# GIS APPLICATIONS FOR COORDINATING TRANSMISSION SITING IN HIGHWAY RIGHTS-OF-WAY

## INNOVATION WEBINAR

January 22, 2026

3:00 to 4:00 p.m. ET

Free & open to the public!

NARUC CPI Innovation Webinar

***Moderator*: Deborah Reynolds,** NARUC

**Allie Kelly,** The Ray

**Jessica Oh,** Minnesota Department of Transportation

**Rebecca O'Neil,** Pacific Northwest National Laboratory

# About NARUC

- Founded in 1889, the National Association of Regulatory Utility Commissioners (NARUC) is a non-profit organization dedicated to representing the state public service commissions who regulate the utilities that provide essential services such as energy, telecommunications, power, water, and transportation.
- NARUC's members include all 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands.
- Our mission is to serve the public interest by improving the quality and effectiveness of public utility regulation.
- For more information, visit: www.naruc.org

# About NARUC CPI

- The NARUC Center for Partnerships & Innovation (CPI) builds relationships, develops resources, and delivers training to assist state commissions contending with complex current and emerging issues.
- CPI is funded by cooperative agreements with the U.S. Department of Energy (DOE) and the National Institute of Standards and Technology (NIST).
- CPI conducts work across five key energy areas and many topics within each: generation; transmission; distribution; customers; and critical infrastructure preparedness, response, and resilience.
- Among other events, CPI hosts a monthly innovation webinar series on a wide range of timely topics.
- For more information, visit: www.naruc.org/cpi

# Upcoming Events

## Virtual Events:

- **Informational Webinar: Free Technical Assistance for Regulatory Sandboxes and Other Innovative Approaches for Advanced Grid Technologies:** January 22, 2026, 2:00 to 3:00 p.m. ET.
- **January 2026 NCEP Member Update Webinar:** January 26, 2026, 3:00 to 4:00 p.m. ET.
- **March Innovation Webinar:** March 19, 2:00 to 3:00 p.m. ET.

## Upcoming In-Person Events:

- **NARUC Winter Policy Summit:** February 8 to 11, 2026, Washington, DC
- **NCEP Annual Meeting:** May 5 to 6, 2026, Charleston, SC

See the full list of events and access registration links at: www.naruc.org/events/event-list/

# Today's Speakers

Pacific Northwest
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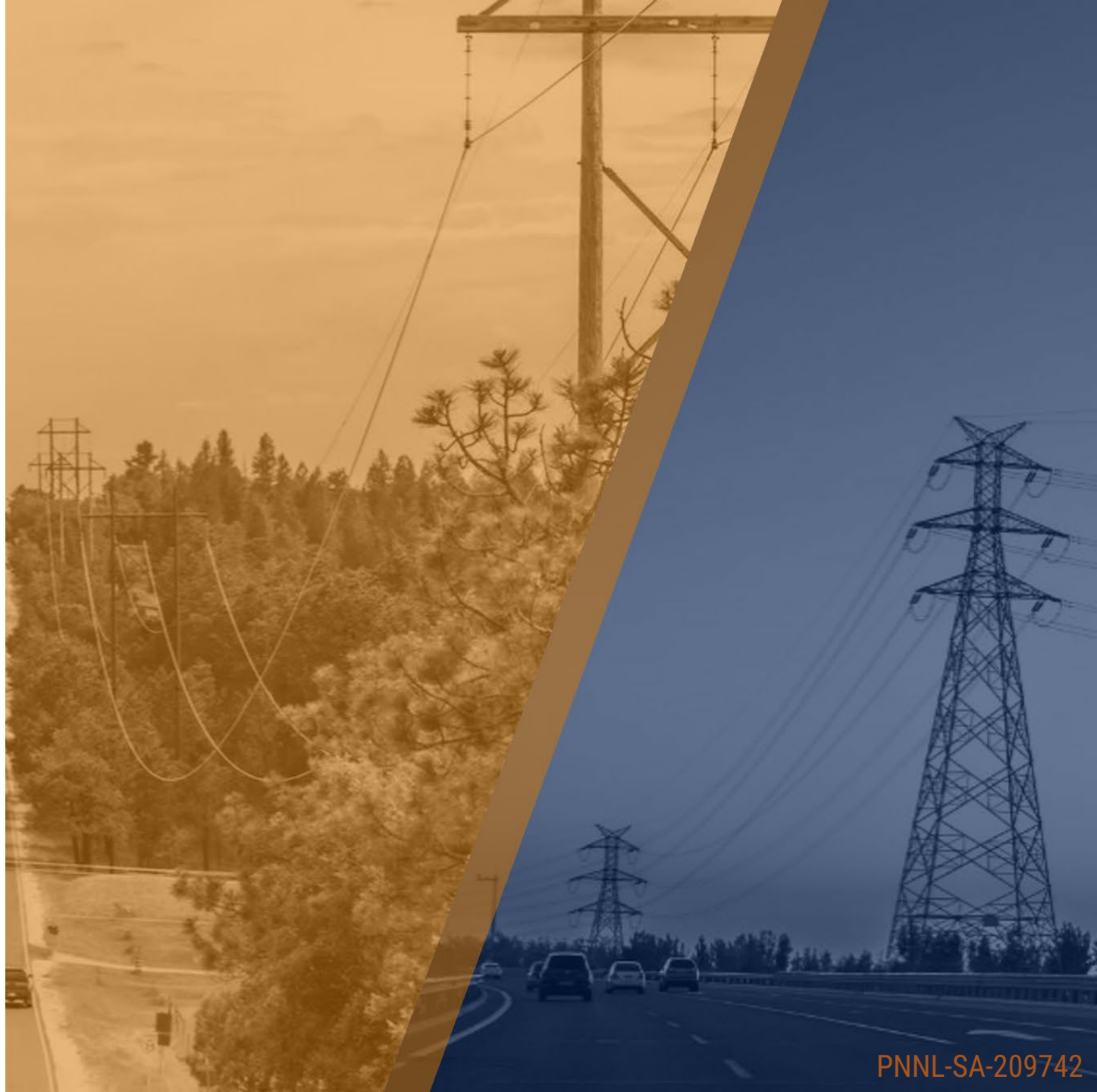
U.S. Department of Transportation
Volpe Center

# Electric Transmission in Transportation Rights-of-Way: An Overview

NARUC Innovation Webinar, January 2026

**Rebecca O'Neil**

**Research Principal, Infrastructure, PNNL**



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# Seven (7) topics relevant to transmission and transportation

**01 Policy**
Analysis of policies governing transmission and transportation ROWs

**02 Institutional**
Organizations involved have separate missions and cultures

**03 Planning**
Potential relationships between transportation and transmission planning

**04 Financial**
Financial structures and motivations are different for transportation and transmission

**05 Siting & Permitting**
Authorizations and jurisdictions for project development in ROWs

**06 Engineering**
Complex design, construction, and operation, in compliance with codes and regulations

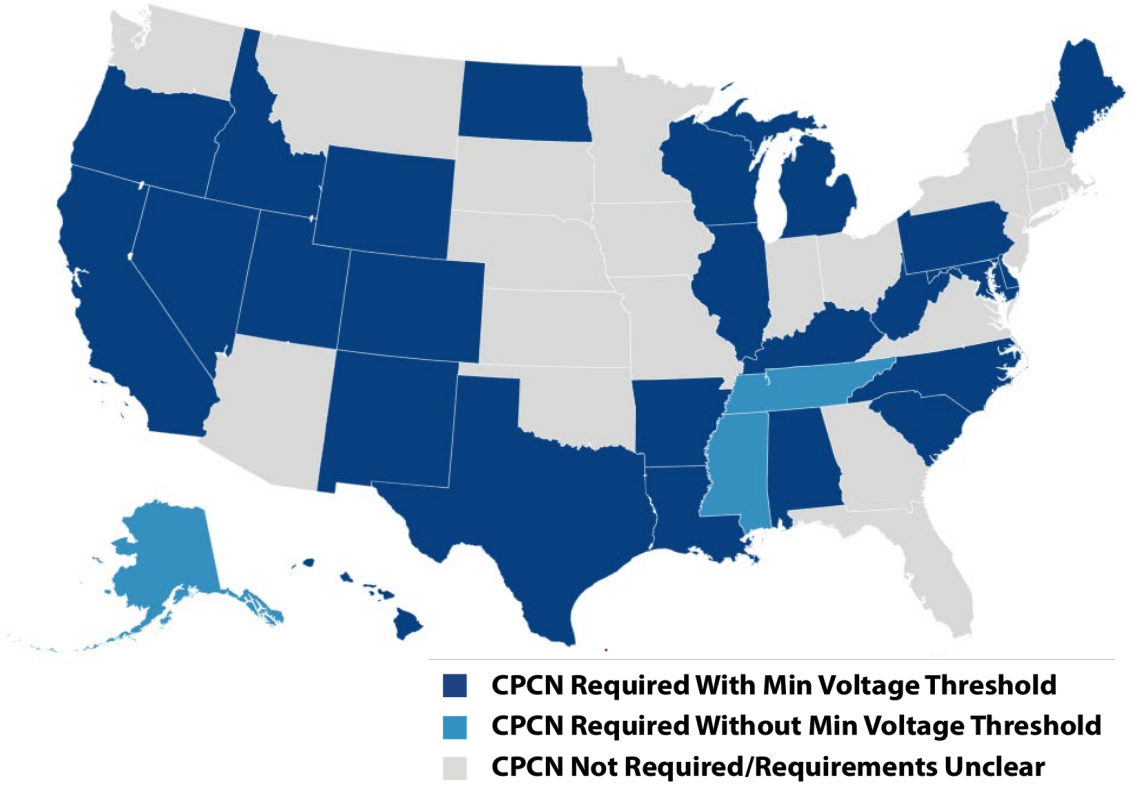
**07 Rail**
Each rail owner requires license agreements and has independent policies and procedures

# Landscape Review and Data Appendices

| | |
|---|---|
| Appendix A – Transmission Projects Located Longitudinally in the Transportation Right-of-Way | Appendix E – State Transmission Siting Requirements |
| Appendix B – Summary of State DOT Utility Accommodation Policies | Appendix F – Transmission in ROW Case Studies |
| Appendix C – Summary of Class I Railroad Utility Accommodation Policies | Appendix G – Transmission Projects in Canada, Europe, and China Located Longitudinally in the Transportation Right-of-Way |
| Appendix D – State Statutes and Legislation Supporting Use of the Transportation ROW for Transmission | https://www.pnnl.gov/projects/electric-transmission-transportation-rights-way/data-appendices |

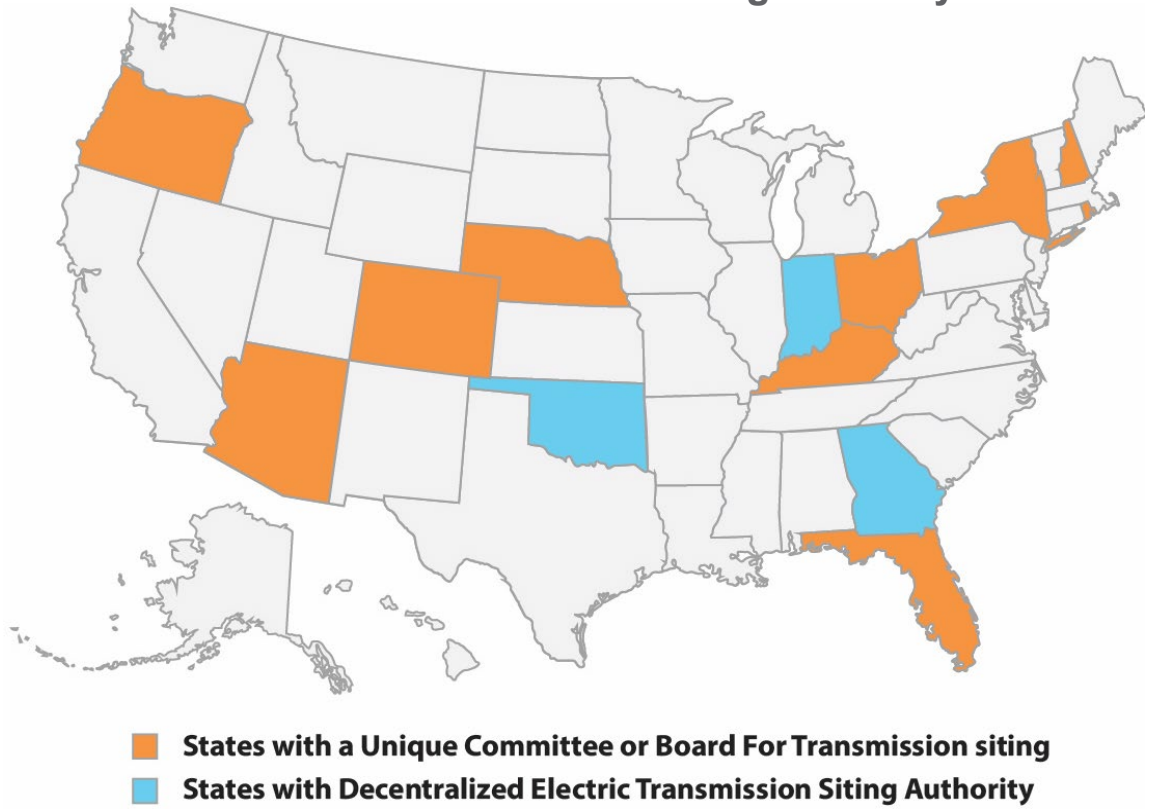
# Transmission siting authorities are state-specific and highly variable

### State CPCN Requirements




A Certificate of Public Convenience and Necessity (CPCN) is a type of regulatory compliance certificate intended to demonstrate public need and authorize infrastructure projects.

