Appendix B

Multimodal Transportation Impact Analysis Report

San Luis Ranch Specific Plan

Multimodal Transportation Impact Analysis Report

Near Term 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
MULTIMODAL TRANSPORTATION IMPACT ANALYSIS REPORT

NEAR TERM US 101 MAINLINE, RAMPS AND WEAVE OPERATIONS

Prepared For:
City of San Luis Obispo
919 Palm Street
San Luis Obispo, CA 93401

Prepared By:
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April 2018

65-6457-09
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Year 2025 Near Term Conditions

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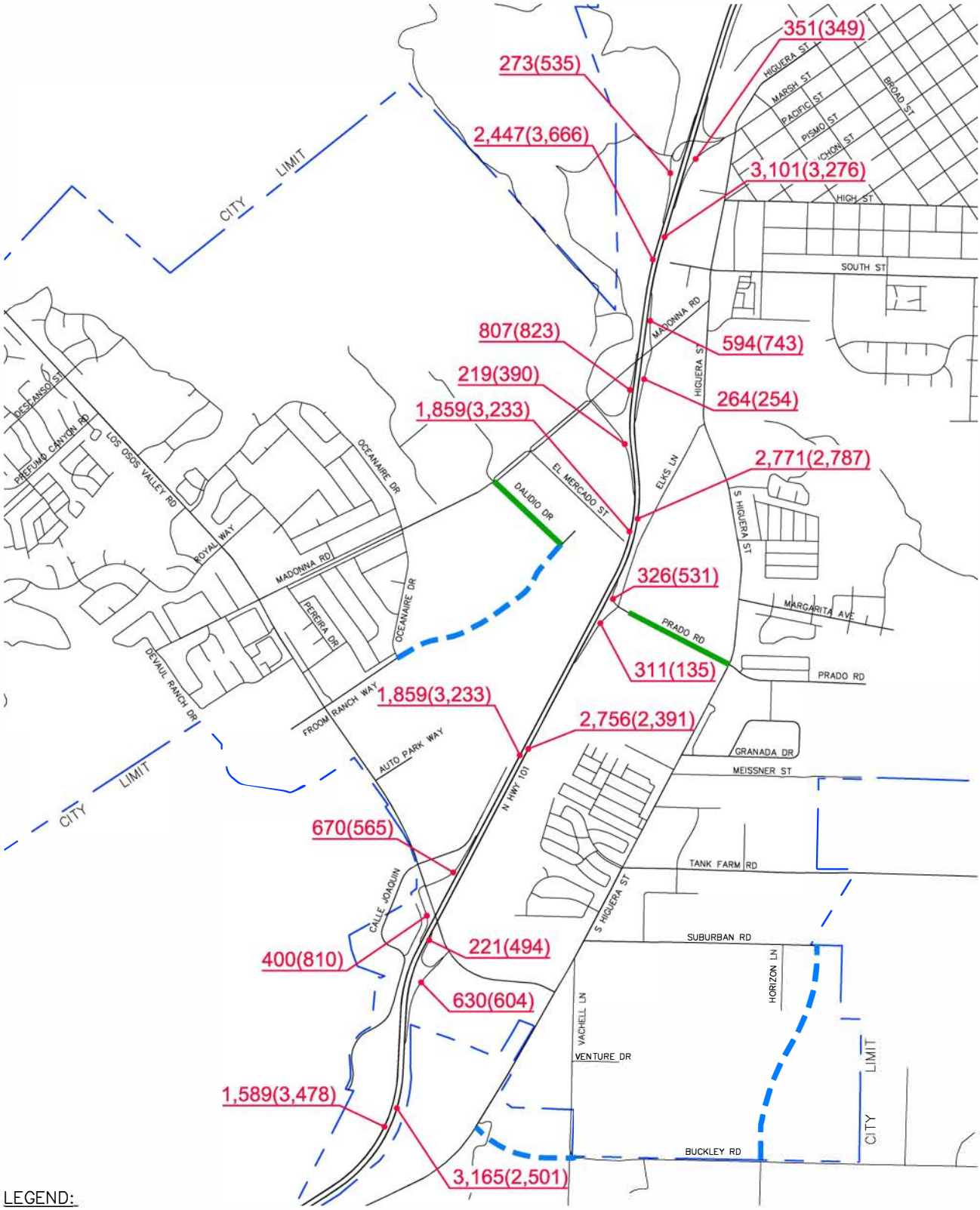
Year 2025 Near Term Plus Project Conditions

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

Year 2025 Near Term Plus Project Mitigation Conditions

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



SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 1A

Year 2025 Near Term US 101 Peak Hour Traffic Volumes

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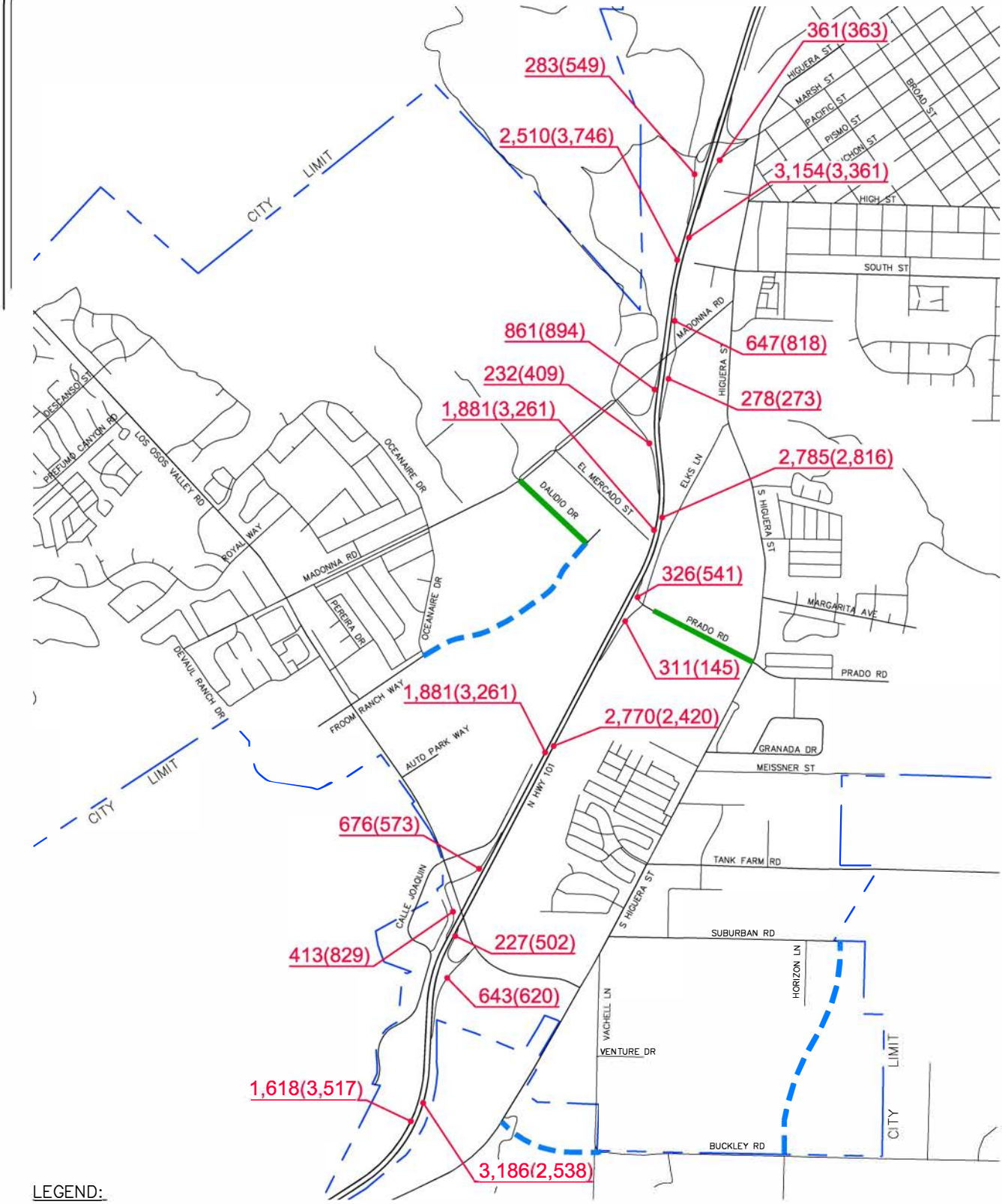

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 2A

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

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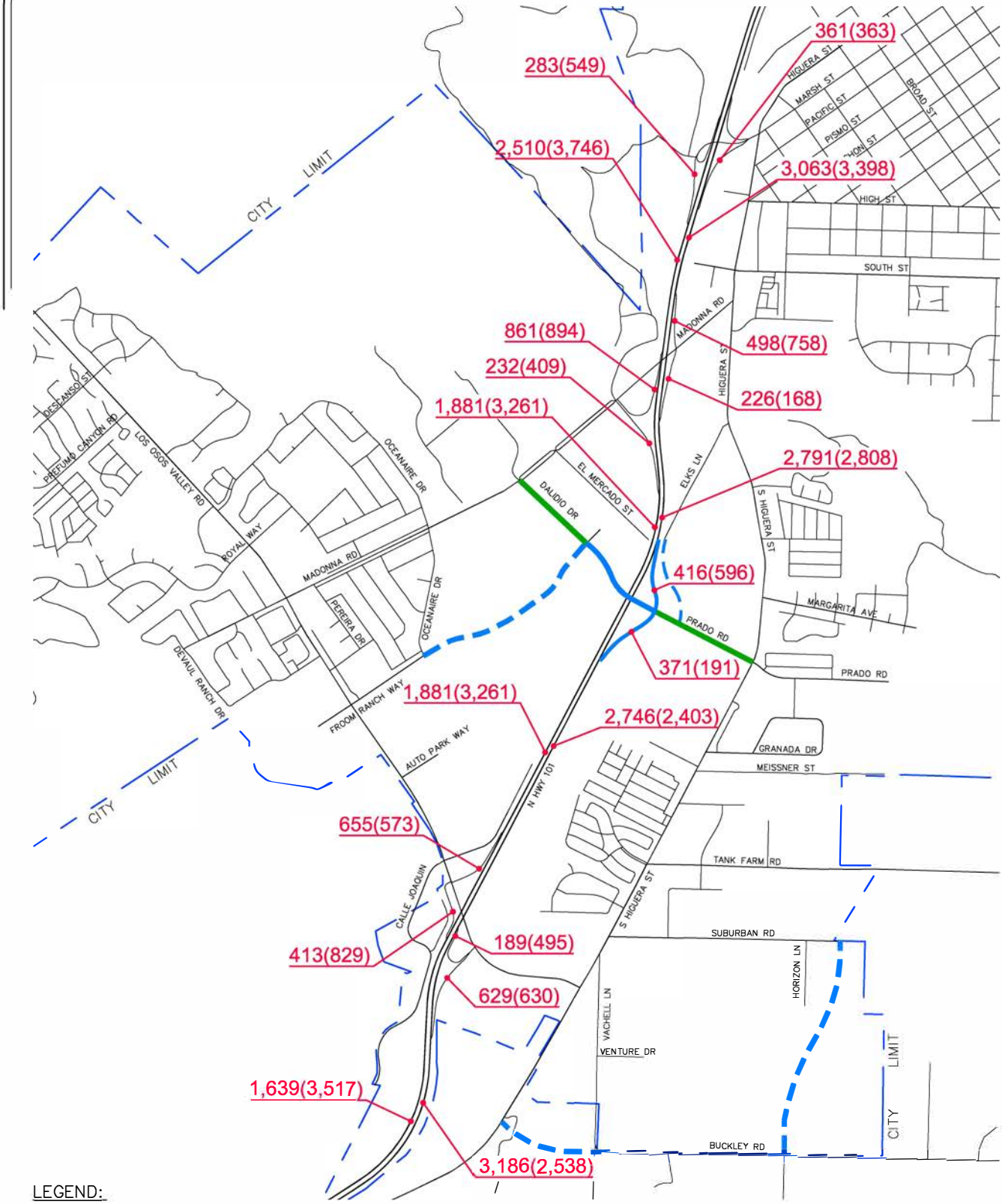

SAN LUIS RANCH SPECIFIC PLAN MULTIMODAL TIS

Figure 3A

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

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TABLE 52:
YEAR 2025 NEAR TERM CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

Interchange Location	Target LOS	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	C	Freeway	2	**3,165**	**28.8**	**D**	2,501	22.0	C
US 101 NB Los Osos Valley Road Off Ramp	C	Diverge	1	**630**	**33.2**	**D**	604	26.7	C
US 101 NB Los Osos Valley Road On Ramp	C	Merge	1	221	26.0	C	494	22.6	C
US 101 NB South of Prado Road	C	Freeway	2	2,756	24.4	C	2,391	21.0	C
US 101 NB Prado Road Off Ramp	C	Diverge	1	**311**	**29.7**	**D**	135	26.1	C
US 101 NB South of Madonna Road	C	Weave	2	3,096	26.8	C	3,113	27.0	C
US 101 NB South of Marsh Street	C	Weave	3	3,464	19.5	B	3,660	20.7	C
US 101 Southbound									
US 101 SB South of Marsh Street	C	Weave	3	2,733	15.2	B	4,096	24.4	C
US 101 SB Madonna Road On Ramp	C	Merge	1	219	16.3	B	**390**	**28.4**	**D**
US 101 SB South of Madonna Road	C	Freeway	2	1,859	16.3	B	**3,233**	**29.7**	**D**
US 101 SB Los Osos Valley Road Off Ramp	C	Diverge	1	670	17.7	B	**565**	**31.2**	**D**
US 101 SB Los Osos Valley Road On Ramp	C	Merge	1	400	16.9	B	**810**	**33.5**	**D**
US 101 SB South of Los Osos Valley Road	C	Freeway	2	1,589	14.0	B	**3,478**	**33.0**	**D**

TABLE 52A:
YEAR 2025 NEAR TERM CONDITIONS WEAVING SECTIONS – LEISCH METHOD

Interchange Location	Target LOS	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	C	Weave	2	**2,140**	**3,096**	**E**	**2,140**	**3,113**	**E**
US 101 NB North of Madonna Road	C	Weave	3	**1,330**	**3,464**	**C/D**	**1,330**	**3,660**	**D**
US 101 Southbound									
US 101 SB South of Marsh Street	C	Weave	3	2,065	2,733	B/C	**2,065**	**4,096**	**E**

TABLE 61:
YEAR 2025 NEAR TERM PLUS PROJECT CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

