“A WAY FORWARD”
ITS APPLICATIONS ANALYSIS FOR NASSAU COUNTY
FINAL REPORT

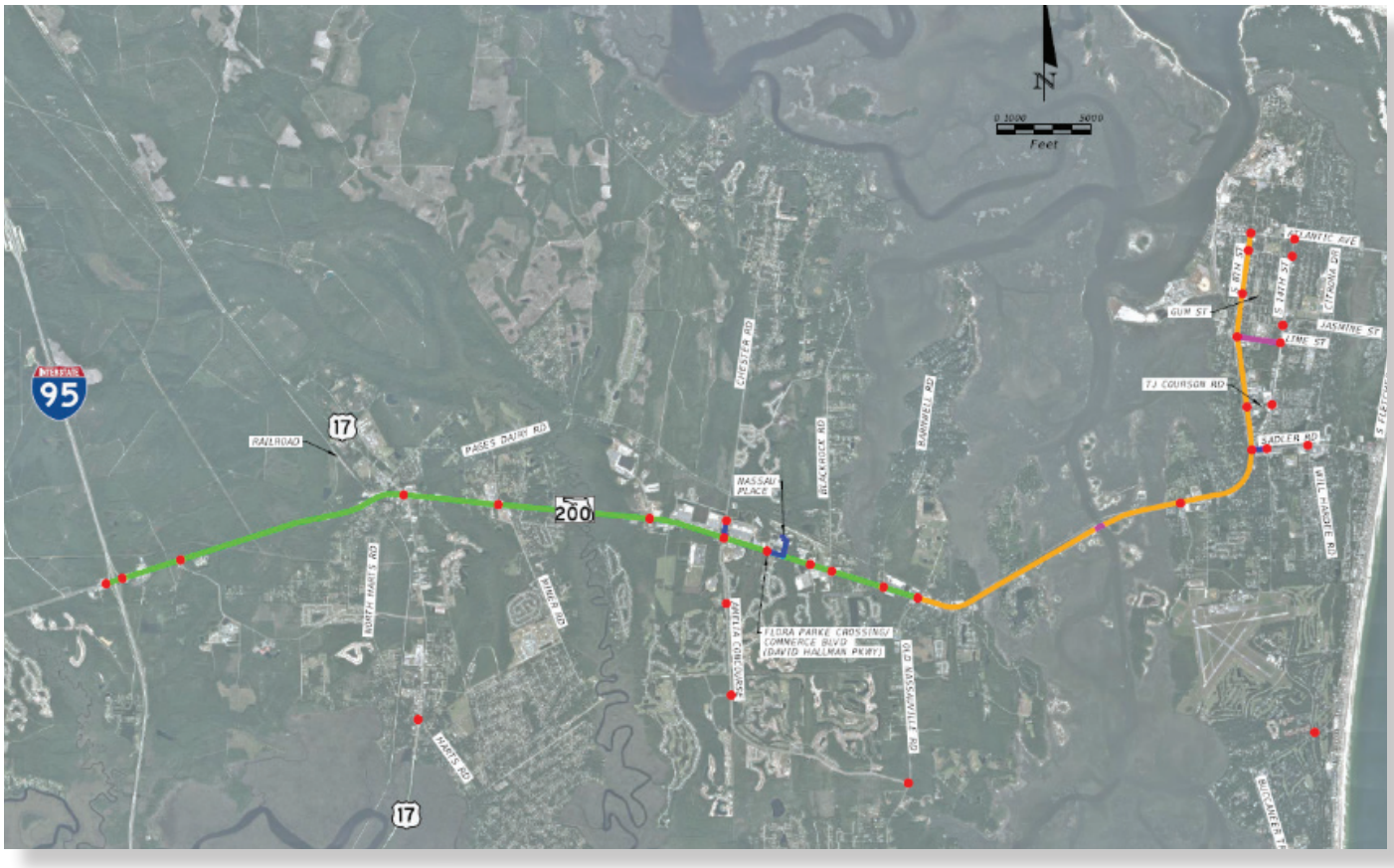

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TABLE OF CONTENTS

EXECUTIVE SUMMARY....1

OVERVIEW....5

PURPOSE....5

BACKGROUND....5

- TRAFFIC SIGNAL CONTROLLERS....5
- TRAFFIC SIGNAL CONTROLLER CABINETS....6
- SYSTEM SOFTWARE....6

COMMUNICATIONS NETWORK....6

- OPERATIONS AND MAINTENANCE....6
- AS-BUILTS....7

DYNAMIC MESSAGE SIGNS....8

CAMERAS....9

ADVANCED VEHICLE DETECTION SYSTEMS....10

REDUNDANCY AND POWER SYSTEMS....10

TRAFFIC SIGNAL PREEMPTION AND PRIORITY....11

CONNECTED VEHICLES....12

TRAFFIC SIGNAL TIMING PLANS....12

TRAFFIC MANAGEMENT CENTER....12

STAFFING....13

TRAVELLER INFORMATION....13

CONCLUSIONS....14

RECOMMENDATIONS....14

EXECUTIVE SUMMARY

England-Thims & Miller, Inc. (ETM) was retained by the North Florida Transportation Planning Organization (TPO) to analyze and provide recommendations for future ITS applications and features to be considered along SR 200 in Nassau County. These applications and features will address Nassau County's existing arterial infrastructure. This report provides Nassau County with assistance, guidance, and a roadmap for the selection and operation of future ITS strategies along SR 200, and to increase Nassau County's involvement and participation in existing Northeast Florida ITS operations. The vision is to implement the best solutions in arterial operational efficiency, public information dissemination and effective ITS maintenance based on the recommendations presented herein.

Nassau County has an arterial Advanced Traffic Management System (ATMS) network installed through previous Florida Department of Transportation (FDOT) projects and through in-house efforts consistent with FDOT District 2 arterial networks. This report considers the application of Dynamic Message Signs, Cameras, Advanced Vehicle Detection Systems, Back Up Power Systems, Traffic Signal Preemption and Transit Priority, Connected Vehicle Technologies, Parking Systems, Traveler Information Systems, the existing Traffic Management Center and Staffing and Traffic Signal Timing Plan needs.

The following is a summary of recommendations to enhance the existing ITS network along SR 200.

