

Prioritization of corridors for adaptive signal control technology

ITE Western District Annual Meeting

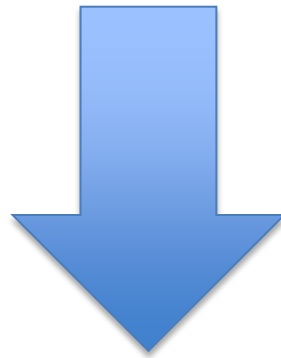
Las Vegas, NV

July 21, 2015

Basis for project



TSM&O



MAP-21

Prioritization

Identify need

CDOT FY14-15 Performance Plan



Colorado
Department
of Transportation

November 2013



Strategic Policy Initiative:

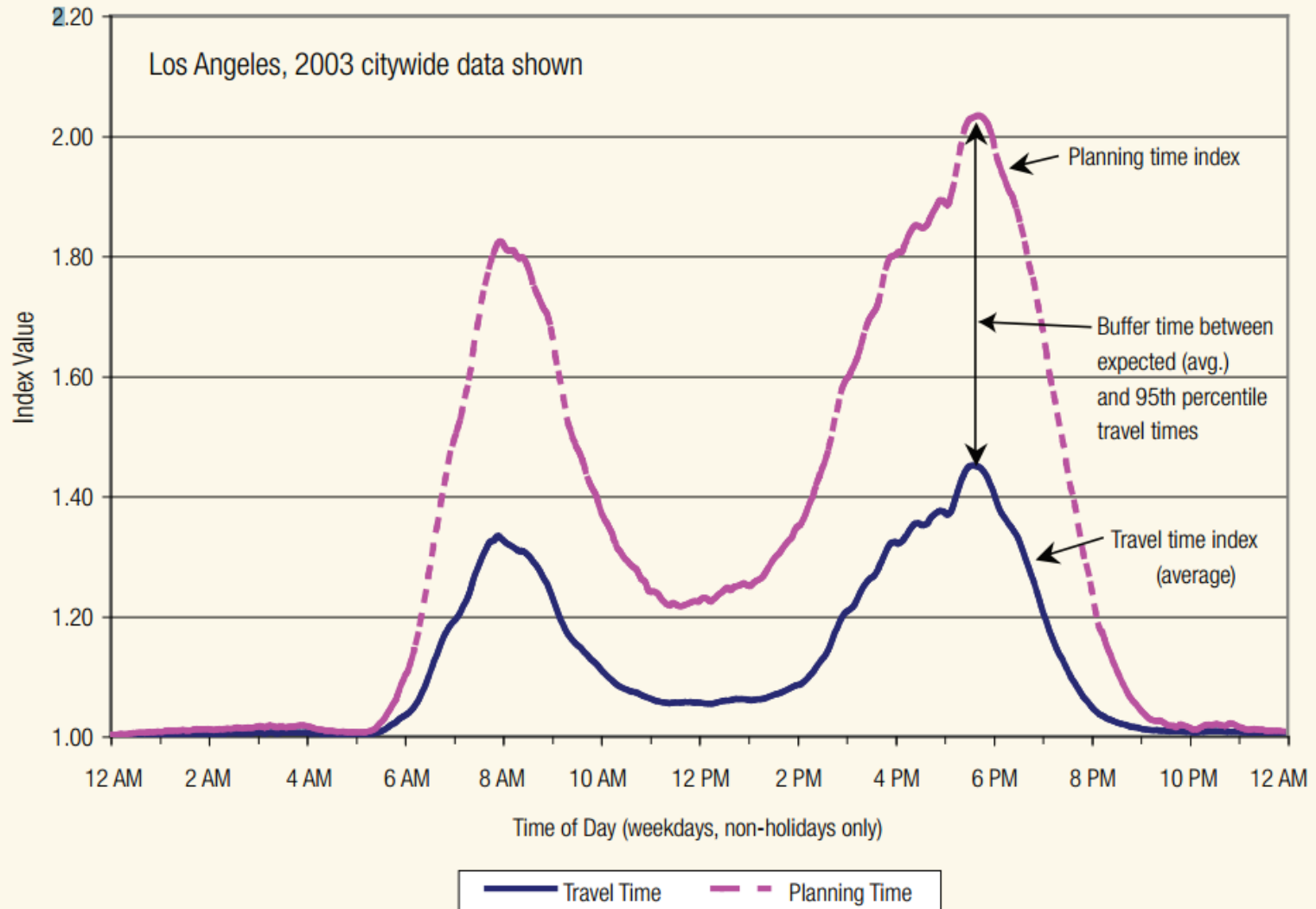
4. System Reliability

PTI of 1.25 or less



Planning Time Index (PTI)

Reliability measures compared to average congestion measures (Source: <http://mobility.tamu.edu/mmp/>)

