

SYSTEM PLANNING TRAINING

TCR CORRIDOR PERFORMANCE DATA & ANALYSIS

PROVIDED BY:
THE DIVISION OF TRANSPORTATION PLANNING,
OFFICE OF SYSTEM & FREIGHT PLANNING

Module 5

May 21, 2013



Corridor Performance Training Plan

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- Module 5: Finding TCR Corridor Performance data for uncongested freeways and rural two-lane conventional highways.
- PeMS: In-District training using PeMS to find TCR Corridor Performance datasets in development. Tentatively held Summer 2013.
- Module 6: Finding TCR Corridor Performance data for severely congested freeways. Likely to be held in Fall 2013.

Module 5 Scope

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- Urban Route
 - ▣ Uncongested Freeway Methodology
- Rural Route
 - ▣ Two-lane Highway Methodology
- Cover all required datasets and some important optional datasets.
- Using a simple, baseline methodology, that is available statewide.
 - ▣ PeMS will be covered as a separate training through Traffic Operations

Urban Route Datasets

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- AADT
- LOS
- VMT
- DVHD (35 mph)
- Peak Hour
 - ▣ Directional Split
 - ▣ VMT
 - ▣ V/C
 - ▣ Avg. Speed
 - ▣ VHD (35 mph)

Segment #		1
Basic System Operations		
AADT (BY)		9200
AADT (HY)		13340
AADT: Growth Rate/Year		1.55%
LOS Method		HCM
LOS (BY)		E
LOS (HY)		E
LOS Concept		E
VMT (BY)		21022
VMT (HY)		30482
Daily Vehicle Hours of Delay (35 MPH)(BY)		50
Daily Vehicle Hours of Delay (35 MPH)(HY)		70
Daily VHD (35 MPH) Method		PeMS

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		N/A
Peak Hour Time of Day		am
Peak Hour Directional Split (BY)		70/30
Peak Hour Directional Split (HY)		80/20
Peak Hour VMT (BY)		10000
Peak Hour VMT (HY)		20000
Peak Hour V/C (BY)		1
Peak Hour V/C (HY)		1
Peak Hour Avg. Speed (mph)(BY)		30
Peak Hour Avg. Speed (mph)(HY)		25
Peak Hour Vehicle Hours of Delay (35 mph) (BY)		100
Peak Hour Vehicle Hours of Delay (35 mph) (HY)		140
Peak Hour VHD (35 MPH) Method		PeMS

*Managed Lane Performance and Bottleneck datasets are covered in the PeMS training

* Truck AADT covered in Rural

Rural Route Datasets

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- AADT
- LOS
- VMT
- Truck Traffic
- Peak Hour
 - ▣ Directional Split
 - ▣ VMT
 - ▣ V/C
 - ▣ Avg. Speed
 - ▣ VHD (35 mph)

Segment #		1
Basic System Operations		
AADT (BY)		9200
AADT (HY)		13340
AADT: Growth Rate/Year		1.55%
LOS Method		HCM
LOS (BY)		E
LOS (HY)		E
LOS Concept		E
VMT (BY)		21022
VMT (HY)		30482
Truck Traffic		
Total Average Annual Daily Truck Traffic (AADTT) (BY)		322
Total Average Annual Daily Truck Traffic (AADTT) (HY)		700
Total Trucks (% of AADT) (BY)		3.5%
Total Trucks (% of AADT)(HY)		5.2%
5+ Axle Average Annual Daily Truck Traffic (AADTT)(BY)		129
5+ Axle Average Annual Daily Truck Traffic (AADTT)(HY)		300
5+ Axle Trucks (as % of AADT)(BY)		1.40%
5+ Axle Trucks (as % of AADT)(HY)		2.2%

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		N/A
Peak Hour Time of Day		am
Peak Hour Directional Split (BY)		70/30
Peak Hour Directional Split (HY)		80/20
Peak Hour VMT (BY)		10000
Peak Hour VMT (HY)		20000
Peak Hour V/C (BY)		1
Peak Hour V/C (HY)		1
Peak Hour Avg. Speed (mph)(BY)		30
Peak Hour Avg. Speed (mph)(HY)		25
Peak Hour Vehicle Hours of Delay (35 mph) (BY)		100
Peak Hour Vehicle Hours of Delay (35 mph) (HY)		140
Peak Hour VHD (35 MPH) Method		PeMS

SR-99 Segment Analysis

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Urban Uncongested Freeway

Urban Route: Uncongested Freeway

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- A freeway is a separated highway with full control of access and two or more lanes in each direction dedicated to the exclusive use of traffic. (HCM Ch. 10)
- Uncongested: This methodology applies to freeway routes that are not experiencing severe congestion. For the purposes of this methodology, severe congestion occurs when travel demand exceeds freeway capacity, vehicular speeds are 35 miles per hour (mph) or less, and conditions lasts for 15 minutes or longer during peak commute periods on a typical incident-free weekday.

Urban Route Sample: SR 99

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- Segment: PM 29.364 - PM T37.451 (north of Southgate Ave. to north of W. Eaton Rd.)
- 4F facility within the City of Chico in Butte County
- Important north-south corridor that provides access for commuting and recreational traffic
- Urban development along the corridor



SR 99 from the Skyway overcrossing



PM T37.451
North of W. Eaton Rd.

PM 29.364
North of Southgate Ave.

Urban Data Tools and Sources

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- Google Measuring Tool
- Highway Capacity Software 2010
 - ▣ LOSPLAN - FREEPLAN module
- Traffic Volumes Book
- Traffic Volumes Book – Peak Hour Volume Data Table (back of book)
- Ramp Volumes Book
- Truck Volumes Book

- Traffic, Ramp, and Truck Volumes Books can be found here:
<http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/index.htm>

Google Measuring Tool

The image shows a screenshot of the Google Maps website. The browser address bar displays "maps.google.com/maps?hl=en&tab=wl". The search bar contains "chico, ca". The main map area shows a satellite view of Chico, California, with various streets and landmarks labeled. On the left side, there is a sidebar with information for "Chico, CA", including directions, photos, and a list of places like "Sierra Nevada Brewing Company" and "California State University". A red callout bubble is overlaid on the bottom left of the map, containing the text "Maps Labs - t" and "- ©2013 Google -".

Google Measuring Tool

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The screenshot shows the Google Maps Labs interface. At the top, there's a navigation bar with links like '+You', 'Search', 'Images', 'Maps', 'Play', 'YouTube', 'News', 'Gmail', 'Drive', 'Calendar', and 'More'. Below this is the Google search bar with 'chico, ca' entered. The main map area shows a satellite view of Chico, CA. On the left, there's a sidebar with 'Chico, CA' and various options like 'Get directions', 'My places', 'Directions', 'Search nearby', 'more', 'Explore this area', 'Photos', and 'Places'. The 'Places' section lists 'Sierra Nevada Brewing Company', 'Cal Northern School of Law', and 'California State University'. A 'Google Maps Labs' panel is open on the right, listing several experimental features. A red callout bubble with the text 'Click Enable & Save Changes' points to the 'Enable' radio button for the 'Distance Measurement Tool'.

Google Maps Labs

Google Maps Labs is a testing ground for experimental features that aren't quite ready for primetime. They may **change**, **break** or **disappear** at any time.
If such a feature breaks, and you're having trouble loading Maps, use this escape hatch: </maps?ftr=0>.

Feature	Author	Enable	Disable
 Distance Measurement Tool	Adam S, Andrey S, James M, Seth L	<input checked="" type="radio"/>	<input type="radio"/>
 Show Me Here!	Cornelius Q	<input type="radio"/>	<input checked="" type="radio"/>
 Drag 'n' Zoom	Dave D	<input type="radio"/>	<input checked="" type="radio"/>
 Back to Beta	David S	<input type="radio"/>	<input checked="" type="radio"/>

Save changes **Cancel** **Important:** To save your enabled Labs for next time, you must [sign in to your Google account](#).

Google Maps & Measuring Tool

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The screenshot displays the Google Maps interface with the Distance Measurement Tool active. The tool's control panel on the left includes a 'Get directions' button, a 'My places' button, and a compass. Below these, the text reads 'Distance Measurement Tool' and 'Click on the map to trace a path you want to measure.' The 'Units' section shows 'Metric' selected and 'English' as an option, with a link for 'I'm feeling geeky'. The 'Total distance' is displayed as 8.00691 mi, with 'Delete last point' and 'Reset' buttons below it. The map itself shows a satellite view of Chico, California, with a red path tracing a route through the city. The path starts near the top center, goes south on E. 1st St., then west on W. 1st St., then south on W. 2nd St., then east on E. 2nd St., then south on W. 3rd St., then east on E. 3rd St., then south on W. 4th St., then east on E. 4th St., then south on W. 5th St., then east on E. 5th St., then south on W. 6th St., then east on E. 6th St., then south on W. 7th St., then east on E. 7th St., then south on W. 8th St., then east on E. 8th St., then south on W. 9th St., then east on E. 9th St., then south on W. 10th St., then east on E. 10th St., then south on W. 11th St., then east on E. 11th St., then south on W. 12th St., then east on E. 12th St., then south on W. 13th St., then east on E. 13th St., then south on W. 14th St., then east on E. 14th St., then south on W. 15th St., then east on E. 15th St., then south on W. 16th St., then east on E. 16th St., then south on W. 17th St., then east on E. 17th St., then south on W. 18th St., then east on E. 18th St., then south on W. 19th St., then east on E. 19th St., then south on W. 20th St., then east on E. 20th St., then south on W. 21st St., then east on E. 21st St., then south on W. 22nd St., then east on E. 22nd St., then south on W. 23rd St., then east on E. 23rd St., then south on W. 24th St., then east on E. 24th St., then south on W. 25th St., then east on E. 25th St., then south on W. 26th St., then east on E. 26th St., then south on W. 27th St., then east on E. 27th St., then south on W. 28th St., then east on E. 28th St., then south on W. 29th St., then east on E. 29th St., then south on W. 30th St., then east on E. 30th St., then south on W. 31st St., then east on E. 31st St., then south on W. 32nd St., then east on E. 32nd St., then south on W. 33rd St., then east on E. 33rd St., then south on W. 34th St., then east on E. 34th St., then south on W. 35th St., then east on E. 35th St., then south on W. 36th St., then east on E. 36th St., then south on W. 37th St., then east on E. 37th St., then south on W. 38th St., then east on E. 38th St., then south on W. 39th St., then east on E. 39th St., then south on W. 40th St., then east on E. 40th St., then south on W. 41st St., then east on E. 41st St., then south on W. 42nd St., then east on E. 42nd St., then south on W. 43rd St., then east on E. 43rd St., then south on W. 44th St., then east on E. 44th St., then south on W. 45th St., then east on E. 45th St., then south on W. 46th St., then east on E. 46th St., then south on W. 47th St., then east on E. 47th St., then south on W. 48th St., then east on E. 48th St., then south on W. 49th St., then east on E. 49th St., then south on W. 50th St., then east on E. 50th St., then south on W. 51st St., then east on E. 51st St., then south on W. 52nd St., then east on E. 52nd St., then south on W. 53rd St., then east on E. 53rd St., then south on W. 54th St., then east on E. 54th St., then south on W. 55th St., then east on E. 55th St., then south on W. 56th St., then east on E. 56th St., then south on W. 57th St., then east on E. 57th St., then south on W. 58th St., then east on E. 58th St., then south on W. 59th St., then east on E. 59th St., then south on W. 60th St., then east on E. 60th St., then south on W. 61st St., then east on E. 61st St., then south on W. 62nd St., then east on E. 62nd St., then south on W. 63rd St., then east on E. 63rd St., then south on W. 64th St., then east on E. 64th St., then south on W. 65th St., then east on E. 65th St., then south on W. 66th St., then east on E. 66th St., then south on W. 67th St., then east on E. 67th St., then south on W. 68th St., then east on E. 68th St., then south on W. 69th St., then east on E. 69th St., then south on W. 70th St., then east on E. 70th St., then south on W. 71st St., then east on E. 71st St., then south on W. 72nd St., then east on E. 72nd St., then south on W. 73rd St., then east on E. 73rd St., then south on W. 74th St., then east on E. 74th St., then south on W. 75th St., then east on E. 75th St., then south on W. 76th St., then east on E. 76th St., then south on W. 77th St., then east on E. 77th St., then south on W. 78th St., then east on E. 78th St., then south on W. 79th St., then east on E. 79th St., then south on W. 80th St., then east on E. 80th St., then south on W. 81st St., then east on E. 81st St., then south on W. 82nd St., then east on E. 82nd St., then south on W. 83rd St., then east on E. 83rd St., then south on W. 84th St., then east on E. 84th St., then south on W. 85th St., then east on E. 85th St., then south on W. 86th St., then east on E. 86th St., then south on W. 87th St., then east on E. 87th St., then south on W. 88th St., then east on E. 88th St., then south on W. 89th St., then east on E. 89th St., then south on W. 90th St., then east on E. 90th St., then south on W. 91st St., then east on E. 91st St., then south on W. 92nd St., then east on E. 92nd St., then south on W. 93rd St., then east on E. 93rd St., then south on W. 94th St., then east on E. 94th St., then south on W. 95th St., then east on E. 95th St., then south on W. 96th St., then east on E. 96th St., then south on W. 97th St., then east on E. 97th St., then south on W. 98th St., then east on E. 98th St., then south on W. 99th St., then east on E. 99th St., then south on W. 100th St., then east on E. 100th St.

HCS 2010

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The image shows a screenshot of the McTrans HCS 2010 software interface. The background is an aerial view of a road network. The McTrans logo is at the top center, with the tagline "Moving Technology". The main title "HCS 2010" is prominently displayed in the center. A menu of tools is visible on the left and right sides. The "FREEPLAN" option is highlighted with a red circle.

