

Pennsylvania Safety Transportation and Research Track (PennSTART)



2018 Transportation Engineering and Safety Conference
Session 2C: Transportation Research and Testing Facilities
December 5, 2018

Introductions and Agenda

- Overview and Systems Engineering Process
- Feasibility Study and Concept Exploration
- Concept of Operations
- Next Steps and Schedule



OVERVIEW AND SYSTEMS ENGINEERING PROCESS

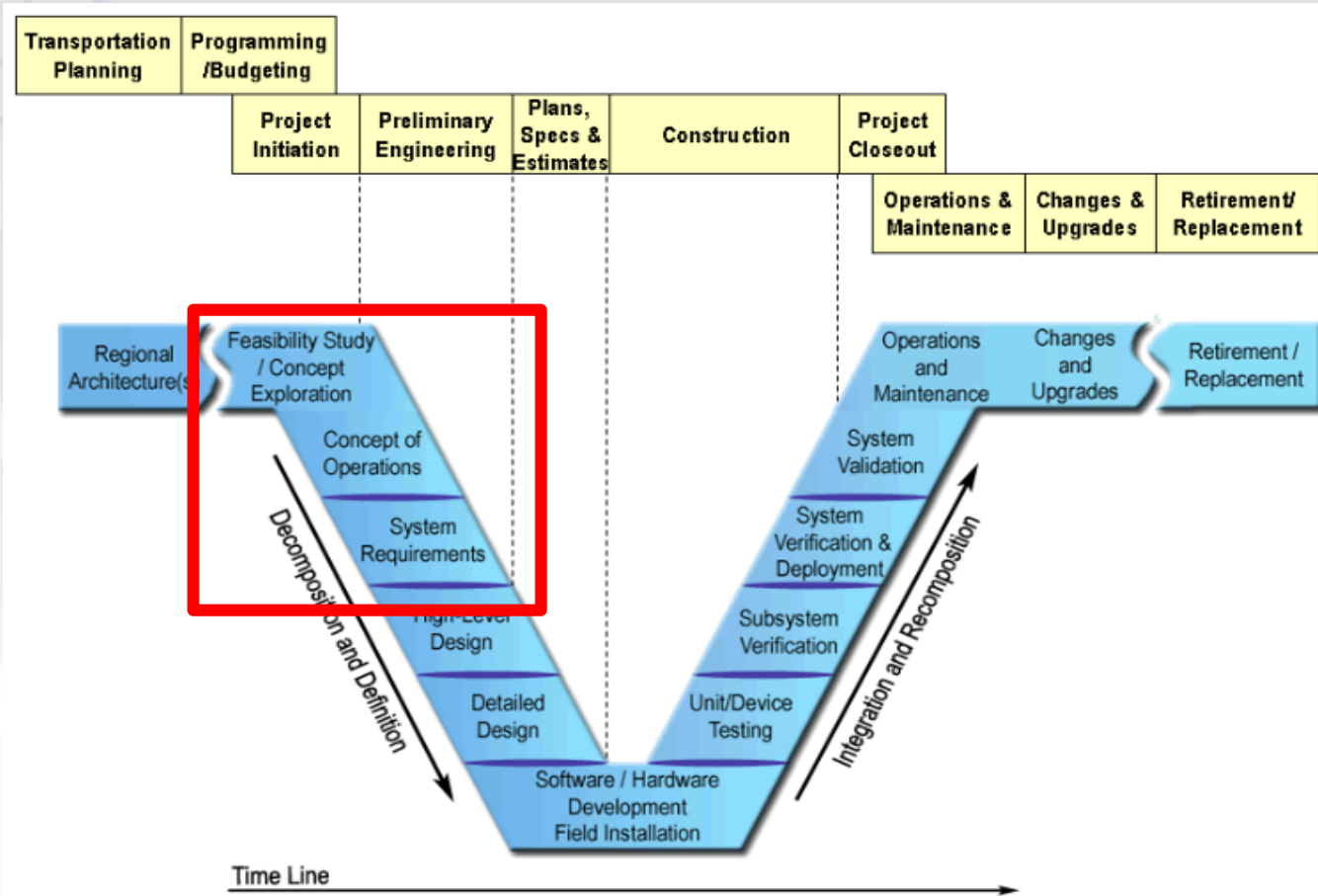
Overview

- High-speed test track and transportation facility for research, testing, and training
- Designed to accelerate innovation in the areas of:
 - Safety testing and training for traffic incident management (TIM), work zones, railways and crossings, and aircraft;
 - Connected and autonomous vehicle (CAV) testing; and
 - Tolling and intelligent transportation systems (ITS) technology testing.

Overview

- Targets private and public-sector end-users to form a collaborative environment that drives emerging innovation from three cornerstones:
 - Public Sector Testing and Training
 - Private Sector Testing and Research
 - Academic Sector Testing and Research
- Spearheaded and lead by a unique partnership between the PA Turnpike Commission, PennDOT, and Penn State University

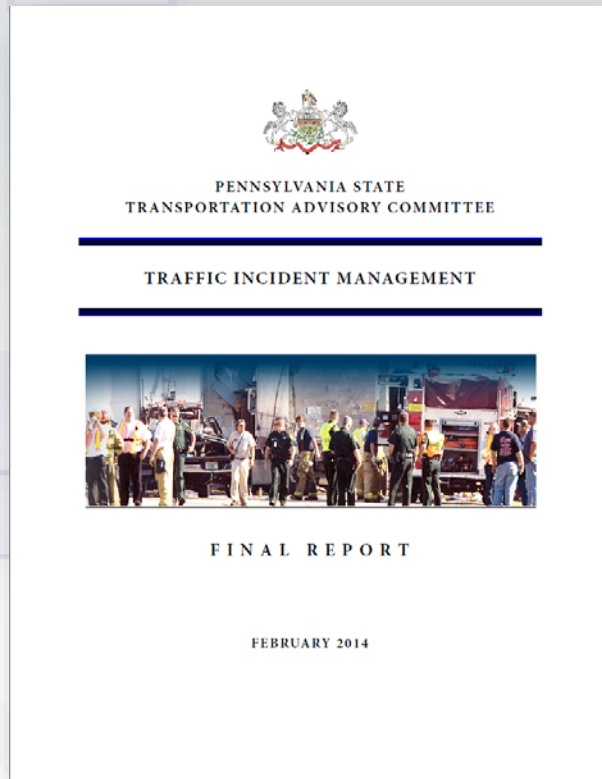
Systems Engineering Process (SEP)



FEASIBILITY STUDY AND CONCEPT EXPLORATION

Background

2014 PA Transportation Advisory Committee TIM Study



2016 PA TIM Summit

TIM SUMMIT

PenNSylvania Traffic Incident Management (TIM)

Pennsylvania Agencies Host Statewide TIM Kick-off Meeting

On November 16, 2016, the Pennsylvania Department of Transportation (PennDOT), Pennsylvania Emergency Management Agency (PEMA), Pennsylvania State Police (PSP), and the Pennsylvania Turnpike Commission (PTC) hosted and participated in an inaugural kick-off meeting to discuss the results of the Pennsylvania Transportation Advisory Committee's (TAC) 2014 Traffic Incident Management Report and identify critical next steps to implement a statewide TIM program.

