Falls Church Smart Communities

Northern Virginia Transportation Authority
Transportation Technology Committee Meeting

VIRGINIA TECH TRANSPORTATION INSTITUTE

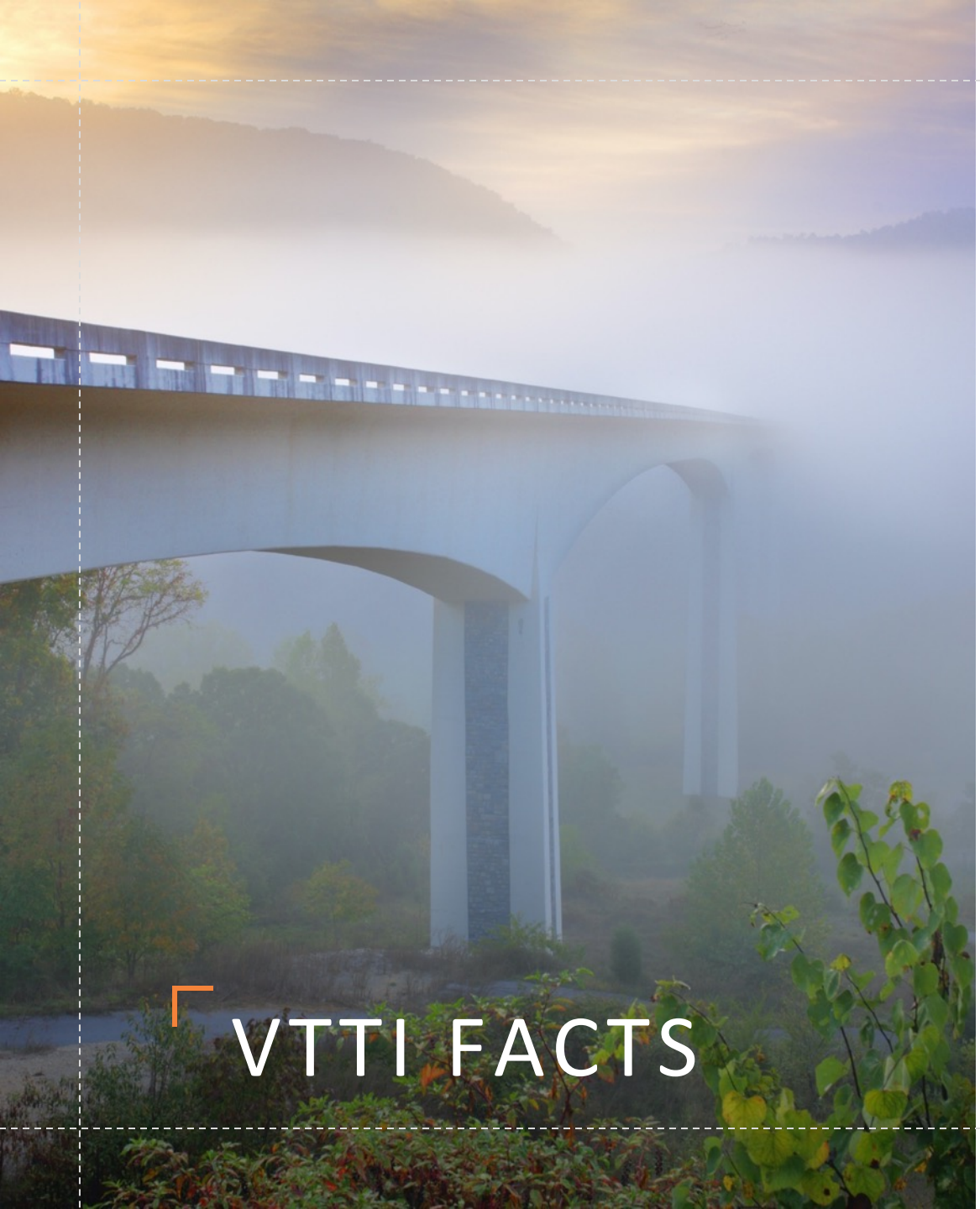
OCTOBER 21, 2021

VIRGINIA TECH TRANSPORTATION INSTITUTE

Background

ABOUT US

The Virginia Tech Transportation Institute (VTTI) conducts research to save lives, time, money, and protect the environment.

