Homework and Study Guide

To effectively prepare for the June 2017 Transportation Commission meeting please review materials included and referenced within this study guide. These materials have been compiled to provide background and information to guide Transportation Commission discussion.

To help prepare for our discussion of transit agencies in the Ann Arbor area, please review the following, provided by the Ann Arbor Area Transit Authority (AAATA):

- Key Transit Principles (Jared Walker Human Transit)
- TheRide's Transit Improvement Plan and Community Reports

For additional background about Smart Cities and Intelligent Transportation Systems (ITS):

- City of Ann Arbor Traffic Signal System Overview (attached)
- Honda Vehicle to Pedestrian (V2P) Technology Safety Scenarios (Video)
- ITE Article- Smart Cities and Communities (attached) (Note: this was also provided as a resource with the May 2017 Homework and Study Guide)

Traffic Signal System Overview

The City of Ann Arbor maintains and operates traffic signals at 162 signalized intersections to provide safe, reliable and efficient service to all road users. Of all the traffic signals maintained by the City, 38 traffic signals are under jurisdiction of the Michigan Department of Transportation and two (2) traffic signals are on the University of Michigan properties.

Staff inspects traffic control devices at signalized intersections annually and completes repair as needed. In addition to preventive maintenance, other needs for repairs and upgrade are identified through sources such as road user experience, capital improvement projects, private development projects, partner agency request, changes in traffic demand, and advancement in technology.

An extensive and expanding fiber communication network supports the operations of traffic signals. The majority of traffic signals in the City communicate via the fiber network to a central management system. Intersections that currently do not have communication capability include the ones listed below. Staff will identify opportunities to bring communications to these intersections.

- Barton & Pontiac Trail
- Hubbard & Huron Pkwy
- Huron Pkwy & Platt
- Maple & Pauline

The central management system utilizes TACTICS software from Siemens to routinely check traffic signal status, synchronize controller clocks, collect data and change timing plans. Since 2004, City has deployed an 'off-the-shelf' signal control system, Split Cycle Offset Optimization Technique (SCOOT) by Siemens. This traffic adaptive system optimizes signal operation in real-time, constantly minimizing delay. SCOOT has been operational on the following arteries.

- Washtenaw from S. University to US-23
- Plymouth from Swift to US-23
- Eisenhower/Packard from Ann Arbor–Saline to Turnberry
- South State from Airport to Oakbrook
- East Stadium from Packard to Washtenaw
- Packard from Stadium to Eisenhower
- Ellsworth from Varsity to Braeburn

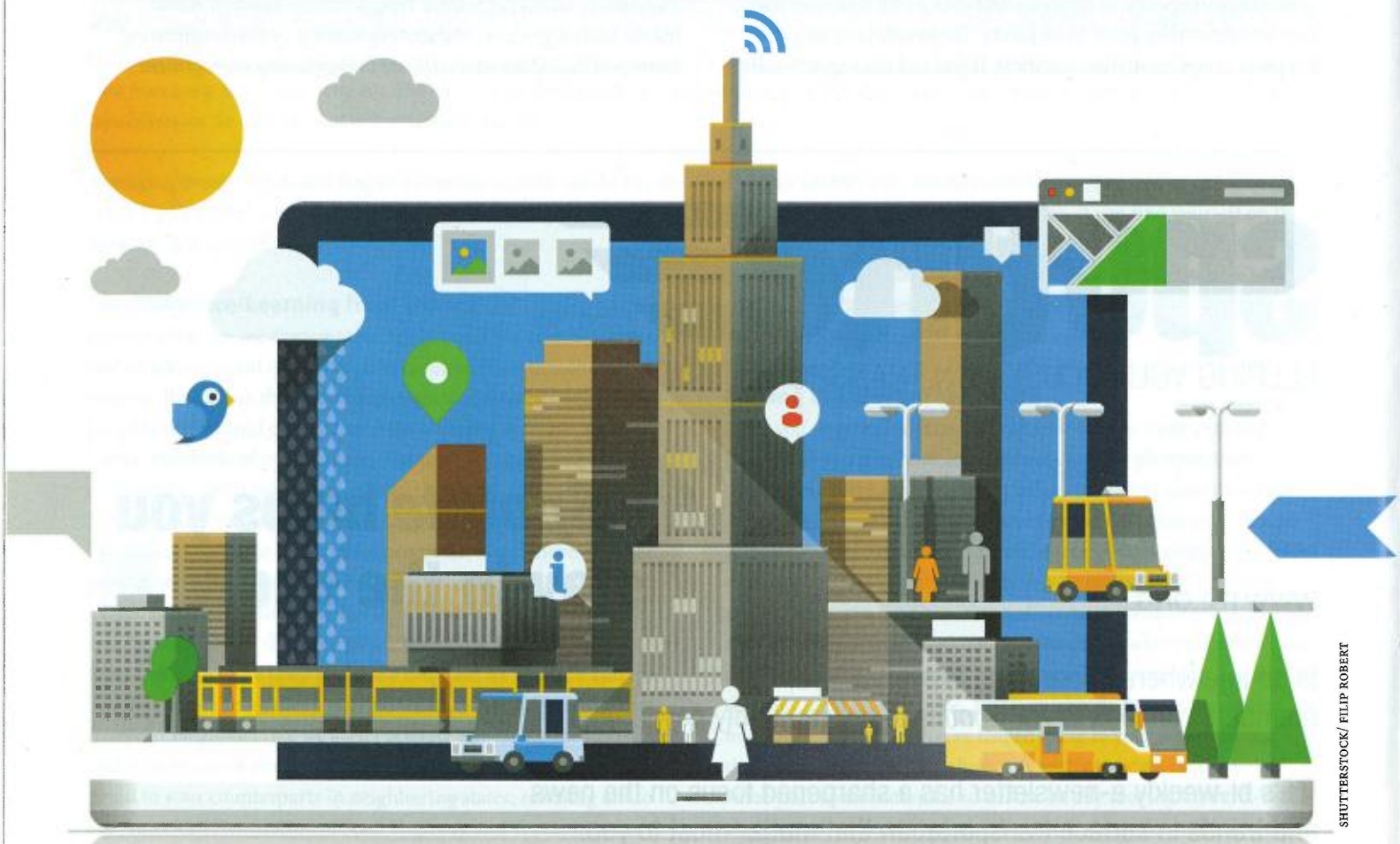
Traffic signal equipment and timing plans are often adjusted or reconfigured for special events and construction activities involving lane/road closure and traffic detour.