### States with Transmission Siting Authority




Transmission siting authority varies by state. Some have no primary authority, while others are more centralized and coordinated.

# State DOT Utility Accommodation Policies

- Historically, public highway right-of-way has been reserved for highway purposes, with limited exceptions for utilities, by Federal laws and regulations
- Since 1988, state Departments of Transportation (DOTs) have had more latitude over what types of utilities are permitted in their rights-of-way
- State DOTs write Utility Accommodation Policies, which must be approved by the Federal Highway Administration (FHWA). **Utility Accommodation Policies determine whether and to what extent co-located transmission is permitted in each state.**

# Many states restrict or prohibit the installation of transmission lines, especially in freeways

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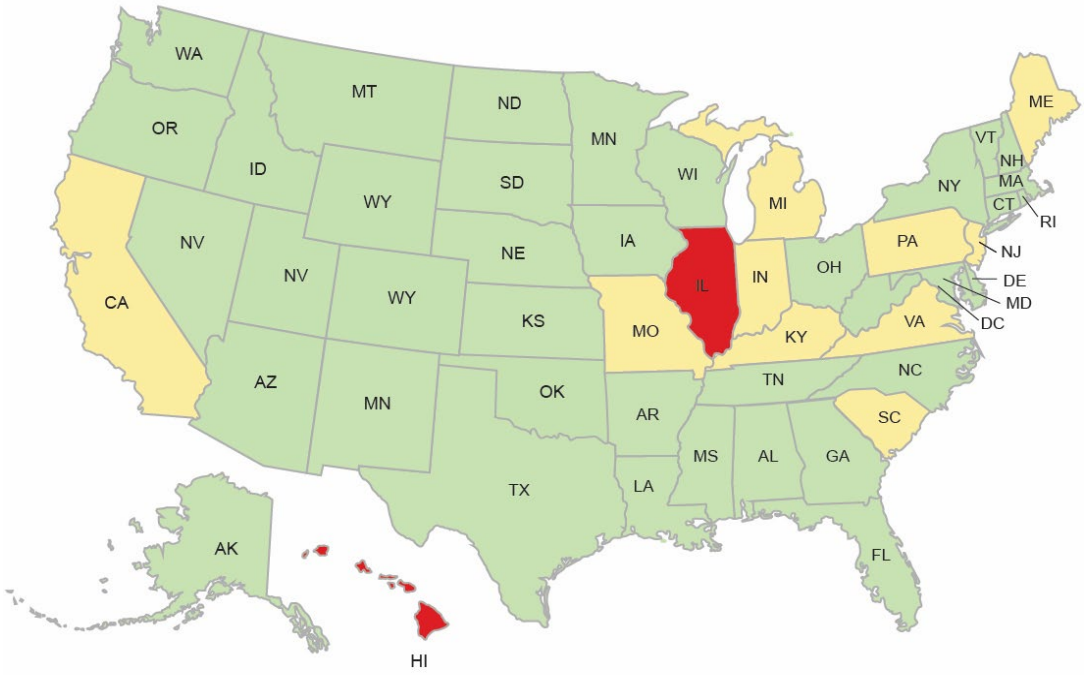
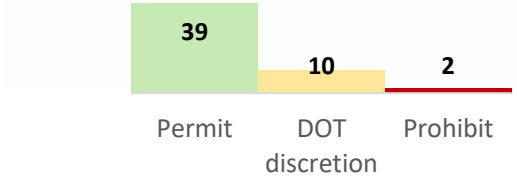
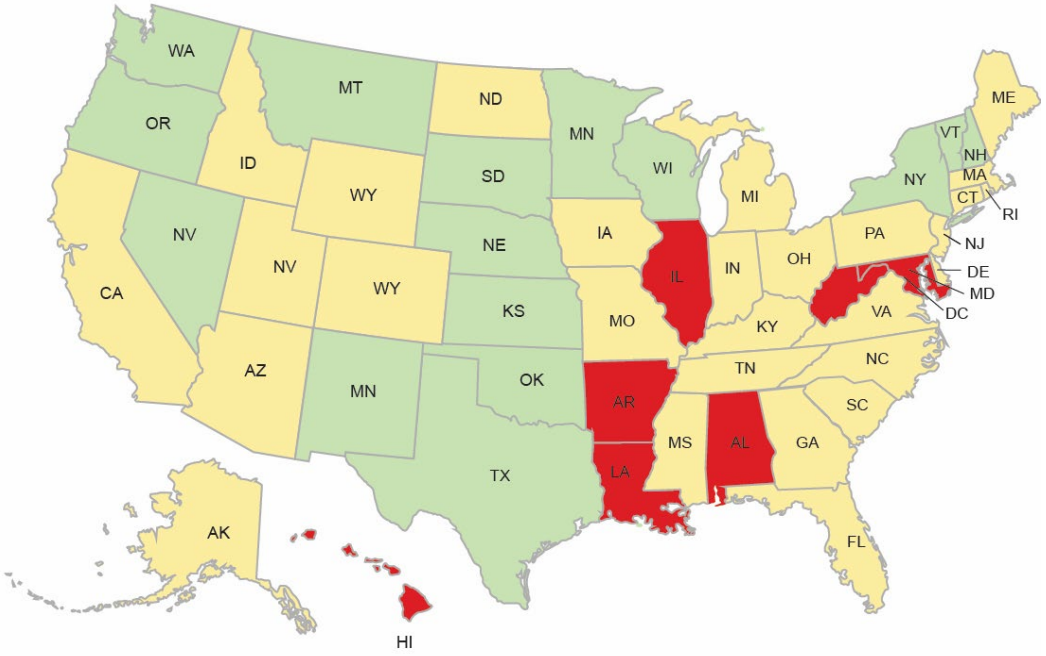
## Prohibitions of Longitudinal Tx in Non-Freeways

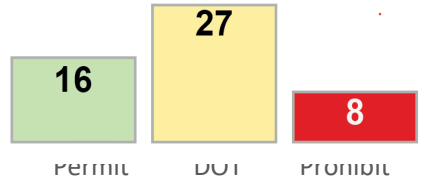



## Prohibitions of Longitudinal Tx in Freeways







# A growing number of states promote the use of Highway ROW for transmission

| States with Statutory Promotion for Use of Highway ROW for Transmission | | |
|---|---|---|
|  Delaware | Promotes use of transportation ROW for renewable energy projects over 30MW and connected to PJM transmission grid (2024) | 84 Del. Laws, c. 401, § 13 |
|  Florida | Transportation department shall accommodate 69KV or higher lines for baseload power (2021) | 2021 FL Statutes Title XXVI Chapter 337 § 401 |
|  Minnesota | Permits longitudinal transmission and requires consideration of ROW during the transmission permit application process | Sec. 161.45 MN Statutes |
|  Wisconsin | Comprehensive energy policy promoting use of transportation right of way (2003) | 2003 Wisconsin Act 89 |
|  Maine  New Hampshire | Energy policy promoting transmission siting on specific named interstates and routes (Maine 2010, New Hampshire 2016) | Sec. A-2. 35-A MRSA § 122(1-B) (ME) Chapter 162-R Energy Infrastructure Development and Corridors (NH) |
|  Colorado | Policy allowing high-voltage transmission within highway rights of way unless public safety, environmental, or operational concerns require a denial (2025) | HB25-1292: Transmission Lines in State Highway Rights-of-Way \| CCW |

# Transportation and transmission planning differ in important ways

## TRANSPORTATION

### 01 Long-range Planning
- State DOT- or MPO-wide
- Vision/connection with broader goals; may include specific projects
- 20-25 years

### 02 Programming
- State DOT- or MPO-wide
- List of projects
- 4-5 years

### 03 Project Development
- Specific project/location
- Includes NEPA, engineering/design, ROW and utility coordination

### 04 Construction & Maintenance
- Specific project/location
- Includes utility coordination and relocation

## TRANSMISSION

### Planning 01
- Multi-state region (ISO/RTO)
- Paths/connecting zones
- Utility resource planning for load/ build forecasts
- 5-30 years

### Siting 02
- Project proponent (utility, federal PMA, merchant)
- Specific route – may be multiple states
- NEPA, permitting

### Engineering Design 03
- FERC & NERC regulatory requirements
- NESC & ASCE standards
- Accessibility and safety
- Public comments

### Construction & Maintenance 04
- Specific route – may be in multiple states

# Variation in type of entities that conduct and benefit from planning stages

## TRANSPORTATION

01

02

03

04

**Transportation agencies (state DOT, MPO) involved throughout process**

Designed for public and societal beneficiaries

## TRANSMISSION

01

02

03

04

**Constellation of authorities, public and private sector**

Designed to benefit system performance, industry coordination, markets and competition

# Variation in financing and capital that influence planning structures

## TRANSPORTATION

01

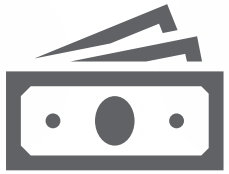
02

03

04

**Funding from federal, state, and local government**

Public investment is patient and pre-determined



**Funding sources vary, but typically private capital and/or rate based**

Private capital is market- and time-sensitive

## TRANSMISSION

01

02

03

04

# Geographic and jurisdictional boundaries are different

## TRANSPORTATION

**01 Long-range Planning**
- State DOT- or MPO-wide
- Vision/connection with broader goals; may include specific projects
- 20-25 years

**02** Planning occurs within state DOT and Metropolitan Planning Organization (MPO) boundaries

**03** Established and recognizable governance and spatial jurisdictions

**04**

## TRANSMISSION

**01 Planning**
- Multi-state region (ISO/RTO)
- Paths/connecting zones
- Utility resource planning for load / build forecasts
- 5-30 years

**02** Planning occurs within system operator or utility footprints

**03** Unique boundaries that can change over time, utility drivers include access to generating resources and markets

**04**

# Specific project design decisions are not well aligned on planning timelines

## TRANSPORTATION

**01 Long-range Planning**
- State DOT- or MPO-wide
- Vision/connection with broader goals; may include specific projects
- 20-25 years

**02 Programming**
- State DOT- or MPO-wide
- Fiscally constrained
- 4-5 years

**03 Project Development**
- Specific project/location
- Includes NEPA, engineering/design, ROW and utility coordination

**04 Construction & Maintenance**
- Specific project/location
- Includes utility coordination and relocation

**Key inputs about Tx in ROW would be <u>needed</u> 20 years before construction**

**Key inputs about Tx in ROW are <u>available</u> 1-5 years before construction**

## TRANSMISSION

**01 Planning**
- Multi-state region (ISO/RTO)
- Paths/connecting zones
- 5-30 years

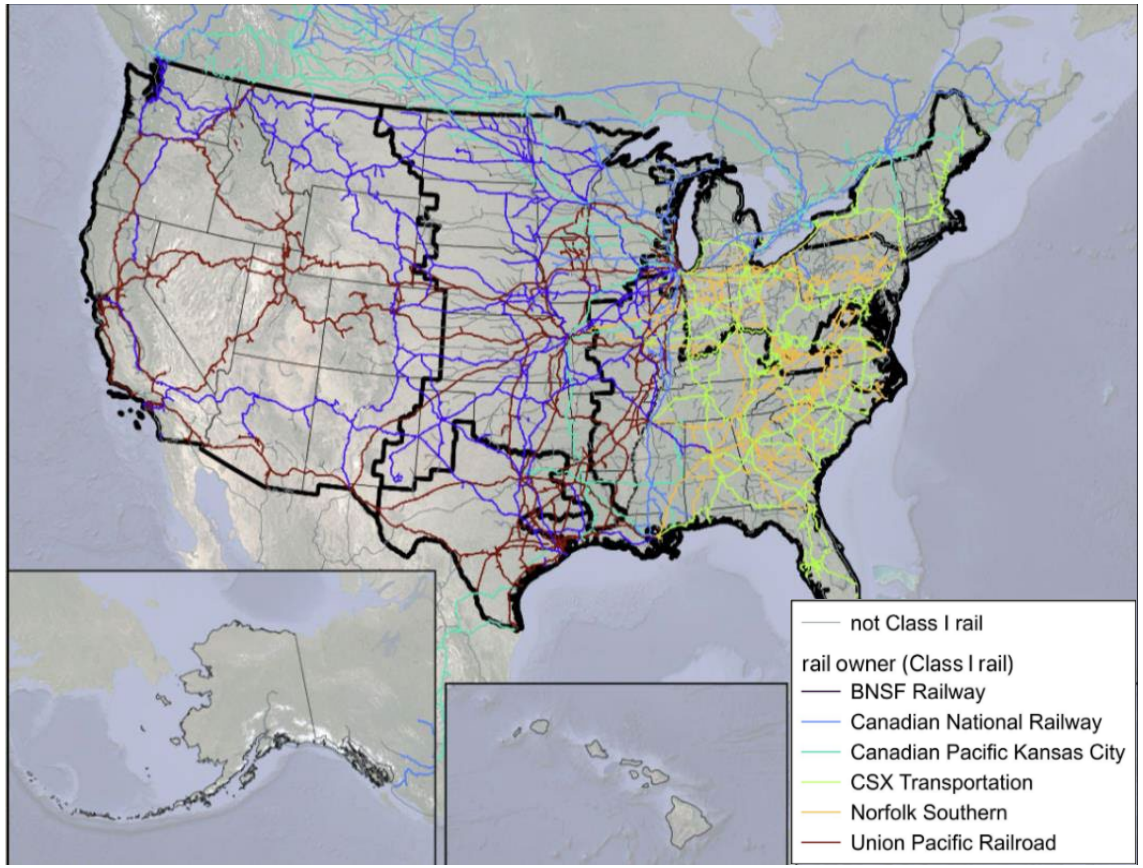
**02 Siting**
- Project proponent (utility, federal PMA, merchant)
- Specific route – may be multiple states
- NEPA, permitting

