



**OPTIMIZING SIGNAL TIMINGS
FOR BRT, MULTIMODAL
SAFETY & OTHER BENEFITS**

CITY OF ST. PETERSBURG, FL

2025 Mid-Colonial District Annual Meeting
Annapolis, MD | April 24, 2025

Pennon

1

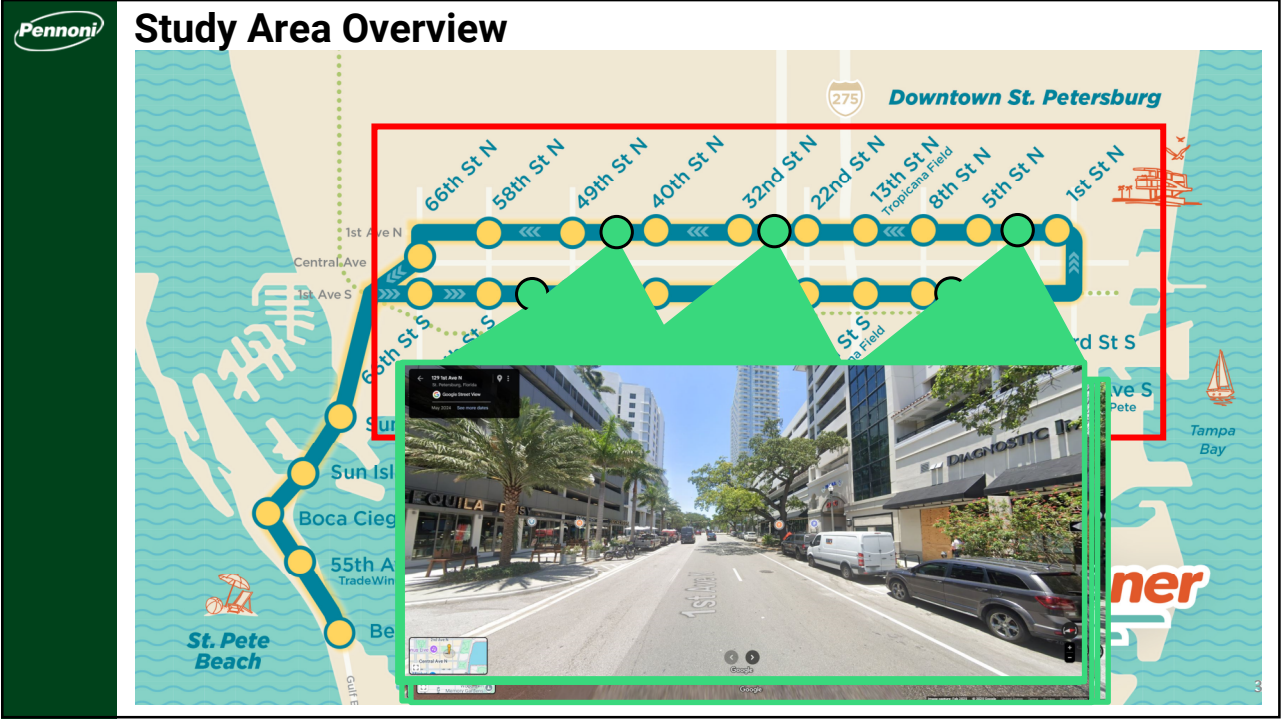


Presentation Overview

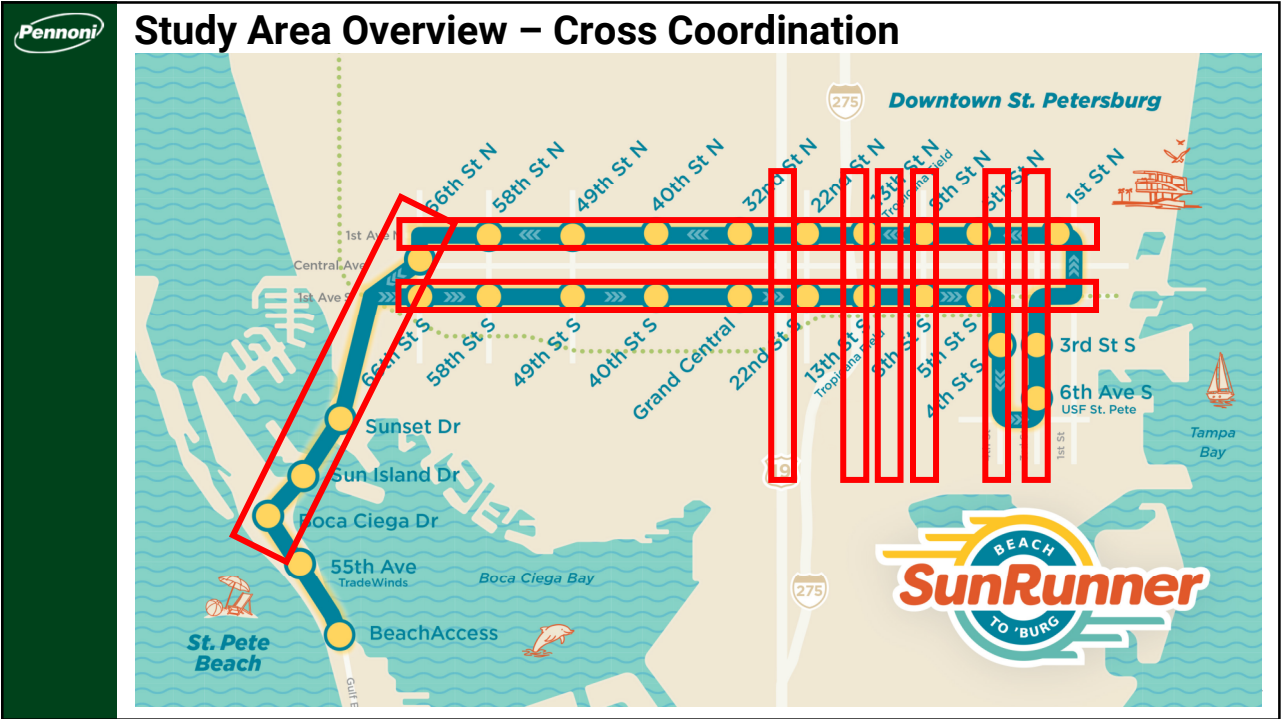
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- ▶ Study Area Overview
- ▶ Goals and Objectives
- ▶ Schedule
- ▶ Existing Conditions & Observations
- ▶ Data Collection
- ▶ Field Inventory
- ▶ Analysis & Implementation
- ▶ Signal Retiming Results
- ▶ Benefit/Cost Ratio
- ▶ Recommendations

