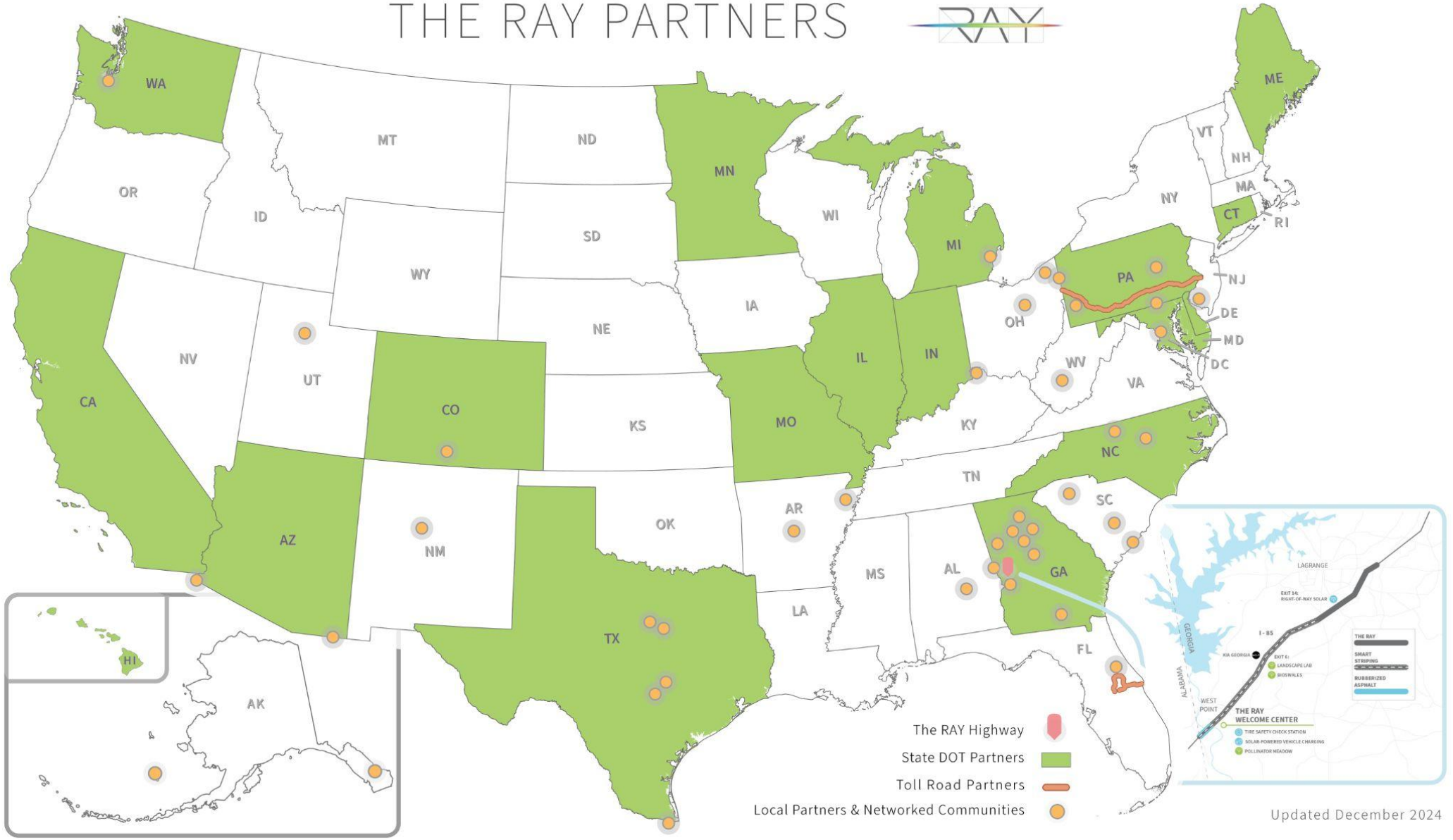
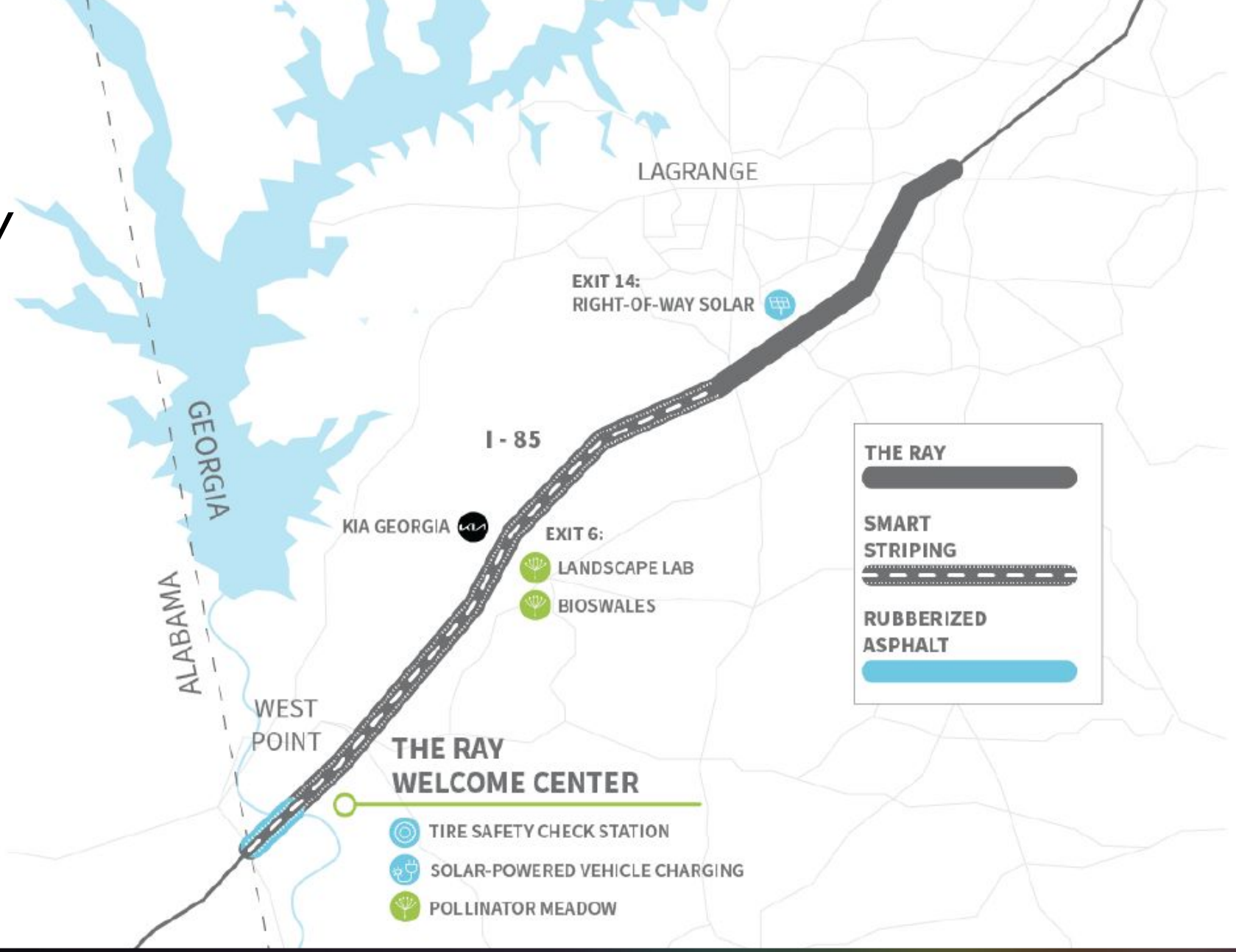

