

# TCAAP Site Redevelopment Infrastructure

## PRELIMINARY DESIGN REPORT



JUNE 2015

Prepared By:

**Kimley»Horn**



June 25, 2015

Ms. Beth Engum, P.E.  
Ramsey County Public Works  
1425 Paul Kirkwold Drive  
Arden Hills, MN 55112-3933

**RE: *Preliminary Design Report***  
***TCAAP Site Redevelopment Infrastructure***

Dear Ms. Engum:

The enclosed preliminary design report has been prepared for the Twin Cities Army Ammunitions Plant (TCAAP) Site Redevelopment Infrastructure improvements. This report details the proposed public infrastructure to support the redevelopment of the 427-acre TCAAP site including the following improvements:

- Roadway
- Site grading and storm drainage
- Remeander of Rice Creek
- Trunk sanitary sewer
- Trunk water main
- Landscape architecture/urban design enhancements
- Regional trail improvements
- TCAAP Groundwater Recovery System (TGRS) modifications

The proposed scope, estimated costs, financing, and schedule for the improvements are detailed in this report.

Information utilized in the preparation of this report included utility as-builts, information gathered through field reviews, GIS information, topographic survey, public involvement input, and discussions with Ramsey County and City of Arden Hills staff. All available information was reviewed and considered to determine the feasibility of the proposed improvements.

We believe that the proposed improvements identified in this report are feasible and necessary to support the redevelopment of the TCAAP site.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.

  
Thomas J. Lincoln, PE  
Associate

Enclosure

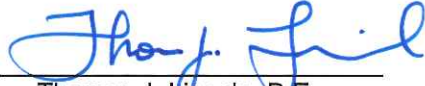
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File 160553004

PRELIMINARY DESIGN REPORT  
FOR  
TCAAP SITE REDEVELOPMENT INFRASTRUCTURE

JUNE 2015

Kimley-Horn and Associates, Inc.  
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(651) 645-4197

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

Signature:   
Thomas J. Lincoln, P.E.

License No. 21433

Date: June 25, 2015

File: 160553004

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## EXECUTIVE SUMMARY

Ramsey County, in coordination with the City of Arden Hills, is planning for the redevelopment of the former Twin Cities Army Ammunitions Plant (TCAAP) site. The TCAAP site is a 427-acre parcel adjacent to US Highway 10 and Highway 96 in Arden Hills. The site is currently undergoing demolition and environmental clean up to ready it for redevelopment by late 2015. In order to prepare the property for sale and redevelopment, Ramsey County and the City of Arden Hills are developing plans for the public infrastructure required to serve the site. The proposed public infrastructure improvements include the following:

- roadway and sidewalk/trail improvements
- site grading and storm drainage improvements
- remeander of Rice Creek in conjunction with the proposed roadway and storm drainage improvements
- trunk sanitary sewer improvements
- trunk water system improvements
- landscape architecture/urban design improvements
- regional trail improvements
- TGRS improvements

These improvements are proposed to be designed and constructed consistent with those identified in the Master Plan and AUAR for the TCAAP site.

The estimated costs for the proposed improvements are detailed below. The estimated costs include a 10 percent contingency an allowance for indirect costs such as engineering, administrative, and legal items as well as capitalized interest. The estimated roadway, sanitary sewer, and water main project costs include a 20 percent indirect allowance, while the remaining project costs, with the exception of the TGRS costs, include a 30 percent indirect allowance. The TGRS costs do not include any indirect allowance.

<u>Proposed Improvements</u>	<u>Estimated Project Cost</u>
A. Roadway	
Spine Road	\$11,605,000
Thumb Road (inside TCAAP)	\$ 1,573,000
Thumb Road (outside TCAAP)	<u>\$ 2,926,000</u>
Subtotal	\$16,104,000
B. Site Grading and Storm Drainage	
Mass Grading and Earthwork	\$ 3,563,000
Storm Water Ponds (private development)	\$ 1,087,000
Wetland Restoration	\$ 174,000
Rice Creek Remeander	<u>\$ 1,118,000</u>
Subtotal	\$ 5,942,000

C. Trunk Sanitary Sewer	
Spine Road	\$ 1,193,000
Thumb Road	\$ 223,000
Subtotal	\$ 1,416,000
D. Trunk Water Main	
Spine Road	\$ 6,481,000
Thumb Road	\$ 782,000
Subtotal	\$ 7,263,000
E. Landscape Architecture/Urban Design Enhancements	
Spine Road	\$ 985,000
Thumb Road	\$ 306,000
Town Center	\$ 831,000
Green Crossings	\$ 862,000
Entry Gateways	\$ 1,484,000
Pedestrian Nodes	\$ 281,000
Natural Resources Corridor	\$ 1,712,000
Subtotal	\$ 6,461,000
F. Regional Trail Improvements	\$ 469,000
G. TGRS Improvements	\$1,220,000
<b>Total Estimated Project Cost</b>	<b>\$38,875,000</b>

The improvements are proposed to be financed through a combination of Ramsey County and City of Arden Hills funds. The following is a summary of the proposed financing plan for the improvements:

<u>Improvements</u>	<u>Estimated Cost</u>	<u>Financing Source</u>
Roadway	\$16,104,000	Ramsey County
Site Grading and Storm Drainage	\$ 5,942,000	Ramsey County
Trunk Sanitary Sewer	\$ 1,416,000	City of Arden Hills
Trunk Water Main	\$ 7,263,000	City of Arden Hills
Landscape Architecture/Urban Design	\$ 6,461,000	Ramsey County
Regional Trail Improvements	\$ 469,000	Ramsey County
TGRS Improvements	\$ 1,220,000	Ramsey County
<u>Financing Summary</u>	<u>Total Amount</u>	
Ramsey County	\$30,196,000	
City of Arden Hills	\$ 8,679,000	
<b>Total</b>	<b>\$38,875,000</b>	

A majority of the TCAAP infrastructure improvements are proposed to be constructed in 2015 and 2016 to meet the needs of future redevelopment. The construction of the Thumb Road and the installation of some of the landscape architecture/urban design amenities may occur at a later date depending on development pressures and the availability of funding.

# 1. INTRODUCTION

Ramsey County, in coordination with the City of Arden Hills, is planning for the redevelopment of the former Twin Cities Army Ammunitions Plant (TCAAP) site. The TCAAP site is a 427-acre parcel adjacent to US Highway 10 and Highway 96 in Arden Hills. The site is currently undergoing demolition and environmental clean up to ready it for redevelopment by late 2015.

A Master Plan has been prepared by the City of Arden Hills to lay the vision for the redevelopment of the TCAAP site. The Master Plan includes a mix of residential and non-residential uses along with park, civic, and open spaces. An Alternative Urban Areawide Review (AUAR) has also been completed and approved by the City of Arden Hills to document and analyze potential environmental impacts associated with the proposed redevelopment.

In order to prepare the property for sale and redevelopment, Ramsey County and the City of Arden Hills need to have plans in place for the public infrastructure required to serve the site. The proposed public infrastructure improvements include the following:

- roadway and sidewalk/trail improvements
- site grading and storm drainage improvements
- remeander of Rice Creek in conjunction with the proposed roadway and storm drainage improvements
- trunk sanitary sewer improvements
- trunk water main improvements
- landscape architecture/urban design enhancements
- regional trail improvements
- TGRS improvements

These improvements are proposed to be designed and constructed consistent with the Master Plan and AUAR.

The proposed TCAAP Site Redevelopment Infrastructure improvements are detailed in this report along with the estimated costs and proposed financing responsibilities for the improvements.

Ramsey County Parks and Recreation is planning regional trail improvements in the vicinity of the TCAAP site. The extension of a new regional trail along the easterly and northerly boundaries of the TCAAP site is proposed in conjunction with the other TCAAP public infrastructure improvements. This regional trail extension is further detailed in this report.

Ramsey County Public Works is planning for the reconstruction of the existing interchanges along I-35W at Highway 96 and County Road H. The Highway 96 interchange is proposed for reconstruction in 2015, while the County Road H interchange is being planned for reconstruction in 2016. These interchange reconstruction projects are being coordinated with the infrastructure improvements detailed in this report.

A project location map is provided as Exhibit 1 in Appendix A.

## 2. PROPOSED PUBLIC IMPROVEMENTS

The following is a summary of the proposed roadway, site grading and storm drainage, Rice Creek remeander, sanitary sewer, water main, landscape architecture/urban design, regional trail, and TGRS improvements proposed to serve the TCAAP redevelopment area.

### A. ROADWAY IMPROVEMENTS

Two roadways, the Spine Road and the Thumb Road, are proposed to provide access to the TCAAP redevelopment area as detailed below.

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#### SPINE ROAD

The Spine Road is a 1.5 mile long, four-lane divided urban arterial roadway that will provide the primary access to the TCAAP site from Highway 96 and County Road H. The Spine Road will be a County State Aid Highway under the jurisdiction of Ramsey County serving 20,000 to 30,000 vehicles per day. The Highway 96 intersection is proposed to be signalized while a multilane roundabout is proposed at the intersection at County Road H. Access along the Spine Road is proposed at 1/4 mile spacing for full access and 1/8 mile spacing for right-in/right-out access, consistent with Ramsey County's access management guidelines. Traffic control for all other intersections will initially be side-street stop control. The Spine Road typical section includes four travel lanes with shoulders, a multi-use trail on both sides of the road, left and right turn lanes, and a landscaped center median. The proposed right of way width is 150 feet for the first ¼ mile north of Highway 96, and 140 feet from ¼ mile north of Highway 96 to County Road H. Construction of the Spine Road will end on the north side of the bridge over Rice Creek south of the proposed County Road H roundabout. The roundabout will be constructed as a part of the I-35W and County Road H interchange improvements.

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#### SPINE ROAD BRIDGE

The Spine Road bridge will span the remeandered Rice Creek. The bridge will have a clear span of approximately 100 feet. Based on input at the design charrette and other public meetings, the bridge is proposed to be constructed as a precast arch with headwalls reflecting the visual quality elements that have recently been defined for the replacement of bridges along the I-35W corridor.

The bridge will accommodate two lanes of traffic in each direction along with a shoulder, a trail/sidewalk on the south side of the bridge and a variable width median. The total width of the bridge will be approximately 98 feet. Headwalls for the arch will have a stone form liner with a multi-color stain system.

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#### THUMB ROAD (OUTSIDE TCAAP)

The Thumb Road provides access through the TCAAP property between County Road H and County Road I. The Thumb Road outside of the TCAAP site is approximately 2,000 feet long extending from County Road I to the north TCAAP property line. The Thumb Road will be under the jurisdiction of Ramsey County. The proposed typical section consists of a single travel lane in each direction with a parking lane located on the west side of the road. The intersection control at County Road I is a single lane roundabout. Access to the State of Minnesota Fleet Services and Drivers Training facilities will be maintained from the new Thumb Road. Construction of the roadway adjacent to the Fleet Services and Drivers Training facilities will remain within the existing right of way. The realignment of the roadway north of the Fleet Services property requires additional right of way from MnDOT owned property.

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## THUMB ROAD (WITHIN TCAAP)

The Thumb Road inside of the TCAAP site extends approximately 3,000 feet from County Road H to the north TCAAP property line. The Thumb Road will be under the jurisdiction of Ramsey County. The proposed typical section includes a single travel lane in each direction with a center median and left and right turn lanes for future access points into the adjacent development area. The proposed right of way width within the TCAAP site is 80 feet.

Exhibits 2, 3 and 4 in Appendix A further detail the proposed roadway and bridge improvements.

## B. SITE GRADING AND STORM DRAINAGE IMPROVEMENTS

Mass grading is proposed within the TCAAP site to provide for the proposed Spine Road and Thumb Road, to construct the necessary wetland and storm water ponding areas, and to place fill material in portions of the site to help facilitate future development. Full mass grading of the TCAAP site is not proposed at this time since detailed development plans are not available for each of the individual neighborhoods. Future developers will be responsible for mass grading to accommodate their development plans.

Specific site grading, wetland mitigation, environmental, and storm drainage items that will be addressed as a part of the site redevelopment infrastructure are detailed below.

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## ENVIRONMENTAL ISSUES

Infrastructure improvements will be covered by the existing Construction Contingency Plan (CCP) prepared by Wenck & Associates as part of Ramsey County's Demolition/Remediation contract.

Ramsey County is seeking a No Association Determination (NAD) from the MPCA for all of the proposed site infrastructure improvements. A Response Action Plan (RAP) will be prepared for work reaching shallow groundwater at old Building 102 and old Building 103 (Site K). The RAP will detail the following:

- permitting and disposal of dewatering into sanitary sewer
- disposal of all material excavated below the water table as impacted materials
- potential lining of ponds and wetlands with an impervious liner
- installation of anti-seepage collars on the storm sewer inlets and outlets
- modification of existing monitoring wells
- the likely installation of additional monitoring wells

The cost estimate included in this report for the site grading and storm drainage improvements includes allocations for these costs.

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## SPINE ROAD

Mass grading will be performed for the construction of the Spine Road. The proposed Spine Road profile generally follows existing grades with the exception of the south end near Highway 96 where significant cut will be required. Storm sewer will collect and convey roadway drainage to storm water ponds located adjacent to the Spine Road.

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## THUMB ROAD

Mass grading for the Thumb Road within the TCAAP site will be performed by a future developer in conjunction with the mass grading of the adjacent development area. No costs for this mass grading are therefore included in this report. The proposed profile for the Thumb Road within the TCAAP site generally follows the existing grade, with the exception of the north end where significant cut is required to match the existing elevation. Storm sewer will collect and convey roadway drainage to a storm water pond located adjacent to the Thumb Road north of County Road H. The storm water pond will be graded by the future developer, therefore, no costs for the grading of this storm water pond are included in this report.

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## NATURAL RESOURCES CORRIDOR

The natural resources corridor will serve several uses including storm water management, wetland preservation and mitigation, and passive recreation/open space. Ponds and wetlands will be interconnected via surface drainage and storm sewer within the corridor. A bituminous trail is proposed along the west side of the natural resources corridor for both maintenance and recreational purposes. Grading of the ponds, wetlands, and trail have been factored into the overall earthwork volumes represented in the estimated costs. Excavation of the storm water ponds and wetlands within the natural resource corridor will generate significant excess material, which will be used to fill the Creek and Town neighborhoods. The design of the natural resources corridor must allow for future bridge or culvert crossings to provide roadway access to the Creek neighborhood and a trail connection between the Town and Hill neighborhoods.

Wetland replacement will be provided for all impacts resulting from the public infrastructure, including the Spine Road, Thumb Road, utilities, storm water ponds, associated site grading, and maintenance access. All necessary rate control is provided for the infrastructure improvements and all future site development. The Comprehensive Stormwater Management Plan (CSMP) describes the assumptions made for future development, design criteria used, and portions of the site where water quality will be required by means of infiltration.

The CSMP will serve as a working document as the site develops, and developers will need to review to confirm compliance with its terms. Specifically, developers will need to review any potential wetland impacts on their parcel, as wetland mitigation has not been provided for all potential impacts. A summary of areas is as follows:

- 16.4 acres of proposed storm water ponds
- 1.7 acres of wetland impacts resulting from public infrastructure
- 4.4 acres of potential jurisdictional wetland impacts resulting from full development
- 10.7 acres of created wetland with 7.6 acres of wetland buffer
- 4.4 acres of preserved wetland

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## STORM WATER IMPROVEMENTS (OUTSIDE OF NATURAL RESOURCES CORRIDOR)

Ponding is required outside of the natural resources corridor to serve the needs of development near Highway 96 and the Creek neighborhood, with the former draining to Round Lake and the latter to Rice Creek. Existing storm sewer outfalls at the perimeter of the TCAAP boundary will be used to convey storm water to Round Lake. Proposed storm water ponds that are located outside of the natural



resources corridor will need to be constructed by the future developer. These include ponds P-1, P-3, and P-14 on Exhibit 5. The CSMP details the general location of these basins, along with sizing and associated flow rate information.

Drainage for Outlots I, J, and K on the west side of the Spine Road will require a drainage channel along the Highway 10 right-of-way to convey stormwater to pond P-13 for water quality and rate control. A culvert will be constructed under the Spine Road to connect to pond P-13. The emergency overflow for this are will discharge to Rice Creek north of Outlot K. This drainage channel will be further developed in final design.

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## WETLAND IMPACTS AND MITIGATION

Wetland impacts are regulated by federal, state, and local water resource regulations, most of which will be permitted as part of the infrastructure improvements. The two key agencies and their respective approvals required are listed below:

- U.S. Army Corps of Engineers - Clean Water Act Section 404 permit will be required for wetland and creek impacts and will be permitted as part of the infrastructure improvements
- Rice Creek Watershed District (RCWD) has jurisdiction over TCAAP site storm water runoff, erosion control, floodplains, wetlands, and creek crossings. RCWD approval is required in each of these areas via a comprehensive permit. The CSMP defines these requirements in terms of developer responsibilities.

Based on a wetland delineation completed by Ramsey County on the TCAAP site and the adjacent regional trail corridor, a total of 14.4 acres of wetland are located within the TCAAP boundary, with an additional 1.3 acres located within the adjacent regional trail corridor. The Army Corps of Engineers has jurisdiction over different wetlands of a lesser amount, therefore the RCWD numbers are used to identify maximum mitigation requirements, assuming all but the largest on-site wetland will be impacted. Table 2.1 shows the breakdown of wetland impacts based on maximum development grading. The RCWD requires a minimum of 2:1 replacement ratio for wetland impacts, with on-site replacement to be considered first before off-site options are considered. New wetland credit is allowed at 75% of the total wetland acreage created, with wetland buffer eligible for 10% credit if manicured and up to 25% if native and unmowed.

**Table 2.1 Estimated TCAAP Wetland Impacts**

Impacts	Wetland Type		
	Type 1/2	Type 2/3	Total
Natural Resources Corridor	0.30	0	<b>0.30</b>
Spine Road	0	0.46	<b>0.46</b>
Trail Grading	0.30	0	<b>0.30</b>
Mass Grading	0.80	0	<b>0.80</b>
Future Development	0.20	2.30	<b>2.50</b>
<b>TOTAL</b>	<b>1.60</b>	<b>2.76</b>	<b>4.36</b>

The total worst case jurisdictional wetland impact is estimated at 4.4 acres, requiring 8.8 acres of wetland mitigation credit. The County Road I roundabout and Thumb Road impacts result in a need for approximately 0.8 acres of credit, which are not reflected in Table 2.1. Approximately 9.9 acres of wetland

mitigation credit are proposed and included in the estimated costs, which accounts for a total of 4.95 acres of impact. All wetland impacts from infrastructure improvements are mitigated, however future development impacts exceeding the provided mitigation area need to be mitigated by future developers.

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## CREEK NEIGHBORHOOD

To facilitate the development of residential units with full basements, existing grades must be raised such that proposed basements are above seasonal high ground water. This requires on average six feet of fill throughout the area defined as the Creek neighborhood in the Master Plan.

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## TOWN NEIGHBORHOOD

Existing grades are generally flat through this area. Raising grades with additional material will ensure that storm sewer has adequate cover and conveys storm water to ponds within the natural resources corridor. Additionally, fill is required to allow for future development that incorporates underground parking located above ground water.

Exhibit 5 in Appendix A further details the proposed site grading and storm drainage improvements.

## C. RICE CREEK REMEANDER

Rice Creek has been significantly altered from its natural state. Beginning in the early 1900's Rice Creek has been changed to reflect property boundaries, drained wetlands and agricultural fields, and fit stream crossings. This project provides an opportunity to return the stream to a more natural system while also providing space for the construction of the Spine Road and the new County Road H interchange. The layout of the new channel will be an improvement over the current degraded channel by providing more meanders, increased floodplain volumes, lower channel slopes, and native vegetation growing on the banks.

The banks of the new channel will be protected with bioengineered practices (root wads, log toe, tree pins, etc.) as applicable, and in some cases with hard armor (riprap) as required by the anticipated forces of water flow through the new channel. Additional field stone boulders may be placed in the channel to create small scours in the stream bed and provide current breaks for fish. Backwater pools will be created off of the channel to provide temporary seasonal flood storage and wet meadow habitat for amphibians and native plants. The re-vegetation strategy will be based on the soil moisture conditions along the creek (submerged, permanently wet, occasionally moist, and routinely dry) to ensure a diversity of native plant, flower, and shrub species and create a natural environmental amenity for the TCAAP redevelopment site.