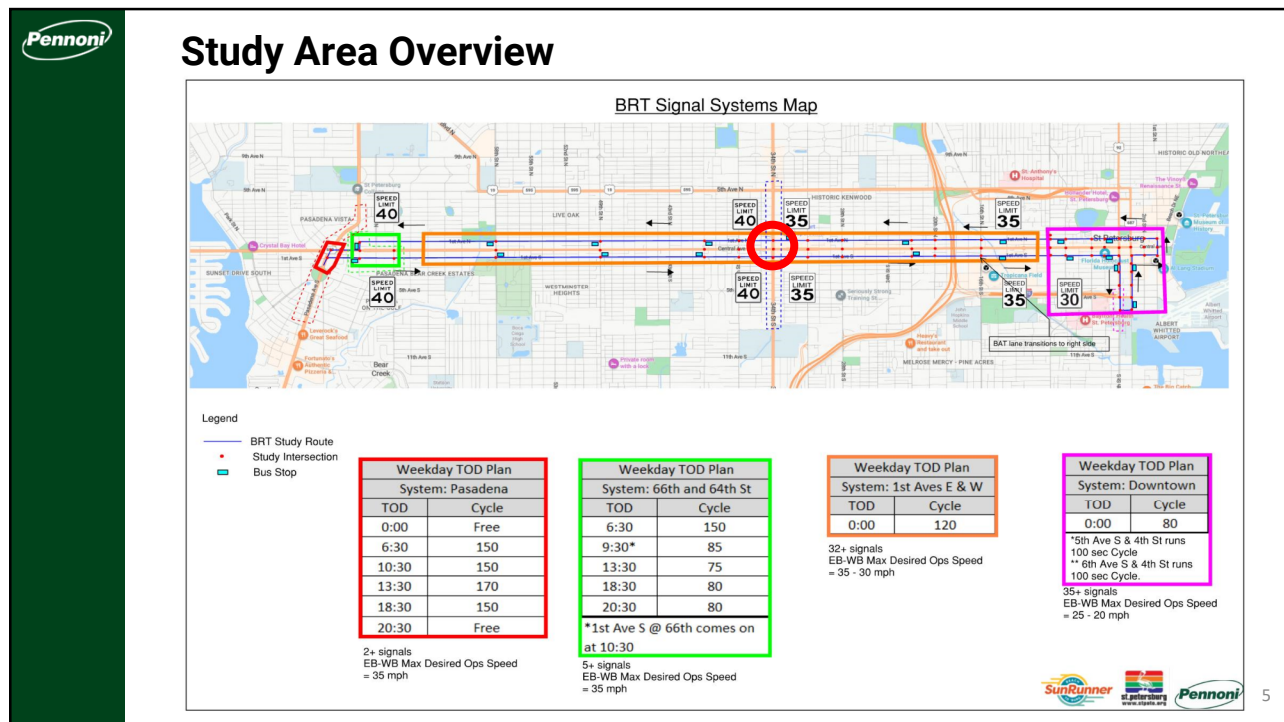
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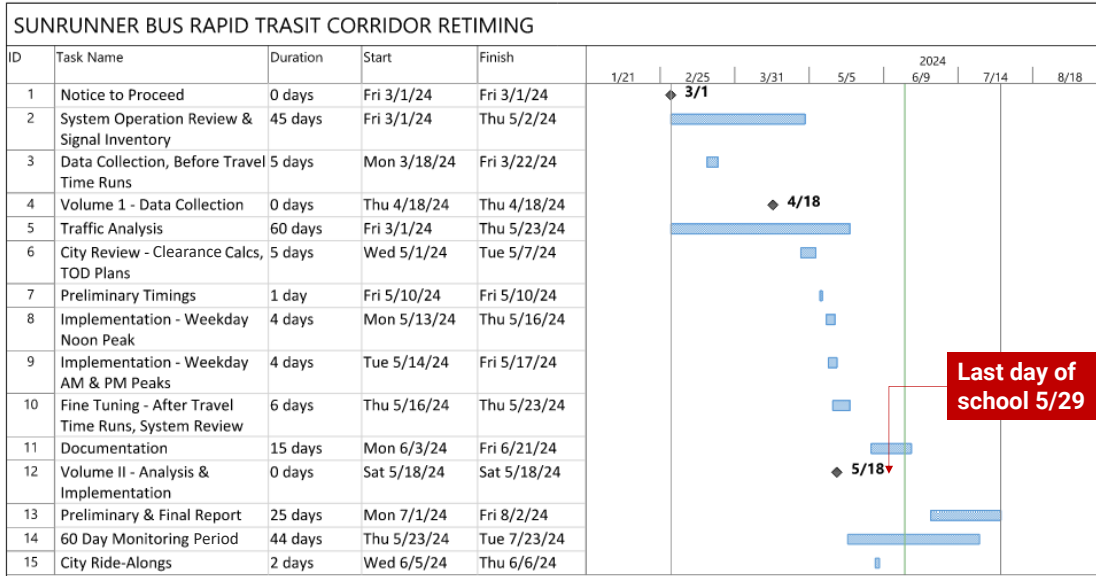
Goals and Objectives

