

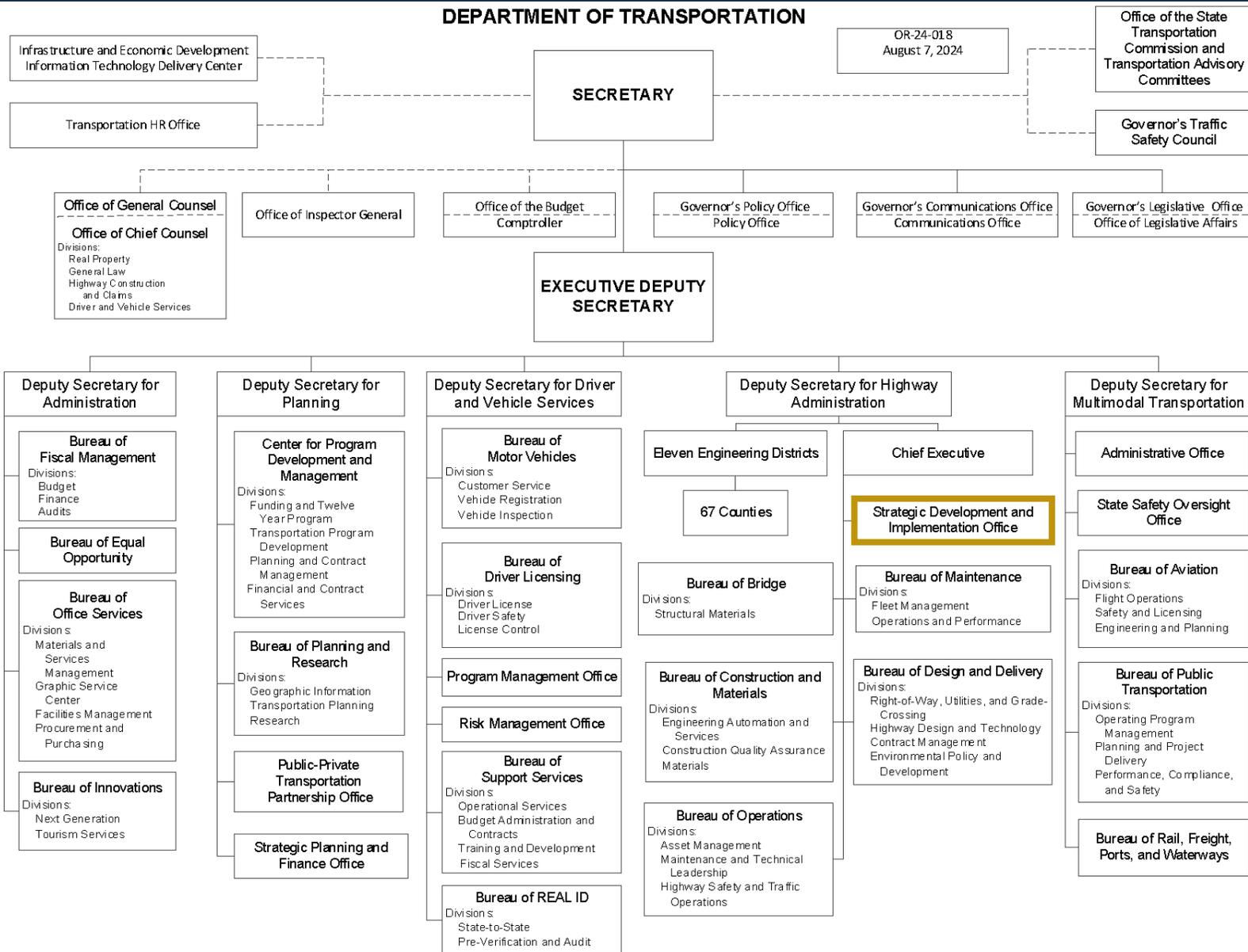
HOW PENNDOT IS PREPARING FOR AI AND OTHER TECHNOLOGIES

MARK KOPKO– PENNDOT

JANUARY 20, 2026

TRANSFORMATIONAL TECHNOLOGY

DEPARTMENT OF TRANSPORTATION



Strategic Development and Implementation Office

Transformational Technology Division

- Derrick Herrmann, P.E.
- Colton Brown
- Dorothy Holloway
- Gunnar Rhone, P.E.
- Kevin Tobias



AGENDA

- Understanding AI Basics
- Current Use Cases in Transportation
- Future Use Cases in Transportation
- Projects at PennDOT
- Future Events
- Q&A