The meeting was held at PEMA Headquarters in Harrisburg, PA, and included 107 attendees representing a diverse cross-section of TIM stakeholders as listed to the right. The meeting included a series of presentations and guest speakers that discussed the following:

- 1. The Importance of TIM and the State of TIM in PA
- 2. Survivor Story from a former Lionville Fire Department Volunteer
- 3. 2014 TAC Study Review
- 4. Success Stories and Exemplary Practices from Peer States

The meeting also included Breakout Work Sessions focusing on the 2014 TAC Study Recommendations and established the following priorities for success moving forward:

1. Establish a PennTIME program
2. Establish an Executive Statewide Incident Management Panel
3. Establish a Joint Operational Policy
4. Enhance and coordinate joint training activities
5. Improve Driver Education and Outreach

Based on these priorities, the critical next steps are to obtain executive level buy-in and commitments from each participating state agency and key stakeholders as the foundation for establishing an Executive Statewide Incident Management Panel and Joint Operational Policy as the foundation for the PennTIME program. Additionally, TIM partners will continue to garner support from the Pennsylvania State Legislature to advance critical TIM policies. Finally, public education and awareness will be promoted through the update to Pennsylvania's Strategic Highway Safety Plan.

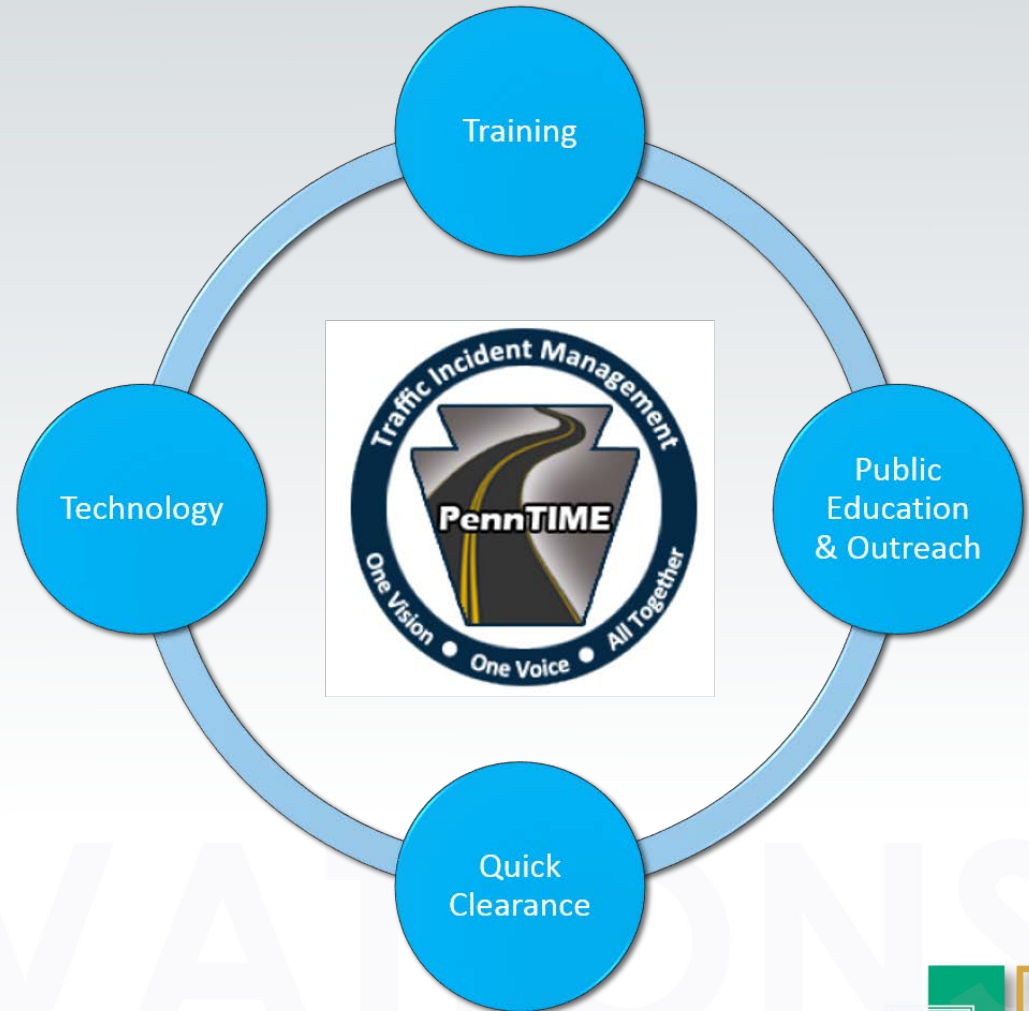
PA TIM Meeting Participants

- AAA
- County Commissioners Association
- Delaware Valley Regional Planning Commission (DVRPC)
- Federal Highway Administration (FHWA)
- Ohio Department of Transportation
- Ohio State Highway Patrol
- PA Chief of Police
- PA Councils Association
- PA Fire Police Association
- PA League of Cities and Municipalities
- PA Motor Truck Association
- PA State Association of Boroughs
- PA State Association of Township Supervisors
- PA Sewing Association
- Pennsylvania Department of Transportation (PennDOT)
- Pennsylvania Emergency Management Agency (PEMA)
- Pennsylvania State Police (PSP)
- Pennsylvania Turnpike Commission (PTC)
- Regional Safety
- South Central Task Force
- Southwestern Pennsylvania Commission (SPC)
- Volunteer Fire Institute Services
- New Jersey Department of Transportation
- New Jersey State Police Incident Management Unit
- Maryland CURE
- Tennessee Highway Patrol

Background

2017

PENNSYLVANIA TRAFFIC INCIDENT MANAGEMENT ENHANCEMENT (PENNTIME) JOINT OPERATIONAL POLICY



Feasibility Study

- Funded by the PA Turnpike Commission and PA State Transportation Innovation Commission (STIC)
- Conducted between January 2017 – August 2018
- Defined Purpose and Need, and preliminary operations model and concept plan
- Formalized partnership between PennDOT, PA Turnpike and Penn State



