



Preliminary Engineering Study

Veterans Memorial Greenway

Dakota County, Minnesota

DAKOT 147332 | January 3, 2020



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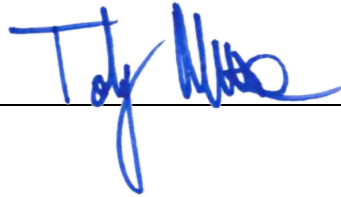
Preliminary Engineering Study

Veterans Memorial Greenway
Dakota County, Minnesota

SEH No. DAKOT 147332

January 3, 2020

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Toby Muse, PE

Date: January 3, 2020

License No.: 43364

Reviewed By: William Bauer, PE

Date: January 3, 2020

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Executive Summary

Background

The Veterans Memorial Greenway is a proposed 5-mile regional corridor that will provide a link between Lebanon Hills Regional Park in Eagan and the Mississippi River in Inver Grove Heights. See Figure 1. The greenway is envisioned to have at least six (6) veterans memorial interpretive site nodes and one large site at Rich Valley Park.

Challenges and Opportunities

Primary challenges and opportunities are shown in Figures 2, 3, and 4. Overall, the preferred greenway alignment is feasible from an engineering perspective. Implementation of this corridor will provide several opportunities to connect to activity centers, schools and social gathering spaces including Lebanon Hills Regional Park, Pinewood Community School, Lakeside Park, St. Thomas Becket Church, Southern Hills Park, Rich Valley Park, and the Mississippi River.

Property Ownership

Major property owners include Flint Hills Resources and Xcel Energy. Both Xcel Energy and Flint Hills representatives support the overall goal of the greenway and the proposed alignment. The proposed greenway alignment impacts St. Thomas Becket Church, four individual property owners west of TH 3 that own land under the existing Highline power corridor, and potentially eight to ten properties along 105th Street, should the master planned greenway alignment be modified to follow that route. Route alternatives exist if individual private properties are unable to be secured.

Preliminary Project Costs

Preliminary project costs are shown in the Table below.

Preliminary Project Costs

Project Element	Cost
~ 5 Miles of Greenway	\$4.8M
Pedestrian Bridge over TH 3	\$2.3M
Underpass of CSAH 71	\$0.3M
Underpass Modification of TH 52	\$0.8M – \$2.0M
Land Acquisition	\$0.5M
Project Delivery (15%)	\$1.5M
Total Project Cost	\$10.2M - \$11.4M

Construction costs are in 2021 dollars, based on historical construction pricing indices for this type of project and include 25% contingency. Costs do not include lighting, site furnishings, wayfinding or any potential at-grade RR crossing modifications at 105th St.

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Preliminary Engineering Study

Veterans Memorial Greenway

Prepared for Dakota County, Minnesota

1 Background

The Veterans Memorial Greenway (formerly known as the Rich Valley Greenway) is a proposed regional trail that will provide a link between Lebanon Hills Regional Park and the Mississippi River in central Dakota County. The five mile corridor is generally positioned in an east and west direction within the cities of Eagan and Inver Grove Heights. See Figure 1. The greenway connects to the Mendota-Lebanon Hills Greenway at the western terminus at Dodd Road in Eagan and to the Mississippi River Regional Trail at the eastern terminus just east of Trunk Highway 52 in Inver Grove Heights. The greenway is envisioned to have at least six (6) veterans memorial interpretive site nodes and one large site at Rich Valley Park.

2 Technical Review

Short Elliott Hendrickson (SEH) evaluated the proposed Veterans Memorial Greenway corridor for feasibility. Preliminary engineering tasks included defining a preferred horizontal and vertical alignment, possible alternate alignments, trail typical section(s), cross sections with associated construction impacts and construction costs.

Greenway design parameters were based on 20 mile per hour design speed and regional trail design standards from Dakota County, American Association of State Highway and Transportation Officials (AASHTO), Minnesota Department of Transportation (MnDOT), and Federal Highway Administration (FHWA) along with engineering judgement. The greenway was designed to be 10 feet wide with a two-foot turf clear zone on each side. No topographic survey was completed. SEH utilized aerial photography and site visits for in-place infrastructure locations. Dakota County GIS LIDAR topographic contours were used to determine existing vertical surface models.