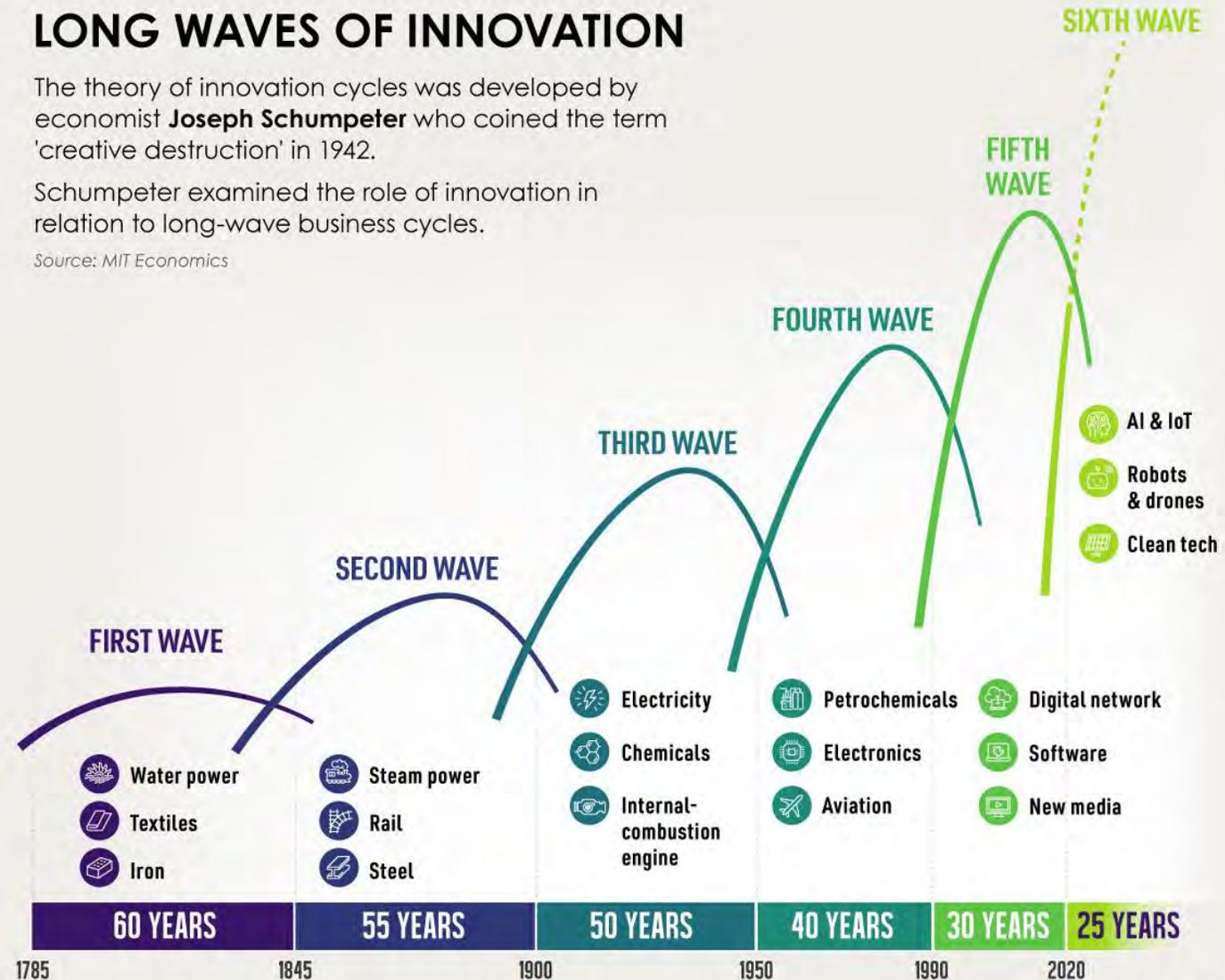
INTRODUCTION

LONG WAVES OF INNOVATION

The theory of innovation cycles was developed by economist **Joseph Schumpeter** who coined the term 'creative destruction' in 1942.

Schumpeter examined the role of innovation in relation to long-wave business cycles.