Purpose and Need

- Evaluate the need and demand for a PA-based, Mid-Atlantic TIM Training Facility
- Centrally located facility offering:
 - Hands-on, multi-agency and multi-disciplinary TIM training
 - Certified TIM training for partners across the Mid-Atlantic region
 - Simulated environment with a variety of incident scenarios
 - Innovative technologies and equipment testing related to roadway safety



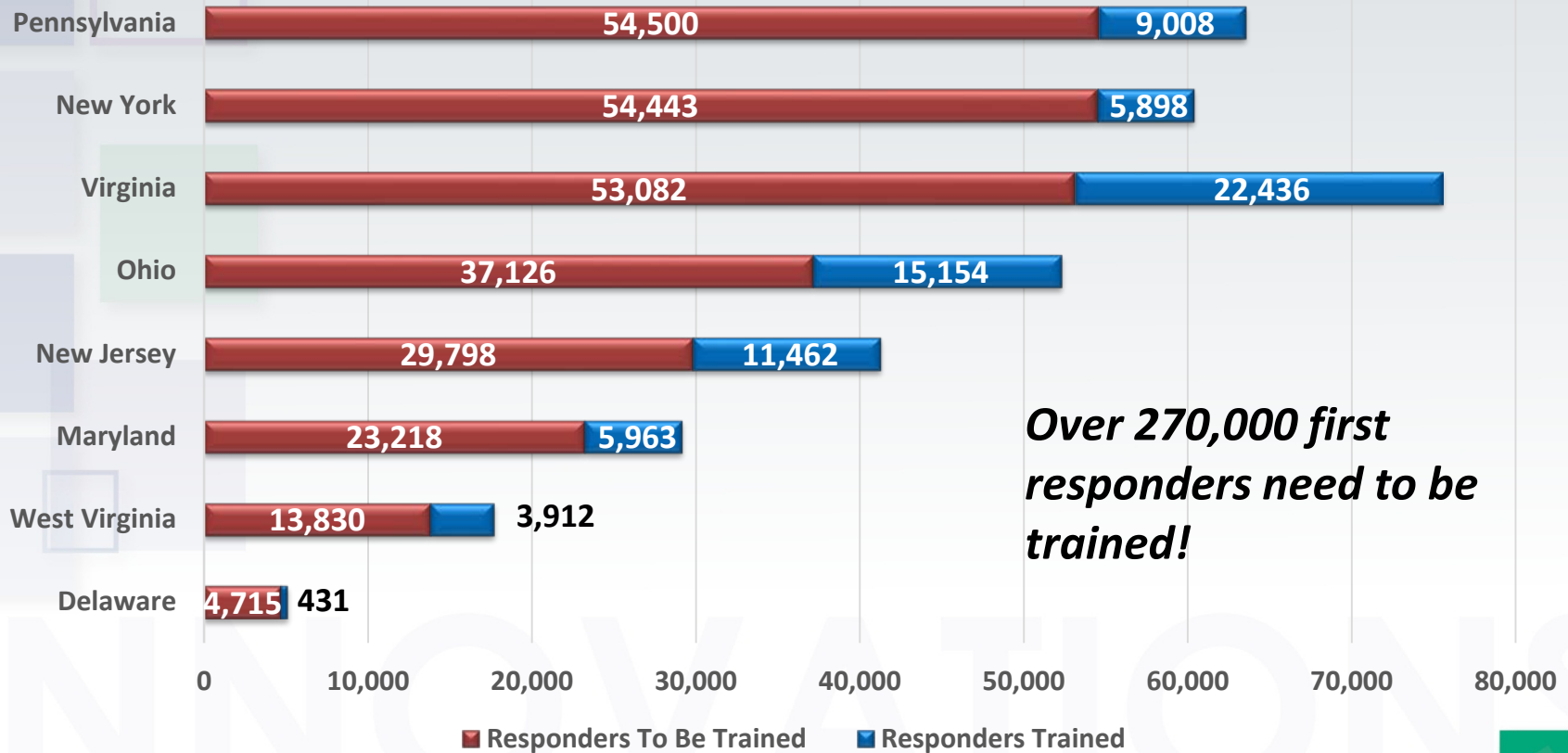
1,149,916

Total Number of Responders to be Trained Nationwide!

Source: FHWA, March 6, 2018

Purpose and Need

Responders: Trained and to-be-Trained



Over 270,000 first responders need to be trained!

Source: FHWA National Traffic Incident Management Responder Training Program, March 6, 2018

“Struck by
Fatalities in PA:”

3 EMS

15 towers

22 FFs

40 PA Turnpike

71 PennDOT

110 police



Stakeholders

- Federal and State Agencies
- Planning Partners - MPOs/RPOs
- County and Local Governments
- TIM Partners/Experts
- Corridor Coalitions
- Safety Organizations
- Technology Partners
- Work Zone Safety
- Education Institutions

Jan 4, 2017 – PTC, PennDOT, and FHWA Joint Agency

Apr 19, 2017 -- PennTIME Meeting

May 9, 2017 – PA Fire Commissioner

May 15, 2017 – PA Fire Commissioner and PennDOT Incident Management

Jun 1, 2017 – DVRPC Regional TIM Meeting

Jun 7, 2017 –ResponderSafety.com Meeting

Jun 14, 2017 – SPC Regional TIM Meeting

Aug 2, 2017 – TN TIM Training Facility Evaluation

Aug 4, 2017 – PSU Larson Transportation Institute

Oct 10, 2017 – EZPass Executive Management Committee

Nov 8, 2017 – State Transportation Innovation Council

Dec 7, 2017 --- PA Transportation Engineering & Safety Conference

Feb 14, 2018 --- PSU Executive Leadership

Partnership (PSU+PennDOT+PTC)

Letter of Understanding

April 10, 2018 Press Release

LETTER OF UNDERSTANDING AMONG THE MEMBERS OF THE MID-ATLANTIC TRANSPORTATION TRAINING AND TESTING CENTER COMMITTEE

This Letter of Understanding (LOU) is made as of the date of last signature by and between the Pennsylvania Department of Transportation (PennDOT), the Pennsylvania Turnpike Commission (Commission) and The Pennsylvania State University (Penn State), each a Party and together referred to as the Parties.

WHEREAS, the Parties desire to evaluate the need and demand for a Pennsylvania-based Mid-Atlantic Transportation Training and Testing Center (Center);

WHEREAS, the Parties desire to evaluate the need and demand for a Pennsylvania-based Mid-Atlantic Transportation Training and Testing Center (Center);

NOW THE complete understanding of the Parties is as follows:

A. Vision and Mission

1. A vision to add to the Mid-Atlantic Transportation Training and Testing Center (Center) the following:

- To provide a state-of-the-art facility for testing and training in a simulated real-world environment.
- To provide a state-of-the-art facility for testing and training in a simulated real-world environment.
- To provide a state-of-the-art facility for testing and training in a simulated real-world environment.
- To provide a state-of-the-art facility for testing and training in a simulated real-world environment.