Interchange Location	Target LOS	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	C	Freeway	2	**3,186**	**29.1**	**D**	2,538	22.3	C
US 101 NB Los Osos Valley Road Off Ramp	C	Diverge	1	**643**	**33.5**	**D**	620	27.1	C
US 101 NB Los Osos Valley Road On Ramp	C	Merge	1	227	26.1	C	502	22.9	C
US 101 NB South of Prado Road	C	Freeway	2	2,770	24.5	C	2,420	21.2	C
US 101 NB Prado Road Off Ramp	C	Diverge	1	**311**	**29.9**	**D**	145	26.4	C
US 101 NB South of Madonna Road	C	Weave	2	3,112	27.0	C	3,146	27.3	C
US 101 NB South of Marsh Street	C	Weave	3	3,523	19.9	B	3,754	21.3	C
US 101 Southbound									
US 101 SB South of Marsh Street	C	Weave	3	2,804	15.6	B	4,184	23.9	C
US 101 SB Madonna Road On Ramp	C	Merge	1	232	16.5	B	**409**	**28.6**	**D**
US 101 SB South of Madonna Road	C	Freeway	2	1,881	16.5	B	3,261	30.0	D
US 101 SB Los Osos Valley Road Off Ramp	C	Diverge	1	676	17.9	B	**573**	**31.5**	**D**
US 101 SB Los Osos Valley Road On Ramp	C	Merge	1	413	17.1	B	**829**	**33.8**	**D**
US 101 SB South of Los Osos Valley Road	C	Freeway	2	1,618	14.2	B	**3,517**	**33.6**	**D**

TABLE 61A:
YEAR 2025 NEAR TERM PLUS PROJECT CONDITIONS WEAVING SECTIONS – LEISCH METHOD

Interchange Location	Target LOS	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	C	Weave	2	**2,140**	**3,112**	**E**	**2,140**	**3,146**	**E**
US 101 NB North of Madonna Road	C	Weave	3	**1,330**	**3,523**	**D**	**1,330**	**3,754**	**D**
US 101 Southbound									
US 101 SB South of Marsh Street	C	Weave	3	2,065	2,804	C	**2,065**	**4,184**	**E**

TABLE 61B:
YEAR 2025 NEAR TERM PLUS PROJECT MITIGATION CONDITIONS MAINLINE, RAMPS & WEAVING SECTIONS – HCS 2010 ANALYSIS

Interchange Location	Target LOS	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	C	Freeway	2	**3,186**	**29.1**	**D**	2,538	22.3	C
US 101 NB Los Osos Valley Road Off Ramp	C	Diverge	1	**629**	**33.5**	**D**	630	27.1	C
US 101 NB Los Osos Valley Road On Ramp	C	Merge	1	189	25.9	C	495	22.7	C
US 101 NB South of Prado Road	C	Freeway	2	2,746	24.3	C	2,403	21.1	C
US 101 NB Prado Road Off Ramp	C	Diverge	1	**371**	**29.6**	**D**	191	26.3	C
US 101 NB South of Madonna Road	C	Weave	3	3,117	17.4	B	3,137	17.5	B
US 101 NB South of Marsh Street	C	Weave	3	3,421	19.2	B	3,795	21.5	C
US 101 Southbound									
US 101 SB South of Marsh Street	C	Weave	3	2,804	15.6	B	4,184	23.9	C
US 101 SB Madonna Road On Ramp	C	Merge	1	232	16.5	B	**409**	**28.6**	**D**
US 101 SB South of Madonna Road	C	Freeway	2	1,881	16.5	B	3,261	30.0	D
US 101 SB Los Osos Valley Road Off Ramp	C	Diverge	1	655	17.9	B	**573**	**31.5**	**D**
US 101 SB Los Osos Valley Road On Ramp	C	Merge	1	413	17.3	B	**829**	**33.8**	**D**
US 101 SB South of Los Osos Valley Road	C	Freeway	2	1,639	14.4	B	**3,517**	**33.6**	**D**

TABLE 61C:
YEAR 2025 NEAR TERM PLUS PROJECT MITIGATION CONDITIONS WEAVING SECTIONS – LEISCH METHOD

Interchange Location	Target LOS	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	C	Weave	3	940	3,117	C	940	3,137	C
US 101 NB North of Madonna Road	C	Weave	3	**1,330**	**3,421**	**C/D**	**1,330**	**3,795**	**D**
US 101 Southbound									
US 101 SB South of Marsh Street	C	Weave	3	2,065	2,804	C	**2,065**	**4,184**	**E**

TECHNICAL APPENDIX

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	

Overall results are not computed when free-flow speed is less than 55 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:	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	

Overall results are not computed when free-flow speed is less than 55 mph.

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, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 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_O = 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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = N/A	mph
Space mean speed for all vehicles,	S = 56.5	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:	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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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:	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	

Overall results are not computed when free-flow speed is less than 55 mph.

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, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 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_O = 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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = N/A	mph
Space mean speed for all vehicles,	S = 58.3	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 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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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:	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	

Overall results are not computed when free-flow speed is less than 55 mph.

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, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 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_O = 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, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 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_O = 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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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:	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

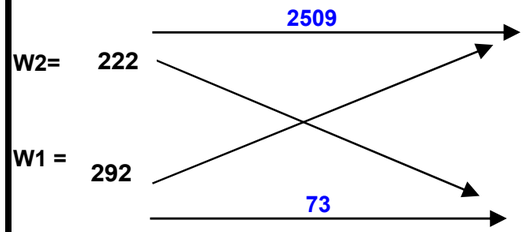
LOS and Performance Measures

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	

Overall results are not computed when free-flow speed is less than 55 mph.

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

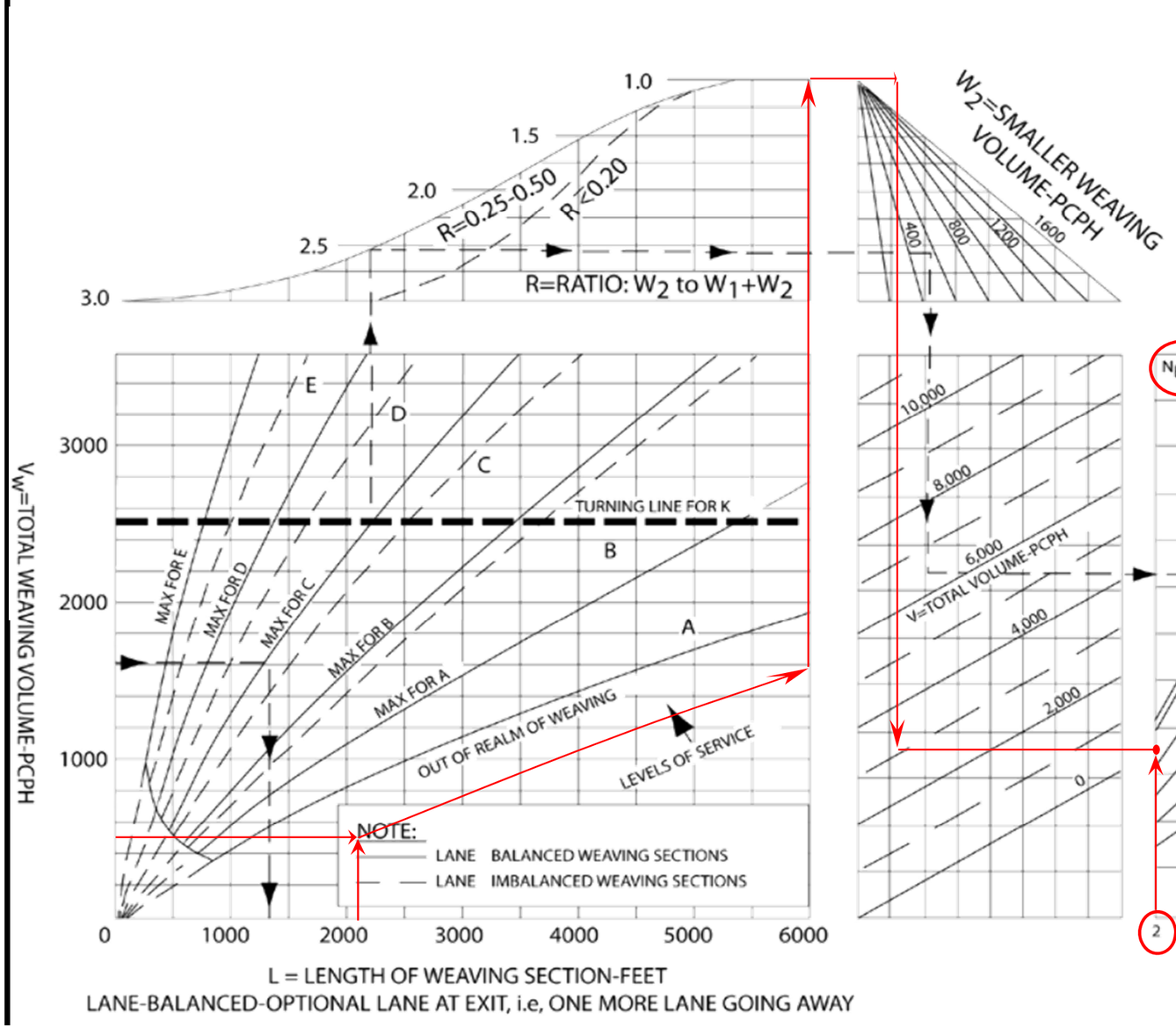
Direction : North

Project: 2025 Near Term

Year: 2025 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd



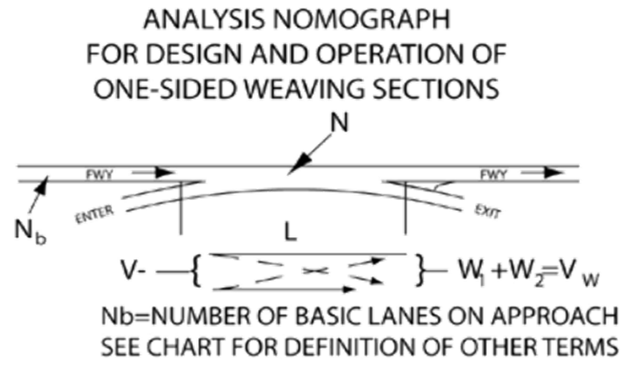
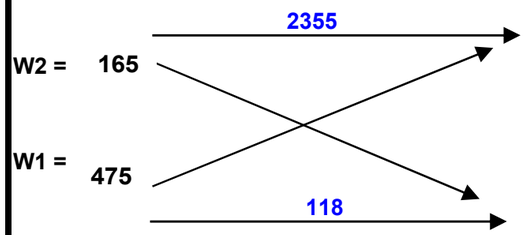


