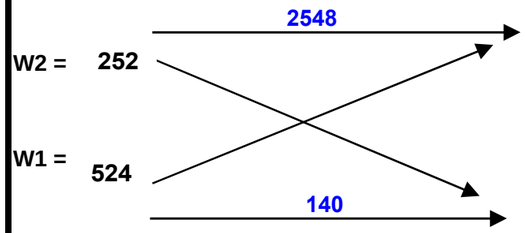


Figure 504.7A Design Curve for Freeway and Collector Weaving



V = 3464 pcph

L = 1330 feet

W1 = 524 pcph

W2 = 252 pcph

V_w = 776 pcph

R = 0.32

Direction : North

Project: 2025 Near Term

Year: 2025 Peak Hour: AM Peak

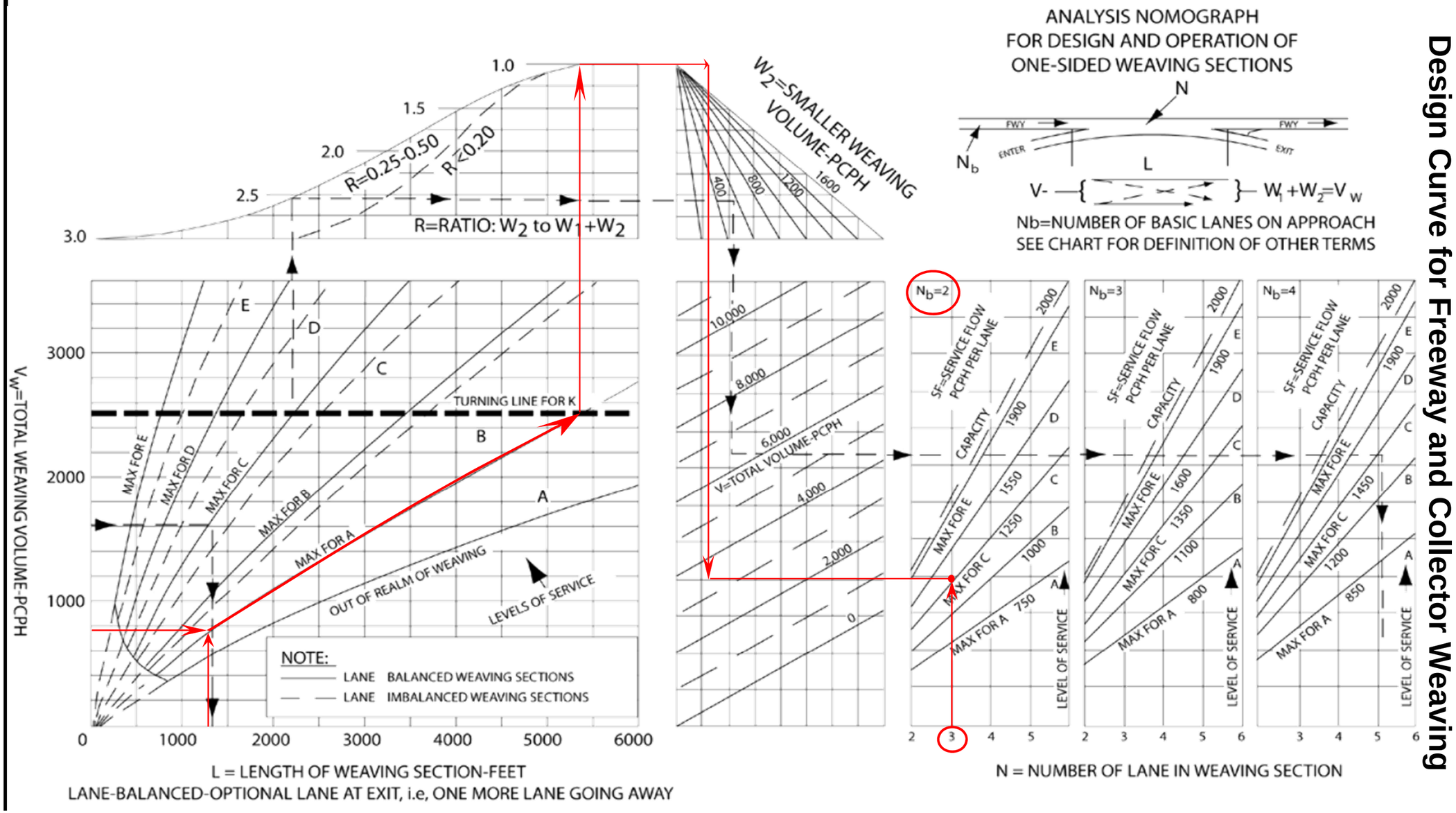
On Ramp: Madonna Rd

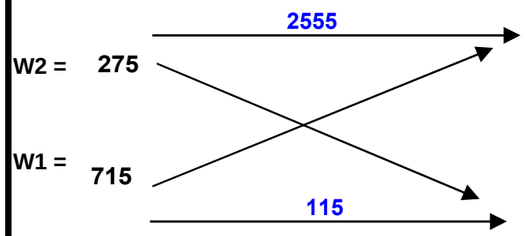
Off Ramp: Marsh St

LOS weave = A/B

Compo. LOS = C/D

Figure 504.7A Design Curve for Freeway and Collector Weaving





V = 3660 pcph

V_w = 990 pcph

L = 1330 feet

R = 0.28

W1 = 715 pcph

W2 = 275 pcph

Direction : North

Project: 2025 Near Term

Year: 2025 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

LOS weave = B

Compo. LOS = D

ANALYSIS NOMOGRAPH
FOR DESIGN AND OPERATION OF
ONE-SIDED WEAVING SECTIONS

Nb=NUMBER OF BASIC LANES ON APPROACH
SEE CHART FOR DEFINITION OF OTHER TERMS

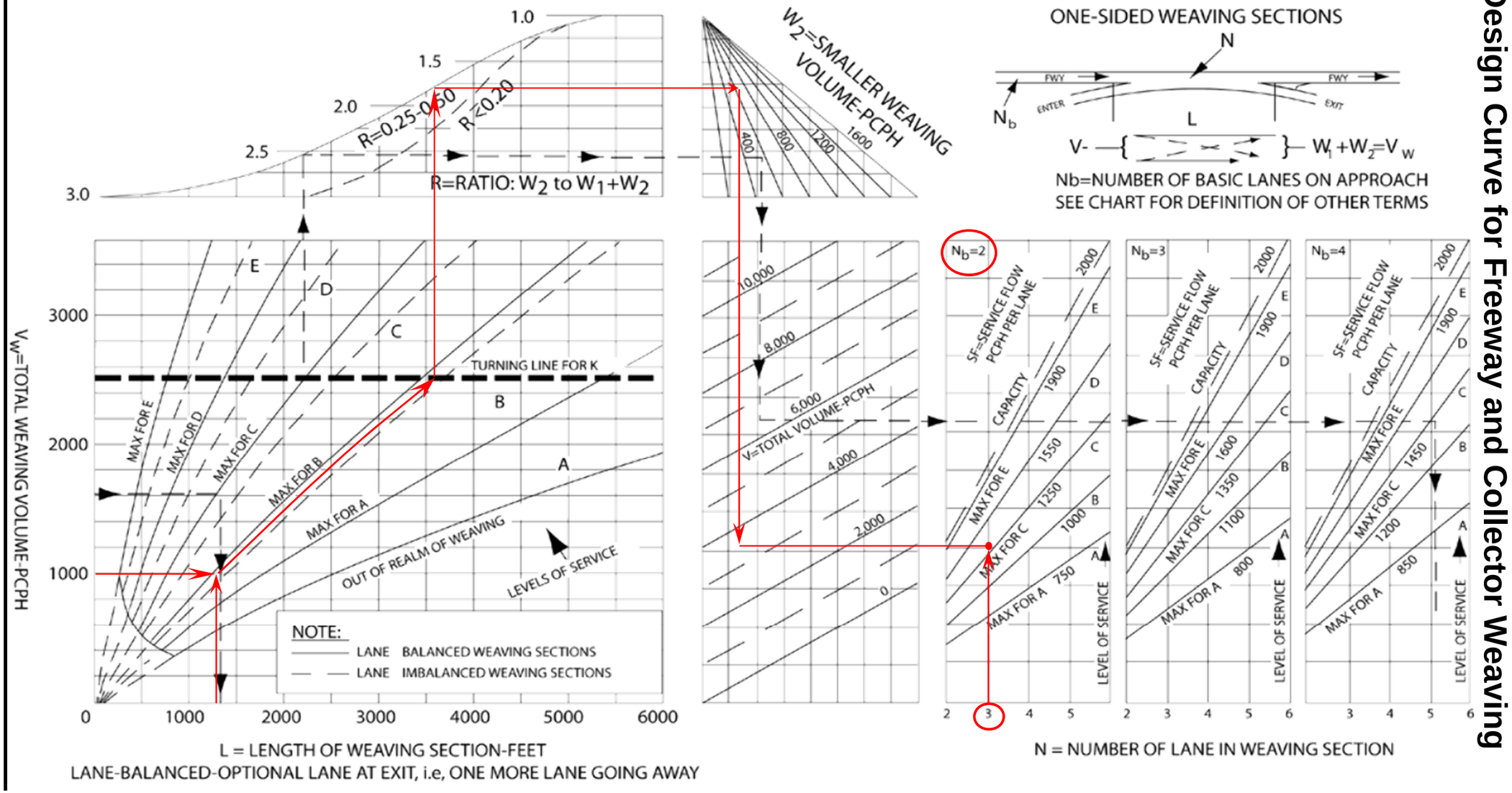
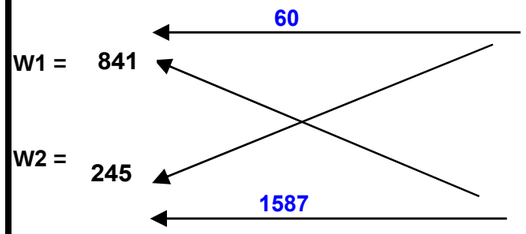


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = B/C

V = 2733 pcph

L = 2065 feet

W1 = 841 pcph

W2 = 245 pcph

V_w = 1086 pcph

R = 0.23

Direction : South

Project: 2025 Near Term

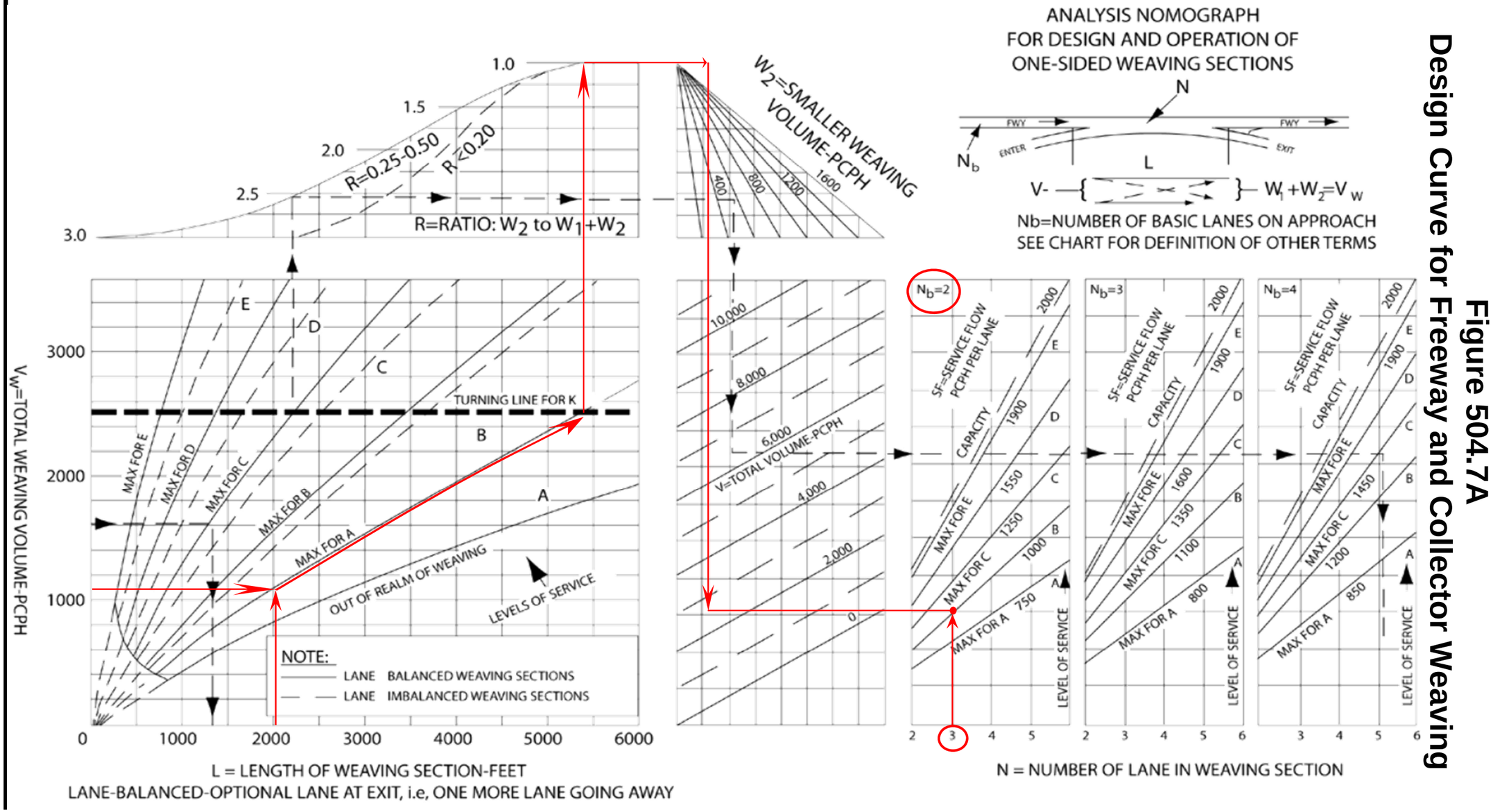
Year: 2025 Peak Hour: AM Peak

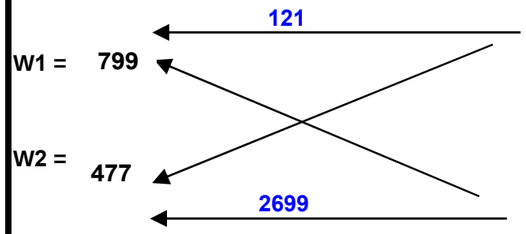
On Ramp: Marsh St

Off Ramp: Madonna Rd

Design Curve for Freeway and Collector Weaving

Figure 504.7A





LOS weave = B

Compo. LOS = E

V = 4096 pcph

L = 2065 feet

W1 = 799 pcph

W2 = 477 pcph

V_w = 1276 pcph

R = 0.37

Direction : South

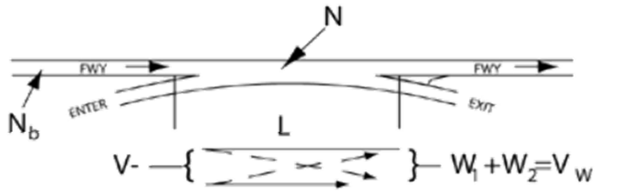
Project: 2025 Near Term

Year: 2025 Peak Hour: PM Peak

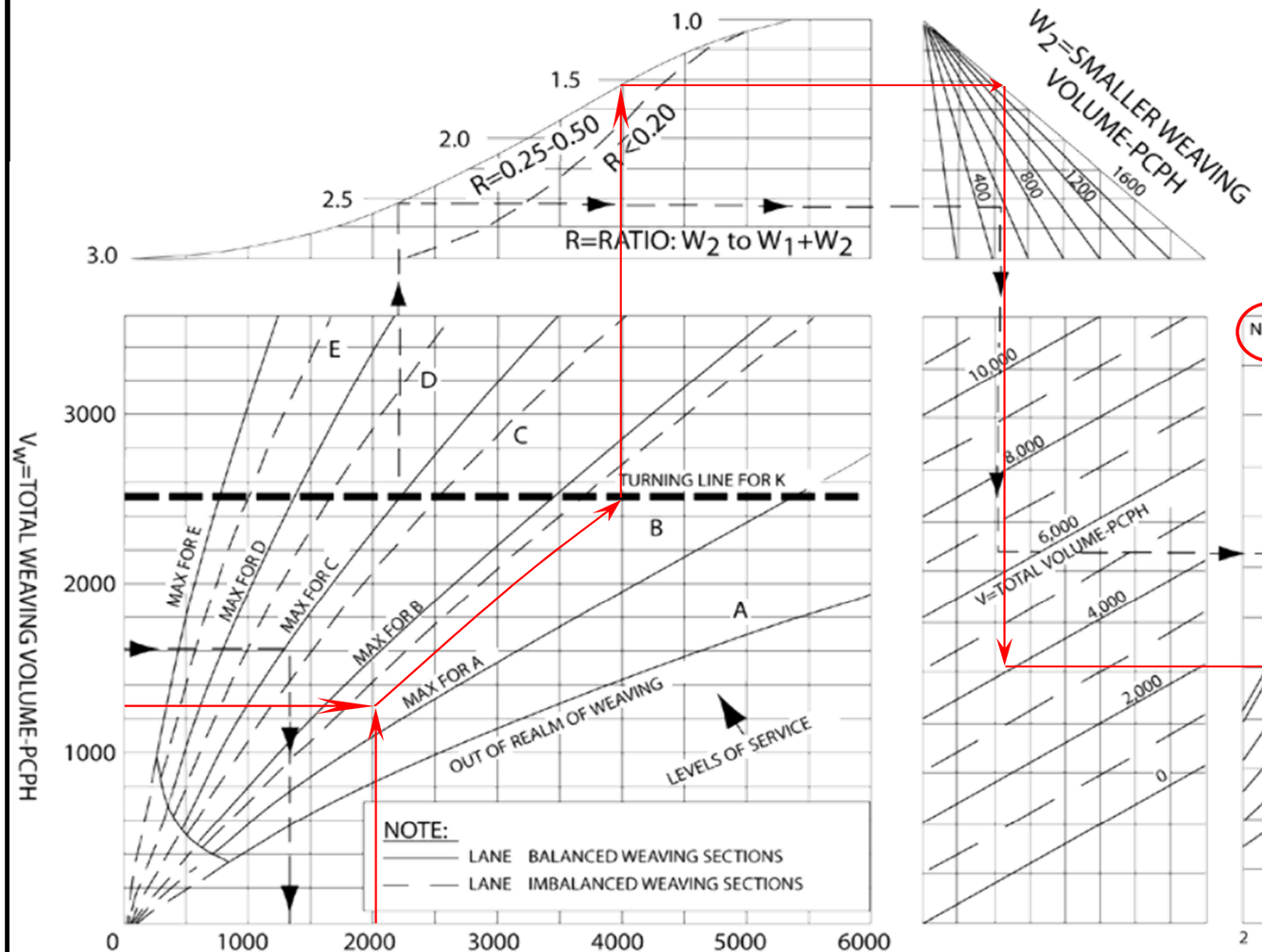
On Ramp: Marsh St

Off Ramp: Madonna Rd

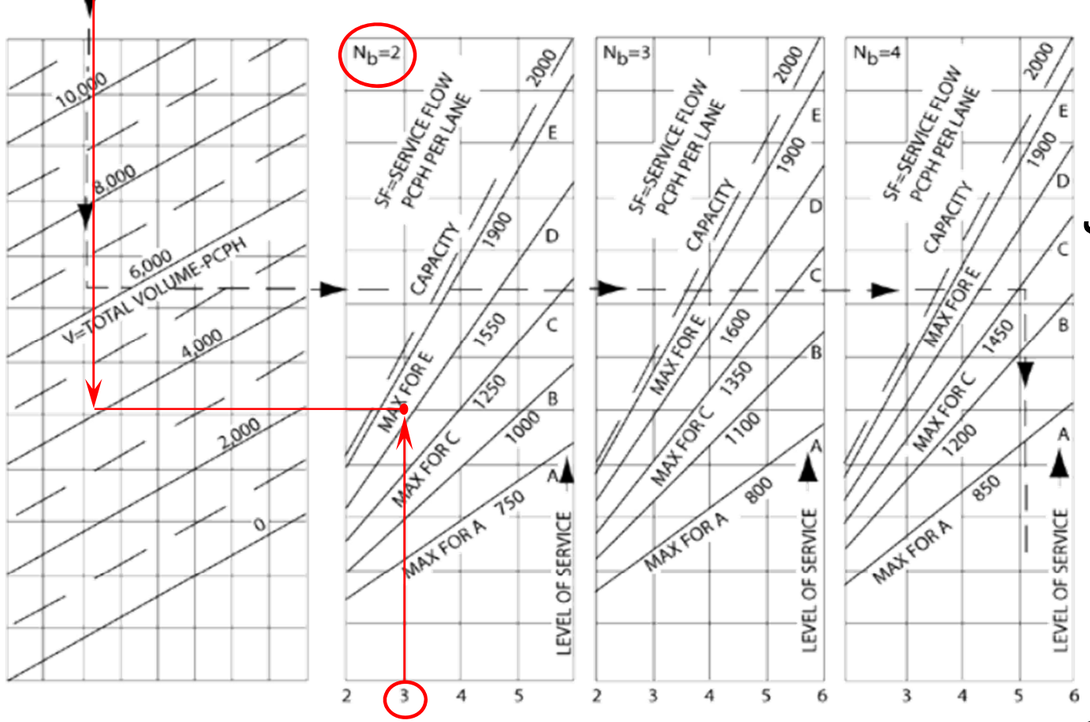
ANALYSIS NOMOGRAPH
FOR DESIGN AND OPERATION OF
ONE-SIDED WEAVING SECTIONS



Nb=NUMBER OF BASIC LANES ON APPROACH
SEE CHART FOR DEFINITION OF OTHER TERMS



L = LENGTH OF WEAVING SECTION-FEET
LANE-BALANCED-OPTIONAL LANE AT EXIT, i.e, ONE MORE LANE GOING AWAY



N = NUMBER OF LANE IN WEAVING SECTION

Figure 504.7A
Design Curve for Freeway and Collector Weaving

Year 2025 Near Term Plus Project Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Year 2025 Near Term Plus Project Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3186	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	866	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1818	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1818	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.5	mi/h
Number of lanes, N	2	
Density, D	29.1	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2538	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	690	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1448	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1448	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.3	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3186	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	643	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	227	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3186	643	227	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	866	175	62	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3636	734	259	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3636 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3636	4700	No
$v_{FO} = v_F - v_R$	2902	4700	No
v_R	734	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3636 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3636	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 33.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.494

Space mean speed in ramp influence area, S_R = 53.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.6 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR OFF RAMP
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2538	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	620	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	502	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2538	620	502	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	690	168	136	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2897	708	573	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2897 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2897	4700	No
$v_{FO} = v_F - v_R$	2189	4700	No
v_R	708	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2897 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2897	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 27.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.492

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2543	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	227	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	643	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2543	227	643	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	691	62	175	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2902	259	734	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2902 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3161	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2902 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3161	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 26.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.370	
Space mean speed in ramp influence area,	S_R = 56.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.5	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1918	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	502	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	620	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1918	502	620	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	521	136	168	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2189	573	708	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2189 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2762	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2189 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2762	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 22.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.339	
Space mean speed in ramp influence area,	S_R = 57.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2770	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	753	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1581	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1581	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	2	
Density, D	24.5	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2420	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	658	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1381	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1381	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.2	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2770	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	311	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	227	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2770	311	227	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	753	85	62	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3161	355	259	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3161 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3161	4700	No
$v_{FO} = v_F - v_R$	2806	4700	No
v_R	355	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3161 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3161	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 29.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.460	
Space mean speed in ramp influence area,	S_R = 54.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.4	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2420	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	145	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	502	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2420		145		502		vph
Peak-hour factor, PHF	0.92		0.92		0.92		
Peak 15-min volume, v15	658		39		136		v
Trucks and buses	10		10		10		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2762	165	573	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2762 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2762	4700	No
$v_{FO} = v_F - v_R$	2597	4700	No
v_R	165	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2762 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2762	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 26.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.443

Space mean speed in ramp influence area, S_R = 54.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.8 mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	2140	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2246	261	213	65	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	597	69	57	17	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2509	292	238	73	pc/h

Volume ratio, VR	0.170	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	67	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1307	lc/h
Total lane changes, LCALL	1374	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.159

Average weaving speed, SW	58.1	mi/h
Average non-weaving speed, SNW	57.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.6	mi/h
Weaving segment density, D	27.0	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.711	
Weaving segment flow rate, v	3112	pc/h
Weaving segment capacity, cW	4171	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4235	2140	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2190	c
		Maximum	Analyzed	
v/c ratio		1.00	0.711	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	2140	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2110	433	165	108	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	561	115	44	29	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2357	484	184	121	pc/h

Volume ratio, VR	0.212	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	67	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1285	lc/h
Total lane changes, LCALL	1352	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.157

Average weaving speed, SW	58.2	mi/h
Average non-weaving speed, SNW	57.4	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.6	mi/h
Weaving segment density, D	27.3	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.729	
Weaving segment flow rate, v	3146	pc/h
Weaving segment capacity, cW	4109	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4663	2140	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2157	c
		Maximum	Analyzed	
v/c ratio		1.00	0.729	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2282	511	225	136	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	607	136	60	36	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2549	571	251	152	pc/h

Volume ratio, VR	0.233	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	699	lc/h
Total lane changes, LCALL	812	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.153

Average weaving speed, SW	58.4	mi/h
Average non-weaving speed, SNW	59.4	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.1	mi/h
Weaving segment density, D	19.9	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.565	
Weaving segment flow rate, v	3523	pc/h
Weaving segment capacity, cW	5937	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4880	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2078	c
		Maximum	Analyzed	
v/c ratio		1.00	0.565	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2293	705	250	113	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	610	188	66	30	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2561	788	279	126	pc/h

Volume ratio, VR	0.284	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	697	lc/h
Total lane changes, LCALL	810	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.153

Average weaving speed, SW	58.4	mi/h
Average non-weaving speed, SNW	59.0	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.8	mi/h
Weaving segment density, D	21.3	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.614	
Weaving segment flow rate, v	3754	pc/h
Weaving segment capacity, cW	5820	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5415	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2037	c
		Maximum	Analyzed	
v/c ratio		1.00	0.614	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1422	227	805	56	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	378	60	214	15	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1588	254	899	63	pc/h

Volume ratio, VR	0.411	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	882	lc/h
Total lane changes, LCALL	1029	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.130	

Average weaving speed, SW	59.2	mi/h
Average non-weaving speed, SNW	60.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	60.0	mi/h
Weaving segment density, D	15.6	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.480	
Weaving segment flow rate, v	2804	pc/h
Weaving segment capacity, cW	5559	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6807	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1987	c
		Maximum	Analyzed	
v/c ratio		1.00	0.480	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2413	439	784	110	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	642	117	209	29	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2695	490	876	123	pc/h

Volume ratio, VR	0.326	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1122	lc/h
Total lane changes, LCALL	1269	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.154

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	58.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.3	mi/h
Weaving segment density, D	23.9	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.677	
Weaving segment flow rate, v	4184	pc/h
Weaving segment capacity, cW	5883	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5870	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2059	c
		Maximum	Analyzed	
v/c ratio		1.00	0.677	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1649	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	232	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1649	232		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	448	63		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1882	265	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1882 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2147	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1882 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2147	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 16.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.291	
Space mean speed in ramp influence area,	S_R = 58.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.3	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2852	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	409	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2852	409		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	775	111		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3255	467	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3255 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3722	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3255 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3722	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 28.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.419	
Space mean speed in ramp influence area,	S_R = 55.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 55.4	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1881	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	511	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1073	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1073	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.5	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3261	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	886	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1861	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1861	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.0	mi/h
Number of lanes, N	2	
Density, D	30.0	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1881	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	676	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	413	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	1881		676		413		vph
Peak-hour factor, PHF	0.92		0.92		0.92		
Peak 15-min volume, v15	511		184		112		v
Trucks and buses	10		10		10		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2147	772	471	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2147 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2147	4700	No
$v_{FO} = v_F - v_R$	1375	4700	No
v_R	772	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2147 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2147	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 17.9 pc/mi/ln D

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.497

Space mean speed in ramp influence area, S_R = 53.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.6 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3261	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	573	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	829	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3261	573	829	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	886	156	225	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3722	654	946	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3722 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3722	4700	No
$v_{FO} = v_F - v_R$	3068	4700	No
v_R	654	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3722 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3722	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 31.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.487

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1205	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	413	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	676	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1205	413	676	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	327	112	184	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1375	471	772	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1375 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1846	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1375 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1846	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 17.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.318	
Space mean speed in ramp influence area,	S_R = 57.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.7	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2688	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	829	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	573	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2688	829	573	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	730	225	156	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3068	946	654	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3068 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4014	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3068 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4014	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 33.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.509	
Space mean speed in ramp influence area,	S_R = 53.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.3	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1618	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	440	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	923	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	923	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.2	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Near Term Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3517	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	956	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2007	pc/h/ln

Speed Inputs and Adjustments

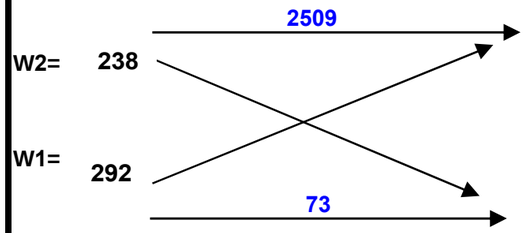
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2007	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.8	mi/h
Number of lanes, N	2	
Density, D	33.6	pc/mi/ln
Level of service, LOS	D	