B. Background

1. PennDOT, PTC, and Penn State are currently conducting a study to evaluate the need and demand for a Pennsylvania-based Mid-Atlantic Transportation Training and Testing Center (Center).

2. The Parties intend to form a Mid-Atlantic Transportation Training and Testing Center Committee (Committee). The Committee consists of the Parties.

3. The Parties may agree to add members as appropriate by unanimous vote to fulfill the Committee's Vision and Mission.

C. Committee Membership and Objectives

1. The Parties intend to form a Mid-Atlantic Transportation Training and Testing Center Committee (Committee). The Committee consists of the Parties.

2. The Parties may agree to add members as appropriate by unanimous vote to fulfill the Committee's Vision and Mission.

3. The Committee shall have the following objectives:

- To provide a state-of-the-art facility for testing and training in a simulated real-world environment.
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- To provide a state-of-the-art facility for testing and training in a simulated real-world environment.

D. Key Representatives

1. The Parties intend to form a Mid-Atlantic Transportation Training and Testing Center Committee (Committee). The Committee consists of the Parties.

2. The Parties may agree to add members as appropriate by unanimous vote to fulfill the Committee's Vision and Mission.

3. The Committee shall have the following objectives:

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- To provide a state-of-the-art facility for testing and training in a simulated real-world environment.

E. Term

This LOU is in full force and effect from the date of last signature by and between the Parties and shall remain in full force and effect for a period of five (5) years, unless terminated or renewed by the Parties.

F. Effect

1. This LOU is not intended to create a partnership, joint venture, agency or an association of any kind.

2. This LOU does not create any monetary obligations on behalf of any Party.




3. Nothing contained in this LOU shall be construed as creating a partnership, joint venture, agency or an association of any kind.

By our signature below, we certify that we are authorized to enter into this LOU on behalf of our respective organization.

Leslie S. Richards 4/5/18
Leslie S. Richards, Secretary of Transportation, PA Department of Transportation

Mark P. Compton 4/10/18
Mark P. Compton, Chief Executive Officer, PA Turnpike Commission

Neil Sharkey 3/25/18
Neil Sharkey, Ph.D., Vice President for Research, Pennsylvania State University

FOR IMMEDIATE RELEASE
April 10, 2018

PennDOT, Pa. Turnpike, Penn State University to Collaborate on State-of-the-Art Safety, Training and Research Facility
Facility would offer much-needed operational, training opportunities for PA Mid-Atlantic

PITTSBURGH, PA. (APRIL 10, 2018) — Pennsylvania Department of Transportation Secretary and Pa. Turnpike Commission (PTC) Chair Leslie S. Richards today announced at the [Pennsylvania Automated Vehicle Summit](#) that the two agencies are partnering with Penn State University (Penn State) to commence site planning and design for the Pennsylvania Safety, Transportation and Research Track, or **PennSTART**, — a state-of-the-art facility envisioned to benefit emergency responders, transportation organizations and research institutions.

The aim of **PennSTART** is to address safety, training and research needs in six key areas: traffic incident management (TIM); tolling and intelligent transportation systems (ITS); technology; work zones; commercial vehicles; transit vehicles; and connected and automated vehicles. Information on the facility, including a draft rendering and video simulation, is available at [www.PennSTART.org](#).

"As we make advancements in highway safety and transportation technologies, we need to be sure that our teams, researchers and students and first-responder partners have as much knowledge as possible about these tools as they develop," Richards said. "PennSTART will provide Pennsylvania and the Mid-Atlantic region with access to innovative technologies for testing and education purposes."

Examples of technologies for which safety and operational testing as well as training could be conducted at the facility include:

- TIM training;
- testing and hands-on training for new ITS, tolling and signal equipment;
- safe, simulated training for higher-speed and mobile work-zone operations;
- safety certification training opportunities;
- simulated environments for temporary traffic control device testing and evaluation;
- smart truck parking applications and other opportunities for commercial vehicle technology partnerships; and
- controlled environments to test various connected and automated vehicle technologies for transit buses, infrastructure equipment and other applications.

"We as highway operators have a responsibility to adapt to growing traffic and emerging technology in a thoughtful way while also being mindful of the speed at which these changes are taking place in our industry," said PTC CEO Mark P. Compton. "The testing and training that will be available at **PennSTART** will give the commonwealth a huge head-start on ensuring the continued safety of travelers and responders on our highways both today and well into the future."

Partnership (PSU+PennDOT+PTC)

MISSION

To advance the PennSTART through the required systems engineering process and leverage financial and technical resources required to construct, operate and maintain the center.

VISION

Explore and advance a state-of-the-art training and testing facility to address the transportation safety and operational needs of Pennsylvania and the Mid-Atlantic Region

Case Study Research




- Tennessee TIM Training Facility (Nashville, TN)
- TransCore Amtech Technology Center (Albuquerque, NM)
- Mcity (Ann Arbor, MI)
- American Center for Mobility (Ypsilanti, MI)
- Transportation Research Center
- Virginia Smart Road (Blacksburg, VA)
- SunTrax (Polk County, FL)
- Security and Emergency Response Training Center (Pueblo, CO)

