TSM&O Consortium Meeting Summary

Meeting Date:	June 29, 2017 (Thursday)	**Time**: 10:00 AM – 12:00 PM
Subject:	TSM&O Consortium Meeting	
Meeting Location:	FDOT's Orlando Office 133 S. Semoran Blvd., Orlando, FL Lake Apopka B Conference Room	

I. OVERVIEW

The purpose of this recurring meeting is to provide an opportunity for District Five FDOT staff and regional agency partners to collaborate on the state of the TSM&O Program and ongoing efforts in District Five.

II. TSM&O DOCUMENTATION UPDATE

David Williams (VHB) gave a brief update to consortium members on the status of the District 5 TSM&O Documents:

- Planning for TSM&O Guidebook – Final version submitted to FHWA
- TSM&O Implementation Plan – Finalizing document based off feedback
- TSM&O Tools and Resources – Finalizing table
- TSM&O Strategy Guide – To begin development upon completion of the Implementation Plan

III. OPENING THE DOOR TO MULTIMODAL APPLICATIONS – IMPORTANCE OF GTFS, GTFS-REALTIME, AND DATA QUALITY – Dr. Sean J. Barbeau, Center for Urban Transportation Research (CUTR)

Dr. Sean J. Barbeau gave a presentation explaining where public transportation is as an industry in terms of open data sharing and applications.

- At a high level, why are we interested in transportation applications?
    - Traditional transit schedules are intimidating and complicated
        - USF Study asking people to manually plan their trip- almost half were unable to do this. This problem can be addressed with trip planning applications
    - First step in making trip planning applications: Locating the buses in real time
        - The more information available to users, the shorter the perceived wait time and the shorter actual wait time.
    - Applications lower the learning curve for new riders and may help hesitant users make the decision to use transit.
        - Yields Increased ridership
        - Yields Increased perception of safety
        - Riders prefer mobile apps

- General Transit Feed Specification (GTFS) data is the de facto standard for transit data sets
    - Over 1,000 agencies are openly sharing GTFS data; this information is used by Google Maps and other third-party applications
    - An easy way get the data from the transit agency to the hands of the users and 3rd party developers who will build useful products that synergize with the transit system
    - Sharing transit data openly creates benefits:
        - More efficient
        - More cost-effective
    - Most major scheduling software (Trapeze, Hastus) can output GTFS data.
        - There are many in-house tools that are open source and web-based applications.
        - There are also 3rd party operators that can be used affordably
    - Transitfeeds.com and other places to publish GTFS data. – USDOT, State specific (FTDE)
    - CUTR helped to publish GTFS best practices published early 2017
    - GTFS is schedule based (updated 3-4 times per year)
- GTFS-realtime data
    - Vehicle positions / Arrival estimates / Service alerts
    - 84% of riders rely on real-time info instead of posted schedule
    - Sharing GTFS realtime feed gives other apps access to your data.
    - CUTR is developing a GTFS-realtime validation tool, to evaluate and understand how good the data is (are there any errors)- can't yet say why/measure errors
- GTFS-Based Applications
    - Google Maps, Moovit, Transit, OneBusAway, Open Trip Planner, Bing Maps, Apple Maps
    - Accessibility
        - BrailleNote – device that assists visually impaired users with finding bus stops using GTFS data
        - Travel Assistance Device (TAD) – mobile application that assists persons with cognitive disabilities with determining their correct bus route and appropriate bus stops
    - OneClick – Demand response, which includes transit, and private providers
    - Planning and Analysis – This data is only recently coming along (Remix, Walkscore, OpenTripPlanner Analyst, TBEST, FTA STOPS)
    - Timetable publishing – GTFS to HTML – take data and make it a schedule
- GTFS-flex
    - Adds capability to describe demand-response transit
    - Hail-and-Ride
    - Deviated-fixed
    - Dial-a-Ride
    - DRT-to-fixed connections
    - Allows us to export non-fixed route data
- General Bikeshare Feed Specification - GBFS
    - Shares real-time bike/rack locations and availability/capacity
    - Adopted by all North American Bikeshare Association vendors
- Resources:
    - TransitWiki
    - *Awesome-transit list*
- Questions:

- Q: Jon Cheney uses MyStop App (ArcGIS based) and asked if this data can be exported as GTFS data.
  - Answer: This is an app for viewing data, this app likely does not use GTFS data
- Q: Are these tools compatible with land use data formats (FSUTMS)?
  - A: Dr. Barbeau was unsure
- Q: How do these relate to proprietary solutions?
  - A: It is mainly data interchange and format, still need people / software to plan routes – GTFS actually has helped the private sector because the data format is standardized into GTFS
- Q: What about monetizing the data? Or what kinds of compensation are we given in exchange for public transportation data? Are people exchanging data? The data should be free but getting this data may be cost-prohibitive for some.
  - A: Benefits to the agency will come without charging for transit data. Google Maps, for example, is now a free private trip planner. In terms of traffic data, Google Maps is ahead of the game. Cost for getting data into GTFS format is cheap.
- Q: What does HART having GTFS data standardization mean in terms of working with other regional agencies that don't participate in GTFS. – Will people expect real-time data everywhere? Who take the leadership on this issue?
  - A: Work on getting other agencies involved and motivated for synergies. It typically is very simple to activate the data. In Tampa, research funded by FDOT Central Office and District 7- so they have driven some of the progress and take advantage of existing partnerships and relationships

IV. *STATE OF THE SYSTEM* UPDATES BY LOCAL AGENCIES

Jon Cheney, Volusia County

- Majority of devices are signals (61%)
  - 27% are school flashers
  - Majority are County-owned
- Challenges
  - Balancing traffic from metro Orlando
  - Special Events in the Coastal Community
    - Mob flashes (large convoy of vehicles; anywhere from 500 to 1,500 Jeeps)
- 57% of signals are coordinated
- Many cities have traffic signal priority
  - looking to offer this with transit to feed Sunrail
- Lucity – GIS-Based work request
  - Coordinating with FDOT to provide video for hurricane evacuation routes
- Mature in terms of special events because there are so many
  - Have a playbook to refer to for each major event
  - Coordinate with city of Daytona with special events
- High-End Systems
  - Would like to deploy BlueToad readers
    - Have purchased their first 4 readers
- County still uses proportionate fair share – however, they require developers to spend their fair share towards an appropriate project rather than providing just money

    - Looking for Traffic Adaptive Models
    - Would like developers to pay toward the purchase of Econolite Module
- Funding
    - Majority towards signals (66%)
    - Funding comes from gas taxes and impact fees
    - Haven't signed contract for FDOT reimbursement because it isn't cost-effective
        - Now asking FDOT to directly fund underperforming signal replacement
        - The County cannot replace signals on their own
- 21 Positions for Staff
    - 2 unfunded, higher engineers not filled
        - However, very strong success with technicians
    - 3-7 new signals every year
    - Looking to hire on the construction side
    - Need 6 months to train on the maintenance side
- Sensitive to clients and realize that not all cities are able or willing to invest, and so willing to remove signals if they cannot be maintained
- Retiming
    - Typically, retime for the weekday
    - This doesn't work perfectly because County has so many weekend events and traffic
- Transit Priority System
    - Should not promote it as transit benefit, but as a fire preemption benefit
    - Cities are more likely to fund if it is pitched this way
- Gotten rid of 1970s controller boxes and now working with FDOT to get rid of 1980s controllers
- Q: What Vehicle Preemption software are you using?
    - A: Opticom (same as Orange County) – All auxiliary agreements are paid 100% by the city. The county maintains the equipment, but the city is responsible for paying for it.

Joedel Zaballero, Osceola County

- Rural county except for Urban Growth Boundary
    - Includes City of St. Cloud
    - City of Kissimmee
- Contract out everything but preventative maintenance
- Video detection- Loops / Video – prefer video and working to convert
- 107 out of 191 total signals are connected to network by fiber optic
    - 4 signals are connected wirelessly by Myovision because they are so far away
- Looking to FDOT to do TSP
- ITS – Relying heavily on external management and consultants
- Large contingent of population exits County during AM Peak
    - Some roadways are 70% Out / 30% In
    - Difficult to coordinate these types of traffic patterns
    - Always looking for funding from FDOT to address these issues
- Budgeting process is slow and so problems that arise only get funding for the next fiscal year
    - Therefore, ITS progress has been slow
    - Not appropriately staffed
    - Several vacant positions
    - Most work is contracted out
    - Now hiring signal timing engineer

    - IT help, specifically for ITS network, is needed
        - Currently only general IT for the County
    - The County operates in monitoring and maintenance mode; not much in the way of performance measurements because future planning has been hard to fund
- Traffic operations is under transportation planning, not public works
    - Recently absorbed Osceola Expressway Authority
        - Outdated equipment on this system; no cameras or data collection
- Looking at Preemption and Dual emitters
    - GPS for fire vehicles
- Projects (working with FDOT)
    - Starting with ReIP, reconfiguring network away from serial network
        - Making it so one loss doesn't spread further
    - Working with FDOT to establish own firewall
    - Hiring new network administrator

Robert Lawler, Sumter County

- Population of 115,000
    - Growth from 50,000 people in 2000
    - Most of growth is due to villages
- 50 fully functional traffic signals
- Convergence of Turnpike and I-75 is a major consideration
    - Overflow onto County roads an issue
- Would like to improve communication with FDOT, as well as Lake and Marion Counties
- ATMS Master Plan – 3 Phases
    - Install Fiber in northern portion of County (more urban area)
    - Better Communication w/FDOT for I-75/Turnpike
    - Connect signals in southern portion of County with wireless (more rural area)
- No traffic control center and no real-time information (no cameras)
- Traffic light out → road user calls sheriff → who then calls public works → they call consultant
    - Looking to streamline this process with better monitoring
- Adequately staffed
    - But only for simple repairs
    - Other work must be contracted out
- Would love to use BlueToad for golf cart traffic in the future; significant golf cart usage in The Villages
- Traffic signal maintenance budget $280,000
- Q: Who updates signals on US 301 corridor?
    - A: City of Coleman and 2 within City of Bushnell
- Q: Who maintains signals in The Villages?
    - A: Villages builds/maintains- after 2 years, signals and roadway maintenance over to Sumter County
- Q: Are mast arm signals used in the Villages?
    - A: Yes, and painted by a subcontractor to maintain the aesthetics of the area

Charlie Wetzel, Seminole County

- 384 Signals

    - Maintain all but 1
    - 373 on fiber
    - 10 on radio
    - 1 not connected
- ATCs – 89% – only 16 type one left
- Adaptive signals at 69 locations
    - TrafficWare Central System
- Detection technology – loops, video, radar, pod
- TSP
    - Fire wants to upgrade whole county but unsure if that will go through
- 400 miles of fiber
- BlueToad with own server
    - 96 units
    - 80 new units to swap out
- Signal Performance Metrics (SPM)
    - old version so not used currently, but looking to upgrade
- Connected Vehicle
    - Beginning stages of project
    - looking to connect with vehicles that are available
    - using County sales tax funds
- Budgeting
    - $1.2 Million for signals
    - $1 million in revenue
    - .01 sales tax for Capital Improvements
    - MetroPlan/FDOT funded ATMS projects ($3/$4 million projects) every few years
- Challenges
    - Adding Staff and finding experienced staff
    - Staff time is difficult and hard to farm out
    - Burdensome paperwork
    - Political support for projects
    - Seems much easier for Traffic Engineering Division to purchase high-end equipment rather than pay for a new salaried position
- Q: How is the CV program funded?
    - A: Just one connection from company to server, so funding is through sales tax and not very expensive.

Steve Bostel (SCTPO), Brevard County

- County Maintains 334 signals
    - 180 in ITS system
    - This funding came from economic stimulus – since then there has been complete staff turnover and few with institutional knowledge
- Staff
    - Recently have been filling positions
    - Have updated video wall in cubicle
    - Staff education has been positive
    - TPO added 200k for ITS staff
- Progress

  - Have just completed re-IP addressing
  - Moved from Microsoft 2003 to 2012 server
  - Have worked on as built cabinet drawings
- Challenges
  - Still short-staffed
  - Working on monitoring
  - New ITS operator is working on detection more closely
  - Many signal techs have retired
  - Political climate is not conducive to additional funding; having to ask the TPO for funding
    - Need a LAP agreement just to pay their people – staff salaries seem cleanest compared to buying stuff
- Melbourne is next largest maintaining agency
  - Weekly monitoring reports
  - Great signal retiming program
  - Working on Re-IP
  - Funding 3 expansion projects through TPO
  - Expanding fiber network and replacing radios
    - Could use funding for expansion of system, but have done a good job budgeting with what they have
- Titusville / Palm Bay
  - About 40 signals per city
  - High staff turnover so it has been hard to establish connections with these agencies

Nicholas Blizzard, City of Ocala

- Broken into divisions
  - Telecommunications
  - Engineering
  - Operations
- 126 intersections
  - Done by Nasdaq
  - 100 on cloud
  - Timed with school clocks
  - 30 ITS cameras (Bosch/secure)
    - 20 with cameras
    - 10 with Bluetooth
- 0 loops failing and Ocala community is engaged in communication
- Installing 200 cyberlocks w/JPA
- 70 velocity Bluetooth readers
- Possibly 60 type-9 signal cabinets
- Considering transit priority and emergency priority

V. CURRENT INITIATIVES UPDATE – Ryan Cunningham, ATCMTD Grant Proposal "Connecting the East Orlando Communities"

- ATCMTD is a 5-year grant created by FAST act
  - $60 million per year; 5 to 10 awards per year, up to $12 million per award
  - requires 50% match
  - Partnered with MetroPlan and UCF
- Feedback from last year's application: didn't connect with community needs

    - As a result, this time they focused on one community and telling the story
    - Focused on the needs of East Orlando
- 3 main programs
    - PedSafe
        - CV/LiDAR
        - deployed in UCF area and Pine Hills
    - Greenways
        - Real time signal analytics and control
        - Integrated with train control
        - Multimodal
        - Showing portability and scalability
    - SmartCommunity
        - Smart City Technology
        - Allows performance management
        - Machine learning and planning dashboards
        - Could synergize with Central Florida Automated Vehicle Partnership
    - All three programs work with SunStore
- Continue to Invest in O&M
- Q: will there be student involvement? And what is the timeline?
    - A: This would start sometime next year, and UCF had funds for this project, so likely would be working with UCF in terms of research.

VI. ATTACHMENTS

- A – Sign in sheets
- B – Presentation Slides
- C – Meeting agenda

END OF SUMMARY

This summary was prepared by Jordan Crandall and David Williams, and is provided as a summary (not verbatim) for use by the Consortium Members. The comments do not reflect FDOT's concurrence. Please review and send comments via e-mail to dwilliams@vhb.com *so they can be finalized for the files.*

TSM&O Consortium Meeting
June 29, 2017

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June 29, 2017

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Welcome to the TSM&O Consortium Meeting

June 29, 2017

FDOT

Transportation Systems Management & Operations

TSM&O

Meeting Agenda

1. Introduction
2. D5 TSM&O Documentation Update
3. Opening the Door to Multimodal Applications – Importance of GTFS, GTFS-Realtime, and Data Quality
4. Local Agency Updates – *State of the System*
5. ATCMTD Grant Proposal

TSM&O Documentation Update

David Williams, VHB

FDOT

Transportation Systems Management & Operations

Status of D5 TSM&O Documents

- Planning for TSM&O Guidebook
  - Final version submitted to FHWA
- TSM&O Implementation Plan
  - Majority of content is complete
- TSM&O Tools and Resources
  - Table that lists and describes the various tools/resources available to D5 and partner agencies; In Development
- TSM&O Strategy Guide
  - Development to commence upon completion of Implementation Plan

Opening the Door to Multimodal Applications

Importance of GTFS, GTFS-realtime, and Data Quality

Presented by

Sean J. Barbeau, Ph.D.

Center for Urban Transportation Research
University of South Florida

Why do we need open transit data and transit apps?

