Transportation Theme Update

National Geospatial Advisory Committee

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17 October 2024

U.S. Department of Transportation
Office of the Secretary of Transportation

Bureau of Transportation Statistics

Agenda

1. A Transportation Theme Update
2. Roads, HD Maps, and Road ENCs
3. USDOT and HD Maps
4. Establishing a Navigation Theme
5. Fostering Innovation with HD Maps and Open Addresses Data

Theme Update

Expansion and Contraction

Expansion

Add the FAA's Aeronautical Charts

- Provide essential information for pilots to navigate the national airspace safely and efficiently

Add the National Tunnel Inventory

- Critical federal database that tracks and maintains detailed information about tunnels on public roads
- Sister inventory to the National Bridge Inventory

Contraction

- Remove Intermodal Passenger Facilities
- Remove Intermodal Freight Facilities

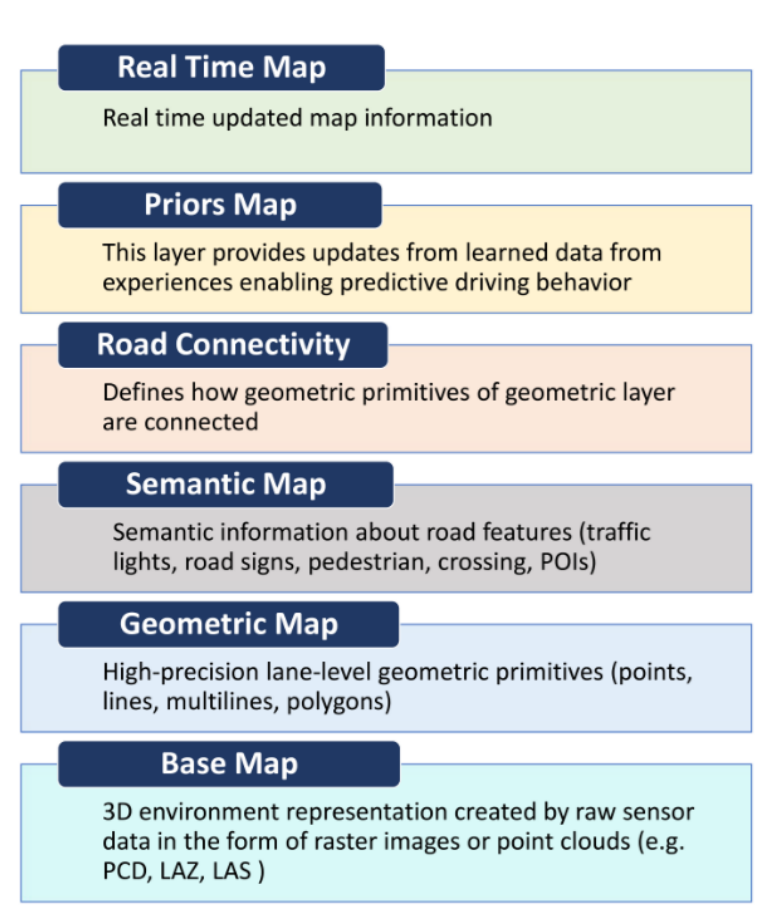
Why?

- Layers have become duplicative
- Aggregated from Roadway, Waterway, Aviation, Transit, & Intercity Bus layers
- Do not have a supporting community for standards development

Questions?

Roads, HD Maps, Roadway ENCs

High-Definition Maps



- Exceptionally large scale (~5 to 20 cm)
- Convey near-real-time road information to human or automated drivers
- AI Decision Support Tool (DST)
- Geospatial data layers act as a Car's memory; it defines the expectation
- A cars sensors creates a perception
- A difference between the expectation and perception indicates a decision point

HD Map Benefits

HD Maps support all of the Department's strategic goals

- Safety
- Economic Strength and Global Competitiveness
- Equity
- Climate Change and Sustainability
- Transformation, and
- Organizational Excellence

