COLLIER Metropolitan Planning Organization

Transportation System Performance Report & Action Plan

Action Plan

DRAFT

Prepared by

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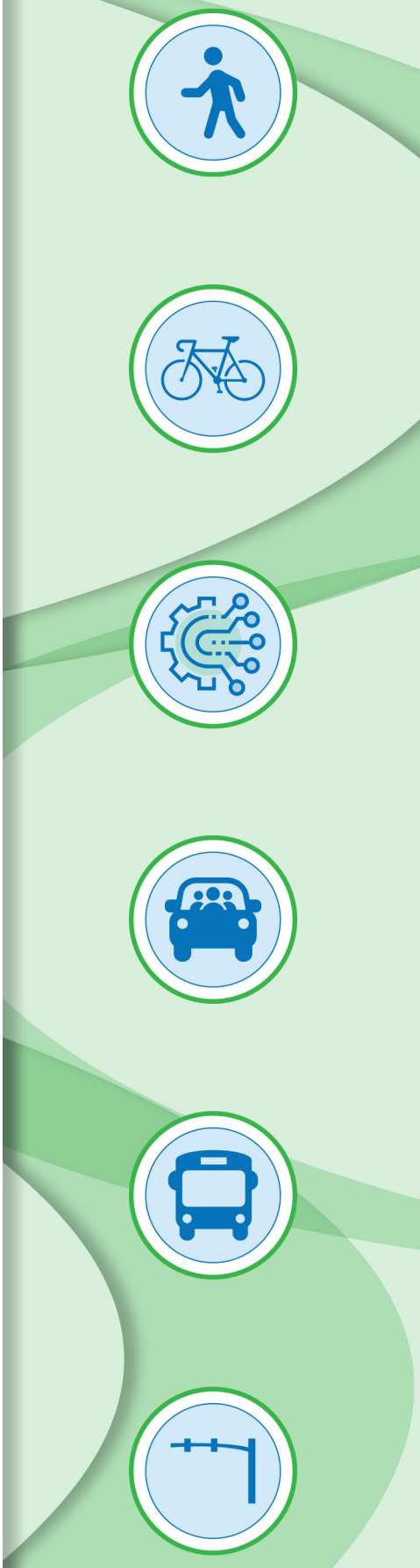

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1.0 Introduction

The Collier Metropolitan Planning Organization (MPO) is federally mandated to implement a Congestion Management Process (CMP) as part of its routine planning efforts.

The Congestion Management Process (CMP) is a detailed 8-step process that an urban area follows to improve the performance of its transportation system by reducing the negative impacts of traffic congestion. A CMP is developed to improve traffic flow and safety conditions. It seeks to accomplish this by using an objectives-driven, performance-based approach and provides accurate, up-to-date information on transportation system performance and assesses alternative strategies for congestion management that meet state and local needs.

To carry out these requirements, the MPO has created the Transportation System Performance (TSP) Report and Action plan. The Action Plan covers steps 5 through 8 of the CMP. Steps 2 through 4 are discussed in the Baseline Conditions Report. As the first TSP Report produced by the MPO, this Action Plan includes recommendations for revising the overall CMP report that was last adopted by the MPO Board in 2017. The 2017 CMP provides the overview and direction for completing the Baseline Conditions and Action Plan analysis.

The Baseline Conditions Report and the Action Plan work in tandem to cover each of the 8 steps in detail. The list below shows each step of the CMP and the specific plan and chapter in which it is addressed.

1. **DEVELOP CONGESTION MANAGEMENT OBJECTIVES** – Define objectives for congestion management that achieve the desired outcome *(**Action Plan – Chapter 2**)*
2. **DEFINE CMP NETWORK** – Define the transportation system that will be analyzed in the CMP *(**Baseline Conditions Report – Chapter 2**)*
3. **DEVELOP MULTIMODAL PERFORMANCE MEASURES** – Define measures that will be used to measure congestion *(**Baseline Conditions Report – Chapter 3**)*
4. **COLLECT DATA/ MONITOR SYSTEM PERFORMANCE** – Establish a coordinated program for data collection and system performance monitoring *(**Baseline Conditions Report – Chapter 4**)*
5. **ANALYZE CONGESTION PROBLEMS AND NEEDS** – Identify locations with congestion problems and identify the sources of these problems. *(**Baseline Conditions Report – Chapter 5 & Action Plan – Chapter 3**)*
6. **IDENTIFY AND ASSESS STRATEGIES** – Identify and evaluate benefits of appropriate congestion management strategies *(**Action Plan – Chapter 4**)*
7. **PROGRAM AND IMPLEMENT STRATEGIES** – Identify plan for implementing the CMP as part of the regional transportation planning process (***Action Plan – Chapter 5**)*
8. **EVALUATE STRATEGY EFFECTIVENESS** – Implement a process for regular assessment of the effectiveness of implemented strategies (***Action Plan – Chapter 6**)*

Action Plan

The CMP is a working tool that is integrated into the MPO's project prioritization process, Transportation Improvement Program (TIP), and Long Range Transportation Plan (LRTP). The objectives-driven, performance-based CMP starts with the Baseline Conditions Report which monitored and evaluated the current conditions to identify where congestion exists. Based on the identified goals and objectives and the established performance measures of the CMP, the Action Plan analyzed and evaluated the congested areas to identify potential mitigation strategies, implementation of appropriate strategies, and the development of a monitoring plan.

The outputs of the CMP, such as identified hot spot congested corridors/locations and their recommended mitigation measures, proceed through the CMP process where they are evaluated, and projects or strategies are selected for implementation. The projects or strategies that are identified for implementation through the CMP are then moved into project development and programmed into the TIP for funding and implementation. Once completed, the implemented projects are monitored to evaluate the strategy effectiveness. In Collier County, CMP projects are typically funded using boxed funds identified in the LRTP along with other local revenues. This allows the MPO to review current needs and fund strategies for implementation which best address congestion.

In addition to identifying future congestion reduction strategies, this Action Plan includes suggested revisions to the 2017 CMP Report based on the review of gaps in data availability and revisions resulting from the Baseline Conditions analysis. Further recommendations are identified later in this report associated with the identification and evaluation of strategies implemented through the CMP. These recommendations are outlined in the following section.

2.0 Congestion Management Process Revisions

Revisions to four areas of the Congestion Management Process were identified during the TSP Baseline Conditions and Action Plan. These include:

1) Updated goals, objectives, and performance measures in the Baseline Condition Report.
2) New congestion management strategies added to the Implementation Matrix to address the expanded analysis and definition of congestion in the Baseline Conditions Report.
3) Updated Strategy Evaluation Criteria to align with congestion management, goals, strategies, and hot spot congested areas in Collier County.
4) Revising the strategy evaluation and monitoring plan to better identify the appropriate performance measures being addressed.

2.1 Goals and Objectives

The CMP Goal and Objectives were expanded in the Baseline Conditions Report to guide the process of monitoring congestion and improving the mobility of persons and goods in Collier County. As a part of the TSP recommended enhancements to the CMP process, these revisions were compiled based on a review of CMP goals and objectives used by other MPOs in Florida and nationwide that would complement the Collier MPO's 2017 CMP Objectives.

The CMP goal and objectives are used to guide the selection of performance measures used to measure congestion, identify, and prioritize congestion management strategies.

2.1.1 Goal

Improve Collier County's transportation system performance and reliability through mitigating congestion and improving the safety and mobility of people and goods.

2.1.2 Objectives

Objective 1: Promote transportation investments that support the Long Range Transportation Plan's priorities, goals, and objectives.

Objective 2: Integrate the Congestion Management Process and its proposed improvements into the Long Range Transportation Plan, the Transit Development Plan (TDP), the Bicycle and Pedestrian Master Plan, and support the integration of transportation and land use.

Objective 3: Develop, maintain, expand, and close gaps in pedestrian, bicycle, and shared use path facility networks for efficient and safe movement of people. Connect these pedestrian and bicycle facilities to existing and future transit stops.

Objective 4: Reduce vehicle miles traveled (VMT) by encouraging alternative modes of transportation, supporting sustainable land use development, and creating an integrated multi-modal transportation system.

Objective 5: Optimize the movement of goods.

Objective 6: Improve the safety of the transportation facilities.

2.1.3 Performance Measures

Table 3-2 provides a crosswalk illustrating the alignment between the multimodal performance measures and the objectives that guide the CMP as noted above. Each performance measure was chosen to assess system performance and identify problem areas to achieve the desired outcome stated by the goal and objectives.

Table 2-1: Performance Measure & Objective Alignment

Category	Objectives	1	2	3	4	5	6
Travel Demand	Percent of Roadway Miles by Volume to Capacity (V/C) Ratio	✓	✓			✓	
	Percent of Vehicle Miles Traveled by Volume to Capacity (V/C) Ratio	✓	✓			✓	
	Number of signalized intersections connected to ATMS	✓	✓			✓	
Transit Travel	Average bus route service frequency and number of routes	✓	✓		✓		
	Passenger Trips (Annual Ridership)	✓	✓		✓		
	Passenger trips per revenue hour	✓	✓		✓		
	Transit On-Time Performance	✓	✓		✓		
Pedestrian/ Bicycle Facilities	Centerline miles of bicycle lanes	✓		✓	✓		
	Linear miles of connector sidewalks on arterial roadways	✓		✓	✓		
	Linear miles of Shared Use Paths adjacent to roadways	✓	✓	✓	✓		
Goods Movement	Vehicle Miles Traveled (VMT) on designated truck routes with V/C greater than 1.0	✓	✓			✓	
	Number of Crashes Involving Heavy Vehicles / Trucks	✓	✓			✓	✓
Safety	Total Crashes	✓		✓			✓
	Motor vehicle severe injury crashes	✓		✓			✓
	Motor vehicle fatal crashes	✓		✓			✓
	Pedestrian and bicycle severe injury and fatal crashes	✓		✓			✓
TDM	Number of people registered in the FDOT Commute Connector database that have an origin in Collier County.	✓	✓		✓		
Accessibility	Share of regional jobs within ¼ mile of transit	✓	✓		✓		
	Share of regional households within ¼ mile of transit	✓	✓		✓		
Incident Duration	Mean time for responders to arrive on-scene after notification	✓					✓
	Mean incident clearance time	✓					✓
	Road Ranger stops	✓					✓
Customer Service	Report on nature of comments/responses and customer satisfaction.	✓	✓				

2.1.4 Implementation Strategies

Based on the expanded definition of congestion causing factors included in the Baseline Conditions Report, appropriate strategies have been suggested and included in the Congestion Management Strategies. These strategies provide the MPO's planning partners with an expanded opportunity to identify future projects which address a range of multimodal considerations. Section 4 of this report provides additional detail on those revisions.

2.1.5 Strategy Evaluation Criteria

As part of this TSP update, a review of the 2017 CMP Report identified certain performance measures were better suited as strategy evaluation criteria. In addition to relocating these performance measures to the strategy evaluation step, a criterion was added to screen project submittals for consistency with the identification of congestion hot spots in the Baseline Conditions Report.

2.1.6 Strategy Effectiveness Matrix

Likewise, the strategy effectiveness used for evaluating implemented strategies was expanded to better connect the CMP performance measures to implemented projects consistent with the congestion reduction strategies identified as part of this Action Plan.

3.0 Analysis of Congested Areas and Hotspots

This section of the Action Plan furthers the analysis conducted in the Baseline Conditions Report which identified a tiered list of congestion hotspots. This section provides an analysis of those congested hot spots and identifies mitigation strategies based on the following categories:

- Committed Projects
- Safety
- Schools
- Transit
- Multimodal
- Intersection analysis (ICE)
- "Big Data"

Based on this analysis the list of CMP congestion mitigation strategies can be targeted based on congestion in Collier County.

3.1 Committed and Programmed Projects

Figure 3-1, Table 2-1 and Table 2-2 indicate the locations and descriptions of programmed roadway projects in Collier County. While these projects are not necessarily projects originally identified as part of the Congestion Management Projects, they address efficient travel movement, operational improvements, and roadway capacity which all have an influence on existing traffic conditions along the CMP network. These projects are overlaid with the hotspot congestion areas identified in the Baselines Conditions Report, in Figure 3-1, to highlight several of the congested corridors that will be affected by the implementation of these projects including:

- (CR 846) Immokalee Rd,
- Vanderbilt Beach Rd,
- Pine Ridge Rd,
- US 41 in the City of Naples.

Considering the effect of these projects on future levels of congestions is important for conducting the system wide analysis as these projects may alleviate or shift travel patterns leading to congested corridors.

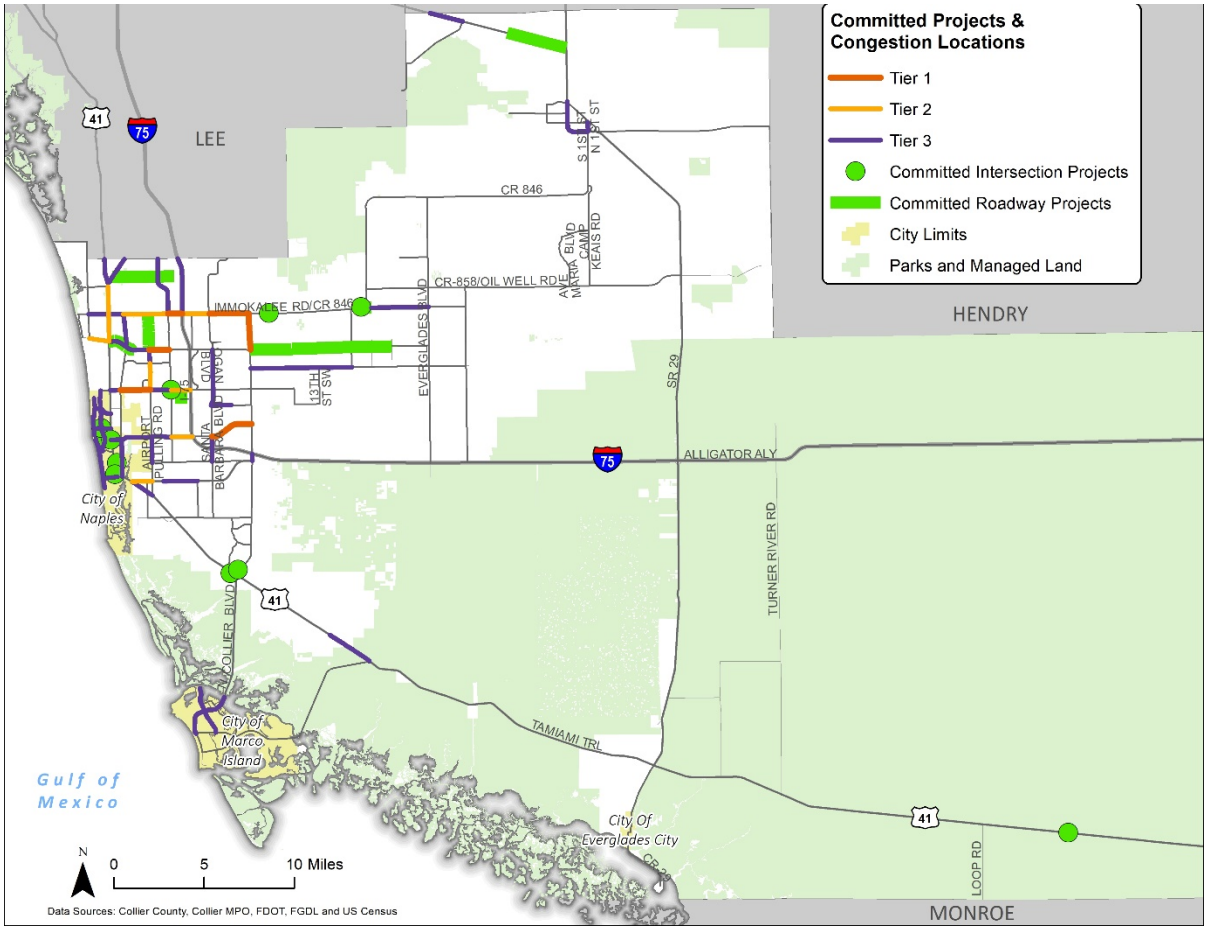


Figure 3-1: Programmed Roadway Projects in Collier County

Table 3-1: Programmed Roadway Segment Projects to be Evaluated

Project Location	Improvement
16th St Bridge from 16th St to 16th St	New Bridge
Randall Blvd from Immokalee Rd to 8th St	Widen from 2 to 4 lanes
SR 82 from Gator Slough Ln to SR 29	Widen from 2 to 4 lanes
Vanderbilt Beach Rd from Collier Blvd to 16th St	New 2 lane and new 4 lane Facility and widen from 2 to 4 lanes
Airport Pulling Rd from Vanderbilt Beach Rd to Immokalee Rd	Widen from 4 to 6 lanes
Vanderbilt Beach Rd from US 41 to East of Goodlette-Frank Rd	Widen from 4 to 6 lanes
Veterans Memorial Blvd from Old US 41 to Strand Blvd	Widen from 2 to 4 lanes and New 4 lane Facility
Whippoorwill Ln from Pine Ridge Rd to Stratford Ln	Widen from 2 to 4

Table 3-2: Programmed Intersection Projects to be Evaluated

Project Location	Improvement
US 41 at Oasis Visitor Center	Add Left Turn Lane
Immokalee Rd at Woodcrest Dr	Intersection Improvements
Price St at Waterford Dr	Roundabout Implementation
Pine Ridge Rd at Livingston Rd	Intersection Improvements
Randall Blvd at Immokalee Rd	Intersection Improvements
Triangle Blvd at Celeste Dr	Roundabout Implementation
10th St at 5th Ave N	Roundabout Implementation
3rd Ave S at 8th St S	Roundabout Implementation
Mooring Line Dr at Crayton Rd	Roundabout Implementation
Crayton Rd at Harbour Dr	Roundabout Implementation
Golden Gate Pkwy at US 41	Intersection Improvement

3.2 Safety Analysis

MPOs are required to address the Safety Emphasis Areas of the State Strategic Highway Safety Plan in their planning efforts. To address safety conditions, the Baseline Condition Reports determined the top intersection and roadway segment crash locations based on highest frequency (total) and highest rate (based on traffic volume) of crashes over a five-year analysis period (2014 to 2018). From the top crash locations, five high crash corridors were selected for conducting a safety assessment to identify appropriate countermeasures for improving roadway safety. Figure 3-2 shows the five corridors where the safety assessments were conducted.

The safety assessments included a disaggregation of the crash data by crash type, injury severity, environmental conditions, and road conditions and reported the statistics compared with statewide averages. A detailed desktop review was conducted on crash trends and roadway characteristics and observations to develop corridor specific safety recommendations. The safety assessments for these five locations are included in Appendix C.

Several of the key recommendations that came out the assessments include:

- Signal timing and signal change/clearance intervals studies
- Signage and Pavement Markings (e.g. special emphasis crosswalks, yield/stop for pedestrian signs, advanced street signs)
- Visibility and sightline improvements at intersections
- Traffic control devices (e.g. left turn signals, variable message signs, pedestrian hybrid beacons)
- New and upgrade existing bicycle and pedestrian facilities and crossings

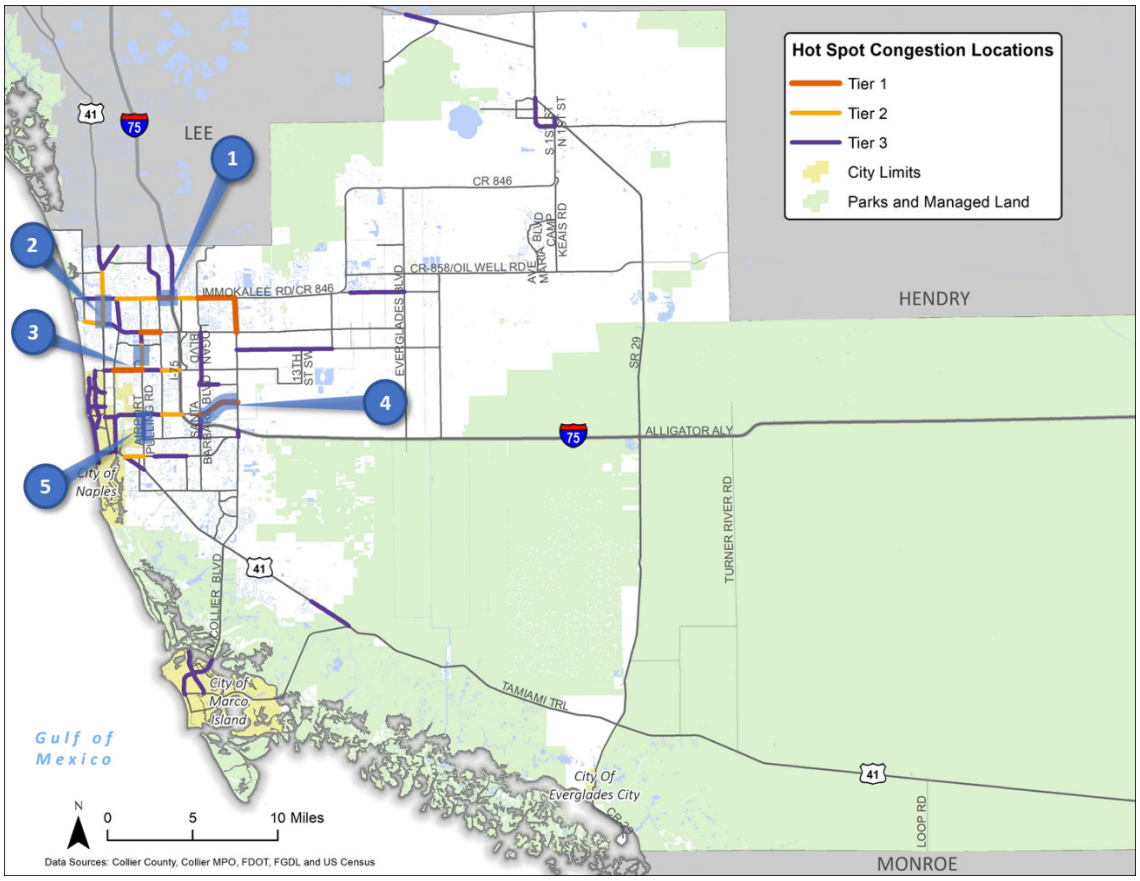


Figure 3-2: Safety Assessment Corridors

Map	Safety Assessment Corridors
1	Immokalee Rd from Livingston Rd to I-75
2	US 41 from Vanderbilt Beach Rd to Immokalee Rd
3	Airport-Pulling Rd from Pine Ridge Rd to Orange Blossom Dr
4	Golden Gate Parkway from Santa Barbara Blvd to CR 951 (Collier Blvd)
5	Airport-Pulling Rd from Golden Gate Pkwy to Radio Rd

3.3 School Analysis

The Baseline Conditions Report listed top 20 schools with the most traffic congestion concerns and refined the list to 9 schools as top-tier locations. The analysis conducted to identify the top-tier locations of concern included selecting the schools with highest bus eligibility rates. Students that qualify for bus eligibility when they are not in reasonable walking distance from school. Reasonable walking distance is defined by Florida Administrative Code 6A-3.001(3) as any distance not more than 2 miles between the home and school or one and one-half (1 ½) miles between the home and assigned bus stop. Additionally, the School District of Collier County indicated that school bus ridership is very low. Therefore, schools with the highest bus eligibility rates were selected for further analysis and for evaluation against school congestion management

strategies because their student population is the most vehicle dependent therefore generating higher volumes of trips during arrival and pick-up time.

Congestion management tools were evaluated for applicability and effectiveness at each of the 9 schools. These tools were categorized into three types of strategies which included the operation and design of the adjacent roadway network; operation and design of the school site; and transportation modes.

The following provides a summary of the effectiveness of the congestion management strategies that were evaluated at the top-tier congested school locations. A full school by school analysis as well as additional recommendations for future studies and strategies can be found in Appendix D.

- Low to medium effectiveness
    - Traffic calming measures – many of the roadways adjacent to the schools are arterials and collectors, traffic calming techniques would not necessarily feasible or would create more congestion.
    - Additional sidewalks and bicycle facilities – the installation of new pedestrian and bicycle facilities or upgrading the existing facilities (e.g. constructing wider or separated bike lanes and sidewalks) could increase the attractiveness of walking and cycling. However, some schools are located far away from residential areas or are located along major arterials where it is not safe or feasible to walk or bike due to age of the student and speed and volume of traffic.
- Medium to high effectiveness
    - Traffic signal coordination – tools such as signal coordination, signal optimization at school dismissal times, and pedestrian priority crossing signals were considered effective because of the flexibility of the tools. Additionally, many of the schools are near signals installed along adjacent arterials and collectors.
    - School site management – on-site design and off-site waiting lots, staggering dismissal times, and school dismissal automation software reduce peak volume times and congestion in drop-off and pick-up zones.
- High effectiveness
    - Transportation mode switch – encouragement strategies such as information about school bussing routes, carpooling apps, transit, walking school bus and bike to school days aim to reduce the number of vehicle trips at peak hours drop-off and pick-up times.

Figure 3-3: Top-Tier Congested Schools

Table 3-3: Top Collier County Schools for Congestion Management Evaluation

School Name	School Abbreviation
Gulf Coast High	GCH
Laurel Oak Elementary	LOE
Marco Island Academy	MIA
Naples High	NHS
North Naples Middle	NNM
Oakridge Middle School	OMS
Pelican Marsh Elementary	PME
Palmetto Ridge High	PRH
Pine Ridge Middle	PRM

3.4 Transit Analysis

Collier Area Transit (CAT) is currently conducting an update to the Transit Development Plan (TDP) that will develop improvements for meeting transit needs in Collier County for the next 10 years. Preliminary recommendations from the TDP were reviewed for strategies that coincide with congestion strategies and congestion hotspots identified in the Baselines Conditions Report. Figure 3-4 shows the transit routes with the highest ridership mapped against the congested hotspots. Routes with the highest ridership will be analyzed in the TDP.

The main recommendations that were applicable to congestion hotspots were service improvements and one notable capital/infrastructure improvement. Service improvements include enhancements to existing routes related to route and system network design, frequency, extended service hours, and/or additional days of service. This category also includes service expansion, including new routes/modes for operating in areas not currently served CAT. Capital/Infrastructure improvements involve Park-and-Ride Lots. A study is currently underway to identify and develop a standardized methodology for locating, operating, and maintaining park-and-ride sites in Collier County. The study will consider each site's proximity to existing and planned transit routes, major employment locations, educational facilities, and tourist destinations.

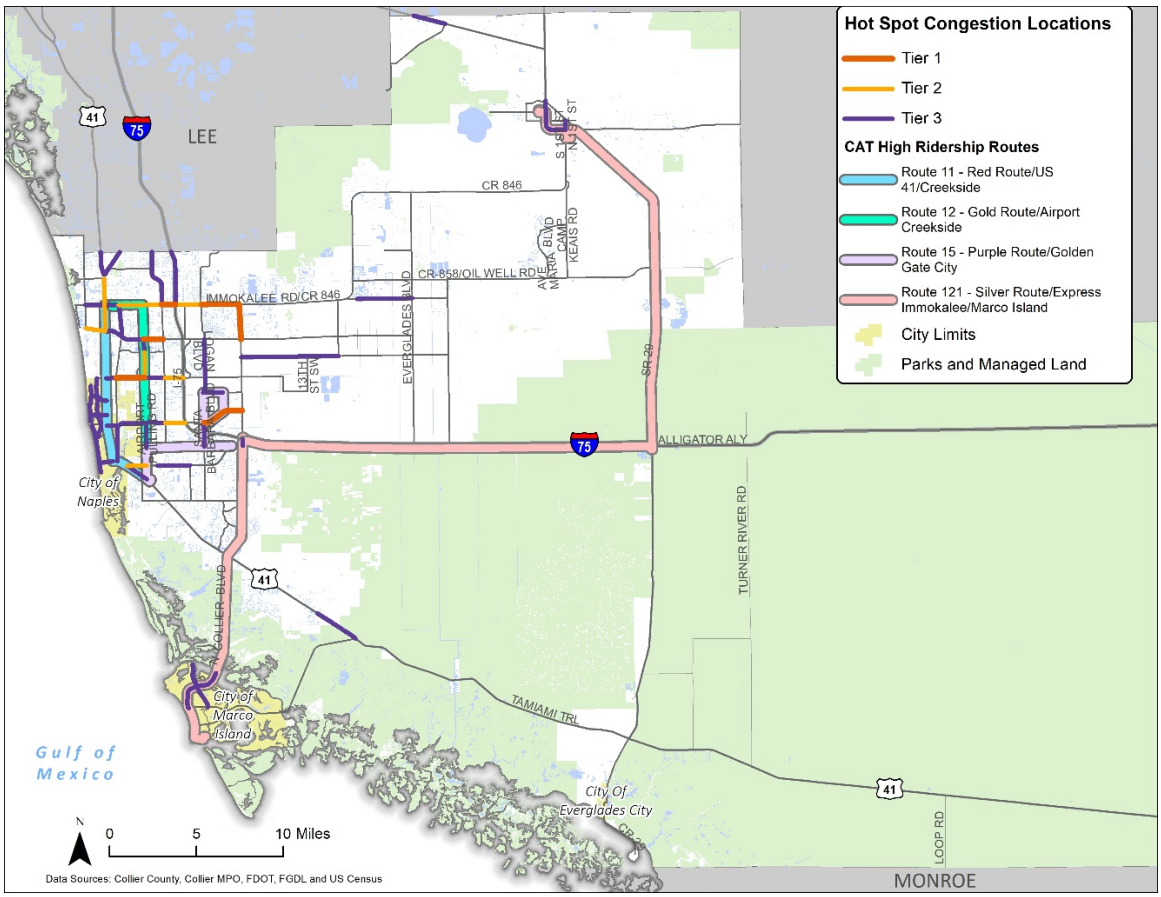


Figure 3-4: Hot Spot Congestion locations and High Ridership Bus Routes

3.5 Bicycle and Pedestrian Analysis

The 2019 Bicycle and Pedestrian Master Plan (BPMP) conducted an analysis of Collier County's transportation network based on equity, safety, and network connectivity to highlight priority multimodal projects. These priority projects were evaluated against the congestion hotspots identified in the Baseline Conditions Report to identify location where there was overlap between hot spot congestion areas and priority projects recommended in the BPMP.

Table 3-4 shows priority projects identified in the BPMP for Complete Streets/Safety Corridor Studies which make recommendations for multimodal projects that aim to reduce bicycle and pedestrian crashes and improve safety along the transportation network. These areas are high crash corridors that generate non-recurring congestion which have also been identified in the Baseline Conditions Report as having a high number and frequency of crashes, projections to exceed capacity in 2023, proximity to schools, and slows speeds during peak hours.

Table 3-4: Complete Streets/Safety Corridor Studies

Road	From	To	Project Description
Airport Rd	Estey Ave	Golden Gate Pkwy	Corridor Study
US 41	Commercial Dr/Palm St	10th Ave N	Corridor Study
Davis Blvd	US 41	Airport Rd	Corridor Study
Golden Gate Pkwy*	Santa Barbara Blvd	Collier Blvd	Corridor Study

*Golden Gate Parkway between Santa Barbara and Collier Boulevards – This section of Golden Gate Parkway overlaps with the designated "Spine Trail Network" which is targeted in the BPMP for enhanced bicycle and pedestrian facilities. Segment is also within newly designated economic development zone Golden Gate City Economic Development Zone and has been identified as needing improved bicycle and pedestrian safety features in the Golden Gate City Walkable Community Study (2019).

Additionally, the BPMP prioritized network gaps on arterials and collector roads by public input. Table 3-5 shows the results of that analysis. These are the facility gaps identified by technical analysis that the public is most interested in addressing at this time.

Table 3-5: Bicycle and Pedestrian Gap Priorities

Road	From	To	Dist. (Mi)	Agency	Facility
111th Ave N	Vanderbilt Dr	Tamiami TRL N	1.0	Collier Co	Bike Lane/Path
Airport Rd N	Pine Ridge Rd	Immokalee Rd	4.2	Collier Co	Bike Lane/Path
Golden Gate Pkwy	9th St N	Estuary Blvd	1.6	Naples	Bike Lane/Path
Immokalee Rd	Tamiami Trl	Northbrooke Dr	4.0	Collier Co	Bike Lane/Path
Logan Blvd N	Logan Blvd	Vanderbilt Beach Rd	1.1	Collier Co	Bike Lane/Path
Old US 41 N	Tamiami Trl	Performance Way	1.5	Collier Co	Pathway
Pine Ridge Rd	Tamiami Trl	Logan Blvd S	5.1	Collier Co	Bike Lane/Path
Vanderbilt Beach Rd	Gulfshore Dr	Vanderbilt Dr	0.4	Collier Co	Bike Lane/Path

3.6 Intersection Analysis

Intersections can often contribute to the main source of congestion in urban areas. Intersection characteristics such as traffic signals, traffic movement conflicts, and multi-modal interactions are causes of recurring congestion. In Collier County, many of the intersections are at capacity and are built-out with no remaining right-of-way (ROW). To accurately address the intersections located in the hot spot congestion areas identified in the Baseline Conditions Report, this section presents analysis of six critical intersections. Synchro and FDOT's Cap-X analysis tool were used to evaluate and identify innovative design and alternative concepts to address congestion at critical intersections shown in Figure 3-5 and Table 3-6.

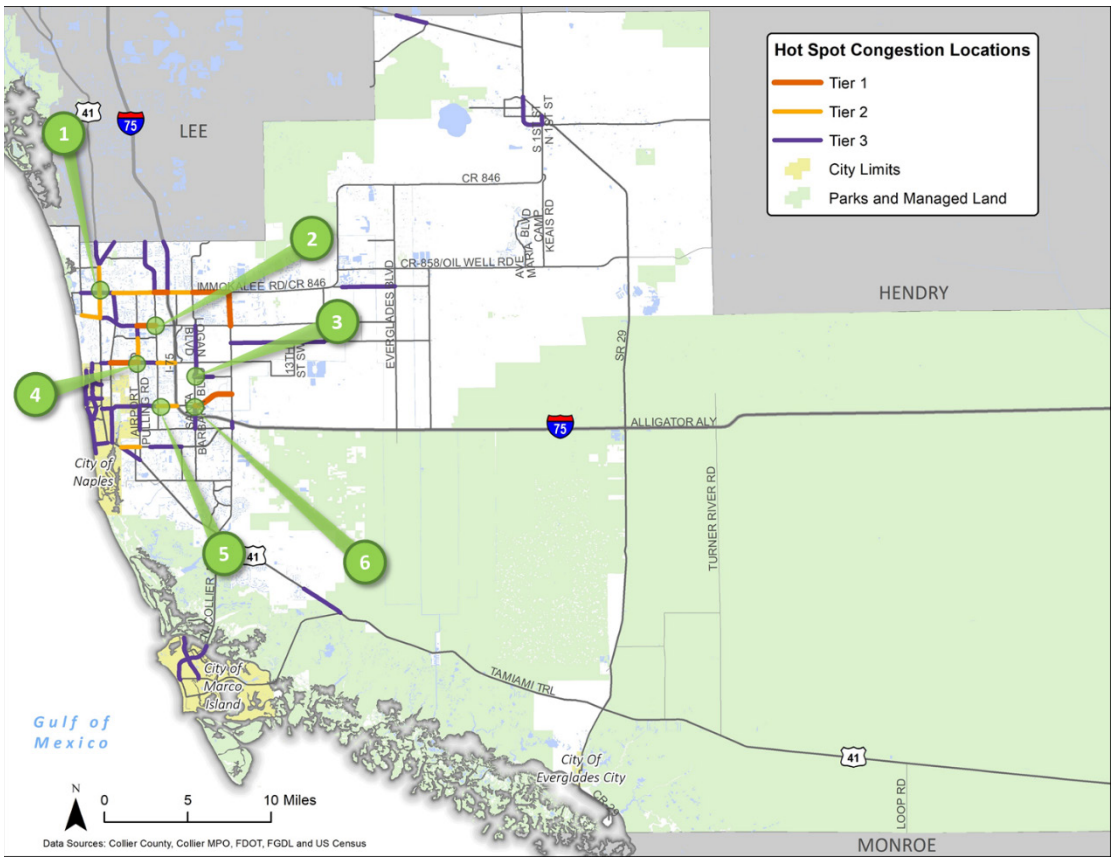


Figure 3-5: Critical Intersections

Table 3-6: Intersections Selected for Operational Analysis

Map	Intersections
1	US 41 at CR-846 (Immokalee Rd)
2	CR-862 (Vanderbilt Beach Road) at Livingston Road
3	Santa Barbara Blvd/Logan Blvd at Green Blvd
4	Airport-Pulling Rd at Pine Ridge Rd
5	Golden Gate Pkwy at Livingstone Rd
6	Golden Gate Pkwy at Santa Barbara Blvd

The following provides and initial summary of the analysis that was conducted at these six intersections. A detailed analysis of the intersections can be found in Appendix E.

#1 - US-41 at CR-846 (Immokalee Road)

US-41 at CR-846 (Immokalee Road) is currently signalized. The traffic signal appears to operate adequately to the year 2025. Cap-X indicated that this intersection operates acceptably through 2025 in the existing configuration. However, based on local knowledge, it is known that this intersection does experience significant delay. Therefore, this intersection was analyzed in Synchro and deficiencies were confirmed, predominantly related to the significant left-turn volumes on all approaches. Based on left-turning volumes, it is recommended that this location be reviewed for a displaced left-turn configuration or an overpass, Right-of-Way constraints would likely be an issue at this intersection as development exists on each corner.

#2 – CR-862 (Vanderbilt Beach Road) at Livingston Road

CR-862 (Vanderbilt Beach Road) at Livingston Road is currently signalized. The existing traffic signal will fail in the future year, 2025 scenario, based on the Turning Movement Count in the PM peak. Most alternative intersections analyzed using Cap-X also fail in the 2025 PM peak hour. The exception occurred under Displace Left Turn alternative concept. Based on the Synchro analysis, all travel directions are estimated to operate acceptably. Drawings showing potential impacts of the North/South and East/West alternatives on the adjacent land uses and utilities were prepared and detailed in Appendix E. It is recommended that a detailed review of the acceptability of the ROW impacts is conducted using a more advanced modeling package (i.e. VISSIM) to evaluate this project.

#3 – Santa Barbara Boulevard/Logan Boulevard at Green Boulevard

Santa Barbara Boulevard/Logan Boulevard at Green Boulevard is currently signalized. In the existing condition and future condition, high delay was observed at the intersection, predominantly related to the high southbound left-turning volume. An analysis in Synchro was conducted to identify potential improvements. Based on this analysis it is recommended that the following alternative concepts be considered:

- Dual southbound left-turn lanes
- If feasible, a separate northbound right-turn lane. The right-turn lane is optional but does provide for an estimated 30% reduction in overall delay during the PM peak. However, even without the right-turn improvement, the dual southbound left-turn lane does provide significantly improved operation.

#4 – Airport-Pulling Rd at Pine Ridge Rd

Pine Ridge Road and Airport Road is currently signalized. The existing traffic signal will fail in the 2025 scenario due to TMC in PM peak. All other analyzed alternative intersections also fail in 2025 PM peak. It is recommended to evaluate regional origin/destination trip management to

understand origin-destination points of existing traffic and reduce traffic through this intersection through alternative routes and access to I-75.

#5 - Golden Gate Parkway and Livingston Road

Golden Gate Parkway and Livingston Road is currently signalized. The existing traffic signal will fail in the 2025 scenario based on the Turning Movement County in the AM peak. Most alternative intersections also fail in the 2025 AM peak with exception of displaced left-turn, but it almost reaches the failing point with 0.98 V/C. It is recommended that the intersection be evaluated for grade separation as both single-point N/S and diamond N/S alternatives to accommodate 2025 expected volumes.

#6 - Golden Gate Parkway and Santa Barbara Boulevard

Golden Gate Parkway and Santa Barbara Boulevard is currently signalized. The Existing traffic signal appears to operate adequately to the year 2025. After Cap-X analysis alternative intersections were deemed not necessary. It is recommended that the intersection be evaluated in Synchro for 2025 as a traffic signal to confirm adequate operation.

3.7 "Big Data" Analysis

Travel time reliability is identified as a best practice system performance reporting measure because it allows for a more robust understanding of congestion along the transportation network and provides opportunities to identify strategies that go beyond capacity-related congestion management strategies to include operations and demand management solutions. In the Baseline Condition Report, travel speed data was used to provide a snapshot of how long trips are taking on certain days during the year. However, this does not factor in the reliability of the transportation system. The Baseline Conditions Report recommended that travel time reliability be considered as a potential system performance reporting measure subject to the MPO's ability to collect and analyze travel reliability data. This section of the report includes identification and evaluation of travel reliability data resources and monitoring practices to assess the opportunities for obtaining data and incorporating reliability analysis into the MPO's Congestion Management Process.

Most travel time reliability measures compare high-delay days to those with an average delay. The most effective methods of measuring travel time reliability are:

- *90th or 95th Percentile Travel Times* –the simplest method; estimates how bad delay will be on specific routes during the heaviest traffic days.
- *Buffer Index* - the additional travel time that is necessary to budget when planning for on-time arrival.
- *Planning Time Index* - the total travel time that is necessary, including buffer time.

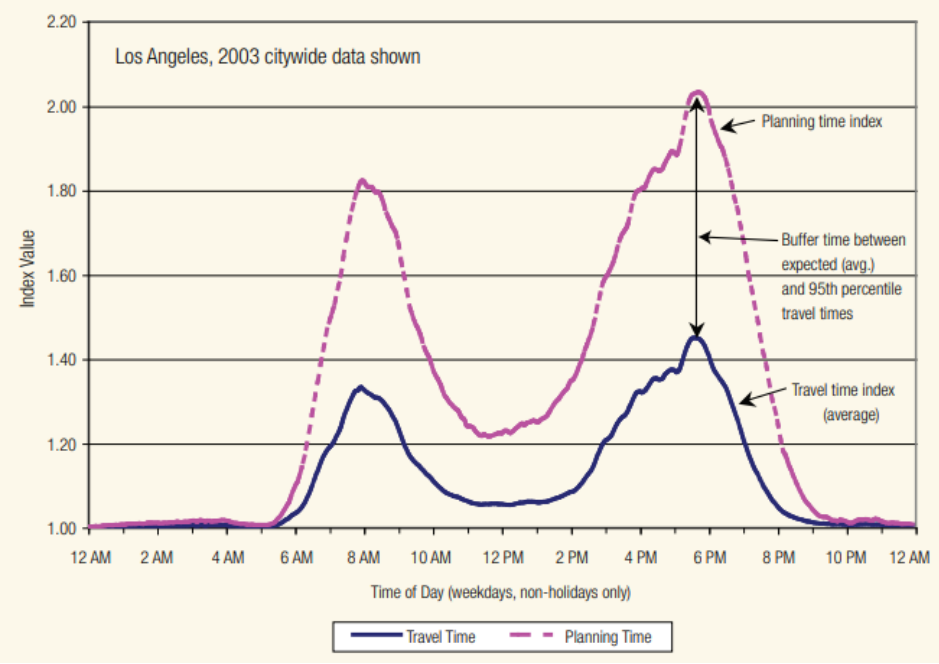


Figure 4-6: Reliability Measures Compared to Average Congestion Measures

Source: Federal Highway Administration. Travel Time Reliability: Making It There on Time, All the Time

Five transportation analysis, monitoring, and data visualization software products were reviewed for applicability and effectiveness in Collier County (Table 3-7). The two recommended data providers for the Collier MPO are INRIX and RITIS as both provide performance measure and travel time reliability data. INRIX provides a host of metrics including volume, performance measures, origin-destination, routes, mode, demographics, and trip attributes however, RITIS is a composite data provider and combines data from several analytic indexes and providers including HERE, INRIX, NPMRDS, and Tom Tom. RITIS access is typically granted to government agencies (including Federal, state DOTs, and MPOs) or consultants who are working on projects for a government partner. RITIS has extensive data for larger and more populated Counties throughout the state however, the data available for Collier County is sufficient for analysis of the Collier County Congestion Management Network (e.g. major collectors, arterials, and freeways). A detailed analysis of all the data sources can be found in Appendix F.