Source: MIT Economics



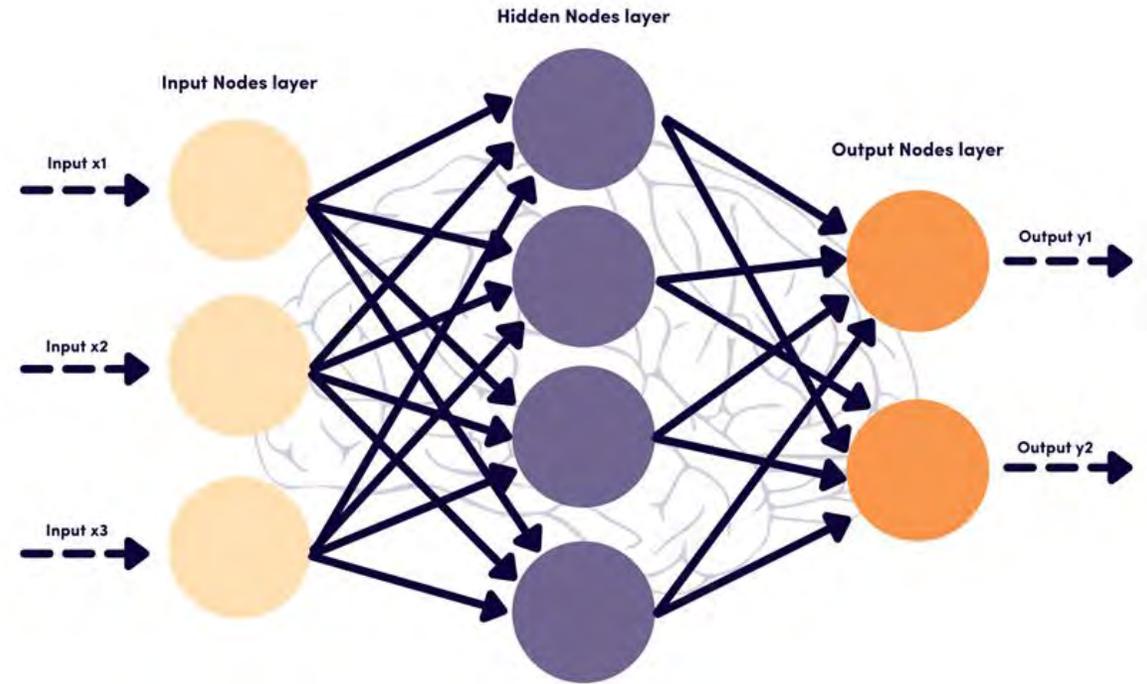
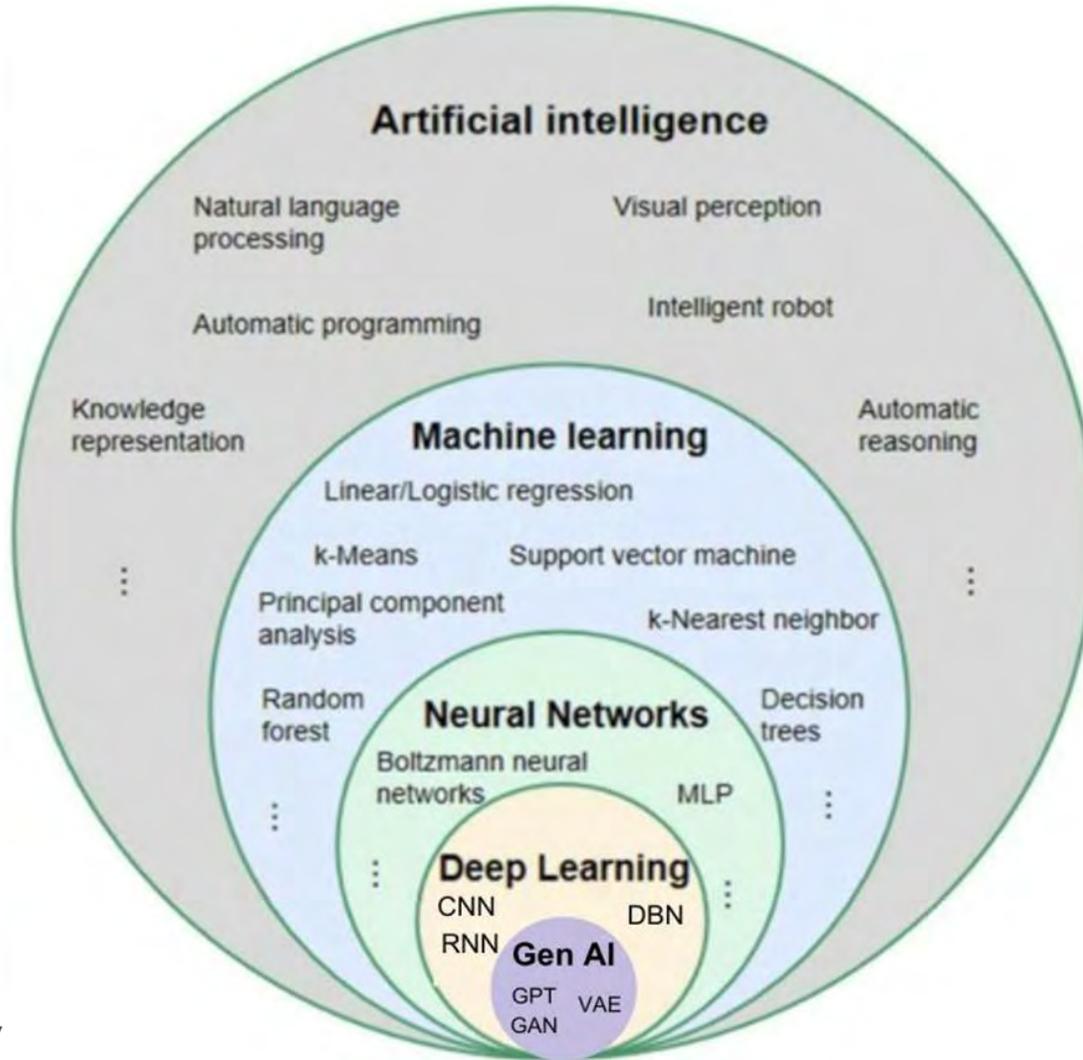
Source: Edelson Institute



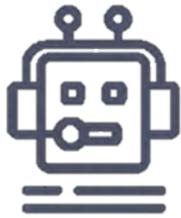
UNDERSTANDING AI: BASICS AND TYPES

WHAT IS AI?