Year 2025 Near Term Plus Project Conditions

Leisch Method Worksheets



LOS weave = A

Compo. LOS = E

V = 3112 pcph

L = 2140 feet

W1 = 292 pcph

W2 = 238 pcph

V_w = 530 pcph

R = 0.45

Direction : North

Project: 2025 Near Term Plus Project

Year: 2025 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd

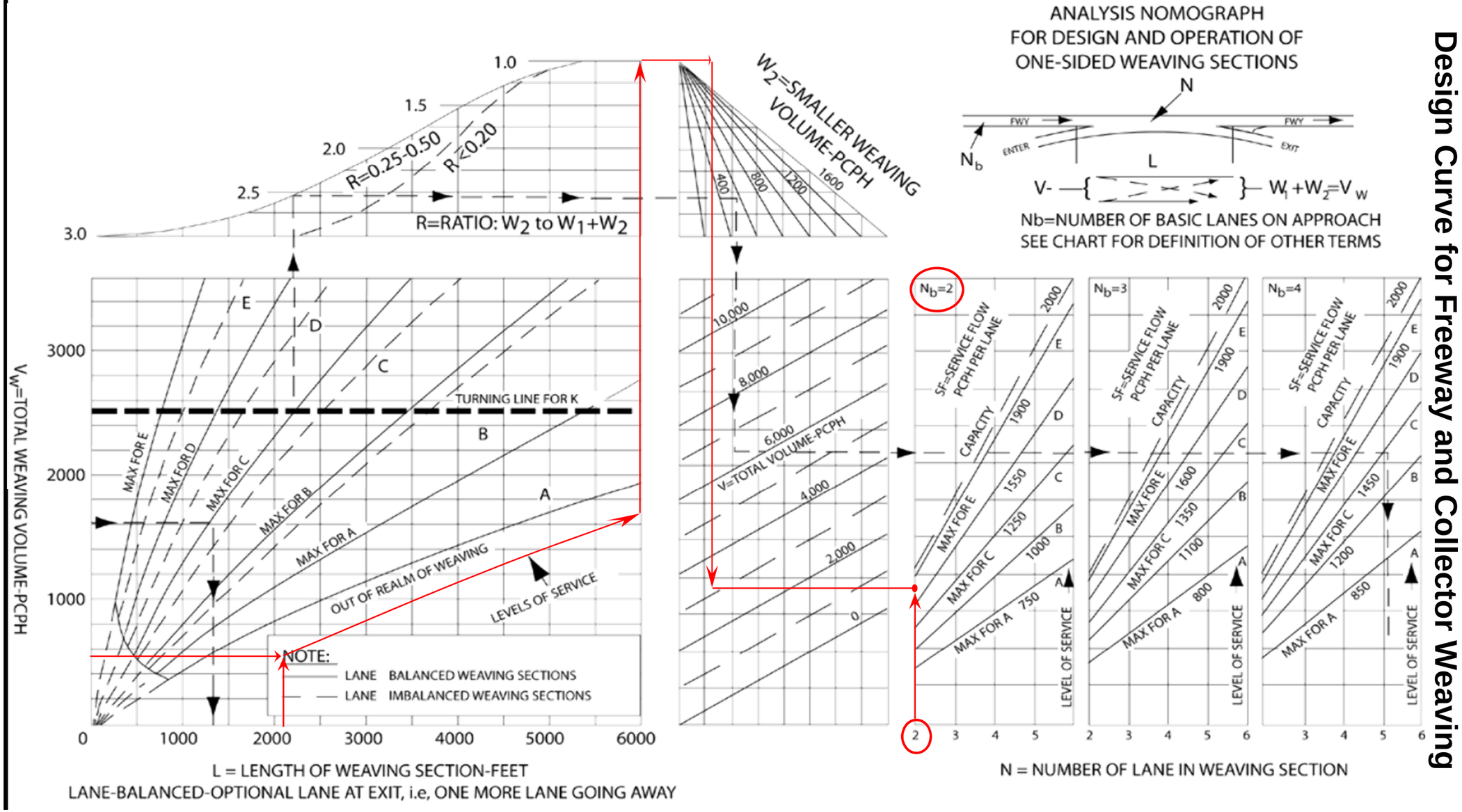
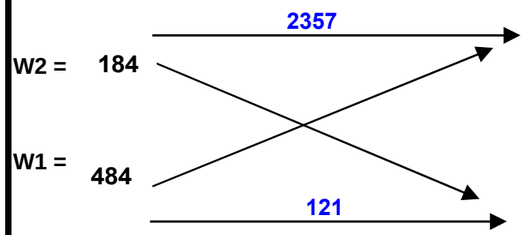


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = E

V = 3146 pcph

L = 2140 feet

W1 = 484 pcph

W2 = 184 pcph

V_w = 668 pcph

R = 0.28

Direction : North

Project: 2025 Near Term Plus Project

Year: 2025 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd

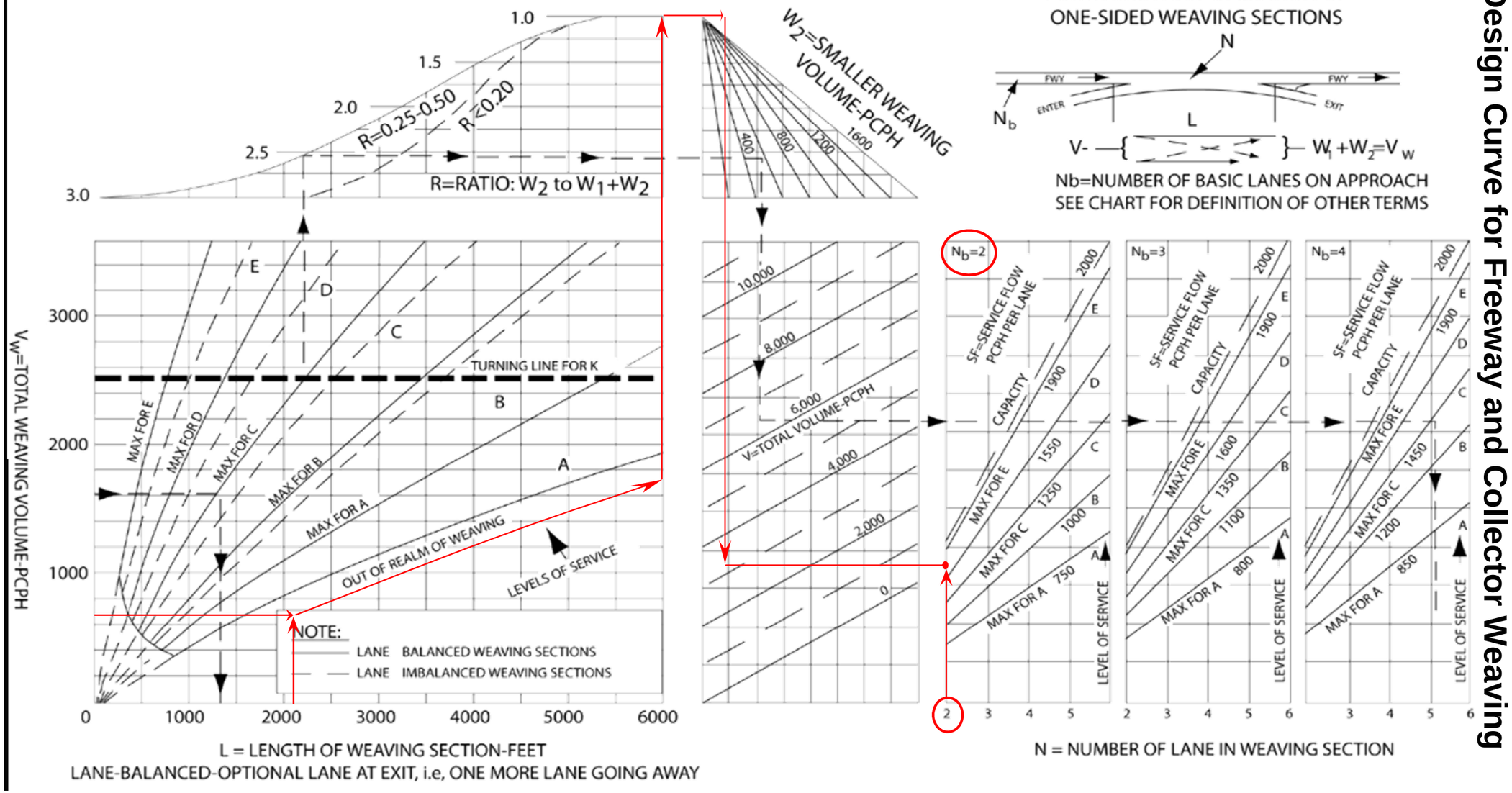
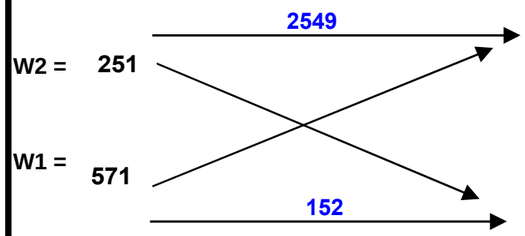


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3523 pcph

L = 1330 feet

W1 = 571 pcph

W2 = 251 pcph

V_w = 822 pcph

R = 0.31

Direction : North

Project: 2025 Near Term Plus Project

Year: 2025 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

LOS weave = B

Compo. LOS = D

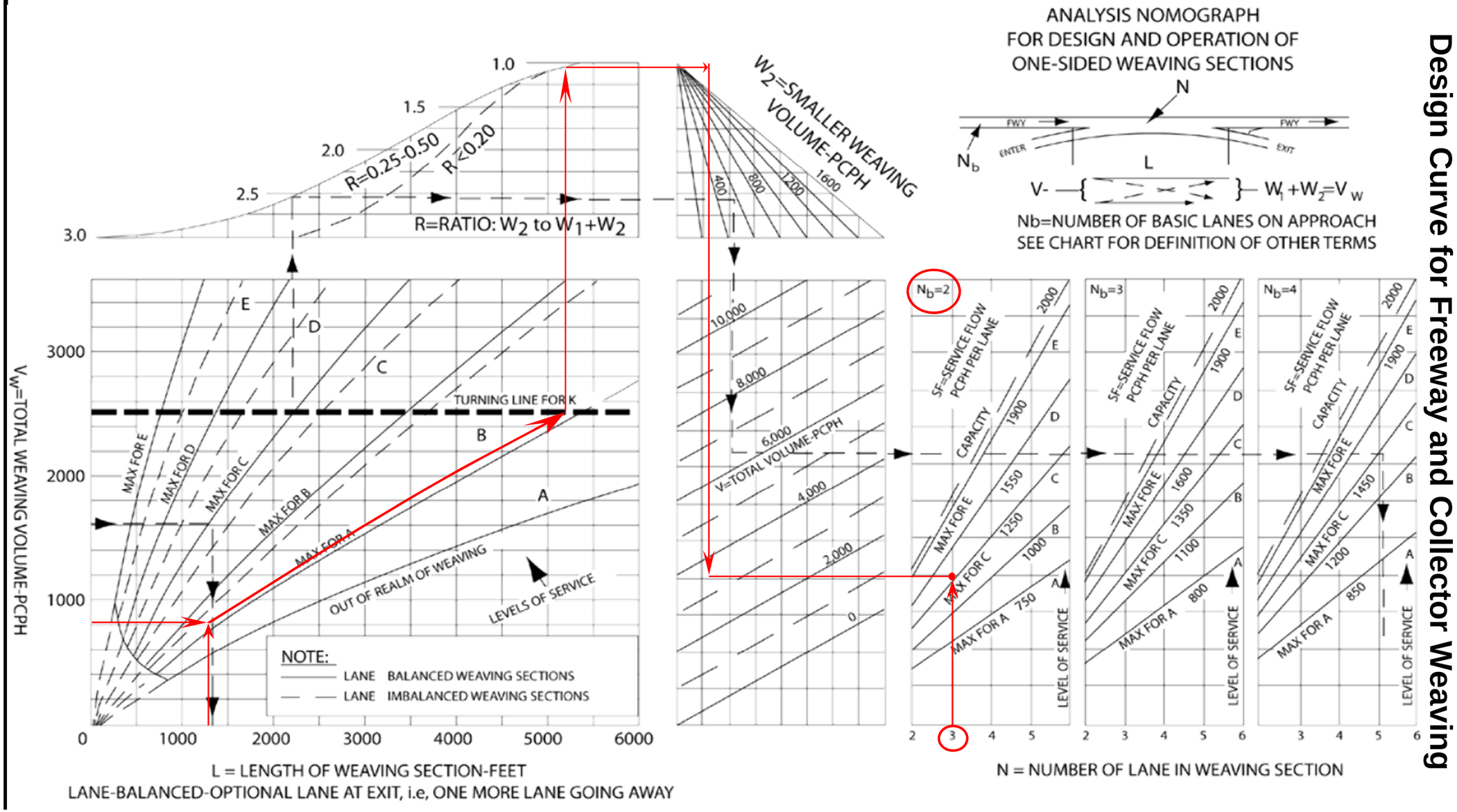
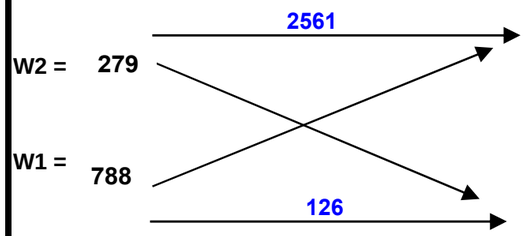


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3754 pcph

L = 1330 feet

W1 = 788 pcph

W2 = 279 pcph

V_w = 1067 pcph

R = 0.26

Direction : North

Project: 2025 Near Term Plus Project

Year: 2025 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

LOS weave = B

Compo. LOS = D

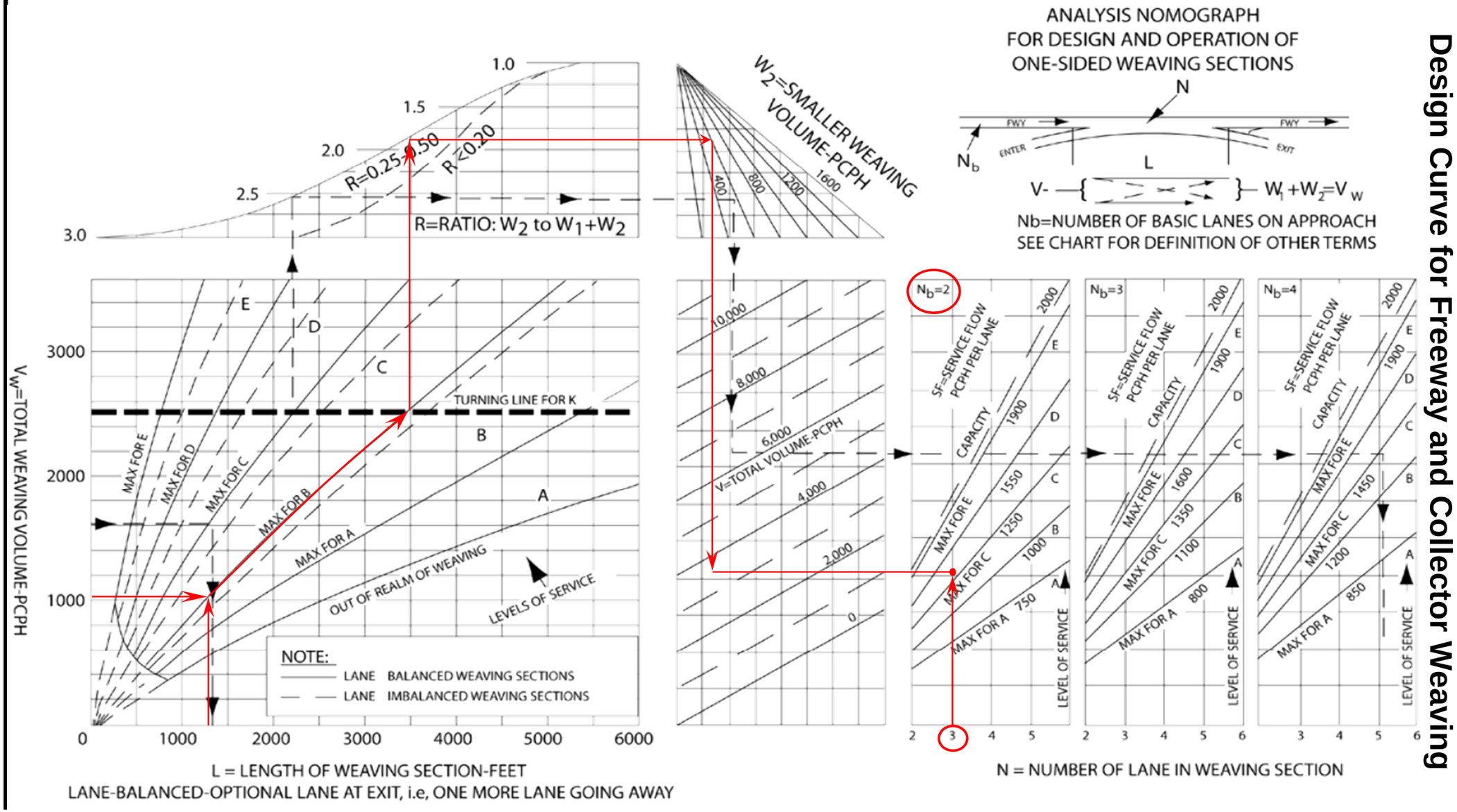
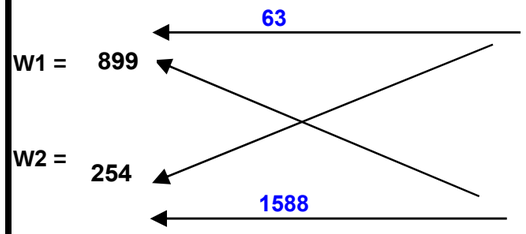


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = C

V = 2804 pcph

L = 2065 feet

W1 = 899 pcph

W2 = 254 pcph

V_w = 1153 pcph

R = 0.22

Direction : South

Project: 2025 Near Term Plus Project

Year: 2025 Peak Hour: AM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

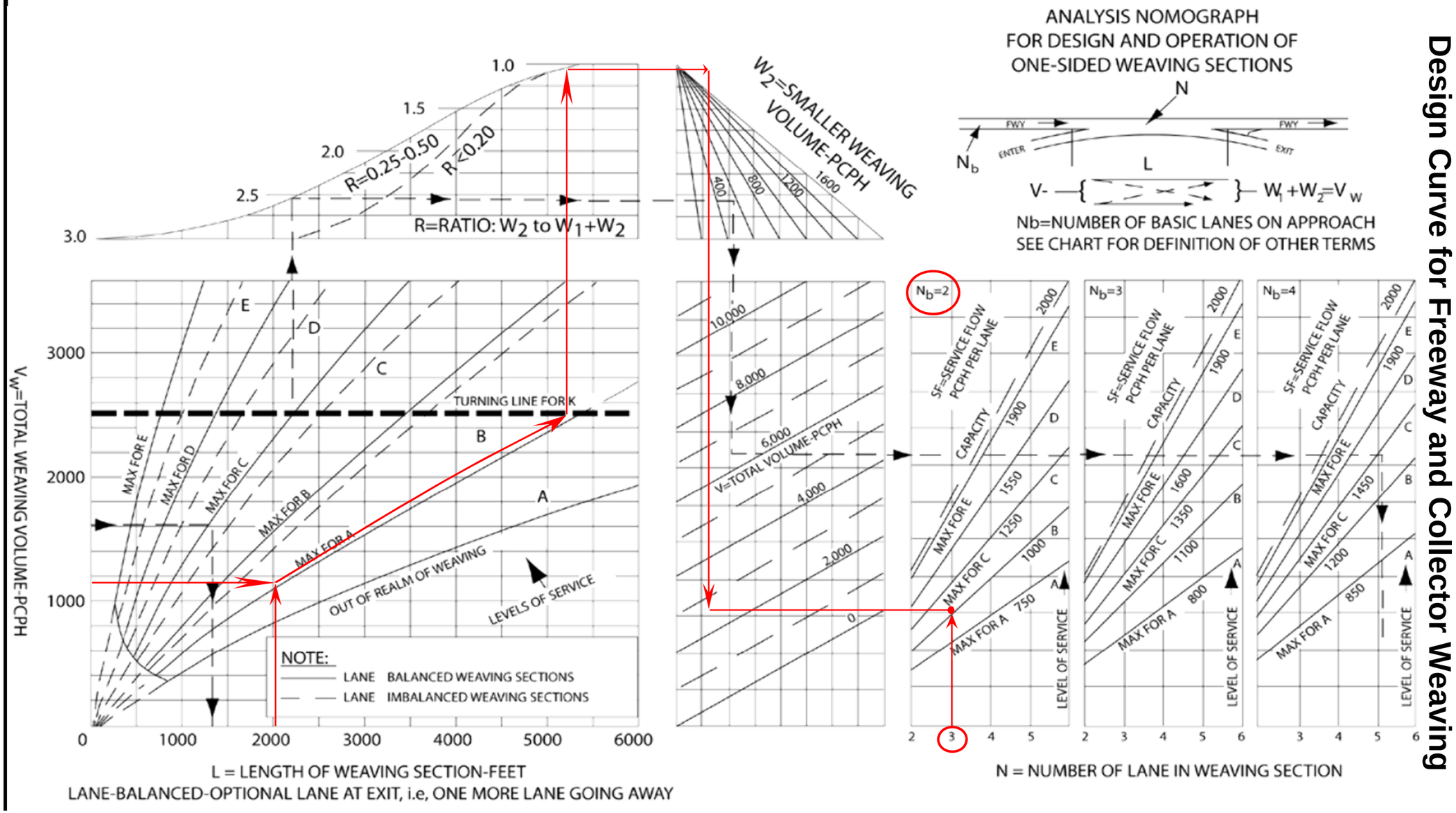
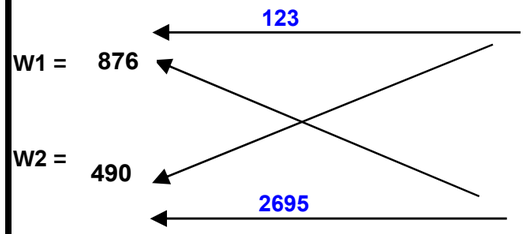


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = E

V = 4184 pcph

L = 2065 feet

W1 = 876 pcph

W2 = 490 pcph

V_w = 1366 pcph

R = 0.36

Direction : South

Project: 2025 Near Term Plus Project

Year: 2025 Peak Hour: PM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

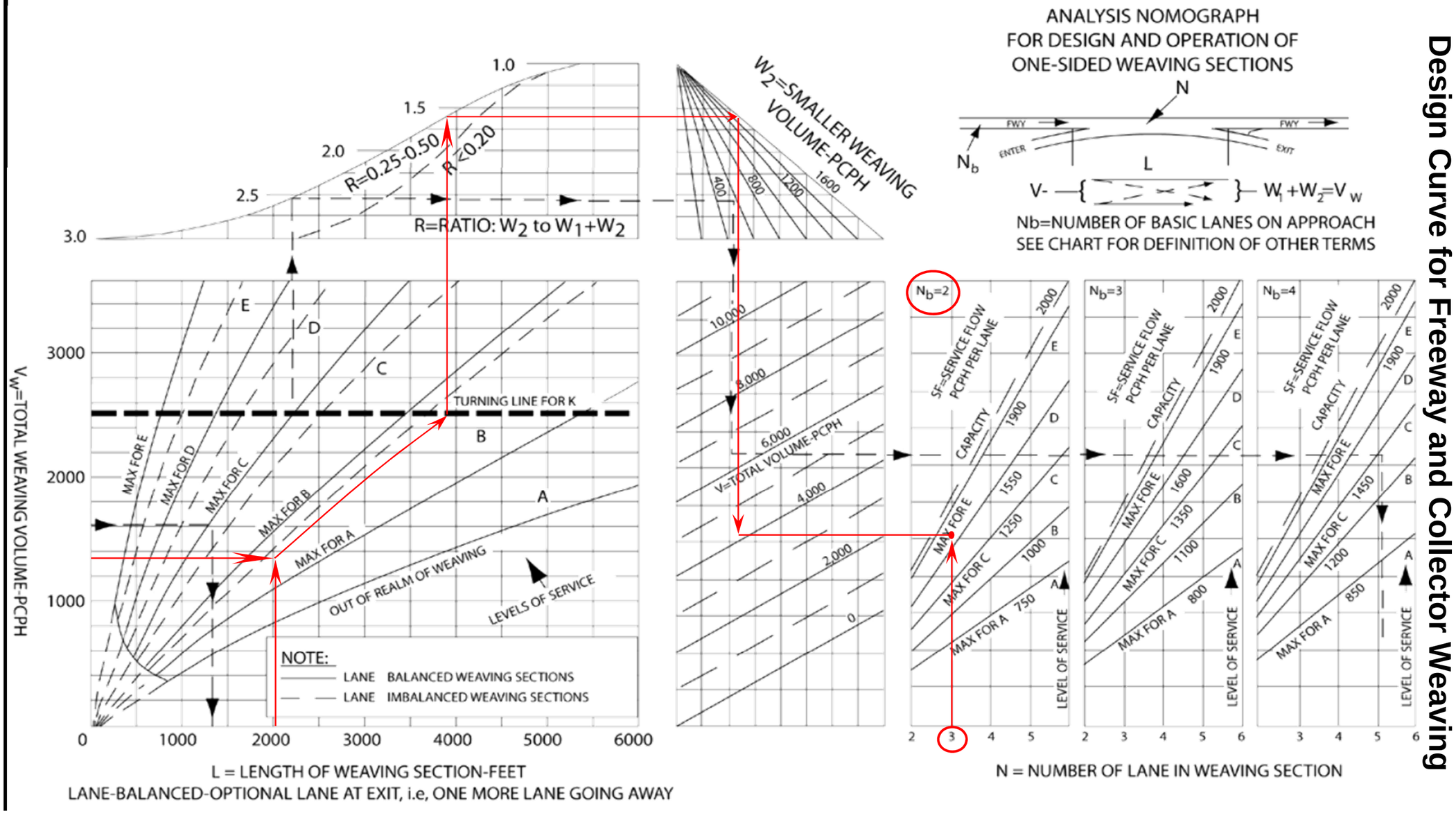


Figure 504.7A
Design Curve for Freeway and Collector Weaving

Year 2025 Near Term Plus Project Mitigation Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Year 2025 Near Term Plus Project Mitigation Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3186	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	866	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1818	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1818	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.5	mi/h
Number of lanes, N	2	
Density, D	29.1	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2538	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	690	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1448	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1448	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.3	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3186	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	629	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	189	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3186	629	189	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	866	171	51	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3636	718	216	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3636 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3636	4700	No
$v_{FO} = v_F - v_R$	2918	4700	No
v_R	718	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3636 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3636	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 33.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.493

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR OFF RAMP
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2538	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	630	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	495	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2538	630	495	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	690	171	135	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2897	719	565	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2897 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2897	4700	No
$v_{FO} = v_F - v_R$	2178	4700	No
v_R	719	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2897 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2897	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 27.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.493

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2557	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	189	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	629	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2557	189	629	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	695	51	171	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2918	216	718	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2918 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3134	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2918 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3134	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 25.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.367	
Space mean speed in ramp influence area,	S_R = 56.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.6	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1908	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	495	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	630	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1908	495	630	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	518	135	171	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2178	565	719	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2178 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2743	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2178 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2743	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 22.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.338	
Space mean speed in ramp influence area,	S_R = 57.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2746	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	746	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1567	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1567	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	24.3	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2403	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	653	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1371	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1371	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.1	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2746	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	371	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	189	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2746	371	189	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	746	101	51	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3134	423	216	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3134 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3134	4700	No
$v_{FO} = v_F - v_R$	2711	4700	No
v_R	423	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3134 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3134	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 29.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.466

Space mean speed in ramp influence area, S_R = 54.3 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.3 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2403	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	191	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	495	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2403	191	495	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	653	52	135	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2743	218	565	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2743 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2743	4700	No
$v_{FO} = v_F - v_R$	2525	4700	No
v_R	218	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2743 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2743	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 26.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.448	
Space mean speed in ramp influence area,	S_R = 54.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 54.7	mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	940	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2149	416	226	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	572	111	60	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2400	465	252	0	pc/h
Volume ratio, VR		0.230			

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	89	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	426	lc/h
Total lane changes, LCALL	515	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.141

Average weaving speed, SW	58.8	mi/h
Average non-weaving speed, SNW	60.0	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.7	mi/h
Weaving segment density, D	17.4	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.507	
Weaving segment flow rate, v	3117	pc/h
Weaving segment capacity, cW	5860	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4846	940	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2051	c
		Maximum	Analyzed	
v/c ratio		1.00	0.507	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	940	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2044	596	168	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	544	159	45	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2283	666	188	0	pc/h

Volume ratio, VR	0.272	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	89	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	402	lc/h
Total lane changes, LCALL	491	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.135	

Average weaving speed, SW	59.0	mi/h
Average non-weaving speed, SNW	60.0	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.7	mi/h
Weaving segment density, D	17.5	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.518	
Weaving segment flow rate, v	3137	pc/h
Weaving segment capacity, cW	5763	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5288	940	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2017	c
		Maximum	Analyzed	
v/c ratio		1.00	0.518	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2308	394	257	104	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	614	105	68	28	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2578	440	287	116	pc/h

Volume ratio, VR	0.213	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	698	lc/h
Total lane changes, LCALL	811	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.153

Average weaving speed, SW	58.4	mi/h
Average non-weaving speed, SNW	59.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.3	mi/h
Weaving segment density, D	19.2	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.544	
Weaving segment flow rate, v	3421	pc/h
Weaving segment capacity, cW	5986	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4665	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2095	c
		Maximum	Analyzed	
v/c ratio		1.00	0.544	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2382	653	258	105	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	634	174	69	28	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2661	729	288	117	pc/h

Volume ratio, VR	0.268	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	715	lc/h
Total lane changes, LCALL	828	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.155

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	58.9	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.8	mi/h
Weaving segment density, D	21.5	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.617	
Weaving segment flow rate, v	3795	pc/h
Weaving segment capacity, cW	5860	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5243	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2051	c
		Maximum	Analyzed	
v/c ratio		1.00	0.617	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1422	227	805	56	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	378	60	214	15	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1588	254	899	63	pc/h

Volume ratio, VR	0.411	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	882	lc/h
Total lane changes, LCALL	1029	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.130

Average weaving speed, SW	59.2	mi/h
Average non-weaving speed, SNW	60.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	60.0	mi/h
Weaving segment density, D	15.6	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.480	
Weaving segment flow rate, v	2804	pc/h
Weaving segment capacity, cW	5559	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6807	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1987	c
		Maximum	Analyzed	
v/c ratio		1.00	0.480	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2413	439	784	110	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	642	117	209	29	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2695	490	876	123	pc/h
Volume ratio, VR		0.326			

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1122	lc/h
Total lane changes, LCALL	1269	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.154

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	58.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.3	mi/h
Weaving segment density, D	23.9	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.677	
Weaving segment flow rate, v	4184	pc/h
Weaving segment capacity, cW	5883	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5870	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2059	c
		Maximum	Analyzed	
v/c ratio		1.00	0.677	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1649	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	232	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1649	232		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	448	63		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1882	265	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1882 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2147	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1882 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2147	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 16.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.291	
Space mean speed in ramp influence area,	S_R = 58.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.3	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2852	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	409	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2852	409		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	775	111		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3255	467	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3255 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3722	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3255 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3722	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 28.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.419	
Space mean speed in ramp influence area,	S_R = 55.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 55.4	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1881	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	511	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1073	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1073	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.5	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3261	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	886	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1861	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1861	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	62.0	mi/h
Number of lanes, N	2	
Density, D	30.0	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1881	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	655	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	413	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1881	655	413	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	511	178	112	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2147	748	471	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2147 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2147	4700	No
$v_{FO} = v_F - v_R$	1399	4700	No
v_R	748	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2147 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2147	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 17.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.495

Space mean speed in ramp influence area, S_R = 53.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.6 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3261	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	573	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	829	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3261	573	829	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	886	156	225	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3722	654	946	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3722 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3722	4700	No
$v_{FO} = v_F - v_R$	3068	4700	No
v_R	654	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3722 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3722	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 31.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.487

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.8 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1226	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	413	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	655	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1226	413	655	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	333	112	178	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1399	471	748	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1399 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1870	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1399 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1870	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 17.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.318	
Space mean speed in ramp influence area,	S_R = 57.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.7	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2688	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	829	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	573	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2688	829	573	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	730	225	156	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3068	946	654	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3068 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4014	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3068 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4014	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 33.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.509	
Space mean speed in ramp influence area,	S_R = 53.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.3	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1639	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	445	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	935	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	935	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.4	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2025 Plus Project Mitigation
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3517	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	956	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2007	pc/h/ln