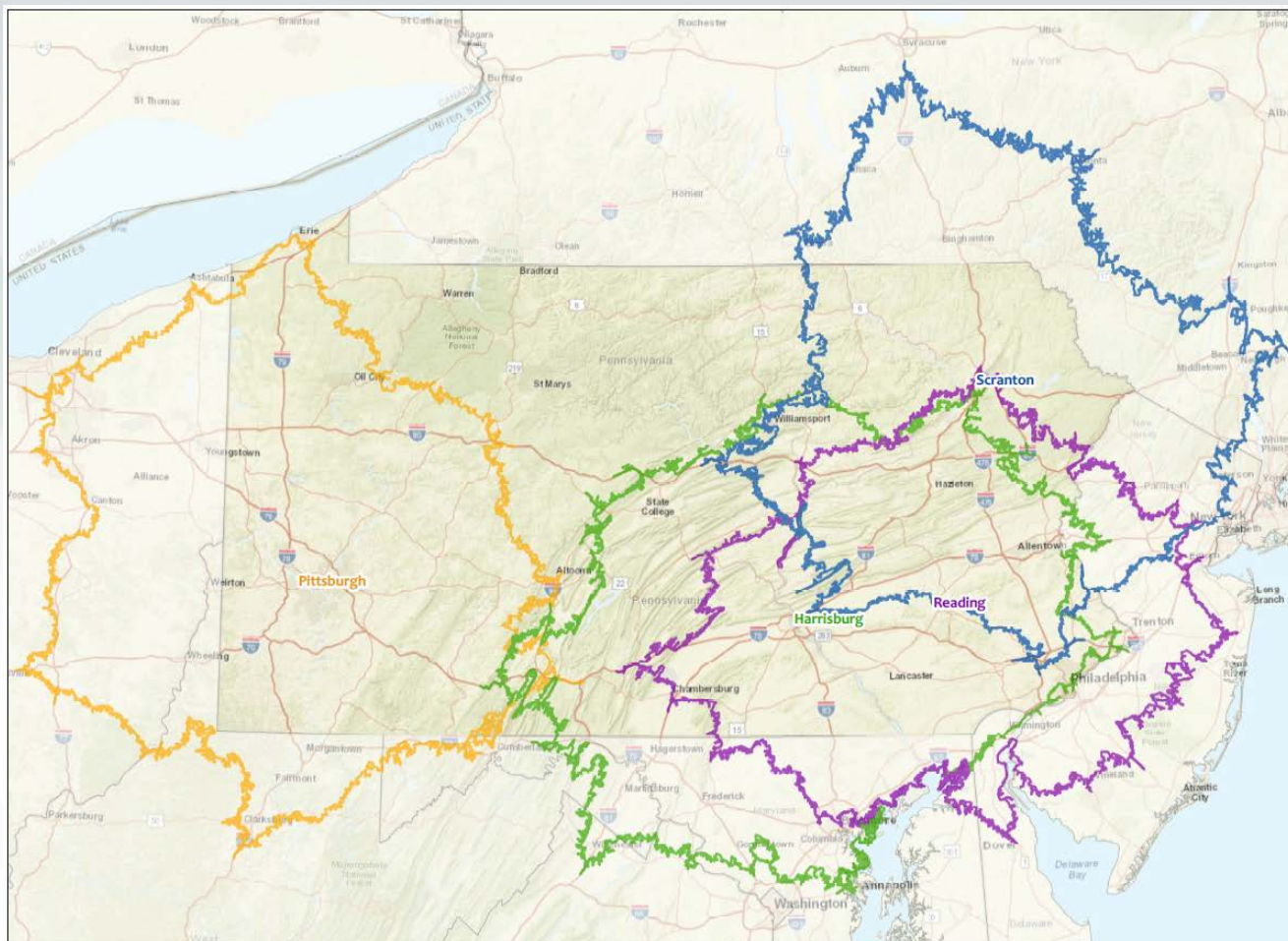
Case Study Research

- Need and demand for a hands-on simulated roadway environment for TIM training
- Need to diversify PennSTART's safety and transportation testing and research capabilities beyond TIM
- Validated PennSTART's partnership model (academic research + transportation agencies)

Site Location Analysis

Two Hour Drive Time Analysis

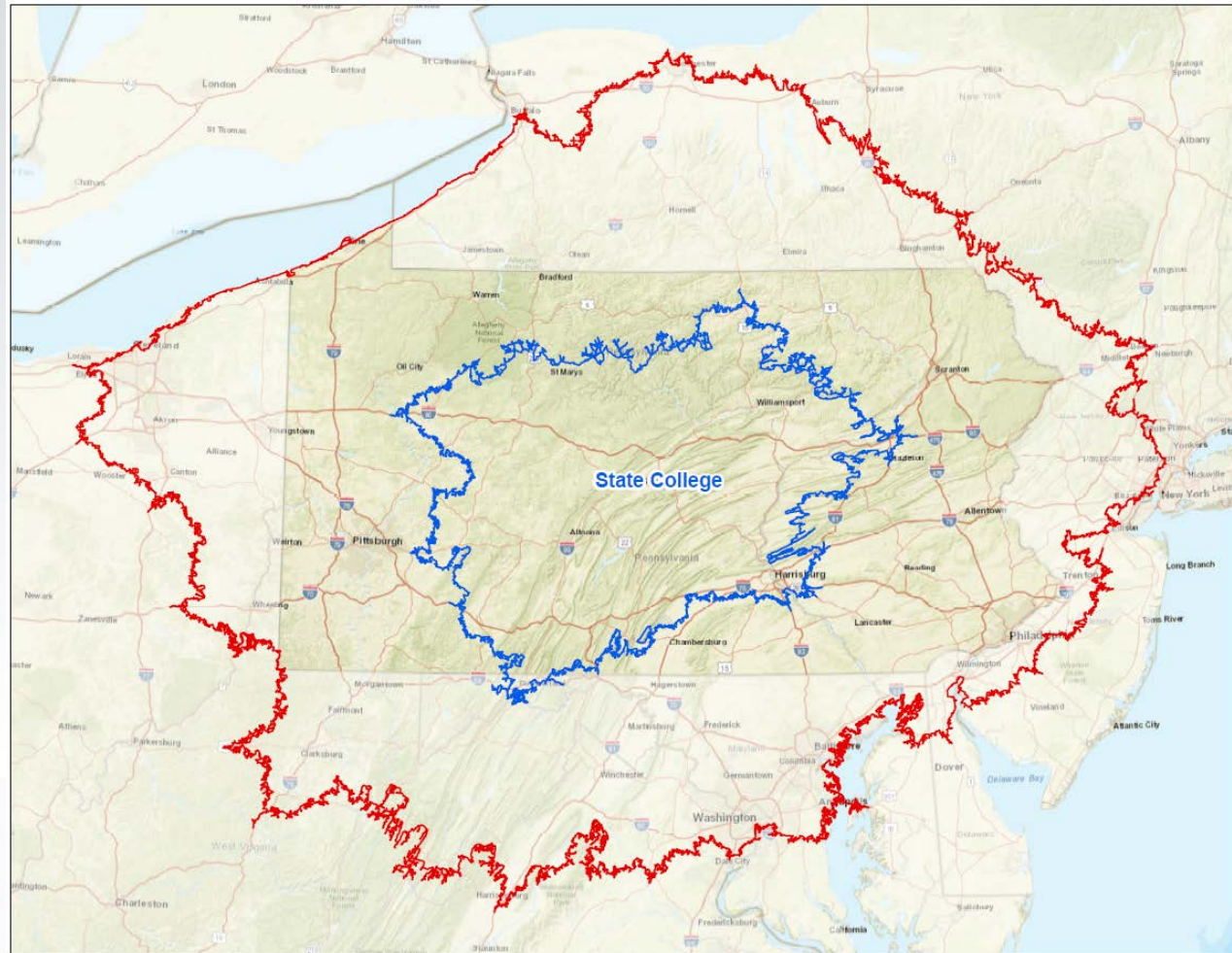
-  Pittsburgh
-  Harrisburg
-  Scranton
-  Reading