- ▶ Providing coordinated flow during peak and off-peak periods
- ▶ Providing sufficient time for cross-street motorists and main-street left turns
- ▶ Ensuring that timing plan changes are accomplished at the proper time
- ▶ Ensuring that adequate time is provided to accommodate safe pedestrian movements
- ▶ Improve overall system reliability without increasing system speeds
- ▶ Reduce BRT travel times

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6

Schedule



7

7

Existing Conditions & Observations



- ▶ There is little/no detection (including peds) at most project Intersections - impacting system efficiency
- ▶ Lack of Actuated Pedestrian Push-Button operation impacts signal operation timing
- ▶ The Critical Intersection of 34th St (US 19) controls the system operations of the Central System
- ▶ Capacity is NOT an operational issue...no intersections are over-saturated



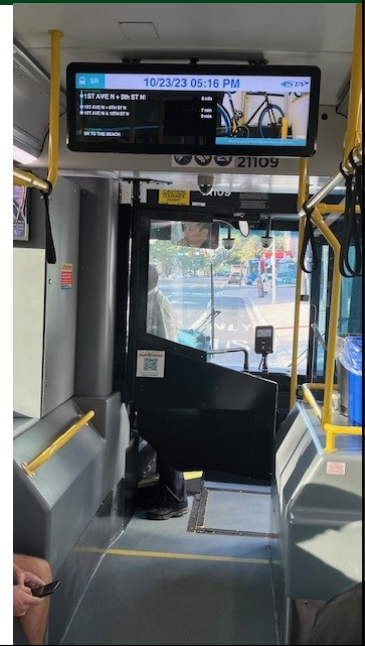
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8

Existing Conditions & Observations



- ▶ Since Central System cannot go “FREE” (most all signals are running pre-timed plans), there is a significant amount of unused green time for side streets, especially during “low volume” time periods (e.g., late night)
- ▶ Most E/W congestion occurs during Tropicana Field events
- ▶ “Double-Service” of SBL turn at 6th Ave/4th St (CBD) and WBL at Pasadena/Central (Western) will improve system reliability
- ▶ Per FDOT - and field observations - 34th St N-S coord works well at 120 seconds. HOLD this cycle length when not “FREE”

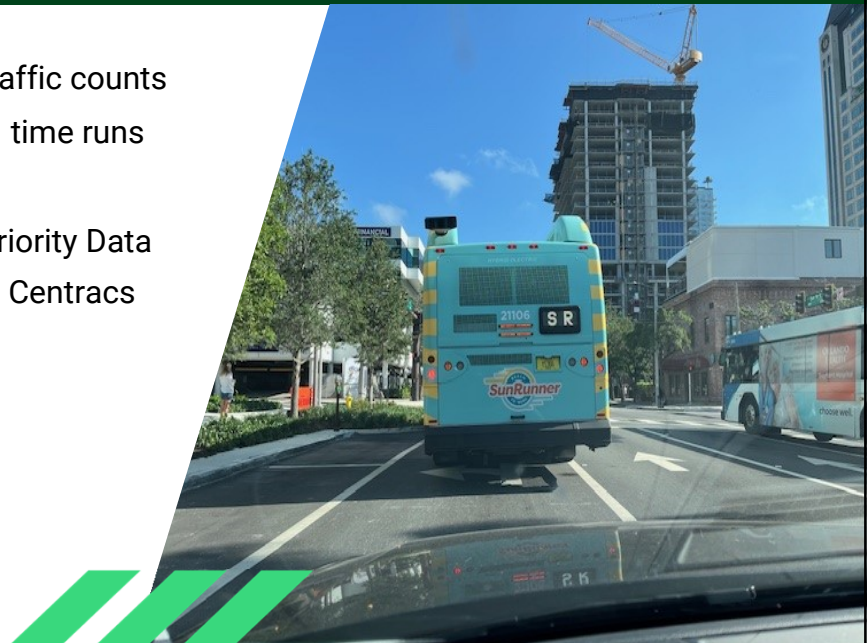


9

Data Collection



- ▶ Collect multi-modal traffic counts
- ▶ Collect “Before” travel time runs
- ▶ Crash History
- ▶ PSTA Traffic Signal Priority Data
- ▶ City timing database - Centracs



