



New Concepts and Designs for Accessing Managed Lanes

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Look at the Congestion!



The background image is a photograph of a modern, curved building with a metallic, shingled facade. The building features several rectangular windows of varying sizes, some of which are slightly protruding. The building is set against a cloudy sky. The foreground shows a grassy area with some low-lying plants.

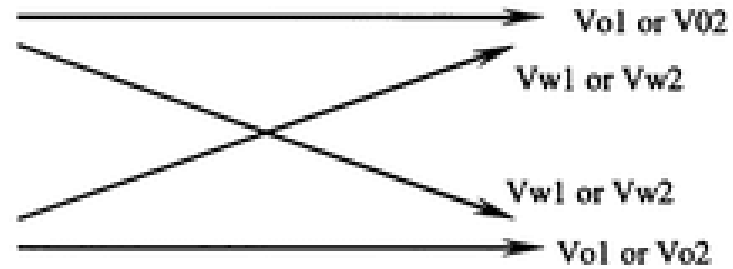
Why the Need for Innovative Ideas Relative to the Operations of Managed Lanes

Traditional Methods - Weaving

- Enter on crossroad entrance ramp and weave across general purpose lanes to merge with managed lanes - reverse for exiting



Typical Weaving Diagram for Freeways



Number of Lane-changes Required by Movement Vw1	Number of Lane-Changes Required by Movement Vw2		
	0	1	≥ 2
0	TYPE B	Type B	Type C
1	Type B	Type A	N/A
≥ 2	Type C	N/A	N/A

Traditional Methods – Weaving (Loss of Throughput)

**Table 1 Throughput Losses for 3-Lane Freeway Section with Various Weaving Volumes and Lengths
(Volumes and Capacities Shown in Passenger Cars Per Hour)**

WEAVING DISTANCE	WEAVING VOLUME	NO WEAVE	WITH WEAVE	LOST THROUGHPUT	% LOST
		(Maximum Throughput)			
1500'	100	6900	5448	1452	21.0%
	200	6900	5348	1552	22.5%
	300	6900	5248	1652	23.9%
	400	6900	5148	1752	25.4%
2400'	100	6900	5639	1261	18.3%
	200	6900	5539	1361	19.7%
	300	6900	5439	1461	21.2%
	400	6900	5339	1561	22.6%
3600'	100	6900	5897	1003	14.5%
	200	6900	5798	1103	16.0%
	300	6900	5697	1203	17.4%
	400	6900	5597	1303	18.9%
4500'	100	6900	6155	745	10.8%
	200	6900	6055	845	12.2%
	300	6900	5955	945	13.7%
	400	6900	5855	1045	15.1%

Table 2: Comparison of Crashes for a 3-Lane Directional Freeway with Weaving vs. Non-Weaving

WEAVING DISTANCE	WEAVING VOLUME	NO WEAVE	WITH WEAVE	TOTAL NO. OF CRASHES	% DIFF. TOTOAL NO. CRASHES
1500'	100	→		16.3	35.0%
			→	22.0	
	200	→		15.8	39.2%
			→	21.9	
	300	→		15.4	42.9%
			→	22.0	
2400'	400	→		14.9	47.7%
			→	22.0	
	100	→		21.5	28.8%
			→	27.7	
	200	→		20.9	32.5%
			→	27.7	
	300	→		20.4	35.3%
			→	27.6	
	400	→		19.8	41.4%
			→	28.0	