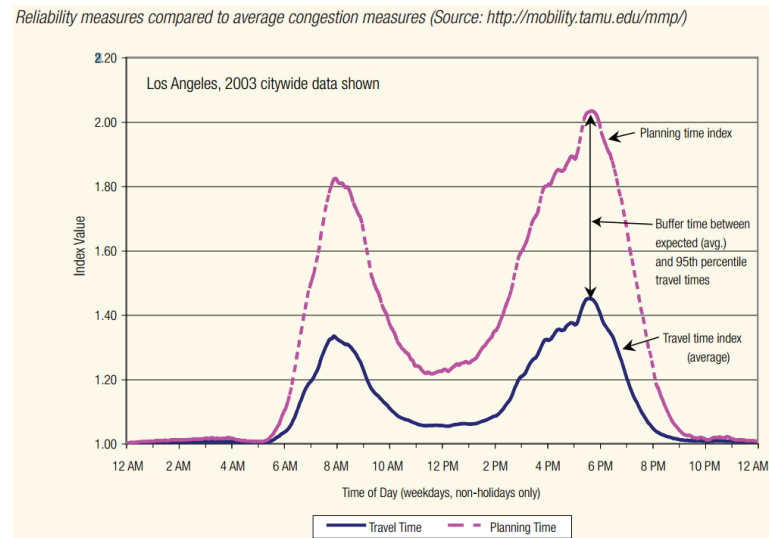


PTI Thresholds

SHOW PTI:								
Town	Street	From	To	Number of Signals	AADT	Direction	AM PTI	PM PTI
Ft. Collins	SH 14	I-25 East Frontage Road	SH 257	3	11225	WB	1.12	1.14
						EB	1.08	1.09
Niwot	SH 119	Jay Road	Niwot Road	4	41667	WB	1.66	1.24
						EB	1.17	2.17
Windsor	SH 392 / Main Street	CR 1	7th Street	6	18000	WB	1.26	1.22
						EB	1.32	1.38
Loveland	US 287	71st (CR 32)	23rd (29th St)	9	26333	NB	1.34	1.56
						SB	1.30	1.56
Longmont	SH 119	CR 3 1/2	I-25 East Frontage Rd	8	36000	WB	1.61	1.55
						EB	1.62	1.68
Greeley	US 34 Bypass	65th (83rd Ave)	8th (8th Ave)	6	15792	WB	1.37	1.53
						EB	1.43	1.51
Greeley	US 85 Bypass	5th (8th St)	22nd (18th St)	5	11878	NB	1.54	1.95
						SB	1.64	1.68
Longmont	US 287	Lookout Road	Niwot Road	3	25250	NB	1.71	1.72
						SB	1.84	1.72

ID corridors appropriate for adaptive control

- Traffic conditions fluctuate often
- Incidents change demand
 - Crashes
 - Special events
 - Preemption
 - Weather
- Demanding situations with few constraints
 - Low ped volumes
- System reliability
 - PTI differs significantly from TTI



Travel time benefit

10th St (InSync)	
Project Parameters	
Number of Intersections:	11
Length of Corridor (miles)	4
Days that best capture the majority of	350
AADT	26500
Assumptions	
Value of Time	\$15.00
Vehicle Occupancy	1.3
Reported Benefit:	
Daily Travel Time Benefit (veh-hours)	207
Daily Travel Time Benefit (\$)	\$4,037
Annual Travel Time Benefit (\$)	\$1,412,775
Calculations	
Benefit per Vehicle (hours)	0.00781
Benefit per Vehicle (sec)	28
Benefit per Vehicle per Intersection (s):	2.6
Benefit per Vehicle per Mile (s):	7.0
	(weighted by AADT)
	WEIGHTED AVERAGE:
Benefit per Vehicle per Intersection (s):	3.1

Travel time benefit

Town	Street	From	To	Number of Signals	AADT	Direction	AM PTI	PM PTI	Daily Travel Time Benefit (veh-hrs)
Niwot	SH 119	Jay Road	Niwot Road	4	41667	WB	1.66	1.24	145
						EB	1.17	2.17	
Windsor	SH 392 / Main Street	CR 1	7th Street	6	18000	WB	1.26	1.22	94
						EB	1.32	1.38	
Longmont	SH 119	CR 3 1/2	I-25 East Frontage Rd	8	36000	WB	1.61	1.55	251
						EB	1.62	1.68	
Greeley	US 34 Bypass	65th (83rd Ave)	8th (8th Ave)	6	15792	WB	1.37	1.53	83
						EB	1.43	1.51	
Greeley	US 85 Bypass	5th (8th St)	22nd (18th St)	5	11878	NB	1.54	1.95	52
						SB	1.64	1.68	
Longmont	US 287	Lookout Road	Niwot Road	3	25250	NB	1.71	1.72	66
						SB	1.84	1.72	

Benefit/cost

10th St (InSync) (23rd to 29th)	
Project Parameters	
Number of Intersections:	11
Days that best capture the majority of typical traffic	350
AADT	26500
Reported Cost:	
Misc. Construction (sidewalk, potholing, erosion, etc.)	\$34,750
Bored Conduit	\$6,600
Pull Boxed	\$7,100
Wiring	\$35,510
InSync System and Components	\$416,319
Instal Controller Cabinets	\$10,125
Telemetry (communication system)	\$38,178
Construction equipment and control	\$101,418
Engineering	\$250,000
Annual Maintenance Costs (estimate)	\$5,500
Calculations	
TOTAL COST	\$905,500
Cost per intersection	\$82,318
(weighted by number of intersections)	WEIGHTED AVERAGE:
Cost per intersection	\$61,504.35