3 Challenges/Opportunities

Primary challenges and opportunities are shown in Figures 2, 3, and 4. Overall, the preferred greenway alignment is feasible from an engineering perspective. Implementation of this corridor will provide several opportunities to connect to activity centers, schools and social gathering spaces including Lebanon Hills Regional Park, Pinewood Community School, Lakeside Park, St. Thomas Becket Church, Southern Hills Park, Rich Valley Park, and the Mississippi River.

This section will highlight and describe challenges and opportunities shown in Figures 2-4. Significant opportunities exist to incorporate veterans memorial interpretive nodes. Interpretive node site characteristics are shown in Table 1 and included in Figures 2 and 3.

Table 1 – Interpretive Node Characteristics

Node	Name	Node Type	Parking	Characteristics
1	Dodd Road	Small – trail side	None	<ul style="list-style-type: none"> • Former military road • Limited space between existing trail and ROW for linear interpretive feature • Trail junction with Eagan’s Highline Trail
2	Lakeside Park	Small – trail side	Very limited on-street parking	<ul style="list-style-type: none"> • Small neighborhood park • Picturesque setting with small lake • Short ADA trail system within park
3	Hwy 3 Bridge	Small – trail side	None, unless permitted by Thomas Beckett Church for special events	<ul style="list-style-type: none"> • Site of future ped/bike bridge over Hwy 3 • Bridges have the potential to be named as memorials
4	Southern Hills Park	Small – trail side	Very Limited on-street parking	<ul style="list-style-type: none"> • Small natural area park • Future boardwalk has the potential to be named as memorial • Small pond in a remote and peaceful setting • Natural area interpretation could compliment memorial
5	Flint Hills buffer land	Multiple – trail side	Varies	<ul style="list-style-type: none"> • Multiple opportunities for linear memorials in Flint Hills buffer land
6	Rich Valley Underpass	Small- trail side	None	<ul style="list-style-type: none"> • Former military road • Site of future underpass at Rich Valley Blvd (CSAH 71) • Underpass approach walls have the potential to be used as a memorial • Surrounding landscape is open and natural
7A	Rich Valley Park	Large	Large parking lots that would be available during non-peak park use times	<ul style="list-style-type: none"> • Large athletic complex designed to accommodate many visitors • Bathrooms • Drinking fountains • Picnic shelters • ADA park trail system • Concession stand • Large mowed areas that could potentially accommodate multiple memorials • Scenic stormwater pond
7B	Rich Valley South (private property)	Large (alternate)	NA	<ul style="list-style-type: none"> • If Rich Valley Park is unavailable, several large private properties immediately south of Barnes Ave have the potential to accommodate a large memorial

3.1 City of Eagan, Lakeside Park and Highline Corridor

Beginning at the west end of the corridor near Dodd Road, the greenway alignment is positioned under existing overhead power lines (Highline corridor) and on private property. The alignment was placed far enough south to avoid significant tree clearing adjacent to the residential homes to the north. An access agreement with Xcel Energy will be required to locate the greenway under the existing overhead power lines. At the City of Eagan's Lakeside Park the preferred greenway alignment is feasible on the north side, however, just east of Lakeside Park the preferred greenway alignment crosses 3 more private properties before reaching the St. Thomas Becket Catholic Church property.

In the event that the County cannot secure land across the 3 private properties east of the park, an alternate alignment is feasible that traverses through Lakeside Park to Atlantic Hills Drive where an on-street greenway condition could exist since Atlantic Hills Drive is a dead end cul-de-sac with very low average daily traffic volumes. The drawback of this alternate is that the Rich Valley Greenway master plan from 2017, indicates that church members preferred the greenway traverse the north side of their property in order to avoid impacting the restored prairie where the alternate alignment is proposed.

One of the most technically challenging locations of this corridor is the grade separated crossing of MnDOT's Trunk Highway 3 (TH 3 or S Robert Trail) and the railroad track spur line owned by Progressive Railroad just east of TH 3. TH3 is currently a 2-lane rural section road with average daily traffic counts of approximately 11,000 vehicles per day. The crossing of TH 3 is complicated by the location of multiple existing overhead power lines in the Highline corridor, a north/south overhead power line on the west side of TH 3 and MnDOT minimum vertical clearance requirements over TH 3. In order to feasibly construct a pedestrian bridge at this location, Great River Energy (GRE) would need to move one of their transmission poles and associated overhead lines. Based on correspondence with GRE, they have indicated their pole is located in TH 3 right of way and that they do not have an existing easement or permit for their facilities. They also indicated they did not see a need to enter into any agreements with Dakota County and that all work to relocate the pole and associated overhead lines would be an internal GRE capital project. GRE will not procure any internal capital projects at this time until notified by the County that funding is secured. They requested a minimum of 6-months lead time in order to initiate a power pole relocation project. It appears the Xcel Energy north/south overhead power lines/poles on the west side of TH 3 are located in MnDOT right of way. The County assumes Xcel Energy can feasibly relocate or bury the lines at no cost to the project per State law.

