

SIGNAL TIMING IMPROVEMENTS

Current Signal Timing Conditions

The US 550 study corridor is currently coordinated from I-25 to Paseo del Volcan incorporating a 140, 100, and 140 second cycle lengths for the AM, midday, and PM peak periods respectively.

Proposed Signal Timing

Using Synchro, signal timing and coordination plans were developed for AM commuter peak, midday peak, and PM commuter peak traffic demands. Additionally, the Paseo del Volcan intersection was assumed to be signalized for the proposed scenario.

Baseline Signal Parameters

In order to accurately determine the best cycle lengths for the corridor, the following inputs were analyzed and adjusted:

- Pedestrian Crossing Times** – New pedestrian crossing times were calculated based on the latest MUTCD pedestrian walking speed of 3.5 feet per second and a walking distance as the greatest of measured lengths in both directions from the pedestrian ramp to pedestrian ramp. Calculated pedestrian times are summarized in **Appendix D**. The table indicates that the majority of all pedestrian phases are anywhere from 2 to 4 seconds less than those currently in use, and from 5 to 9 seconds less than current pedestrian crossing times at EB Sprint Boulevard, EB Jemez Dam, SB Jemez Dam Rd, and NB Camino Don Tomas. Only the existing pedestrian crossing time at westbound Camino Don Tomas exceeds the calculated time. In an attempt to maintain coordination even during pedestrian calls, the calculated pedestrian crossing time was included in the green time split for all of the corridor intersections. Finally, pedestrian clearances from button to opposite pedestrian ramp were calculated and if the distance was not covered by the proposed walk plus flashing don't walk time then time was added to the walk interval. This occurs at the NB and EB pedestrian phases at NM 528, all pedestrian phases at Camino Don Tomas, WB pedestrian phase at Jemez Dam, and the SB pedestrian phase at NM 313. Recommended pedestrian flashing don't walk periods are shown in **Table 7**.

Table 7. Existing and Recommended Pedestrian Change Intervals

MAIN STREET	CROSS STREET	EXISTING PED CLEARANCE INTERVAL				PROPOSED PED CLEARANCE INTERVAL			
		NB	EB	SB	WB	NB	EB	SB	WB
US 550	Paseo Del Volcan	0	0	0	0	23	20	0	0
US 550	Sprint Blvd	0	12	0	0	0	21	0	0
US 550	NM 528	18	20	17	18	20	24	21	20
US 550	Jemez Dam	0	10	21	10	0	17	26	13
US 550	Don Tomas	14	10	14	10	22	12	18	7
US 550	NM 313	22	11	15	14	25	13	17	16

- Yellow and Red Clearance Intervals** – Recommended yellow and red change intervals are based on the latest NMDOT Change Interval policy with recommended yellow and red times are indicated in **Table 8**.

Table 8. Existing and Recommended Change Intervals

MAIN STREET	CROSS STREET	TOTAL CHANGE PERIOD															
		NB LT		NB		EB LT		EB		SB LT		SB		WB LT		WB	
		Y	RC	Y	RC	Y	RC	Y	RC	Y	RC	Y	RC	Y	RC	Y	RC
EXISTING	US 550 Paseo Del Volcan	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	US 550 Sprint Blvd	0.0	0.0	3.5	2.0	0.0	0.0	5.0	2.0	0.0	0.0	0.0	0.0	4.0	1.5	5.0	2.0
	US 550 NM 528	3.5	1.0	3.5	1.5	3.5	2.0	4.5	2.0	3.5	1.0	3.5	1.5	4.5	2.5	4.5	2.0
	US 550 Jemez Dam	0.0	0.0	3.0	1.0	3.0	1.0	4.0	2.0	0.0	0.0	3.0	1.0	3.0	1.0	4.5	2.0
	US 550 Don Tomas	0.0	0.0	3.0	1.0	3.0	1.0	3.5	2.0	0.0	0.0	3.0	1.0	3.0	1.0	3.5	2.0
PROPOSED	US 550 NM 313	3.0	1.0	3.0	1.5	3.0	1.0	3.5	2.0	3.0	1.0	3.0	1.5	3.0	1.0	3.5	2.0
	US 550 Paseo Del Volcan	0.0	0.0	3.0	1.0	0.0	0.0	4.5	1.0	0.0	0.0	0.0	0.0	3.0	1.0	4.5	1.0
	US 550 Sprint Blvd	3.0	1.0	4.0	1.0	0.0	0.0	4.5	1.0	0.0	0.0	0.0	0.0	3.0	1.0	4.5	1.0
	US 550 NM 528	3.0	1.0	4.5	1.0	3.0	1.0	4.5	1.0	3.0	1.0	4.0	1.0	3.0	1.0	4.5	1.0
	US 550 Jemez Dam	3.0	1.0	3.0	2.0	3.0	1.0	4.5	1.0	3.0	1.0	3.0	2.0	3.0	1.0	4.5	1.0
US 550 Don Tomas		3.0	1.0	4.0	1.5	3.0	1.0	4.0	1.0	3.0	1.0	4.0	1.0	3.0	1.0	4.0	1.0
	US 550 NM 313	3.0	1.0	4.0	1.5	3.0	1.0	4.0	1.0	3.0	1.0	4.0	1.0	3.0	1.0	4.0	1.0