McTrans™
Moving Technology

HCS™
2010

Left Menu:

- Streets
- TRANSYT-7F
- TWSC
- AWSC
- Roundabouts
- Warrants
- DAITA

Right Menu:

- Facilities
- Freeways
- Weaving
- Ramps
- Multilane
- TwoLane
- LOSPLAN

Bottom Right Menu:

- ARTPLAN
- HIGHPLAN
- FREEPLAN**

Urban: AADT BY and HY

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- Required
- Average Annual Daily Traffic

Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		
LOS Method		
LOS (BY)		
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		
Daily Vehicle Hours of Delay (35 MPH)(BY)		
Daily Vehicle Hours of Delay (35 MPH)(HY)		
Daily VHD (35 MPH) Method		

Traffic Volumes Book

2011 Traffic Volumes Book

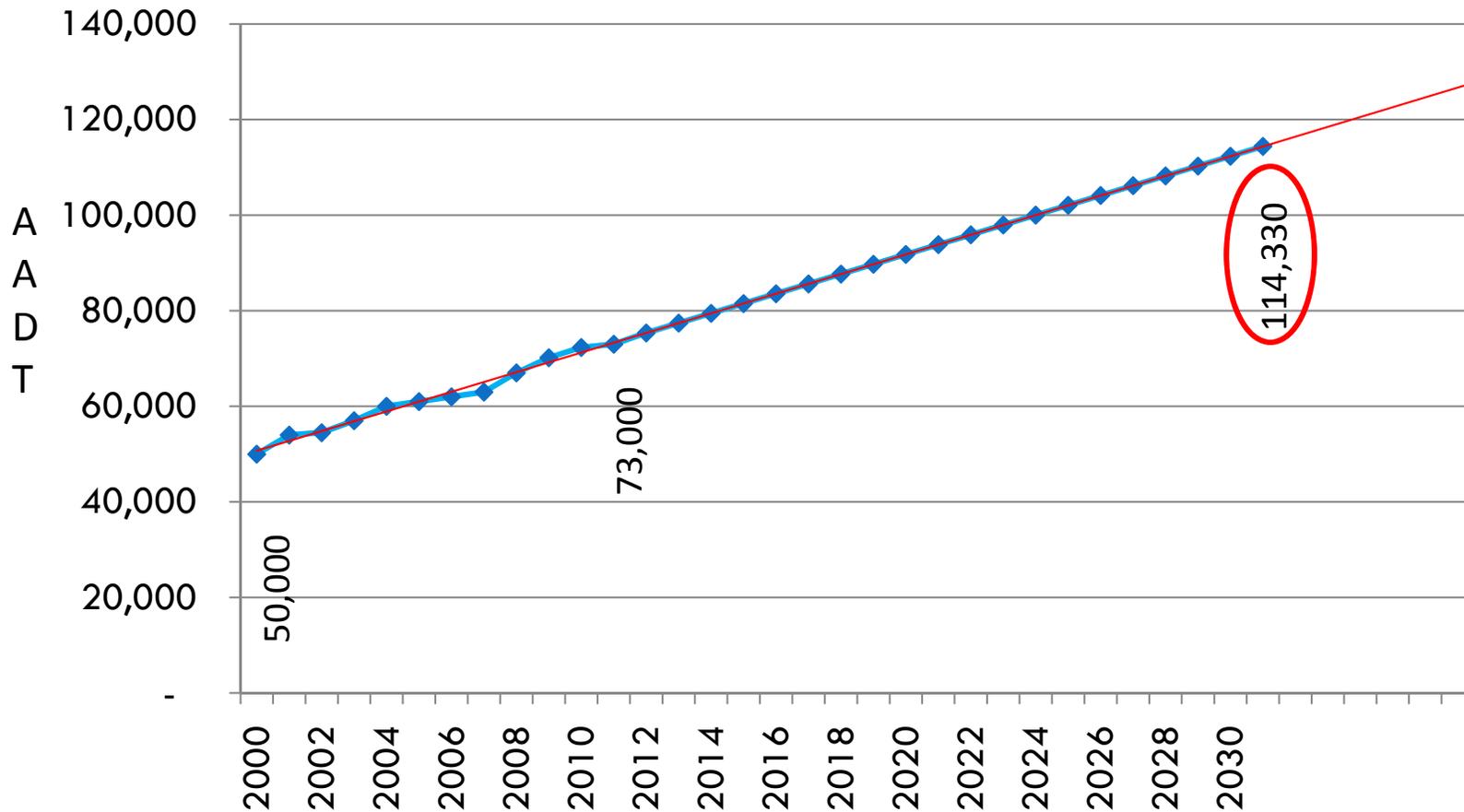
	Dist	Rout	CO	Postmil	Description	Back	Back	Back	Ahead	Ahead	Ahead
		e		e		Peak	Peak	Back	Peak	Peak	Ahead
						Hour	Month	AAADT	Hour	Month	AAADT
3	99	BUT		26.04	NEAL HIGHWAY	2600	28500	26000	2350	26000	24000
3	99	BUT	R	30.603	CHICO, SKYWAY OC	3150	33500	32500	4500	53000	49500
3	99	BUT	R	31.498	EAST 20TH ST	4500	53000	49500	6200	72000	70000
3	99	BUT	R	32.445	CHICO, JCT. RTE. 32 E	6200	72000	70000	7200	75000	73000
3	99	BUT	R	33.282	CHICO, EAST FIRST AVE	7200	75000	73000	5800	61000	59000
3	99	BUT	R	34.245	CHICO, COHASSET HIGHWAY	5800	61000	59000	3700	45000	41500
3	99	BUT	R	34.927	EAST AVE	3750	45000	41500	2600	31000	28000
3	99	BUT	R	36.305	EATON AVE	2600	31000	28000	1800	19400	18800
3	99	BUT		38.79	WILSON LANDING RD	1800	19400	18800	1400	15000	14700

Basic System Operations		
AAADT (BY)		73,000
AAADT (HY)		114,330
AAADT: Growth Rate/Year		

- Present AAADT acquired from the Traffic Volumes (Pick the Highest)
- AAADT 20 Years Horizon produced by MPO model forecast: 114,330

Develop Traffic Projection

Establish Traffic Growth Trend
Based on Existing Data



Urban: AADT Growth Rate/Year

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- Percent of growth of AADT per year

$$g = (x/y)^{1/Z} - 1$$

g = average annual growth rate

x = future (base) year volume

y = earlier year volume

Z = number of years

$$g = ((114,330/73,000)^{1/20}) - 1$$

$$g = 2.2\%$$

Source: NCHRP 255 Highway Traffic Data for Urbanized area Planning and Design

Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		2.2%
LOS Method		
LOS (BY)		
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		
Daily Vehicle Hours of Delay (35 MPH)(BY)		
Daily Vehicle Hours of Delay (35 MPH)(HY)		
Daily VHD (35 MPH) Method		

Urban: LOS Method, BY, HY, Concept

- Optional
- Use FREEPLAN to find LOS BY and HY
- This method only applies if LOS does not reach LOS F. If it does reach LOS F use the congested method that will be covered in Module 6.

Segment #		1
Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/year		2.2%
LOS Method		HCM 2010
LOS (BY)		
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		
Daily Vehicle Hours of Delay (35 MPH)(BY)		
Daily Vehicle Hours of Delay (35 MPH)(HY)		

FREEPLAN: TCR Inputs and Outputs

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□ Inputs

- ▣ Peak Hour Directional Split
- ▣ Peak Direction Volume
- ▣ % Heavy Vehicles (All Trucks)

□ Outputs

- ▣ LOS
- ▣ Avg. Speed

HCS 2010

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FREEPLAN LOS

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FREEPLAN Project Properties

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FREEPLAN 2009: Transitioning/Urban Area - [Project Properties]

File View Help

Roadway Information

Freeway Name: BUT-99

From: PM 29.4 To: PM T37.5

Area Type: Transitioning/Urban

Peak Direction: Northbound

Off Peak Direction: Southbound

Study Period: Dir Hr Demand Vol

File Information

File Name: 3SR-99 NorthBound.xfp

Analyst: Al Arana

Analysis Date: 5/ 7/2013

Agency: Caltrans

Notes

The area type sets the default values that will initially appear in the data input fields. Note that changing the area type at any time during an analysis will reset all data input fields to the default values corresponding to the selected area type.

For the variables highlighted in blue on the following screen, local values must be used.

Project Properties | Segment Data | LOS Results | Service Volumes

INPUTS:

- County & Route
- Post Mile Range
- Area Type
- Peak & Off-Peak Direction
- Study Period: Directional Hour Demand Volumes

FREEPLAN: Peak Direction

- Chose NB direction because collected on a Thursday, which is more representative of an average day of traffic than a Monday
- Resource: Traffic Volumes Book – Peak Hour Volume Data Table (back of book)

OTM32420
06/29/2012
08:07:16

CALTRANS TRAFFIC VOLUMES
LATEST TRAFFIC YEAR SELECTED
PEAK HOUR VOLUME DATA

DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	AM PEAK				Dir	PM PEAK									
									1 WAY PHV	% K	% D	% KD		HR	DAY	MNTH	1 WAY PHV	% K	% D	% KD	HR	DAY	MNTH
03	099	BUT	R	30.60	585	B	11	S	1985	9.65	63.22	6.1	7	MON	SEP	N	1808	10.03	55.38	5.55	16	THU	SEP

FREEPLAN Study Period

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The screenshot shows the 'Project Properties' dialog box in FREEPLAN 2009. The window title is 'FREEPLAN 2009: Transitioning/Urban Area - [Project Properties]'. The interface is divided into two main sections: 'Roadway Information' and 'File Information'.
Roadway Information:
- Freeway Name: BUT- 99
- From: PM 29.4 To: PM T37.5
- Area Type: Transitioning/Urban (dropdown menu)
- Peak Direction: Northbound (dropdown menu)
- Off Peak Direction: Southbound
- Study Period: Dir Hr Demand Vol (dropdown menu, with K100, Kother, and Dir Hr Demand Vol visible in the list)
File Information:
- File Name: 4SR-99 NorthBound.xfp
- Analyst: Al Arana
- Analysis Date: 5/ 7/2013
- Agency: Caltrans
- Notes: (empty text area)
At the bottom of the dialog, a red note states: 'The area type sets the default values that will initially appear in the data input fields. Note that changing the area type at any time during an analysis will reset all data input'.

- **Dir. Hr Demand Vol**
- **K100th** The ratio of the 100th highest traffic volume hour of the year to the annual average daily traffic.
- **Kother** User enters a K factor for a time period other than the K100, such as, K30, K5/6.

FREEPLAN Segment Data

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- Data Inputs: AADT, % Heavy Vehicles, Peak Hour Factor, and Hourly Volumes
- Characteristic Inputs: From/To, Segment Type, Segment Length, Number of Thru lanes, Number of Aux Lanes, Posted Speed, Free Flow Speed, and Terrain
- Must start with a Segment Type of Basic Segment as Segment 1
- Local Adj. Factor automatically set when Area type is selected under Project Properties

FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]

File View Help

C:\Projects\Training\

Add New Row Insert New Row Delete Row

Facility-wide Values

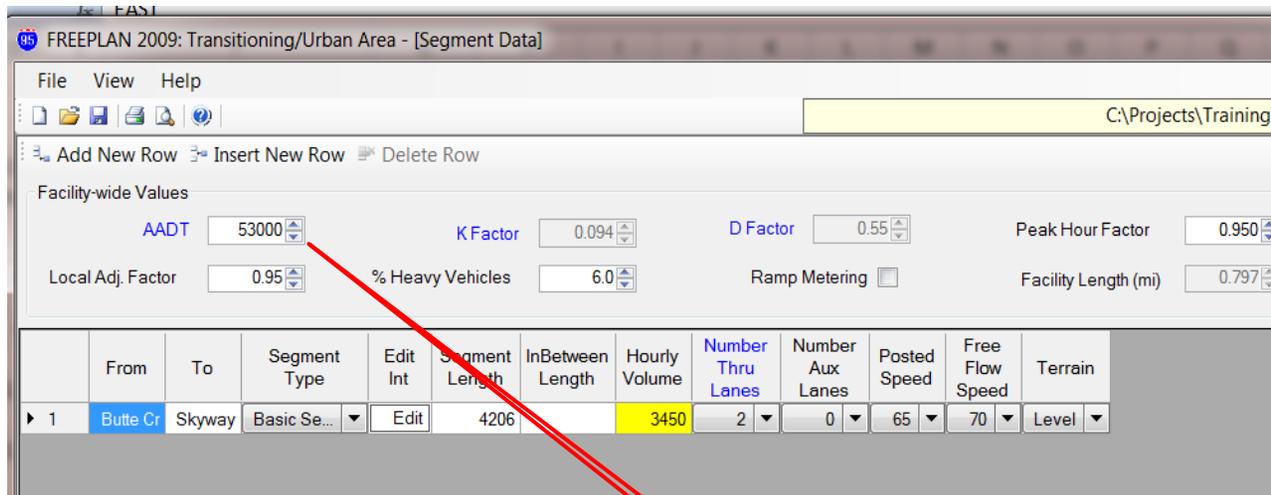
AADT 53000 K Factor 0.094 D Factor 0.55 Peak Hour Factor 0.950

Local Adj. Factor 0.95 % Heavy Vehicles 6.0 Ramp Metering Facility Length (mi) 0.797

	From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
▶ 1	Butte Cr	Skyway	Basic Se...	Edit	4206		3450	2	0	65	70	Level

FREEPLAN: AADT

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- Pick an AADT that is representative of the beginning of the segment

2011 Traffic Volumes Book

Dist	Rout	CO	Postmil	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour
3	99	BUT	26.04	NEAL HIGHWAY	2600	28500	26000	2350
3	99	BUT	R 30.603	CHICO, SKYWAY OC	3150	33500	32500	4500
3	99	BUT	R 31.498	EAST 20TH ST	4500	53000	49500	6200
3	99	BUT	R 32.445	CHICO, JCT. RTE. 32 E	6200	72000	70000	7200
3	99	BUT	R 33.282	CHICO, EAST FIRST AVE	7200	75000	73000	5800
3	99	BUT	R 34.245	CHICO, COHASSET HIGHWAY	5800	61000	59000	3700
3	99	BUT	R 34.927	EAST AVE	3750	45000	41500	2600

- Likely different than the AADT Reported in the TCR

FREEPLAN: % Heavy Vehicles

FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]

File View Help

C:\Projects\Training\

Add New Row Insert New Row Delete Row

Facility-wide Values

AADT: 53000 K Factor: 0.094 D Factor: 0.55 Peak Hour Factor: 0.950

Local Adj. Factor: 0.95 % Heavy Vehicles: 6.0 Ramp Metering: Facility Length (mi): 0.797

	From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	Butte Cr	Skyway	Basic Se...	Edit	4206		3450	2	0	65	70	Level

Resource:

- Truck Volumes Book 2011
- TRUCK % TOT VEH

RTE	DIST	CNTY	POST MILE	LEG	DESCRIPTION	VEHICLE AADT TOTAL	TRUCK AADT TOTAL	TRUCK % TOT VEH	2	TRUCK By 3	AADT Axle 4	TOTAL 5+
99	3	BUT	4.38	A	GRIDLEY, SPRUCE STREET	14500	1305	9	301	194	124	685
99	3	BUT	11.159	B	JCT. RTE. 162 WEST	10500	1050	10	231	140	106	573
99	3	BUT	11.159	A	JCT. RTE. 162 WEST	10700	1070	10	235	143	108	583
99	3	BUT	13.161	B	JCT. RTE. 162 EAST	12500	1250	10	275	166	126	683
99	3	BUT	13.161	A	JCT. RTE. 162 EAST	9100	910	10	200	122	92	496
99	3	BUT	R30.603	B	CHICO, SKYWAY OVERCROSSING	32500	3380	10.4	1437	439	226	1278
99	3	BUT	R30.603	A	CHICO, SKYWAY OVERCROSSING	49500	3277	6.62	2177	193	73	834
99	3	BUT	R32.445	A	CHICO, JCT. RTE. 32 EAST	73000	4833	6.62	3211	284	107	1230
99	3	BUT	R34.245	B	CHICO, COHASSET	59000	3475	5.89	2346	178	70	881

FREEPLAN: Segment Type

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From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	1	Basic Segr	Edit	4830		3500	2	0	65	70	Level

- Segment Type
 - ▣ Basic Segment
 - ▣ Diamond
 - ▣ Partial Cloverleaf
 - ▣ Full Cloverleaf
 - ▣ On Ramp
 - ▣ Off Ramp

- Although we are finding data for one TCR segment, for analysis purposes in FREEPLAN, the segment needs to be broken into smaller sub-segments to capture interchanges separately from basic segments.