Exhibit 6 in Appendix A further details the proposed Rice Creek remeander improvements.

## D. TRUNK SANITARY SEWER

This project includes the installation of 8-inch to 18-inch trunk sanitary sewer to collect sanitary sewage from future development areas. The total length of this sanitary sewer extension is approximately 12,400 feet. This sanitary sewer is proposed to be constructed within public right-of-way along the Thumb Road and Spine Road, or in public utility easements.

The TCAAP site is currently served by an 18-inch gravity trunk sanitary sewer under I-35W at County Road H that was installed by the Army in 1994. This trunk sanitary sewer system discharges into the City of Mounds View trunk sanitary sewer system at County Road H and Highway 10, before connecting to a

MCES interceptor and lift station located west of the site in Mounds View. This existing trunk sanitary sewer has been inspected and has the capacity to serve the TCAAP redevelopment.

A Sanitary Sewer Connection and Use Agreement was executed in 1994 between the City of Arden Hills, the City of Mounds View, and the Army when the 18-inch trunk sanitary sewer was installed. This agreement established joint use rights and a billing mechanism.

A new agreement will need to be established between the City of Arden Hills, the City of Mounds View, and MCES to address sanitary flow metering, reporting, and use payment. The proposed flow metering method discussed with MCES consists of installing a flow meter within the new lift station to meter flows from the southerly portion of the TCAAP site and using water usage meters to measure sewage flows from the Thumb parcel.

The Thumb parcel will be served with an 8-inch gravity sewer system connecting to the existing 18-inch trunk sewer system south of the County Road H roundabout. The Thumb parcel sanitary sewer system improvements will include 420 feet of 4-inch force main to provide future service to the State of Minnesota facilities located north of the Thumb parcel.

The remainder of the TCAAP site, south of County Road H, will be served with 8-inch to 18-inch gravity sanitary sewer and a proposed lift station located along the I-35W right-of-way, south of Rice Creek. The lift station will consist of a deep wet well, duplex variable submersible pumps and a valve vault equipped with a flow meter. The lift station will discharge via force main under Rice Creek to a gravity manhole located south of the County Road H roundabout. The design will include parallel force mains to accommodate the growth in sanitary sewer flows as the development builds out.

Infrastructure improvements will be covered by the existing Construction Contingency Plan (CCP) prepared by Wenck & Associates as part of Ramsey County's Demolition/Remediation contract.

Ramsey County is seeking a No Association Determination (NAD) from the MPCA for all of the proposed site infrastructure improvements. A Response Action Plan (RAP) will be prepared for work reaching shallow groundwater at old Building 102 and old Building 103 (Site K). For sanitary sewer installation in the Site K area of TCAAP, the RAP will require the contractor to permit and dispose of dewatering into the sanitary sewer, dispose of all trench material excavated below the water table as impacted materials, install anti-seepage collars on the sanitary sewer, and backfill the pipe with a cohesive soil. Additional monitoring wells will be likely. These additional costs are reflected in the cost estimates.

Exhibits 7A and 7B in Appendix A further detail the proposed trunk sanitary sewer improvements.

More detailed information on the proposed trunk sanitary sewer design is provided in Appendix D.

## E. TRUNK WATER MAIN

This project includes the installation of a 12-inch water main connecting to the existing Arden Hills distribution system to provide potable water demand and fire protection for future development within TCAAP. The total length of the water main extension is approximately 18,100 feet. This water main is proposed to be constructed within public right-of-way along the Thumb Road and Spine Road, or in public utility easements.

A water study and modeling was conducted in order to size the proposed water mains and verify that adequate fire protection will be provided to the future developments. Data was collected for the existing Arden Hills water system, including the pipe network, water towers, booster station, and water demand

data from the City of Arden Hills and the City of Roseville. The model was compared and calibrated against field data and adjusted for up to 20% future growth.

The results of the fire flow simulations confirmed that the 12-inch water mains proposed for the development will be adequate. Additional 12-inch water main loops will be installed throughout the TCAAP development concurrently with future developments.

The results of the fire flow simulations concluded the need for additional water main infrastructure to serve TCAAP. A water tower with a capacity of up to 1.5 million gallons will be required to serve the additional demand generated by future development and has been located on the TCAAP site along the eastern border at the highest geographical elevation. Additionally, a new booster station is required. The City currently has one booster station, so the new booster station will benefit the TCAAP site and the existing system by providing redundancy of critical infrastructure. The proposed booster station location is off-site west of Snelling Avenue just south of I-694. The final sizing of this water main infrastructure will be completed during the final design process.

The proposed water main extension will include connections to the existing Arden Hills system and reconnection of an existing service to the State of Minnesota facilities north of the Thumb parcel. A 24-inch steel casing will be jacked under Highway 96 in order to facility a connection to an existing 12-inch water main located along the south side of the Highway 96 right-of-way. A second 24-inch steel casing will be jacked under Highway 10 in order to connect to an existing 12" water main located along the west side of the Highway 10 right-of-way. A portion of the existing 10" water service to the State of Minnesota facilities located north of the Thumb parcel will be removed and reconnected with the proposed 12-inch water main in the Thumb right-of-way. The proposed improvements will eliminate the need for water service from the City of Mounds View, but a connection will be retained with a normally closed valve that can be opened for emergencies only.

The proposed water distribution system includes hydrants spaced approximately 600' feet apart, per City of Arden Hills requirements. The proposed water distribution system includes two 12-inch water main crossings under the remeandered Rice Creek. The 12-inch water main will be installed within a 24-inch steel casing at these locations.

Infrastructure improvements will be covered by the existing Construction Contingency Plan (CCP) prepared by Wenck & Associates as part of Ramsey County's Demolition/Remediation contract.

Ramsey County is seeking a No Association Determination (NAD) from the MPCA for all of the proposed site infrastructure improvements. A Response Action Plan (RAP) will be prepared for work reaching shallow groundwater at old Building 102 and old Building 103 (Site K). For water main installation in the Site K area of TCAAP, the RAP will require the contractor to permit and dispose of dewatering into the sanitary sewer, dispose of all trench material excavated below the water table as impacted materials, install anti-seepage collars on the water main, and backfill the pipe with a cohesive soil. Additional monitoring wells will be likely. These additional costs are reflected in the cost estimates.

Exhibits 8A and 8B in Appendix A further detail the proposed trunk water main improvements.

More detailed information on the water system modeling and the proposed trunk water main system is provided in Appendix E.

## F. LANDSCAPE ARCHITECTURE/URBAN DESIGN ENHANCEMENTS

The proposed landscape architecture/urban design enhancements include the addition of trees, shrub/perennial beds, pedestrian scale and effects lighting, furnishings, special pavements, walls, railings, monuments, shade structures, and natural feature elements. An urban design and character framework plan has been developed to illustrate the proposed enhancements as detailed in Exhibits 9A, 9B, 9C, 9D, 9E and 9F in Appendix A. The urban design and character framework plan was prepared based on input received through a design workshop/charrette, at public meetings, and through discussions with Ramsey County and Arden Hills staff. A summary of the design workshop/charrette activity is provided in Appendix F.

Concepts for the proposed landscape architecture/urban design enhancements have been prepared for the following specific areas of the TCAAP site:

- Spine Road and Thumb Road
- Town Center Area
- Spine Road Green Crossing Areas (2 areas)
- Entry Gateways (Highway 96, County Road H, and County Road I)
- Pedestrian Nodes (11 areas)
- Natural Resources Corridor

## G. REGIONAL TRAIL IMPROVEMENTS

Ramsey County Parks and Recreation is planning to extend the Rice Creek North Regional Trail, connecting the existing trail corridor with Highway 96. Ramsey County is currently in the process of acquiring a 150-foot wide corridor from the United States along the northerly and easterly boundaries of the TCAAP site for the regional trail extension. A 12-foot wide bituminous trail is proposed to meander within this 150-foot wide corridor consistent with the approved Rice Creek North Regional Trail Master Plan Amendment. The trail will have a cross slope of no more than 2% and a longitudinal grade of no more than 8% and will be designed with horizontal and vertical curves meeting the MnDOT Bikeway Facility Manual for Shared-Use Paths. At the southeast corner of the TCAAP site, an existing high point will need to be lowered by approximately 8 feet to maintain longitudinal slopes for the trail that do not exceed the design standards.

Exhibit 10 in Appendix A further details the proposed regional trail improvements.

## H. TCAAP GROUNDWATER RECOVERY SYSTEM (TGRS) IMPROVEMENTS

The US Army owns and operates a groundwater extraction and treatment system on the TCAAP site. This system is known as the TCAAP Groundwater Recovery System, or TGRS. The system consists of 13 active and one inactive extraction wells, 12 well houses, and thousands of feet of underground 3" to 16" force main that runs throughout the TCAAP site. The pumps are controlled and monitored with buried control wiring. The extraction wells pump impacted groundwater to a treatment facility located in Building 116. The system discharges treated groundwater to an infiltration system east of Building 116 on AHATS property. The US Army will own and operate this system indefinitely.

The TCAAP Site Redevelopment Infrastructure design process has identified a number of locations where the TGRS system is either in conflict with proposed infrastructure improvements or movement of the TGRS system will improve development of the TCAAP site. These TGRS modifications and

improvements are being designed and constructed by Bolander as a change order to their Demolition/Remediation contract. These improvements will be completed in the fall 2015. It is unclear if additional TRGS modifications will be required in the future for public or private improvements.

Exhibit 12 in Appendix A further details the proposed TGRS Improvements.

### 3. RIGHT OF WAY AND EASEMENT REQUIREMENTS

Ramsey County is preparing a plat for the TCAAP site that will establish a majority of the right of way and easements required for the proposed infrastructure improvements. Exhibit 11 in Appendix A illustrates the proposed plat concept plan and details the other right of way and easement needs for the project.

### 4. ESTIMATED COSTS

The estimated costs for the proposed improvements are detailed below. The estimated costs include a 10 percent contingency and an allowance for indirect costs such as engineering, administrative, and legal items as well as capitalized interest. The estimated roadway, sanitary sewer, and water main project costs include a 20 percent indirect allowance, while the remaining project costs, with the exception of the TGRS costs, include a 30 percent indirect allowance. The TGRS costs do not include any indirect allowance.

<u>Proposed Improvements</u>	<u>Est. Project Cost</u>
<b>A. Roadway</b>	
Spine Road	\$11,605,000
Thumb Road (inside TCAAP)	\$ 1,573,000
Thumb Road (outside TCAAP)	\$ 2,926,000
<u>Subtotal</u>	<u>\$16,104,000</u>
<b>B. Site Grading and Storm Drainage</b>	
Mass Grading and Earthwork	\$ 3,563,000
Storm Water Ponds (private development)	\$ 1,087,000
Wetland Restoration	\$ 174,000
<u>Rice Creek Remeander</u>	<u>\$ 1,118,000</u>
<u>Subtotal</u>	<u>\$ 5,942,000</u>
<b>C. Trunk Sanitary Sewer</b>	
Spine Road	\$ 1,193,000
Thumb Road	\$ 223,000
<u>Subtotal</u>	<u>\$ 1,416,000</u>
<b>D. Trunk Water Main</b>	
Spine Road	\$ 6,481,000
Thumb Road	\$ 782,000
<u>Subtotal</u>	<u>\$ 7,263,000</u>

E. Landscape Architecture/Urban Design Enhancements	
Spine Road	\$ 985,000
Thumb Road	\$ 306,000
Town Center	\$ 831,000
Green Crossings	\$ 862,000
Entry Gateways	\$ 1,484,000
Pedestrian Nodes	\$ 281,000
Natural Resources Corridor	\$ 1,712,000
Subtotal	\$ 6,461,000
F. Regional Trail Improvements	\$ 469,000
G. TGRS Improvements	\$ 1,220,000
<b>Total Estimated Project Cost</b>	<b>\$38,875,000</b>

## 5. PROPOSED FINANCING

The TCAAP Site Redevelopment Infrastructure improvements are proposed to be financed through a combination of Ramsey County and City of Arden Hills funds. The following is a summary of the proposed financing plan for the improvements:

<u>Improvements</u>	<u>Estimated Cost</u>	<u>Financing Source</u>
Roadway	\$16,104,000	Ramsey County
Site Grading and Storm Drainage	\$ 5,942,000	Ramsey County
Trunk Sanitary Sewer	\$ 1,416,000	City of Arden Hills
Trunk Water Main	\$ 7,263,000	City of Arden Hills
Landscape Architecture/Urban Design	\$ 6,461,000	Ramsey County
Regional Trail Improvements	\$ 469,000	Ramsey County
TGRS Improvements	\$ 1,220,000	Ramsey County

<u>Financing Summary</u>	<u>Total Amount</u>
Ramsey County	\$30,196,000
City of Arden Hills	\$ 8,679,000
<b>Total</b>	<b>\$38,875,000</b>

Ramsey County and the City of Arden Hills are currently evaluating funding sources and approaches for the infrastructure elements that they are financing.

## 6. PROJECT SCHEDULE

The TCAAP infrastructure improvements are proposed to be constructed in 2015 and 2016 to meet the needs of future redevelopment. The improvements are currently proposed to be constructed in three bid packages as follows:



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## BID PACKAGE #1

Bid Package #1 includes the construction of the remainder of Rice Creek to allow for the construction of the County Road H roundabout and interchange at I-35W. Bid Package #1 will include the extension of the existing I-35W culvert (Bridge No. 91071) and the new culvert under the proposed NB I-35W ramp to County Road H (Box Culvert No. 62X04) that are a part of the I-35W and County Road H interchange. These culvert costs are not included in this Preliminary Design Report. Bid Package #1 construction is planned to start in fall 2015 and be completed in July 2016.

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## BID PACKAGE #2

Bid Package #2 includes the construction of the Spine Road from Highway 96 to the County Road H roundabout, the traffic signal at Highway 96 and the Spine Road, the Spine Road bridge over the remeandered Rice Creek, grading and storm water and wetland improvements in the natural resources corridor, mass grading of the Creek and Town neighborhoods, and trunk sanitary and water main improvements. Bid Package #2 is planned for construction in 2016.

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## BID PACKAGE #3

Bid Package #3 includes the construction of the Thumb Road north of the TCAAP boundary and the County Road I roundabout. Bid Package #3 is planned for construction in 2017.

A more detailed schedule for the implementation of the improvements is provided in Appendix C.

The schedule for the construction of the Thumb Road within the TCAAP boundary and for the installation of some of the landscape architecture/urban design amenities is yet to be determined. The exact schedule for these improvements will be determined at a later date based on development needs and the availability of funding.

## 7. SUMMARY AND RECOMMENDATIONS

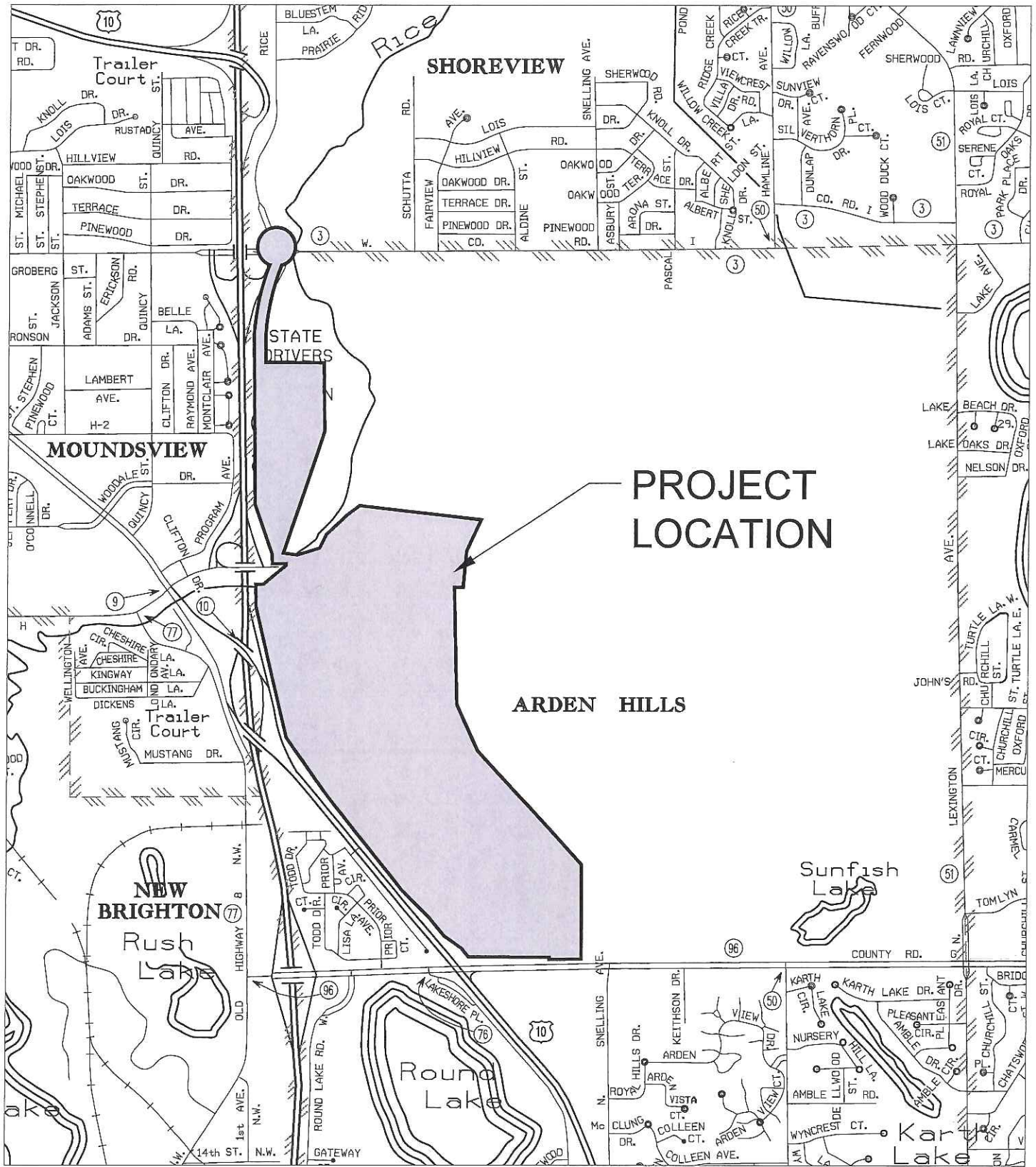
The various public infrastructure improvements needed to provide for the redevelopment of the TCAAP site are detailed in this Preliminary Design Report. Based on the information provided in this report, we recommend that Ramsey County and the City of Arden Hills proceed as follows:

- A. The County and City evaluate the scope and estimated cost for the proposed improvements. If the improvements are deemed to be economically viable, the County and City should proceed in the preparation of final plans and specifications for the improvements.
- B. That Bid Package #1 be initiated for 2015 construction in accordance with the schedule detailed in this report. The Bid Package #1 improvements should be implemented in 2015 and 2016 to prepare for the construction of the I-35W and County Road H interchange in 2016.
- C. That Bid Package #2 be initiated for 2016 construction in accordance with the schedule detailed in this report. The Bid Package #2 improvements should be implemented in 2016 to ready the TCAAP site for sale to private investors and subsequent redevelopment.
- D. That Bid Package #3 be initiated for 2017 construction in accordance with the schedule detailed in this report.

E. That the County and City develop financing plans and establish funding sources for their individual cost responsibilities.