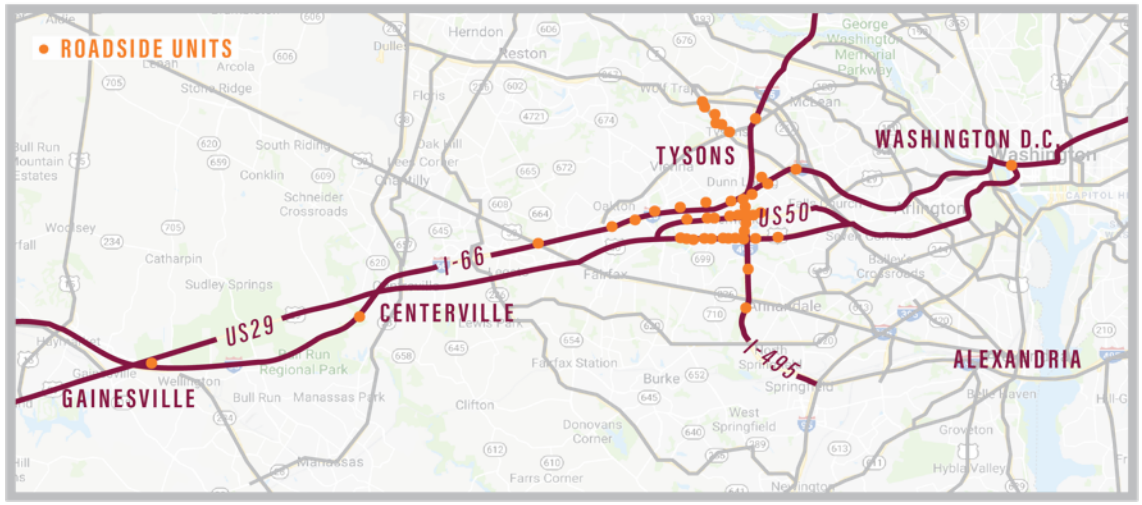


VTTI FACTS

- Top three transportation institute globally
- Largest group of driving safety researchers worldwide
- Pioneers of the naturalistic driving study research method (70M miles of data, 4,000 instrumented vehicles)
- 300 active projects and collaborations with more than 100 sponsors across the private and public sectors
- $46M annual sponsored program research expenditures (pre-pandemic)
- Over $60M in externally-sponsored awards in FY20/Q1 of FY 21
- 500 employed or partnering with VTTI, including graduate and undergraduate students
- ~12-15% of the Virginia Tech SPRE Portfolio
- Infrastructure worth more than $150M