Figure 504.7A
Design Curve for Freeway and Collector Weaving



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

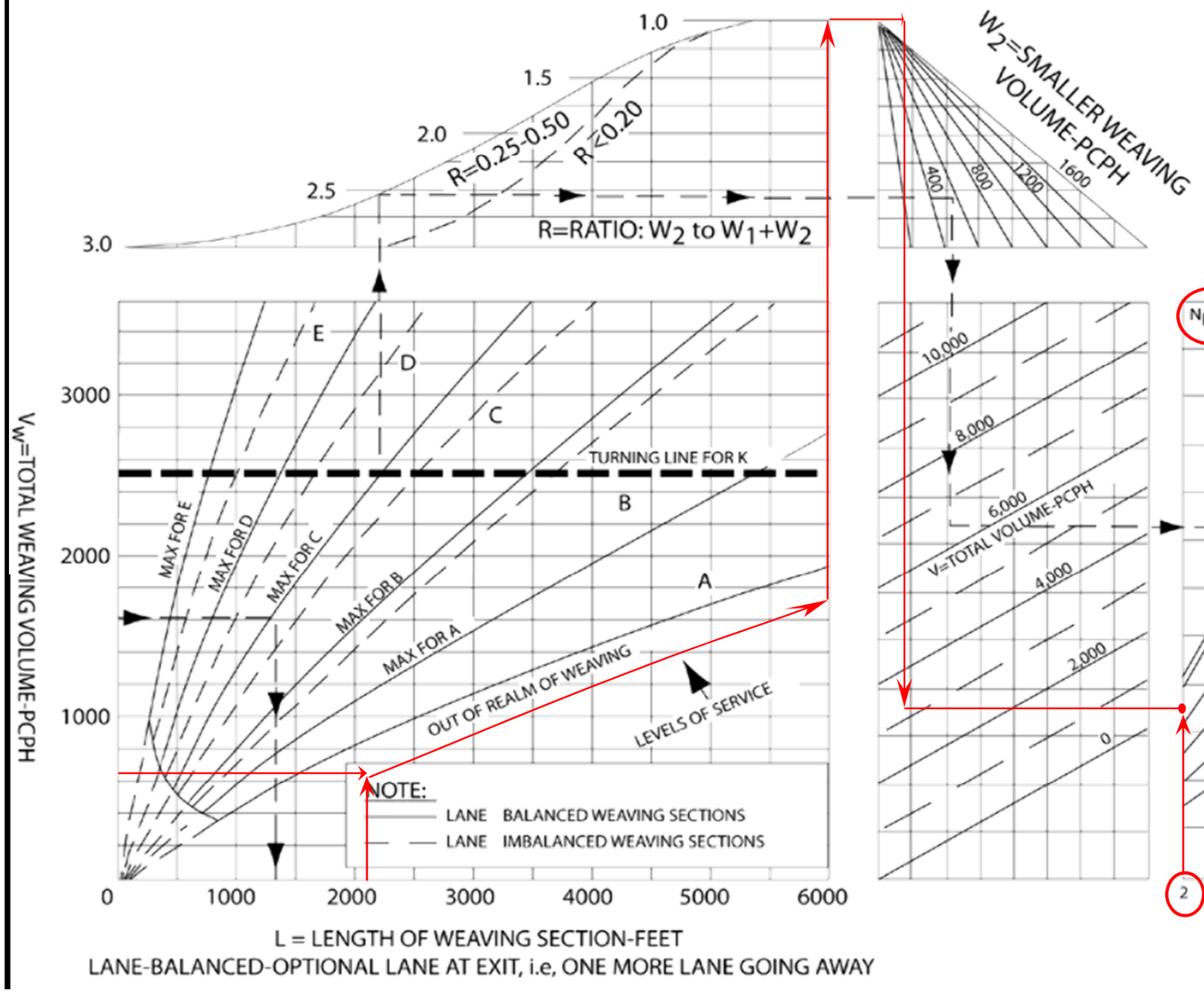
Direction : North

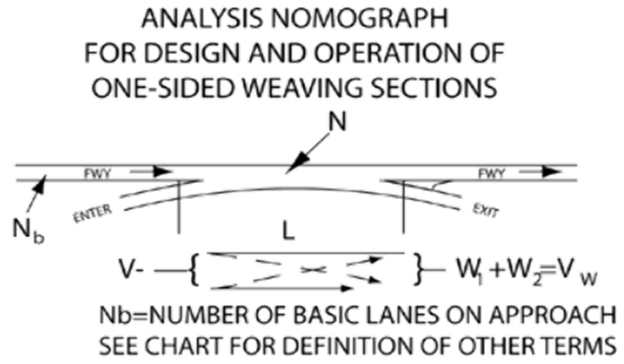
Project: 2025 Near Term

Year: 2025 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





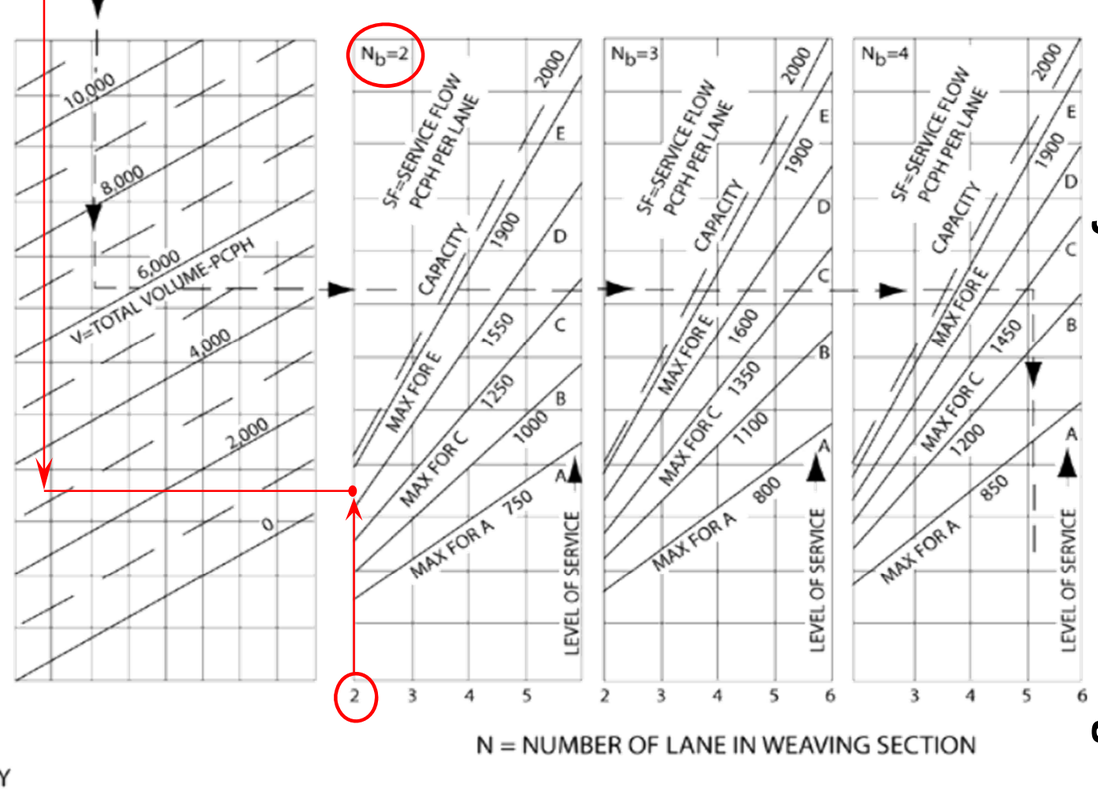
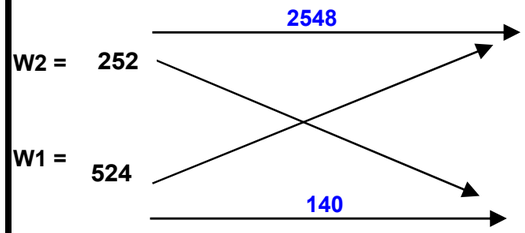


Figure 504.7A
Design Curve for Freeway and Collector Weaving



LOS weave = A/B

Compo. LOS = C/D

V = 3464 pcph

L = 1330 feet

W1 = 524 pcph

W2 = 252 pcph

V_w = 776 pcph

R = 0.32

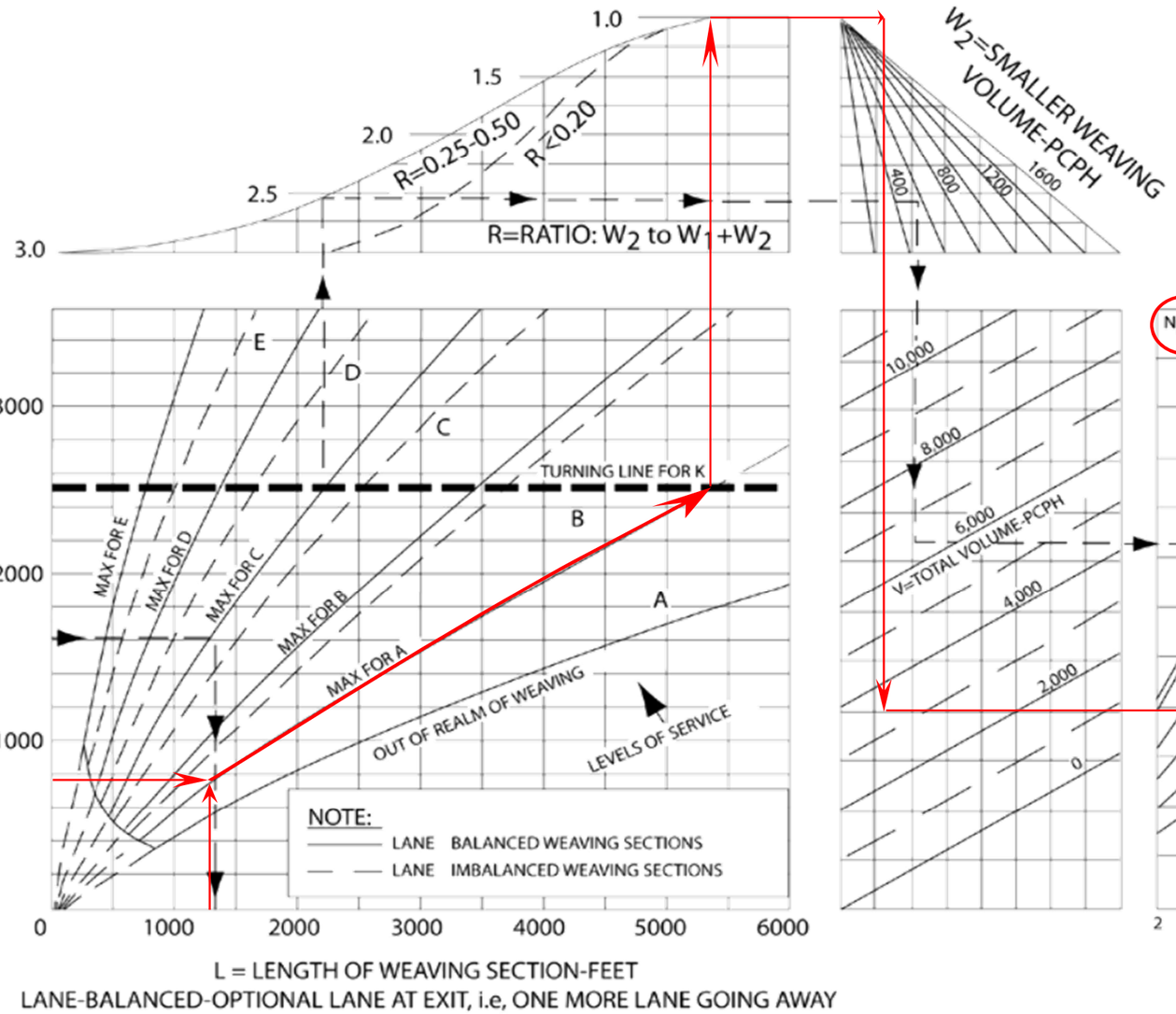
Direction : North

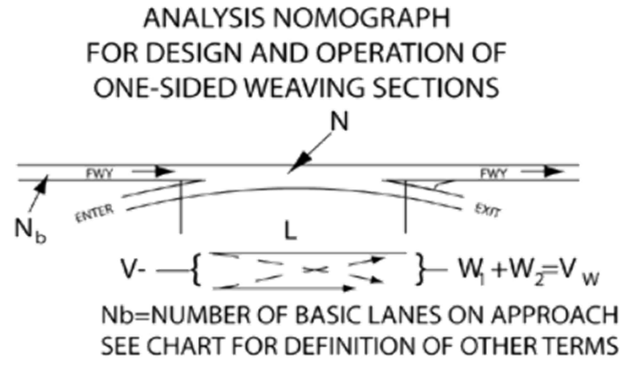
Project: 2025 Near Term

Year: 2025 Peak Hour: AM Peak

On Ramp: Madonna Rd

Off Ramp: Marsh St





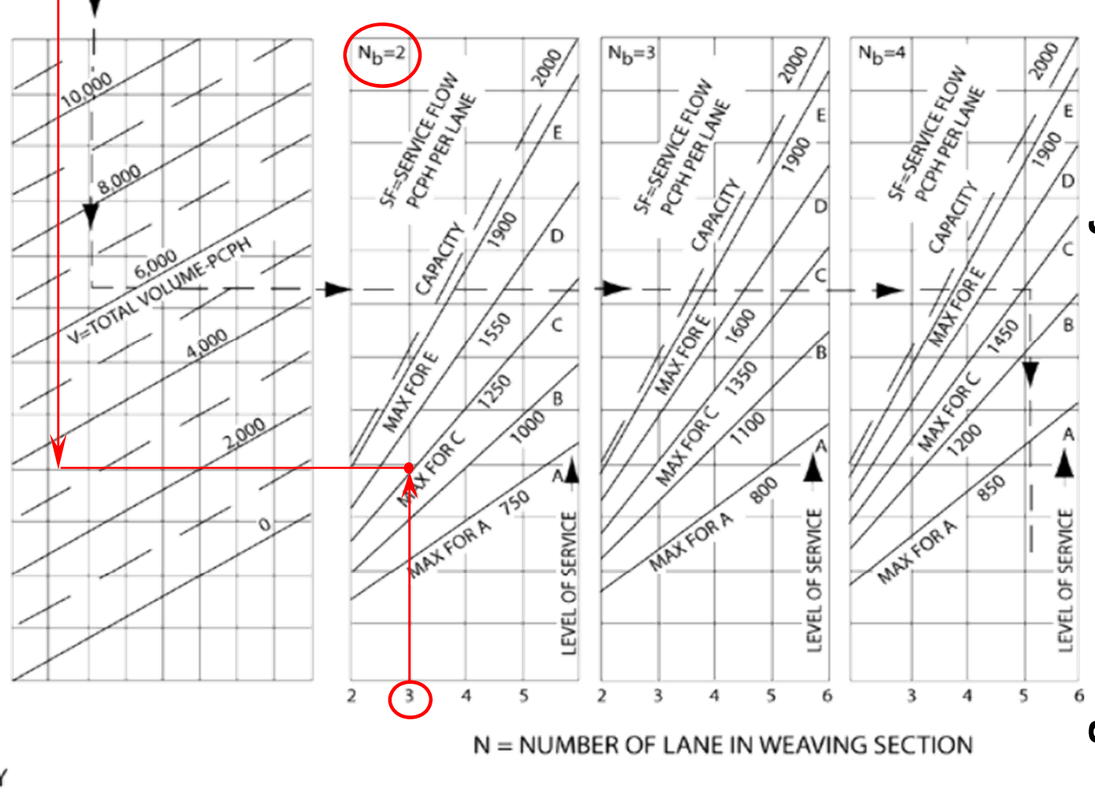
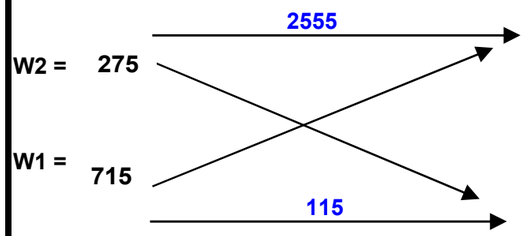