Traffic signal system operations service the entire transportation network. The City of Ann Arbor continues to evaluate the system and seek opportunities to improve signal functions to benefit all users

Smart Cities and Communities

By Egan Smith, P.E., PTOE, PTP

The United States' transportation system is facing a period of revolutionary changes. The U.S. Department of Transportation (USDOT) is investing in the advancement and widespread deployment of innovative and life-saving technologies. This effort is part of USDOT's larger initiative to improve the future of transportation by moving toward a more intelligent and connected system.



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In 2014, USDOT released the *ITS Strategic Plan 2015–2019*, which outlines the direction and goals of USDOT's Intelligent Transportation Systems (ITS) Program and provides a framework around which ITS research, development, and adoption activities are conducted. The plan put forward a vision: "Transform the Way Society Moves."

As our environments become more connected, ITS will play an ever-more important and central role in our cities, towns, suburbs, and rural communities, between regions and across borders. The transportation system as a whole can best serve vital needs when it is using technology to its fullest potential and enabling transportation system managers to effectively "connect the dots" of information from various factors that affect transportation operations (e.g., weather, congestion, accidents, and unanticipated emergencies).

To accelerate the deployment of ITS, USDOT has awarded funding to the New York City Department of Transportation (NYCDOT); Tampa Hillsborough Expressway Authority (THEA); and Wyoming/ICF to pilot next-generation connected vehicle technology. The locations were selected in a competitive process to go beyond traditional vehicle technologies to help drivers better use the roadways to get to work and appointments, relieve the stress caused by bottlenecks, and communicate with pedestrians on cell phones of approaching vehicles. These three CV Pilot sites have developed comprehensive deployment plans and are now going through a design-build-test phase before running an operational environment. All information from these projects is publically available and used in various training and outreach activities.

The Smart City Challenge

To further the goal of developing a connected society, USDOT launched the Smart City Challenge in December 2015. As part of this effort, USDOT encouraged cities to put forward their best and most creative ideas for innovatively addressing the challenges they are facing. USDOT intended for the challenge to address how emerging transportation and other data, technologies, applications, and clean energy solutions can be integrated in a city to address transportation challenges cities are facing.

The Smart City Challenge called for more than merely introducing new transportation technologies. It required bold new solutions that would change the face of transportation by closing the gap between rich and poor; capturing the needs of both young and old; and bridging the digital divide through smart design so that the future of transportation meets the needs of all. USDOT identified twelve vision elements that comprise a Smart City with successful proposals aligning to some or all of the USDOT's vision elements and fostering integration between the elements. Through alignment with these vision elements, the Smart City Challenge is expected to improve safety, enhance mobility, enhance ladders of opportunity, accelerate the transition to clean transportation, and address climate change.

Figure 1. Twelve vision elements that comprise a Smart City, as ide... by USDOT.