Table 3-7: Data Source Metrics

Data Source	INRIX	Streetlight	Google	RITIS	Teralytics
Buffer Time	Yes	Yes	No	Yes	No
Buffer Time Index	Yes	Yes	No	Yes	No
Travel Time	Yes	Yes	Yes	Yes	No
Travel Time Index	Yes	Yes	No	Yes	No
Planning Time	Yes	Yes	No	Yes	No
Planning Time Index	Yes	Yes	No	Yes	No
Traffic Count	N/A	Yes	No	N/A	No
Traffic Volume	Yes	N/A	No	Yes	Yes
Traffic Speed	Yes	Yes	Yes	Yes	No
Area (O&D) Analysis	N/A	Yes	No	Yes	Yes
Congestion Analysis	N/A	Yes	No	Yes	N/A
Cost	$$$	$$$$	$	No cost to MPO (*)	Unknown

* Access to the RITIS database is available to the MPO at no cost through the FDOT contract. Agreeing with terms of the statewide data licensing agreement is required.

4.0 Congestion Management Strategies

Federal guidance recommends that identification of congestion management strategies be based on their ability to support regional congestion management objectives, meet local context, and contribute to other regional goals and objectives. Strategies that effectively manage congestion and achieve congestion management goals and objectives established in the CMP process are selected to meet Collier County's specific needs. In the 2020 CMP update process, new CMP strategies were identified and added to the existing strategies list based on the analysis that was conducted in the Baseline Conditions Report which identified causes and locations of congested corridors and the Action Plan which analyzed and identified congestion mitigation strategies for the specific corridors. The main additions include safety strategies and strategies to address school related congestion. Table 4-1 lists the category and respective congestion management strategies identified to mitigate congestion along the CMP network in Collier County.

Table 4-1: Collier MPO Congestion Management Strategies

STRATEGIES: Demand Management (Programmatic), Transportation & Land Use Policy	Improved incident management
	Carpooling Assistance and Carpooling Technology including School Carpooling Apps
	Flexible Work Hours
	Transit Vouchers
	Transit Oriented Development
	Jobs/Housing Regional Balance
	Implement Complete Streets Policy All New Development
	High-Density & Mixed-Use Fixed Route Corridor
	School Dismissal timing (e.g. stagger dismissal times, dismissal automation software)
	Walking, Biking, Transit and School Bus Awareness/Education campaigns
	Safe Routes to School & School Zone Traffic Congestion Study
	Origin-Destination Study
STRATEGIES: Transit	Amenities to Attract New Ridership
	MPO transit service expansion and improvement (e.g. frequency, hours of operation, realign routes)
	Regional Transit system Expansion
	Bus rapid transit corridor
	Park & Ride facilities
	Intermodal Hubs
	Transit ITS and MOD
	Arrival Prediction Technology
	Park-and-Ride lots

STRATEGIES: ITS & Access Management - Active Roadway Management	Expanded traffic signal timing & coordination - ITS
	Traffic Center Operations Enhancements
	Traffic signal equipment modernization - ITS
	Traveler information devices - ITS
	Communications networks & roadway surveillance - ITS
	Access management
	School Zone Traffic Calming Measures
	School Zone pedestrian and traffic signal optimization
	School off-site waiting lots and curbing and parking zones
STRATEGIES: Physical Roadway Capacity Enhancement	Intersection Improvements
	Replace intersections with round-abouts & other innovative designs
	Deceleration lanes and turn lanes
	New grade-separated intersections
	New travel lanes (general purpose)
	New roadway network connections
STRATEGIES: Bicycle & Pedestrian Facilities	New off-street pedestrian and multi-use facilities to close gaps in the transportation network and make connections to key destinations
	Integrated into TODs, High Density Corridors
	Regional Bike/Ped Facilities
	Complete Streets on New Facilities & Retrofit or new on-street bicycle
	Supporting bicycle infrastructure (e.g. secure and convenient parking, bike repair and pumps)
STRATEGIES: Safety	Signage and Pavement Markings (e.g. special emphasis crosswalks, yield/stop for pedestrian signs, advanced street signs)
	Visibility and Sightline Improvements
	New and upgraded street lighting
	Traffic control devices (e.g. left turn signals, variable message signs, pedestrian hybrid beacons)
	New and Upgrade existing bicycle and pedestrian crossings

5.0 Implementation Process and Strategy Selection

This section summarizes the implementation and management of the CMP strategies. This includes the process for selecting strategies/projects for implementation on congested corridors as well as the sources and funds for implementing the proposed projects.

The main tool used to identify strategies for implementation on the congested corridors is the Implementation Matrix. In the 2017 CMP, the Implementation Matrix presented congestion management/ITS projects from the 2040 LRTP Cost Feasible Plan and evaluated projects submitted as CMP congestion management strategies. As a part of the TSP update, the Implementation Matrix has been updated to target the congestion hotspot locations identified in the Baseline Conditions Report. The updated Implementation Matrix lists the congested corridors and identifies the strategies that can be used along the corridors to mitigate congestion. These strategy recommendations are based on the analysis conducted in Section 3 of the Action Plan. The strategies provide the MPO's planning partners with an expanded opportunity to develop future projects which address a range of multimodal and congestion reduction considerations. The updated Implementation Matrix is attached in Appendix A.

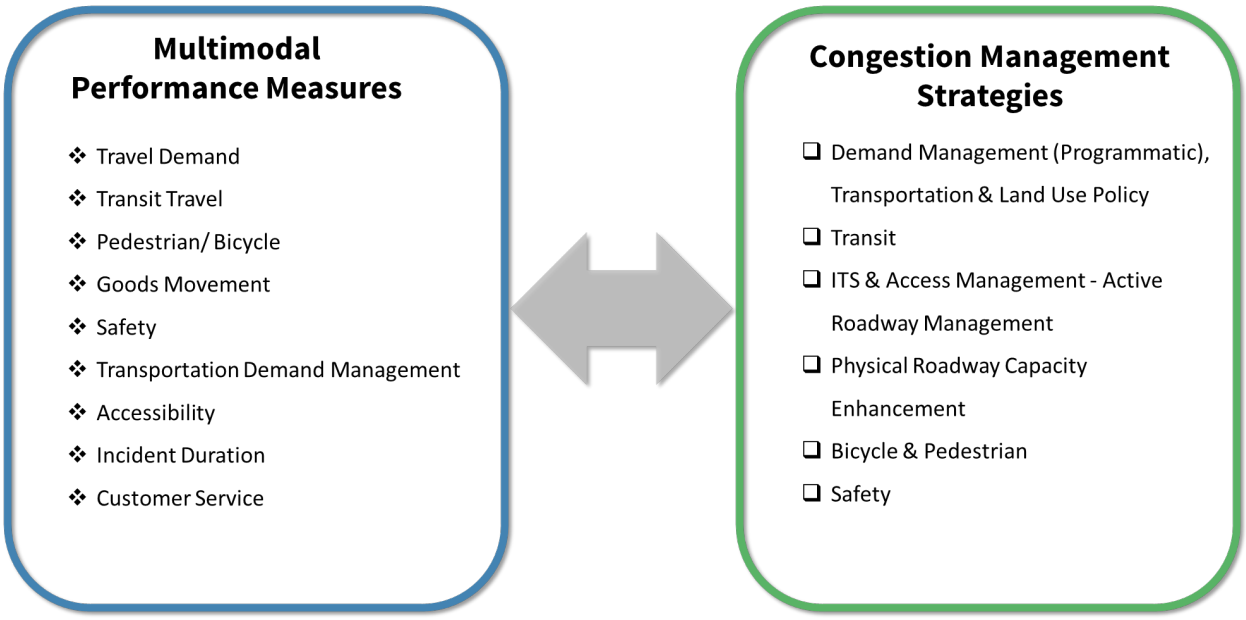
5.1 Congestion Management Strategy Evaluation Criteria

The Congestion Management Committee (CMC) plays an integral role in identifying congestion mitigation strategies with the greatest potential benefit. Once projects consistent with the mitigation strategies identified in the Implementation Matrix are developed and submitted for funding, evaluation and prioritization of these projects is conducted by the CMC using the Strategy Evaluation Criteria. The 2017 Strategy Evaluation Criteria was updated as part of the 2020 TSP Action Plan to incorporate certain performance measures from the 2017 CMP that were better suited as strategy evaluation criteria (Appendix B). The purpose of the Strategy Evaluation Criteria is to screen project submittals for consistency with CMP goals, strategies, and congestion hotspots identified in the Baseline Conditions Report. The CMC uses these criteria as the basis for making CMP project recommendations to the MPO Board as priorities for funding in the 5-year Transportation Improvement Program (TIP) consistent with the LRTP. The CMP projects that are moved into project development and programmed in the TIP are funded using boxed funds identified in the 2040 LRTP along with other local revenues as available. The typical annual funding allotment and the cumulative programmable amounts are outlined in the TIP.

6.0 Strategy Evaluation and Effectiveness

This section identifies the methods and the schedule for monitoring performance and tracking the effectiveness of the implemented congestion management strategies. The evaluation of strategies at the system scale and at the project level enables decision makers, the CMC, and the public the opportunity to identify the most effective strategies for future implementation. Monitoring the effectiveness of the strategies will be conducted at a system wide scale using the quantifiable performance measures established for the CMP. The framework for this monitoring process was established in the TSP Baseline Condition Report (Section 4) where the cumulative effects of the congestion management strategies on the County's transportation system can be evaluated using the performance measures. In 2020, the initial baseline was set using 2018-2020 data and this baseline can be compared against the new evaluations conducted with the future updates of the CMP analysis.

Additionally, the performance measures serve as a tool to evaluate project level effectiveness of the implemented congestion management strategies.



The congestion management project application submittal form will require each sponsoring agency to identify:

1. the Congestion Management Strategy Category the project is using;
2. the Performance Measure(s) the project will address; and,
3. the data and criteria that will be used to measure effectiveness of the project.

The sponsoring agency will be responsible for compiling the necessary data, conducting the performance evaluations, and producing a user-friendly performance-based report that demonstrates the link between the results of the project and stated congestion management strategies and performance measure(s). The report will be presented to the CMC within one year

of the project becoming fully operational, consistent with the 2017 CMP requirements. The Transportation System Performance Report will be reviewed periodically and updated as needed. As congestion management projects are implemented, their impacts will be reviewed and accounted for in the MPOs planning process.

Table 6-1 shows the project evaluation and monitoring matrix which includes the Congestion Management Projects funded in the currently adopted TIP. While the congestion management priority projects identified in 2019 were not required to establish strategies and performance measures when previously approved, this model for upcoming projects is anticipated to be used in measuring post-implementation of these projects. The 2019 congestion management priority projects will be transitioned to this evaluation model and should be updated by the sponsoring or implementing agency, in conjunction with the MPO staff, as the projects advance.

Table 6-1: Strategy Effectiveness Matrix

ITS Projects (2019 CMP Priorities)	FPN	Funded Amt	TIP/CIP YR	Congestion Management Strategy Per CMP 2020	Performance Measure(s) Per CMP 2020	Evaluation - Benefits Achieved	Prioritization Date(s)
ITS Fiber Optic and FPL Power Infrastructure: 13 locations	4462501	$ 272,725	CST 2024/25				
Travel Time Data Collection & Performance Measurements	4462511	$ 700,000	CST 2024/25				
Updated School Flasher System	4462521	$ 353,250	CST 2020/21				
Vehicle Count Station Update	4462541	$ 311,562	CST 2024/25				
Bicycle Detection Systems: 4 intersections: US41/Central Ave, US41/3rd Ave S; Park Shore Drive/Crayton Rd: 8th St S/3rd Ave S	4462531	$ 66,429	CST 2023/24				
Adaptive Traffic Control System: 13 intersections on Santa Barbara & Golden Gate Pkwy	4463421	$ 893,000	PE 2023/24 CST 2024/25				

Appendix A: Implementation Matrix

2020 CMP IMPLEMENTATION MATRIX

2020 TSP Update	Tiered Congestion Hot Spots & Key Intersections (referenced in 2020 TSP BASELINE CONDITION REPORT)	ESTIMATED TOTAL PROJECT COSTS	FUNDING SOURCE
Immokalee Rd from Livingston Rd to I-75*	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD
Immokalee Rd from Logan Rd to CR 951 (Collier Blvd)*	Tier 1 Congestion Hot Spot	TBD	TBD
CR 951 (Collier Blvd) from Vanderbilt Beach Rd to Immokalee Rd	Tier 1 Congestion Hot Spot	TBD	TBD
CR-862 (Vanderbilt Beach Rd) from Airport-Pulling Rd to Livingston Rd	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD
Pine Ridge from Goodlette Frank Rd to Airport-Pulling Rd	Tier 1 Congestion Hot Spot	TBD	TBD
Golden Gate Parkway from Santa Barbara Blvd to CR 951 (Collier Blvd)	Tier 1 Congestion Hot Spot	TBD	TBD
Immokalee Rd from I-75 to Logan Rd*	Tier 2 Congestion Hot Spot	TBD	TBD
Immokalee Rd from Goodlette Frank Rd to Livingston Rd*	Tier 2 Congestion Hot Spot	TBD	TBD
US 41 from Vanderbilt Beach Rd to Immokalee Rd	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD
US 41 from Immokalee Rd to Old US 41	Tier 2 Congestion Hot Spot	TBD	TBD
CR-862 (Vanderbilt Beach Rd) from Wiggins Pass to US 41	Tier 2 Congestion Hot Spot	TBD	TBD
Airport-Pulling Rd from Pine Ridge Rd to Orange Blossom Dr	Tier 2 Congestion Hot Spot	TBD	TBD
Pine Ridge Rd from Livingston Rd to I-75**	Tier 2 Congestion Hot Spot	TBD	TBD
Golden Gate Pkwy from Livingston Rd to I-75	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD
Davis Blvd from US 41 to Airport-Pulling Rd	Tier 2 Congestion Hot Spot	TBD	TBD
Airport-Pulling Rd from Golden Gate Pkwy to Radio Rd	Tier 3 Congestion Hot Spot & Critical Intersection	TBD	TBD
Santa Barbara Blvd/Logan Blvd at Green Blvd	Critical Intersection	TBD	TBD
SUBTOTAL		$ -	$ -

2020 TSP UPDATE - NEW STUDIES/COMMITTEES	NEW CMP 2017 PRIORITIES	ESTIMATED PROJECT COSTS	FUNDING SOURCE
Identify integration opportunities for travel time reliability in future congestion analysis and evaluation	Scope TBD	TBD	TBD
School Transportation Working Group	Scope TBD	TBD	TBD
Intersection ROW Study and Modeling	Scope TBD	TBD	TBD
Origin-Destination Study	Scope TBD	TBD	TBD

Notes:

***Immokalee Road -** A Corridor Congestion Study is being conducted along Immokalee Road Corridor between Livingston Road and Logan Boulevard. The study is expected to be completed in the Spring of 2021. Recommendations from this study should be implemented to address congestion along this corridor.

****Pine Ridge Road** - Study conducted in 2018 to consider innovative intersection design concepts for the intersections along Pine Ridge Road from Livingston Road to Napa Boulevard. Recommendations from this study should be implemented to address congestion along this corridor.

*****I-75** - a capacity improvement project involves the potential construction of managed lanes in each direction on Interstate 75 (I-75), from east of Collier Boulevard (SR 951) in Collier County to Bayshore Road (SR 78) in Lee County. (Collier County interchanges effected - Immokalee Rd, Pine Ridge Rd, Golden Gate Pkwy, SR 951 (Collier Blvd))

LEGEND - SCHEDULE

	In TIP or UPWP
	In LRTP Needs Plan/Cross-Referenced in Cost Feasible Plan, TD Plan, Bicycle & Pedestrian Master Plan
	In LRTP Unfunded Needs Plan
	Candidate Project

STRATEGIES: Demand Management (Programmatic), Transportation & Land Use Policy

Improved incident management
Carpooling Assistance and Carpooling Technology including School Carpooling Apps
Flexible Work Hours
Transit Vouchers
Transit Oriented Development
Jobs/Housing Regional Balance
Implement Complete Streets Policy All New Development
High-Density & Mixed-Use Fixed Route Corridor
School Dismissal timing (e.g. staggered dismissal times, dismissal automation software)
Walking, Biking, Transit and School Bus Awareness/education campaigns
Safe Routes to School & School Zone Traffic Congestion Study
Origin-Destination Study

STRATEGIES: TRANSIT

Amenities to Attract New Ridership
MPO transit service expansion and improvement (frequency, hours of operation, realign routes)
Regional Transit system Expansion
Bus rapid transit corridor
Park & Ride facilities
Intermodal Hubs
Transit ITS and MOD
Arrival Prediction Technology
Park-and-Ride lots

STRATEGIES: ITS & Access Management - Active Roadway Management

Expanded traffic signal timing & coordination - ITS
Traffic Center Operations Enhancements
Traffic signal equipment modernization - ITS
Traveler information devices - ITS
Communications networks & roadway surveillance - ITS
Access management
School Zone Traffic Calming Measures
School Zone pedestrian and traffic signal optimization
School off-site waiting lots and curbing and parking zones

STRATEGIES: Physical Roadway Capacity Enhancement

Intersection Improvements
Replace intersections with round-abouts & other innovative designs
Deceleration lanes and turn lanes
New grade-separated intersections
New travel lanes (general purpose)
New roadway network connections

STRATEGIES: Bicycle & Pedestrian Facilities

New off-street pedestrian and multi-use facilities to close gaps in the transportation network and make connections to key destinations
Integrated into TODs, High Density Corridors
Regional Bike/Ped Facilities
Complete Streets on New Facilities & Retrofit or new on-street bicycle treatments
Supporting bicycle infrastructure (e.g. secure and convenient parking, bike pumps)

STRATEGIES: Safety

Signage and Pavement Markings (e.g. special emphasis crosswalks, yield/stop for pedestrians signs, advanced street signs)
Visibility and Sightline Improvements
New and upgraded street lighting
Traffic control devices (left turn signals, variable message signs, pedestrian hybrid beacons)
New and Upgrade existing bicycle and pedestrian crossings

(See breakdown of matrix in following 4 pages)

2020 CMP IMPLEMENTATION MATRIX (1/4)

				STRATEGIES: Demand Management (Programmatic), Transportation & Land Use Policy												
				Improved incident management	Carpooling Assistance and Carpooling Technology including School Carpooling Apps	Flexible Work Hours	Transit Vouchers	Transit Oriented Development	Jobs/Housing Regional Balance	Implement Complete Streets Policy All New Development	High-Density & Mixed-Use Fixed Route Corridor	School Dismissal timing (e.g. stagger dismissal times, dismissal automation software)	Walking, Biking, Transit and School Bus Awareness/Education campaigns	Safe Routes to School & School Zone Traffic Congestion Study	Origin-Destination Study
2020 TSP Update	**Tiered Congestion Hot Spots & Key Intersections (referenced in 2020 TSP BASELINE CONDITION REPORT)**	**ESTIMATED TOTAL PROJECT COSTS**	**FUNDING SOURCE**													
Immokalee Rd from Livingston Rd to I-75*	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD													
Immokalee Rd from Logan Rd to CR 951 (Collier Blvd)*	Tier 1 Congestion Hot Spot	TBD	TBD													
CR 951 (Collier Blvd) from Vanderbilt Beach Rd to Immokalee Rd	Tier 1 Congestion Hot Spot	TBD	TBD													
CR-862 (Vanderbilt Beach Rd) from Airport-Pulling Rd to Livingston Rd	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD													
Pine Ridge from Goodlette Frank Rd to Airport-Pulling Rd	Tier 1 Congestion Hot Spot	TBD	TBD													
Golden Gate Parkway from Santa Barbara Blvd to CR 951 (Collier Blvd)	Tier 1 Congestion Hot Spot	TBD	TBD													
Immokalee Rd from I-75 to Logan Rd*	Tier 2 Congestion Hot Spot	TBD	TBD													
Immokalee Rd from Goodlette Frank Rd to Livingston Rd*	Tier 2 Congestion Hot Spot	TBD	TBD													
US 41 from Vanderbilt Beach Rd to Immokalee Rd	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD													
US 41 from Immokalee Rd to Old US 41	Tier 2 Congestion Hot Spot	TBD	TBD													
CR-862 (Vanderbilt Beach Rd) from Wiggins Pass to US 41	Tier 2 Congestion Hot Spot	TBD	TBD													
Airport-Pulling Rd from Pine Ridge Rd to Orange Blossom Dr	Tier 2 Congestion Hot Spot	TBD	TBD													
Pine Ridge Rd from Livingston Rd to I-75**	Tier 2 Congestion Hot Spot	TBD	TBD													
Golden Gate Pkwy from Livingston Rd to I-75	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD													
Davis Blvd from US 41 to Airport-Pulling Rd	Tier 2 Congestion Hot Spot	TBD	TBD													
Airport-Pulling Rd from Golden Gate Pkwy to Radio Rd	Tier 3 Congestion Hot Spot & Critical Intersection	TBD	TBD													
Santa Barbara Blvd/Logan Blvd at Green Blvd	Critical Intersection	TBD	TBD													
SUBTOTAL		**$ -**	**$ -**													
2020 TSP UPDATE - NEW STUDIES/COMMITTEES	**NEW CMP 2017 PRIORITIES**	**ESTIMATED PROJECT COSTS**	**FUNDING SOURCE**													
Identify integration opportunities for travel time reliability in future congestion analysis and evaluation	Scope TBD	TBD	TBD													
School Transportation Working Group	Scope TBD	TBD	TBD													
Intersection ROW Study and Modeling	Scope TBD	TBD	TBD													
Origin-Destination Study	Scope TBD	TBD	TBD													

Notes:

***Immokalee Road -** A Corridor Congestion Study is being conducted along Immokalee Road Corridor between Livingston Road and Logan Boulevard. The study is expected to be completed in the Spring of 2021. Recommendations from this study should be implemented to address congestion along this corridor.

****Pine Ridge Road** - Study conducted in 2018 to consider innovative intersection design concepts for the intersections along Pine Ridge Road from Livingston Road to Napa Boulevard. Recommendations from this study should be implemented to address congestion along this corridor.

*****I-75** - a capacity improvement project involves the potential construction of managed lanes in each direction on Interstate 75 (I-75), from east of Collier Boulevard (SR 951) in Collier County to Bayshore Road (SR 78) in Lee County. (Collier County interchanges effected - Immokalee Rd, Pine Ridge Rd, Golden Gate Pkwy, SR 951 (Collier Blvd))

LEGEND - SCHEDULE

- In TIP or UPWP
- In LRTP Needs Plan/Cross-Referenced in Cost Feasible Plan, TD Plan, Bicycle & Pedestrian Master Plan
- In LRTP Unfunded Needs Plan
- Candidate Project

2020 CMP IMPLEMENTATION MATRIX (2/4)

				STRATEGIES: TRANSIT								
				Amenities to Attract New Ridership	MPO transit service expansion and improvement (frequency, hours of operation, realign routes)	Regional Transit system Expansion	Bus rapid transit corridor	Park & Ride facilities	Intermodal Hubs	Transit ITS and MOD	Arrival Prediction Technology	Park-and-Ride lots
2020 TSP Update	**Tiered Congestion Hot Spots & Key Intersections (referenced in 2020 TSP BASELINE CONDITION REPORT)**	**ESTIMATED TOTAL PROJECT COSTS**	**FUNDING SOURCE**									
Immokalee Rd from Livingston Rd to I-75*	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD									
Immokalee Rd from Logan Rd to CR 951 (Collier Blvd)*	Tier 1 Congestion Hot Spot	TBD	TBD									
CR 951 (Collier Blvd) from Vanderbilt Beach Rd to Immokalee Rd	Tier 1 Congestion Hot Spot	TBD	TBD									
CR-862 (Vanderbilt Beach Rd) from Airport-Pulling Rd to Livingston Rd	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD									
Pine Ridge from Goodlette Frank Rd to Airport-Pulling Rd	Tier 1 Congestion Hot Spot	TBD	TBD									
Golden Gate Parkway from Santa Barbara Blvd to CR 951 (Collier Blvd)	Tier 1 Congestion Hot Spot	TBD	TBD									
Immokalee Rd from I-75 to Logan Rd*	Tier 2 Congestion Hot Spot	TBD	TBD									
Immokalee Rd from Goodlette Frank Rd to Livingston Rd*	Tier 2 Congestion Hot Spot	TBD	TBD									
US 41 from Vanderbilt Beach Rd to Immokalee Rd	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD									
US 41 from Immokalee Rd to Old US 41	Tier 2 Congestion Hot Spot	TBD	TBD									
CR-862 (Vanderbilt Beach Rd) from Wiggins Pass to US 41	Tier 2 Congestion Hot Spot	TBD	TBD									
Airport-Pulling Rd from Pine Ridge Rd to Orange Blossom	Tier 2 Congestion Hot Spot	TBD	TBD									
Pine Ridge Rd from Livingston Rd to I-75**	Tier 2 Congestion Hot Spot	TBD	TBD									
Golden Gate Pkwy from Livingston Rd to I-75	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD									
Davis Blvd from US 41 to Airport-Pulling Rd	Tier 2 Congestion Hot Spot	TBD	TBD									
Airport-Pulling Rd from Golden Gate Pkwy to Radio Rd	Tier 3 Congestion Hot Spot & Critical Intersection	TBD	TBD									
Santa Barbara Blvd/Logan Blvd at Green Blvd	Critical Intersection	TBD	TBD									
SUBTOTAL		**$ -**	**$ -**									
2020 TSP UPDATE - NEW STUDIES/COMMITTEES	**NEW CMP 2017 PRIORITIES**	**ESTIMATED PROJECT COSTS**	**FUNDING SOURCE**									
Identify integration opportunities for travel time reliability in future congestion analysis and evaluation	Scope TBD	TBD	TBD									
School Transportation Working Group	Scope TBD	TBD	TBD									
Intersection ROW Study and Modeling	Scope TBD	TBD	TBD									
Origin-Destination Study	Scope TBD	TBD	TBD									

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LEGEND - SCHEDULE

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- In LRTP Unfunded Needs Plan
- Candidate Project

2020 CMP IMPLEMENTATION MATRIX (3/4)

				STRATEGIES: ITS & Access Management - Active Roadway Management									STRATEGIES: Physical Roadway Capacity Enhancement					
				Expanded traffic signal timing & coordination - ITS	Traffic Center Operations Enhancements	Traffic signal equipment modernization - ITS	Traveler information devices - ITS	Communications networks & roadway surveillance - ITS	Access management	School Zone Traffic Calming Measures	School Zone pedestrian and traffic signal optimization	School off-site waiting lots and curbing and parking zones	Intersection Improvements	Replace intersections with round-abouts & other innovative designs	Deceleration lanes and turn lanes	New grade-separated intersections	New travel lanes (general purpose)	New roadway network connections
2020 TSP Update	**Tiered Congestion Hot Spots & Key Intersections (referenced in 2020 TSP BASELINE CONDITION REPORT)**	**ESTIMATED TOTAL PROJECT COSTS**	**FUNDING SOURCE**															
Immokalee Rd from Livingston Rd to I-75*	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD															
Immokalee Rd from Logan Rd to CR 951 (Collier Blvd)*	Tier 1 Congestion Hot Spot	TBD	TBD															
CR 951 (Collier Blvd) from Vanderbilt Beach Rd to Immokalee Rd	Tier 1 Congestion Hot Spot	TBD	TBD															
CR-862 (Vanderbilt Beach Rd) from Airport-Pulling Rd to Livingston Rd	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD															
Pine Ridge from Goodlette Frank Rd to Airport-Pulling Rd	Tier 1 Congestion Hot Spot	TBD	TBD															
Golden Gate Parkway from Santa Barbara Blvd to CR 951 (Collier Blvd)	Tier 1 Congestion Hot Spot	TBD	TBD															
Immokalee Rd from I-75 to Logan Rd*	Tier 2 Congestion Hot Spot	TBD	TBD															
Immokalee Rd from Goodlette Frank Rd to Livingston Rd*	Tier 2 Congestion Hot Spot	TBD	TBD															
US 41 from Vanderbilt Beach Rd to Immokalee Rd	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD															
US 41 from Immokalee Rd to Old US 41	Tier 2 Congestion Hot Spot	TBD	TBD															
CR-862 (Vanderbilt Beach Rd) from Wiggins Pass to US 41	Tier 2 Congestion Hot Spot	TBD	TBD															
Airport-Pulling Rd from Pine Ridge Rd to Orange Blossom	Tier 2 Congestion Hot Spot	TBD	TBD															
Pine Ridge Rd from Livingston Rd to I-75**	Tier 2 Congestion Hot Spot	TBD	TBD															
Golden Gate Pkwy from Livingston Rd to I-75	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD															
Davis Blvd from US 41 to Airport-Pulling Rd	Tier 2 Congestion Hot Spot	TBD	TBD															
Airport-Pulling Rd from Golden Gate Pkwy to Radio Rd	Tier 3 Congestion Hot Spot & Critical Intersection	TBD	TBD															
Santa Barbara Blvd/Logan Blvd at Green Blvd	Critical Intersection	TBD	TBD															
SUBTOTAL		**$ -**	**$ -**															
2020 TSP UPDATE - NEW STUDIES/COMMITTEES	**NEW CMP 2017 PRIORITIES**	**ESTIMATED PROJECT COSTS**	**FUNDING SOURCE**															
Identify integration opportunities for travel time reliability in future congestion analysis and evaluation	Scope TBD	TBD	TBD															
School Transportation Working Group	Scope TBD	TBD	TBD															
Intersection ROW Study and Modeling	Scope TBD	TBD	TBD															
Origin-Destination Study	Scope TBD	TBD	TBD															

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LEGEND - SCHEDULE

- In TIP or UPWP
- In LRTP Needs Plan/Cross-Referenced in Cost Feasible Plan, TD Plan, Bicycle & Pedestrian Master Plan
- In LRTP Unfunded Needs Plan
- Candidate Project

2020 CMP IMPLEMENTATION MATRIX (4/4)

				STRATEGIES: Bicycle & Pedestrian Facilities					STRATEGIES: Safety				
				New off-street pedestrian and multi-use facilities to close gaps in the transportation network and make connections to key destinations	Integrated into TODs, High Density Corridors	Regional Bike/Ped Facilities	Complete Streets on New Facilities & Retrofit or new on-street bicycle treatments	Supporting bicycle infrastructure (e.g. secure and convenient parking, bike pumps)	Signage and Pavement Markings (e.g. special emphasis crosswalks, yield/stop for pedestrians signs, advanced street signs)	Visibility and Sightline Improvements	New and upgraded street lighting	Traffic control devices (left turn signals, variable message signs, pedestrian hybrid beacons)	New and Upgrade existing bicycle and pedestrian crossings
2020 TSP Update	**Tiered Congestion Hot Spots & Key Intersections (referenced in 2020 TSP BASELINE CONDITION REPORT)**	**ESTIMATED TOTAL PROJECT COSTS**	**FUNDING SOURCE**										
Immokalee Rd from Livingston Rd to I-75*	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD										
Immokalee Rd from Logan Rd to CR 951 (Collier Blvd)*	Tier 1 Congestion Hot Spot	TBD	TBD										
CR 951 (Collier Blvd) from Vanderbilt Beach Rd to Immokalee Rd	Tier 1 Congestion Hot Spot	TBD	TBD										
CR-862 (Vanderbilt Beach Rd) from Airport-Pulling Rd to Livingston Rd	Tier 1 Congestion Hot Spot & Critical Intersection	TBD	TBD										
Pine Ridge from Goodlette Frank Rd to Airport-Pulling	Tier 1 Congestion Hot Spot	TBD	TBD										
Golden Gate Parkway from Santa Barbara Blvd to CR 951 (Collier Blvd)	Tier 1 Congestion Hot Spot	TBD	TBD										
Immokalee Rd from I-75 to Logan Rd*	Tier 2 Congestion Hot Spot	TBD	TBD										
Immokalee Rd from Goodlette Frank Rd to Livingston	Tier 2 Congestion Hot Spot	TBD	TBD										
US 41 from Vanderbilt Beach Rd to Immokalee Rd	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD										
US 41 from Immokalee Rd to Old US 41	Tier 2 Congestion Hot Spot	TBD	TBD										
CR-862 (Vanderbilt Beach Rd) from Wiggins Pass to US	Tier 2 Congestion Hot Spot	TBD	TBD										
Airport-Pulling Rd from Pine Ridge Rd to Orange	Tier 2 Congestion Hot Spot	TBD	TBD										
Pine Ridge Rd from Livingston Rd to I-75**	Tier 2 Congestion Hot Spot	TBD	TBD										
Golden Gate Pkwy from Livingston Rd to I-75	Tier 2 Congestion Hot Spot & Critical Intersection	TBD	TBD										
Davis Blvd from US 41 to Airport-Pulling Rd	Tier 2 Congestion Hot Spot	TBD	TBD										
Airport-Pulling Rd from Golden Gate Pkwy to Radio Rd	Tier 3 Congestion Hot Spot & Critical Intersection	TBD	TBD										
Santa Barbara Blvd/Logan Blvd at Green Blvd	Critical Intersection	TBD	TBD										
SUBTOTAL		$ -	$ -										
2020 TSP UPDATE - NEW STUDIES/COMMITTEES	**NEW CMP 2017 PRIORITIES**	**ESTIMATED PROJECT COSTS**	**FUNDING SOURCE**										
Identify integration opportunities for travel time reliability in future congestion analysis and evaluation	Scope TBD	TBD	TBD										
School Transportation Working Group	Scope TBD	TBD	TBD										
Intersection ROW Study and Modeling	Scope TBD	TBD	TBD										
Origin-Destination Study	Scope TBD	TBD	TBD										

Notes:

***Immokalee Road -** A Corridor Congestion Study is being conducted along Immokalee Road Corridor between Livingston Road and Logan Boulevard. The study is expected to be completed in the Spring of 2021. Recommendations from this study should be implemented to address congestion along this corridor.

****Pine Ridge Road** - Study conducted in 2018 to consider innovative intersection design concepts for the intersections along Pine Ridge Road from Livingston Road to Napa Boulevard. Recommendations from this study should be implemented to address congestion along this corridor.

*****I-75** - a capacity improvement project involves the potential construction of managed lanes in each direction on Interstate 75 (I-75), from east of Collier Boulevard (SR 951) in Collier County to Bayshore Road (SR 78) in Lee County. (Collier County interchanges effected - Immokalee Rd, Pine Ridge Rd, Golden Gate Pkwy, SR 951 (Collier Blvd))

LEGEND - SCHEDULE

- In TIP or UPWP
- In LRTP Needs Plan/Cross-Referenced in Cost Feasible Plan, TD Plan, Bicycle & Pedestrian Master Plan
- In LRTP Unfunded Needs Plan
- Candidate Project

Appendix B: CMC Strategy Evaluation Criteria

Congestion Management Committee Evaluation Criteria and Scores

A. Pre-Project Evaluation

Q 1 – Does this project address a congested roadway?

Yes
No

B. General Project Evaluation

Q 4 – Is this application supported by multiple jurisdictions?

Yes – 3 pt.
No (blank) – 0 pt.

Q 7 – Are there specific technical and/or monetary local contributions for this project?

Yes – 3 pt.
No – 0 pt.

Q 9 – Does this project require the acquisition of right-of-way?

Yes – 0 pt.
No – 3 pt.

C. Project Specific Evaluation:

Q1 - Uses TSM Approach?

High – 5 pts. – Incorporates intersection improvements such as turn lanes, signal improvements etc.; or significantly enhances operational response time for emergency vehicles on intersections/facilities which have an existing Level of Service (LOS) " F"

Med – 3 pts. – Incorporates intersection improvements such as turn lanes, signal improvements, etc.; or significantly enhances operational response time for emergency vehicles on intersections/facilities which have an existing LOS "E"

Low – 1 pt.- incorporates intersection improvements such as turn lanes, signal improvements, etc.; or establish and/or improves traffic diversion capability on intersections/facilities (for example signage for alternative routes) which have an existing LOS "D"

Q2 - Uses TDM strategy?

High – 5 pts. – Reduces congestion and increases efficiency of the system by adding a new a transit route or a new park & ride facility or cooperating with regional TDM program

Med – 3 pts. – Reduces congestion and increases system efficiency by increasing existing carpooling, vanpooling, transit or a park & ride facility.

Low – 1 pt. – Reduces congestion and increases system efficiency by adding new bicycle or pedestrian facilities

Q3 - Supports/enhances and effectively integrates with existing ITS and maintains concurrency with FDOT Regional ITS Architecture and technological advances in TOC equipment and operations?

High – 5 pts. – Project affects arterial roadways; or addresses a critical need due to insufficient communication and/or system expansion

Med – 3 pts. – Project affects collector roadways; or addresses a critical need

Low – 1 pt. – Project location is not specific; or project is to address contingency system backup or to purchase miscellaneous equipment

Q4 - Increases Security?

Yes – 3 pt.
No (blank) – 0 pt.

Q5 - Increases Safety?

High – 5 pts. – Addresses a documented safety problem; reduces the total number of vehicle-related crashes or serious injuries; reduces the total number of bicycle-related or pedestrian related crashes; reduce the number of transit related injuries

Med – 3 pts. – Increases bicycle or pedestrian safety at high traffic location; and/or increases/improves safety of emergency responders at incident sites; or to reduce the number of secondary incidents as a result of a primary incident

Q6 - Promote Regional Connectivity?

High – 5 pts. – Enhances the inter-county connectivity of highways or transit

Med – 3 pts. – Enhances the inter-county connectivity of pathways/bikeways/trails

Low – 1 pt. – project is on a facility identified on the regional network

Q7 - Promotes Multi-Modal Solutions?

High – 5 pts. – Improves at least three modes; increases connectivity between motorized and non-motorized modes; advances recommendations from existing MPO Bicycle/Pedestrian Safety Studies, Audits, and Community Walkability Studies

Med – 3 pts. – Enhances at least two modes of transportation

Low – 1 pt. – Improves one mode; increases transit ridership on a specific route; increases transit enhancements such as park and ride lots or bus shelters; and other enhancements for non-motorized facilities etc.

Q8 - Protect Environmental Resources?

High – 5 pts. – Reduces air quality emissions; reduces fuel consumption by reducing corridor congestion

Med – 3 pts. – Reduces fuel consumption by reducing specific intersection delays; improves monitoring and reporting capability

Low – 1 pt. – Supports general congestion avoidance measures

Q9 - Promotes Economic Development or Freight Movement?

High – 5 pts. – Project is located at and directly affects access to airports, major activity centers, or freight activity centers

Med- 3 pts. – Project is located near and affects access to, airports, high employment areas, or freight activity centers

Low – 1 pt. – Project is not located near to airports, or high employment areas but can promote overall economic development of the community

Appendix C: Safety Analysis

CR-31 (AIRPORT ROAD) FROM CR-896 (PINE RIDGE ROAD) TO ORANGE BLOSSOM DRIVE

Corridor Statistics

AADT	34,686
Preliminary Crash Rate	4.943 — Higher than State Avg. for Urban 6-Lane Divided, Raised: 4.714
Preliminary Ranking by Crash Frequency	3
Preliminary Ranking by Crash Rate	6
Preliminary Ranking of Intersection by Crash Frequency	At Pine Ridge Rd, Rank: 1

	2014	2015	2016	2017	2018	5-Yr Total	Mean Crashes Per Yr	Serious Injury Crashes	%
Angle	8	2	4	12	5	31	6.2	2	2.6%
Backing	0	1	1	1	1	4	0.8	0	0.3%
Bike	2	2	2	1	3	10	2	0	0.9%
Head-On	2	1	0	0	1	4	0.8	0	0.3%
Hit Fixed Object	17	17	12	4	7	57	11.4	2	4.9%
Hit Non-Fixed Object	0	5	1	1	0	7	1.4	0	0.6%
Left-turn	9	9	9	11	3	41	8.2	3	3.5%
Lost Control	0	2	2	0	0	4	0.8	0	0.3%
Overturn	0	0	0	1	1	2	0.4	0	0.2%
Pedestrian	2	0	0	1	0	3	0.6	1	0.3%
Rear-end	183	176	144	122	136	761	152.2	3	64.8%
Right-turn	11	17	9	9	7	53	10.6	0	4.5%
Run Off-road	1	2	1	0	1	5	1	0	0.4%
Sideswipe	43	30	27	30	36	166	33.2	0	14.1%
Single Vehicle	2	1	0	0	2	5	1	0	0.4%
U-Turn	6	10	4	1	1	22	4.4	0	1.9%
Total	**286**	**275**	**216**	**194**	**204**	**1,175**	**235**	**11**	**100%**
Fatal	0	1	0	0	1	2	0.4	-	0.2%
Incapacitating	3	0	2	2	2	9	1.8	-	0.8%
Non-Incapacitating	15	12	9	8	19	63	12.8	-	5.4%
Possible	31	30	16	26	27	130	26	-	11.1%
None	237	232	189	158	155	971	196.8	-	82.6%
Total	**286**	**275**	**216**	**194**	**204**	**1,175**	**235**	**-**	**100%**
Daylight	252	236	181	163	175	1,007	204.2	7	85.7%
Dawn	1	4	5	3	5	18	3.6	0	1.5%
Dusk	5	2	6	1	3	17	3.4	1	1.4%
Dark-Lighted	25	32	22	25	20	124	24.8	3	10.6%
Dark-Not Lighted	3	1	0	1	1	6	1.2	0	0.5%
Lighting	0	0	2	1	0	3	0.6	0	0.3%
Total	**286**	**275**	**216**	**194**	**204**	**1,175**	**235**	**11**	**100%**
Dry Roadway	228	224	178	160	171	961	195	9	81.8%
Wet Roadway	58	51	38	34	33	214	42.8	2	18.2%
Total	**286**	**275**	**216**	**194**	**204**	**1,175**	**237.8**	**11**	**100%**

Note: Fatal and incapacitating crash types were only reviewed.