THE
RAY

THE RAY PARTNERS



Updated December 2024

THE RAY HIGHWAY



Transportation ROW

- FHWA prioritizes ROW transmission
  - ➔ No FMV requirement
  - ➔ No secondary access requirement
- Streamlined NEPA permitting
  - ➔ Project delivery
- New source of Title 23 funds for State DOTs

Memorandum

U.S. Department of Transportation
Federal Highway Administration

Subject: State DOTs Leveraging Alternative Uses of the Highway Right of-Way Guidance

From:
Stephanie Pollack
Acting Administrator

Date: April 27, 2021

Reply to: HEPR-40

To:
Directors of Field Services
Division Administrators
Division Directors

PURPOSE

The purpose of this guidance document is to provide clarification to FHWA Division Offices who work with State departments of transportation (State DOTs) on certain uses of the highway right-of-way (ROW) that can be leveraged by State DOTs for pressing public needs relating to climate change, equitable communications access, and energy reliability. This guidance document supports the consistent utilization of the ROW for renewable energy generation, electrical transmission and distribution projects, broadband projects, vegetation management, inductive charging in travel lanes, alternative fueling facilities, and other appropriate uses as identified herein. FHWA Division Offices should share this memo with their State DOTs for their consideration for these alternate uses of highway ROW.

These uses of the highway ROW, including the development of renewable energy projects, enable breakthrough transportation

Transportation ROW

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Time to Market Efficiency

- Single “landowner” per state
  - ➔ Interregional transmission
- Reduces land use conflict for energy infrastructure
  - ➔ NIMBYs
  - ➔ Eminent domain litigation
- Reduces project costs
  - ➔ Land acquisition
  - ➔ Streamlined permitting

ROW Energy Feasibility

2020

The Ray Solar Highway Project:
Assessment of solar potential installed in ROWs across the United States

Emily A. Beagle, PhD, Kelsey J. Richardson, Joshua D. Rhodes, PhD, Michael E. Webber, PhD

Webber Energy Group
University of Texas at Austin
2020

Webber Energy Group
THE UNIVERSITY OF TEXAS AT AUSTIN

THE RAY
Let's drive the future.