MOTIVATION

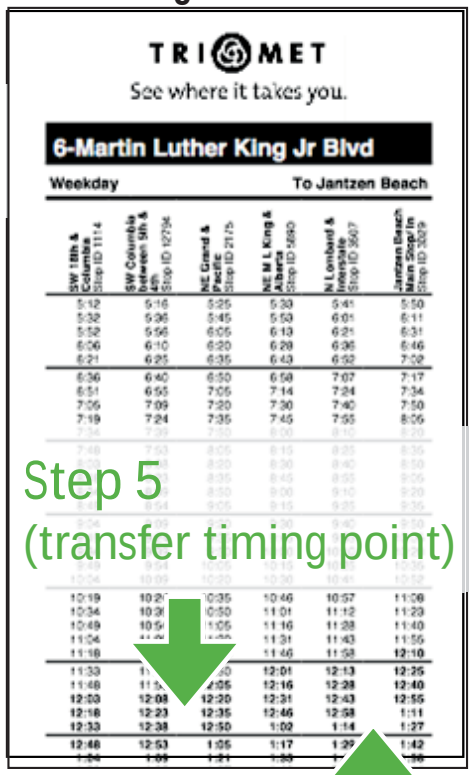
Let's take a trip…

There are lots of opportunities to get lost. Traditional transit schedules intimidate.

Step 1 (destination)

Step 2 (my house)

Step 3 (transfer point)



TRIMET

See where it takes you.

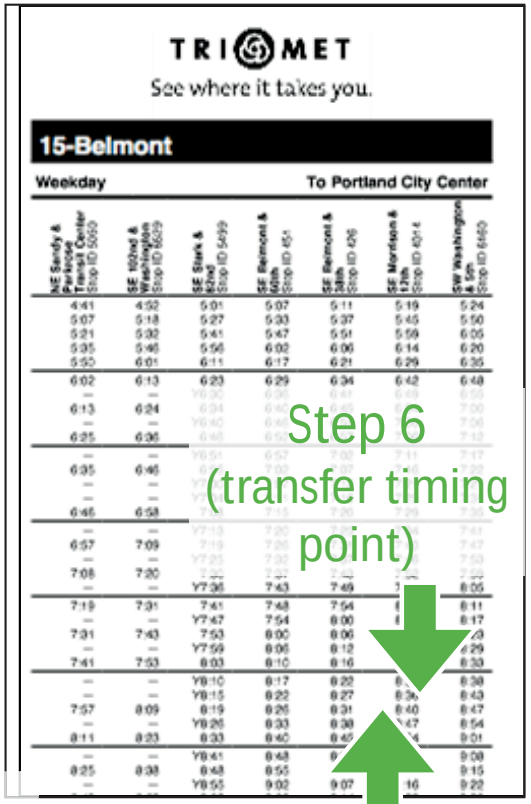
6-Martin Luther King Jr Blvd

Weekday — To Jantzen Beach

SW 18th & Columbia Stop ID 111-4	SW Columbia between 9th & 4th Stop ID 12794	NE Grand & Pacific Stop ID 2175	NE M L King & Alberta Stop ID 5880	N Lombard & Interstate Stop ID 3567	Jantzen Beach Main Stop Inbound Stop ID 3529
5:12	5:16	5:25	5:30	5:41	5:50
5:32	5:36	5:45	5:53	6:01	6:11
5:52	5:56	6:05	6:13	6:21	6:31
6:06	6:10	6:20	6:28	6:36	6:46
6:21	6:25	6:35	6:43	6:52	7:02
6:36	6:40	6:50	6:58	7:07	7:17
6:51	6:55	7:05	7:14	7:24	7:34
7:06	7:09	7:20	7:30	7:40	7:50
7:19	7:24	7:35	7:45	7:55	8:06

Step 5 (transfer timing point)

Step 4 (destination timing point)



TRIMET

See where it takes you.

15-Belmont

Weekday — To Portland City Center

NE Sandy & Parkrose Transit Center Stop ID 5060	SE 102nd & Washington Stop ID 6629	SE Stark & 82nd Stop ID 5499	SE Belmont & 60th Stop ID 451	SE Belmont & 34th Stop ID 426	SE Morrison & 12th Stop ID 424	SW Washington & 5th Stop ID 6460
4:41	4:52	5:01	5:07	5:11	5:19	5:24
5:07	5:18	5:27	5:33	5:37	5:45	5:50
5:21	5:32	5:41	5:47	5:51	5:59	6:05
5:35	5:46	5:56	6:02	6:06	6:14	6:20
5:50	6:01	6:11	6:17	6:21	6:29	6:35
6:02	6:13	6:23	6:29	6:34	6:42	6:48
—	—	YB:30	6:38	6:43	6:51	6:58
6:13	6:24	6:34	6:40	6:45	6:53	7:00
—	—	YB:40	6:48	6:53	7:01	7:08
6:25	6:36	6:46	6:52	6:57	7:05	7:12
—	—	YB:51	6:57	7:02	7:11	7:17
6:35	6:46	6:56	7:02	7:07	7:15	7:22
—	—	YB:59	7:05	7:10	7:19	7:26
—	—	YB:03	7:09	7:14	7:23	7:30
6:46	6:58	7:08	7:14	7:19	7:28	7:35
—	—	YB:13	7:19	7:24	7:33	7:41
6:57	7:09	7:19	7:25	7:30	7:39	7:47
—	—	YB:25	7:31	7:36	7:45	7:53
7:08	7:20	7:30	7:36	7:41	7:50	7:58
—	—	YB:36	7:43	7:49	7:58	8:05
7:19	7:31	7:41	7:48	7:54	8:03	8:11
—	—	YB:47	7:54	8:00	8:09	8:17
7:31	7:43	7:53	8:00	8:06	8:15	8:23
—	—	YB:59	8:06	8:12	8:21	8:29
7:41	7:53	8:03	8:10	8:16	8:25	8:33
—	—	YB:10	8:17	8:22	8:31	8:38
—	—	YB:15	8:22	8:27	8:36	8:43
7:57	8:09	8:19	8:26	8:31	8:40	8:47
—	—	YB:26	8:33	8:38	8:47	8:54
8:11	8:23	8:33	8:40	8:45	8:54	9:01
—	—	YB:41	8:48	8:53	9:02	9:08
8:25	8:38	8:48	8:55	9:00	9:09	9:15
—	—	YB:55	9:02	9:07	9:16	9:22

Step 6 (transfer timing point)

Step 7 (origination)

USF study

Almost **half of participants** were unable to correctly identify bus times using standard timetables and maps.

Design Elements of Effective Transit Information Materials (2004), *National Center for Transit Research at the University of South Florida* (*http://www.nctr.usf.edu/pdf/527-12.pdf*)

Why real-time transit info?

Tony Kurdzuk/The Star-Ledger

- Real-time transit information has many benefits
  - Shorter perceived wait time [1]
  - Shorter actual wait time [1]
  - Lowers learning curve for new riders [2]
  - Increased ridership [3][7]
  - Increased feeling of safety (e.g., at night) [5][6]
- Riders prefer accessing real-time transit info via mobile apps [1]

[1] Kari Edison Watkins, Brian Ferris, Alan Borning, G. Scott Rutherford, and David Layton (2011), "Where Is My Bus? Impact of mobile real-time information on the perceived and actual wait time of transit riders," *Transportation Research Part A: Policy and Practice,* Vol. 45 pp. 839-848.
[2] C. Cluett, S. Bregman, and J. Richman (2003). "Customer Preferences for Transit ATIS," Federal Transit Administration. Available at http://ntl.bts.gov/lib/jpodocs/repts_te/13935/13935.pdf#sthash.jwn5Oltr.dpuf
[3] Lei Tang and Piyushimita Thakuriah (2012), "Ridership effects of real-time bus information system: A case study in the City of Chicago," *Transportation Research Part C: Emerging Technologies,* Vol. 22 pp. 146-161.
[4] Aaron Steinfeld and John Zimmerman, "Interviews with transit riders in San Francisco and Seattle," ed, 2010.
[5] Brian Ferris, Kari Watkins, and Alan Borning (2010), "OneBusAway: results from providing real-time arrival information for public transit," in Proceedings of the 28th International CHI Conference on Human Factors in Computing Systems, Atlanta, Georgia, USA, pp. 1807-1816.
[6] A. Gooze, K. Watkins, and A. Borning (2013), "Benefits of Real-Time Information and the Impacts of Data Accuracy on the Rider Experience," in Transportation Research Board 92nd Annual Meeting, Washington, D.C., January 13, 2013.
[7] Brakewood, Macfarlane and Watkins (2015). The Impact of Real-Time Information on Bus Ridership in New York City. Transportation Research Part C: Emerging Technologies, Volume 53, pp. 59-7

Why open data?

- TRB TCRP Synthesis 115 – "Open Data: Challenges and Opportunities for Transit Agencies":
  - *The benefits to the agency* ***strongly support*** *open transit data*
  - ***The impacts on the private sector*** *have been* ***encouraging*** *over the past several years.*
  - ***Applications and visualizations*** *that could not necessarily have been conceived or developed by a transit agency* ***have been created***
  - *The* ***impacts*** *of open transit data on customers and the general public* ***are significant***
  - *The* ***legal fears*** *often thought to be barriers to opening transit data* ***have not been realized***

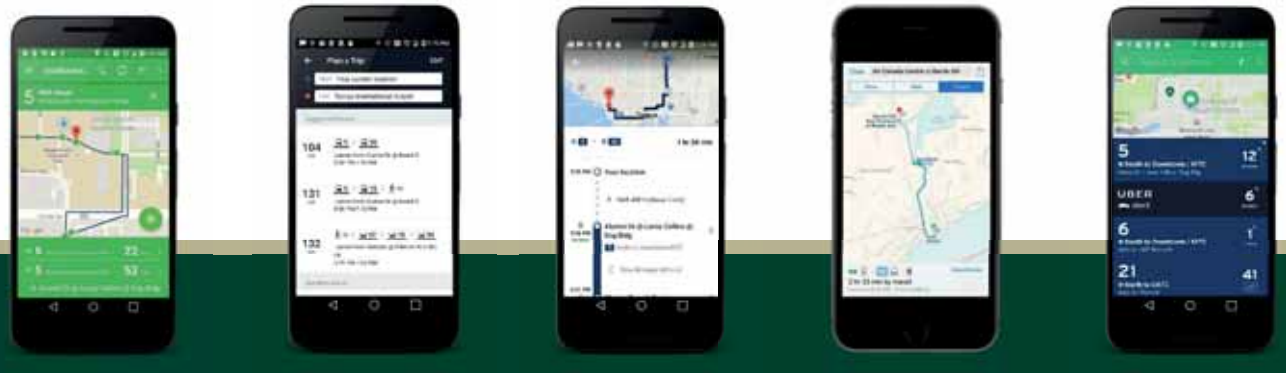
[1] Schweiger, C. Transit Cooperative Research Program Synthesis 115-Open Data: Challenges and Opportunities for Transit Agencies. 2015.

GTFS

GENERAL TRANSIT FEED SPECIFICATION (GTFS)

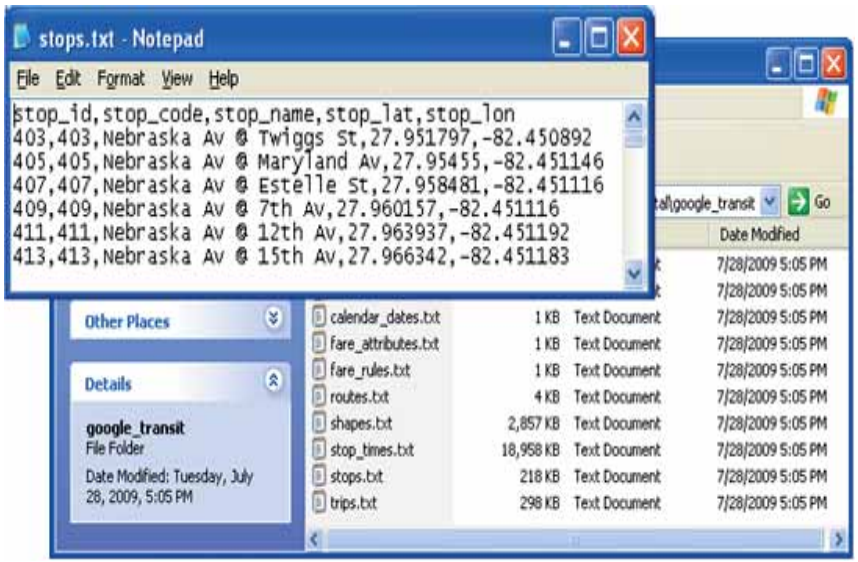
GTFS – What is it? (1)

- General Transit Feed Specification (GTFS) - the de facto standard for transit schedule, geospatial, and fare data
  - https://developers.google.com/transit/gtfs/reference
- Over 1000 agencies offer data in GTFS format
  - http://transitfeeds.com/
- GTFS data is used in Google Maps and in many other 3rd party applications.



GTFS – What is it? (2)

- GTFS data is a set of text files that represent a snapshot of your scheduled service:
  - stops.txt
  - routes.txt
  - trips.txt
  - calendar.txt
  - shapes.txt
  - …
- Zipped into a file:
  - gtfs_data.zip
- ..and shared via web:
  - http://my.agency.org/gtfs_data.zip



GTFS Maintenance Tools

1. Using scheduling software
   – Trapeze, HASTUS, Connexionz, Mentor Engineering
2. In-house tools - open-source or in-house applications
   – For examples see http://bit.ly/GTFS-Open-Tools
3. Web-based application - Self-service or full-service

GTFS Maintenance Vendors

Open list at
http://bit.ly/GTFS-Vendors

Vendor Name	Vendor website	Contact	Email	Phone	Self-service tool?	Full service?
Bliksem Labs B.V.	http://ovapi.nl/	Stefan de Konink	gtfs@bliksemlabs.com	-	No	Yes
goEuropa Polska	http://www.goeuropa.eu	Wojciech Kulesza	wojciech.kulesza@goeuropa.eu	48616248682	Yes	Yes
Concept Apps	http://transitdirector.com/	Tudor Iliescu	tudor@conceptapps.ro	40741628868	Yes	Yes
Iteris, Inc.	https://www.iteris.com	Tom Roberts	tlr@iteris.com	(949) 270-9400	Yes	Yes
Integrated Transport Planning Ltd	http://www.itpworld.net	Neil Taylor	taylor@itpworld.net	+44 115 9886905	Yes	Yes
CFTI Consulting	http://cfti.info	Neil Trenk	trenk@cfti.info	(914) 620-2384	No	Yes
Caliper Corporation	http://www.caliper.com	Howard Slavin	sales@caliper.com	6175274700	Yes	No
AddTransit	https://addtransit.com	Neil Selkirk	neil@addtransit.com	+1 650 843 9177	Yes	Yes
MJC	http://mjcaction.com	Marcy Jaffe	marcy@mjcaction.com	(360) 643 1002	No	Yes
MECATRAN	http://www.mecatran.com	Marcy Jaffe/Nicolas Taillade	info@mecatran.com	(360) 643 1002/(33)411650635	Yes	Yes
National RTAP (no-cost tools & support)	http://nationalrtap.org/supportcenter/Builder-Apps/GTFS-Builder	Neil Rodriguez	support@nationalrtap.org	(888) 589-6821	Yes	No
Trillium Solutions, Inc.	http://trilliumtransit.com	Thomas Craig	info@trilliumtransit.com	(503) 567-8422 ext 4	Yes	Yes
Canal TP	http://www.canaltp.fr	Bertrand Billoud	bertrand.billoud@canaltp.fr	+33 (0)1 44 75 12 14	Yes	Yes

