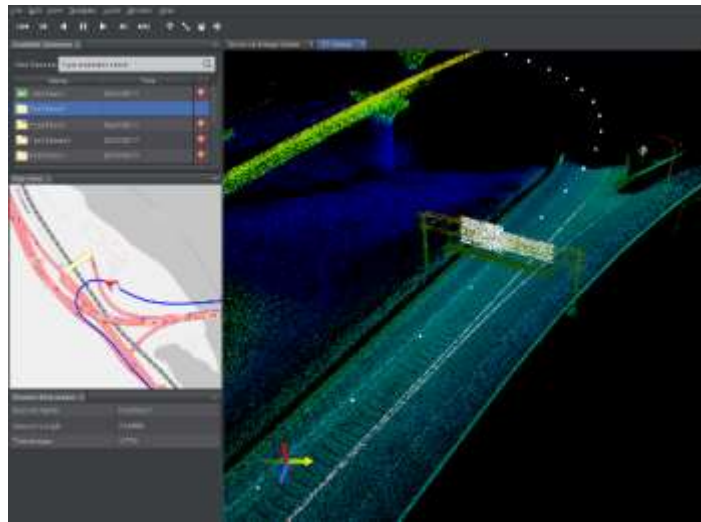


# Minnesota Department of Transportation Barrier End Treatment Inventory & Assessment (BETIA) Project



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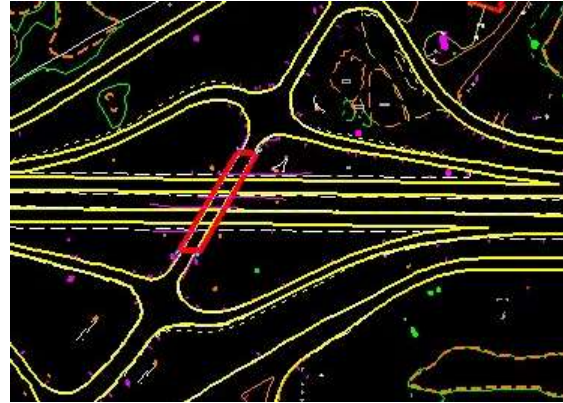
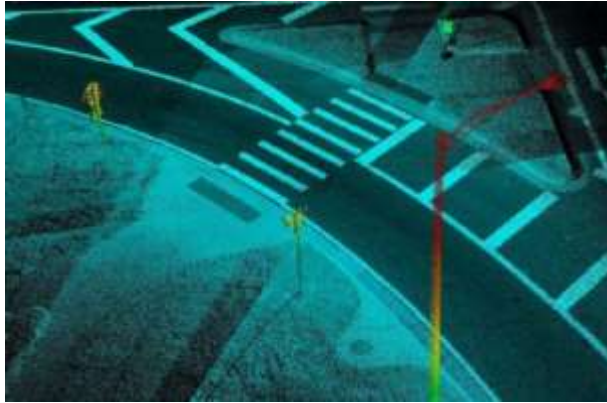
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# Transportation



**2016-2017  
Horizontal Asset  
Projects**

Wisconsin  
Minnesota  
Indiana  
Tennessee  
Missouri  
California  
Illinois  
Kentucky  
Mississippi  
New Mexico  
Oregon  
Texas





## Accident on December 28, 2009 – I35W

- 30-40 feet of guardrail passed through the car due to improperly installed end treatment
- Lawsuit filed in December, 2015 citing concerns over “negligently installed ELT guardrails”
- Concerns raised with ET-Plus guardrails as well (over 1,500 on MN roads)

# Prevalent problem throughout the US

- Virginia DOT documented 385 crashes from 10/31/14 – 1/31/17 involving the modified ET-Plus terminal, 7 of which involved penetrations of the guardrail into the vehicle. 32 crashes in same time period with X-Lite
- Tennessee DOT lawsuits



# Minnesota Department of Transportation

## Barrier End Treatment Inventory & Assessment (BETIA) Project

- **Goal:** Collect and assess all barrier end treatments and longitudinal barriers/guardrails on state owned highways
  - Database design for assets
  - Training for MnDOT staff
- Over 15,000 centerline miles of data collection
- Project expanded to include additional assets within the ROW

MnDOT Contract No. 1001338  
Exhibit A  
Scope of Work

### Purpose

The purpose of this contract is to develop a statewide inventory, assessment, and an associated library database of roadside barrier end terminals, longitudinal metal barriers, and bullnose crash cushions installed on the interstate and trunk highway system.

