

Downtown Riverside Synchronization Project

RBITRAFFIC, INC.

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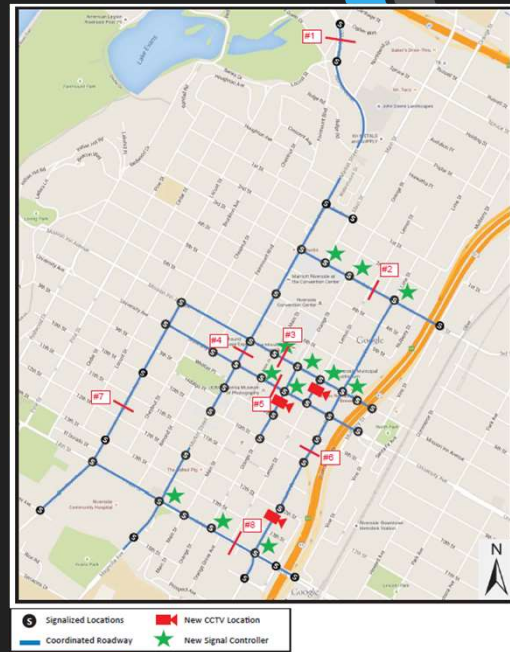
Project Overview

- Part of a larger project (High Friction Surface Treatment, HAWK Signals, and Signal Timing)
- Provide traffic signal coordination for 46 downtown intersections on 7 corridors
 - Market Street
 - 14th Street
 - University Avenue
 - Mission Inn Avenue
 - 3rd Street
 - Brockton Avenue
 - Lime Street
- Project Goal
 - Increase speed along each corridor
 - Reduce the number of stops along each corridor
 - Reduce travel time along each corridor
 - Improve CSPI score for each corridor



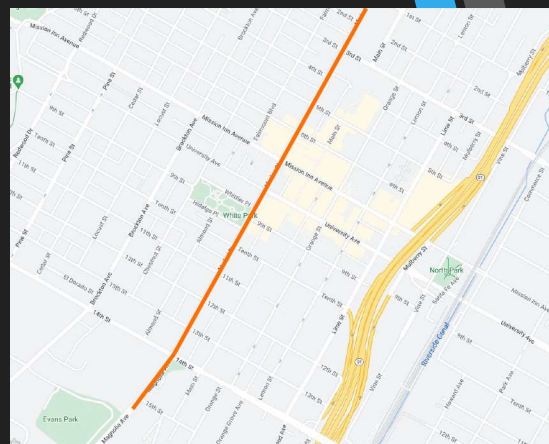
Methodology

- Determine Peak AM, Midday, and PM periods from 24-hour counts
 - AM Peak – 6:00 a.m. to 9:00 a.m.
 - Midday Peak – 11:30 a.m. to 1:30 p.m.
 - PM Peak – 3:30 p.m. to 6:30 p.m.
- Create a computer model of all 46 intersections
 - Turning movement counts
 - Lane configurations
 - Distance between intersections
- Determine system wide cycle lengths
 - AM Peak – 110 seconds
 - Midday Peak – 110 seconds
 - PM Peak – 120 seconds



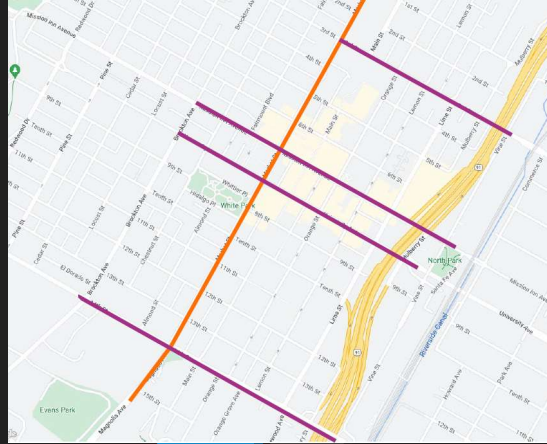
Methodology Continued

- Create signal timing plans for each individual intersection
 - Determine 'yellow' time for each approach
 - Measure each leg and establish safe pedestrian walk times
 - Allocate appropriate 'green times' for each signal phase
- Assign priority levels to each corridor
 - Priority 1 – Coordinated without concern for other corridors
 - Market Street