10


Data Collection

Camera Deployment & Delivery

Turning movement counts at 74 Intersections

7-day ATR Counts at 55 locations


"Near-Miss" Data



The image shows a worker in a yellow safety vest and sunglasses, using a power drill to install a camera on a traffic sign pole. The pole has several white rectangular signs attached to it. The background shows some greenery and a clear sky.

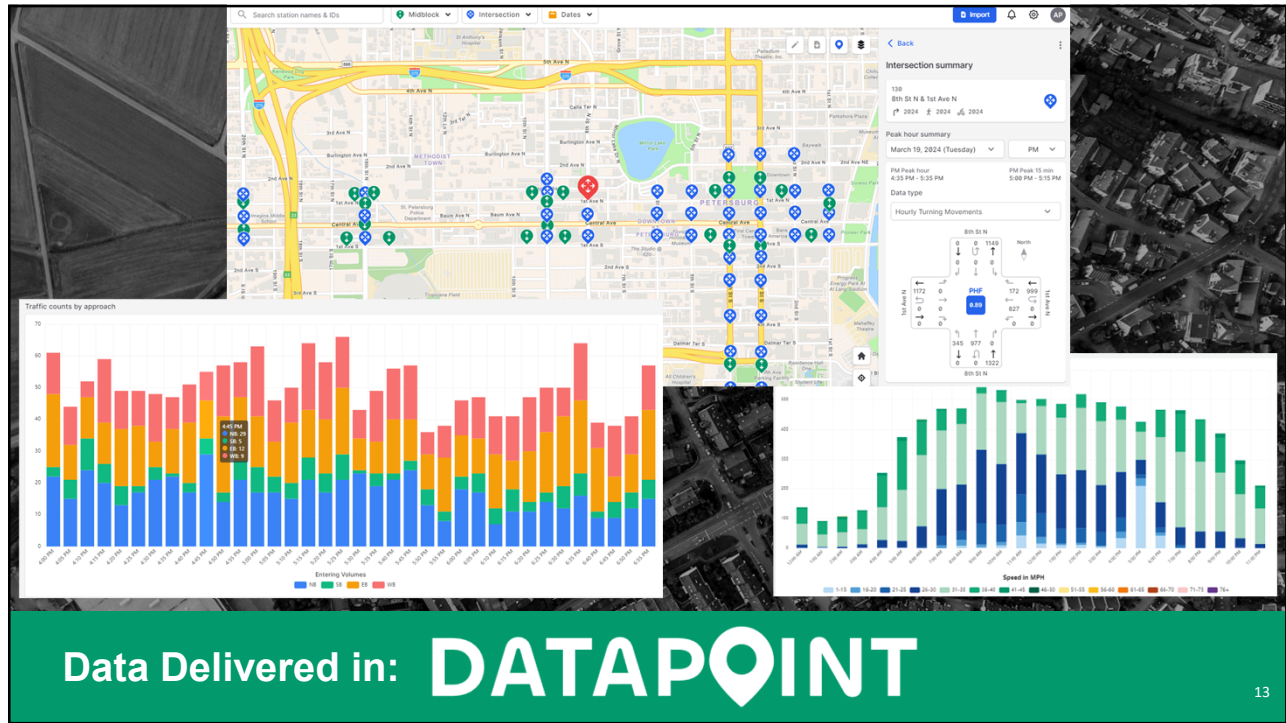
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"Near-Miss" Data



The image is a traffic camera view of an intersection. It shows several vehicles, including a red pickup truck, a blue car, and a black car. Overlaid on the image are two colored lines (blue and green) representing vehicle paths. The text "401081 2024/03/19 11:13:43" is visible at the top. The logo "QC" is in the top right corner. The text "Counts.net" is at the bottom. The image is framed by green vertical bars on the left and right sides.