The Contractor will develop a field inventory manual from the library database that will be used with the project inventory collection. The field inventory manual will be used for future inventory work performed by State maintenance staff.

It is anticipated that this contract will utilize automated data collection processes to aid in the consistency of the data collection, assessment, and documentation. The intent of this effort is to provide and support the overall asset management activities related to safe roadides.

### System Requirements

The Contractor was provided the following IT Standard Documents as part of the solicitation process:

- Infrastructure Standards
- Java Development Standards
- Microsoft / GIS Development Standards

All work performed under this contract will adhere to these standards.



# MnDOT BETIA – Targeted Assets

## ORIGINAL SCOPE

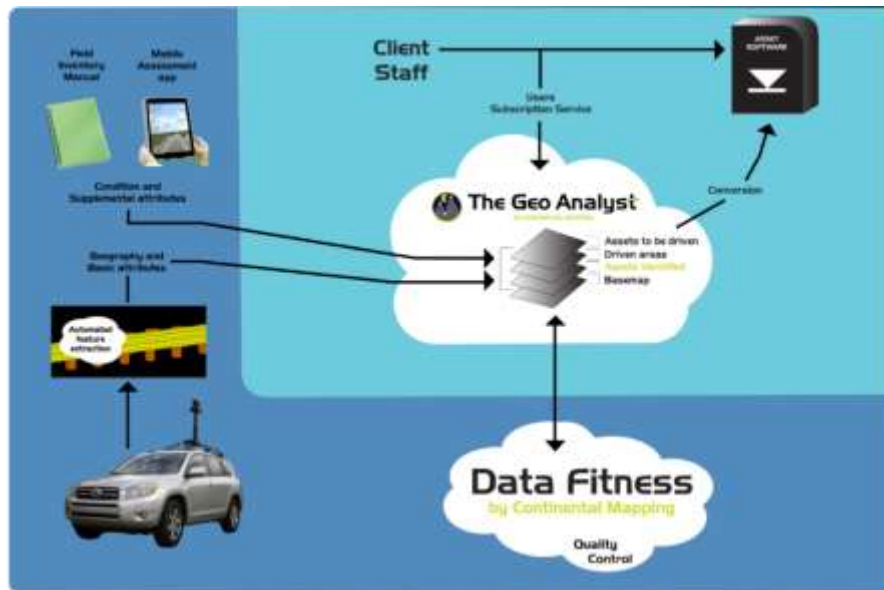
- End terminals
- Longitudinal Metal Barriers
- Transitions
- Cable Barriers
- Cable Anchors
- Crash Cushions

## EXPANDED SCOPE (as of 6-20-17)

- Signs
- LRS Centerline
- Edge of Pavement
- Paint Striping
- Rumble Strips
- Concrete Barriers
- Light Poles
- Traffic Signals
- Overhead Sign Clearances
- Bridge Clearances
- Utility Line Clearances
- Catch Basins
- Reference Markers (Mile Markers)

# MnDOT BETIA – Technical Approach

- Database design
- Mobile lidar and 360-degree image collection
- Field crews to assess barrier end treatments and crash cushions
- Data reporting via GIS portal
- Final deliverables