Complexity and Processing Power Increases



TYPES OF AI



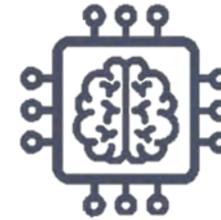
Artificial Narrow
Intelligence

Designed to perform
a specific Task



Artificial General
Intelligence

Can behave in
human-like way
across all tasks



Artificial Super
Intelligence

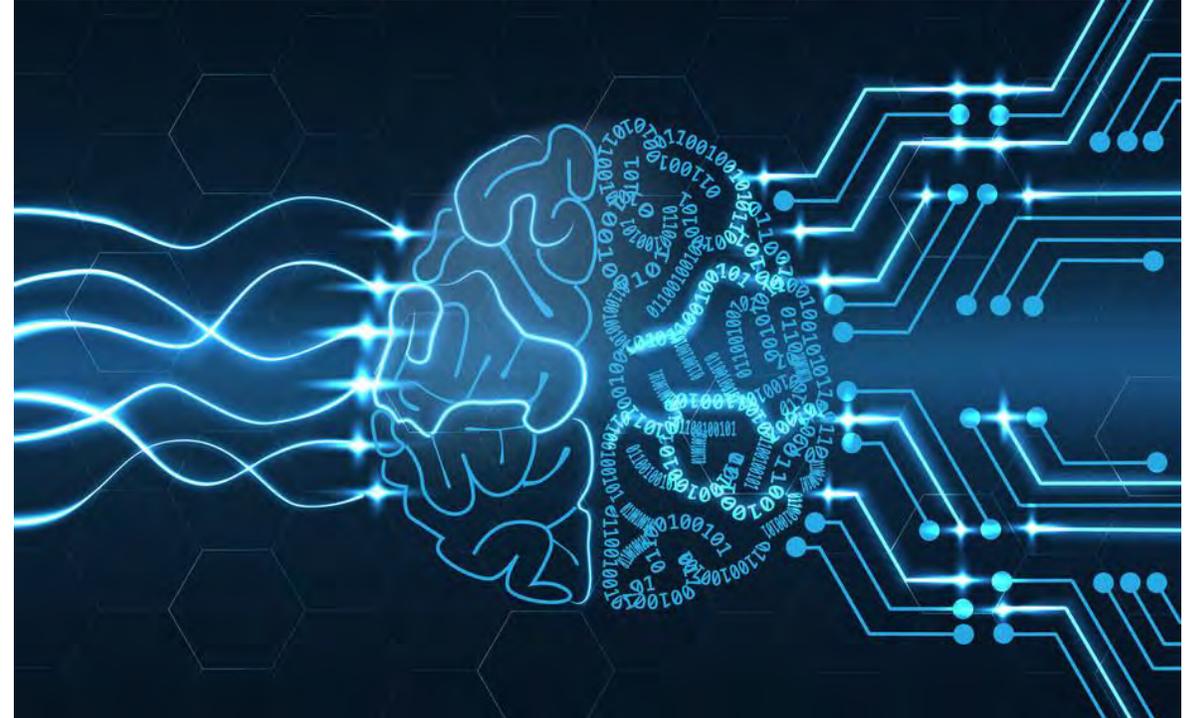
More capable than
humans in every way



GEN AI BASICS

What is Generative AI?

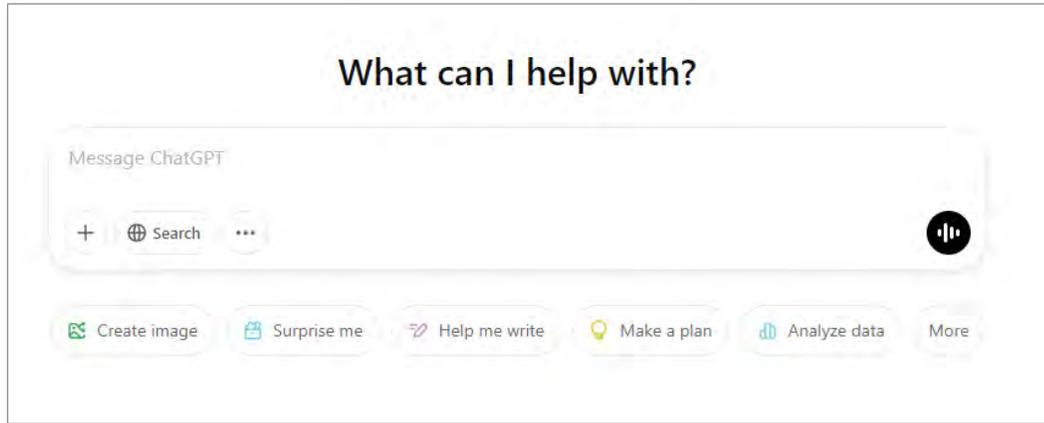
- Generative AI is a type of artificial intelligence that can create content based on training data
- Most common Gen AI platforms are ChatGPT, Copilot, and Gemini
- These platforms can aid in workflows and speed up work



Source: <https://engineering.fb.com/2016/12/01/ml-applications/artificial-intelligence-revealed/>



GEN AI BASICS



Give me the outline for a research report for our Automated Driving System Demonstration Grant project.

Here's a structured outline for your **Automated Driving System (ADS) Demonstration Grant Project Research Report**:

Automated Driving System Demonstration Grant Project Research Report

PennDOT Transformational Technology Division

1. Executive Summary

- Brief overview of the project
- Key objectives and expected outcomes
- Summary of key findings and impacts

2. Introduction

- Background on Automated Driving Systems (ADS)
- Purpose of the ADS Demonstration Grant
- Project partners and stakeholders (e.g., Carnegie Mellon University)
- Scope and timeline of the project

3. Project Objectives

Message ChatGPT

+ Search ...

Important warning at the bottom of the page:

ChatGPT can make mistakes. Check important info.



CURRENT USE OF AI IN TRANSPORTATION

HOW IS IT BEING USED NOW?

- License plate readers
- **Automated vehicles**
- Real-time traffic management or TMC decision support
- Risk identification/predicting crashes
- Object and behavior detection
- Aiding in writing reports



Source: <https://weshield.us/e-commerce-and-omnichannel-logistics-7-key-strategies-to-win-at-delivery-3/>