Strategic Goal	Aspirational Support
Safety	Advanced driver-assistance systems (ADAS) Autonomous Navigation Real-time situational awareness Reducing human error and Improving decision-making Enable safer navigation for vehicles, particularly in challenging environments (e.g., low visibility, complex intersections).
Economic Strength & Global Competitiveness	Enhancing Supply Chain Resilience Facilitating Innovation and New Business Models Improving Infrastructure Conditions and Reducing Costs Attracting Investment in Advanced Transportation Technologies
Equity	Expanding Access to Underserved Communities Supporting Safe Infrastructure for Vulnerable Populations Reducing Barriers to Mobility Data-Driven Decision-Making for Equitable Transportation Investments
Climate and Sustainability	Accurate route planning can optimize EV charging infrastructure Improved fuel efficiency can reduce greenhouse gas emissions Reach USDOT goal of net-zero emissions by 2050 Building a resilient, environmentally conscious infrastructure
Transformation	Enable smarter, data-driven transportation systems and infrastructure Connected vehicle technologies Help in creating smart cities and intelligent transportation systems (ITS) Improved traffic flow, reduce congestion, and enhance reliability Helps modernize transportation for the future.
Organizational Excellence	Enhancing efficiency Improving data-driven decision-making Improved Customer Service for Public Transit Users Workforce development

Questions?

Meeting of Experts

Title 49

Title 49 requires the Bureau of Transportation Statistics (BTS) to:

- Build and disseminate the transportation layer of the National Spatial Data Infrastructure
- Coordinate and develop geospatial transportation data standards
- Compile intermodal geospatial data
- Collect geospatial data not being collected by other entities
- Develop and maintain a National Transportation Atlas Database that is comprised of geospatial databases that depict among other things transportation networks

Looking Ahead

How to best provide timely and relevant geospatial information products to meet this mandate in a rapidly evolving geospatial information ecosystem

Need to better understand the issues and options regarding HD Maps and the role of BTS, NTAD, and the NSDI

Contracted National Academy of Sciences (NAS) Geographical and Geospatial Sciences Committee (GGSC) to hold a Meeting of Experts (MOE)

Whatcha Doin MOE?

Discuss technical issues pertaining to the development of a comprehensive national system of HD Maps and BIM.

How might High-Definition (HD) Maps, Building Information Modeling (BIM), and Geographic Information Systems (GIS) converge to improve the NSDI, the NTAD, and decision-support tools.

How do we ensure the USDOT provides timely and relevant geospatial information products as the mid-21st century approaches.

Questions?

Toward a National Roadway Electronic Navigation Chart to Enable Automation

Project Objectives

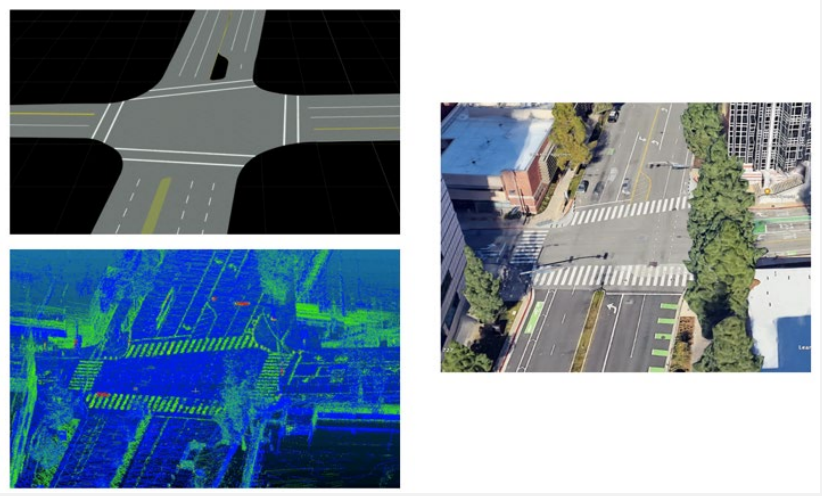
Assess use cases and feasibility of a high-definition map of the national roadway network, by

- Conducting case analysis and vetting with stakeholders to evaluate viability and value, and;
- Prototyping applications.