Speed Inputs and Adjustments

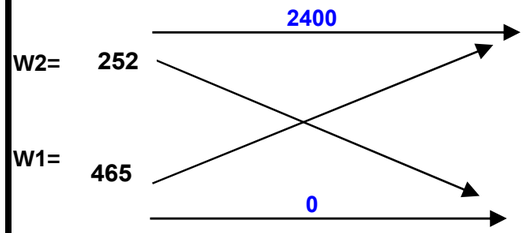
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2007	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.8	mi/h
Number of lanes, N	2	
Density, D	33.6	pc/mi/ln
Level of service, LOS	D	

Year 2025 Near Term Plus Project Mitigation Conditions

Leisch Method Worksheets



LOS weave = B

Compo. LOS = C

V = 3117 pcph

L = 940 feet

W1 = 465 pcph

W2 = 252 pcph

V_w = 717 pcph

R = 0.35

Direction : North

Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd

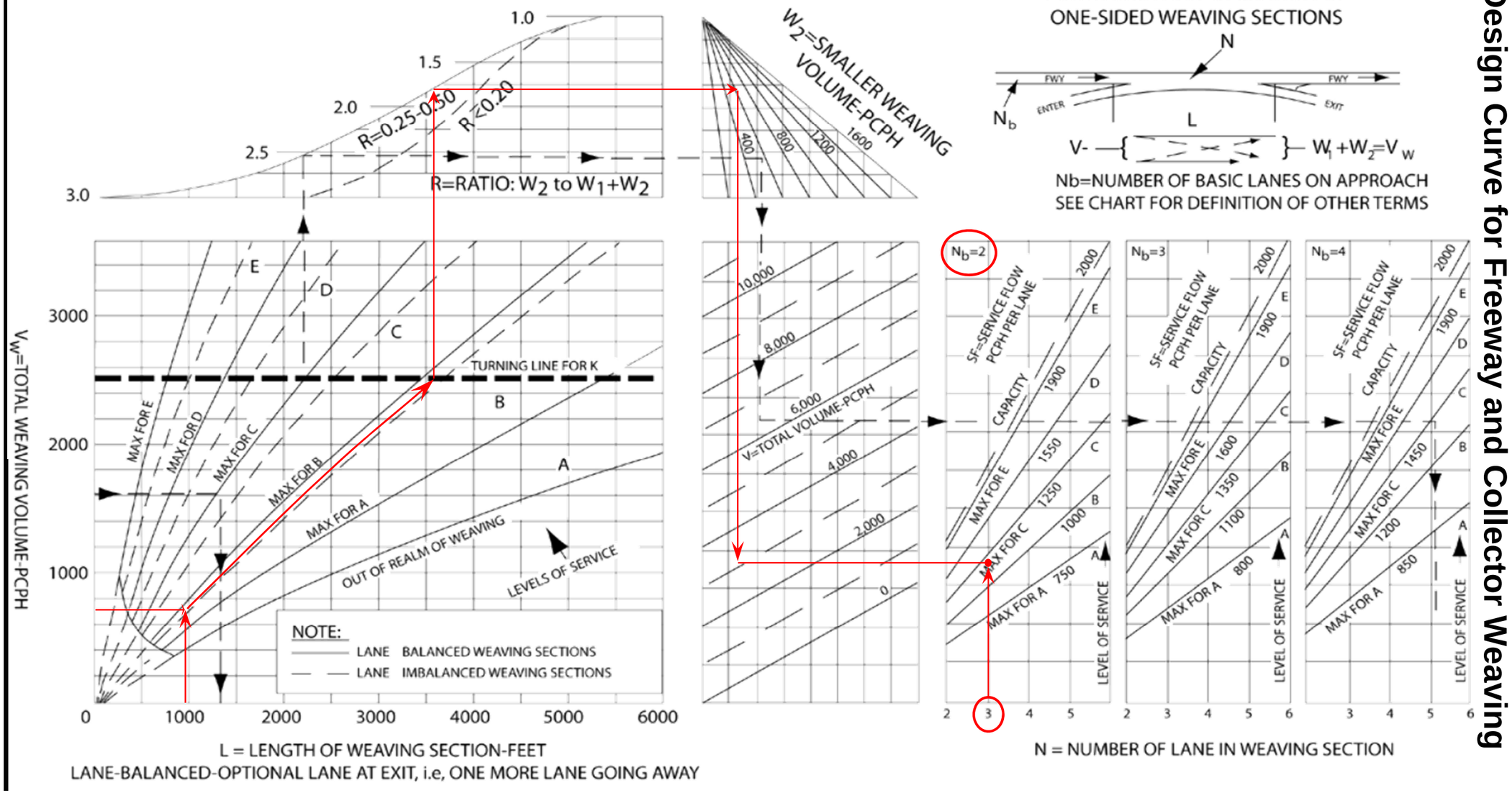
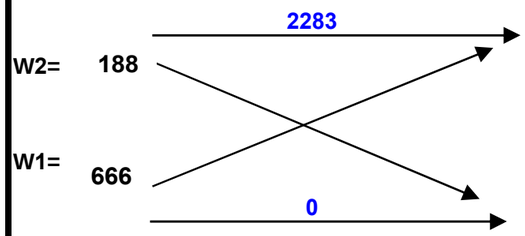


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = C

V = 3137 pcph

L = 940 feet

W1 = 666 pcph

W2 = 188 pcph

V_w = 854 pcph

R = 0.22

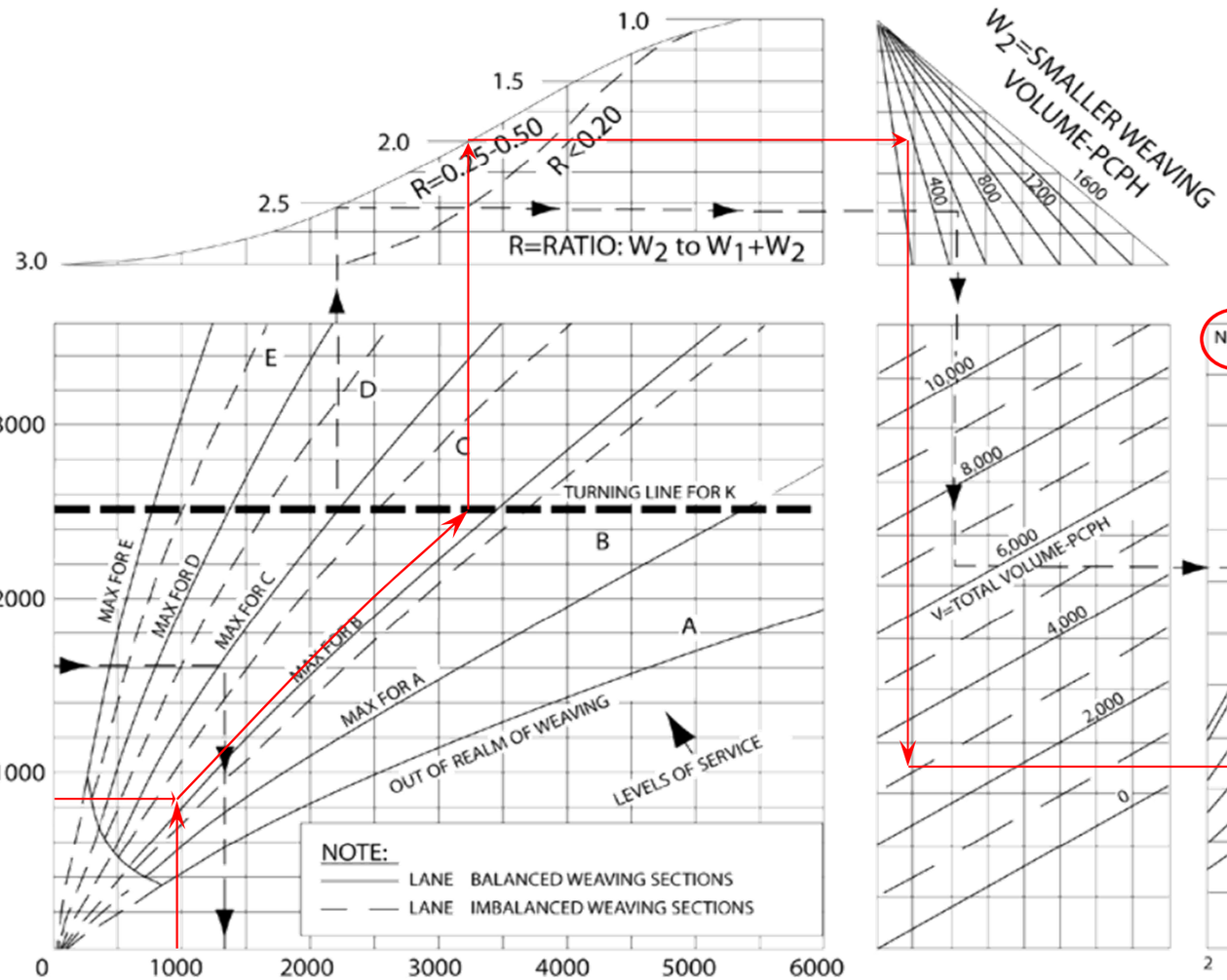
Direction : North

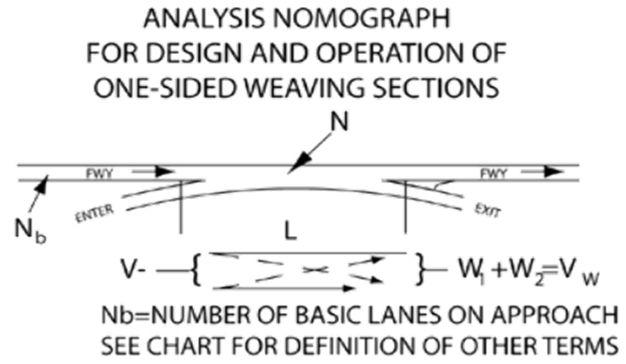
Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





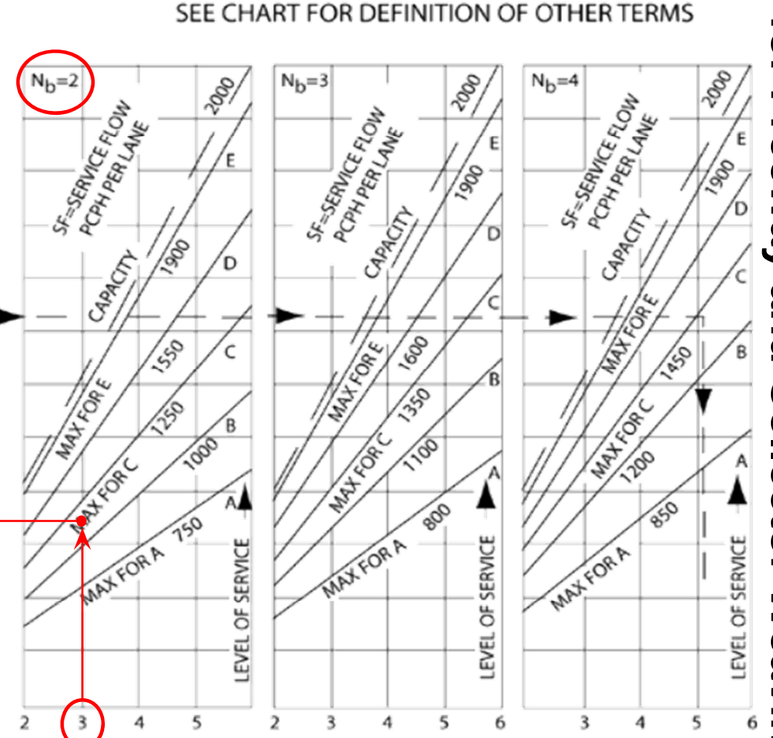
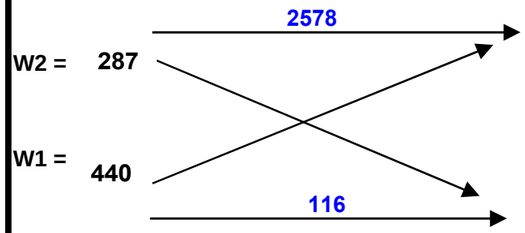


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = C/D

V = 3421 pcph

L = 1330 feet

W1 = 440 pcph

W2 = 287 pcph

V_w = 727 pcph

R = 0.39

Direction : North

Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

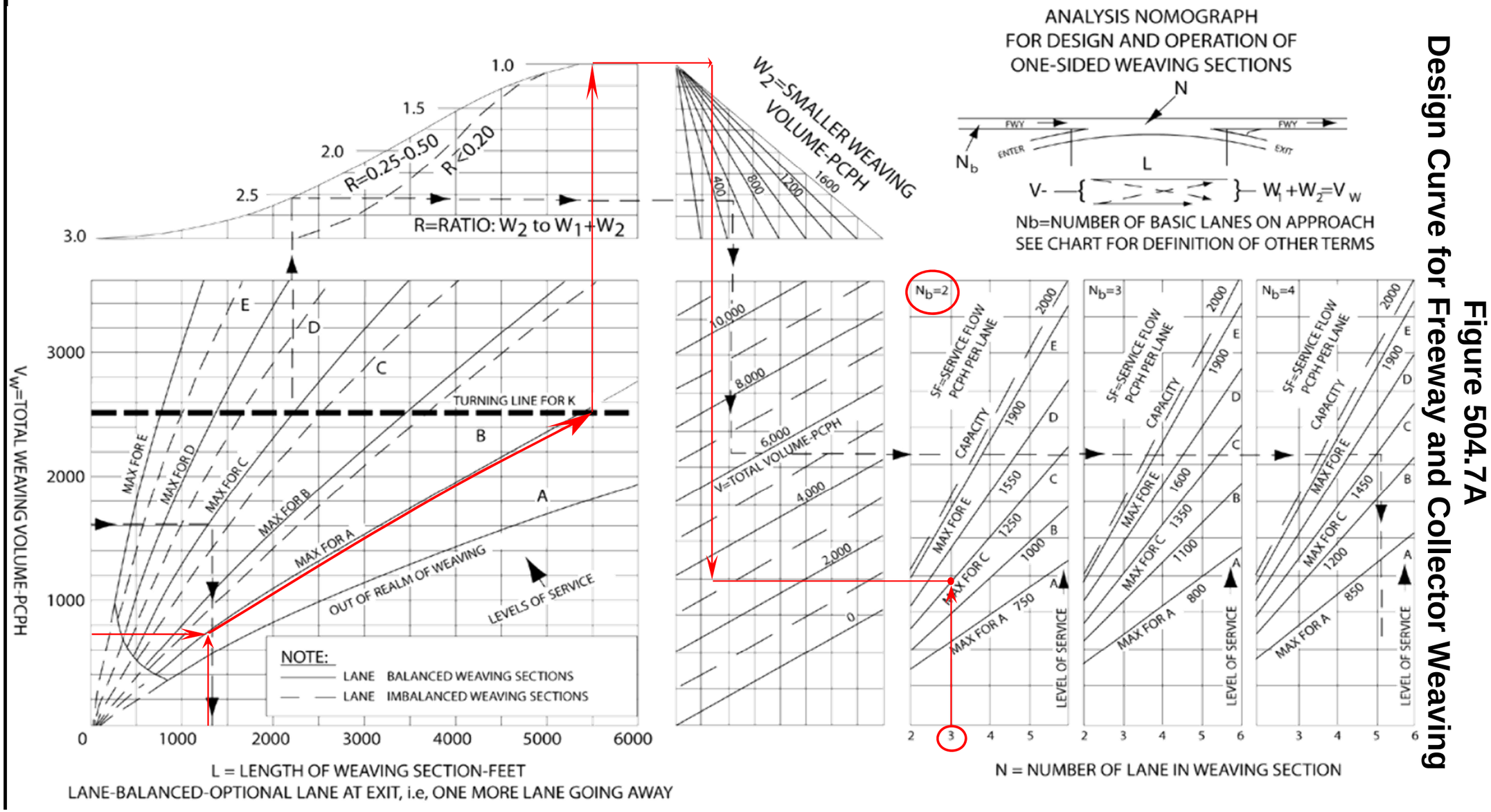
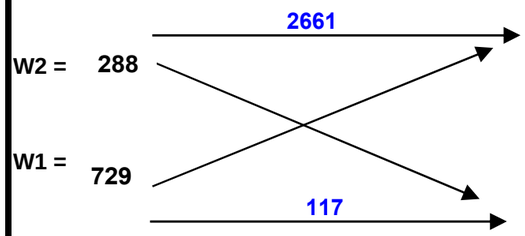


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3795 pcph V_w = 1017 pcph

L = 1330 feet R = 0.28

W1 = 729 pcph

W2 = 288 pcph Direction : North

Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: PM Peak

On Ramp: Madonna Rd

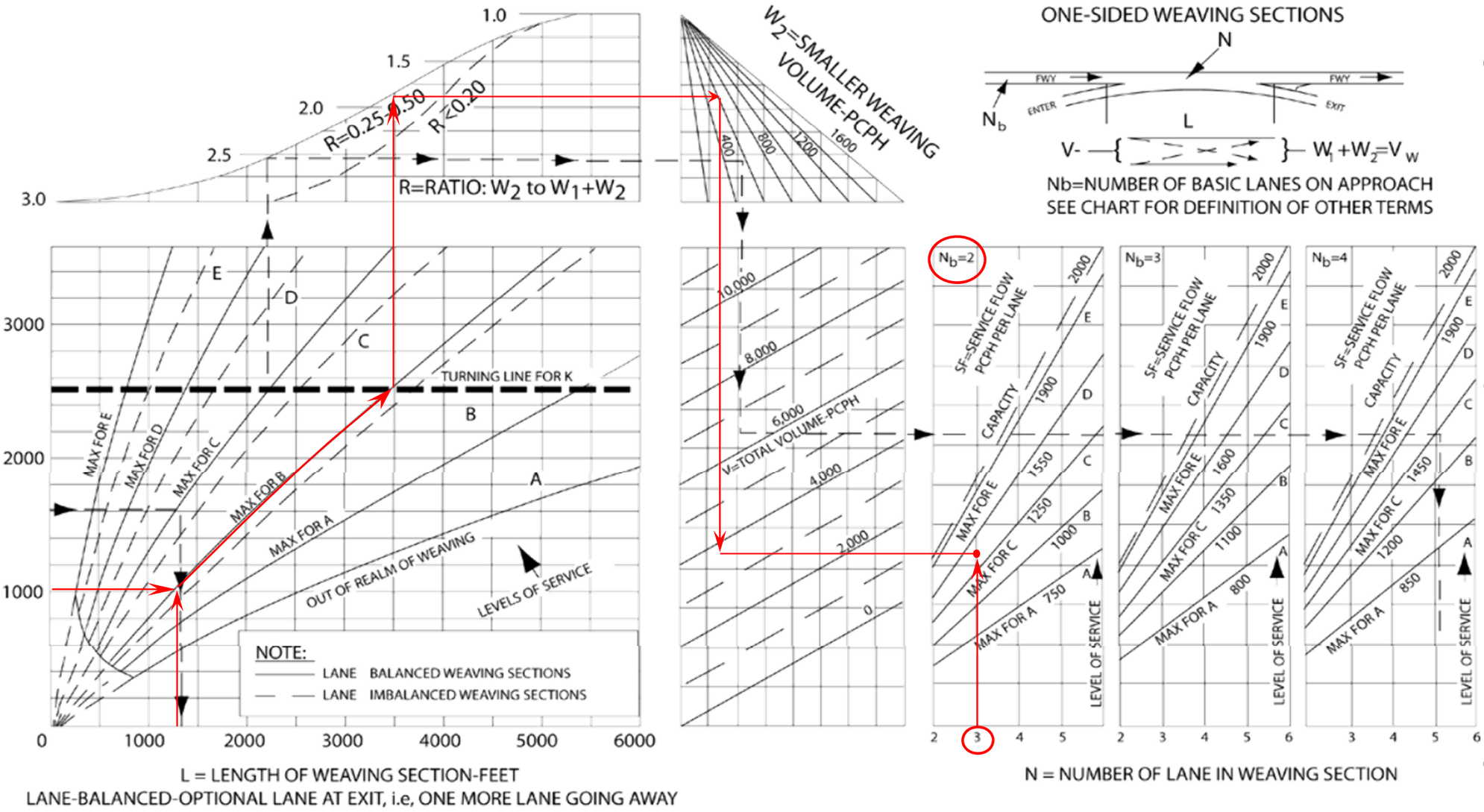
Off Ramp: Marsh St

LOS weave = B

Compo. LOS = D

ANALYSIS NOMOGRAPH
FOR DESIGN AND OPERATION OF
ONE-SIDED WEAVING SECTIONS

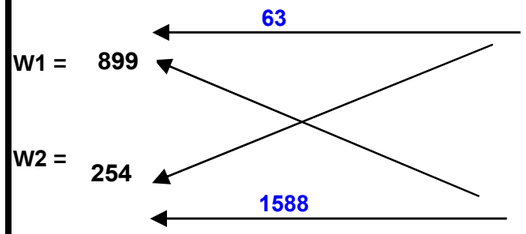
Nb=NUMBER OF BASIC LANES ON APPROACH
SEE CHART FOR DEFINITION OF OTHER TERMS



L = LENGTH OF WEAVING SECTION-FEET
LANE-BALANCED-OPTIONAL LANE AT EXIT, i.e, ONE MORE LANE GOING AWAY

N = NUMBER OF LANE IN WEAVING SECTION

Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = C

V = 2804 pcph

L = 2065 feet

W1 = 899 pcph

W2 = 254 pcph

V_w = 1153 pcph

R = 0.22

Direction : South

Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: AM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

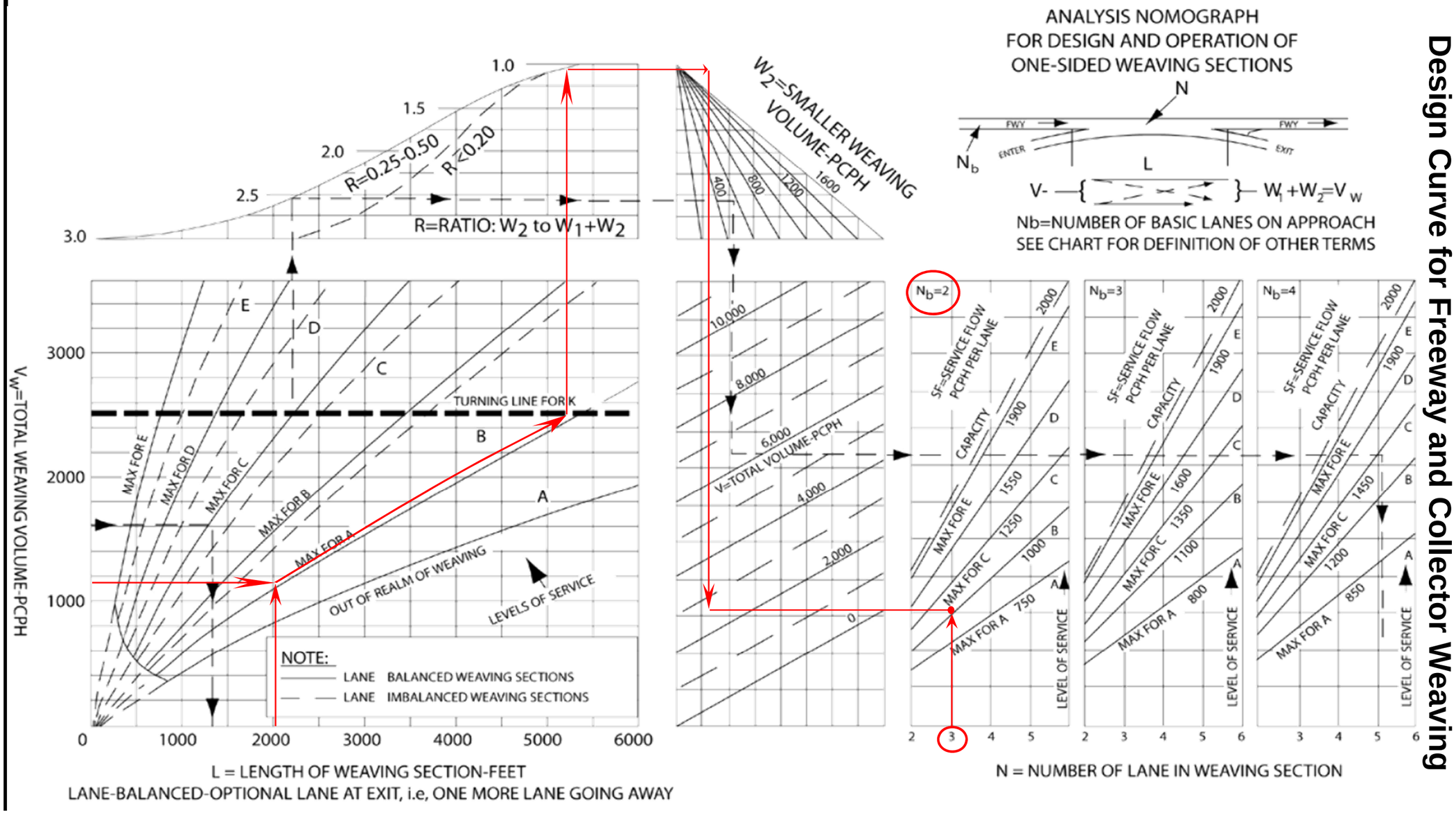
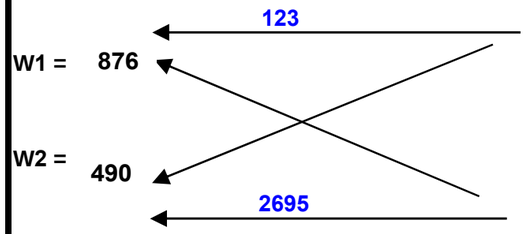


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = E

V = 4184 pcph

L = 2065 feet

W1 = 876 pcph

W2 = 490 pcph

V_w = 1366 pcph

R = 0.36

Direction : South

Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: PM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

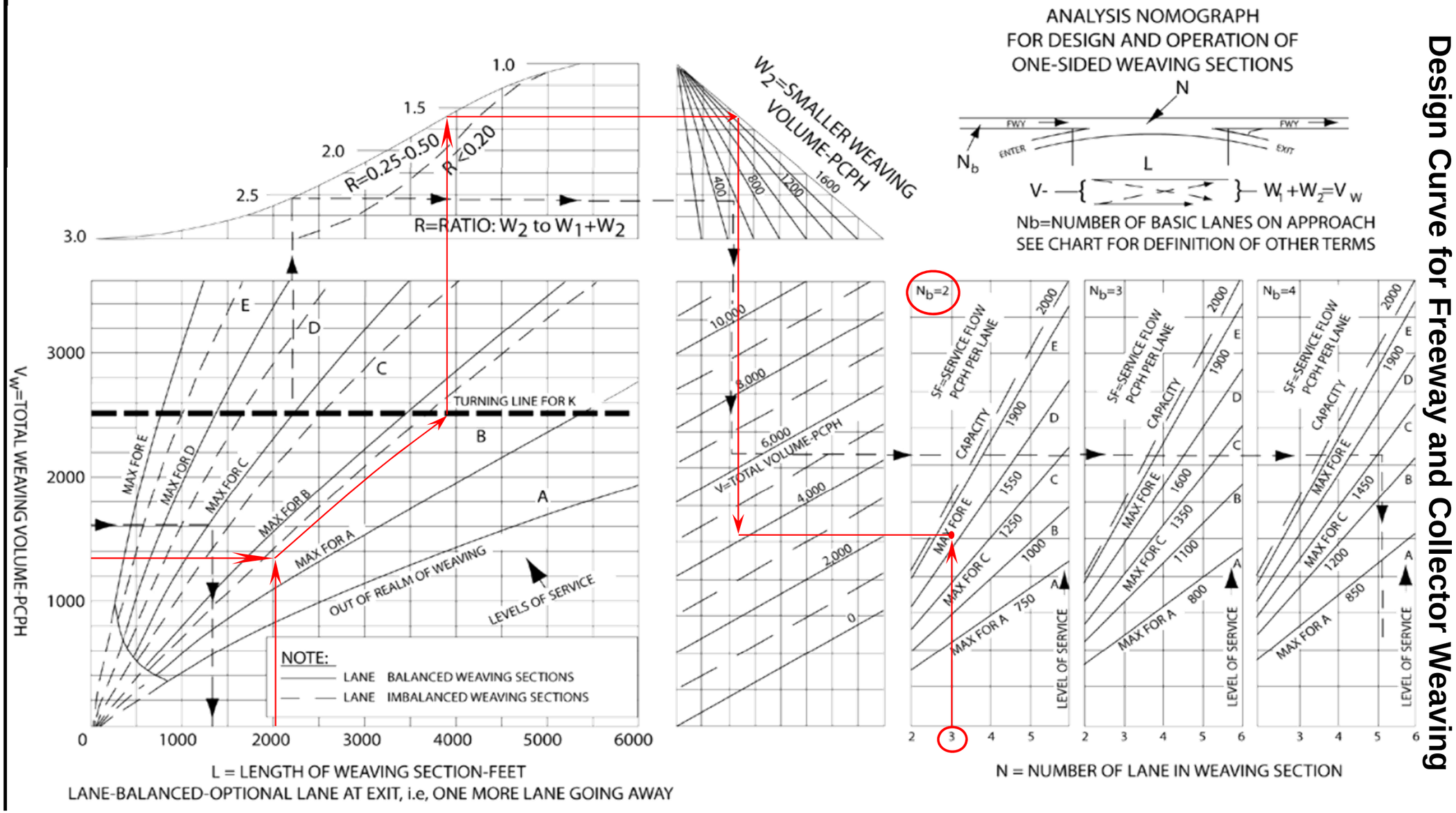


Figure 504.7A
Design Curve for Freeway and Collector Weaving

Year 2035 Full Build Prado Interchange Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Year 2035 Full Build Prado Interchange Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3454	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	939	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1971	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1971	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.4	mi/h
Number of lanes, N	2	
Density, D	32.6	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2703	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	735	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1542	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1542	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	23.8	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, A GHD Company
Date performed:	3/16/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3454	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	759	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	230	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3454	759	230	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	939	206	62	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3942	866	262	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3942 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3942	4700	No
$v_{FO} = v_F - v_R$	3076	4700	No
v_R	866	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3942 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3942	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 36.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.506

Space mean speed in ramp influence area, S_R = 53.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.4 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2703	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	628	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	530	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2703		628		530		vph
Peak-hour factor, PHF	0.92		0.92		0.92		
Peak 15-min volume, v15	735		171		144		v
Trucks and buses	10		10		10		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3085	717	605	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3085 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3085	4700	No
$v_{FO} = v_F - v_R$	2368	4700	No
v_R	717	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3085 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3085	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 28.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.493

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2695	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	230	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	759	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2695	230	759	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	732	62	206	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3076	262	866	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3076 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3338	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3076 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3338	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 27.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.387	
Space mean speed in ramp influence area,	S_R = 56.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.1	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2075	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	530	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	628	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2075	530	628	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	564	144	171	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2368	605	717	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2368 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2973	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2368 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2973	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 24.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.354	
Space mean speed in ramp influence area,	S_R = 56.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.9	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2925	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	795	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1669	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1669	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.0	mi/h
Number of lanes, N	2	
Density, D	26.1	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2605	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	708	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1487	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1487	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	22.9	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2925	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	446	vph
Length of first accel/decel lane	141	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	230	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2925	446	230	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	795	121	62	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3338	509	262	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3338 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3338	4700	No
$v_{FO} = v_F - v_R$	2829	4700	No
v_R	509	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3338 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3338	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 31.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.474