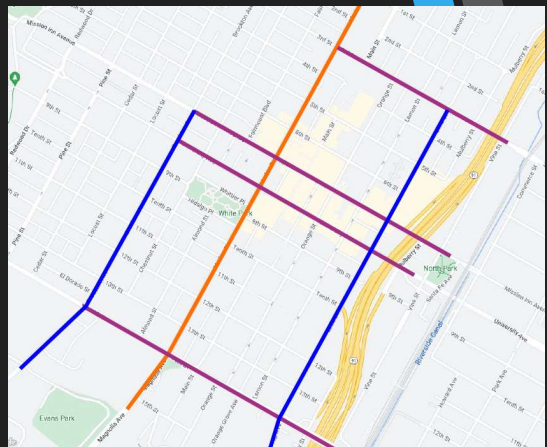
Methodology Continued

- Create signal timing plans for each individual intersection
 - Determine 'yellow' time for each approach
 - Measure each leg and establish safe pedestrian walk times
 - Allocate appropriate 'green times' for each signal phase
- Assign priority levels to each corridor
 - Priority 1 – Coordinated without concern for other corridors
 - Market Street
 - Priority 2 – Coordinated based on Priority 1 coordination
 - 14th Street
 - University Avenue
 - Mission Inn Avenue
 - 3rd Street



Methodology Continued

- Create signal timing plans for each individual intersection
 - Determine 'yellow' time for each approach
 - Measure each leg and establish safe pedestrian walk times
 - Allocate appropriate 'green times' for each signal phase
- Assign priority levels to each corridor
 - Priority 1 – Coordinated without concern for other corridors
 - Market Street
 - Priority 2 – Coordinated based on Priority 1 coordination
 - 14th Street
 - University Avenue
 - Mission Inn Avenue
 - 3rd Street
 - Priority 3 – Coordinated non-Priority 1 and 2 intersections only
 - Brockton Avenue
 - Lime Street
 - Excluded intersections



Implementation

- 'Before' Travel Time study
 - 'Floating car' method
 - Runs for each Peak Period
 - GPS and computers software package
- Input new signal timing at each intersection
 - Observe each intersection at each Peak Period for proper operation
 - Fine-tune each corridor and adjust offsets
- 'After' Travel Time study
 - Duplicate 'Before' Travel Time study methodology

Corridor Synchronization Performance Index (CSPI)

- Uses a tiered scale to evaluate performance level
- Score is generated by proprietary software
 - Reads information directly from GPS device
- Uses data collected by 'floating car' studies
 - Travel time
 - Number of stops
 - Amount of delay
 - Average travel speed

PERFORMANCE LEVEL	DESCRIPTION	CSPI SCORE
Very Good Signal Synchronization Tier 1	Operations with very few numbers of stops at signalized intersections occurring with favorable progression and travel speeds along the corridor. Vehicles get through most of the signalized intersections without stopping. The corridor has very good signal synchronization.	>= 80
Good Signal Synchronization Tier 2	Operations with few numbers of stops at signalized intersections occurring with good progression and travel speeds along the corridor. Vehicles get through many signalized intersections without stopping. The corridor has good signal synchronization.	>= 70 to 80
Average Signal Synchronization Tier 3	Operations with average numbers of stops at signalized intersections occurring with fair progression and travel speeds along the corridor. Vehicles get through above average numbers of signalized intersections without stopping. The corridor has an above average level signal synchronization.	>= 60 to 70
Below Average Signal Synchronization Tier 4	Operations with many numbers of stops at signalized intersections occurring with limited progression and slower than desired travel speeds. Many vehicles experience delay and vehicles get through fewer numbers of signalized intersections without stopping than expected. The corridor has a below average level signal synchronization.	>= 50 to 60
Needs Improvement to the Signal Synchronization Tier 5	Operations with delays and numbers of stops unacceptable to most drivers occurring with over-saturated conditions, poor progression, and low travel speeds. Most vehicles experience high delay and low travel speeds, and vehicles get through very few numbers of signalized intersections without stopping. The corridor needs improvement to the signal synchronization.	<50

Source: OCTA 2012

Results

- Balanced both directions so that no CSPI value was lower than Tier 3. Previous values ranged from Tier 1 to Tier 5.

CORRIDOR	COORDINATION SYNCHRONIZATION PERFORMANCE INDEX (CSPI)											
	AM PEAK BOTH DIRECTIONS				MIDDAY PEAK BOTH DIRECTIONS				PM PEAK BOTH DIRECTIONS			
	Before	Tier	After	Tier	Before	Tier	After	Tier	Before	Tier	After	Tier
Market Street	67.50	III	72.75	II	51.50	IV	76.75	II	73.10	II	75.25	II
14th Street	59.75	IV	92.00	I	74.50	II	100.50	I	82.50	I	91.50	I
Mission Inn Avenue	65.25	III	76.50	II	73.25	II	94.75	I	61.10	III	85.25	I
University Avenue	60.00	III	81.00	I	48.50	V	91.50	I	43.00	V	107.00	I
3rd Street	89.00	I	88.75	I	93.50	I	87.00	I	91.75	I	101.25	I
Brockton Avenue	45.75	V	71.25	II	48.05	V	102.50	I	52.50	IV	65.50	III
Lime Street	63.25	III	88.50	I	69.60	III	91.00	I	53.60	IV	92.50	I