

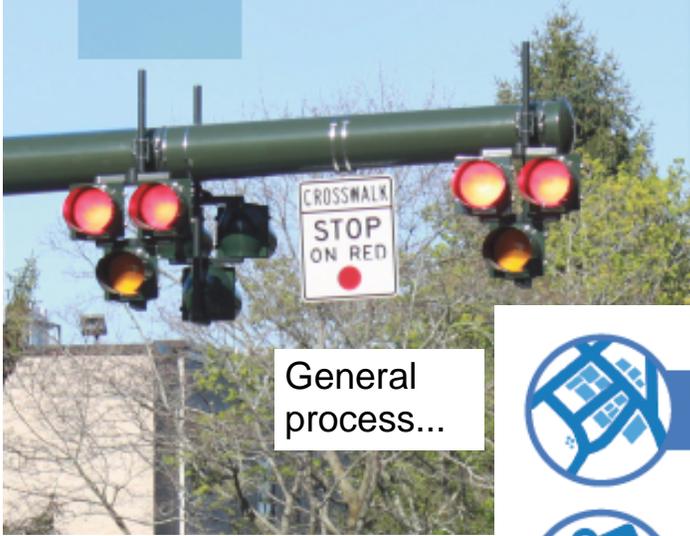


U.S. Department of Transportation
Federal Highway Administration



Based on...

Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations



General process...

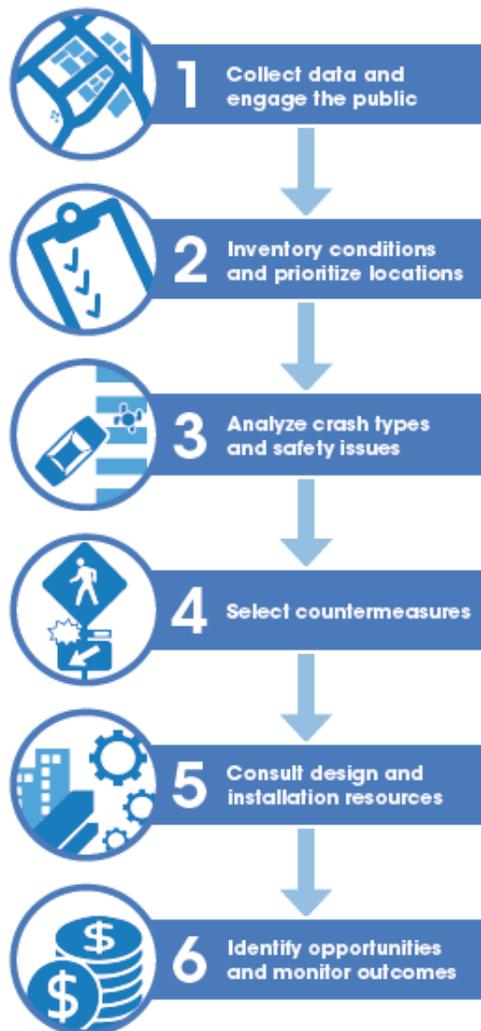


Figure 1. Process diagram for selecting countermeasures at uncontrolled pedestrian crossing locations.

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	① 2 4 5 6	① 5 6 7 9	① 5 6 ⑦ ⑨	① 4 5 6 7 9	① 5 6 7 9	① 5 6 ⑦ ⑨	① 4 5 6 7 9	① 5 6 7 9	① 5 6 ⑨
3 lanes with raised median (1 lane in each direction)	① 2 3 4 5	① ③ 5	① ③ 5	① 3 4 5	① ③ 5	① ③ 5	① ③ 4 5	① ③ 5	① ③ 5
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	① 2 3 4 5 6 7 9	① ③ 5 6 7 9	① ③ 5 6 ⑨	① 3 4 5 6 7 9	① ③ 5 6 ⑦ ⑨	① ③ 5 6 ⑨	① ③ 4 5 6 7 9	① ③ 5 6 ⑨	① ③ 5 6 ⑨
4+ lanes with raised median (2 or more lanes in each direction)	① ③ 5 7 8 9	① ③ 5 7 8 9	① ③ 5 8 ⑨	① ③ 5 7 8 9	① ③ 5 ⑦ 8 ⑨	① ③ 5 8 ⑨	① ③ 5 ⑦ 8 ⑨	① ③ 5 8 ⑨	① ③ 5 8 ⑨
4+ lanes w/o raised median (2 or more lanes in each direction)	① ③ 5 6 7 8 9	① ③ 5 ⑥ 7 8 9	① ③ 5 ⑥ 8 ⑨	① ③ 5 ⑥ 7 8 9	① ③ 5 ⑥ ⑦ 8 ⑨	① ③ 5 ⑥ 8 ⑨	① ③ 5 ⑥ ⑦ 8 ⑨	① ③ 5 ⑥ 8 ⑨	① ③ 5 ⑥ 8 ⑨