REAL-LIFE EXAMPLES

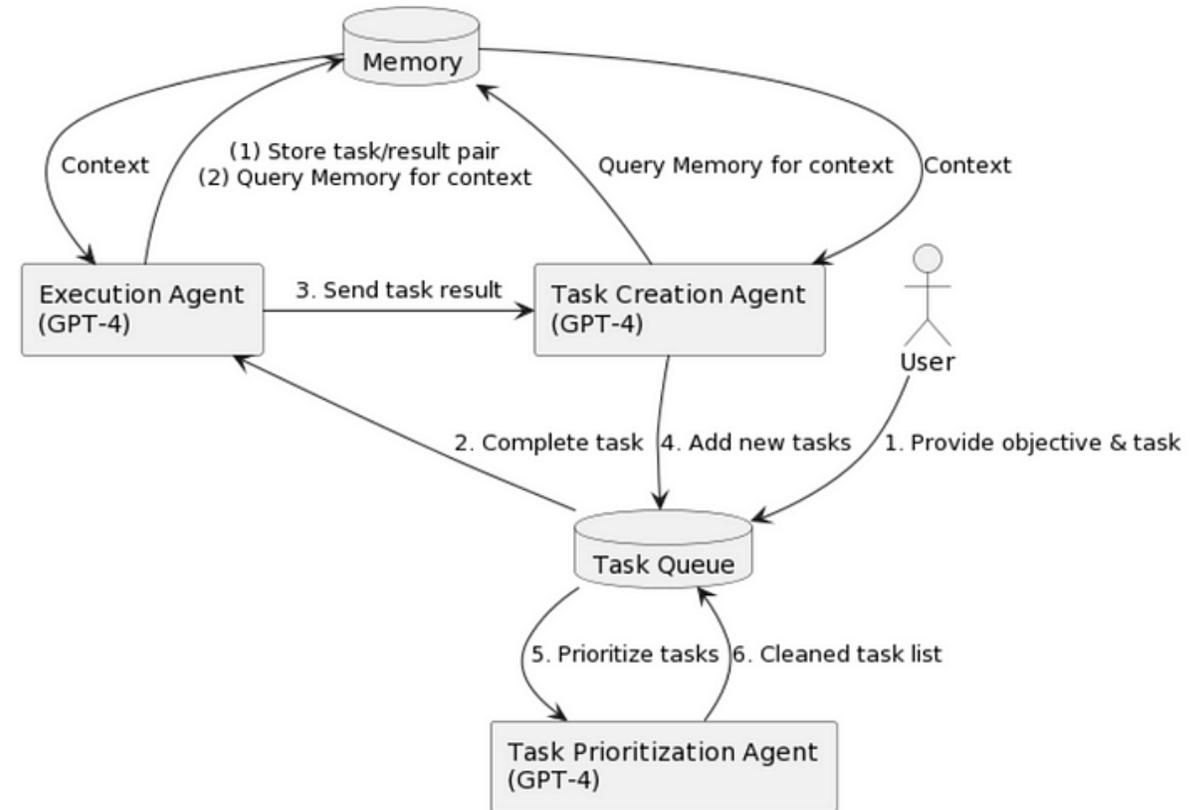
- **Alabama:** Has cameras mounted on their trucks that they use to **identify damaged guide rail**
- **Delaware:**
 - **Predictive traffic signal control**
 - **Congestion prediction**
 - Detour/routing selection based on predicted traffic flow/demand
 - Machine vision for traffic count, speed, turning movement, queue estimation
 - Machine vision for vehicle reidentification
 - Machine vision for vulnerable road users and conflict/near missing monitoring/prediction
 - Flood prediction using hydrology sensors for traffic management
- **Kentucky:** **Wrong-way driver detection**
- **New Jersey:** Planning, Reporting and Dashboard tools, Safety prediction, **Plan request assistance**, Structural analysis and Research.
- **Tennessee and Virginia:** **Decision support system**
- **Vermont:** **Drafting communications to the public** in response to specific requests, usually around mobility and signing laws.
- **West Virginia:** **Extracting features/objects from pictures** taken from roadway data collection projects; **estimating AADT data** for paved local roads without traffic counters



FUTURE USE CASES OF AI IN TRANSPORTATION

HOW WILL WE BE USING IT IN 5 YEARS?

- Autonomous agents
- Plan development
- Plan review
- Quantity takeoff and estimates
- Analyzing vehicle telematics to generate alerts



AI RELATED LAWS, EOS, & POLICIES

AI EOS AND RESOLUTIONS



Executive Order
Commonwealth of Pennsylvania
Governor's Office

Executive Order 2023-19 – Expanding and Governing the Use of
Generative Artificial Intelligence Technologies Within the
Commonwealth of Pennsylvania

Date: September 20, 2023

By Direction of: 
Josh Shapiro, Governor

- WHEREAS, the integration of Generative Artificial Intelligence (AI) into Pennsylvania's economy and the daily lives of Pennsylvanians requires the Commonwealth to ensure it is used responsibly and ethically in the Commonwealth's operations; and
- WHEREAS, responsible use of Generative AI can help Commonwealth agencies more efficiently communicate with and serve Pennsylvania's customers, residents, visitors, and industry when the technology is made available for the agency's use; and
- WHEREAS, Generative AI cannot and should never replace human creativity, moral judgment, or lived experiences of Pennsylvanians; and
- WHEREAS, Generative AI's full potential can only be achieved by the Commonwealth when its use is grounded in a balanced approach prioritizing our employees, encouraging the innovative uses of technology to better serve Pennsylvanians, and aligning with industry standards on proportionate and adaptive policies; and
- WHEREAS, responsible and ethical use of Generative AI by the Commonwealth should be conducted within a governance structure that ensures transparency, tests for bias, addresses privacy concerns, and safeguards our values.

NOW, THEREFORE, I, Josh Shapiro, Governor of the Commonwealth of Pennsylvania, by virtue of the authority vested in me by the Constitution of the Commonwealth of Pennsylvania and other laws of the Commonwealth, do hereby create the Generative AI Governing Board and order and direct the following:

PRIOR PRINTER'S NO. 1789

PRINTER'S NO. 3488

THE GENERAL ASSEMBLY OF PENNSYLVANIA

HOUSE RESOLUTION

No. 170 Session of
2023

INTRODUCED BY MERSKI, PIELLI, MADDEN, NEILSON, GREEN, VENKAT,
FRIEL, GERGELY, B. MILLER, SCHLOSSBERG, SANCHEZ, MALAGARI,
JAMES, HOWARD, GALLAGHER, BRENNAN, HILL-EVANS, HARKINS, KHAN,
DONAHUE, O'MARA, D. WILLIAMS, CIRESI AND KINSEY,
JUNE 29, 2023

AS AMENDED, HOUSE OF REPRESENTATIVES, JULY 3, 2024

A RESOLUTION

- 1 Directing the Joint State Government Commission to establish an
- 2 advisory committee to conduct a study on the field of
- 3 artificial intelligence and its impact and potential future
- 4 impact in Pennsylvania.
- 5 WHEREAS, Artificial intelligence (AI) means models and
- 6 systems performing functions generally associated with human
- 7 intelligence, such as reasoning and learning; and
- 8 WHEREAS, Recent news stories and reports have shown the rapid
- 9 acceleration of AI utilization across many different industries
- 10 in this Commonwealth; and
- 11 WHEREAS, While AI has the potential to be a tool to improve a
- 12 variety of industries, many experts in the AI field have been
- 13 warning that we may be moving too quickly for comfort; and
- 14 WHEREAS, The "godfather of AI," Geoffrey Hinton, left his job
- 15 at Google where he developed AI programs, to "blow the whistle"
- 16 on the dangers that AI possesses; and
- 17 WHEREAS, It is important for the Commonwealth to take



GEN AI GOVERNANCE BOARD

- Governor's Gen AI Governance oversees Gen AI at Commonwealth agencies
- ["Use of Public Generative Artificial Intelligence" policy](#)
- AI training
- More info: <https://www.pa.gov/agencies/oa/programs/information-technology2/gen-ai.html>

We can't ignore new technology — we have to educate ourselves and be proactive to minimize the risks and maximize the benefits of innovation and that's the approach my Administration is taking here in Pennsylvania. We have the potential to become a leader in responsible, ethical use of generative artificial intelligence."