Site Location Analysis

Drive Time Analysis

- Two Hour Drive
- Four hour Drive



Dynamic Operations Model



CONNECTED AND AUTONOMOUS VEHICLE TECHNOLOGY TESTING



TOLLING AND ITS TECHNOLOGY TESTING



SAFETY TESTING AND TRAINING



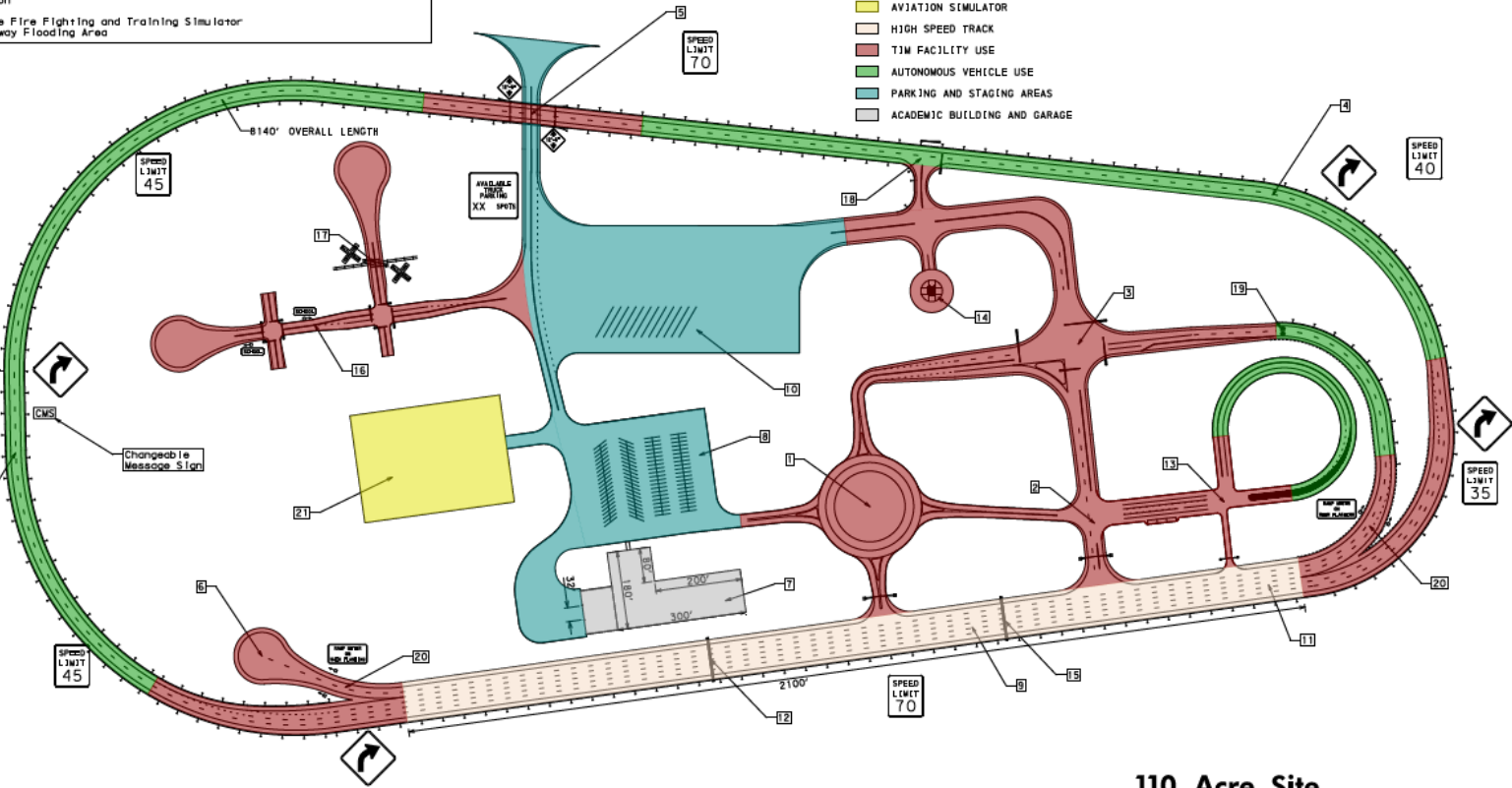
Pennsylvania Safety Transportation and Research Track (PennSTART)

1. 4 Point Roundabout with area for Green Space
2. Rural Intersections
3. Urban 4 Point Intersection (Leg 1 Simulates Multilane through with Left turn lane, Leg 2 Simulates Multilane through with right turn only, Leg 3 Simulates Left turn and Right turn only with concrete Island and signal, Leg 4 Simulates a Typical Intersection layout with left turn into a rural intersection.)
4. Potential Automation Test Loop (Will Have sections to simulate Type 31-5 guide rail, Cable systems, and Concrete Jersey Barrier.)
5. Typical Bridge Section with embankments
6. Truck Turnaround area
7. Academic Building with Classrooms and Labs and Garage
8. Parking Lot Currently Showing 160 spaces
9. High Speed Testing with Return Loop
10. Truck Parking and Staging Area with Smart Truck Parking capabilities
11. 6 Lane Highway Section with on ramp and off ramp simulations
12. Overhead Tolling Gantry
13. City Simulation with Small Radial
14. Heliport
15. Active Traffic Management System
16. Signalized Urban Corridor
17. Railroad at Grade Crossing
18. Signalized Rural / High Speed Intersection
19. Queue Preemption
20. Ramp Meters
21. Aircraft Rescue Fire Fighting and Training Simulator
22. Potential Roadway Flooding Area

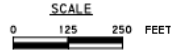
PENNSYLVANIA SAFETY TRANSPORTATION AND RESEARCH TRACK (PennSTART)

DISTRICT	COUNTY	ROUTE	SECTION	SHEET	
X-X	XXXX	XXXX	XXX	OF XX	
XXXXXXXXXX					
REVISION NUMBER	REVISIONS			DATE	BY

- AVIATION SIMULATOR
- HIGH SPEED TRACK
- TIM FACILITY USE
- AUTONOMOUS VEHICLE USE
- PARKING AND STAGING AREAS
- ACADEMIC BUILDING AND GARAGE