## EXHIBITS

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**PRELIMINARY DESIGN  
REPORT  
JUNE 2015**

**PROJECT LOCATION MAP**









**EXHIBIT 1**

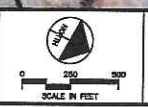


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**LEGEND**

	PROPOSED ROADWAY		EXISTING RIGHT OF WAY
	PROPOSED BRIDGE		PROPOSED RIGHT OF WAY
	TRAILS, WALKS		TCAAP BOUNDARY
	PROPOSED MEDIAN		PROPOSED SIGNAL SYSTEM

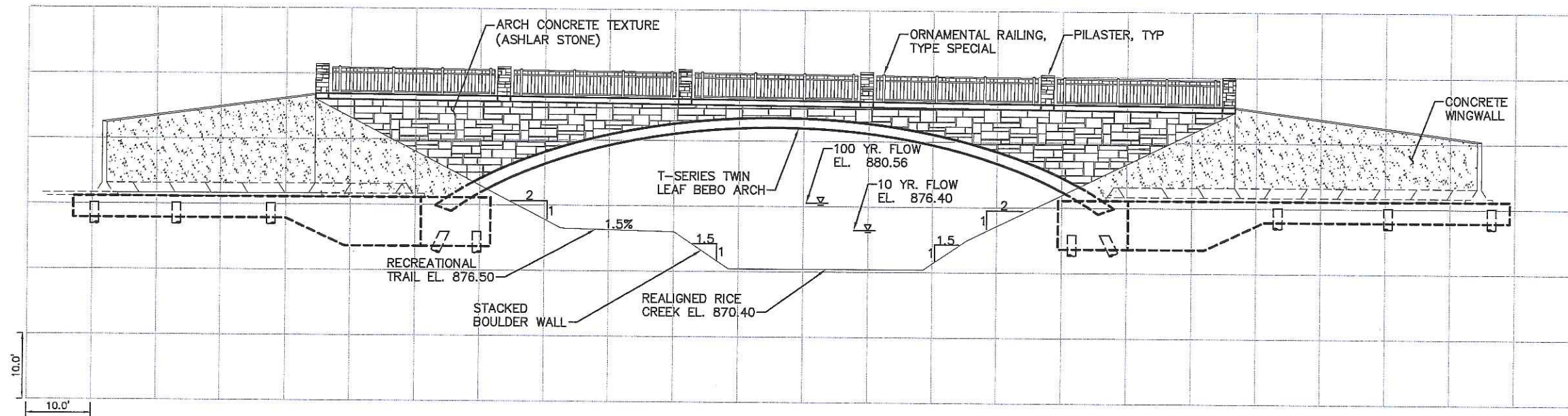


**PRELIMINARY DESIGN REPORT**  
JUNE 2015

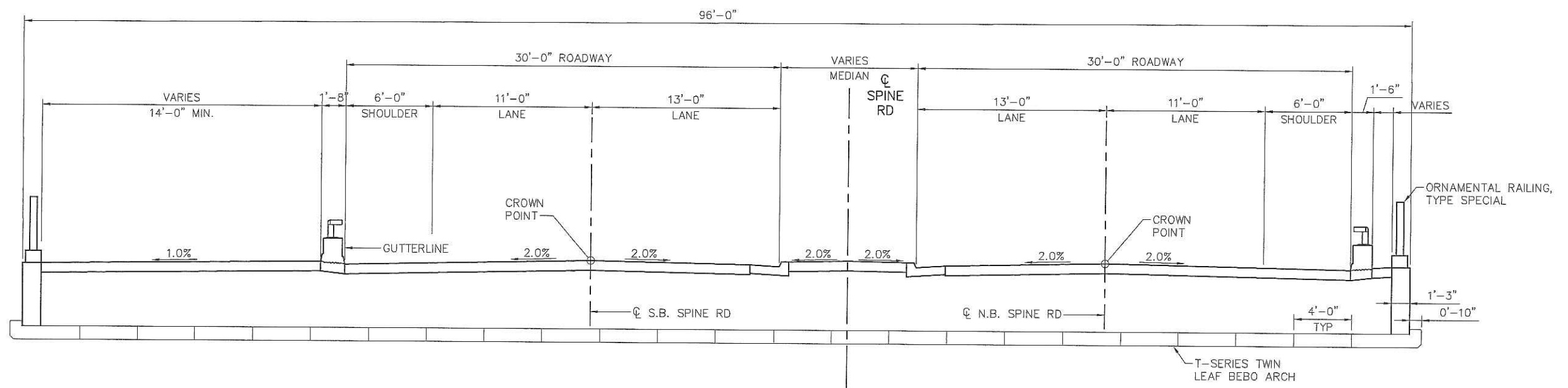
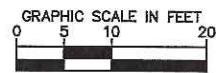
**ROADWAY IMPROVEMENTS**  
**SPINE ROAD**  
**EXHIBIT 2**



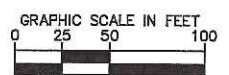
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GENERAL ELEVATION

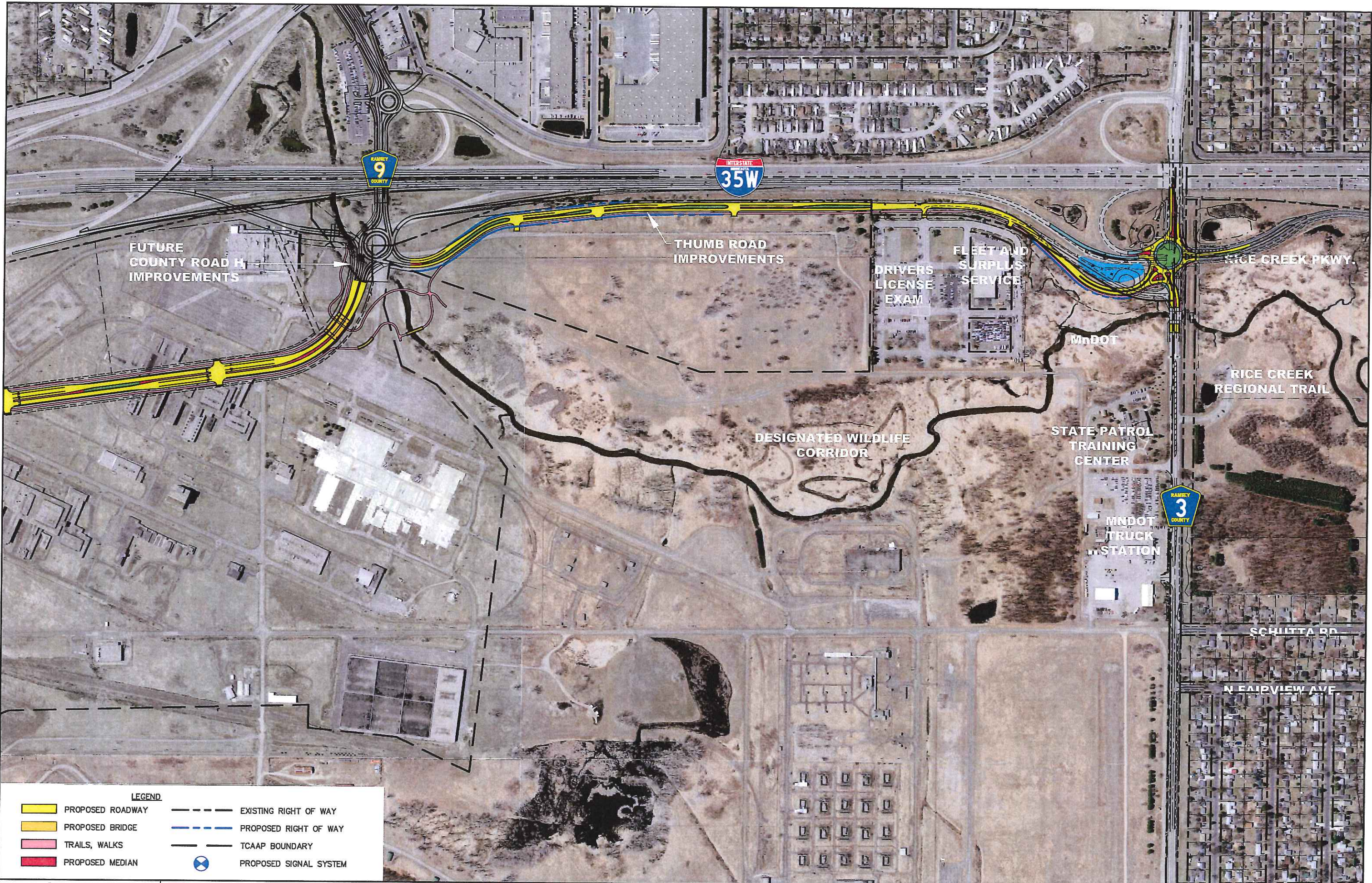


TYPICAL SECTION












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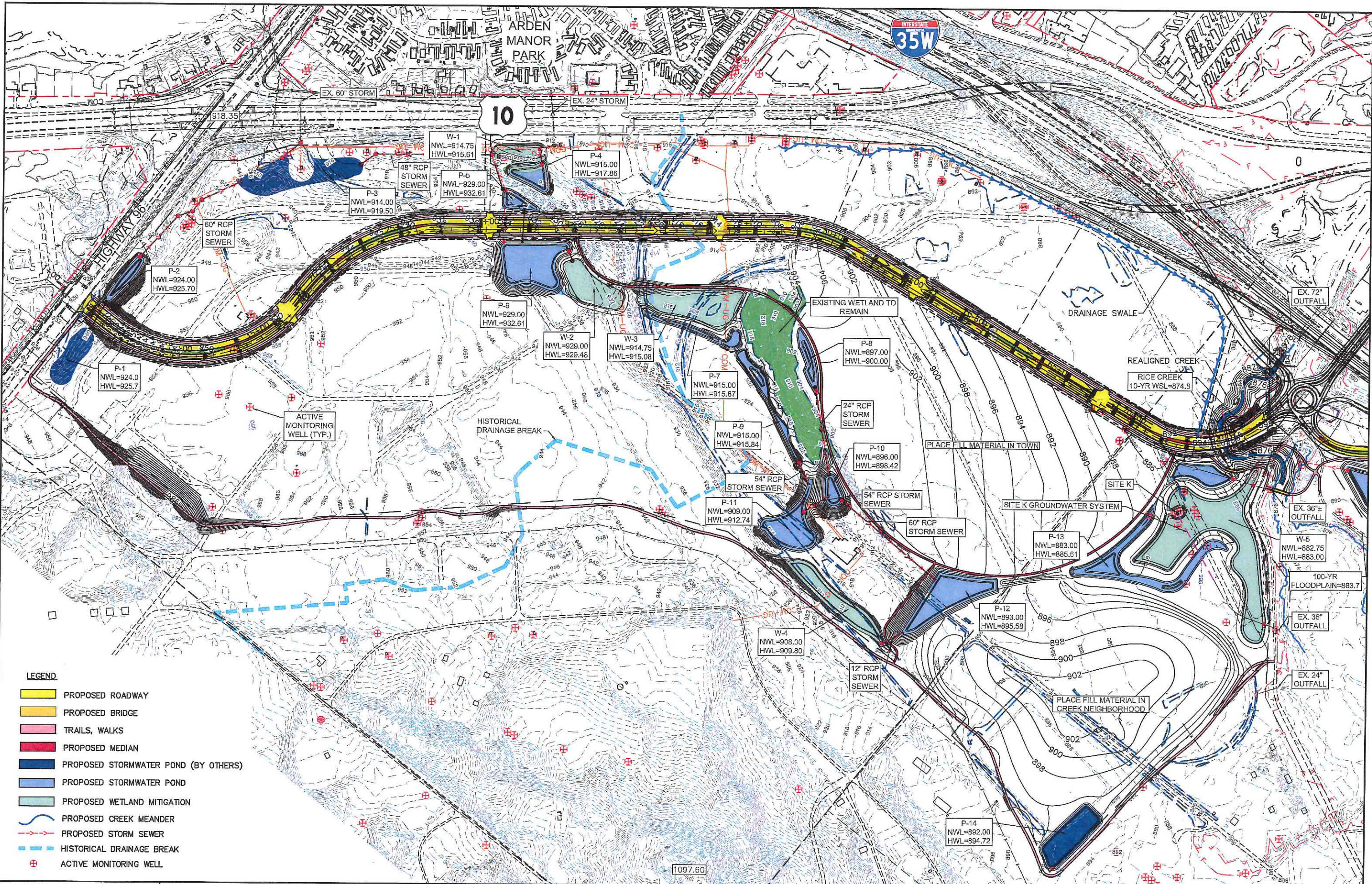


**LEGEND**

 PROPOSED ROADWAY	 EXISTING RIGHT OF WAY
 PROPOSED BRIDGE	 PROPOSED RIGHT OF WAY
 TRAILS, WALKS	 TCAAP BOUNDARY
 PROPOSED MEDIAN	 PROPOSED SIGNAL SYSTEM



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- LEGEND**
- PROPOSED ROADWAY
  - PROPOSED BRIDGE
  - TRAILS, WALKS
  - PROPOSED MEDIAN
  - PROPOSED STORMWATER POND (BY OTHERS)
  - PROPOSED STORMWATER POND
  - PROPOSED WETLAND MITIGATION
  - PROPOSED CREEK MEANDER
  - PROPOSED STORM SEWER
  - HISTORICAL DRAINAGE BREAK
  - ACTIVE MONITORING WELL

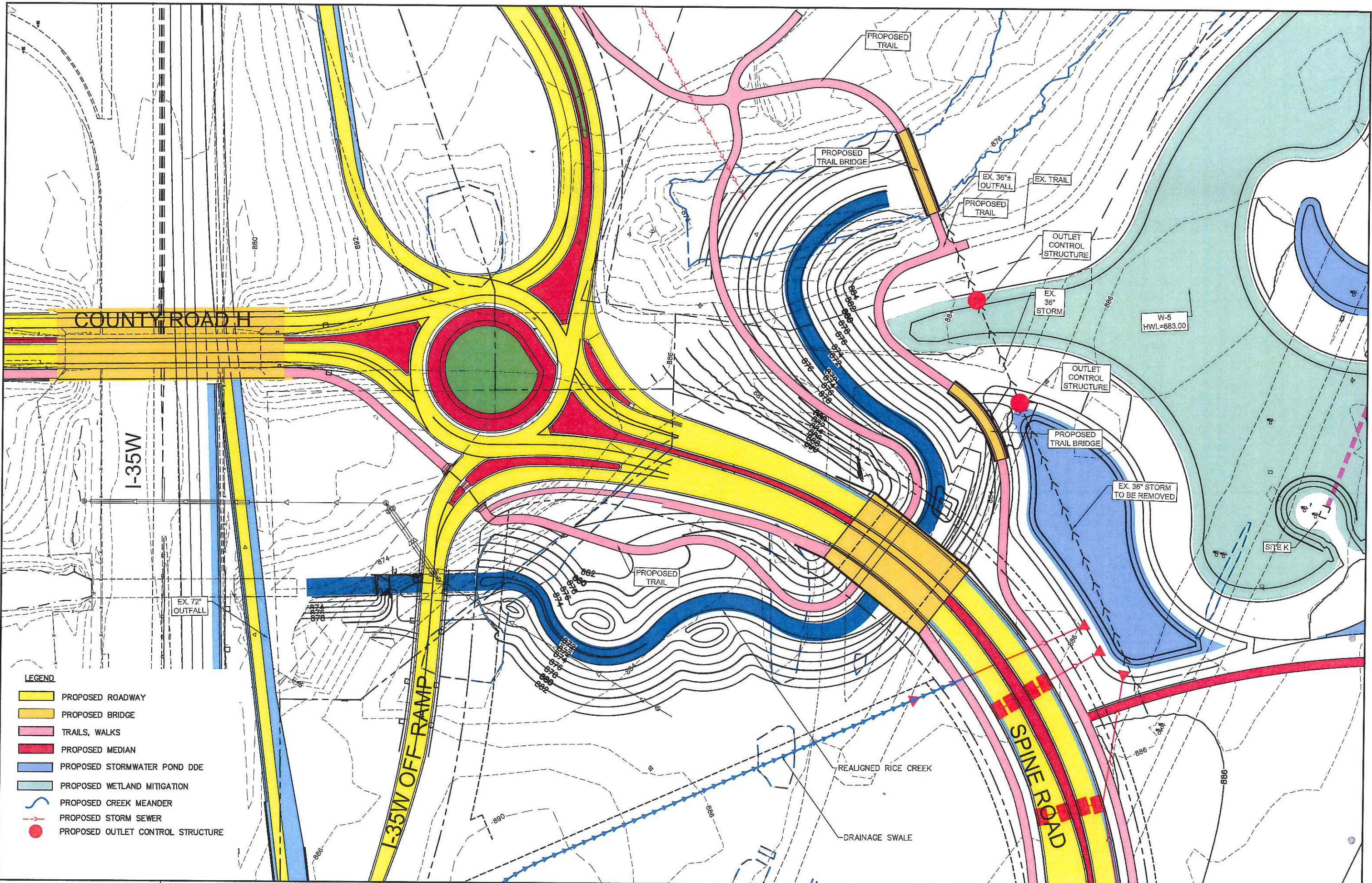


**PRELIMINARY DESIGN  
REPORT  
JUNE 2015**

**SITE GRADING AND STORM  
DRAINAGE IMPROVEMENTS  
EXHIBIT 5**



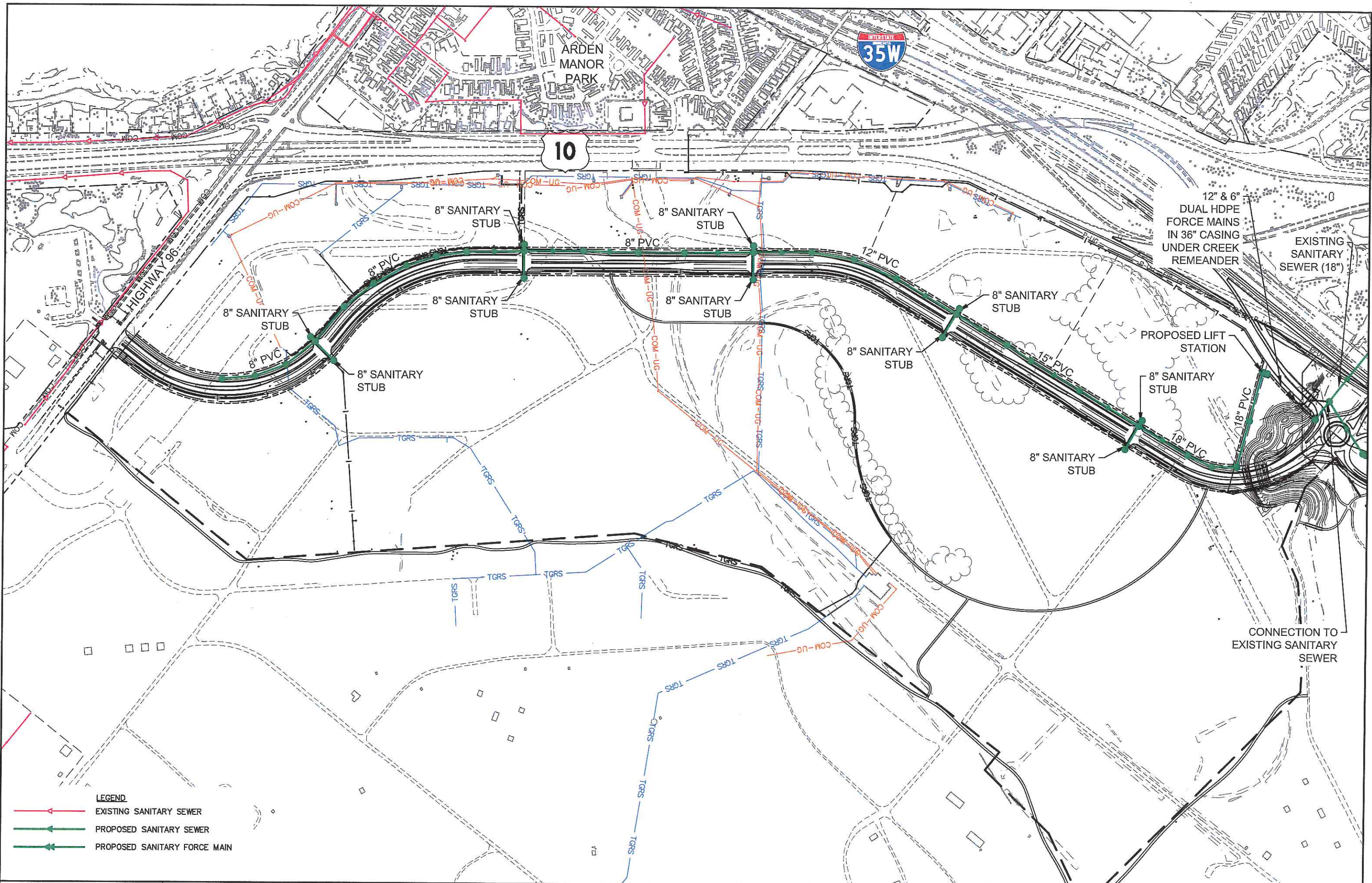
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- LEGEND**
- PROPOSED ROADWAY
  - PROPOSED BRIDGE
  - TRAILS, WALKS
  - PROPOSED MEDIAN
  - PROPOSED STORMWATER POND DDE
  - PROPOSED WETLAND MITIGATION
  - PROPOSED CREEK MEANDER
  - PROPOSED STORM SEWER
  - PROPOSED OUTLET CONTROL STRUCTURE