12



13

Field Inventory

- ▶ Existing Equipment
- ▶ Timings / Time of Day
- ▶ Verify Actuation
- ▶ Intersection Photos
- ▶ Operational Characteristics

Signal Retiming Field Inventory - St. Petersburg, FL
78, 1st st, Central Ave

GIS BASED APPLICATION USING FULCRUM

14

Analysis & Implementation

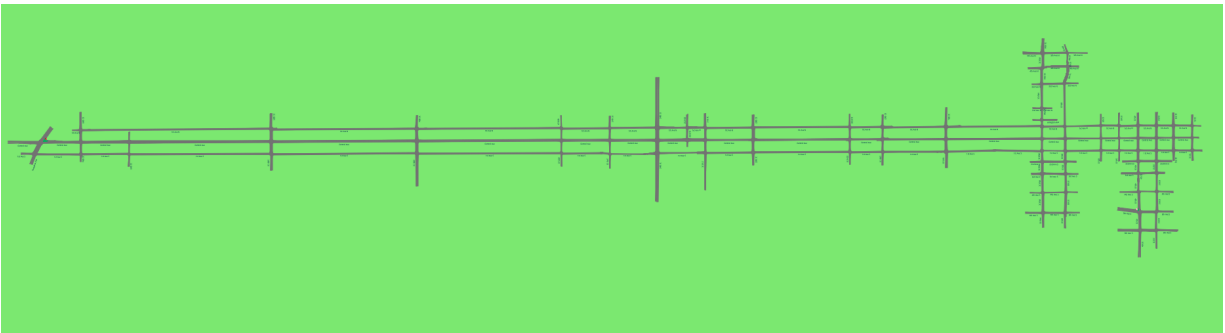


- Develop and calibrate existing conditions Synchro models



17

Synchro Model Development



18

18

Model Calibration



Peak Hour Period	Direction of Travel	Tru-Traffic (seconds)	SimTraffic (seconds)	% Δ
AM	WB	820.0	758.8	7.46 %
	EB	984.0	870.4	11.54 %
MID-DAY	WB	867.0	791.1	8.75 %
	EB	880.0	849.8	3.43 %
PM	WB	980.0	852.1	13.05 %
	EB	891.0	871.9	2.14 %

* The average travel time of the ten (10) SimTraffic runs is within 15% of the field travel times, which meets the FHWA (Publication No. FHWA-HRT-04-040) calibration guidelines.