**03 Engineering Design**
- NESC & ASCE standards
- Accessibility
- Public comments

**04 Construction & Maintenance**
- Specific route – may be in multiple states

# Class I railroads have national reach for transmission opportunities

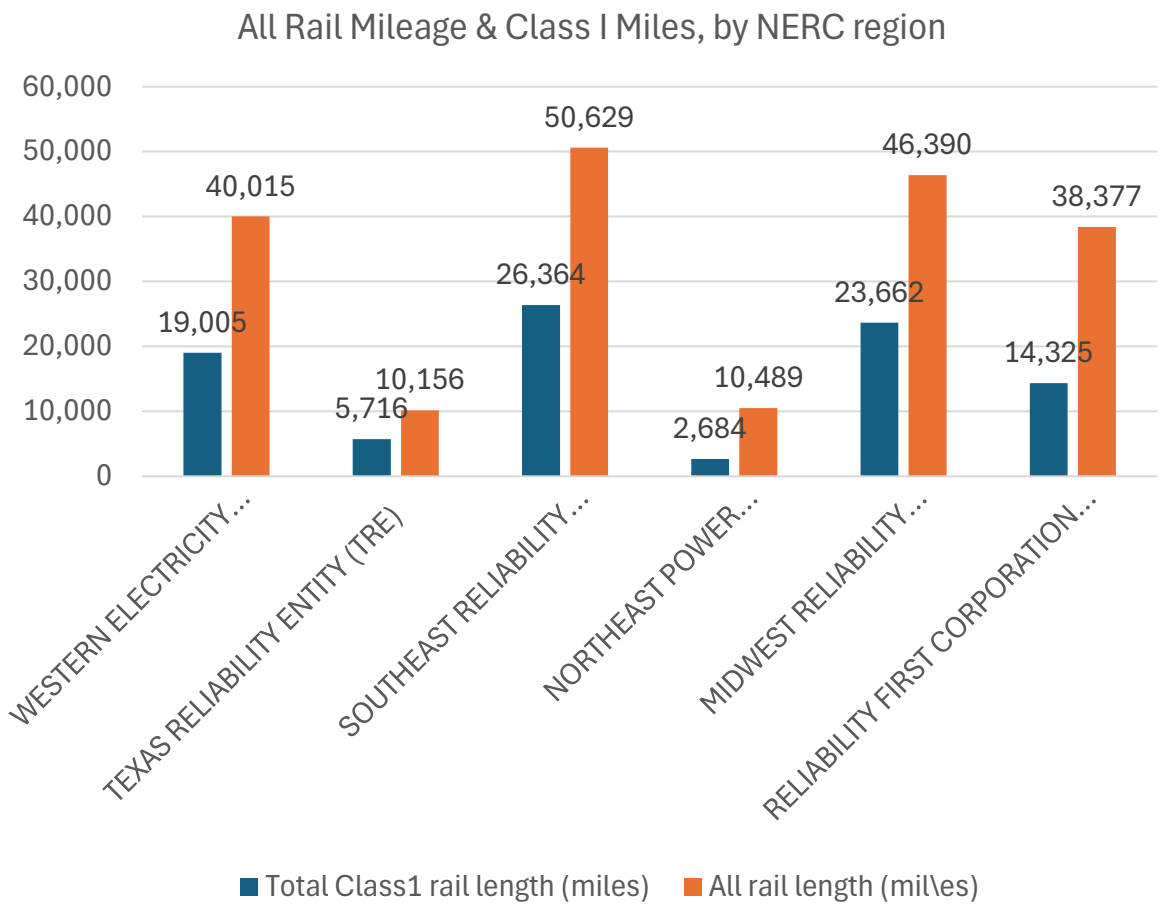
- Freight railroads in the U.S. are designated according to their annual operating revenues as Class I, II, or III.
- Approximately **two-thirds** of the nation's rail network (~92,000 route miles) is **owned by six Class I freight railroad** companies.
- Class II and III make up 600 short line railroads and include private, public, and quasi-public operators and owners.
- Railroad property rights often come from easements, license agreements, and/or adverse possession.




*Above: Class I rail owners related to NERC regions. Note that all bulk electric reliability regions have Class I rail opportunities.*

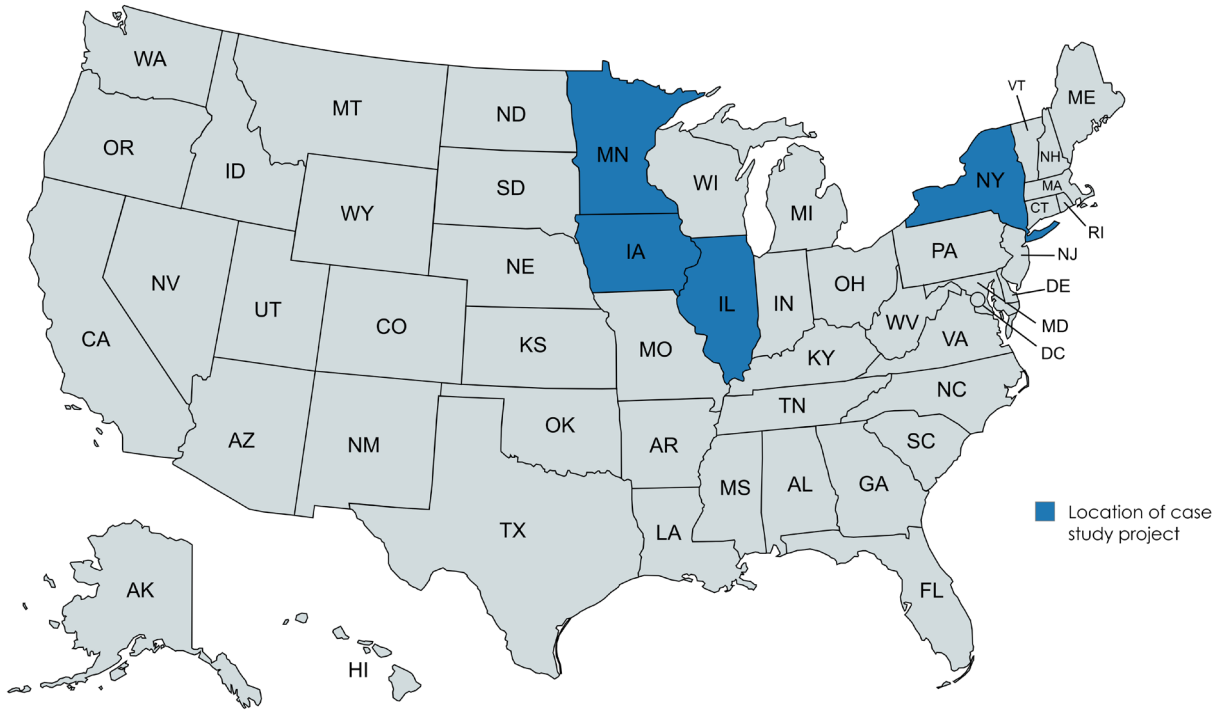
# Rail right-of-way requirements and prohibitions; Class I regional distribution

- Railroad companies have individual requirements for development in their rights-of-way.
- Common requirements:
  - Minimum distance to centerline of track and communication and signal lines
  - Minimum vertical clearance
  - Minimum depth
  - Encasement material
  - Inductive interference coordination study
- **Two of the Class I rail owners (BNSF and CP) have restrictions within their utility policies for high voltage towers in the ROW (overhead installations).**



# Case Studies

- The Volpe Center has prepared a series of draft case studies that highlight opportunities for transportation agencies to creatively streamline permit processes, reap financial benefits, and increase grid reliability by siting energy projects on their properties and rights-of-way.
- Example projects featured:
  - SOO Green HVDC Link (Iowa & Illinois)
  - Champlain Hudson Power Express (New York)




**Case Study Project Locations**

# Opportunities to Advance

**ESTABLISH DATASETS**

- Develop and pioneer data and methods for evaluating “siting-informed” transmission planning through explicit consideration of available ROWs.
- Develop actionable cost information to support analysis of potential ROW transmission opportunities.
- Develop a comprehensive database of engineering, construction, and operations requirements for the transmission and transportation industries.

**SET STANDARDS & GUIDANCE**

- Develop model guidance for transmission use of highway ROW.
- Develop information on spatial considerations for siting utilities in transportation ROWs, including minimum horizontal and vertical clearances for above ground and below ground construction, and addressing water, fiber, natural gas, and electric services.
- Develop a nationally relevant model or template for UAP language specific to transmission that could be adopted by sates

**CONNECT / COLLABORATE**

- Seek opportunities to connect with and learn from colleagues from states that have successfully delivered transmission projects in their highway and rail ROWs
- Support cross-sector transportation-energy collaborations at the state level.
- Advance collaboration about DOT design requirements for utility accommodation, including any opportunities for flexibility.
- Support cross-sector rail-energy collaborations.

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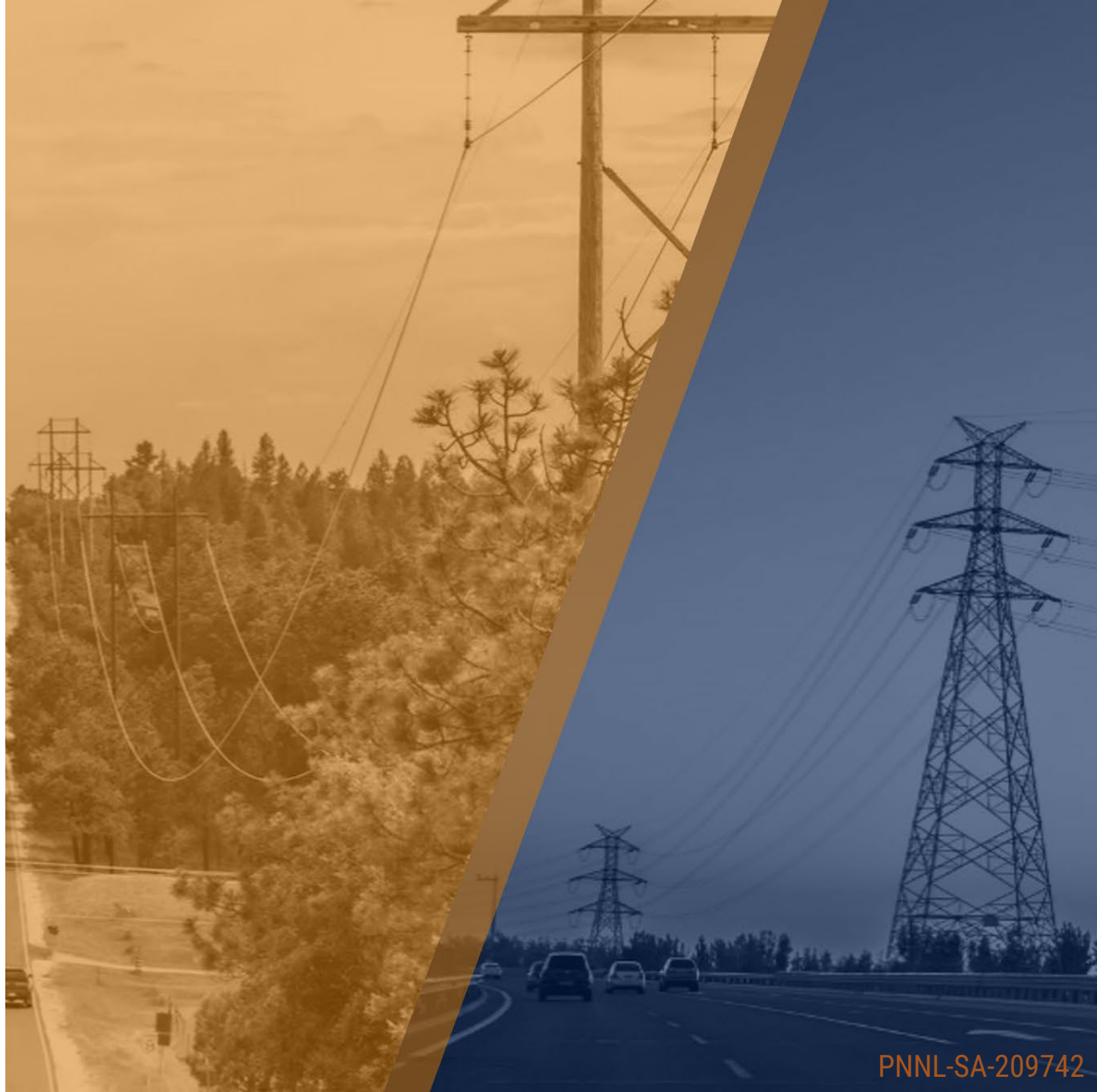
# Contacts


**Volpe**
Maiya Baum
maiya.baum@dot.gov

**PNNL**
Rebecca O'Neil
rebecca.oneil@pnnl.gov

Kelly Gordon
kelly.gordon@pnnl.gov

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# Thank you

# NARUC Innovation Webinar:
# GIS Applications for Coordinating Transmission Siting in Highway Rights of Way
# 01/22/2026


Jessica Oh| Deputy Director

Minnesota Department of Transportation

Office of Sustainability & Public Health


DEPARTMENT OF TRANSPORTATION

mndot.gov

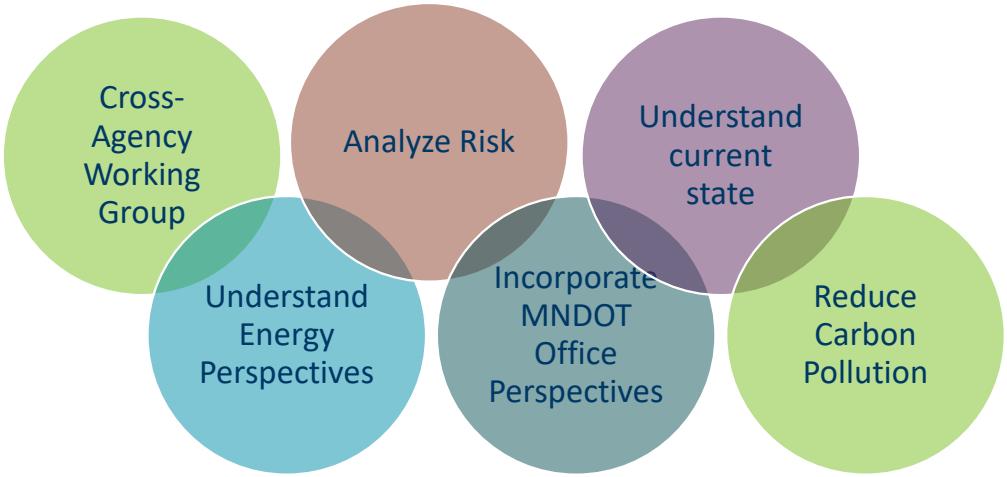
# Background Information:
# NextGen Highways and Transmission in Highway Rights of Way

What are NextGen Highways?