- Governor Josh Shapiro



AV LAWS

SENATE AMENDED

PRIOR PRINTER'S NOS. 2794, 2916, 3774

PRINTER'S NO. 4276

THE GENERAL ASSEMBLY OF PENNSYLVANIA

HOUSE BILL

No. 1958 Session of 2017

INTRODUCED BY ROTHMAN, SCHLOSSBERG, HELM, SAYLOR, MILLARD, NELSON, EVERETT, MISTIO, DIAMOND, TAYLOR, CHARLTON, FEE, KORTZ, GILLEN, KEEFER AND BARBIN, DECEMBER 11, 2017

AS AMENDED ON THIRD CONSIDERATION, IN SENATE, OCTOBER 16, 2018

AN ACT

~~1 Amending Title 75 (Vehicles) of the Pennsylvania Consolidated~~ <<
~~2 Statutes, in general provisions, further providing for~~
~~3 definitions, in rules of the road in general, providing for~~
~~4 platooning, and providing for autonomous vehicles.~~ <<
~~5 AMENDING TITLE 75 (VEHICLES) OF THE PENNSYLVANIA CONSOLIDATED~~ <<
~~6 STATUTES, IN GENERAL PROVISIONS, FURTHER PROVIDING FOR~~
~~7 DEFINITIONS, IN RULES OF THE ROAD IN GENERAL, PROVIDING FOR~~
~~8 PLATOONING, AND PROVIDING FOR HIGHLY AUTOMATED VEHICLES;~~ <<
~~9 AMENDING TITLE 75 (VEHICLES) OF THE PENNSYLVANIA CONSOLIDATED~~ <<
~~10 STATUTES, IN GENERAL PROVISIONS, FURTHER PROVIDING FOR~~
~~11 DEFINITIONS, IN RULES OF THE ROAD IN GENERAL, PROVIDING FOR~~
~~12 PLATOONING, AND PROVIDING FOR HIGHLY AUTOMATED VEHICLES.~~ <<
13 The General Assembly of the Commonwealth of Pennsylvania
14 hereby enacts as follows:
15 Section 1. Section 102 of Title 75 of the Pennsylvania
16 Consolidated Statutes is amended by adding definitions to read:
17 § 102. Definitions.
18 Subject to additional definitions contained in subsequent
19 provisions of this title which are applicable to specific
20 provisions of this title, the following words and phrases when
21 used in this title shall have, unless the context clearly
22 indicates otherwise, the meanings given to them in this section:

HOUSE AMENDED

PRIOR PRINTER'S NOS. 1773, 1823, 1952

PRINTER'S NO. 2042

THE GENERAL ASSEMBLY OF PENNSYLVANIA

SENATE BILL

No. 1199 Session of 2020

INTRODUCED BY AUMENT, PHILLIPS-HILL, MENSCH, SCAVELLO, STEFANO AND FITTMAN, JUNE 15, 2020

AS AMENDED ON SECOND CONSIDERATION, HOUSE OF REPRESENTATIVES, SEPTEMBER 30, 2020

AN ACT

~~1 Amending Title 75 (Vehicles) of the Pennsylvania Consolidated~~ <<
~~2 Statutes, in general provisions, further providing for~~
~~3 definitions, and, in highly automated vehicles, further~~
~~4 providing for highly automated vehicle advisory committee and~~
~~5 providing for personal delivery devices.~~ <<
~~6 AMENDING TITLE 75 (VEHICLES) OF THE PENNSYLVANIA CONSOLIDATED~~ <<
~~7 STATUTES, IN GENERAL PROVISIONS, FURTHER PROVIDING FOR~~
~~8 DEFINITIONS, IN HIGHLY AUTOMATED VEHICLES, FURTHER PROVIDING~~ <<
~~9 FOR DEFINITIONS AND FOR HIGHLY AUTOMATED VEHICLE ADVISORY~~
~~10 COMMITTEE AND PROVIDING FOR PERSONAL DELIVERY DEVICES; AND~~
~~11 MAKING EDITORIAL CHANGES.~~ <<
12 The General Assembly of the Commonwealth of Pennsylvania
13 hereby enacts as follows:
14 Section 1. The definition of "pedestrian" in section 102 of
15 Title 75 of the Pennsylvania Consolidated Statutes is amended to
16 read:
17 § 102. Definitions.
18 Subject to additional definitions contained in subsequent
19 provisions of this title which are applicable to specific
20 provisions of this title, the following words and phrases when
21 used in this title shall have, unless the context clearly

SENATE AMENDED

PRIOR PRINTER'S NOS. 2819, 3200, 3256

PRINTER'S NO. 3563

THE GENERAL ASSEMBLY OF PENNSYLVANIA

HOUSE BILL

No. 2398 Session of 2022

INTRODUCED BY OBERLANDER, ROTHMAN, MERCURI, MIZGORSKI, HELM, SMITH, ROWE, KAIL, STEPHENS, MAJOR, ORTIZAY, GAYDOS, LEWIS DELROSSO, E. NELSON, MUSTELLO, BROOKS, MARSHALL, MASSER, COX AND ARMANINI, MARCH 10, 2022