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- LEGEND**
-  EXISTING SANITARY SEWER
  -  PROPOSED SANITARY SEWER
  -  PROPOSED SANITARY FORCE MAIN

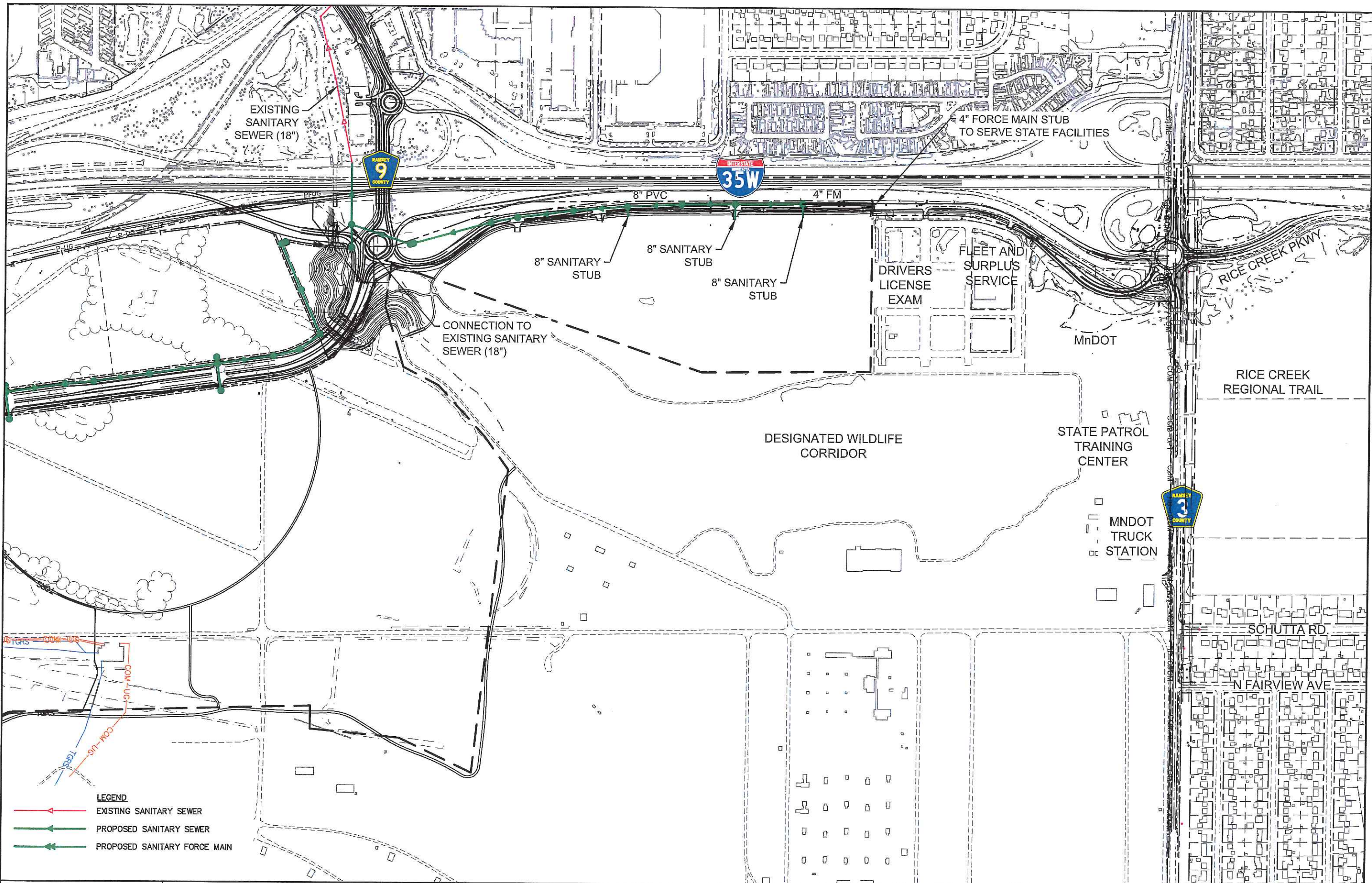


**PRELIMINARY DESIGN  
REPORT  
JUNE 2015**

**SANITARY SEWER IMPROVEMENTS  
SPINE ROAD  
EXHIBIT 7A**

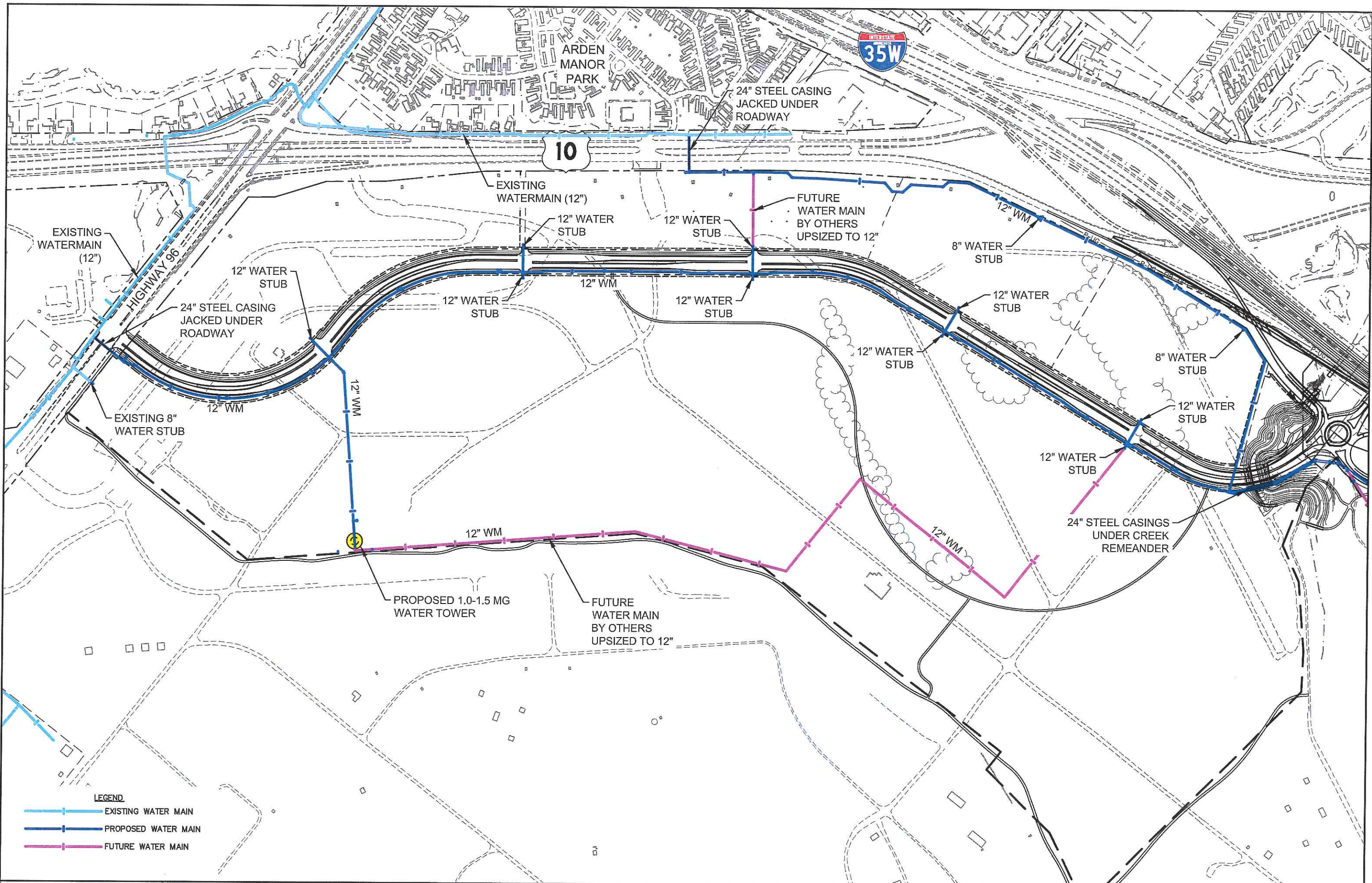


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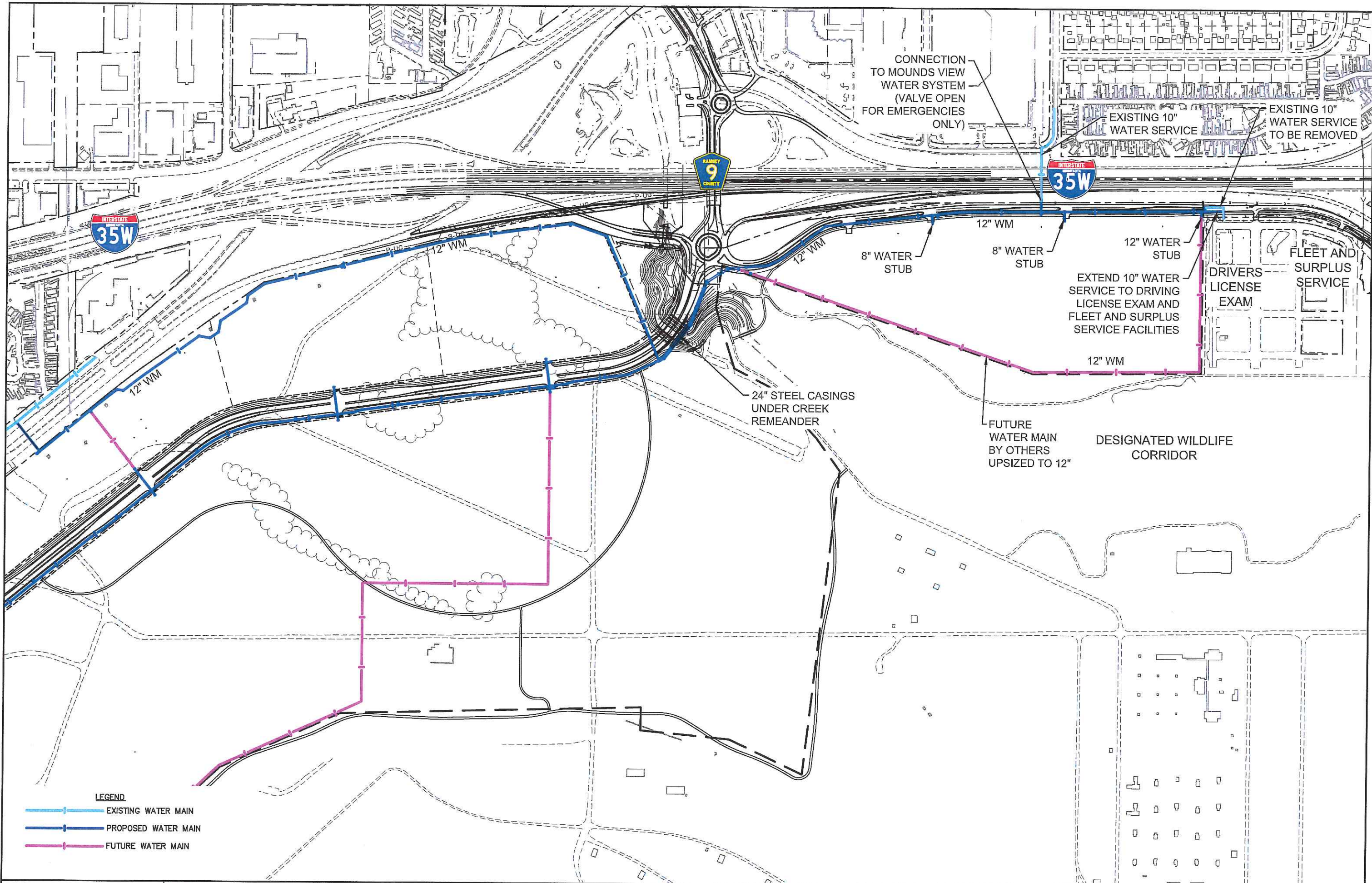


**LEGEND**

- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- FUTURE WATER MAIN



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CONNECTION TO MOUNDS VIEW WATER SYSTEM (VALVE OPEN FOR EMERGENCIES ONLY)

EXISTING 10" WATER SERVICE

EXISTING 10" WATER SERVICE TO BE REMOVED



12" WM

12" WM

12" WM

12" WM

12" WM

8" WATER STUB

8" WATER STUB

12" WATER STUB

FLEET AND SURPLUS SERVICE

EXTEND 10" WATER SERVICE TO DRIVING LICENSE EXAM AND FLEET AND SURPLUS SERVICE FACILITIES

DRIVERS LICENSE EXAM

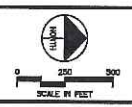
24" STEEL CASINGS UNDER CREEK REMEANDER

FUTURE WATER MAIN BY OTHERS UPSIZED TO 12"

DESIGNATED WILDLIFE CORRIDOR

LEGEND

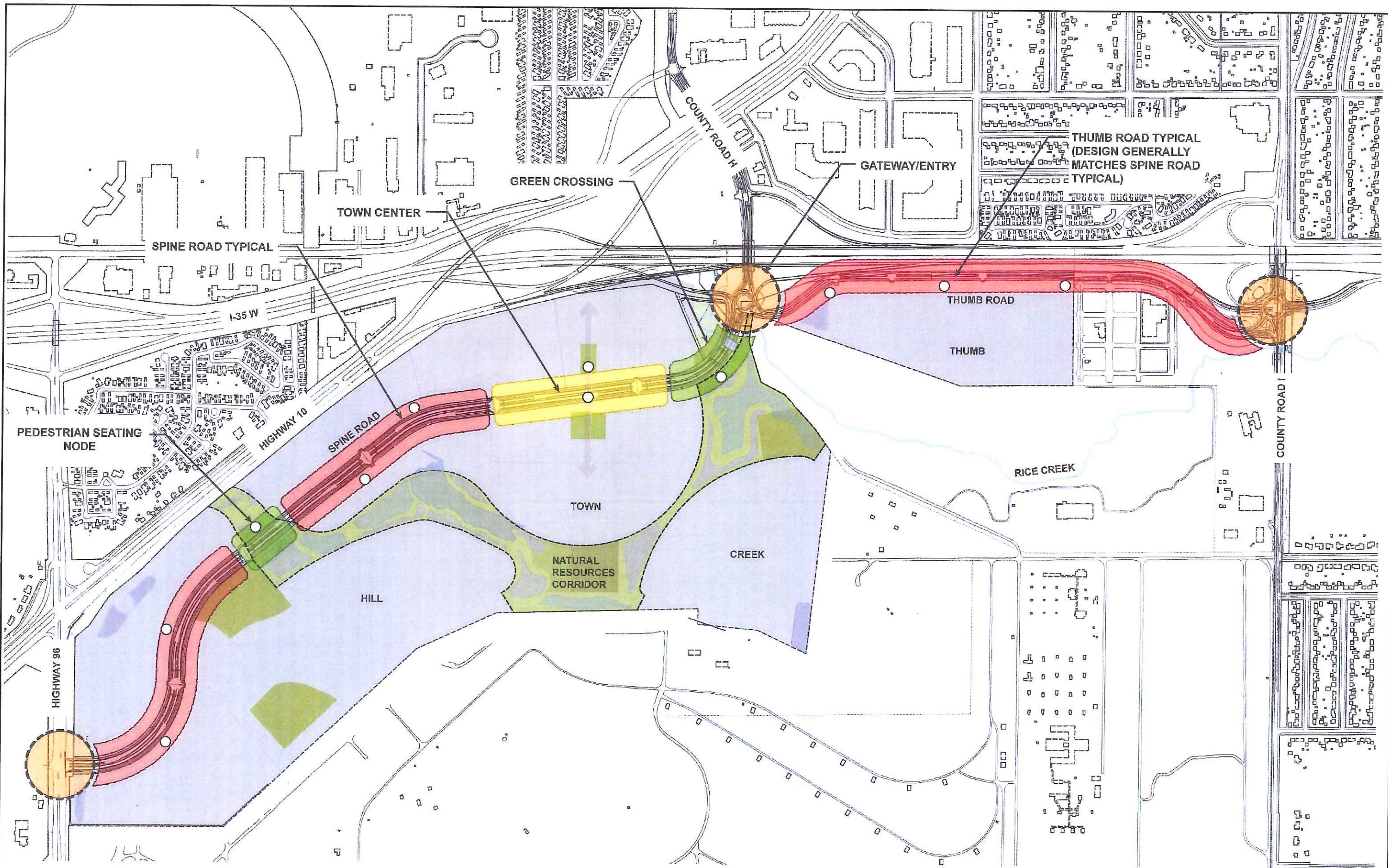
- EXISTING WATER MAIN
- PROPOSED WATER MAIN
- FUTURE WATER MAIN



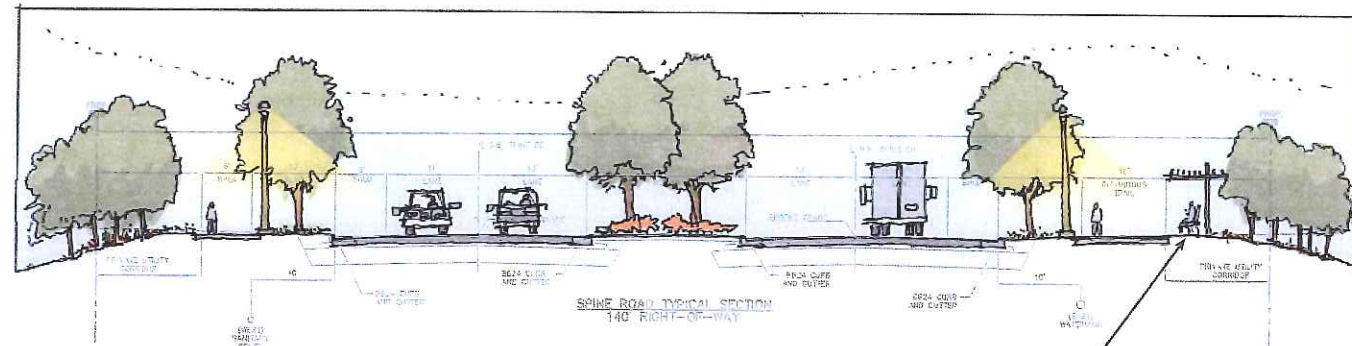
PRELIMINARY DESIGN REPORT JUNE 2015

WATERMAIN IMPROVEMENTS THUMB ROAD EXHIBIT 8B



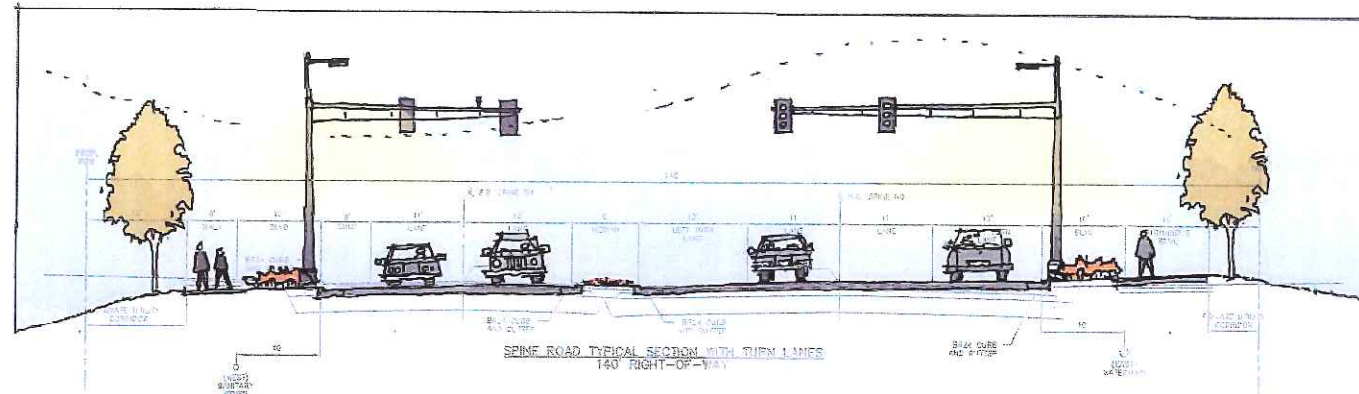






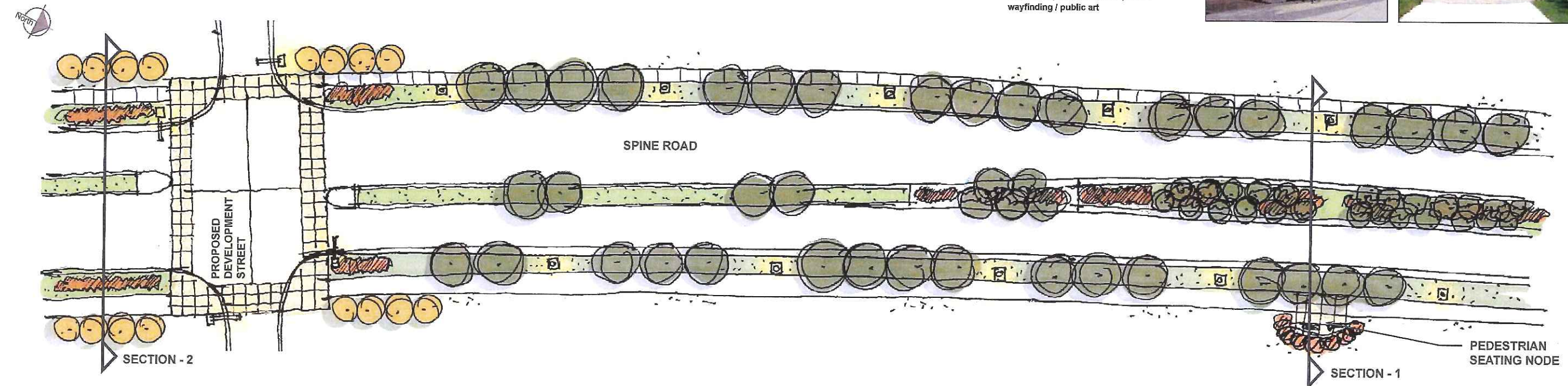
**Spine Road Typical Section - 1**  
Scale: NTS