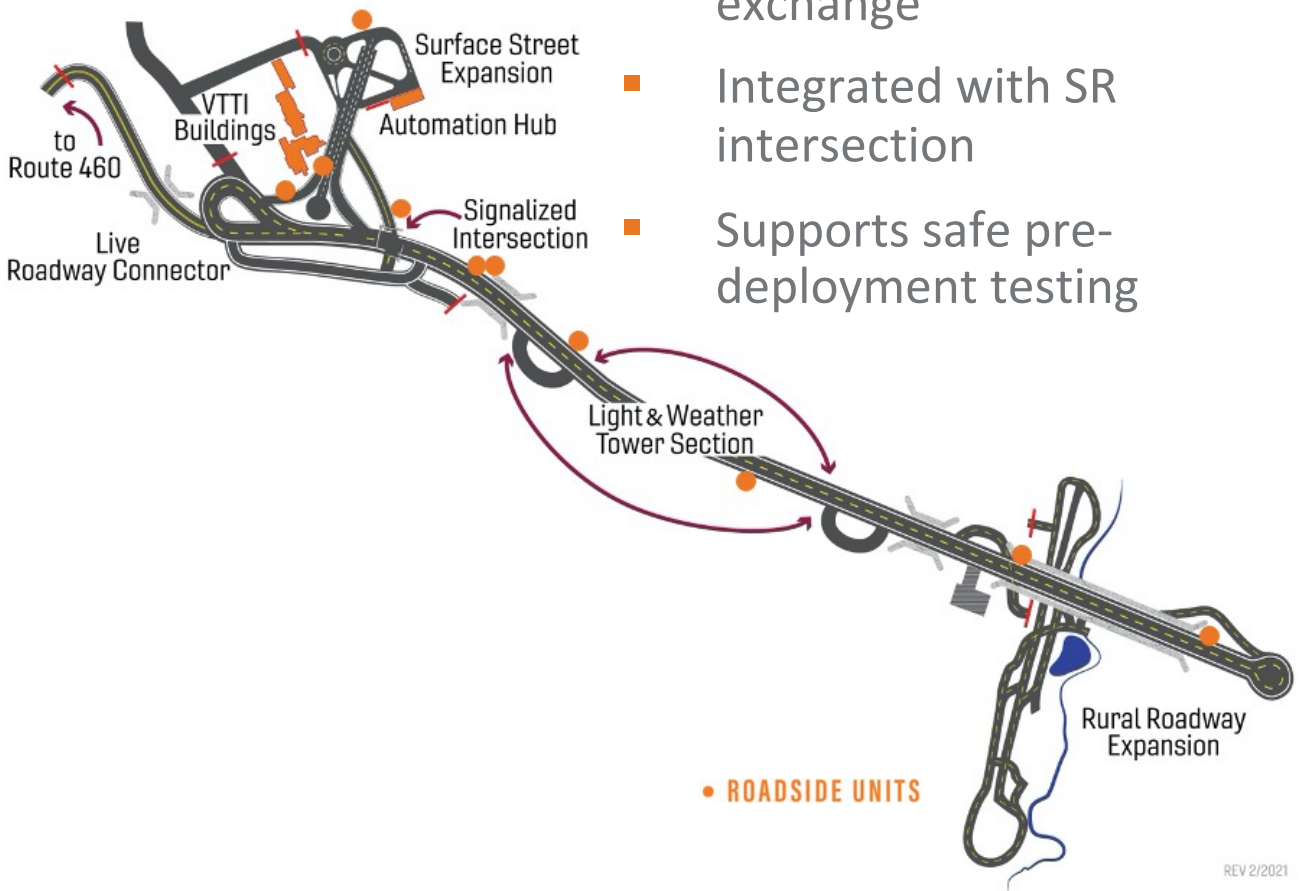
VTTI FACILITIES

VTTI's Virginia Connected Corridor Living Lab



Virginia Smart Roads

- 8 DSRC and 4 C-V2X / 5G RSUs
- Integrated with VCC data exchange
- Integrated with SR intersection
- Supports safe pre-deployment testing



Northern Virginia Testbed

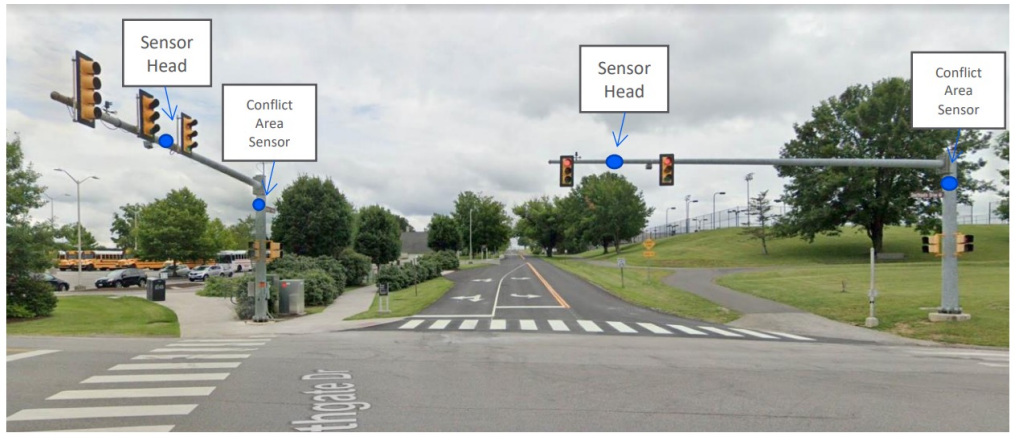
- 38 DSRC and 11 C-V2X / 5G RSUs
- Live operational environment
- Integrated into 30 intersections
- Supports on-road application testing and evaluation