SENATOR LANGERHOLZ, TRANSPORTATION, IN SENATE, AS AMENDED, OCTOBER 18, 2022

AN ACT

~~1 Amending Title 75 (Vehicles) of the Pennsylvania Consolidated~~ <<
~~2 Statutes, in general provisions, further providing for~~
~~3 definitions; in certificate of title and security interests,~~ <<
~~4 further providing for content and effect of certificate of~~
~~5 title; in licensing of drivers, further providing for persons~~ <<
~~6 ineligible for licensing, license issuance to novice and~~
~~7 junior driver's license, in financial responsibility, further~~
~~8 providing for proof of financial responsibility following~~ <<
~~9 accident, in rules of the road in general, repealing~~ <<
~~10 provisions relating to platooning; in MISCELLANEOUS~~ <<
~~11 PROVISIONS, PROVIDING FOR THEFT OF CATALYTIC CONVERTER; in~~
~~12 miscellaneous provisions relating to accidents and accident~~
~~13 reports, further providing for accidents involving death or~~
~~14 personal injury, for accidents involving damage to attended~~
~~15 vehicle or property, for duty to give information and render~~
~~16 aid, for accidents involving damage to unattended vehicle or~~
~~17 property, for accident scene clearance, AND for immediate~~ <<
~~18 notice of accident to police department and for written~~ <<
~~19 reports of accident by driver or owner; in equipment~~
~~20 standards, further providing for promulgation of vehicle~~
~~21 equipment standards; in inspection of vehicles, further~~
~~22 providing for requirement for periodic inspection of~~
~~23 vehicles; in size, weight and load, further providing for~~
~~24 width of vehicles; in powers of department and local~~
~~25 authorities, further providing for specific powers of~~
~~26 department and local authorities; and, in highly automated~~
~~27 vehicles, further providing for definitions, for highly~~
~~28 automated vehicles and for Highly Automated Vehicle Advisory~~
~~29 Committee, providing for certificate of compliance required,~~
~~30 for powers of department, for self-certification application,~~

Act 117 of 2018
Platooning and Work
Zone Vehicles

Act 106 of 2020
Personal Delivery
Devices

Act 130 of 2022
Unmanned AV
Operations

Personal Delivery Device (PDD) Operations Policy



pennsylvania
DEPARTMENT OF TRANSPORTATION
www.penn.gov

PUB-955 (2-21)



HIGHLY AUTOMATED VEHICLE (HAV)
CERTIFICATE OF COMPLIANCE GUIDELINES



pennsylvania
DEPARTMENT OF TRANSPORTATION

1/18/2022 (2-21)



PROJECTS AT PENNDOT

CURRENT WORK

- Policies
 - AI Strategic Plan
- Pilots
 - Winter Operations AI Project
 - Telematics data gaps
 - Work zone safety analytics
 - Weather detection using CCTV
- Projects
 - PennSTART
- Exploring
 - AI image interpretation software



AI STRATEGIC PLAN

- **Purpose:** Conduct literature and best practices review on AI implementation.
- **Focus Areas:** Governance structures for AI programs (human expertise, committees, organizational structures).
 - Current state of AI capabilities and peer usage.
 - Workforce development and training recommendations.
 - Potential AI use cases for:
 - Standard business practices.
 - Transportation Systems Management & Operations (TSMO) program.
 - Acceptable use practices for ethics, security, and data privacy.
- **Research Targets:**
 - **TxDOT AI Strategic Plan (2024):** Framework for AI processes, policies, and management.
 - **Pennsylvania Turnpike Commission (PTC):** AI program framework, acceptable use policy, guidelines, data classifications.
 - **ITS America:** “Guide to Practical Next Steps for AI Implementation.”



WINTER OPERATIONS AI PROJECT

- Goal: Leverage our big data to help visualize and improve winter plow optimization
- Output
 - Consolidate our large data into a visual output
 - Allow managers to evaluate snow routes for efficiencies
 - Determine the most efficient material applications for a specific roadway with specific winter conditions
 - (salt reduction, brine efficiencies, reduced application in sensitive areas, overall route QA)
 - Reduce the reliance on consultant staff augmentation to evaluate our large data
 - Provide managers with instant feedback to their questions rather than hours of research resulting in stale or information that is no longer relevant to the question