110 Acre Site

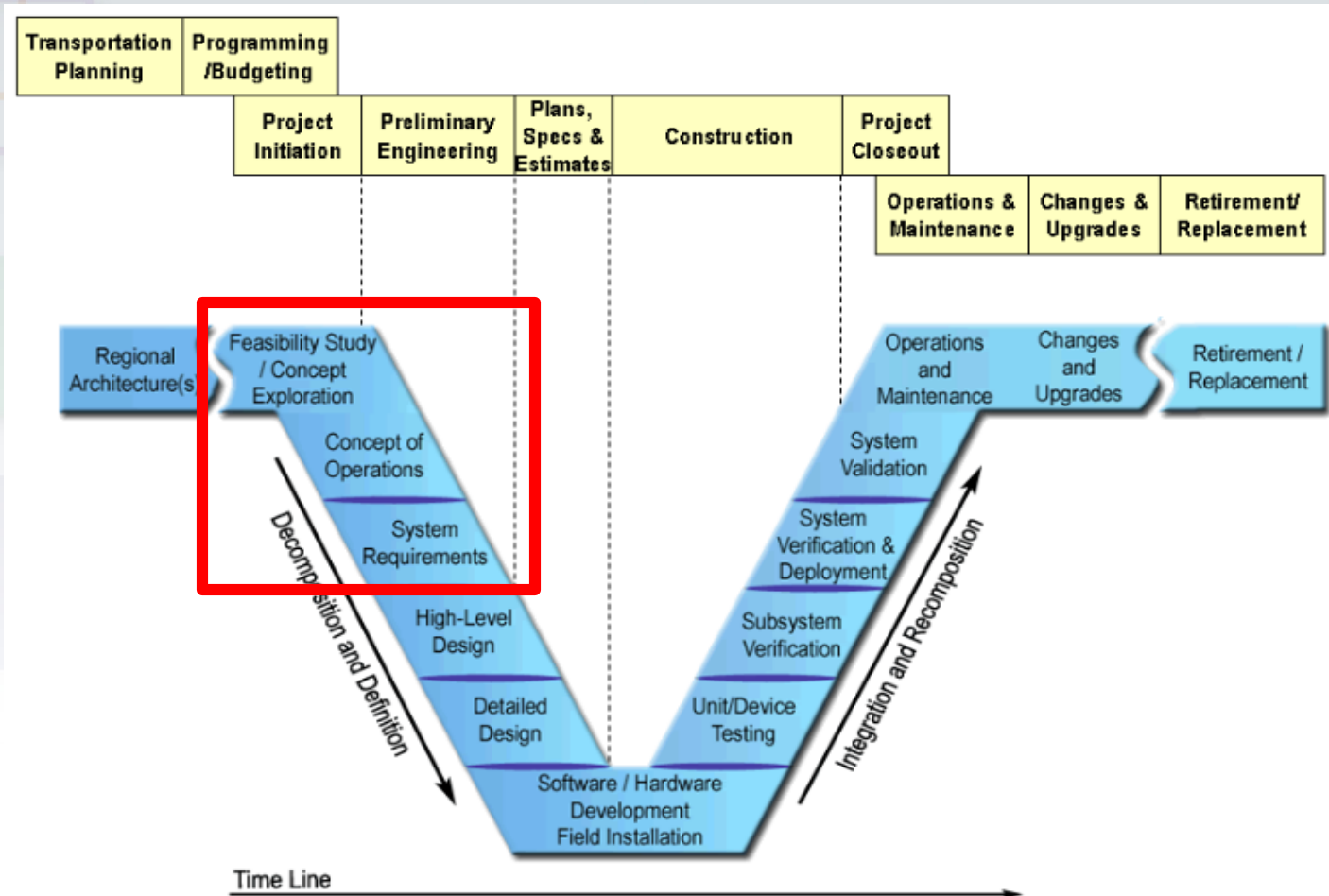


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CONCEPT OF OPERATIONS

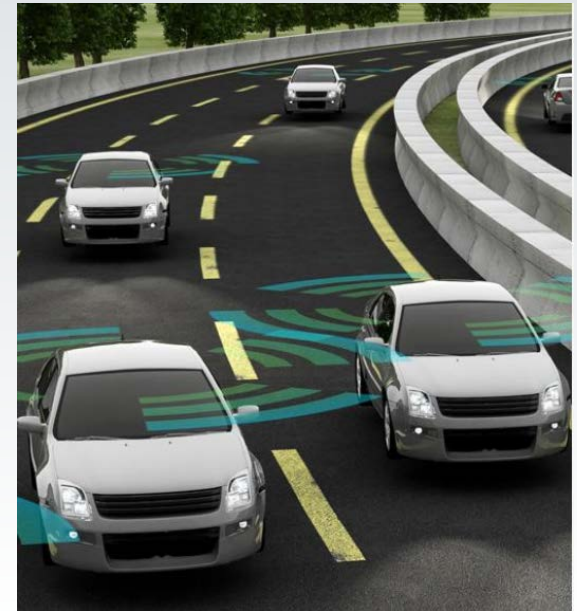
INNOVATIONS

Systems Engineering Process



Concept of Operations (ConOps)

- Describes system characteristics from the users viewpoint
- Communicates overall quantitative and qualitative system characteristics
- Describes the user organization(s), mission(s), and organizational objectives from an integrated systems point of view



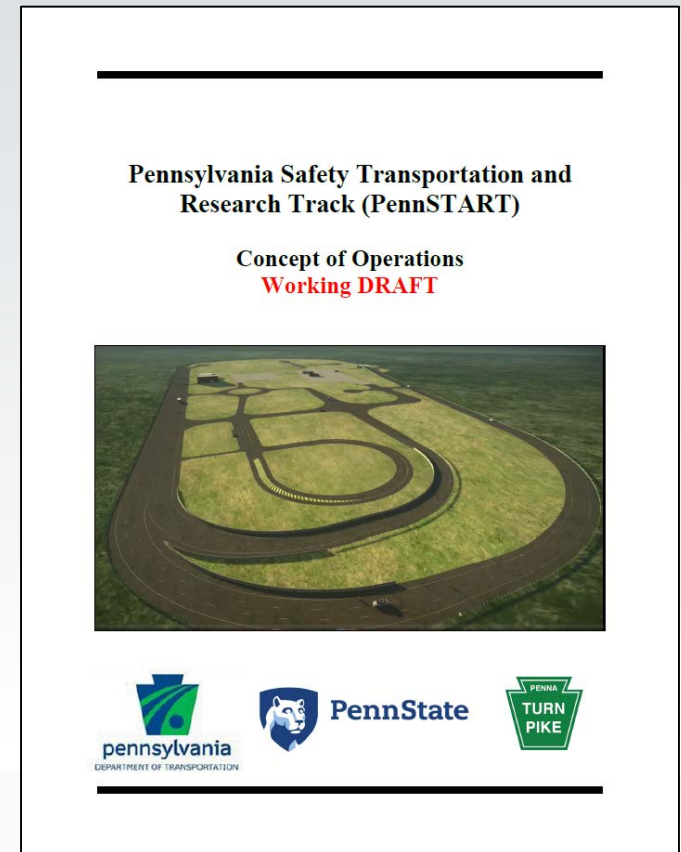
Concept of Operations (ConOps)