Space mean speed in ramp influence area, S_R = 54.1 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.1 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2605	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	177	vph
Length of first accel/decel lane	141	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	530	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2605	177	530	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	708	48	144	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2973	202	605	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2973 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2973	4700	No
$v_{FO} = v_F - v_R$	2771	4700	No
v_R	202	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2973 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2973	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 28.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.446

Space mean speed in ramp influence area, S_R = 54.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.7 mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	940	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2247	415	232	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	598	110	62	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2510	464	259	0	pc/h

Volume ratio, VR	0.224	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	89	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	449	lc/h
Total lane changes, LCALL	538	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.146	

Average weaving speed, SW	58.6	mi/h
Average non-weaving speed, SNW	59.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.6	mi/h
Weaving segment density, D	18.1	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.524	
Weaving segment flow rate, v	3233	pc/h
Weaving segment capacity, cW	5874	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4779	940	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2056	c
		Maximum	Analyzed	
v/c ratio		1.00	0.524	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	940	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2255	626	173	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	600	166	46	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2519	699	193	0	pc/h

Volume ratio, VR	0.262	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	89	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	451	lc/h
Total lane changes, LCALL	540	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.146

Average weaving speed, SW	58.6	mi/h
Average non-weaving speed, SNW	59.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.3	mi/h
Weaving segment density, D	19.2	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.561	
Weaving segment flow rate, v	3411	pc/h
Weaving segment capacity, cW	5789	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5175	940	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2026	c
		Maximum	Analyzed	
v/c ratio		1.00	0.561	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2458	445	204	118	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	654	118	54	31	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2746	497	228	132	pc/h

Volume ratio, VR	0.201	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	736	lc/h
Total lane changes, LCALL	849	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.159

Average weaving speed, SW	58.2	mi/h
Average non-weaving speed, SNW	59.2	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.0	mi/h
Weaving segment density, D	20.4	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.571	
Weaving segment flow rate, v	3603	pc/h
Weaving segment capacity, cW	6011	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4549	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2104	c
		Maximum	Analyzed	
v/c ratio		1.00	0.571	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means,a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2675	688	206	111	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	711	183	55	30	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2988	769	230	124	pc/h

Volume ratio, VR	0.243	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	784	lc/h
Total lane changes, LCALL	897	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.166

Average weaving speed, SW	57.9	mi/h
Average non-weaving speed, SNW	58.4	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.3	mi/h
Weaving segment density, D	23.5	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.662	
Weaving segment flow rate, v	4111	pc/h
Weaving segment capacity, cW	5917	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4981	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2071	c
		Maximum	Analyzed	
v/c ratio		1.00	0.662	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means,a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2228	187	574	47	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	593	50	153	13	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2489	209	641	53	pc/h

Volume ratio, VR	0.251	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1065	lc/h
Total lane changes, LCALL	1212	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.148

Average weaving speed, SW	58.5	mi/h
Average non-weaving speed, SNW	59.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.3	mi/h
Weaving segment density, D	19.1	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.533	
Weaving segment flow rate, v	3392	pc/h
Weaving segment capacity, cW	6060	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5060	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2121	c
		Maximum	Analyzed	
v/c ratio		1.00	0.533	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2932	390	623	98	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	780	104	166	26	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3275	436	696	109	pc/h

Volume ratio, VR	0.251	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1239	lc/h
Total lane changes, LCALL	1386	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.165

Average weaving speed, SW	57.9	mi/h
Average non-weaving speed, SNW	57.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.8	mi/h
Weaving segment density, D	26.0	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.710	
Weaving segment flow rate, v	4516	pc/h
Weaving segment capacity, cW	6060	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5061	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2121	c
		Maximum	Analyzed	
v/c ratio		1.00	0.710	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	4/24/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Madonna-Prado
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1815	175	600	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	483	47	160	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2027	195	670	0	pc/h

Volume ratio, VR	0.299	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	70	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	219	lc/h
Total lane changes, LCALL	289	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.112

Average weaving speed, SW	59.9	mi/h
Average non-weaving speed, SNW	60.4	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	60.2	mi/h
Weaving segment density, D	16.0	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.488	
Weaving segment flow rate, v	2892	pc/h
Weaving segment capacity, cW	5649	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5574	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1977	c
		Maximum	Analyzed	
v/c ratio		1.00	0.488	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	4/24/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Madonna-Prado
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3001	340	321	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	798	90	85	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3352	380	359	0	pc/h

Volume ratio, VR	0.181	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	70	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	492	lc/h
Total lane changes, LCALL	562	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.190

Average weaving speed, SW	57.0	mi/h
Average non-weaving speed, SNW	58.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.2	mi/h
Weaving segment density, D	23.4	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.658	
Weaving segment flow rate, v	4091	pc/h
Weaving segment capacity, cW	5920	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4339	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2072	c
		Maximum	Analyzed	
v/c ratio		1.00	0.658	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	Dalidio SB On
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	175	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	101	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	175	101		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	48	27		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	200	115	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 200 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	315	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	

If yes, v_{12A} = 200 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	315	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 4.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M_S = 0.284	
Space mean speed in ramp influence area,	S_R = 58.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.5	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	Dalidio SB On
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	340	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	152	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	340	152		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	92	41		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	388	173	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 388 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	561	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 388 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	561	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 6.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M_S = 0.286	
Space mean speed in ramp influence area,	S_R = 58.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.4	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Dalidio Dr
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2091	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	568	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1193	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1193	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.4	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Dalidio Dr
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3493	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	949	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1993	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1993	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	2	
Density, D	33.2	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	4/24/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2091	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	741	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	101	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2091	741	101	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	568	201	27	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2386	846	115	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2386 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2386	4700	No
$v_{FO} = v_F - v_R$	1540	4700	No
v_R	846	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2386 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2386	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 20.0+ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.504

Space mean speed in ramp influence area, S_R = 53.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.4 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	4/24/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3493	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	511	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	152	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3493	511	152	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	949	139	41	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3987	583	173	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3987 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3987	4700	No
$v_{FO} = v_F - v_R$	3404	4700	No
v_R	583	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3987 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3987	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 33.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.480

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1350	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	540	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	741	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1350	540	741	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	367	147	201	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1541	616	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1541 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2157	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1541 (Equation 13-15, 13-16, 18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2157	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 19.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.327	
Space mean speed in ramp influence area,	S_R = 57.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.5	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/16/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2982	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	839	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	511	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2982	839	511	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	810	228	139	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3403	958	583	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3403 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4361	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3403 (Equation 13-15, 13-16, 18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4361	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 36.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.599	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 51.2	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1890	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	514	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1079	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1079	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.6	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 Full Build
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3821	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1038	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2180	pc/h/ln

Speed Inputs and Adjustments

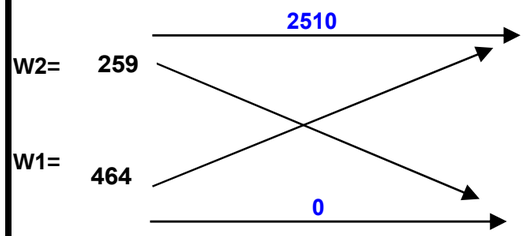
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2180	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	56.4	mi/h
Number of lanes, N	2	
Density, D	38.7	pc/mi/ln
Level of service, LOS	E	

Year 2035 Full Build Prado Interchange Conditions

Leisch Method Worksheets



LOS weave = B

Compo. LOS = C

V = 3233 pcph

L = 940 feet

W1 = 464 pcph

W2 = 259 pcph

V_w = 723 pcph

R = 0.36

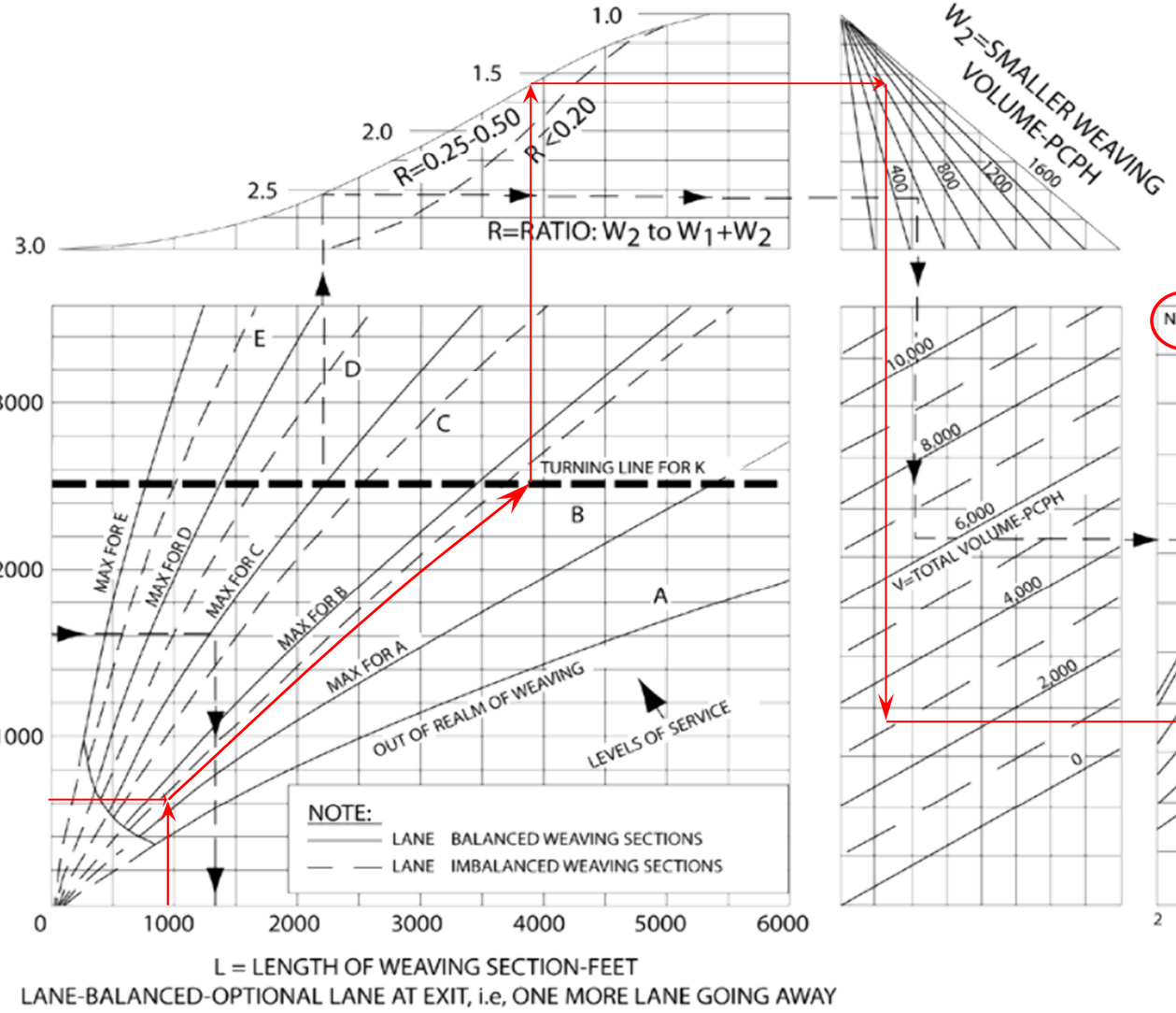
Direction : North

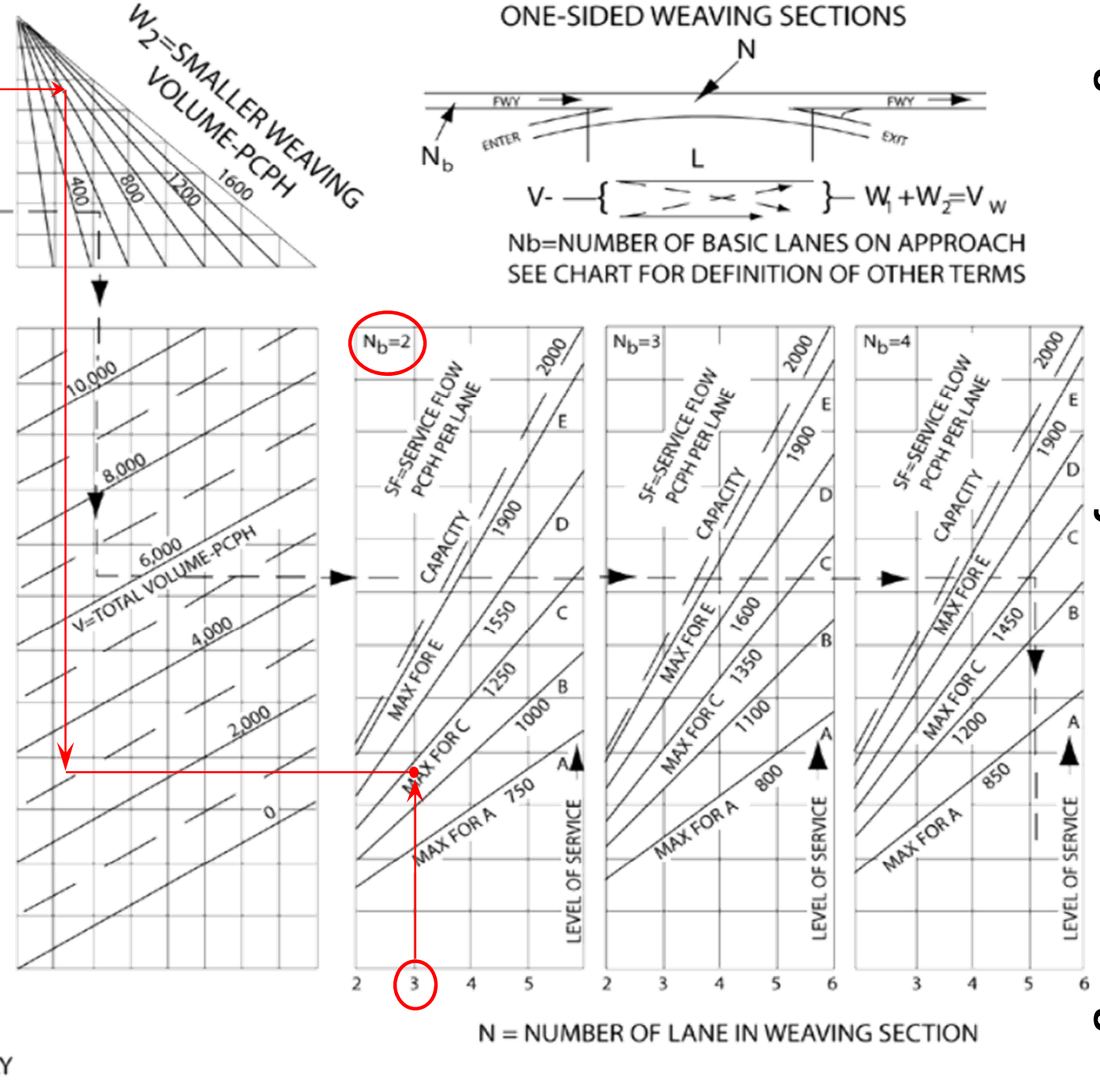
Project: 2035 Full Build - Alt A1

Year: 2035 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





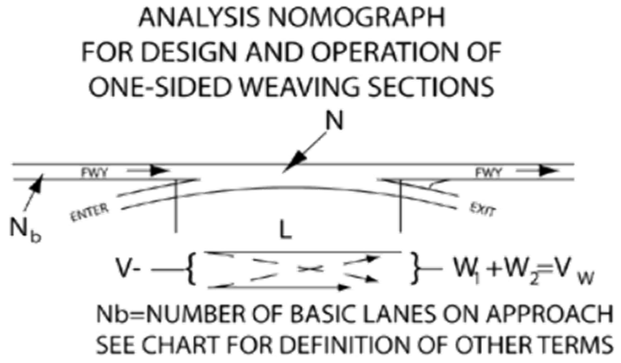
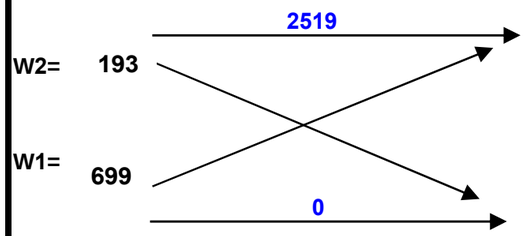


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = C/D

V = 3411 pcph

L = 940 feet

W1 = 699 pcph

W2 = 193 pcph

V_w = 892 pcph

R = 0.22

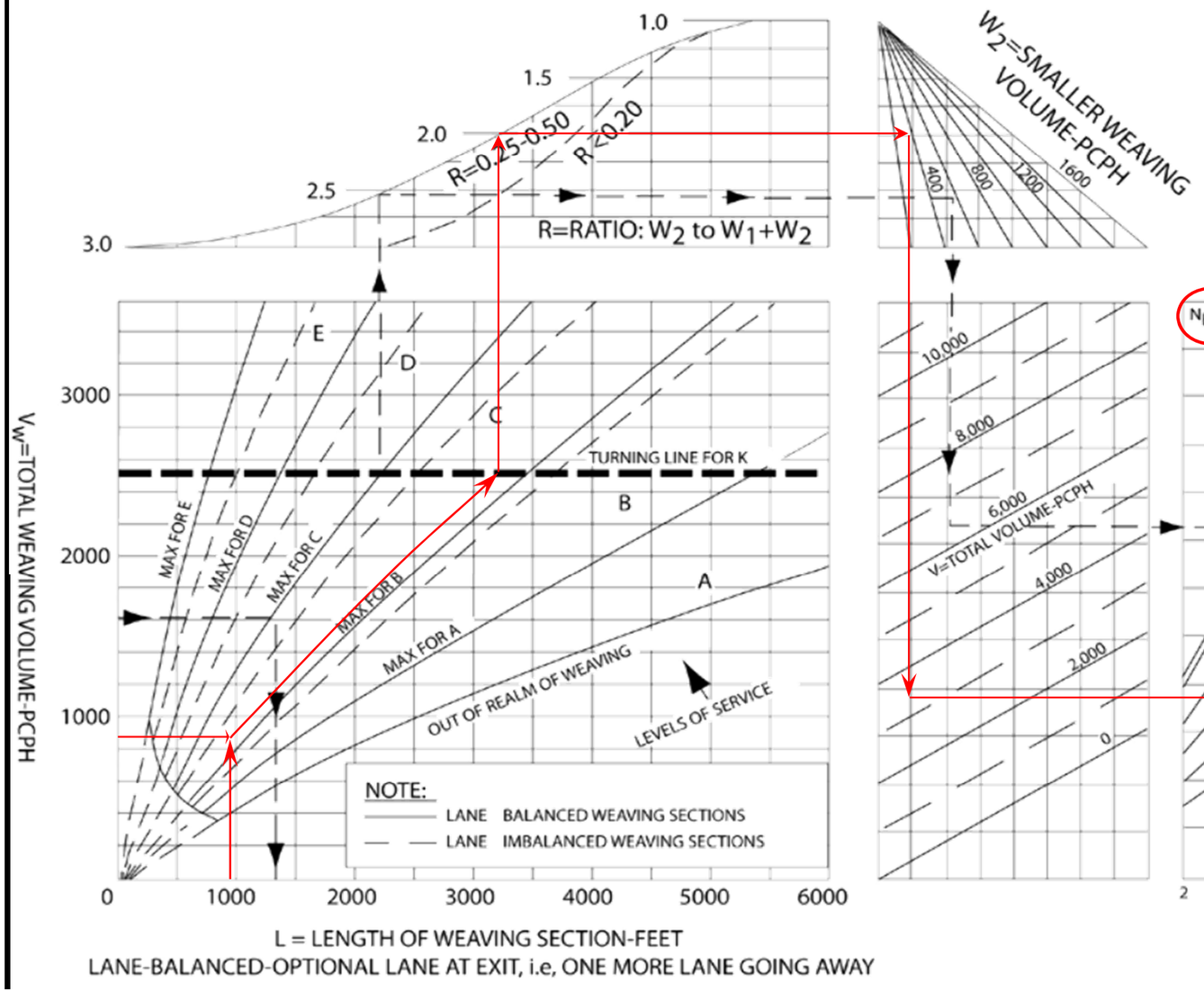
Direction : North

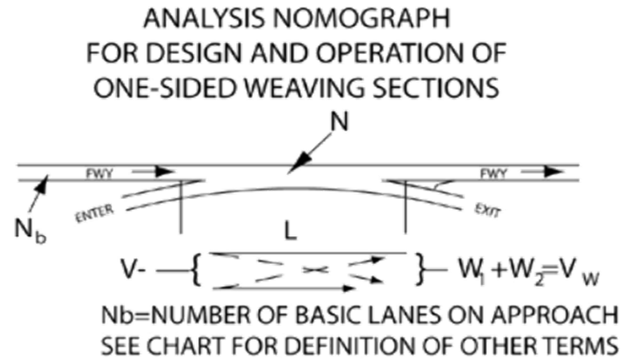
Project: 2035 Full Build - Alt A1

Year: 2035 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





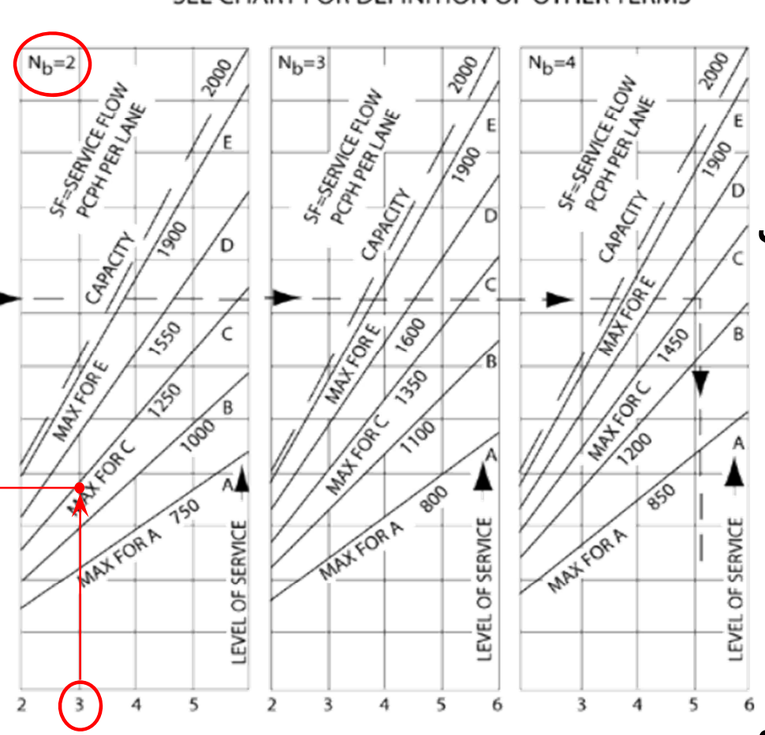
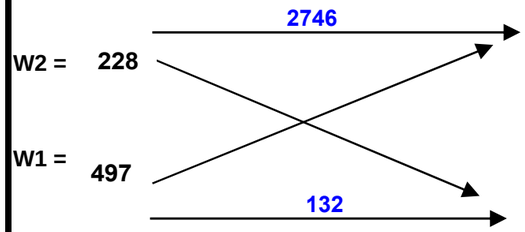


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = D

V = 3603 pcph

L = 1330 feet

W1 = 497 pcph

W2 = 228 pcph

V_w = 725 pcph

R = 0.31

Direction : North

Project: 2035 Full Build - Alt A1

Year: 2035 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

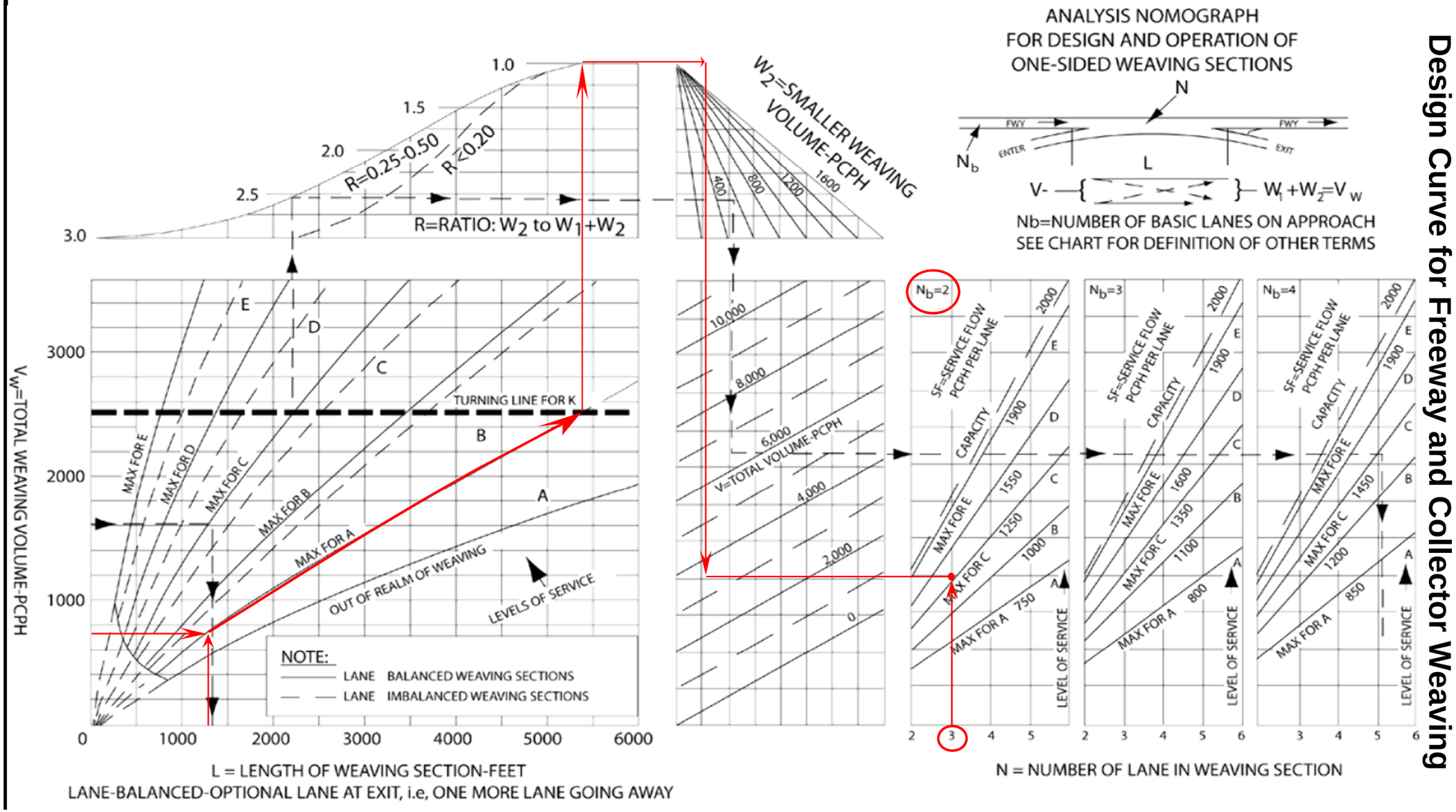
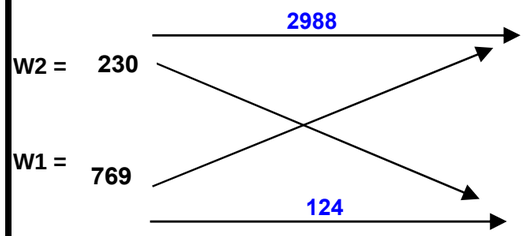


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = D

V = 4111 pcph

L = 1330 feet

W1 = 769 pcph

W2 = 230 pcph

V_w = 999 pcph

R = 0.23

Direction : North

Project: 2035 Full Build - Alt A1

Year: 2035 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

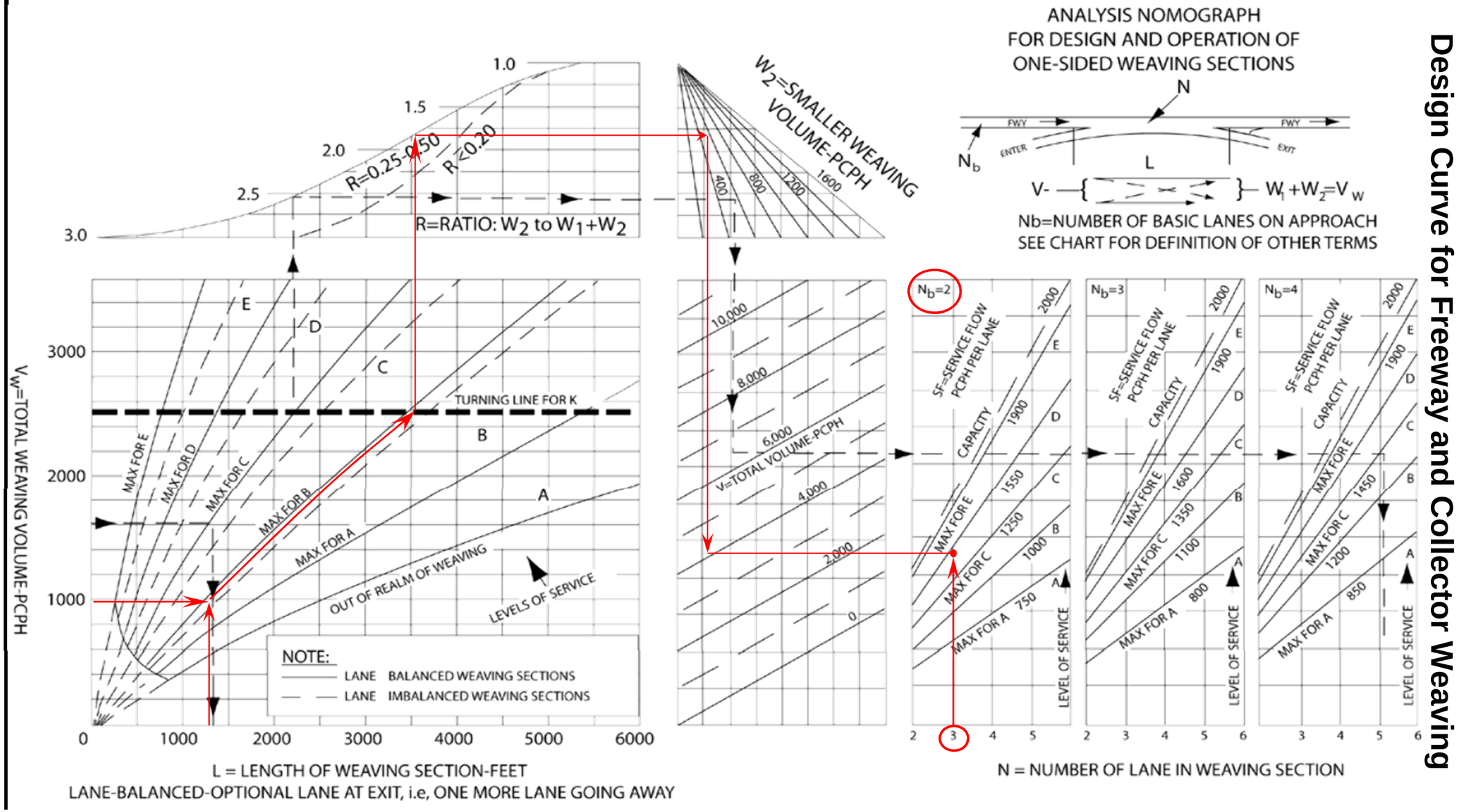
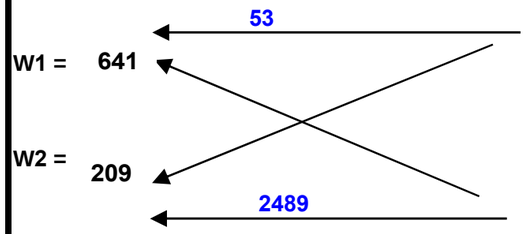