THE RAY

TRANSPORTATION + ENERGY
SMART POWERED HIGHWAYS

2020

EXECUTIVE SUMMARY

The future of transportation is electric and will increasingly be powered by batteries and fuel cells. In the US, 18.7 million electric vehicles (EVs) are expected to be on the roads by 2030.[1] To enable this electric future, we need to modernize our energy infrastructure – generation and transmission – to deliver exponentially more power to meet unprecedented demand in the transportation sector. It must generate and deliver the power to quickly charge EVs, or generate clean hydrogen, where and when we need it. Our current electricity grid is underpowered for the electric transportation future. Additionally, opportunities exist to significantly increase the climate resiliency of the grid and to develop a national grid by strengthening the interconnections between existing regional grids. As we modernize our grid, we have the opportunity to power it with more renewable energy, and to charge EVs with cost-effective clean energy.

We can accomplish this by making the most of the publicly owned interstate system through three major developments:

Use the state-owned land along our interstates to generate renewable energy.

We could generate up to 36 TWh annually just by installing solar panels at interstate interchanges. This is enough to power up to 12 million EVs and represents an opportunity of $4bn annually for State DOTs.[14]

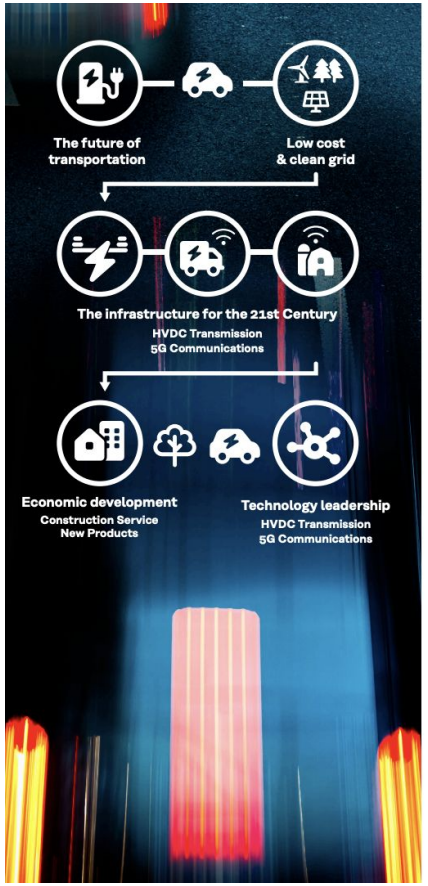
Use this renewable energy to charge EVs on the interstate.

Wireless charging lanes and direct current fast chargers allow fast and convenient EV charging. By using the energy close to where it is generated, we create a more efficient system that could improve

Use our interstate system to build national high-voltage direct-current (HVDC) grid.

Burying HVDC lines along our interstates increases the resiliency of our grid and enables greater use of our solar and wind resources. A truly national grid would create a coast-to-coast market for our nation's

2022



Project Team and Project Leads

This white paper was produced by NGI Consulting, The Ray, Great Plains Institute, Satterfield Consulting, Tracy Warren and 5 Lakes Energy.

Morgan Putnam from NGI Consulting and Laura Rogers from The Ray were the project co-leads.

NGI Consulting is based in Seattle, WA and is focused on helping cities, corporations, and states envision a path towards next-generation infrastructure. For more information, contact morgan@buildngi.com.

The Ray is a 501(c)(3) nonprofit charity and net-zero highway testbed, located on 18 miles of Interstate 85 between LaGrange, Georgia and the Georgia-Alabama state line. The stretch of interstate was named in memory of Ray C. Anderson (1934-2011), a Georgia native recognized as a leader in green business when he challenged his company, Interface, Inc., to pursue a zero environmental footprint. "The Ray Highway" testbed is paving the way for a zero carbon, zero waste, zero death highway system to build a safer and more prosperous future for all.

Learn more at theray.org

THE RAY

NGI
NEXT GENERATION INFRASTRUCTURE

GIS Analysis

- **Non-traditional stakeholders**
- **Unfamiliar infrastructure**
- **Different interests, priorities**
- **“Everything, all at once”**

- **Shared understanding**
- **Data-driven analysis**
- **Collaborative process**
- **Specific project → Specific ROW**
- **The “next” questions**
- **3D visualization**

ROW Transmission Deployment Tool

1. Data inputs + weighted criteria + optional layers (Highways & Railroads)
2. Identify the suitable ROW parcels for overhead & underground transmission.
3. Create an optimal path from origin(s) to destination(s) in most suitable ROW.
4. Adjust the optimal path within suitability zones.
5. Surface modeling assesses vegetation removal.
6. ROM build cost projection.
7. Visualize the optimal path and vegetation clearance zone in 3D view.