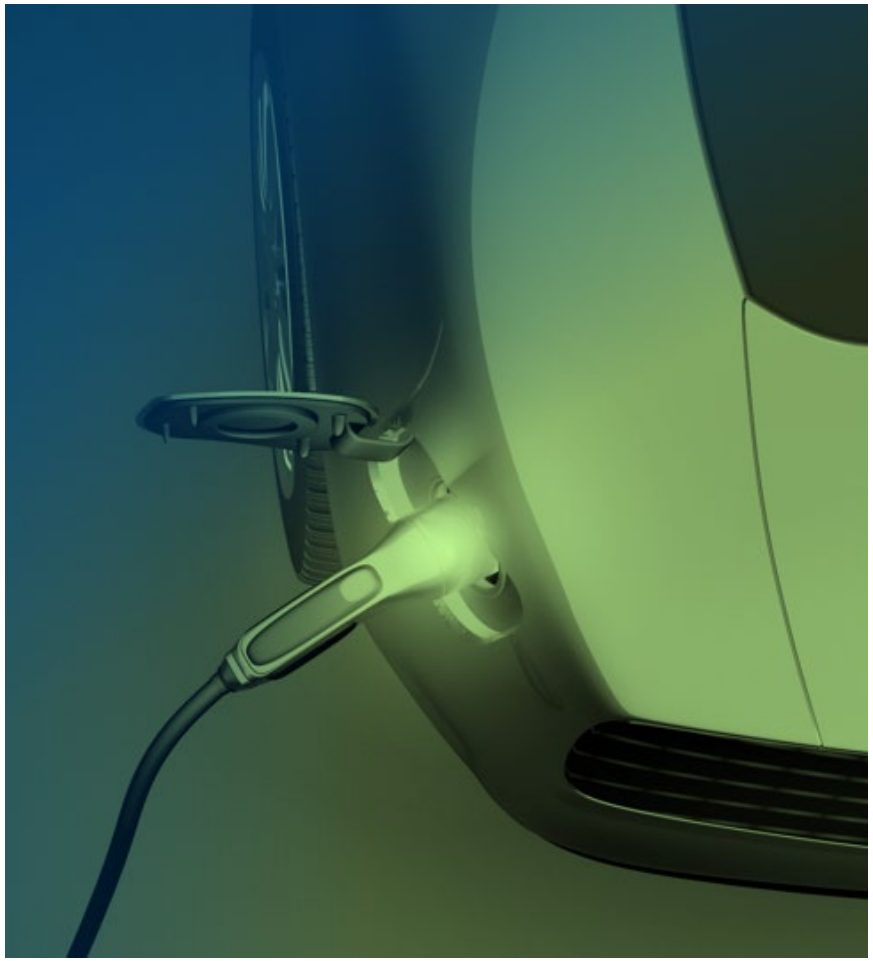
Transportation corridors with the strategic co-location of electric transmission lines

**2022 Feasibility Study**, led by the Ray, Next Generation Highways, Great Plains Institute and other partners. This was a proactive planning project underwritten by philanthropy.

- ***Can use of highway rights of way for transmission siting help address significant decarbonization barriers for energy and transportation?***
- ***What are the technical, regulatory, and economic barriers for siting transmission lines in highway Rights of Way?***



# What problem is the Minnesota Dept of Transportation trying to solve? Clean Energy Needed for Electrification of Transportation



Electrification of transportation is a key component of MnDOT's **Carbon Reduction Strategy**

New Legislation: All electricity must come from 100% **Clean Energy by 2040** - law passed in MN 2023 Legislative session.

There are strong benefits to the state of Minnesota to expand use of right of way for transmission to support energy decarbonization and the increased generation/transmission needed to support the electrification of transportation.

# What Role can State DOT's Play?

New MN State statutes

+

Increasing requests for use of rights of way for Transmission

→

Expand use of highway rights of way for transmission to support the clean energy transition.

**Co-location**

(transmission located with within highway rights of way)

**Paralleling**

(poles ***outside*** of rights of way with arial encroachment ***within*** right of way)

**Crossings**

(well established accommodation)

# What do you see?  Underutilized Land?

# Uses & Demands on MnDOT's Highway Roadsides

# What We Learned: Categories of Pressure Points for Added Transmission Infrastructure in Highway Rights of Way

Limit Future Right of Way Use

Safety/Risk for Traveling Public

Safety, Operations & Maintenance Impacts for Transpo Workers

Added Costs for Transportation – who pays? Ex. Grounding/Relocation

Relocation of Poles: Cost and Timing

Impact to Scenic Viewsheds

Environmental Impacts

Vegetation Removal

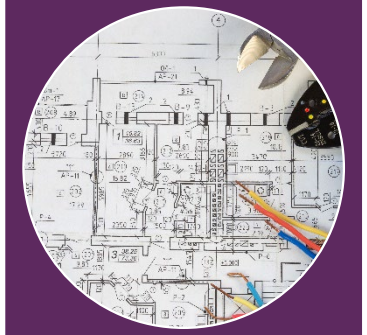
# MnDOT's AASHTO "Moonshot"

New Resources for Early Coord. With Transmission Developers

Safety Analysis

2026 Joint Training with Sister Agencies: MN PUC & MN Commerce

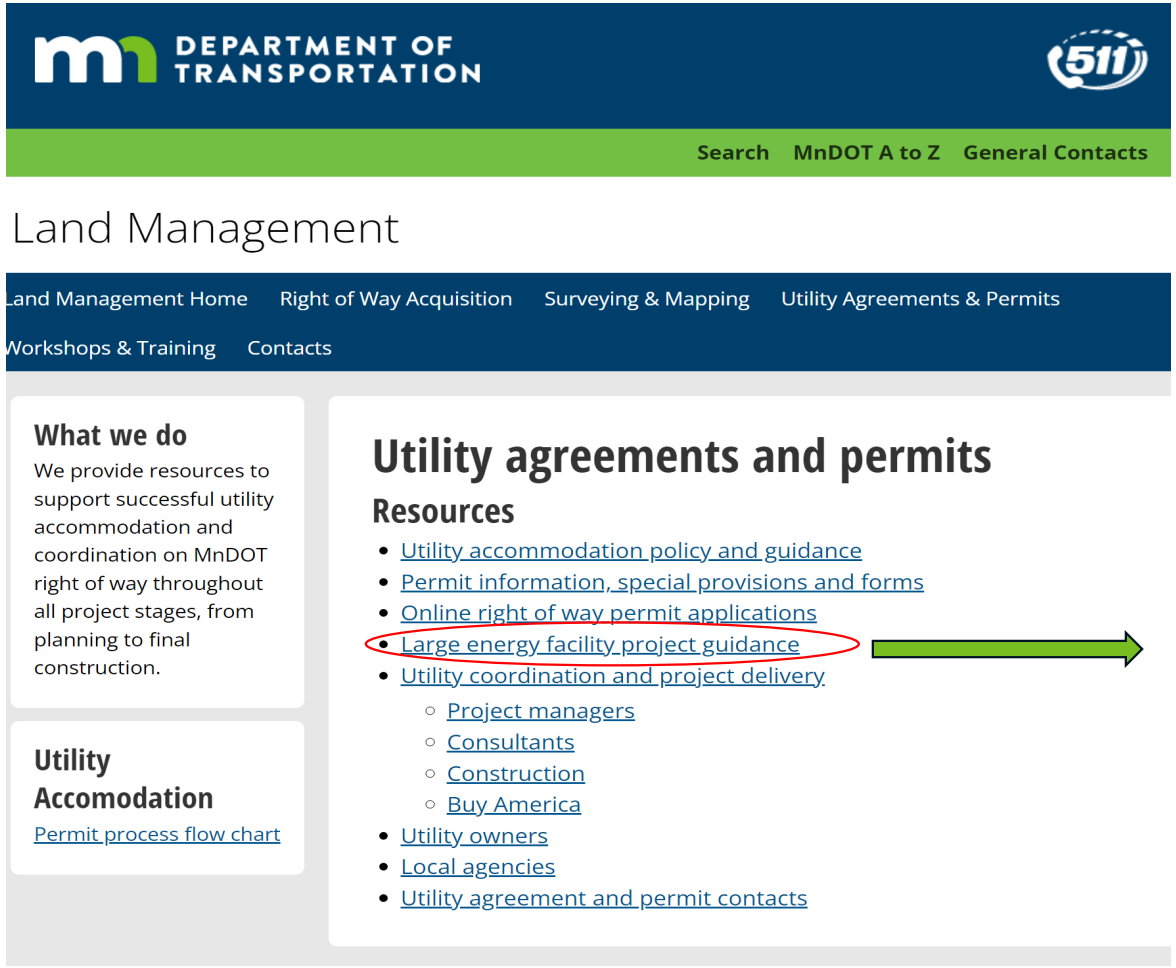
Get the Word Out on Statutory Shifts: District Tour & Listening Sessions



Add Transmission Staff in DOT Utility Permits Section

Partner with the Ray Transmission Right of Way GIS Tool

# MnDOT's New Transmission Resources




## Large Energy Facility Project Guidance

### Overview

The Minnesota Department of Transportation (MnDOT) has developed several guidance documents to assist Large Energy Project proposers in providing adequate information, specific to MnDOT needs, during various stages of project development. This guidance applies to projects affecting MnDOT-owned land, rights-of-way, and other areas of interest requiring a Certificate of Need, Route Permit, Site Permit, or Minor Alteration (CN, RP, SP, MA) from the Minnesota Public Utilities Commission (MPUC).

Contact MnDOT's Routing and Siting Coordinator for assistance with MPUC project review coordination.

### Guidance Documents

MnDOT Utility Project Guidance for Large Energy Facility Project Proposals
Transmission Line Guidelines
MnDOT Environmental Requirements
PUC and MnDOT Permitting Process Flowchart

### Other Resources

Home / Public Utilities Commission (mn.gov)
Energy Environmental Review and Analysis Home (state.mn.us)
MN DOC Efiling (state.mn.us)

To view full case records for MPUC projects:
1. Visit eDockets / Public Utilities Commission (mn.gov)
2. Select "Go to eDockets" Project Database.
3. Enter the year (XX) and the docket number (XXX) in the Basic Search area.
4. Select Search.

# Reflections on this journey in Minnesota

- Role of Outside Partners: The Ray & NextGen Highways Coalition brought Expertise, Momentum, Focus, Capacity, Resources, Facilitation, Analysis.
- Defining the non-transportation “problem” was challenging. Lack of trust among all parties - Transportation/Energy/Utilities.
- Cross agency Working Group: 12 MnDOT Offices, FHWA, PUC, Commerce
- Created Forums for Understanding the Problem: FHWA Peer Exchange, Listening Sessions with Utilities & Sister Agencies
- Legislative change occurred in 2023 in Minnesota
- Key executive level commitment & engagement across State Agencies
- PRE PUC PERMIT: Improve early coordination by utilizing “Early Notification Memo for Large Energy Projects” for early environmental coordination and “Constructability Report” for documenting impacts to transportation

# Next Chapter: Launching Interagency Working Group to Analyze GIS Tool Created by the Ray

- MNDOT- Department of Transportation
- MN Public Utility Commission
- MN Department of Commerce
- Department of Natural Resources
- MNIT – Enterprise-wide Information Technology Services
- MNGEO – Enterprise-wide Geospatial Commons