FREEPLAN: Sub-segment Length

30

The screenshot displays the FREEPLAN 2009 software interface. At the top, the title bar reads "FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]". Below this is a menu bar with "File", "View", and "Help". A toolbar contains icons for file operations. Below the toolbar are buttons for "Add New Row", "Insert New Row", and "Delete Row".

The "Facility-wide Values" section includes several input fields:

- AADT: 53000
- K Factor: 0.094
- D Factor: 0.55
- Peak Hour Factor: 0.950
- Local Adj. Factor: 0.95
- % Heavy Vehicles: 6.0
- Ramp Metering:
- Facility Length (mi): 0.797

A data table is visible below the values:

	From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
▶ 1	Butte Cr	Skyway	Basic Se...	Edit	4206		3450	2	0	65	70	Level

Below the table is a map view showing an aerial view of a road segment. A red line on the map indicates the segment being measured. A "Distance Measurement Tool" window is overlaid on the map, showing "Total distance: 4206.03 ft". A red circle highlights the "Total distance" text in the tool window. The bottom of the interface has a navigation bar with "Project Properties", "Segment Data" (highlighted), "LOS Results", "Service Volumes", and navigation arrows.

Tool:

- Google Measuring Tool

FREEPLAN: Hourly Volume

31

- Use Peak Hour Volume for the direction chosen for analysis
- Peak Hour Vol x Directional Split Factor = Hourly Vol

The screenshot shows the FREEPLAN 2009 software interface. The title bar indicates the project is 'FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]'. The interface includes a menu bar (File, View, Help) and a toolbar. Below the toolbar, there are options to 'Add New Row', 'Insert New Row', and 'Delete Row'. The 'Facility-wide Values' section contains several input fields: AADT (53000), K Factor (0.094), D Factor (0.55), Peak Hour Factor (0.950), Local Adj. Factor (0.95), % Heavy Vehicles (6.0), Ramp Metering (unchecked), and Facility Length (mi) (0.797). Below this section is a data table with the following columns: From, To, Segment Type, Edit Int, Segment Length, InBetween Length, Hourly Volume, Number Thru Lanes, Number Aux Lanes, Posted Speed, Free Flow Speed, and Terrain. The first row of data shows 'Butte Cr' to 'Skyway' with a segment length of 4206 and an hourly volume of 3450. The 'Hourly Volume' cell is highlighted in yellow and circled in red.

From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	Butte Cr	Skyway	Basic Se...	Edit	4206	3450	2	0	65	70	Level

Urban : Peak Hour Directional Split Factor

- Assume Peak Hour Directional Split Remains Unchanged for HY
- Directional Split Factor = 0.55
- Resource: Traffic Volumes Book – Peak Hour Volume Data Table (back of book)

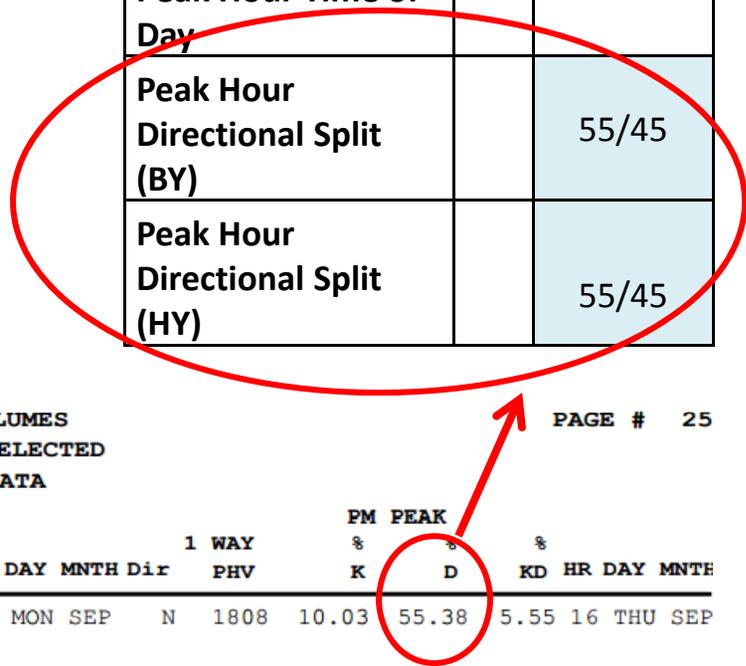
Peak Hour Traffic Data		
Peak Period Length		
Peak Hour Direction		
Peak Hour Time of Day		
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45

OTM32420
06/29/2012
08:07:16

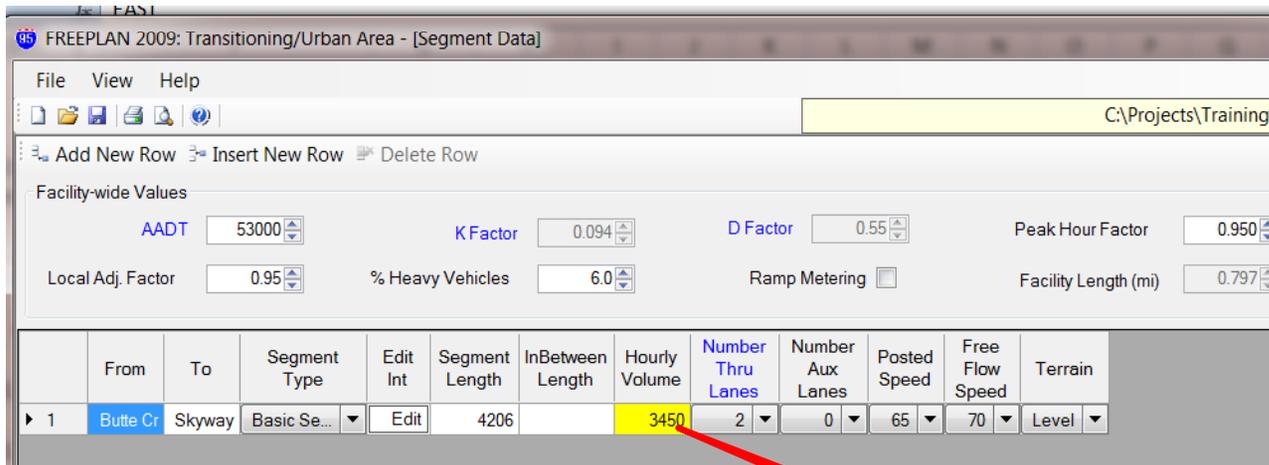
CALTRANS TRAFFIC VOLUMES
LATEST TRAFFIC YEAR SELECTED
PEAK HOUR VOLUME DATA

PAGE # 25

DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	AM PEAK				Dir	PM PEAK					
									1 WAY PHV	% K	% D	% KD		1 WAY PHV	% K	% D	% KD		
03	099	BUT	R	30.60	585	B	11	S	1985	9.65	63.22	6.1	7 MON SEP	N	1808	10.03	55.38	5.55	16 THU SEP



FREEPLAN: Hourly Volume



- Peak Hour Volume = 6200
- Directional Split Factor = .55
- Hourly Vol = $6200 \times 0.554 = 3,450$

2011 Traffic Volumes Back

Dist	Rout	CO	Postmil	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour
3	99	BUT	R 31.498	EAST 20TH ST	4500	53000	49500	6200
3	99	BUT	R 32.445	CHICO, JCT. RTE. 32 E	6200	72000	70000	7200
3	99	BUT	R 33.282	CHICO, EAST FIRST AVE	7200	75000	73000	5800
3	99	BUT	R 34.245	CHICO, COHASSET HIGHWAY	5800	61000	59000	3700
3	99	BUT	R 34.927	EAST AVE	3750	45000	41500	2600
3	99	BUT	R 36.305	EATON AVE	2600	31000	28000	1800
3	99	RIT	R 38.79	WILSON LANDING RD	1800	19400	18800	1400

FREEPLAN: Sub-segment 2

34

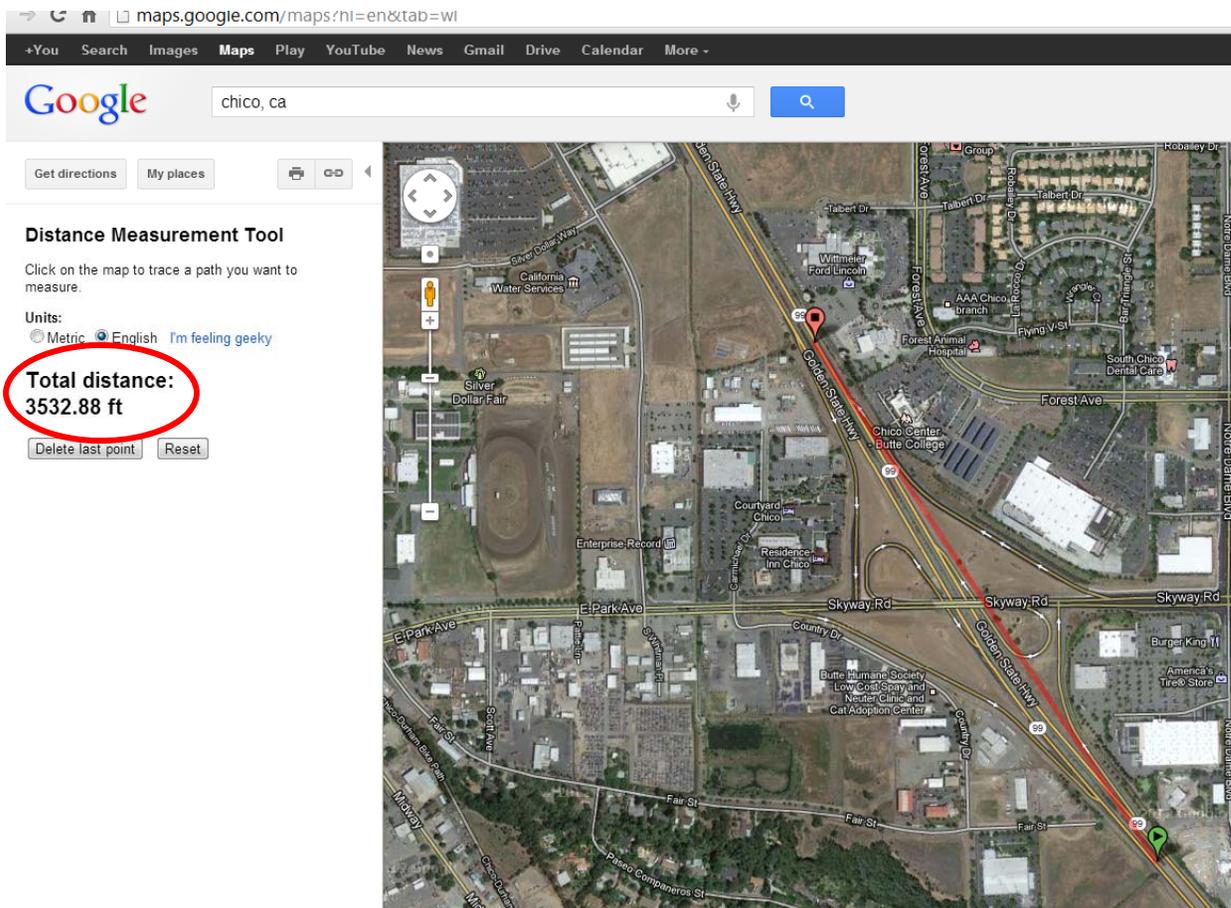
- Once the inputs for the Basic Segment have been entered, need to add a new row for analysis of the interchange

The screenshot shows the FREEPLAN 2009 software interface. The title bar reads "FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]". The menu bar includes "File", "View", and "Help". The toolbar contains icons for "Add New Row", "Insert New Row", and "Delete Row". The "Add New Row" button is circled in red. Below the toolbar are "Facility-wide Values" including AADT (53000), K Factor (0.094), D Factor (0.55), Peak Hour Factor (0.950), Local Adj. Factor (0.95), % Heavy Vehicles (6.0), Ramp Metering (unchecked), and Facility Length (mi) (1.331). The main data table has columns: From, To, Segment Type, Edit Int, Segment Length, InBetween Length, Hourly Volume, Number Thru Lanes, Number Aux Lanes, Posted Speed, Free Flow Speed, and Terrain. The table contains three rows. Row 2 is highlighted with a red box, indicating a new row added for analysis.