19

19

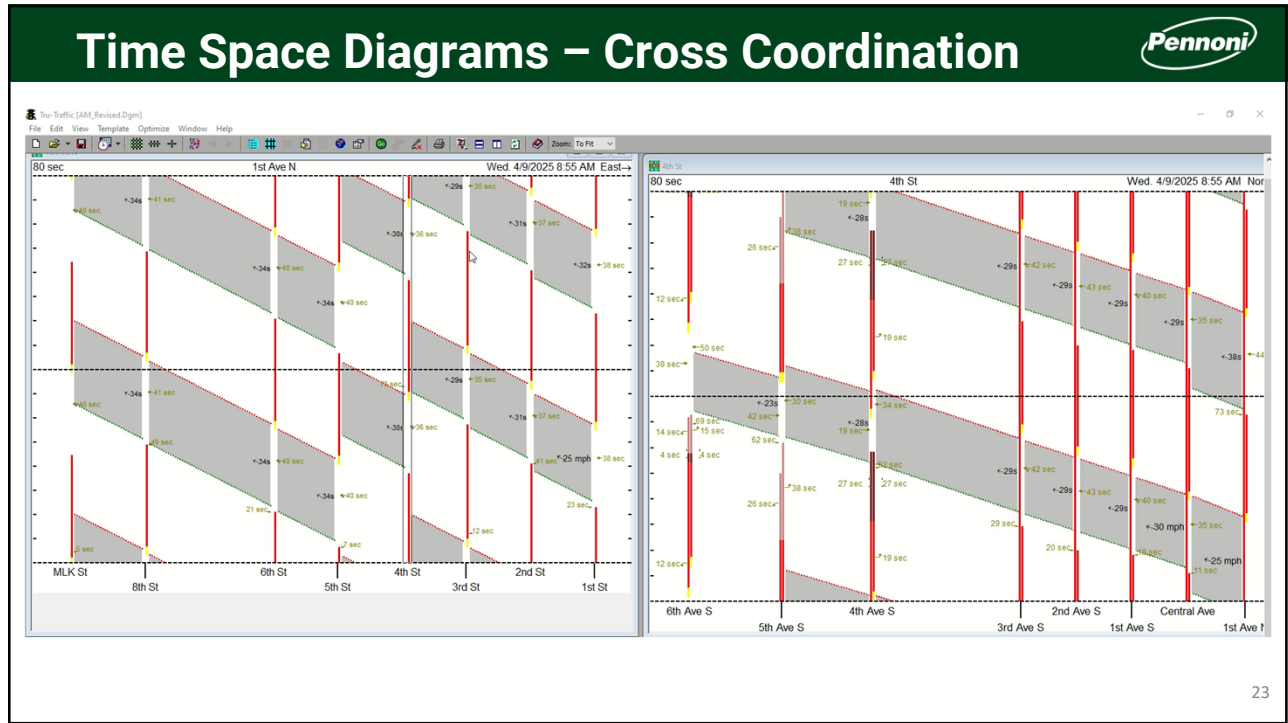
Analysis & Implementation



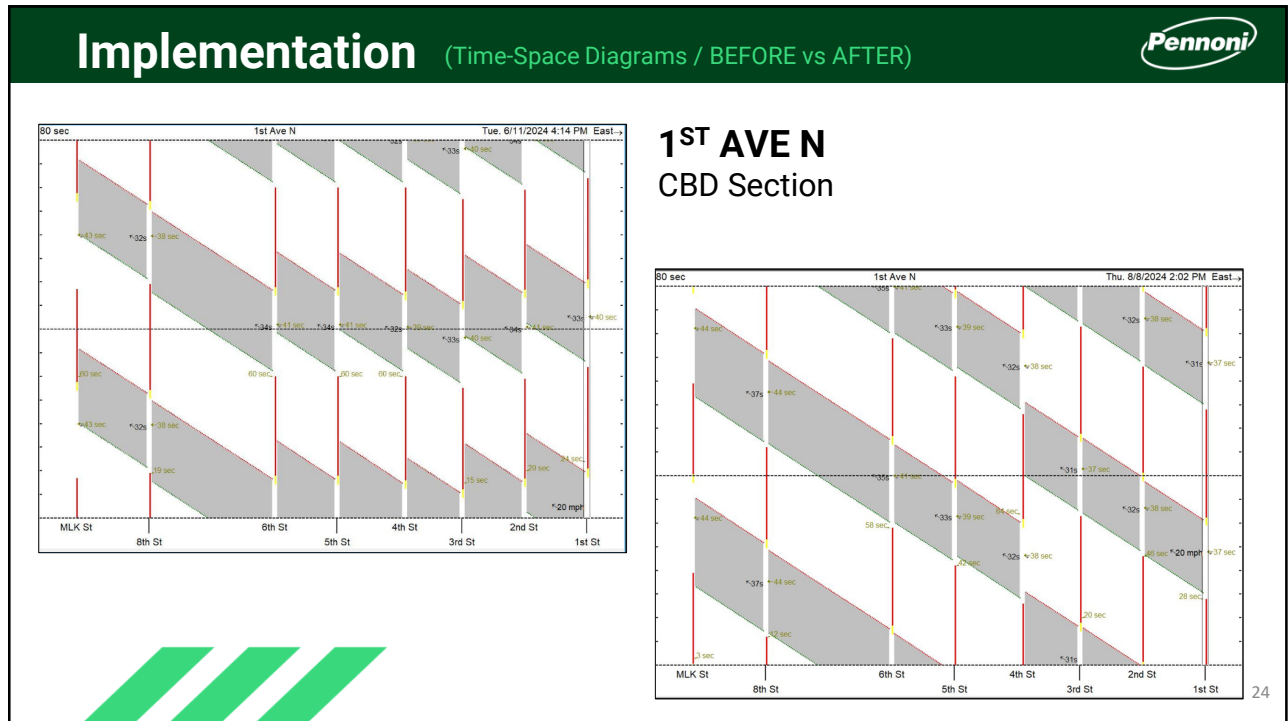
- ▶ Develop and calibrate existing conditions Synchro models
- ▶ **Vehicular and Pedestrian Clearance Calculations**
- ▶ **Optimize cycle length, splits, and offset**