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3660 pcph

L = 1330 feet

W1 = 715 pcph

W2 = 275 pcph

V_w = 990 pcph

R = 0.28

Direction : North

Project: 2025 Near Term

Year: 2025 Peak Hour: PM Peak

On Ramp: Madonna Rd

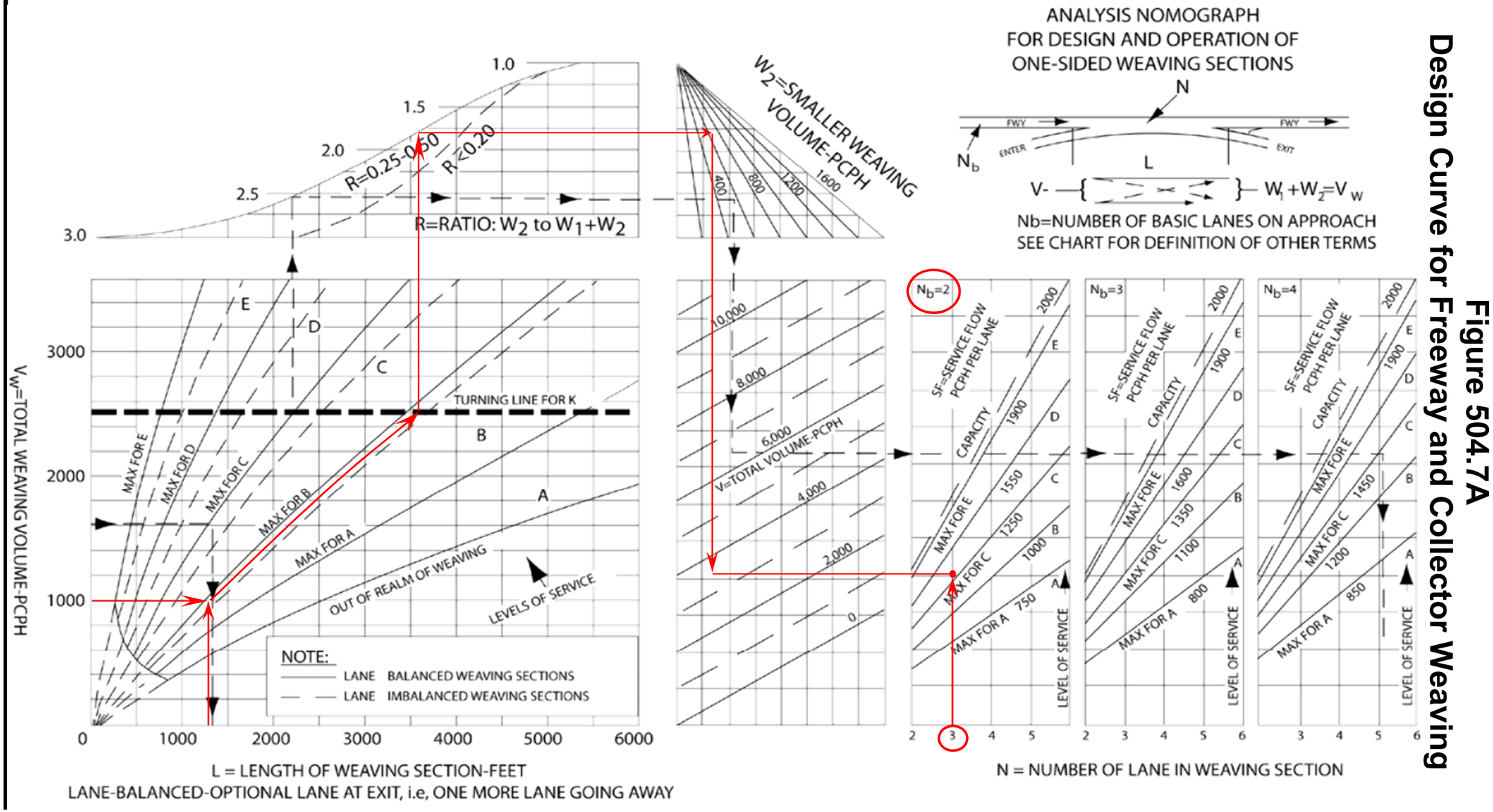
Off Ramp: Marsh St

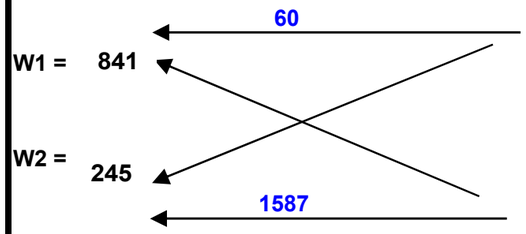
LOS weave = B

Compo. LOS = D

Design Curve for Freeway and Collector Weaving

Figure 504.7A





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

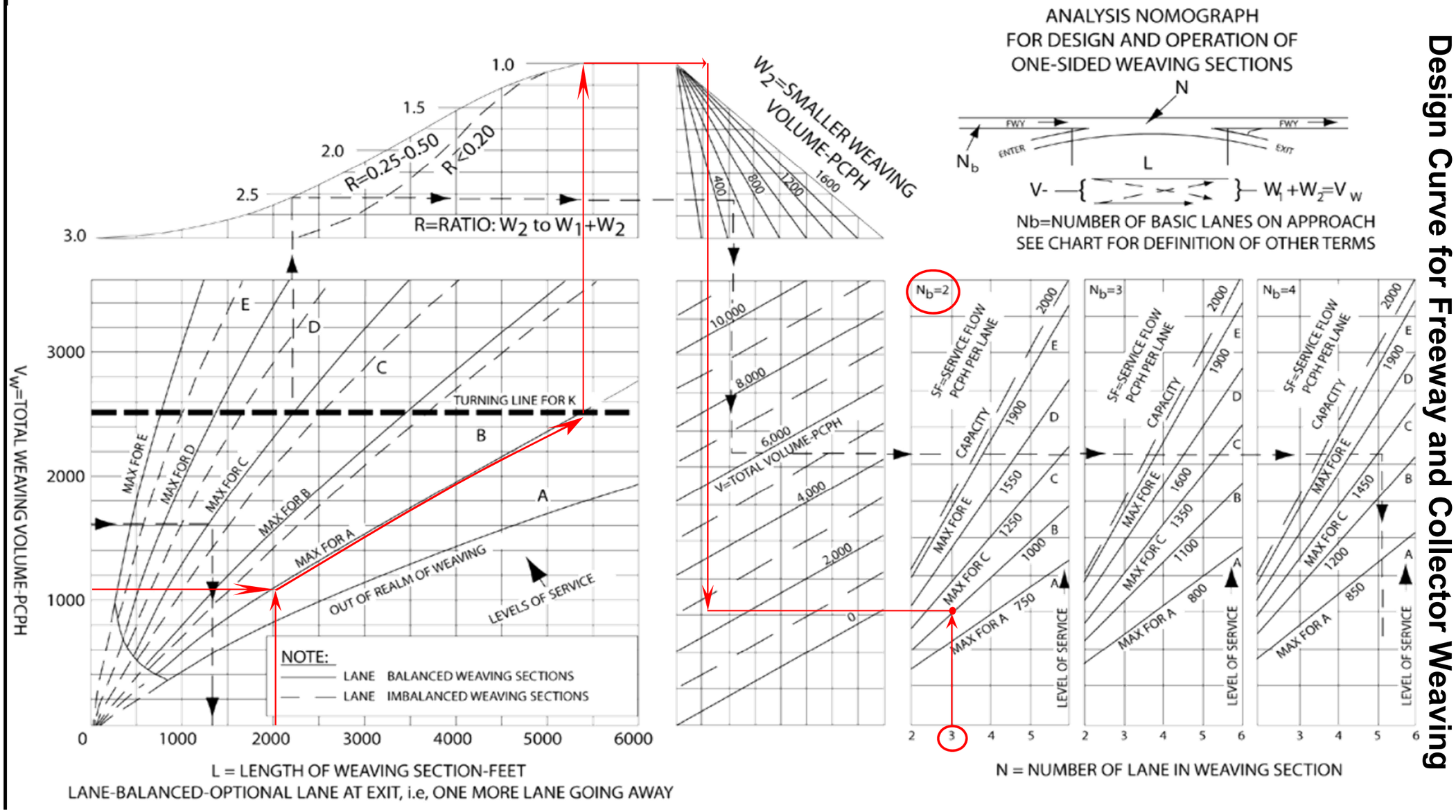
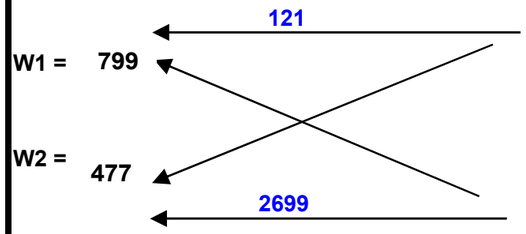


Figure 504.7A
Design Curve for Freeway and Collector Weaving



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

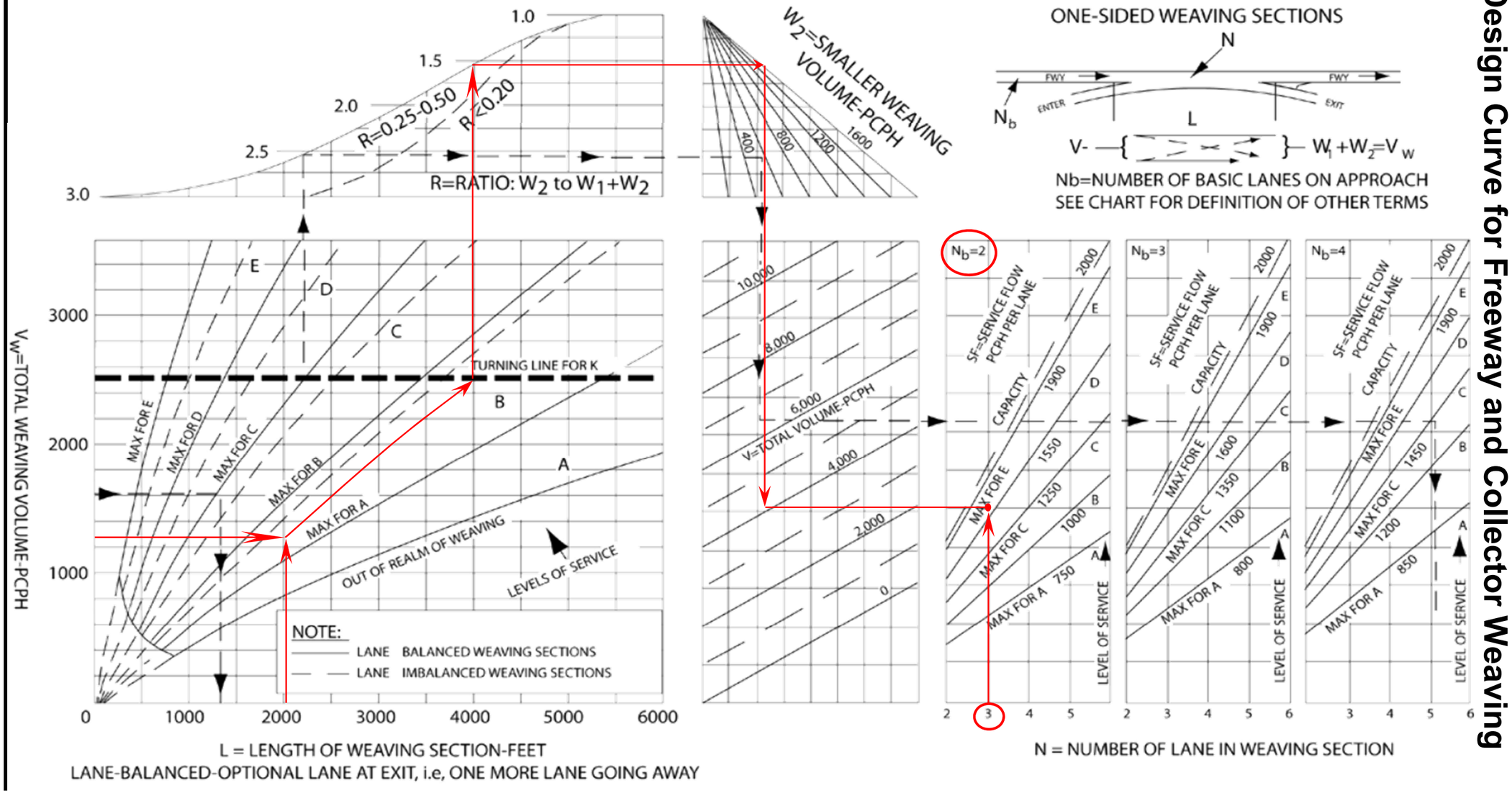


Figure 504.7A
Design Curve for Freeway and Collector Weaving

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	

Overall results are not computed when free-flow speed is less than 55 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:	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	

Overall results are not computed when free-flow speed is less than 55 mph.

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, 18, or 19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3636	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 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_O = 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, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12}$ = 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_O = 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 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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = N/A	mph
Space mean speed for all vehicles,	S = 56.5	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:	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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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:	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	

Overall results are not computed when free-flow speed is less than 55 mph.

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, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 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_O = 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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = N/A	mph
Space mean speed for all vehicles,	S = 58.3	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 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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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:	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	

Overall results are not computed when free-flow speed is less than 55 mph.

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, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 17.9 pc/mi/ln

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

Speed Estimation

Intermediate speed variable,	D_S = 0.497	
Space mean speed in ramp influence area,	S_R = 53.6	mph
Space mean speed in outer lanes,	S_O = 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, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 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_O = 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:	3/14/2018
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_O = N/A	mph
Space mean speed for all vehicles,	S = 57.7	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	JAV
Agency/Co.:	Omni-Means, a GHD Company
Date performed:	3/14/2018
Analysis time period:	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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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:	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

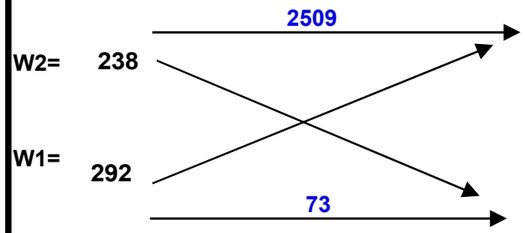
LOS and Performance Measures

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	

Overall results are not computed when free-flow speed is less than 55 mph.

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

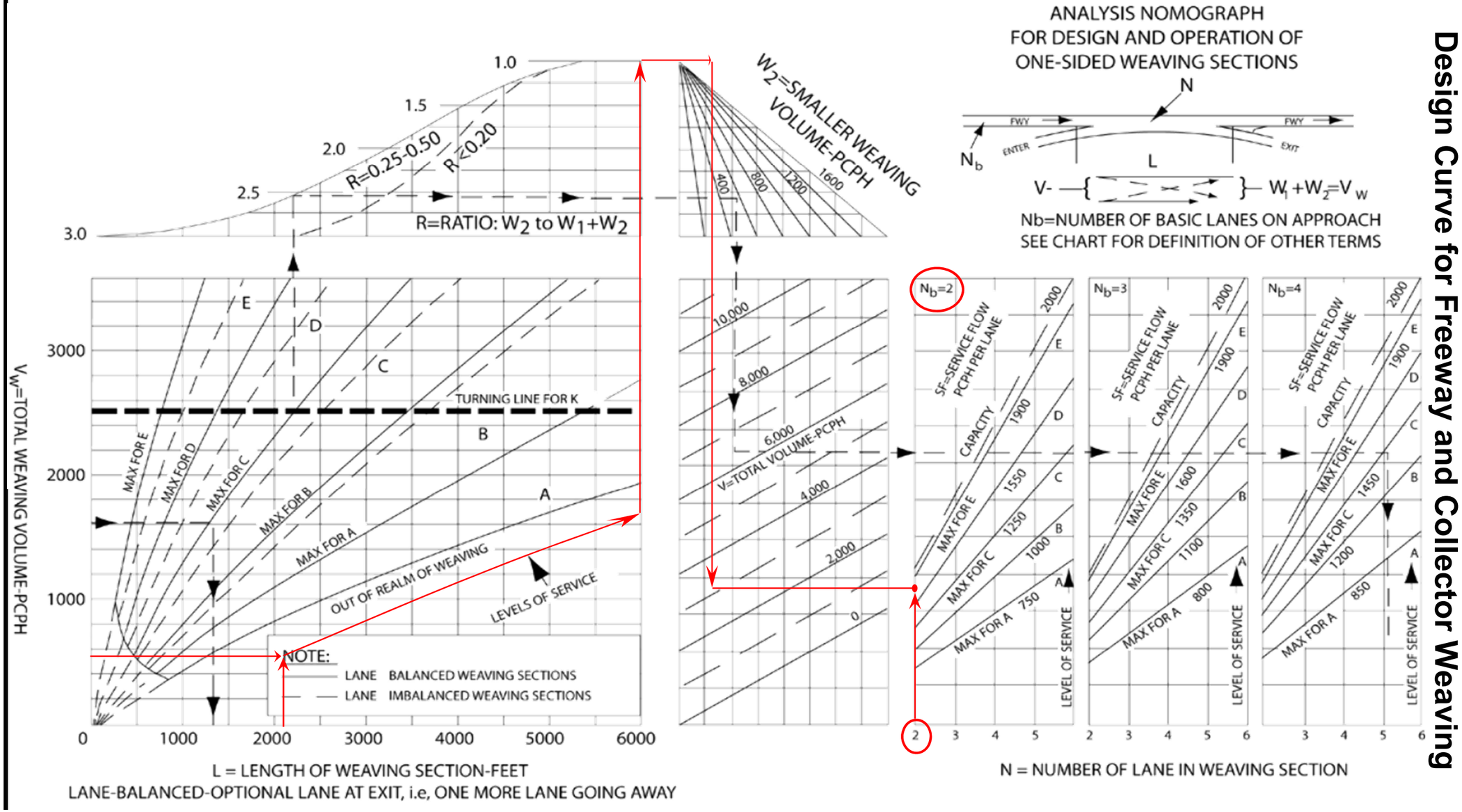
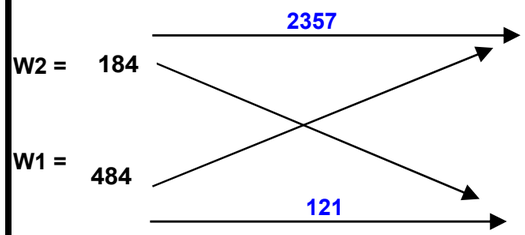