Criteria Examples: Construction Obstacles

Common criteria

- Built environment
  - Railroads
  - Pipelines
- Natural features
  - Water features
  - Bedrock
  - Slope
- Human-made features
  - Urban

Underground only

- Surficial geology

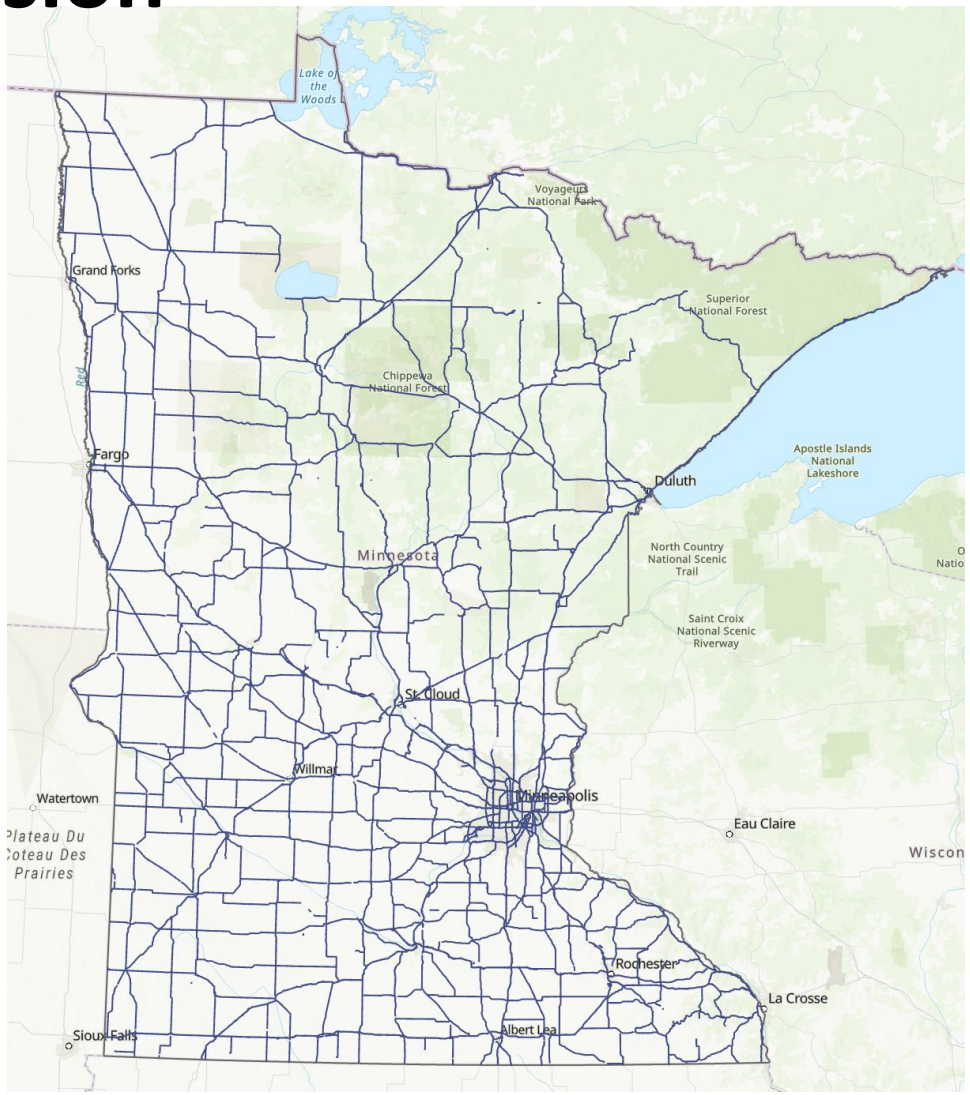
Overhead only

- Wetlands
- High-risk floodplain
- Aerial obstacles

Optional criteria

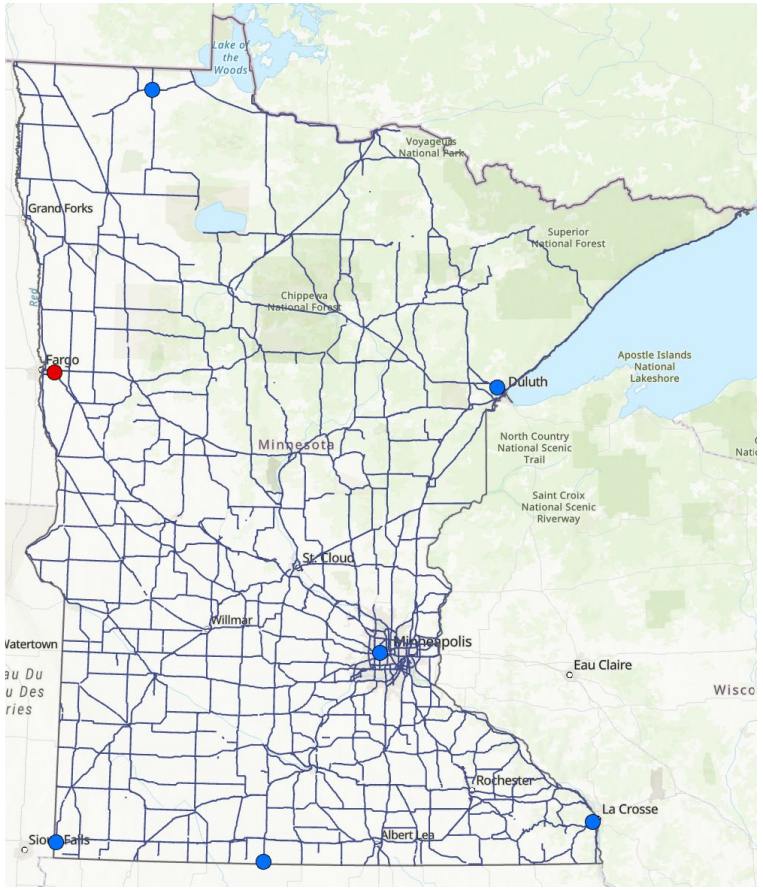
- Endangered species
- State transportation improvement plans (STIP)