Potentially include aspects to enable integration of automation within the national multimodal transportation system and/or other (non-RENC) high-value, national-scale digital mapping applications

Context

- Both RENC and NHDM need multiple layers of detailed spatial data.
- ADS requires even more granular and real-time data to function effectively, but may not need entire road environment data
- Example Data Layers
  - Geometric Layer
  - Semantic Layer
  - Operations Data Layers

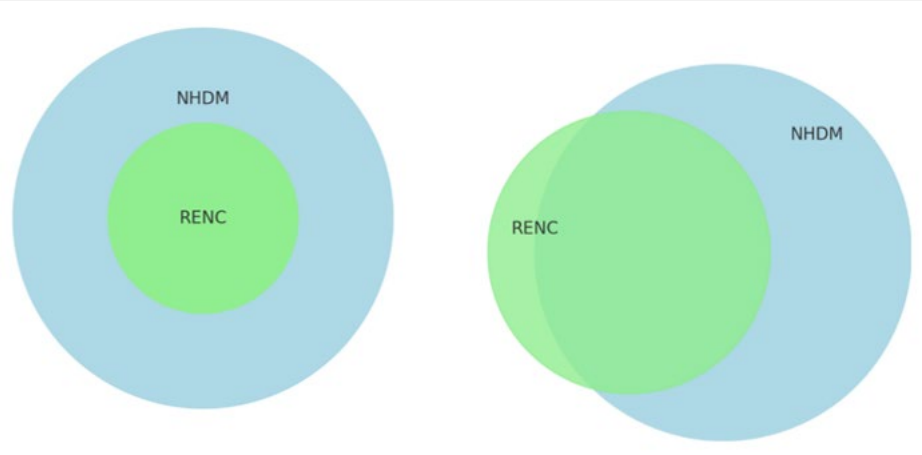


- Need for Open Standards
  - Current data standards vary widely
  - Flexible, adaptable open specifications are necessary
  - Supports high-definition map layer exchange for seamless ADS integration

Context

- **Broader NHDM Applications**:
  - Digital As-Builts (DABs): For infrastructure design and maintenance
  - Asset Management: Monitoring public assets with accurate location data
  - Complete Trip, Complete Street: Includes pedestrian pathways and accessibility features
  - Disaster Response and Supply Chain Resiliency: Real-time road conditions and hazard information

- **Shortcomings in Current HD Maps**:
  - Traffic Control Devices and Signs
  - Traffic Laws and Regulations
  - Curb Resource Information
  - Sidewalks, Cyclist Routes, Pedestrian Info



Overview

Task 1: Project Management

Task 2: Outreach and Engagement Planning and Tracking

Task 3: Internal Environmental Scan and Synthesis

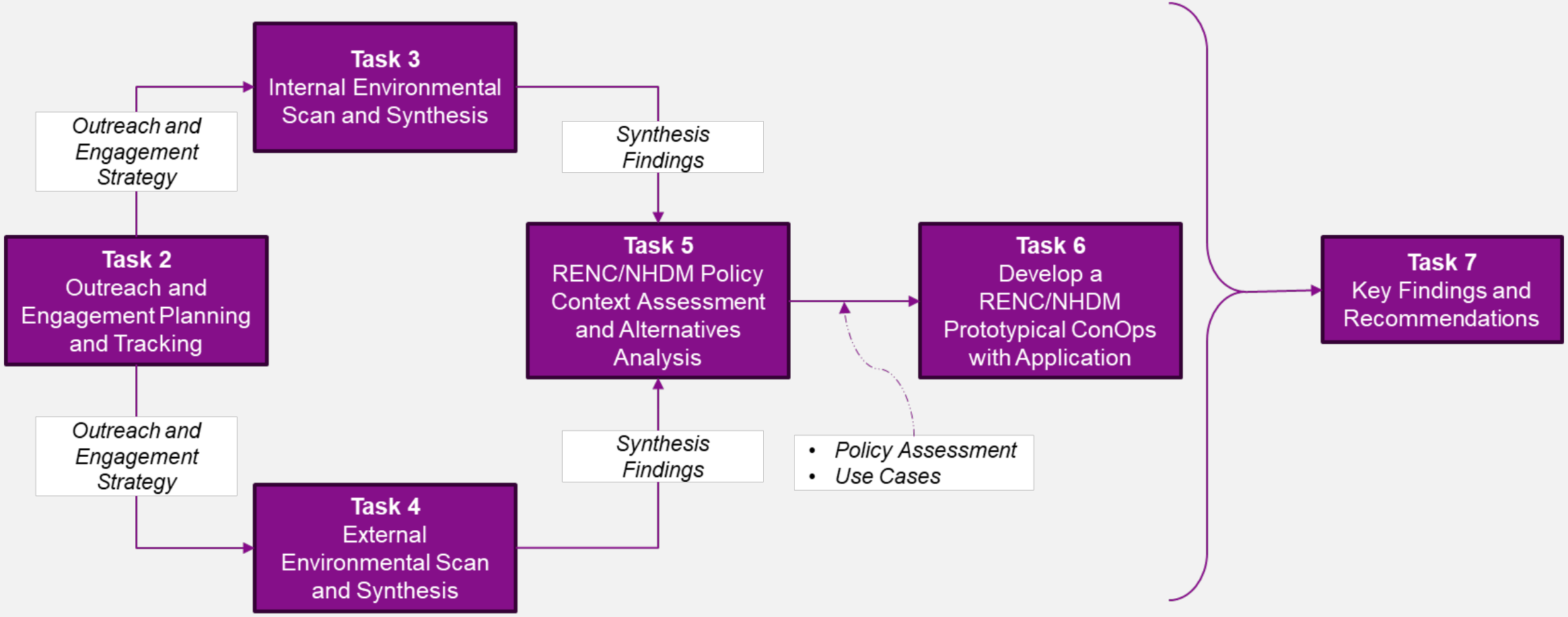
Task 4: External Environmental Scan and Synthesis