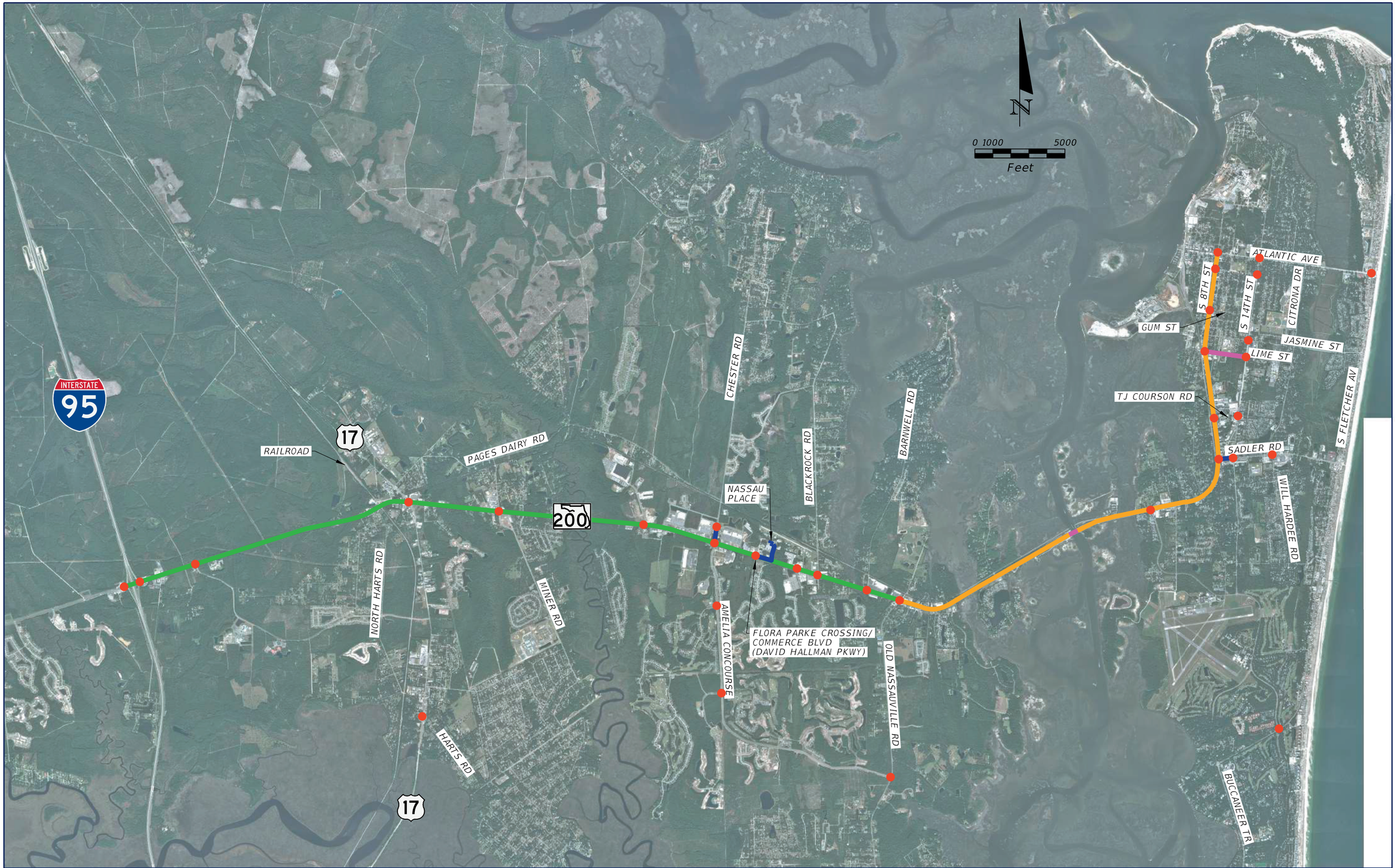
Short Term (within two years):

- Provide staff with fiber-optic cable training so minor and/or temporary repairs can be implemented.
- Upgrade the current TMC to provide additional video capabilities.
- Consider adding another full-time Traffic Signal Technician (as recommended per ITE and NCHRP guidelines). Additionally, conduct a financial analysis to determine whether additional staff, an on-call maintenance contractor, or another County Department would provide the most effective fiber-maintenance option.
- Consider a video streaming application to provide existing camera views to citizens via computer or smart phone.
- Implement hurricane evacuation timing plan capability for SR 200 between the Amelia River and Interstate-95.
- Install additional cellular communications for outlying intersections.

Long Term (beyond two years):

- Consider the design of additional DMS locations to provide travel time, alternate routing, and special event information.
- Provide a fiber-optic link across the Amelia River to replace the existing wireless connection, either by a directional bore or by utilizing existing bridge-attached conduit.
- Consider additional traffic-monitoring staffing - TMC Operators can be housed at either FDOT District 2 or Nassau County to efficiently operate and manage the County's growing ITS system.
- Pursue grant opportunities that would supplement ITS expansion and operational capabilities.

Pages 2-4 illustrate Nassau County's ITS fiber status.