DOT's 12 Priority of Vision Elements	
Vision Element	**Priority**
Technology Elements	
Vision Element #1: Urban Automation	Highest Priority
Vision Element #2: Connected Vehicles	Highest Priority
Vision Element #3: Intelligent, Sensor-Based Infrastructure	Highest Priority
Innovative Approaches to Urban Transportation Elements	
Vision Element #4: Urban Analytics	High Priority
Vision Element #5: User-Focused Mobility Services and Choices	High Priority
Vision Element #6: Urban Delivery and Logistics	High Priority
Vision Element #7: Strategic Business Models and Partnering Opportunities	High Priority
Vision Element #8: Smart Grid, Roadway Electrification, and Electric Vehicles	High Priority
Vision Element #9: Connected, Involved Citizens	High Priority
Underlying Smart City Elements	
Vision Element #10: Architecture and Standards	Priority
Vision Element #11: Low-Cost, Efficient, Secure, and Resilient Information and Communications Technology	Priority
Vision Element #12: Smart Land Use	Priority

USDOT sought bold and innovative ideas for proposed demonstrations to effectively test, evaluate, and demonstrate the significant benefits of smart city concepts. Seventy-eight cities submitted entries to the competition, and in March 2016, seven finalists were selected. These finalists were Austin, TX; Columbus, OH; Denver, CO; Kansas City, MO; Pittsburgh, PA; Portland, OR; and San Francisco, CA. Finalists were awarded $100,000 to develop detailed applications on their proposed plans to conduct a federally funded Smart City Demonstration in their jurisdiction.

Smart Columbus

In June 2016, Columbus was selected as the winner of the Smart City Challenge and will receive $40 million from USDOT and $10 million from Paul G. Allen's Vulcan, Inc. to supplement the $90 million that the city raised from other private partners to carry out its plan for a smart city demonstration. Using these resources, Columbus will work to reshape its transportation system to become part of a fully-integrated city that harnesses the power and potential of data, technology, and creativity to reimagine how people and goods move throughout their city.

Columbus' smart city demonstration will occur over a 4-year period and will pilot projects in four distinct types of districts (residential, commercial, downtown, and logistics). To tackle the challenges each community faces, the Smart Columbus Program included smart solutions built on four core-enabling technologies:

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Columbus, OH, USA, winner of the Smart City Challenge.

- The **Connected Columbus Transportation Network** will include traffic signals equipped with traffic detection and sensors, dedicated short-range communications (DSRC), and pedestrian detection; truck loading zones with machine vision detection of zone availability; multifunction kiosks with transit service information, first/last mile and bikesharing and carsharing information, parking availability, and Wi-Fi hot spots.
- The **Integrated Data Exchange** open data environment will contain data from many different sources; generate performance metrics for program monitoring and evaluation; transparently serve the needs of public agencies, researchers, and entrepreneurs; provide practical guidance and lessons learned to other potential deployment sites; and assist health and human service organizations.
- A suite of applications and processes will deliver **Enhanced Human Services** to residents and visitors. These applications include a multimodal trip planning application, a common payment system for all transportation modes, a smartphone application for assistance to persons with disabilities, and integration of travel options at key locations for visitors.
- Smart Columbus will expand the Smart Grid program and increase **Electric Vehicle (EV) Infrastructure**. The city will install vehicle-to-grid capability for charging stations to manage grid resources, provide assistance and analysis to fleet operators to encourage EV adoption, increase investment in EV charging, create customer education programs, and create an EV cooperative buying program.

Conclusion

Through a cooperative agreement, the ITS Joint Program Office (JPO) and our modal partners at USDOT will work with Columbus to implement its Smart Columbus program. USDOT will provide technical assistance to support planning, design, implementation, evaluation, and outreach. The challenge has garnered global interest catapulting the United States and USDOT into a leadership position in the Internet of Things/Smart Communities emerging technology field. An independent evaluation will be conducted to monitor the impact of the demonstration on mobility, safety, ladders of opportunity, efficiency, clean energy, sustainability, and climate change. This effort will produce a playbook to inspire other cities to advance smart city strategies throughout the United States and globally.

As new ITS technologies and systems evolve into market-ready products, USDOT is addressing questions associated with adoption and deployment. The goal is to speed up the transformation of ITS research and prototypes into market-ready technologies that are commercially viable and adopted by the transportation community. USDOT provides communication and education support to facilitate awareness, understanding, acceptance, adoption, and deployment of ITS technologies across stakeholder groups and ensures effective partnerships are fostered and developed at various levels—executive, program, and project. USDOT seeks to advance ITS work from research, to initial adoption, and subsequently on to wider-scale deployment in coordination with other stakeholders at the federal, state, regional, and local levels. **itej**

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