**TRADITIONAL METHODS FOR PROVIDING
ACCESS AND EGRESS FOR Interior MANAGED
LANES Without Weaving**

Traditional Methods – Bridge Over General Purpose Lanes

13



Traditional Methods – Direct Ramps from Interchange Bridges





INNOVATIVE SERVICE INTERCHANGE DESIGNS FOR BOTH GENERAL PURPOSE AND MANAGED LANES

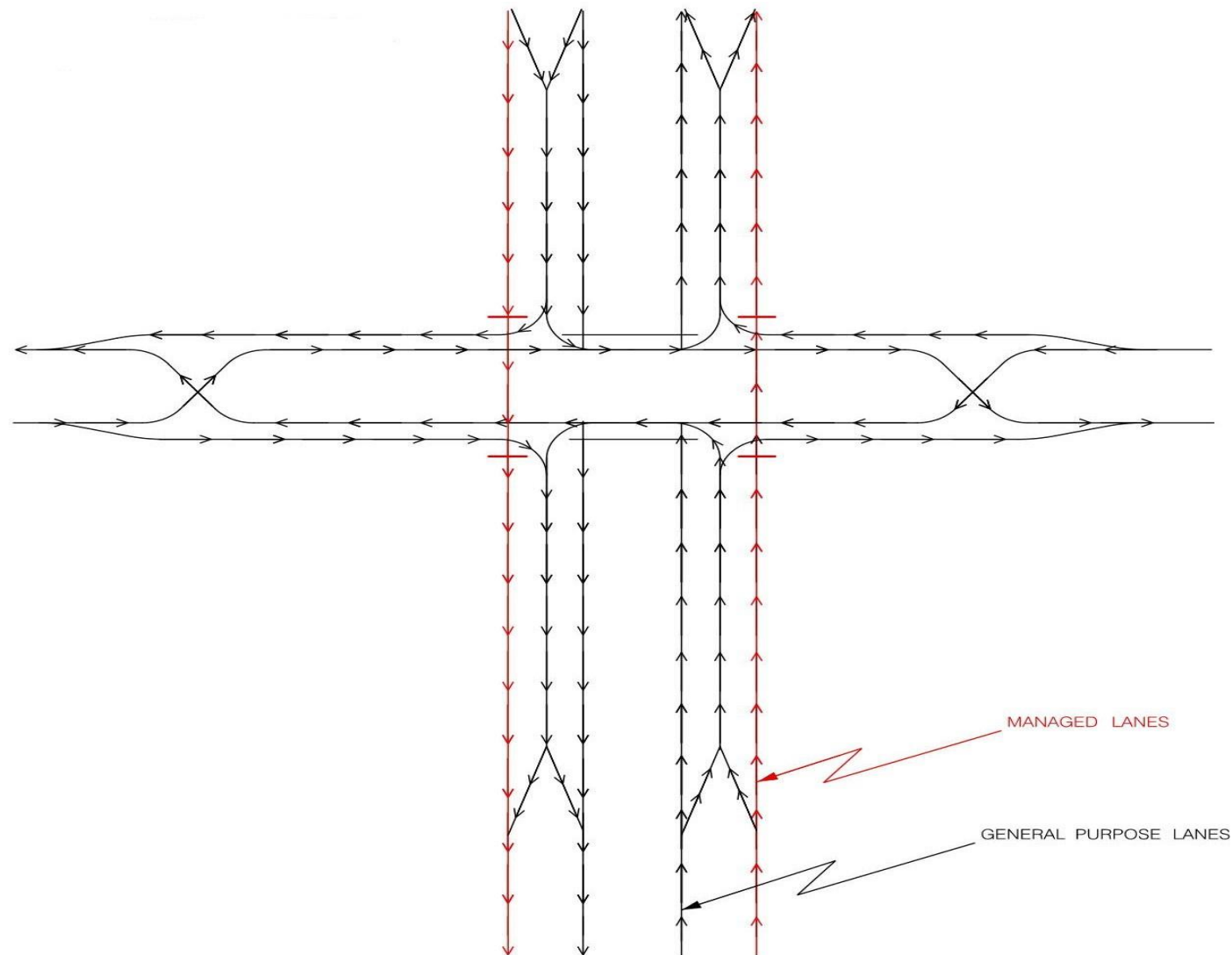
With **No** Loss of Throughput
And **No** Increase in Crashes

Innovative Designs – Single Ramp System for Both General Purpose and Managed Lanes (Traditional ROW)

16



Diverging Diamond Interchange with Common Ramp for Managed Lanes and General Purpose Lanes