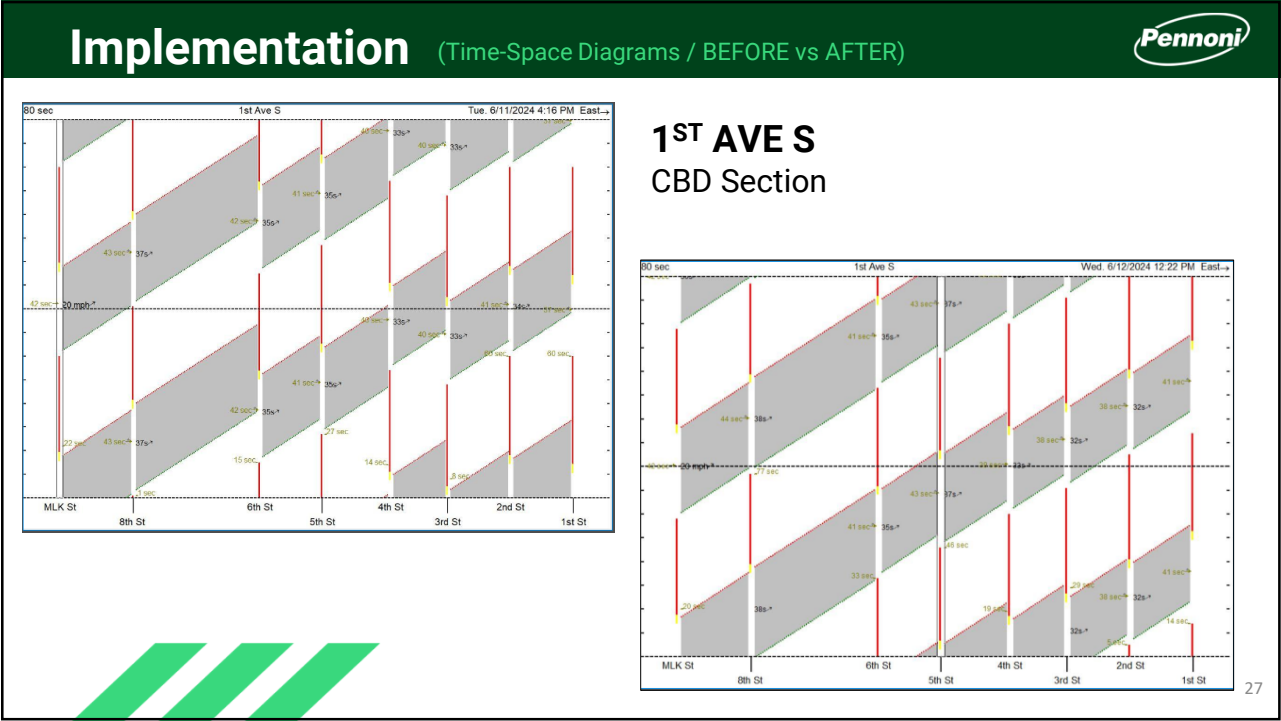
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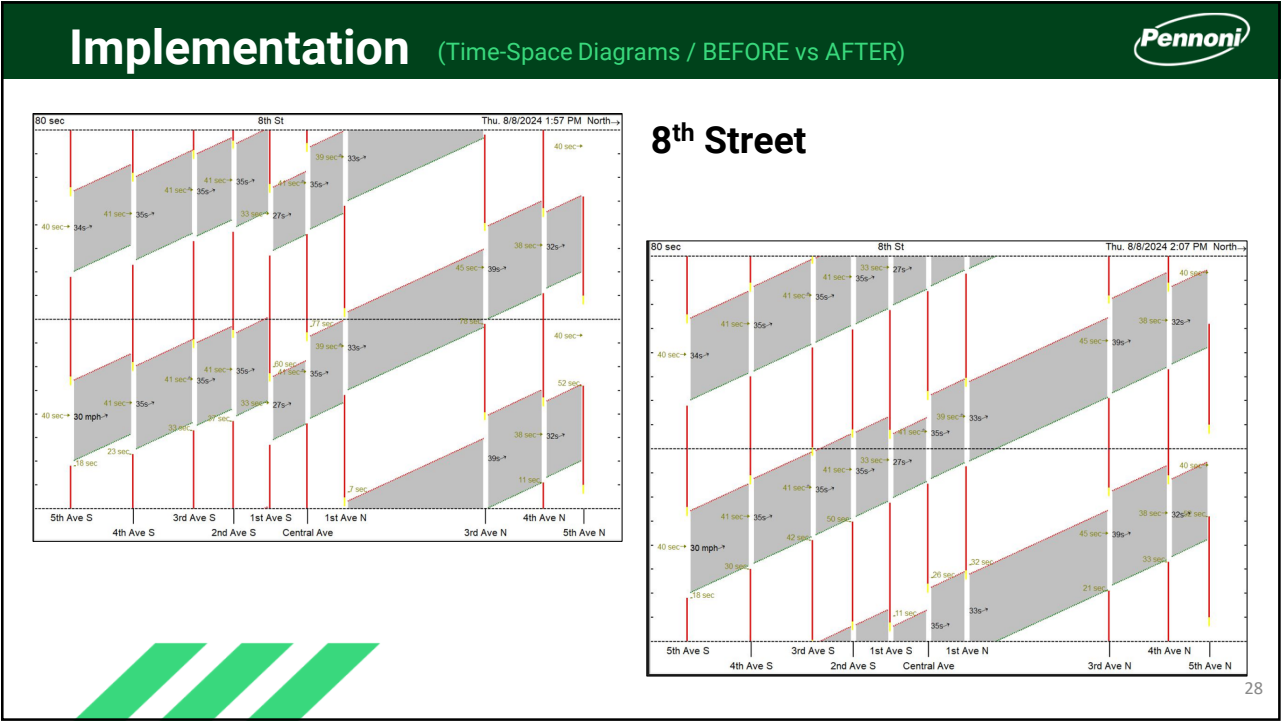
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24

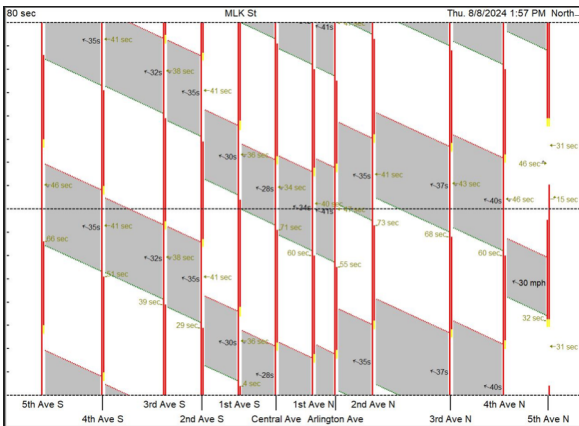


27

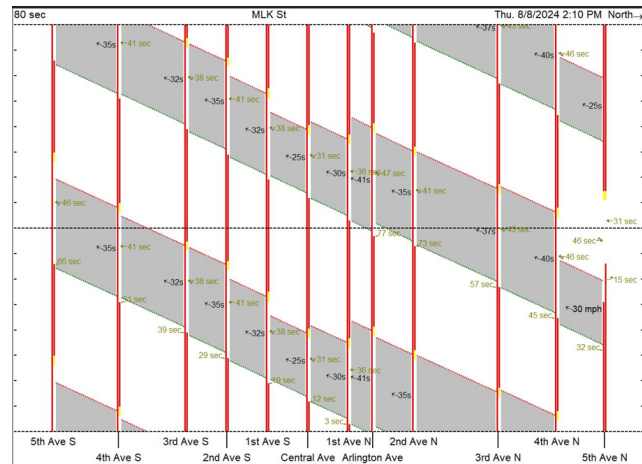


28

Implementation (Time-Space Diagrams / BEFORE vs AFTER)