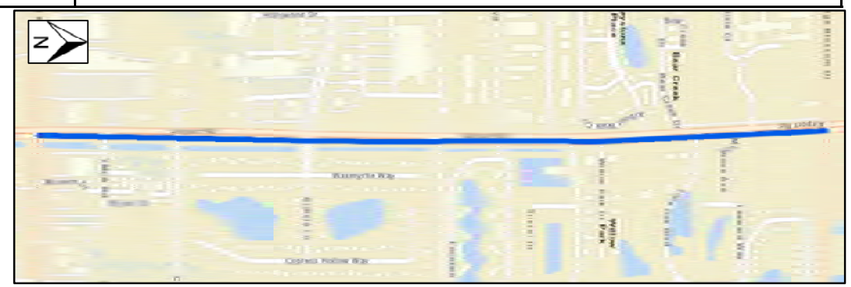
Nightime Crashes	14%	Lower than Statewide Average of 30%
Wet Roadway Crashes	18%	Equal to Statewide Average of 18%

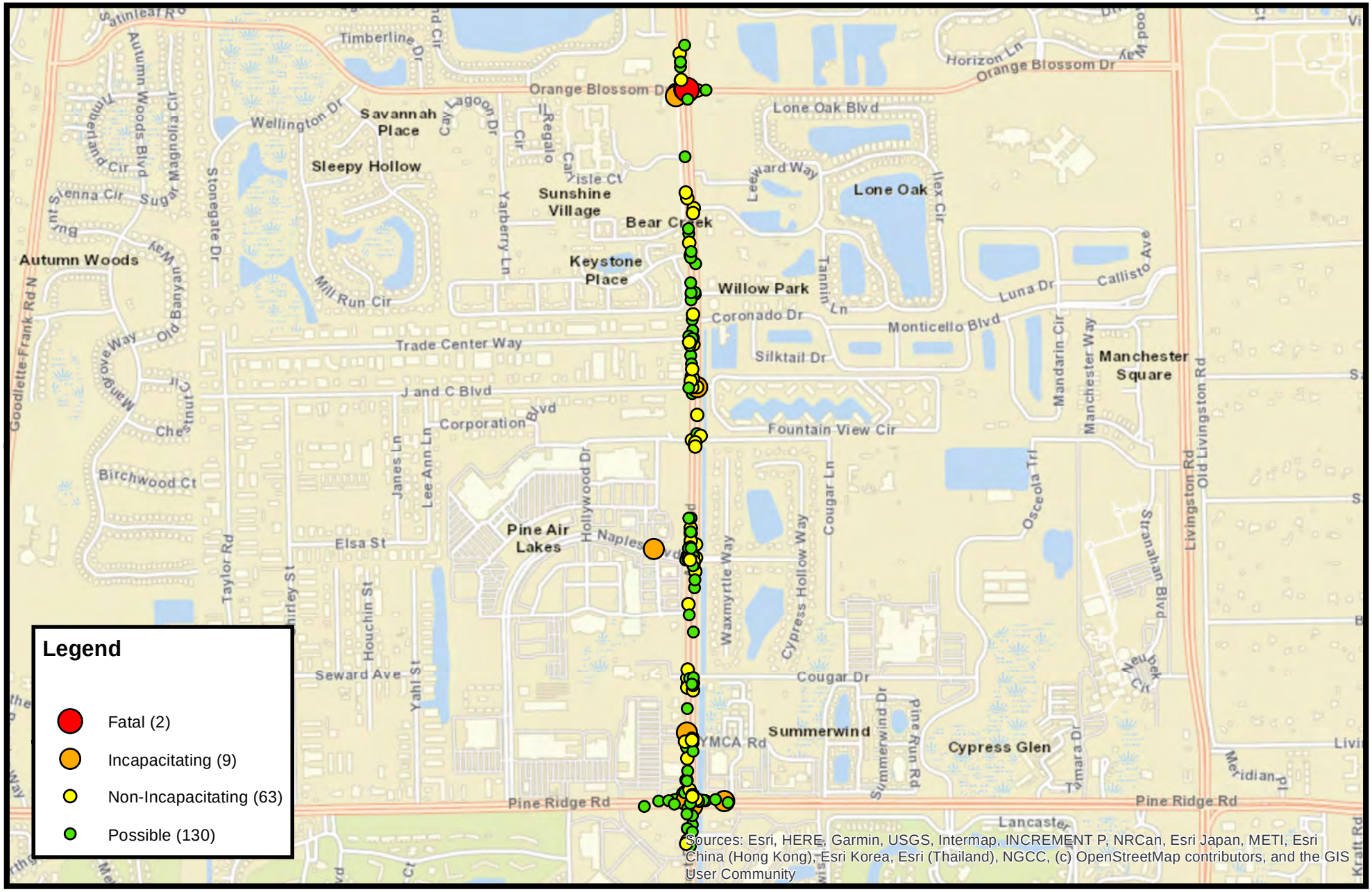
Observations & Recommendations

Location Description	Crash Trends/ Google Maps Observations	Recommendation
Corridor-wide	761 rear-end crashes; all at intersections; 3 incapacitating; 600 (79%) of rear-end crashes at signalized intersections; 154 (20%) of rear-end crashes occurred in wet surface conditions; 82 (11%) of rear-end crashes occurred from dusk-to-dawn; 131 (17%) of rear-end crashes occurred at signalized 4-leg intersection Naples Blvd/Ardisia Ln	Evaluate yellow change and all red-clearance intervals. Rear-end crashes may be due to congestion. Conduct a field review and consider conducting a signal retiming study. After signal retiming is completed, monitor crashes to determine if crashes are reduced; if signal retiming does not help with signal progression, consider conducting ICE analysis as the intersection may be at capacity and additional capacity improvements may be needed.
	166 sideswipe crashes; 138 (83%) of all sideswipe crashes at signalized intersections; based on preliminary Google Maps observations, no advance street name signs for signalized intersections at Cougar Rd and at J & C Blvd/Fountain View	Install advance street name signs for signalized intersections; advanced street name signs have a Crash Reduction Factor (CRF) of 10% for sideswipe crashes
	57 hit fixed object crashes; 2 incapacitating; 23 (40%) of all hit fixed object crashes occurred from dusk-to-dawn conditions; based on preliminary Google Maps observations, no street lighting is installed along the west shoulder of the corridor; locations with street lighting are high-pressure sodium (HPS) luminaires	Conduct lighting analysis to determine if lighting needs to be installed where lighting is not present and conduct structural analysis of existing utility poles to determine if lighting could be installed on them. Replace existing HPS luminaires with LED as LED provides wide, consistent light pattern versus the HPS and LEDs reduce maintenance cost due to their longer lives.
	53 right-turn crashes; 17 (32%) at 4-leg signalized intersection of CR-896 (Pine Ridge Rd); Common pattern with right turns at Pine Ridge Rd is vehicles failing to yield at red predominately southbound and westbound vehicles (82%); southbound and westbound rights have 5-section signals and eastbound and northbound rights have protected signals	Consider protected right for southbound and westbound right turns at CR-896 (Pine Ridge Rd).
	41 left-turn crashes; 1 fatal and 2 incapacitating; 34 (83%) of all left-turn crashes occurred at signalized intersections; 7 (17%) of all left-turn crashes occurred at non-signalized intersecitons; 19 (46%) of left-turn crashes at Orange Blossom Dr; intersection has 5-section flashing left-turn signals	At Orange Blossom Dr: Consider protected only by direction with highest crash rates or adjust protected by time of day if needed and continue to monitor left-turn crashes if pattern continues.
Signalized Intersections	Based on preliminary review from Google Maps, there are no yellow retroreflective backplates on traffic signals at signalized intersections, except J&C Blvd/Fountain View	Install yellow retroflective backplates on all traffic signals where missing.
	Based on preliminary review from Google Maps, there are standard parallel crosswalks at all signalized intersections, except at the east leg of Cougar Dr where a special emphasis crosswalk exists.	Install special emphasis crosswalks on each leg of signalized intersections.
	13 bike/pedestrian crashes; 11 (85%) of all bike/pedestrian crashes occurred at or near an intersection; 4 (31%) of all bike/pedestrian crashes occured at an intersection where turning vehicle failed to see bicyclist; based on preliminary review from Google Maps, there are no pedestrian signage at signalized intersections	Provide R10-15a (TURNING VEHICLES STOP TO PEDESTRIANS) signage at all signalized intersections.
Unsignalized Intersections	Based on preliminary review from Google Maps, there are standard parallel crosswalks at all unsignalized intersections.	Install special emphasis crosswalks on all unsignalized intersections.

Other Roadway Characteristics/Observations:

- Segment Funtional Classification: Minor Urban Arterial
- 6-Lane divided roadway
- Speed Limit: 45 mph
- Median is curbed and landscaped with trees
- Sidewalk on both sides
- Street lighting only on east shoulder; utilities on west shoulder
- No bike lanes





N

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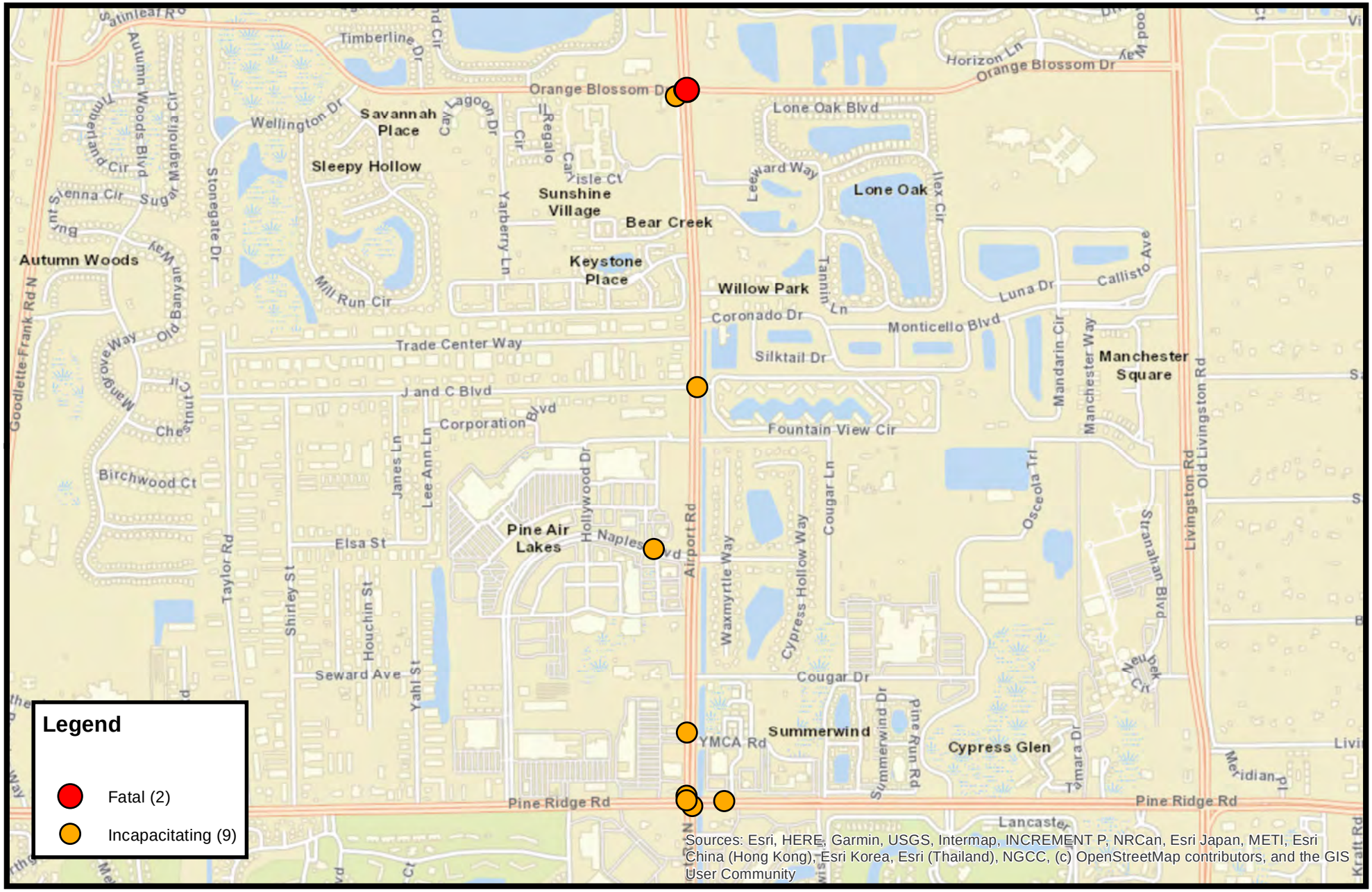
CR-31 (Airport Road) from North of CR-896 (Pine Ridge Road) to South of Orange Blossom Drive
All Injury Crashes (2014 - 2018)



CR-31 (Airport Road) from North of CR-896 (Pine Ridge Road) to South of Orange Blossom Drive
Severe Injury Crashes (2014 - 2018)

CR-31 (AIRPORT ROAD) FROM CR-856 (RADIO ROAD) TO CR-886 (GOLDEN GATE PARKWAY)

Corridor Statistics

AADT	44,008
Preliminary Crash Rate	3.537 — Lower than State Avg. for Urban 6-Lane Divided, Raised: 4.714
Preliminary Ranking by Crash Frequency	5
Preliminary Ranking by Crash Rate	17
Preliminary Ranking of Intersection by Crash Frequency	At CR-886 (Golden Gate Pkwy), Rank: 14

	2014	2015	2016	2017	2018	5-Yr Total	Mean Crashes Per Yr	Serious Injury Crashes	%
Angle	6	10	7	14	9	46	9.2	0	5.6%
Backing	0	0	0	0	1	1	0.2	0	0.1%
Bike	2	3	1	3	3	12	2.4	2	1.5%
Head-On	0	0	2	0	2	4	0.8	0	0.5%
Hit Fixed Object	9	9	5	10	8	41	8.2	1	5.0%
Hit Non-Fixed Object	1	1	0	0	4	6	1.2	0	0.7%
Left-turn	6	4	11	9	7	37	7.4	1	4.5%
Lost Control	1	1	0	1	2	5	1	0	0.6%
Overturn	1	0	0	0	0	1	0.2	0	0.1%
Mechanical	0	1	0	0	0	1	0.2	0	0.1%
Pedestrian	0	1	0	1	0	2	0.4	0	0.2%
Rear-end	119	97	101	86	92	495	99	3	60.0%
Right-turn	5	6	1	5	4	21	4.2	1	2.5%
Run Off-road	4	0	0	0	0	4	0.8	0	0.5%
Sideswipe	29	29	28	29	23	138	27.6	1	16.7%
U-Turn	3	3	2	2	1	11	2.2	0	1.3%
Total	**186**	**165**	**158**	**160**	**156**	**825**	**165**	**9**	**100%**
Fatal	0	0	1	0	0	1	0.2	-	0.1%
Incapacitating	1	0	1	4	2	8	1.6	-	1.0%
Non-Incapacitating	12	8	8	9	11	48	9.6	-	5.8%
Possible	17	22	28	31	17	115	23	-	13.9%
None	156	135	120	116	126	653	130.6	-	79.2%
Total	**186**	**165**	**158**	**160**	**156**	**825**	**165**	**-**	**100%**
Daylight	164	145	141	134	132	716	143.2	5	86.8%
Dawn	0	1	2	3	4	10	2	0	1.2%
Dusk	2	4	4	1	1	12	2.4	1	1.5%
Dark-Lighted	19	14	10	20	19	82	16.4	2	9.9%
Dark-Not Lighted	1	1	1	2	0	5	1	1	0.6%
Total	**186**	**165**	**158**	**160**	**156**	**825**	**165**	**9**	**100%**
Dry Roadway	161	152	139	138	135	725	145	8	87.9%
Wet Roadway	25	13	19	22	21	100	20	1	12.1%
Total	**186**	**165**	**158**	**160**	**156**	**825**	**165**	**9**	**100%**

Note: Fatal and incapacitating crash types were only reviewed.

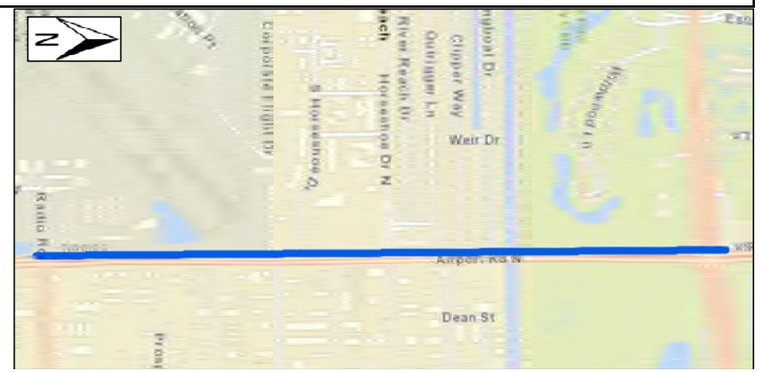
Nighttime Crashes	**13%**	**Lower than Statewide Average of 30%**
Wet Roadway Crashes	**12%**	**Lower than Statewide Average of 18%**

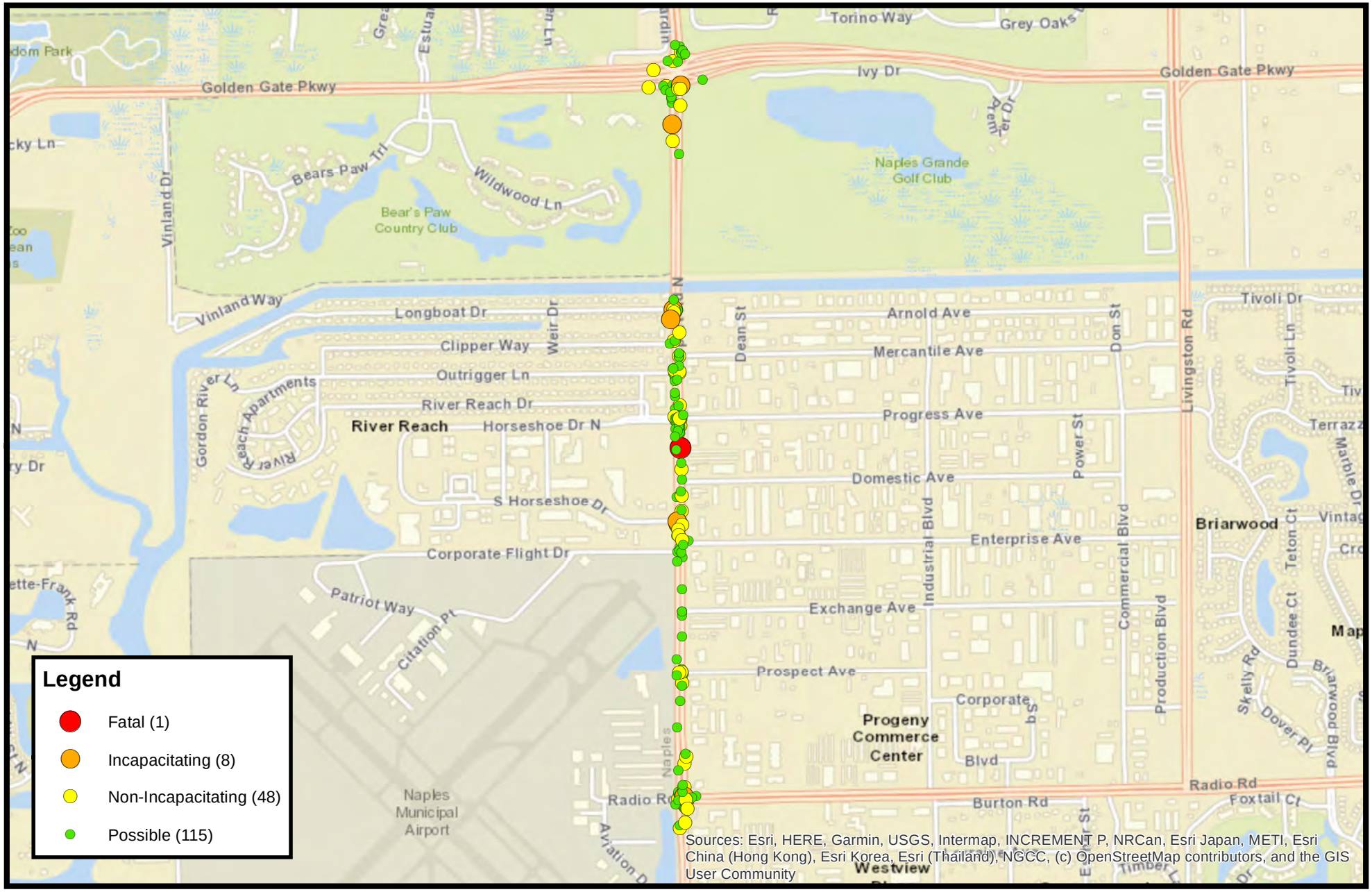
Observations & Recommendations

Location Description	Crash Trends/ Google Maps Observations	Recommendation
Corridor-wide	495 rear-end crashes; 1 fatal and 2 incapacitating; 433 (87%) of rear-end crashes at signalized intersections; 63 (13%) of rear-end crashes occurred in wet surface conditions; 48 (10%) of rear-end crashes occurred from dusk-to-dawn; 210 (42%) of rear-end crashes occurred at signalized 4-leg intersection Golden Gate Parkway	Evaluate yellow change and all red-clearance intervals. Rear-end crashes may be due to congestion. Conduct a field review and consider conducting a signal retiming study. After signal retiming is completed, monitor crashes to determine if crashes are reduced; if signal retiming does not help with signal progression, consider conducting ICE analysis as the intersection may be at capacity and additional capacity improvements may be needed.
	138 sideswipe crashes; 1 incapacitating; 105 (76%) of all sideswipe crashes at signalized intersections; based on preliminary Google Maps observations, no advance street name signs for signalized intersections at Mercantile Ave, Longboat Dr, or Enterprise Ave	Install advance street name signs for signalized intersections; advanced street name signs have a Crash Reduction Factor (CRF) of 10% for sideswipe crashes
	46 angle crashes; 37 (80%) of all angle crashes occurred at signalized intersections; 14 (30%) occurred at 4-leg signalized intersection Horseshoe Dr N/Progress Ave	Review yellow change and all-red clearance intervals at Horseshoe Dr N/Progress Ave Conduct a field review to determine if red-light running is an issue and consider enforcement.
	41 hit fixed object crashes; 1 incapacitating; 20 (49%) of all hit fixed object crashes occurred from dusk-to-dawn conditions; based on preliminary Google Maps observations, no street lighting is installed on east side from Radio Rd to Prospect Ave, no lighting from Prospect Ave to Horseshoe Dr N/Progress Ave, no lighting on west side from Horseshoe Dr N/Progress Ave to 0.25 mi south of Golden Gate Pkwy; The street lighting is high-pressure sodium (HPS) luminaires	Conduct lighting analysis to determine if lighting needs to be installed where lighting is not present. Replace existing HPS luminaires with LED as LED provides wide, consistent light pattern versus the HPS and LEDs reduce maintenance cost due to their longer lives.
	37 left-turn crashes; 1 incapacitating; 33 (89%) of all left-turn crashes occurred at signalized intersections; 12 (46%) of left-turn crashes at Horseshoe Dr N/Progress Ave; intersection has 4-section flashing northbound and southbound and protected eastbound and westbound	At Horseshoe Dr N/Progress Ave Consider protected only by direction with highest crash rates or adjust protected by time of day if needed and continue to monitor left-turn crashes if pattern continues.
	14 non-motorist crashes; 12 bike and 2 pedestrian; 2 incapacitating bike crashes; 9 of the crashes occurred at unsignalized intersections or non-junction; 10 (71%) of non-motorist crashes occurred due to right-turning vehicles; All crosswalks at intersections, signalized and unsignalized, have parallel painted crosswalks	Install R10-15a signs, TURNING VEHICLE STOP FOR PEDESTRIAN, at all intersections to increase awareness of non-motorists. Install special emphasis crossings at all crossings to increase visibility of crosswalks.
All Signalized Intersections	Based on preliminary review from Google Maps, there are no yellow retroreflective backplates on traffic signals at the following signalized intersections: Radio Rd and Longboat Dr	Install yellow retroreflective backplates on all traffic signals where missing, which has a crash reduction factor of 15% for all crash types and severities.
At CR-586 (Radio Rd)	No pedestrian crossing on south side; Intersection lighting only on northeast corner; Westbound right-turn has a R10-15a sign, TURNING VEHICLE YIELD TO PEDESTRIAN	Determine feasibility of installing pedestrian crossing on south side. See recommendations on lighting. Replace YIELD TO PEDESTRIAN R10-15a sign with STOP FOR PEDESTRIAN R10-15a sign.
Mercantile Ave	No pedestrian crossing on north side	Determine feasibility of installing pedestrian crossing on north side.
Longboat Dr	No pedestrian crossing on north side because sidewalk ends to north along east side due to bridge.	No recommendation to add sidewalk due to bridge.

Other Roadway Characteristics/Observations:

- Segment Functional Classification: Minor Urban Arterial
- 6-Lane divided roadway
- Speed Limit: 45 mph
- Median is curbed and landscaped with trees
- Sidewalk on both sides, except on east side from Longboat Dr to Golden Gate Pkwy
- Street lighting described in observations.
- No bike lanes





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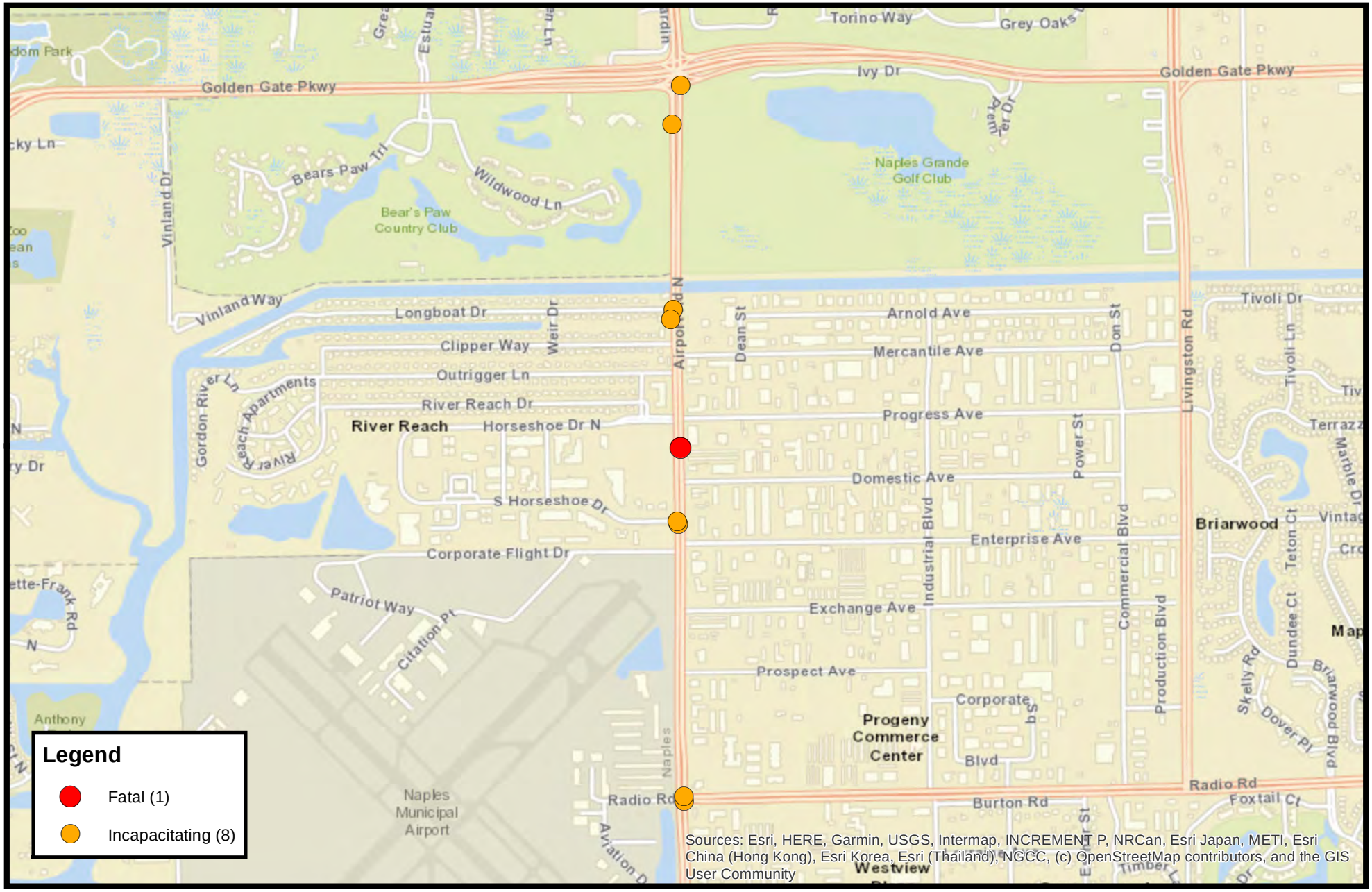
CR-31 (Airport Road) from CR-856 (Radio Road) to CR-886 (Golden Gate Parkway) All Injury Crashes (2014 - 2018)



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0 0.125 0.25 0.5 Miles

CR-31 (Airport Road) from CR-856 (Radio Road) to CR-886 (Golden Gate Parkway) Severe Injury Crashes (2014 - 2018)

CR-886 (GOLDEN GATE PARKWAY) FROM SANTA BARBARA BOULEVARD TO CR-951 (COLLIER BOULEVARD)

Corridor Statistics

AADT	27,496
Preliminary Crash Rate	5.048 **Higher than State Avg. Urban 4-Lane Divided, Raised: 3.634**
Preliminary Ranking by Crash Frequency	1
Preliminary Ranking by Crash Rate	5
Preliminary Ranking of Intersection by Crash Frequency	At Santa Barbara Blvd, Rank: 6
Preliminary Ranking of Intersection by Crash Rate	At Collier Blvd, Rank: 7; At Santa Barbara Blvd, Rank: 13

	2014	2015	2016	2017	2018	5-Yr Total	Mean Crashes Per Yr	Serious Injury Crashes	%
Animal	1	0	0	0	0	1	0.2	0	0.1%
Angle	17	20	36	34	23	130	26	1	12.0%
Bike	2	1	1	1	2	7	1.4	1	0.6%
Head-On	2	2	4	1	1	10	2	0	0.9%
Hit Fixed Object	10	7	8	4	6	35	7	0	3.2%
Hit Non-Fixed Object	1	0	1	0	2	4	0.8	0	0.4%
Left-turn	30	21	26	30	24	131	26.2	7	12.1%
Lost Control	1	0	0	0	1	2	0.4	0	0.2%
Overturn	0	0	0	0	1	1	0.2	0	0.1%
Mechanical	0	1	0	0	0	1	0.2	0	0.1%
Pedestrian	1	1	1	0	0	3	0.6	0	0.3%
Rear-end	95	125	120	119	117	576	115.2	1	53.1%
Right-turn	5	3	6	6	7	27	5.4	1	2.5%
Sideswipe	23	22	37	33	26	141	28.2	0	13.0%
U-Turn	2	1	6	5	2	16	3.2	1	1.5%
Total	**190**	**204**	**246**	**233**	**212**	**1,085**	**217**	**12**	**100%**
Fatal	0	0	0	0	0	0	0	-	0.0%
Incapacitating	1	1	4	3	3	12	2.4	-	1.1%
Non-Incapacitating	14	12	11	16	17	70	14	-	6.5%
Possible	21	20	27	27	25	120	24	-	11.1%
None	154	171	204	187	167	883	176.6	-	81.4%
Total	**190**	**204**	**246**	**233**	**212**	**1,085**	**217**	**-**	**100%**
Daylight	139	149	187	162	150	787	157.4	4	72.5%
Dawn	2	1	5	4	2	14	2.8	0	1.3%
Dusk	4	3	5	2	12	26	5.2	0	2.4%
Dark-Lighted	42	45	43	61	47	238	47.6	7	21.9%
Dark-Not Lighted	2	6	6	4	1	19	3.8	1	1.8%
Lighting	1	0	0	0	0	1	0.2	0	0.1%
Total	**190**	**204**	**246**	**233**	**212**	**1,085**	**217**	**12**	**100%**
Dry Roadway	154	171	209	201	182	**917**	183.4	11	84.5%
Wet Roadway	35	33	36	32	30	**166**	33.2	1	15.3%
Unknown	1	0	1	0	0	**2**	0.4	0	0.2%
Total	**190**	**204**	**246**	**233**	**212**	**1,085**	**217**	**12**	**100%**

Note: Fatal and incapacitating crash types were only reviewed.

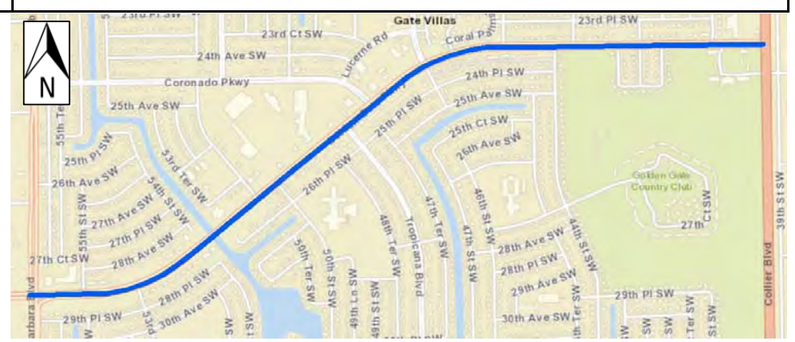
Nighttime Crashes	**27.5%**	**Lower than Statewide Average of 30%**
Wet Roadway Crashes	**15.3%**	**Lower than Statewide Average of 18%**

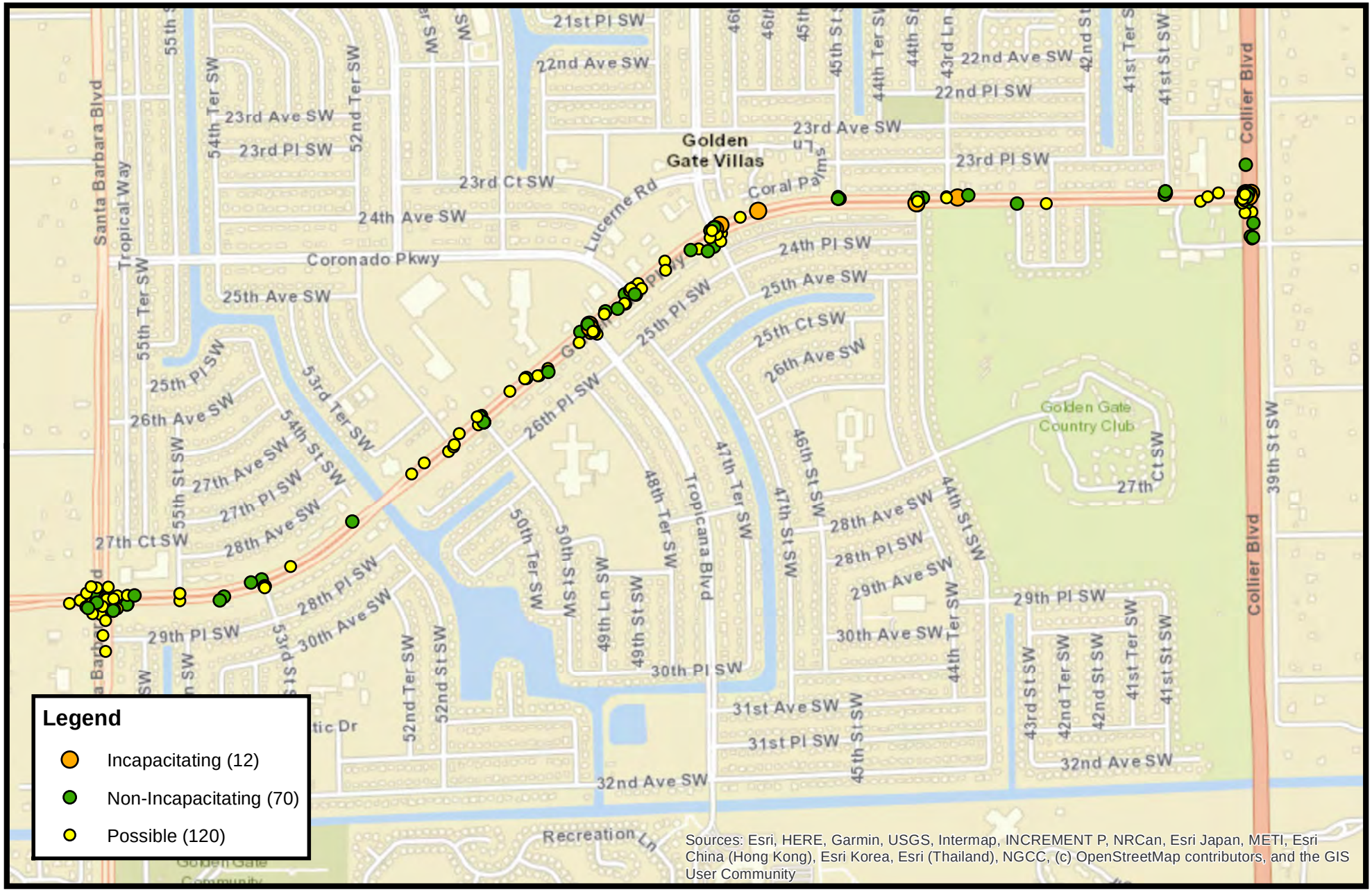
Observations & Recommendations

Location Description	Crash Trends/ Google Maps Observations	Recommendation
Corridor-wide	576 rear-end crashes; all at intersections; 534 (83%) of rear-end crashes at signalized intersections; 91 (16%) of rear-end crashes occured during wet surface conditions; 264 (46%) of rear-end crashes occurred at signalized 4-leg intersection at Santa Barbara Blvd	Evaluate yellow change and all-red clearance intervals at Santa Barbara Blvd. Rear-end crashes may be due to congestion. Conduct a field review and consider conducting a signal retiming study. After signal retiming is completed, monitor crashes to determine if crashes are reduced; if signal retiming does not help with signal progression, consider conducting ICE analysis as the intersection may be at capacity and additional capacity improvements may be needed.
	130 angle crashes; 105 (81%) of all angle crashes occurred at signalized intersections; 29 (22%) of all angle crashes occurred at signalized 4-leg intersection at Sunshine Blvd/47th St SW; 27 (21%) of all angle crashes occurred at signalized 4-leg intersection at Tropicana Blvd	Review yellow change and all-red clearance intervals. Conduct a field review to determine if red-light running is an issue and consider enforcement.
	141 sideswipe crashes; 117 (83%) of all sideswipe crashes occured at signalized intersections; based on preliminary review from Google Maps, there are no advanced street name signs, except at Santa Barbara Blvd	Install advance street name signs for signalized intersections; advanced street name signs have a Crash Reduction Factor (CRF) of 10% for sideswipe crashes.
	131 left-turn crashes; 101 (77%) occurred at signalized intersections; 30 (23%) occurred at unsignalized intersections; 43 (33%) of left-turn crashes occured at t-intersection of Collier Blvd (3 incap); Collier Blvd has northbound 5-section left-turn signal and there is average of 9 crashes a year; 14 left-turn crashes occurred at signalized 4-leg intersection at Sunshine Blvd/47th St SW; some left-turn approaches at intersections have 4-section flashing left-turn signals; 11 left-turn crashes occurred at median opening of 41st St SW	Continue to monitor left-turn crashes at signalized intersections; evaluate feasibility of installing 4-section flashing left turn signals at additional problematic approaches. Landscaping along median may cause a sight issue for left turning vehicles; evaluate sight distance and trim or remove landscaping near median openings if obscuring drivers' line of sight.
Signalized Intersections	Based on preliminary review from Google Maps, there are no yellow retroreflective backplates on traffic signals at signalized intersections except: Tropicana Blvd, 47th St SW, and 44th St SW	Install yellow retroreflective backplates on all traffic signals; has a CRF of 15% for all crash types.
	Based on preliminary review from Google Maps, there are R10-15s, TURNING VEHICLE YIELD TO PED signs, at all signalized intersections, except Santa Barbara Blvd and Collier Blvd	Per new FHWA and FDOT guidelines, consider replacing TURNING VEHICLE YIELD TO PEDESTRIAN signs with TURNING VEHICLE STOP FOR PEDESTRIAN R10-15a signs.
School Zone	School zone within study corridor; SCHOOL markings on roadway and S1-1 School zone signs present on median and shoulder; children observed crossing CR-886 within school zone in Google Maps; 10 bike/ped crashes; one incapacitating bike crash; nearest crossings across CR-886 within school zone are approximately 0.46 mile apart	Conduct mid-block crossing analysis within school zone to determine if a mid-block crossing is warranted. Per FHWA MUTCD Section 7B.15, review state and local statute and conduct an engineering study to determine if a school zone is appropriate for Golden Gate Middle School along CR-886.
At 50th St SW, Coronado Pkwy, and 44th St SW	Based on preliminary review from Google Maps, crosswalk legs are missing from the following signalized intersections: - 50th St SW (Southwest leg) - Coronado Pkwy (Northeast leg) - 44th St SW (East leg)	Determine feasibility of installing special emphasis crosswalks on missing legs of the three intersections with pedestrian signals.