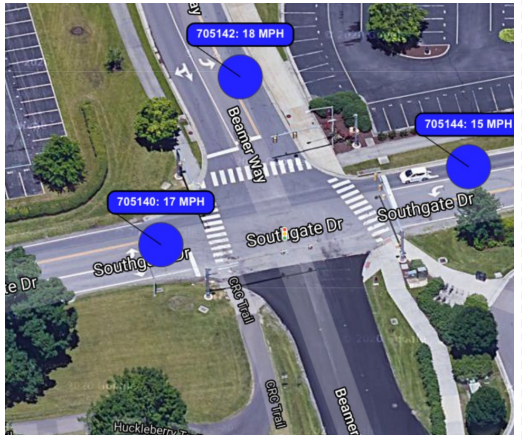
Smart Intersection Evaluation

Sponsor: Virginia DOT

Focus:

- Deploy smart intersection technologies on test track and in live operations
- Evaluate data quality, reliability, accuracy, latency
- Assess application requirements and align to available solutions
- Make recommendations for future deployments





Smart Adaptive Lighting

Sponsor: FHWA, Department of Energy, Virginia DOT

Impact:

- Developing approaches to lighting where lighting is dimmed or turned off when it is not needed
- Balancing the positive effects of lighting (safety/comfort) against the potential negative effects (health, environment, energy usage)
- Technology and standard development

Safety Monitoring of the Relay Low-Speed Automated Vehicle Deployment

Sponsor: VTRC / Fairfax County

Impact: Safety monitoring of SAE Level 4 shuttle in Fairfax County, VA.

- Providing traffic signal information to shuttle to support safe intersection operations
- Operations in mixed traffic on an urban circulator route (most complex route to date)
- 360-degree video with near real time evaluation
- First of its kind data reduction protocol to assess impact on direct and indirect traffic conflicts
- Facilitating NHTSA disengagement reporting requirements

eScooter Research Project

- Collaboration between Spin, Ford, and VTTI
- Co-funded by Spin and VTTI's Safe-D UTC Program
- Exclusive operation for one year with 200+ eScooters
- VTTI manages the research aspects of the program
- Goal: Assess impact of eScooter deployment on campus and provide data for policymaking
- Multiple safety issues identified and countermeasures deployed
- Overall – well received and safer than average deployment

Consortia Facilitation Examples

Automated Mobility Partnership
OEM's that fund and collaboratively solve challenging pre-competitive ADS issues through member-directed research program

Automated Truck Mounted Attenuator
Work zone safety stakeholders that co-funded the development of an automated TMA truck leading to a commercializable technology package

eScooter Research at Virginia Tech
Administrators, local government, public safety, risk management, and mobility researchers study deployment of scooters on VT's campus

National Surface Transportation Safety Center for Excellence
Program funded by GM, FMCSA, NSC, VDOT, VTTI, and insurance companies to develop and disseminate advanced transportation safety techniques and innovations in both rural and urban communities

Relay Safety Monitoring
A group of transportation stakeholders working together to address policy, legal, technology, safety, and mobility related challenges to develop an electric AV transit service on public roads