For information only – inclusion does not imply endorsement

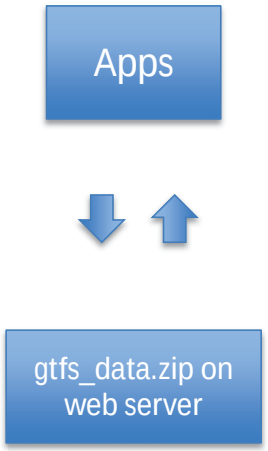
GTFS Maintenance Vendors

Open list at
http://bit.ly/GTFS-Vendors

Vendor Name	Vendor website	Contact	Email	Phone	Self-service tool?	Full service?
TransLoc	http://www.transloc.com	Joel Bush	info@transloc.com	(888) 959-3120	Yes	Yes
Conveyal	http://conveyal.com/	David Emory	demory@conveyal.com	(404) 635-6777	Yes	No
EACOMM Corporation	http://www.eacomm.com/services/public-transport-management-systems/	Karlo Robosa	solutions@eacomm.com	+6324382986	No	Yes
Lepton Software	http://www.leptonsoftware.com	Rajeev Saraf	rajeev.saraf@leptonsofware.com	+91 9810006581	No	Yes
Mobilibus	http://www.mobilibus.com.br	Marco Littig	contato@mobilibus.com.br	+554799850298	Yes	Yes
Omni	http://omnimodal.io	Nathan Selikoff	nathan@omnimodal.io	407-319-5198	Yes	Yes

GTFS Maintenance

- gtfs_data.zip file is placed on a public web server where apps can access it
  - Self-hosted - http://my.agency.org/gtfs_data.zip
  - Third-party hosted - http://company.com/my_agency_gtfs_data.zip
- When service changes (e.g., quarterly), someone will need to update these files, and post the new zip file
  - Always keep the same file name!
  - Post at least one week in advance of changes
  - Merge current and future service files to avoid interruption
    - https://github.com/google/transitfeed/wiki/Merge

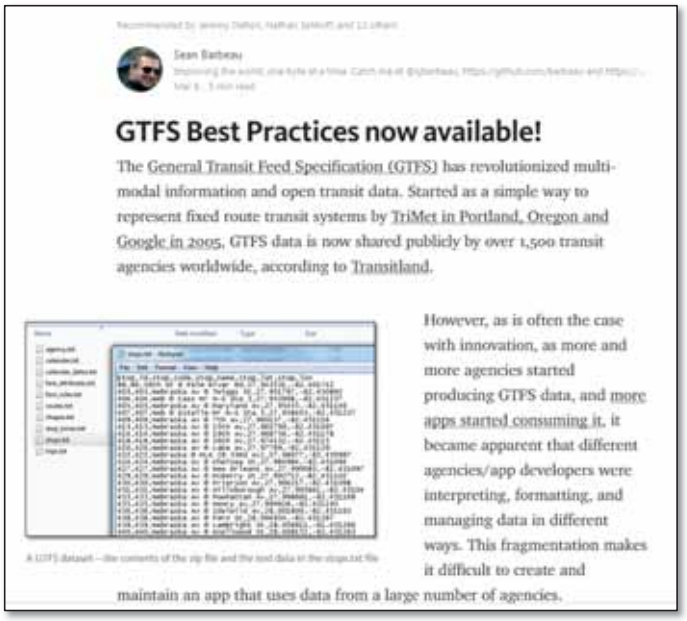


GTFS Data Publishing

- Share your data on GTFS feed registries:
  - Transitfeeds.com - http://transitfeeds.com/
  - Transitland - https://transit.land/feed-registry/
  - USDOT National Transit Map (bit.ly/USDOT-NTM)
  - State-specific - Florida Transit Data Exchange (FTDE) - http://www.ftis.org/ftde.html
- Great ways to reach 3rd party developers

GTFS Best Practices

- New GTFS Best Practices published in early 2017
  - http://gtfs.org/best-practices/
- Clarifies some gray areas in spec
- Blog post summary:
  - http://bit.ly/gtfs-best-practices



Sean Barbeau

GTFS Best Practices now available!

The General Transit Feed Specification (GTFS) has revolutionized multi-modal information and open transit data. Started as a simple way to represent fixed route transit systems by TriMet in Portland, Oregon and Google in 2005, GTFS data is now shared publicly by over 1,500 transit agencies worldwide, according to Transitland.

However, as is often the case with innovation, as more and more agencies started producing GTFS data, and more apps started consuming it, it became apparent that different agencies/app developers were interpreting, formatting, and managing data in different ways. This fragmentation makes it difficult to create and maintain an app that uses data from a large number of agencies.

GTFS-realtime

- Vehicle positions

- Arrival estimates (trip updates)

- Service Alerts

Route 5 is experiencing significant delays due to flooded roads

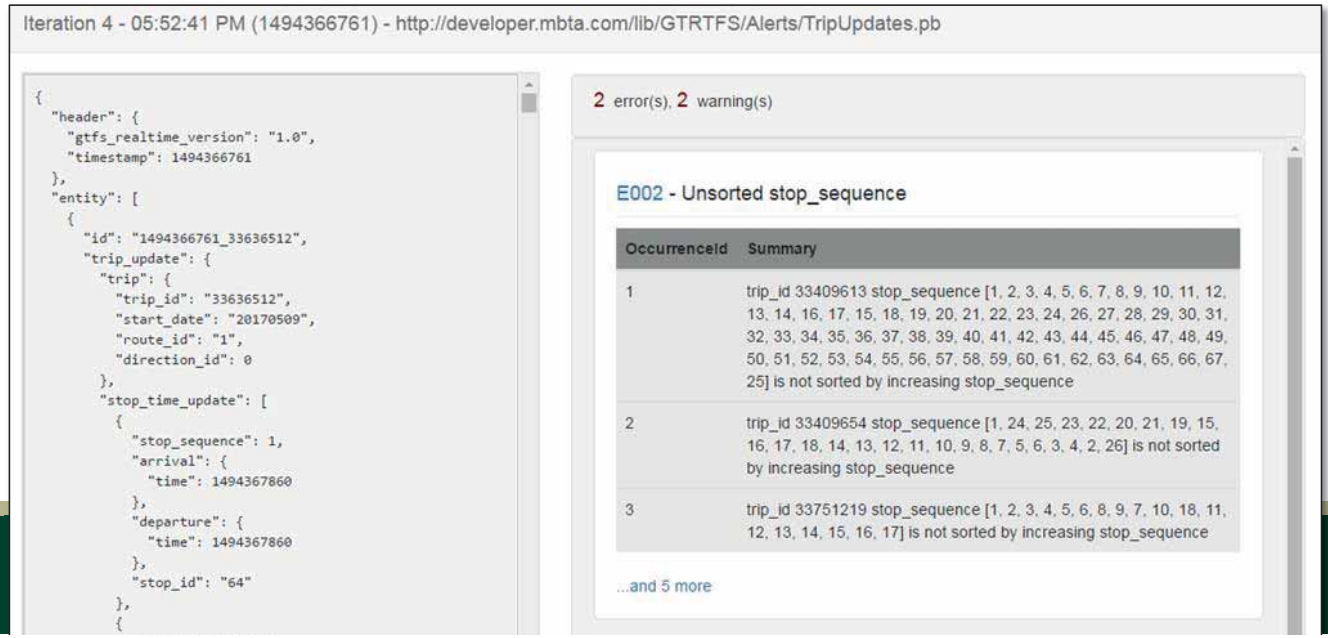
GTFS-realtime -> Better data

- Over 50 agencies sharing GTFS-realtime feeds[1]
- Quality is important!!!
  - 84% of riders rely on real-time info instead of schedule[1]
  - 74% of riders say difference of 4 minutes between actual and predicted arrivals is an error[1]
  - 9% of riders say they took the bus less due to errors[1]
- Sharing a GTFS-realtime feed allows other apps to share your data, and help find and fix problems

[1] Transitfeeds.com. http://transitfeeds.com/search?q=gtfsrt
[2] Gooze, A., Watkins, K., and Borning, A. "Benefits of Real-Time Transit Information and the Impacts of Data Accuracy in the Rider Experience." Transportation Research Board 2013 Annual Meeting and to be published in Transportation Research Record.

GTFS-realtime Validation Tool

- Helps identify common problems
  - https://github.com/CUTR-at-USF/gtfs-realtime-validator
  - Demo server - http://transittools.forest.usf.edu/



Making the most of the schedule and real-time data

GTFS-BASED APPLICATIONS

Trip planning and real-time

OneBusAway

Moovit

Google Maps

Apple Maps

Transit

OpenTripPlanner

Microsoft Bing Maps

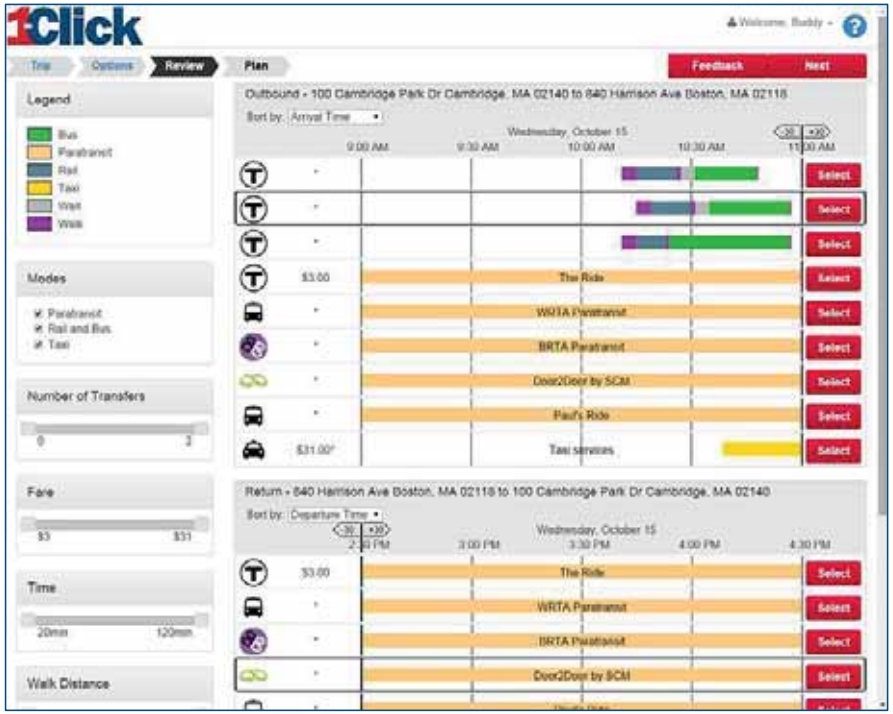
Accessibility

Humanware BrailleNote

Travel Assistance Device (TAD) transit navigation mobile app

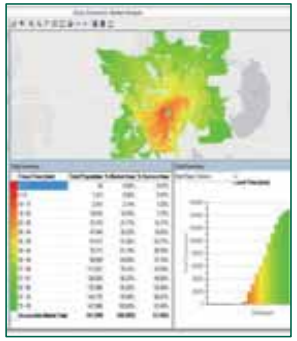
Demand-response

- **OneClick –**
  - Multi-modal: Fixed-route, demand-responsive, taxi, and human service transportation options.
  - Open-source
  - *www.camsys.com/1Click.htm*



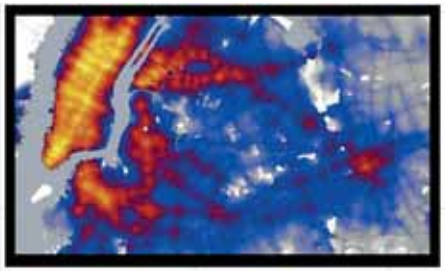
Planning & Analysis

Remix



TBEST

FTA STOPS

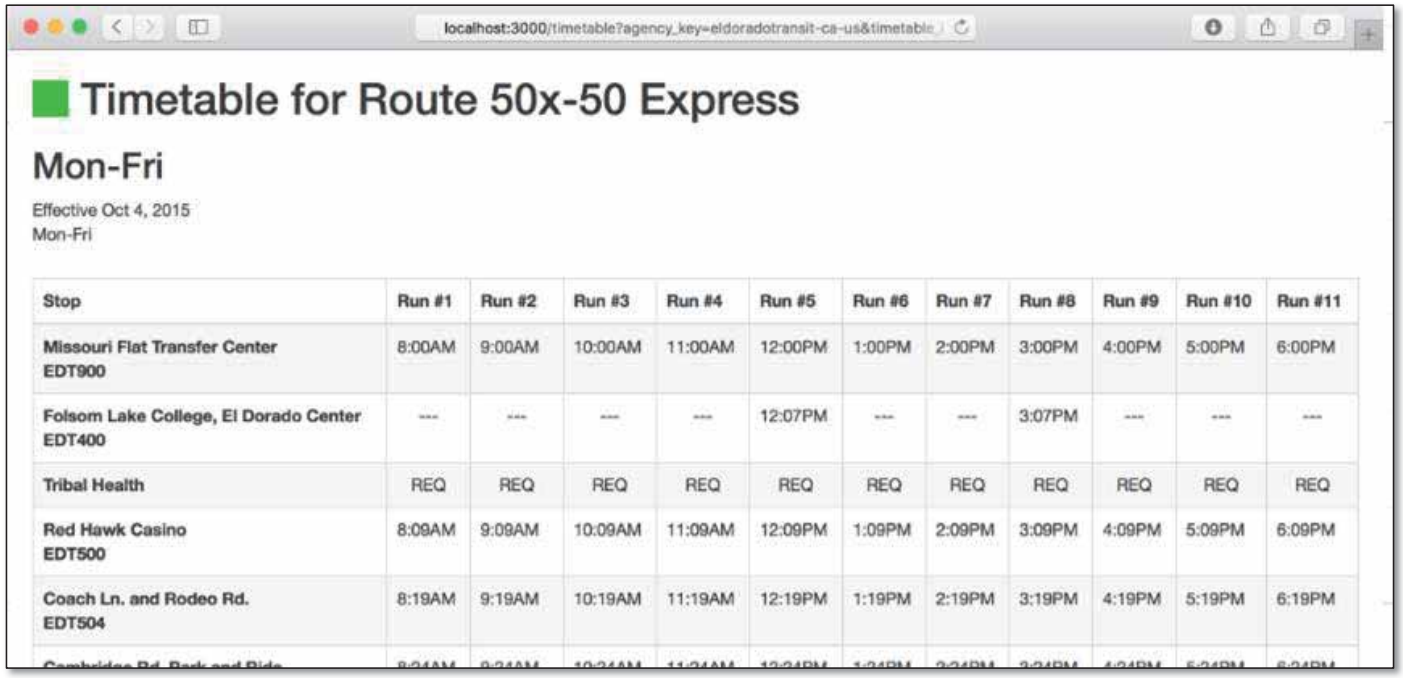


OpenTripPlanner Analyst

Conveyal Analyst

WalkScore

Timetable publishing



Stop	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8	Run #9	Run #10	Run #11
Missouri Flat Transfer Center EDT900	8:00AM	9:00AM	10:00AM	11:00AM	12:00PM	1:00PM	2:00PM	3:00PM	4:00PM	5:00PM	6:00PM
Folsom Lake College, El Dorado Center EDT400	---	---	---	---	12:07PM	---	---	3:07PM	---	---	---
Tribal Health	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ
Red Hawk Casino EDT500	8:09AM	9:09AM	10:09AM	11:09AM	12:09PM	1:09PM	2:09PM	3:09PM	4:09PM	5:09PM	6:09PM
Coach Ln. and Rodeo Rd. EDT504	8:19AM	9:19AM	10:19AM	11:19AM	12:19PM	1:19PM	2:19PM	3:19PM	4:19PM	5:19PM	6:19PM

GTFS-to-HTML

https://github.com/brendannee/gtfs-to-html

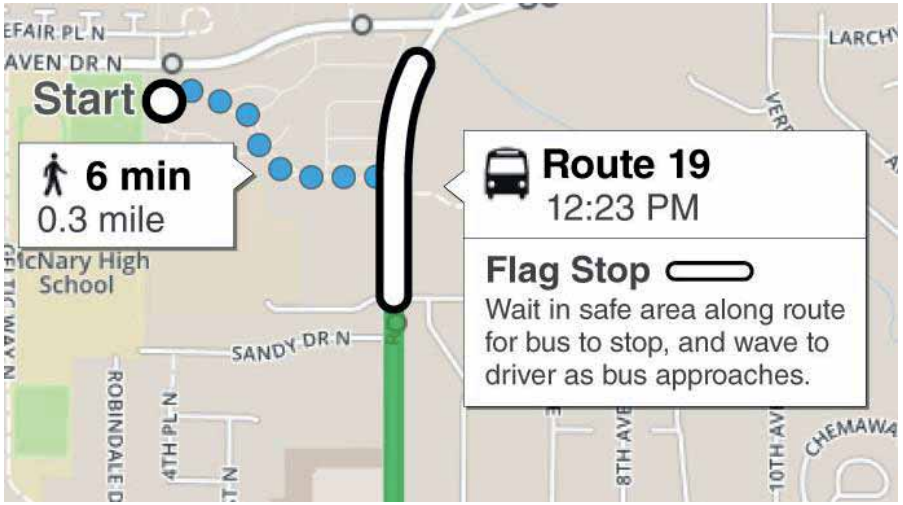
The future of multimodal information

WHAT'S NEXT?