If overhead power infrastructure can be relocated to facilitate the grade separate crossing, a 435 foot 4-span prestressed concrete girder pedestrian bridge is feasible to construct. A bridge similar to the one proposed is shown in Photo 1.



Photo 1: Example Prestressed Concrete Girder Pedestrian Bridge with Decorative Railings

The proposed profile of the pedestrian bridge meets MnDOT and railroad minimum vertical clearance requirements. Following relocation of GRE infrastructure and based on aerial photography measurements, remaining horizontal distance between the pedestrian bridge and the closest Xcel Energy overhead power line to the south is approximately 30'-40'. Based on previous bridge projects, this distance would meet minimum horizontal clearance dimensions, but further analysis with Xcel Energy will ultimately be required to determine minimum requirements since they are dependent on the existing line configuration, capacity, type, age and spacing.

3.2 Xcel Energy

East of TH 3, the greenway is proposed on Xcel Energy property that includes the Wescott Gas Plant. Based on previous conversations with Xcel Energy during the master plan, they are supportive of the proposed greenway on their property. An access agreement will be required to locate the greenway under the existing overhead power lines. In order to meet minimum horizontal curve requirements, the greenway alignment impacts existing perimeter chain link fencing and relocation will be required. At the southeastern corner of the Xcel Energy property, significant grading and tree removal is required to maintain desired vertical profile slopes on the greenway. Dakota County/Xcel Energy should consider a tree inventory to identify if high-value trees are present at this location. If so, additional measures such as retaining walls could be considered to limit impacts.

3.3 City of Inver Grove Heights and Southern Hills Park

South of Xcel Energy, the greenway is proposed to traverse on City of Inver Grove Heights' Southern Hills Park. The park is heavily forested and contains several wetland complexes that could provide educational opportunities for users. To maximize this opportunity, the preferred greenway alignment includes a proposed 200 foot long timber boardwalk that traverses between 2 wetland complexes and connects to an existing paved bituminous trail that was previously constructed in conjunction with the nearby single family home development.

The proposed greenway follows the existing trail throughout the remainder of the park as it crosses under overhead power lines and terminates at Cliff Road (County State Aid Highway 32). Several grade challenges exist with this stretch of the greenway alignment. At least 3 separate locations along the existing trail do not meet minimum horizontal curve requirements. At least 5 separate locations totaling approximately 750 feet exceed desired maximum vertical profile slopes of 5%, with one 300 foot stretch exceeding 13%. An access agreement with Xcel Energy will be required to locate the greenway under the existing overhead power lines. For the purposes of this study, impacts to surrounding private property resulting from redesign/relocation of the existing trail in order to meet minimum/maximum horizontal/vertical design requirements was not completed, however, at a minimum it is understood that temporary grading easements and significant tree clearing on private property east of City property will be required. It is recommended that Dakota County evaluate whether utilizing the existing trail is in the best interest of user safety and experience and County operations and maintenance programs.

3.4 Cliff Road (County State Aid Highway 32 or 110th Street E)

From the City of Inver Grove Heights property, the proposed greenway alignment is located on the north side of Cliff Road to Akron Avenue (County Road 73). Cliff Road is currently a rural section 2-lane road classified as a minor arterial. The proposed section in this corridor maintains the required paved shoulder width on Cliff Road (9.5 feet) and introduces a concrete barrier curb and gutter section with 2 separate storm sewer systems to capture and outlet drainage. Behind or north of the curb section, a 5-foot boulevard, 10-foot trail and 2-foot clear zone were designed. Based on this section, no private property impacts are anticipated; however, further storm sewer design is required to determine if an outlet structure is required at the third private property east of Alameda Path.

3.5 Flint Hills Resources

East of Akron Avenue, the greenway is proposed to traverse on Flint Hills Resources (FH) property that initially provides excellent views of existing forested land and other natural resources. Based on previous conversations with FH during this study and the master plan, they are supportive of the proposed greenway on their property. FH has also indicated a willingness to incorporate a 50' wide County natural resource buffer zone on either side of greenway. An access agreement with FH will be required to locate the greenway and buffer zone.