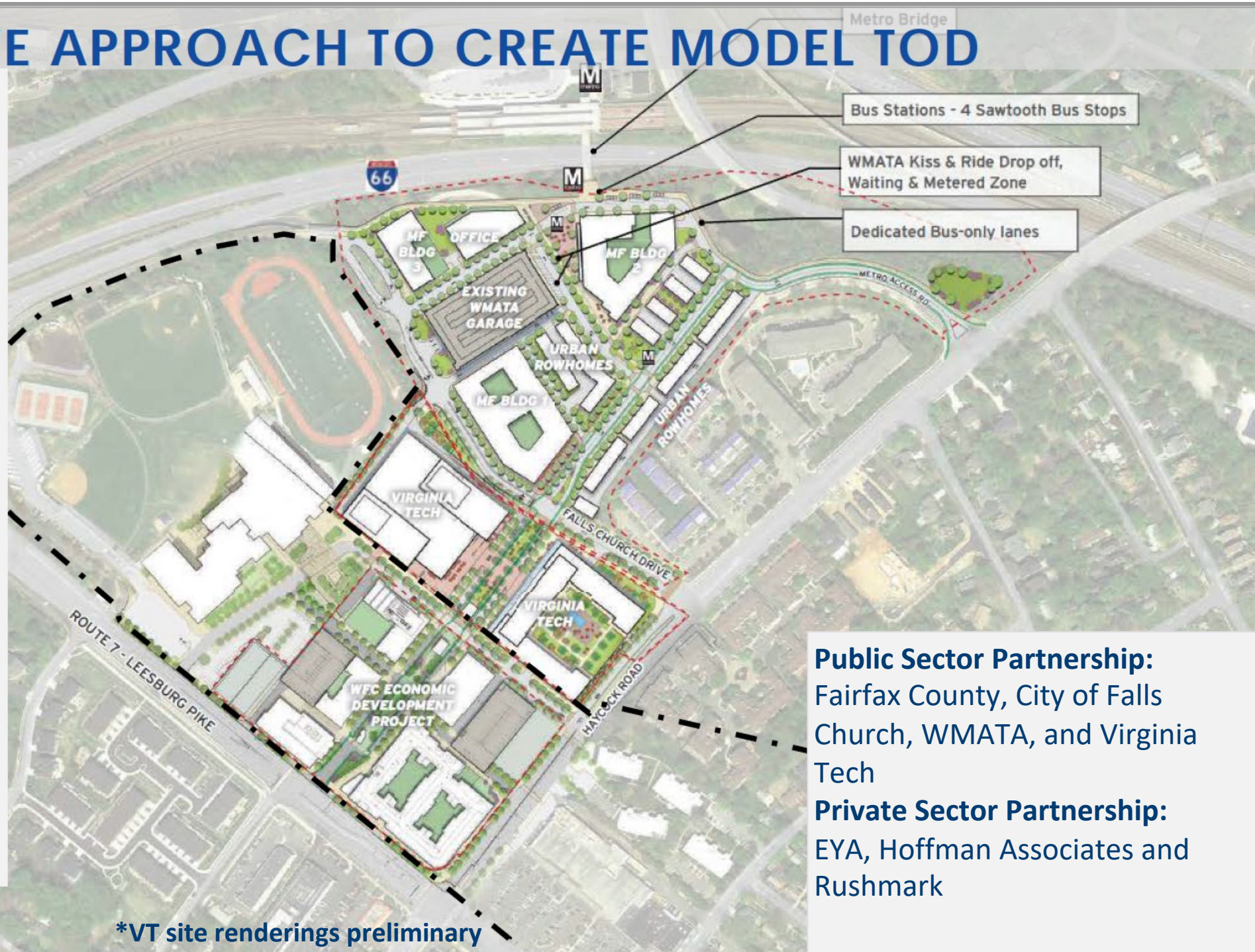
Falls Church Smart Cities

- VTTI to lead stakeholders in Smart Cities technology implementation in West Falls Church revitalization project
- Establish a sustained “living lab” environment
- $2M allocated to support road construction
- $8M allocated to select and deploy applications
- Public sector partners:
  - Virginia Tech
  - City of Falls Church
  - Fairfax County
  - WMATA
  - VDOT/VTRC