GTFS-flex

- Draft spec at http://gtfsflex.com
- Adds capability to describe demand-response transit:
  - Hail-and-Ride
  - Deviated-fixed
  - Dial-a-Ride
  - DRT-to-fixed connections

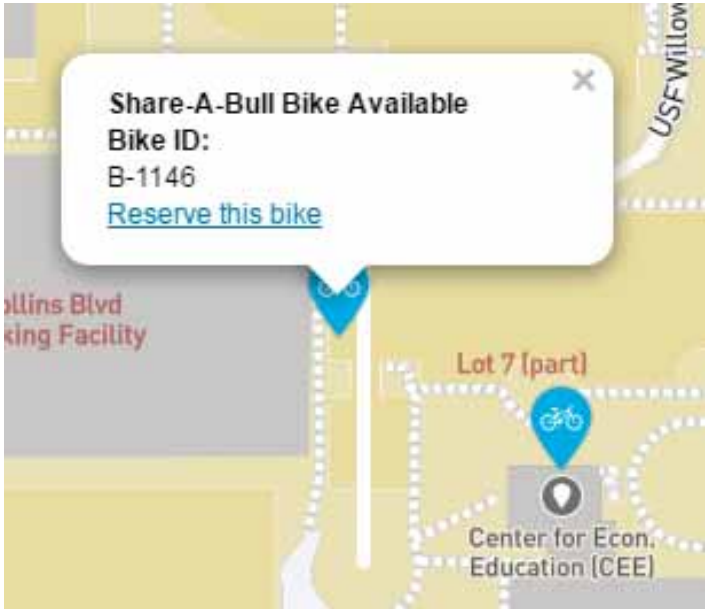
GTFS-flex



- Project underway to add GTFS-flex features to OpenTripPlanner
  - See http://bit.ly/otp-flex for mailing list

General Bikeshare Feed Specification

- Shares real-time bike/rack locations and availability/capacity
- Adopted by all North American Bikeshare Association vendors
- https://github.com/NABSA/gbfs



http://maps.usf.edu

Online resources

- TransitWiki
  - Great resource for introduction to GTFS
  - http://www.transitwiki.org/TransitWiki/index.php/General_Transit_Feed_Specification

- awesome-transit list
  - Open-source projects and on-line tools
  - https://github.com/luqmaan/awesome-transit

Acknowledgments

- Funding in part from:
  - San Benito County Local Transportation Authority in Hollister, California
  - Eastern Sierra Transit Authority, in Bishop, California
  - Florida Department of Transportation

- It should be noted that this presentation is intended as an informational resource
- Mention of an application or vendor service does not imply endorsement of that application or vendor
- Partial slide credits to Aaron Antrim from Trillium Solutions
- Thanks to FDOT, VHB, and Omni for facilitating this presentation

Thanks!

Sean J. Barbeau, Ph.D.

Principal Mobile Software Architect for R&D
Center for Urban Transportation Research
University of South Florida

barbeau@cutr.usf.edu
(813) 974-7208
@sjbarbeau

How to create and maintain GTFS data?

GTFS MAINTENANCE

Working with GTFS vendors (1)

- Retain ownership of your data!!
- Self service tool, or full service?
  - If self-service, training on using tools should be provided
  - If full service, what data format does the vendor expect you to provide changes in?
  - Monthly cost for hosting data (in addition to cost of tool)?
- Who is the primary contact for Google and others - agency or vendor?
- Ensure that data is reviewed (e.g., via Google) before service changes go into effect
  - Allow at least 1 week lead time
  - Who is responsible for quality assurance (QA) - agency or vendor?
  - May require a merge of two adjacent schedule periods to provide uninterrupted service - vendor should provide this merged dataset

Working with GTFS vendors (2)

- Ask for guarantees of conformance with GTFS best practices and fulfillment of requirements of 3rd party applications
- Validate your data using industry tools:
  - Official GTFS validation tool - https://github.com/google/transitfeed/wiki/FeedValidator
  - Online version - http://gtfsfeedvalidator.transitscreen.com/
  - List - https://github.com/luqmaan/awesome-transit#gtfs-validators
- Ask for at least 3 references for other agencies maintaining and sharing data with Google through the vendor

MORE ON GTFS

Need help with open-source transit tools?

Vendors/consultants offering services:

Name	Website	Contact person	Contact email	Contact phone	Experience w/ OneBusAway?	Experience w/ OpenTripPlanner?	Experience w/ TransiTime?
Center for Urban Transportation Research @ University of South Florida	http://www.cutr.usf.edu/	Sean Barbeau	barbeau@cutr.usf.edu	(813) 974-7208	Yes	Yes	No
Transitime	http://www.transitime.org	Michael Smith	michael@transitime.org	(415) 260-4700	Yes	Yes	Yes
Trillium Solutions	http://trilliumtransit.com	Aaron Antrim	aaron@trilliumtransit.com	(503) 567-8422	Yes	Yes	No
Evan Siroky	http://www.evansiroky.com	Evan Siroky	evan.siroky@gmail.com	(206) 799-6545	Yes	Yes	No
Cambridge Systematics	http://www.camsys.com/	Sarah Anderson	sanderson@camsys.com	(617) 234-0540	Yes	Yes	Yes
IBI Group	http://transitrealtime.com/docs/IBI_TRANSIT-realtime.pdf	Ritesh Warade	ritesh.warade@ibigroup.com	(617) 699-9544	No	Yes	Yes
Canal TP	http://www.canaltp.fr	Bertrand Billoud	bertrand.billoud@canaltp.fr	+33 (0)1 44 75 12 14	No	Yes	No
goEuropa Polska	http://www.goeuropa.eu	Wojciech Kulesza	wojciech.kulesza@goeuropa.eu	48616248682	Yes	Yes	Yes
Kisio Digital	http://www.canaltp.fr//	Stephan Simart	stephan.simart@canaltp.fr	33144751800	No	No	No
Trillium Solutions, Inc.	http://trilliumtransit.com	Aaron Antrim	aaron@trilliumtransit.com	(503) 567-8422 ext 3	Yes	Yes	No

GTFS-flex

- Draft spec at http://gtfsflex.com
- Adds capability to describe demand-response transit:
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  - Deviated-fixed
  - Dial-a-Ride
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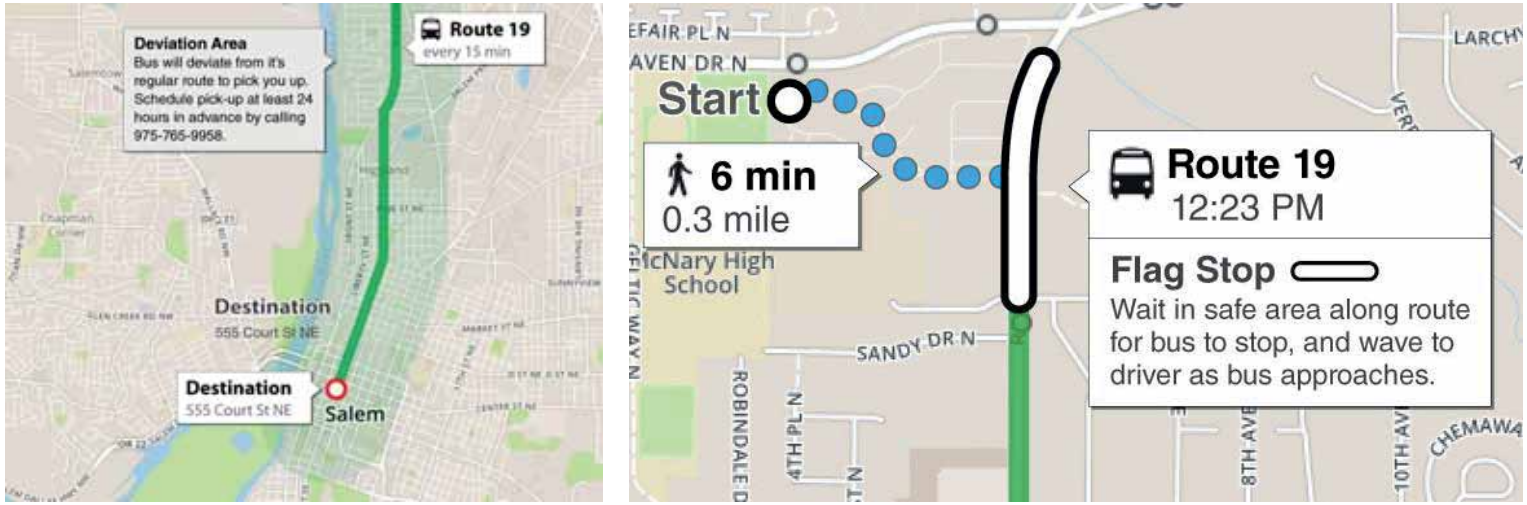
GTFS-flex



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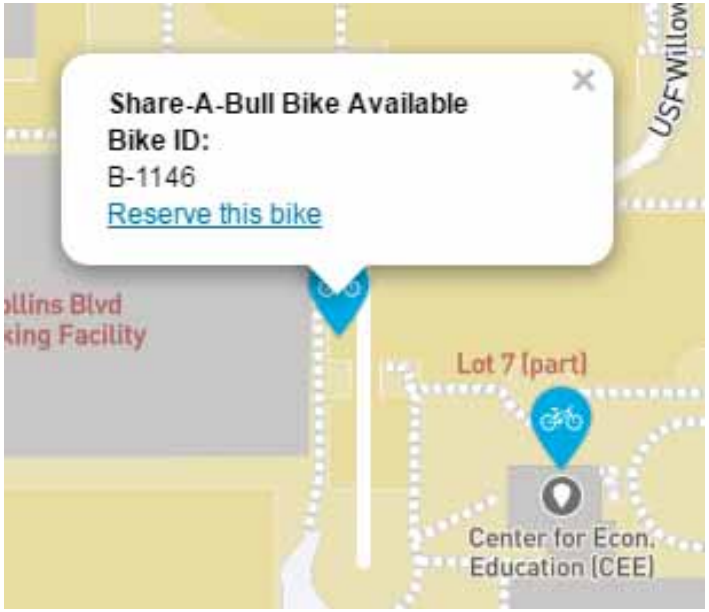


http://maps.usf.edu

GTFS Best Practices Coming Soon!

- Developed by leaders in the GTFS community over the last year
- Will be available at GTFS.org soon!

Details about sharing real-time transit data

MORE ON GTFS-REALTIME

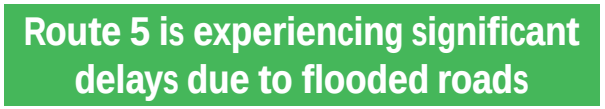
GTFS-realtime

- Vehicle positions

- Arrival estimates (trip updates)

Requires automatic vehicle location (AVL) hardware

- Service Alerts



Can be managed via web-based customer service tools

Service Alerts

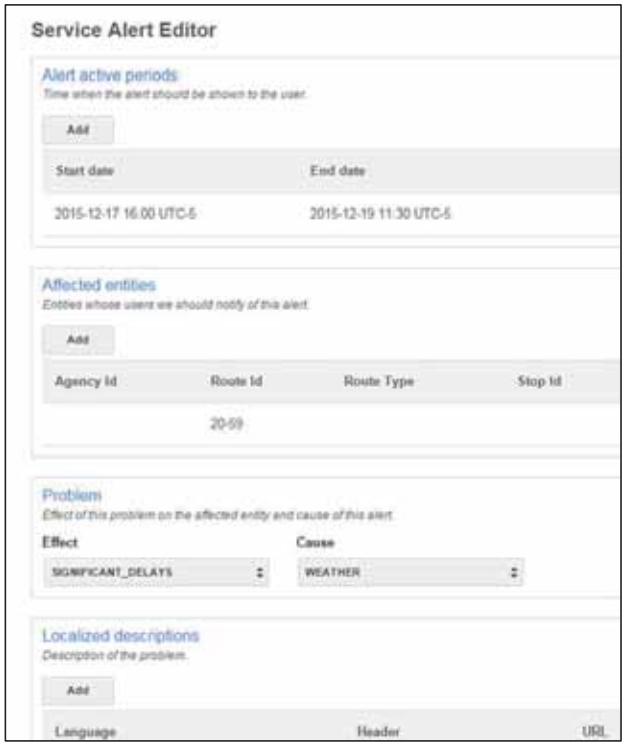
- Your customer service department can manage service alerts
- Requires a web-based tool to translate from human-readable format:
  - "Route 5 is experiencing significant delays due to flooded roads"
- ...to a machine-readable format like GTFS-realtime Service Alerts[1]

Service Alerts

```
header {
  gtfs_realtime_version: "1.0"
  timestamp: 1450386709
}
entity {
  id: "1"
  alert {
    informed_entity {
      agency_id: "Hillsborough Area Regional Transit"
    }
    header_text {
      translation {
        text: "Route 5 delays"
        language: "en"
      }
    }
    description_text {
      translation {
        text: "Route 5 is experiencing significant delays due to flooded roads"
        language: "en"
      }
...
```

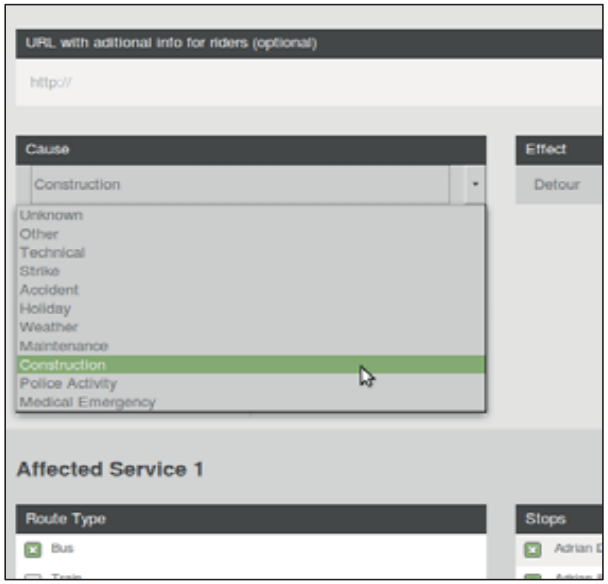
Service Alerts Publishing Tools (1)

- Google Transit Partner Dash:
  - Freely available
  - Publishes alerts only to Google Maps