Other Roadway Characteristics/Observations:

- Segment Funtional Classification: Minor Urban Arterial
- 4-Lane divided roadway
- Speed Limit: 35 mph
- Median is curbed and landscaped with trees
- Sidewalk and street lighting on both sides
- No bike lanes

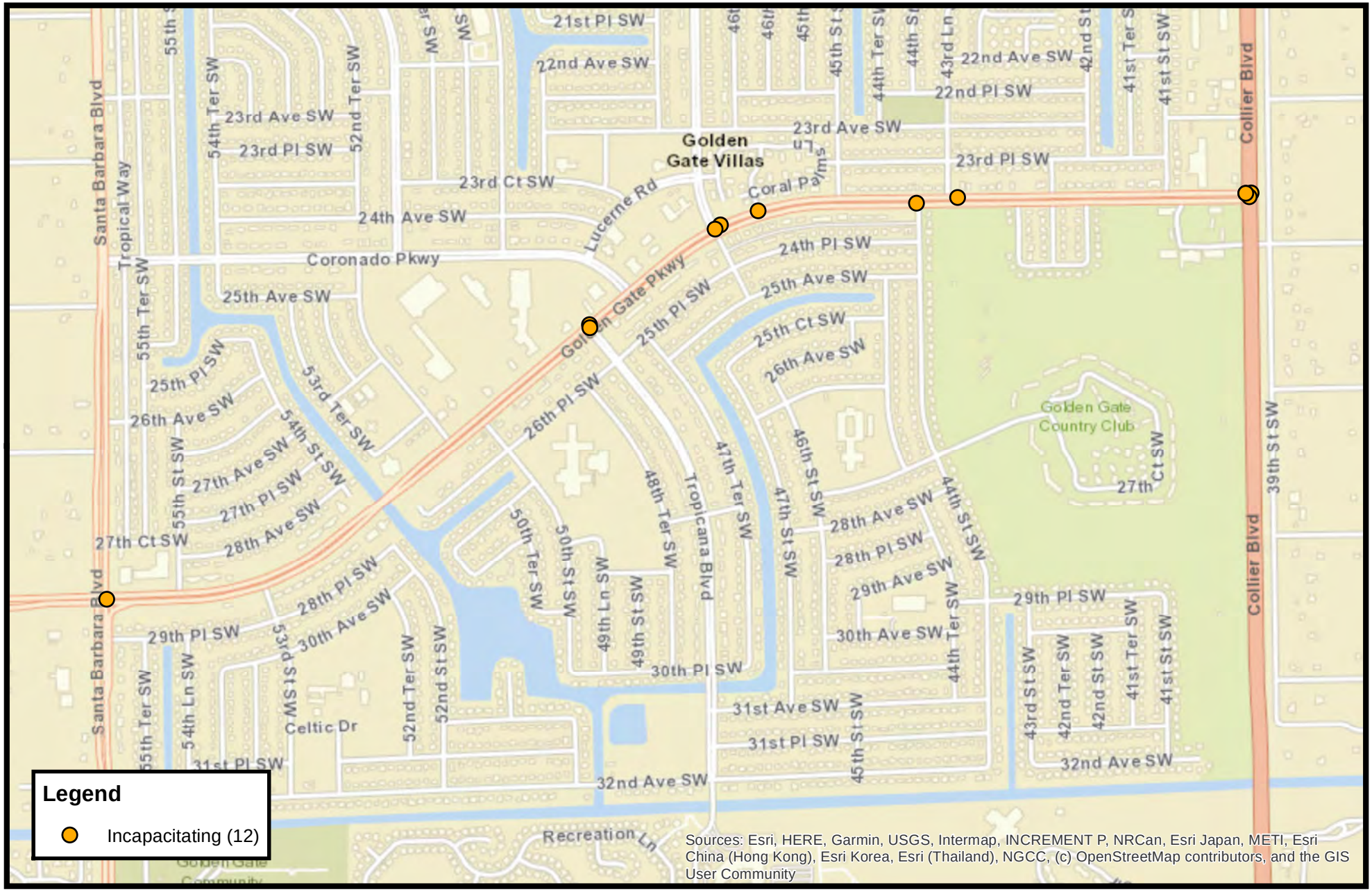




N

0 0.1 0.2 0.4 Miles

CR-886 (Golden Gate Parkway) from Santa Barbara Boulevard to CR-951 (Collier Boulevard) All Injury Crashes (2014 - 2018)



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0 0.1 0.2 0.4 Miles

CR-886 (Golden Gate Parkway) from Santa Barbara Boulevard to CR-951 (Collier Boulevard)
Severe Injury Crashes (2014 - 2018)

CR-846 (IMMOKALEE ROAD) FROM LIVINGSTON ROAD TO I-75

Corridor Statistics

AADT	46,874
Preliminary Crash Rate	5.886 Higher than State Avg. for Urban 6+ Lane Divided, Raise 4.714
Preliminary Ranking by Crash Frequency	10
Preliminary Ranking by Crash Rate	3
Preliminary Ranking of Intersection by Crash Frequenc	At Livingston Rd, Rank: 9

	2014	2015	2016	2017	2018	5-Yr Total	Mean Crashes Per Yr	Serious Injury Crashes	%
Angle	11	4	13	7	9	44	8.8	1	4.7%
Backing	1	0	1	0	1	3	0.6	0	0.3%
Bike	1	1	2	1	0	5	1	1	0.5%
Head-On	3	1	0	0	0	4	0.8	0	0.4%
Hit Fixed Object	3	6	3	2	5	19	3.8	0	2.0%
Hit Non-Fixed Object	1	0	0	0	0	1	0.2	0	0.1%
Left-turn	0	1	2	2	5	10	2	1	1.1%
Pedestrian	1	1	0	1	0	3	0.6	3	0.3%
Rear-end	136	163	148	142	120	709	141.8	1	75.0%
Right-turn	1	1	4	8	7	21	4.2	0	2.2%
Run Off-road	1	0	0	0	0	1	0.2	0	0.1%
Sideswipe (Same Direction)	21	21	24	28	27	121	24.2	0	12.8%
U-Turn	1	2	0	1	0	4	0.8	0	0.4%
Total	**181**	**201**	**197**	**192**	**174**	**945**	**189**	**7**	**100%**
Fatal	1	0	0	0	0	1	0.2	-	0.1%
Incapacitating	2	1	0	3	0	6	1.2	-	0.6%
Non-Incapacitating	2	9	7	8	7	33	6.6	-	3.5%
Possible	25	20	19	20	16	100	20	-	10.6%
None	151	171	171	161	151	805	161	-	85.2%
Total	**181**	**201**	**197**	**192**	**174**	**945**	**189**	**-**	**100%**
Daylight	145	159	156	152	138	750	150	5	79.4%
Dawn	3	2	1	4	3	13	2.6	1	1.4%
Dusk	4	3	3	6	4	20	4	0	2.1%
Dark-Lighted	27	35	35	28	28	153	30.6	0	16.2%
Dark-Not Lighted	2	1	1	1	1	6	1.2	1	0.6%
Dark-Unknown Lighting	0	1	1	1	0	3	0.6	0	0.3%
Total	**181**	**201**	**197**	**192**	**174**	**945**	**189**	**7**	**100%**
Dry Roadway	149	168	164	163	143	787	157.4	7	83.3%
Wet Roadway	32	33	33	29	31	158	31.6	0	16.7%
Total	**181**	**201**	**197**	**192**	**174**	**945**	**189**	**7**	**100%**

Note: Fatal and incapacitating crash types were only reviewed.

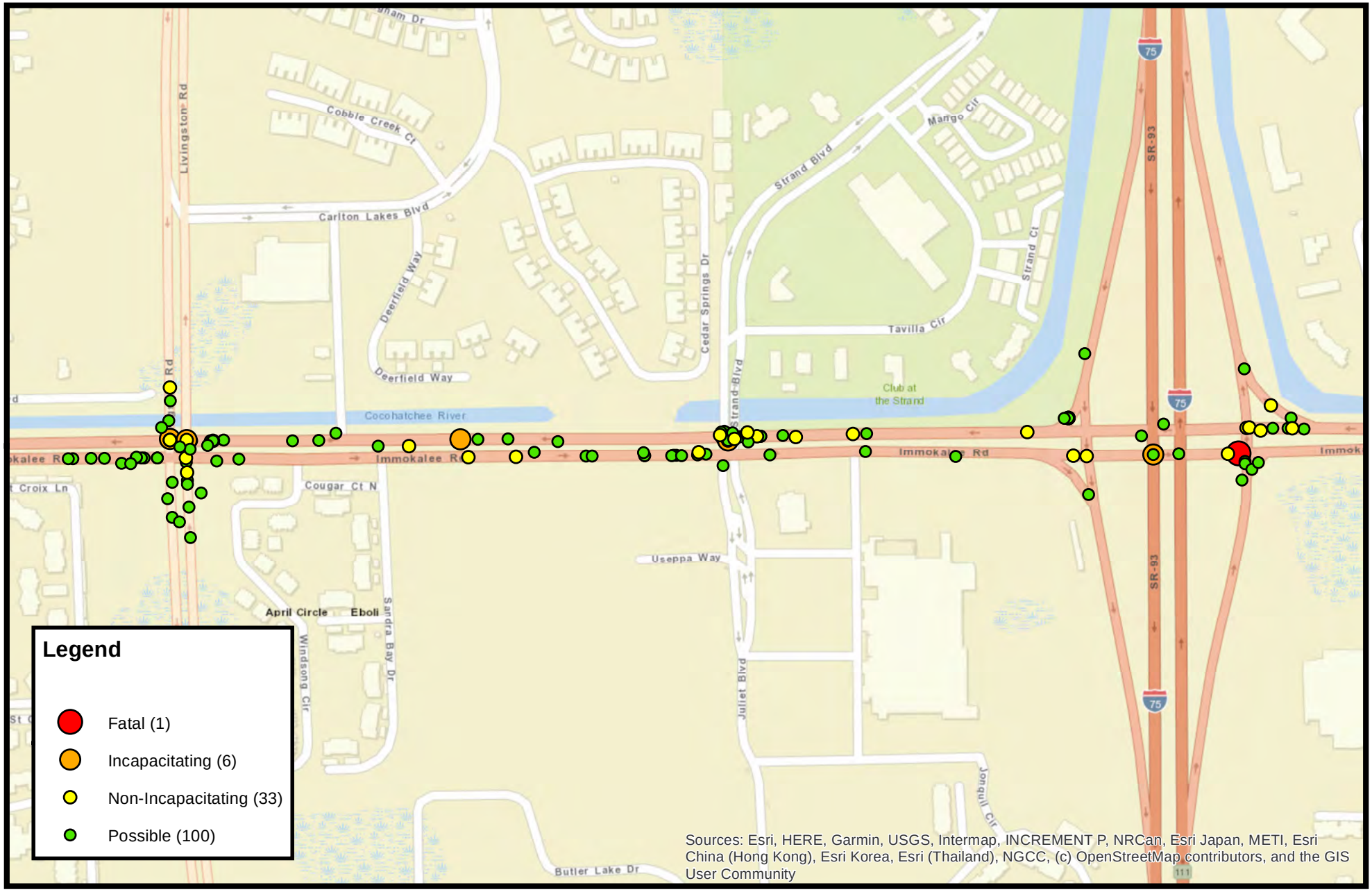
Nightime Crashes	21%	Lower than Statewide Average of 30%
Wet Roadway Crashes	17%	Lower than Statewide Average of 18%

Observations & Recommendations

Location Description	Crash Trends/ Google Maps Observations	Recommendation
Corridor-wide	225 rear-end crashes; 675 (96%) of all rear-end crashes at/approaching signalized intersections; 125 (18%) of all rear-end crashes occured during wet surface conditions; 244 (35%) of all rear-end crashes occurred at/approaching I-75, which has 2 separate signalized intersections 229 (32%) of all rear-end crashes occurred at/approaching signalized 4-leg intersection at Livingston Rd	Evaluate yellow change and all red-clearance intervals.
		Rear-end crashes may be due to congestion. Conduct a field review and consider conducting a signal retiming study.
		After signal retiming is completed, monitor crashes to determine if crashes are reduced; if signal retiming does not help with signal progression, consider conducting ICE analysis as the intersection may be at capacity and additional capacity improvements may be needed.
	44 angle crashes; 42 (95%) of all angle crashes occurred at/approaching signalized intersections; 23 (52%) of all angle crashes occurred at/approaching signalized 4-leg intersection at Juliet Blvd/Strand Blvd; 17 (39%) occured during nighttime conditions	Review yellow change and all-red clearance intervals at signalized intersections.
		Conduct a field review to determine if red-light running is an issue and consider enforcement.
	121 sideswipe crashes; 111 (92%) of all sideswipe crashes occured at/approaching signalized intersections; based on preliminary review from Google Maps, there are advance street name signs for all signals; however, signs appear to be smaller than design guidelines per MUTCD eastbound and westbound left turns at all signals are dual lanes and skip striping is provided to guide vehicles during their turns;	Confirm with field review that advance street name signs meet MUTCD standards.
		Install advance street name signs with "XX FEET AHEAD" for clarity.
	19 hit fixed object crashes; no fatal or incapacitating; 13 (68%) of crashes occurred at signalized 4-leg intersection of Livingston Rd; 6 of 13 (46%) occurred during wet pavement conditions at Livingston Rd	Conduct drainage analysis at Livingston Rd intersection.
		Determine feasibility of high friction surface treatment (HFST) at Livingston Rd intersection.
At Livingston Rd	Parallel pedestrian crossings on all legs; 3 bike/ped crashes (2 incapacitating)	Paint special emphasis crosswalks to increase visibility of crosswalks to vehicles.
	Yellow retroreflective backplates only on some traffic signals	Install yellow retroreflective backplates on signals where missing.
At Juliet Blvd/ Strand Blvd	Parallel pedestrian crossings on all legs; 2 bike/ped crashes (1 incapacitating)	Paint special emphasis crosswalks to increase visibility of crosswalks to vehicles.
	Yellow retroreflective backplates missing on all traffic signals	Install yellow retroreflective backplates on signals.
	No intersection street lighting on northeast corner	Install street lighting on northeast corner.
At I-75	Yellow retroreflective backplates missing on all traffic signals	Install yellow retroreflective backplates on signals.
	Dual rights on exit ramps; no right turn on red sign for inside right turns; 8 right turn crashes; all occurred 2016 and later	Continue to monitor right turn crashes at both ramps, and if pattern of crashes continue to increase, consider installing sign to prohibit right turn on red for both lanes.
	Based on user experience, during the PM, NB I-75 traffic backs up on the interstate, down the ramps and both directions on the cross street	Conduct a field review and consider conducting a signal retiming study.

Other Roadway Characteristics/Observations:

- Segment Functional Classification: Minor Urban Arterial
- 6-Lane to 8-Lane divided roadway
- Speed Limit: 45 mph
- Median is curbed and landscaped with palm trees
- Street lighting on both sides
- Sidewalk only along the south side
- Concrete barrier wall along north side to protect vehicles from Cocohatchee River
- No bike lanes



N

0 0.045 0.09 0.18 Miles

CR-846 (Immokalee Road) from Livingston Road to I-75
All Injury Crashes (2014 - 2018)

N

0 0.045 0.09 0.18 Miles

CR-846 (Immokalee Road) from Livingston Road to I-75
Severe Injury Crashes (2014 - 2018)

US-41/SR-45/TAMIAMI TRAIL N FROM CR-862 (VANDERBILT BEACH ROAD) TO CR-846 (IMMOKALEE ROAD)/111TH AVENUE N

Corridor Statistics

AADT	35,925
Preliminary Crash Rate	4.005 — Lower than State Avg. for Urban 6-Lane Divided, Raised: 4.714
Preliminary Ranking by Crash Frequency	7
Preliminary Ranking by Crash Rate	12
Preliminary Ranking of Intersection by Crash Frequency	At Immokalee Rd/111th Ave, Rank: 3
	At Vanderbilt Beach Rd, Rank 15
Preliminary Ranking of Intersection by Crash Rate	At Immokalee Rd/111th Ave, Rank: 10

	2014	2015	2016	2017	2018	5-Yr Total	Mean Crashes Per Yr	Serious Injury Crashes	%
Angle	15	14	13	20	17	79	15.8	2	7.8%
Backing	0	1	0	0	0	1	0.2	0	0.1%
Bike	2	4	4	6	4	20	4	1	2.0%
Head-On	0	0	0	0	1	1	0.2	0	0.1%
Hit Fixed Object	12	10	9	8	5	44	8.8	2	4.4%
Hit Non-Fixed Object	2	1	1	1	1	6	1.2	0	0.6%
Left-turn	4	7	8	4	2	25	5	3	2.5%
Lost Control	0	0	0	0	1	1	0.2	1	0.1%
Medical	0	1	0	0	0	1	0.2	0	0.1%
Pedestrian	2	1	1	1	2	7	1.4	1	0.7%
Rear-end	125	138	132	129	96	620	124	1	61.4%
Right-turn	6	6	1	7	4	24	4.8	1	2.4%
Sideswipe	32	33	40	35	24	164	32.8	0	16.2%
Single Vehicle	0	0	1	0	0	1	0.2	0	0.1%
U-Turn	4	0	2	7	3	16	3.2	0	1.6%
Total	**204**	**216**	**212**	**218**	**160**	**1,010**	**202**	**12**	**100%**
Fatal	0	0	1	0	1	2	0.4	-	0.2%
Incapacitating	1	0	2	5	2	10	2	-	1.0%
Non-Incapacitating	15	9	12	9	11	56	11.2	-	5.5%
Possible	21	28	25	35	22	131	26.2	-	13.0%
None	167	179	172	169	124	811	162.2	-	80.3%
Total	**204**	**216**	**212**	**218**	**160**	**1,010**	**202**	**-**	**100%**
Daylight	154	172	164	171	130	791	158.2	8	78.3%
Dawn	1	2	3	3	1	10	2	1	1.0%
Dusk	8	5	8	8	1	30	6	1	3.0%
Dark-Lighted	40	35	33	35	23	166	33.2	2	16.4%
Dark-Not Lighted	1	1	3	0	4	9	1.8	0	0.9%
Dark-Unknown Lighting	0	1	1	1	1	4	0.8	0	0.4%
Total	**204**	**216**	**212**	**218**	**160**	**1,010**	**202**	**12**	**100%**
Dry Roadway	179	190	191	201	146	907	181.4	11	89.8%
Wet Roadway	25	26	21	17	14	103	20.6	1	10.2%
Total	**204**	**216**	**212**	**218**	**160**	**1,010**	**202**	**12**	**100%**

Note: Fatal and incapacitating crash types were only reviewed.

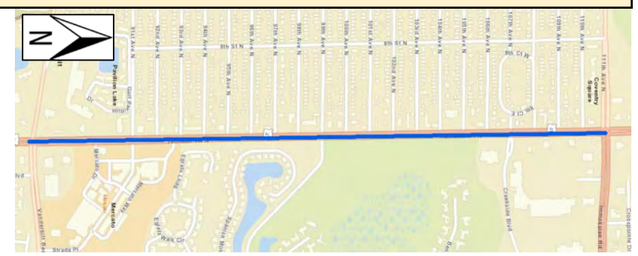
Nighttime Crashes	**22%**	**Lower than Statewide Average of 30%**
Wet Roadway Crashes	**10%**	**Lower than Statewide Average of 18%**

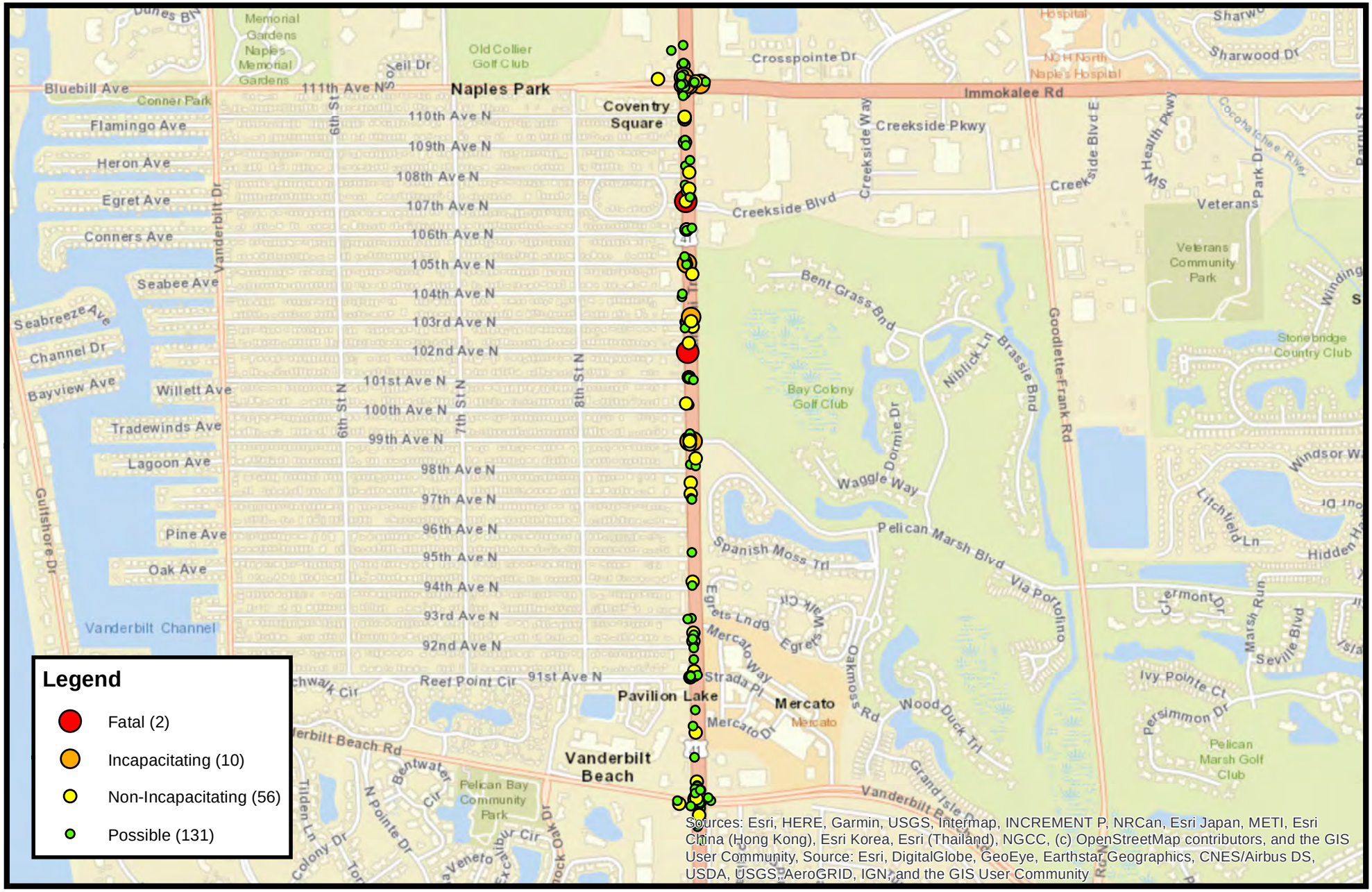
Observations & Recommendations

Location Description	Crash Trends/ Google Maps Observations	Recommendation
Corridor-wide	620 rear-end crashes; 1 incapacitating; 541 (87%) of rear-end crashes at signalized intersections; 68 (11%) of rear-end crashes occurred in wet surface conditions; 111 (18%) of rear-end crashes occurred from dusk-to-dawn; 226 (36%) of rear-end crashes occurred at signalized 4-leg intersection Immokalee Rd	Evaluate yellow change and all red-clearance intervals. Rear-end crashes may be due to congestion. Conduct a field review and consider conducting a signal retiming study. After signal retiming is completed, monitor crashes to determine if crashes are reduced; if signal retiming does not help with signal progression, consider conducting ICE analysis as the intersection may be at capacity and additional capacity improvements may be needed.
	164 sideswipe crashes; 135 (82%) of all sideswipe crashes at signalized intersections; based on preliminary Google Maps observations, no advance street name signs for signalized intersections at 91st Ave N/Strada Pl and Immokalee Rd/111th Ave N	Install advance street name signs for signalized intersections; advanced street name signs have a Crash Reduction Factor (CRF) of 10% for sideswipe crashes
	79 angle crashes; 2 incapacitating crashes 70 (89%) of all angle crashes occurred at signalized intersections; 37 (47%) occurred at 4-leg signalized intersection CR-846 (Immokalee Rd)/111th Ave N	Review yellow change and all-red clearance intervals at CR-846 (Immokalee Rd)/111th Ave N Conduct a field review to determine if red-light running is an issue and consider enforcement.
	44 hit fixed object crashes; 2 incapacitating; 22 (50%) of all hit fixed object crashes occurred from dusk-to-dawn conditions; based on preliminary Google Maps observations, no street lighting is installed on west side from Vanderbilt Beach Rd to 91st Ave N/Strada Pl; The street lighting is high-pressure sodium (HPS) luminaires	Conduct lighting analysis to determine if lighting needs to be installed where lighting is not present. Replace existing HPS luminaires with LED as LED provides wide, consistent light pattern versus the HPS and LEDs reduce maintenance cost due to their longer lives.
	27 non-motorist crashes occurred along corridor; 20 bike and 7 pedestrian; 1 fatal pedestrian crash and 1 incapacitating bike crash; 21 (78%) of the crashes involved right turning vehicles at intersections, 1 incapacitating; All signalized intersections have parallel marked crossings, except 107th Ave/Creekside Blvd which has special emphasis; All side streets do not have marked crossings	Install R10-15a signs, TURNING VEHICLE STOP FOR PEDESTRIAN, at all intersections to increase awareness of non-motorists. Install special emphasis crossings at all existing crossings at signalized intersections where parallel marked crossing is present to increase visibility of crosswalks. Install special emphasis crossings on all side streets.
	25 left-turn crashes; 1 fatal and 2 incapacitating; 16 (64%) of all left-turn crashes occurred at signalized intersections; Average number of crashes per location is 1 crash per year or less;	Due to low average number of crashes per location per year, there are no recommendations at this time.
	Bike lanes along corridor do not meet current FDOT standards: design speed of 45 mph (posted 40 mph) for bike lanes is standard and posted is 50 mph; Lane widths are 12 ft wide; bike lanes 5 ft wide; average of 5 non-motorist crashes per year	As a long term recommendation, consider a shared use path on one side of corridor; lane widths can be reduced and removal of bike lanes could accommodate for a shared use path; this recommendation is also based on whether non-motorist activity is high (must be confirmed with field review)
Signalized Intersections	Based on preliminary review from Google Maps, there are no yellow retroreflective backplates on traffic signals at the following signalized intersections: Vanderbilt Beach Rd, 91st Ave/Strada Pl, and missing on some signals at 99th Ave/Pelican Marsh Blvd and 111th Ave/Immokalee Rd	Install yellow retroreflective backplates on all traffic signals where missing, which has a crash reduction factor of 15% for all crash types and severities.
	No intersection lighting at the following intersections: Vanderbilt Beach Rd, 99th Ave/ Pelican Marsh Blvd,	See recommendation on lighting.
At 91st Ave/Strada Pl	There is no pedestrian crossing on south leg; Lighting only on northwest and southeast corners	Determine feasibility of installing pedestrian crossing on south leg. See recommendation on lighting.
At 107th Ave/ Creekside Blvd	Lighting only on north side of intersection	See recommendation on lighting.
At 117th Ave/ Immokalee Rd	Lighting only on south side of intersection	See recommendation on lighting.

Other Roadway Characteristics/Observations:

- Segment Functional Classification: Other Principal Urban Arterial
- 6-Lane divided roadway
- Speed Limit: 50 mph
- Median is curbed and landscaped with trees
- Sidewalk on both sides from Vanderbilt Beach Rd to 91st Ave/Strada Pl and only on west side from 91st Ave/Strada Pl to Immokalee Rd
- Street lighting described in observations.
- 5 ft Bike lanes on both sides.

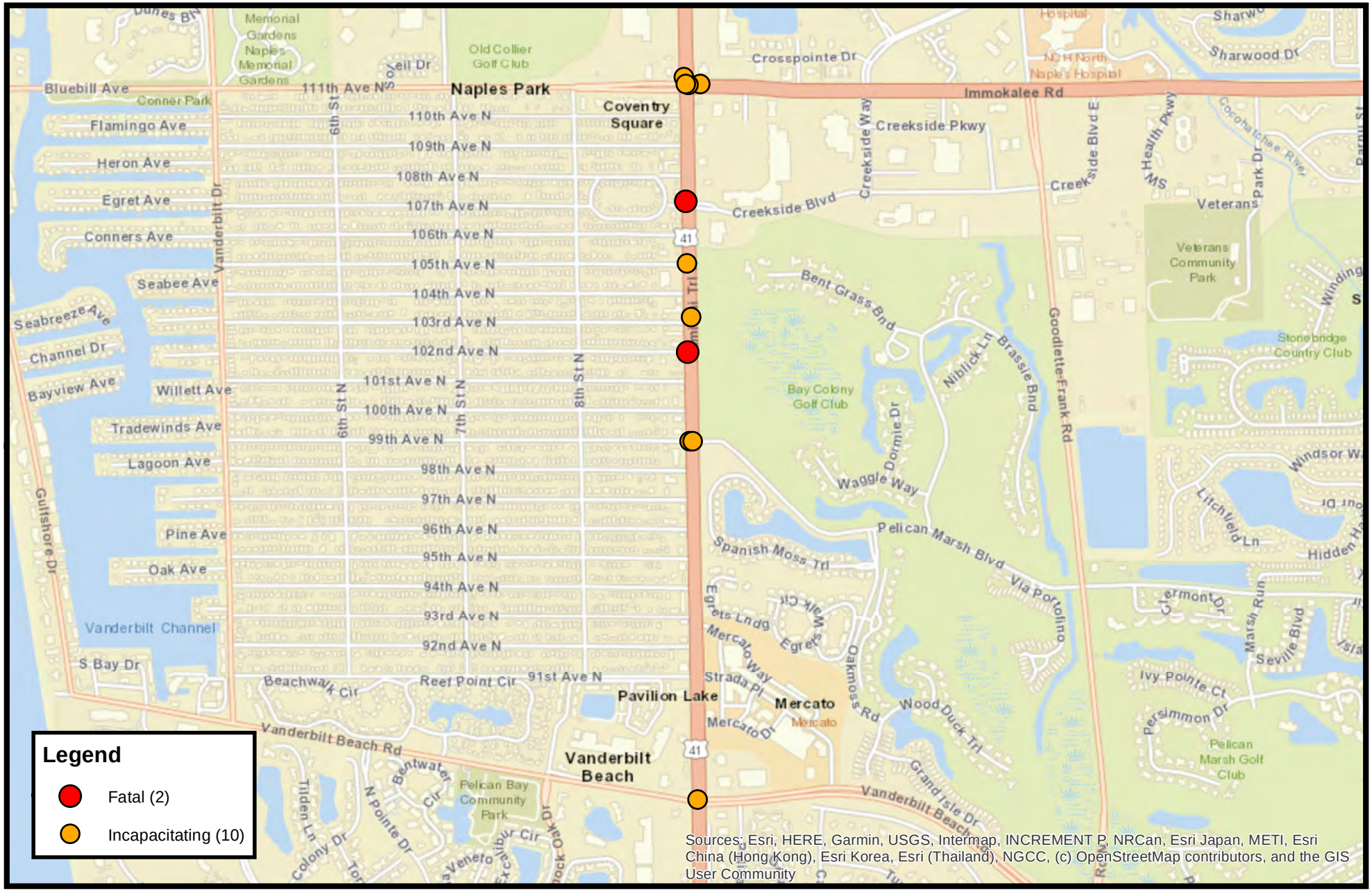




N

0 0.125 0.25 0.5 Miles

US-41/SR-45/Tamiami Trail N from CR-862 (Vanderbilt Beach Road) to CR-846 (Immokalee Road)/111th Avenue N
All Injury Crashes (2014 - 2018)



N

0 0.125 0.25 0.5 Miles

US-41/SR-45/Tamiami Trail N from CR-862 (Vanderbilt Beach Road) to CR-846 (Immokalee Road)/111th Avenue N Severe Injury (2014 - 2018)

Appendix D: School Congestion Analysis

School Congestion Matrix Draft

Prepared for:
Collier Metropolitan Planning Organization (MPO)
2885 South Horseshoe Drive
Naples, FL 34104

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GREAT INSIGHTS.
GREATER OUTCOMES.

Tindale Oliver

planning | design | engineering

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School Congestion Matrix

There are 58 public schools in Collier County, of these, the School District of Collier County has identified 20 schools with the most traffic congestion concerns. School enrollment and school bus eligibility data from the 20 schools with traffic congestion concerns was analyzed to provide a metric for identifying the approximate number of students who are eligible and are enrolled for school bus transportation. Florida Administrative Code (FAC) 6A-3.001 requires school districts to provide transportation to students whose homes are more than a reasonable walking distance from the assigned public school. Reasonable walking distance, as defined by FAC 6A-3.001(3), is any distance not more than 2 miles between the home and school or one and one-half (1 ½) miles between the home and assigned bus stop. Schools that had the highest school bus eligibility rates, 68% or higher, were selected as the top-tier locations of concern for traffic congestion (Appendix B). The following matrix was created to evaluate the top-tier school locations against strategies for reducing congestion. For addressing long-term congestion and site-specific solutions, future studies and recommendations are detailed below.

Table 1: Potential Effectiveness of Road Network Congestion Management Strategies for Schools in Collier County with High Traffic Congestion

ROAD NETWORK CONGESTION MANAGEMENT STRATEGIES			
RESULTS		• **Reduces congestion** • **Lowers motor vehicle speeds in school zones** • **Improves pedestrian and bicyclist safety**	
EXAMPLES		**Circulation Improvement:** - Evaluate and optimize traffic signals around school dismissal times - Evaluate pedestrian signal timing (crossing and wait times) - Evaluate the street network to optimize routing to and from school sites	**Infrastructure Tools:** - Traffic calming measures (curb extensions, chicanes, lateral shifts, roundabouts, etc.) - Traffic control devices (traffic signals, variable message signs, pedestrian hybrid beacons) - Pavement markings and signage (Marked crosswalks, guidance signage, warning signage, speed feedback signage)
POTENTIAL EFFECTIVENESS OF CONGESTION MANAGEMENT STRATEGIES	**Gulf Coast High (GCH)**	**Medium**	**Low**
	Laurel Oak Elementary (LOE)	**Medium**	**Low**
	Marco Island Academy (MIA)	**Low**	**Low**
	Naples High (NHS)	**High**	**Medium**
	North Naples Middle (NNM)	**Medium**	**Low**
	Oakridge Middle School (OMS)	**Medium**	**Medium**
	Pelican Marsh Elementary (PME)	**Medium**	**Medium**
	Palmetto Ridge High (PRH)	**Medium**	**Low**
	Pine Ridge Middle (PRM)	**High**	**Medium**

Table 2: Potential Effectiveness of School Site Congestion Management Strategies for Schools in Collier County with High Traffic Congestion

SCHOOL SITE CONGESTION MANAGEMENT STRATEGIES			
RESULTS		• **Eliminates peak volume times, reducing congestion** • **Reduces congestion in drop-off and pick-up areas**	
EXAMPLES		**Site-Design:** - Establish off-site waiting lots and curbing and parking zones - Designate separate entrances and additional entrances for different modes of travel (bus, drop-off/ pick-up, pedestrians/ bicyclists) - Establish a priority parking and loading zone for carpool vehicles - Provide a pull-through lane to the left side of the on-site drop-off zones to permit passing	**Demand scheduling:** - Stagger dismissal times - School Dismissal Automation Software (e.g. PikMyKid, School Pass)
POTENTIAL EFFECTIVENESS OF CONGESTION MANAGEMENT STRATEGIES	**Gulf Coast High (GCH)**	**Medium**	**High**
	Laurel Oak Elementary (LOE)	**High**	**High**
	Marco Island Academy (MIA)	**High**	**Medium**
	Naples High (NHS)	**Medium**	**High**
	North Naples Middle (NNM)	**Medium**	**Medium**
	Oakridge Middle School (OMS)	**High**	**Medium**
	Pelican Marsh Elementary (PME)	**High**	**Medium**
	Palmetto Ridge High (PRH)	**Low**	**High**
	Pine Ridge Middle (PRM)	**High**	**Medium**

Table 3: Potential Effectiveness of Transportation Mode Congestion Management Strategies for Schools in Collier County with High Traffic Congestion

TRANSPORTATION MODE CONGESTION MANAGEMENT STRATEGIES			
RESULTS		• **Reduces volume of vehicle traffic** • **Improves pedestrian and bicyclist safety**	
EXAMPLES		**Encouragement Solutions:** - Awareness campaign about school bus routes among eligible students - School Carpooling Apps (e.g GoKid, KiD CarPool, Carpool to School, Carpools-Kids, Zūm, Hop Skip Drive, Sheprd, Kango) - Waking/biking school bus - Walk/ride to school days	**Infrastructure Solutions:** - Fill gaps in the pedestrian and bicycle network - Path and trail connection from school to adjacent properties - Secure and convenient bicycle parking
POTENTIAL EFFECTIVENESS OF CONGESTION MANAGEMENT STRATEGIES	**Gulf Coast High (GCH)**	**High**	**Medium**
	Laurel Oak Elementary (LOE)	**High**	**Low**
	Marco Island Academy (MIA)	**High**	**Low**
	Naples High (NHS)	**High**	**High**
	North Naples Middle (NNM)	**High**	**Low**
	Oakridge Middle School (OMS)	**High**	**Medium**
	Pelican Marsh Elementary (PME)	**High**	**Medium**
	Palmetto Ridge High (PRH)	**High**	**Low**
	Pine Ridge Middle (PRM)	**High**	**Low**

The Collier County School Board provides school bus transportation for two of the seven charter schools (Marco Island Academy (MIA) and Marco Island Charter Middle (MCM)). As such, most of the student population who attend charter schools in Collier County rely upon vehicular transportation to/from school. While the majority of the top-tier schools identified for evaluation in the matrix are public schools, strategies for reducing traffic congestion are applicable at both public and charter schools. However, strategies that may be the most effective at reducing traffic congestion at charter schools are the strategies that reduce the volume of vehicle traffic such as encouraging switching modes of transportation – carpooling, transit, and waking or biking (if options are available). Site specific studies are recommended to address the unique needs of each charter school. The discussion below provides further options to address traffic congestion at both public and charter schools.

Future Studies and Strategies

Site-specific studies and stakeholder collaboration are needed to thoroughly understand and address the dynamics of congestion and safety around public and charter schools in Collier County. The following studies and working groups are recommended to improve transportation and safety around schools:

School Zone Traffic Congestion and Safety Study – A School Zone Traffic Congestion and Safety Study identifies alternatives for improving transportation operations and design, accessibility, multimodal safety, and traffic flow in areas at and around local public schools. Many of Collier County schools access/egress roadways are arterials and collector roads. During rush hour traffic, routes that are already constrained by normal congestion are further delayed as vehicles slow and/or queue to enter/exit school campuses. This type of study can provide site specific solutions for schools with student populations that rely on vehicular transportation to/from school and school areas with the most congestion.

Safe Routes to School (SRTS) Study – A Safe Routes to School Study analyzes existing infrastructure, institutional, and programmatic barriers that hinder students from walking and biking to school and proposes practical education, encouragement, engineering, and enforcement solutions to these problems. This study can provide strategies to increase the walking and biking rate within the 2-mile distance of schools where School District of Collier County does not provide school bus transportation and encourage the use of public transit and carpools where walking or biking is not feasible. This study can also provide a basis for applying for Florida Safe Routes to School Infrastructure Funding from the Florida Department of Transportation (FDOT). Program funds are available to public, private, and charter schools serving Kindergarten through High School.

School Transportation Working Group – Successful identification and implementation of school transportation studies and safety measures involve collaboration between multiple local stakeholders. The creation of a specific School Transportation Working Group or a School Transportation Committee under the umbrella of the Collier County Community Traffic Safety Team (CTST) could establish a forum for dialogue and support the identification and resolution of issues related to transportation surrounding schools. Possible stakeholders include: School District (public and charter), Local Governments, FDOT, Metropolitan Planning Organization (MPO), Law Enforcement, Parent Advisory Committees, School District Committees, Public and Community Health Partners, and County Transit Authority.