Given the set of conditions in a cell,

Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.

● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.

○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

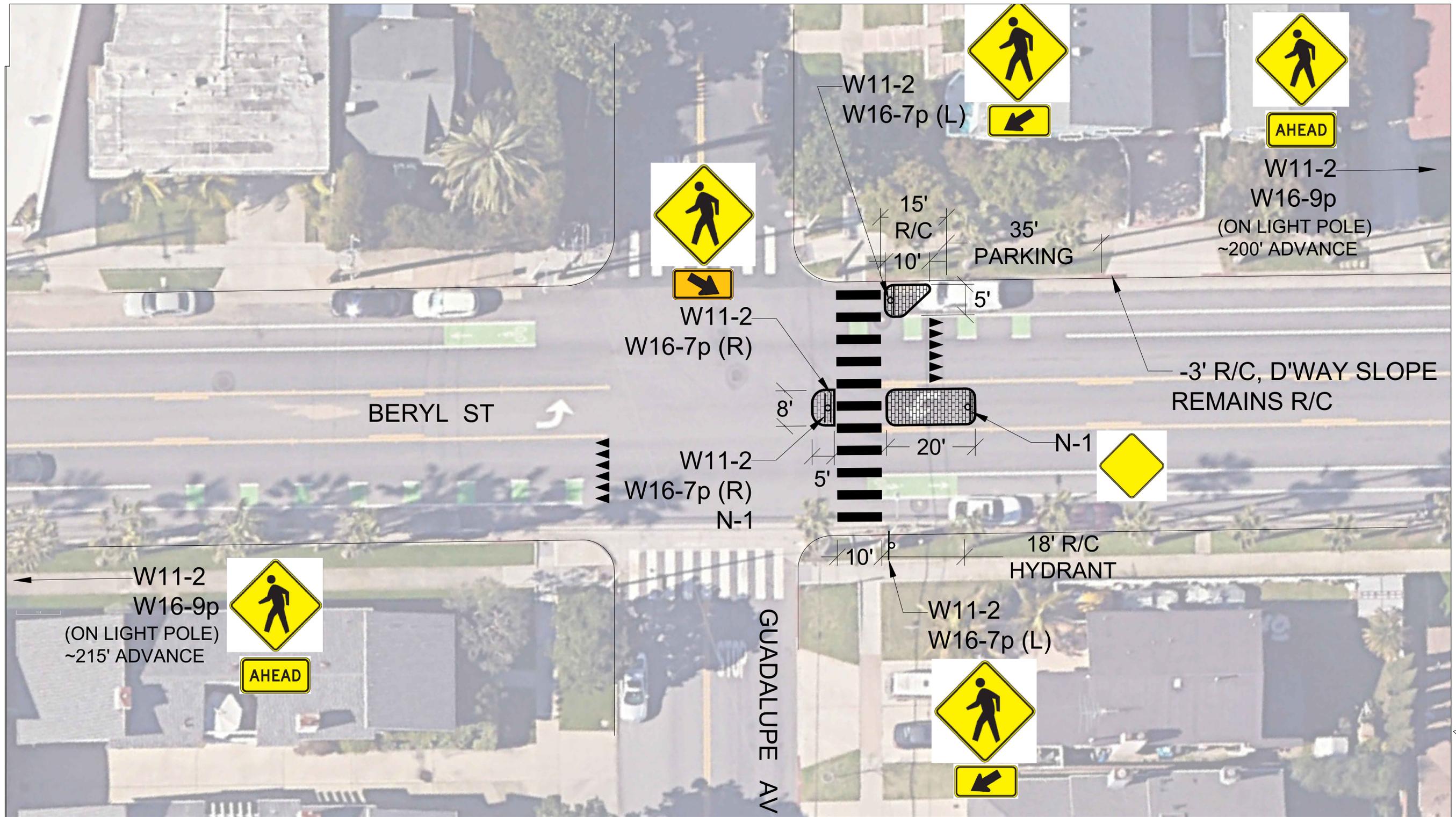
- ✓ 1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
- 2 Raised crosswalk
- ✓ 3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
- ✓ 4 In-Street Pedestrian Crossing sign
- ✓ 5 Curb extension
- ✓ 6 Pedestrian refuge island
- ? 7 Rectangular Rapid-Flashing Beacon (RRFB)**
- 8 Road Diet
- 9 Pedestrian Hybrid Beacon (PHB)**

*Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

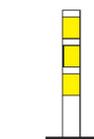
**It should be noted that the PHB and RRFB are not both installed at the same crossing location.

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. <http://www.cmfclearinghouse.org/>; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). <http://www.pedbikesafe.org/PEDSAFE/>; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

All treatments can be considered, high visibility crosswalk markings, lighting, daylighting (restricting parking), and signage should always be considered.



TYPE Q MARKERS TO BE PLACED AT CORNERS OF PEDESTRIAN ISLAND



Type Q (CA)

1. EASTBOUND BERYL GREEN BIKE MARKING TO BE WET SANDBLASTED AND SHIFTED EAST SLIGHTLY.
2. WESTBOUND BERYL LEFT-TURN ARROW SHALL BE REMOVED.
3. ADDITIONAL DOUBLE SOLID YELLOW SHALL BE STRIPED IN VICINITY OF ISLAND.
4. CONFLICTING BIKE LANE GREEN MARKING SHALL BE REMOVED, ONE ADDITIONAL GREEN MARKING SHALL BE ADDED IN ADVANCE OF EXISTING MARKINGS.
5. 2' CROSSWALK BARS; 3' GAP

REVISIONS		CITY OF REDONDO BEACH					
DATE	DESCRIPTION	CALIFORNIA PUBLIC WORKS DEPARTMENT ENGINEERING SERVICES DIVISION					
		BERYL & GUADALUPE ENHANCED CROSSWALK SIGNING AND STRIPING PLAN					
		DRAWN	RL	CHECKED	LS	SCALE	N.T.S.
		APPROVED BY				DATE	
		CITY ENGINEER - RCE #					
		PROJECT NO.	SHEET NO. <u>1</u>	DRAWING NO.			
		XXXXX	OF <u>1</u> SHEETS				

Rectangular rapid flashing beacon



HCM 7th TWSC
3: Guadalupe Av & Beryl St

10/08/2024

Intersection												
Int Delay, s/veh	3											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Vol, veh/h	12	16	3	3	22	26	1	108	8	32	152	6
Future Vol, veh/h	12	16	3	3	22	26	1	108	8	32	152	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	17	3	3	24	28	1	117	9	35	165	7

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	370	366	168	367	365	122	172	0	0	126	0	0
Stage 1	238	238	-	124	124	-	-	-	-	-	-	-
Stage 2	132	128	-	243	241	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	587	562	876	589	563	929	1405	-	-	1460	-	-
Stage 1	765	708	-	880	793	-	-	-	-	-	-	-
Stage 2	872	790	-	760	706	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	532	548	876	555	549	929	1405	-	-	1460	-	-
Mov Cap-2 Maneuver	532	548	-	555	549	-	-	-	-	-	-	-
Stage 1	747	691	-	879	793	-	-	-	-	-	-	-
Stage 2	819	789	-	721	689	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s/v	11.82	10.63	0.06	1.27
HCM LOS	B	B		

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1405	-	-	694	562	1460	-
HCM Lane V/C Ratio	0.001	-	-	0.08	0.06	0.024	-
HCM Control Delay (s/veh)	7.6	-	-	10.6	11.8	7.5	-
HCM Lane LOS	A	-	-	B	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0.1	-