Task 5: RENC/NHDM Policy Context Assessment and Alternatives Analysis

Task 6: Develop a RENC/NHDM Prototypical Concept of Operations with Prototypical Application

Task 7: Key Findings and Recommendations

Workflow


Task 3
Internal Environmental Scan and Synthesis
Outreach and Engagement Strategy
Synthesis Findings
Task 2
Outreach and Engagement Planning and Tracking
Task 5
RENC/NHDM Policy Context Assessment and Alternatives Analysis
Task 6
Develop a RENC/NHDM Prototypical ConOps with Application
Task 7
Key Findings and Recommendations
Outreach and Engagement Strategy
Synthesis Findings
Policy Assessment
Use Cases
Task 4
External Environmental Scan and Synthesis

Questions?

Managing Disruptions to Operations Data Exchange

Purpose and Background

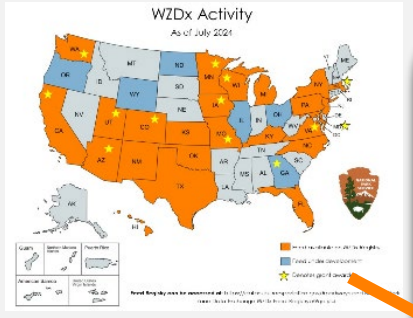
Provide authoritative, real-time, and machine-readable data about disruptions across the nation's roadways.

May include lane restrictions, total road closures, construction zones, and other non-recurring events that significantly impact traffic flow and roadway availability.

Ensure critical information is shared consistently and accurately across multiple agencies and platforms

Improve public safety and allow for better traffic management

MDODE: Possible Architecture



Work Zone Data Exchange (WZDx)

Active feeds in 25 States + National Park Service

Notes:
1) IOO—Infrastructure Owner Operator.
2) OEM—Original Equipment Manufacturer.

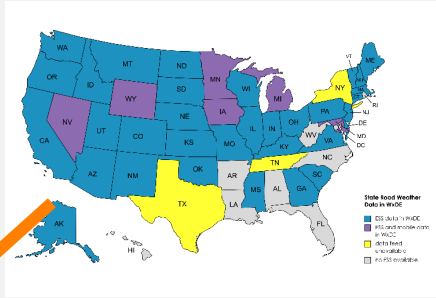
Managing Disruptions to Operations Data Exchange

Policy and Governance

Data Discovery, Support Services

Work Zone	Incident	Special Event	Weather
QA/QC Service	QA/QC Service	QA/QC Service	QA/QC Service
Registry	Registry	Registry	Registry
Standards and Specs	Standards and Specs	Standards and Specs	Standards and Specs
...	...	...	...

State Agency | Local Agency | IOO Agency | Agency "X" | Third Party | OEM



Weather Data Environment (WxDE)

Active feeds in 42 States; map feeds updated daily

Challenges

Fragmented sources

IOOs have many sources of observations but lack clear, consistent, timely, computable information about ongoing disruptions (manual processes, legacy systems)

3rd party products are emerging but vary in coverage, quality, and availability

Poor quality

Manual processes, reliance on field personnel input make it hard for agencies to support high-quality data feeds

WZDX is a good example of the challenge in maintaining quality

Non-authoritative

IOOs desire the ability to communicate and control the message during major events but struggle to communicate to the information service providers like mapping companies

Non-standard

While WZDX is a good start and there are existing standards (like TMDD), state feeds do not yet produce interoperable data