PEDESTRIAN SEATING NODE



**Spine Road Typical Section - 2**  
Scale: NTS

**Spine Road Typical Segment Plan**  
Scale: NTS



**DESIGN COMPONENTS**

**Landscaping**

- Concept**
- Controlled, natural plantings
  - Maximize green / minimize pavements
  - Create sense of enclosure / pedestrian scale

- Application**
- Large overstory trees / dense canopies / shade
  - Grouping / massing of plants
  - Native plant types / natural forms (Hackberry, Elm, Oak, shrubs, perennials, turf)

**Lighting**

- Concept**
- Promote natural experience - lower lighting levels
  - Limited roadway lighting
  - Focus on pedestrian scale lighting

- Application**
- Roadway lighting - signal mast only
  - Pedestrian scale fixtures - 12' to 18' height, alternate
  - Safety vs. continuous illumination
  - Dark, earth tone colors, traditional design, hidden source, LED

**Pavements**

- Concept**
- Minimize additional pavements
  - Special pavements focused on pedestrian areas
  - Use pavement changes for vehicle / pedestrian interface

- Application**
- Primarily standard concrete sidewalks; bituminous trails and road
  - Concrete pavement intersections
  - Special concrete pavements at crosswalks and nodes
  - Simple jointing; integrally colored (earth tones)

**Furnishings**

- Concept**
- Placement and quantity to encourage active living
  - Rest, shade, and interaction
  - Destination along the journey

- Application**
- Pedestrian seating node- Locate at point of rest and/or viewing - approx. 1/2 mile
  - Includes bench and litter receptacle
  - Vertical elements to provide canopy / enclosure / shade
  - Opportunity to include interpretive wayfinding / public art

**IMAGERY**





## DESIGN COMPONENTS

### Landscaping

#### Concept

- Ordered landscape design / patterned
- Consistent across road / spans and connects two sides of Town Center
- Dramatic in its placement and effect
- Transparent landscape

#### Application

- Uniform and even spacing of trees and planting beds
- Species have distinct characteristics (color, form, texture)
- Contained beds or planters
- Ornamental plant types (Maples, Ginkgo, Crabapple, Hawthorn, Oak, perennials)

## IMAGERY



## DESIGN COMPONENTS

### Furnishings

#### Concept

- Placement and quantity to encourage active living
- Encourages activity and interaction
- Primary component of public space design

#### Application

- Locate at primary crossing/access and focal points
- Include multiple benches, tables/chairs, litter receptacles, bicycle facilities, planters
- Opportunity to include interpretive wayfinding/public art



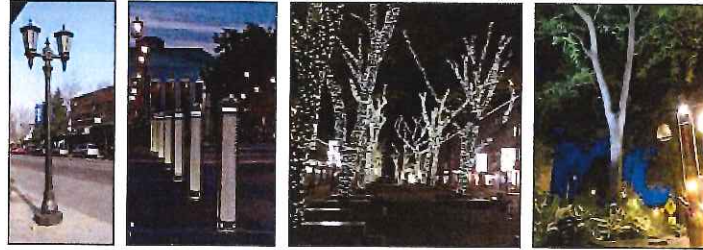
### Lighting

#### Concept

- Enforces identity of Town Center
- Variety of lighting types and increased levels
- Pedestrian scale fixtures serve as roadway lighting

#### Application

- Roadway lighting – signal mast only
- Pedestrian scale fixtures – 12' to 18' height, opposite arrangement
- Accent lighting in the median – uplighting, bollards, additional ped. lights, seasonal
- Continuous illumination
- Dark, earth tone colors, traditional design, hidden source, LED



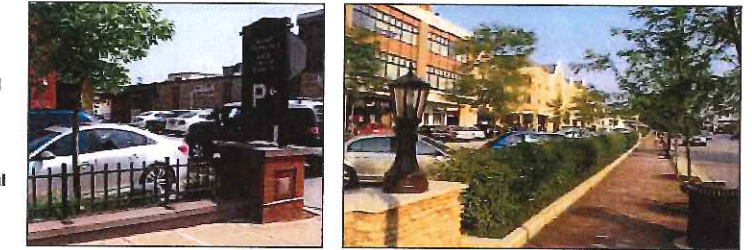
### Structures

#### Concept

- Strategic to define edges and guide circulation
- Design connects to other structures in TCAAP

#### Application

- Locate at primary crossing/access and focal points
- Low decorative walls and ornamental railings - pylons
- Provide opportunities for additional, informal seating



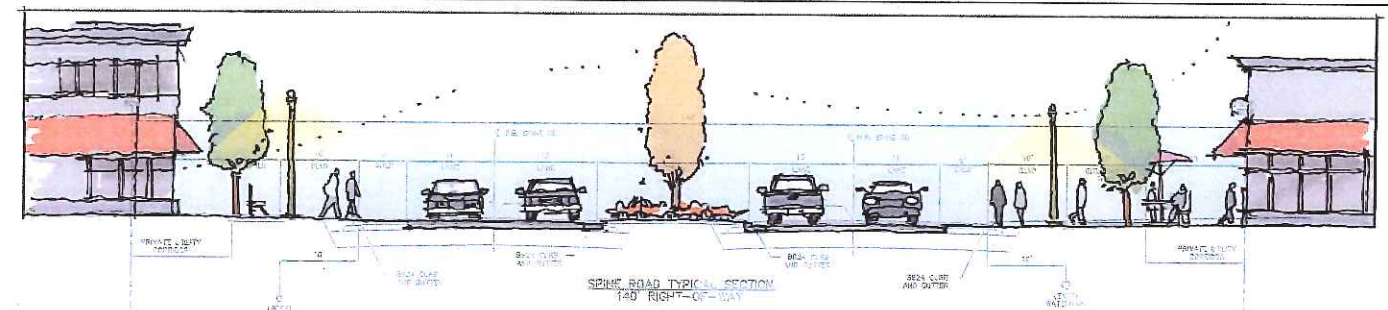
### Pavements

#### Concept

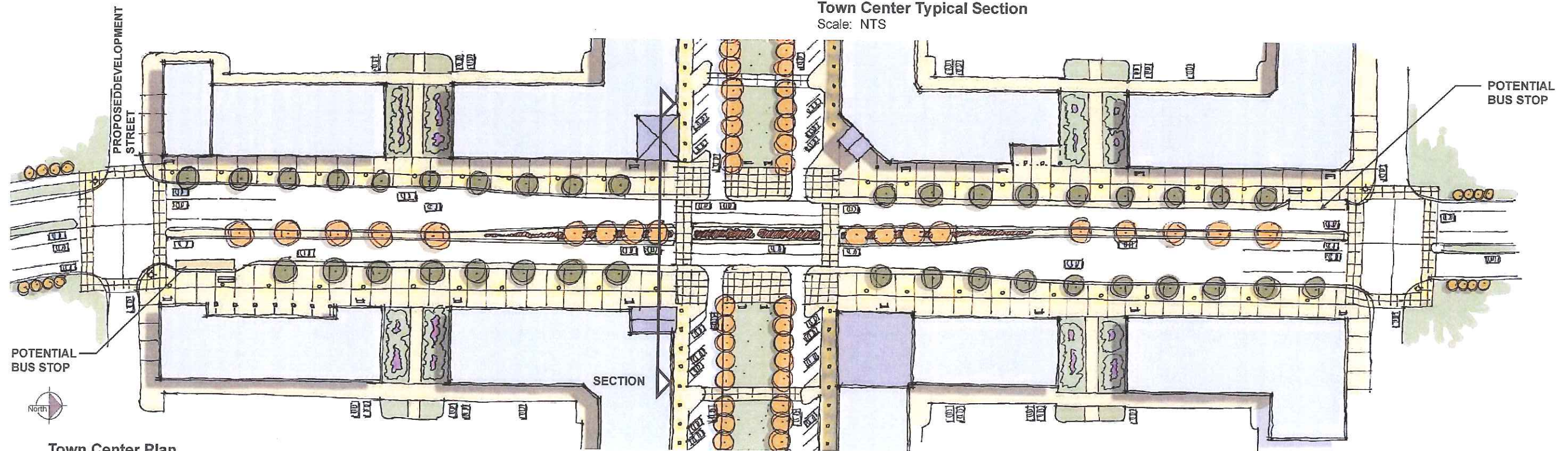
- Pavements as hardscape design element – reduced landscape
- Use special pavement changes for vehicle/pedestrian interface
- Special pavement throughout Town Center – vehicular and pedestrian
- Opportunity to promote connectivity by additional mid-block crossing

#### Application

- Primarily standard concrete sidewalks, trails and road
- Simple jointing; integrally colored (earth tones) at pedestrian crossings
- Tabled mid-block crossing – pavements match crosswalks
- Maintenance edge and curbed planters in median and boulevards

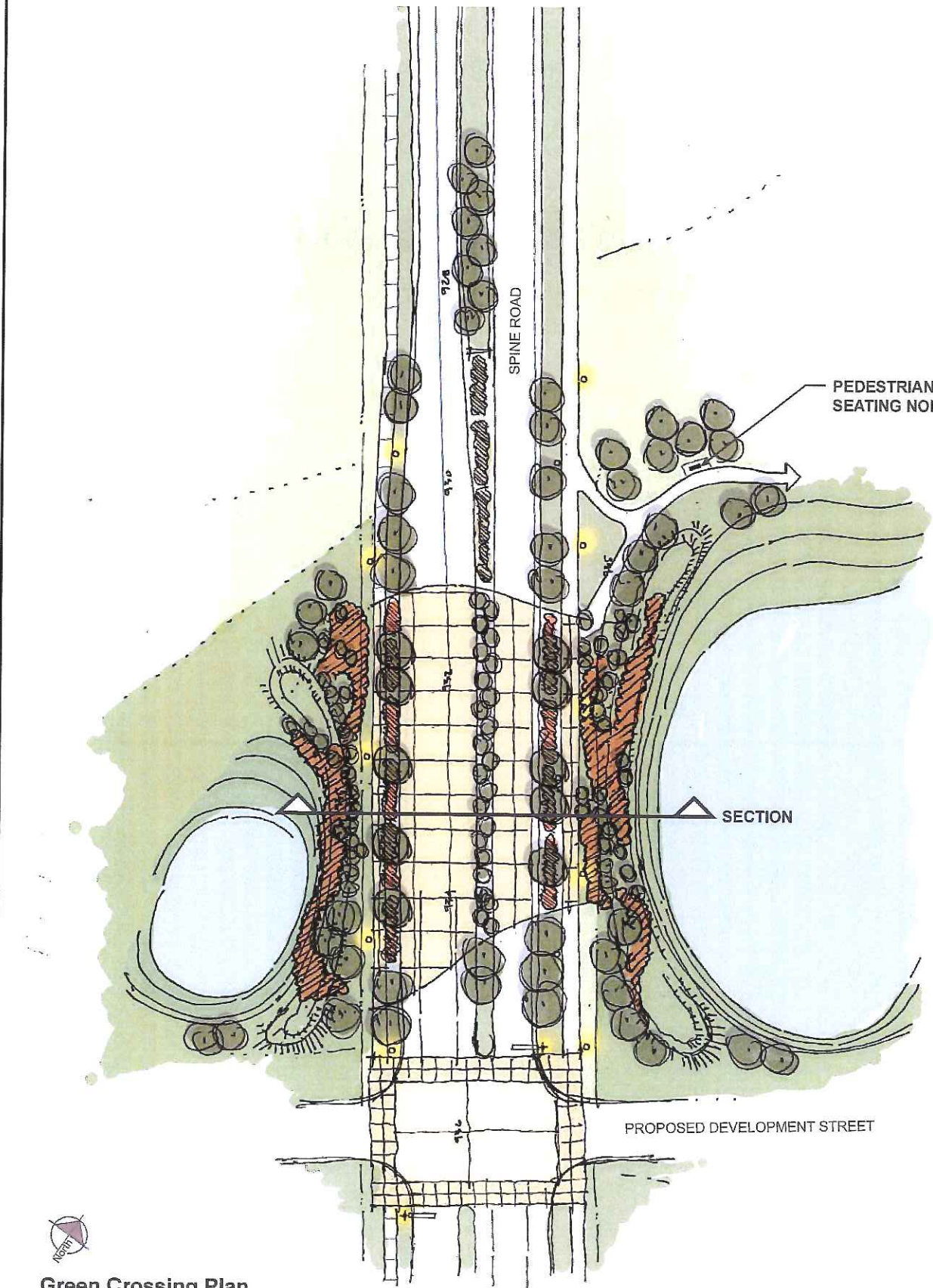


Town Center Typical Section  
Scale: NTS



Town Center Plan  
Scale: NTS





**Green Crossing Plan**  
Scale: NTS

**DESIGN COMPONENTS**

**Landscaping**

- |   |  |
|---|--|
| <p><b>Concept</b></p> <ul style="list-style-type: none"> <li>• Random, natural planting types and design to respond to open space</li> <li>• Roadway passes through the open space - generally uninterrupted</li> </ul> | <p><b>Application</b></p> <ul style="list-style-type: none"> <li>• Tree species in a variety of scale and maturity</li> <li>• Grouping / massing of plants</li> <li>• Species have distinct characteristics (color, form, texture)</li> <li>• Native plant types / natural forms (Birch, Oak, Dogwood, Sumac, shrubs, grasses, perennials, no-mow turf)</li> </ul> |
|---|--|

**IMAGERY**



**Lighting**

- |   |   |
|---|---|
| <p><b>Concept</b></p> <ul style="list-style-type: none"> <li>• Promotes natural experience - lower lighting levels</li> <li>• Limited roadway lighting</li> </ul> | <p><b>Application</b></p> <ul style="list-style-type: none"> <li>• Minimal roadway lighting - signal mast only</li> <li>• Pedestrian scale fixtures - lighted bollards along trails and walks</li> <li>• Dark, earth tone colors, traditional design, hidden source, LED</li> </ul> |
|---|---|



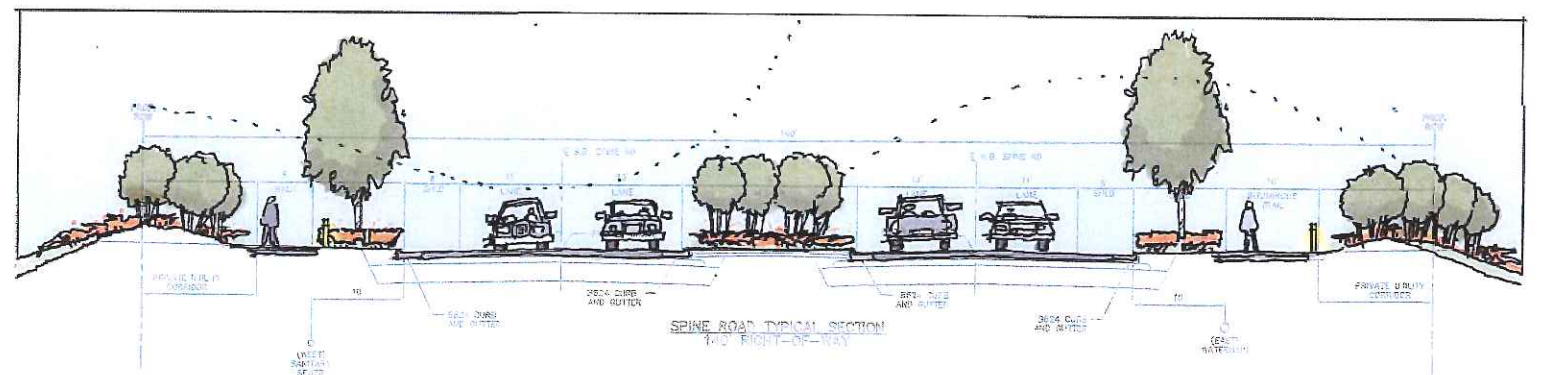
**Pavements**

- |   |   |
|---|---|
| <p><b>Concept</b></p> <ul style="list-style-type: none"> <li>• Minimize additional pavements</li> <li>• Emphasize open space crossing</li> <li>• Trail connections from street to green corridor</li> </ul> | <p><b>Application</b></p> <ul style="list-style-type: none"> <li>• Primarily standard concrete sidewalks; bituminous trails and road</li> <li>• Special concrete pavements at open space crossing</li> <li>• Simple jointing; integrally colored (earth tones)</li> </ul> |
|---|---|



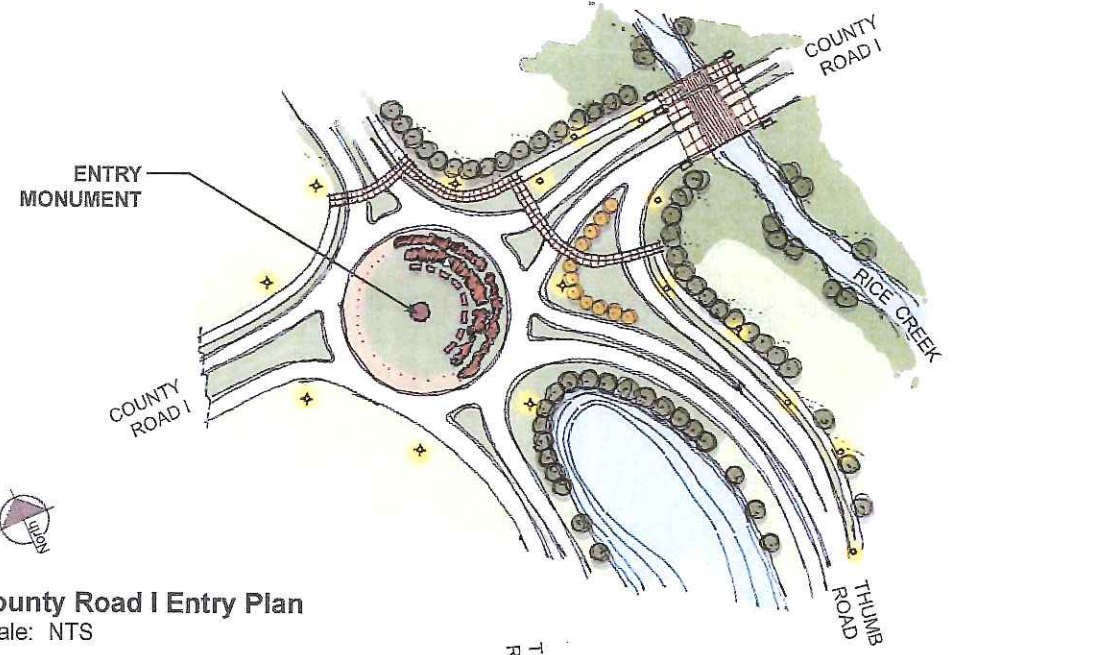
**Furnishings**

- |   |   |
|---|---|
| <p><b>Concept</b></p> <ul style="list-style-type: none"> <li>• Placement and quantity to encourage interaction with the adjacent open space</li> <li>• Rest and reflection - experience nature</li> </ul> | <p><b>Application</b></p> <ul style="list-style-type: none"> <li>• Locate at local points to adjacent open space</li> <li>• Includes benches and litter receptacles</li> <li>• Furnishings to be lower maintenance, recycled materials - neutral tones</li> </ul> |
|---|---|