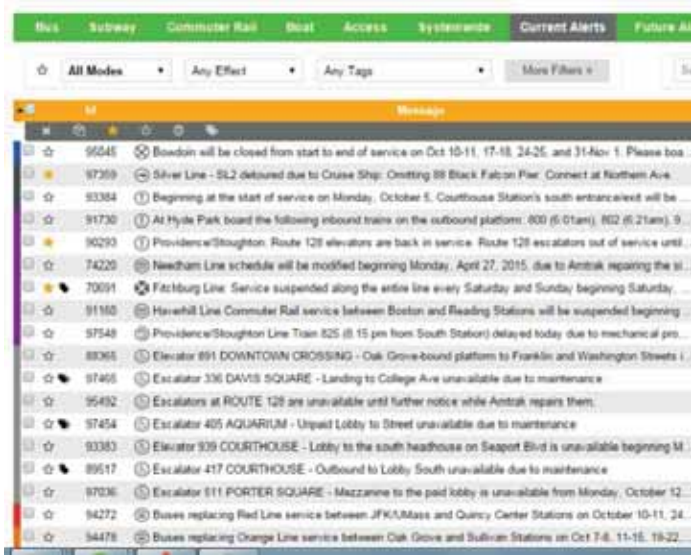
Service Alerts Publishing Tools (2)

- Trillium Transit Alerts - Product from Trillium
- Publishes alerts to any app supporting GTFS-realtime Service Alerts
  - Google Maps
  - The Transit App
  - OpenTripPlanner
  - OneBusAway
- Target alerts to particular routes and stops
- Also offers integration to publish same alerts to:
  - Websites
  - Social media accounts
  - Email, SMS, and other Alerts



Service Alerts Publishing Tools (3)

- IBI TRANSIT-alerts:
  - Available as product from IBI Group
- Publishes alerts to any app supporting GTFS-realtime Service Alerts
  - Google Maps
  - The Transit App
  - OpenTripPlanner
  - OneBusAway
- Target alerts to particular routes and stops
- Also offers integration to publish same alerts to:
  - Websites
  - Social media accounts
  - Email, SMS, and other Alerts



Service Alerts Publishing Tools (4)

- Do-It-Yourself (DIY) open-source tools:
  - OneBusAway
    - Part of the main OneBusAway server application - https://github.com/OneBusAway/onebusaway-application-modules/wiki/Creating-Service-Alerts
    - A stand-alone web application - https://www.youtube.com/watch?v=roIsmq9R7Wc, https://github.com/OneBusAway/onebusaway-service-alerts
- GTFS-rt-admin
  - A stand-alone web application - https://github.com/conveyal/gtfs-rt-admin

How do I share vehicle positions and arrival predictions? (1)

- Procuring a new AVL system
  - Include RFP language requesting GTFS-realtime[1] or SIRI[2] Application Programming Interface (API) when procuring an AVL system
    - Make sure you retain ownership of your data
    - Require that your real-time IDs match your schedule GTFS data
    - Require that your GTFS and GTFS-realtime data are updated in sync
    - Request the timepoint field in stop_times.txt - it's increasingly important for real-time
  - Prior to accepting product, test API with at least one app
    - e.g., Google Maps

How do I share vehicle positions and arrival predictions? (2)

- Already have an AVL system, but not a realtime API?
  - A good read - “Legacy AVL system? It’s okay, join the club,” https://kurtraschke.com/2015/01/legacy-avl-export
  - Open-source converters:
    - GTFS-realtime - https://github.com/luqmaan/awesome-transit#gtfs-realtime
    - SIRI - https://github.com/luqmaan/awesome-transit#siri

Innovation - Open AVL systems

1. Choose your AVL vendor to provide vehicle positions
2. Create arrival estimates from vehicle positions
   - TransiTime - Open-source project
     - https://github.com/Transitime/core
3. OneBusAway.org - Distribute info to mobile apps

Local Agency Updates - *State of the System*

Volusia County

Osceola County

Sumter County

Seminole County

Brevard County

City of Orlando

City of Ocala

Transportation Systems Management & Operations

Local Agency State of the System

Jon Cheney, P.E.

Volusia County Traffic Engineering

Volusia County
FLORIDA

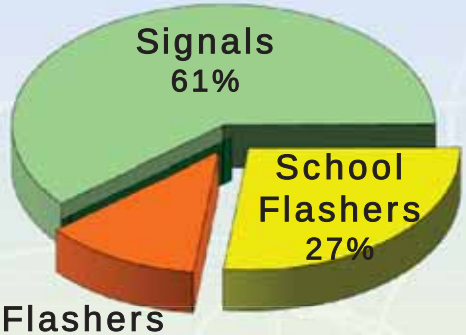
FDOT

Transportation Systems Management & Operations

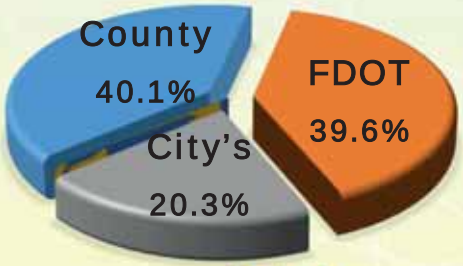
TSM&O

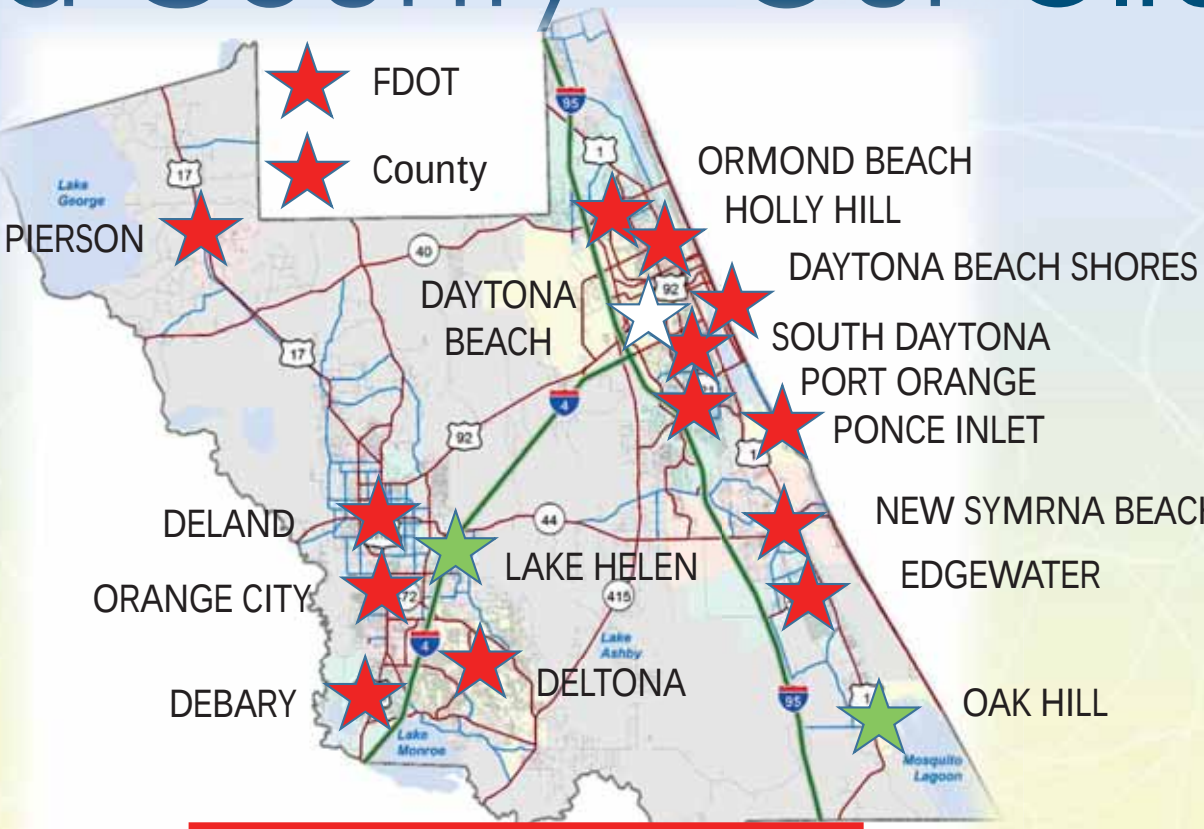
Volusia County – Our Clients

TRAFFIC DEVICES - 538



OWNERSHIP





Signal O&M (15 jurisdictions)

Traf Engr Services (2 jurisdictions)

Volusia County – Our Challenges

COASTAL COMMUNITY's SPECIAL EVENTS SUMMER BEACH SEASON

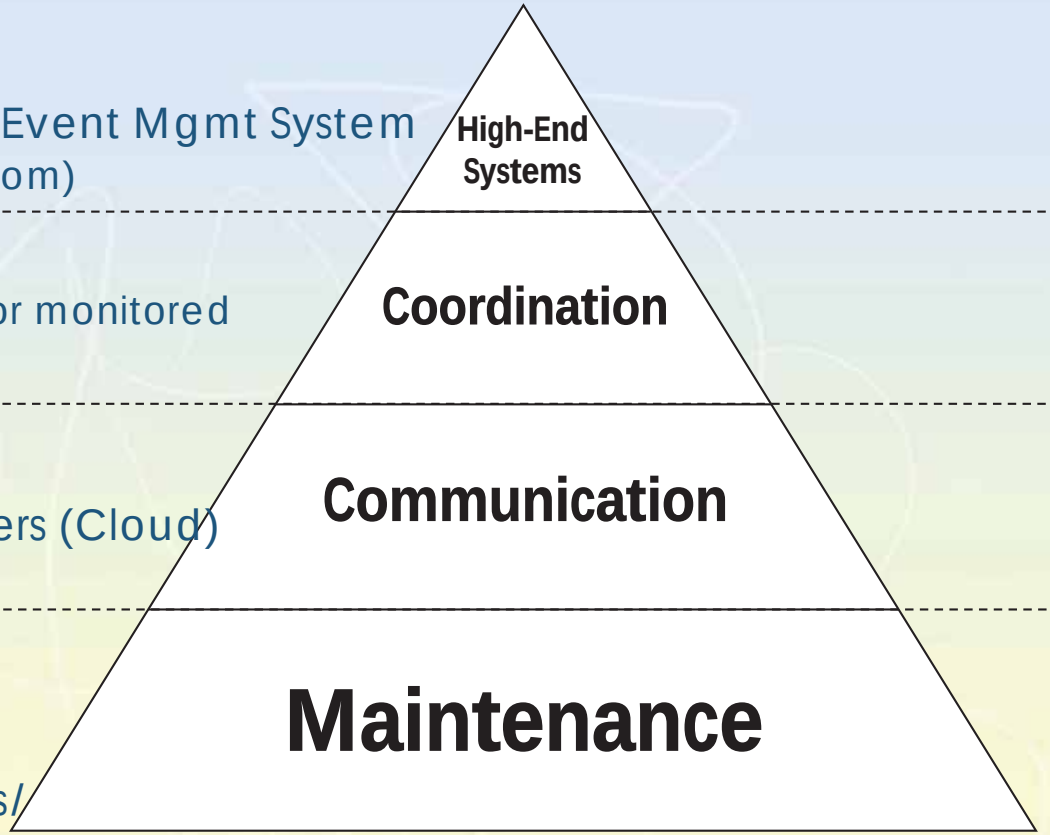
METRO ORLANDO SPECIAL EVENTS ECHO-TOURISM

FDOT

Traffic Signal Systems

More Complex Systems

- **High-End Systems**
  - Adaptive Signal (InSync)
  - Special Event Mgmt System
  - Traffic Signal Priority – Fire & Bus (Opticom)
- **Coordination**
  - 188 Signals (57%) are coordinated &/or monitored (Econolite Centracs)
- **Communication**
  - 52 miles of fiber
  - School Flashers (Cloud)
  - 8 wireless networks
- **Maintenance**
  - 2x yearly PM Signals
  - 1x year PM School Flashers/Flashers/ Conflict Monitors
  - Moving toward Overhead Vehicle Detection (video & radar)



Traffic Signal Systems

- Maintenance
  - **Mature** - Asset Mgmt Program (GIS)
- Communication
  - Readdressing of ITS Devices completed
  - Provide FDOT access to 35 local CCTV's
  - **Collaborating** with R2C TPO ITS Master Plan
- Coordination
  - **Mature** – Special Events (Daytona Beach) & Signal Retiming (FDOT)
  - **Improving** – FDOT Incident Mgmt; however, most detour routes have Max III
- High-End Systems
  - **Improving** – Deploying local BlueToad Readers
  - **Improving** – Looking for Developer (PFS) funding Econolite Traffic Adaptive Module

Volusia County Traffic Management Center

FDOT

Transportation Systems Management & Operations

TSM&O

Traffic Management

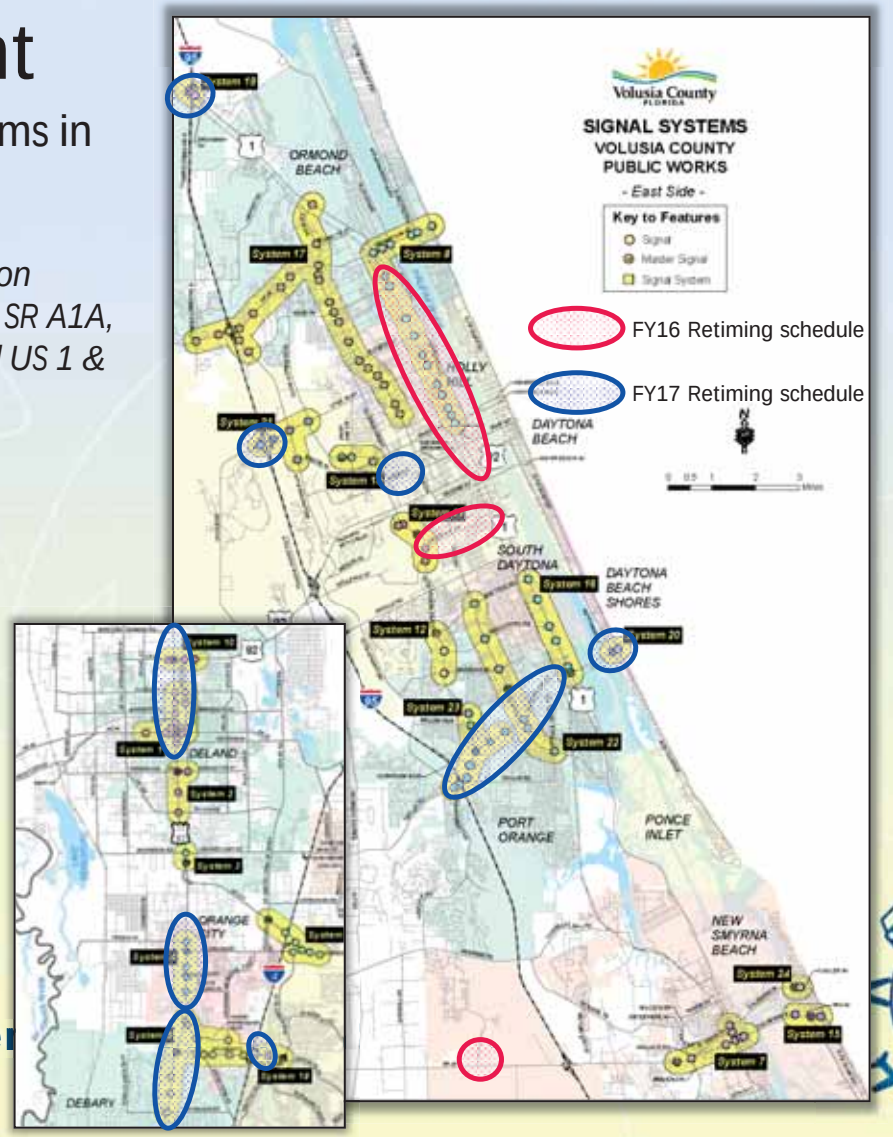
FY17 Retiming of Traffic Signal Systems in partnership with Florida DOT