	From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	Butte Cr	Skyway	Basic Se...	Edit	2000		3400	2	0	65	70	Level
2	Skyway		Partial Cl...	Edit	3530		3400	2	0	65	70	Level
3			Basic Se...	Edit	1500		3315	2	0	65	70	Level

FREEPLAN: Segment Data

35



- Measure the Segment Length
- Segment is a Partial Cloverleaf

FREEPLAN: Segment Data

36

FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]

File View Help

C:\Projects\Training\4

Add New Row Insert New Row Delete Row

Facility-wide Values

AADT: 53000 K Factor: 0.094 D Factor: 0.55 Peak Hour Factor: 0.950

Local Adj. Factor: 0.95 % Heavy Vehicles: 6.0 Ramp Metering: Facility Length (mi): 1.331

	From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	Butte Cr	Skyway	Basic Se...	Edit	2000		3400	2	0	65	70	Level
2	Skyway		Partial Cl...	Edit	3530		3400	2	0	65	70	Level
3			Basic Se...	Edit	1500		3315	2	0	65	70	Level

Click on Edit to input ramp data

<<-- Project Properties Segment Data LOS Results Service Volumes -->>

□ Pick Partial Cloverleaf

□ Input Segment Length

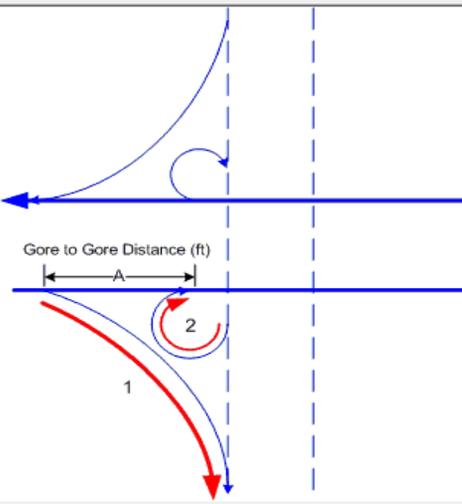
□ Ramp data

FREEPLAN: Editing Ramp Data

37

Interchange Data

Segment #2: From to



06/21/2012
06:38:19

CALTRANS TRAFFIC VOLUMES
PRINT FILE FOR RAMP AADT

03-BUT-099

P POST P MILE	P S DESCRIPTION	2002 ADT	2003 ADT	2004 ADT	2005 ADT
023.613	NB OFF TO PENTZ/DURHAM	700			
023.692	SB ON FR PENTZ/DURHAM	710			
024.127	SBOFF TO PENTZ/DURHAM	2060			
024.145	NB ON FR PENTZ/DURHAM	2030			
R 030.355	NB OFF TO SKYWAY	3610			4590
R 030.448	SB ON FR SKYWAY	4480			5250
R 030.693	NB ON FR EB SKYWAY	2950			3740

Gore to Gore Distance (ft)

A 530

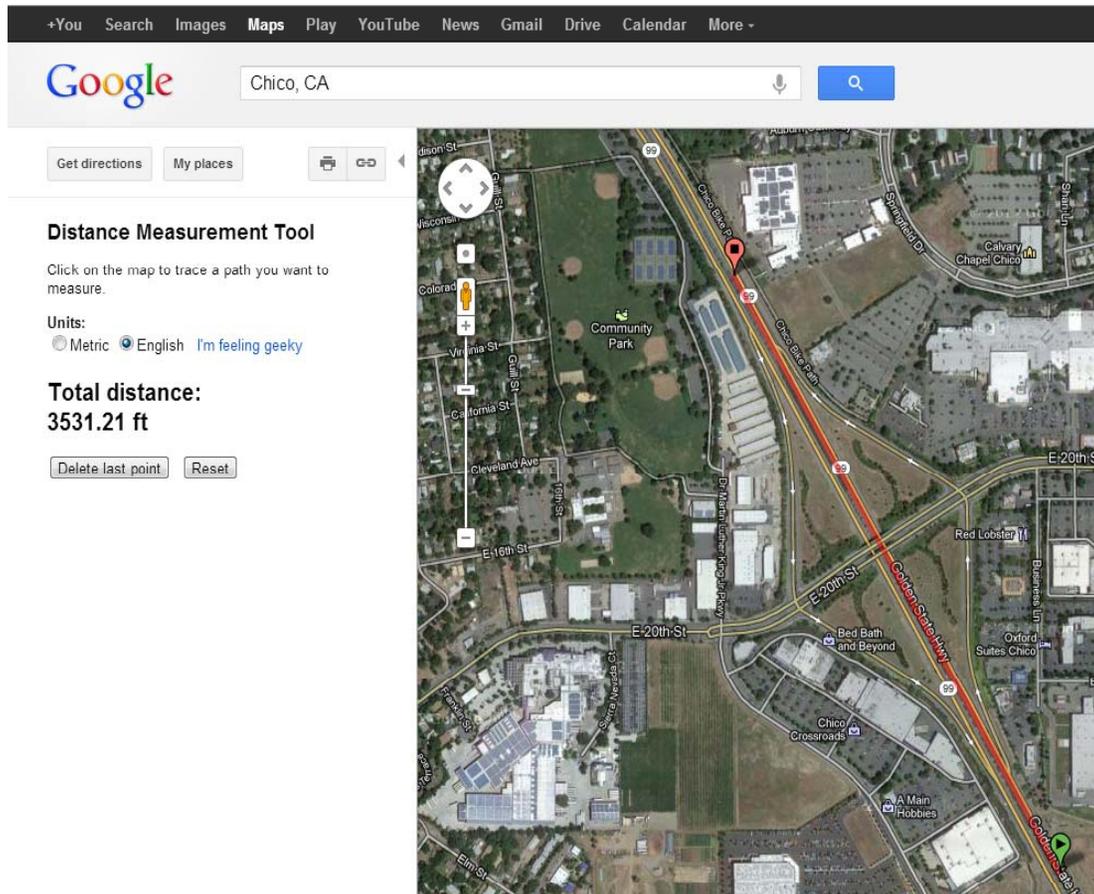
Ramp Number	Ramp Type	Demanc (veh/h)	% Heavy Vehicles	Number of Lanes	Accel/Decel Length	Free Flow Speed	Off-Ramp Analysis	Edit
1	Off Ra...	459	5	1	426	45	<input type="checkbox"/>	Edit
2	On Ra...	374	5	1	668	45	<input type="checkbox"/>	Edit

$4,590 * 0.1 = 459$

- Resource: Ramp Volumes Book
- Assume 10% of RAMP ADT for Ramp Peak Hourly Volume
- Free Flow Speed: 45 mph is the default for ramps
- Accel/Decel Length: measured using the Google measurement tool

FREEPLAN: Sub-segment 4

38



- Measure the Next Segment
- Segment is a Diamond I/C

Diamond I/C

39

FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]

File View Help

C:\Projects\Training\4SR-99 NorthBound.xfp

Add New Row Insert New Row Delete Row

Facility-wide Values

ADT: 53000 K Factor: 0.094 D Factor: 0.55 Peak Hour Factor: 0.950

Local Adj. Factor: 0.95 % Heavy Vehicles: 6.0 Ramp Metering: Facility Length (mi): 2.982

	From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	Butte Cr	Skyway	Basic Se...	Edit	2000		3450	2	0	65	70	Level
2	Skyway		Partial Cl...	Edit	3530		3450	2	0	65	70	Level
3			Basic Se...	Edit	1500		3365	2	0	65	70	Level
4	E. 20th		Diamond	Edit	3530		3365	2	0	65	70	Level
5			Basic Se...	Edit	1500		3815	2	0	65	70	Level
6	SR-32		Diamond	Edit	3530		3815	2	0	65	70	Level

Click on Edit to input ramp data

<<- | Project Properties | Segment Data | LOS Results | Service Volumes | -->>

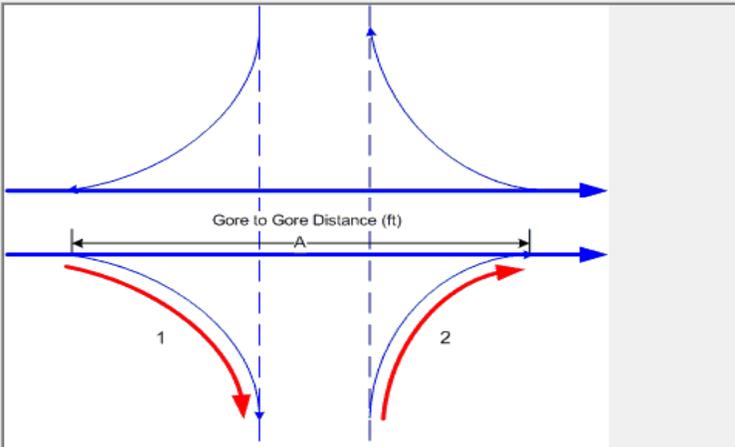
- Pick Diamond I/C
- Input Segment Length
- Ramp data

Diamond I/C Ramp Volumes

40

Interchange Data

Segment #5: From to



Gore to Gore Distance (ft)

A

Gore to Gore Distance

A 2280

Ramp Number	Ramp Type	Demand (veh/h)	% Heavy Vehicles	Number of Lanes	Accel/Decel Length	Free Flow Speed	Off-Ramp Analysis	Edit
1	Off Ra...	355	5	1	450	40	<input type="checkbox"/>	Edit
2	On Ra...	1270	5	1	820	45	<input type="checkbox"/>	Edit

R 030.355	NB OFF TO SKYWAY	3610	4590
R 030.448	SB ON FR SKYWAY	4480	5250
R 030.693	NB ON FR EB SKYWAY	2950	3740
R 030.748	SB OFF TO EB SKYWAY		8990
R 030.749	SB OFF TO WB SKYWAY		4400
R 030.820	NB ON FR SKYWAY	9360	
R 030.821	NB ON FR WB SKYWAY		10460
R 030.887	SB OFF TO SKYWAY	25900	13390
R 031.298	NB OFF TO 20TH ST	2730	3550
R 031.319	SB ON FROM 20TH ST	2750	2950
R 031.677	NB ON FROM 20TH ST	12540	12710

$3,555 * 0.1 = 355$

INPUTS:

- Assume 10% of the ADT for Ramps

FREEPLAN: Completed Segment

41

FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]

File View Help

C:\Projects\Training\4

Add New Row Insert New Row Delete Row

Facility-wide Values

AADT 53000 K Factor 0.094 D Factor 0.55 Peak Hour Factor 0.950

Local Adj. Factor 0.95 % Heavy Vehicles 6.0 Ramp Metering Facility Length (mi) 8.088

	From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	Butte Cr	Skyway	Basic Se...	Edit	2000		3450	2	0	65	70	Level
2	Skyway		Partial Cl...	Edit	3530		3450	2	0	65	70	Level
3			Basic Se...	Edit	1500		3365	2	0	65	70	Level
4	E. 20th		Diamond	Edit	3530		3365	2	0	65	70	Level
5			Basic Se...	Edit	1657		3815	2	0	65	70	Level
6	SR-32		Diamond	Edit	3530		3815	2	0	65	70	Level
7			Basic Se...	Edit	2500		3793	2	0	65	70	Level
8	E. 1st ...	Ave	Diamond	Edit	3530		3793	2	0	65	70	Level
9			Basic Se...	Edit	2365		3003	2	0	65	70	Level
10	Cohas...		Partial Cl...	Edit	3530		3003	2	0	65	70	Level
11			Basic Se...	Edit	1850		2003	2	0	65	70	Level
12	EastA...		Diamond	Edit	3530		2003	2	0	65	70	Level
13			Basic Se...	Edit	3300		1393	2	0	65	70	Level
14	W. Eat...		Diamond	Edit	3530		1393	2	0	65	70	Level
15			Basic Se...	Edit	2820		1413	2	0	65	70	Level

<<< | Project Properties Segment Data LOS Results Service Volumes | >>>

HIGHWAY

- Continue Downstream
- Measure and Indicate Type of I/C
- Last segment is recommended to be a Basic Segment
- Click LOS Results to get the outputs

Results

42

FREEPLAN 2009: Transitioning/Urban Area - [LOS Results]

File View Help

C:\Projects\Training\4SR-99 No

	Segment	Segment Type	Dir. Hourly Volume	Adj. Dir. Capacity	Average Speed	Density	Segment LOS	Hot Spots
▶ 1	Butte Cr-Sky...	Basic	3450	4206	63.1	31.2	D	View
2	Skyway-	ParClo	3450	3855	60.0	31.6	D	View
3	-	Basic	3365	4205	64.0	30.0	D	View
4	E. 20th-	Diamond	3365	3855	57.9	32.4	D	View
5	-	Basic	3815	4208	59.0	36.9	E	View
6	SR-32-	Diamond	3815	3857	58.5	33.8	D	View
7	-	Basic	3793	4208	59.2	36.5	E	View
8	E. 1st. Ave-...	Diamond	3793	3857	62.9	28.0	D	View
9	-	Basic	3003	4203	66.9	25.6	C	View
10	Cohasset-	ParClo	3003	3853	60.3	22.2	C	View
11	-	Basic	2003	4191	69.5	16.5	B	View
12	East Ave.-	Diamond	2003	3842	61.9	14.7	B	View
13	-	Basic	1393	4176	69.9	11.5	B	View
14	W. Eaton-	Diamond	1393	3828	62.0	12.5	B	View
15	-	Basic	1413	4177	69.8	11.6	B	View

Length (mi) 8.088 Free Flow Delay (sec/veh) 50.3 LOS Threshold Delay (sec/veh) 39.3 Avg. Speed (mi/h) 62.5 Density (pc/mi/ln) 24.4 LOS D

<<-- Project Properties Segment Data LOS Results Service Volumes -->>

Outputs:

- LOS: D
- Average Speed: 62.5

Urban: LOS BY

43

- Optional
- Level of Service (BY)

Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		2.2%
LOS Method		HCM 2010
LOS (BY)		D
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		
Daily Vehicle Hours of Delay (35 MPH)(BY)		
Daily Vehicle Hours of Delay (35 MPH)(HY)		

Length (mi) 8.088 Free Flow Delay (sec/veh) 50.3 LOS Threshold Delay (sec/veh) 39.3 Avg. Speed (mi/h) 62.5 Density (pc/mi/ln) 24.4 LOS D

<<-- | Project Properties | Segment Data | **LOS Results** | Service Volumes | -->>

Urban: LOS HY

44

- Optional
- Level of Service (HY)

Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		2.2%
LOS Method		HCM 2010
LOS (BY)		D
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		
Daily Vehicle Hours of Delay (35 MPH)(BY)		
Daily Vehicle Hours of Delay (35 MPH)(HY)		

Urban LOS HY

45

FREEPLAN 2009: Transitioning/Urban Area - [Segment Data]

File View Help

Add New Row Insert New Row Delete Row

Facility-wide Values

AAADT: 53000 K Factor: 0.090 D Factor: 0.55 Peak Hour Factor: 1.56

Local Adj. Factor: 0.95 % Heavy Vehicles: 6.0 Ramp Metering: Facility Length: 0

	From	To	Segment Type	Edit Int	Segment Length	InBetween Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	Butte Cr	Skyway	Basic Se...	Edit	2000		5382	2	0	65	70	Level
2	Skyway		Partial Cl...	Edit	3530		5382	2	0	65	70	Level
3			Basic Se...	Edit	1500		5297	2	0	65	70	Level
4	E. 20th		Diamond	Edit	3530		5297	2	0	65	70	Level
5			Basic Se...	Edit	1657		5747	2	0	65	70	Level
6	SR-32		Diamond	Edit	3530		5747	2	0	65	70	Level
7			Basic Se...	Edit	2500		5725	2	0	65	70	Level
8	E. 1st ...	Ave	Diamond	Edit	3530		5725	2	0	65	70	Level
9			Basic Se...	Edit	2365		4935	2	0	65	70	Level
10	Cohas...		Partial Cl...	Edit	3530		4935	2	0	65	70	Level
11			Basic Se...	Edit	1850		3935	2	0	65	70	Level
12	East A...		Diamond	Edit	3530		3935	2	0	65	70	Level
13			Basic Se...	Edit	3300		3325	2	0	65	70	Level
14	W. Eat...		Diamond	Edit	3530		3325	2	0	65	70	Level
15			Basic Se...	Edit	2820		3345	2	0	65	70	Level

<<-- Project Properties Segment Data LOS Results Service Volumes -->>

- When future Peak Hour Volumes are entered in FREEPLAN future LOS is display in the LOS results screen
- Hourly Vol (HY) = Hourly Vol BYx20 Yr GF
- 20 Yr GF = AADT (HY) / AADT (BY) = $114300 / 73000 = 1.56$
- Hourly Vol HY = $3450 \times 1.56 = 5382$
- Click LOS Results to get LOS HY

Urban LOS HY

46

FREEPLAN 2009: Transitioning/Urban Area - [LOS Results]