Figure 504.7A
Design Curve for Freeway and Collector Weaving



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

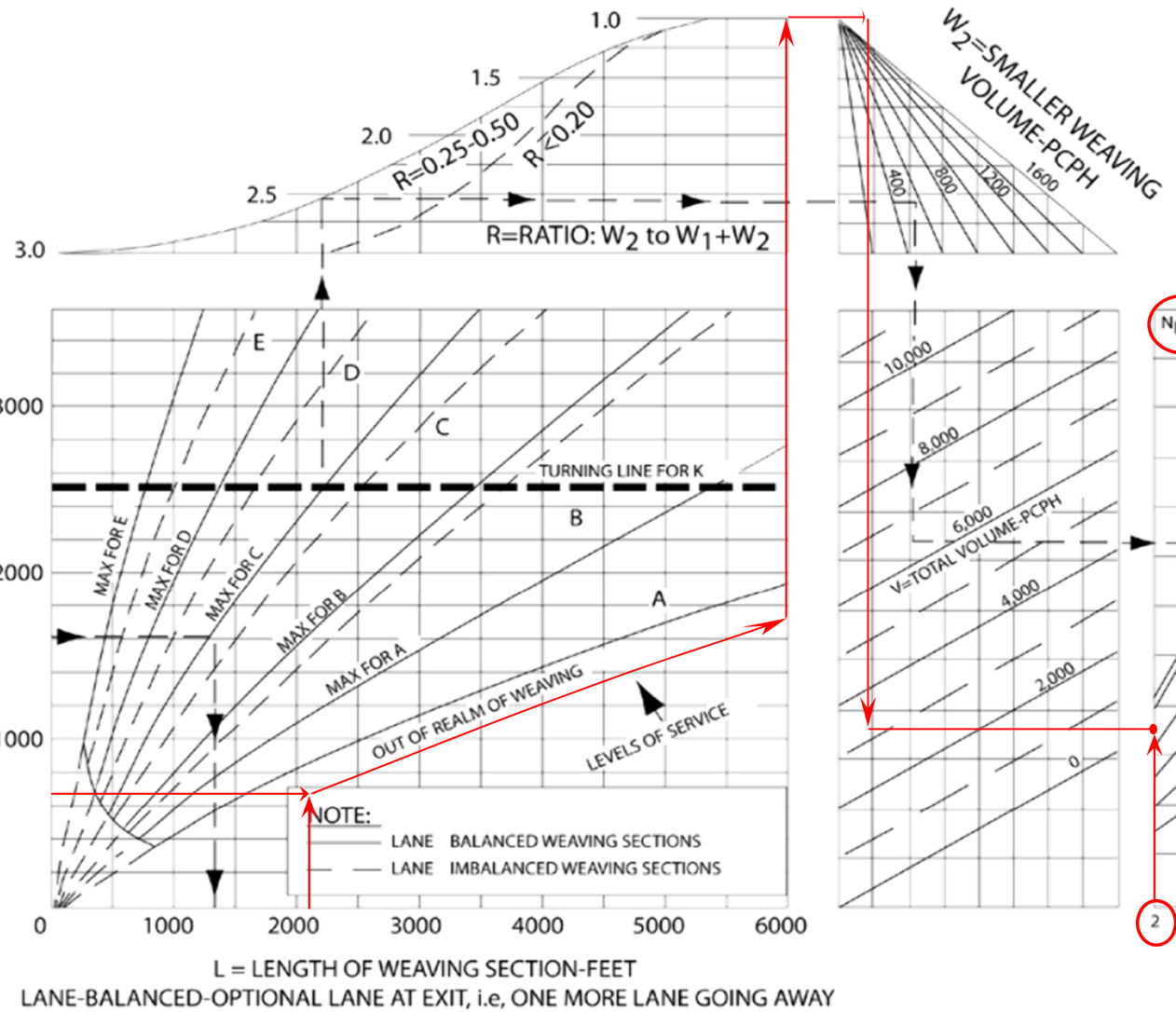
Direction : North

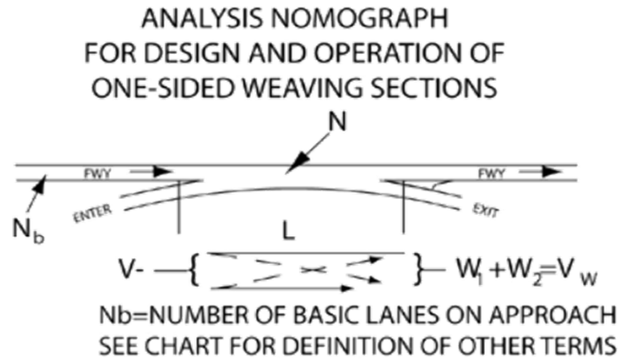
Project: 2025 Near Term Plus Project

Year: 2025 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





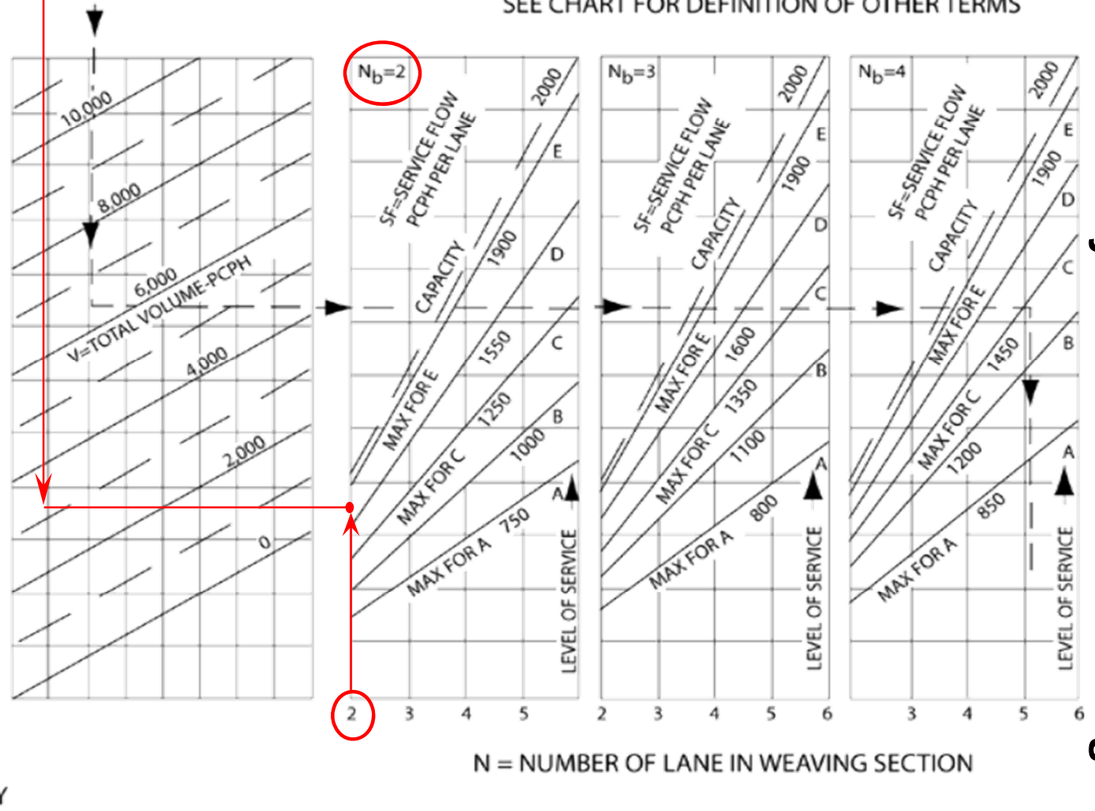
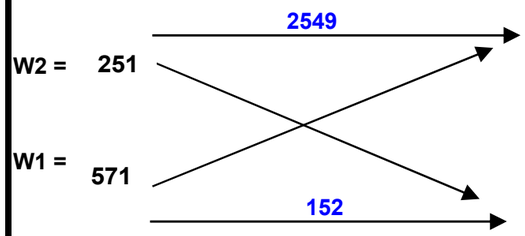


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3523 pcph V_w = 822 pcph

L = 1330 feet R = 0.31

W1 = 571 pcph

W2 = 251 pcph 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

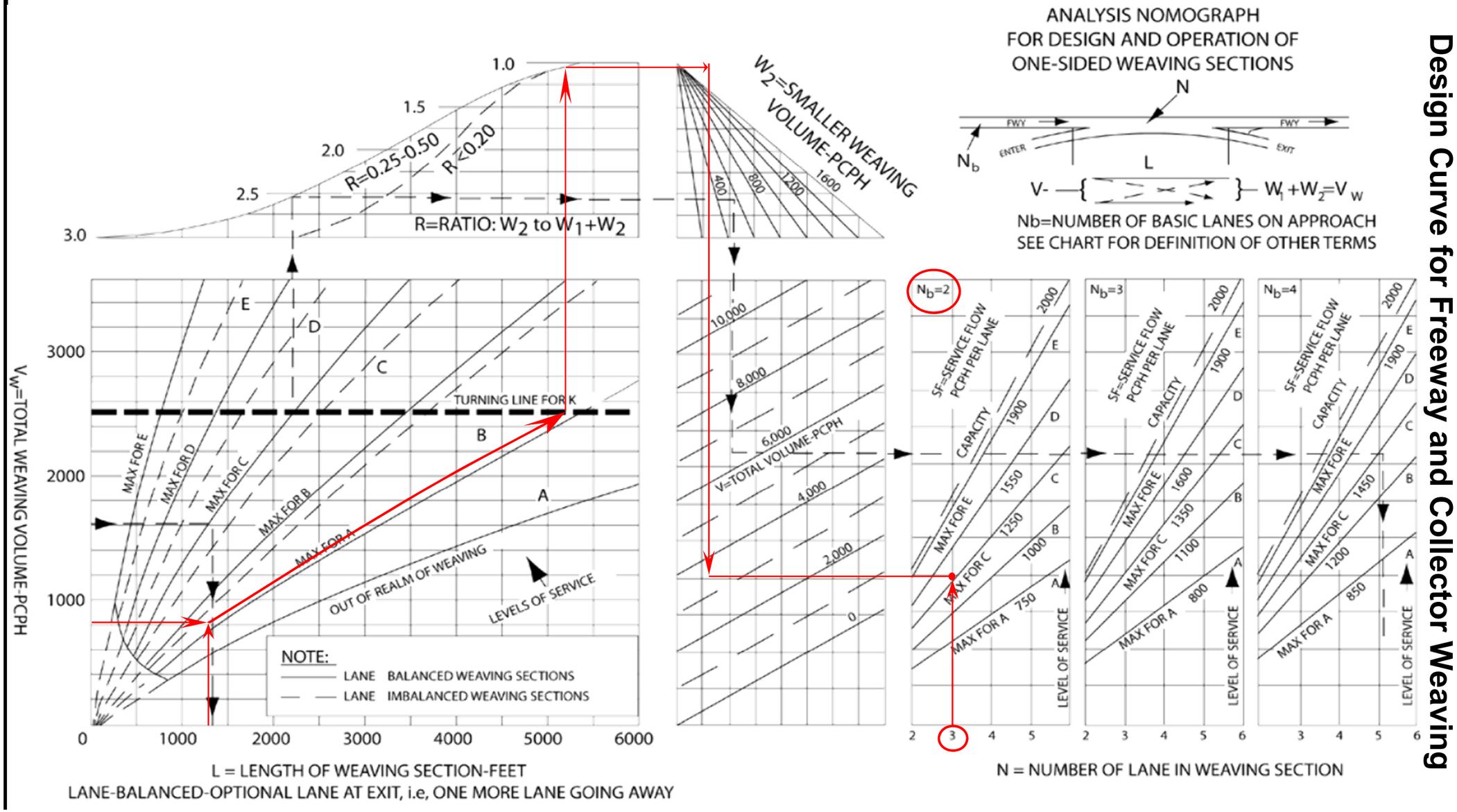
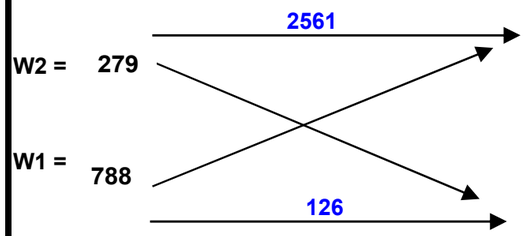


Figure 504.7A
Design Curve for Freeway and Collector Weaving



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

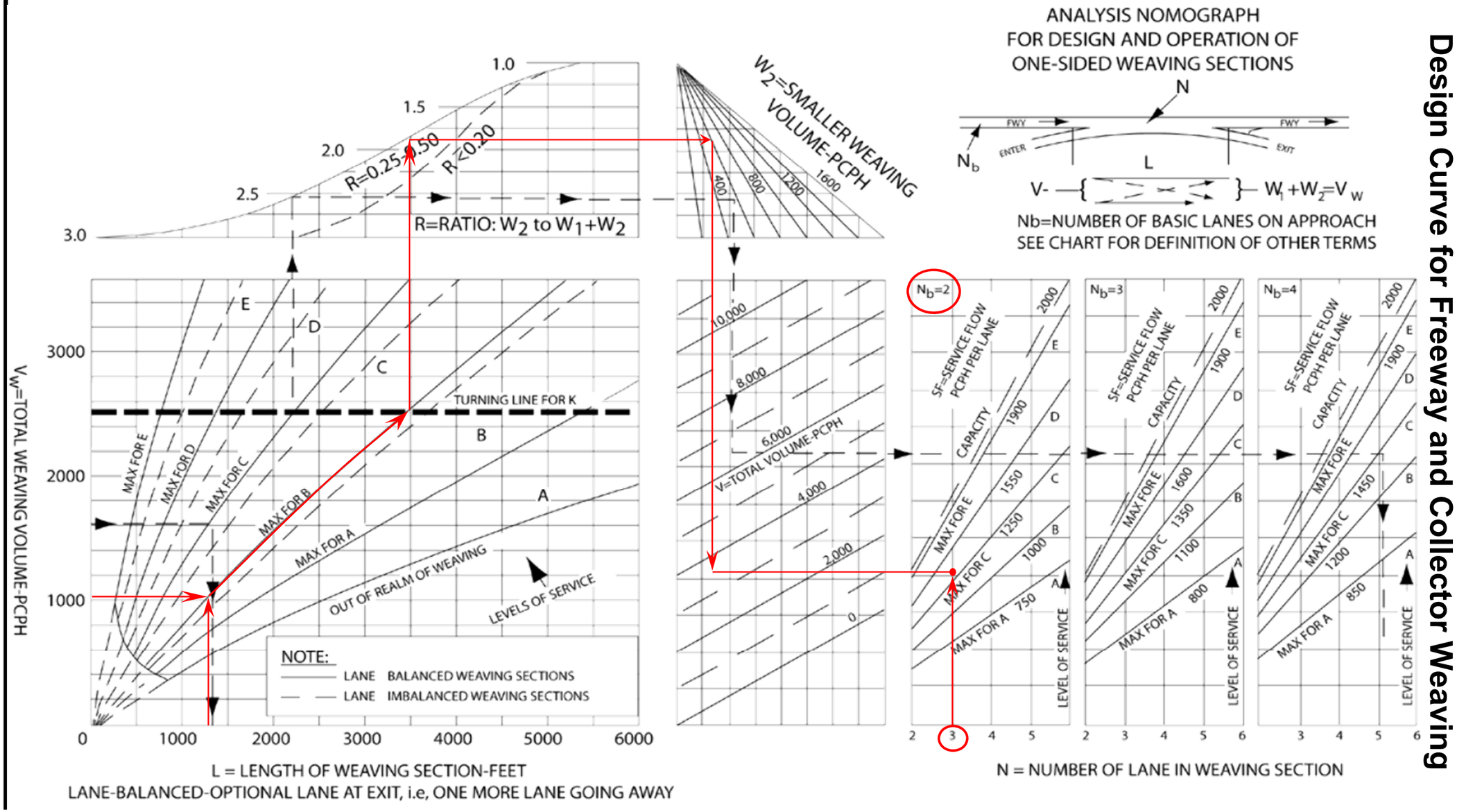
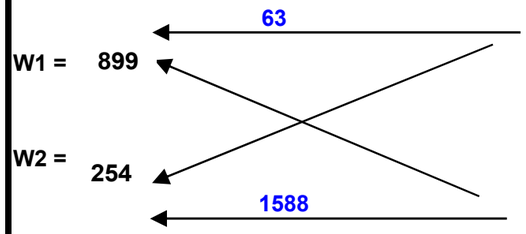