- *I-95 & LPGA Interchange, I-95 & US 1 Interchange, US 17/92, SR 44, I-4 & Saxon Interchange, I-4 & Dirksen Interchange, SR A1A, SR 430/Mason, SR 421/Dunlawton, and US 1 & SR 442*

Benefits of Retiming:

- Improves traffic flow through group of coordinated signals
- Account for changes in traffic patterns over time
- Reduce driver frustration with reduced delay at signals
- Reduce GHG emissions and fuel consumption

Traffic Signals – Volusia has Consolidated Services Countywide; except Daytona Beach



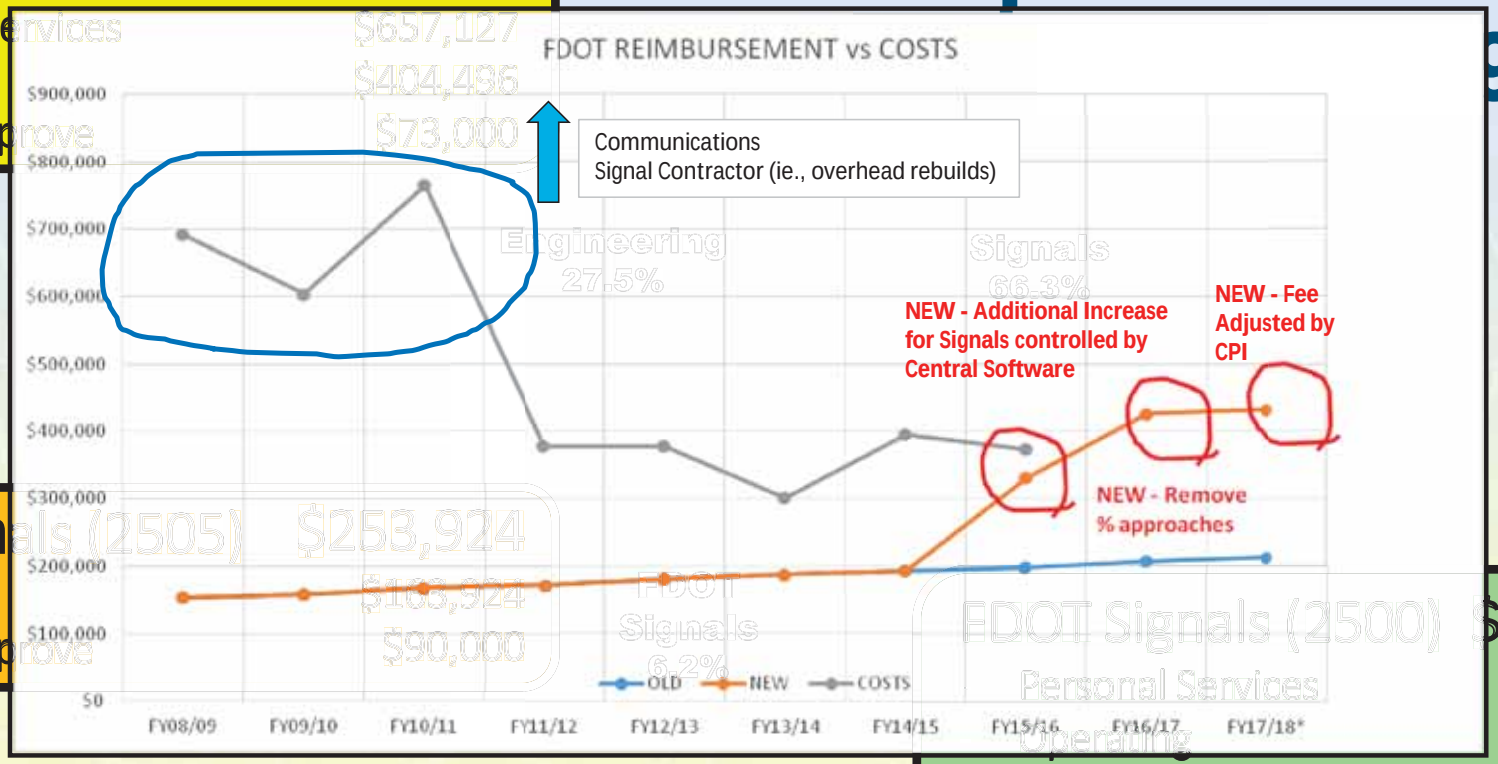
FDOT

Transportation Syste

TSM&O

Funding Proposed FY 17/18

Engineering(2500) $1,134,623
- Personal Services
- Operating
- Capital Improve



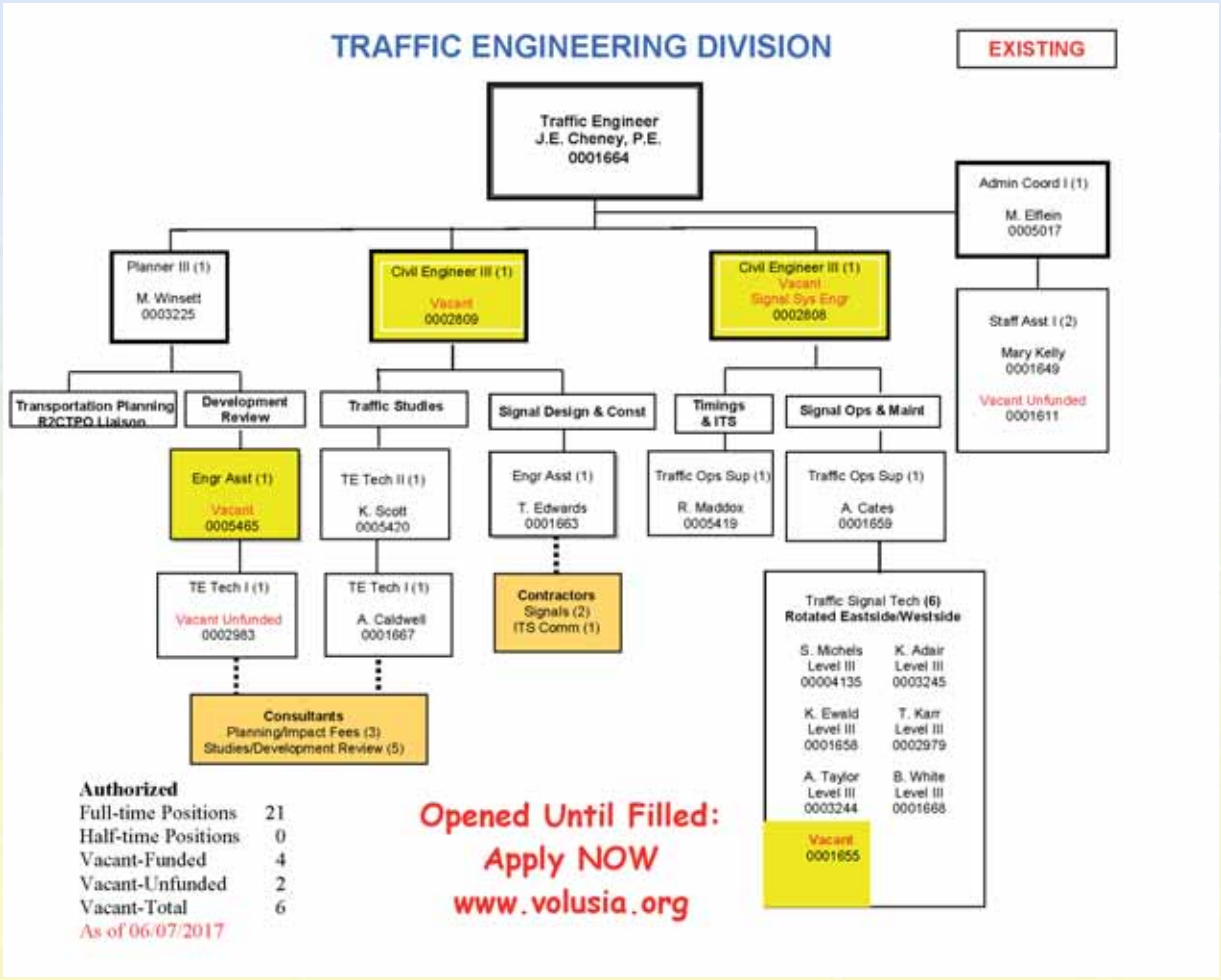
FDOT Signals (2505) $253,924
- Operating
- Capital Improve

FDOT Signals (2500) $2,735,492
- Personal Services $809,935
- Operating $845,557
- Capital Improve $1,080,000

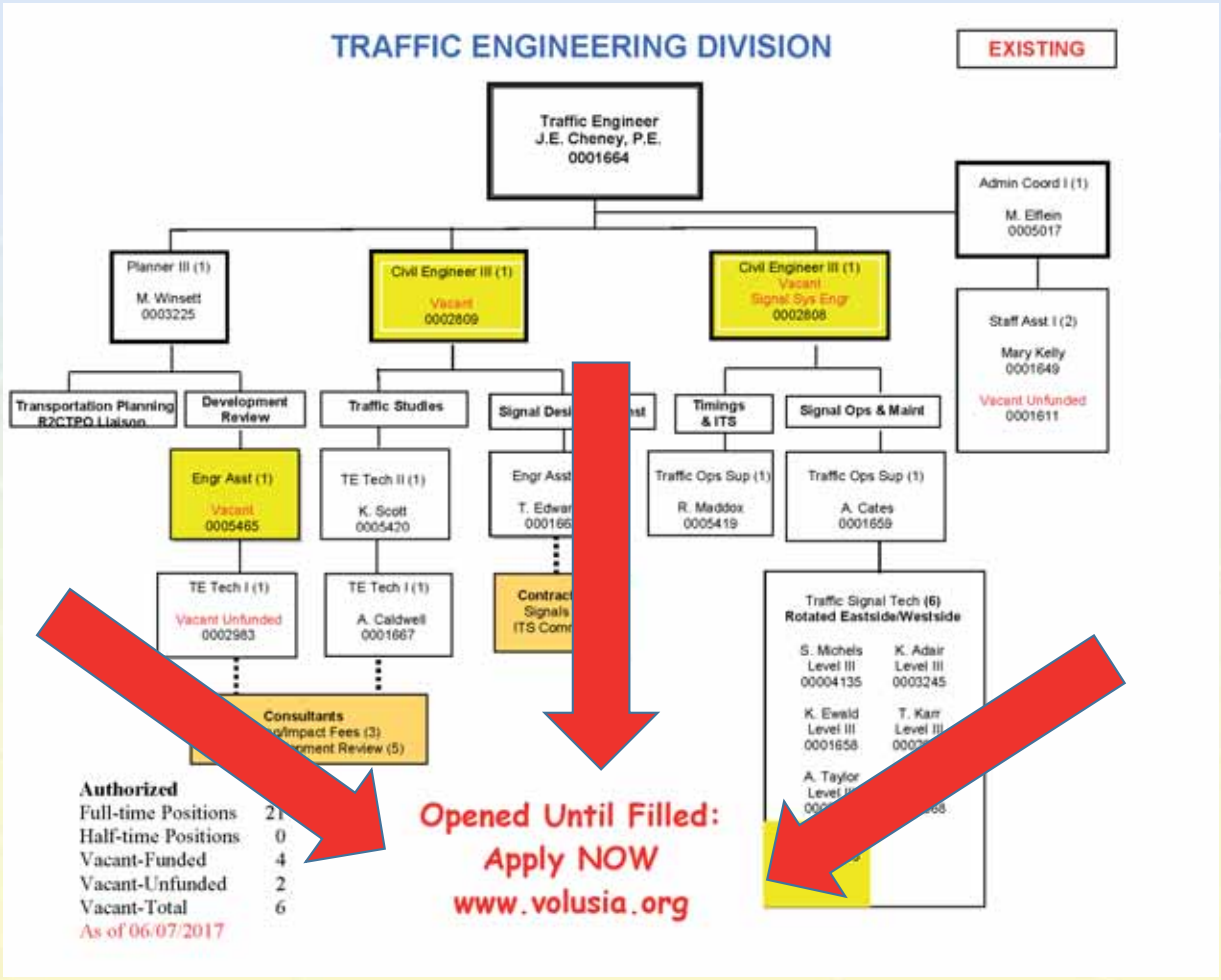
FDOT

Transportation Systems Management

Staffing


TRAFFIC ENGINEERING DIVISION
EXISTING
Traffic Engineer
J.E. Cheney, P.E.
0001664
Admin Coord I (1)
M. Elflein
0005017
Planner III (1)
M. Winsett
0003225
Civil Engineer III (1)
Vacant
0002809
Civil Engineer III (1)
Vacant
Signal Sys Engr
0002808
Staff Asst I (2)
Mary Kelly
0001649
Vacant Unfunded
0001611
Transportation Planning
R2CTPO Liaison
Development Review
Traffic Studies
Signal Design & Const
Timings & ITS
Signal Ops & Maint
Engr Asst (1)
Vacant
0005465
TE Tech II (1)
K. Scott
0005420
Engr Asst (1)
T. Edwards
0001663
Traffic Ops Sup (1)
R. Maddox
0005419
Traffic Ops Sup (1)
A. Cates
0001659
TE Tech I (1)
Vacant Unfunded
0002983
TE Tech I (1)
A. Caldwell
0001667
Contractors
Signals (2)
ITS Comm (1)
Traffic Signal Tech (6)
Rotated Eastside/Westside
S. Michels
Level III
00004135
K. Adair
Level III
0003245
K. Ewald
Level III
0001658
T. Karr
Level III
0002979
A. Taylor
Level III
0003244
B. White
Level III
0001668
Vacant
0001655
Consultants
Planning/Impact Fees (3)
Studies/Development Review (5)
Authorized
Full-time Positions 21
Half-time Positions 0
Vacant-Funded 4
Vacant-Unfunded 2
Vacant-Total 6
As of 06/07/2017
Opened Until Filled:
Apply NOW
www.volusia.org

Staffing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Current Events, Issues & Trends

TRAFFIC SIGNALS:

- **Signal Clients** – Not all city's want to invest (LED replacement & hurricane damage)
- **Future Workload**:
  - Adaptive Signal Control (FDOT system along US 17/92, DeLand with future extension to DeBary)
    Proposed 5 more corridors (R2C TPO funding Opportunity):
    SR 40/Granada Blvd, Ormond Beach (Retail & Beach Access Corridor)(Funded DBMO FY 20/21)
    SR 421/Dunlawton Blvd, Port Orange (Retail & Beach Access Corridor)
    SR 44, NSB (Retail & Beach Access Corridor)
    LPGA Blvd, Daytona Beach (Retail, Special Event & I-95 Access Corridor)(Econolite Module)
    Saxon Blvd, Orange City (Retail & I-4 Access Corridor)(Econolite Module)
  - Emergency Preemption System (Port Orange, Ormond Beach, NSB, Deltona, DeBary and Orange City)
  - Transit Priority System (VOTRANs customer delivery to Sunrail station on-time)
  - Update Traffic Controllers & Cabinets (system & isolated) (NEMA TS2)(Battery backup)
- **Signal Retiming** (system & isolated) for less delay (Partnering w/ Florida DOT)

QUESTIONS?