	Segment	Segment Type	Dir. Hourly Volume	Adj. Dir. Capacity	Average Speed	Density	Segment LOS	Hot Spots
▶ 1	Butte Cr-Sky...	Basic	5382	4206	N/A	N/A	F	View
2	Skyway-	ParClo	5382	3855	N/A	N/A	F	View
3	-	Basic	5297	4205	N/A	N/A	F	View
4	E. 20th-	Diamond	5297	3855	N/A	N/A	F	View
5	-	Basic	5747	4207	N/A	N/A	F	View
6	SR-32-	Diamond	5747	3857	N/A	N/A	F	View
7	-	Basic	5725	4207	N/A	N/A	F	View
8	E. 1st. Ave-...	Diamond	5725	3856	N/A	N/A	F	View
9	-	Basic	4935	4204	N/A	N/A	F	View
10	Cohasset-	ParClo	4935	3854	N/A	N/A	F	View
11	-	Basic	3935	4198	57.2	39.3	E	View
12	East Ave.-	Diamond	3935	3848	N/A	N/A	F	View
13	-	Basic	3325	4193	64.3	29.6	D	View
14	W. Eaton-	Diamond	3325	3844	59.7	30.5	D	View
15	-	Basic	3345	4193	64.1	29.9	D	View

Length (mi) 8.088 Free Flow Delay (sec/veh) N/A LOS Threshold Delay (sec/veh) N/A Avg. Speed (mi/h) N/A Density (pc/mi/ln) N/A LOS **F**

<<- Project Properties Segment Data **LOS Results** Service Volumes ->>

- Starting at the initial segment the Freeway immediately goes over capacity, resulting in LOS F for the entire facility
- Note that none of the other outputs can be calculated

Urban: LOS CONCEPT

47

- Optional
- Based on District policy

Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		2.2%
LOS Method		HCM 2010
LOS (BY)		D
LOS (HY)		F
LOS Concept		E
VMT (BY)		
VMT (HY)		
Daily Vehicle Hours of Delay (35 MPH)(BY)		
Daily Vehicle Hours of Delay (35 MPH)(HY)		

Urban: VMT BY

- Required
- Vehicle Miles Traveled
- Resource: Traffic Volumes Book
- $VMT = AADT \times Length$

Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		2.2%
LOS Method		HCM 2010
LOS (BY)		D
LOS (HY)		F
LOS Concept		E
VMT (BY)		
VMT (HY)		
Daily Vehicle Hours of Delay (35 MPH)(BY)		
Daily Vehicle Hours of Delay (35 MPH)(HY)		

Urban: VMT BY (Daily, Bi-Directional)

Dist	Rout	CO	Postmil	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
3	99	BUT	26.04	NEAL HIGHWAY	2600	28500	26000	2350	26000	24000
3	99	BUT	R 30.603	CHICO, SKYWAY OC	3150	33500	32500	4500	53000	49500
3	99	BUT	R 31.498	EAST 20TH ST	4500	53000	49500	6200	72000	70000
3	99	BUT	R 32.445	CHICO, JCT. RTE. 32 E	6200	72000	70000	7200	75000	73000
3	99	BUT	R 33.282	CHICO, EAST FIRST AVE	7200	75000	73000	5800	61000	59000
3	99	BUT	R 34.245	CHICO, COHASSET HIGHWAY	5800	61000	59000	3700	45000	41500
3	99	BUT	R 34.927	EAST AVE	3750	45000	41500	2600	31000	28000
3	99	BUT	R 36.305	EATON AVE	2600	31000	28000	1800	19400	18800
3	99	BUT	38.79	WILSON LANDING RD	1800	19400	18800	1400	15000	14700

PM	Distance	Back AADT	Daily VMT
29.364	(Begin Segment)		
30.603	1.239	32,500	40,268
31.498	0.895	49,500	44,303
32.445	0.947	70,000	66,290
33.282	0.837	73,000	61,101
34.245	0.963	59,000	56,817
34.927	0.682	41,500	28,303
36.305	1.378	28,000	38,584
37.451	1.146	18,800	21,545
TOTAL VMT			357,210

Segment #	1
Basic System Operations	
AADT (BY)	73,000
AADT (HY)	114,330
AADT: Growth Rate/Year	2.2%
LOS Method	HCM 2010
LOS (BY)	D
LOS (HY)	F
LOS Concept	F
VMT (BY)	357,210
VMT (HY)	

Urban: VMT HY(Daily, Bi-Directional)

50

- Present AADT acquired from the Traffic Volumes
- AADT 20 Years Horizon produced by MPO model forecast: 114,330
- To obtain your 20 Year Growth Factor Divide Future Year AADT Over Present Year AADT and apply resulting factor to your present year VMT

$$\text{VMT HY} = \text{VMT (BY)} \times \text{20 YR GF}$$

$$\text{20 YR GF} = \text{AADT (HY)} / \text{AADT (BY)} = 1.56$$

$$\text{VMT (HY)} = 357,210 \times 1.56 = 557,000$$

SOURCES: Segment #		1
Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		2.2%
LOS Method		HCM 2010
LOS (BY)		D
LOS (HY)		F
LOS Concept		E
VMT (BY)		357,210
VMT (HY)		557,000
Daily Vehicle Hours of Delay (35 MPH)(BY)		

Urban : Daily VHD (35 mph) BY

51

- Required
- Daily Vehicle Hours of Delay using a threshold of 35 mph

Length (mi)	8.088	Free Flow Delay (sec/veh)	50.3	LOS Threshold Delay (sec/veh)	39.3	Avg. Speed (mi/h)	62.5	Density (pc/mi/ln)	24.4	LOS	D
Project Properties Segment Data LOS Results Service Volumes -->>											

- Based on FREEPLAN, average Speed throughout the segment is 62.5 MPH therefore there is no delay under 35 MPH

Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		2.2%
LOS Method		HCM 2010
LOS (BY)		D
LOS (HY)		F
LOS Concept		E
VMT (BY)		357,210
VMT (HY)		557,000
Daily Vehicle Hours of Delay (<35 MPH)(BY)		0

Urban: DVHD (35 mph) HY

- Optional
- Daily Vehicle Hours of Delay using a threshold of 35 mph
- Suggested for Freeways and Expressways in Urban areas.
- Cannot calculate using this method because the segment reaches LOS F in the HY

Segment #		1
Basic System Operations		
AADT (BY)		73,000
AADT (HY)		114,330
AADT: Growth Rate/Year		2.2%
LOS Method		HCM 2010
LOS (BY)		D
LOS (HY)		F
LOS Concept		E
VMT (BY)		357,210
VMT (HY)		557,000
Daily Vehicle Hours of Delay (35 MPH)(BY)		0
Daily Vehicle Hours of Delay (35 MPH)(HY)		*

Urban: Peak Hour

53

- **Peak Period Length:** The length of time during which the peak traffic occurs. Must use a minimum length of 1 hour. Only required if Peak Period is being reported instead of Peak Hour.
- **Peak Hour Direction:** Indicate direction of peak traffic. Indicate Northbound (NB), Southbound (SB), Eastbound (EB), Westbound (WB), or both. Only required if repeating the datasets by direction.
- **Peak Hour Time of Day:** Indicate am, pm, am and pm, or the actual time. Only required if Peak Hour/Period data will be provided.

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		
Peak Hour Directional Split (HY)		
Peak Hour VMT (BY)		
Peak Hour VMT (HY)		
Peak Hour V/C (BY)		
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		

Urban : Peak Hour Directional Split BY and HY

- Optional
- Suggested to include if not repeating peak hour measures for each direction.
- Assume Peak Hour Directional Split Remains Unchanged for HY

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		N/B
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45

OTM32420
06/29/2012
08:07:16

CALTRANS TRAFFIC VOLUMES
LATEST TRAFFIC YEAR SELECTED
PEAK HOUR VOLUME DATA

PAGE # 25

DI	RTE	CO	PRE	PM	CS	LEG	YR	Dir	1 WAY PHV	AM PEAK			HR	DAY	MNT	Dir	1 WAY PHV	PM PEAK					
										% K	% D	% KD						% K	% D	% KD			
03	099	BUT	R	30.60	585	B	11	S	1985	9.65	63.22	6.1	7	MON	SEP	N	1808	10.03	55.38	5.55	16	THU	SEP

Urban : Peak Hour VMT BY

55

- This measure is encouraged but if data is completely unavailable it is not required
- Resource: FREEPLAN Segment Length and Hourly Volume

	From	To	Segment Type	Edit Int	Segment Length	In Between Length	Hourly Volume	Number Thru Lanes	Number Aux Lanes	Posted Speed	Free Flow Speed	Terrain
1	Butte Cr	Skyway	Basic Se...	Edit	2000		3450	2	0	65	70	Level
2	Skyway		Partial CL...	Edit	3530		3450	2	0	65	70	Level
3			Basic Se...	Edit	1500		3365	2	0	65	70	Level
4	E. 20th		Diamond	Edit	3530		3365	2	0	65	70	Level
5			Basic Se...	Edit	1657		3815	2	0	65	70	Level
6	SR-32		Diamond	Edit	3530		3815	2	0	65	70	Level
7			Basic Se...	Edit	2500		3793	2	0	65	70	Level
8	E. 1st ...	Ave	Diamond	Edit	3530		3793	2	0	65	70	Level
9			Basic Se...	Edit	2365		3003	2	0	65	70	Level
10	Cohas...		Partial CL...	Edit	3530		3003	2	0	65	70	Level
11			Basic Se...	Edit	1850		2003	2	0	65	70	Level
12	East A..		Diamond	Edit	3530		2003	2	0	65	70	Level
13			Basic Se...	Edit	3300		1393	2	0	65	70	Level
14	W. Eat..		Diamond	Edit	3530		1393	2	0	65	70	Level
15			Basic Se...	Edit	2820		1413	2	0	65	70	Level

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45
Peak Hour VMT (BY)		
Peak Hour VMT (HY)		
Peak Hour V/C (BY)		
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		

Peak Hr. VMT BY

56

- Peak Hour Volume is copied from Hourly Volume column in FREEPLAN
- Convert FREEPLAN Segment Length from feet to miles
- Peak Hour VMT = Segment Length x Peak Hour Volume
- Calculate SB Peak Hr. VMT using 55/45 split

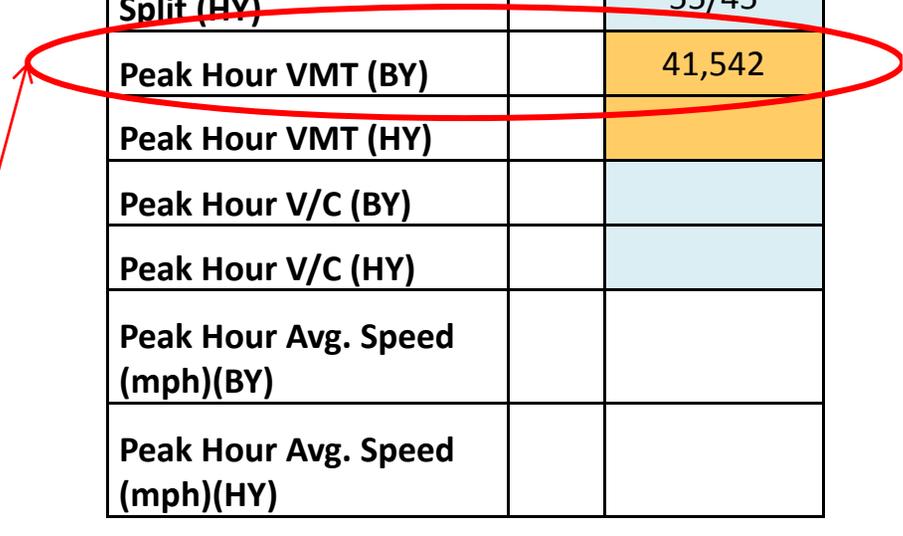
Segment Length (ft)	Segment Length (mi)	Peak Hour Volume	Daily VMT
2000	0.378788	3450	1307
3530	0.668561	3450	2307
1500	0.284091	3365	956
3530	0.668561	3365	2250
1657	0.313826	3815	1197
3530	0.668561	3815	2551
2500	0.473485	3793	1796
3530	0.668561	3793	2536
2365	0.447917	3003	1345
3530	0.668561	3003	2008
1850	0.350379	2003	702
3530	0.668561	2003	1339
3300	0.625	1393	871
3530	0.668561	1393	931
2820	0.534091	1413	755
Peak Hr. VMT NB			22849
Peak Hr. VMT SB (based on 55/45 split)			18693
TOTAL Peak Hr. VMT			41542

Urban : Peak Hour VMT BY

- This measure is encouraged but if data is completely unavailable it is not required

Peak Hr. VMT NB	22849
Peak Hr. VMT SB (based on 55/45 split)	18693
TOTAL Peak Hr. VMT	41542

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45
Peak Hour VMT (BY)		41,542
Peak Hour VMT (HY)		
Peak Hour V/C (BY)		
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		



Urban : Peak Hour VMT HY

58

- This measure is encouraged but if data is completely unavailable it is not required

$$\text{VMT (HY)} = \text{VMT (BY)} \times 20 \text{ Yr GF}$$

$$\text{VMT (HY)} = 41542 \times 1.56 =$$

64805

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45
Peak Hour VMT (BY)		41,542
Peak Hour VMT (HY)		64,805
Peak Hour V/C (BY)		
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		

Urban : Peak Hour V/C BY

59

- Optional
- If $V/C > 1$ report D/C.
- D/C is the ratio of demand to capacity which measures the extent to which capacity is exceeded during the analysis period.
- Resource: FREEPLAN LOS results

	Segment	Segment Type	Dir. Hourly Volume	Adj. Dir. Capacity	Average Speed	Density	Segment LOS
1	Butte Cr-Sky...	Basic	3450	4206	63.1	31.2	D
2	Skyway-	ParClo	3450	3855	60.0	31.6	D
3	-	Basic	3365	4205	64.0	30.0	D
4	E. 20th-	Diamond	3365	3855	57.9	32.4	D
5	-	Basic	3815	4208	59.0	36.9	E
▶ 6	SR-32-	Diamond	3815	3857	58.5	33.8	D ⓘ

$$V/C = 3,815 / 4208 = 0.91$$

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45
Peak Hour VMT (BY)		41,542
Peak Hour VMT (HY)		64,805
Peak Hour V/C (BY)		0.91
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		

Urban : Peak Hour V/C HY

60

- Optional
- $V/C (HY) = [\text{Dir. Hourly Vol (BY)} \times 20 \text{ YR GF}] / \text{Capacity}$
- $V/C(HY) = (3815 \times 1.56) / 4208 = 1.41$
- Because V/C is > 1 , report as D/C

	Segment	Segment Type	Dir. Hourly Volume	Adj. Dir. Capacity	Average Speed	Density	Segment LOS
1	Butte Cr-Sky...	Basic	3450	4206	63.1	31.2	D
2	Skyway-	ParClo	3450	3855	60.0	31.6	D
3	-	Basic	3365	4205	64.0	30.0	D
4	E. 20th-	Diamond	3365	3855	57.9	32.4	D
5	-	Basic	3815	4208	59.0	36.9	E
▶ 6	SR-32-	Diamond	3815	3857	58.5	33.8	D ⓘ