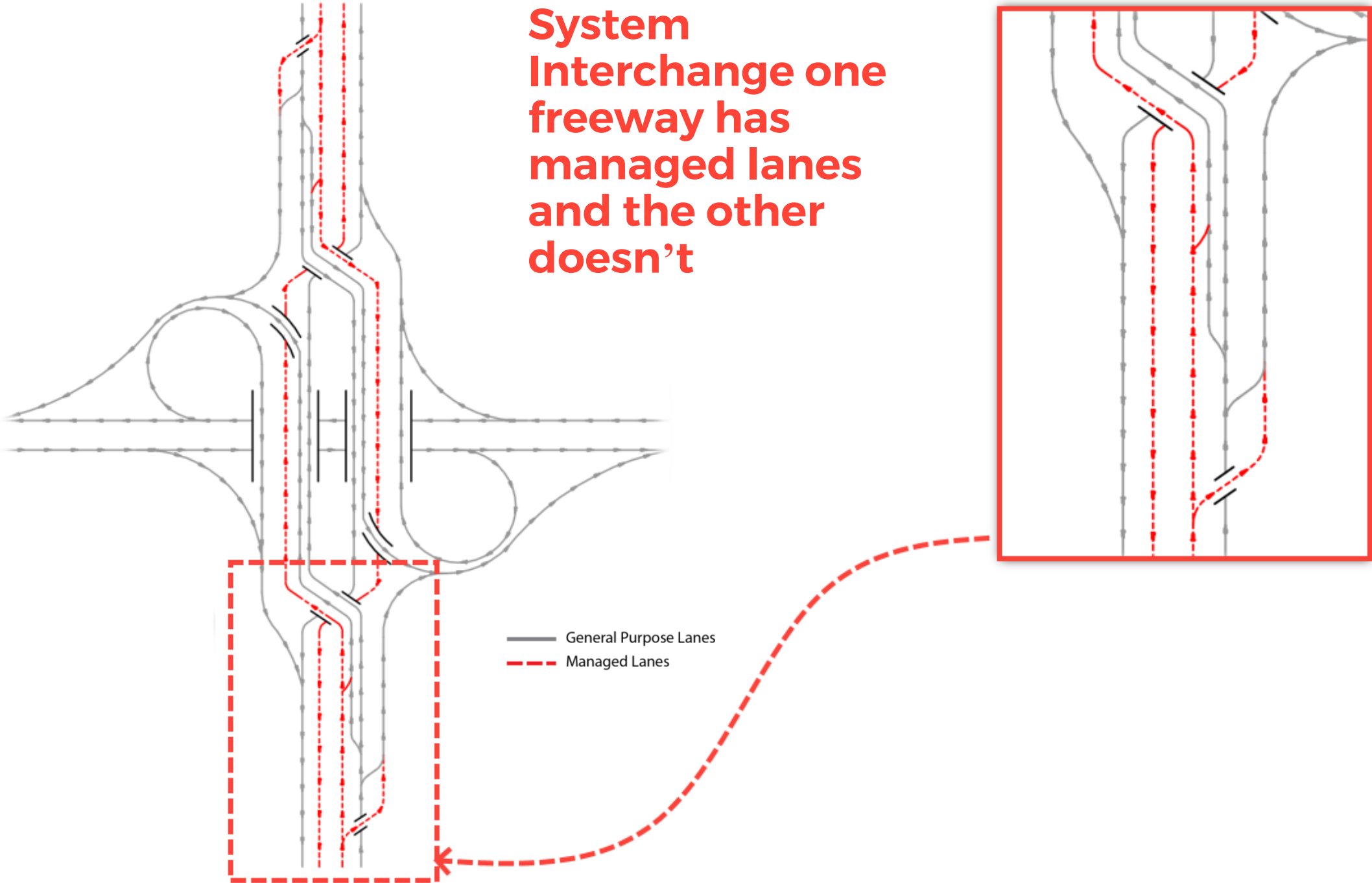


Innovative Designs – Dual Ramp Systems for General Purpose Lanes and for Managed Lanes