At Blaine Avenue (County Road 71), a grade separated crossing via a 14-foot wide by 10-foot high concrete box culvert is proposed in order to maximize user safety and maintain a seamless user experience. Existing overhead power lines exist on the east side of Blaine Avenue, but do not appear to be in conflict with the proposed crossing location. Further evaluation of the existence and location of buried private utilities as well as completing drainage design is recommended to fully vet the feasibility of this crossing. Just east of the crossing, a significant

opportunity exists to connect the Veterans Memorial Greenway to Rich Valley Park. Further evaluation is recommended to determine the most feasible spur trail route to connect to the park.

3.6 105th Street and Union Pacific Railroad

East of FH property, the greenway is proposed along 105th Street. 105th Street is currently a 24-foot wide paved rural section 2-lane road with low traffic volumes between Barnes Avenue and Borman Avenue. East of Borman Avenue the road has a gravel surface and varies in width from 24 feet to 26 feet. Several options exist in this section of the corridor to feasibly construct the greenway including:

- Widening the pavement section on both the north and south sides of the road and creating an on-street greenway either via dedicated bicycle lanes or with sharrow symbols. Digital renderings of each are shown in Photos 2 and 3.



Photo 2: 105th Street Rendering with Bike Lanes – Looking West



Photo 3: 105th Street Rendering with Sharrow Symbols – Looking West

- Maintain the existing road location and place the greenway on the north side of the road and incorporate a drainage swale north of the trail. This is the option evaluated as part of this study. Temporary grading impacts would occur to all properties adjacent to the greenway within the corridor. A digital rendering of this option is shown in Photo 4.



Photo 4: 105th Street Rendering with Off-Street Trail – Looking West

- Incorporate a curb and gutter section and associated storm sewer system(s) with the greenway placed beyond the curb and a 5-foot turf boulevard similar to the typical section shown in Photo 5.

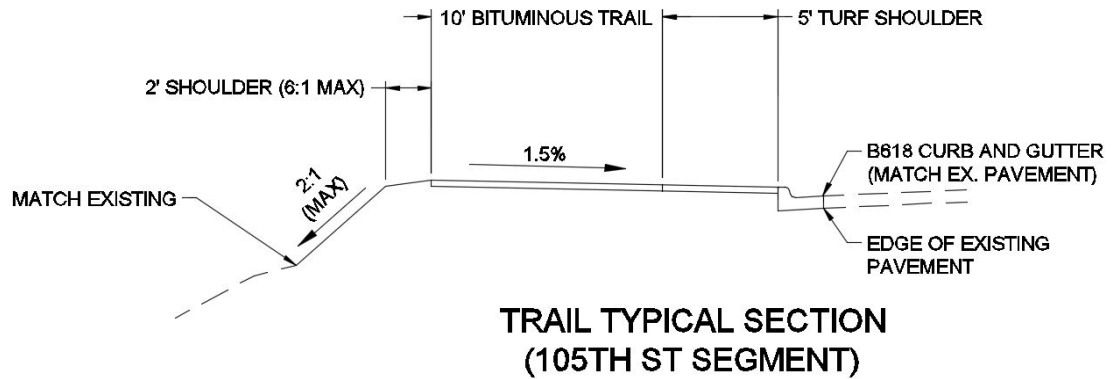


Photo 5: Trail Typical Section

- Widen the south side of 105th Street to better fit the north side trail/swale configuration that minimizes grading impacts.

East of Borman Avenue to Inver Grove Trail, the road has a gravel surface and varies in width from 24 feet to 26 feet. Here, it is recommended that the County consider paving 105th Street to

facilitate greenway implementation. Approximately 400 feet east of Barnes Way, the City of Inver Grove Heights has a 66 foot easement across private property for the remainder of 105th Street east to Inver Grove Trail. Just west of the 105th Street at grade crossing with the Union Pacific Railroad, a 375 foot timber boardwalk is proposed in order to avoid existing steep grades and impacting a wetland/water body. An opportunity exists to provide natural resource educational opportunities for users at this location. A crossing agreement with Union Pacific Railroad will be required where 105th Street crosses the tracks.

East of the crossing, the existing vertical profile slope of 105th Street or existing ground east of Inver Grove Trail ranges from approximately 7.5%-8.5%. While not ideal from a user experience and safety perspective, the greenway could be designed to match these slopes to minimize grading impacts. An access agreement with Xcel Energy will be required to locate the greenway under the existing overhead power lines east of Inver Grove Trail.