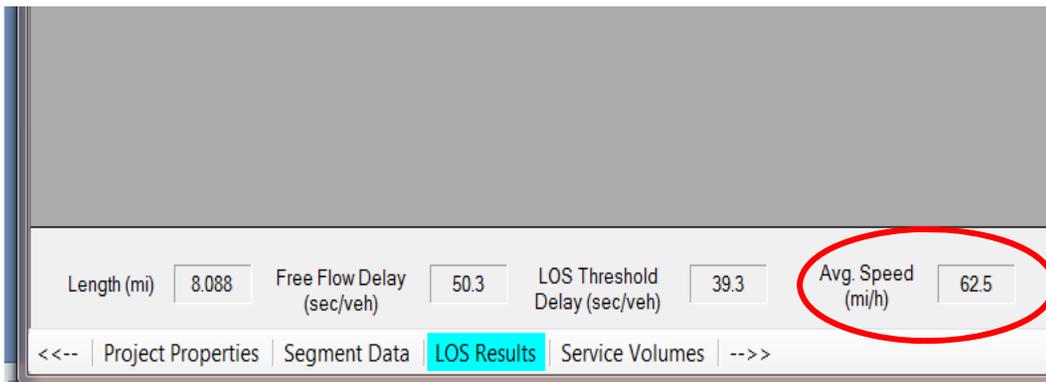
$$V/C(HY) = (3815 \times 1.56) / 4208 = 1.41 = D/C (HY)$$

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45
Peak Hour VMT (BY)		41,542
Peak Hour VMT (HY)		64,805
Peak Hour V/C (BY)		0.91
Peak Hour D/C (HY)		1.41
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		

Urban : Peak Hour Avg. Speed BY

61

- Required
- Avg. Speed in MPH is provided in the FREEPLAN results table



Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45
Peak Hour VMT (BY)		41,542
Peak Hour VMT (HY)		64,805
Peak Hour V/C (BY)		0.91
Peak Hour V/C (HY)		1.41
Peak Hour Avg. Speed (mph)(BY)		62.5
Peak Hour Avg. Speed (mph)(HY)		N/A

Urban : Peak Hour VHD (35 mph) BY and HY

- When delay occurs at 35 MPH or less the segment is congested, therefore this method is not applicable
- The method to find delay will be covered in module 6

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		16:00
Peak Hour Directional Split (BY)		55/45
Peak Hour Directional Split (HY)		55/45
Peak Hour VMT (BY)		41,542
Peak Hour VMT (HY)		64,805
Peak Hour V/C (BY)		0.91
Peak Hour V/C (HY)		1.41
Peak Hour Avg. Speed (mph)(BY)		62.5
Peak Hour Avg. Speed (mph)(HY)		N/A
Peak Hour Vehicle Hours of Delay (35 mph) (BY)		
Peak Hour Vehicle Hours of Delay (35 mph) (HY)		
Peak Hour VHD (35 mph) Method		

Rural Two-Lane Highway

Rural Route: SR 99 Sutter Co.

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- Segment: PM T34.97 to PM 39.045 (end of freeway near Lomo Crossing to Bishop Ave.)
- 2C, Class I facility
- North-south corridor that serves commuter traffic



SR 99 south of Live Oak

Rural: Class I Two-Lane Hwy

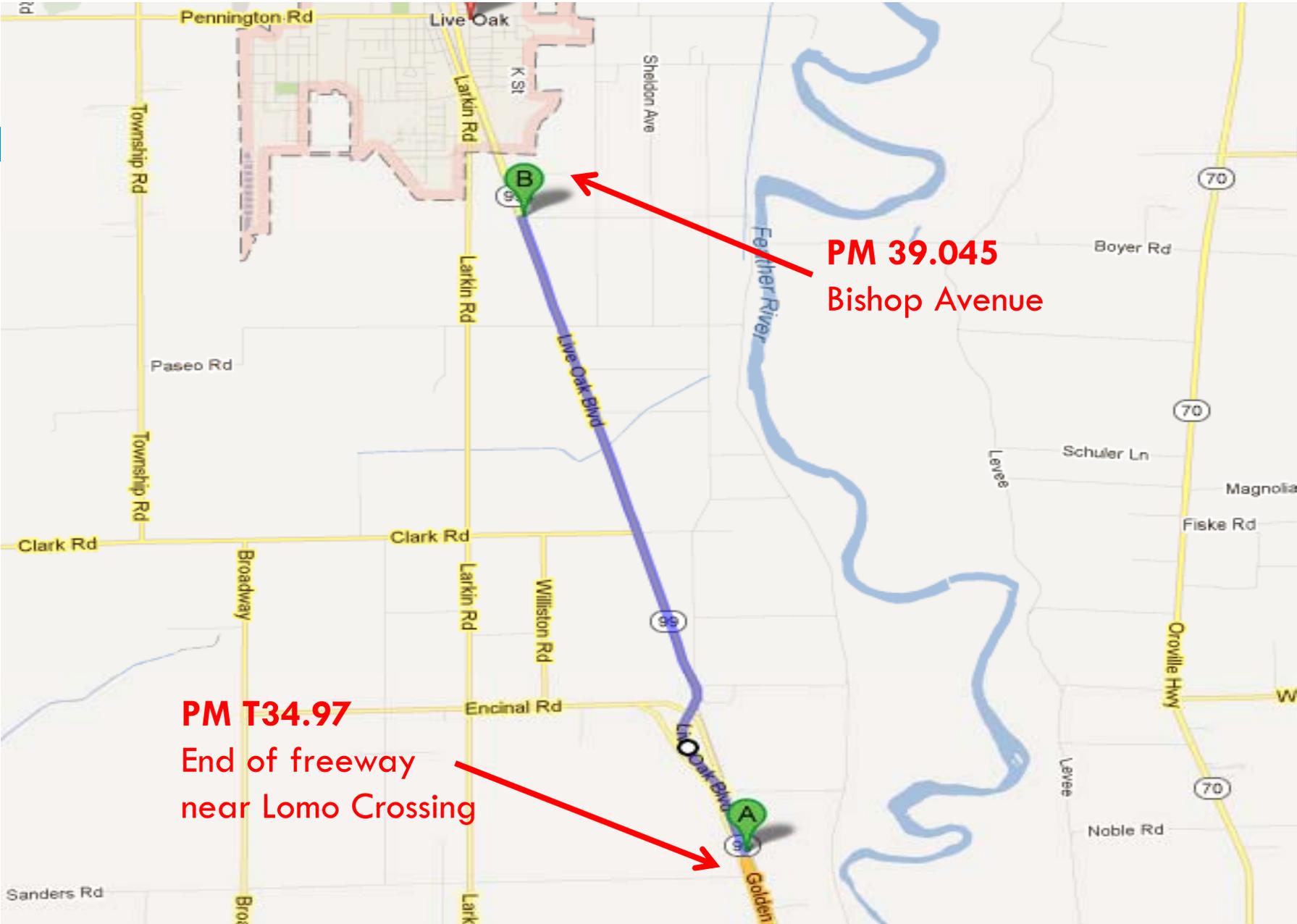
- Highways where motorists expect to travel at relatively high speeds. Two-lane highways that are major intercity routes, primary connectors of major traffic generators, daily commuter routes, or major links in state or national highway networks are generally assigned to Class I. These facilities serve mostly long-distance trips or provide the connections between facilities that serve long-distance trips.
(HCM Ch.15)

Rural: Class II Two-lane Hwy

- Highways where motorists do not necessarily expect to travel at high speeds. Two-lane highways functioning as access routes to Class I facilities, serving as scenic or recreational routes (and not as primary arterials), or passing through rugged terrain (where high-speed operation would be impossible) are assigned to Class II. Class II facilities most often serve relatively short trips, the beginning or ending portions of longer trips, or trips for which sightseeing plays a significant role. (HCM Ch.15)

Rural: Class III Two-lane Hwy

- Highways serving moderately developed areas. They may be portions of a Class I or Class II highway that pass through small towns or developed recreational areas. On such segments, local traffic often mixes with through traffic, and the density of unsignalized roadside access points is noticeably higher than in a purely rural area. Class III highways may also be longer segments passing through more spread-out recreational areas, also with increased roadside densities. Such segments are often accompanied by reduced speed limits that reflect the higher activity level. (HCM Ch. 15)



PM T34.97
End of freeway
near Lomo Crossing

PM 39.045
Bishop Avenue

Rural Data Tools

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- Google Measuring Tool
- Highway Capacity Software 2010
 - TwoLane module
- Traffic Volumes Book
- Truck Volumes Book

- Traffic and Truck Volumes Books can be found here:
[http://www.dot.ca.gov/hq/traffops/saferesr/trafd
ata/index.htm](http://www.dot.ca.gov/hq/traffops/saferesr/trafd
ata/index.htm)

Rural: AADT BY

70

- Average Annual Daily Traffic
- Required

Basic System Operations		
AADT (BY)		
AADT (HY)		
AADT: Growth Rate/Year		
LOS Method		
LOS (BY)		
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		

Rural: AADT BY

2011 Traffic Volumes Book

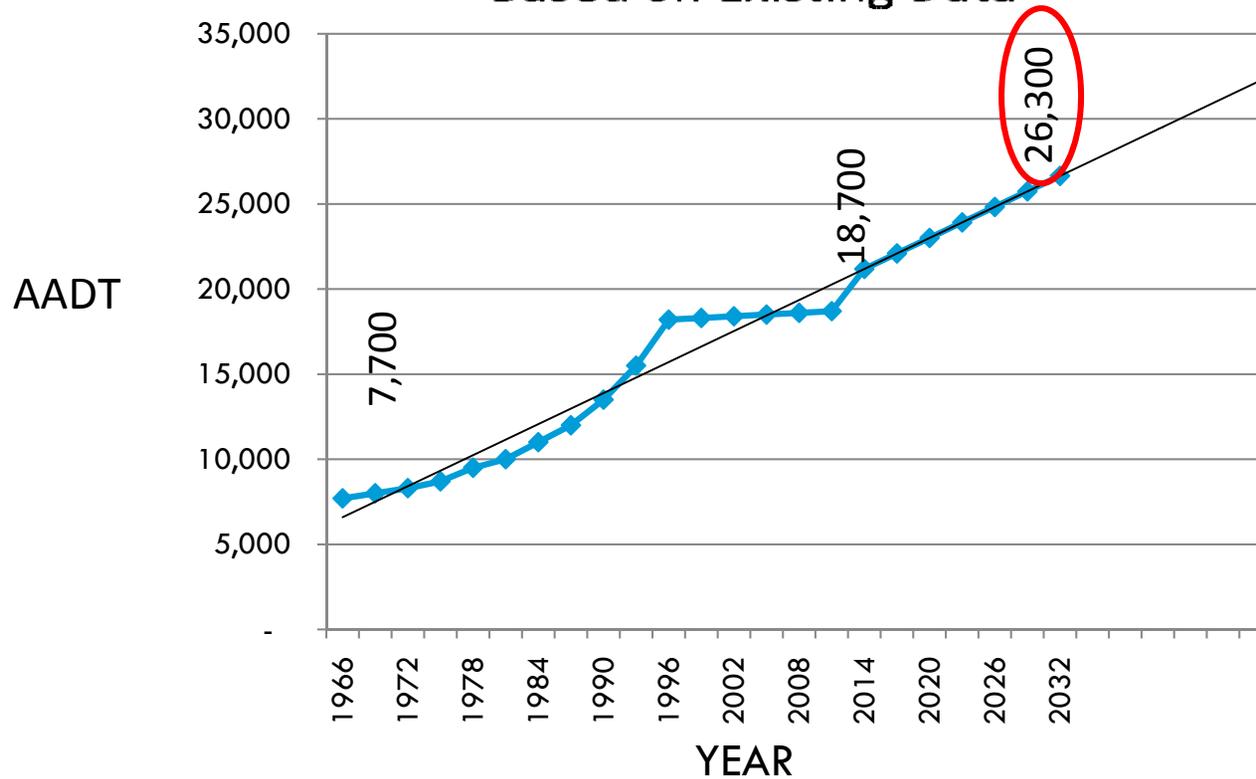
Dist	Route	CO	Postmile	Description	Back	Back	Ahead	Ahead	Ahead	
					Peak Hour	Peak Month	Back AADT	Peak Hour		Peak Month
3	99	SUT	35.96	ENCINAL/LIVE OAK	1650	21100	18700	1600	18600	18000
3	99	SUT	40.25	LIVE OAK, PENNINGTON	1600	18600	18000	1800	22000	18000
3	99	SUT	42.389	SUTTER/BUTTE CO LINE	1450	15300	14600			

- Present AADT acquired from the Traffic Volumes (Pick the Highest)

Basic System Operations		
AADT (BY)		18,700
AADT (HY)		
AADT: Growth Rate/Year		
LOS Method		
LOS (BY)		
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		

Rural: AADT (HY)

Establish Traffic Growth Trend
Based on Existing Data



Rural: AADT Growth Rate/Year

73

- Percent of growth of AADT per year

$$g = (x/y)^{1/Z} - 1$$

g = average annual growth rate

x = future (base) year volume

y = earlier year volume

Z = number of years

$$g = ((26,300/18,000)^{1/20}) - 1$$

$$g = 1.9\%$$

Source: NCHRP 255 Highway Traffic Data for Urbanized area Planning and Design

Basic System Operations		
AADT (BY)		18,000
AADT (HY)		26,300
AADT: Growth Rate/Year		1.9%
LOS Method		
LOS (BY)		
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		

Rural: LOS Method, BY, HY, Concept

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- Optional
- Use HCS 2010 TwoLane module to find LOS BY and HY

Basic System Operations		
AADT (BY)		18,000
AADT (HY)		26,300
AADT: Growth Rate/Year		1.9%
LOS Method		HCM 2010
LOS (BY)		
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		

HCS 2010: TwoLane

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HCS 2010

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TwoLane: Default Data

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Directional Report Quick

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT ANALYSIS

General Information

Analyst: Highway:
Agency/Co.: From/To:
Date: Units: U. S. Customary Jurisdiction:
Analysis Time Period: Analysis Year:
Project Description:

Input Data

Data for the analysis direction only.

Shoulder Width: ft
Lane Width: ft
Segment Length: mi

Class I Highway Class II Highway
 Class III Highway

Analysis Direction Volume: vph
Opposing Direction Volume: vph

Terrain:
Percent Trucks Crawling:
TCS Difference: mi/h
Grade: % Length: mi

Peak Hour Factor, PHF:
Trucks and Buses: %
Recreational Vehicles: %
Percent No-Passing Zones: %
Access-Point Density: /mi

TwoLane: General Information

The screenshot shows a software application window with a menu bar (File, Edit, View, Reports, Window, Help) and a toolbar with icons for file operations. The window title is "Directional Report Quick". The main content area is titled "DIRECTIONAL TWO-LANE HIGHWAY SEGMENT ANALYSIS". Below this is a "General Information" section with the following fields:

Analyst	Kelly Lier	Highway	SR-99	
Agency/Co.	Caltrans OFSP	From/To	PM T34.97 to PM 39.045	
Date	5/15/2013	Units: U. S. Customary	Jurisdiction	Dist-3
Analysis Time Period	PM Peak Hour	Analysis Year	2011	
Project Description	Perf. Measures for SR-99 TCR			

TwoLane: Classification, Segment Length, Shoulder Width

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File Edit View Reports Window Help

Directional Report Quick

Date: 5/15/2013 Units: U. S. Customary Jurisdiction: Dist-3

Analysis Time Period: PM Peak Hour Analysis Year: 2011

Project Description: Perf. Measures for SR-99 TCR

Input Data

Data for the analysis direction only.