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = C

V = 3392 pcph

L = 2065 feet

W1 = 641 pcph

W2 = 209 pcph

V_w = 850 pcph

R = 0.25

Direction : South

Project: 2035 Full Build - Alt A1

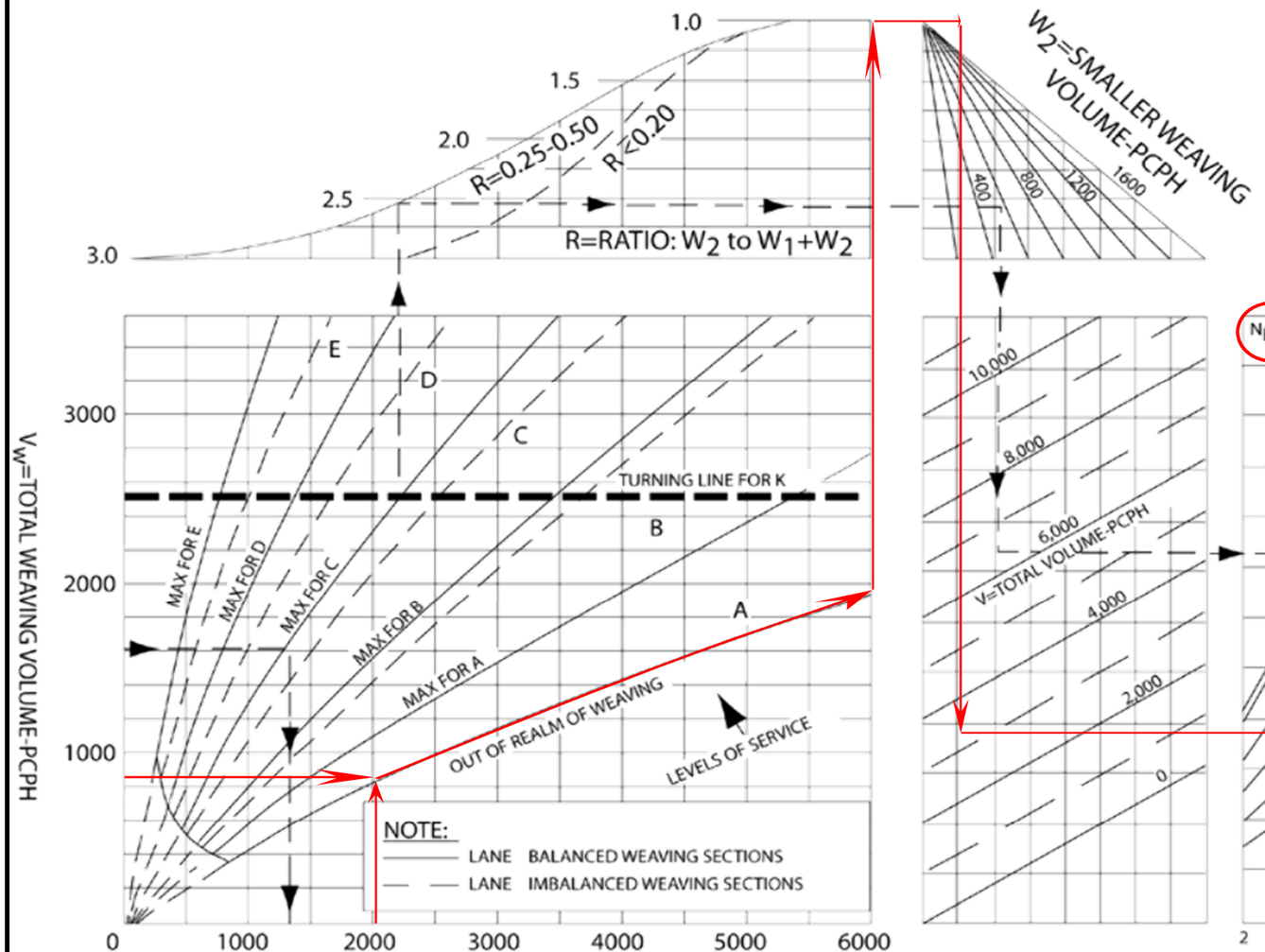
Year: 2035 Peak Hour: AM Peak

On Ramp: Marsh St

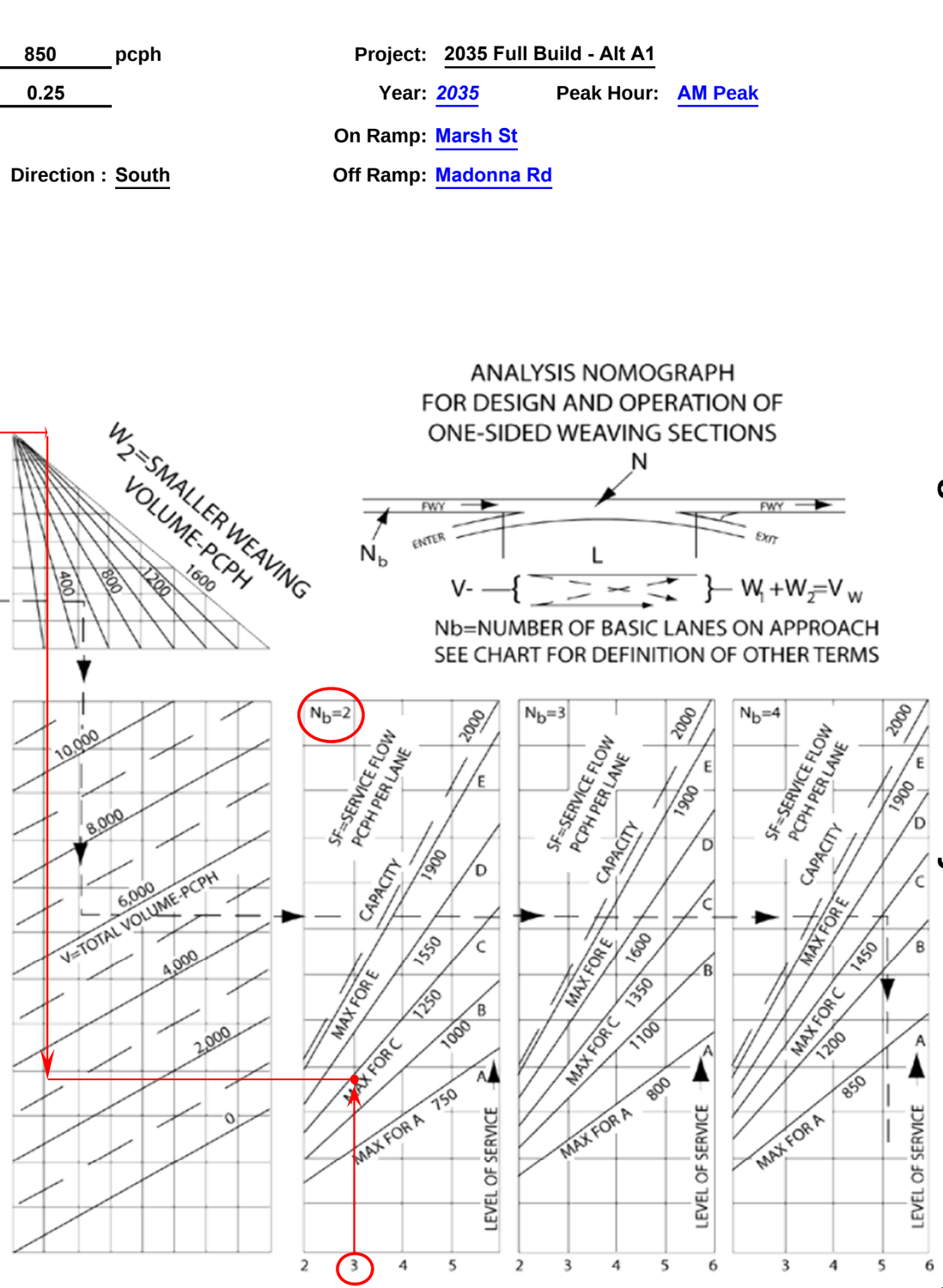
Off Ramp: Madonna Rd

ANALYSIS NOMOGRAPH
FOR DESIGN AND OPERATION OF
ONE-SIDED WEAVING SECTIONS

Nb=NUMBER OF BASIC LANES ON APPROACH
SEE CHART FOR DEFINITION OF OTHER TERMS

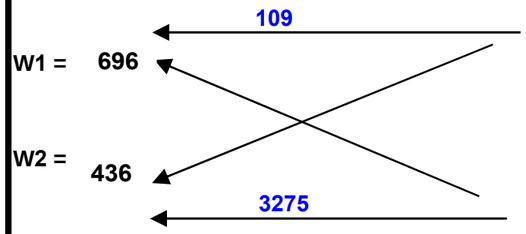


L = LENGTH OF WEAVING SECTION-FEET
LANE-BALANCED-OPTIONAL LANE AT EXIT, i.e, ONE MORE LANE GOING AWAY



N = NUMBER OF LANE IN WEAVING SECTION

Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = E

V = 4516 pcph

L = 2065 feet

W1 = 696 pcph

W2 = 436 pcph

V_w = 1132 pcph

R = 0.39

Direction : South

Project: 2035 Full Build - Alt A1

Year: 2035 Peak Hour: PM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

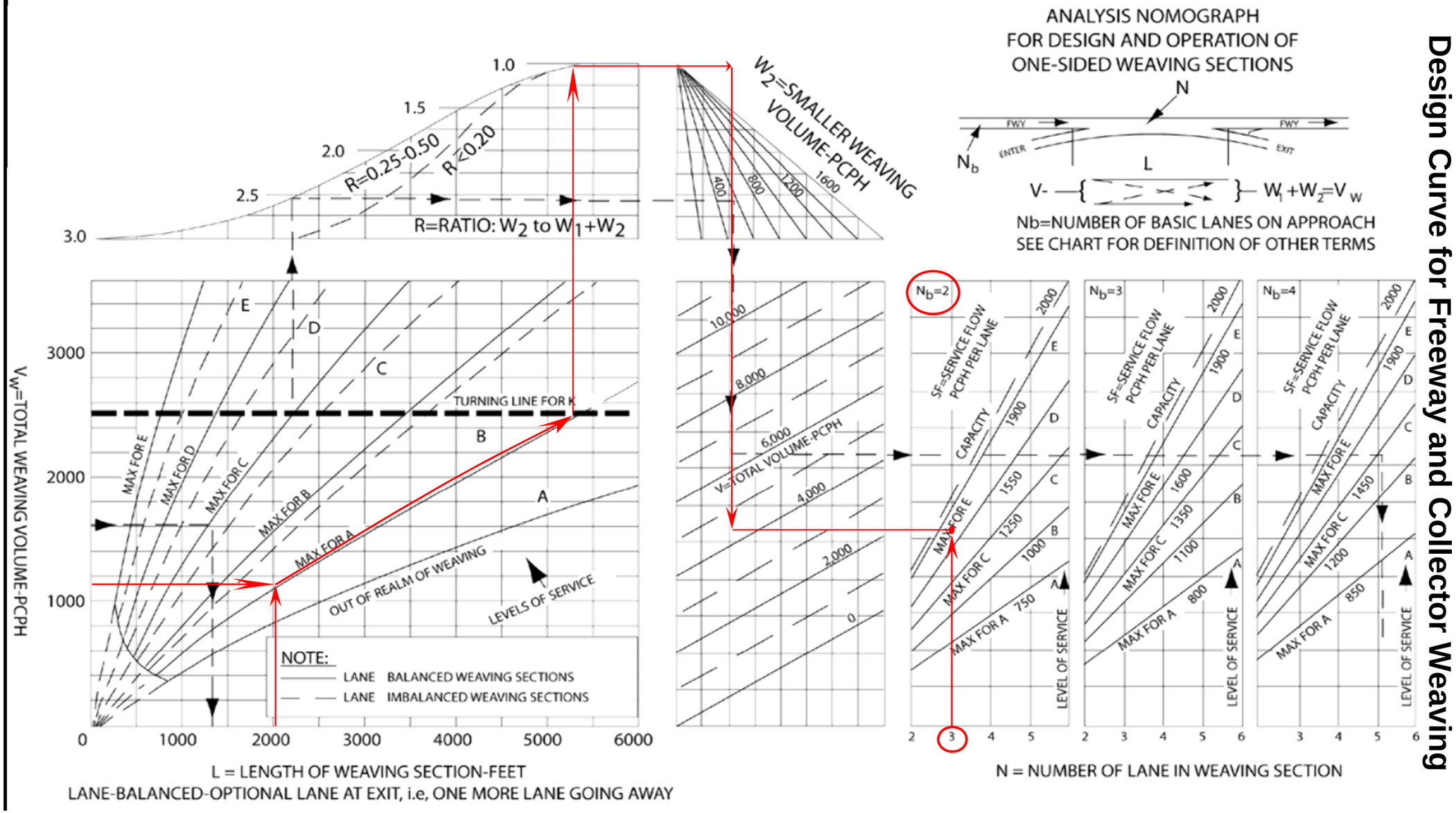
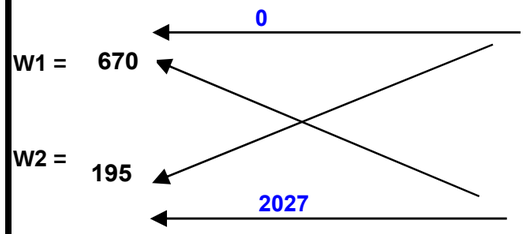


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = C

V = 2892 pcph

L = 700 feet

W1 = 670 pcph

W2 = 195 pcph

V_w = 865 pcph

R = 0.23

Direction : South

Project: 2035 Full Build - Alt A1

Year: 2035 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Dalidio Dr/Prado Rd

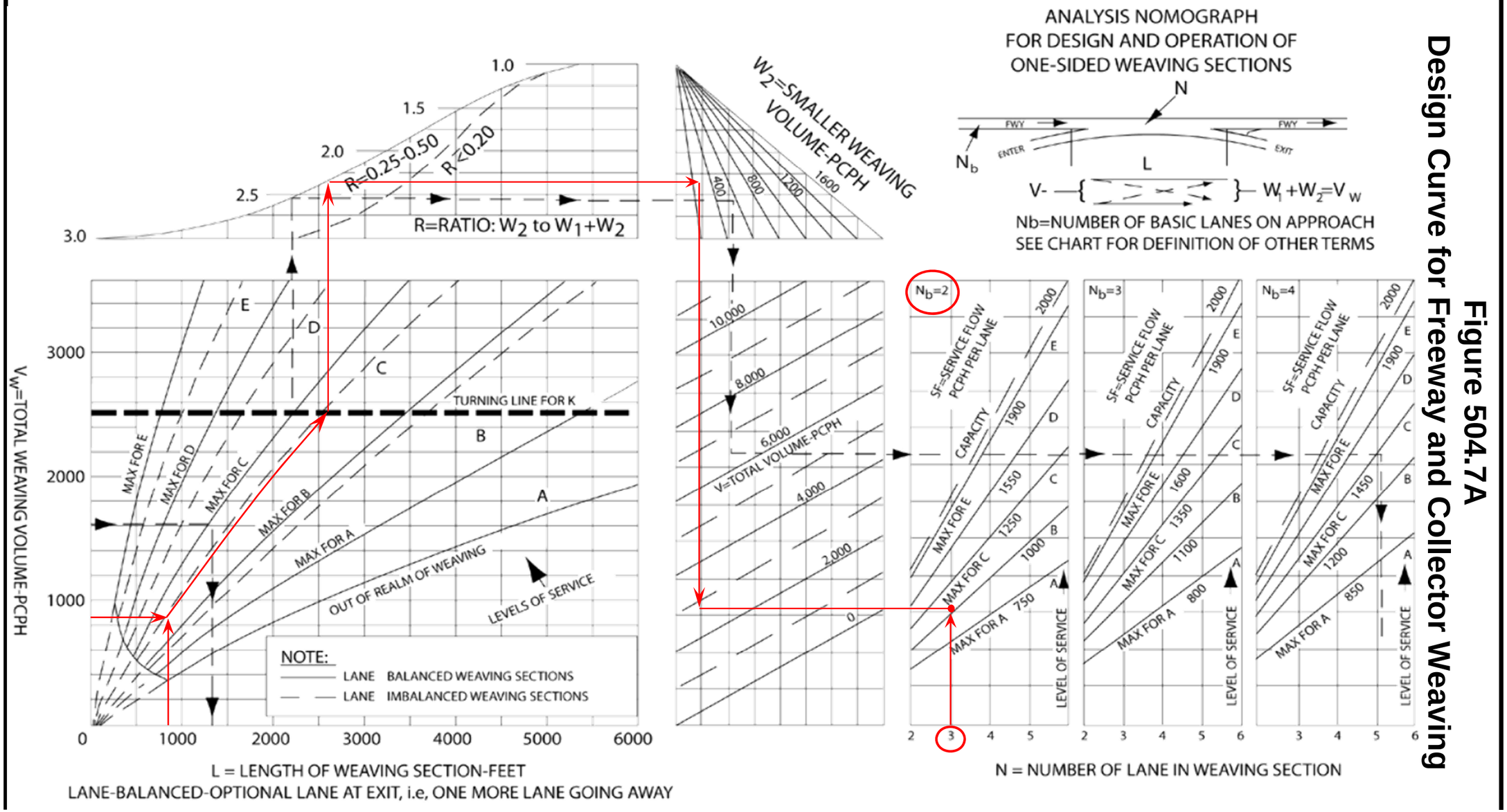
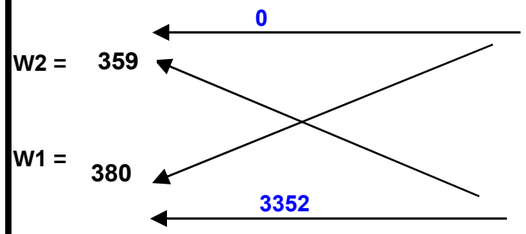


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = D/E

V = 4091 pcph

L = 700 feet

W1 = 380 pcph

W2 = 359 pcph

V_w = 739 pcph

R = 0.49

Direction : South

Project: 2035 Full Build - Alt A1

Year: 2035 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Dalidio Dr/Prado Rd

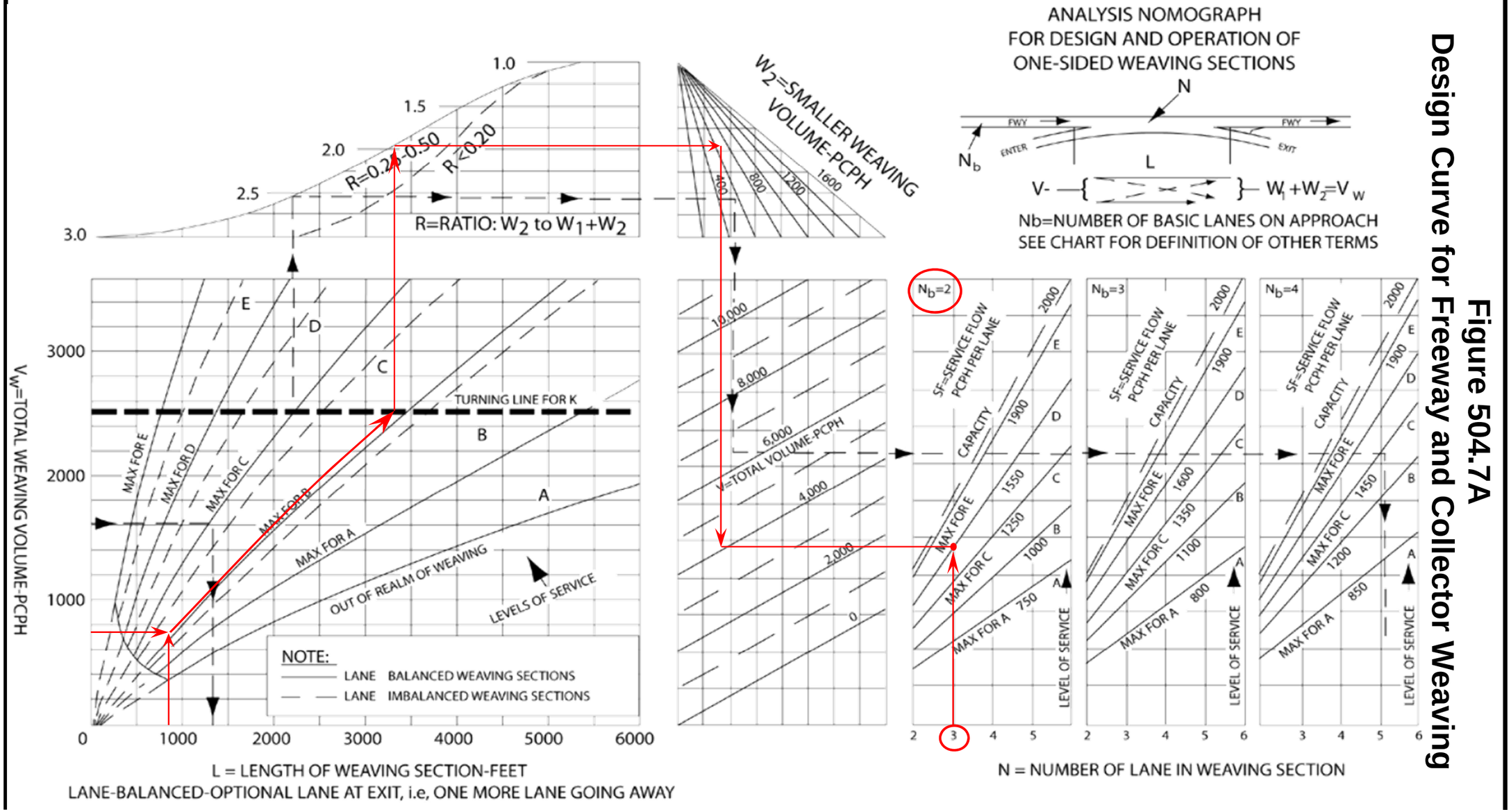


Figure 504.7A
Design Curve for Freeway and Collector Weaving

Year 2035 Full Build Prado Interchange Plus Project Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Year 2035 Full Build Prado Interchange Plus Project Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3491	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	949	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1992	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1992	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	2	
Density, D	33.2	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2728	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	741	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1557	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1557	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	24.1	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, A GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3491	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	766	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	230	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3491	766	230	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	949	208	62	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3984	874	262	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3984 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3984	4700	No
$v_{FO} = v_F - v_R$	3110	4700	No
v_R	874	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3984 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3984	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 36.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.507

Space mean speed in ramp influence area, S_R = 53.3 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.3 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2728	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	637	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	530	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2728	637	530	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	741	173	144	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3113	727	605	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3113 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3113	4700	No
$v_{FO} = v_F - v_R$	2386	4700	No
v_R	727	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3113 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3113	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 29.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.493

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2725	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	230	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	766	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2725	230	766	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	740	62	208	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3110	262	874	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3110 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3372	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3110 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3372	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 27.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.391	
Space mean speed in ramp influence area,	S_R = 56.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.0	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2091	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	530	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	637	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2091	530	637	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	568	144	173	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2386	605	727	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2386 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2991	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2386 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2991	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 24.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.355	
Space mean speed in ramp influence area,	S_R = 56.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.8	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2955	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	803	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1686	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1686	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	63.8	mi/h
Number of lanes, N	2	
Density, D	26.4	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Prado
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2621	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	712	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1496	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1496	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	23.1	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2955	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	466	vph
Length of first accel/decel lane	141	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	230	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2955	466	230	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	803	127	62	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3373	532	262	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3373 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3373	4700	No
$v_{FO} = v_F - v_R$	2841	4700	No
v_R	532	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3373 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3373	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 32.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.476

Space mean speed in ramp influence area, S_R = 54.1 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.1 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	PRADO NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2621	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	203	vph
Length of first accel/decel lane	141	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	530	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2621	203	530	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	712	55	144	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2991	232	605	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2991 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2991	4700	No
$v_{FO} = v_F - v_R$	2759	4700	No
v_R	232	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2991 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2991	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 28.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.449

Space mean speed in ramp influence area, S_R = 54.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.7 mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	940	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2257	453	232	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	600	120	62	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2521	506	259	0	pc/h

Volume ratio, VR	0.233	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	89	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	451	lc/h
Total lane changes, LCALL	540	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.146

Average weaving speed, SW	58.6	mi/h
Average non-weaving speed, SNW	59.7	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.5	mi/h
Weaving segment density, D	18.4	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.535	
Weaving segment flow rate, v	3286	pc/h
Weaving segment capacity, cW	5854	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4874	940	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2049	c
		Maximum	Analyzed	
v/c ratio		1.00	0.535	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Prado-Madonna
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	940	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2245	680	173	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	597	181	46	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2508	760	193	0	pc/h

Volume ratio, VR	0.275	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	89	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	448	lc/h
Total lane changes, LCALL	537	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.145

Average weaving speed, SW	58.7	mi/h
Average non-weaving speed, SNW	59.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.2	mi/h
Weaving segment density, D	19.5	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.573	
Weaving segment flow rate, v	3461	pc/h
Weaving segment capacity, cW	5757	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5321	940	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2015	c
		Maximum	Analyzed	
v/c ratio		1.00	0.573	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2492	454	218	120	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	663	121	58	32	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2784	507	244	134	pc/h

Volume ratio, VR	0.205	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	744	lc/h
Total lane changes, LCALL	857	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.160	

Average weaving speed, SW	58.1	mi/h
Average non-weaving speed, SNW	59.1	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.9	mi/h
Weaving segment density, D	20.8	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.582	
Weaving segment flow rate, v	3669	pc/h
Weaving segment capacity, cW	6003	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4584	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2101	c
		Maximum	Analyzed	
v/c ratio		1.00	0.582	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means,a GHD Company
Date Performed:	3/16/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2711	699	214	113	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	721	186	57	30	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3028	781	239	126	pc/h

Volume ratio, VR	0.244	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	793	lc/h
Total lane changes, LCALL	906	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.167

Average weaving speed, SW	57.8	mi/h
Average non-weaving speed, SNW	58.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.2	mi/h
Weaving segment density, D	23.9	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.672	
Weaving segment flow rate, v	4174	pc/h
Weaving segment capacity, cW	5914	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4995	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2070	c
		Maximum	Analyzed	
v/c ratio		1.00	0.672	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means,a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2259	195	582	49	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	601	52	155	13	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2523	218	650	55	pc/h

Volume ratio, VR	0.252	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1072	lc/h
Total lane changes, LCALL	1219	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.149

Average weaving speed, SW	58.5	mi/h
Average non-weaving speed, SNW	59.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.2	mi/h
Weaving segment density, D	19.4	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.542	
Weaving segment flow rate, v	3446	pc/h
Weaving segment capacity, cW	6057	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5074	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2120	c
		Maximum	Analyzed	
v/c ratio		1.00	0.542	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2974	400	633	101	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	791	106	168	27	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3322	447	707	113	pc/h

Volume ratio, VR	0.251	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1249	lc/h
Total lane changes, LCALL	1396	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.166

Average weaving speed, SW	57.9	mi/h
Average non-weaving speed, SNW	57.7	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.7	mi/h
Weaving segment density, D	26.5	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.722	
Weaving segment flow rate, v	4589	pc/h
Weaving segment capacity, cW	6057	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5069	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2120	c
		Maximum	Analyzed	
v/c ratio		1.00	0.722	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	4/24/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Madonna-Prado
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1815	175	639	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	483	47	170	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2027	195	714	0	pc/h

Volume ratio, VR	0.310	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	70	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	219	lc/h
Total lane changes, LCALL	289	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.112

Average weaving speed, SW	59.9	mi/h
Average non-weaving speed, SNW	60.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	60.2	mi/h
Weaving segment density, D	16.3	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.497	
Weaving segment flow rate, v	2936	pc/h
Weaving segment capacity, cW	5623	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5687	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1968	c
		Maximum	Analyzed	
v/c ratio		1.00	0.497	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	4/24/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Madonna-Prado
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3001	340	373	0	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	798	90	99	0	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3352	380	417	0	pc/h

Volume ratio, VR	0.192	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	70	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	492	lc/h
Total lane changes, LCALL	562	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.190

Average weaving speed, SW	57.0	mi/h
Average non-weaving speed, SNW	58.4	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.1	mi/h
Weaving segment density, D	23.8	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.670	
Weaving segment flow rate, v	4149	pc/h
Weaving segment capacity, cW	5894	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4456	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2063	c
		Maximum	Analyzed	
v/c ratio		1.00	0.670	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	Dalidio SB On
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	175	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	120	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	175	120		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	48	33		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	200	137	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 200 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	337	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 200 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	337	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 4.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M_S = 0.284	
Space mean speed in ramp influence area,	S_R = 58.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.5	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	Dalidio SB On
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	340	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	179	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	340	179		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	92	49		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	388	204	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 388 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	592	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 388 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	592	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 6.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M_S = 0.286	
Space mean speed in ramp influence area,	S_R = 58.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.4	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Dalidio Dr
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2110	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	573	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1204	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1204	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.5	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Dalidio Dr
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3520	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	957	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2009	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2009	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.7	mi/h
Number of lanes, N	2	
Density, D	33.6	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	4/24/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2110	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	741	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	120	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2110	741	120	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	573	201	33	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2408	846	137	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2408 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2408	4700	No
$v_{FO} = v_F - v_R$	1562	4700	No
v_R	846	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2408 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2408	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 20.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.504

Space mean speed in ramp influence area, S_R = 53.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.4 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	4/24/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3520	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	511	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	179	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3520	511	179	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	957	139	49	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4017	583	204	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4017 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4017	4700	No
$v_{FO} = v_F - v_R$	3434	4700	No
v_R	583	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4017 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4017	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 34.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.480

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1369	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	546	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	741	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1369	546	741	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	372	148	201	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1562	623	846	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1562 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2185	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 1562 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2185	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A =$ 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.328	
Space mean speed in ramp influence area,	S_R = 57.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.5	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/17/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3009	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	848	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	511	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3009	848	511	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	818	230	139	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3434	968	583	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3434 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4402	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3434 (Equation 13-15, 13-16, 18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4402	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 36.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.611	
Space mean speed in ramp influence area,	S_R = 50.9	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 50.9	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1915	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	520	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1093	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1093	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.8	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/17/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 Full Build Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3857	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1048	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2201	pc/h/ln