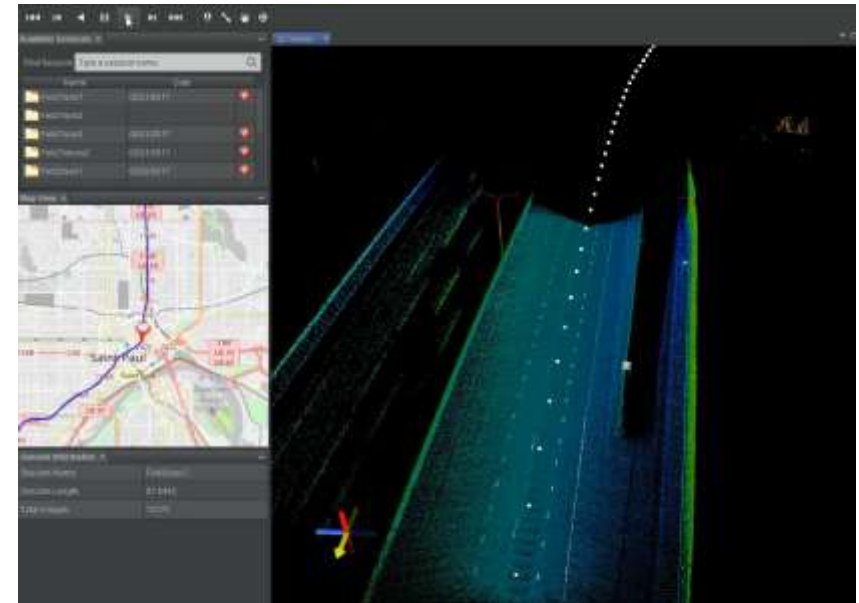
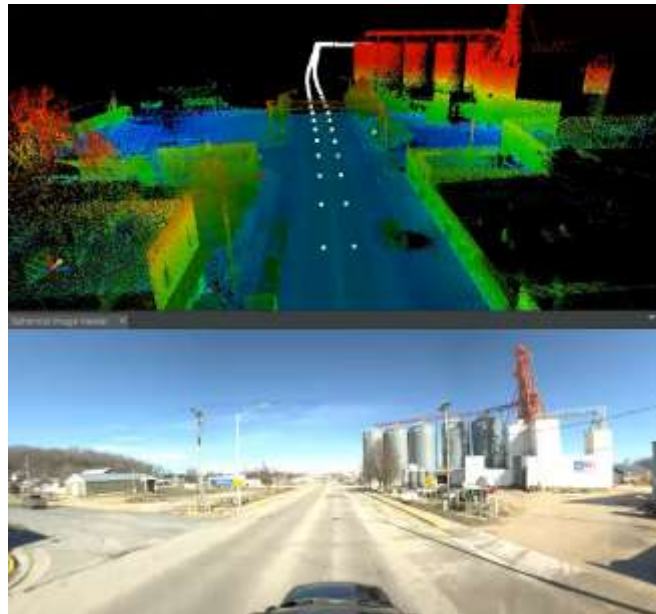