Figure 504.7A
Design Curve for Freeway and Collector Weaving



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

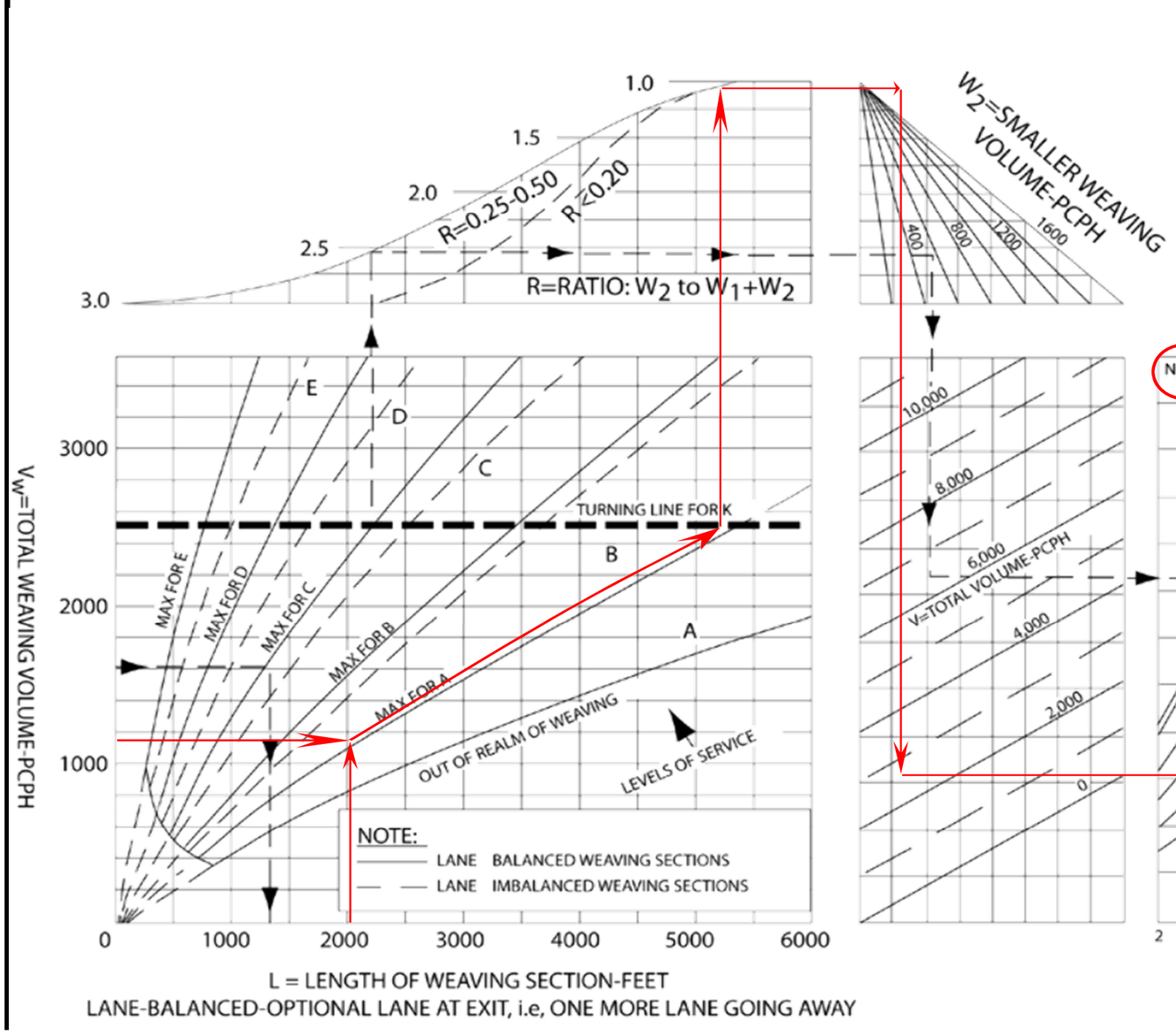
Direction : South

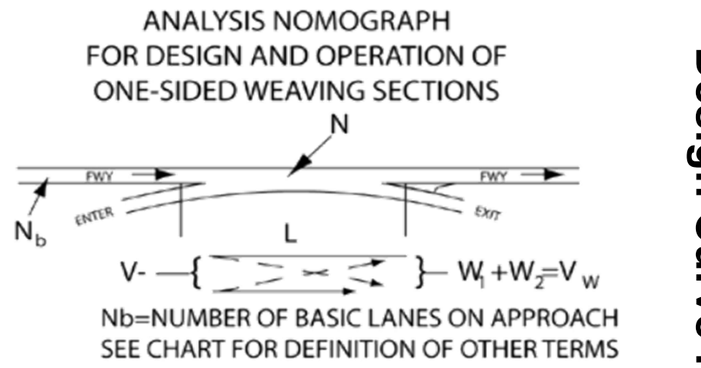
Project: 2025 Near Term Plus Project

Year: 2025 Peak Hour: AM Peak

On Ramp: Marsh St

Off Ramp: Madonna Rd





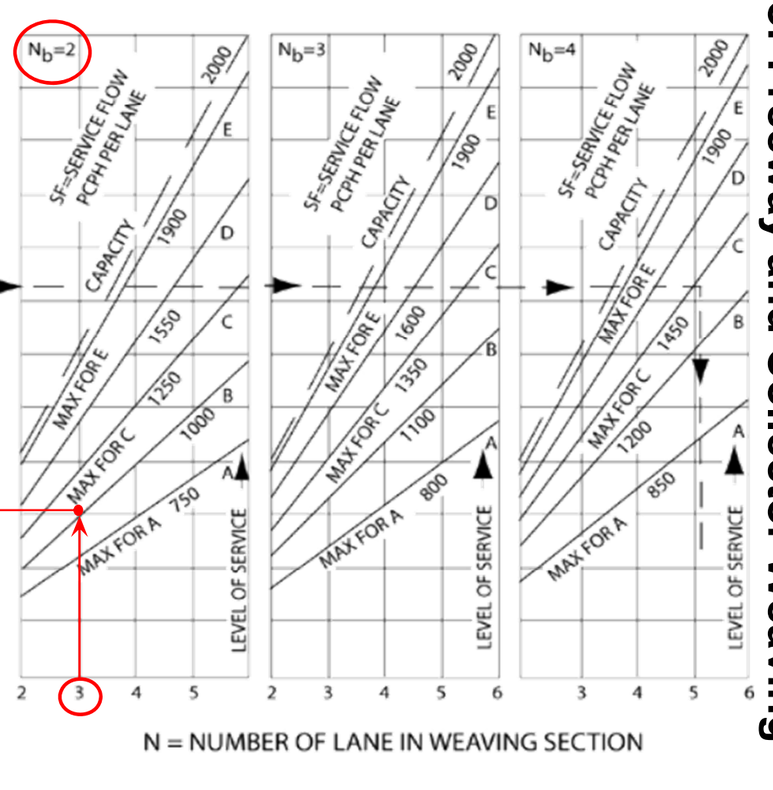
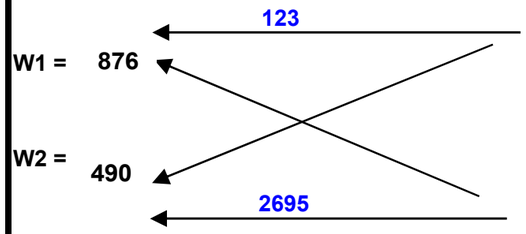


Figure 504.7A
Design Curve for Freeway and Collector Weaving



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

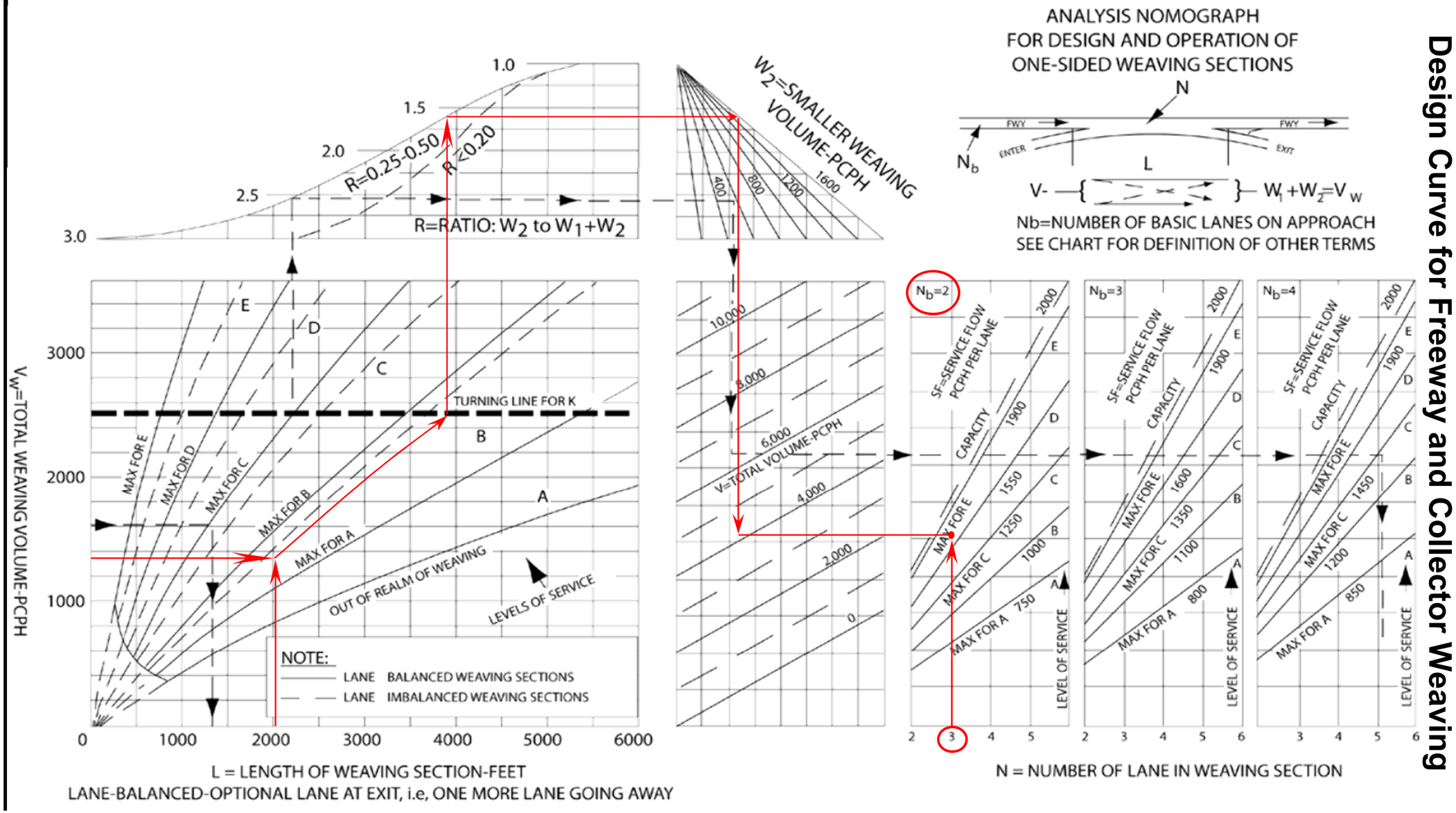


Figure 504.7A
Design Curve for Freeway and Collector Weaving

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	

Overall results are not computed when free-flow speed is less than 55 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 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	

Overall results are not computed when free-flow speed is less than 55 mph.

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_O = 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_O = N/A	mph
Space mean speed for all vehicles,	S = 56.6	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:	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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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 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	

Overall results are not computed when free-flow speed is less than 55 mph.

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_O = 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, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 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:
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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.

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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = N/A	mph
Space mean speed for all vehicles,	S = 58.3	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 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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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:	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	

Overall results are not computed when free-flow speed is less than 55 mph.

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, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 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_O = 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 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)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 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

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_O = 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	

Overall results are not computed when free-flow speed is less than 55 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 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

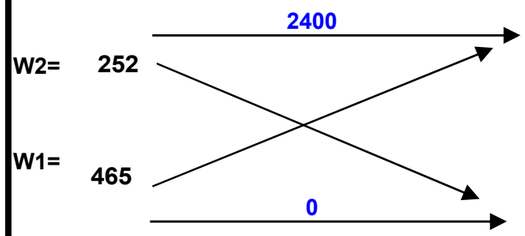
LOS and Performance Measures

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	

Overall results are not computed when free-flow speed is less than 55 mph.