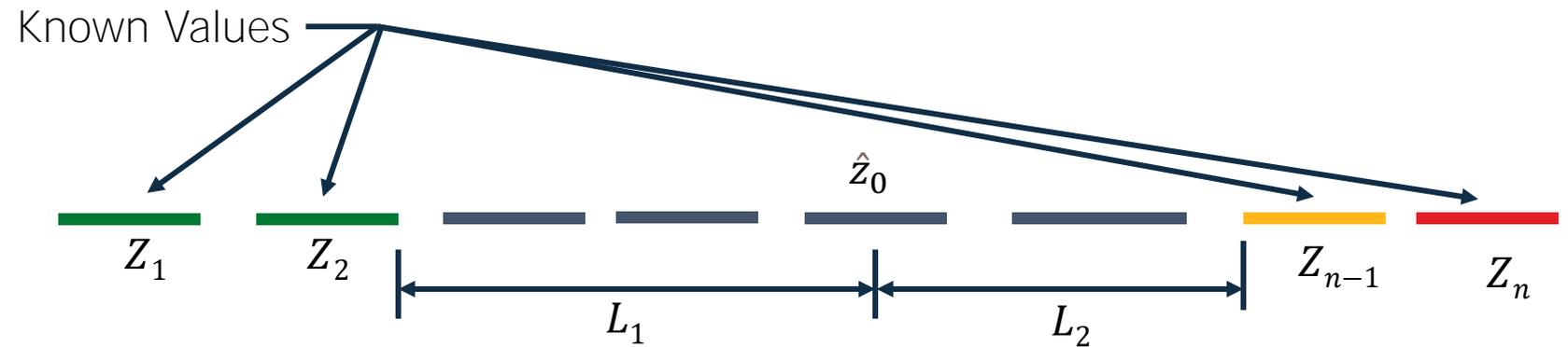
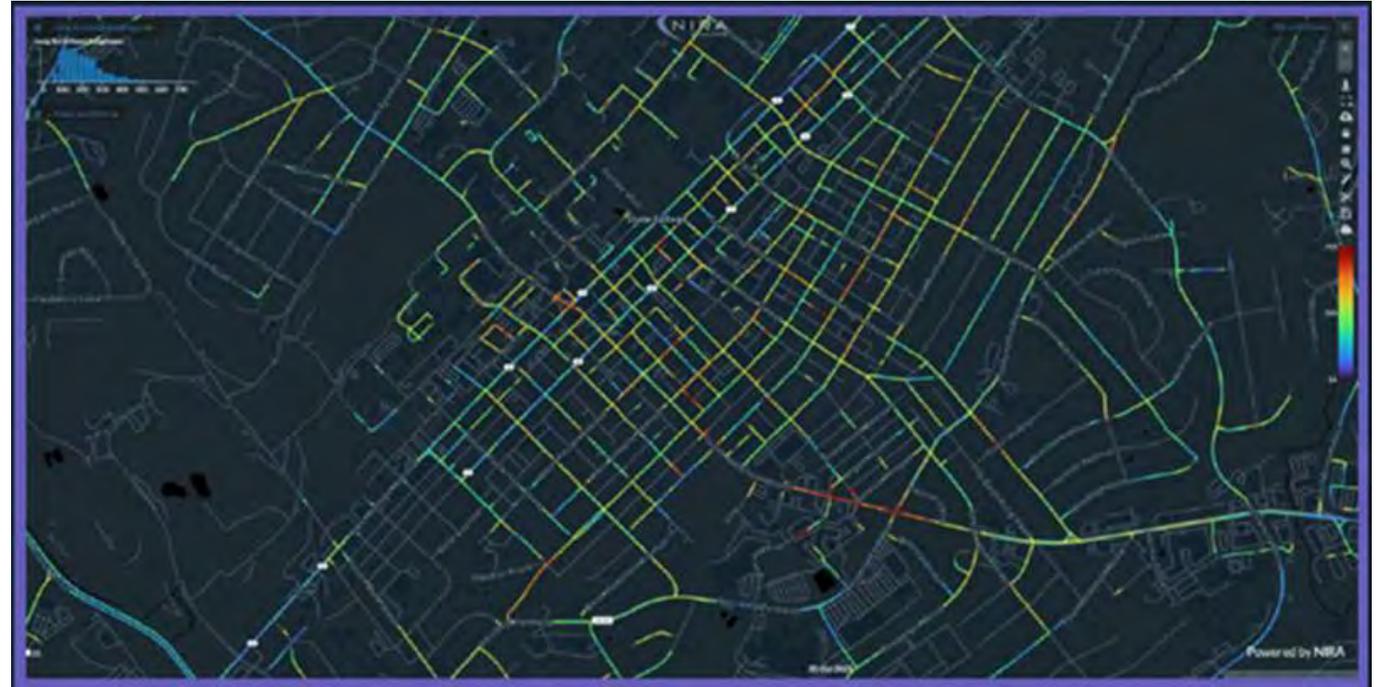
TELEMATICS DATA GAPS

- **Challenge:**

- NIRA's data currently has gaps, especially rural areas and during winter weather events

- **Solution:**

- Use ML to fill in the gaps



OVERALL AI CHALLENGES

Legal

- Liability for incorrect output
- Ownership of data

IT

- Data privacy and security

General

- Bias
- Decision transparency
- Cost



PENNSTART

- Mission
 - Advance a state-of-the-art research, testing and training facility to address the transportation safety and operational needs of Pennsylvania and the Mid-Atlantic Region.
- Focus Areas
 - Connected and Automated Vehicles
 - Traffic Incident Management
 - ITS/Signals/Tolling
 - Work Zones
 - Commercial Vehicles
 - Transit
 - Advanced Air Mobility
- Breaking ground Fall, 2025
- **Governor's Office of Transformation** and Opportunity Fast Track Project



www.pennstart.org





Aerial Technologies Zone

Relocated RIDC Innovation Center West Gate

28,500 sf Welcome Center, Administration and Conference Center Renovation of 1st Floor

TIM Training Zone

Vertiport UAS Pad
Relocated Ring Road
Props Shed

Hazardous Liquid Containment
Fire Rated Pavement

Configurable TIM Training
7 AC

TIM Parking

Truck Staging and Employee Parking

Dedicated PennSTART Maintenance

Second Floor Welcome and Conference Center with Vertical Circulation Tower

Vehicle Dynamic Zone

Rail Xing Safety Zone

Stormwater Management Pond A
3.3 AC

PennSTART Secure Entrance

PennSTART Parking

Renovated CUP for Vehicle Maintenance and Testing Bays

VDA
17.6 AC

300' Tunnel

Vehicle Maintenance and Testing Bays

Stormwater Management Pond B 1.2 AC

Track Overpass

User Defined Area
5.0 AC

Terrain Operations and Testing Zone

3 Acre Solar Farm Microgrid

High Speed Test Track

High Speed Proving Grounds Zone

Urban/Suburban Road Course
17.2 AC

Compound Geometry Course
5.6 AC

Special Pavement Surfaces
3.9 AC

Off Road Testing
8.2 AC

Straightline Track/
Rural Road Simulator

User Defined Zone

Urban/Suburban Road Environment Zone

Special Surface Testing Zone

FUTURE EVENTS

AI IN TRANSPORTATION SUMMIT

- **When:** Summer 2026
- **Where:** Harrisburg University of Science and Technology
- **Audience:** transportation, technology, construction and engineering professionals
- Sessions about AI's impact for the future of Transportation

AI in Transportation 2025



QUESTIONS?

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Pennsylvania Department of Transportation

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