Appendices

Appendix A – Collier County Schools with Congestion

SCHOOL NAME	SCHOOL ABBREVIATION	CONGESTION AM	CONGESTION PM
Eden Park Elementary (EPE)	EPE	X	X
Gulf Coast High	GCH	X	X
Golden Gate Elementary North	GGE (N)	X	X
Golden Gate Elementary North	GGE (S)	X	X
Golden Gate High	GGH	X	X
Golden Gate Middle	GGM	X	X
Golden Terrace Elementary (N)	GTE(N)	X	X
Golden Terrace Elementary (S)	GTE(S)	X	X
Immokalee High	I.H.S	X	X
Immokalee Middle	IMS	X	X
Laurel Oak Elementary	LOE	X	X
Lake Trafford Elementary	LTE	X	X
Marco Island Academy	MIA	X	X
Naples High	NHS	X	X
North Naples Middle	NNM	X	X
Naples Park Elementary	NPE	X	X
Osceola Elementary	OES	X	X
Oakridge Middle School	ORM	X	X
Pelican Marsh Elementary	PME	X	X
Palmetto Ridge High	PRH	X	X
Pine Ridge Middle	PRM	X	X
Parkside Elementary	PSE		X

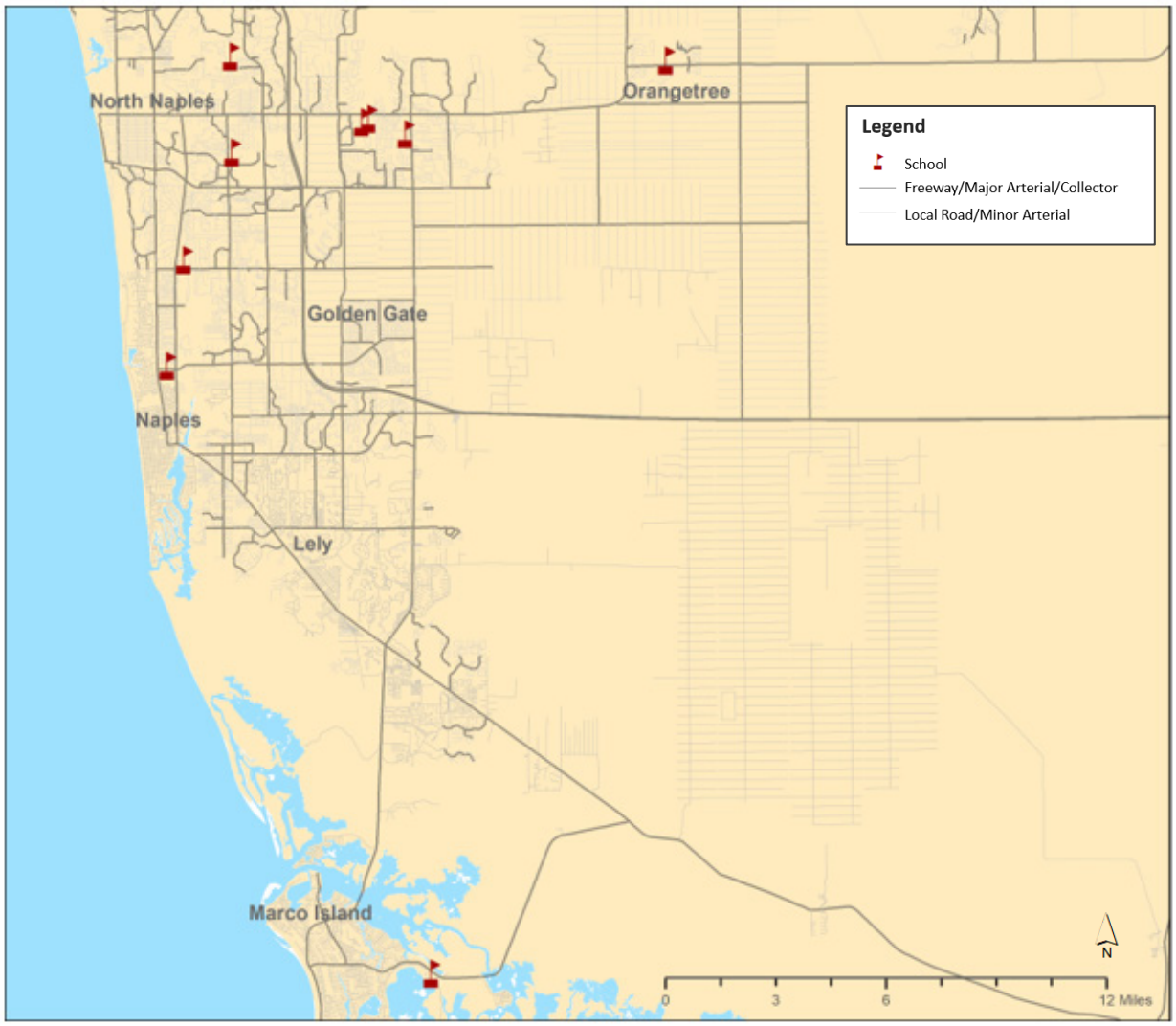
Appendix B – Collier County School Bus Eligibility and Enrolment

Schools with > 67% of enrolled students eligible for school bussing

School	Total Students Enrolled	Eligible Riders	Walkers	Not Eligible	Assigned	Routed	Eligible & Unassigned	% Eligible	% Assigned
LOE - REG P	981	899	36	46	899	899	0	92%	92%
LOE - REG	981	899	36	46	899	899	0	92%	92%
NNM - REG P	912	799	39	74	797	793	3	88%	87%
NNM - REG	913	795	42	76	792	788	3	87%	87%
PRH - REG	1904	1632	246	26	1632	1632	0	86%	86%
PRH - REG P	1903	1629	248	26	1629	1629	0	86%	86%
PRM - REG P	995	807	112	76	806	805	1	81%	81%
PRM - REG	996	807	112	77	806	805	1	81%	81%
OMS - REG	1192	915	233	44	914	912	1	77%	77%
OMS - REG P	1191	914	232	45	913	911	1	77%	77%
GCH - REG	2308	1768	466	74	1768	1768	0	77%	77%
GCH - REG P	2304	1763	465	76	1763	1760	0	77%	77%
MIA - REG P	212	156	16	40	68	68	88	74%	32%
MIA - REG	212	156	16	40	68	68	88	74%	32%
NHS - REG	1690	1157	288	245	1152	1152	5	68%	68%
NHS - REG P	1691	1156	288	247	1151	1150	5	68%	68%
PME - REG	712	484	126	102	484	484	0	68%	68%
PME - REG P	711	483	126	102	483	483	0	68%	68%
OES - REG	715	398	208	109	398	398	0	56%	56%
OES - REG P	714	397	208	109	397	397	0	56%	56%
IHS - REG	1710	818	872	20	818	818	0	48%	48%
IHS - REG P	1704	804	877	23	804	804	0	47%	47%
IMS - REG	1654	662	979	13	661	660	1	40%	40%
IMS - REG P	1653	655	985	13	654	653	1	40%	40%
EPE - REG	633	202	416	15	202	202	0	32%	32%
NPE - REG	369	117	196	56	116	114	1	32%	31%
NPE - REG P	361	109	196	56	108	106	1	30%	30%

School	Total Students Enrolled	Eligible Riders	Walkers	Not Eligible	Assigned	Routed	Eligible & Unassigned	% Eligible	% Assigned
LTE - REG	654	191	432	31	191	191	0	29%	29%
EPE - REG P	673	160	496	17	160	160	0	24%	24%
LTE - REG P	653	138	483	32	138	138	0	21%	21%
GTE - REG P	846	175	646	25	175	175	0	21%	21%
GTE - REG	846	175	646	25	175	175	0	21%	21%
GGM - REG	1078	215	855	8	215	215	0	20%	20%
GGM - REG P	1099	217	873	9	217	217	0	20%	20%
GGE - REG	860	49	803	8	49	49	0	6%	6%
GGE - REG P	855	0	847	8	0	0	0	0%	0%
PSE - REG P	689	0	673	16	0	0	0	0%	0%
PSE - REG	689	0	673	16	0	0	0	0%	0%

Appendix C – Map of Top-Tier Schools of Concern for Traffic Congestion



Appendix C – Full Matrix of Potential Effectiveness of Congestion Management Strategies for Schools in Collier County with High Traffic Congestion

CONGESTION MANAGEMENT STRATEGY	RESULTS	EXAMPLES	POTENTIAL EFFECTIVENESS OF CONGESTION MANAGEMENT STRATEGIES								
			SCHOOLS								
			Gulf Coast High (GCH)	Laurel Oak Elementary (LOE)	Marco Island Academy (MIA)	Naples High (NHS)	North Naples Middle (NNM)	Oakridge Middle School (OMS)	Pelican Marsh Elementary (PME)	Palmetto Ridge High (PRH)	Pine Ridge Middle (PRM)
ROAD NETWORK	• **Reduces congestion** • **Lowers motor vehicle speeds in school zones** • **Improves pedestrian and bicyclist safety**	**Circulation Improvement:** - Evaluate and optimize traffic signals around school dismissal times - Evaluate pedestrian signal timing (crossing and wait times) - Evaluate the street network to optimize routing to and from school sites	**Medium**	**Medium**	**Low**	**High**	**Medium**	**Medium**	**Medium**	**Medium**	**High**
		Infrastructure Tools: - Traffic calming measures (curb extensions, chicanes, lateral shifts, roundabouts, etc.) - Traffic control devices (traffic signals, variable message signs, pedestrian hybrid beacons) - Pavement markings and signage (Marked crosswalks, guidance signage, warning signage, speed feedback signage)	**Low**	**Low**	**Low**	**Medium**	**Low**	**Medium**	**Medium**	**Low**	**Medium**
SCHOOL SITE	• **Eliminates peak volume times, reducing congestion** • **Reduces congestion in drop-off and pick-up areas**	**Site-Design:** - Establish off-site waiting lots and curbing and parking zones - Designate separate entrances and additional entrances for different modes of travel (bus, drop-off/ pick-up, pedestrians/ bicyclists) - Establish a priority parking and loading zone for carpool vehicles - Provide a pull-through lane to the left side of the on-site drop-off zones to permit passing	**Medium**	**High**	**High**	**Medium**	**Medium**	**High**	**High**	**Low**	**High**
		Demand scheduling: - Stagger dismissal times - School Dismissal Automation Software (e.g. PikMyKid, School Pass)	**High**	**High**	**Medium**	**High**	**Medium**	**Medium**	**Medium**	**High**	**Medium**
TRANSPORTATION MODE	• **Reduces volume of vehicle traffic** • **Improves pedestrian and bicyclist safety**	**Encouragement Solutions:** - Awareness campaign about school bus routes among eligible students - School Carpooling Apps (e.g GoKid, KiD CarPool, Carpool to School, Carpools-Kids, Zūm, Hop Skip Drive, Sheprd, Kango) - Waking/biking school bus - Walk/ride to school days	**High**	**High**	**High**	**High**	**High**	**High**	**High**	**High**	**High**
		Infrastructure Solutions: - Fill gaps in the pedestrian and bicycle network - Path and trail connection from school to adjacent properties - Secure and convenient bicycle parking	**Medium**	**Low**	**Low**	**High**	**Low**	**Medium**	**Medium**	**Low**	**Low**

Appendix E: Intersection Control Evaluation and Synchro Analysis

Cap X Analysis - US 41 at CR-846 (Immokalee Rd) 2020 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.45	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn N-S	0.53	2	4.8	Fair	Fair	Good
Traffic Signal	0.65	3	4.8	Fair	Fair	Good
Quadrant Roadway S-E	0.66	4	4.4	Fair	Fair	Fair
Partial Median U-Turn N-S	0.75	5	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn N-S	0.83	6	6.3	Good	Good	Fair
Median U-Turn N-S	0.97	7	6.3	Good	Good	Fair
2 X 2	2.68	8	5.6	Fair	Good	Good
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Cap X Analysis - US 41 at CR-846 (Immokalee Rd) 2025 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.49	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn N-S	0.59	2	4.8	Fair	Fair	Good
Traffic Signal	0.71	3	4.8	Fair	Fair	Good
Quadrant Roadway S-E	0.73	4	4.4	Fair	Fair	Fair
Partial Median U-Turn N-S	0.83	5	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn N-S	0.92	6	6.3	Good	Good	Fair
Median U-Turn N-S	1.07	7	6.3	Good	Good	Fair
2 X 2	3.70	8	5.6	Fair	Good	Good
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Cap X Analysis - US 41 at CR-846 (Immokalee Rd) 2020 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.48	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn N-S	0.50	2	4.8	Fair	Fair	Good
Quadrant Roadway S-E	0.79	3	4.4	Fair	Fair	Fair
Traffic Signal	0.83	4	4.8	Fair	Fair	Good
Signalized Restricted Crossing U-Turn N-S	0.88	5	6.3	Good	Good	Fair
Partial Median U-Turn N-S	0.99	6	6.3	Good	Good	Fair
Median U-Turn N-S	1.12	7	6.3	Good	Good	Fair
2 X 2	3.44	8	5.6	Fair	Good	Good
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Cap X Analysis - US 41 at CR-846 (Immokalee Rd) 2025 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.53	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn N-S	0.55	2	4.8	Fair	Fair	Good
Quadrant Roadway S-E	0.88	3	4.4	Fair	Fair	Fair
Traffic Signal	0.91	4	4.8	Fair	Fair	Good
Signalized Restricted Crossing U-Turn N-S	0.98	5	6.3	Good	Good	Fair
Partial Median U-Turn N-S	1.10	6	6.3	Good	Good	Fair
Median U-Turn N-S	1.23	7	6.3	Good	Good	Fair
2 X 2	4.38	8	5.6	Fair	Good	Good
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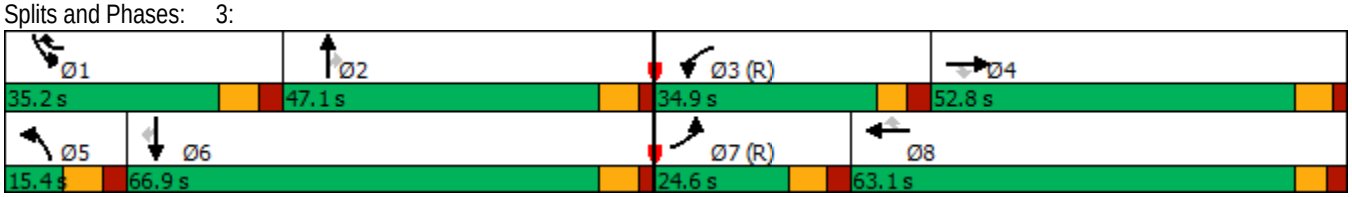
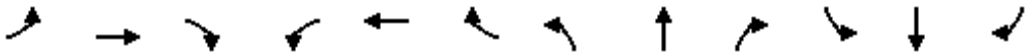
Timings
3: Immokalee Rd. and US-41 06/29/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	441	137	550	483	952	64	418	115	538	1182	126
Future Volume (vph)	220	441	137	550	483	952	64	418	115	538	1182	126
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	1	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.8	52.8	52.8	14.0	60.9	15.1	15.1	47.1	47.1	15.1	64.1	64.1
Total Split (s)	24.6	52.8	52.8	34.9	63.1	35.2	15.4	47.1	47.1	35.2	66.9	66.9
Total Split (%)	14.5%	31.1%	31.1%	20.5%	37.1%	20.7%	9.1%	27.7%	27.7%	20.7%	39.4%	39.4%
Yellow Time (s)	4.8	4.8	4.8	4.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.0	2.0	2.0	3.0	2.9	3.0	3.0	2.0	2.0	3.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.8	6.8	6.8	7.0	6.9	8.1	8.1	7.1	7.1	8.1	7.1	7.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	None	C-Max	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	26.8	29.6	29.6	37.9	39.8	87.5	9.0	32.7	32.7	40.8	64.5	64.5
Actuated g/C Ratio	0.16	0.17	0.17	0.22	0.23	0.51	0.05	0.19	0.19	0.24	0.38	0.38
v/c Ratio	0.44	0.78	0.32	0.78	0.63	0.69	0.39	0.47	0.26	0.71	0.67	0.19
Control Delay	70.5	75.8	1.8	69.9	61.7	29.4	83.7	61.6	1.3	65.2	45.5	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.5	75.8	1.8	69.9	61.7	29.4	83.7	61.6	1.3	65.2	45.5	2.3
LOS	E	E	A	E	E	C	F	E	A	E	D	A
Approach Delay		61.7			48.5			52.4			48.3	
Approach LOS		E			D			D			D	

Intersection Summary	
Cycle Length: 170	
Actuated Cycle Length: 170	
Offset: 0 (0%), Referenced to phase 3:WBL and 7:EBL, Start of Green	
Natural Cycle: 155	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 50.9	Intersection LOS: D
Intersection Capacity Utilization 84.0%	ICU Level of Service E
Analysis Period (min) 15	

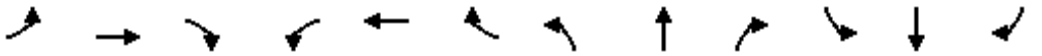
Splits and Phases: 3:





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.8	52.8	52.8	14.0	60.9	15.1	15.1	47.1	47.1	15.1	64.1	64.1
Total Split (s)	24.6	52.8	52.8	34.9	63.1	35.2	15.4	47.1	47.1	35.2	66.9	66.9
Total Split (%)	14.5%	31.1%	31.1%	20.5%	37.1%	20.7%	9.1%	27.7%	27.7%	20.7%	39.4%	39.4%
Maximum Green (s)	16.8	46.0	46.0	27.9	56.2	27.1	7.3	40.0	40.0	27.1	59.8	59.8
Yellow Time (s)	4.8	4.8	4.8	4.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.0	2.0	2.0	3.0	2.9	3.0	3.0	2.0	2.0	3.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	None	None	C-Max	None	None	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		39.0	39.0		47.0			33.0	33.0		50.0	50.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
90th %ile Green (s)	16.8	37.0	37.0	27.9	47.2	36.1	11.2	40.0	40.0	36.1	64.9	64.9
90th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Hold	Hold	Max	Max	Max
70th %ile Green (s)	16.8	32.7	32.7	27.9	42.9	40.4	9.8	40.0	40.0	40.4	70.6	70.6
70th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Hold	Hold	Max	Max	Max
50th %ile Green (s)	23.5	29.3	29.3	34.6	39.5	42.0	8.9	35.1	35.1	42.0	68.2	68.2
50th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Gap	Gap	Hold	Hold	Gap	Gap	Gap
30th %ile Green (s)	33.1	26.8	26.8	44.2	37.0	41.8	7.9	28.2	28.2	41.8	62.1	62.1
30th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Gap	Gap	Hold	Hold	Gap	Gap	Gap
10th %ile Green (s)	43.8	22.3	22.3	54.9	32.5	43.8	7.0	20.0	20.0	43.8	56.8	56.8
10th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Gap	Min	Min	Min	Gap	Hold	Hold

Intersection Summary
Cycle Length: 170
Actuated Cycle Length: 170
Offset: 0 (0%), Referenced to phase 3:WBL and 7:EBL, Start of Green
Control Type: Actuated-Coordinated



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	441	137	550	483	952	64	418	115	538	1182	126
Future Volume (veh/h)	220	441	137	550	483	952	64	418	115	538	1182	126
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	239	479	149	598	525	1035	70	454	125	585	1285	137
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	466	869	388	765	1160	1355	137	1039	323	551	1650	512
Arrive On Green	0.13	0.24	0.24	0.22	0.33	0.33	0.04	0.20	0.20	0.16	0.32	0.32
Sat Flow, veh/h	3456	3554	1585	3456	3554	2790	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	239	479	149	598	525	1035	70	454	125	585	1285	137
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1395	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	10.9	20.0	13.3	27.7	19.9	51.6	3.4	13.2	11.6	27.1	38.7	10.9
Cycle Q Clear(g_c), s	10.9	20.0	13.3	27.7	19.9	51.6	3.4	13.2	11.6	27.1	38.7	10.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	466	869	388	765	1160	1355	137	1039	323	551	1650	512
V/C Ratio(X)	0.51	0.55	0.38	0.78	0.45	0.76	0.51	0.44	0.39	1.06	0.78	0.27
Avail Cap(c_a), veh/h	466	962	429	765	1175	1367	148	1201	373	551	1796	558
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	68.3	56.1	53.5	62.3	45.3	35.7	80.0	59.2	58.5	71.4	52.0	42.6
Incr Delay (d2), s/veh	1.0	0.5	0.6	5.3	0.3	2.6	2.9	0.6	1.6	55.8	2.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	9.1	5.5	12.8	9.0	18.1	1.6	5.8	4.9	16.3	17.0	4.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.3	56.6	54.2	67.6	45.5	38.3	82.9	59.8	60.2	127.3	54.6	43.2
LnGrp LOS	E	E	D	E	D	D	F	E	E	F	D	D
Approach Vol, veh/h		867			2158			649			2007	
Approach Delay, s/veh		59.7			48.2			62.4			75.0	
Approach LOS		E			D			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	35.2	41.7	44.6	48.5	14.8	62.0	30.7	62.4
Change Period (Y+Rc), s	* 8.1	7.1	7.0	* 6.9	* 8.1	7.1	7.8	6.9
Max Green Setting (Gmax), s	* 27	40.0	27.9	* 46	* 7.3	59.8	16.8	56.2
Max Q Clear Time (g_c+I1), s	29.1	15.2	29.7	22.0	5.4	40.7	12.9	53.6
Green Ext Time (p_c), s	0.0	6.7	0.0	3.8	0.0	14.3	0.3	1.9

Intersection Summary	
HCM 6th Ctrl Delay	61.0
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

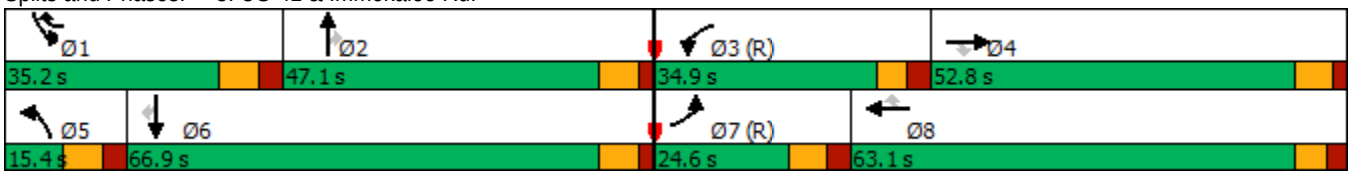
Synchro Analysis - US 41 at CR-846 (Immokalee Rd) 2025 AM Peak

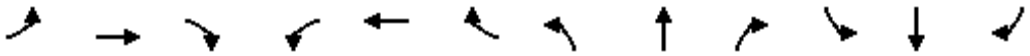
Timings
3: US-41 & Immokalee Rd. 06/30/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	242	487	151	607	533	1051	71	462	127	594	1305	139
Future Volume (vph)	242	487	151	607	533	1051	71	462	127	594	1305	139
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	1	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.8	52.8	52.8	14.0	60.9	15.1	15.1	47.1	47.1	15.1	64.1	64.1
Total Split (s)	24.6	52.8	52.8	34.9	63.1	35.2	15.4	47.1	47.1	35.2	66.9	66.9
Total Split (%)	14.5%	31.1%	31.1%	20.5%	37.1%	20.7%	9.1%	27.7%	27.7%	20.7%	39.4%	39.4%
Yellow Time (s)	4.8	4.8	4.8	4.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.0	2.0	2.0	3.0	2.9	3.0	3.0	2.0	2.0	3.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.8	6.8	6.8	7.0	6.9	8.1	8.1	7.1	7.1	8.1	7.1	7.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	None	C-Max	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	21.8	32.6	32.6	32.9	42.8	90.2	9.3	35.0	35.0	40.5	66.2	66.2
Actuated g/C Ratio	0.13	0.19	0.19	0.19	0.25	0.53	0.05	0.21	0.21	0.24	0.39	0.39
v/c Ratio	0.60	0.78	0.34	0.99	0.65	0.75	0.41	0.48	0.27	0.79	0.72	0.21
Control Delay	77.6	73.3	2.8	99.2	60.0	32.1	84.0	60.3	1.3	68.8	46.6	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	77.6	73.3	2.8	99.2	60.0	32.1	84.0	60.3	1.3	68.8	46.6	3.5
LOS	E	E	A	F	E	C	F	E	A	E	D	A
Approach Delay		62.4			57.5			51.5			50.1	
Approach LOS		E			E			D			D	

Intersection Summary	
Cycle Length: 170	
Actuated Cycle Length: 170	
Offset: 0 (0%), Referenced to phase 3:WBL and 7:EBL, Start of Green	
Natural Cycle: 155	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 54.9	Intersection LOS: D
Intersection Capacity Utilization 88.5%	ICU Level of Service E
Analysis Period (min) 15	

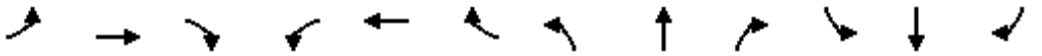
Splits and Phases: 3: US-41 & Immokalee Rd.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.8	52.8	52.8	14.0	60.9	15.1	15.1	47.1	47.1	15.1	64.1	64.1
Total Split (s)	24.6	52.8	52.8	34.9	63.1	35.2	15.4	47.1	47.1	35.2	66.9	66.9
Total Split (%)	14.5%	31.1%	31.1%	20.5%	37.1%	20.7%	9.1%	27.7%	27.7%	20.7%	39.4%	39.4%
Maximum Green (s)	16.8	46.0	46.0	27.9	56.2	27.1	7.3	40.0	40.0	27.1	59.8	59.8
Yellow Time (s)	4.8	4.8	4.8	4.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.0	2.0	2.0	3.0	2.9	3.0	3.0	2.0	2.0	3.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	None	None	C-Max	None	None	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		39.0	39.0		47.0			33.0	33.0		50.0	50.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
90th %ile Green (s)	16.8	40.4	40.4	27.9	50.6	32.7	11.7	40.0	40.0	32.7	61.0	61.0
90th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Hold	Hold	Max	Max	Max
70th %ile Green (s)	16.8	36.0	36.0	27.9	46.2	37.1	10.2	40.0	40.0	37.1	66.9	66.9
70th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Hold	Hold	Max	Max	Max
50th %ile Green (s)	16.8	32.5	32.5	27.9	42.7	40.6	9.2	40.0	40.0	40.6	71.4	71.4
50th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Hold	Hold	Max	Max	Max
30th %ile Green (s)	22.1	29.1	29.1	33.2	39.3	44.0	8.2	34.7	34.7	44.0	70.5	70.5
30th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Hold	Hold	Max	Gap	Gap
10th %ile Green (s)	36.4	25.2	25.2	47.5	35.4	47.9	7.0	20.4	20.4	47.9	61.3	61.3
10th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Min	Gap	Gap	Max	Hold	Hold

Intersection Summary
Cycle Length: 170
Actuated Cycle Length: 170
Offset: 0 (0%), Referenced to phase 3:WBL and 7:EBL, Start of Green
Control Type: Actuated-Coordinated



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	487	151	607	533	1051	71	462	127	594	1305	139
Future Volume (veh/h)	242	487	151	607	533	1051	71	462	127	594	1305	139
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	263	529	164	660	579	1142	77	502	138	646	1418	151
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	402	913	407	672	1175	1367	139	1112	345	551	1722	534
Arrive On Green	0.12	0.26	0.26	0.19	0.33	0.33	0.04	0.22	0.22	0.16	0.34	0.34
Sat Flow, veh/h	3456	3554	1585	3456	3554	2790	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	263	529	164	660	579	1142	77	502	138	646	1418	151
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1395	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	12.4	22.1	14.6	32.3	22.2	56.2	3.7	14.5	12.7	27.1	43.3	11.9
Cycle Q Clear(g_c), s	12.4	22.1	14.6	32.3	22.2	56.2	3.7	14.5	12.7	27.1	43.3	11.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	402	913	407	672	1175	1367	139	1112	345	551	1722	534
V/C Ratio(X)	0.65	0.58	0.40	0.98	0.49	0.84	0.56	0.45	0.40	1.17	0.82	0.28
Avail Cap(c_a), veh/h	402	962	429	672	1175	1367	148	1201	373	551	1796	558
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.9	55.1	52.3	68.2	45.5	37.4	80.1	57.7	57.0	71.4	51.7	41.3
Incr Delay (d2), s/veh	3.8	0.8	0.6	30.1	0.3	4.7	3.9	0.6	1.6	95.7	3.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	10.1	6.0	17.1	10.0	21.4	1.7	6.4	5.3	19.4	19.2	4.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	75.7	55.9	53.0	98.2	45.8	42.1	84.0	58.3	58.6	167.2	55.3	41.9
LnGrp LOS	E	E	D	F	D	D	F	E	E	F	E	D
Approach Vol, veh/h		956			2381			717			2215	
Approach Delay, s/veh		60.8			58.6			61.1			87.0	
Approach LOS		E			E			E			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	35.2	44.1	40.1	50.6	14.9	64.4	27.6	63.1
Change Period (Y+Rc), s	* 8.1	7.1	7.0	* 6.9	* 8.1	7.1	7.8	6.9
Max Green Setting (Gmax), s	* 27	40.0	27.9	* 46	* 7.3	59.8	16.8	56.2
Max Q Clear Time (g_c+I1), s	29.1	16.5	34.3	24.1	5.7	45.3	14.4	58.2
Green Ext Time (p_c), s	0.0	7.3	0.0	4.2	0.0	12.0	0.2	0.0

Intersection Summary	
HCM 6th Ctrl Delay	69.3
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Synchro Analysis - US 41 at CR-846 (Immokalee Rd) 2020 PM Peak

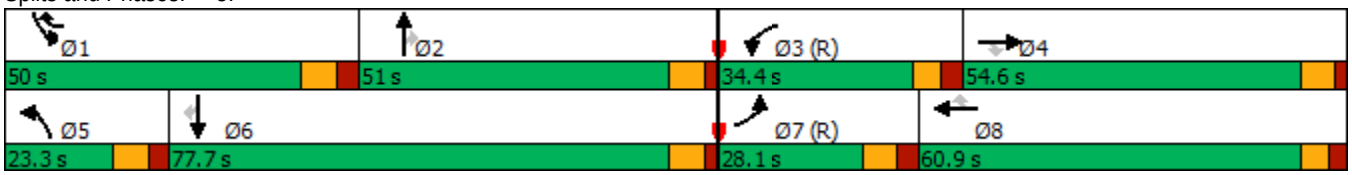
Timings
3: Immokalee Rd. and US-41

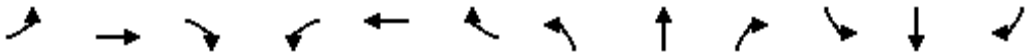
06/29/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	324	464	170	383	456	1112	153	1080	178	698	841	53
Future Volume (vph)	324	464	170	383	456	1112	153	1080	178	698	841	53
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	1	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.8	52.8	52.8	14.0	60.9	15.1	15.1	47.1	47.1	15.1	64.1	64.1
Total Split (s)	28.1	54.6	54.6	34.4	60.9	50.0	23.3	51.0	51.0	50.0	77.7	77.7
Total Split (%)	14.8%	28.7%	28.7%	18.1%	32.1%	26.3%	12.3%	26.8%	26.8%	26.3%	40.9%	40.9%
Yellow Time (s)	4.8	4.8	4.8	4.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.0	2.0	2.0	3.0	2.9	3.0	3.0	2.0	2.0	3.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.8	6.8	6.8	7.0	6.9	8.1	8.1	7.1	7.1	8.1	7.1	7.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	None	C-Max	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	20.3	34.0	34.0	27.4	40.2	99.3	14.5	47.4	47.4	52.2	85.1	85.1
Actuated g/C Ratio	0.11	0.18	0.18	0.14	0.21	0.52	0.08	0.25	0.25	0.27	0.45	0.45
v/c Ratio	0.96	0.80	0.45	0.84	0.66	0.81	0.64	0.93	0.36	0.80	0.40	0.08
Control Delay	120.6	84.3	15.7	94.7	72.8	40.2	96.0	81.5	8.6	71.6	37.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	120.6	84.3	15.7	94.7	72.8	40.2	96.0	81.5	8.6	71.6	37.0	0.2
LOS	F	F	B	F	E	D	F	F	A	E	D	A
Approach Delay		84.4			58.5			73.9			50.9	
Approach LOS		F			E			E			D	

Intersection Summary	
Cycle Length: 190	
Actuated Cycle Length: 190	
Offset: 0 (0%), Referenced to phase 3:WBL and 7:EBL, Start of Green	
Natural Cycle: 155	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 64.3	Intersection LOS: E
Intersection Capacity Utilization 88.2%	ICU Level of Service E
Analysis Period (min) 15	

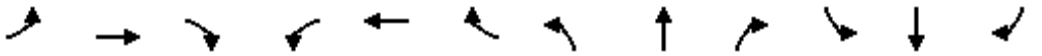
Splits and Phases: 3:





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.8	52.8	52.8	14.0	60.9	15.1	15.1	47.1	47.1	15.1	64.1	64.1
Total Split (s)	28.1	54.6	54.6	34.4	60.9	50.0	23.3	51.0	51.0	50.0	77.7	77.7
Total Split (%)	14.8%	28.7%	28.7%	18.1%	32.1%	26.3%	12.3%	26.8%	26.8%	26.3%	40.9%	40.9%
Maximum Green (s)	20.3	47.8	47.8	27.4	54.0	41.9	15.2	43.9	43.9	41.9	70.6	70.6
Yellow Time (s)	4.8	4.8	4.8	4.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.0	2.0	2.0	3.0	2.9	3.0	3.0	2.0	2.0	3.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	None	None	C-Max	None	None	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		39.0	39.0		47.0			33.0	33.0		50.0	50.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
90th %ile Green (s)	20.3	41.5	41.5	27.4	47.7	48.2	18.4	43.9	43.9	48.2	73.7	73.7
90th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Max	Max	Max	Hold	Hold
70th %ile Green (s)	20.3	36.9	36.9	27.4	43.1	52.8	16.1	43.9	43.9	52.8	80.6	80.6
70th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Max	Max	Max	Hold	Hold
50th %ile Green (s)	20.3	34.2	34.2	27.4	40.4	55.5	14.5	43.9	43.9	55.5	84.9	84.9
50th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Max	Max	Max	Hold	Hold
30th %ile Green (s)	20.3	30.6	30.6	27.4	36.8	53.5	12.9	49.5	49.5	53.5	90.1	90.1
30th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Gap	Gap	Max	Max	Gap	Hold	Hold
10th %ile Green (s)	20.3	26.7	26.7	27.4	32.9	51.0	10.6	55.9	55.9	51.0	96.3	96.3
10th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Gap	Gap	Max	Max	Gap	Hold	Hold

Intersection Summary
Cycle Length: 190
Actuated Cycle Length: 190
Offset: 0 (0%), Referenced to phase 3:WBL and 7:EBL, Start of Green
Control Type: Actuated-Coordinated



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	324	464	170	383	456	1112	153	1080	178	698	841	53
Future Volume (veh/h)	324	464	170	383	456	1112	153	1080	178	698	841	53
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	352	504	185	416	496	1209	166	1174	193	759	914	58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	369	936	418	455	1010	1408	204	1180	366	762	2005	622
Arrive On Green	0.11	0.26	0.26	0.13	0.28	0.28	0.06	0.23	0.23	0.22	0.39	0.39
Sat Flow, veh/h	3456	3554	1585	3456	3554	2790	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	352	504	185	416	496	1209	166	1174	193	759	914	58
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1395	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	19.2	23.1	18.5	22.6	22.1	54.0	9.0	43.6	20.3	41.7	25.2	4.4
Cycle Q Clear(g_c), s	19.2	23.1	18.5	22.6	22.1	54.0	9.0	43.6	20.3	41.7	25.2	4.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	369	936	418	455	1010	1408	204	1180	366	762	2005	622
V/C Ratio(X)	0.95	0.54	0.44	0.91	0.49	0.86	0.81	1.00	0.53	1.00	0.46	0.09
Avail Cap(c_a), veh/h	369	936	418	498	1010	1408	276	1180	366	762	2005	622
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	84.4	60.0	58.3	81.4	56.6	41.1	88.4	72.9	64.0	74.0	42.7	36.4
Incr Delay (d2), s/veh	34.8	0.6	0.7	20.3	0.4	5.6	12.6	25.0	2.7	31.5	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.5	10.7	7.6	11.4	10.1	25.9	4.4	21.9	8.6	21.9	10.9	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	119.2	60.7	59.1	101.7	56.9	46.7	101.0	97.9	66.6	105.5	43.0	36.5
LnGrp LOS	F	E	E	F	E	D	F	F	E	F	D	D
Approach Vol, veh/h		1041			2121			1533			1731	
Approach Delay, s/veh		80.2			59.9			94.3			70.2	
Approach LOS		F			E			F			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	50.0	51.0	32.0	57.0	19.3	81.7	28.1	60.9
Change Period (Y+Rc), s	* 8.1	7.1	7.0	* 6.9	* 8.1	7.1	7.8	6.9
Max Green Setting (Gmax), s	* 42	43.9	27.4	* 48	* 15	70.6	20.3	54.0
Max Q Clear Time (g_c+I1), s	43.7	45.6	24.6	25.1	11.0	27.2	21.2	56.0
Green Ext Time (p_c), s	0.0	0.0	0.5	4.1	0.2	16.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	74.2
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

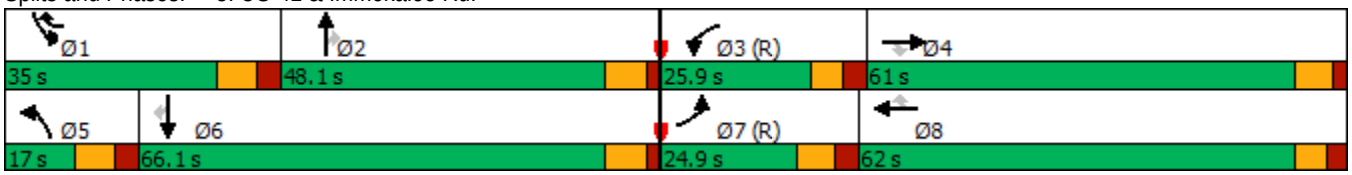
Synchro Analysis - US 41 at CR-846 (Immokalee Rd) 2025 PM Peak

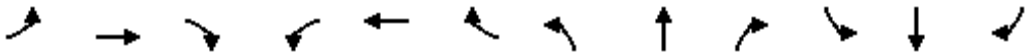
Timings
3: US-41 & Immokalee Rd. 06/30/2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	358	512	188	423	503	1228	169	1192	197	771	929	59
Future Volume (vph)	358	512	188	423	503	1228	169	1192	197	771	929	59
Turn Type	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Detector Phase	7	4	4	3	8	1	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.8	52.8	52.8	14.0	60.9	15.1	15.1	47.1	47.1	15.1	64.1	64.1
Total Split (s)	24.9	61.0	61.0	25.9	62.0	35.0	17.0	48.1	48.1	35.0	66.1	66.1
Total Split (%)	14.6%	35.9%	35.9%	15.2%	36.5%	20.6%	10.0%	28.3%	28.3%	20.6%	38.9%	38.9%
Yellow Time (s)	4.8	4.8	4.8	4.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.0	2.0	2.0	3.0	2.9	3.0	3.0	2.0	2.0	3.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.8	6.8	6.8	7.0	6.9	8.1	8.1	7.1	7.1	8.1	7.1	7.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	C-Max	None	None	C-Max	None	None	None	Min	Min	None	Min	Min
Act Effct Green (s)	17.1	34.4	34.4	18.9	35.3	88.9	16.6	41.0	41.0	46.7	71.0	71.0
Actuated g/C Ratio	0.10	0.20	0.20	0.11	0.21	0.52	0.10	0.24	0.24	0.27	0.42	0.42
v/c Ratio	1.13	0.78	0.44	1.21	0.74	0.89	0.55	1.06	0.39	0.89	0.48	0.09
Control Delay	152.9	71.7	12.9	175.5	69.3	43.2	79.5	102.5	8.0	71.1	37.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	152.9	71.7	12.9	175.5	69.3	43.2	79.5	102.5	8.0	71.1	37.7	0.2
LOS	F	E	B	F	E	D	E	F	A	E	D	A
Approach Delay		88.8			75.3			88.0			51.1	
Approach LOS		F			E			F			D	

Intersection Summary	
Cycle Length: 170	
Actuated Cycle Length: 170	
Offset: 0 (0%), Referenced to phase 3:WBL and 7:EBL, Start of Green	
Natural Cycle: 155	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.21	
Intersection Signal Delay: 74.0	Intersection LOS: E
Intersection Capacity Utilization 95.4%	ICU Level of Service F
Analysis Period (min) 15	

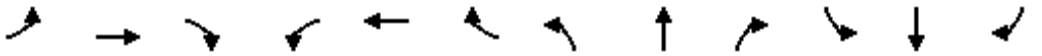
Splits and Phases: 3: US-41 & Immokalee Rd.





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4		3	8	1	5	2		1	6	
Permitted Phases			4			8			2			6
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	14.8	52.8	52.8	14.0	60.9	15.1	15.1	47.1	47.1	15.1	64.1	64.1
Total Split (s)	24.9	61.0	61.0	25.9	62.0	35.0	17.0	48.1	48.1	35.0	66.1	66.1
Total Split (%)	14.6%	35.9%	35.9%	15.2%	36.5%	20.6%	10.0%	28.3%	28.3%	20.6%	38.9%	38.9%
Maximum Green (s)	17.1	54.2	54.2	18.9	55.1	26.9	8.9	41.0	41.0	26.9	59.0	59.0
Yellow Time (s)	4.8	4.8	4.8	4.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1
All-Red Time (s)	3.0	2.0	2.0	3.0	2.9	3.0	3.0	2.0	2.0	3.0	2.0	2.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	C-Max	None	None	C-Max	None	None	None	Min	Min	None	Min	Min
Walk Time (s)		7.0	7.0		7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		39.0	39.0		47.0			33.0	33.0		50.0	50.0
Pedestrian Calls (#/hr)		0	0		0			0	0		0	0
90th %ile Green (s)	17.1	42.3	42.3	18.9	43.2	38.8	18.2	41.0	41.0	38.8	61.6	61.6
90th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Max	Max	Max	Max	Max
70th %ile Green (s)	17.1	37.7	37.7	18.9	38.6	43.4	17.0	41.0	41.0	43.4	67.4	67.4
70th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Max	Max	Max	Hold	Hold
50th %ile Green (s)	17.1	34.2	34.2	18.9	35.1	46.9	16.4	41.0	41.0	46.9	71.5	71.5
50th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Max	Max	Max	Hold	Hold
30th %ile Green (s)	17.1	31.4	31.4	18.9	32.3	49.7	16.0	41.0	41.0	49.7	74.7	74.7
30th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Max	Max	Max	Hold	Hold
10th %ile Green (s)	17.1	26.6	26.6	18.9	27.5	54.5	15.5	41.0	41.0	54.5	80.0	80.0
10th %ile Term Code	Coord	Gap	Gap	Coord	Hold	Max	Gap	Max	Max	Max	Hold	Hold

Intersection Summary
Cycle Length: 170
Actuated Cycle Length: 170
Offset: 0 (0%), Referenced to phase 3:WBL and 7:EBL, Start of Green
Control Type: Actuated-Coordinated



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	358	512	188	423	503	1228	169	1192	197	771	929	59
Future Volume (veh/h)	358	512	188	423	503	1228	169	1192	197	771	929	59
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	389	557	204	460	547	1335	184	1296	214	838	1010	64
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	348	1131	504	384	1152	1346	181	1231	382	547	1772	550
Arrive On Green	0.10	0.32	0.32	0.11	0.32	0.32	0.05	0.24	0.24	0.16	0.35	0.35
Sat Flow, veh/h	3456	3554	1585	3456	3554	2790	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	389	557	204	460	547	1335	184	1296	214	838	1010	64
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1395	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	17.1	21.5	17.1	18.9	20.9	55.1	8.9	41.0	20.1	26.9	27.4	4.7
Cycle Q Clear(g_c), s	17.1	21.5	17.1	18.9	20.9	55.1	8.9	41.0	20.1	26.9	27.4	4.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	348	1131	504	384	1152	1346	181	1231	382	547	1772	550
V/C Ratio(X)	1.12	0.49	0.40	1.20	0.47	0.99	1.02	1.05	0.56	1.53	0.57	0.12
Avail Cap(c_a), veh/h	348	1133	505	384	1152	1346	181	1231	382	547	1772	550
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	76.5	46.9	45.3	75.6	45.9	43.7	80.6	64.5	56.6	71.6	45.2	37.8
Incr Delay (d2), s/veh	84.5	0.3	0.5	111.4	0.3	22.6	71.4	40.6	3.1	248.8	0.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.7	9.7	6.9	14.4	9.4	31.8	5.8	22.4	8.5	30.9	11.8	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	160.9	47.2	45.9	187.0	46.2	66.3	152.0	105.1	59.7	320.3	45.9	38.0
LnGrp LOS	F	D	D	F	D	E	F	F	E	F	D	D
Approach Vol, veh/h		1150			2342			1694			1912	
Approach Delay, s/veh		85.4			85.3			104.5			165.9	
Approach LOS		F			F			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	35.0	48.1	25.9	61.0	17.0	66.1	24.9	62.0
Change Period (Y+Rc), s	* 8.1	7.1	7.0	* 6.9	* 8.1	7.1	7.8	6.9
Max Green Setting (Gmax), s	* 27	41.0	18.9	* 54	* 8.9	59.0	17.1	55.1
Max Q Clear Time (g_c+I1), s	28.9	43.0	20.9	23.5	10.9	29.4	19.1	57.1
Green Ext Time (p_c), s	0.0	0.0	0.0	4.9	0.0	15.2	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	111.6
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Cap X Analysis - CR-862 (Vanderbilt Beach Road) at Livingston Road 2020 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.36	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn E-W	0.47	2	4.8	Fair	Fair	Good
Traffic Signal	0.63	3	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.63	3	6.3	Good	Good	Fair
Median U-Turn E-W	0.82	5	6.3	Good	Good	Fair
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Cap X Analysis - CR-862 (Vanderbilt Beach Road) at Livingston Road 2025 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.39	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn E-W	0.52	2	4.8	Fair	Fair	Good
Traffic Signal	0.69	3	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.70	4	6.3	Good	Good	Fair
Median U-Turn E-W	0.91	5	6.3	Good	Good	Fair
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Cap X Analysis - CR-862 (Vanderbilt Beach Road) at Livingston Road 2020 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.67	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn E-W	0.76	2	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.90	3	6.3	Good	Good	Fair
Traffic Signal	0.96	4	4.8	Fair	Fair	Good
Median U-Turn E-W	1.02	5	6.3	Good	Good	Fair
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Cap X Analysis - CR-862 (Vanderbilt Beach Road) at Livingston Road 2025 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.75	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn E-W	0.84	2	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.99	3	6.3	Good	Good	Fair
Traffic Signal	1.06	4	4.8	Fair	Fair	Good
Median U-Turn E-W	1.12	5	6.3	Good	Good	Fair
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Synchro Analysis - CR-862 (Vanderbilt Beach Road) at Livingston Road - 2025 AM Peak Partial Displaced Left Turn

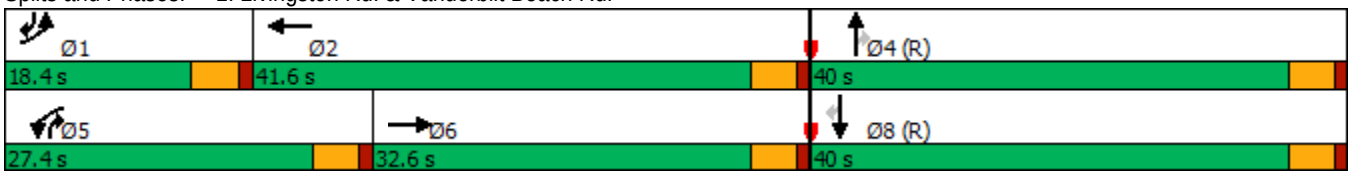
Timings

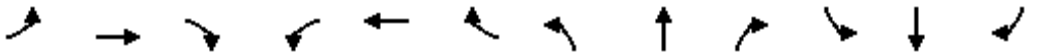
1: Livingston Rd. & Vanderbilt Beach Rd. 06/30/2020

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	244	445	486	1228	487	300	527	340
Future Volume (vph)	244	445	486	1228	487	300	527	340
Turn Type	Prot	NA	Prot	NA	NA	pm+ov	NA	pm+ov
Protected Phases	1	6	5	2	4	5	8	1
Permitted Phases						4		8
Detector Phase	1	6	5	2	4	5	8	1
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	32.5	9.5	32.5	38.5	9.5	38.5	9.5
Total Split (s)	18.4	32.6	27.4	41.6	40.0	27.4	40.0	18.4
Total Split (%)	18.4%	32.6%	27.4%	41.6%	40.0%	27.4%	40.0%	18.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag		Lead		Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes		Yes
Recall Mode	None	Max	None	Max	C-Max	None	C-Max	None
Act Effct Green (s)	12.3	30.6	20.4	38.7	35.5	60.4	35.5	52.3
Actuated g/C Ratio	0.12	0.31	0.20	0.39	0.36	0.60	0.36	0.52
v/c Ratio	0.63	0.31	0.76	0.68	0.29	0.33	0.32	0.43
Control Delay	48.4	27.8	44.7	27.9	23.8	6.7	24.0	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.4	27.8	44.7	27.9	23.8	6.7	24.0	13.4
LOS	D	C	D	C	C	A	C	B
Approach Delay		35.1		32.7	17.3		19.9	
Approach LOS		D		C	B		B	