# Thank you

**Minnesota Department of Transportation**

**Office of Sustainability and Public Health**

**Jessica Oh, Deputy Director**

**Jessica.oh@state.mn.us/612-430-4762**

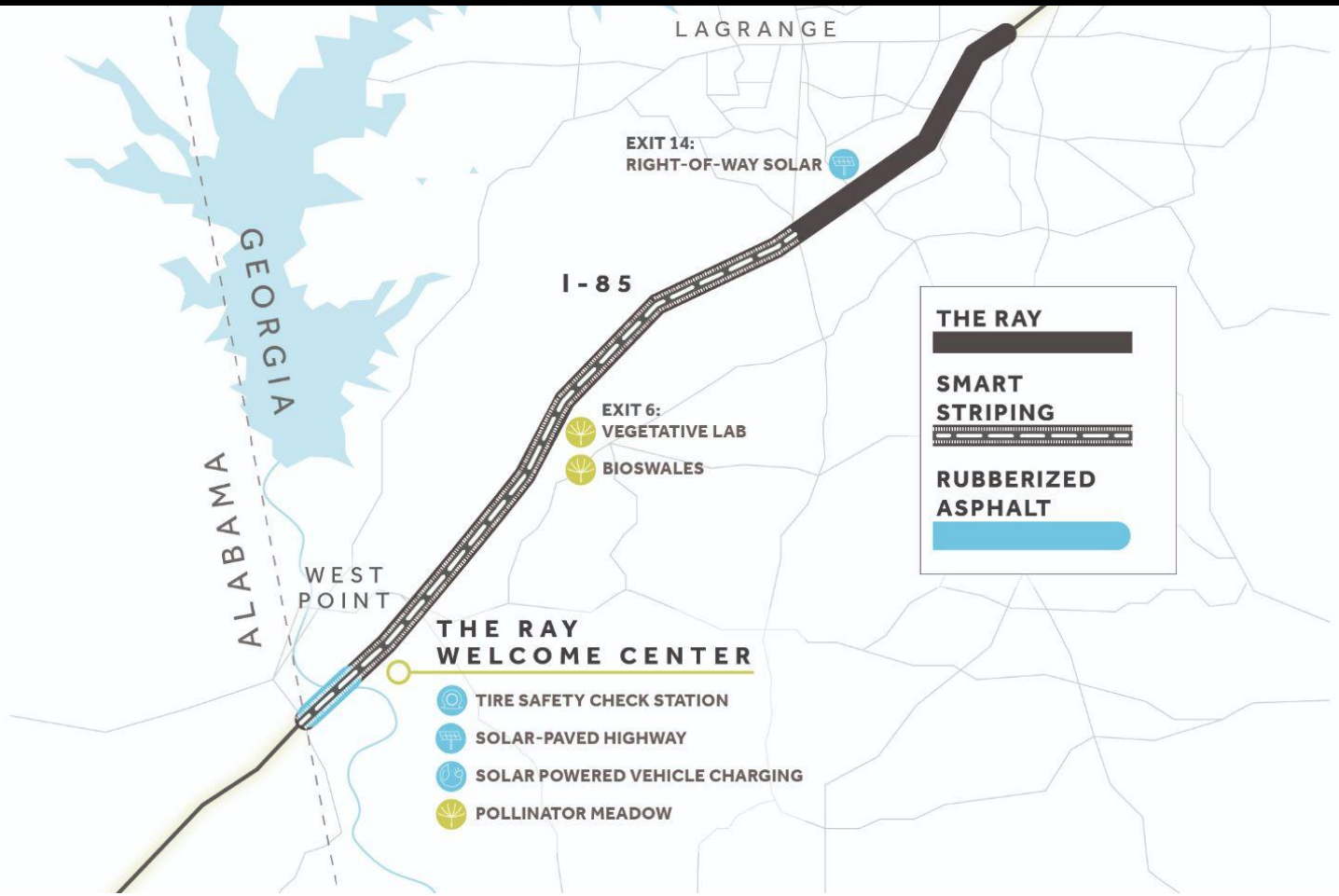

# NARUC Innovation Webinar
# January 22, 2026

# THE RAY HIGHWAY

The Ray Highway is the nation's only public proving ground, co-managed by Georgia DOT, FHWA and The Ray.

Interstate 85  features 13 projects:

- Safety (5)
- Energy (3)
- Natural Capital / Landscape Lab
- Road materials



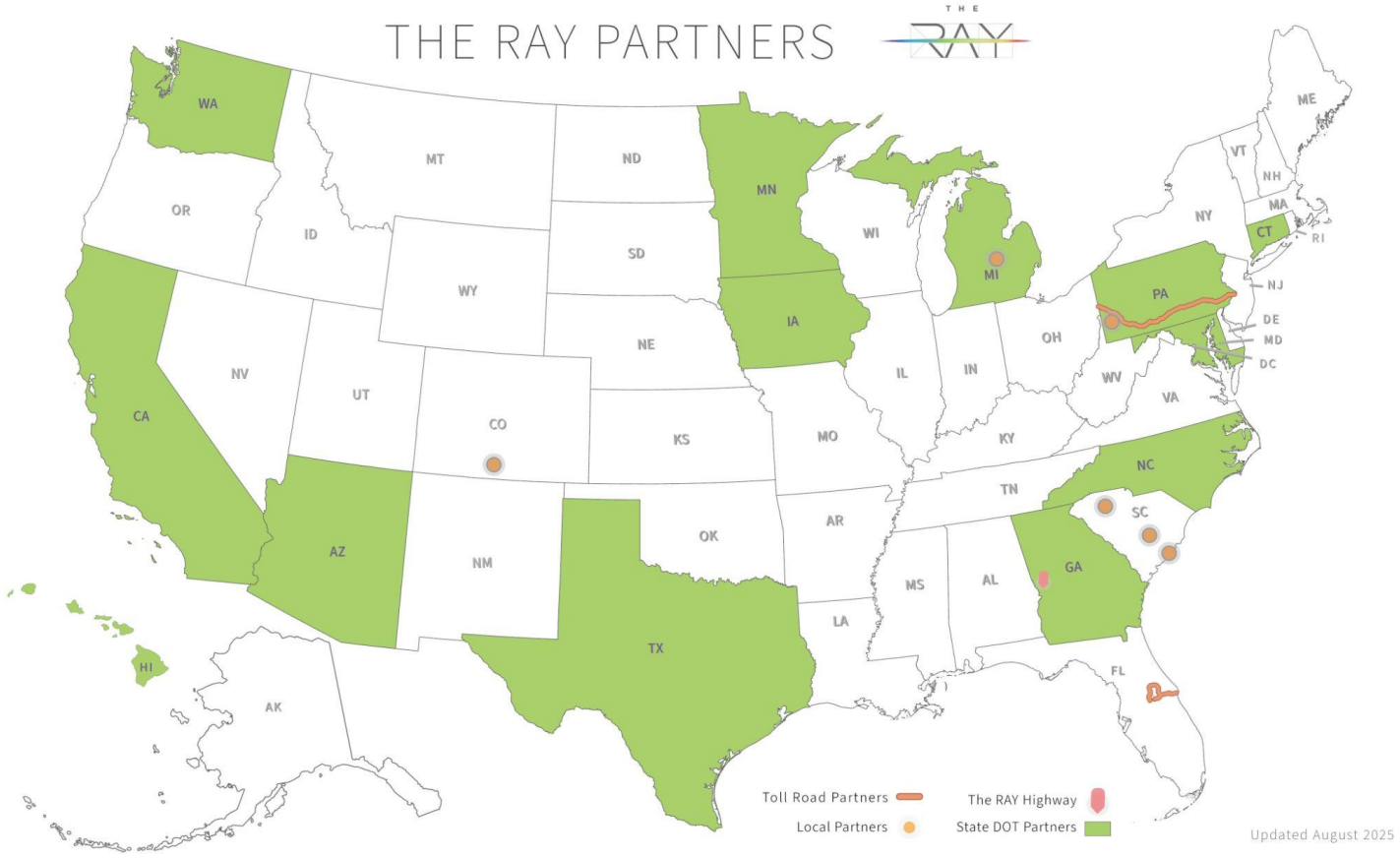
# PARTNERSHIPS

The Ray is a national nonprofit organization. We facilitate advanced infrastructure projects with transportation partners, focused on net-zero outcomes.

Our partnerships with State DOTs, turnpikes & tollways, local governments & airports span more than half of the U.S.

> 2023-2025 USDOT Thriving Communities Program

> 2024-2027 NLR “Energy in Roadway Right-of-Way”



# ROW COLOCATION

**NLR Rights-of-Way Energy Resources (ROWER) Project**

Solar suitability analysis for all ROW of National Highway System (April 2026)

**National Academies / Joint Office of Energy & Transportation**

National Convening, "Reinventing the Right-of-Way" (April 2025)

TRB Workshop, "Siting Energy Infrastructure in Corridors" (January 2026)

**National Governors Association**

Transmission Summit (October 2025)

Transmission & Linear Infrastructure in ROW Roundtable (November 2025)

**PNNL / Volpe Center (USDOT)**

"Electric Transmission in Transportation ROW" study (under review)

**USDOT "Great American Corridors of Commerce" announcement**

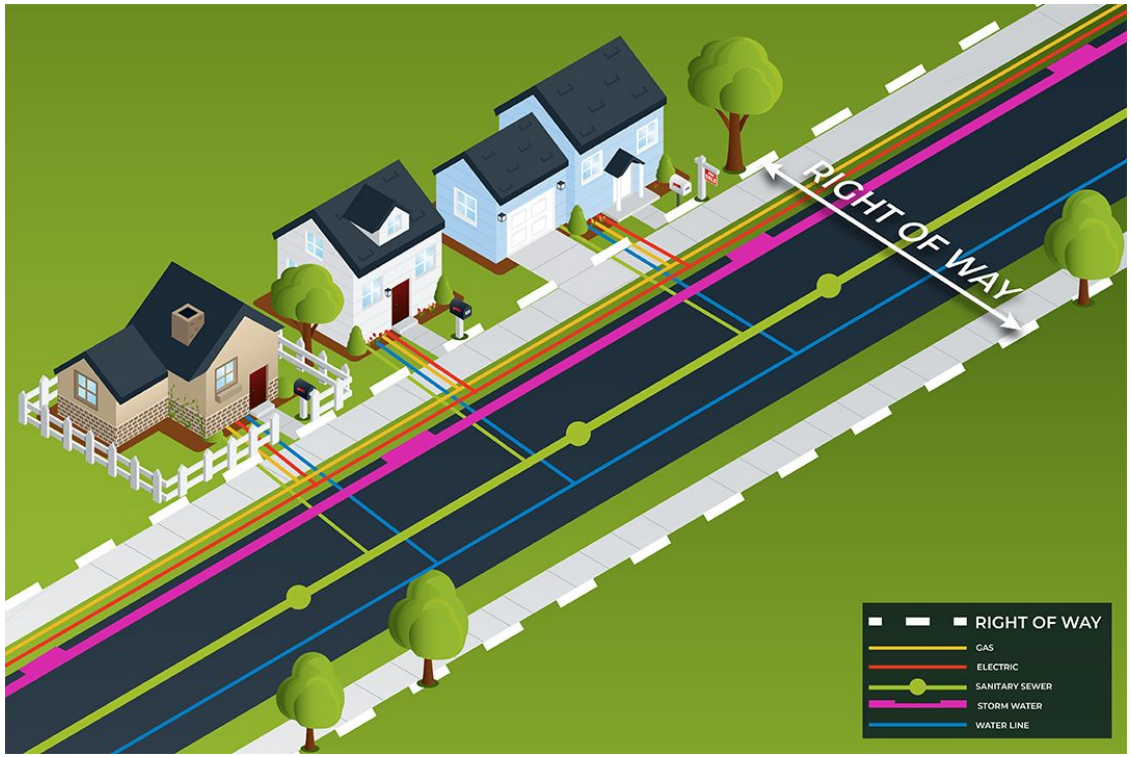
# ROW COLOCATION

- Maximizing existing infrastructure with underutilized ROW
- ROI for State DOTs
  - Reduce ROW maintenance & energy costs
  - Funding for deferred capital & maintenance projects
  - Resilient energy resources to meet State DOTs’ growing demand
  - Private investment in safety enhancements & smart transportation infrastructure
- Speed and cost efficiencies + permitting benefits within existing ROW
- Reliable, efficient energy resources to meet states’ growing demands
  - Accelerate expanded grid capacity to support data centers & advanced manufacturing

# Use of GIS to Achieve our Vision

# RIGHT-OF-WAY (ROW)

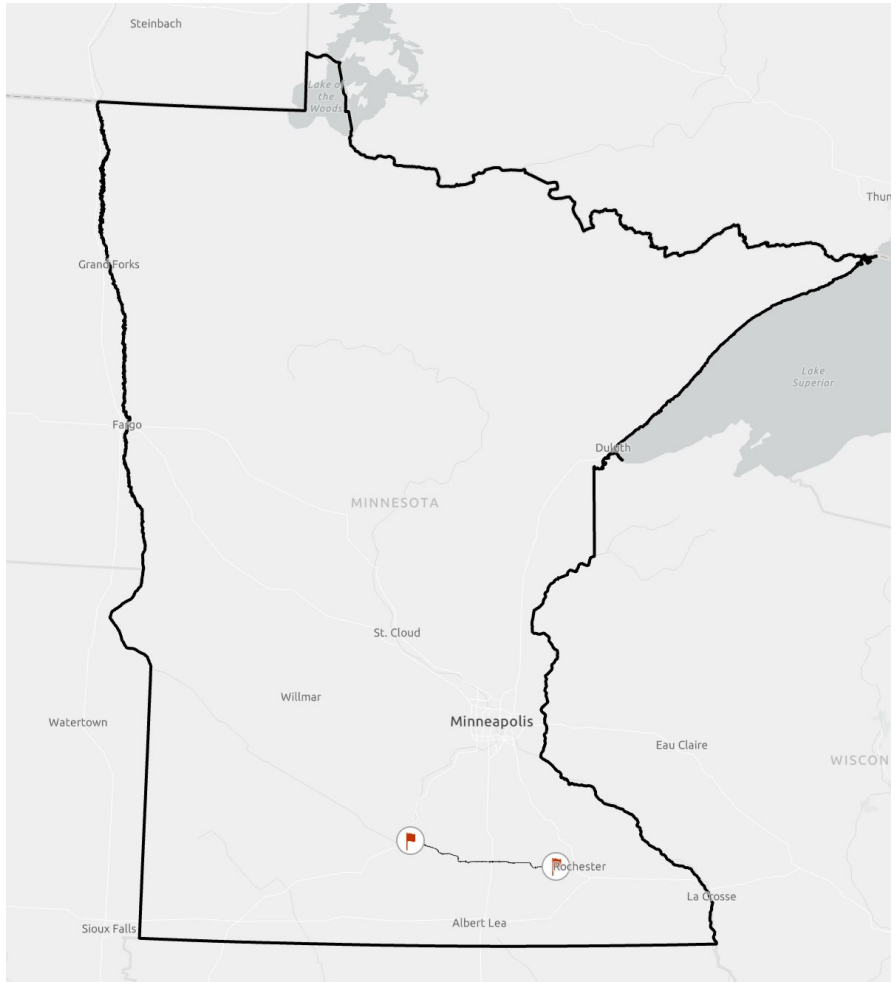
Land, property, or interest acquired for or devoted to transportation infrastructure