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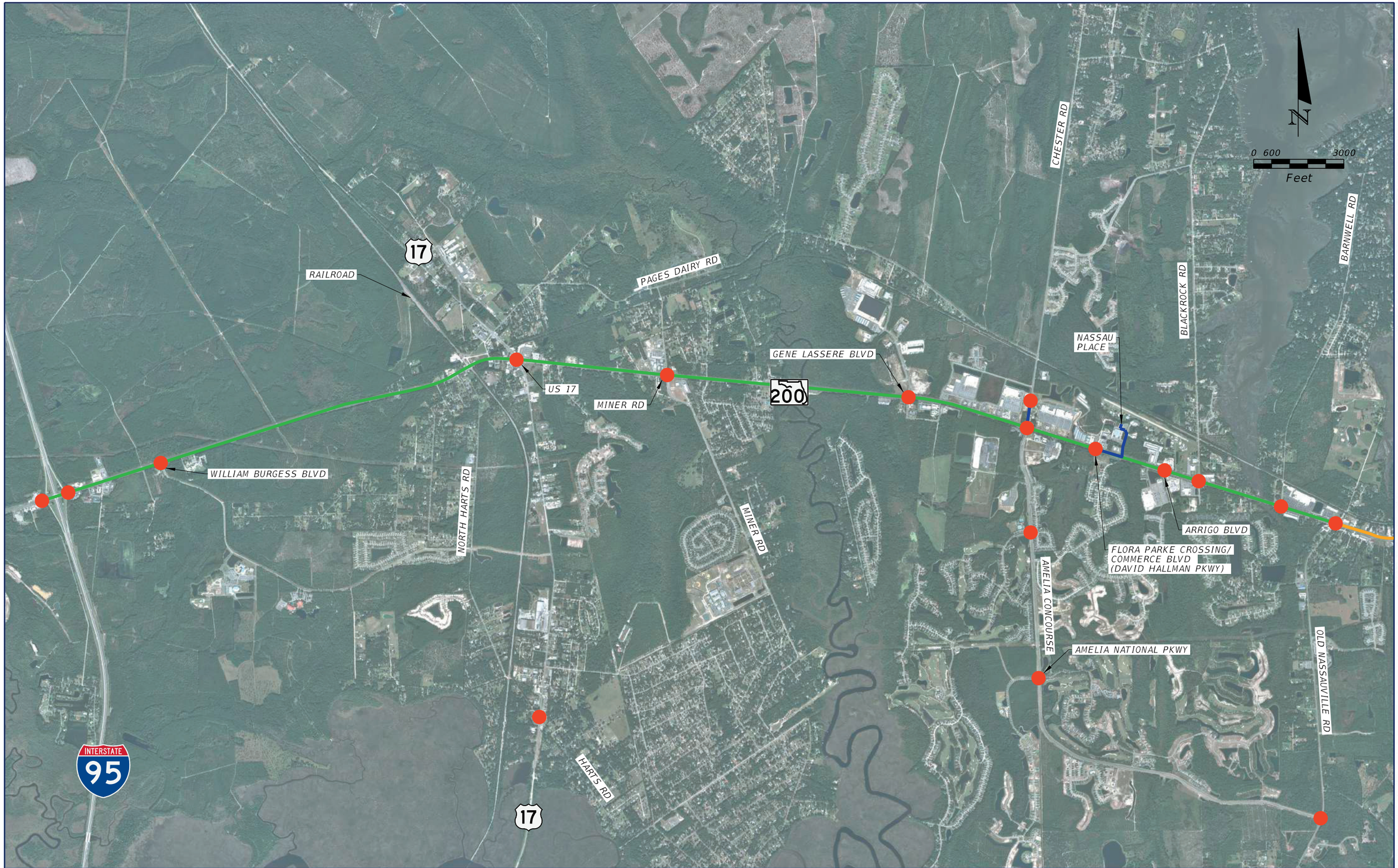
LEGEND

- FDOT UNDER CONSTRUCTION 96 SM
- EXISTING WIRELESS
- EXISTING FIBER 24 SM
- NASSAU COUNTY 24 SM
- TRAFFIC SIGNAL

NASSAU COUNTY ITS FIBER CORRIDOR STATUS

SHEET NO. 1



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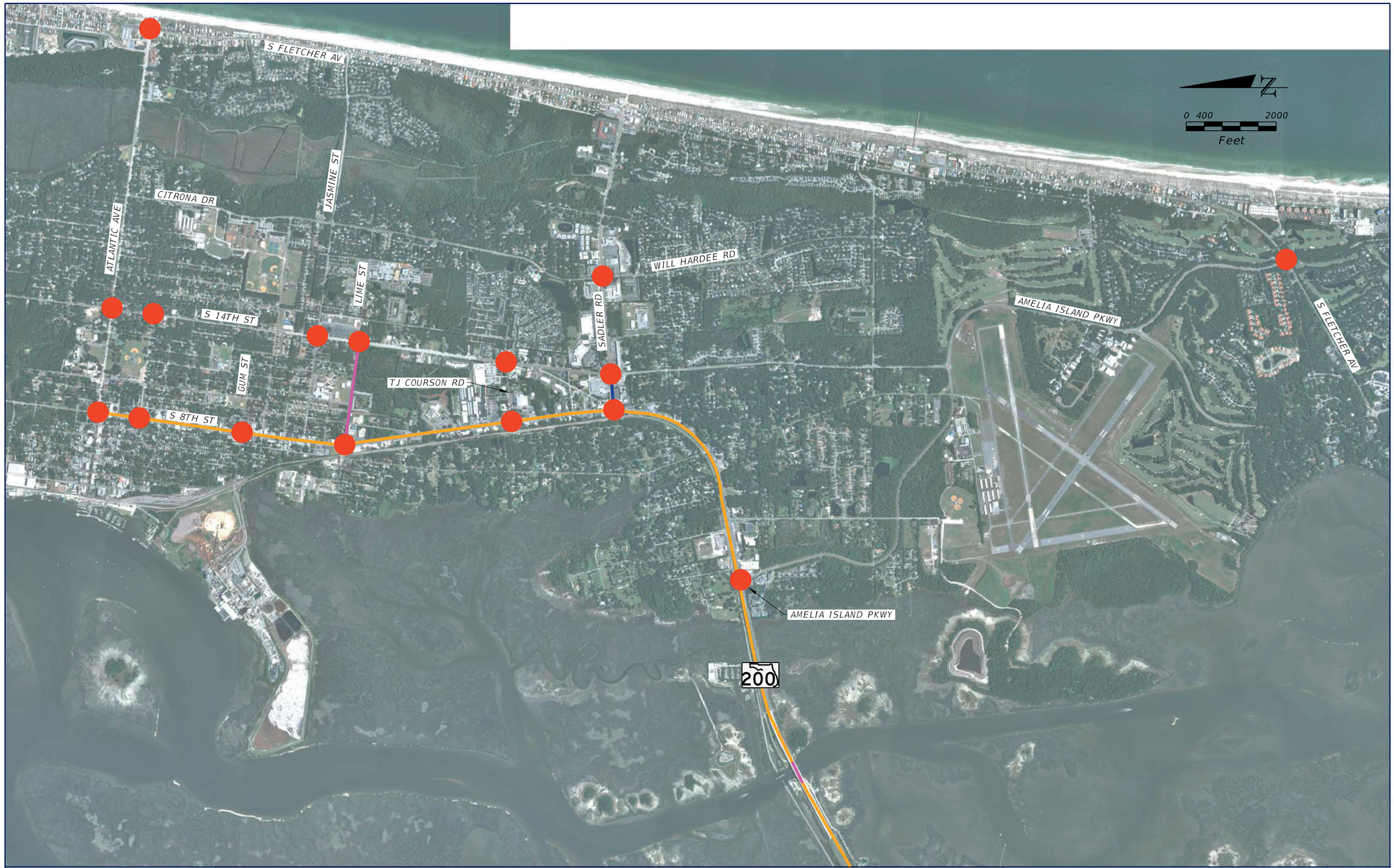