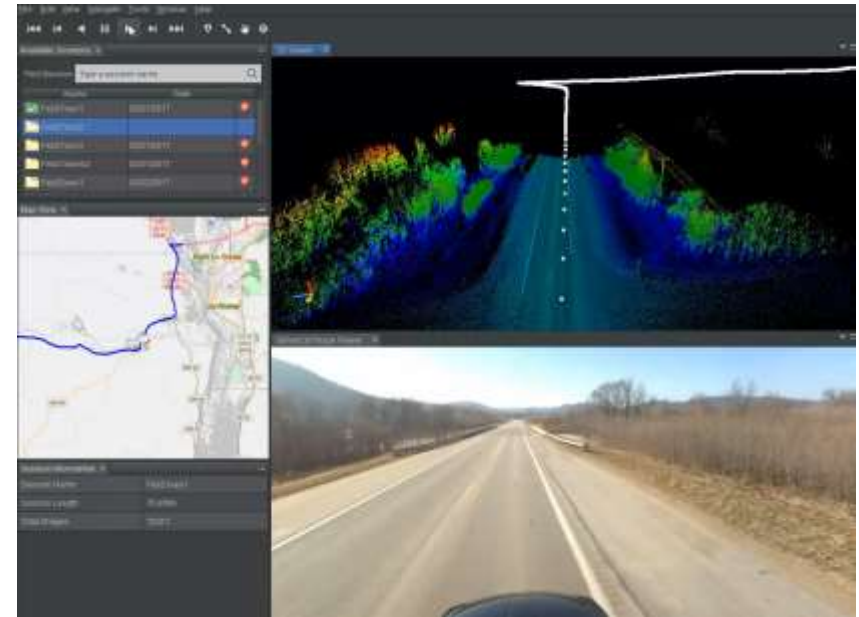
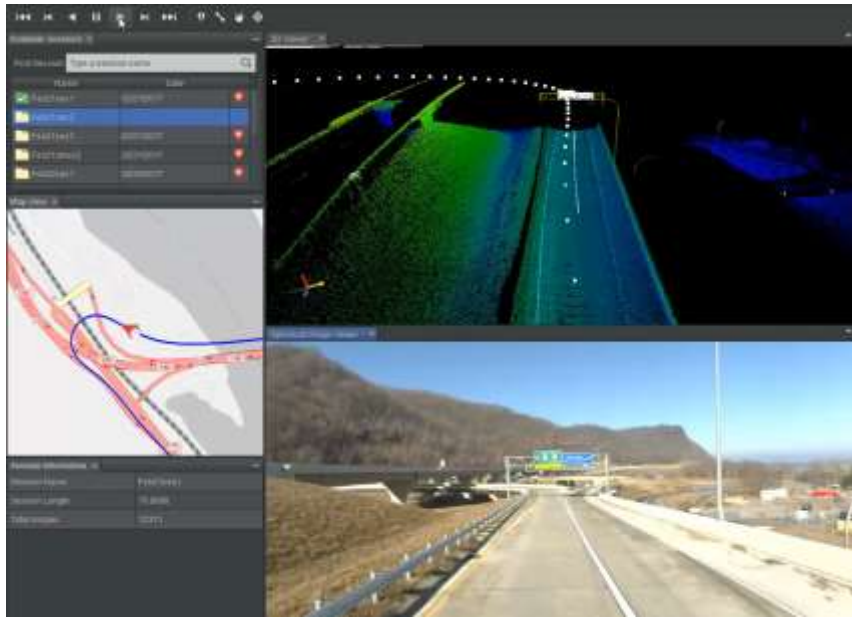
# MnDOT BETIA – Project Timeline