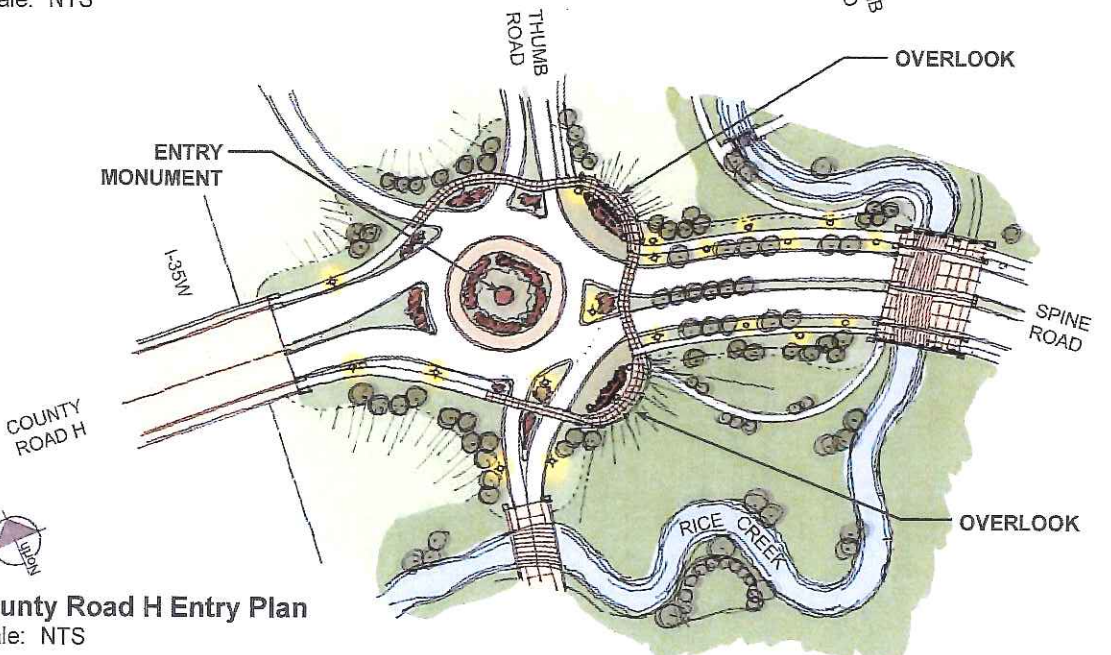


**Green Crossing Typical Section**  
Scale: NTS

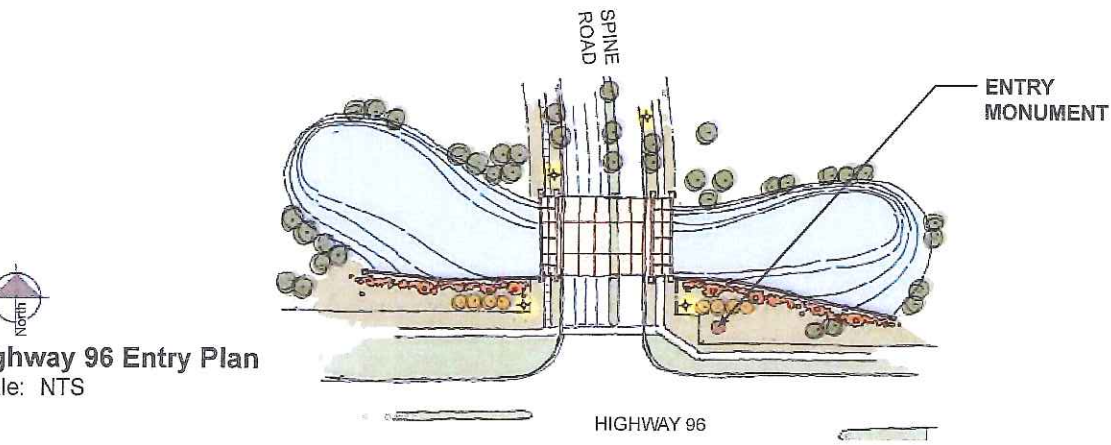




**County Road I Entry Plan**  
Scale: NTS



**County Road H Entry Plan**  
Scale: NTS



**Highway 96 Entry Plan**  
Scale: NTS

## DESIGN COMPONENTS

## IMAGERY

### Landscaping

#### Concept

- First introduction to TCAAP – establishes identity and character
- Backdrop to the other entry features
- Dramatic – unique from the adjacent road/highway

#### Application

- Plantings provide definition and enclosure to entry space
- Native plantings to introduce a natural character
- Controlled natural plantings
- Tree species in a variety of scale and maturity
- Ornamental plant types (Hackberry, elm, oak shrubs, perennials, turf)



### Lighting

#### Concept

- Increased roadway lighting – vehicle and interactions
- Variety of lighting types
- Pedestrian scale fixtures serve as roadway lighting

#### Application

- Roadway lighting – signal mast at Hwy 96 Entry
- Pedestrian scale fixtures – 12' to 18' height near roadway
- Accent lighting in the roundabouts – uplighting
- Bollards at trails, walks and special locations (nodes and overlooks)
- Dark, earth tone colors, traditional design, hidden source, LED



### Pavements

#### Concept

- Minimize appearance of expansive pavements
- Use special pavement changes for vehicle/pedestrian interface
- Special pavements at crosswalks, nodes and overlooks

#### Application

- Primarily standard concrete sidewalks, bituminous trails and road
- Special roundabout pavements within 'circle'
- Simple jointing; integrally colored (earth tones) at pedestrian crossings and nodes



### Furnishings

#### Concept

- Encourages activity and provides opportunity for viewing

#### Application

- Locate at County Road H, for viewing of Rice Creek
- Include benches and litter receptacles
- Opportunity to include interpretive wayfinding/public art



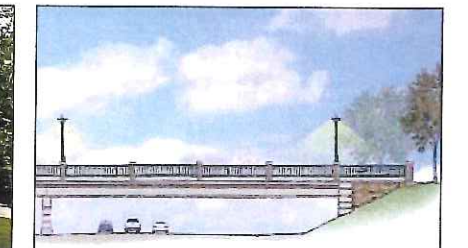
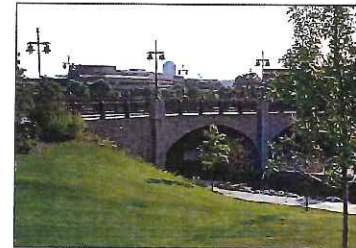
### Structures

#### Concept

- Designs considers proposed I-35W corridor bridge design
- Design connects to other structures in TCAAP

#### Application

- Locate at water crossings and water's edge
- Bridges, retaining walls, site and feature walls
- Ornamental railings and pylons
- Consider arch form at bridge span
- Limestone, earth tones for structures



### Monuments

#### Concept

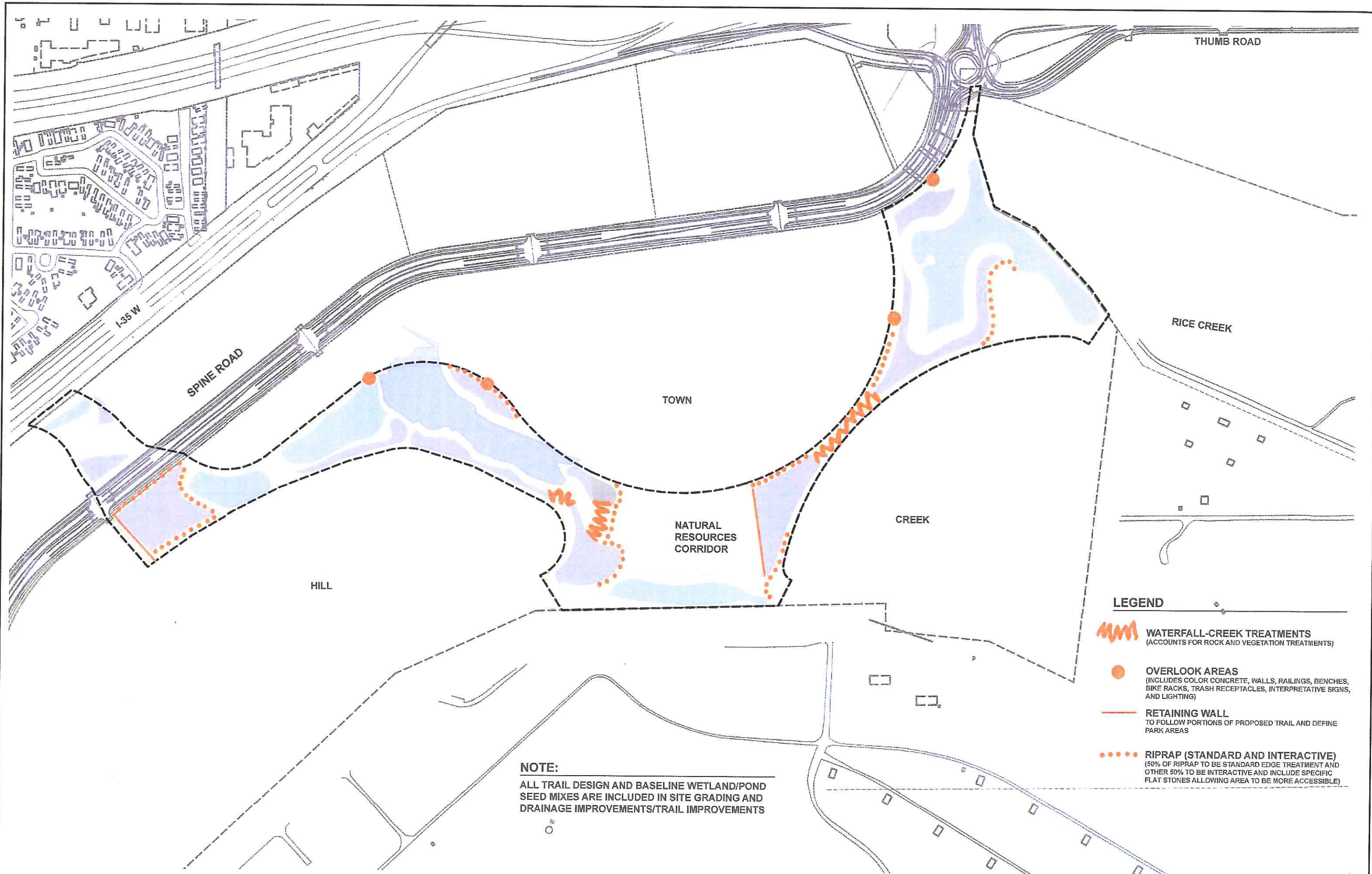
- Marks the entry to TCAAP
- Design continuity at various entries

#### Application

- Vertical forms
- Monumental scale - iconic
- Visual interest – day and night
- Context-based design origins – natural/cultural
- Limestone, earth tones to complement other structures







THUMB ROAD

I-35 W

SPINE ROAD

RICE CREEK





TOWN

NATURAL RESOURCES CORRIDOR

CREEK

HILL

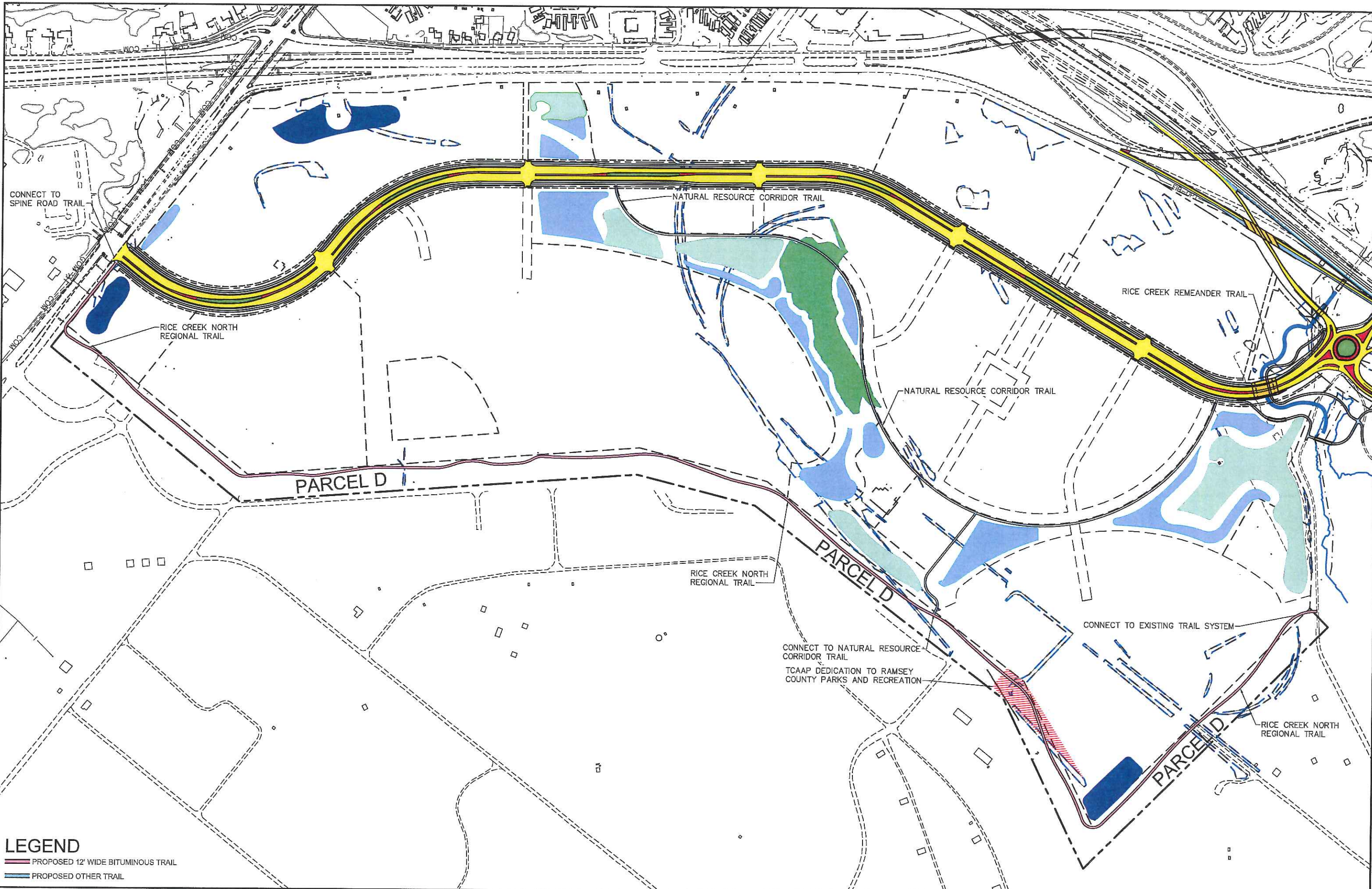
**LEGEND**

-  **WATERFALL-CREEK TREATMENTS**  
(ACCOUNTS FOR ROCK AND VEGETATION TREATMENTS)
-  **OVERLOOK AREAS**  
(INCLUDES COLOR CONCRETE, WALLS, RAILINGS, BENCHES, BIKE RACKS, TRASH RECEPTACLES, INTERPRETATIVE SIGNS, AND LIGHTING)
-  **RETAINING WALL**  
TO FOLLOW PORTIONS OF PROPOSED TRAIL AND DEFINE PARK AREAS
-  **RIPRAP (STANDARD AND INTERACTIVE)**  
(50% OF RIPRAP TO BE STANDARD EDGE TREATMENT AND OTHER 50% TO BE INTERACTIVE AND INCLUDE SPECIFIC FLAT STONES ALLOWING AREA TO BE MORE ACCESSIBLE)

**NOTE:**  
ALL TRAIL DESIGN AND BASELINE WETLAND/POND SEED MIXES ARE INCLUDED IN SITE GRADING AND DRAINAGE IMPROVEMENTS/TRAIL IMPROVEMENTS



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**LEGEND**

- PROPOSED 12' WIDE BITUMINOUS TRAIL
- - - PROPOSED OTHER TRAIL

**Kimley»Horn**  
2340 UNIVERSITY AVENUE WEST, SUITE 2300  
 SAINT PAUL, MINNESOTA 55114  
 PH: 612-445-4127 www.kimley-horn.com