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- TRAFFIC SIGNAL

NASSAU COUNTY ITS FIBER CORRIDOR STATUS

SHEET NO. 3

OVERVIEW

Nassau County serves as the northeastern gateway to the Sunshine State and is in District 2 of FDOT's service area. Nassau County is also under the planning jurisdiction of the North Florida TPO. As of the U.S. Census Bureau's 2016 Quick Facts, the County's population was 80,622. The County seat and largest incorporated city is Fernandina Beach.

Nassau County is also included in the Jacksonville Metropolitan Statistical Area. Tourism, primarily associated with Amelia Island, is the chief economic industry and State Route 200 (SR 200) is the primary east/west corridor in the County connecting Interstate-95 with Amelia Island.

PURPOSE

This analysis identifies and provides recommendations on ITS applications and features to implement in the near-term and long-term in compliance with FDOT District 2 and Statewide ITS architecture standards for Nassau County. These applications primarily address Nassau County's arterial infrastructure.

Nassau County has a modest but commendable ATMS with infrastructure installed through prior FDOT projects and through in-house efforts. As of this analysis, there are two on-going SR 200 construction projects that (when completed) will provide a continuous ITS infrastructure backbone from Centre Street (in downtown Fernandina Beach) to the Interstate-95 interchange. This will provide the County with opportunities to implement ITS strategies along SR 200 and connect with FDOT ITS infrastructure currently operating in northeast Florida. This report will provide Nassau County with assistance, guidance and a roadmap for the selection and operation of ITS strategies along SR 200. Upon completion of the SR 200 construction projects, the North Florida TPO wishes to increase Nassau County's involvement/participation in existing Northeast Florida ITS operations.

BACKGROUND

Through state and local roadway projects, Nassau County implemented an arterial ATMS network consistent with other FDOT District 2 traffic signal maintaining agencies, the Trafficware ATMS.now system. The County's traffic signal infrastructure follows the most recent NEMA TS-2 standards with Advanced Traffic Controllers (ATC) running Linux software. The County's central software is the most recent version of Trafficware's ATMS.now (Version 2.6). The SR 200 projects will also be implementing Trafficware's Adapative Signal Control Technology (ASCT) called SynchroGreen. This system has several deployments throughout the state of Florida, and SR 200 is an excellent candidate for adaptive traffic signal control due to seasonal fluctuating traffic demand. Additionally, the SR 200 roadway projects have traffic signal designs recommended by Trafficware to promote the success of the adaptive system.

Nassau County maintains a traffic-dedicated communications network consisting of fiber-optic cable, wireless radio, and cellular connections to communicate with traffic signals. This network allows Nassau County to communicate with most of their signalized intersections through their ATMS central software. The on-going SR 200 projects are installing a 96-count fiber-optic trunk-line, replacing older fiber-optic cable and installing fiber on the western end of SR 200 which currently operates via wireless radio connections.

Traffic Signal Controllers

FDOT and Nassau County encourage consistency between state and local traffic signal equipment and software. For the last several years, FDOT District 2 has installed Trafficware NEMA TS-2 Type 1 traffic signal controllers at their intersections within the County. Nassau County specifies that all new intersections must conform to this hardware to maintain consistency. To provide the County compatibility with adaptive signal control and other advanced features, FDOT's SR 200 projects will contain the latest Linux-based NEMA ATC traffic signal controller from Trafficware. These new controllers are compatible with Nassau County's existing ATMS made by the same manufacturer.

Nassau County also utilizes a Trafficware maintenance contract provided by FDOT District 2 for County-funded traffic signal controller enhancements.

Traffic Signal Controller Cabinets

Nassau County has historically used NEMA-type standard cabinets. As in most of FDOT District 2, many of the older NEMA TS-1 cabinets were upgraded to NEMA TS-2. As with the traffic signal controllers, the controller cabinets are also manufactured by Trafficware, supporting the County's homogenous traffic controller system.

Nassau County utilizes a Trafficware maintenance contract provided by FDOT District 2 for County-funded traffic cabinet enhancements.

System Software

Nassau County currently operates the latest version of Trafficware's central control software, ATMS.now. This software has several modules available for purchase that provide additional central software features. FDOT is providing the County with the "Adaptive.now" (adaptive signal control) module for the SynchroGreen ASCT deployment being installed on the SR 200 projects.

In addition to ATMS.now, FDOT will be providing Nassau County with two computers that contain District 2's SunGuide software. One of these computers will be located with Nassau County's Traffic Operations staff, and the other at the County Sheriff's Office dispatch center. With the SunGuide central management software, Nassau County will have access to FDOT District 2's assets including Interstate-95 CCTV cameras, dynamic message signs (DMS), and additional network-reporting features.

COMMUNICATIONS NETWORK

Communications is a critical component of an ITS system. As previously mentioned, much of the existing fiber-communications network in the Nassau County area is being replaced as part of the current SR 200 construction projects and upgraded to a 96-count single-mode fiber-optic cable trunk. The fiber-optic cable on Amelia Island is currently a 24-count cable, which is adequate for the foreseeable future. However, there are currently no plans to bridge the existing fiber-optic cable gap over the Amelia River between Amelia Island (to the east) and Nassau County's mainland (to the west). This gap is currently serviced by a Cisco wireless radio link. It is recommended that FDOT begin investigating how to bridge this fiber gap by either attaching to the Thomas J. Shave Jr. Bridge or by using a directional bore under the Amelia River. There are currently existing brackets holding a large conduit on one of the bridge spans that might be available to address this need.