- Minimum Green Times** – Minimum green times are currently set to 7 seconds for most phases except at coordinated through phases which are 15 seconds. It should be noted that these are consistent with recommended minimum initial green times recommended in the *2009 ITE Traffic Signal Timing Manual*. The current minimum green times should provide the appropriate opportunity for early gap out on the non-coordinated phases and the potential for any unused green time to be assigned to the coordinated phases.

Signal Timing/Coordination Development

- Cycle Lengths** - Cycle length optimization was run for the US 550 corridor. Based on the cycle optimization analysis and traffic flow characteristics, the following recommended cycle lengths and the times of operation are summarized in **Table 9**.

Table 9. Recommended Cycle Lengths and Operating Times

	AM	Mid-day	PM
Existing Cycle	140	100	140
Proposed Cycle	120	115	120
Operating Times	6:00 to 9:00 AM	9:00 AM to 2:30 PM	2:30 to 8:00 PM

These recommended cycle lengths are 20 seconds lower than existing cycle lengths in the AM and PM peak and 15 second greater in the midday. Generally, lower cycle lengths tend to provide lower stop delay times and thus reduce queue lengths.

- Intersection Split Times** - All intersection green split times were optimized for all peak period plans using Synchro. We then reviewed all resulting splits and adjusted them to favor the major street through movements. Based on the coordination goals for the study, many side street green times were adjusted to the minimum required pedestrian crossing times,

depending on their traffic demands, as these green times were sufficient to be well below capacity and maintain an LOS of D or greater.

- **Coordination** - While two-way progression is most desirable in each of the timing plans, the signal timings were adjusted to accommodate and benefit the higher directions of flow during each of the peaks. This will provide maximum benefits to the higher direction of traffic, while still providing some benefits to the lesser direction of travel. At times when directional flows were similar, balanced two-way progression was provided in the signal timing plans. All final time space diagrams for the study corridors are provided as part of the appendix to the final report. It should be noted that the through movements on the coordinated corridors were set to C-MAX, and all the other movements are allowed to skip the phase if no call is made. The unused green time would then revert to the coordinated phases. It should be noted that green band requirements per page 55 were not achieved due to the fact that we are accommodating pedestrian crossing times at all intersections and therefore the bandwidth parameters are not realistic id pedestrian crossing times are to be accommodated.

Corridor/Network MOE

Another measure of effectiveness comparison between existing and implemented conditions can be computed directly through the reporting feature of the Synchro software which summarizes the corridor specific and overall network delay. The corridor approach delays (major street only) and the entire network delays (all intersection movements) have been output for each scenario and are shown in **Table 10**

Table 10. Calculated Total Delay Comparison

Network	Total Delay, Veh-Hrs.					
	AM Peak		Mid-day Peak		PM Peak	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
US 550	38	31	40	31	70	64
Entire Network All Approaches	60	48	58	51	115	108

Results of the above table indicate the following:

- Total delay is anticipated to be significantly reduced under proposed timings for peak periods.
- Total delay for the entire network, which includes side street approaches, is anticipated to be significantly reduced under all peak periods.

It should be noted that although intersection splits are not given for the signals at Rail Runner

Avenue and I-25, relative offsets are given. These offsets can be used, or the proposed offsets can be adjusted relative to the existing offsets implemented at these two intersections once construction from NM 313 to I-25 is complete.

The proposed signal timing would require several field observations, if they are to be implemented and should include the following:

- Verification of signal offsets in the field.
- Observations of progression in both directions, approach queues, and phase clearances.
- Field adjustments to splits and offsets to accommodate observations.
- Before and after travel time runs should be completed to validate stop delay, travel time and speeds.