18



System
Interchange one
freeway has
managed lanes
and the other
doesn't

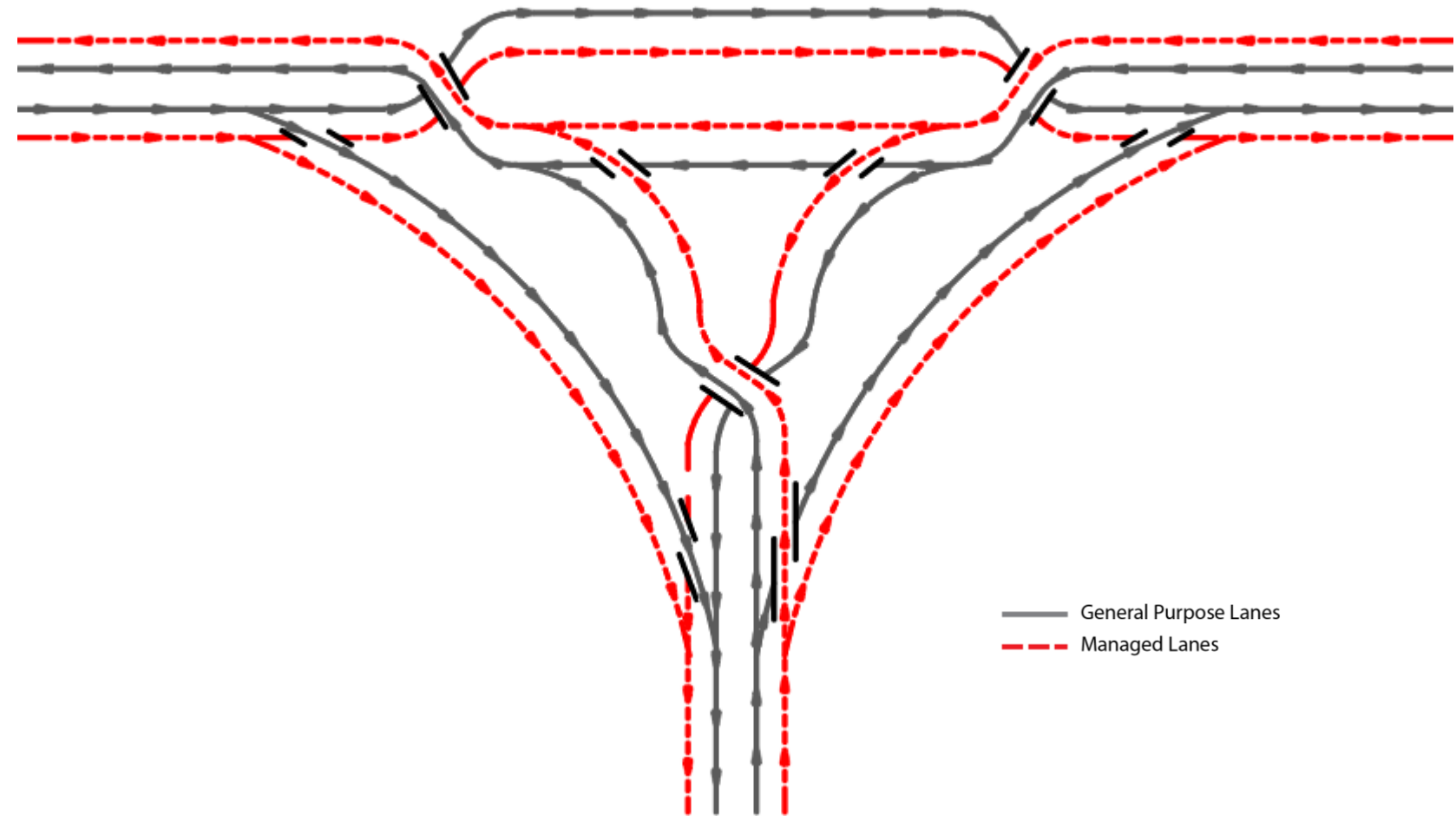


“T” System Interchange for Managed Lanes with Managed Lanes on Both freeways

23



“T” System Interchanges for Managed Lanes at the Second Level



Four Legged System Interchange with Managed Lanes to be Constructed on Both Freeways

25



Double Diverging Diamond with Outside Managed Lanes

- Double diverging diamond system to system with managed lanes