Operations and Maintenance

Generally, the local agency is responsible for maintaining the ITS fiber-optic cable located on the arterial network. Nassau County does not have fiber technician staff, and existing staff is not trained or equipped to repair fiber-optic cable. It is recommended that FDOT and Nassau County develop a plan to support the fiber-optic cable network so that if it is cut or damaged it can be quickly repaired.

To help prevent fiber-optic cable from being damaged, contractors are required to call 811 to have existing utilities located. It is imperative Nassau County have a plan in place for whenever a locate or design ticket is called in that could affect County/FDOT fiber-optic infrastructure. Additionally, it is important that all fiber-optic cable be installed with a locate wire so staff can easily locate all communication assets in the field.

It is recommended that a separate financial analysis be conducted for the most cost-effective option for the County to operate and maintain (O&M) the fiber-optic network. This study should investigate the following:

- Hiring a full-time employee (FTE). The FTE would manage design and locate tickets, and be able to make necessary repairs. The analysis can also determine the number of employees required to manage the current network. An FTE would also require capital expenditures for fiber-optic equipment such as:
    - Optical Time-Domain Reflectometer (OTDR) - Used to test fiber-optic performance (loss budget) and distances. Distances calculated may include terminations, splices, and breaks.

  - Fusion Splicer - Used to butt-splice unterminated fiber ends together.
  - Specialized tools - Tools used to cut , prep, clean fiber, etc.
  - Fiber-Optic Truck or Trailer - Specially designed truck or trailer used to conduct fiber work such as splices and terminations.
  - Locator - Uses the tone wire to properly label with paint the location of the underground fiber asset.

- Memorandum of Understanding with another County Department that already provides this type of service. The Nassau-Amelia Utilities Department has the equipment and performs locate services on their existing infrastructure. Nassau County Traffic could budget additional funds to supply the Department with the resources to manage the traffic/ITS infrastructure. If the Department is already conducting required fiber-optic locating services, it may be financially astute to not duplicate County services.

- Outsource Network Services. Many agencies hire an outside contractor to maintain their physical network, including both locates and repairs. Due to the rural nature of Nassau County, it may be difficult to find a company that does both locates and fiber-optic repairs, so these services may need to be divided between two or more contracts.

The study should also weigh the pros and cons of in-house versus outsource. Having a dedicated in-house employee can provide a faster response and higher commitment than a contractor. However, the capital equipment expenditure required may be offset if locate tickets are infrequent enough that an on-call contractor is sufficient.

As-Builts

It is also important the County and FDOT have accurate as-builts of the installed fiber-optic cable infrastructure to provide this information during the design phases of new projects. This is needed to insure new infrastructure does not damage the fiber-optic cable. If a project designer uses 811 for a design ticket or requests a meeting with Nassau County and FDOT staff, these drawings would be invaluable. Whichever method of O&M is selected, it is important that the fiber-optic infrastructure be documented with a proven software system. There are several systems used in Florida for this purpose:

- ITS-FM - Intelligent Transportation System Facility Management
  ITS-FM is the official FDOT software for tracking ITS infrastructure, including fiber-optic cable, used on many interstate and highway projects. Licensing for local use is handled by the consulting firm holding the ITS General Engineering Services contract, currently ATKINS. The core ITS-FM software is a product of Byers Engineering NexusWorx licensed to FDOT for use in Florida.

- FiberTrak
  FiberTrak is a product solely distributed by Precision Contracting Services (PCS). PCS is an FDOT ITS prequalified contracting and services firm that performs fiber work all over the state. FiberTrak is used by several FDOT Districts and other cities and counties. Some Districts use it independently, others use it in conjunction with ITS-FM.

- OSPInSight
  OSPInSight software was widely used in FDOT District 5 until a few years ago with the push from Central Office to move toward ITS-FM. The software is still utilized for most of the District 5 infrastructure and has software compatibility with ESRI ArcGIS software.

- ESRI
  The ESRI ArcGIS software platform is popular with many GIS Departments. ESRI offers several add-on software packages to assist GIS Technicians with documenting fiber-optic infrastructure.

It is recommended Nassau County choose one of these software packages to document their fiber-optic assets and shared use of FDOT District 2's infrastructure. Once the infrastructure is completely mapped the database must be maintained and every change documented. This should be the responsibility of staff or a consultant.

In addition, the County may want to consider protecting the fiber-optic assets by placing "Buried Fiber-optic" posts every few hundred feet, and making sure all pull box and vault lids are labeled as "Nassau County Traffic" so that anyone conducting underground work is aware of the underground infrastructure and the County's involvement.

The County has had success utilizing Ubiquiti radios which are inexpensive and provide a high bandwidth fully capable of streaming several video feeds and vlan networks. This existing network currently operates within the limits of the ongoing SR 200 projects. Older installations use the end-of-life Cisco wireless radios, like those on the Amelia River Bridge. If this wireless bridge is to remain for the foreseeable future, then these Cisco radios should be upgraded to a higher bandwidth capacity (Ubiquiti) option in a higher spectrum.

As a predominantly rural county, Nassau County will not be able to implement fiber-optic cable to every intersection. The County is using cellular technology to communicate with the traffic signal installation in Hilliard. Since all Florida cities and counties can take advantage of the State of Florida contract for cellular service, Nassau County is utilizing the Verizon State of Florida contract for unlimited data at $38 per month. This low cost "unlimited" plan throttles back when data use reaches five gigabytes. If the County adds CCTV cameras to this and future cellular locations, it is recommended that the County monitor network performance to determine if five gigabytes is being exceeded. If performance deteriorates there are other State Contract plans that do not throttle data down as long as the data is being paid for, usually at a "per gigabyte" rate. These are similar to pay-as-you-go plans in which multiple accounts can share a combined "bucket" of data. To help facilitate expedient maintenance responses and possible man-hour savings, the following remote intersections should also have cellular communications installed:

- Amelia Concourse at North Hampton Way
- Amelia Concourse at Majestic Walk Boulevard
- Amelia Concourse at Old Nassauville Road
- SR A1A at Amelia Island Parkway
- US 17 at Harts Road
- US 1 at Ratliff Road

DYNAMIC MESSAGE SIGNS

There are currently no dynamic message signs (DMS) on the SR 200 corridor in Nassau County, although at least two (2) are planned adjacent to Interstate-95 with the current roadway construction project. Additional DMS locations could provide advance detour opportunities (e.g., using US 17), inform motorists of travel time operations on Interstate-95 and SR 200, and provide relevant traveler information during special events and/or hurricane evacuations.