**RAMSEY COUNTY**

**ARDEN HILLS**

**TCAAP Site Redevelopment Infrastructure**

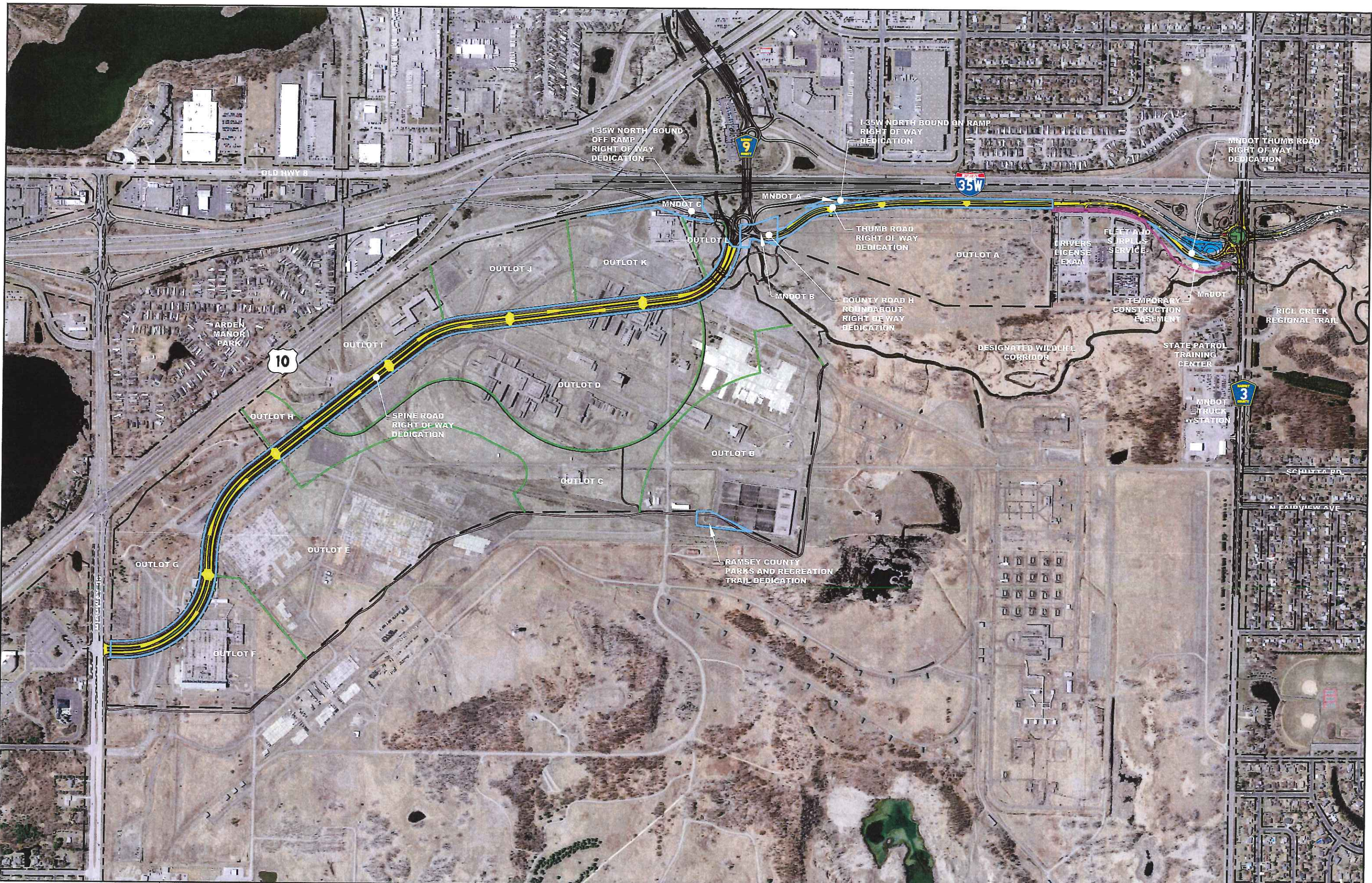
SCALE IN FEET

**PRELIMINARY DESIGN REPORT  
 JUNE 2015**

**REGIONAL TRAIL IMPROVEMENTS  
 EXHIBIT 10**

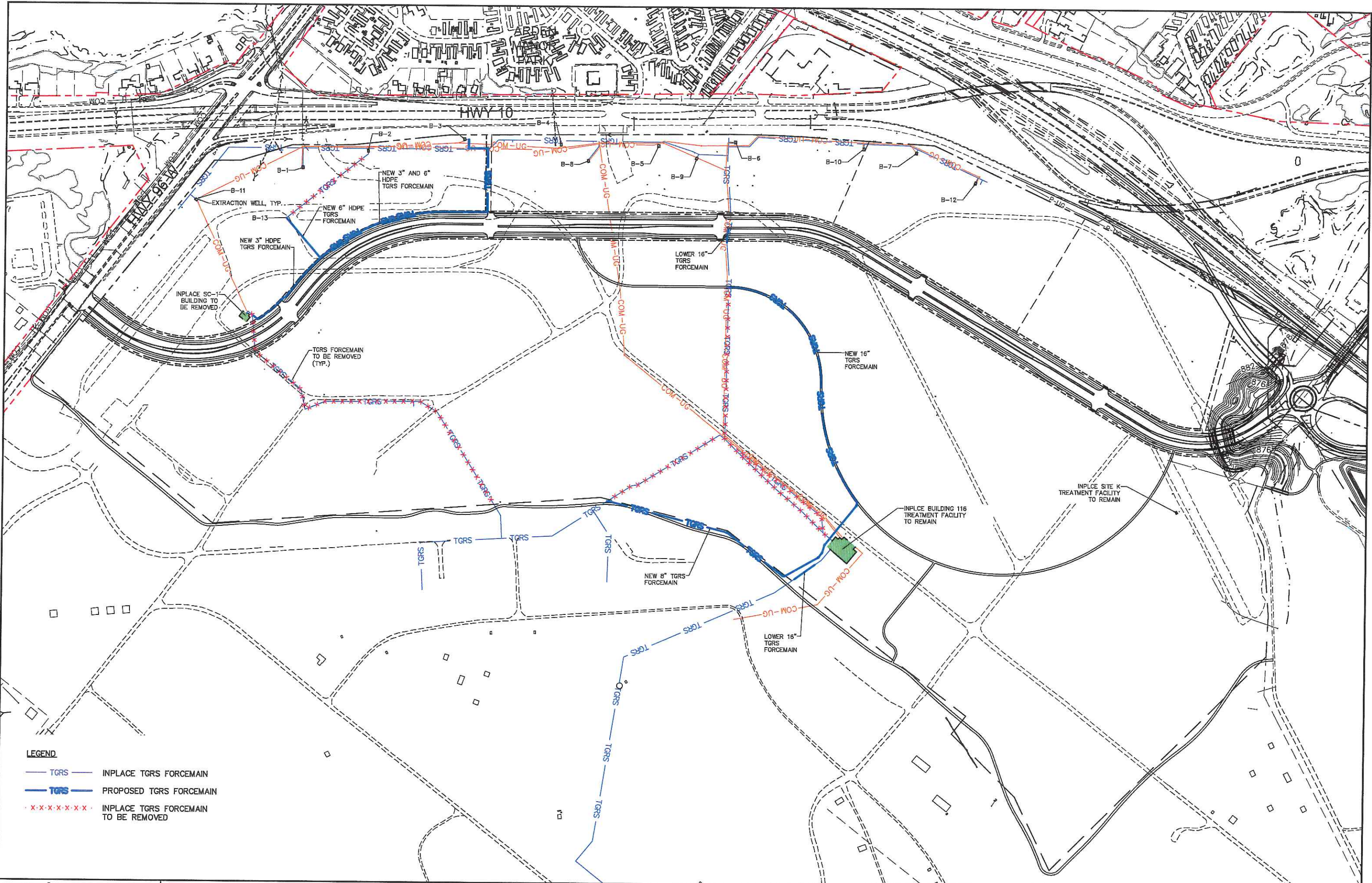


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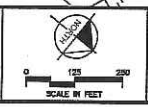
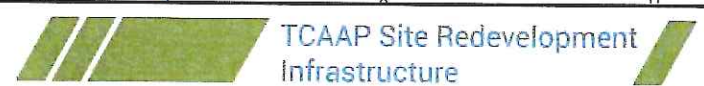




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- LEGEND**
- TGRS — INPLACE TGRS FORCEMAIN
  - TGRS — PROPOSED TGRS FORCEMAIN
  - x-x-x-x-x-x-x- INPLACE TGRS FORCEMAIN TO BE REMOVED



**PRELIMINARY DESIGN REPORT**  
**JUNE 2015**

**TCAAP GROUNDWATER RECOVERY SYSTEM (TGRS) IMPROVEMENTS**  
**EXHIBIT 12**



## DETAILED COST ESTIMATES

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

**SPINE ROAD IMPROVEMENTS**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Mobilization	LS	1	\$ 277,000	\$ 277,000
2	Select Granular Borrow (CV)	CY	44,750	\$ 15	\$ 671,250
3	Excavation - Common (CV)	CY	146,750	\$ 3	\$ 440,250
4	Aggregate Base (CV) Class 5	CY	13,500	\$ 22	\$ 297,000
5	Bituminous Pavement	TON	18,000	\$ 70	\$ 1,260,000
6	18" RC Safety Apron	EACH	1	\$ 700	\$ 700
7	24" RC Safety Apron	EACH	3	\$ 750	\$ 2,250
8	30" RC Safety Apron	EACH	4	\$ 1,000	\$ 4,000
9	48" RC Safety Apron	EACH	2	\$ 1,000	\$ 2,000
10	15" RC Pipe Sewer	LF	3,500	\$ 43	\$ 148,750
11	18" RC Pipe Sewer	LF	1,675	\$ 45	\$ 75,375
12	24" RC Pipe Sewer	LF	1,350	\$ 50	\$ 67,500
13	30" RC Pipe Sewer	LF	1,450	\$ 60	\$ 87,000
14	48" RC Pipe Sewer	LF	1,375	\$ 70	\$ 96,250
15	Construct Drainage Structure	LF	940	\$ 250	\$ 235,000
16	4" Concrete Walk	SF	81,000	\$ 5	\$ 405,000
17	Concrete Curb & Gutter Design B624	LF	28,500	\$ 15	\$ 427,500
18	Pedestrian Curb Ramp	EACH	22	\$ 1,000	\$ 22,000
19	Common Topsoil Borrow (CV)	CY	5,700	\$ 25	\$ 142,500
20	Sodding Type Salt Tolerant	SF	34,000	\$ 5	\$ 170,000
21	Erosion Control	LS	1	\$ 40,000	\$ 40,000
22	Lighting	LS	1	\$ 200,000	\$ 200,000
23	Pavement Markings	LS	1	\$ 20,000	\$ 20,000
24	Signing	LS	1	\$ 10,000	\$ 10,000
	Subtotal				\$ 5,101,000
	10% Construction Contingency				\$ 510,000
	Total Construction Cost				\$ 5,611,000
	20% Indirect Cost				\$ 1,122,000
	<b>Estimated Project Cost</b>				<b>\$ 6,733,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE  
SPINE ROAD BRIDGE IMPROVEMENTS**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Base Bridge	SF	10,500	\$ 250	\$ 2,625,000
2	Additional Railings	LF	400	\$ 100	\$ 40,000
3	Base Bridge Enhancements (Arch Bridge)	LS	1	\$ 700,000	<u>\$ 700,000</u>
	Subtotal				\$ 3,365,000
	10% Construction Contingency				<u>\$ 337,000</u>
	Total Construction Cost				\$ 3,702,000
	20% Indirect Cost				<u>\$ 740,000</u>
	<b>Estimated Project Cost</b>				<b>\$ 4,442,000</b>

**Notes:**

1. Estimated costs assume an arch bridge.

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

**SPINE ROAD HIGHWAY 96 INTERSECTION IMPROVEMENTS**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Mobilization	LS	1	\$ 15,000	\$ 15,000
2	Traffic Signal System	EACH	1	\$ 300,000	\$ 300,000
3	Pavement Markings	LS	1	\$ 2,500	\$ 2,500
4	Signing	LS	1	\$ 2,500	\$ 2,500
5	Traffic Control	LS	1	\$ 5,000	\$ 5,000
	Subtotal				\$ 325,000
	10% Construction Contingency				\$ 33,000
	Total Construction Cost				\$ 358,000
	20% Indirect Cost				\$ 72,000
	<b>Estimated Project Cost</b>				<b>\$ 430,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

**THUMB ROAD (INSIDE TCAAP) IMPROVEMENTS**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Mobilization	LS	1	\$ 63,000	\$ 63,000
2	Select Granular Borrow (CV)	CY	12,250	\$ 15	\$ 183,750
3	Subgrade Preparation	ROAD STA	30	\$ 300	\$ 9,000
4	Aggregate Base (CV) Class 5	CY	3,800	\$ 22	\$ 83,600
5	Bituminous Pavement	TON	3,800	\$ 70	\$ 266,000
6	24" RC Safety Apron	EACH	3	\$ 750	\$ 2,250
7	Outlet Structure	EACH	3	\$ 6,500	\$ 19,500
8	15" RC Pipe Sewer	LF	1,500	\$ 43	\$ 63,750
9	18" RC Pipe Sewer	LF	1,250	\$ 45	\$ 56,250
10	24" RC Pipe Sewer	LF	500	\$ 50	\$ 25,000
11	Construct Drainage Structure	LF	125	\$ 250	\$ 31,250
12	4" Concrete Walk	SF	8,750	\$ 5	\$ 43,750
13	Concrete Curb & Gutter Design B612	LF	5,100	\$ 15	\$ 76,500
14	Concrete Curb & Gutter Design B624	LF	5,600	\$ 15	\$ 84,000
15	Pedestrian Curb Ramp	EACH	6	\$ 1,000	\$ 6,000
16	Common Topsoil Borrow (CV)	CY	800	\$ 25	\$ 20,000
17	Sodding Type Salt Tolerant	SY	4,750	\$ 5	\$ 23,750
18	Erosion Control	LS	1	\$ 20,000	\$ 20,000
19	Lighting	LS	1	\$ 100,000	\$ 100,000
20	Pavement Markings	LS	1	\$ 10,000	\$ 10,000
21	Signing	LS	1	\$ 5,000	\$ 5,000
	Subtotal				\$ 1,192,350
	10% Construction Contingency				\$ 119,000
	Total Construction Cost				\$ 1,311,350
	20% Indirect Cost				\$ 262,000
	<b>Estimated Project Cost</b>				<b>\$ 1,573,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

**THUMB ROAD (OUTSIDE TCAAP) IMPROVEMENTS**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Mobilization	LS	1	\$ 107,000	\$ 107,000
2	Clearing	ACRE	2	\$ 2,000	\$ 4,000
3	Grubbing	ACRE	2	\$ 2,000	\$ 4,000
4	Remove Curb & Gutter	LF	4,925	\$ 5	\$ 24,625
5	Remove Pipe Sewers	LF	725	\$ 10	\$ 7,250
6	Remove Concrete Median	SF	6,300	\$ 5	\$ 31,500
7	Remove Pavement	SY	15,600	\$ 5	\$ 78,000
8	Remove Manhole Or Catch Basin	EACH	20	\$ 400	\$ 8,000
9	Salvage Signal System	EACH	1	\$ 10,000	\$ 10,000
10	Select Granular Borrow (CV)	CY	25,500	\$ 15	\$ 382,500
11	Common Embankment (CV)	CY	5,160	\$ 3	\$ 15,480
12	Excavation - Common (CV)	CY	25,200	\$ 3	\$ 75,600
13	Excavation - Muck	CY	12,300	\$ 7	\$ 86,100
14	Aggregate Base (CV) Class 5	CY	3,940	\$ 22	\$ 86,680
15	Concrete Pavement 8"	SY	2,200	\$ 80	\$ 176,000
16	Bituminous Pavement	TON	4,100	\$ 70	\$ 287,000
17	Expansion Joints, Design E8H	LF	240	\$ 35	\$ 8,400
18	Bridge Approach Panels	SY	270	\$ 150	\$ 40,500
19	18" RC Safety Apron	EACH	1	\$ 700	\$ 700
20	24" RC Safety Apron	EACH	2	\$ 750	\$ 1,500
21	48" RC Safety Apron	EACH	1	\$ 1,000	\$ 1,000
22	12" RC Pipe Sewer	LF	1,525	\$ 40	\$ 61,000
23	15" RC Pipe Sewer	LF	950	\$ 43	\$ 40,375
24	18" RC Pipe Sewer	LF	450	\$ 45	\$ 20,250
25	24" RC Pipe Sewer	LF	480	\$ 50	\$ 24,000
26	30" RC Pipe Sewer	LF	110	\$ 60	\$ 6,600
27	48" RC Pipe Sewer	LF	60	\$ 70	\$ 4,200
28	Construct Drainage Structure	LF	205	\$ 250	\$ 51,250
29	Concrete Curb & Gutter Design B624	LF	8,925	\$ 15	\$ 133,875
30	Concrete Curb & Gutter Design D424	LF	1,800	\$ 15	\$ 27,000
31	Concrete Curb Design B6	LF	435	\$ 20	\$ 8,700
32	Concrete Median	SY	1,200	\$ 70	\$ 84,000
33	Pedestrian Curb Ramp	EACH	14	\$ 1,000	\$ 14,000
34	Wire Fence Design 60-9322	LF	1,870	\$ 20	\$ 37,400
35	Vehicular Gate-Double	EACH	2	\$ 2,500	\$ 5,000
36	Common Topsoil Borrow (CV)	CY	500	\$ 25	\$ 12,500
37	Sodding Type Salt Tolerant	SY	3,000	\$ 5	\$ 15,000
38	Erosion Control	LS	1	\$ 40,000	\$ 40,000
39	Floodplain Mitigation	LS	1	\$ 20,000	\$ 20,000
40	Lighting	LS	1	\$ 100,000	\$ 100,000
41	Pavement Markings	LS	1	\$ 10,000	\$ 10,000
42	Signing	LS	1	\$ 15,000	\$ 15,000
43	Traffic Control	LS	1	\$ 50,000	\$ 50,000
Subtotal					\$ 2,215,985
10% Construction Contingency					\$ 222,000
Total Construction Cost					\$ 2,437,985
20% Indirect Cost					\$ 488,000
<b>Estimated Project Cost</b>					<b>\$ 2,926,000</b>

**Notes:**

- Does not include any security camera or on-site improvement costs for State of MN facilities.

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

**SITE GRADING AND STORM DRAINAGE IMPROVEMENTS**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
<i>Mass Grading and Earthwork</i>					
1	Excavation - Common (CV)	CY	327,500	\$ 3	\$ 982,500
2	Dewatering	EACH	5	\$ 10,000	\$ 50,000
3	Bituminous Pavement	TON	850	\$ 70	\$ 59,500
4	Aggregate Base (CV) Class 5	CY	1,450	\$ 22	\$ 31,900
5	Construct Drainage Structure	EACH	17	\$ 3,000	\$ 51,000
6	Outlet Structure	EACH	14	\$ 6,500	\$ 91,000
7	12" TO 15" RC Pipe Sewer	LF	1,100	\$ 45	\$ 49,500
8	18" TO 24" RC Pipe Sewer	LF	1,420	\$ 50	\$ 71,000
9	36" TO 48" RC Pipe Sewer	LF	1,360	\$ 85	\$ 115,600
10	RC Safety Apron	EACH	16	\$ 750	\$ 12,000
11	Connect to Existing Storm Sewer	EACH	2	\$ 2,600	\$ 5,200
12	Random Riprap Class II	CY	700	\$ 55	\$ 38,500
13	Geotextile Filter Type III	SY	1,100	\$ 3	\$ 3,300
14	Seeding	ACRE	20	\$ 1,000	\$ 19,900
15	Silt Fence, Type Machine Sliced	LF	16,300	\$ 3	\$ 48,900
16	Erosion Control Blanket - Type 1	SY	30,500	\$ 3	\$ 91,500
17	Storm Drain Inlet Protection	EACH	20	\$ 300	\$ 6,000
18	Filter Log Type Compost Log	LF	1,200	\$ 4	\$ 4,800
19	Temporary Sediment Trap	EACH	20	\$ 850	\$ 17,000
<i>Subtotal Mass Grading and Earthwork</i>					\$ 1,749,100
<i>10% Construction Contingency</i>					\$ 175,000
<i>Total Construction Cost</i>					\$ 1,924,000
<i>30% Indirect Cost</i>					\$ 577,000
<b><i>Estimated Project Cost</i></b>					<b>\$ 2,501,000</b>

*Storm Water Ponds (Serving Private Development)*

1	Clearing	ACRE	1	\$ 2,000	\$ 2,200
2	Grubbing	ACRE	1	\$ 2,000	\$ 2,200
3	Excavation - Common (CV)	CY	176,000	\$ 3	\$ 528,000
4	Dewatering	EACH	3	\$ 10,000	\$ 30,000
5	RC Safety Apron	EACH	6	\$ 750	\$ 4,500
6	Construct Drainage Structure	EACH	9	\$ 3,000	\$ 27,000
7	Outlet Structure	EACH	5	\$ 6,500	\$ 32,500
8	18" TO 24" RC Pipe Sewer	LF	240	\$ 50	\$ 12,000
9	54" TO 66" RC Pipe Sewer	LF	140	\$ 160	\$ 22,400
10	Connect Into Existing Storm Sewer	EACH	1	\$ 2,600	\$ 2,600
11	Random Riprap Class II	CY	270	\$ 55	\$ 14,850
12	Geotextile Filter Type III	SY	400	\$ 3	\$ 1,200
13	Seeding	ACRE	3	\$ 1,000	\$ 3,200
14	Silt Fence, Type Machine Sliced	LF	1,100	\$ 3	\$ 3,300
15	Erosion Control Blanket - Type 1	SY	23,000	\$ 3	\$ 69,000
16	Storm Drain Inlet Protection	EACH	10	\$ 300	\$ 3,000
17	Filter Log Type Compost Log	LF	400	\$ 4	\$ 1,600
<i>Subtotal</i>					\$ 759,550
<i>10% Construction Contingency</i>					\$ 76,000
<i>Total Construction Cost</i>					\$ 836,000
<i>30% Indirect Cost</i>					\$ 251,000
<b><i>Estimated Project Cost</i></b>					<b>\$ 1,087,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

*Wetland Restoration*

1	Seeding (Native, upland buffer)	ACRE	5	\$	2,000	\$	10,000
2	Seeding (Temporary)	ACRE	11	\$	800	\$	8,800
3	Seeding (Wetland Native)	ACRE	11	\$	3,000	\$	33,000
4	Wetland Plants/seedlings (Plugs)	EACH	5,000	\$	5	\$	25,000
5	Sod Flats	SF	2,000	\$	10	\$	20,000
6	Soil Prep., Herbicide, and Maintenance (Year 1)	LS	1	\$	25,000	\$	25,000
						<i>Subtotal</i>	\$ 121,800
						<i>10% Construction Contingency</i>	\$ 12,000
						<i>Total Construction Cost</i>	\$ 134,000
						<i>30% Indirect Cost</i>	\$ 40,000
						<b><i>Estimated Project Cost</i></b>	<b>\$ 174,000</b>

*Environmental Issues/Response Action Plan (RAP) - Site K*

1	HDPE Liner	SF	280,000	\$	1.25	\$	350,000
2	Select Granular Borrow (CV)	CY	5,200	\$	15	\$	78,000
3	Excavation - Impacted Soils (CV)	CY	5,200	\$	30	\$	156,000
4	Concrete Seepage Collar	EACH	12	\$	3,000	\$	36,000
5	Modify Existing Monitoring Well	EACH	13	\$	500	\$	6,500
6	New 2" Monitoring Well	EACH	8	\$	2,000	\$	16,000
7	Electrical Service for Site K Stripping Tower	EACH	1	\$	20,000	\$	20,000
8	Well Point Dewatering System	LS	1	\$	80,000	\$	80,000
						<i>Subtotal</i>	\$ 742,500
						<i>10% Construction Contingency</i>	\$ 74,000
						<i>Total Construction Cost</i>	\$ 817,000
						<i>30% Indirect Cost</i>	\$ 245,000
						<b><i>Estimated Project Cost</i></b>	<b>\$ 1,062,000</b>

**Total Estimated Project Cost** **\$ 4,824,000**

**Notes:**

- 1 Mass grading and earthwork section includes ponds and wetlands within the Natural Resources Corridor.
- 2 Environmental issues pertain to the facilities proposed adjacent to the Site K area.
- 3 Well point dewatering system assumed to be required for 3 months duration.
- 4 Impacted soils are those excavated below the water table near Site K.
- 5 Compacted composite clay liner assumed to extend 1 foot above HWL, and is imported material.
- 6 Filter log quantity represents proposed ditch checks for erosion control in swales.
- 7 Sediment traps sized assuming one per five acres of graded area.
- 8 Dewatering includes temporary groundwater dewatering and pumping of storm water during construction.
- 9 Common excavation assumes excavation and recompaction elsewhere on site.
- 10 Assumes type 1/2 and 2/3 wetlands that are mostly vegetated/no open water.
- 11 Bituminous and aggregate base in mass grading section is for trail running along Natural Resources Corridor.
- 12 Portion of excavated soils that are impacted have been removed from mass grading common excavation value.