- Contract executed, January 2017
- Data collection began in Feb, 2017 (2 months early)
- Database design through March
- Pilot project through March
- Collection and processing – spring, summer and fall 2017
- Field assessment – spring, summer and fall 2017
- Final deliverables, Q4 2017
- Load to Agile Assets


# MnDOT BETIA - Collect Sample




# MnDOT BETIA - Collection and Processing



# MnDOT BETIA - Field Findings

 [Back](#) [Home](#) > [Assets](#) > End Terminal: 1082483375872085372-STO

End Terminal **1082483375872085372-STO**



Street:  
Location Description:  
Installed:  
Replaced:

☒ Asset Details

☒ Inspection

☒ Attached Files

☒ Map

☒ QA

6in or more: ☐

4in to 6in: ☐

Tension bearing plate:

Plate missing: ☐

Loose: ☒

Misaligned: ☐

Tension Cable:

Cable missing: ☐

Slack in cable: ☒

Not attached to rail: ☐





# MnDOT BETIA - Field Findings

Assets

Map Filter Search by address

Select Asset Type Add +

End Terminal 1 79

Select Field

Broken post

Is: ☒

P1 End Terminal

Anchor Terminal

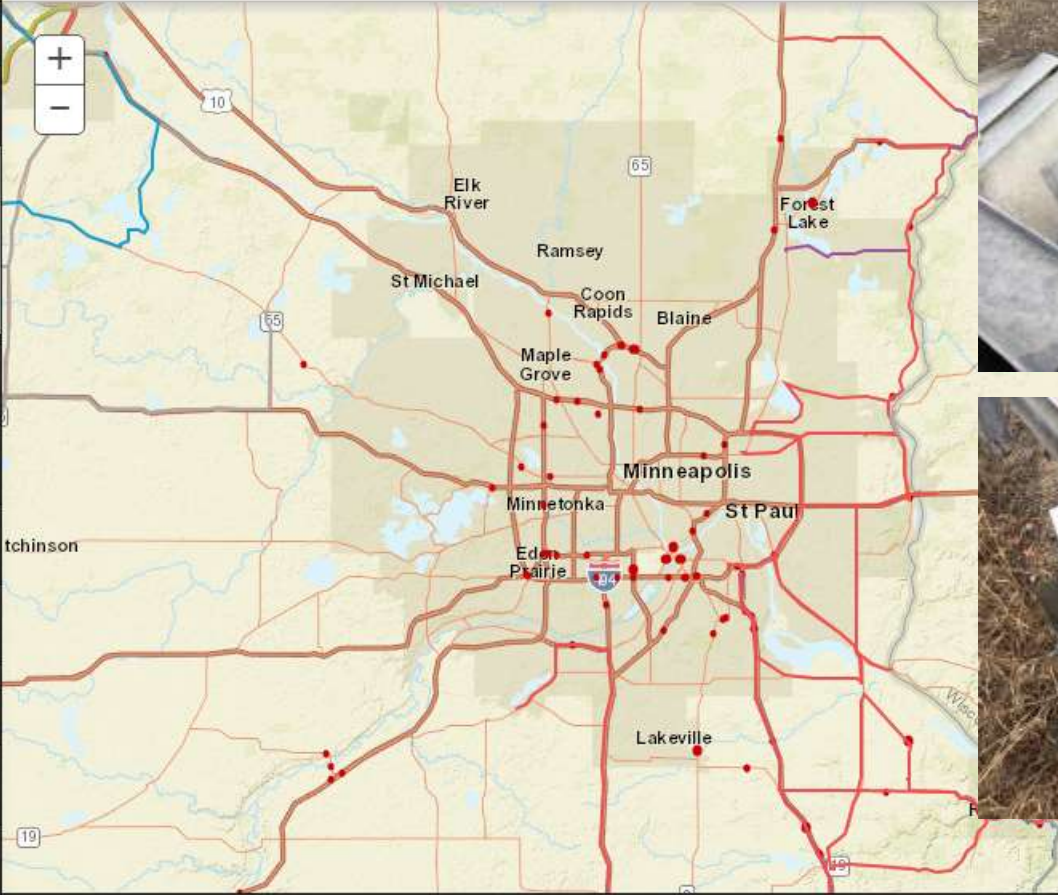
Cable Barrier

Crash Cushion


End Terminal

Metal Barrier


Transition



The map displays the state of Minnesota with major highways and cities labeled. Red dots indicate the locations of assets, primarily concentrated in the central and eastern parts of the state, including areas around Minneapolis, St. Paul, and Lakeville. The map includes zoom controls (+/-) and a search bar.



A close-up photograph of a metal barrier post, showing the post and the surrounding structure.



A close-up photograph of a metal barrier post, showing the post and the surrounding structure.

# MnDOT BETIA - Field Findings



ID	Type	La	L	impacted by vehi...	Rail not into head fully	Where should not be	Post installed incorrectly	Exposed blunt end
<input type="checkbox"/> 1153730991373229094-STO	ET Plus	4	~	⊗	○	○	○	○
<input type="checkbox"/> 2599658321193396155-STO	End Anchorage	4	~	○	○	○	○	○
<input type="checkbox"/> 2680683621888653917-STO	SRT 350	4	~	○	○	○	○	○
<input type="checkbox"/> 3104097676931074878-STO	End Anchorage	4	~	⊗	○	○	○	○
<input type="checkbox"/> 3374742193874869419-STO	ELT	4	~	○	○	○	○	○
<input type="checkbox"/> 3497527613265981146-STO	Rest 350	4	~	○	○	⊗	○	○
<input type="checkbox"/> 3672712572477957128-STO	Rest 350	4	~	○	○	○	⊗	○
<input type="checkbox"/> 3684987623672071694-STO	ELT	4	~	○	○	○	○	⊗