Coordination with the City of Inver Grove Heights and public outreach with the 105th Street neighborhood coupled with further engineering analysis is recommended to determine the most feasible alternative in this corridor.

3.7 Trunk Highway 52 and Union Pacific Railroad (UP)

Once inside MnDOT Trunk Highway 52 (TH 52) right of way, the greenway alignment swings north and parallels the 2 southbound highway lanes on the west side. While the greenway is feasible in this corridor, installation of 2 separate sections of guardrail totaling approximately 850 feet is recommended to provide a safe separation between high speed vehicles and greenway users. This configuration will need to be reviewed by MnDOT for approval.

A potential safety hazard exists at the proposed at-grade greenway crossing Inver Grove Trail. Here, vehicles exiting southbound TH 52 and turning onto Inver Grove Trail may not see southbound greenway users. Further evaluation is recommended to determine if the at-grade crossing should be shifted farther west to provide improved sight distance for motorists and greenway users.

One of the other most technically challenging locations of this corridor is the grade separated crossing of TH 52. For the purposes of this study, the greenway alignment is proposed to cross under the northbound and southbound TH 52 bridges, specifically between south of existing bridge piers and north of existing bridge abutments at each bridge. An existing single set of UP spur line tracks is located north of the bridge pier locations.

A digital rendering of this option is shown in Photos 6 and 7.



Photo 6: Rendering Concept at Northbound TH-52 Bridge



Photo 7: Rendering Concept at Southbound TH-52 Bridge

Access approval from MnDOT and UP will be required. There is uncertainty as to whether UP will approve of the crossing. The railroad approval process requires that engineering designs be prepared and submitted prior to their evaluation. The estimated costs of preparing engineering plans is estimated at \$30,000 and would not guarantee UP approval.

Alternatively, it has been identified that the greenway could pass under TH 52 in a new location closer to Inver Grove Trail, but at a cost that is estimated at \$1.2 million more than sharing the existing UP underpass.

If the preferred greenway alignment utilizing the existing UP crossing is approved by UP, the greenway will connect to the existing Mississippi River Regional Trail. Further evaluation is required to determine whether the greenway can be placed in TH52 right of way and behind the existing sheet pile wall or if the greenway should extend parallel to the UP tracks further east of the TH 52 bridge and tie into the MRRT east of the existing sheet pile wall.

4 Property Ownership

Major property owners include Flint Hills Resources and Xcel Energy. Based on discussions during this feasibility study and past conversations from the 2017 Greenway Master Plan, both Xcel Energy and Flint Hills representatives support the overall goal of the greenway and the proposed alignment. Continued support from these major property owners is essential to the feasibility of the greenway. In addition to the major property owners, the greenway alignment impacts St. Thomas Becket Church, four individual property owners west of TH 3 that own land under the existing Highline power corridor, and potentially eight to ten properties along 105th Street, should the master planned greenway alignment be modified to follow that route. These other properties are important to the quality of the greenway experience, but route alternatives exist if they are unable to be secured.

5 Preliminary Project Costs

Preliminary project costs are shown in Table 2.