# ROW TRANSMISSION DEPLOYMENT TOOL

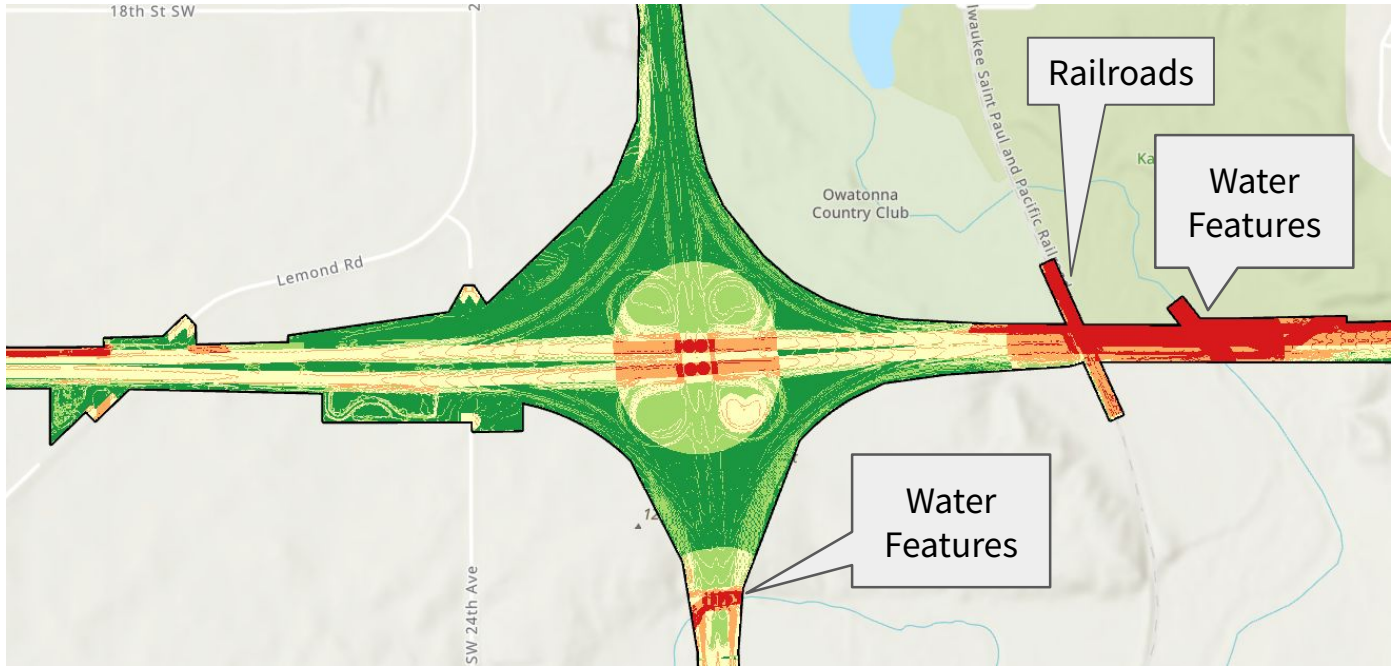
- Data inputs (e.g., railroads, pipelines, water features, and urban) + weighted criteria + optional layers (e.g., STIP, CHIP, and scenic areas)
- Identify the suitable areas for overhead and buried transmission lines in ROW.
- Calculate an optimal path from origin(s) to destination(s) in most suitable ROW.
- Adjust the optimal path within suitability zones.
- Estimate vegetation clearing requirements by using Digital Surface Models.
- Provide ROM construction cost projections.

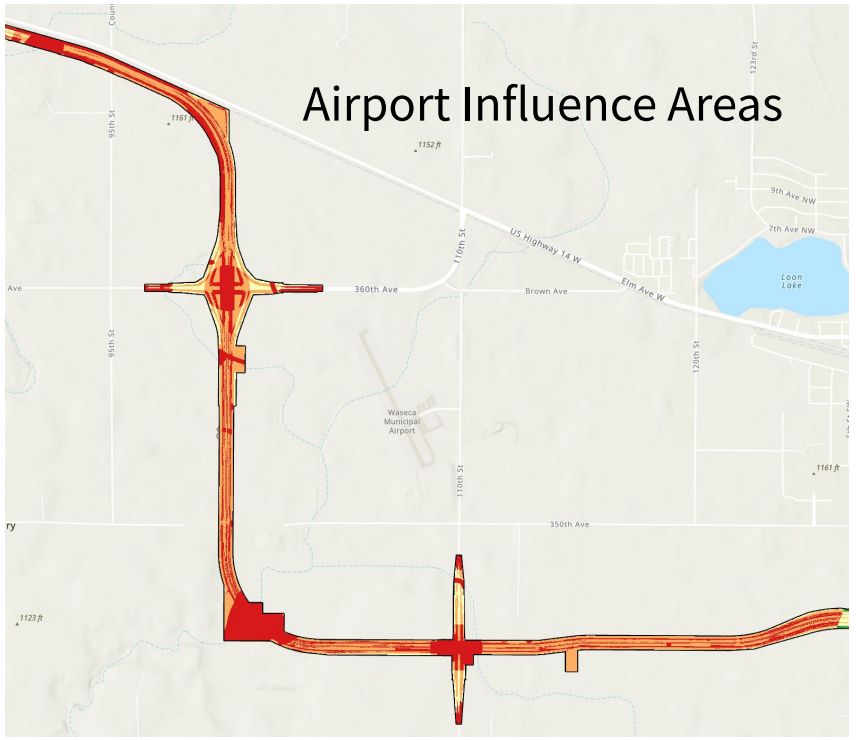
# **OVERHEAD** TRANSMISSION ANALYSIS:




## Hwy 14 from Mankato to Byron, MN

# SUITABLE AREAS




More Suitable (Less Challenging)

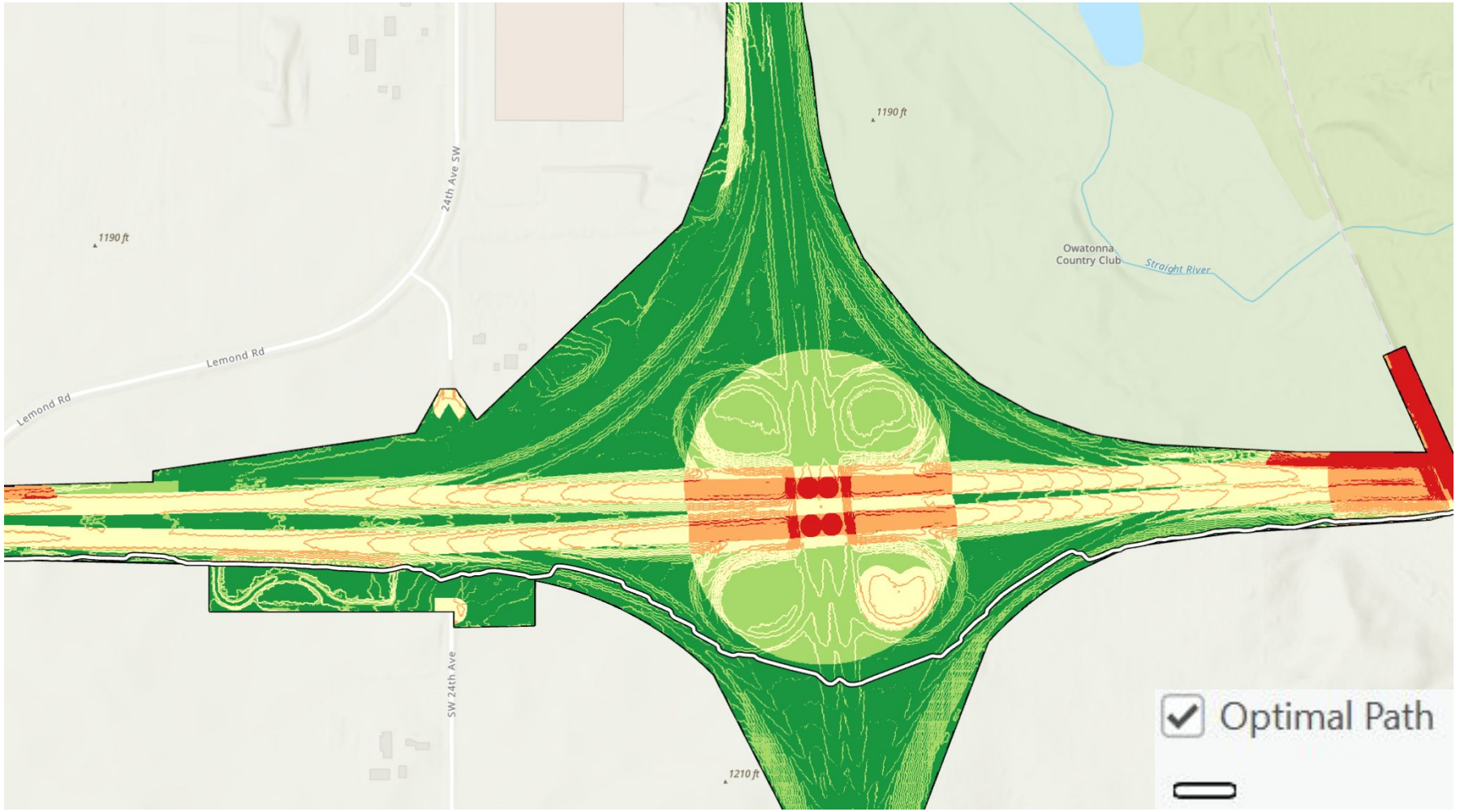
-

-

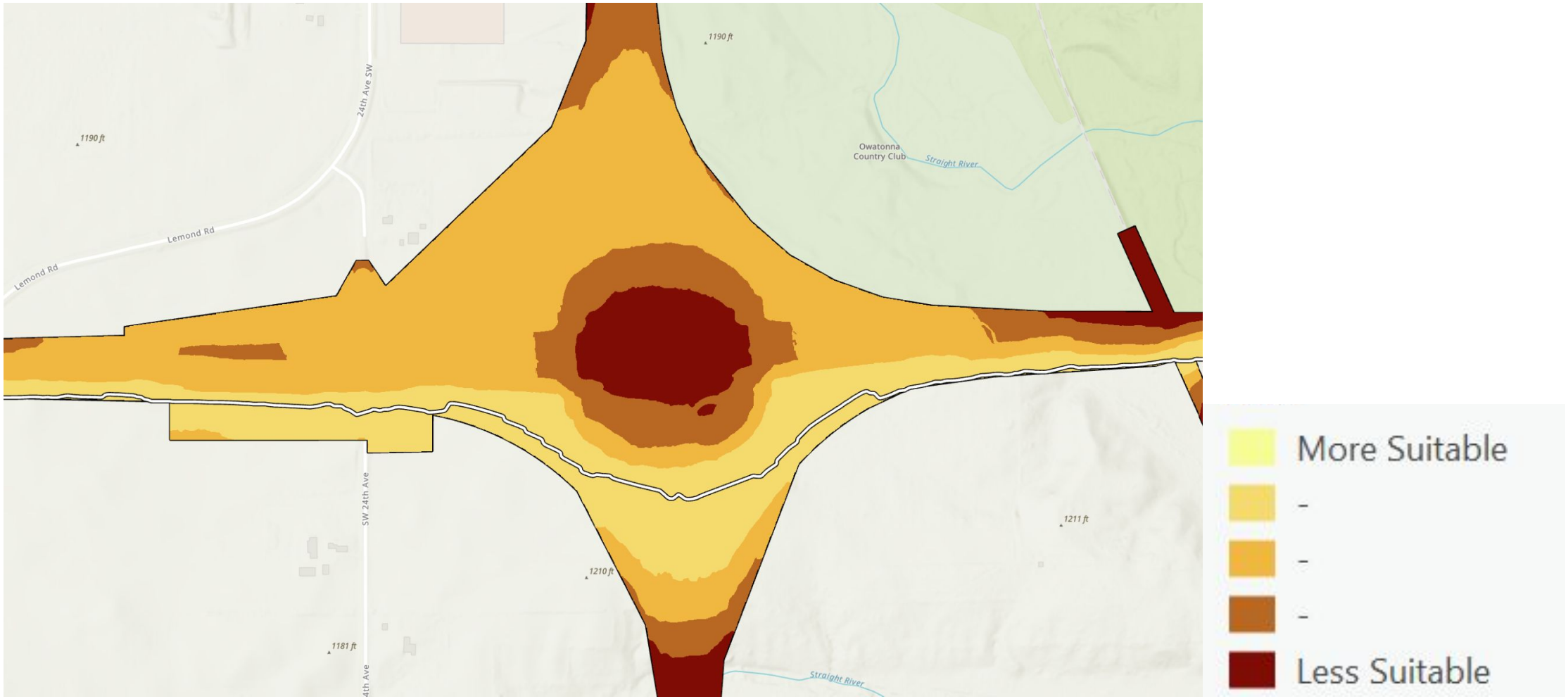
-

Less Suitable (More Challenging)