Volusia County FLORIDA PUBLIC WORKS Traffic Engineering

FDOT

Transportation Systems Management & Operations

TS M&O

Local Agency Updates - *State of the System*

Joedel Zaballero, Osceola County

FDOT

Transportation Systems Management & Operations

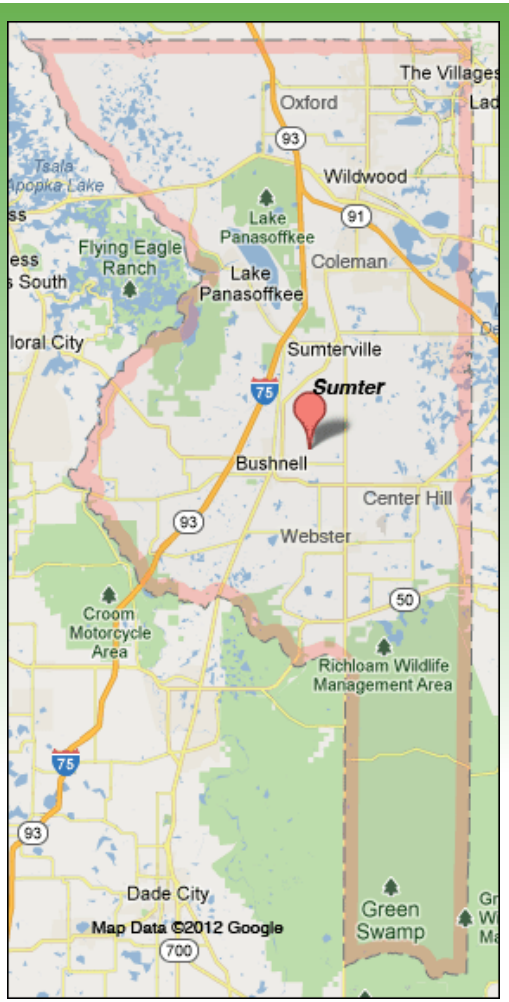
Sumter County
State of the System

Jackey Jackson, Assistant Public Works Director – Operations
Robert Lawler – Engineer
Wendy Alcius - Engineer
Zachary White – Engineer Intern

Sumter County Public Works

Sumter County Overview

- Population of 114,350 (2014)
- 50 fully functional traffic signals
- Recently completed planning phase of an Advanced Traffic Management System (ATMS) Master Plan



Sumter County Public Works

Challenges and Obstacles

- Current Challenges facing Sumter County
  - Coordination with surrounding municipalities
  - I-75 and Turnpike overflow traffic
  - Funding associated with updating current traffic signal system
- Sumter County has taken the initiative to overcome the obstacles by developing the ATMS Master Plan

ATMS Master Plan

- Plan broken into three (3) phases
- Each phase has design and construction element
- Estimated cost of $13.31 million
- Communication will be fiber optic and wireless

- Goals:
  - Provide up-to-date technology
  - Connect to FDOT and Turnpike Systems
  - Coordinate US 441/27 Corridor
  - Provide real-time information

Funding

- Sumter County is adequately staffed
  - Maintenance of Traffic Signal Devices is contracted out currently to Traffic Control Specialists
- Sumter County cost of traffic signal maintenance was $280,000 in Fiscal Year 2017
- FDOT provided $77,000 to maintain and operate signals on state highways
- County has requested $100,000 from FDOT to share the cost of Phase 1 Engineering Design of ATMS Phase I
- Donations are welcome

Sumter County Public Works

Local Agency Updates - *State of the System*

Charlie Wetzel, Seminole County

FDOT

Transportation Systems Management & Operations

Traffic Signal Systems

- 384 signalized intersections
  - 373 on fiber, 10 on radio, 1 not connected
- ATCs – 343 (89%), 980s – 41 (11%), Type 1 Cabinets - 16
- Adaptive Signals at 69 locations:
  - SynchroGreen 49 (4 corridors, 5 isolated), Insync 20 (2 corridors)
- UPS locations – 166, 67 locations w/ remote battery monitoring
- Trafficware Central System (ATMS.Now ver 2.6, waiting on 2.7)
  - Modules – TSP, SPM, CV
  - Daily detection reports, on-call text/email alarms, remote monitoring
- Detection Technologies used – loops, video (w and w/out thermal), radar, pod

ITS / Advanced Systems

- Over 400 miles of fiber
- TMC manned M-F 7am-5pm only
- 29 VMSs – AADCO, slow migration to Daktronics
- Bluetooth reader system (BlueTOAD) – own server, 96 units, upgrading 80 units to new Spectra units
- Signal Performance Metrics (SPM)
  - Old version since 2/2015, working with FDOT to have them host new version
- Connected Vehicle (CV)
  - Signal Phasing and Timing (SPaT) operational soon on 2 test corridors

Funding / Staff

- Operational budget (salaries, OT, materials, some outsourcing) – Signals - $1.2M, Fiber/ITS - $500k
- Maintain signals for FDOT and all 7 Cities – annual revenue $1M
- 1 Cent County Sales Tax for Capital Improvements
  - $1M annually for mast arm rebuilds, painting, extra striping, LED conversions
  - $1M annually new signals and mast arm conversions (FY 17/18 - $1.8M)
  - $1.1M annually for fiber/ITS projects (FY 17/18 - $3.4M)
- MetroPlan/FDOT funded ATMS projects ($3M - $4M) every few years
- Staff - 2 PEs in Division, 11 technicians devoted to signals (7 additional technicians for fiber/ITS/locates)

Challenges and Obstacles

- Adding staff – act of congress for new person vs. capital projects
- Finding experienced staff, especially for what we can pay – steal from contractors
- Staff time – data review (volumes, travel times) – sometimes need to farm out
- In-house installs – cost (OT, burnout) vs. benefits
- Losing a Champion
- Paperwork (permits, LAPs, System Engineering)
- Political support from above – camera issue for us

Local Agency Updates - *State of the System*

Steven Bostel (SCTPO), Brevard County

FDOT

Transportation Systems Management & Operations

Local Agency Updates - *State of the System*

Benton Bonney, City of Orlando

FDOT

Transportation Systems Management & Operations

Local Agency Updates - *State of the System*

Nicholas Blizzard, City of Ocala

FDOT

Transportation Systems Management & Operations

ATCMTD Grant Proposal

Ryan Cunningham, Kittelson & Associates

FDOT

Transportation Systems Management & Operations

Connecting the East Orlando Communities

Overview of ATCMTD Proposal

TSM&O Consortium

June 2017

Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)

ATCMTD by the Numbers

$60M  5-10 awards of up to **$12M**

ATCMTD by the Numbers

50% Match

APPROACH

Collaborative Effort

FDOT

District Five

In Partnership with:

metroplan orlando
A REGIONAL TRANSPORTATION PARTNERSHIP

UCF

Community Driven

Needs Driven

- Proposal highlighted needs of East Orlando
  - Connecting people through different modes
  - Improving pedestrian safety
  - Managing congestion
  - Ensuring timely transfers
  - Making smart, sustainable improvements
  - Understanding risks and benefits of emerging technology

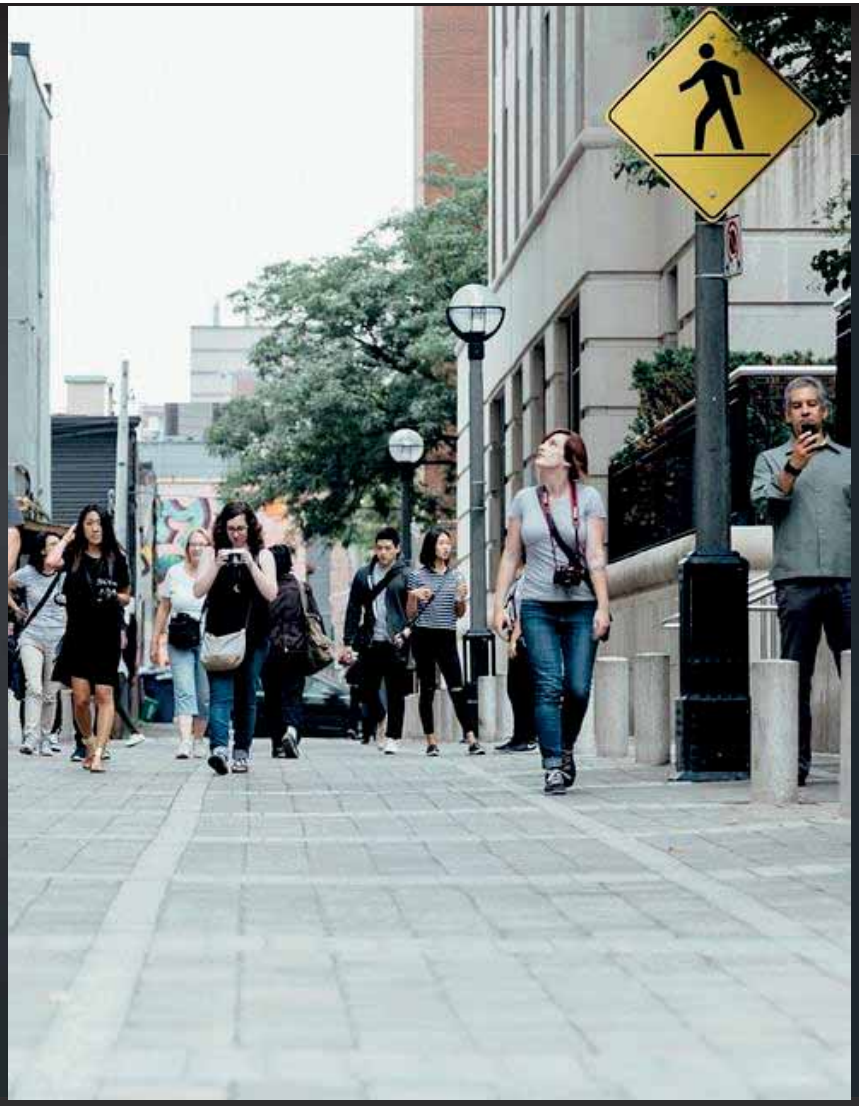
Integration Driven

ATCMTD Focus Areas	Existing Program	Proposed Programs		
	SunStore	PedSafe	GreenWay	SmartCommunity
Multimodal Integrated Corridor Management (ICM)	✓	✓	✓	
CV Tech at Intersections and Ped Crossings	✓	✓	✓	
Freight Community System	✓		✓	✓
Tech to Support Connected Communities	✓	✓		✓
Infrastructure Assessment	✓			✓
Rural Technology Deployments	✓			✓

PROGRAMS

Ped**Safe**

- Leverages advanced signal controller capability and Connected Vehicle (CV) technologies
- Likely to build off work from THEA/University of Arizona
  - LIDAR at intersection for conflict detection
  - Enhanced GPS version due out late 2017
  - Wayfinding for visually disabled
  - One way communication of alerts
    - DSRC, cellular, and Wi-Fi



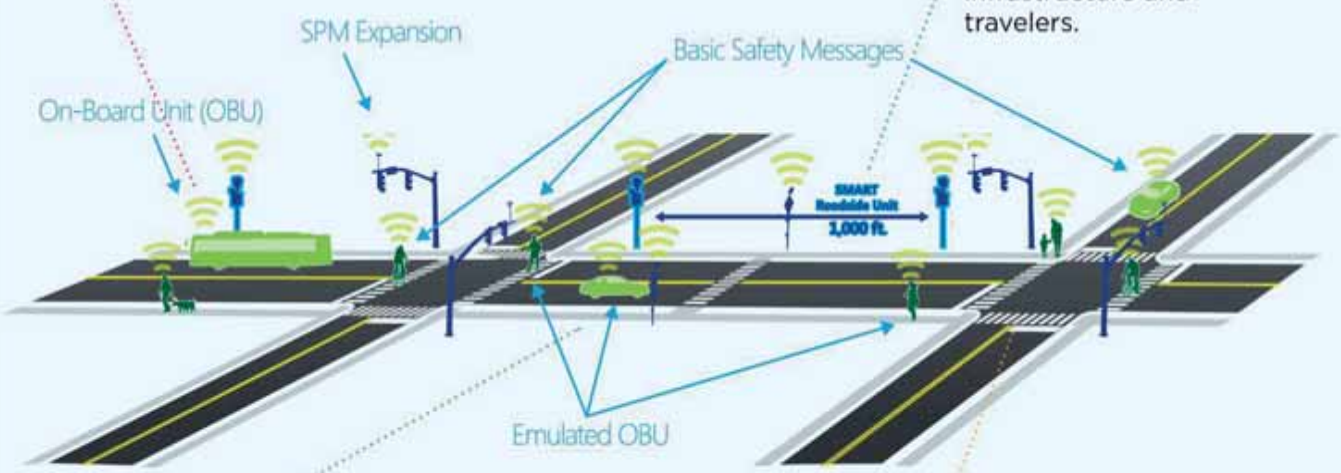
PedSafe

ON-BOARD UNITS (OBU)

Physical on-board units will be installed on buses and fleets.

SMART ROADSIDE UNITS

These physical units will facilitate communication between the infrastructure and travelers.



EMULATED OBUs

Pedestrians, bicyclists, and motorists do not need a physical OBU, they can emulate one on their smartphones.

SIGNAL PERFORMANCE METRICS

Automated performance metrics will enable real-time incident and congestion management.

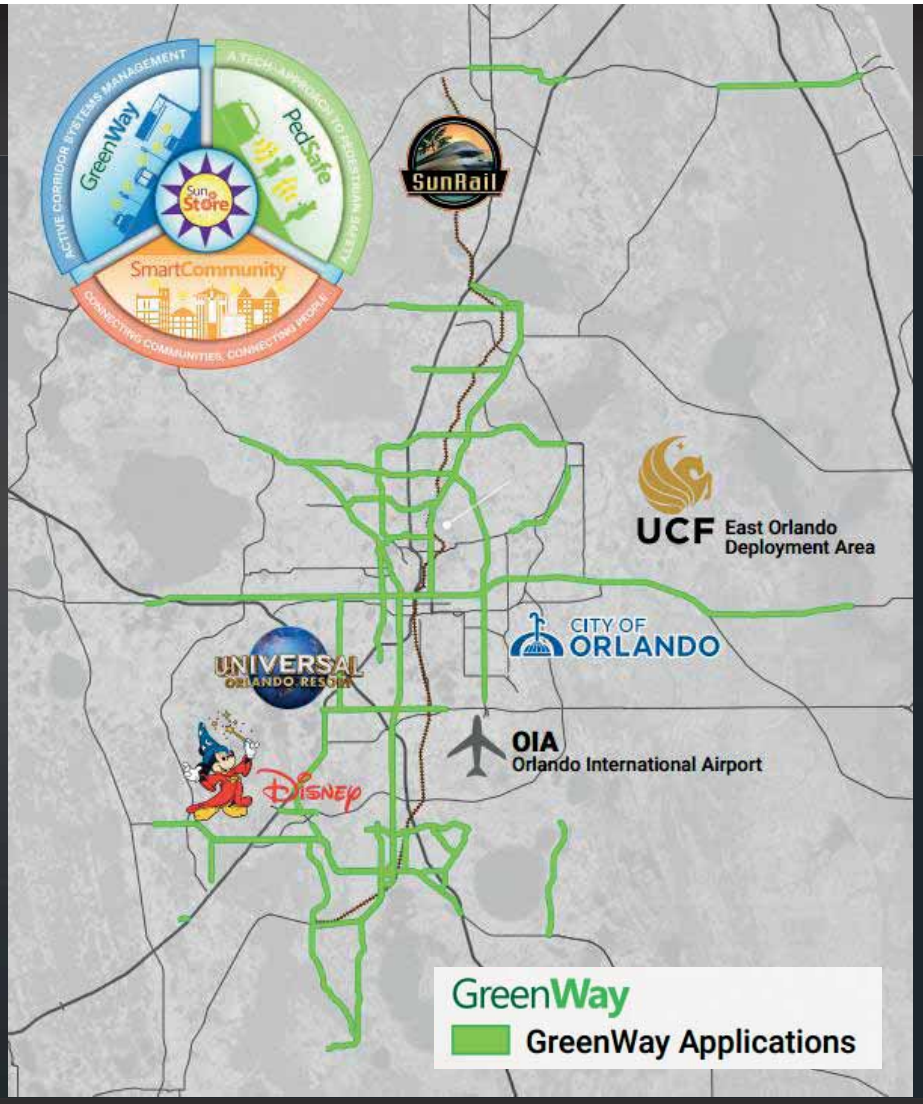

LAKE
BREVARD
ORANGE
UCF Area
Pine Hills
UCF
East Orlando
Deployment Area
CENTRAL FLORIDA
RESEARCH PARK
CITY OF
ORLANDO
UNIVERSAL
ORLANDO RESORT
Disney
OIA
Orlando International Airport