Event prioritization is also not standardized, making it difficult for external systems to handle disruptions data properly

Overlooked policy

T2CFR 511 (RTSMIP) policy framework is already in place, but has not been fully deployed

A renewed focus on this framework is needed, using today's technologies to fully implement solutions

MDODE Vision

Create a national-scale, real-time roadway disruption data exchange system

Allow providers to contribute and access high-quality, real-time data through a central registry

Cover everything from work zones and weather conditions to lane closures and road hazards

Create a system that ensures consistent, authoritative, and interoperable data across all fifty states

Provide decision-makers with the tools necessary to manage disruptions in real-time

Enable predictive models that help mitigate future disruptions

Increase the resiliency of the national transportation infrastructure

Improve overall public safety

Questions?

Establishing a Navigation Theme

Enhanced Intermodal Transportation Integration

Support seamless integration of air, sea, river, and land transportation

Including aeronautical, maritime, river, and roadway charts in a single theme gains:

- Logistics and Supply Chain Efficiency
- Holistic View of National Transportation

Safety and Disaster Response

Improved safety and disaster management across all transportation modes.

Having comprehensive data about all forms of navigation under one system would allow:

- Coordinated Emergency Response
- Accident Prevention

Economic Benefits and Infrastructure Modernization

Support the development and modernization of U.S. transportation infrastructure which is essential for the country's economic competitiveness

The creation of a navigation theme in the NSDI would:

- Support Infrastructure Investments
- Promote Innovation in Transportation Technologies

Interoperability and Data Standardization

The integration of all navigation data under one NSDI theme would enhance data standardization and interoperability.

Would make it easier for agencies, companies, and researchers to access and use geospatial information.

Resulting In:

- Streamlined Data Sharing
- Easier Cross-Sector Collaboration

Environmental Monitoring and Sustainability

Incorporating roadway, maritime, aeronautical, and river navigation charts under one theme would also support efforts to monitor and reduce the environmental impact of transportation.

The theme could:

- Support Green Logistics
- Facilitate Environmental Protection

National Security and Defense

The U.S. military and homeland security agencies rely on accurate spatial data for defense and border protection operations.

A unified navigation theme would:

- Enhance Defense Logistics
- Strengthen Cybersecurity

Questions?

Fostering Innovation with HD Maps and Open Addresses Data

Addresses and HD Maps

Autonomous vehicles (AVs) and advanced driver assistance systems (ADAS) rely heavily on accurate address information to operate safely and efficiently

Open Address Data would lay the groundwork for the further development of these technologies

Could enable route optimization, improve navigation, and enhance safety.

Autonomous systems would be better equipped to navigate complex environments

Smart city projects could use this data to improve traffic management and reduce emissions through optimized transportation systems

Improving Public Services and Safety

Denmark demonstrates open access to address data significantly improves emergency response by reducing response times

We could see similar benefits in the U.S. by integrating address data into 911 systems, disaster response mechanisms, and utility services.

Open access could enhance urban planning and infrastructure development leading to more efficient service delivery across sectors.

Economic Benefits: Lessons from Denmark

Denmark's experience demonstrate the economic benefits of open address data.

Between 2005 and 2009

- Denmark achieved financial benefits totaling EUR 62 million (USD 67 million)
- Costs of maintaining the free access system were only EUR 2 million
- Adjusted for 2024: $98,000,000 – $3,000,000 = $95,000,000
- Denmark’s population and area are about the same size as Wisconsin

Ballpark NSB in the US: $95,000,000 * 50 States = $4,750,000,000

Improving Access

GAO suggests Congress consider…

Assessing the impact of the restrictions of Section 9 of Title 13 and Section 412 of Title 39 of the U.S. Code in moving toward a national geospatial address database

Revising those statutes to authorize the limited release of addresses, without any personally identifiable information, specifically for geospatial purposes.

Such a change could potentially result in significant savings across federal, state, and local governments.

Potential Financial Benefit: Millions of dollars

https://www.gao.gov/assets/gao-24-106915.pdf

Improving Access

Fund a Cost Benefit Analysis to better determine the economic impact

Grant money for resource challenged jurisdictions so they can participate in the NAD

Reframe the concept of Addresses (Service Locations)

Planting a Seed

Perhaps Addresses are an Issue the NGAC might consider.

Questions?

Congratulations!