Intersection Summary		
Cycle Length: 100		
Actuated Cycle Length: 100		
Offset: 0 (0%), Referenced to phase 4:NBT and 8:SBT, Start of Green, Master Intersection		
Natural Cycle: 85		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.76		
Intersection Signal Delay: 27.4	Intersection LOS: C	
Intersection Capacity Utilization 52.3%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 1: Livingston Rd. & Vanderbilt Beach Rd.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	244	445	0	486	1228	0	0	487	300	0	527	340
Future Volume (vph)	244	445	0	486	1228	0	0	487	300	0	527	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5	4.5		4.5	4.5
Lane Util. Factor	0.97	0.91		0.97	0.91			0.91	1.00		0.91	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	1.00
Satd. Flow (prot)	3433	5085		3433	5085			5085	1583		5085	1583
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00		1.00	1.00
Satd. Flow (perm)	3433	5085		3433	5085			5085	1583		5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	265	484	0	528	1335	0	0	529	326	0	573	370
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	49	0	0	34
Lane Group Flow (vph)	265	484	0	528	1335	0	0	529	277	0	573	336
Turn Type	Prot	NA		Prot	NA			NA	pm+ov		NA	pm+ov
Protected Phases	1	6		5	2			4	5		8	1
Permitted Phases									4			8
Actuated Green, G (s)	12.3	30.6		20.4	38.7			35.5	55.9		35.5	47.8
Effective Green, g (s)	12.3	30.6		20.4	38.7			35.5	55.9		35.5	47.8
Actuated g/C Ratio	0.12	0.31		0.20	0.39			0.36	0.56		0.36	0.48
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	422	1556		700	1967			1805	956		1805	827
v/s Ratio Prot	0.08	0.10		c0.15	c0.26			0.10	0.06		0.11	c0.05
v/s Ratio Perm									0.12			0.16
v/c Ratio	0.63	0.31		0.75	0.68			0.29	0.29		0.32	0.41
Uniform Delay, d1	41.7	26.6		37.4	25.5			23.2	11.6		23.4	16.9
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	2.9	0.5		4.6	1.9			0.4	0.2		0.5	0.3
Delay (s)	44.6	27.1		42.1	27.4			23.6	11.8		23.9	17.2
Level of Service	D	C		D	C			C	B		C	B
Approach Delay (s)		33.3			31.5			19.1			21.3	
Approach LOS		C			C			B			C	

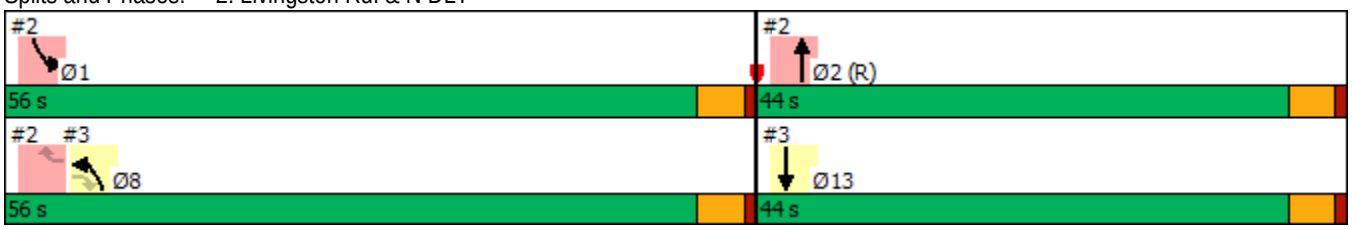
Intersection Summary			
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBR	NBT	SBL	SBT	Ø13
Lane Configurations					
Traffic Volume (vph)	247	487	100	867	
Future Volume (vph)	247	487	100	867	
Turn Type	Perm	NA	Prot	NA	
Protected Phases		2	1	Free	13
Permitted Phases	8				
Detector Phase	8	2	1		
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0		5.0
Minimum Split (s)	22.5	22.5	9.5		22.5
Total Split (s)	56.0	44.0	56.0		44.0
Total Split (%)	56.0%	44.0%	56.0%		44%
Yellow Time (s)	3.5	3.5	3.5		3.5
All-Red Time (s)	1.0	1.0	1.0		1.0
Lost Time Adjust (s)	0.0	0.0	0.0		
Total Lost Time (s)	4.5	4.5	4.5		
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	None		Max
Act Effct Green (s)	18.9	72.1	18.9	100.0	
Actuated g/C Ratio	0.19	0.72	0.19	1.00	
v/c Ratio	0.59	0.14	0.17	0.19	
Control Delay	16.7	6.4	33.1	0.1	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	16.7	6.4	33.1	0.1	
LOS	B	A	C	A	
Approach Delay		6.4		3.5	
Approach LOS		A		A	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 6.2	Intersection LOS: A
Intersection Capacity Utilization 32.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Livingston Rd. & N DLT



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	247	487	0	100	867
Future Volume (vph)	0	247	487	0	100	867
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.0
Lane Util. Factor		1.00	0.91		0.97	0.91
Frt		0.86	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		1611	5085		3433	5085
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		1611	5085		3433	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	268	529	0	109	942
RTOR Reduction (vph)	0	152	0	0	0	0
Lane Group Flow (vph)	0	116	529	0	109	942
Turn Type		Perm	NA		Prot	NA
Protected Phases			2		1	Free
Permitted Phases		8				
Actuated Green, G (s)		18.9	72.1		18.9	100.0
Effective Green, g (s)		18.9	72.1		18.9	100.0
Actuated g/C Ratio		0.19	0.72		0.19	1.00
Clearance Time (s)		4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		304	3666		648	5085
v/s Ratio Prot			0.10		0.03	0.19
v/s Ratio Perm		c0.07				
v/c Ratio		0.38	0.14		0.17	0.19
Uniform Delay, d1		35.4	4.3		34.0	0.0
Progression Factor		1.00	1.32		1.00	1.00
Incremental Delay, d2		0.8	0.1		0.1	0.1
Delay (s)		36.2	5.8		34.1	0.1
Level of Service		D	A		C	A
Approach Delay (s)	36.2		5.8			3.6
Approach LOS	D		A			A

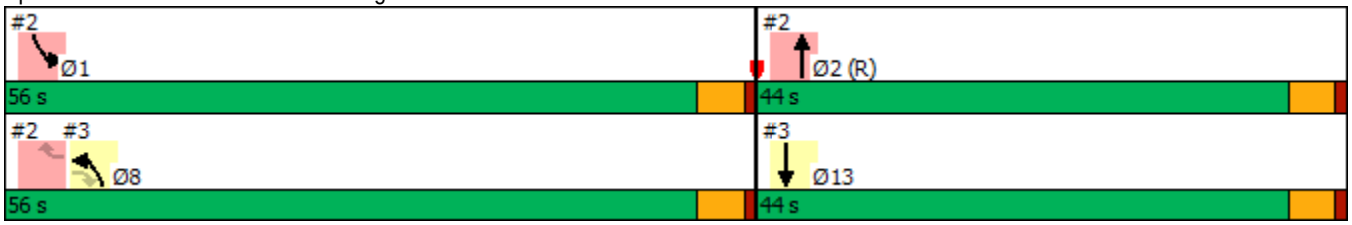
Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

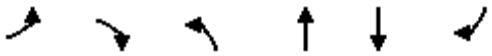
c Critical Lane Group

Lane Group	EBR	NBL	NBT	SBT	Ø1	Ø2
Lane Configurations						
Traffic Volume (vph)	141	383	787	527		
Future Volume (vph)	141	383	787	527		
Turn Type	Perm	Prot	NA	NA		
Protected Phases		8	Free	13	1	2
Permitted Phases	8					
Detector Phase	8	8		13		
Switch Phase						
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		22.5	9.5	22.5
Total Split (s)	56.0	56.0		44.0	56.0	44.0
Total Split (%)	56.0%	56.0%		44.0%	56%	44%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0		
Total Lost Time (s)	4.5	4.5		4.5		
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None		Max	None	C-Max
Act Effct Green (s)	18.9	18.9	100.0	72.1		
Actuated g/C Ratio	0.19	0.19	1.00	0.72		
v/c Ratio	0.35	0.64	0.13	0.16		
Control Delay	6.8	41.6	0.0	6.3		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay	6.8	41.6	0.0	6.3		
LOS	A	D	A	A		
Approach Delay			13.6	6.3		
Approach LOS			B	A		

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 11.0	Intersection LOS: B
Intersection Capacity Utilization 28.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: S DLT & Livingston Rd.





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	141	383	787	527	0
Future Volume (vph)	0	141	383	787	527	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.0	4.5	
Lane Util. Factor		1.00	0.97	0.86	0.91	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1611	3433	6408	5085	
Flt Permitted		1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1611	3433	6408	5085	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	153	416	855	573	0
RTOR Reduction (vph)	0	124	0	0	0	0
Lane Group Flow (vph)	0	29	416	855	573	0
Turn Type		Perm	Prot	NA	NA	
Protected Phases			8	Free	13	
Permitted Phases		8				
Actuated Green, G (s)		18.9	18.9	100.0	72.1	
Effective Green, g (s)		18.9	18.9	100.0	72.1	
Actuated g/C Ratio		0.19	0.19	1.00	0.72	
Clearance Time (s)		4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		304	648	6408	3666	
v/s Ratio Prot			c0.12	0.13	c0.11	
v/s Ratio Perm		0.02				
v/c Ratio		0.10	0.64	0.13	0.16	
Uniform Delay, d1		33.5	37.4	0.0	4.4	
Progression Factor		1.00	1.00	1.00	1.29	
Incremental Delay, d2		0.1	2.2	0.0	0.1	
Delay (s)		33.6	39.6	0.0	5.8	
Level of Service		C	D	A	A	
Approach Delay (s)	33.6			13.0	5.8	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Synchro Analysis - CR-862 (Vanderbilt Beach Road) at Livingston Road - 2025 PM Peak Partial Displaced Left Turn

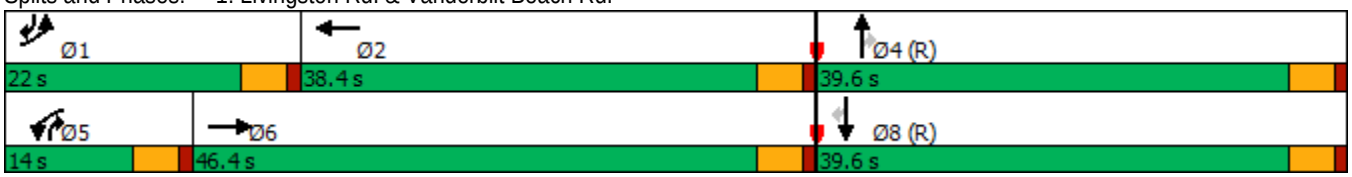
Timings

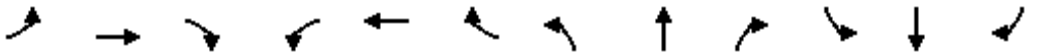
1: Livingston Rd. & Vanderbilt Beach Rd. 06/30/2020

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT	SBR
Lane Configurations								
Traffic Volume (vph)	348	1835	276	793	1041	700	394	267
Future Volume (vph)	348	1835	276	793	1041	700	394	267
Turn Type	Prot	NA	Prot	NA	NA	pm+ov	NA	pm+ov
Protected Phases	1	6	5	2	4	5	8	1
Permitted Phases						4		8
Detector Phase	1	6	5	2	4	5	8	1
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	32.5	9.5	32.5	38.5	9.5	38.5	9.5
Total Split (s)	22.0	46.4	14.0	38.4	39.6	14.0	39.6	22.0
Total Split (%)	22.0%	46.4%	14.0%	38.4%	39.6%	14.0%	39.6%	22.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead	Lag	Lead	Lag		Lead		Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		Yes		Yes
Recall Mode	None	Max	None	Max	C-Max	None	C-Max	None
Act Effct Green (s)	15.5	41.9	9.5	35.9	35.1	49.1	35.1	55.1
Actuated g/C Ratio	0.16	0.42	0.10	0.36	0.35	0.49	0.35	0.55
v/c Ratio	0.71	0.94	0.92	0.47	0.63	0.94	0.24	0.33
Control Delay	47.8	37.7	79.2	26.2	29.0	42.9	23.4	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	47.8	37.7	79.2	26.2	29.0	43.1	23.4	11.5
LOS	D	D	E	C	C	D	C	B
Approach Delay		39.3		39.8	34.7		18.6	
Approach LOS		D		D	C		B	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 0 (0%), Referenced to phase 4:NBT and 8:SBT, Start of Green, Master Intersection	
Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 35.6	Intersection LOS: D
Intersection Capacity Utilization 86.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Livingston Rd. & Vanderbilt Beach Rd.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	348	1835	0	276	793	0	0	1041	700	0	394	267
Future Volume (vph)	348	1835	0	276	793	0	0	1041	700	0	394	267
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			4.5	4.5		4.5	4.5
Lane Util. Factor	0.97	0.91		0.97	0.91			0.91	1.00		0.91	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		1.00	1.00
Satd. Flow (prot)	3433	5085		3433	5085			5085	1583		5085	1583
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00		1.00	1.00
Satd. Flow (perm)	3433	5085		3433	5085			5085	1583		5085	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	378	1995	0	300	862	0	0	1132	761	0	428	290
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	36	0	0	17
Lane Group Flow (vph)	378	1995	0	300	862	0	0	1132	725	0	428	273
Turn Type	Prot	NA		Prot	NA			NA	pm+ov		NA	pm+ov
Protected Phases	1	6		5	2			4	5		8	1
Permitted Phases									4			8
Actuated Green, G (s)	15.5	41.9		9.5	35.9			35.1	44.6		35.1	50.6
Effective Green, g (s)	15.5	41.9		9.5	35.9			35.1	44.6		35.1	50.6
Actuated g/C Ratio	0.16	0.42		0.10	0.36			0.35	0.45		0.35	0.51
Clearance Time (s)	4.5	4.5		4.5	4.5			4.5	4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	532	2130		326	1825			1784	777		1784	872
v/s Ratio Prot	0.11	c0.39		0.09	0.17			0.22	c0.09		0.08	0.05
v/s Ratio Perm									0.37			0.12
v/c Ratio	0.71	0.94		0.92	0.47			0.63	0.93		0.24	0.31
Uniform Delay, d1	40.1	27.8		44.9	24.7			27.1	26.3		23.0	14.5
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	4.4	9.4		30.2	0.9			1.7	17.6		0.3	0.2
Delay (s)	44.6	37.2		75.1	25.6			28.8	43.9		23.3	14.7
Level of Service	D	D		E	C			C	D		C	B
Approach Delay (s)		38.4			38.4			34.8			19.8	
Approach LOS		D			D			C			B	

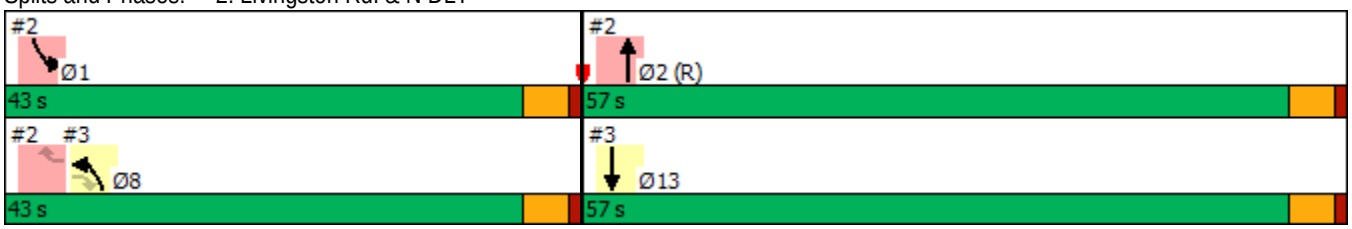
Intersection Summary			
HCM 2000 Control Delay	35.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBR	NBT	SBL	SBT	Ø13
Lane Configurations					
Traffic Volume (vph)	177	1041	230	661	
Future Volume (vph)	177	1041	230	661	
Turn Type	Perm	NA	Prot	NA	
Protected Phases		2	1	Free	13
Permitted Phases	8				
Detector Phase	8	2	1		
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0		5.0
Minimum Split (s)	22.5	22.5	9.5		22.5
Total Split (s)	43.0	57.0	43.0		57.0
Total Split (%)	43.0%	57.0%	43.0%		57%
Yellow Time (s)	3.5	3.5	3.5		3.5
All-Red Time (s)	1.0	1.0	1.0		1.0
Lost Time Adjust (s)	0.0	0.0	0.0		
Total Lost Time (s)	4.5	4.5	4.5		
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	None		Max
Act Effct Green (s)	17.2	73.8	17.2	100.0	
Actuated g/C Ratio	0.17	0.74	0.17	1.00	
v/c Ratio	0.59	0.30	0.42	0.14	
Control Delay	32.4	0.2	38.3	0.1	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	32.4	0.2	38.3	0.1	
LOS	C	A	D	A	
Approach Delay		0.2		9.9	
Approach LOS		A		A	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 19 (19%), Referenced to phase 2:NBT, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 7.0	Intersection LOS: A
Intersection Capacity Utilization 38.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 2: Livingston Rd. & N DLT



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	177	1041	0	230	661
Future Volume (vph)	0	177	1041	0	230	661
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.0
Lane Util. Factor		1.00	0.91		0.97	0.91
Frt		0.86	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		1611	5085		3433	5085
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		1611	5085		3433	5085
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	192	1132	0	250	718
RTOR Reduction (vph)	0	51	0	0	0	0
Lane Group Flow (vph)	0	141	1132	0	250	718
Turn Type		Perm	NA		Prot	NA
Protected Phases			2		1	Free
Permitted Phases		8				
Actuated Green, G (s)		17.2	73.8		17.2	100.0
Effective Green, g (s)		17.2	73.8		17.2	100.0
Actuated g/C Ratio		0.17	0.74		0.17	1.00
Clearance Time (s)		4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		277	3752		590	5085
v/s Ratio Prot			c0.22		0.07	0.14
v/s Ratio Perm		c0.09				
v/c Ratio		0.51	0.30		0.42	0.14
Uniform Delay, d1		37.6	4.4		37.0	0.0
Progression Factor		1.00	0.00		1.00	1.00
Incremental Delay, d2		1.6	0.2		0.5	0.1
Delay (s)		39.2	0.2		37.5	0.1
Level of Service		D	A		D	A
Approach Delay (s)	39.2		0.2			9.7
Approach LOS	D		A			A

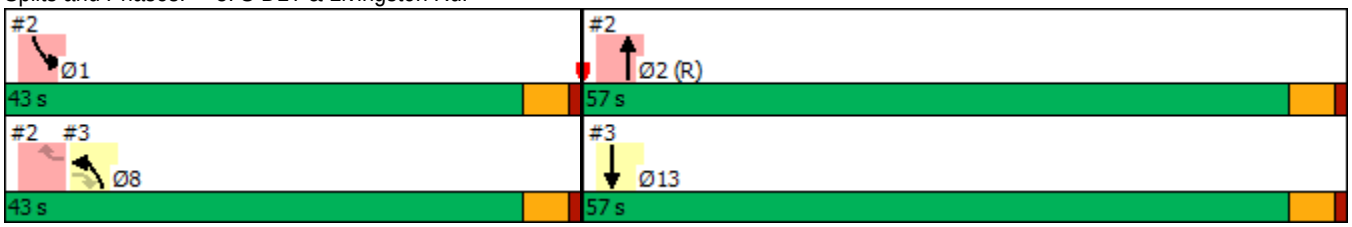
Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

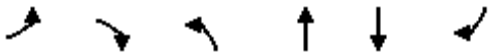
c Critical Lane Group

Lane Group	EBR	NBL	NBT	SBT	Ø1	Ø2
Lane Configurations						
Traffic Volume (vph)	267	336	1741	394		
Future Volume (vph)	267	336	1741	394		
Turn Type	Perm	Prot	NA	NA		
Protected Phases		8	Free	13	1	2
Permitted Phases	8					
Detector Phase	8	8		13		
Switch Phase						
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	22.5	22.5		22.5	9.5	22.5
Total Split (s)	43.0	43.0		57.0	43.0	57.0
Total Split (%)	43.0%	43.0%		57.0%	43%	57%
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0		
Total Lost Time (s)	4.5	4.5		4.5		
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None		Max	None	C-Max
Act Effct Green (s)	17.2	17.2	100.0	73.8		
Actuated g/C Ratio	0.17	0.17	1.00	0.74		
v/c Ratio	0.49	0.62	0.30	0.11		
Control Delay	3.7	42.5	0.1	0.1		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay	3.7	42.5	0.1	0.1		
LOS	A	D	A	A		
Approach Delay			7.0	0.1		
Approach LOS			A	A		

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 19 (19%), Referenced to phase 2:NBT, Start of Green	
Natural Cycle: 45	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 5.7	Intersection LOS: A
Intersection Capacity Utilization 31.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: S DLT & Livingston Rd.

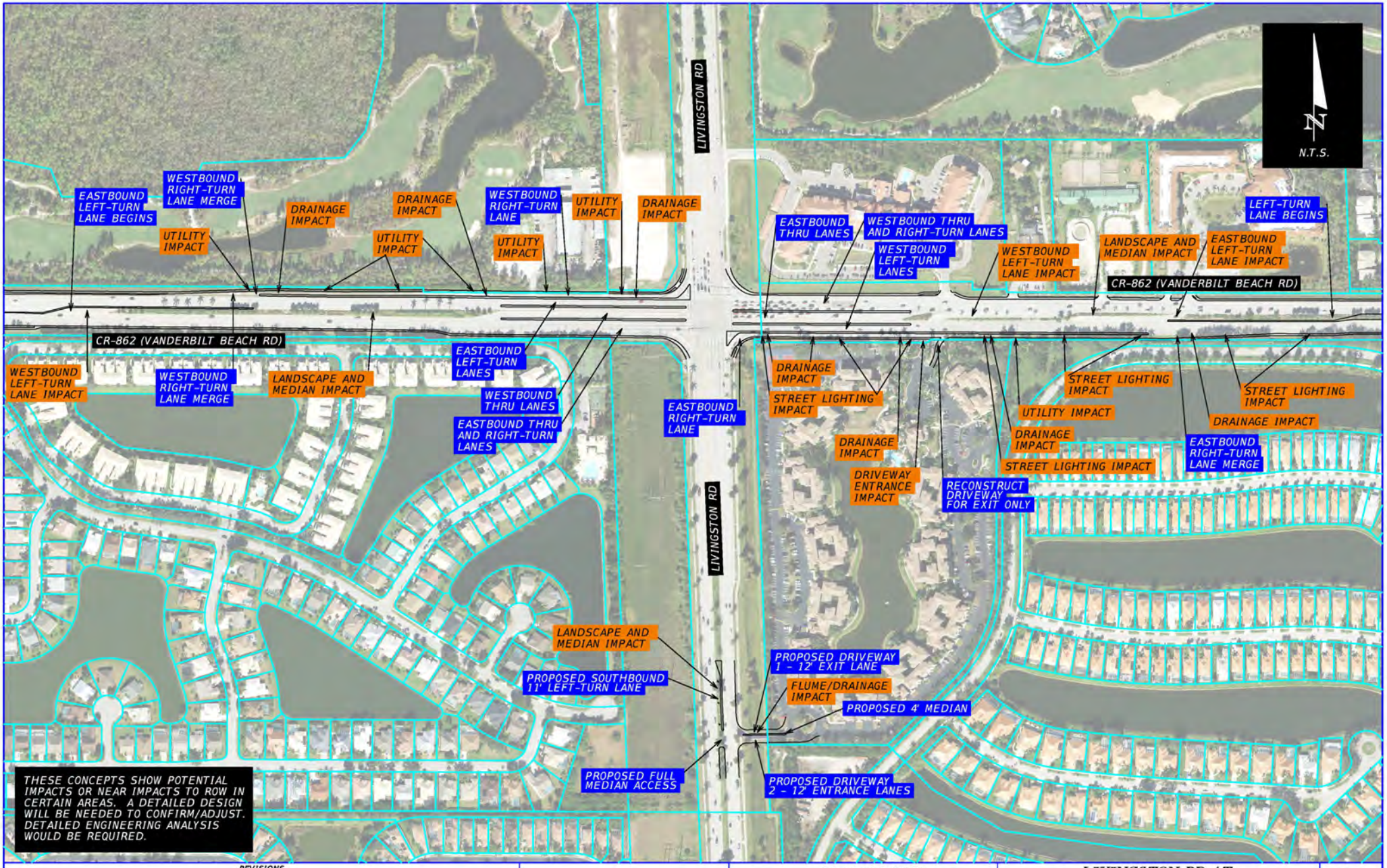




Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	267	336	1741	394	0
Future Volume (vph)	0	267	336	1741	394	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.0	4.5	
Lane Util. Factor		1.00	0.97	0.86	0.91	
Frt		0.86	1.00	1.00	1.00	
Flt Protected		1.00	0.95	1.00	1.00	
Satd. Flow (prot)		1611	3433	6408	5085	
Flt Permitted		1.00	0.95	1.00	1.00	
Satd. Flow (perm)		1611	3433	6408	5085	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	290	365	1892	428	0
RTOR Reduction (vph)	0	240	0	0	0	0
Lane Group Flow (vph)	0	50	365	1892	428	0
Turn Type		Perm	Prot	NA	NA	
Protected Phases			8	Free	13	
Permitted Phases		8				
Actuated Green, G (s)		17.2	17.2	100.0	73.8	
Effective Green, g (s)		17.2	17.2	100.0	73.8	
Actuated g/C Ratio		0.17	0.17	1.00	0.74	
Clearance Time (s)		4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0		3.0	
Lane Grp Cap (vph)		277	590	6408	3752	
v/s Ratio Prot			c0.11	0.30	0.08	
v/s Ratio Perm		0.03				
v/c Ratio		0.18	0.62	0.30	0.11	
Uniform Delay, d1		35.4	38.4	0.0	3.7	
Progression Factor		1.00	1.00	1.00	0.00	
Incremental Delay, d2		0.3	1.9	0.1	0.1	
Delay (s)		35.7	40.3	0.1	0.1	
Level of Service		D	D	A	A	
Approach Delay (s)	35.7			6.6	0.1	
Approach LOS	D			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

LIVINGSTON RD AT CR-862 (VANDERBILT BEACH RD) EASTBOUND/WESTBOUND DISPLACED LEFT CONCEPT IMPACTS

SHEET NO. 1

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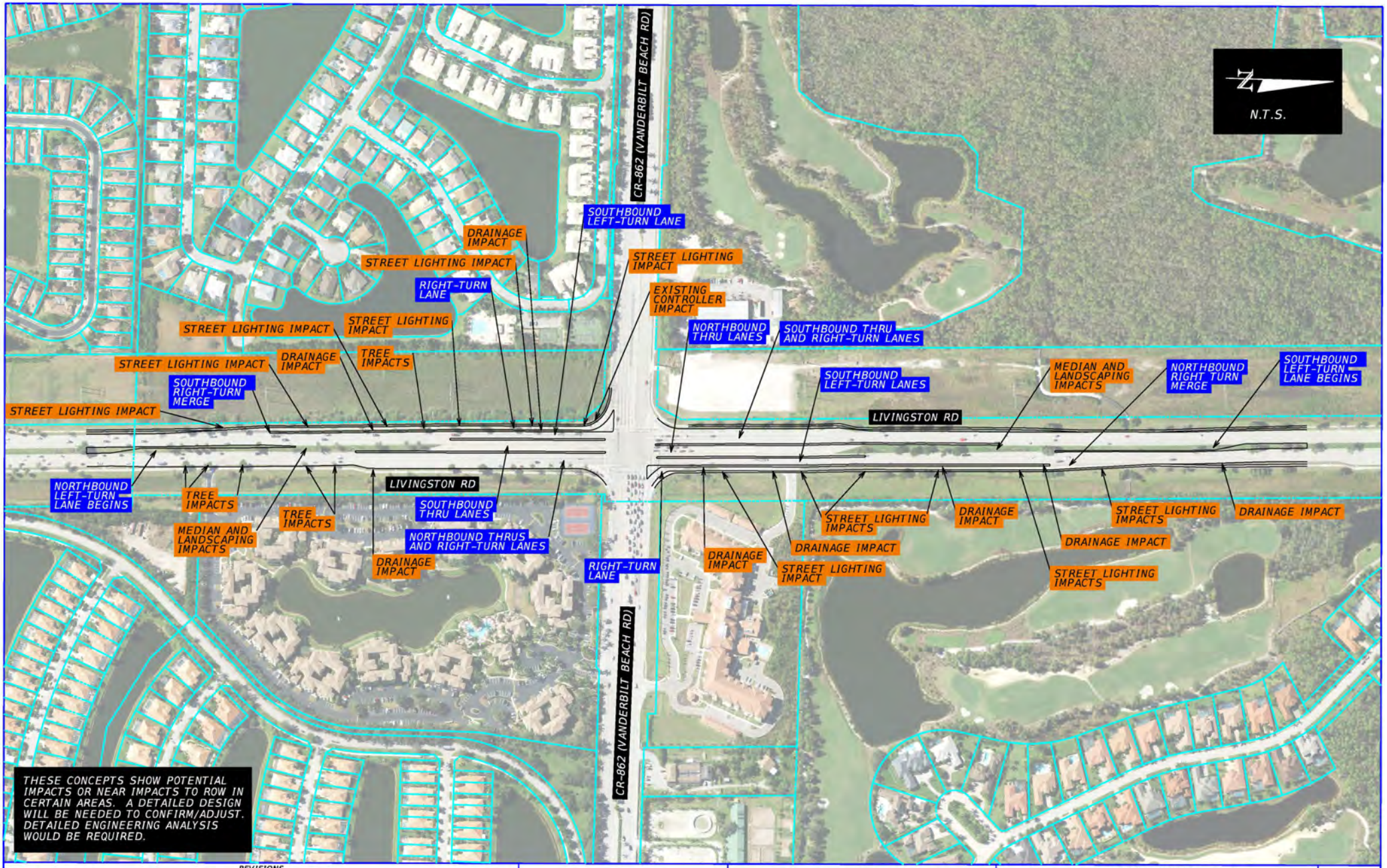

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

LIVINGSTON RD AT CR-862 (VANDERBILT BEACH RD) NORTHBOUND/SOUTHBOUND DISPLACED LEFT CONCEPT IMPACTS

SHEET NO. 1

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Cap X Analysis - Santa Barbara Blvd/Logan Blvd at Green Blvd - 2020 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Signalized Restricted Crossing U-Turn N-S	0.54	1	6.3	Good	Good	Fair
Partial Median U-Turn N-S	0.57	2	6.3	Good	Good	Fair
2 X 2	0.58	3	5.6	Fair	Good	Good
Traffic Signal	0.58	4	4.8	Fair	Fair	Good
Median U-Turn N-S	0.79	5	6.3	Good	Good	Fair
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Cap X Analysis - Santa Barbara Blvd/Logan Blvd at Green Blvd - 2025 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Traffic Signal	0.60	1	4.8	Fair	Fair	Good
Signalized Restricted Crossing U-Turn N-S	0.60	1	6.3	Good	Good	Fair
Partial Median U-Turn N-S	0.63	3	6.3	Good	Good	Fair
2 X 2	0.66	4	5.6	Fair	Good	Good
Median U-Turn N-S	0.88	5	6.3	Good	Good	Fair
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Cap X Analysis - Santa Barbara Blvd/Logan Blvd at Green Blvd - 2020 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Signalized Restricted Crossing U-Turn N-S	0.67	1	6.3	Good	Good	Fair
Partial Median U-Turn N-S	0.78	2	6.3	Good	Good	Fair
Median U-Turn N-S	0.81	3	6.3	Good	Good	Fair
Traffic Signal	0.92	4	4.8	Fair	Fair	Good
2 X 2	0.92	5	5.6	Fair	Good	Good
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Cap X Analysis - Santa Barbara Blvd/Logan Blvd at Green Blvd - 2025 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Signalized Restricted Crossing U-Turn N-S	0.74	1	6.3	Good	Good	Fair
Traffic Signal	0.82	2	4.8	Fair	Fair	Good
Partial Median U-Turn N-S	0.86	3	6.3	Good	Good	Fair
Median U-Turn N-S	0.89	4	6.3	Good	Good	Fair
2 X 2	1.07	5	5.6	Fair	Good	Good
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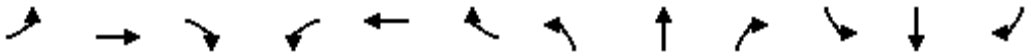
Timings

3: Sta. Barbara Blvd. & Green Blvd. 06/30/2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	12	6	191	3	25	1082	523	1266
Future Volume (vph)	12	6	191	3	25	1082	523	1266
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	16.0	5.0	16.0
Minimum Split (s)	24.8	24.8	24.8	24.8	11.8	24.8	11.8	24.8
Total Split (s)	26.2	26.2	26.2	26.2	11.8	60.8	43.0	92.0
Total Split (%)	20.2%	20.2%	20.2%	20.2%	9.1%	46.8%	33.1%	70.8%
Yellow Time (s)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	19.4	19.4	19.4	19.4	59.0	54.0	97.0	89.9
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.45	0.42	0.75	0.69
v/c Ratio	0.17	0.11	1.01	0.55	0.13	1.04	1.04	0.58
Control Delay	54.5	24.2	121.1	11.5	11.8	70.4	86.9	12.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.5	24.2	121.1	11.5	11.8	70.4	86.9	12.1
LOS	D	C	F	B	B	E	F	B
Approach Delay		33.8		62.4		69.4		33.6
Approach LOS		C		E		E		C

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 130	
Natural Cycle: 130	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 50.5	Intersection LOS: D
Intersection Capacity Utilization 102.5%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 3: Sta. Barbara Blvd. & Green Blvd.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	6	19	191	3	218	25	1082	293	523	1266	28
Future Volume (veh/h)	12	6	19	191	3	218	25	1082	293	523	1266	28
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	13	7	21	208	3	237	27	1176	318	568	1376	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	55	61	184	241	3	234	257	1152	307	551	2382	52
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.02	0.42	0.42	0.28	0.67	0.67
Sat Flow, veh/h	1140	412	1236	1382	20	1568	1781	2774	740	1781	3556	77
Grp Volume(v), veh/h	13	0	28	208	0	240	27	748	746	568	687	719
Grp Sat Flow(s),veh/h/ln	1140	0	1648	1382	0	1588	1781	1777	1737	1781	1777	1856
Q Serve(g_s), s	0.0	0.0	1.9	17.5	0.0	19.4	1.1	54.0	54.0	36.2	27.1	27.1
Cycle Q Clear(g_c), s	19.4	0.0	1.9	19.4	0.0	19.4	1.1	54.0	54.0	36.2	27.1	27.1
Prop In Lane	1.00		0.75	1.00		0.99	1.00		0.43	1.00		0.04
Lane Grp Cap(c), veh/h	55	0	246	241	0	237	257	738	722	551	1190	1244
V/C Ratio(X)	0.23	0.00	0.11	0.86	0.00	1.01	0.11	1.01	1.03	1.03	0.58	0.58
Avail Cap(c_a), veh/h	55	0	246	241	0	237	283	738	722	551	1190	1244
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.0	0.0	47.9	57.2	0.0	55.3	20.7	38.0	38.0	41.3	11.5	11.6
Incr Delay (d2), s/veh	2.1	0.0	0.2	25.8	0.0	61.8	0.1	36.4	42.6	46.3	0.9	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.8	8.6	0.0	11.8	0.5	30.5	31.0	24.7	10.4	10.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.1	0.0	48.1	83.0	0.0	117.1	20.8	74.4	80.6	87.5	12.4	12.4
LnGrp LOS	E	A	D	F	A	F	C	F	F	F	B	B
Approach Vol, veh/h		41			448			1521			1974	
Approach Delay, s/veh		54.1			101.2			76.5			34.0	
Approach LOS		D			F			E			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	43.0	60.8		26.2	9.9	93.9		26.2				
Change Period (Y+Rc), s	6.8	6.8		6.8	6.8	6.8		6.8				
Max Green Setting (Gmax), s	36.2	54.0		19.4	5.0	85.2		19.4				
Max Q Clear Time (g_c+I1), s	38.2	56.0		21.4	3.1	29.1		21.4				
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	23.2		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		58.0	
HCM 6th LOS		E	

Synchro Analysis - Santa Barbara Blvd/Logan Blvd at Green Blvd - 2025 AM Peak
Dual Southbound Left-Turn

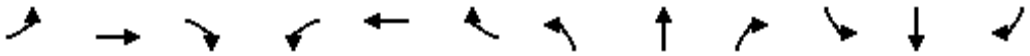
Timings

3: Sta. Barbara Blvd. & Green Blvd. 06/30/2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	30	2	346	4	10	672	170	976
Future Volume (vph)	30	2	346	4	10	672	170	976
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	16.0	5.0	16.0
Minimum Split (s)	24.8	24.8	24.8	24.8	11.8	24.8	11.8	24.8
Total Split (s)	39.0	39.0	39.0	39.0	12.0	63.0	28.0	79.0
Total Split (%)	30.0%	30.0%	30.0%	30.0%	9.2%	48.5%	21.5%	60.8%
Yellow Time (s)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	32.6	32.6	32.6	32.6	36.9	31.8	45.2	43.8
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.40	0.34	0.49	0.48
v/c Ratio	0.20	0.06	0.78	0.61	0.05	0.68	0.33	0.64
Control Delay	29.4	10.0	41.9	13.1	11.4	28.0	13.4	20.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	10.0	41.9	13.1	11.4	28.0	13.4	20.5
LOS	C	A	D	B	B	C	B	C
Approach Delay		19.3		25.9		27.7		19.4
Approach LOS		B		C		C		B

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 92.2	
Natural Cycle: 80	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 23.5	Intersection LOS: C
Intersection Capacity Utilization 75.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 3: Sta. Barbara Blvd. & Green Blvd.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	2	31	346	4	429	10	672	87	170	976	19
Future Volume (veh/h)	30	2	31	346	4	429	10	672	87	170	976	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	33	2	34	376	4	466	11	730	95	185	1061	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	133	30	508	521	5	530	197	1204	157	606	1511	30
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.01	0.38	0.38	0.06	0.42	0.42
Sat Flow, veh/h	923	89	1510	1372	14	1574	1781	3162	411	3456	3564	71
Grp Volume(v), veh/h	33	0	36	376	0	470	11	410	415	185	529	553
Grp Sat Flow(s),veh/h/ln	923	0	1599	1372	0	1587	1781	1777	1796	1728	1777	1858
Q Serve(g_s), s	3.2	0.0	1.4	23.1	0.0	25.2	0.3	16.8	16.8	2.9	22.0	22.0
Cycle Q Clear(g_c), s	28.3	0.0	1.4	24.5	0.0	25.2	0.3	16.8	16.8	2.9	22.0	22.0
Prop In Lane	1.00		0.94	1.00		0.99	1.00		0.23	1.00		0.04
Lane Grp Cap(c), veh/h	133	0	538	521	0	534	197	677	684	606	753	788
V/C Ratio(X)	0.25	0.00	0.07	0.72	0.00	0.88	0.06	0.61	0.61	0.31	0.70	0.70
Avail Cap(c_a), veh/h	152	0	570	548	0	566	276	1107	1119	1222	1422	1486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.6	0.0	20.3	28.6	0.0	28.2	18.5	22.5	22.5	16.9	21.3	21.3
Incr Delay (d2), s/veh	1.0	0.0	0.1	4.4	0.0	14.3	0.0	1.3	1.2	0.1	1.7	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.5	8.0	0.0	11.3	0.1	7.0	7.0	1.1	9.1	9.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.5	0.0	20.4	33.0	0.0	42.5	18.6	23.7	23.7	17.0	23.0	23.0
LnGrp LOS	D	A	C	C	A	D	B	C	C	B	C	C
Approach Vol, veh/h		69			846			836			1267	
Approach Delay, s/veh		31.0			38.3			23.7			22.1	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.9	41.2		37.2	8.0	45.1		37.2				
Change Period (Y+Rc), s	6.8	6.8		6.8	6.8	6.8		6.8				
Max Green Setting (Gmax), s	21.2	56.2		32.2	5.2	72.2		32.2				
Max Q Clear Time (g_c+I1), s	4.9	18.8		30.3	2.3	24.0		27.2				
Green Ext Time (p_c), s	0.3	9.1		0.0	0.0	14.2		2.1				

Intersection Summary												
HCM 6th Ctrl Delay			27.3									
HCM 6th LOS			C									

Synchro Analysis - Santa Barbara Blvd/Logan Blvd at Green Blvd - 2025 PM Peak
Dual Southbound Left-Turn

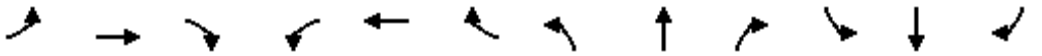
Timings

3: Sta. Barbara Blvd. & Green Blvd. 06/30/2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	13	7	211	3	28	1195	577	1398
Future Volume (vph)	13	7	211	3	28	1195	577	1398
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	16.0	5.0	16.0
Minimum Split (s)	24.8	24.8	24.8	24.8	11.8	24.8	11.8	24.8
Total Split (s)	30.2	30.2	30.2	30.2	12.0	71.8	28.0	87.8
Total Split (%)	23.2%	23.2%	23.2%	23.2%	9.2%	55.2%	21.5%	67.5%
Yellow Time (s)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Min	None	Min
Act Effct Green (s)	22.9	22.9	22.9	22.9	70.1	65.0	92.5	85.4
Actuated g/C Ratio	0.18	0.18	0.18	0.18	0.54	0.50	0.72	0.66
v/c Ratio	0.15	0.10	0.94	0.57	0.16	0.95	0.95	0.67
Control Delay	49.5	21.9	96.7	14.9	9.7	42.1	64.8	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.5	21.9	96.7	14.9	9.7	42.1	64.8	15.9
LOS	D	C	F	B	A	D	E	B
Approach Delay		30.5		52.8		41.5		29.9
Approach LOS		C		D		D		C

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 129	
Natural Cycle: 100	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 36.9	Intersection LOS: D
Intersection Capacity Utilization 95.2%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: Sta. Barbara Blvd. & Green Blvd.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	7	21	211	3	241	28	1195	323	577	1398	31
Future Volume (veh/h)	13	7	21	211	3	241	28	1195	323	577	1398	31
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	8	23	229	3	262	30	1299	351	627	1520	34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	77	78	223	286	3	286	221	1398	370	678	2249	50
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.03	0.50	0.50	0.16	0.63	0.63
Sat Flow, veh/h	1114	426	1224	1378	18	1570	1781	2780	735	3456	3554	79
Grp Volume(v), veh/h	14	0	31	229	0	265	30	820	830	627	759	795
Grp Sat Flow(s),veh/h/ln	1114	0	1650	1378	0	1588	1781	1777	1738	1728	1777	1856
Q Serve(g_s), s	1.6	0.0	2.0	21.3	0.0	21.0	1.0	54.6	58.3	17.6	35.1	35.3
Cycle Q Clear(g_c), s	22.6	0.0	2.0	23.3	0.0	21.0	1.0	54.6	58.3	17.6	35.1	35.3
Prop In Lane	1.00		0.74	1.00		0.99	1.00		0.42	1.00		0.04
Lane Grp Cap(c), veh/h	77	0	301	286	0	290	221	894	874	678	1124	1175
V/C Ratio(X)	0.18	0.00	0.10	0.80	0.00	0.91	0.14	0.92	0.95	0.93	0.68	0.68
Avail Cap(c_a), veh/h	77	0	301	286	0	290	247	901	881	712	1124	1175
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.5	0.0	43.7	53.4	0.0	51.4	16.0	29.4	30.3	41.7	15.1	15.1
Incr Delay (d2), s/veh	1.1	0.0	0.1	14.9	0.0	31.6	0.1	14.1	19.3	17.0	1.8	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.8	8.5	0.0	10.9	0.4	26.1	28.3	11.5	14.1	14.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.6	0.0	43.8	68.2	0.0	83.0	16.1	43.5	49.6	58.7	16.9	16.9
LnGrp LOS	E	A	D	E	A	F	B	D	D	E	B	B
Approach Vol, veh/h		45			494			1680			2181	
Approach Delay, s/veh		50.0			76.2			46.1			28.9	
Approach LOS		D			E			D			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	26.7	71.3		30.2	10.1	87.9		30.2				
Change Period (Y+Rc), s	6.8	6.8		6.8	6.8	6.8		6.8				
Max Green Setting (Gmax), s	21.2	65.0		23.4	5.2	81.0		23.4				
Max Q Clear Time (g_c+I1), s	19.6	60.3		24.6	3.0	37.3		25.3				
Green Ext Time (p_c), s	0.3	4.2		0.0	0.0	24.5		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		41.0	
HCM 6th LOS		D	