Table 2 – Preliminary Project Costs

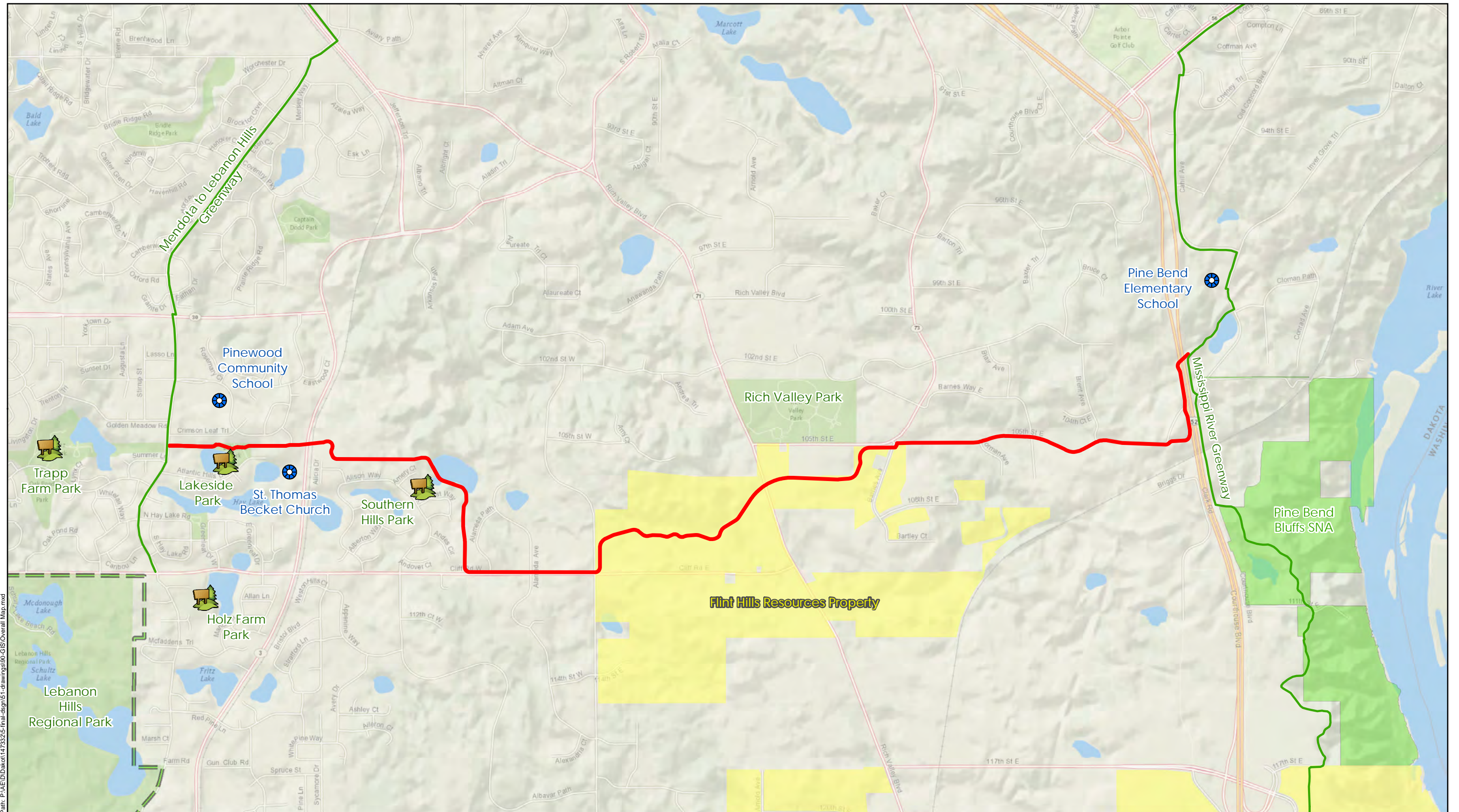
Project Element	Cost
~ 5 Miles of Greenway	\$4.8M
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Underpass Modification of TH 52	\$0.8M – \$2.0M
Land Acquisition	\$0.5M
Project Delivery (15%)	\$1.5M
Total Project Cost	\$10.2M - \$11.4M

Construction costs are in 2021 dollars, based on historical construction pricing indices for this type of project and include 25% contingency. Costs do not include lighting, site furnishings, wayfinding or any potential at-grade RR crossing modifications at 105th St.