HCM 7th TWSC
3: Guadalupe Av & Beryl St

10/08/2024

Intersection												
Int Delay, s/veh	1.8											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Vol, veh/h	9	9	5	4	16	19	6	220	8	20	198	12
Future Vol, veh/h	9	9	5	4	16	19	6	220	8	20	198	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	10	5	4	17	21	7	239	9	22	215	13

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	526	526	222	520	528	243	228	0	0	248	0	0
Stage 1	265	265	-	257	257	-	-	-	-	-	-	-
Stage 2	261	261	-	264	272	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	462	457	818	467	456	795	1340	-	-	1318	-	-
Stage 1	740	689	-	748	695	-	-	-	-	-	-	-
Stage 2	744	692	-	742	685	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	424	447	818	444	446	795	1340	-	-	1318	-	-
Mov Cap-2 Maneuver	424	447	-	444	446	-	-	-	-	-	-	-
Stage 1	728	678	-	744	692	-	-	-	-	-	-	-
Stage 2	703	689	-	714	673	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s/v12.83		11.86	0.2	0.68
HCM LOS	B	B		

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1340	-	-	567	485	1318	-
HCM Lane V/C Ratio	0.005	-	-	0.075	0.052	0.016	-
HCM Control Delay (s/veh)	7.7	-	-	11.9	12.8	7.8	-
HCM Lane LOS	A	-	-	B	B	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0.1	-

HCM 7th TWSC
3: Guadalupe Av & Beryl St

10/08/2024

Intersection												
Int Delay, s/veh	3											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	12	16	3	3	22	26	1	108	8	32	152	6
Future Vol, veh/h	12	16	3	3	22	26	1	108	8	32	152	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	17	3	3	24	28	1	117	9	35	165	7

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	370	366	168	367	365	122	172	0	0	126	0	0
Stage 1	238	238	-	124	124	-	-	-	-	-	-	-
Stage 2	132	128	-	243	241	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	587	562	876	589	563	929	1405	-	-	1460	-	-
Stage 1	765	708	-	880	793	-	-	-	-	-	-	-
Stage 2	872	790	-	760	706	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	530	547	876	553	548	929	1405	-	-	1460	-	-
Mov Cap-2 Maneuver	530	547	-	553	548	-	-	-	-	-	-	-
Stage 1	745	690	-	879	793	-	-	-	-	-	-	-
Stage 2	819	789	-	719	687	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s/v	11.83	10.64	0.06	1.27
HCM LOS	B	B		

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1405	-	-	693	560	301	-
HCM Lane V/C Ratio	0.001	-	-	0.08	0.06	0.024	-
HCM Control Delay (s/veh)	7.6	-	-	10.6	11.8	7.5	0
HCM Lane LOS	A	-	-	B	B	A	A
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0.1	-

HCM 7th TWSC
3: Guadalupe Av & Beryl St

10/08/2024

Intersection												
Int Delay, s/veh	1.8											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	9	9	5	4	16	19	6	220	8	20	198	12
Future Vol, veh/h	9	9	5	4	16	19	6	220	8	20	198	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	100	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	10	5	4	17	21	7	239	9	22	215	13

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	526	526	222	520	528	243	228	0	0	248	0	0
Stage 1	265	265	-	257	257	-	-	-	-	-	-	-
Stage 2	261	261	-	264	272	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	462	457	818	467	456	795	1340	-	-	1318	-	-
Stage 1	740	689	-	748	695	-	-	-	-	-	-	-
Stage 2	744	692	-	742	685	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	423	446	818	443	445	795	1340	-	-	1318	-	-
Mov Cap-2 Maneuver	423	446	-	443	445	-	-	-	-	-	-	-
Stage 1	726	676	-	744	692	-	-	-	-	-	-	-
Stage 2	703	689	-	712	672	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s/v12.85		11.87	0.2	0.68
HCM LOS	B	B		

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1340	-	-	566	483	155	-
HCM Lane V/C Ratio	0.005	-	-	0.075	0.052	0.016	-
HCM Control Delay (s/veh)	7.7	-	-	11.9	12.9	7.8	0
HCM Lane LOS	A	-	-	B	B	A	A
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0.1	-