Synchro Analysis - Santa Barbara Blvd/Logan Blvd at Green Blvd - 2025 PM Peak
Dual Southbound Left-Turn and One Lane Northbound Right-Turn

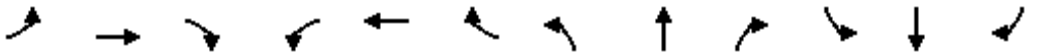
Timings

3: Sta. Barbara Blvd. & Green Blvd. 06/30/2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	13	7	211	3	28	1195	323	577	1398
Future Volume (vph)	13	7	211	3	28	1195	323	577	1398
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	pm+pt	NA
Protected Phases		4		8	5	2		1	6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	5	2	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	16.0	16.0	5.0	16.0
Minimum Split (s)	24.8	24.8	24.8	24.8	11.8	24.8	24.8	11.8	24.8
Total Split (s)	30.0	30.0	30.0	30.0	11.8	60.0	60.0	40.0	88.2
Total Split (%)	23.1%	23.1%	23.1%	23.1%	9.1%	46.2%	46.2%	30.8%	67.8%
Yellow Time (s)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
Lead/Lag					Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Min	Min	None	Min
Act Effct Green (s)	22.6	22.6	22.6	22.6	58.6	53.6	53.6	81.9	75.2
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.50	0.45	0.45	0.69	0.64
v/c Ratio	0.12	0.09	0.87	0.52	0.16	0.81	0.41	0.81	0.69
Control Delay	46.5	21.7	79.7	9.5	11.4	33.5	7.3	37.7	16.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.5	21.7	79.7	9.5	11.4	33.5	7.3	37.7	16.7
LOS	D	C	E	A	B	C	A	D	B
Approach Delay		29.4		42.0		27.7			22.8
Approach LOS		C		D		C			C

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 118.2	
Natural Cycle: 90	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 26.9	Intersection LOS: C
Intersection Capacity Utilization 84.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: Sta. Barbara Blvd. & Green Blvd.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	7	21	211	3	241	28	1195	323	577	1398	31
Future Volume (veh/h)	13	7	21	211	3	241	28	1195	323	577	1398	31
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	14	8	23	229	3	262	30	1299	351	627	1520	34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	116	86	248	326	4	318	204	1645	734	714	2046	46
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.03	0.46	0.46	0.14	0.58	0.58
Sat Flow, veh/h	1114	426	1224	1378	18	1570	1781	3554	1585	3456	3554	79
Grp Volume(v), veh/h	14	0	31	229	0	265	30	1299	351	627	759	795
Grp Sat Flow(s),veh/h/ln	1114	0	1650	1378	0	1588	1781	1777	1585	1728	1777	1856
Q Serve(g_s), s	1.3	0.0	1.6	17.0	0.0	16.8	0.9	32.6	16.1	11.6	33.3	33.4
Cycle Q Clear(g_c), s	18.1	0.0	1.6	18.6	0.0	16.8	0.9	32.6	16.1	11.6	33.3	33.4
Prop In Lane	1.00		0.74	1.00		0.99	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	116	0	334	326	0	321	204	1645	734	714	1023	1069
V/C Ratio(X)	0.12	0.00	0.09	0.70	0.00	0.82	0.15	0.79	0.48	0.88	0.74	0.74
Avail Cap(c_a), veh/h	136	0	364	351	0	350	239	1797	802	1318	1375	1436
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	0.0	34.1	41.7	0.0	40.2	16.3	23.9	19.5	26.2	16.5	16.5
Incr Delay (d2), s/veh	0.5	0.0	0.1	5.6	0.0	13.8	0.1	2.5	0.7	1.4	1.9	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.7	6.2	0.0	7.7	0.4	13.7	5.9	7.9	13.1	13.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.3	0.0	34.2	47.3	0.0	54.0	16.4	26.4	20.2	27.6	18.4	18.4
LnGrp LOS	D	A	C	D	A	D	B	C	C	C	B	B
Approach Vol, veh/h		45			494			1680			2181	
Approach Delay, s/veh		38.9			50.9			24.9			21.0	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.6	55.5		28.1	9.7	67.4		28.1				
Change Period (Y+Rc), s	6.8	6.8		6.8	6.8	6.8		6.8				
Max Green Setting (Gmax), s	33.2	53.2		23.2	5.0	81.4		23.2				
Max Q Clear Time (g_c+I1), s	13.6	34.6		20.1	2.9	35.4		20.6				
Green Ext Time (p_c), s	1.2	13.4		0.0	0.0	25.2		0.7				

Intersection Summary			
HCM 6th Ctrl Delay		26.1	
HCM 6th LOS		C	

Cap X Analysis - Airport-Pulling Rd at Pine Ridge Rd - 2020 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Quadrant Roadway S-W	0.60	1	4.4	Fair	Fair	Fair
Median U-Turn E-W	0.69	2	6.3	Good	Good	Fair
Traffic Signal	0.70	3	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.80	4	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	0.99	5	6.3	Good	Good	Fair
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Cap X Analysis - Airport-Pulling Rd at Pine Ridge Rd - 2025 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Quadrant Roadway S-W	0.66	1	4.4	Fair	Fair	Fair
Median U-Turn E-W	0.76	2	6.3	Good	Good	Fair
Traffic Signal	0.78	3	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.88	4	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.09	5	6.3	Good	Good	Fair
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Cap X Analysis - Airport-Pulling Rd at Pine Ridge Rd - 2020 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Quadrant Roadway S-W	0.91	1	4.4	Fair	Fair	Fair
Median U-Turn E-W	0.99	2	6.3	Good	Good	Fair
Traffic Signal	1.06	3	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	1.12	4	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.48	5	6.3	Good	Good	Fair
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Cap X Analysis - Airport-Pulling Rd at Pine Ridge Rd - 2025 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Quadrant Roadway S-W	1.01	1	4.4	Fair	Fair	Fair
Median U-Turn E-W	1.09	2	6.3	Good	Good	Fair
Traffic Signal	1.17	3	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	1.24	4	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.63	5	6.3	Good	Good	Fair
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Cap X Analysis - Golden Gate Pkwy at Livingstone Rd - 2020 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Partial Displaced Left Turn E-W	0.93	1	4.8	Fair	Fair	Good
Signalized Restricted Crossing U-Turn E-W	1.12	2	6.3	Good	Good	Fair
Traffic Signal	1.17	3	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	1.19	4	6.3	Good	Good	Fair
Median U-Turn E-W	1.20	5	6.3	Good	Good	Fair
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Cap X Analysis - Golden Gate Pkwy at Livingstone Rd - 2025 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.98	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn E-W	1.20	2	4.8	Fair	Fair	Good
Signalized Restricted Crossing U-Turn E-W	1.42	3	6.3	Good	Good	Fair
Traffic Signal	1.49	4	4.8	Fair	Fair	Good
Median U-Turn E-W	1.51	5	6.3	Good	Good	Fair
Partial Median U-Turn E-W	1.51	5	6.3	Good	Good	Fair
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Cap X Analysis - Golden Gate Pkwy at Livingstone Rd - 2020 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Traffic Signal	0.65	1	4.8	Fair	Fair	Good
Partial Displaced Left Turn E-W	0.69	2	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.71	3	6.3	Good	Good	Fair
Median U-Turn E-W	0.83	4	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.02	5	6.3	Good	Good	Fair
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Cap X Analysis - Golden Gate Pkwy at Livingstone Rd - 202Û PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.71	1	4.8	Fair	Fair	Good
Traffic Signal	0.78	2	4.8	Fair	Fair	Good
Partial Displaced Left Turn E-W	0.84	3	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.88	4	6.3	Good	Good	Fair
Median U-Turn E-W	1.02	5	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.27	6	6.3	Good	Good	Fair
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Cap X Analysis - Golden Gate Pkwy at Livingstone Rd - Interchange - 2025 M Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Diamond N-S	0.78	1	4.8	Fair	Fair	Good
Single Point N-S	0.78	1	4.8	Fair	Fair	Good
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Cap X Analysis - Golden Gate Pkwy at Livingstone Rd ¥ 'FL=J;@9F?= - 202Û . M Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Single Point N-S	0.45	1	4.8	Fair	Fair	Good
Diamond N-S	0.57	2	4.8	Fair	Fair	Good
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Cap X Analysis - Golden Gate Pkwy at Santa Barbara Blvd - 2020 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Partial Displaced Left Turn E-W	0.58	1	4.8	Fair	Fair	Good
Traffic Signal	0.60	2	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.92	3	6.3	Good	Good	Fair
Median U-Turn E-W	1.29	4	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.61	5	6.3	Good	Good	Fair
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Cap X Analysis - Golden Gate Pkwy at Santa Barbara Blvd - 2025 AM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Partial Displaced Left Turn E-W	0.66	1	4.8	Fair	Fair	Good
Traffic Signal	0.68	2	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	1.05	3	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.07	4	6.3	Good	Good	Fair
Median U-Turn E-W	1.46	5	6.3	Good	Good	Fair
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Cap X Analysis - Golden Gate Pkwy at Santa Barbara Blvd - 2020 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Partial Displaced Left Turn E-W	0.47	1	4.8	Fair	Fair	Good
Traffic Signal	0.63	2	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	0.89	3	6.3	Good	Good	Fair
Median U-Turn E-W	1.26	4	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.76	5	6.3	Good	Good	Fair
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Cap X Analysis - Golden Gate Pkwy at Santa Barbara Blvd - 2025 PM Peak

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Partial Displaced Left Turn E-W	0.52	1	4.8	Fair	Fair	Good
Traffic Signal	0.76	2	4.8	Fair	Fair	Good
Partial Median U-Turn E-W	1.03	3	6.3	Good	Good	Fair
Signalized Restricted Crossing U-Turn E-W	1.12	4	6.3	Good	Good	Fair
Median U-Turn E-W	1.52	5	6.3	Good	Good	Fair
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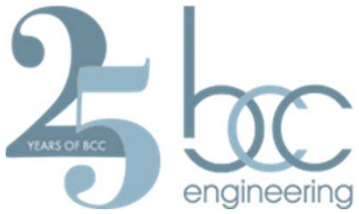
Appendix F: "Big Data" Analysis

Collier MPO Transportation System Performance Report and Action Plan



BCC Engineering

04/20/2020

Biennial Transportation System Performance Report

- The Performance Report will provide a thorough system assessment to identify where priority investments should be made.
- The Performance Report will include an analysis of newly implemented CMS/ITS projects based on the performance measures identified in the CMP as specifically assigned to each funded project.
- The Performance Report will recommend both short- and long-term projects to address congestion.

BCC Goal and Tasks

BCC Goal

Incorporate and evaluate Travel Time Reliability for project assessment and prioritization.

BCC Tasks

1. **Identify Data Gaps**
   a) Evaluate Data Resources and Monitoring Practices
   b) Incorporation of travel time reliability for county arterial and collector roadways using **proper data sources**.
2. **Develop Action Plans**
   a) Identify specific projects or strategies that will help reduce congestion, specifically projects or programs that can be undertaken in the short term for relatively lower costs.
   b) Evaluation of Travel Reliability - **proper data sources**, origin and destination pairs will be used to identify travel times and reliability.
   c) Based on the results of this assessment, recommendations on congested corridors and locations will be identified for development of implementation and intersection geometric recommendations.
3. **Documentation**
   4. Provide documentation support for the analysis and recommendations resulting from analysis of the reliability performance of the system and evaluation of the **proper data**.

Travel Time Reliability Measures

- Most measures compare high-delay days to those with an average delay.
- The most effective methods of measuring travel time reliability are
  - **90th or 95th percentile travel times** – perhaps the simplest method; estimates how bad delay will be on specific routes during the heaviest traffic days;
  - **Buffer index** - the additional travel time that is necessary;
  - **Planning time index** - the total travel time that is necessary.

Figure 3. Reliability measures compared to average congestion measures (Source: http://mobility.tamu.edu/mmp/)

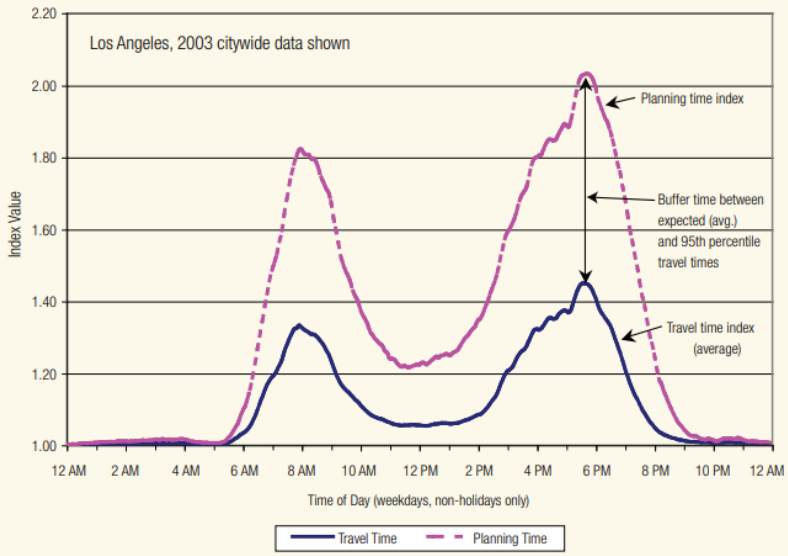


Figure 5. A reliability measure is included in FHWA's Monthly Congestion Dashboard Report

Status: Green Progress: Green	NATIONAL CONGESTION INDICATORS								
	Hours of Congested Travel Per Day			Travel Time Index			Planning Time Index		
Current Quarter	4.823			1.284			1.690		
Same Quarter, Previous Year	5.181			1.294			1.707		
Change vs. Previous Year	6.91% ↓			0.77% ↓			1.00% ↓		
National Congestion Pattern	# of Cities DOWN >5%	# of Cities NO CHANGE	# of Cities UP >5%	# of Cities DOWN >5%	# of Cities NO CHANGE	# of Cities UP >5%	# of Cities DOWN >5%	# of Cities NO CHANGE	# of Cities UP >5%
Total Cities: 19	9	4	6	2	17	0	4	13	2

Data source: FHWA Travel Time Reliability Brochure (https://ops.fhwa.dot.gov/publications/tt_reliability/brochure/ttr_brochure.pdf)

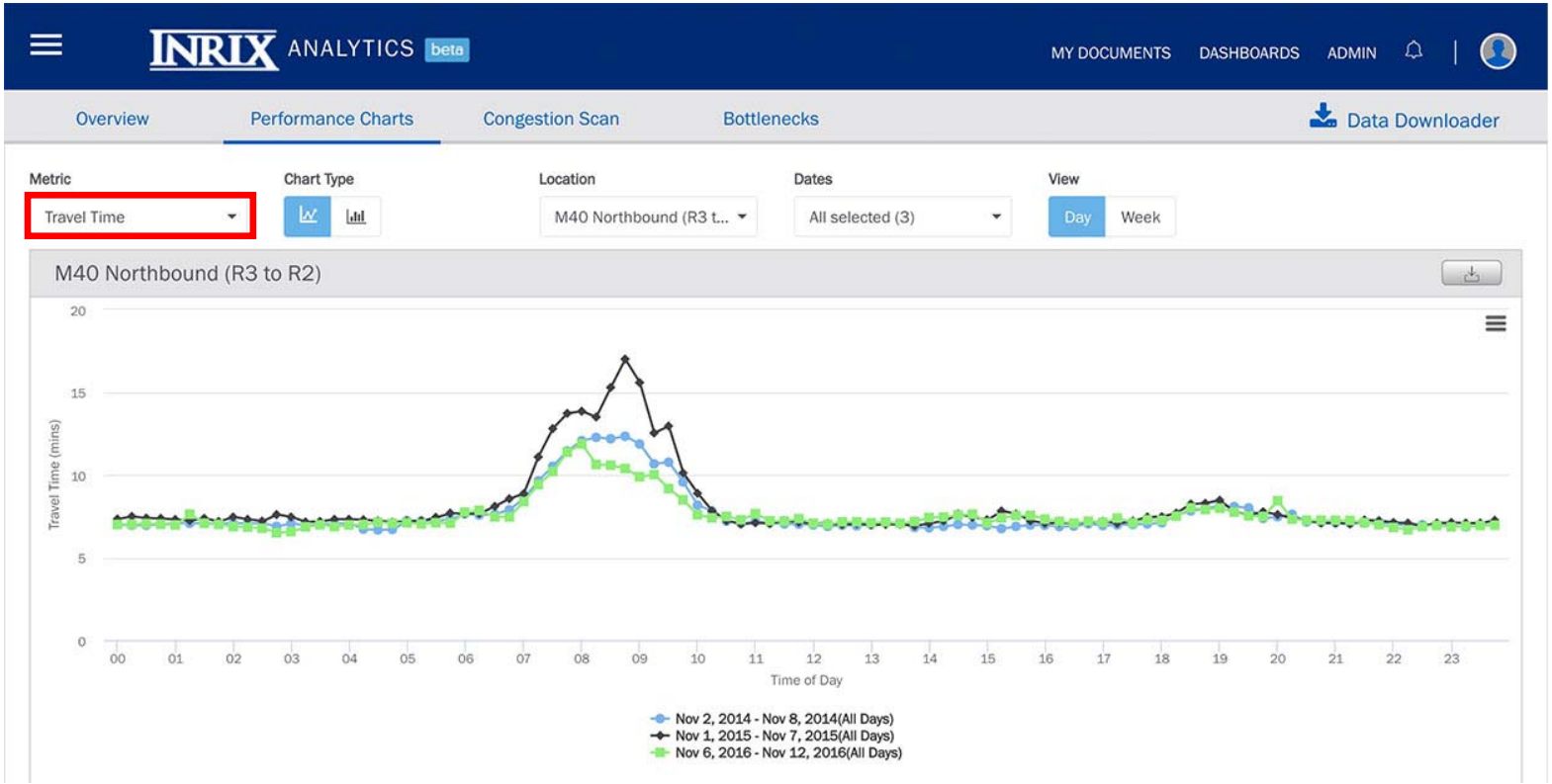
Potential Data Sources

No.	Data Source	Metrics	Travel Time	Link
1	StreetLight	Traffic Counts / AADT, StreetLight O-D, Select link analysis, Top Routes, Trip Purpose, Demographics, Trip Attributes	Can calculate the reliability and speed of commute time on various routes	https://www.streetlightdata.com/transportation-metrics/
2	StreetLytics	Traffic Counts, Volume and Speed, O-D, Routes, Trip Purpose & Mode, Demographics, Trip Attributes	May calculate travel time using distance and speed	https://www.citilabs.com/software/streetlytics/
3	**INRIX**	Volume, Performance Measures (travel time, buffer time, etc.), O-D, Routes, Mode, Demographics, Trip Attributes	**Provide performance measure and travel time reliability related data**	http://inrix.com/products/performance-measures/
4	HERE	Real time traveler information, historical travel information	Main have travel time information, but need to contact HERE to verify	http://here.heresf.acsitefactory.com/products/traffic-solutions/road-traffic-analytics
5	**TomTom**	Travel Time Related measurements - for developer	**Contains travel time related data**	https://move.tomtom.com/assets/Traffic%20Stats%20Product%20Info%20Sheet.pdf
6	AirSage	Trip Matrix	May not be able to provide	https://www.airsage.com/solutions/transportation
7	**Google Data**	Routes, estimated travel times, real-time traffic conditions	**May be able to get travel time related data; waiting to receive**	https://cloud.google.com/maps-platform/routes/
8	Traffic Counts	Traffic Counts	N/A; waiting to receive	
9	RITIS	Combined data source from HERE, INRIX, NPMRDS, and TomTom	**Provide performance measure and travel time reliability related data**	https://www.ritis.org/tools
10	Teralytics	O-D, Volume, Trip Length, Trip Purpose, Routes, Trip Duration, Trip Frequency	Not able to provide	https://www.teralytics.net/

Legend Recommended

INRIX

- Integrated performance measure and congestion scan application and service
- Available data for Travel Time Reliability evaluation and measurements



Data source: INRIX Website (http://inrix.com/products/performance-measures/)

INRIX

Region Explorer

An out-of-the box traffic monitoring solutions for understanding system-wide real-time traffic, bottlenecks, incidents and weather conditions along your road network.

Massive Data Downloader

Complete access to the underlying data for conducting customized analytics beyond those provided within the Performance Measures suite.

Performance Charts

Generate line and bar graphs for before and after inquiries - including comparison studies - and then easily translate the results into visualizations that communicate your findings.

Congestion Scan

Designed to pinpoint locations of sub-optimal conditions, Congestion Scan lets you aggregate speed, congestion, travel time, buffer time and other performance data to dynamically study trouble spots.

Trend Map

This useful tool provides video animation of evolving roadway conditions throughout the course of day, making it easy to share study findings with non-technical audiences.

Performance Summaries

Consolidated reports of key performance metrics, including buffer time, travel time, and planning time make it easy to quickly assess and quantify the performance of your network.

Bottleneck Ranking

A tool for identifying the most significant bottleneck locations along your roadways so you can prioritize capital investments and projects.

User Delay Cost Analysis

Developed in partnership with the Texas A&M Transportation Institute (TTI), this tool estimates the time cost of delay caused by congestion.

Dashboard

A customizable space that provides at-a-glance speed, travel time and bottleneck information for locations frequently monitored.

Data source: INRIX Website (http://inrix.com/products/performance-measures/)

StreetLight InSight

StreetLight InSight

StreetLight InSight users can access customized analytics like origin-destination, select link, travel time, routing, and more in just a few mouse clicks –without downloading any software.

StreetLight Insight Features

- The Best Big Data Sources
- On-Demand Processing Software
- Actionable Analytics

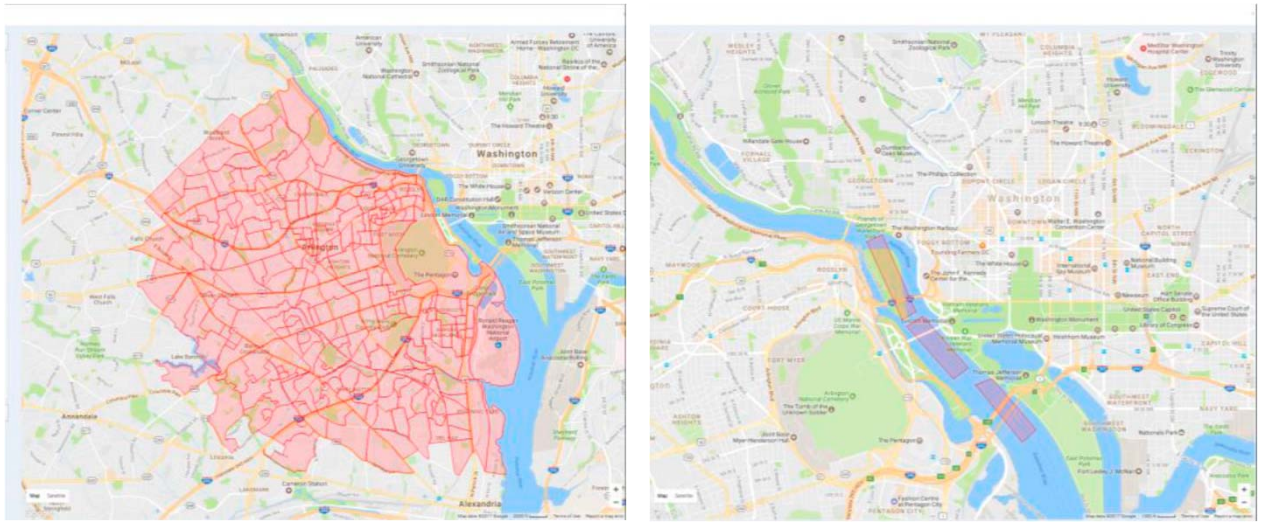
Key processing steps include:

- **Anonymization**: All data is anonymous. All Metrics describe groups, never individuals, to protect privacy.
- **Data Cleaning**: False signals from inbound data are removed.
- **Patternization**: Data is organized into trips and series of activities, including the identification of trip origins and destinations, and the route taken along the road network.
- **Contextualization**: Information like speed limits, road network presence, and census data adds rich, critical insights to Metrics.
- **Metric Creation**: Users specify queries (i.e.: geographic regions, or Zones, time parameters, and more), then StreetLight InSight quickly delivers Metrics as CSVs and visualizations as described below.

Using *StreetLight InSight*

Step 1: Create Zones

Users can designate “Zones” in *StreetLight InSight* in two ways: By uploading a standard shapefile, or by drawing Zones in our interactive “Add Zone Set” module (see figure below). Zones can be any standard geography (e.g. ZIP postal codes, neighborhood boundaries) or they can be unique, customized shapes.

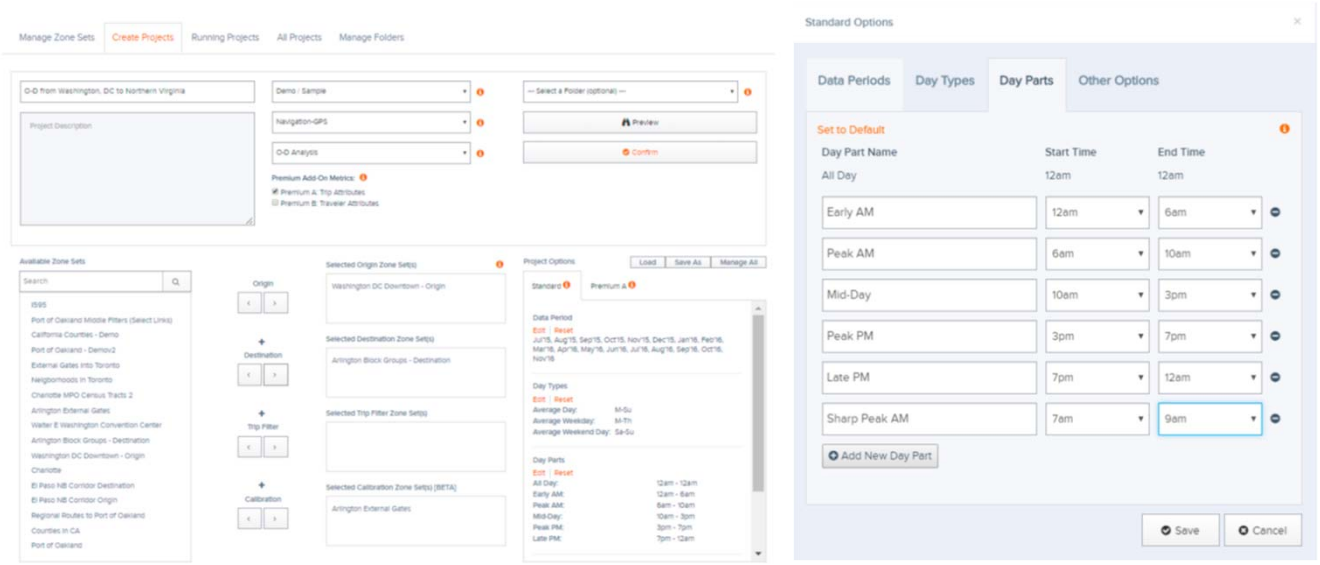


Above: *StreetLight InSight* screenshots of area Zones and road segment Zones

Using *StreetLight InSight*

Step 2: Define a Project

After uploading or drawing Zones in *StreetLight InSight*, users create their projects. This step includes defining Zones as origins or destinations, and setting key parameters such as time periods to study, day part definitions, trip types, and other specifications (see figures below).

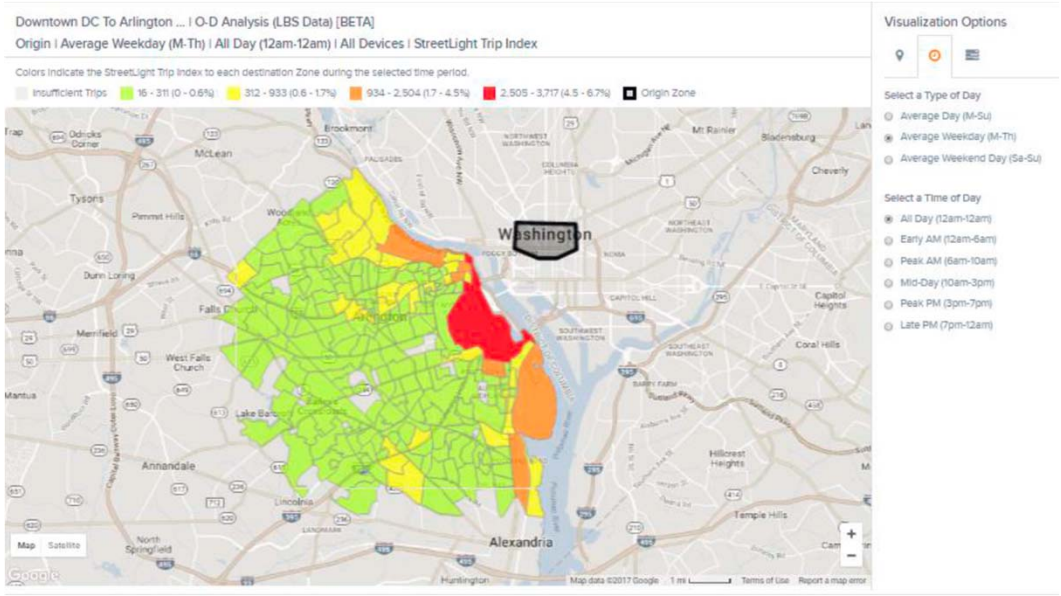


Above: Setting up an Origin-Destination analysis and customizing day parts in StreetLight InSight

Using *StreetLight InSight*

Step 3: Visualize Maps and Charts of the Results

Users can visualize travel patterns within *StreetLight InSight* (see figure below). There are simple toggles so that travel patterns can be visualized as maps or as charts at specific day parts, times of day, and more.

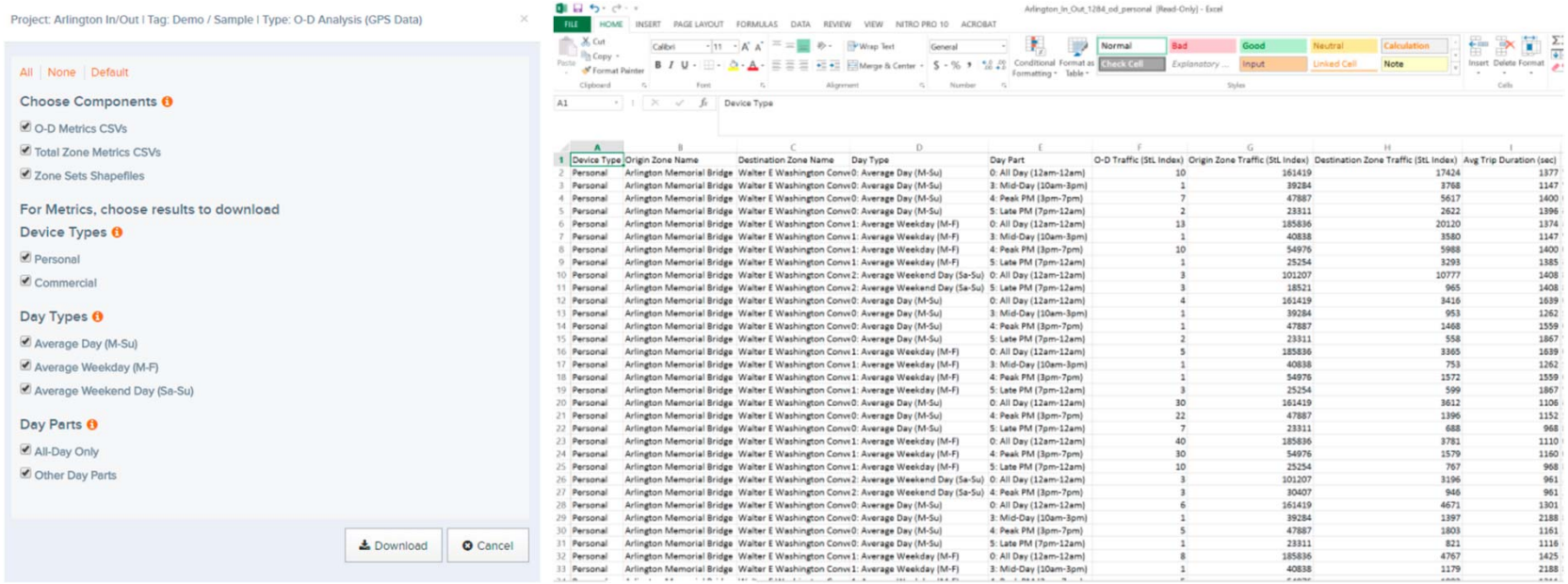


Above: Visualizing Origin-Destination patterns at different times and types of day in StreetLight InSight

Using *StreetLight InSight*

Step 4: Download Results

All StreetLight InSight Metrics can be downloaded for further analysis and manipulation in Microsoft Excel or other analysis tools (see figure below).



Device Type	Origin Zone Name	Destination Zone Name	Day Type	Day Part	O-D Traffic (StL Index)	Origin Zone Traffic (StL Index)	Destination Zone Traffic (StL Index)	Avg Trip Duration (sec)
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	0: All Day (12am-12am)	10	161419	17424	1377
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	3: Mid-Day (10am-3pm)	1	39284	3768	1147
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	4: Peak PM (3pm-7pm)	7	47887	5617	1400
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	5: Late PM (7pm-12am)	2	23311	2622	1396
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	0: All Day (12am-12am)	13	185836	20120	1374
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	3: Mid-Day (10am-3pm)	1	40838	3580	1147
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	4: Peak PM (3pm-7pm)	10	54976	5988	1400
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	5: Late PM (7pm-12am)	1	25254	3293	1385
Personal	Arlington Memorial Bridge	Walter E Washington Conv	2: Average Weekend Day (Sa-Su)	0: All Day (12am-12am)	3	101207	10777	1408
Personal	Arlington Memorial Bridge	Walter E Washington Conv	2: Average Weekend Day (Sa-Su)	5: Late PM (7pm-12am)	3	18521	965	1408
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	0: All Day (12am-12am)	4	161419	3416	1639
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	3: Mid-Day (10am-3pm)	1	39284	953	1262
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	4: Peak PM (3pm-7pm)	1	47887	1468	1559
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	5: Late PM (7pm-12am)	2	23311	558	1867
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	0: All Day (12am-12am)	5	185836	3365	1639
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	3: Mid-Day (10am-3pm)	1	40838	753	1262
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	4: Peak PM (3pm-7pm)	1	54976	1572	1559
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	5: Late PM (7pm-12am)	3	25254	599	1867
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	0: All Day (12am-12am)	30	161419	3612	1106
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	4: Peak PM (3pm-7pm)	22	47887	1396	1152
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	5: Late PM (7pm-12am)	7	23311	688	968
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	0: All Day (12am-12am)	40	185836	3781	1110
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	4: Peak PM (3pm-7pm)	30	54976	1579	1160
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	5: Late PM (7pm-12am)	10	25254	767	968
Personal	Arlington Memorial Bridge	Walter E Washington Conv	2: Average Weekend Day (Sa-Su)	0: All Day (12am-12am)	3	101207	3196	961
Personal	Arlington Memorial Bridge	Walter E Washington Conv	2: Average Weekend Day (Sa-Su)	4: Peak PM (3pm-7pm)	3	30407	946	961
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	0: All Day (12am-12am)	6	161419	4671	1301
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	3: Mid-Day (10am-3pm)	1	39284	1397	2188
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	4: Peak PM (3pm-7pm)	5	47887	1803	1161
Personal	Arlington Memorial Bridge	Walter E Washington Conv	0: Average Day (M-Su)	5: Late PM (7pm-12am)	1	23311	821	1116
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	0: All Day (12am-12am)	8	185836	4767	1425
Personal	Arlington Memorial Bridge	Walter E Washington Conv	1: Average Weekday (M-F)	3: Mid-Day (10am-3pm)	1	40838	1179	2188

Above: Selecting Metrics to download and analyzing O-D Metrics in a CSV file using Microsoft Excel

INRIX Real-Time Traffic & Roadway Analytics

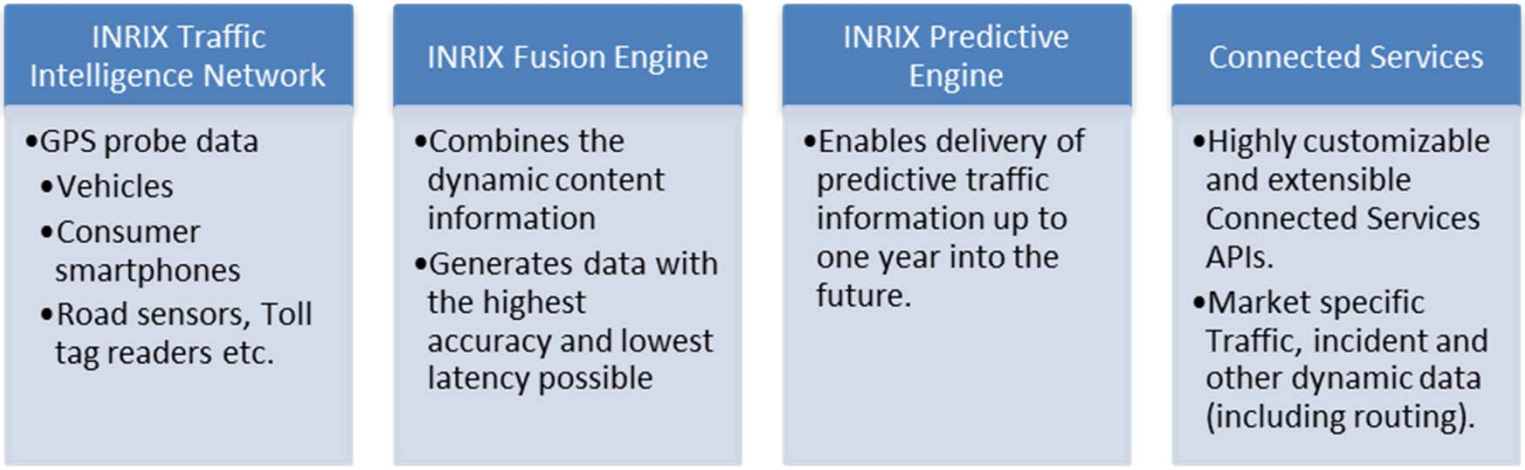
INRIX Overview

- Founded in 2005
- Leading provider of accurate real-time, near real-time, historical and predictive traffic information.
- Every day, government and business customers use INRIX Data as a Service (DaaS) solutions, which are powered by over 275 million real-time vehicles and devices from hundreds of distinct sources across 50+ countries, to improve the mobility of hundreds of millions of people worldwide.
- INRIX intelligent traffic solutions and services are used by 350+ blue-chip customers worldwide.
    - Leading manufacturers like BMW, Audi, Volkswagen, Daimler, Toyota, Lexus, Ford, Volvo etc.

INRIX Real-Time Traffic

INRIX Processes

- INRIX's Intelligent Technology Platform (**Traffic Intelligence Network**, **Fusion Engine**, **Predictive Engine**, and **Connected Services**) is a unique approach that evaluates accuracy, coverage, or scalability of the data at each step, as depicted in the diagram below:

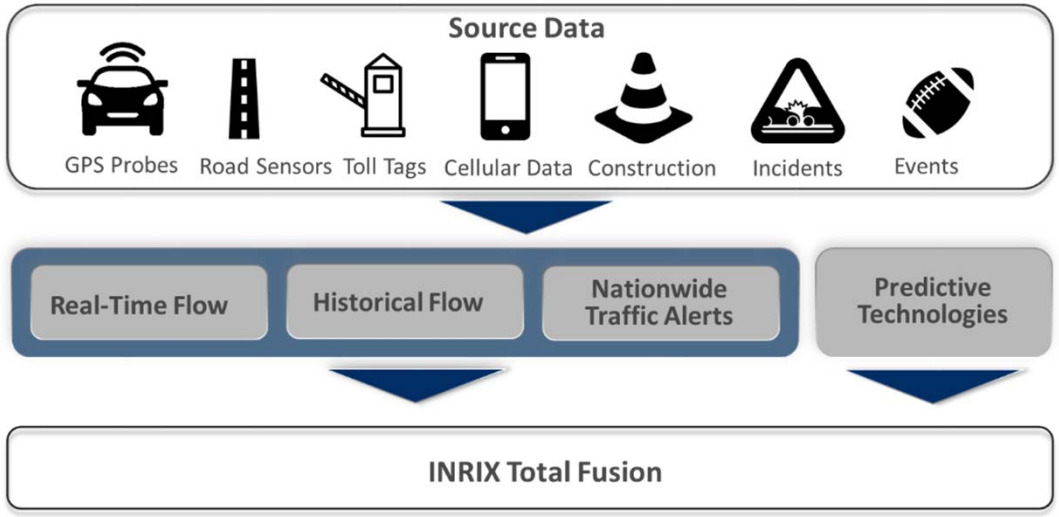


Intelligent Technology Platform

INRIX Real-Time Traffic

Data Collection

- INRIX is a pioneer of the use of Floating Car Data (FCD) and today has created the single largest, global network of GPS probe data.
- The **INRIX Traffic Intelligence Network** is composed of over 400 distinct sources of probe data from 275+ million real-time vehicles and devices around the world.