Figures

Figure 1 – Location Map

Figure 2 – 4 - Challenges and Opportunities



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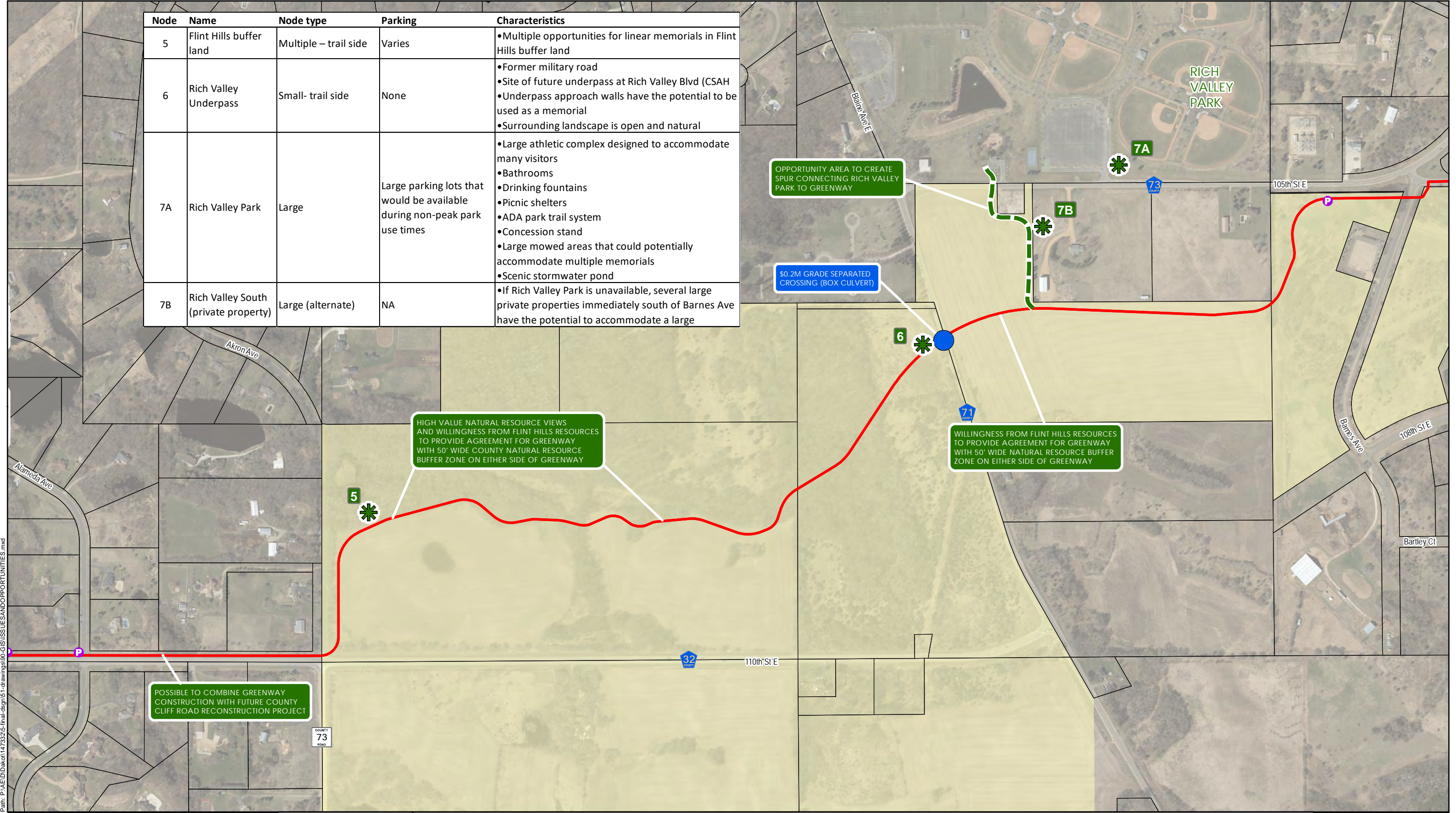
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 Print Date: 1/2/2020
 User Name: msteuernagel
 Projection: NAD 1983 HARN Adj MN Dakota Feet
 Source:

LOCATION MAP
VETERANS MEMORIAL GREENWAY
DAKOTA COUNTY, MINNESOTA

Figure
 1

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Node	Name	Node type	Parking	Characteristics
5	Flint Hills buffer land	Multiple – trail side	Varies	<ul style="list-style-type: none"> • Multiple opportunities for linear memorials in Flint Hills buffer land
6	Rich Valley Underpass	Small- trail side	None	<ul style="list-style-type: none"> • Former military road • Site of future underpass at Rich Valley Blvd (CSAH) • Underpass approach walls have the potential to be used as a memorial • Surrounding landscape is open and natural
7A	Rich Valley Park	Large	Large parking lots that would be available during non-peak park use times	<ul style="list-style-type: none"> • Large athletic complex designed to accommodate many visitors • Bathrooms • Drinking fountains • Picnic shelters • ADA park trail system • Concession stand • Large mowed areas that could potentially accommodate multiple memorials • Scenic stormwater pond
7B	Rich Valley South (private property)	Large (alternate)	NA	<ul style="list-style-type: none"> • If Rich Valley Park is unavailable, several large private properties immediately south of Barnes Ave have the potential to accommodate a large