- November 5, 2018 ConOps Workshop – Harrisburg, PA
- 80 stakeholder participants:
 - Traffic Incident Management & Work Zone Safety
 - ITS/Tolling
 - Connected and Autonomous vehicles (CAV)
 - Commercial and Transit vehicles
 - Crossing Safety (Rail, Bicycle, Pedestrian)
 - Aviation, UAV, Simulator



Concept of Operations (ConOps)

- **ConOps Document**
 - Vision, Mission and Goals
 - Stakeholders
 - User Needs
 - System Overview
 - Operational Scenarios (Use Cases)
 - Operational/Support Environment
 - Systems Engineering Next Steps



ConOps Use Cases

- **TIM & Work Zone Safety**
 - Law Enforcement
 - Fire and Rescue
 - Emergency Medical Services
 - Towing
 - Roadside Maintenance

Pennsylvania Safety Transportation and Research Track (PennSTART)

Concept of Operations
Working DRAFT



ConOps Use Cases

- **ITS & Tolling**
 - Tolling
 - Traffic Signals and Arterial Operations and Mgt.
 - Freeway Operations and Management
 - Camera Technology
 - Dynamic Messaging Sign (DMS) Technology
 - Communication/IT
 - Traffic Management Center (TMC) and Data Analytics

Pennsylvania Safety Transportation and Research Track (PennSTART)

Concept of Operations
Working DRAFT



ConOps Use Cases

- **Connected and Automated Vehicles**
 - Freeway and Highway System Components
 - Signalized Intersections
 - Non-Motorized Transportation Modes
 - Digital Infrastructure
 - Product Testing and Development

Pennsylvania Safety Transportation and Research Track (PennSTART)

Concept of Operations
Working DRAFT



ConOps Use Cases

- Commercial and Transit Vehicles
 - Transit Operations
 - AV Shuttles
 - Truck Platooning
 - Truck Parking
 - Freight Movement
 - Training

Pennsylvania Safety Transportation and Research Track (PennSTART)

Concept of Operations
Working DRAFT



ConOps Use Cases

- Crossing Safety
 - Railroad
 - Bicycle
 - Pedestrian

Pennsylvania Safety Transportation and Research Track (PennSTART)

Concept of Operations
Working DRAFT



ConOps Use Cases

- **Aviation and UAS**
 - Aviation Rescue and Firefighting Training Simulator
 - UAS Training and Research
 - UNV Emergency Operations Center
 - Airport Facility Maintenance Testing and Training
 - Helicopter Landing Zone Training
 - Collision Analysis and Reconstruction (CAR)

Pennsylvania Safety Transportation and Research Track (PennSTART)

Concept of Operations
Working DRAFT



NEXT STEPS AND SCHEDULE

INNOVATIONS

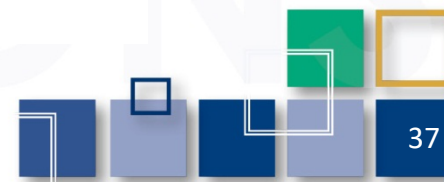
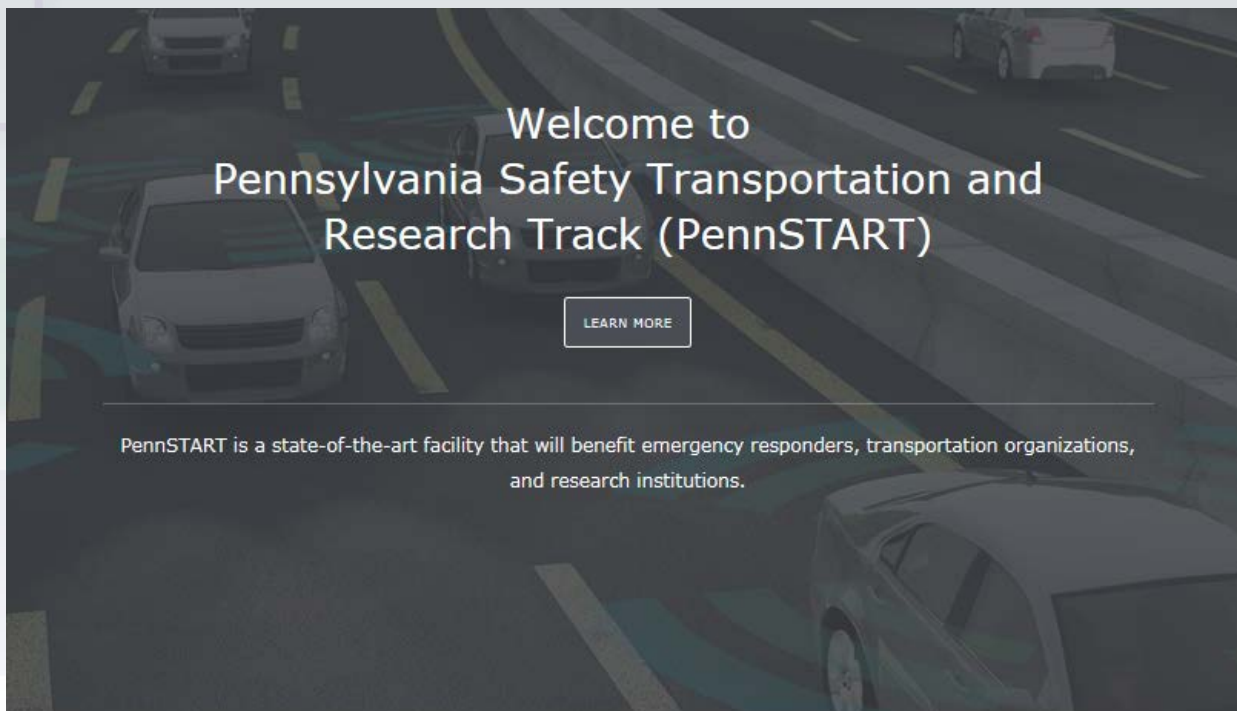
Next Steps

- **Current Systems Engineering Phase:**
 - Industry Outreach
 - Develop Concept of Operations
 - Requirements Gathering
 - Business Plan Development
- **Future System Engineering Phases:**
 - Engineering and Design
 - Construction
 - Initiate Operations and Maintenance
 - Perform Changes and Upgrades

Schedule



www.PennSTART.org



Questions/Comments

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