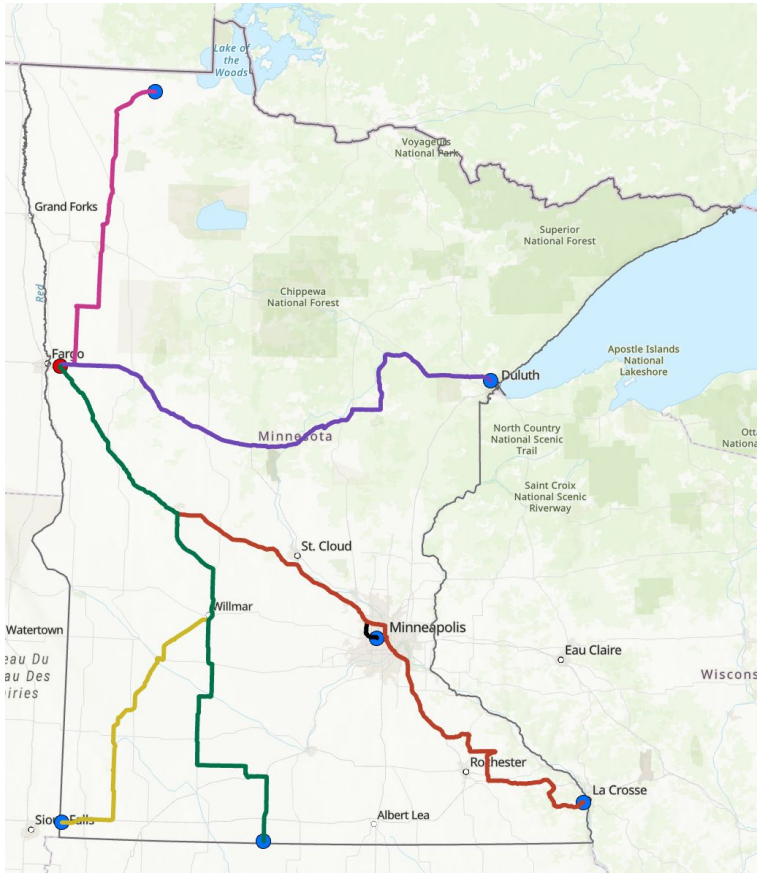
Buried Transmission



Suitability Analysis

Optimal Path





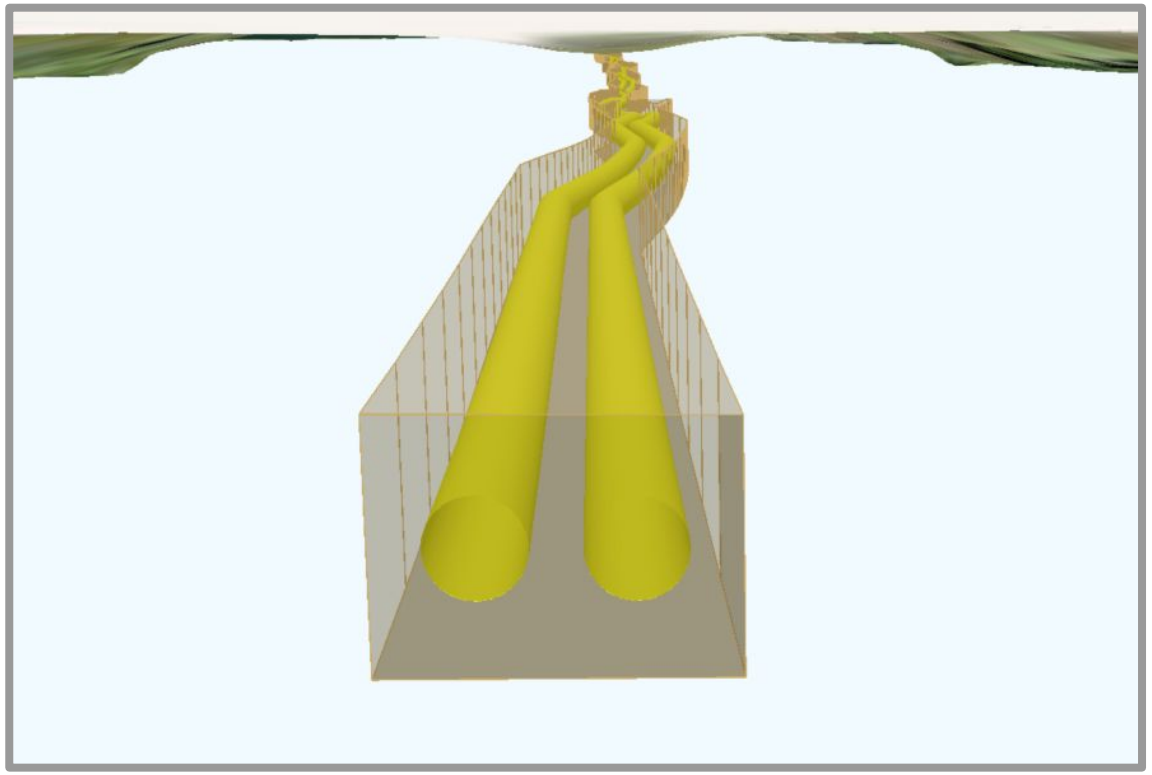