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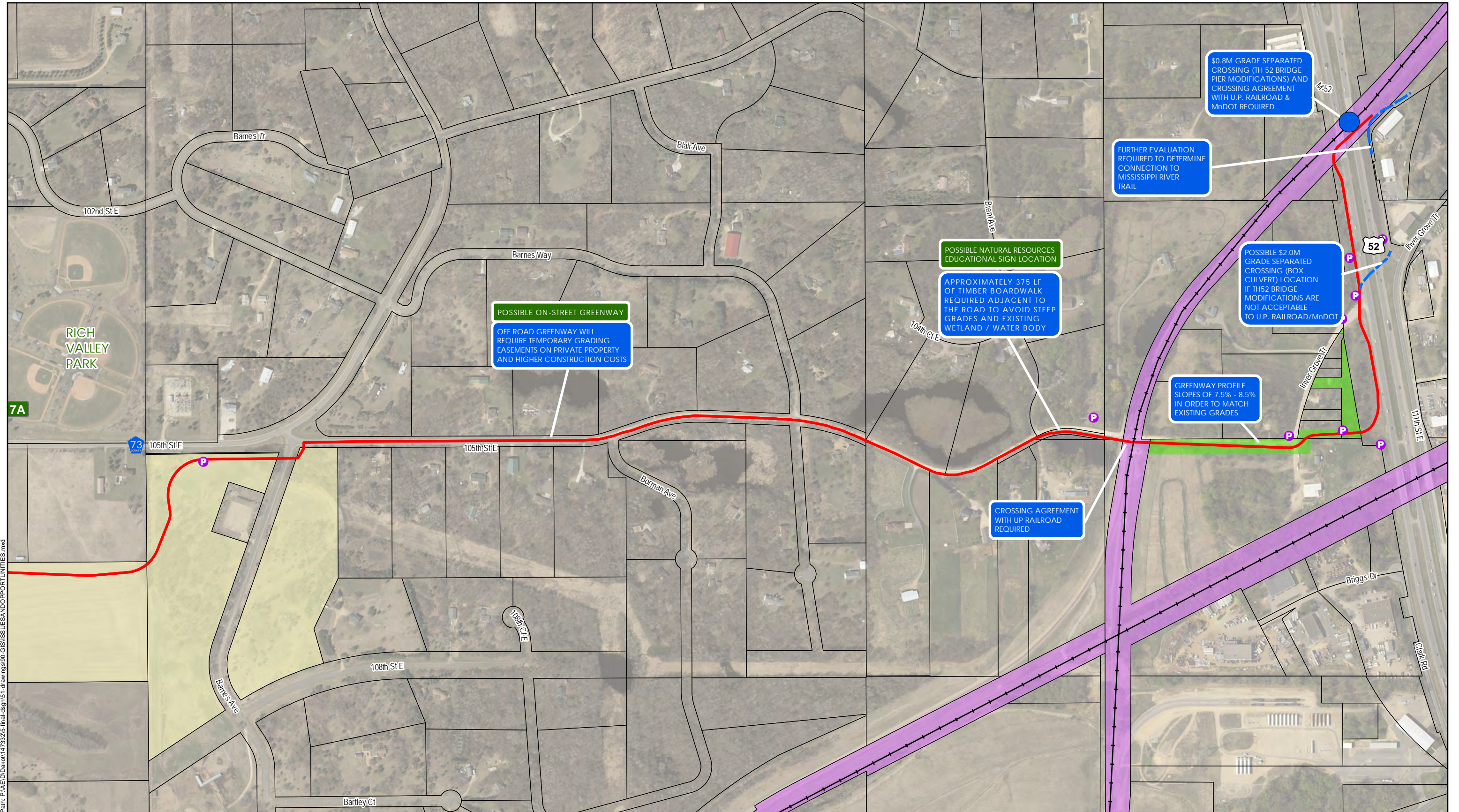
- Proposed Alternate Greenway Alignment
- Proposed Greenway Alignment
- Existing Northern States Power Co / Xcel Energy Parcel
- P Power Pole / Tower Approximate Location
- Flint Hills Parcels
- City of Eagan Parcels
- City of Inver Grove Heights Parcels
- Union Pacific Railroad
- Progressive Railroad
- Permanent Private Property Easement Required
- ✱ Possible Veterans Memorial Interpretive Node Location

CHALLENGES AND OPPORTUNITIES

VETERANS MEMORIAL GREENWAY DAKOTA COUNTY, MINNESOTA

Figure
3

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CHALLENGES AND OPPORTUNITIES

VETERANS MEMORIAL GREENWAY DAKOTA COUNTY, MINNESOTA

Figure
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