Speed Inputs and Adjustments

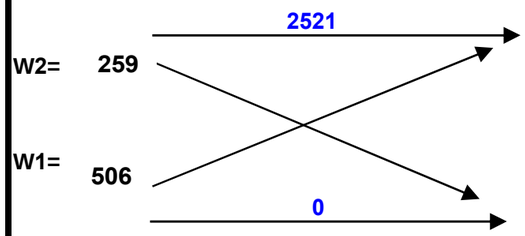
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2201	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.9	mi/h
Number of lanes, N	2	
Density, D	39.4	pc/mi/ln
Level of service, LOS	E	

Year 2035 Full Build Prado Interchange Plus Project Conditions

Leisch Method Worksheets



LOS weave = B

Compo. LOS = C

V = 3286 pcph

L = 940 feet

W1 = 506 pcph

W2 = 259 pcph

V_w = 765 pcph

R = 0.34

Direction : North

Project: 2035 Full Build Plus Project - Alt A1

Year: 2035 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd

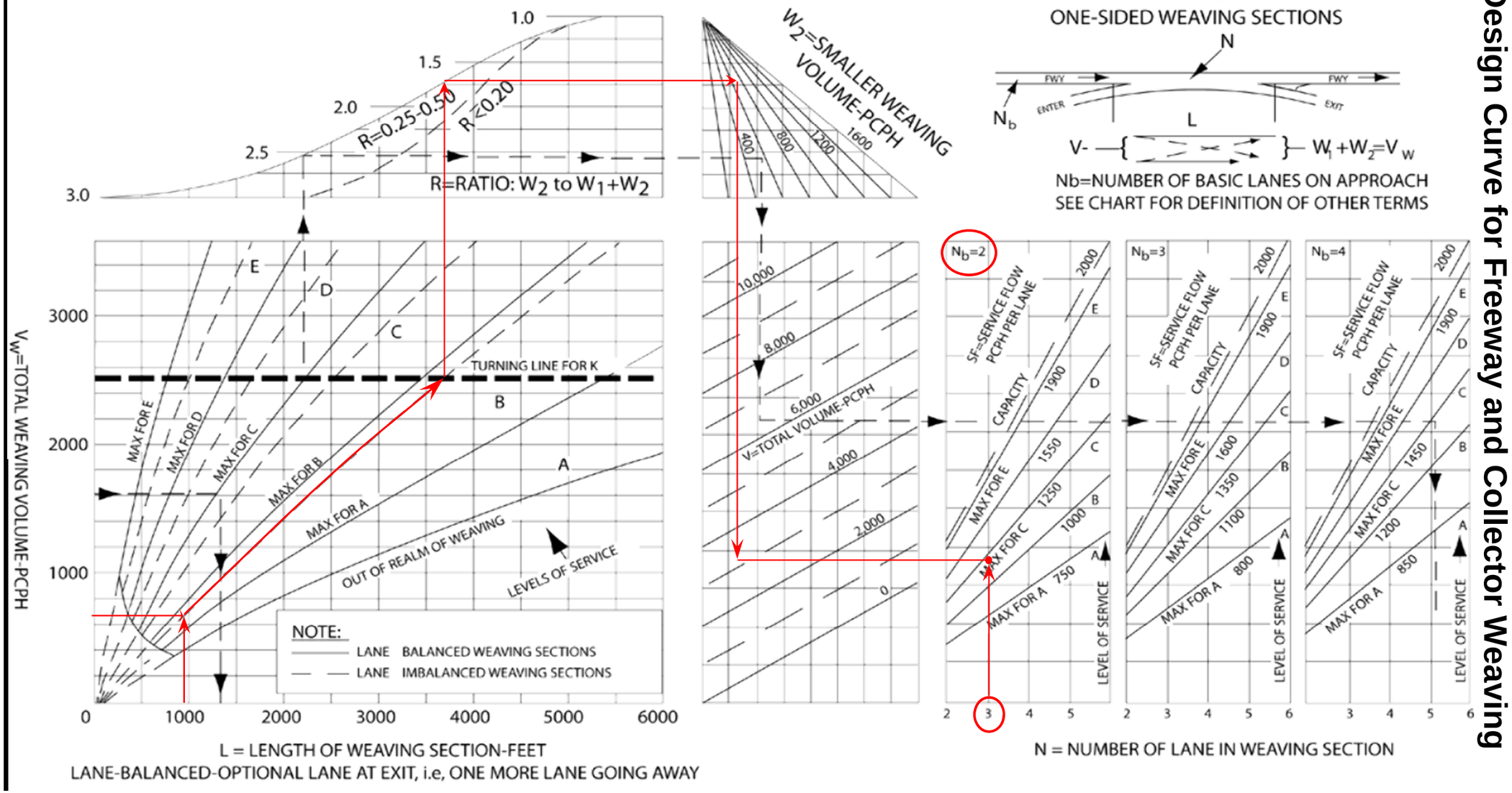
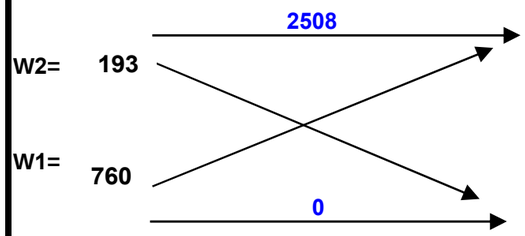


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = C/D

V = 3461 pcph

L = 940 feet

W1 = 760 pcph

W2 = 193 pcph

V_w = 953 pcph

R = 0.20

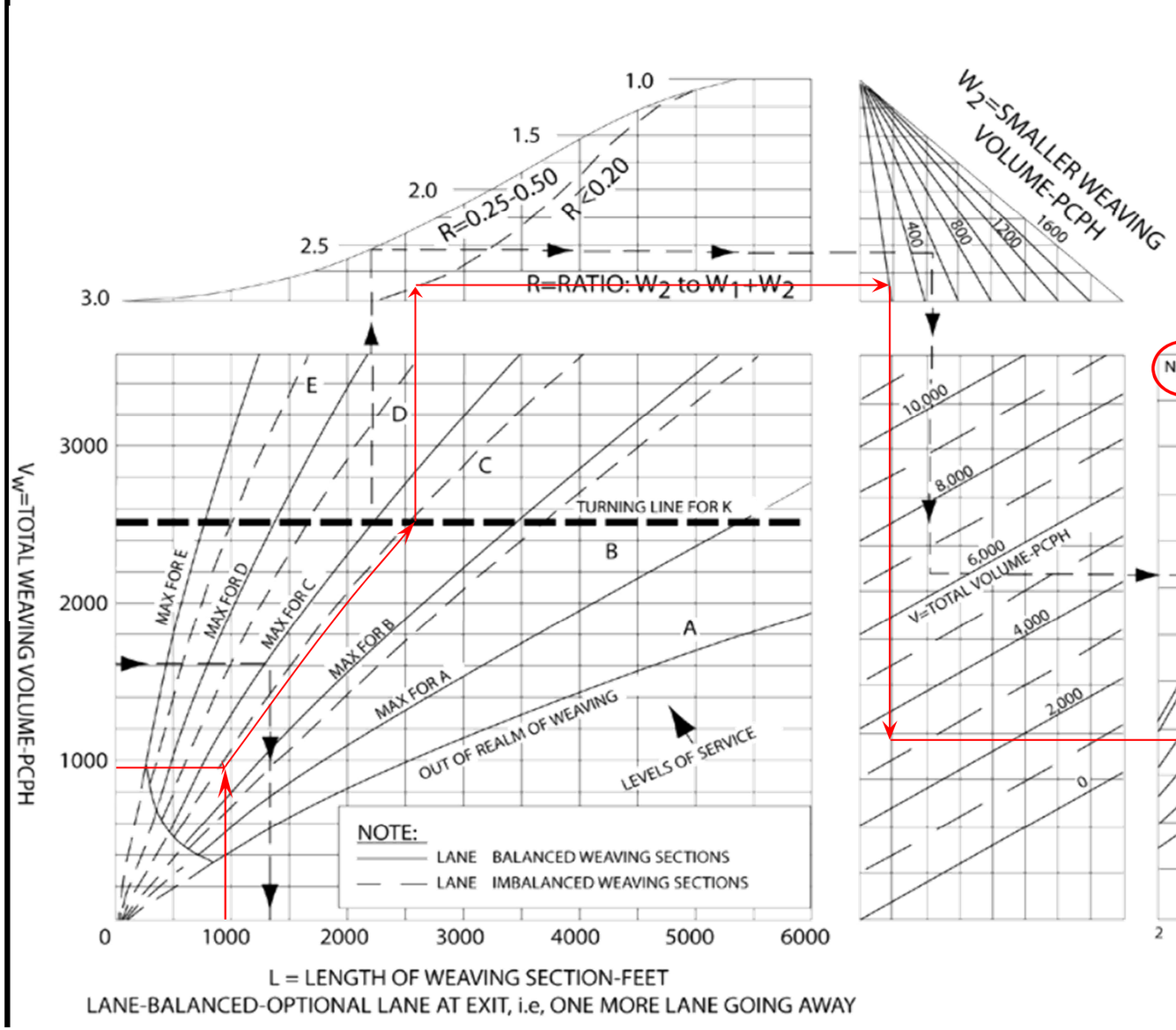
Direction : North

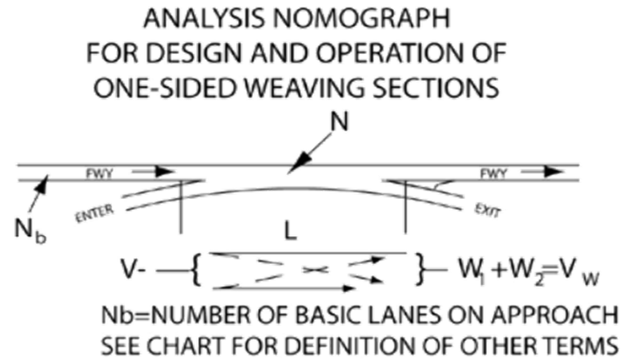
Project: 2035 Full Build Plus Project - Alt A1

Year: 2035 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





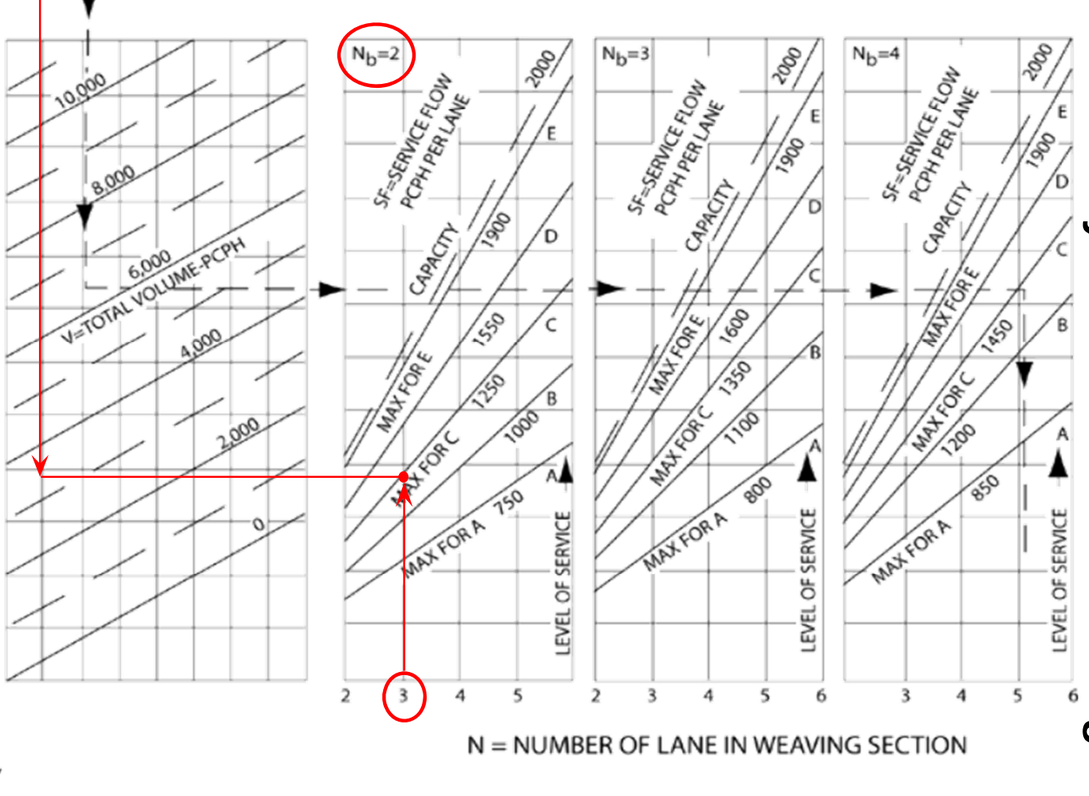
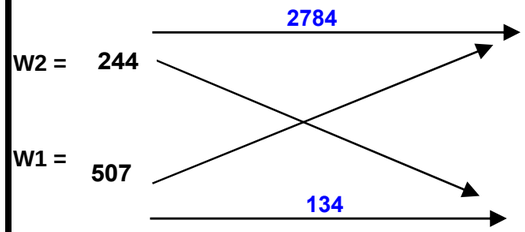


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = D

V = 3669 pcph

L = 1330 feet

W1 = 507 pcph

W2 = 244 pcph

V_w = 751 pcph

R = 0.32

Direction : North

Project: 2035 Full Build Plus Project - Alt A1

Year: 2035 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

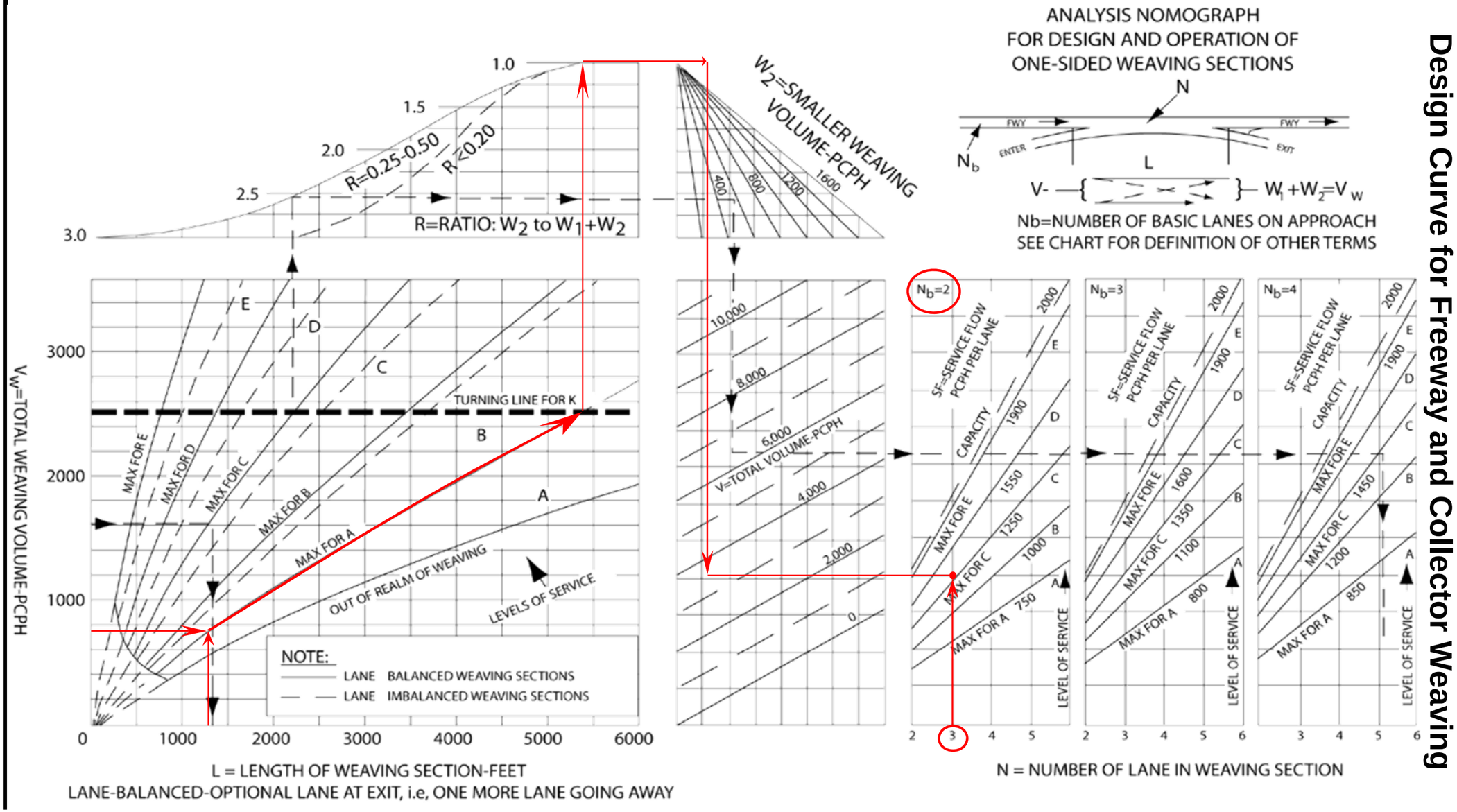
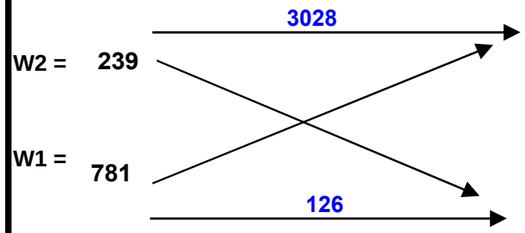


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 4174 pcph

L = 1330 feet

W1 = 781 pcph

W2 = 239 pcph

V_w = 1020 pcph

R = 0.23

Direction : North

Project: 2035 Full Build Plus Project - Alt A1

Year: 2035 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

LOS weave = B

Compo. LOS = D

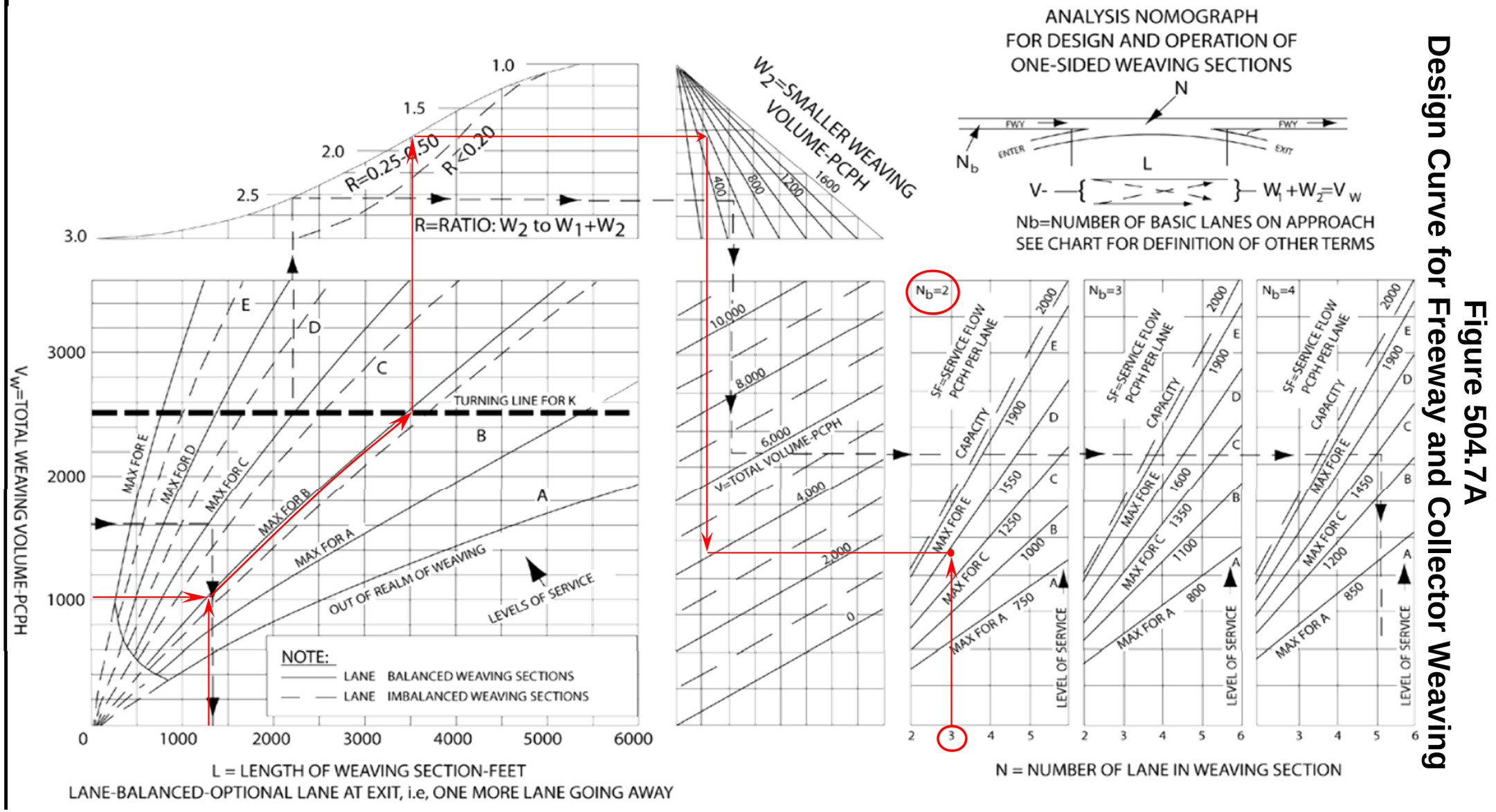
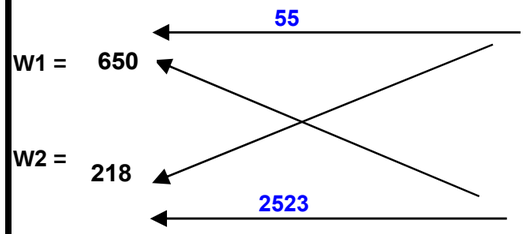


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A

Compo. LOS = C/D

V = 3446 pcph

L = 2065 feet

W1 = 650 pcph

W2 = 218 pcph

V_w = 868 pcph

R = 0.25

Direction : South

Project: 2035 Full Build Plus Project - Alt A1

Year: 2035 Peak Hour: AM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

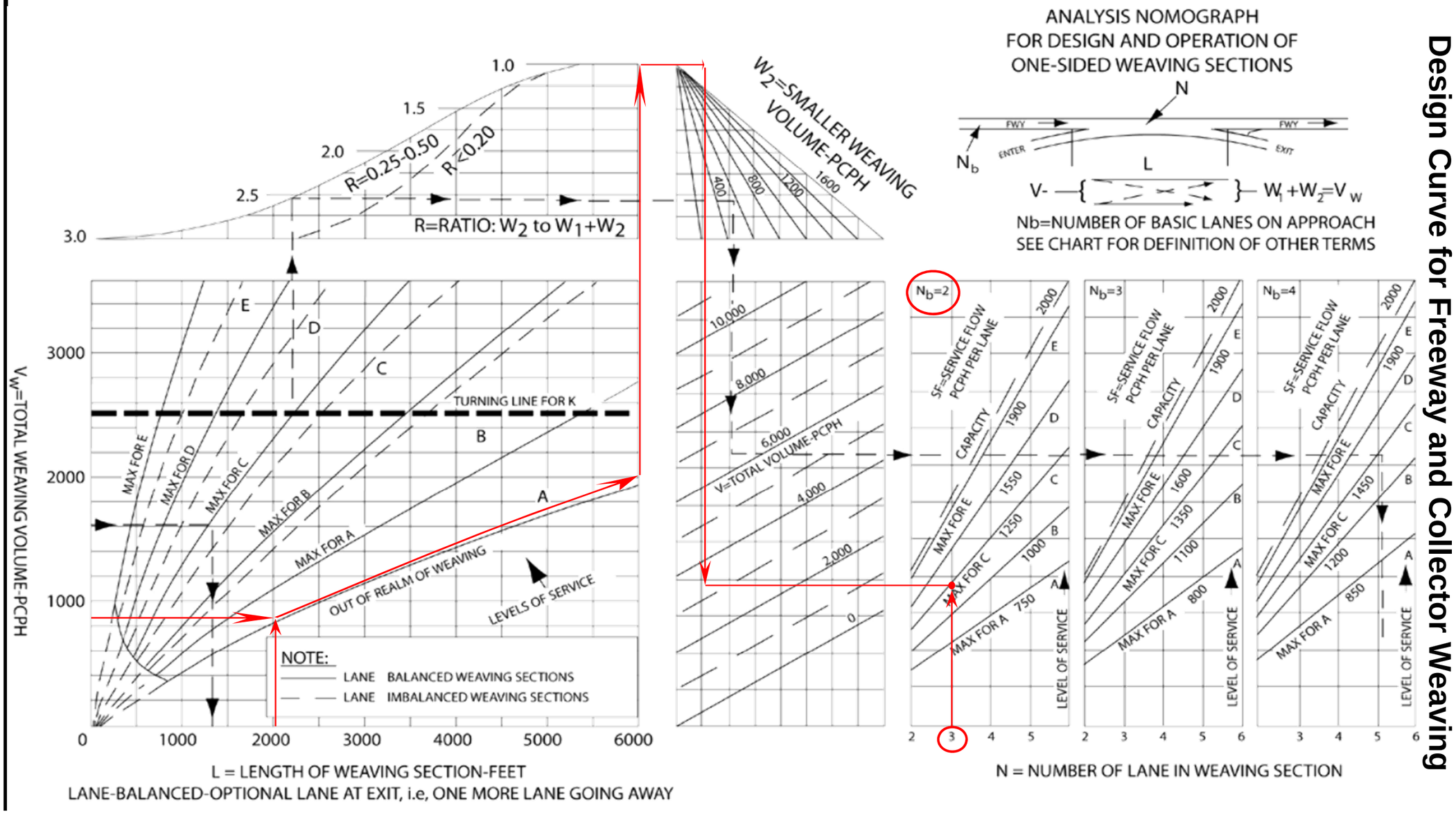
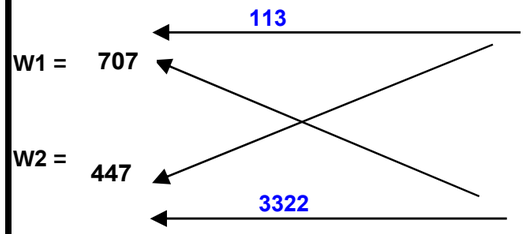


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = E

V = 4589 pcph

L = 2065 feet

W1 = 707 pcph

W2 = 447 pcph

V_w = 1154 pcph

R = 0.39

Direction : South

Project: 2035 Full Build Plus Project - Alt A1

Year: 2035 Peak Hour: PM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

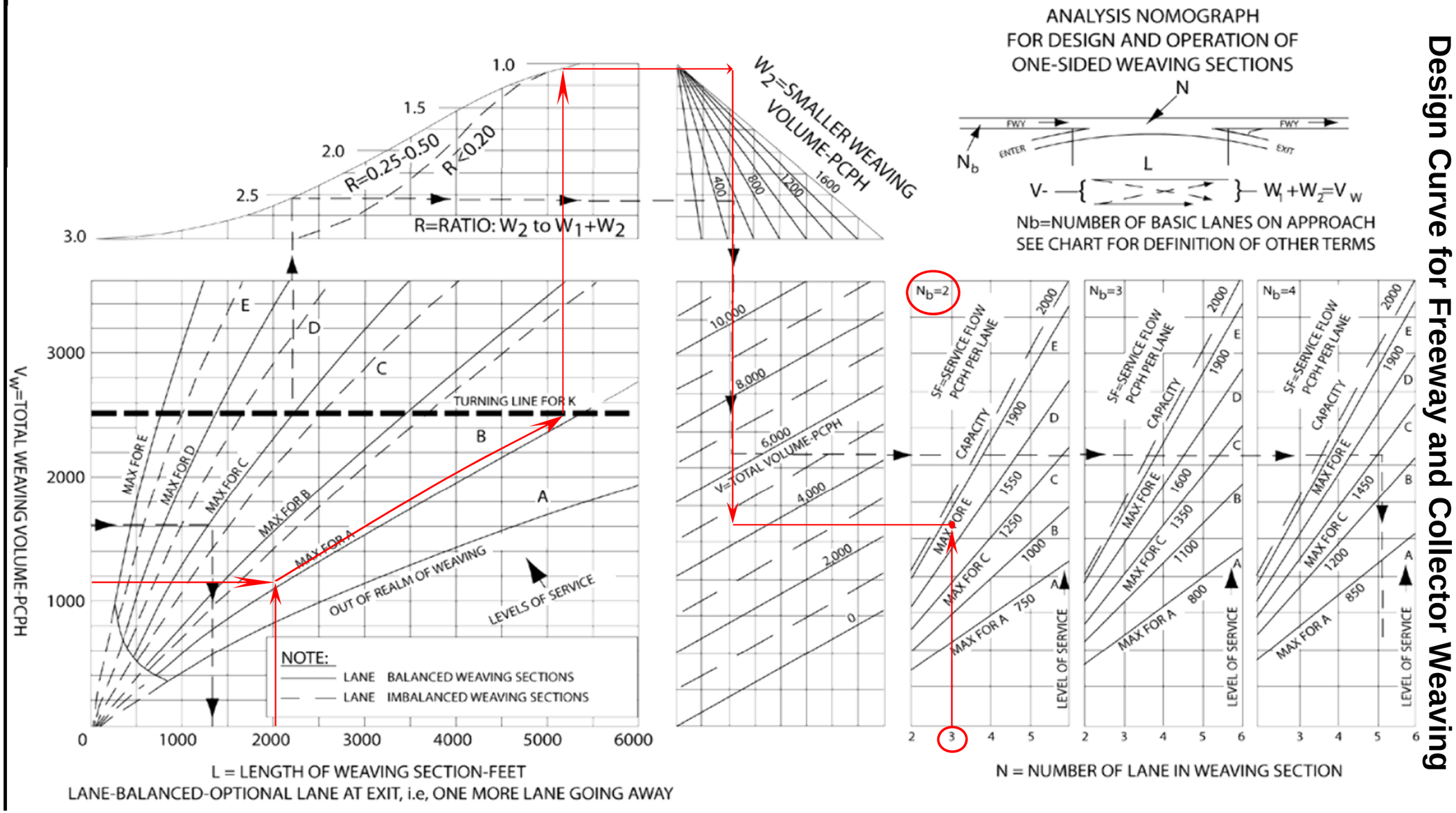
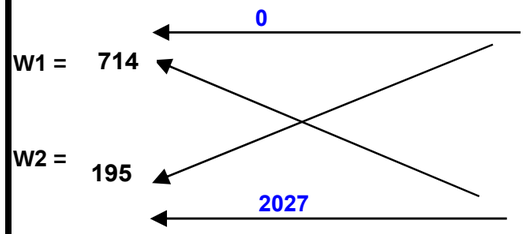


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = C

V = 2936 pcph

L = 700 feet

W1 = 714 pcph

W2 = 195 pcph

V_w = 909 pcph

R = 0.21

Direction : South

Project: 2035 Full Build Plus Project - Alt A1

Year: 2035 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Dalidio Dr/Prado Rd