To blend with the County's more rural appearance and character, it is not envisioned that any DMS installed in the area would be the large "walk-in" over the road signs, but the smaller front-access signs either on a cantilever arm or mounted on a pedestal. Additionally, any new DMS could be controlled by either Nassau County staff or FDOT District 2 staff using the SunGuide software.

The size of the arterial DMS should be determined with FDOT based on the types of messages to be displayed. Due to the speeds on SR 200, 18" font size is recommended. A two-row 18" font requires an DMS height of 5'8". To spell out "evacuation", a length of 13'5" is required for 10 characters. Front access DMS are generally under 2' in depth. These signs are customizable and can be built to order. On the following page is an example of a typical DMS application.

Example of Typical DMS Installation

CAMERAS

It is the goal of Nassau County to have a CCTV camera at every signalized intersection. The primary objective of CCTV cameras is detection of traffic congestion and verification of traffic signal malfunctions from a remote location. With this visual information, the formulation of an appropriate response to each situation can be initiated and the response's effectiveness evaluated. Additional benefits include validating signal timing modifications, monitoring corridor performance during special events and/or evacuations and determining emergency responder asset needs during traffic incidents. While all traffic cameras have pan/tilt/zoom (PTZ) capabilities, these features are typically only used when monitoring specific events.

Like many other agencies in Florida, Nassau County does not wish to store or record camera video except for the temporary recording of traffic volume data used to improve traffic flows. If a local TMC is constructed within the County facilities, it will comply with FDOT security procedures restricting access to trained County staff via an electronic key system. Policies will be needed to guide staff in the appropriate use of the cameras. In the past decade, CCTV prices have dropped significantly, especially when installed on existing infrastructure such as a traffic signal mast arm or strain pole.

In the future, if additional cameras are required between intersections that span long distances, CCTV standalone poles should be considered. CCTV poles should only be designed as high as the largest bucket truck Nassau County staff can reach, otherwise a camera lowering device (CLD) will be required.

Nassau County wishes to stream their images to the public as well as to County staff. Currently, FDOT 511 offers snapshot-only images updated every few minutes for FDOT CCTV cameras, so a separate streaming service will be needed to provide this service.

Streaming CCTV video to the internet can be accomplished in several ways. If completed with in-house resources, a large server capable of streaming to the outside demand must be purchased and maintained by the County, most likely the IT Department. This will require the County to investigate their current "to-the-internet" or upload bandwidth. The bandwidth "pipe" must be large enough to handle the load of streaming video demand from internet users. Another option is to stream video directly to the cloud as the City of Gainesville, Florida does. The cloud processes the video and distributes it to all users. The benefit of the cloud is that it does not require additional server hardware

and/or maintenance; although an additional network firewall or routing device may be needed. Also, the cloud can handle any number of user demands, while an in-house option can only handle its maximum designed load.

ADVANCED VEHICLE DETECTION SYSTEMS

With support from the North Florida TPO, FDOT is deploying five (5) BlueToad Bluetooth arterial travel time system devices along SR 200 from Interstate-95 to Amelia Island. BlueToad is the only travel time device utilized by District 2. Therefore, it is recommended the County continue using this device to be consistent with the existing system.

Some intersections will be receiving advanced vehicle detection capabilities on the current SR 200 construction projects to complement the SynchroGreen ASCT system. These detection systems include FLIR thermal cameras for stop bar presence detection at every intersection approach. Several of the wider approaches are being fitted with two detection cameras. The County should review this design over time to see if the two-camera requirement is necessary as it could add substantial maintenance costs to the system. The 6'x6' advanced induction loops are also being installed. The primary function of these devices is to provide the SynchroGreen algorithm with volumes approaching the intersection, while the FLIR detection cameras are used for normal actuated control and to calculate occupancy for the SynchroGreen algorithm.

REDUNDANCY AND POWER SYSTEMS

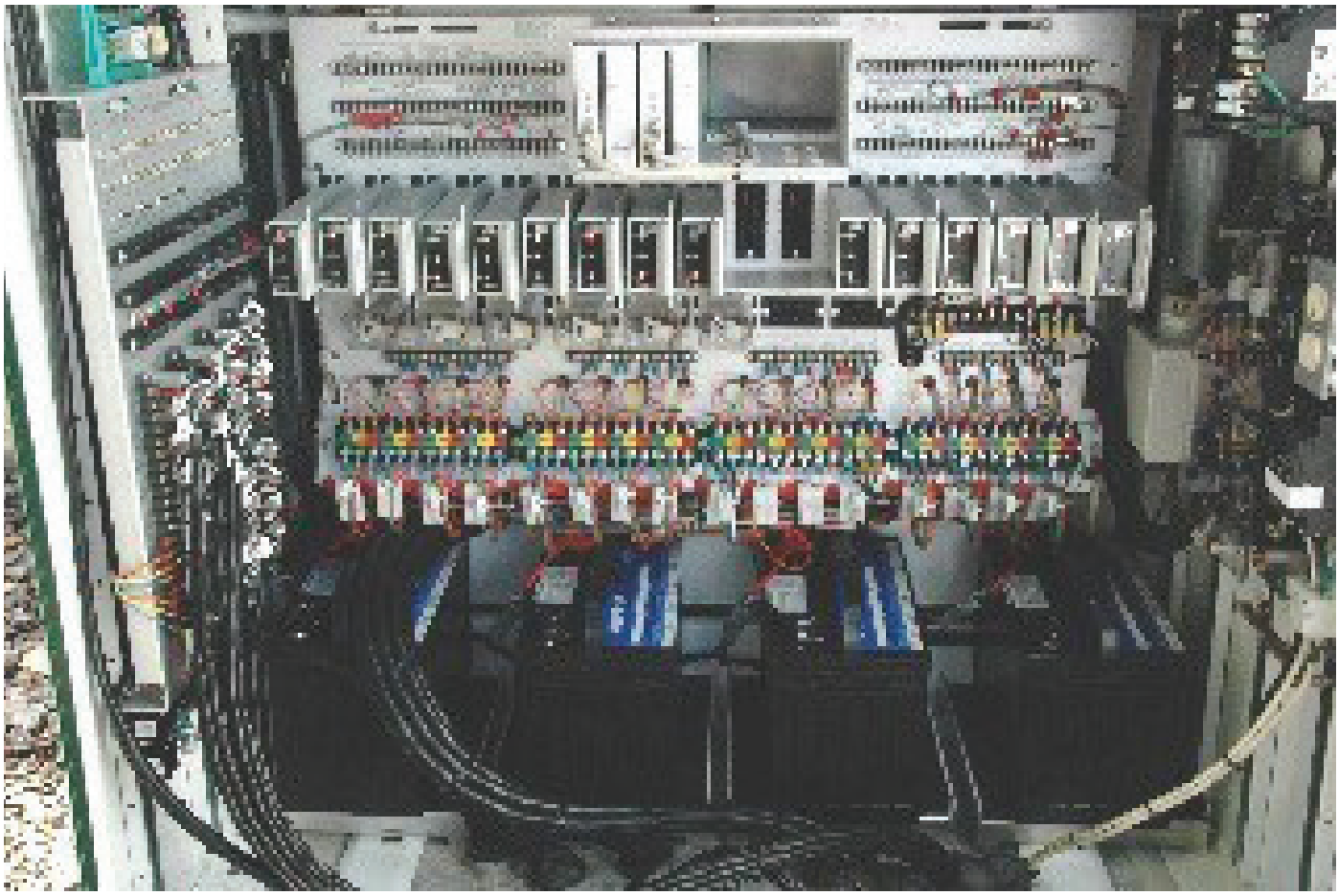
Besides SR 200, Nassau County does not have any other major arterials to provide a geographical redundant path for its outside fiber-optic cable plant. For this reason, the County should consider maintaining its existing wireless radio network as a redundant wireless path in the event the newly installed fiber-optic cable network is compromised. Depending on coverage, this would prevent portions of the network from dropping offline if something were to happen to the fiber-optic cable trunk.