COLLABORATIVE APPROACH TO CREATE MODEL TOD

PROJECT BENEFITS:

- **40 Acre** Model TOD
- **$1.2 Billion** of investment
- **3 Million SF** of Development
- **Significant Tax Benefit** to the City, State and County
- Anchors:
  - 200K SF of Retail
  - Virginia Tech
  - 125K SF MOB
- Approximately 8,000 linear feet of **new and upgraded roads** to relieve regional traffic congestion
- 24 Acres of **open space** and 6 acres of parks
- 10% affordable housing relative to 8% elsewhere in Fairfax (Approx. 140 units).



*VT site renderings preliminary

Public Sector Partnership:
Fairfax County, City of Falls Church, WMATA, and Virginia Tech

Private Sector Partnership:
EYA, Hoffman Associates and Rushmark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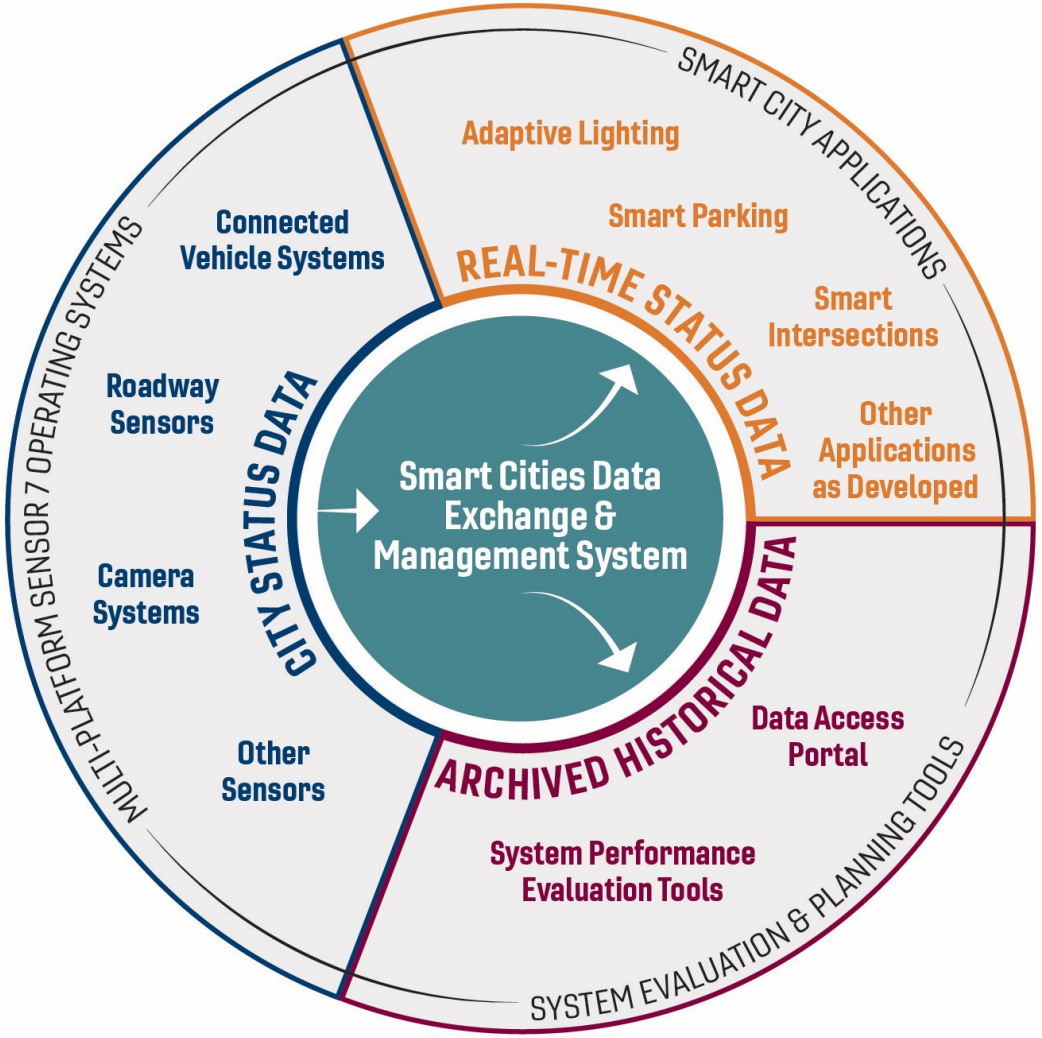
After a decade of trial and error, municipal leaders are realizing that smart-city strategies start with people, not technology. "Smartness" is not just about installing digital interfaces in traditional infrastructure or streamlining city operations. It is also about using technology and data purposefully to make better decisions and deliver a better quality of life.