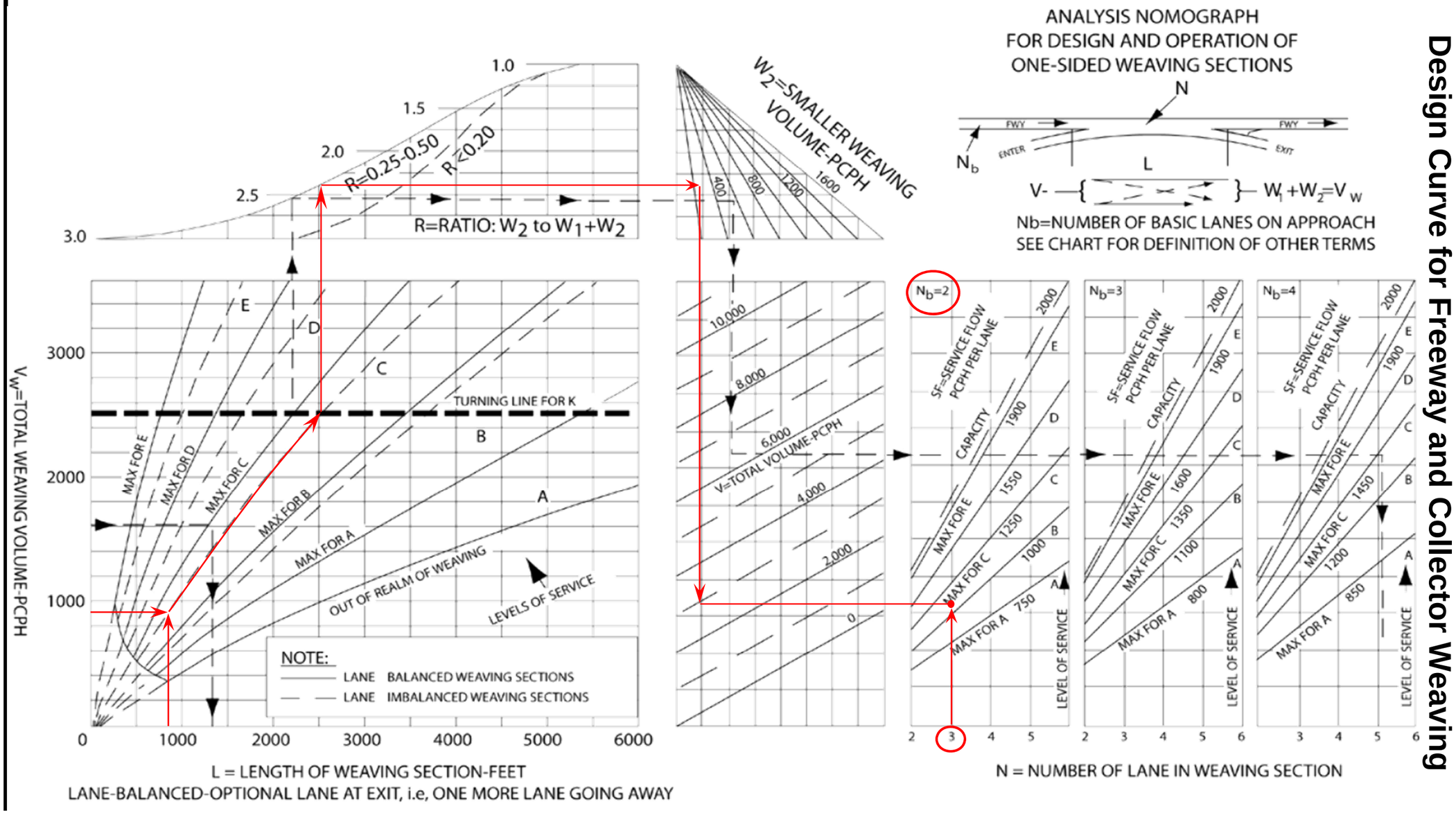
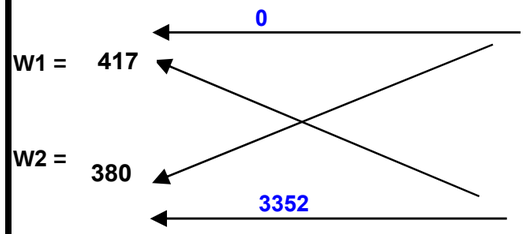


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = E

V = 4149 pcph

L = 700 feet

W1 = 417 pcph

W2 = 380 pcph

V_w = 797 pcph

R = 0.48

Direction : South

Project: 2035 Full Build Plus Project - Alt A1

Year: 2035 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Dalidio Dr/Prado Rd

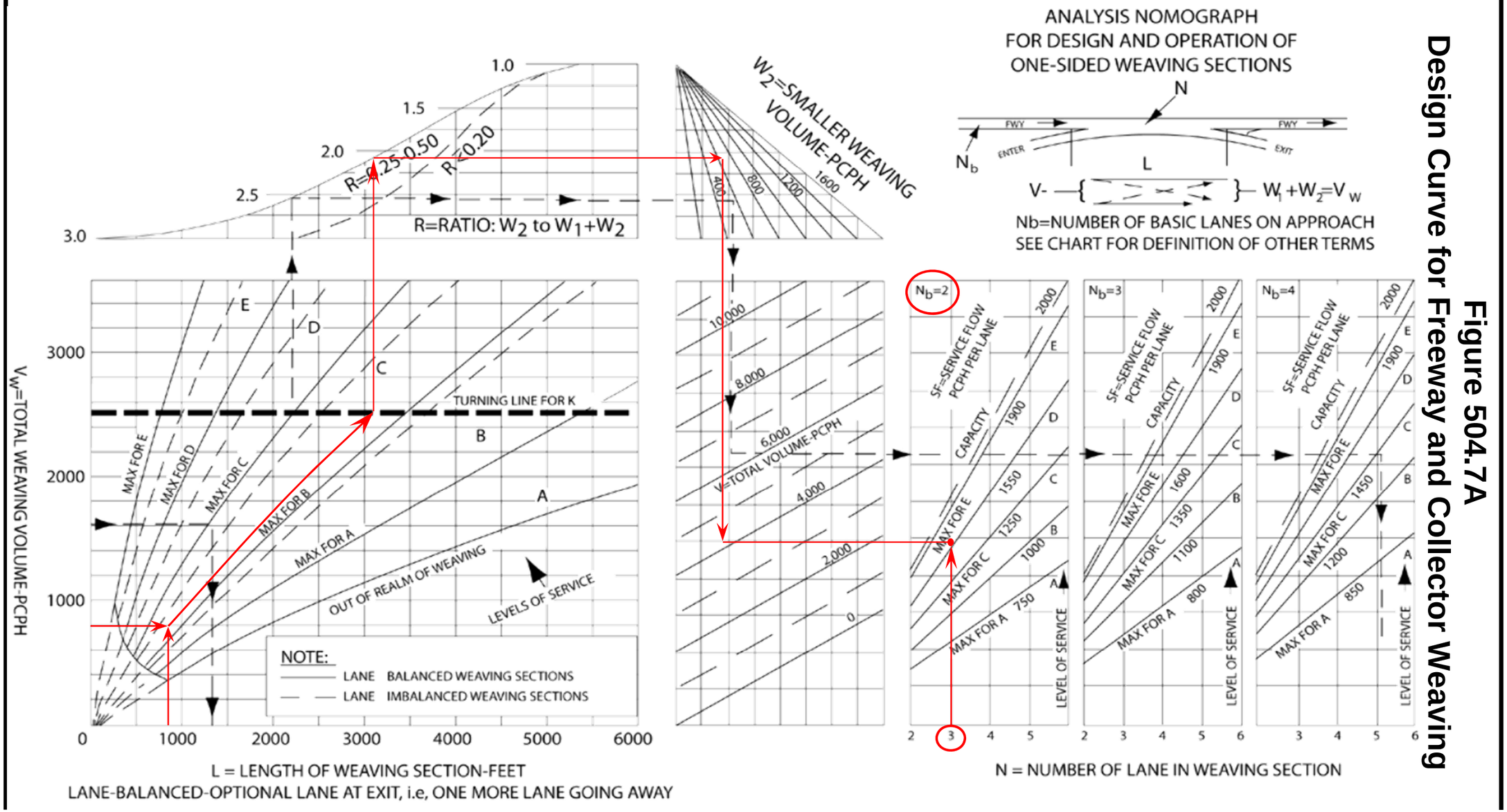


Figure 504.7A
Design Curve for Freeway and Collector Weaving

Year 2035 Prado Road Overcrossing Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Year 2035 Prado Road Overcrossing Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3454	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	939	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1971	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1971	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.4	mi/h
Number of lanes, N	2	
Density, D	32.6	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2688	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	730	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1534	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1534	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	23.7	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3454	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1031	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	408	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3454	1031	408	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	939	280	111	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3942	1177	466	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3942 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3942	4700	No
$v_{FO} = v_F - v_R$	2765	4700	No
v_R	1177	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3942 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3942	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 36.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.534

Space mean speed in ramp influence area, S_R = 52.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 52.7 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR OFF RAMP
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2688	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	720	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	696	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2688	720	696	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	730	196	189	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3068	822	794	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3068 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3068	4700	No
$v_{FO} = v_F - v_R$	2246	4700	No
v_R	822	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3068 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3068	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 28.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.502

Space mean speed in ramp influence area, S_R = 53.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2423	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	408	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1031	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2423	408	1031	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	658	111	280	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2765	466	1177	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2765 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3231	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2765 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3231	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 26.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.376	
Space mean speed in ramp influence area,	S_R = 56.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.3	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1968	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	696	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	720	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1968	696	720	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	535	189	196	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2246	794	822	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2246 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3040	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2246 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3040	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 24.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.359

Space mean speed in ramp influence area, S_R = 56.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 56.7 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2831	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	769	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1616	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1616	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.3	mi/h
Number of lanes, N	2	
Density, D	25.1	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2664	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	724	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1520	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1520	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	2	
Density, D	23.5	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	MADONNA NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2831	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	402	vph
Length of first accel/decel lane	200	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2831	402		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	769	109		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3231	459	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3231 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3231	4700	No
$v_{FO} = v_F - v_R$	2772	4700	No
v_R	459	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3231 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3231	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 30.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.469

Space mean speed in ramp influence area, S_R = 54.2 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.2 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	MADONNA NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2664	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	253	vph
Length of first accel/decel lane	200	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2664	253		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	724	69		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3040	289	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3040 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3040	4700	No
$v_{FO} = v_F - v_R$	2751	4700	No
v_R	289	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3040 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3040	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 28.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.454

Space mean speed in ramp influence area, S_R = 54.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.6 mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2268	628	161	167	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	603	167	43	44	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2533	701	180	187	pc/h

Volume ratio, VR	0.245	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	703	lc/h
Total lane changes, LCALL	816	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.154	

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	59.2	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.0	mi/h
Weaving segment density, D	20.3	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.580	
Weaving segment flow rate, v	3601	pc/h
Weaving segment capacity, cW	5911	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4998	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2069	c
		Maximum	Analyzed	
v/c ratio		1.00	0.580	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2272	1080	139	174	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	604	287	37	46	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2538	1206	155	194	pc/h

Volume ratio, VR	0.333	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	706	lc/h
Total lane changes, LCALL	819	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.154

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	58.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.4	mi/h
Weaving segment density, D	23.4	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.683	
Weaving segment flow rate, v	4093	pc/h
Weaving segment capacity, cW	5709	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5935	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1998	c
		Maximum	Analyzed	
v/c ratio		1.00	0.683	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1625	185	1072	46	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	432	49	285	12	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1815	207	1197	51	pc/h

Volume ratio, VR	0.429	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	926	lc/h
Total lane changes, LCALL	1073	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.135

Average weaving speed, SW	59.1	mi/h
Average non-weaving speed, SNW	59.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.5	mi/h
Weaving segment density, D	18.3	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.585	
Weaving segment flow rate, v	3270	pc/h
Weaving segment capacity, cW	5324	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	7012	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1972	c
		Maximum	Analyzed	
v/c ratio		1.00	0.585	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2758	390	847	98	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	734	104	225	26	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3081	436	946	109	pc/h

Volume ratio, VR	0.302	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1199	lc/h
Total lane changes, LCALL	1346	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.161

Average weaving speed, SW	58.1	mi/h
Average non-weaving speed, SNW	57.7	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.8	mi/h
Weaving segment density, D	26.4	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.733	
Weaving segment flow rate, v	4572	pc/h
Weaving segment capacity, cW	5940	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5608	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2079	c
		Maximum	Analyzed	
v/c ratio		1.00	0.733	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1810	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	262	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1810	262		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	492	71		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2066	299	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2066 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2365	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	

If yes, v_{12A} = 2066 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2365	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 18.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.300	
Space mean speed in ramp influence area,	S_R = 58.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.1	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3148	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	436	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3148	436		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	855	118		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3593	498	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3593 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4091	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3593 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4091	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 31.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.491	
Space mean speed in ramp influence area,	S_R = 53.7	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.7	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2072	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	563	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1182	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1182	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.2	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3584	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	974	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2045	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2045	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	59.1	mi/h
Number of lanes, N	2	
Density, D	34.6	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2072	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	811	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	548	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	2072		811		548		vph
Peak-hour factor, PHF	0.92		0.92		0.92		
Peak 15-min volume, v15	563		220		149		v
Trucks and buses	10		10		10		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2365	926	625	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2365 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2365	4700	No
$v_{FO} = v_F - v_R$	1439	4700	No
v_R	926	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2365 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2365	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 19.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.511

Space mean speed in ramp influence area, S_R = 53.2 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.2 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3584	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	601	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	892	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3584	601	892	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	974	163	242	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4090	686	1018	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4090 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4090	4700	No
$v_{FO} = v_F - v_R$	3404	4700	No
v_R	686	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4090 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4090	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 34.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.490

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1261	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	548	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	811	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1261	548	811	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	343	149	220	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1439	625	926	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1439 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2064	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	

If yes, v_{12A} = 1439 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2064	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 18.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.324	
Space mean speed in ramp influence area,	S_R = 57.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.6	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2983	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	892	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	601	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2983	892	601	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	811	242	163	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3405	1018	686	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3405 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4423	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	

If yes, v_{12A} = 3405 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4423	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 37.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.618	
Space mean speed in ramp influence area,	S_R = 50.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 50.8	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1809	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	492	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1032	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1032	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.9	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 OC
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3875	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1053	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2211	pc/h/ln

Speed Inputs and Adjustments

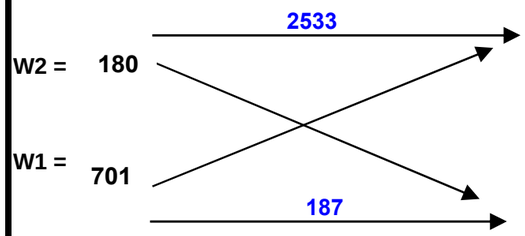
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2211	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.7	mi/h
Number of lanes, N	2	
Density, D	39.7	pc/mi/ln
Level of service, LOS	E	

Year 2035 Prado Road Overcrossing Conditions

Leisch Method Worksheets



V = 3601 pcph

L = 1330 feet

W1 = 701 pcph

W2 = 180 pcph

V_w = 881 pcph

R = 0.20

Direction : North

Project: 2035 Overcrossing

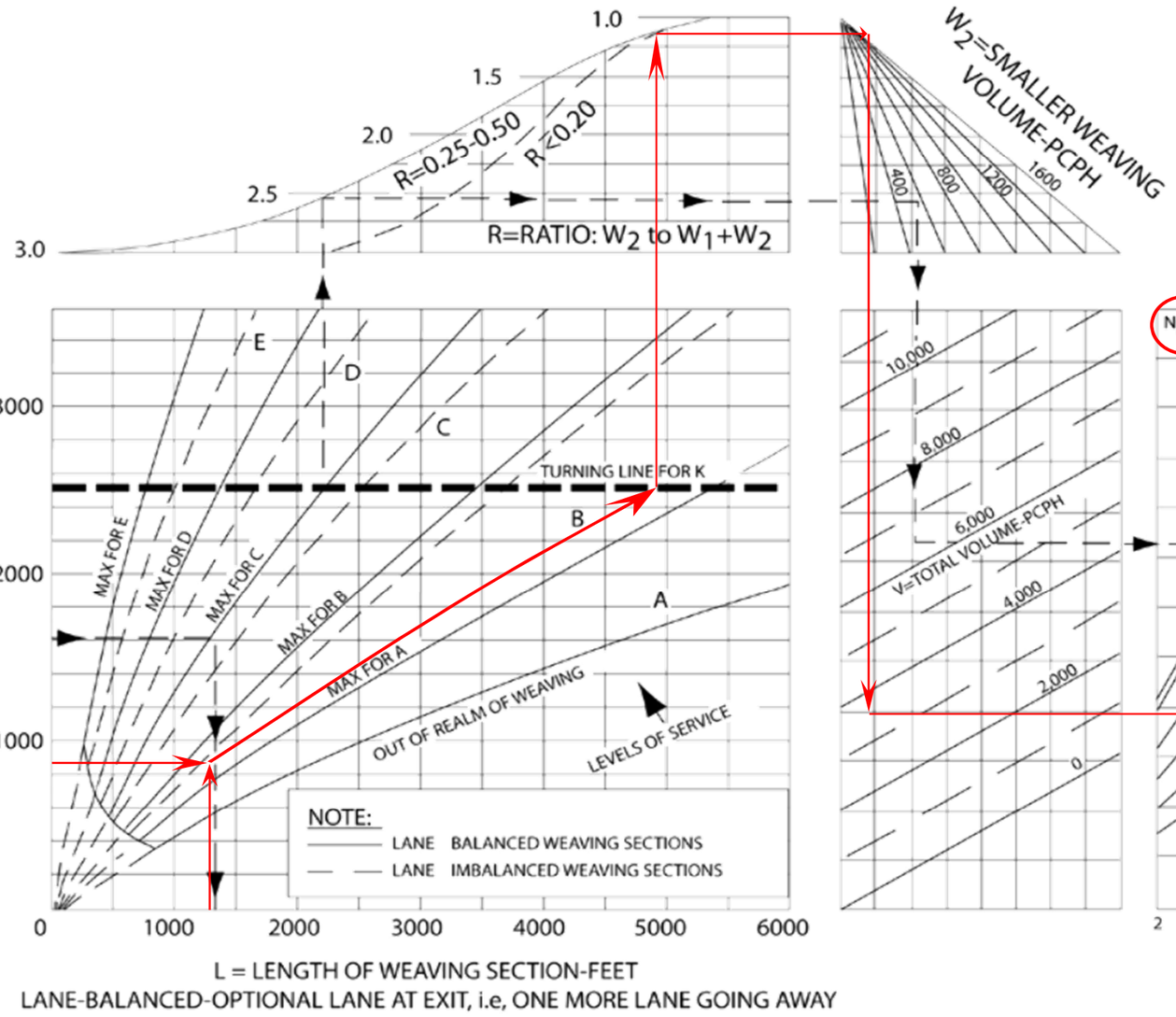
Year: 2035 Peak Hour: AM Peak

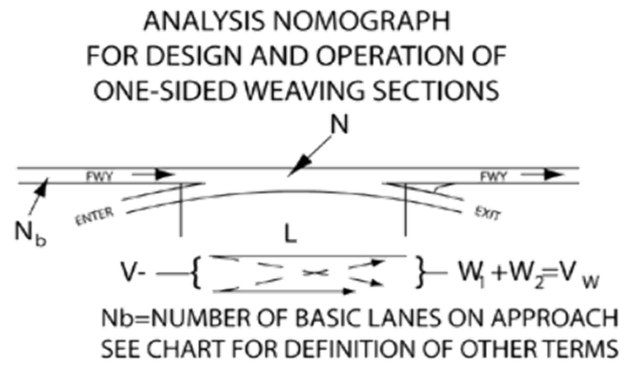
On Ramp: Madonna Rd

Off Ramp: Marsh St

LOS weave = B

Compo. LOS = C/D





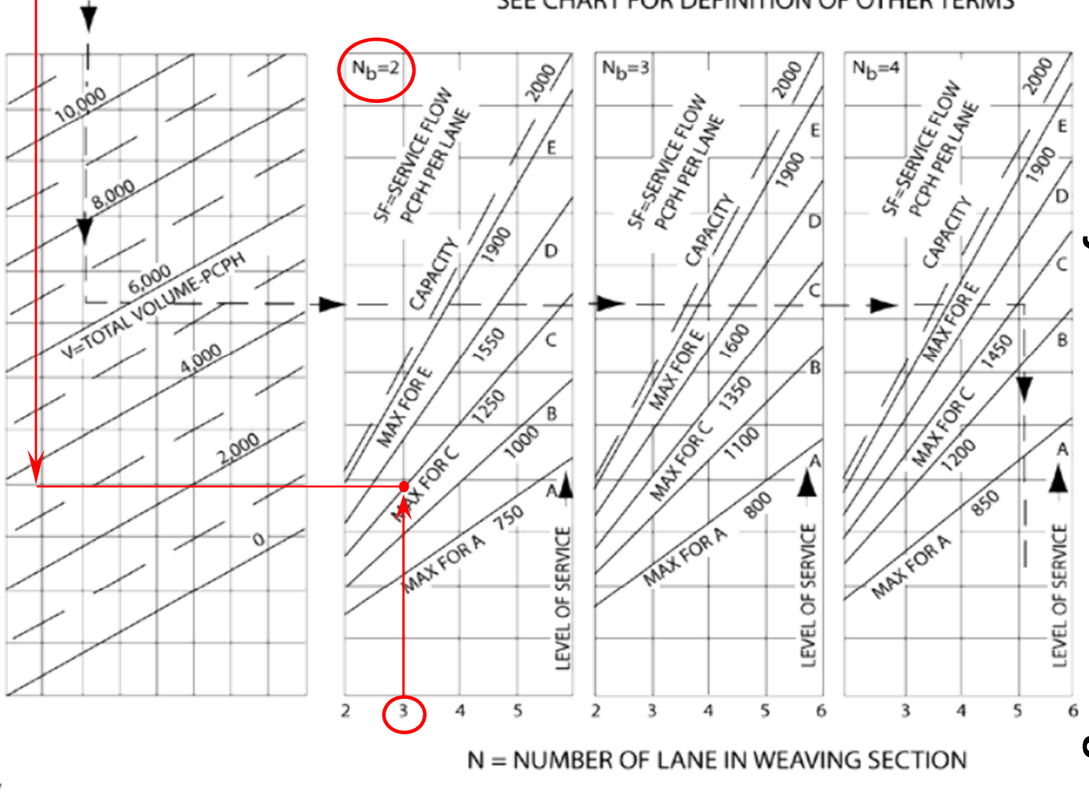
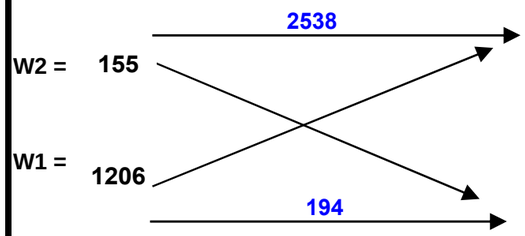


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = D

V = 4093 pcph

L = 1330 feet

W1 = 1206 pcph

W2 = 155 pcph

V_w = 1361 pcph

R = 0.11

Direction : North

Project: 2035 Overcrossing

Year: 2035 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

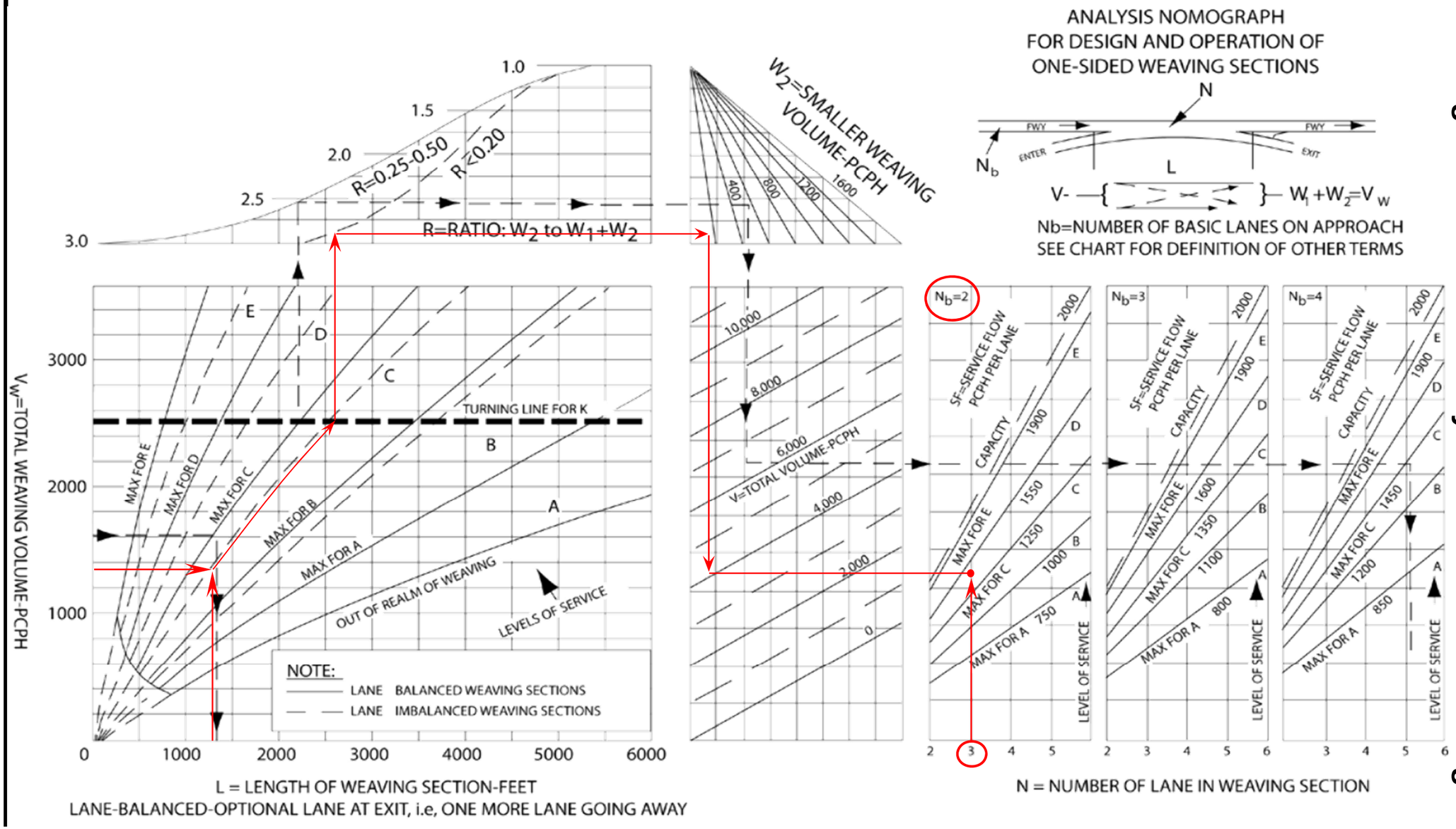
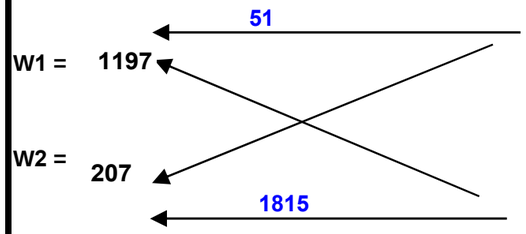