Green**Way**

- Multimodal Integrated Corridor Management
- Real-time traffic signal analytics and control
- Adaptive Traffic Signal Interface with Track Positive Train Control
- Conditional Transit Signal Priority

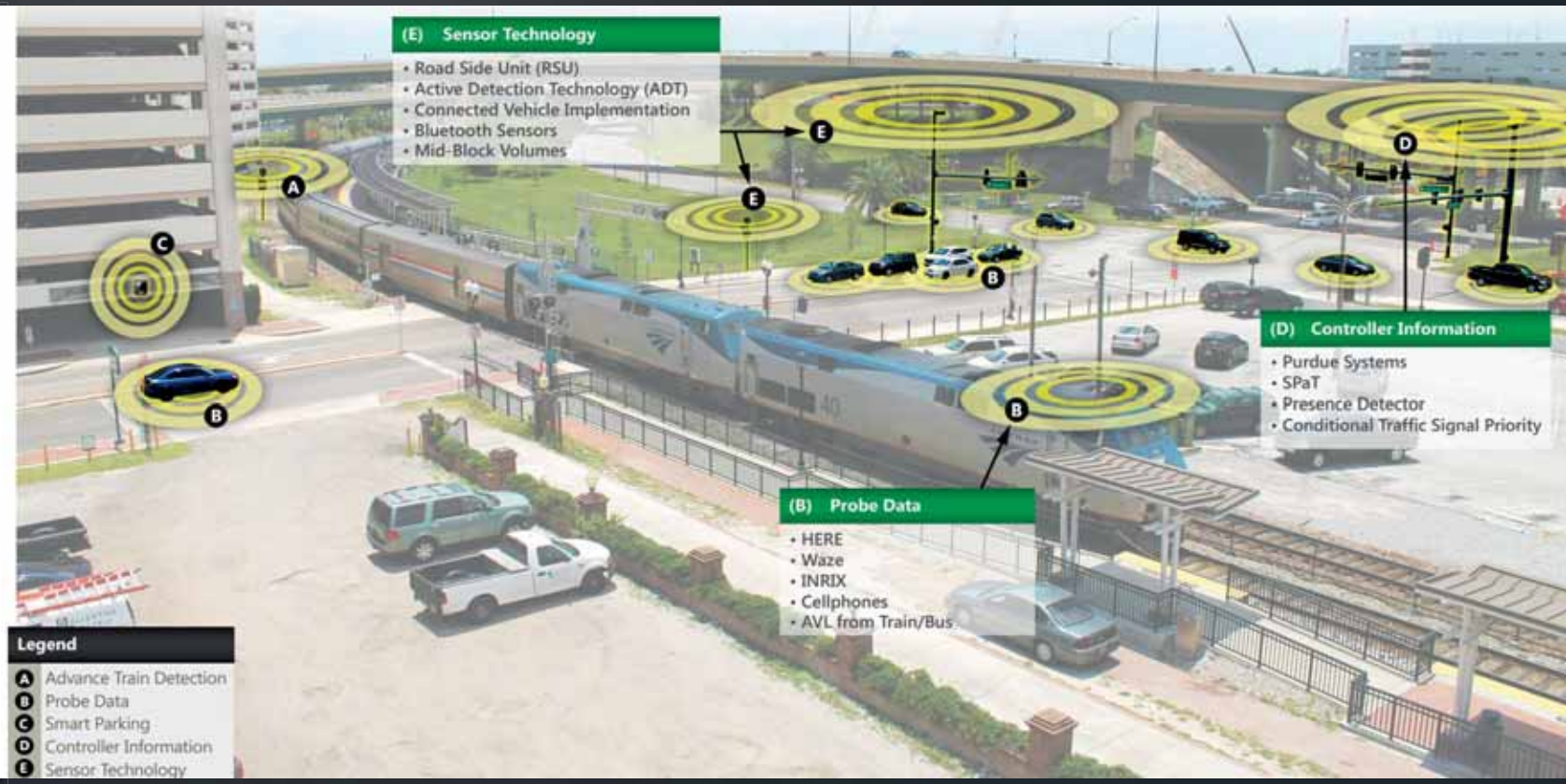
Scalability and Portability

- Manage major corridors throughout the District
- Inside and outside of MetroPlan Orlando



Latest and Greatest Roadside Technology

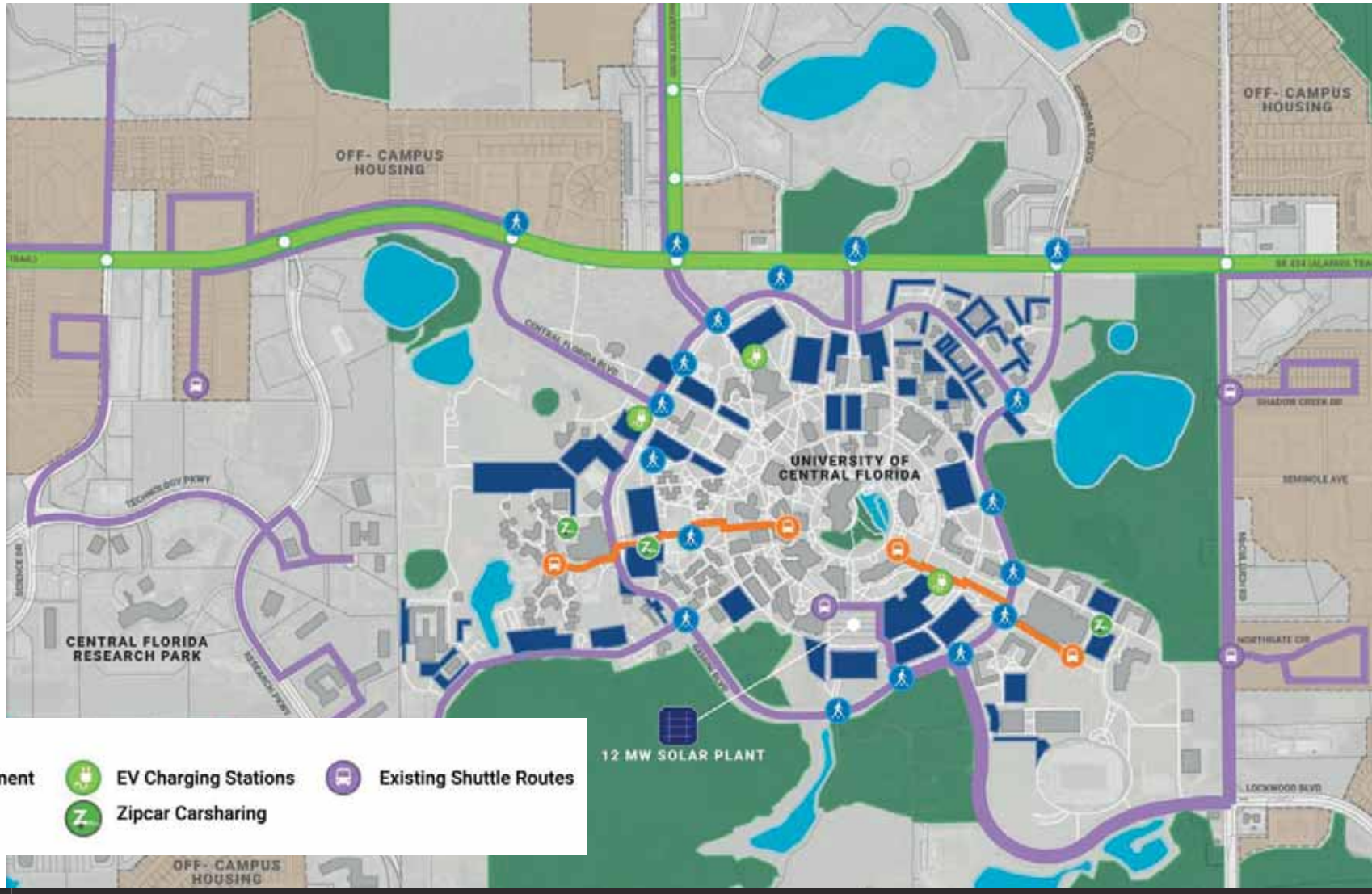
GreenWay



Smart**Community**

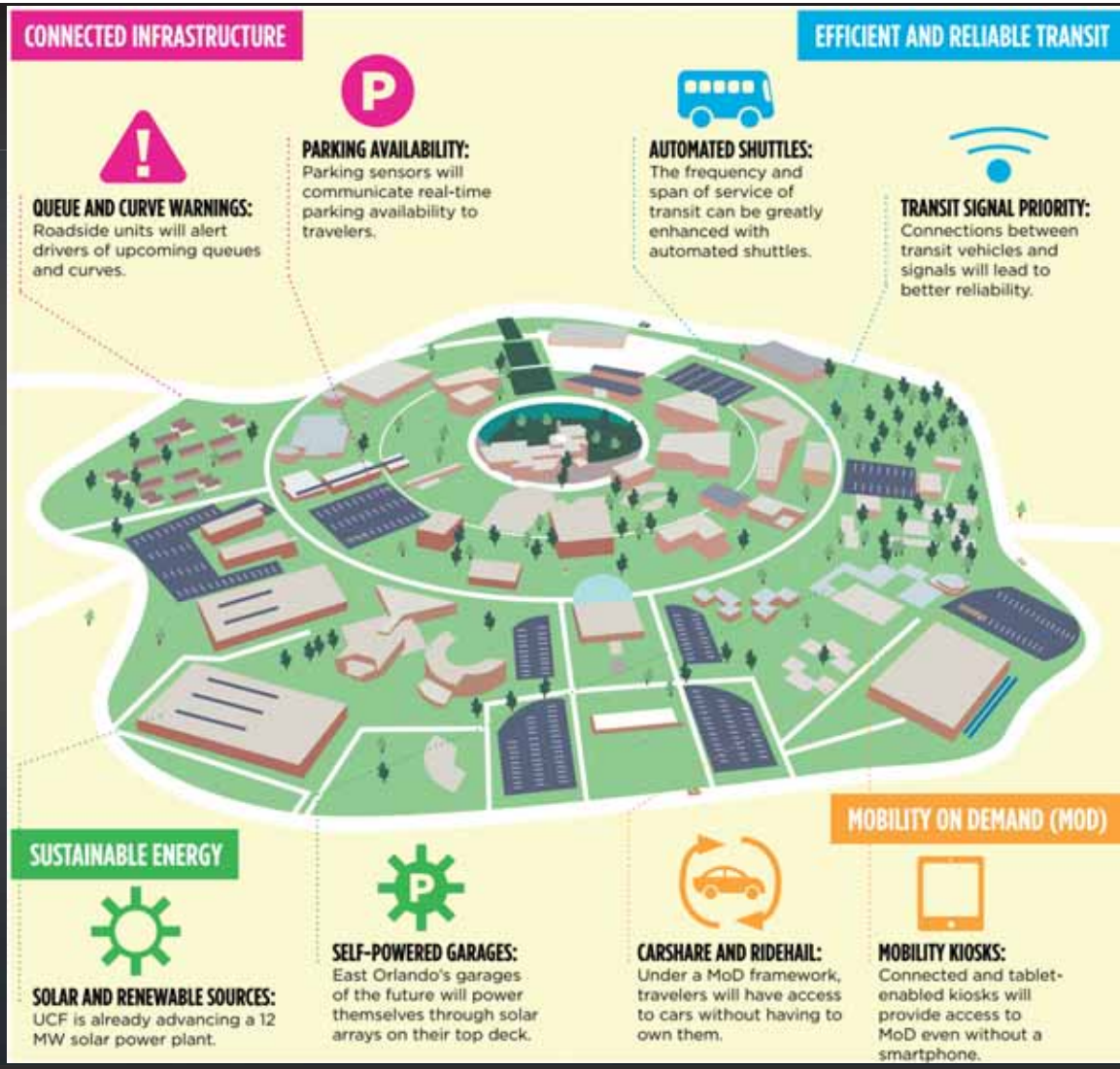
- Leveraging Aspects of Smart Cities
- Developing Mobility on Demand (MoD) framework
- Trying to pave way for Mobility as a Service (MaaS)

SmartCommunity



Latest and Greatest Smart Cities Technology

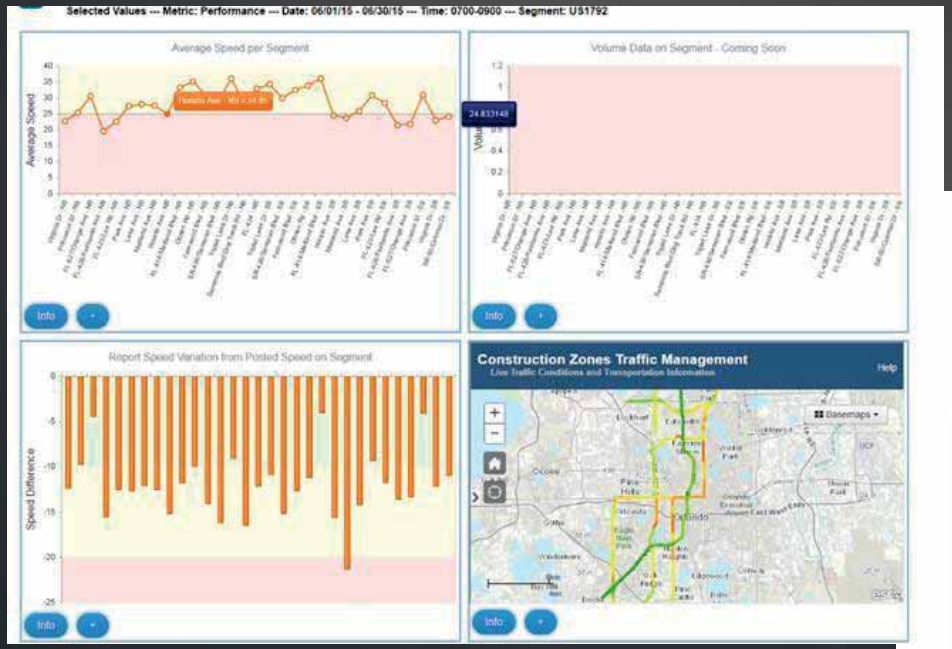
- Transit Kiosk
- Connected Vehicle Technology
  - Safety and Mobility Applications
- Autonomous Vehicles
- Solar Energy
- Real-Time Multimodal Data
  - Bus Automated Vehicle Location
  - Parking Availability
  - Travel Times
  - Ride Share Availability
  - Transit Demand



Sun**Store**

- Engine the makes everything work
- Performance Management
- Keeping everyone on same page
- Latest and Greatest Technology for Data Management

Planning Dashboards



Synergies

- Central Florida Automated Vehicle Partners
- Tampa CV Pilot
- Smart City Council Designation

Questions and Answers

- Continue to invest in O&M
  - Improve security by complying with standards
  - Implementing Standard Configuration of Devices
  - Continue establishment domain trusts, BGP, and IP scheme
  - Repairing end devices (detectors, cameras, and sensors)
- Continue effort to share resources
  - Software
  - Data Sharing
  - Fiber

QUESTIONS?

TSM&O Consortium Meeting

MEETING AGENDA

D5 Urban Office
133 S. Semoran Blvd.
Orlando, FL 32807
Lake Apopka A Conference Room

June 29, 2017; 10:00 AM-12:00 PM

1) WELCOME

2) TSM&O DOCUMENTATION UPDATE

   - David Williams, VHB

3) OPENING THE DOOR TO MULTIMODAL APPLICATIONS – IMPORTANCE OF GTFS,[1] GTFS-REALTIME, AND DATA QUALITY

   - Dr. Sean J. Barbeau, Center for Urban Transportation Research (CUTR)

4) *STATE OF THE SYSTEM* UPDATES BY LOCAL AGENCIES

5) CURRENT INITIATIVES

   - Jeremy Dilmore, District Five TSM&O (Ryan Cunningham)

[1] General Transit Feed Specification