Shoulder Width: 9.9 ft

Lane Width: 12.0 ft

Segment Length: 4.1 mi

Class I Highway Class II Highway Class III Highway

Analysis Direction Volume: 0 vph

Opposing Direction Volume: 0 vph

Terrain: Level

Grade: + % Length: %

Percent Trucks Crawling: 0.0 TCS Difference: 0.0 mi/h

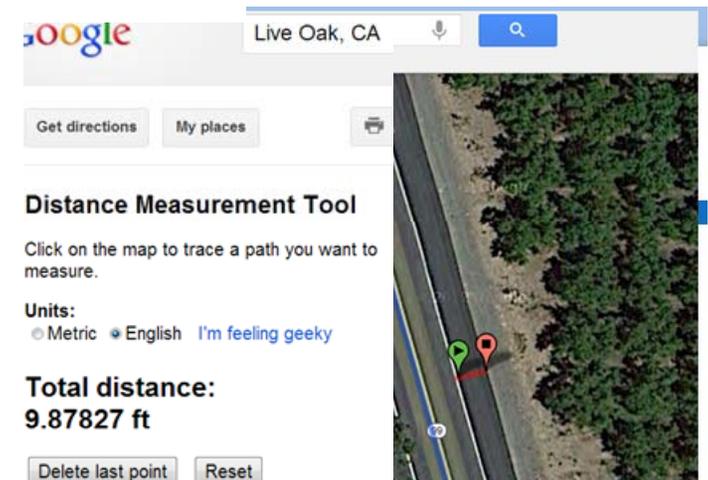
Peak Hour Factor, PHF: 0.88

Trucks and Buses: 6%

Recreational Vehicles: 4%

Percent No-Passing Zones: 20%

Access-Point Density: 8 / mi



- Estimate Shoulder Width using Google Measurement Tool
- Segment Length: From PM T34.97 to PM 39.045 = 4.07 Miles

TwoLane: Directional Volume

File Edit View Reports Window Help

Directional Report Quick

Date: 5/15/2013 Units: U. S. Customary Jurisdiction: Dist-3

Analysis Time Period: PM Peak Hour Analysis Year: 2011

Project Description: Perf. Measures for SR-99 TCR

Input Data

Data for the analysis direction only:

Terrain: Level

Percent Trucks Crawling: 0.0 TCS Difference: 0.0 mi/h

Shoulder Width: 9.9 ft Grade: + % Length: mi

Lane Width: 12.0 ft

Segment Length: 4.1 mi

Peak Hour Factor, PHF: 0.88

Trucks and Buses: 9 %

Recreational Vehicles: 4 %

Percent No-Passing Zones: 100 %

Access-Point Density: 8 / mi

Class I Highway Class II Highway Class III Highway

Analysis Direction Volume: 940 vph

Opposing Direction Volume: 684 vph

INPUTS

- Peak Hourly Volumes Based on 58/42 Split
- Peak Hour Factor (Default)

OTM32420
06/29/2012
08:07:16

CATRANS TRAFFIC VOLUMES
LATEST TRAFFIC YEAR SELECTED
PEAK HOUR VOLUME DATA

DI	RTE	CO	PRE	PM CS	LEG	YR	Dir	AM PEAK				1 WAY PHV	PM PEAK					
								% K	% D	% KD	HR DAY MNTH		% K	% D	% KD	HR DAY MNTH		
03	099	SUT	T	35.96	563	B 11	S	638	5.73	59.63	3.42	7 TUE MAR	N	940	8.7	57.85	5.03	16 FRI DEC

TwoLane: Truck Volumes

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File Edit View Reports Window Help

Directional Report Quick

Date: 5/15/2013 Units: U. S. Customary Jurisdiction: Dist-3

Analysis Time Period: PM Peak Hour Analysis Year: 2011

Project Description: Perf. Measures for SR-99 TCR

Input Data

Data for the analysis direction only.

Terrain: Level

Percent Trucks Crawling: 0.0 TCS Difference: 0.0 mi/h

Shoulder Width: 9.9 ft Grade: + % Length: mi

Lane Width: 12.0 ft

Segment Length: 4.1 mi

Peak Hour Factor, PHF: 0.88

Trucks and Buses: 9 %

Recreational Vehicles: 4 %

Percent No-Passing Zones: 20 %

Access-Point Density: 8 / mi

Class I Highway Class II Highway Class III Highway

Analysis Direction Volume: 940 vph

Opposing Direction Volume: 684 vph

INPUTS

- Truck and Buses From Truck Volumes Book
- TRUCK % TOT VEH

RTE	DIST	CNTY	POST MILE	L E G DESCRIPTION	VEHICLE AADT TOTAL	TRUCK AADT TOTAL	TRUCK % TOT VEH	TRUCK AADT TOTAL					% TRUCK AADT					EAL 2-WAY (1000)	YEAR VER/ EST
								2	3	4	5+	2	3	4	5+				
099	03	SUT	T35.96	B	ENCINAL ROAD/LIVE OAK BOULEVARD	18700	1720	9.2	273	230	588	36.5	15.9	13.4	34.2	284	97E		
099	03	SUT	T35.96	A	ENCINAL ROAD/LIVE OAK BOULEVARD	18000	1656	9.2	263	224	565	36.5	15.9	13.5	34.1	273	97E		

TwoLane: Percent No-Passing Zone & Access Point Density

- Find Percent No-Passing Zone and Access-Point Density using Photolog, Google Maps, or a field check

File Edit View Reports Window Help

Directional Report Quick

Date: 5/15/2013 Units: U. S. Customary Jurisdiction: Dist-3

Analysis Time Period: PM Peak Hour Analysis Year: 2011

Project Description: Perf. Measures for SR-99 TCR

Input Data

Data for the analysis direction only.

Terrain: Level

Percent Trucks Crawling: 0.0 TCS Difference: 0.0 mi/h

Shoulder Width: 9.9 ft

Lane Width: 12.0 ft

Segment Length: 4.1 mi

Grade: + % Length: mi

Peak Hour Factor, PHF: 0.88

Trucks and Buses: 9%

Recreational Vehicles: 4%

Percent No-Passing Zones: 100%

Access-Point Density: 8 / mi

Analysis Direction Volume: 940 vph

Opposing Direction Volume: 684 vph

TwoLane: Terrain

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- Find Terrain using TSN or historical data

The screenshot shows the 'Directional Report Quick' software interface. The menu bar includes File, Edit, View, Reports, Window, and Help. The toolbar contains icons for file operations and help. The main window displays the following information:

Directional Report Quick

Date: 5/15/2013 Units: U. S. Customary Jurisdiction: Dist-3

Analysis Time Period: PM Peak Hour Analysis Year: 2011

Project Description: Perf. Measures for SR-99 TCR

Input Data

Data for the analysis direction only.

Terrain: Level (highlighted with a red circle)

Percent Trucks Crawling: 0.0 TCS Difference: 0.0 mi/h

Shoulder Width: 9.9 ft Grade: + % Length: mi

Lane Width: 12.0 ft

Segment Length: 4.1 mi

Class I Highway Class II Highway

Class III Highway

Analysis Direction Volume: 940 vph Peak Hour Factor, PHF: 0.88

Opposing Direction Volume: 684 vph Trucks and Buses: 9 %

Recreational Vehicles: 4 %

Percent No-Passing Zones: 100 %

Access-Point Density: 8 / mi

TwoLane: Report

HCS 2010 TwoLane - [TwoLane1.k1]

File Edit View **Reports** Window Help

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	Kelly Lier	Highway / Direction of Travel	SR-99
Agency or Company	Caltrans OFSP	From/To	PM T34.97 to PM 39.045
Date Performed	5/15/2013	Jurisdiction	Dist-3
Analysis Time Period	PM Peak Hour	Analysis Year	2011
Project Description: Perf. Measures for SR-99 TCR			
Input Data			
		<input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> Class II highway <input type="checkbox"/> Class III highway <input checked="" type="checkbox"/> Terrain Level <input type="checkbox"/> Rolling Grade Length mi Up/down Peak-hour factor, PHF 0.88 No-passing zone 100% % Trucks and Buses, P _T 9% % Recreational vehicles, P _R 4% Access points mi 8/mi	
Analysis direction vol., V _d	940veh/h		
Opposing direction vol., V _o	684veh/h		
Shoulder width ft	9.9		
Lane Width ft	12.0		
Segment Length mi	4.1		
Average Travel Speed			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)		1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)		1.0	1.0
Heavy-vehicle adjustment factor, f _{HV,ATS} = 1 / (1 + P _T (E _T - 1) + P _R (E _R - 1))		1.000	0.991
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		1.00	1.00
Demand flow rate ² , v _i (pc/h) v _i = V _i / (PHF * f _{g,ATS} * f _{HV,ATS})		1068	784
		Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed
Mean speed of sample ³ , S _{FM}			60.0 mi/h
Total demand flow rate, both directions, v			0.0 mi/h
Free-flow speed, FFS = S _{FM} + 0.00776(v f _{HV,ATS})			2.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.4 mi/h			58.0 mi/h
			42.2 mi/h
			72.7 %

Rural: LOS BY

- Optional
- Use TwoLane results

<i>Level of Service and Other Performance Measures</i>	
Level of service, LOS (Exhibit 15-3)	E
Volume to capacity ratio, v/c	0.63
Capacity, $C_{d,ATS}$ (Equation 15-12) pc/h	1685
Capacity, $C_{d,PTSF}$ (Equation 15-13) pc/h	1700
Percent Free-Flow Speed $PFFS_d$ (Equation 15-11 - Class III only)	72.7

Basic System Operations		
AADT (BY)		18,000
AADT (HY)		26,300
AADT: Growth Rate/Year		1.9
LOS Method		HCM 2010
LOS (BY)		E
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		



Rural: LOS HY

86

- Optional
- Need to use projected Peak Hourly Volumes in TwoLane to find LOS (HY)
- $PHV(HY) = PHV(BY) \times 20$
Yr GF
- 20 YR GF =
 $AADT(HY) / AADT(BY)$
= 1.46

Basic System Operations		
AADT (BY)		18,000
AADT (HY)		26,300
AADT: Growth Rate/Year		1.9
LOS Method		HCM 2010
LOS (BY)		E
LOS (HY)		
LOS Concept		
VMT (BY)		
VMT (HY)		

TwoLane: LOS HY

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File Edit View Reports Window Help

Directional Report Quick

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT ANALYSIS

General Information

Analyst: Kelly Lier Highway: SR-99
Agency/Co.: Caltrans OFSP From/To: PM T34 97 to PM 39 045
Date: 5/15/2013 Units: U. S. Customary Jurisdiction: Dist-3
Analysis Time Period: PM Peak Hour Analysis Year: 2011
Project Description: Perf. Measures for SR-99 TCR

Input Data

Data for the analysis direction only.

Shoulder Width: 9.9 ft
Lane Width: 12.0 ft
Segment Length: 4.1 mi

Percent Trucks Crawling: 0.0
TCS Difference: 0.0 mi/h
Grade: + % Length: mi

Terrain: Level

Class I Highway (selected)
Class II Highway
Class III Highway

Analysis Direction Volume: 1372 vph
Opposing Direction Volume: 998 vph

Peak Hour Factor, PHF: 0.88
Trucks and Buses: 9 %
Recreational Vehicles: 4 %
Percent No-Passing Zones: 100 %
Access-Point Density: 8 / mi

- Peak Hourly Volumes based on 58/42 Split Remain the same
- Peak Hour Factor (Default)
- Percent No-Passing Zones and other factors remain constant

$$\begin{aligned} \text{PHV (HY)} &= 940 \times 1.46 = 1372 \\ &= 684 \times 1.46 = 998 \end{aligned}$$

Rural: LOS HY

- Optional
- From HY TwoLane Results

<i>Level of Service and Other Performance Measures</i>	
Level of service, LOS (Exhibit 15-3)	E
Volume to capacity ratio, v/c	0.93
Capacity, $C_{d,ATS}$ (Equation 15-12) pc/h	1700
Capacity, $C_{d,PTSF}$ (Equation 15-13) pc/h	1700
Percent Free-Flow Speed $PFFS_d$ (Equation 15-11 - Class III only)	61.8

Basic System Operations		
AADT (BY)		18,000
AADT (HY)		26,300
AADT: Growth Rate/Year		1.9
LOS Method		HCM 2010
LOS (BY)		E
LOS (HY)		E
LOS Concept		
VMT (BY)		
VMT (HY)		



Rural: LOS Concept

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- Optional
- Based on District Policy

Basic System Operations		
AADT (BY)		18,000
AADT (HY)		26,300
AADT: Growth Rate/Year		1.9
LOS Method		HCM 2010
LOS (BY)		E
LOS (HY)		E
LOS Concept		D
VMT (BY)		
VMT (HY)		

Rural: VMT BY(Daily, Bi-Directional)

Dist	Rout e	CO	Postmil e	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
3	99	SUT	T 35.96	ENCINAL/LIVE OAK	1650	21100	18700	1600	18600	18000
3	99	SUT	40.25	LIVE OAK, PENNINGTON	1600	18600	18000	1800	22000	18000
3	99	SUT	42.389	SUTTER/BUTTE CO LINE	1450	15300	14600			

Resource: Traffic Volumes Book

Daily VMT=AADT x Length

PM	Distance	AADT	Daily VMT
	(Begin Segment)		
34.97			
39.045	4.075	18,000	73,350

Basic System Operations		
AADT (BY)		18,000
AADT (HY)		26,300
AADT: Growth Rate/Year		1.9
LOS Method		HCM 2010
LOS (BY)		E
LOS (HY)		E
LOS Concept		D
VMT (BY)		73,750
VMT (HY)		



Rural: VMT HY(Daily, Bi-Directional)

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- VMT Horizon Year is derived by applying the 20 yr Growth Factor, 1.46, to VMT(BY)
- $73,750 \times 1.46 =$
107,756

Basic System Operations		
AADT (BY)		18,000
AADT (HY)		26,300
AADT: Growth Rate/Year		1.9
LOS Method		HCM 2010
LOS (BY)		E
LOS (HY)		E
LOS Concept		D
VMT (BY)		73,750
VMT (HY)		107,756

Truck Volumes BY

- ❑ Required
- ❑ Total and 5+ Axle Average Annual Daily Truck Traffic
- ❑ Total and 5+ Axle Trucks (% of AADT)
- ❑ Use AADT reported in the Truck Volumes Book
- ❑ Resource: Truck Volumes Book