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = C

V = 3270 pcph V_w = 1404 pcph

L = 2065 feet R = 0.15

W1 = 1197 pcph

W2 = 207 pcph

Direction : South

Project: 2035 Overcrossing

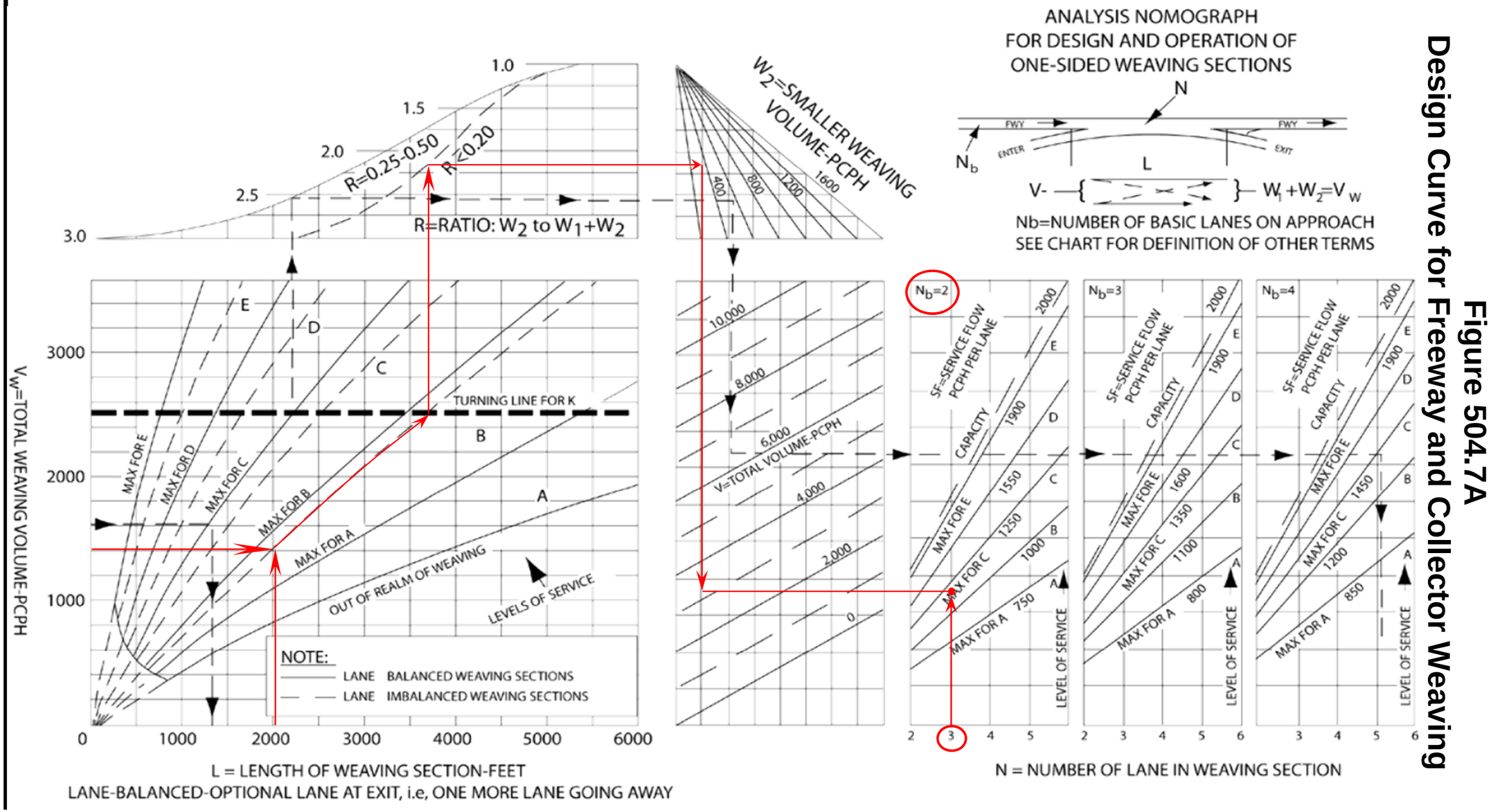
Year: 2035 Peak Hour: AM Peak

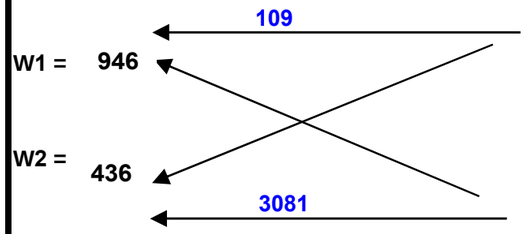
On Ramp: Marsh St

Off Ramp: Madonna Rd

Design Curve for Freeway and Collector Weaving

Figure 504.7A





LOS weave = B

Compo. LOS = E

V = 4572 pcph

L = 2065 feet

W1 = 946 pcph

W2 = 436 pcph

V_w = 1382 pcph

R = 0.32

Direction : South

Project: 2035 Overcrossing

Year: 2035 Peak Hour: PM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

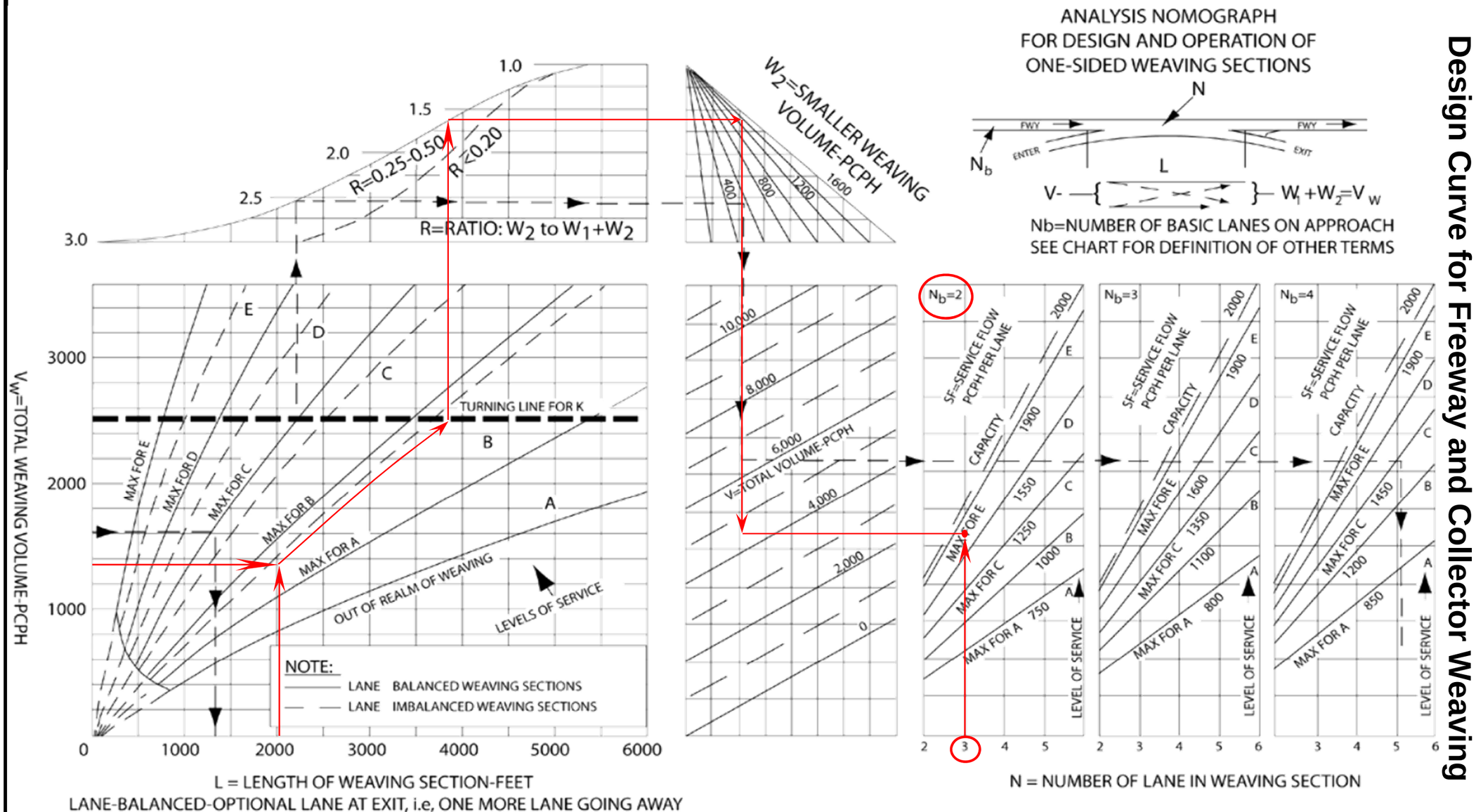


Figure 504.7A
Design Curve for Freeway and Collector Weaving

“Year 2035 Prado Road Overcrossing Plus Project Conditions

- **US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets**
- **Leisch Method Worksheets**

Year 2035 Prado Road Overcrossing Plus Project Conditions

US 101 Mainline, Merge/Diverge and Weaving Section LOS Worksheets

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3481	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	946	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1986	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1986	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	60.1	mi/h
Number of lanes, N	2	
Density, D	33.0	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2723	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	740	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1554	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1554	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	24.0	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3481	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1044	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	412	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3481	1044	412	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	946	284	112	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3973	1192	470	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3973 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3973	4700	No
$v_{FO} = v_F - v_R$	2781	4700	No
v_R	1192	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3973 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3973	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 36.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.535

Space mean speed in ramp influence area, S_R = 52.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 52.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR OFF RAMP
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2723	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	736	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	703	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2723	736	703	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	740	200	191	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3108	840	802	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3108 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3108	4700	No
$v_{FO} = v_F - v_R$	2268	4700	No
v_R	840	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3108 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3108	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 28.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.504

Space mean speed in ramp influence area, S_R = 53.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.4 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2437	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	412	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1044	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2437	412	1044	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	662	112	284	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2781	470	1192	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2781 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3251	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2781 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3251	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 26.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.378	
Space mean speed in ramp influence area,	S_R = 56.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.3	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	LOVR NB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1987	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	703	vph
Length of first accel/decel lane	620	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	736	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1545	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1987	703	736	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	540	191	200	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2268	802	840	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2268 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3070	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2268 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3070	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 25.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.362

Space mean speed in ramp influence area, S_R = 56.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 56.7 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2849	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	774	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1626	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1626	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.3	mi/h
Number of lanes, N	2	
Density, D	25.3	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 NB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2690	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	731	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1535	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1535	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	23.7	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	MADONNA NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2849	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	416	vph
Length of first accel/decel lane	200	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2849	416		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	774	113		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3252	475	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3252 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3252	4700	No
$v_{FO} = v_F - v_R$	2777	4700	No
v_R	475	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3252 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3252	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 30.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.471

Space mean speed in ramp influence area, S_R = 54.2 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.2 mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Junction:	MADONNA NB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2690	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	272	vph
Length of first accel/decel lane	200	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2690	272		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	731	74		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3070	310	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3070 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3070	4700	No
$v_{FO} = v_F - v_R$	2760	4700	No
v_R	310	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 3070 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3070	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 28.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.456

Space mean speed in ramp influence area, S_R = 54.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 54.5 mph

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2271	663	162	176	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	604	176	43	47	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2537	741	181	197	pc/h

Volume ratio, VR	0.252	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	706	lc/h
Total lane changes, LCALL	819	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.154

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	59.2	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.9	mi/h
Weaving segment density, D	20.7	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.591	
Weaving segment flow rate, v	3656	pc/h
Weaving segment capacity, cW	5894	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5077	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2063	c
		Maximum	Analyzed	
v/c ratio		1.00	0.591	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	US 101 NB
Weaving Location:	Madonna-Marsh
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1330	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2273	1133	145	182	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	605	301	39	48	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2539	1266	162	203	pc/h

Volume ratio, VR	0.342	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	113	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	708	lc/h
Total lane changes, LCALL	821	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.154

Average weaving speed, SW	58.3	mi/h
Average non-weaving speed, SNW	58.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.3	mi/h
Weaving segment density, D	23.8	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.699	
Weaving segment flow rate, v	4170	pc/h
Weaving segment capacity, cW	5683	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6044	1330	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1989	c
		Maximum	Analyzed	
v/c ratio		1.00	0.699	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	1620	195	1131	49	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	431	52	301	13	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1810	218	1263	55	pc/h

Volume ratio, VR	0.443	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	926	lc/h
Total lane changes, LCALL	1073	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.135	

Average weaving speed, SW	59.1	mi/h
Average non-weaving speed, SNW	59.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	59.4	mi/h
Weaving segment density, D	18.8	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.617	
Weaving segment flow rate, v	3346	pc/h
Weaving segment capacity, cW	5164	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	7163	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	1960	c
		Maximum	Analyzed	
v/c ratio		1.00	0.617	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Weaving Location:	Marsh-Madonna
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2065	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2350	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2754	400	902	101	veh/h
Peak hour factor, PHF	0.94	0.94	0.94	0.94	
Peak 15-min volume, v15	732	106	240	27	
Trucks and buses	10	10	10	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.952	0.952	0.952	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3076	447	1008	113	pc/h

Volume ratio, VR	0.313	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.00	int/mi
Minimum RF lane changes, LCRF	0	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	0	lc/h
Weaving lane changes, LCW	147	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	1198	lc/h
Total lane changes, LCALL	1345	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.161

Average weaving speed, SW	58.1	mi/h
Average non-weaving speed, SNW	57.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.7	mi/h
Weaving segment density, D	26.8	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.748	
Weaving segment flow rate, v	4644	pc/h
Weaving segment capacity, cW	5914	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5727	2065	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2350	2070	c
		Maximum	Analyzed	
v/c ratio		1.00	0.748	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.
d. Volumes exceed the weaving segment capacity. The level of service is F.

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1815	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	275	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1815	275		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	493	75		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2071	314	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2071 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2385	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 2071 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2385	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 18.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.300	
Space mean speed in ramp influence area,	S_R = 58.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 58.1	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	MADONNA SB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3154	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	454	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3154	454		vph
Peak-hour factor, PHF	0.92	0.92		
Peak 15-min volume, v15	857	123		v
Trucks and buses	10	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.952	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3600	518	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 3600 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4118	4700	No

v_3 or v_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3600 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4118	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 31.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	M_S = 0.498	
Space mean speed in ramp influence area,	S_R = 53.6	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 53.6	mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	2090	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	568	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1193	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1193	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.4	pc/mi/ln
Level of service, LOS	C	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o Madonna
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3608	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	980	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2059	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2059	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	58.8	mi/h
Number of lanes, N	2	
Density, D	35.0-	pc/mi/ln
Level of service, LOS	D	

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2090	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	816	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	561	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2090	816	561	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	568	222	152	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2385	931	640	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2385 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2385	4700	No
$v_{FO} = v_F - v_R$	1454	4700	No
v_R	931	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 2385 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2385	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_D$ = 20.0- pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.512

Space mean speed in ramp influence area, S_R = 53.2 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB OFF
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3608	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	607	vph
Length of first accel/decel lane	530	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	910	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3608	607	910	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	980	165	247	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	0.00 %	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	0.00 mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4118	693	1039	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4118 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4118	4700	No
$v_{FO} = v_F - v_R$	3425	4700	No
v_R	693	2000	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	

If yes, v_{12A} = 4118 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4118	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_R - 0.009 L_{12}$ = 34.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.490

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 53.7 mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	AM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1274	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	561	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	816	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1274	561	816	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	346	152	222	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1454	640	931	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1454 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2094	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	

If yes, v_{12A} = 1454 (Equation 13-15, 13-16, 18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	2094	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 19.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.325	
Space mean speed in ramp influence area,	S_R = 57.5	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.5	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	PM Peak
Freeway/Dir of Travel:	US 101 SB
Junction:	LOVR SB ON
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	3001	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	910	vph
Length of first accel/decel lane	400	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	607	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1650	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3001	910	607	vph
Peak-hour factor, PHF	0.92	0.92	0.92	
Peak 15-min volume, v15	815	247	165	v
Trucks and buses	10	10	10	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.952	0.952	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3425	1039	693	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 3425 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4464	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 3425 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4464	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{FO} + 0.0078\ v_{R12} - 0.00627\ L_A$ = 37.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, M_S = 0.632

Space mean speed in ramp influence area, S_R = 50.5 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 50.5 mph

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	AM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	1835	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	499	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1047	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1047	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.1	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	JAV
Agency or Company:	Omni-Means, a GHD Company
Date Performed:	3/14/2018
Analysis Time Period:	PM Peak
Freeway/Direction:	US 101 SB
From/To:	s/o LOVR
Jurisdiction:	SLO
Analysis Year:	2035 OC Plus Project
Description:	San Luis Ranch Specific Plan Multimodal TIS

Flow Inputs and Adjustments

Volume, V	3911	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	1063	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	-	%
Segment length	-	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	2232	pc/h/ln

Speed Inputs and Adjustments

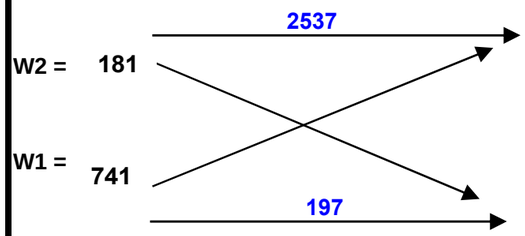
Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	2232	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	55.2	mi/h
Number of lanes, N	2	
Density, D	40.4	pc/mi/ln
Level of service, LOS	E	

Year 2035 Prado Road Overcrossing Plus Project Conditions

Leisch Method Worksheets



V = 3656 pcph

L = 1330 feet

W1 = 741 pcph

W2 = 181 pcph

V_w = 922 pcph

R = 0.20

Direction : North

Project: 2035 Overcrossing Plus Project

Year: 2035 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

LOS weave = B

Compo. LOS = C/D

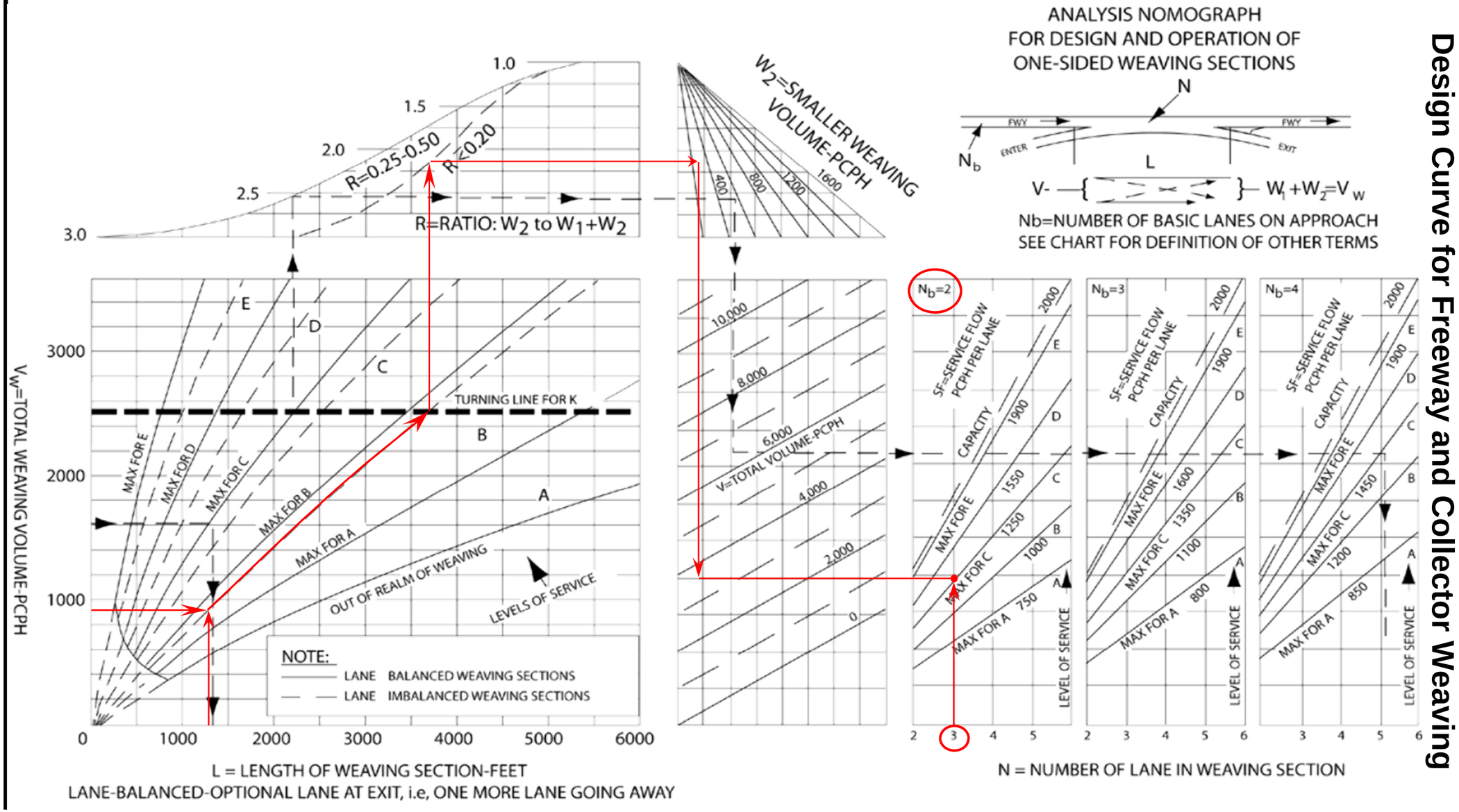
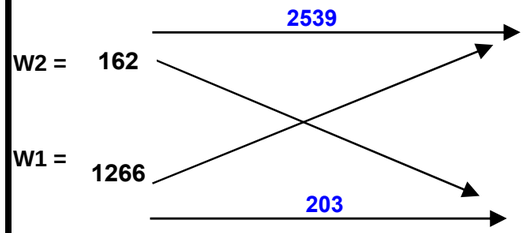


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = C

Compo. LOS = D

V = 4170 pcph V_w = 1428 pcph

L = 1330 feet R = 0.11

W1 = 1266 pcph

W2 = 162 pcph Direction : North

Project: 2035 Overcrossing Plus Project

Year: 2035 Peak Hour: PM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St

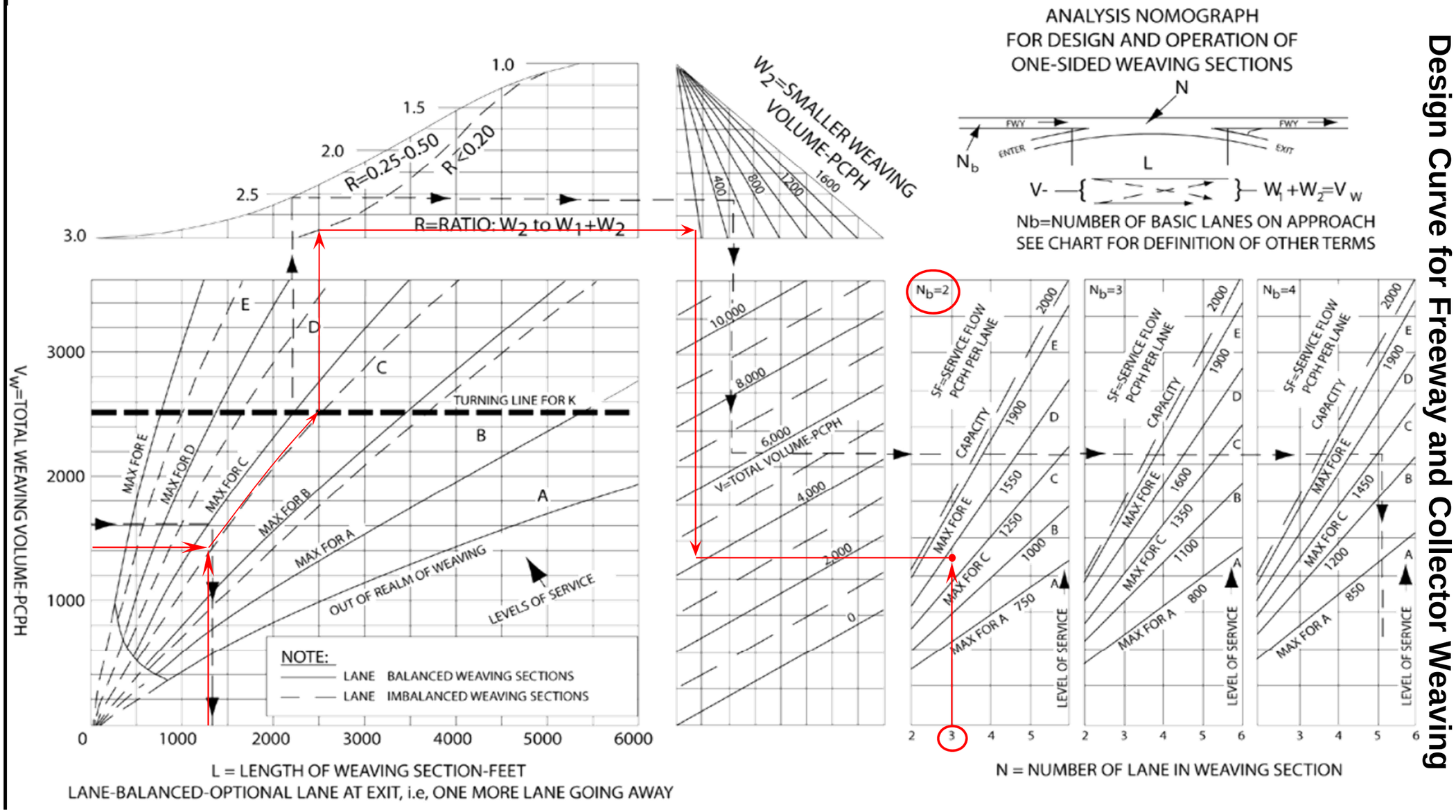
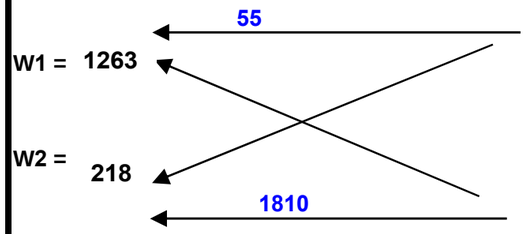


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = C

V = 3346 pcph

L = 2065 feet

W1 = 1263 pcph

W2 = 218 pcph

V_w = 1481 pcph

R = 0.15

Direction : South

Project: 2035 Overcrossing Plus Project

Year: 2035 Peak Hour: AM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

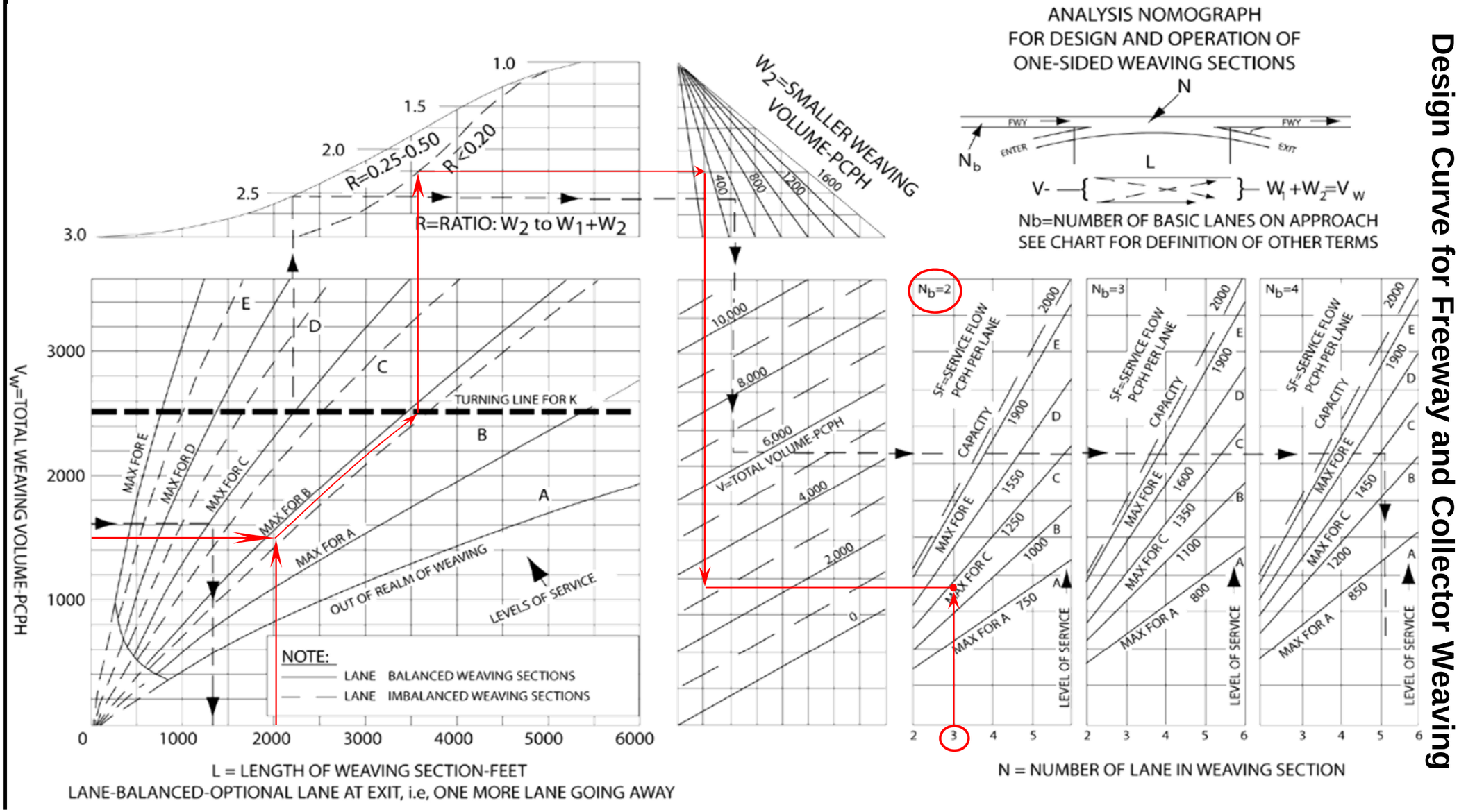
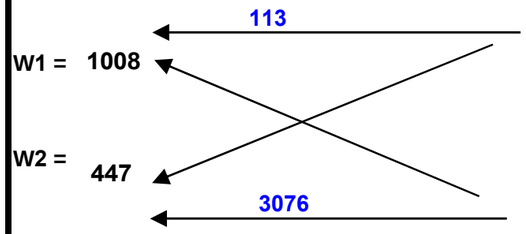


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = B

Compo. LOS = E

V = 4644 pcph

L = 2065 feet

W1 = 1008 pcph

W2 = 447 pcph

V_w = 1455 pcph

R = 0.31

Direction : South

Project: 2035 Overcrossing Plus Project

Year: 2035 Peak Hour: PM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd

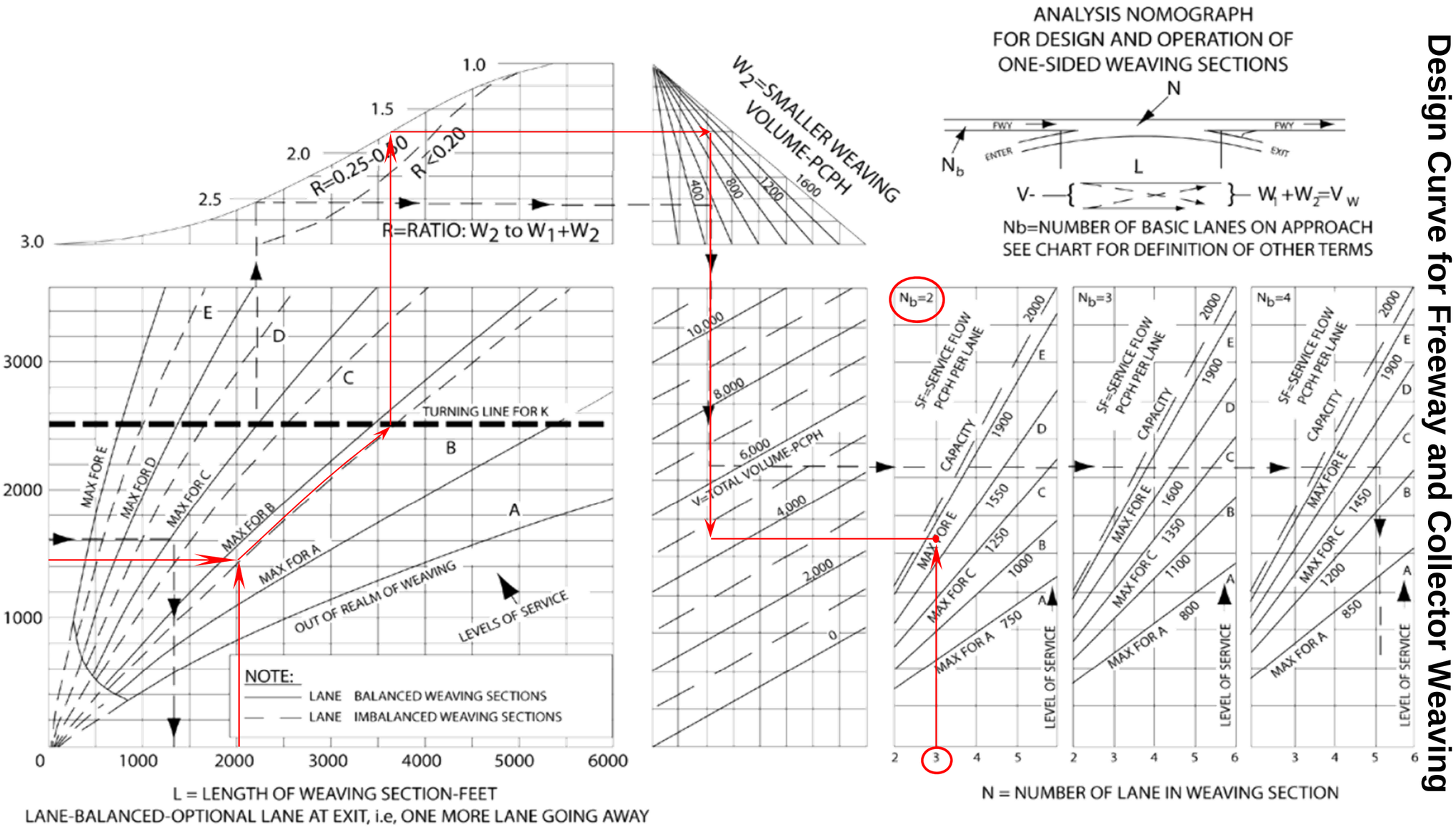


Figure 504.7A
Design Curve for Freeway and Collector Weaving