McKinsey and Company. "Smart cities: Digital solutions for a more livable future", June 5, 2018



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Proposed Smart Cities Applications

Smart Cities Data Exchange and Management System ($2M)

- Real-time and archive data integrated from all city resources to support application of algorithm an AI For active and planning and decision making. This system is the basis of all Smart City applications.

Adaptive Lighting ($2M)

- An adaptive lighting system reduces energy consumption and the potential negative aspects of lighting such as an impact on sleep, safety, crime, and the environment.

Smart Parking and Payment ($1M)

- Provides information on the availability of parking spaces while reducing the need to hunt and seek for parking options. Information can be provided through signage and/or connected applications. Also provides a convenient payment while ensuring compliance.

Proposed Smart Cities Applications (cont'd)

Smart Intersections ($1M)

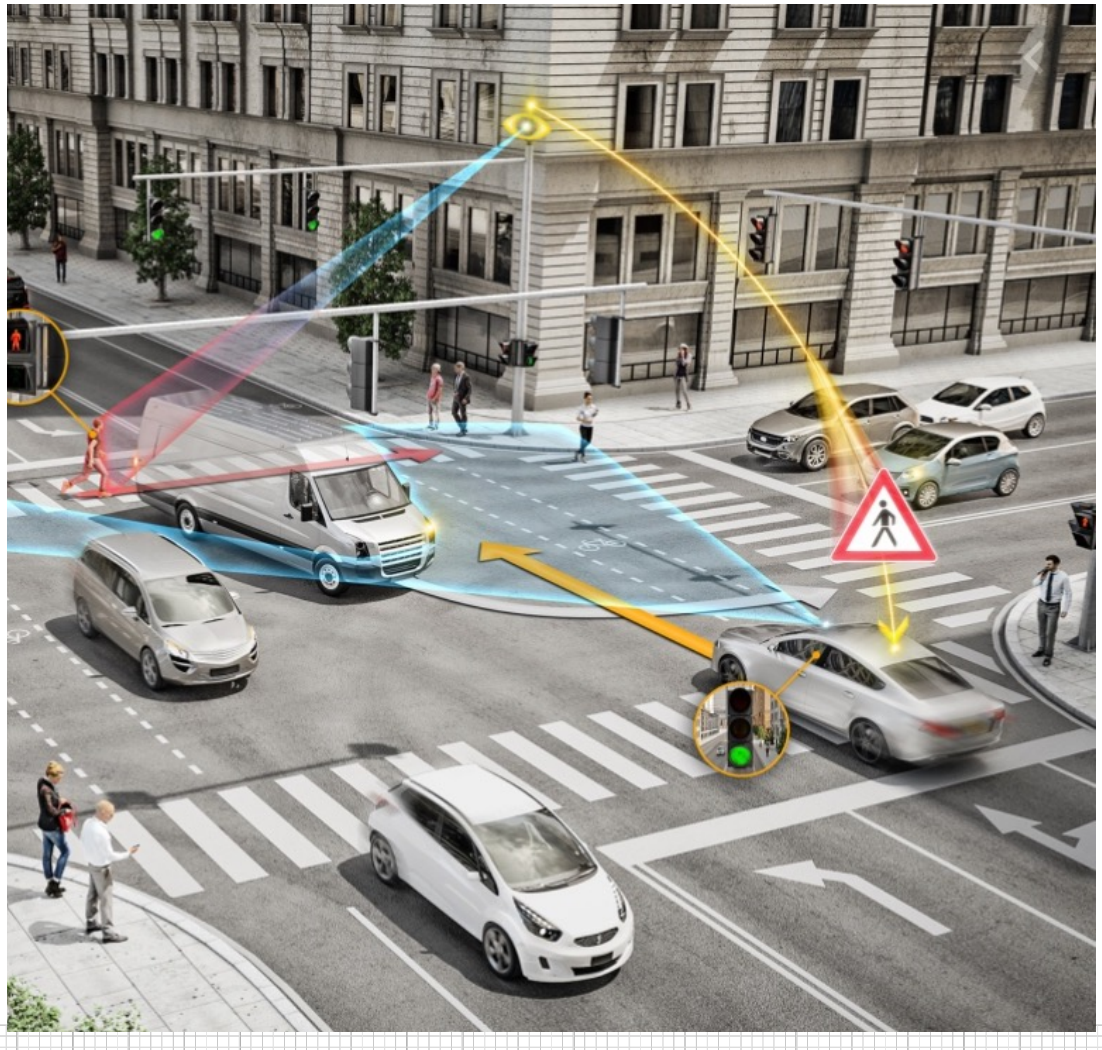
- Sensors provide presence of vehicle and pedestrians to adjust signal behavior, optimizing vehicle flow to reduce potential for delays and vehicle stoppage. Data about the signal behavior can also be provided to an automated or connected vehicle to allow for safety warnings, conflict detection, and vehicle speed optimization.