Suitability Zones

Projected Cost

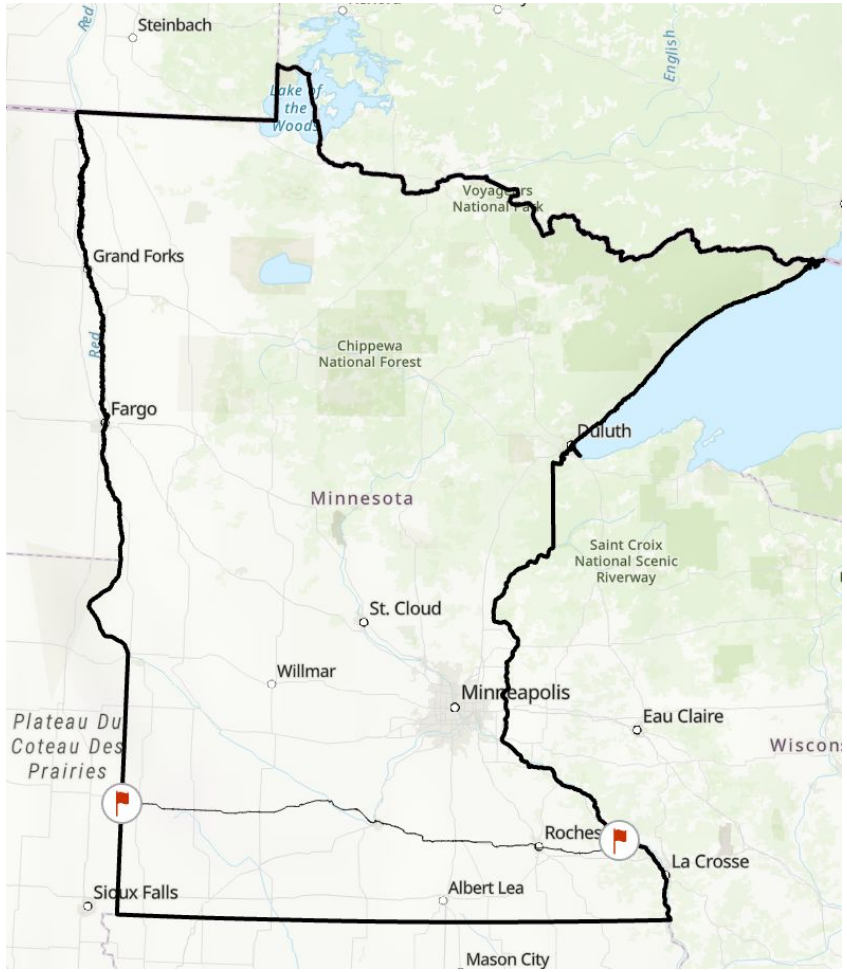
Costing Path Identity RdCL WaterBuf Demo - Optimal Path Costing