MLK Street



29

29

Analysis & Implementation



- ▶ Develop and calibrate existing conditions Synchro models
- ▶ Vehicular and Pedestrian Clearance Calculations
- ▶ Optimize cycle length, splits, and offset
- ▶ Develop existing and proposed Time-Space Diagrams using Tru-Traffic Software
- ▶ **Signal Timing Implementation**
- ▶ **Field observation and fine-tuning**
- ▶ **Collect "After" travel time runs**




30

Signal Retiming Results										
Peak Hour Period	Direction of Travel	Average Travel Time (seconds)			Average Speed (mph)			Average Stops		
		Before	After	% difference	Before	After	% difference	Before	After	% difference
AM	1 st Ave N	820	627	-23.54%	25.6	33.2	29.69%	4.7	2.0	-57.45%
	1 st Ave S	984	720	-26.83%	21.2	29.05	37.03%	8.0	2.0	-75.00%
MID DAY	1 st Ave N	867	675	-22.15%	24.1	30.9	28.22%	5.7	2.0	-64.91%
	1 st Ave S	880	673	-23.52%	23.7	31.1	31.22%	6.0	3.0	-50.00%
PM	1 st Ave N	978	506	-48.26%	21.6	31.0	43.52%	7.0	2.0	-71.43%
	1 st Ave S	890	679	-23.71%	23.6	30.7	30.08%	6.3	1.8	-71.43%

31


31

Signal Retiming Results



BEFORE / AFTER SUNRUNNER RIDES

TOD Period	Before / Mar 2024	After / May 2024	Total Time Savings
	Travel Time (Minutes)		(Minutes)
AM Peak	54:29	48:02	- 6:27
Midday Peak	50:42	49:22	- 1:20
PM Peak	47:25	43:45	- 3:20



32

32

Analysis & Implementation



- ▶ Develop and calibrate existing conditions Synchro models
- ▶ Vehicular and Pedestrian Clearance Calculations
- ▶ Optimize cycle length, splits, and offset
- ▶ Develop existing and proposed Time-Space Diagrams using Tru-Traffic Software
- ▶ Signal Timing Implementation
- ▶ Field observation and fine-tuning
- ▶ Collect "After" travel time runs
- ▶ **Complaint resolution – 60 days**
- ▶ **Benefit/Cost summary and project documentation**



33

Signal Retiming Results



ANTICIPATED PROJECT BENEFIT / COST

FHWA Tool for Operations Benefit/Cost (TOPS-BC): Version 4.0

Estimate Benefits of TSM&O Strategies

(Please note, some cells will show error codes before the User enters data in the required Green Cells)

Strategy: Signal Coordination: Transit Signal Priority

Length of Analysis Period (Hours) 16

Signal Timing Type: Transit Signal Pri

Cost Information

Facility Characteristics	Link Facility Type: Principal Arterial		Baseline		Improvement		Improvement		Change	
	Baseline	Override	Baseline	Override	Baseline	Override	Baseline	Override	Baseline	Override
Link Length (Miles)	6									
Total Number of Lanes	4				4				4	
Link Capacity (All Lanes - per Period)	115200				115200				131328	
Free Flow Speed (MPH)	30	45								
Link Volume (during the time period of analysis)										
	16883									
Congested Speed										
				29.877				29.877		0.000
Vehicles Miles Traveled (VMT)				101298.0000				101298.0000		0.0000
V/C				0.1466				0.1286		-0.0180
TTI(m)				1.0041				1.0041		0.0000

→ 67:1

34

34

Recommendations



SHORT TERM

- 1) Run the "Midday Peak TOD Plan" for CBD, Central Systems from 6:30 PM to 6:30 AM
- 2) Review/Evaluate options for pedestrian operations
- 3) Restripe 40th St between Central/1st Ave N to add a left turn lane NB
- 4) Consider reducing the Transit Signal Priority (TSP) "schedule deviation delay"
- 5) Post-Implementation Crash Analysis



35

Recommendations



MEDIUM TERM

- 1) Actuate all Central System Signals 2
- 2) Improve Cross-Coordination with FDOT north/south systems
- 3) City-Wide Retiming Program



36

Recommendations



LONG TERM

- 1) Upgrade "Older" Span Wire Intersections to Mast Arms
- 2) Consider Lane Use Reconfiguration at FDOT's 4th St and I-175 Ramps
- 3) When appropriate adjacent redevelopment occurs, perform Intersection Control Evaluations (ICE) analysis
- 4) Intelligent Transportation System (ITS) Enhancements



37

Questions?



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38