Benefit/cost

Town	Street	From	To	Number of Signals	AADT	Direction	AMPTI	PMPTI	Daily Travel Time Benefit (veh-hrs)	Daily Travel time Benefit (\$)	Annual Travel Time Benefit (\$)	Known Cost per intersection	Estimated Total Cost for Corridor	For every dollar spent to install, will result in a savings of:	Original investment will be recovered in (days):
Niwot	SH 119	Jay Road	Niwot Road	4	41667	WB	1.66	1.24	145	\$2,832	\$991,091.72		\$246,017	\$4.03	87
						EB	1.17	2.17							
Windsor	SH 392 / Main Street	CR 1	7th Street	6	18000	WB	1.26	1.22	94	\$1,835	\$642,227.44		\$369,026	\$1.74	201
						EB	1.32	1.38							
Longmont	SH 119	CR 3 W2	I-25 East Frontage Rd	8	36000	WB	1.61	1.55	251	\$4,893	\$1,712,606.49		\$492,035	\$3.48	101
						EB	1.62	1.68							
Greeley	US 34 Bypass	65th (83rd Ave)	8th (8th Ave)	6	15792	WB	1.37	1.53	83	\$1,610	\$563,458.51	\$40,950	\$245,700	\$2.29	153
						EB	1.43	1.51							
Greeley	US 85 Bypass	5th (9th St)	22nd (18th St)	5	11878	NB	1.54	1.95	52	\$1,009	\$353,159.02	\$43,900	\$219,500	\$1.61	218
						SB	1.64	1.68							
Longmont	US 287	Lookout Road	Niwot Road	3	25250	NB	1.71	1.72	66	\$1,287	\$450,451.19		\$184,513	\$2.44	143
						SB	1.84	1.72							

Direction	AM PTI	PM PTI	Daily Travel Time Benefit (veh-hrs)	Daily Travel time Benefit (\$)	Annual Travel Time Benefit (\$)	Known Cost per intersection	Estimated Total Cost for Corridor	for every dollar spent to install, will result in a savings of:	Original investment will be recovered in (days):
WB	1.66	1.24	145	\$2,832	\$991,091.72		\$246,017	\$4.03	87
EB	1.17	2.17							
WB	1.26	1.22	94	\$1,835	\$642,227.44		\$369,026	\$1.74	201
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Next steps

Results for Intersections														
#	TYPE OF INTERSECTION	Sheet	Zone 1 (North)		Zone 2 (South)		Zone 3 (East)		Zone 4 (West)		Zone 5 (Center)		Overall w/c Ratio	Ranking
			CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C	CLV	V/C		
1	Conventional	FULL									1404	0.88	0.88	16
2	Conventional Shared RT LN	CSRL									1846	1.15	1.15	20
3.1	Quadrant Roadway	S-W			1402	0.88			714	0.45	1150	0.72	0.88	13
3.2		N-E	1394	0.87			284	0.18			1369	0.86	0.87	11
3.3		S-E			1266	0.79	1266	0.79			1383	0.86	0.86	10
3.4		N-W	1402	0.88					953	0.60	1373	0.86	0.88	13
4.1	Partial Displaced Left Turn	N-S	925	0.58	1333	0.83					1199	0.75	0.83	3
4.2		E-W					38	0.02	318	0.20	1402	0.88	0.88	13
5	Displaced Left Turn	FULL	925	0.58	1333	0.83	38	0.02	318	0.20	1172	0.73	0.83	3
6.1	Restricted Crossing U-Turn	N-S	1365	0.85	1036	0.65	925	0.58	1333	0.83			0.85	5
6.2		E-W	4436	2.77	4024	2.52	1236	0.77	1541	0.96			2.77	21
7.1	Median U-Turn	N-S	1484	0.93	1053	0.66					1464	0.92	0.93	18
7.2		E-W					382	0.24	196	0.12	1380	0.86	0.86	8
8.1	Partial Median U-Turn	N-S	1615	1.01	1028	0.64					1392	0.87	1.01	19
8.2		E-W					110	0.07	161	0.10	1394	0.87	0.87	12
16.1	Jug Handle	N-S	1355	0.85	1373	0.86	74	0.05	703	0.44	1360	0.85	0.86	7
17.0	Bow Tie	FULL									1380	0.86	0.86	8
18.0	Paired	FULL	79	0.05	79	0.05					1369	0.86	0.86	6
19.1	Double Wide	E-W					703	0.44	74	0.05	1415	0.88	0.88	17
19.2		N-S	901	0.56	1219	0.76					879	0.55	0.55	1
20.0	Split	FULL	999	0.62	1373	0.86							0.62	2

Thank you!