# Optimal Path

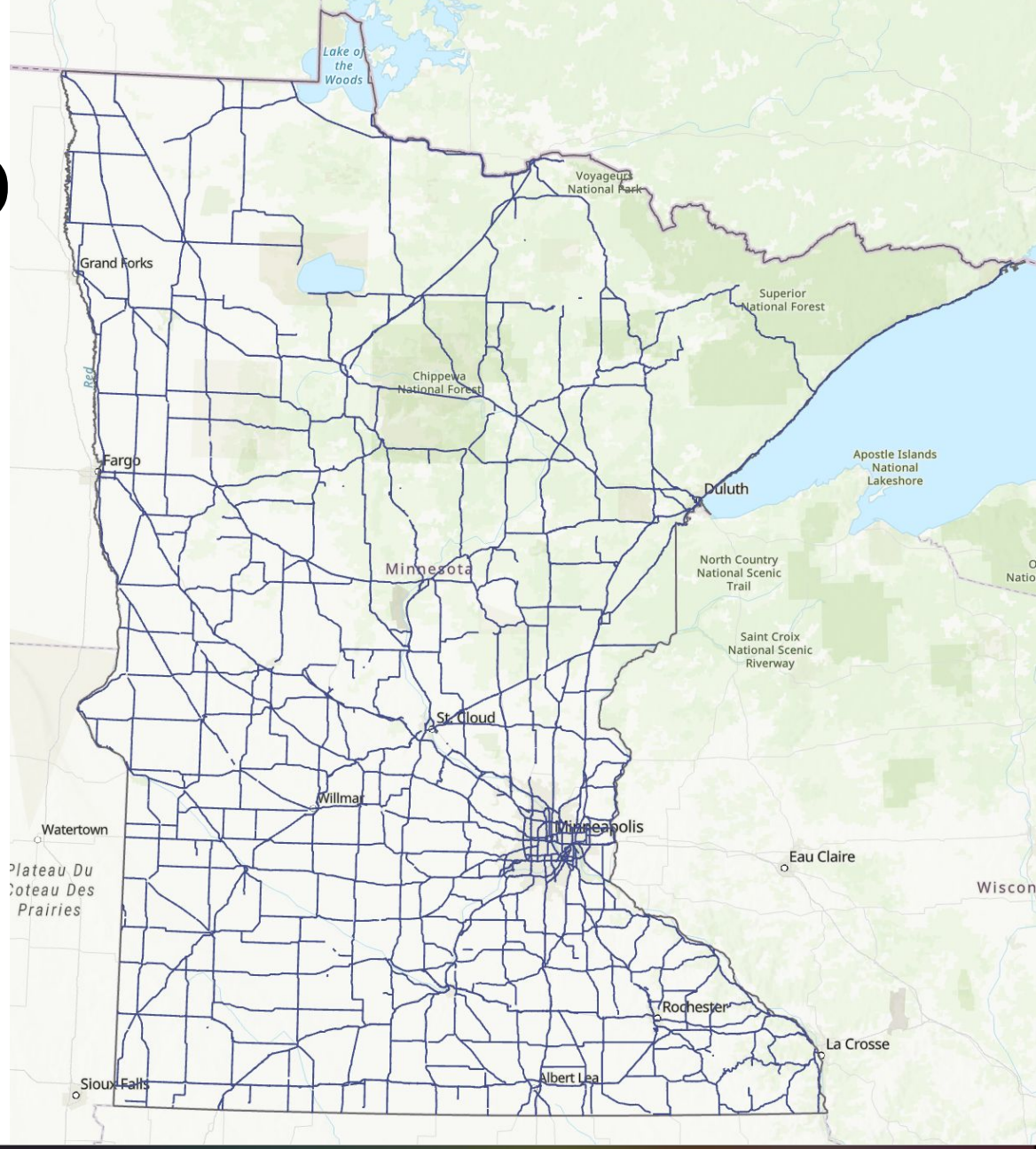


# SUITABILITY ZONES



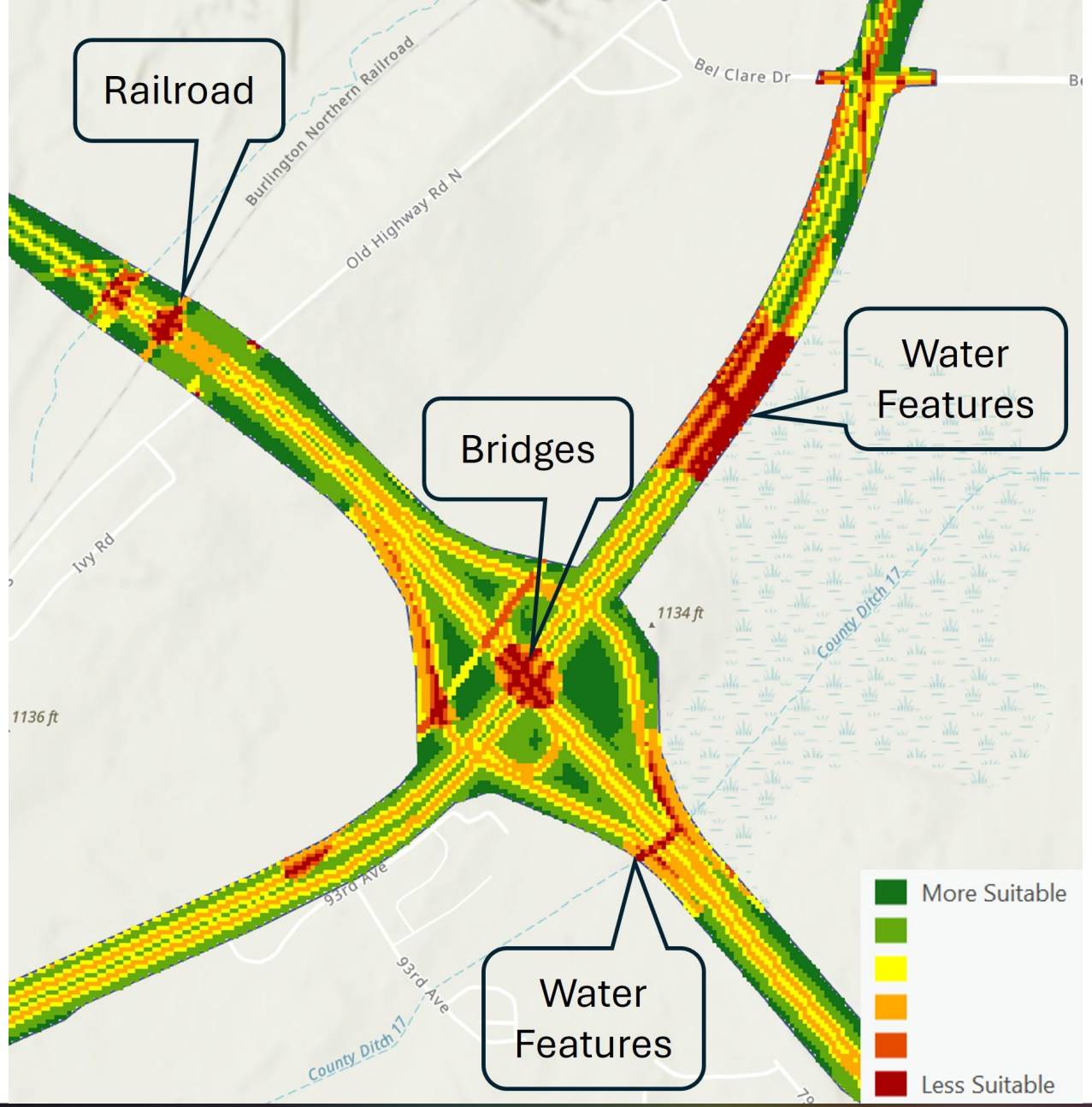
# VEGETATION & OPERATIONAL CLEARANCE ZONE