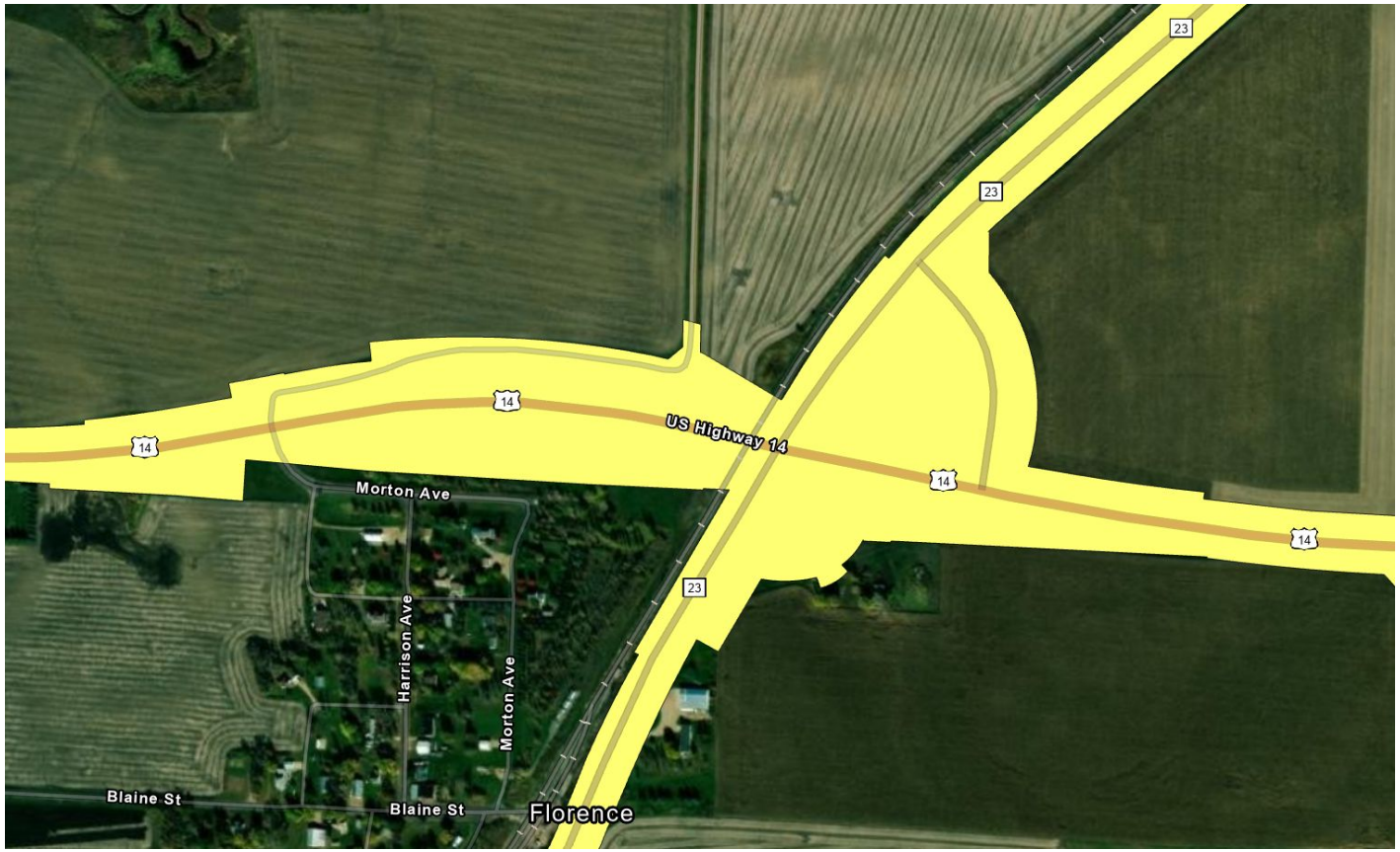
Item	Amount	Cost/unit	Total Cost Est.
Trenching	270.8 miles	$50 / ft	$71,503,398
Boring	11.4 miles	$100 / ft	$6,027,928
Vaults	747 count	$20,000 each	$14,940,000
Summary:			
Total Miles: **282.3**	Total Cost Estimate: **$92,471,326**		