Due to the number of storms Florida experiences in an average year, backup power must be considered with any new ITS system. There are different levels of backup power available. Budget and staffing can be used to determine the capacity of the system. Generally, non-critical ITS infrastructure does not require extended uninterruptable power supply (UPS) capabilities.

Another alternative is a local UPS at the intersection/device. If the County wishes to maintain power to the entire intersection during a power outage, several batteries are required at the traffic signal cabinet. UPS and battery systems can be maintenance intensive, and therefore the County needs to insure these requirements can be met. A UPS system should be maintained to operate for its given design load and time, such as four hours without power. If an intersection does not receive its required maintenance for any reason, the County could possibly be liable for incidents that occur because the UPS failed to reach its designed time (e.g., four hours).

The County currently provides full traffic signal cabinet UPS's at major intersections, such as the US 17/SR 200 intersection. The County should consider smaller UPS to maintain network uptime at minor intersections if their current staffing and funding can support it.

The full intersection UPS backup system can be designed in several ways. Some agencies contain the UPS unit within the existing signal cabinet, usually on the top shelf of the largest NEMA signal cabinet (Type VI), with the unit's batteries at the bottom of the cabinet. Some agencies purchase a secondary cabinet for the batteries. A third option is to place both the UPS and the batteries in a larger secondary cabinet either attached or near the signal cabinet. This decision is usually made based on technician preferences. Alpha and Clary are two popular FDOT-approved UPS systems. If a secondary cabinet is chosen, the cabinet's width is usually the same size as the NEMA cabinet's depth of 24-26", a depth of 12-16", and height is determined by the number of batteries and whether the UPS control unit is also in the cabinet. Four batteries and the control unit will require minimum 36" height, while batteries only would be 24". Specialized pre-wired cabinets can usually be purchased by the same vendor/distributor as the UPS unit. Below is one example of a UPS system contained within the traffic signal cabinet.



Controller Cabinet with four (4) UPS batteries located at the bottom

Another option is a smaller UPS to keep network devices online, such as local Ethernet switches, CCTV, and other ITS devices. Even though the traffic signal may be dark, the network and cameras would continue to operate. The smaller UPS can be easily replaced and does not necessarily require external batteries.

A battery backup system (BBS) for use by just the field network gear switches can be purchased from a reputable retailer. These devices are not meant to run the intersection but can keep the network MFES up and running for several hours during a power outage.

TRAFFIC SIGNAL PREEMPTION AND PRIORITY

Nassau County's traffic signal system offers several types of preemption and priority systems which could be used for fire rescue and transit agencies. Similar to the section discussing UPS and battery backups, these systems often require either extra hardware in the field or extensive software testing.

One of the most popular systems is Opticom GPS, which uses radio and GPS signals to place either a priority or preemption call from a vehicle. Every vehicle, whether it's an emergency or transit fleet vehicle, requires an emitter to transmit to the intersection devices in order to request priority service. New systems that use cellular technology claim to accomplish the same feat.

Another option is a virtual system such as Trafficware's Emergency.now that can track fleet vehicles via GPS, monitor vehicle status, and preempt the traffic signal when conditions are met via the network connection to the traffic signal controller. While no hardware is required at the intersection for this system, there often are other extensive software obstacles to overcome.

Due to existing staffing and budget constraints, the County has decided not to invest in this technology at this time. Grants may be available to fund these systems and to provide additional staff support.

CONNECTED VEHICLES

The FDOT is currently conducting several testbeds for connected-vehicle technology. The connected vehicle industry is still in its infancy and therefore testing and standardization needs to occur between automobile manufacturers and data providers.

Signal Phasing and Timing Data, known as SPaT, is currently being tested with several different controllers, external recorders, and communications means. Some systems will use dedicated short-range communication (DSRC) radio at the intersection, while other systems will use the cellular radio market.

Regardless of which technology prevails, Nassau County's traffic signal infrastructure is properly equipped and will be able to migrate to a connected vehicle system.

TRAFFIC SIGNAL TIMING PLANS

For the signal system to be effective in addressing congestion issues, several timing plans should be designed for traffic flows throughout the day. Although a significant part of the current coordinated system will be operating adaptive in the near future, it is important that normal timing plans are maintained should the adaptive operation be shut down for an extended period of time.