Truck Traffic		
Total Average Annual Daily Truck Traffic (AADTT) (BY)		1,720
Total Average Annual Daily Truck Traffic (AADTT) (HY)		
Total Trucks (% of AADT) (BY)		9.2
Total Trucks (% of AADT)(HY)		
5+ Axle Average Annual Daily Truck Traffic (AADTT)(BY)		588
5+ Axle Average Annual Daily Truck Traffic (AADTT)(HY)		
5+ Axle Trucks (as % of AADT)(BY)		1.6%
5+ Axle Trucks (as % of AADT)(HY)		

RTE	DIST	CNTY	POST MILE	L E G DESCRIPTION	VEHICLE	TRUCK	TRUCK	TRUCK AADT TOTAL				% TRUCK AADT				EAL	YEAR	
					AADT TOTAL	AADT TOTAL	& TOT VEH	----- By Axle -----				----- By Axle -----						2-WAY
099	03	SUT	T35.96	B	ENCINAL ROAD/LIVE OAK BOULEVARD	18700	1720	9.2	628	273	230	588	36.5	15.9	13.4	34.2	284	97E
099	03	SUT	T35.96	A	ENCINAL ROAD/LIVE OAK BOULEVARD	18000	1656	9.2	604	263	224	565	36.5	15.9	13.5	34.1	273	97E

Truck Volumes HY

- ❑ Optional
- ❑ Total and 5+ Axle Average Annual Daily Truck Traffic
- ❑ Total and 5+ Axle Trucks (% of AADT)
- ❑ Use AADT reported in the Truck Volumes Book
- ❑ 1.46 GF is Applied to AADT and Existing Truck Volumes Data
- ❑ Resource: Truck Volumes Book

Truck Traffic		
Total Average Annual Daily Truck Traffic (AADTT) (BY)		1,720
Total Average Annual Daily Truck Traffic (AADTT) (HY)		2,511
Total Trucks (% of AADT) (BY)		9.2
Total Trucks (% of AADT)(HY)		9.2
5+ Axle Average Annual Daily Truck Traffic (AADTT)(BY)		588
5+ Axle Average Annual Daily Truck Traffic (AADTT)(HY)		858
5+ Axle Trucks (as % of AADT)(BY)		1.6%
5+ Axle Trucks (as % of AADT)(HY)		1.6%

RTE	DIST	CNTY	MILE	L POST E G	DESCRIPTION	VEHICLE	TRUCK	TRUCK	TRUCK AADT TOTAL				% TRUCK AADT				EAL	YEAR
						AADT	AADT	& TOT	----- By Axle -----				----- By Axle -----					
						TOTAL	TOTAL	VEH	2	3	4	5+	2	3	4	5+	(1000)	EST
099	03	SUT	T35.96	B	ENCINAL ROAD/LIVE OAK BOULEVARD	18700	1720	9.2	628	273	230	588	36.5	15.9	13.4	34.2	84	97E
099	03	SUT	T35.96	A	ENCINAL ROAD/LIVE OAK BOULEVARD	18000	1656	9.2	604	263	224	565	36.5	15.9	13.5	34.1	273	97E

Rural: Peak Hour

- **Peak Period Length:** The length of time during which the peak traffic occurs. Must use a minimum length of 1 hour. Only required if Peak Period is being reported instead of Peak Hour.
- **Peak Hour Direction:** Indicate direction of peak traffic. Indicate Northbound (NB), Southbound (SB), Eastbound (EB), Westbound (WB), or both. Only required if repeating the datasets by direction.
- **Peak Hour Time of Day:** Indicate am, pm, am and pm, or the actual time. Only required if Peak Hour/Period data will be provided.

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		PM
Peak Hour Directional Split (BY)		
Peak Hour Directional Split (HY)		
Peak Hour VMT (BY)		
Peak Hour VMT (HY)		
Peak Hour V/C (BY)		
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		

Rural: Peak Hour Directional Split BY and HY

- Optional
- Suggested to include if not repeating peak hour measures for each direction.
- Assume same split in HY

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		PM
Peak Hour Directional Split (BY)		58/42
Peak Hour Directional Split (BY)		58/42

OTM32420
06/29/2012
08:07:16

CALTRANS TRAFFIC VOLUMES
LATEST TRAFFIC YEAR SELECTED
PEAK HOUR VOLUME DATA

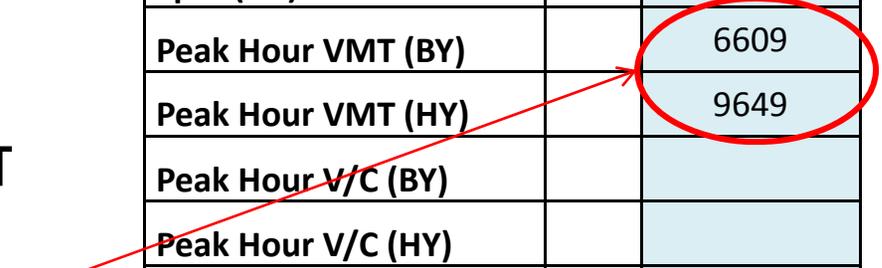
PAGE # 25

DI	RTE	CO	PRE	PM CS	LEG	YR	Dir	1 WAY PHV	AM PEAK			HR	DAY	Mnth	Dir	PM PEAK			HR	DAY	Mnth	
									% K	% D	% KD					% K	% D	% KD				
03	099	SUT	T	35.96	563	B 11	S	638	5.73	59.63	3.42	7	TUE	MAR	N	940	8.7	57.85	5.03	16	FRI	DEC

Rural: Peak Hour VMT BY

- This measure is encouraged but if data is completely unavailable it is not required
- Analysis direction vol., V_d 940veh/h
Opposing direction vol., V_o 684veh/h
- $(V_d + V_o) \times \text{Length} = \text{Pk. Hr. VMT}$
- $(940 + 684) \times 4.07 = 6,609$
- $\text{HY} = \text{BY} \times 1.46 \text{ GF} = 9,649$

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		PM
Peak Hour Directional Split (BY)		58/42
Peak Hour Directional Split (HY)		58/42
Peak Hour VMT (BY)		6609
Peak Hour VMT (HY)		9649
Peak Hour V/C (BY)		
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		



Rural: Peak Hour V/C BY

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- Optional
- If $V/C > 1$ report D/C. D/C is the ratio of demand to capacity which measures the extent to which capacity is exceeded during the analysis period.
- Use BY TwoLane Report to find V/C

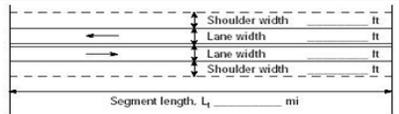
Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		PM
Peak Hour Directional Split (BY)		58/42
Peak Hour Directional Split (HY)		58/42
Peak Hour VMT (BY)		6609
Peak Hour VMT (HY)		9649
Peak Hour V/C (BY)		
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		

HCM 2010 TwoLane Report

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HCS 2010 TwoLane - [TwoLane1]
 File Edit View Reports Window Help

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	Kelly Lier	Highway / Direction of Travel	SR-99
Agency or Company	Caltrans OFSP	From/To	PM T34.97 to PM 39.045
Date Performed	5/15/2013	Jurisdiction	Dist-3
Analysis Time Period	PM Peak Hour	Analysis Year	2011
Project Description: Perf. Measures for SR-99 TCR			
Input Data			
		<input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> Class II highway <input type="checkbox"/> Class III highway Terrain <input checked="" type="checkbox"/> Level <input type="checkbox"/> Rolling Grade Length mi Up/down Peak-hour factor, PHF 0.88 No-passing zone 100% % Trucks and Buses, P _T 9% % Recreational vehicles, P _R 4% Access points mi 8/mi	
Analysis direction vol., V _d	940veh/h	 Show North Arrow	
Opposing direction vol., V _o	684veh/h		
Shoulder width ft	9.9		
Lane Width ft	12.0		
Segment Length mi	4.1		
Average Travel Speed			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)		1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)		1.0	1.0
Heavy-vehicle adjustment factor, f _{HV,ATS} = 1 / (1 + P _T (E _T -1) + P _R (E _R -1))		1.000	0.991
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		1.00	1.00
Demand flow rate ² , v _i (pc/h) v _i = V _i / (PHF * f _{g,ATS} * f _{HV,ATS})		1068	784
	Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Mean speed of sample ³ , S _{FM}		Base free-flow speed ⁴ , BFFS 60.0 mi/h	
Total demand flow rate, both directions, v		Adj. for lane and shoulder width ⁴ , f _{LS} (Exhibit 15-7) 0.0 mi/h	
Free-flow speed, FFS = S _{FM} + 0.00776(v f _{HV,ATS})		Adj. for access points ⁴ , f _A (Exhibit 15-8) 2.0 mi/h	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.4 mi/h		Free-flow speed, FFS (FSS=BFFS-f _{LS} -f _A) 58.0 mi/h	
		Average travel speed, ATS _d = FFS - 0.00776(v _{d,ATS} + v _{o,ATS}) - f _{np,ATS} 42.2 mi/h	
		Percent free flow speed, PFFS 72.7 %	

Rural: Peak Hour V/C BY

- Optional
- If $V/C > 1$ report D/C.
D/C is the ratio of demand to capacity which measures the extent to which capacity is exceeded during the analysis period.

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 15-3)	F
Volume to capacity ratio, v/c	0.63
Capacity, $C_{d,ATS}$ (Equation 15-12) pc/h	1685
Capacity, $C_{d,PTSF}$ (Equation 15-13) pc/h	1700
Percent Free-Flow Speed $PFFS_d$ (Equation 15-11 - Class III only)	72.7

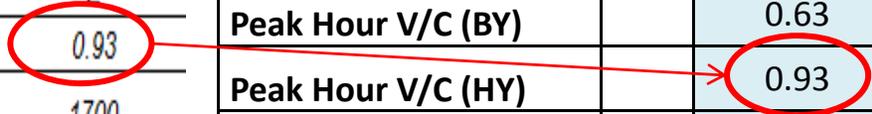
Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		PM
Peak Hour Directional Split (BY)		58/42
Peak Hour Directional Split (HY)		58/42
Peak Hour VMT (BY)		6609
Peak Hour VMT (HY)		9649
Peak Hour V/C (BY)		0.63
Peak Hour V/C (HY)		
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		

Rural: Peak Hour V/C HY

- Optional
- Use HY TwoLane Report to find V/C

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 15-3)	F
Volume to capacity ratio, v/c	0.93
Capacity, $C_{d,ATS}$ (Equation 15-12) pc/h	1700
Capacity, $C_{d,PTSF}$ (Equation 15-13) pc/h	1700
Percent Free-Flow Speed PF_{FS_d} (Equation 15-11 - Class III only)	61.8

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		PM
Peak Hour Directional Split (BY)		58/42
Peak Hour Directional Split (HY)		58/42
Peak Hour VMT (BY)		6609
Peak Hour VMT (HY)		9649
Peak Hour V/C (BY)		0.63
Peak Hour V/C (HY)		0.93
Peak Hour Avg. Speed (mph)(BY)		
Peak Hour Avg. Speed (mph)(HY)		



Rural: Peak Hour Avg. Speed BY

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- Optional
- Use BY TwoLane Report to find Peak Hour Average Speed BY

Base free-flow speed ⁴ , BFFS	60.0 mi/h
Adj. for lane and shoulder width, ⁴ f_{LS} (Exhibit 15-	0.0 mi/h
Adj. for access points ⁴ , f_A (Exhibit 15-8)	2.0 mi/h
Free-flow speed, FFS ($FSS = BFFS \cdot f_{LS} \cdot f_A$)	58.0 mi/h
Average travel speed, $ATS_d = FFS \cdot 0.00776(v_{d,ATS}$	42.2 mi/h
$v_{o,ATS}) \cdot f_{np,ATS}$	
Percent free flow speed, PFFS	72.7 %

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		PM
Peak Hour Directional Split (BY)		58/42
Peak Hour Directional Split (HY)		58/42
Peak Hour VMT (BY)		6609
Peak Hour VMT (HY)		9649
Peak Hour V/C (BY)		0.63
Peak Hour V/C (HY)		0.93
Peak Hour Avg. Speed (mph)(BY)		42.2
Peak Hour Avg. Speed (mph)(HY)		

Rural: Peak Hour Avg. Speed HY

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- Optional
- Use HY TwoLane Report to find Peak Hour Average Speed HY

Base free-flow speed ⁴ , BFFS	60.0 mi/h
Adj. for lane and shoulder width, ⁴ f_{LS} (Exhibit 15-7)	0.0 mi/h
Adj. for access points ⁴ , f_A (Exhibit 15-8)	2.0 mi/h
Free-flow speed, FFS ($FSS=BFFS-f_{LS}-f_A$)	58.0 mi/h
Average travel speed, $ATS_d = FFS - 0.00776(v_{d,ATS} - v_{o,ATS}) - f_{np,ATS}$	35.8 mi/h
Percent free flow speed, PFFS	61.8 %

Peak Hour Traffic Data		
Peak Period Length		1
Peak Hour Direction		NB
Peak Hour Time of Day		PM
Peak Hour Directional Split (BY)		58/42
Peak Hour Directional Split (HY)		58/42
Peak Hour VMT (BY)		6609
Peak Hour VMT (HY)		9649
Peak Hour V/C (BY)		0.63
Peak Hour V/C (HY)		0.93
Peak Hour Avg. Speed (mph)(BY)		42.2
Peak Hour Avg. Speed (mph)(HY)		35.8

Rural Class I: Peak Hour VHD (35 mph) BY and HY

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- Peak Hour Vehicle Hours of Delay using a threshold of 35 mph
- Based on speed results previously posted, there is no delay under 35 MPH in BY or HY

Peak Hour Traffic Data		
Peak Hour V/C (BY)		0.63
Peak Hour V/C (HY)		0.93
Peak Hour Avg. Speed (mph)(BY)		42.2
Peak Hour Avg. Speed (mph)(HY)		35.8
Peak Hour Vehicle Hours of Delay (35 mph) (BY)		0
Peak Hour Vehicle Hours of Delay (35 mph) (HY)		0
Peak Hour VHD (35 MPH) Method		HCM 2010

Formatting Tables

- To the extent possible format the tables as shown in the TCR template
- Once that format becomes too cumbersome use District discretion when formatting.
- If the tables are so large that they need to be moved to an appendix please reference the tables and their location in the corresponding narrative in the body of the TCR.
 - ▣ Feel free to include data tables in the appendix either within segment factsheets or as standalone tables

Contact Us

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- As you develop your TCRs feel free to direct questions to The Office of System & Freight Planning
- To find your current District Liaison please go to :
<http://www.dot.ca.gov/hq/tpp/offices/oasp/>
 - ▣ Juven Alvarez: Districts 1, 2, and 9
 - ▣ Kelly Lier: Districts 5, 7, and 12
 - ▣ Paul Moore: Districts 6, 8, and 11
 - ▣ Robert J Peters: Districts 3, 4, and 10



QUESTIONS?