Data Access & Evaluation Tools ($2M)

- Provides historical and longitudinal data to allow informed and efficient placement, maintenance, and purchase of city resources. This is the analysis and audit system of the Smart City applications which will also provide data for expansion.

Roadway & Infrastructure Development ($2M)

- Build roadway and coordinate sensors with infrastructure (for example, type of roadway and/or building materials to avoid impacting sensor signals) to adequately house and protect the sensors.



Other Smart Cities Applications of Interest

Automated Shuttle and/or Package Delivery

- A variety of platforms and pilot services are becoming available. We'd could assess the local transport and delivery needs to identify and test the best option. On-demand, microtransit and how it interfaces with traditional transit to provide more convenience using less energy, etc.

Smart Waste Management

- Trash cans can be outfitted with sensors and compactors allowing for on-demand servicing. These programs have been shown to reduce garbage truck trips by more than 80% in pilot deployments.

Unique Embedded Sensing Systems

- Fiber sensing for temperature, sound, strain can provide information about road freezing, traffic flow, fires, crowds, etc.

Key Elements to Success

Technology Base

- A wide variety of sensors deployed with high speed, high bandwidth connectivity feeding their data to a common storage and compute system. A large number of users with access driven by ubiquitous connectivity.

Applications

- Applications that can tap into a wide variety of data sources and take unique approaches to solving life's challenges. Mobility, health, security, waste management, air quality, safety. Applications must connect users to their communities and community leaders.

User Engagement

- Engagement and adoption by a wide range of connected, motivated users fuels the fire of success. Ideation, context, and feedback are key elements of the process.

Current Program Status

Pre-award Kickoff held at VTTI in Blacksburg July ‘21

- Established governance structure and initial working groups
- Group charters and meeting invites to distributed post award

Latest Information – Planning Project

- Initial 4 mo Planning Project between VTTI and VTRC expected award October 15, 2021
- Collaborative effort led by VTTI to develop a Phase 1 project plan
  - Establish Steering Committee, Working Groups, and Key Subgroups
  - Determine immediate needs and priorities
  - Propose a community engagement plan

Phase 1 Project

- TBD, expected beginning Q2 ‘22

Questions?

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