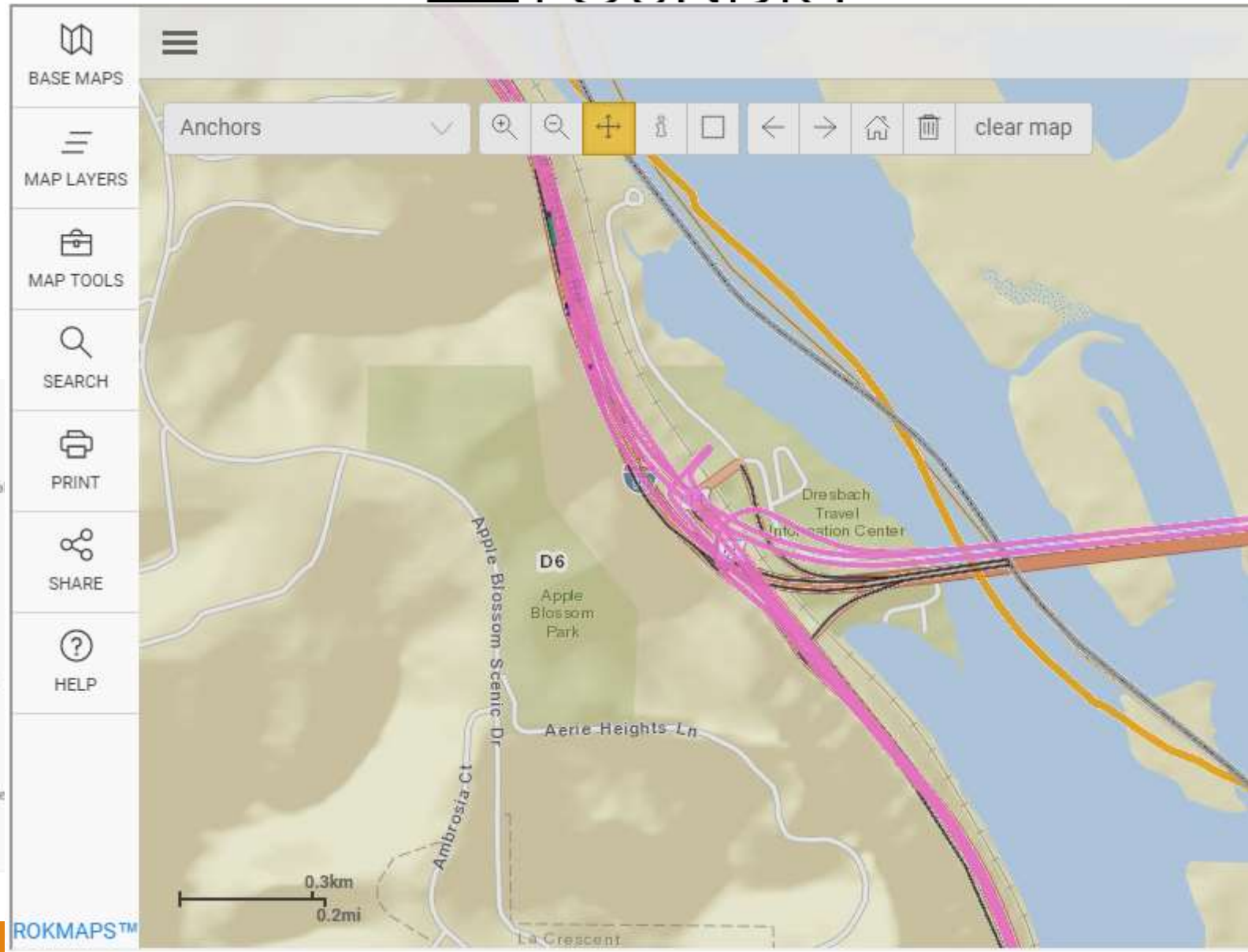


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# Lessons (being) learned

- SME engagement early critical
- Field deployment flexibility for “human” reasons necessary.
- Never underestimate safety protocols in the field
- Revisit project goals monthly. Stay on track
- Bigger servers! Faster internet!

# FAMOUS STRUCTURES



LOCATION: RED WING, MN

SUBJECT: RED WING BRIDGE

BRIDGE STYLE: CANTILEVER

PURPOSE: CONNECT MN AND WI BY CROSSING THE  
MIGHTY MISSISSIPPI RIVER

ROADBED: US ROUTE 63

STATS:

- >35' WIDE
- >ROADBED 65' FROM THE RIVER BELOW
- >BUILT IN 1960
- >OFFICIALLY NAMED "EISENHOWER BRIDGE"

NOTE: BRIDGE TO BE REPLACED IN 2017, AS IT IS "FRAC-  
TURE CRITICAL." ESSENTIALLY, IF ONE PIECE FRAC-  
TURES, THEN THE BRIDGE WILL COLLAPSE.