3D View

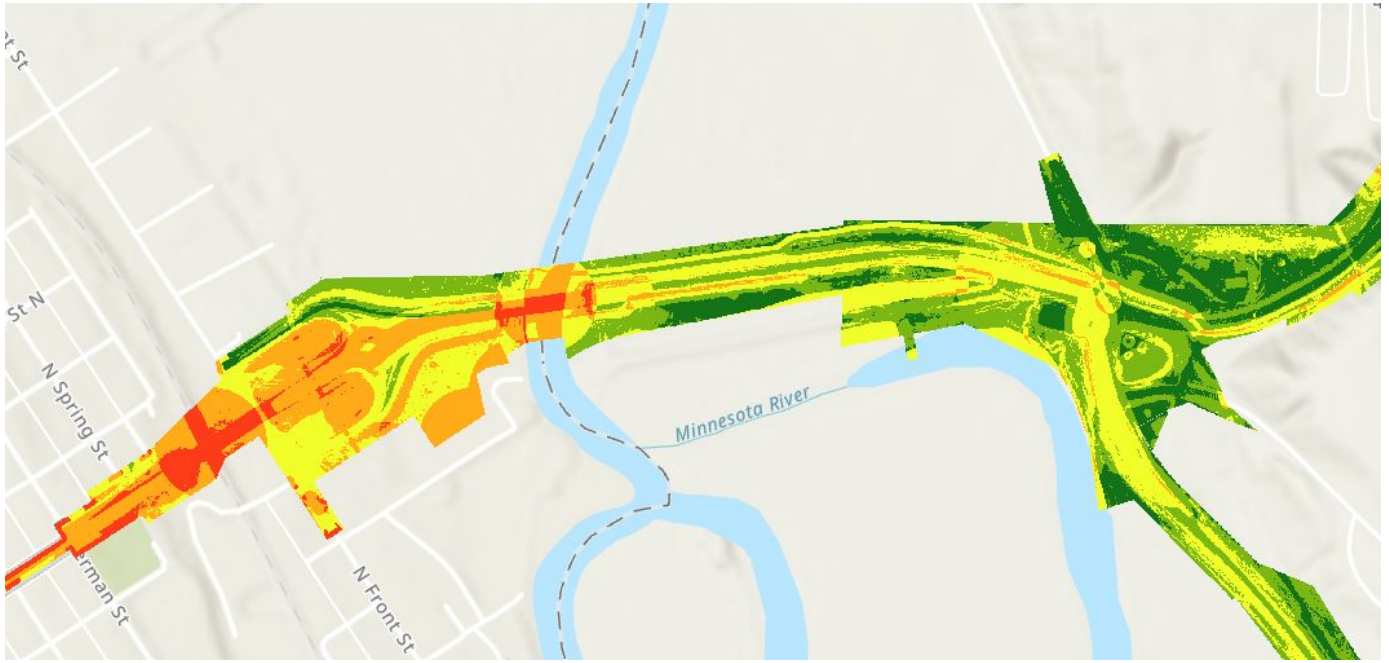


Overhead Transmission





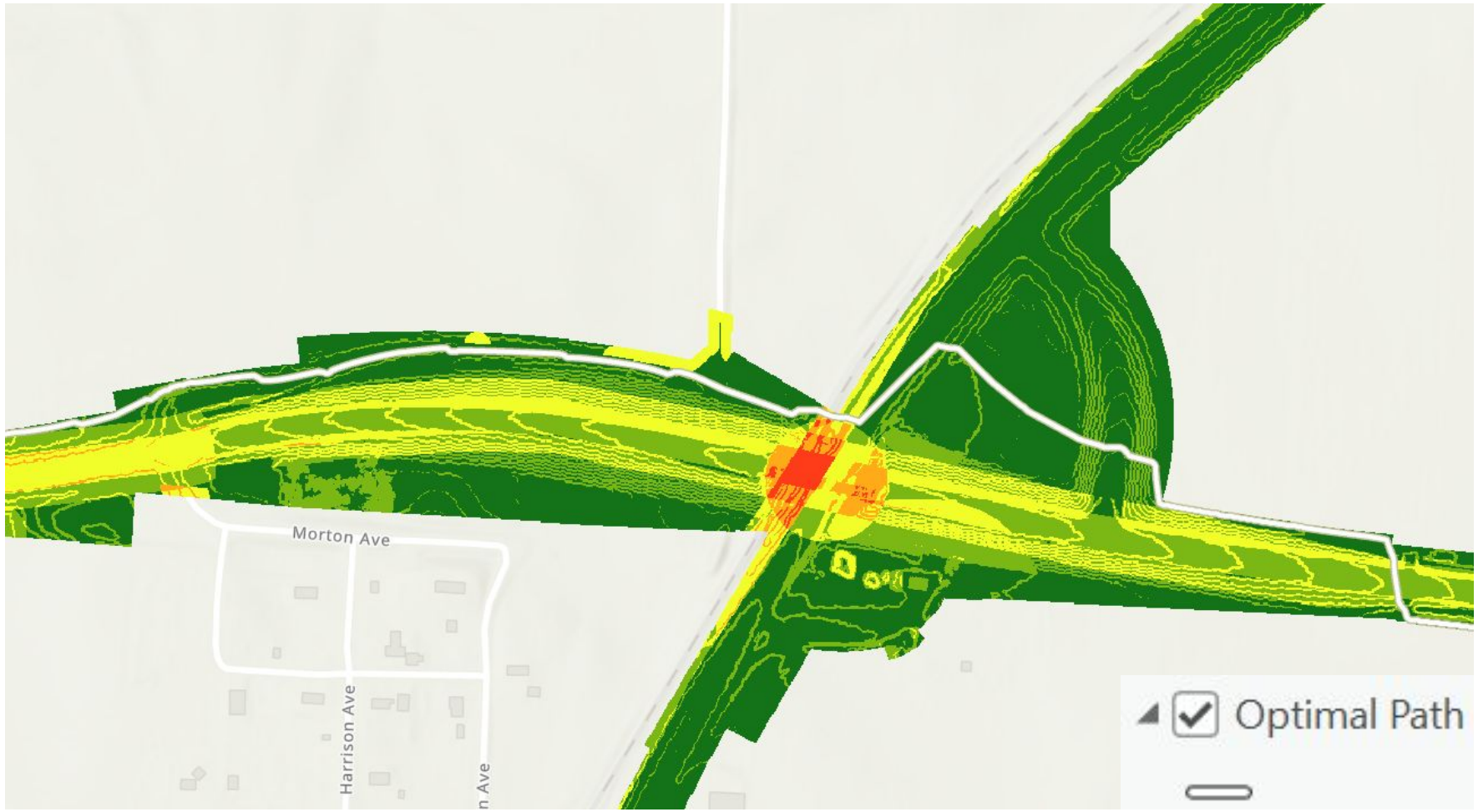
Suitable Areas



Less challenging (more suitable)

More challenging (less suitable)

Optimal Path



Suitability Zones

THANK YOU!

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