# MNDOT STATEWIDE **BURIED** TRANSMISSION ANALYSIS

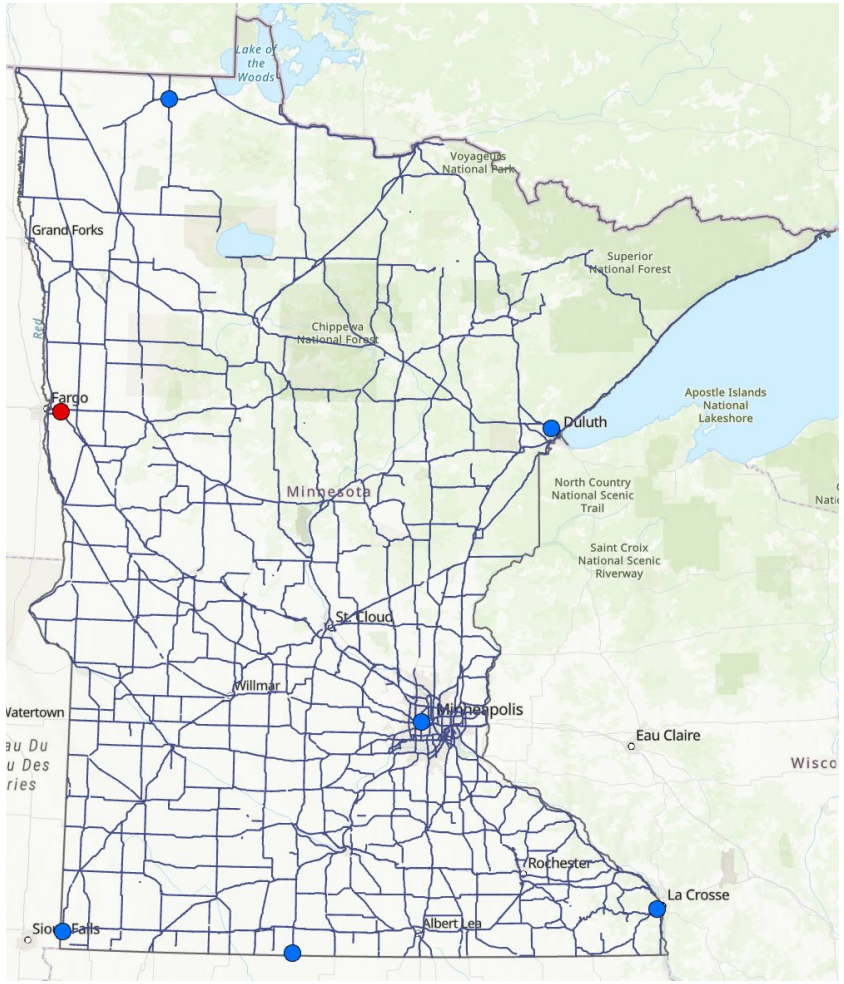


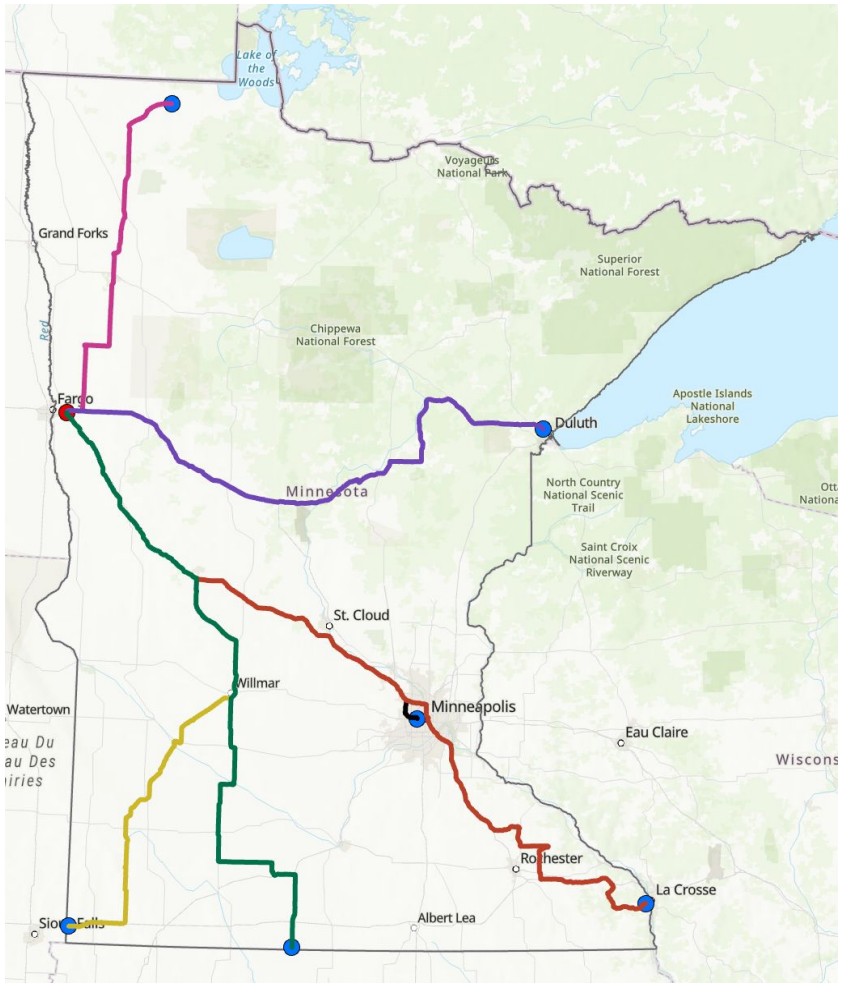
# SUITABLE AREAS

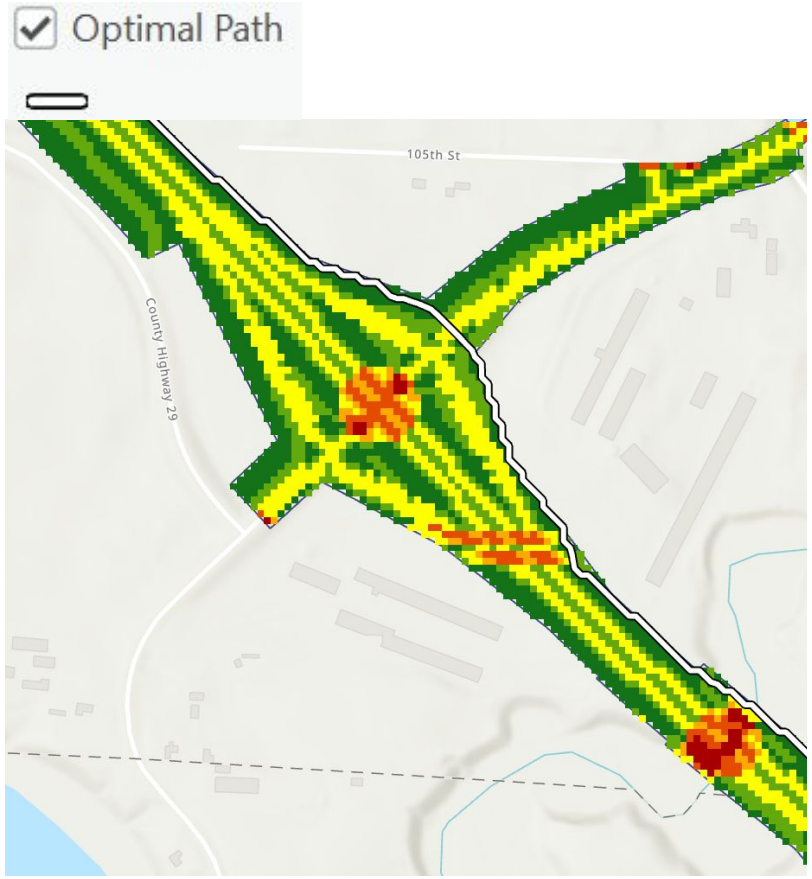
- [x] Bedrock
- [x] Elec_Trans_HighV
- [x] Railroads
- [x] Road_Bridges
- [x] ROW_Too_Narrow_for_Construction
- [x] Slope
- [x] Soil_Peat_Histosols
- [x] Trees
- [x] Urban
- [x] WaterFeatures



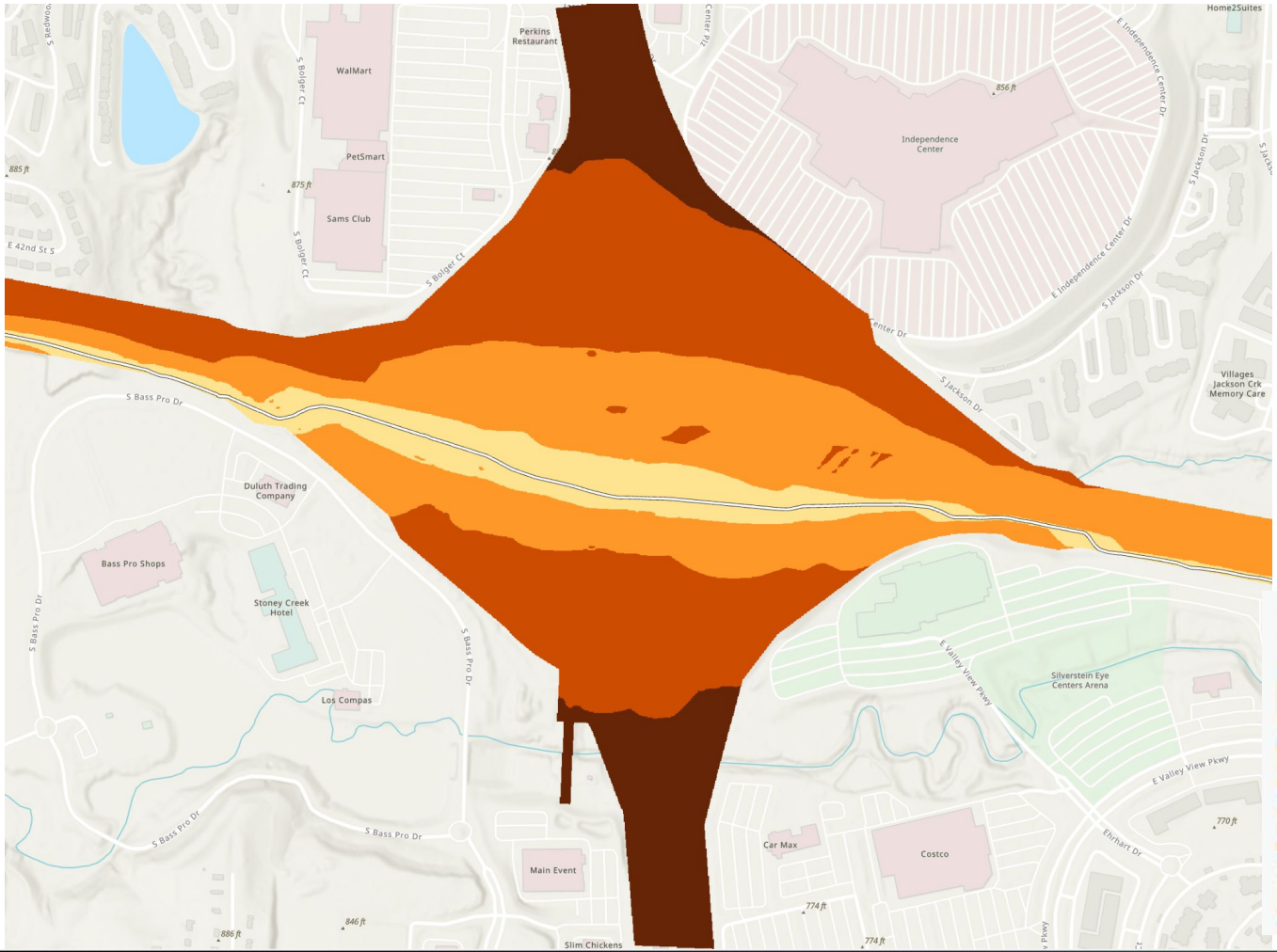
# OPTIMAL PATH



# SUITABILITY ZONES



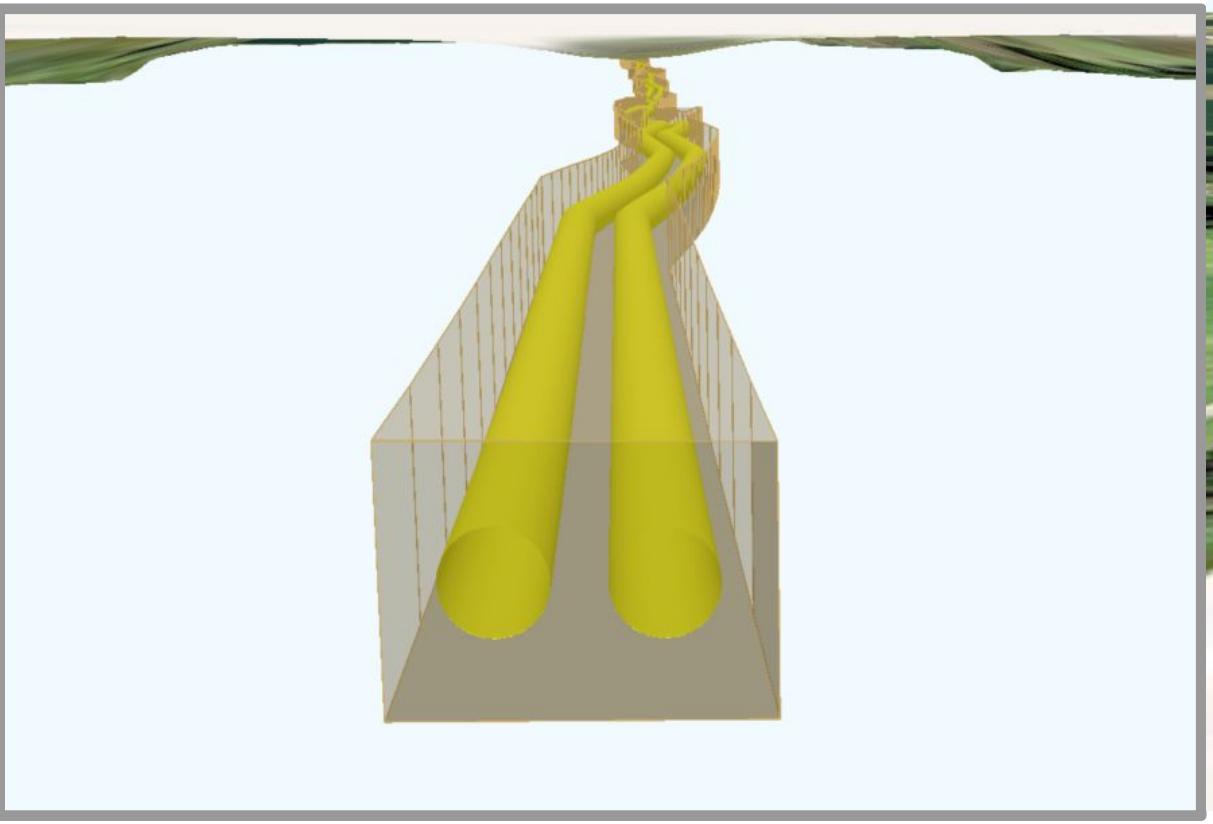
# VEGETATION CLEARANCE ZONE

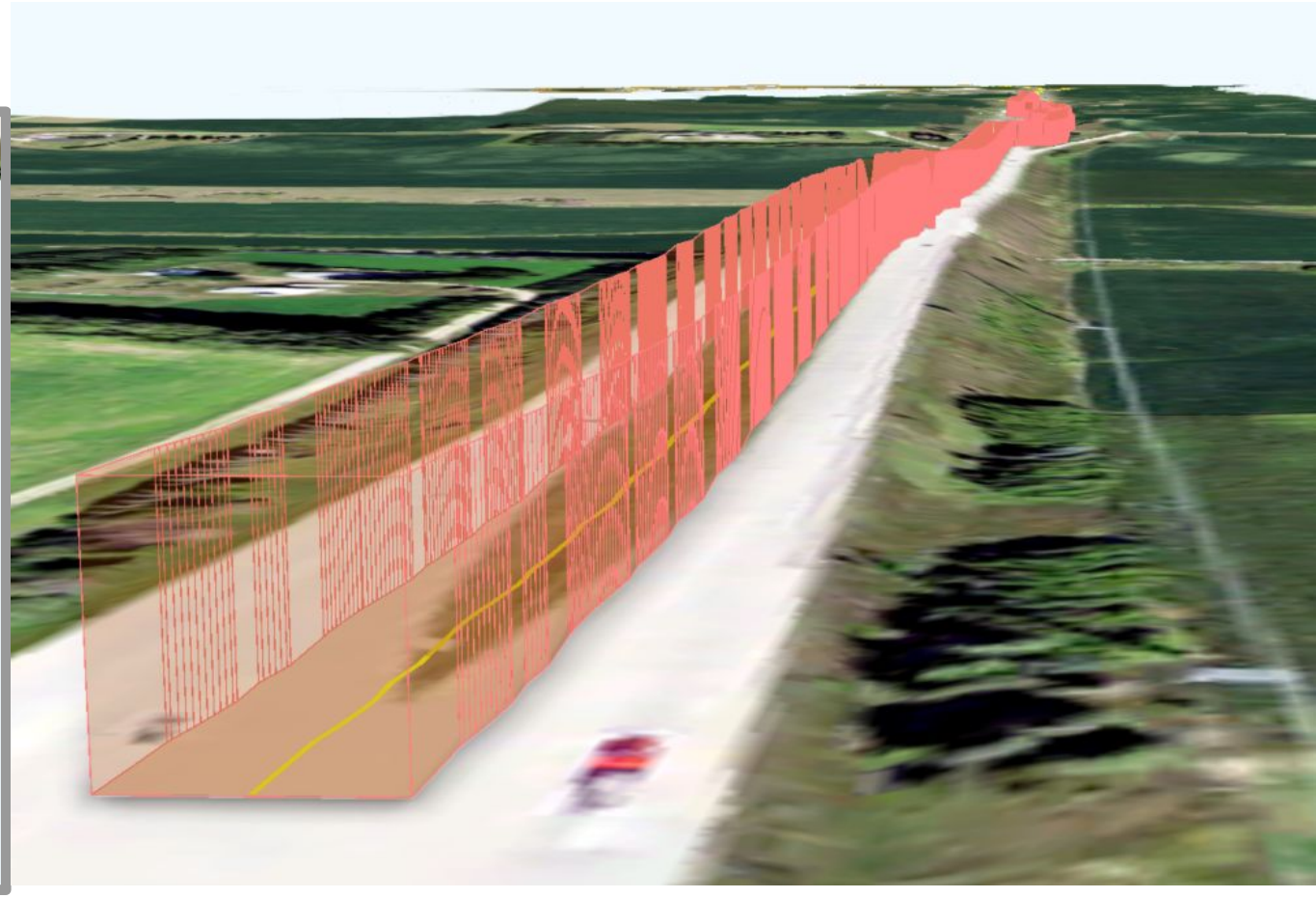
# ESTIMATED COSTS

Costing Path Identity RdCL WaterBuf Demo - Optimal Path Costing

| Item | Amount | Cost/unit | Total Cost Est. |
|---|---|---|---|
| Trenching | 270.8 miles | $50 / ft | $71,503,398 |
| Boring | 11.4 miles | $100 / ft | $6,027,928 |
| Vaults | 747 count | $20,000 each | $14,940,000 |
| Summary: | | | |
| Total Miles: **282.3** | Total Cost Estimate: **$92,471,326** | | |

# 3D VIEW





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# Q&A with all Speakers