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

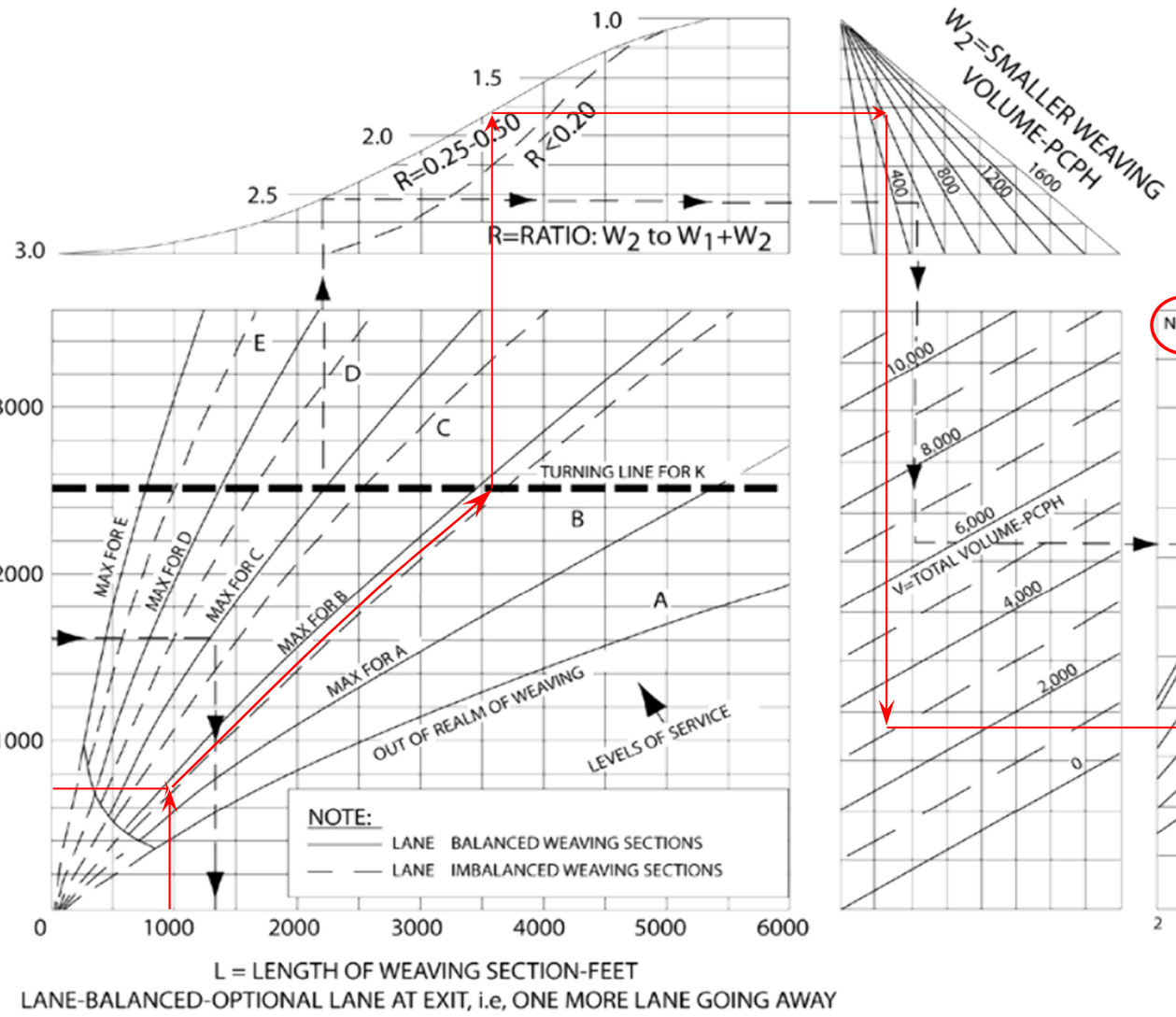
Direction : North

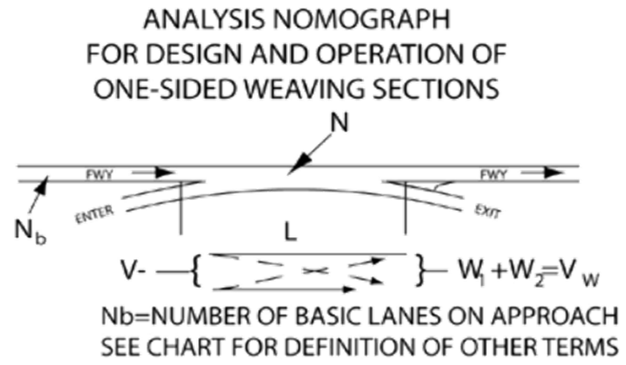
Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: AM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





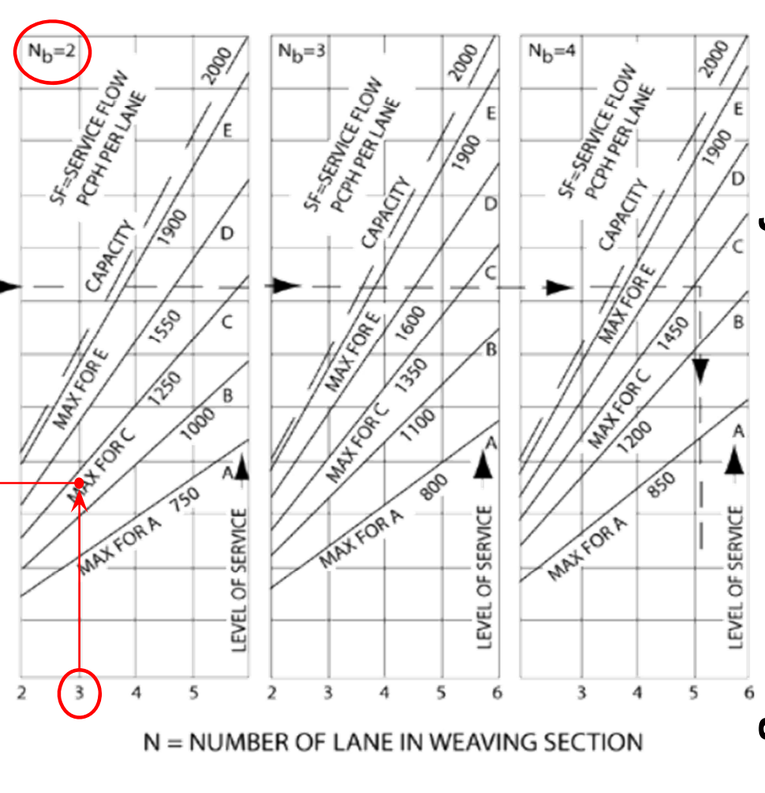
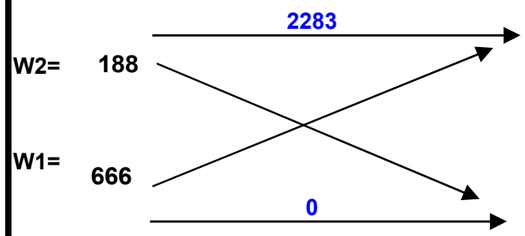


Figure 504.7A
Design Curve for Freeway and Collector Weaving



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

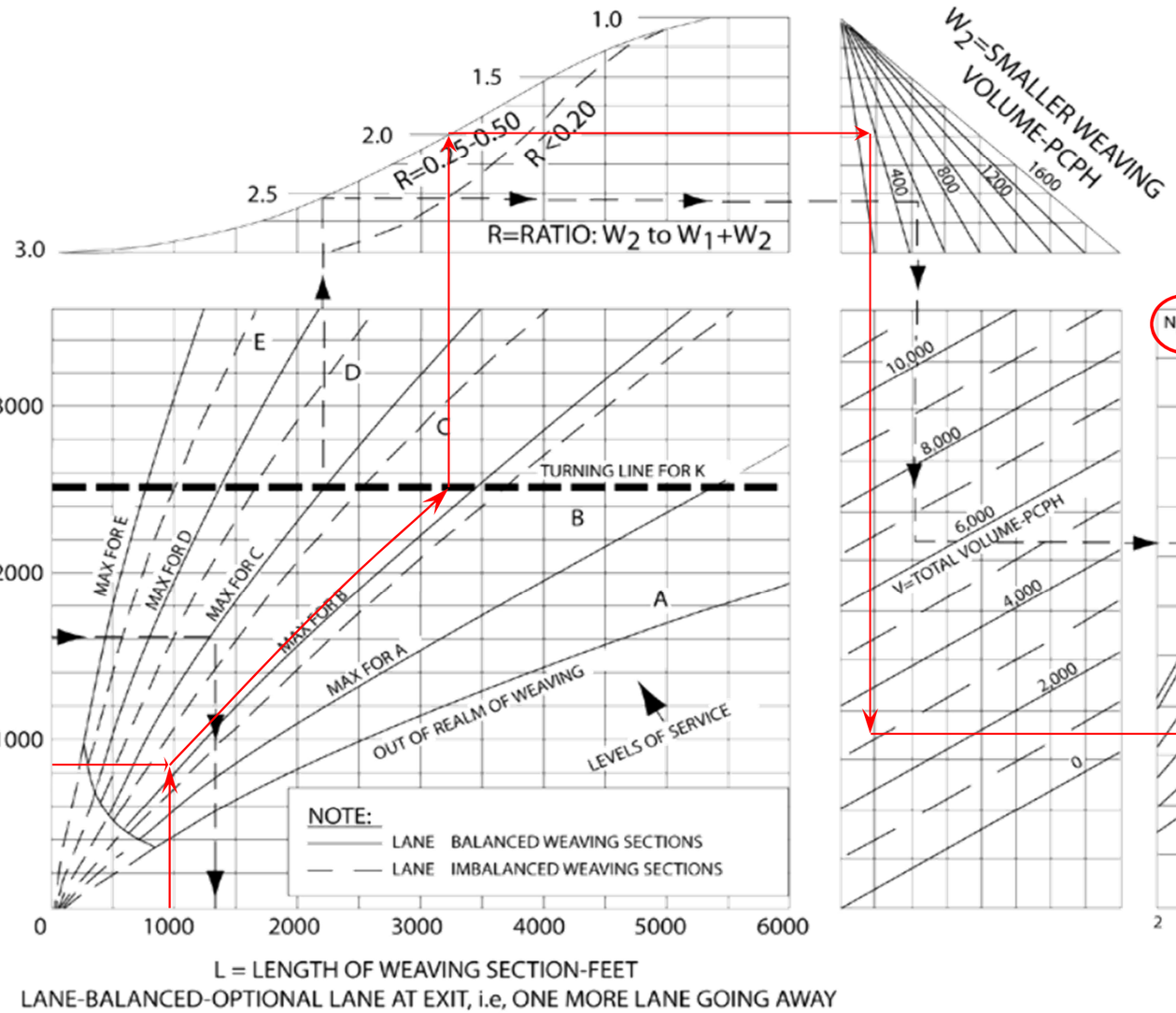
Direction : North

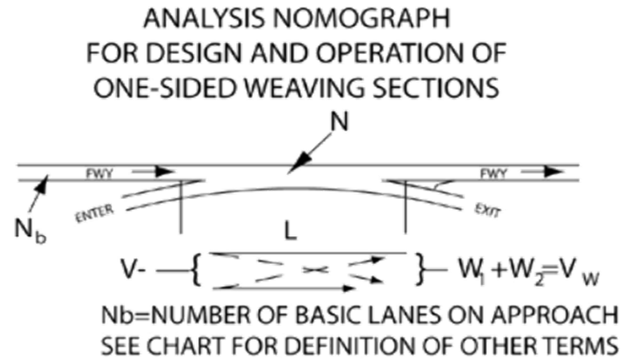
Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: PM Peak

On Ramp: Prado Rd

Off Ramp: Madonna Rd





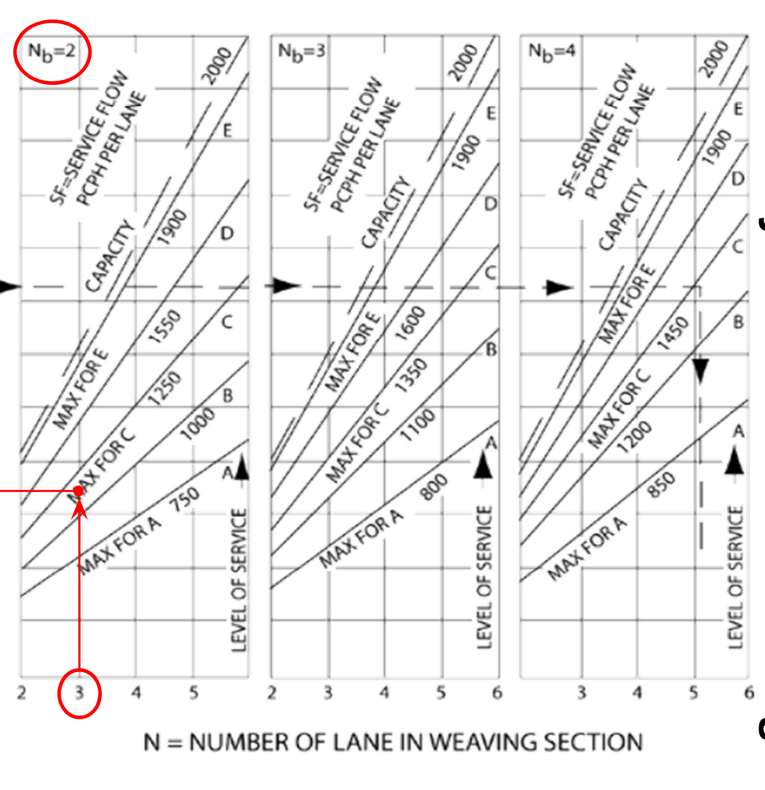
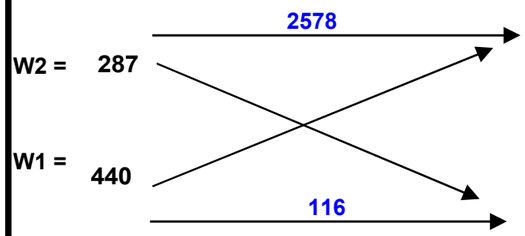


Figure 504.7A
Design Curve for Freeway and Collector Weaving



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

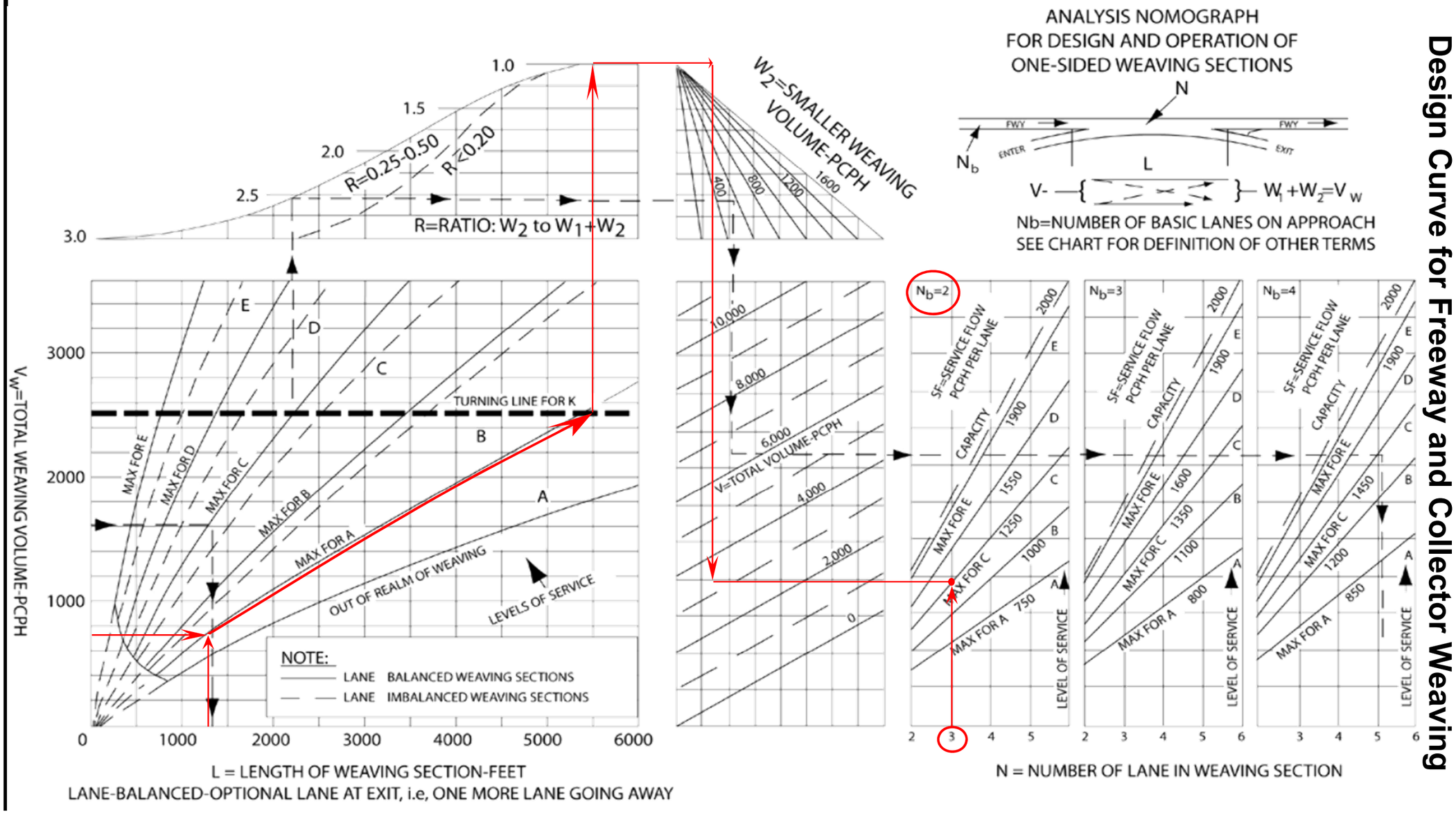
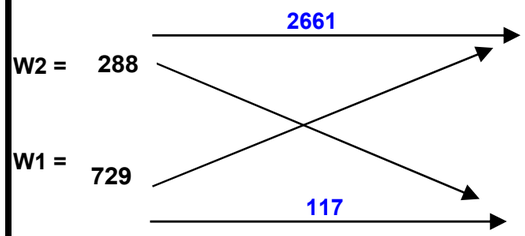