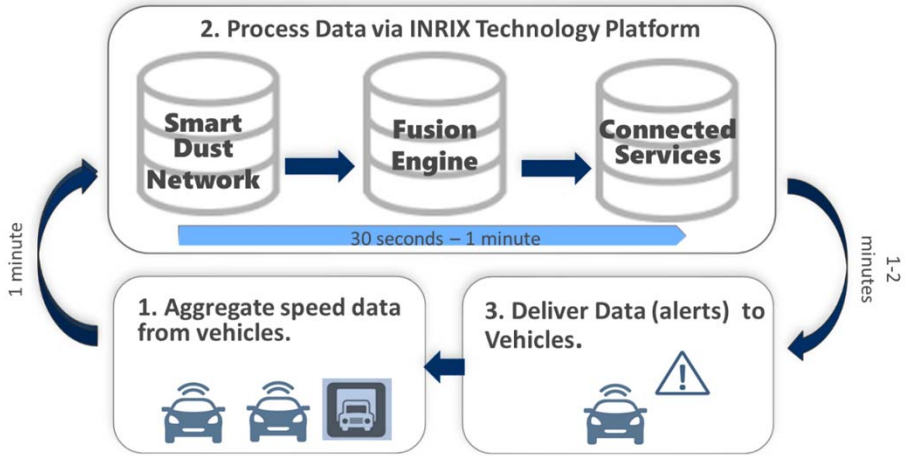


INRIX Data Collection

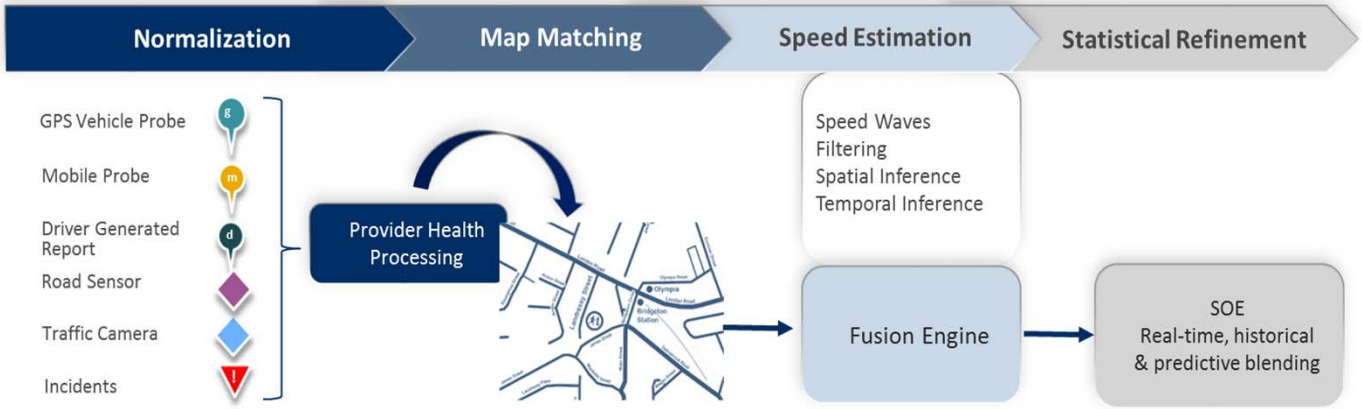
INRIX Real-Time Traffic
Data Processing

INRIX Data Processing Techniques:

- *Geospatial Filtering*
- *Collaborative Filtering and Outlier Detection*
- *Optimization of Spatial Granularity*
- *Statistically Optimized Estimation*
- *Elimination of Low Confidence Data*
- *SpeedWaves™ for Enhanced Granularity*



Overall Latency of INRIX Traffic Technology



Processing of Incoming Information

INRIX Roadway Analytics

Key Functionality

- Map-base selection tools designed to easily identify a variety of study locations.
  - Intuitive corridor and zone selection modules enabling use cases including single corridor to region-wide analyses.
- Supports multi-date, multi-time and multi-location selection to enable comparison studies.
- Enhanced workflow enables individual to share study location files, visualization and zone files with others managing analysis.

Data Source and Coverage

- XD-based roadway segmentation and coverage
- XD-based visualization and analysis
- Data granularity defined by user in 1-, 5-, 15-, or 60-minute increments

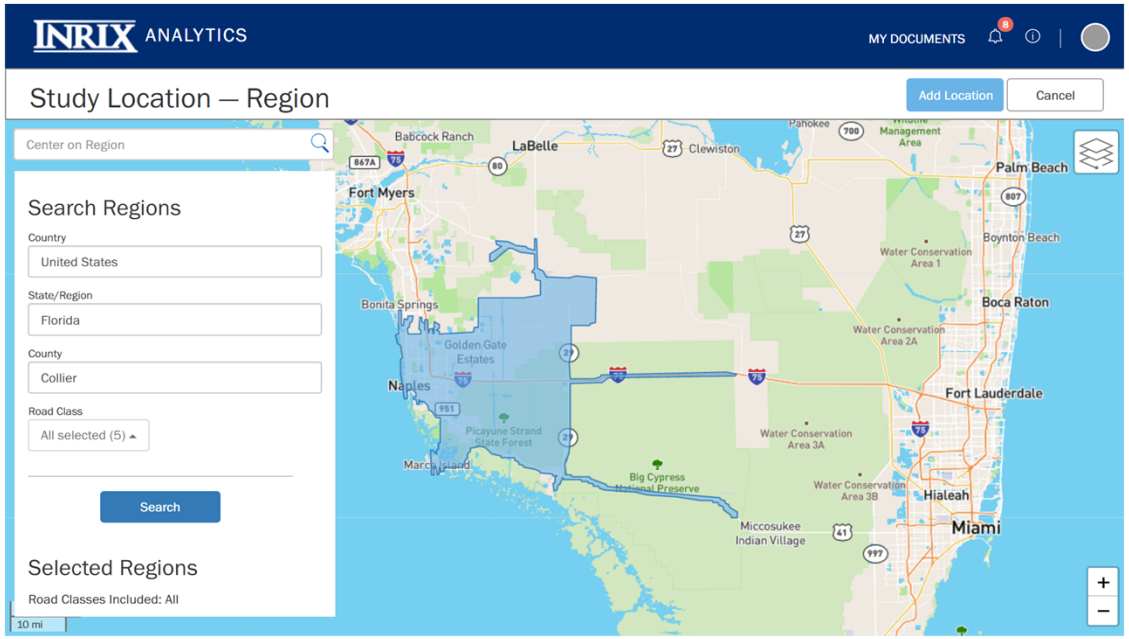
Data Storage and Access Features

- All data and data artifacts of Roadway Analytics housed in a cloud-based storage solution
- As a cloud-based SAAS, Roadway Analytics is accessible anywhere with internet access
- Supports a multitude of simultaneous users through unique individual accounts

INRIX Roadway Analytics

Key Features - Tools

- **Congestion Scan** is an analytics and visualization tool that enable users to pinpoints where traffic conditions are suboptimal along a corridor. It provides segment by segment visibility of the roadway condition along the length of a corridor.
- **Performance Charts** and summaries is an analytics and visualization tool that plots, tabulates and summarizes data as a line or bar chart. It enables trending analyses and comparison studies.
- **Bottleneck Ranking** is an on-demand bottleneck reporting tool that identifies, tabulates and visualizes bottlenecks or congested corridors for a specific analysis period within an area. Bottlenecks are ranked by considering the number of occurrences, length and duration.



INRIX Roadway Analytics

Congestion Scan

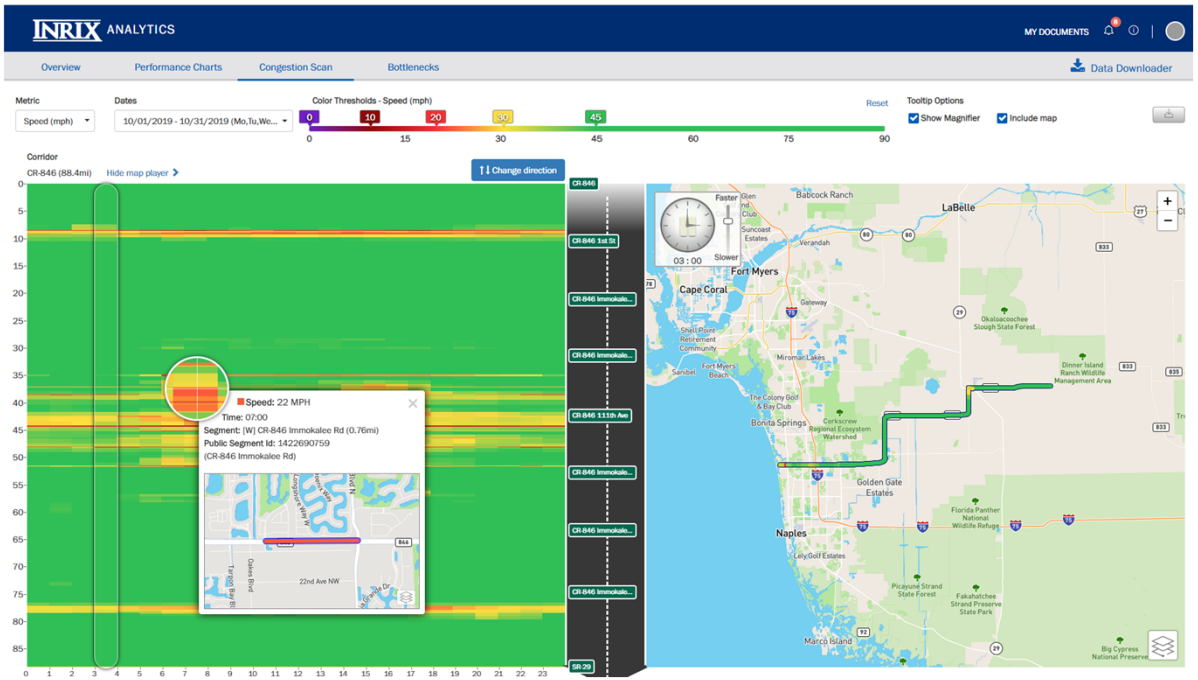
The Congestion Scan enables user to aggregate data in 1-, 5-, 10-, 15-, 30-, and 60-minute bins to for any corridor or set of contiguous roadways to represent speed, congestion, travel time, buffer time and other performance metrics. As the tool correlates temporal and spatial information, it is particularly suited for planning or assessment efforts that require pinpointing locations of sub-optimal conditions. Users can use speed and color sliders to dynamically enhance their visibility into trouble spots while the metric dropdown enable user to view a variety of performance metrics.

Key features

- Pinpoint areas that are underperforming
- Visualize both time and roadway location impacted
- Supports up to 7 different dates
- Exportable images
- Multiple chart types
- Map Player for easy location referencing of conditions for any time period

Metric include

- Speed
- Historic average speed
- **Travel time**
- **Travel time index**
- **Buffer time**
- **Buffer time index**
- **Planning time**
- **Planning time index**



Example of Congestion Scan for CR-846

INRIX Roadway Analytics

Performance Charts

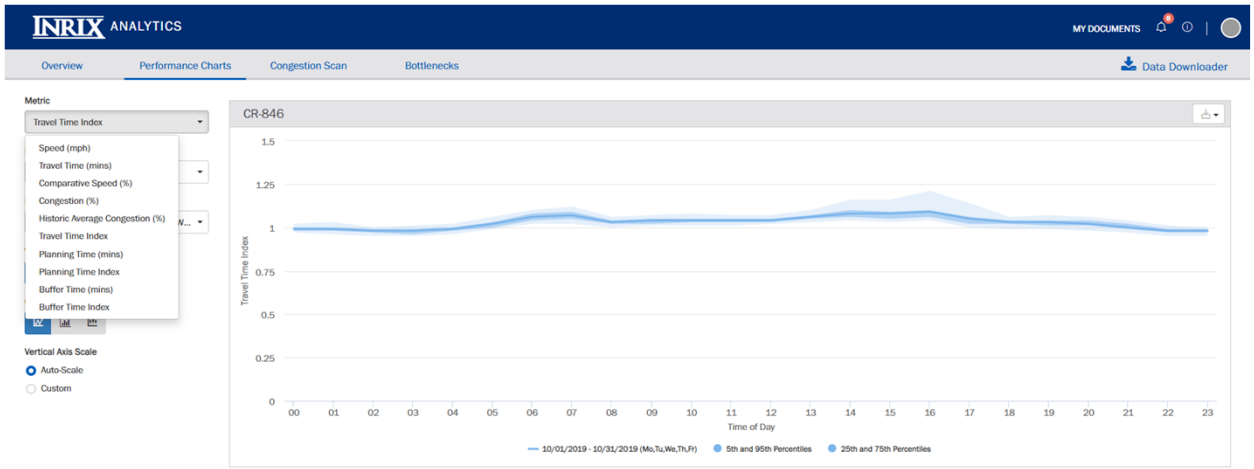
The Performance Charts enable the visualization of data in a graphical layout that is particularly suited for decoding trends, day-by-day or year-over-year. Transportation professional responsible for decipher and leveraging trends to plan the smart cities of tomorrow will turn to this tool for on-demand analytics and a familiar set of visualization readily understood by industry professionals. Charts indicate trends and technical analysis though a variety of chart options including, bar, scatter, line and candle stick view. Fully customizable line colors and selectable metrics enable users to easily compare up to seven analysis periods.

Key features

- Enables comparison, before & after studies
- Supports up to 7 different dates
- Exportable images
- Multiple chart types

Metric include

- Speed
- Historic average speed
- **Travel time**
- **Travel time index**
- **Buffer time**
- **Buffer time index**
- **Planning time**
- **Planning time index**



Example of Performance Chart for CR-846

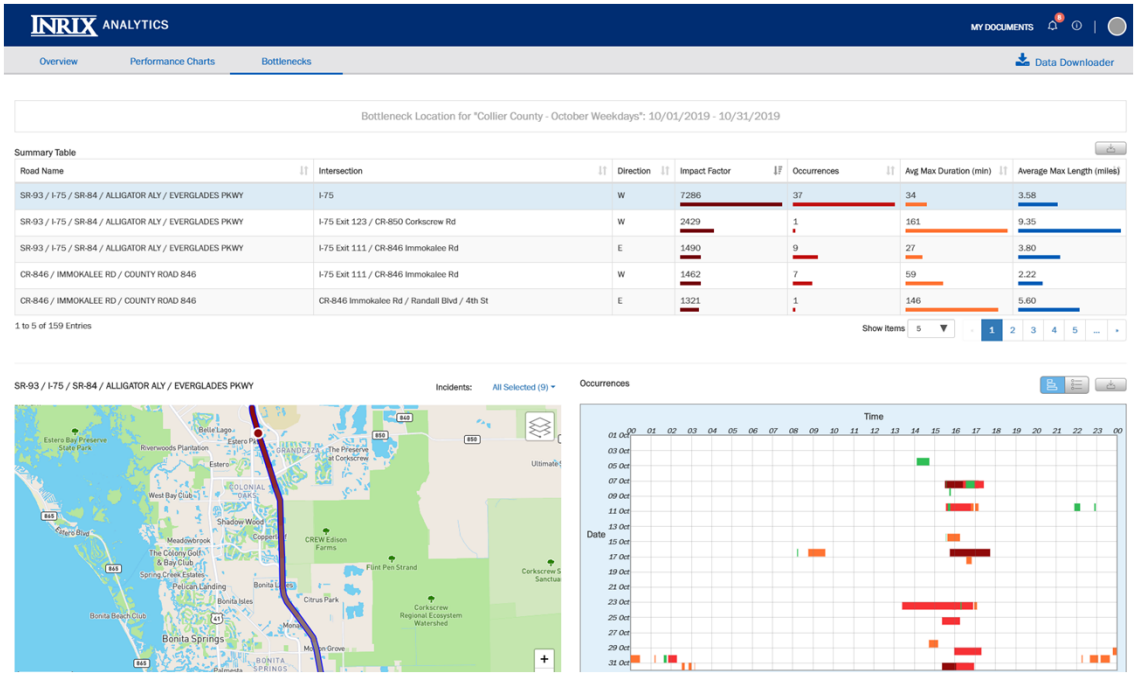
INRIX Roadway Analytics

Bottleneck Ranking

The Bottleneck Ranking tool is particularly well suited to identify chronically congested locations. By specifying the date range and geographical breadth, users custom query an archive of bottleneck and their associated attributes including bottleneck locations, average duration, average length and the number of occurrences. By considering the impact factor, or the magnitude of the bottleneck attributes, the tool identifies the most impactful bottleneck locations. Those required to report on recurring congestion or that need to identify and prioritize the investment of capital investment turn to this tool for actionable insight. Note, initial dataset for historical bottlenecks is from 2016 and forward.

Key features

- An archive of bottleneck locations
- Identifies location of recurrent congestion
- Quantifies bottleneck attributes
- Identifies most congested locations
- Enables prioritization of deficiencies



Example of Bottleneck Ranking Tool

INRIX Summary of Fees

- This is a summary of the fee options for access to the INRIX Roadway Analytics tool that will include data for Collier County. The pricing is for BCC Engineering to have access of the tool and provide study results to the County.

Description	1 Month	3 Months	6 Months	12 Months
Roadway Analytics	NA	$12,000	$19,800	$30,000
Additional Data	$3,000	$7,200	$12,000	$18,000

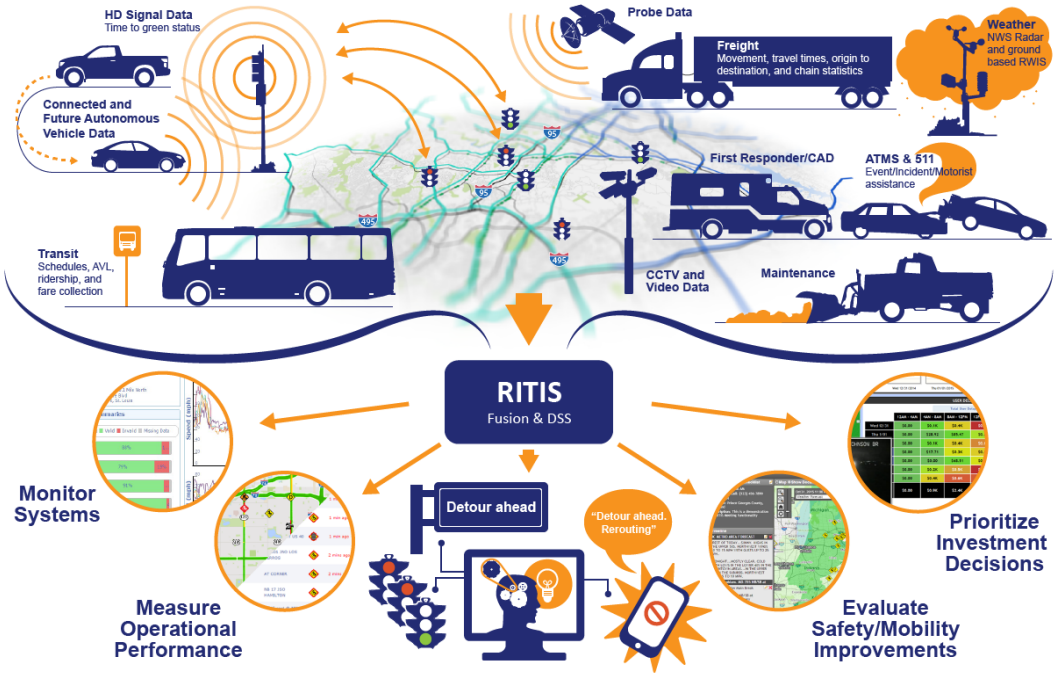
Note:

- Annual (12 months) subscription includes access to the data of 1 year before and 1 year after the requested date
- 6 months subscription includes access to the data 6 months before and 6 months after the requested date
- 3 months subscription includes access to the data 3 months before and 3 months after the requested date

RITIS Overview

RITIS – Introduction

- Situational awareness, data archiving, and analytics platform.
- A broad portfolio of analytical tools and features with data from transportation and public safety systems, the private sector, and military.



Above: *RITIS Data Source*

Data source: RITIS Website (https://www.ritis.org/intro)

RITIS – Introduction

- RITIS Data Types Example:

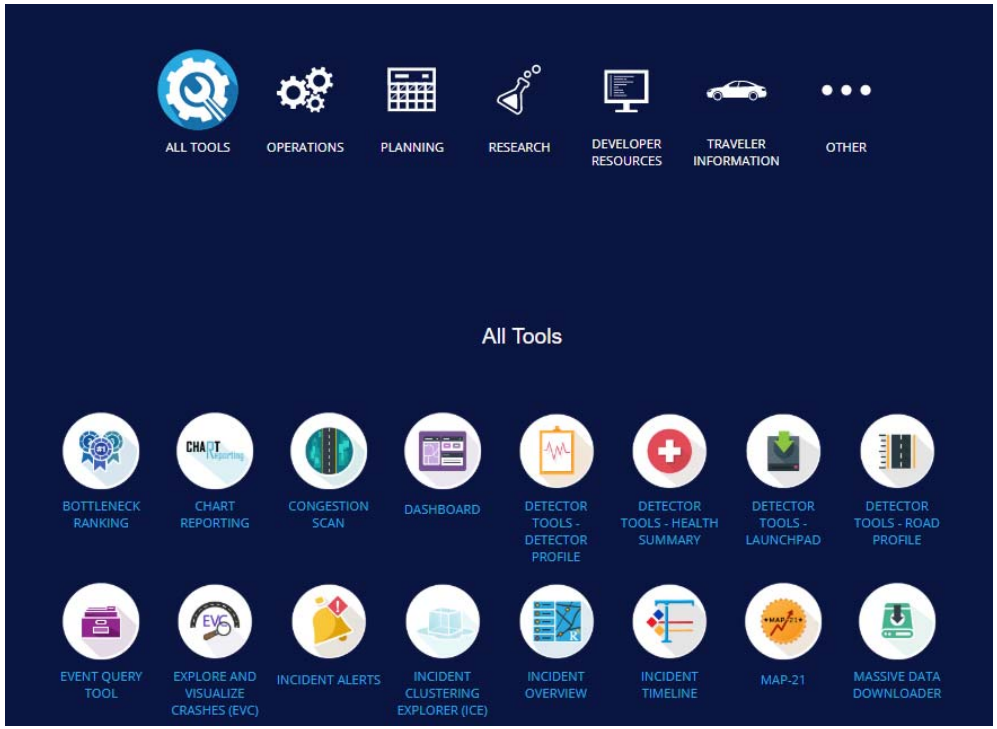
Data Types	Description
Traffic volume, speed, class, and occupancy from sensors (loops, RTMS, Video detection, Sensys pucks, etc.)	Information collected by agencies and third parties from roadway sensors that could include inductive loops, side-fired sensors (acoustic, microwave, etc.), radar, and video. This also includes data from probe-based systems—either agency-owned (Bluetooth) or third-party supplied (HERE Technologies, INRIX, TomTom.)
Travel time	Often a derivative of speed data, travel time data represent the number of minutes it takes a person to travel from one location to another. Travel times are often divided into road segments where the start and end point of the segments are intersections or key features such as bridges or tunnels. Vehicle travel time data can be derived from point sensor speed data. It also can be directly measured by probes, such as license plate recognition, toll tag transponders, Global Positioning Systems, and cell phone tracking. Alternatively, it can be estimated and predicted from other data sources.
Freight movements	Mixture of data related to the origin-destination (O-D) of various shipments or types of shipments, statistics on the type of goods being shipped, the mode by which the goods are shipped, value of the goods, quantity of goods, type of shipping container, and safety records.

Above: *RITIS Data Type*

Data source: RITIS Website (https://www.ritis.org/intro)

RITIS – Overlook of Tools

- RITIS has 40 tools supporting tasks related to operations, planning, research, developer resources, traveler information, and others.



Data source: RITIS Website (https://www.ritis.org/tools)

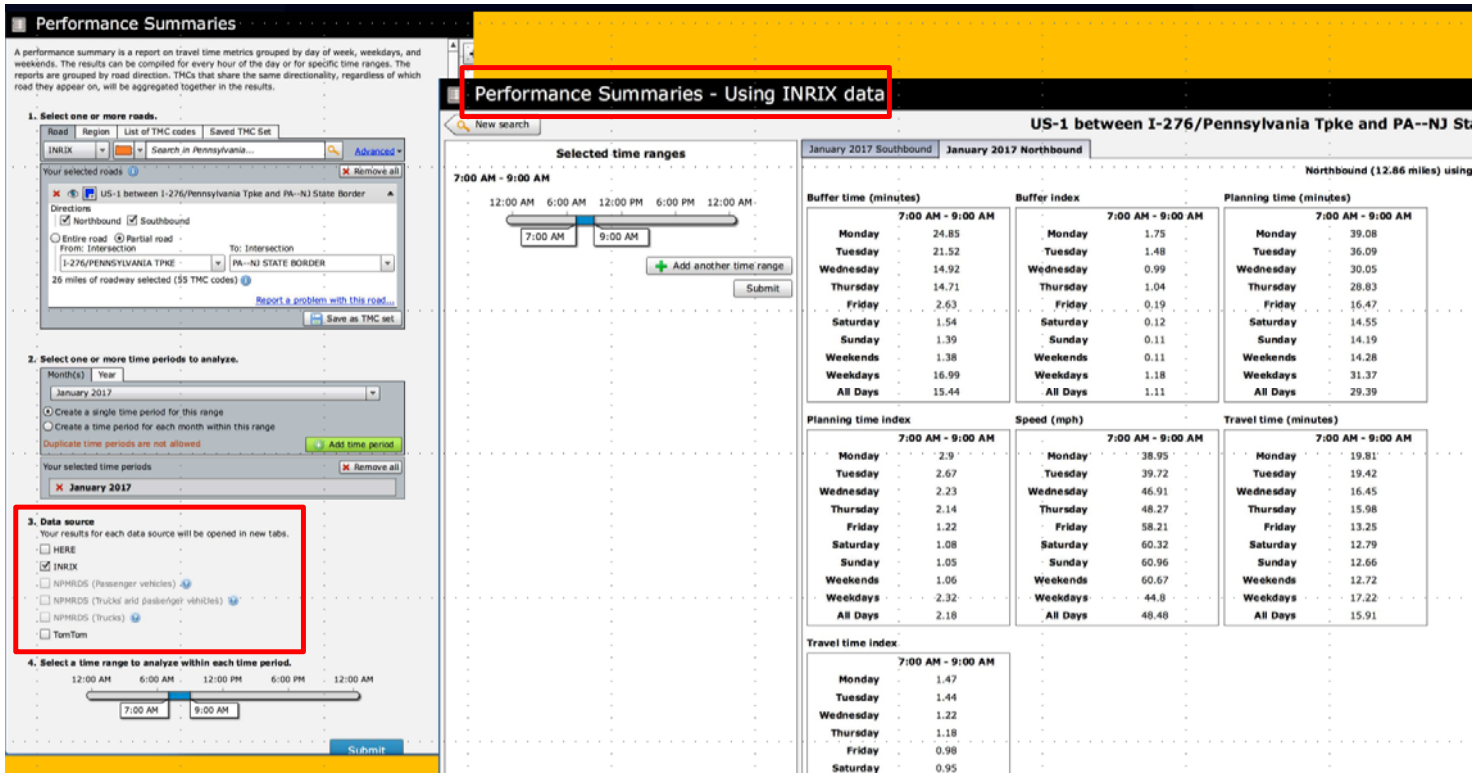
RITIS – Access

- Organizations are eligible for access to RITIS by means of sponsorship plans funded on their behalf by USDOT, a state DOT, or a local MPO. RITIS access is typically granted to government agencies (including Federal, state and local DOTs, MPOs, law enforcement, public safety, military, etc.) or consultants and researchers who are working on projects for a government partner.

- While some features of RITIS are 100% free, others require funding.

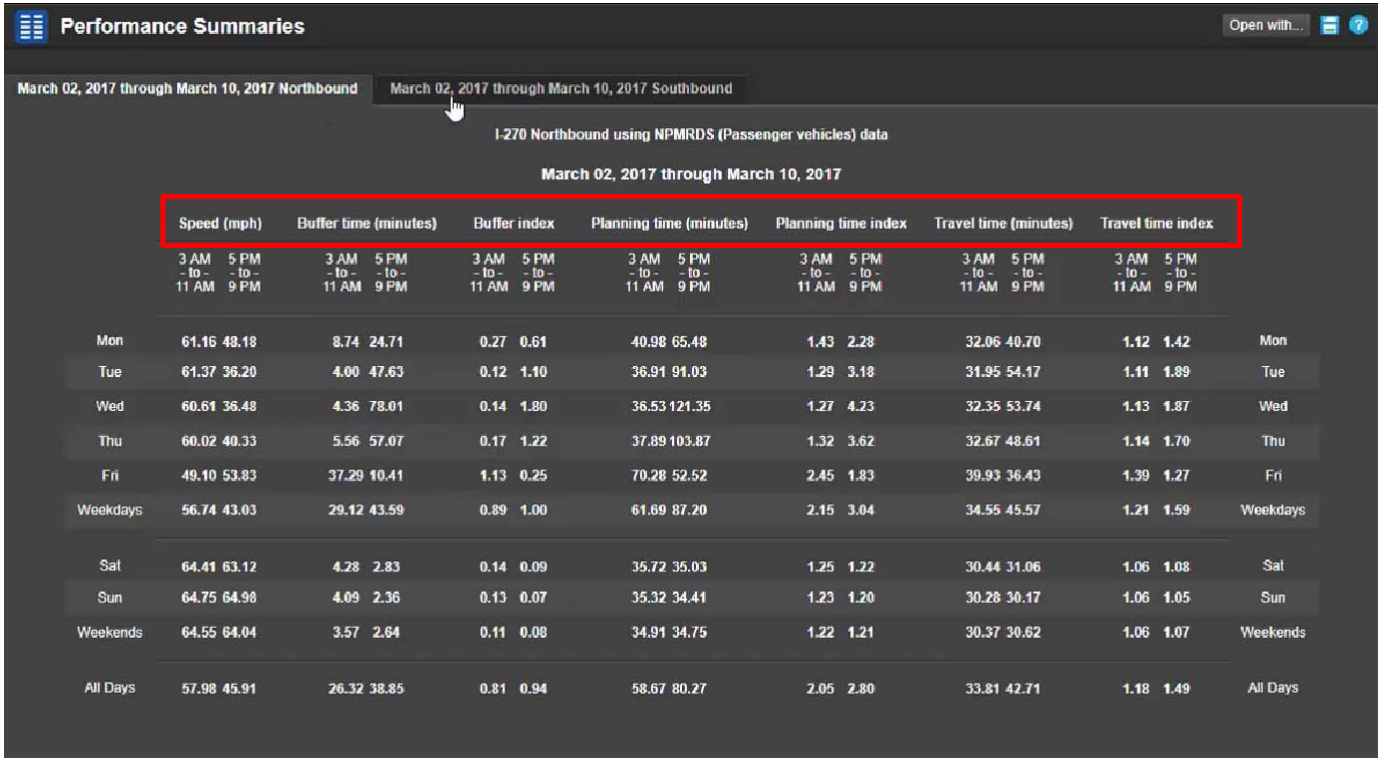
RITIS – Performance Summaries

- The performance summary is a report on travel time metrics grouped by day of week, weekdays, and weekends. The results can be compiled for every hour of the day or for specific time ranges. The reports are grouped by road direction.



Data source: RITIS Website (https://www.ritis.org/tools)

RITIS – Performance Summaries



Performance Summaries

Open with...

March 02, 2017 through March 10, 2017 Northbound | March 02, 2017 through March 10, 2017 Southbound

I-270 Northbound using NPMRDS (Passenger vehicles) data

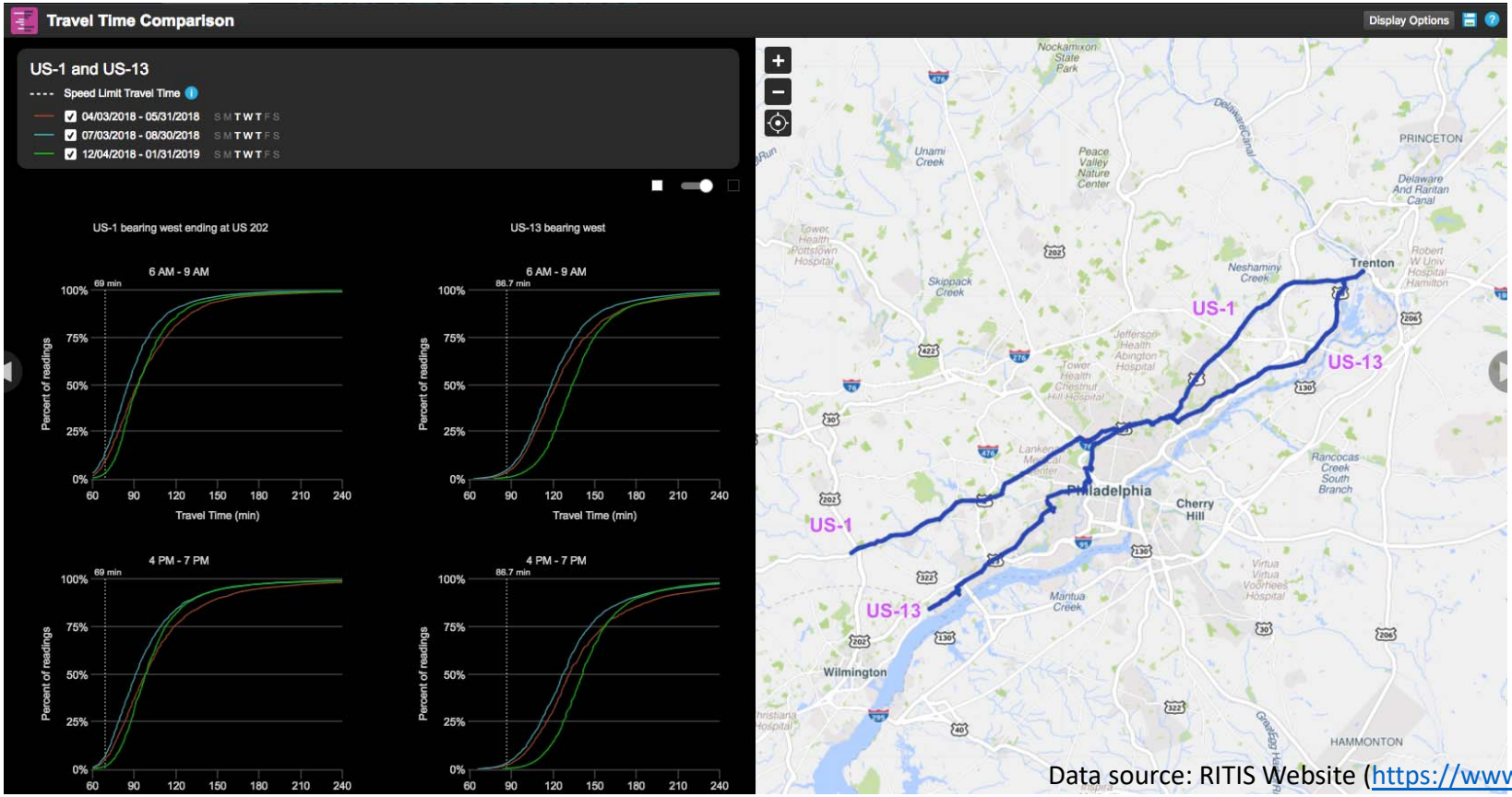
March 02, 2017 through March 10, 2017

	Speed (mph)		Buffer time (minutes)		Buffer index		Planning time (minutes)		Planning time index		Travel time (minutes)		Travel time index		
	3 AM - to - 11 AM	5 PM - to - 9 PM	3 AM - to - 11 AM	5 PM - to - 9 PM	3 AM - to - 11 AM	5 PM - to - 9 PM	3 AM - to - 11 AM	5 PM - to - 9 PM	3 AM - to - 11 AM	5 PM - to - 9 PM	3 AM - to - 11 AM	5 PM - to - 9 PM	3 AM - to - 11 AM	5 PM - to - 9 PM	
Mon	61.16	48.18	8.74	24.71	0.27	0.61	40.98	65.48	1.43	2.28	32.06	40.70	1.12	1.42	Mon
Tue	61.37	36.20	4.00	47.63	0.12	1.10	36.91	91.03	1.29	3.18	31.95	54.17	1.11	1.89	Tue
Wed	60.61	36.48	4.36	78.01	0.14	1.80	36.53	121.35	1.27	4.23	32.35	53.74	1.13	1.87	Wed
Thu	60.02	40.33	5.56	57.07	0.17	1.22	37.89	103.87	1.32	3.62	32.67	48.61	1.14	1.70	Thu
Fri	49.10	53.83	37.29	10.41	1.13	0.25	70.28	52.52	2.45	1.83	39.93	36.43	1.39	1.27	Fri
Weekdays	56.74	43.03	29.12	43.59	0.89	1.00	61.69	87.20	2.15	3.04	34.55	45.57	1.21	1.59	Weekdays
Sat	64.41	63.12	4.28	2.83	0.14	0.09	35.72	35.03	1.25	1.22	30.44	31.06	1.06	1.08	Sat
Sun	64.75	64.98	4.09	2.36	0.13	0.07	35.32	34.41	1.23	1.20	30.28	30.17	1.06	1.05	Sun
Weekends	64.55	64.04	3.57	2.64	0.11	0.08	34.91	34.75	1.22	1.21	30.37	30.62	1.06	1.07	Weekends
All Days	57.98	45.91	26.32	38.85	0.81	0.94	58.67	80.27	2.05	2.80	33.81	42.71	1.18	1.49	All Days

Data source: RITIS Website (https://www.ritis.org/tools)

RITIS - Travel Time Comparison

- A comparison of travel times on a selected corridor for specified “before” and “after” date. The tool produces cumulative frequency diagrams (CFDs) of the travel times that illustrate the difference between the before and after conditions.



Data source: RITIS Website (https://www.ritis.org/tools)

Teralytics

Teralytics - Overview

- Teralytics' proprietary machine learning-based approach allows clients to imagine and create transportation services that are based on real, current needs of everyone in your community.
- Customers can plan and run mobility services with confidence, utilizing insight that is based on the most accurate and inclusive indicator of people's mobility – mobile signal.

Teralytics – Data Source

- Signal data from mobile phones, collected at signal tower
  - Data from one carrier
  - Data location accuracy: ~250m
  - Updated every 24 hours
  - Up to 3 years historical data
  - Aggregated to “Zone to Zone” data
  - Able to capture both regular commuting and occasional trips

Teralytics - Matrix

- Teralytics Matrix lets you see instantly how people are travelling within your chosen region and understand how this may be changing throughout the day, weekdays to weekends, season to season, year on year.

Make everyone's journeys better

Prioritize infrastructure upgrades and improve traffic flows by understanding where people travel to and from.

Run services that meet demand

Improve scheduling and deploy your fleet when and where it is needed the most.

Understand market opportunity

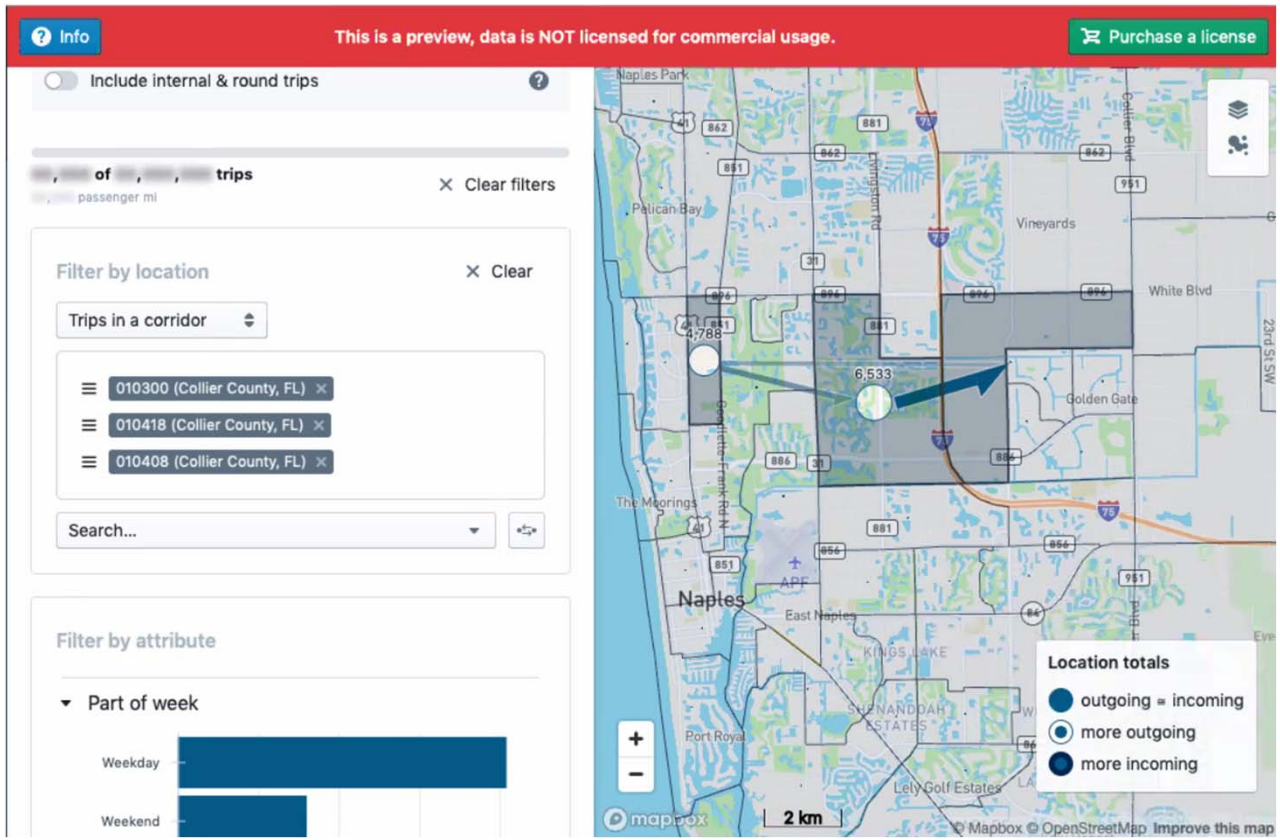
Adjust pricing and competitive positioning by understanding where people wish to travel.

Teralytics - Matrix

- Application
  - Prioritize road maintenance projects
  - Improve traffic flows through signage and signaling
  - Understand how people move within and in and out of the city
  - Evaluate mobility trends over time

- Matrix Custom
  - Users able to set their own parameters – geographic reach and timeframe – and overlay their own data to evaluate the performance.
  - Able to validate long-term impact

Teralytics – Example in Collier County



Products Comparison

	Matrix	Matrix Custom
Scope	Within set area	Within / incoming / outgoing / through the study area
Accessibility	Immediate	Upon completing feasibility checks and computation
Time range	Monthly	Custom
Updates	Included	Optional
Traffic volume comparison	Hourly (or daily and three hourly), weekday-weekend, monthly	Custom timeframes
Trip length	Included	Included
Most frequent origin-destination pairs	Included	Included
Mode of transport	Long distance	Long distance and within city, including mobility-as-a-service (ride-sharing, ride-hailing)
Trip purpose	Included	Included
Other		Routes Trip duration Trip frequency Commercial vs non-commercial traffic Hub analysis (airports, stadiums, venues)

Teralytics - Pulse

- Teralytics Pulse provides insights into the current passenger distribution across a transportation network, or an area, to help you run your services smoothly and act on any anomalies as they occur.

- Customer
  - Mobility service providers and transport hubs – provide the highest quality of service to their travelers.
  - Public safety agencies – understand how people travel within an area when an incident or a natural disaster occurs

Data Source Metrics in Details

Data Source	Travel Time Reliability Measures						Traffic Count	Traffic Volumes	Traffic Speed	Area (O&D) Analysis	Congestion Analysis	Cost
	Buffer Time	Buffer Time Index	Travel Time	Travel Time Index	Planning Time	Planning Time Index						
Inrix	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes			$$$
Streetlight	Yes*						Yes		Yes	Yes	Yes	$$$$
Google	No	No	Yes	No	No	No	No	No	Yes	No	No	$
RITIS	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Unknown**
Teralytics	No						No	Yes	No	Yes		Unknown

*Although Streetlight didn't include the 6 measures on the website description, travel time reliability calculation is provided
**RITIS is available in other projects. Need to verify if RITIS can be used for free.