Most common time-of-day plans often include:

- AM Peak
- PM Peak
- Midday Peak
- Weekend

Less common time-of-day plans may include:

- Midday off-peak
- Evening
- Late-night

In addition to the normal timing plans, special timing plans are often needed to acccomodate special conditions or objectives. In Nassau County's case, special traffic signal timing plans have already been developed for hurricane evacuation on portions of SR 200. Additional special timing plans should be developed for the remaining portions of SR 200 for hurricane evacuations and known special events (Shrimp Festival, etc.).

TRAFFIC MANAGEMENT CENTER

With the new SR 200 adaptive traffic signal system and ITS devices coming online in the next several months, Nassau County should consider their own traffic management center to operate with the regional traffic management center (RTMC) in Jacksonville. The traffic management center could be located at the Nassau County James S. Page Government Complex just east of Chester Road. Fiber-optic cable is located at the complex, adjacent to where the current operations staff is located. It is recommended that staff investigate if existing conduit infrastructure is available to link operations staff with the complex's main building.

When selecting monitors for the TMC, bezel size and not screen size should be considered. A monitor's bezel is the area of a display that surrounds the screen. Projection screens and LCD screens with bezels that are 3 mm or less are available but expensive. Comparatively, 65" LCD screens with a slightly larger bezel are now available for less than $1500. Similar 55" LCD monitors with a very slim bezel cost more than $3500.

Video management systems have also come down in price. If the primary objective is to display multiple video streams in a mosaic (aka tile) such as 2x2 or 3x3, then these systems can be obtained affordably.

Another option is that Nassau County could become a satellite TMC for District 2's Activu video wall management system. This would keep technologies consistent between the two centers at a minimal cost (when compared to a brand new Activu system). Nassau County's video wall system would be an additional node and could be controlled by District 2 RTMC staff, if necessary. Equipment in the TMC would be simplified to include the servers required for the video wall decoding, the FDOT SunGuide computer, the Trafficware ATMS.now servers, necessary Nassau County workstations, and network switching equipment.

As mentioned in a previous section, the local TMC will be required to follow FDOT security procedures and access to these systems will be through an electronic key system by trained County staff. Policies will need to be developed to guide staff in the appropriate use of cameras and other ITS devices.

STAFFING

The ITE "Traffic Control Systems Operations" manual suggests that a system should have one traffic engineer per 100 signals and one signal technician per 31 signals. An NCHRP report also suggests 38 to 43 signals per technician. An additional technician may be required to effectively operate and maintain Nassau County's ITS network, especially as the system expands with new ITS devices along SR 200.

This technician recommendation is in addition to the staffing requirements discussed in the communications section. However, the same communications financial analysis can also review current traffic signal call-outs, locate tickets, and preventative maintenance activities to conclude if a single full-time employee can provide both communications infrastructure and traffic signal/ITS maintenance support.

Further TMC staffing can be provided by FDOT for traffic monitoring capabilities. FDOT currently employs operators for freeway and arterial operations in many parts of the District. As the system matures, FDOT can allocate existing TMC Operators or consider a dedicated position to monitor Nassau County arterials and highways.

Immediate concerns include:

- According to both ITE and NCHRP guidelines, Nassau County should have an additional traffic signal technician.
- All system information is currently with one technician. If this technician were to leave suddenly there would be no knowledge transfer to the next technician.
- Fiber-Optic Network Maintenance
    - The single technician is not trained in fiber-optic repair and does not have any equipment necessary to maintain the arterial fiber network system.
    - As discussed in the Communications Section, FDOT District 2 and Nassau County should decide whether:
        - The fiber-optic cable system should be sub-contracted out to a maintenance contractor;
        - Current County maintenance staff can help provide communications maintenance; and
        - Additional Traffic Operations staff should be hired and dedicated to this task.

TRAVELER INFORMATION

Several examples of traveler information have been mentioned in previous sections. In an effort to provide citizens and visitors of Nassau County with information collected from various ITS devices, the following ideas can be used for information dissemination.

- Dynamic Message Signs
  - Display travel times from the BlueToad travel times devices.
  - Report traffic conditions for SR 200 and Interstate-95.
  - Recommend alternative routes.
  - Direct motorists to special parking areas (e.g., for festivals).
  - Provide vital information regarding evacuations.

- Traffic Camera Streaming Video
  - Set up Nassau County's CCTV to stream video to motorists' computers or smartphones.

- Parking Systems
  - If smart parking systems are deployed, they can be used to direct motorists to open parking spaces (which would reduce traffic circulation). Information can be obtained by LED parking signs or via a smartphone app.
  - Motorists can pay for parking via a smartphone app.

- Florida 511
  - Encourage motorists to use SunGuide information via Florida 511 (through the FL511 app or phone service).

CONCLUSIONS

Nassau County's ATMS will continue modernizing as the SR 200 projects are completed. Several challenges such as staffing and fiber maintenance need to be addressed and will require the coordination of various stakeholders including County staff, the North Florida TPO, and the Florida Department of Transportation District 2. Various components of the ATMS have already been constructed in the field and all programmed traffic signal/roadway projects include ATMS infrastructure.

RECOMMENDATIONS

The following short-term objectives are recommended within the next two years:

- Provide staff with fiber-optic cable training so minor and/or temporary repairs can be completed.
- Upgrade the current TMC to provide additional video capabilities.
- Consider adding another full-time Traffic Signal Technician (as recommended per ITE and NCHRP guidelines). Additionally, conduct a financial analysis to determine whether additional staff, an on-call maintenance contractor, or another County Department would provide the most effective fiber-maintenance option.
- Consider a video streaming application to provide existing camera views to citizens via computer or smart phone.
- Implement hurricane evacuation timing plan capability for SR 200 between the Amelia River and Interstate-95.
- Install additional cellular communications for outlying intersections.

The following long-term objectives are also recommended:

- Consider the design of additional DMS locations to provide travel time, alternate routing, and special event information.
- Provide a fiber-optic link across the Amelia River to replace the existing wireless connection, either by a directional bore or by utilizing existing bridge-attached conduit.
- Consider additional traffic-monitoring staffing – TMC Operators can be housed at either FDOT District 2 or Nassau County to efficiently operate and manage the County's growing ITS system.
- Pursue grant opportunities that would supplement ITS expansion and operational capabilities:
  - To provide emergency vehicle preemption capabilities.
  - To provide additional staffing to support network operational and maintenance activities.