Figure 504.7A
Design Curve for Freeway and Collector Weaving



V = 3795 pcph

L = 1330 feet

W1 = 729 pcph

W2 = 288 pcph

V_w = 1017 pcph

R = 0.28

Direction : North

Project: 2025 Near Term Plus Project Mitigation

Year: 2025 Peak Hour: PM Peak

On Ramp: Madonna Rd

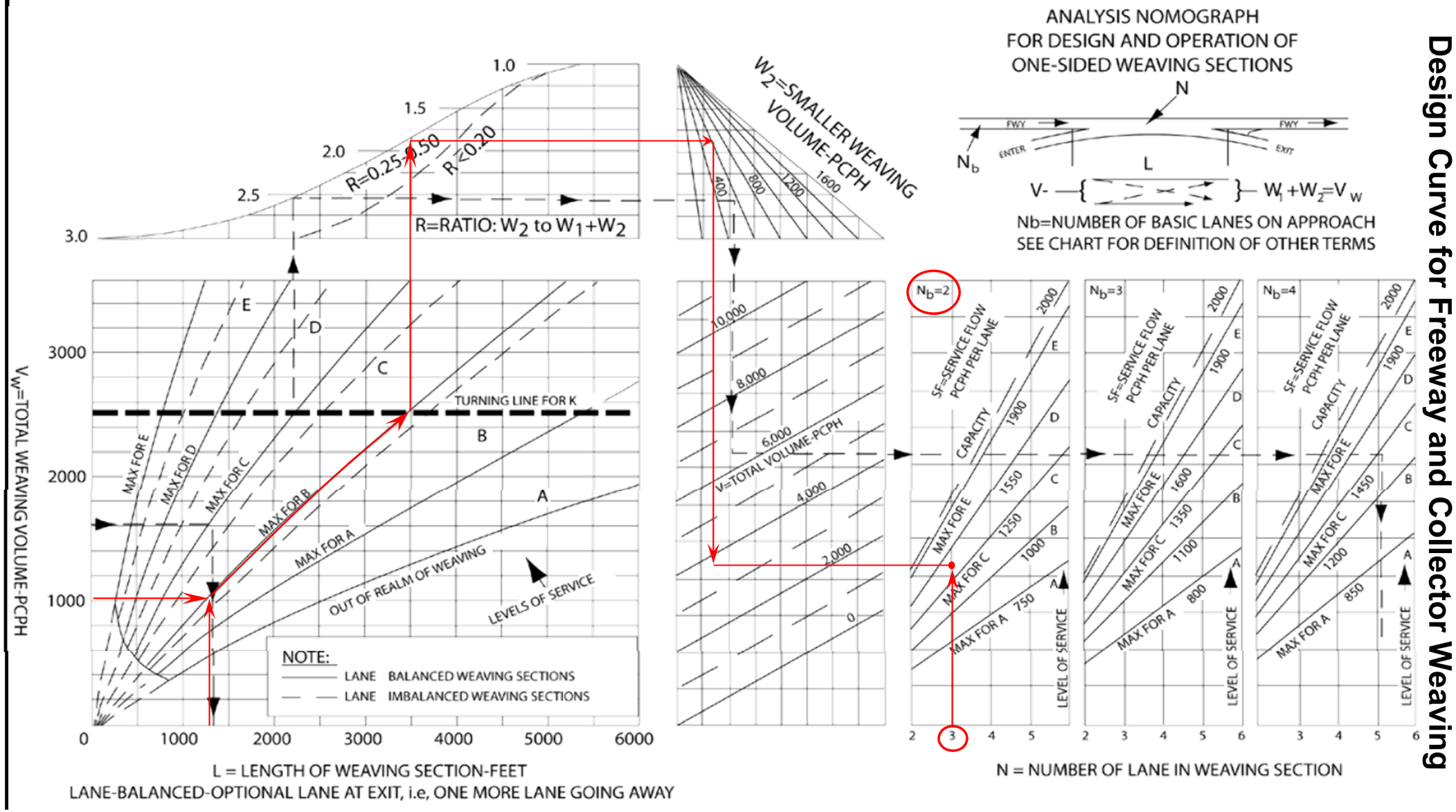
Off Ramp: Marsh St

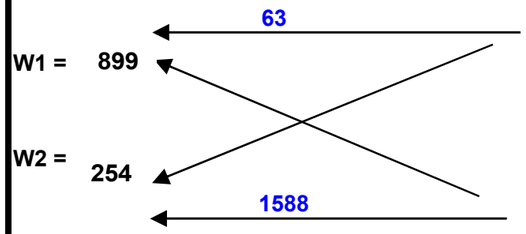
LOS weave = B

Compo. LOS = D

Design Curve for Freeway and Collector Weaving

Figure 504.7A





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

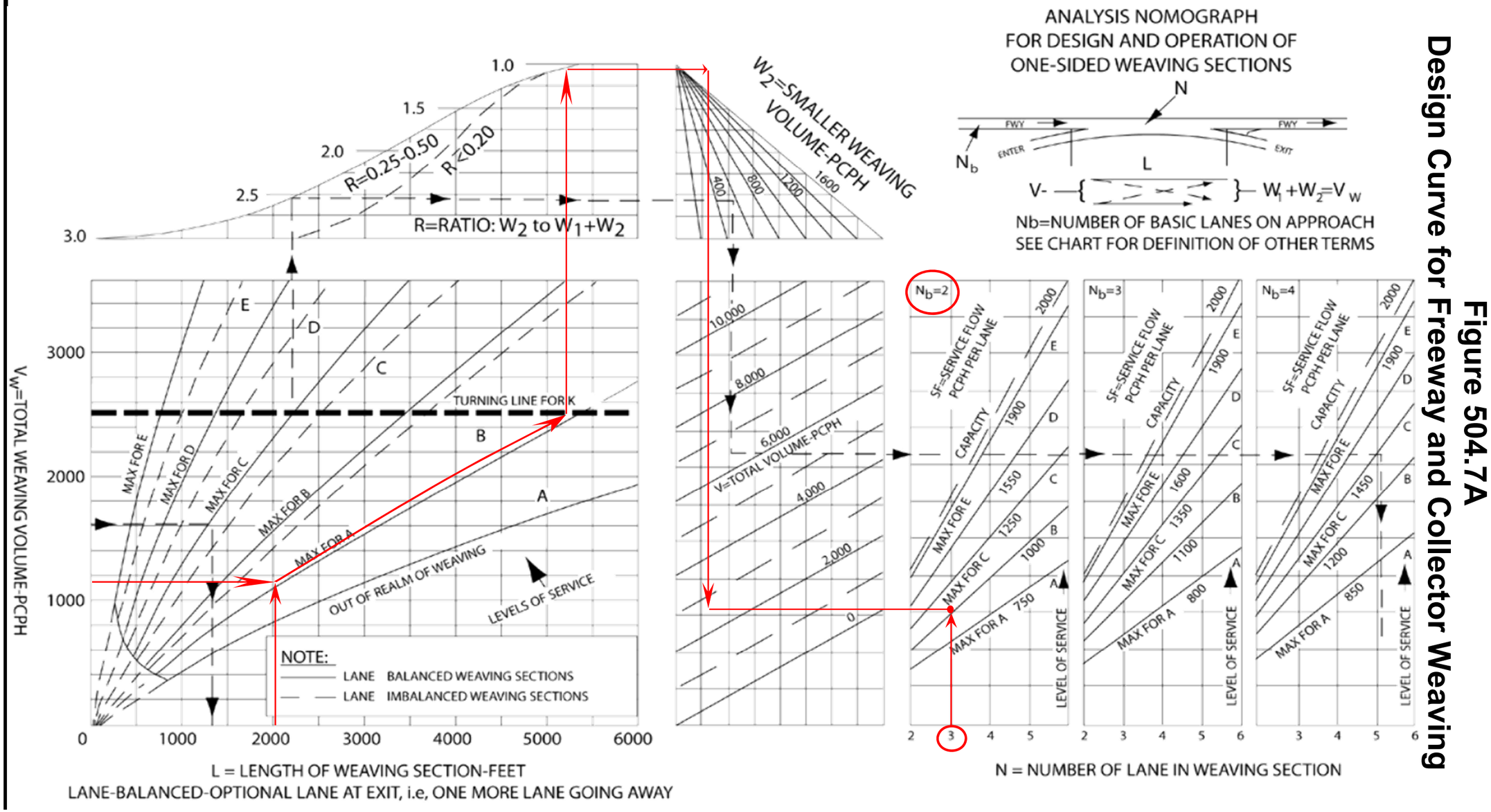
Project: 2025 Near Term Plus Project Mitigation

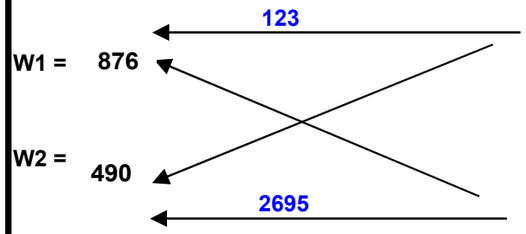
Year: 2025 Peak Hour: AM Peak

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

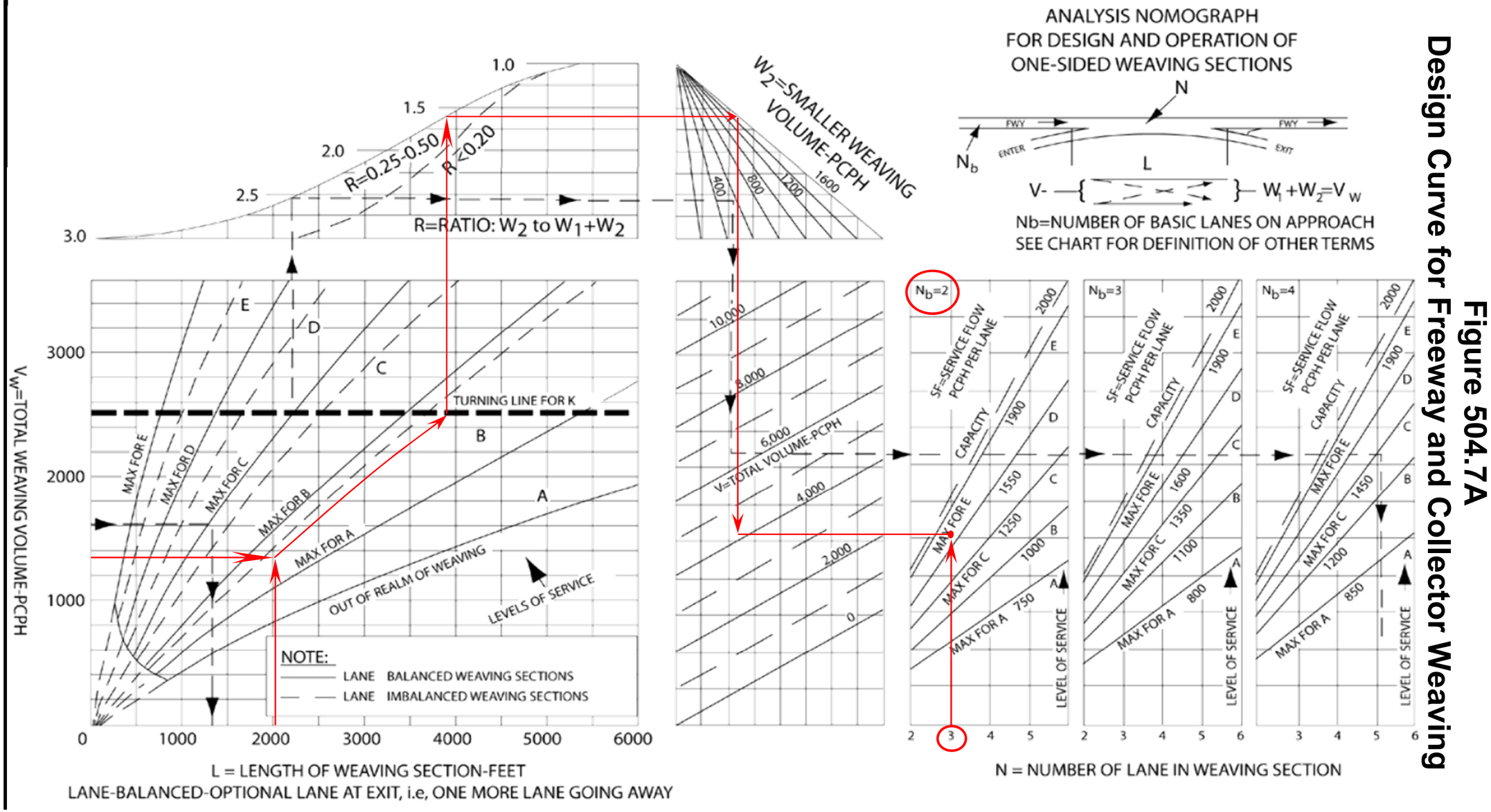


Figure 504.7A
Design Curve for Freeway and Collector Weaving