**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE  
RICE CREEK REMEANDER IMPROVEMENTS  
ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Mobilization (5%)	LS	1	\$ 40,000	\$ 40,000
2	Temp Erosion Control	LS	1	\$ 10,000	\$ 10,000
3	Clearing and Grubbing	AC	2	\$ 4,000	\$ 6,000
4	Remove Bituminous Trail	SY	455	\$ 8	\$ 3,640
5	Excavation - Common (CV)	CY	41,700	\$ 3	\$ 125,100
	Excavation - Rice Creek Bypass (CV)	CY	4,200	\$ 5	\$ 21,000
6	Topsoil Import	CY	4,000	\$ 25	\$ 100,000
7	Bituminous Pavement	TON	260	\$ 70	\$ 18,200
8	Aggregate Base (CV) Class 5	CY	415	\$ 22	\$ 9,130
9	Pedestrian Bridge Crossing of Rice Creek (12'x 80' Continental-style Bridge)	LS	1	\$ 200,000	\$ 200,000
10	MN DOT Type 5, Non-Woven Geotextile Fabric	SY	600	\$ 5	\$ 3,000
11	Class III Riprap	TON	650	\$ 120	\$ 78,000
12	24" to 36" Fieldstone Boulders (Cover Boulders & Rootwad Installation)	TON	120	\$ 120	\$ 14,400
13	Root Wads (Log Toe, Tree Pin & Rootwad Installation)	EA	35	\$ 200	\$ 7,000
14	Footer Logs (Log Toe, Tree Pin & Rootwad Installation)	EA	35	\$ 150	\$ 5,250
15	MN State Seed Mix 34-261 Riparian South & West	SY	5,000	\$ 3	\$ 15,000
16	MN State Seed Mix 34-271 Wet Meadow South & West	SY	600	\$ 3	\$ 1,800
17	MN State Seed Mix 35-241 Mesic Prairie	SY	10,000	\$ 1	\$ 10,000
18	MN State Seed Mix 35-221 Dry Prairie	SY	7,500	\$ 1	\$ 7,500
19	MN DOT Type 5 Hydromulch (Applied at 2100 LB/Acre)	LB	7,350	\$ 2	\$ 11,025
20	Erosion Control Blanket MN DOT 3885 Category 3, Straw 2S, Natural Fiber Netting Only	SY	5,600	\$ 3	\$ 16,800
21	Erosion Control Blanket Rolanka (BioD-Net 40 or Equivalent)	SY	5,000	\$ 5	\$ 25,000
22	9" Straw Wattle or Bioroll	LF	5,400	\$ 5	\$ 27,000
23	Live Stakes	EA	2,400	\$ 5	\$ 12,000
24	Trees - #25 Container	EA	8	\$ 300	\$ 2,400
25	Nursery Logs	EA	10	\$ 300	\$ 3,000
26	Non-Game Animal Habitat - Turtle Hibernaculum	EA	3	\$ 1,000	\$ 3,000
27	Non-Game Animal Habitat - Snake Hibernaculum	EA	2	\$ 1,000	\$ 2,000
28	Non-Game Animal Habitat - Lofting Logs	EA	5	\$ 800	\$ 4,000
29	Non-Game Animal Habitat - Fox Den	EA	1	\$ 1,000	\$ 1,000
	Subtotal				\$ 782,000
	10% Construction Contingency				\$ 78,000
	Total Construction Cost				\$ 860,000
	30% Indirect Cost				\$ 258,000
	<b>Estimated Project Cost</b>				<b>\$ 1,118,000</b>

**Notes:**

1. Filling of the existing creek alignment is assumed to be part of the CR H interchange scope.

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE  
SANITARY SEWER IMPROVEMENTS (SPINE)**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Dewatering	LS	1	\$ 20,000	\$ 20,000
2	Haul & Dispose of Contaminated Material	CY	500	\$ 30	\$ 15,000
3	Concrete Seepage Collar	EACH	8	\$ 3,000	\$ 24,000
4	Connect to Existing Sanitary Sewer	EACH	1	\$ 2,000	\$ 2,000
5	Lift Station	LS	1	\$ 240,000	\$ 240,000
6	Electrical Service (Lift Station)	LS	1	\$ 20,000	\$ 20,000
7	Backup Generator (Lift Station)	LS	1	\$ 40,000	\$ 40,000
8	8" Pipe Plug	EACH	10	\$ 500	\$ 5,000
9	6" PVC Force Main	LF	210	\$ 30	\$ 6,300
10	12" PVC Force Main	LF	210	\$ 40	\$ 8,400
11	6" HDPE Force Main (Directionally Drilled)	LF	150	\$ 120	\$ 18,000
12	12" HDPE Force Main (Directionally Drilled)	LS	150	\$ 200	\$ 30,000
13	8" PVC Sanitary Sewer Pipe	LF	4,100	\$ 30	\$ 123,000
14	12" PVC Sanitary Sewer Pipe	LF	1,251	\$ 35	\$ 43,785
15	15" PVC Sanitary Sewer Pipe	LF	1,235	\$ 40	\$ 49,400
16	18" PVC Sanitary Sewer Pipe	LF	1,400	\$ 50	\$ 70,000
17	Monitoring Well	EACH	2	\$ 2,000	\$ 4,000
18	Construct Sanitary Sewer Manhole	EACH	27	\$ 5,000	\$ 135,000
19	Construct Sanitary Sewer Drop Manhole	EACH	1	\$ 8,000	\$ 8,000
20	Lean Mix Backfill	CY	250	\$ 120	\$ 30,000
21	Cohesive Soil Borrow	CY	500	\$ 25	\$ 12,500
Subtotal					\$ 904,000
10% Construction Contingency					\$ 90,000
Total Construction Cost					\$ 994,000
20% Indirect Cost					\$ 199,000
<b>Estimated Project Cost</b>					<b>\$ 1,193,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE  
SANITARY SEWER IMPROVEMENTS (THUMB)**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Dewatering	LS	1	\$ 10,000	\$ 10,000
2	Abandon Existing Meter Station	LS	1	\$ 5,000	\$ 5,000
3	Reconstruct Existing Sanitary Manhole	EACH	3	\$ 1,500	\$ 4,500
4	Connect to Existing Sanitary Sewer	EACH	1	\$ 2,000	\$ 2,000
5	8" Pipe Plug	EACH	3	\$ 500	\$ 1,500
6	4" Pipe Plug	EACH	1	\$ 450	\$ 450
7	4" PVC Force Main	LF	420	\$ 30	\$ 12,600
8	8" PVC Sanitary Sewer Pipe	LF	2,933	\$ 30	\$ 87,990
9	Construct Sanitary Sewer Manhole	EACH	9	\$ 5,000	\$ 45,000
	Subtotal				\$ 169,000
	10% Construction Contingency				\$ 17,000
	Total Construction Cost				\$ 186,000
	20% Indirect Cost				\$ 37,000
	<b>Estimated Project Cost</b>				<b>\$ 223,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

**WATER MAIN IMPROVEMENTS (SPINE)**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Dewatering	LS	1	\$ 10,000	\$ 10,000
2	Haul & Dispose of Contaminated Material	CY	350	\$ 30	\$ 10,500
3	Concrete Seepage Collar	EACH	11	\$ 3,000	\$ 33,000
4	Booster Station - 20 x 40 Pump Station Building	LS	1	\$ 170,000	\$ 170,000
5	Booster Station - Pump Skid	LS	1	\$ 90,000	\$ 90,000
6	Booster Station - Generator & Transfer Switch	LS	1	\$ 60,000	\$ 60,000
7	Booster Station - Electrical/Controls	LS	1	\$ 130,000	\$ 130,000
8	Booster Station - Plumbing & Exterior Pipe	LS	1	\$ 100,000	\$ 100,000
9	Water Tower - 1.5 MG Composite	LS	1	\$ 3,250,000	\$ 3,250,000
10	Water Tower - Yard Piping	LS	1	\$ 50,000	\$ 50,000
11	Water Tower - Site Grading/Access Driveway	LS	1	\$ 50,000	\$ 50,000
12	Water Tower - Electrical/Controls	LS	1	\$ 125,000	\$ 125,000
13	Water Tower - Logo on Tank	LS	1	\$ 25,000	\$ 25,000
14	Electrical Service (Water Tower)	LS	1	\$ 11,000	\$ 11,000
15	Electrical Service (Booster Station)	LS	1	\$ 15,500	\$ 15,500
16	12" Wet Tap w/Gate Valve and Box	EACH	1	\$ 5,000	\$ 5,000
17	Thrust Block	EACH	1	\$ 1,000	\$ 1,000
18	6" Gate Valve and Box	EACH	13	\$ 1,500	\$ 19,500
19	12" Gate Valve and Box	EACH	20	\$ 3,000	\$ 60,000
20	Hydrant	EACH	13	\$ 3,400	\$ 44,200
21	Connect to Existing Water Main	EACH	2	\$ 1,500	\$ 3,000
22	24" Steel Casing Pipe	EACH	500	\$ 300	\$ 150,000
23	12" PVC Water Main (C900)	LF	9,941	\$ 40	\$ 397,640
24	6" PVC Water Main (C900)	LF	108	\$ 30	\$ 3,240
25	Cohesive Soil Borrow	CY	500	\$ 25	\$ 12,500
26	Lean Mix Backfill	CY	350	\$ 120	\$ 42,000
27	Ductile Iron Fittings	LB	6,000	\$ 7	\$ 42,000
	Subtotal				\$ 4,910,000
	10% Construction Contingency				\$ 491,000
	Total Construction Cost				\$ 5,401,000
	20% Indirect Cost				\$ 1,080,000
	<b>Estimated Project Cost</b>				<b>\$ 6,481,000</b>



**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE  
WATER MAIN IMPROVEMENTS (THUMB)**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Remove Existing Water Main	LF	1,000	\$ 15	\$ 15,000
2	Dewatering	LS	1	\$ 10,000	\$ 10,000
3	12" Wet Tap w/Gate Valve and Box	EACH	1	\$ 5,000	\$ 5,000
4	Thrust Block	EACH	2	\$ 1,000	\$ 2,000
5	6" Gate Valve and Box	EACH	3	\$ 1,500	\$ 4,500
6	8" Gate Valve and Box	EACH	1	\$ 2,000	\$ 2,000
7	12" Gate Valve and Box	EACH	13	\$ 3,000	\$ 39,000
8	Hydrant	EACH	4	\$ 3,400	\$ 13,600
9	Connect to Existing Water Main	EACH	2	\$ 1,500	\$ 3,000
10	24" Steel Casing Pipe	EACH	500	\$ 300	\$ 150,000
11	12" PVC Water Main (C900)	LF	7,950	\$ 40	\$ 318,000
12	8" PVC Water Main (C900)	LF	40	\$ 35	\$ 1,400
13	6" PVC Water Main (C900)	LF	65	\$ 30	\$ 1,950
14	Ductile Iron Fittings	LB	4,000	\$ 7	\$ 28,000
	Subtotal				\$ 593,000
	10% Construction Contingency				\$ 59,000
	Total Construction Cost				\$ 652,000
	20% Indirect Cost				\$ 130,000
	<b>Estimated Project Cost</b>				<b>\$ 782,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

**LANDSCAPE ARCHITECTURE/URBAN DESIGN ENHANCEMENTS**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
<i>Spine Road Segments</i>					
1	Overstory Tree	EACH	290	\$ 400	\$ 116,000
2	Understory Tree	EACH	180	\$ 300	\$ 54,000
3	Shrub/Perennial Beds	SF	19,000	\$ 5	\$ 95,000
4	Landscape Edger	LF	650	\$ 3	\$ 1,950
5	Pedestrian Lights	EACH	59	\$ 5,000	\$ 295,000
6	Colored Concrete (4" Walk)	SF	8,800	\$ 2	\$ 17,600
7	Colored Concrete (8" Road)	SF	8,800	\$ 8	\$ 70,400
8	Standard Concrete (8" Road)	SF	13,000	\$ 3	\$ 39,000
	<i>Subtotal</i>				\$ 688,950
	<i>10% Construction Contingency</i>				\$ 69,000
	<i>Total Construction Cost</i>				\$ 757,950
	<i>30% Indirect Cost</i>				\$ 227,000
	<b><i>Estimated Project Cost</i></b>				<b>\$ 985,000</b>
 <i>Thumb Road Segments</i>					
1	Overstory Tree	EACH	90	\$ 400	\$ 36,000
2	Understory Tree	EACH	60	\$ 300	\$ 18,000
3	Shrub/Perennial Beds	SF	5,900	\$ 5	\$ 29,500
4	Landscape Edger	LF	200	\$ 3	\$ 600
5	Pedestrian Lights	EACH	18	\$ 5,000	\$ 90,000
6	Colored Concrete (4" Walk)	SF	2,800	\$ 2	\$ 5,600
7	Colored Concrete (8" Road)	SF	2,800	\$ 8	\$ 22,400
8	Standard Concrete (8" Road)	SF	4,000	\$ 3	\$ 12,000
	<i>Subtotal</i>				\$ 214,100
	<i>10% Construction Contingency</i>				\$ 21,000
	<i>Total Construction Cost</i>				\$ 235,100
	<i>30% Indirect Cost</i>				\$ 71,000
	<b><i>Estimated Project Cost</i></b>				<b>\$ 306,000</b>
 <i>Town Center</i>					
1	Overstory Tree	EACH	75	\$ 400	\$ 30,000
2	Understory Tree	EACH	40	\$ 300	\$ 12,000
3	Shrub/Perennial Beds	SF	7,500	\$ 5	\$ 37,500
4	Pedestrian Lights	EACH	42	\$ 5,000	\$ 210,000
5	6' Wood/Metal Benches	EACH	8	\$ 1,000	\$ 8,000
6	Wood Metal Trash Receptacles	EACH	8	\$ 500	\$ 4,000
7	Bike Racks	EACH	4	\$ 1,000	\$ 4,000
8	Colored Concrete (4" Walk)	SF	8,500	\$ 2	\$ 17,000
9	Colored Concrete (8" Road)	SF	8,500	\$ 8	\$ 68,000
10	Standard Concrete (8" Road)	SF	60,000	\$ 3	\$ 180,000
11	Aesthetic Walls	LF	140	\$ 75	\$ 10,500
	<i>Subtotal</i>				\$ 581,000
	<i>10% Construction Contingency</i>				\$ 58,000
	<i>Total Construction Cost</i>				\$ 639,000
	<i>30% Indirect Cost</i>				\$ 192,000
	<b><i>Estimated Project Cost</i></b>				<b>\$ 831,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

*Green Crossing 1 of 2 (near Hill area)*

1	Overstory Tree	EACH	50 \$	400 \$	20,000
2	Understory Tree	EACH	55 \$	300 \$	16,500
3	Shrub/Perennial Beds	SF	5,000 \$	5 \$	25,000
4	Landscape Edger	LF	100 \$	3 \$	300
5	Pedestrian Lights	EACH	2 \$	5,000 \$	10,000
6	Bollard Lights	EACH	10 \$	2,500 \$	25,000
7	Colored Concrete (4" Walk)	SF	1,250 \$	2 \$	2,500
8	Colored Concrete (8" Road)	SF	5,000 \$	8 \$	40,000
9	Standard Concrete (4" Walk)	SF	6,200 \$	3 \$	18,600
10	Standard Concrete (8" Road)	SF	25,000 \$	3 \$	<u>75,000</u>
					<i>Subtotal</i>
					\$ 232,900
					<i>10% Construction Contingency</i>
					<u>\$ 23,000</u>
					<i>Total Construction Cost</i>
					\$ 255,900
					<i>30% Indirect Cost</i>
					<u>\$ 77,000</u>
					<b><i>Estimated Project Cost</i></b>
					<b>\$ 333,000</b>

*Green Crossing 2 of 2 (near County Road H)*

1	Overstory Tree	EACH	65 \$	400 \$	26,000
2	Understory Tree	EACH	65 \$	300 \$	19,500
3	Shrub/Perennial Beds	SF	6,400 \$	5 \$	32,000
4	Landscape Edger	LF	100 \$	3 \$	300
5	Pedestrian Lights	EACH	16 \$	5,000 \$	80,000
6	Bollard Lights	EACH	15 \$	2,500 \$	37,500
7	Colored Concrete (4" Walk)	SF	1,600 \$	2 \$	3,200
8	Colored Concrete (8" Road)	SF	6,400 \$	8 \$	51,200
9	Standard Concrete (4" Walk)	SF	8,000 \$	3 \$	24,000
10	Standard Concrete (8" Road)	SF	32,000 \$	3 \$	<u>96,000</u>
					<i>Subtotal</i>
					\$ 369,700
					<i>10% Construction Contingency</i>
					<u>\$ 37,000</u>
					<i>Total Construction Cost</i>
					\$ 406,700
					<i>30% Indirect Cost</i>
					<u>\$ 122,000</u>
					<b><i>Estimated Project Cost</i></b>
					<b>\$ 529,000</b>

*Entry/Gateway (Highway 96)*

1	Overstory Tree	EACH	40 \$	400 \$	16,000
2	Understory Tree	EACH	20 \$	300 \$	6,000
3	Evergreen Tree	EACH	30 \$	450 \$	13,500
4	Shrub/Perennial Beds	SF	20,000 \$	5 \$	100,000
5	Pylon Lights on Wall	EACH	16 \$	1,500 \$	24,000
6	Entry Monument	EACH	1 \$	75,000 \$	75,000
7	Standard Concrete (4" Walk)	SF	990 \$	2 \$	1,980
8	Standard Concrete (8" Road)	SF	8,910 \$	3 \$	26,730
9	CIP Wall (with Formliner - 11' HT Max.)	LF	180 \$	325 \$	58,500
10	Ornamental Rail (on CIP Wall)	LF	200 \$	80 \$	16,000
11	Formliner Pylons	EACH	8 \$	3,000 \$	<u>24,000</u>
					<i>Subtotal</i>
					\$ 361,710
					<i>10% Construction Contingency</i>
					<u>\$ 36,000</u>
					<i>Total Construction Cost</i>
					\$ 397,710
					<i>30% Indirect Cost</i>
					<u>\$ 119,000</u>
					<b><i>Estimated Project Cost</i></b>
					<b>\$ 517,000</b>

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

*Entry/Gateway (County Rd H)*

1	Overstory Tree	EACH	40	\$	400	\$	16,000
2	Understory Tree	EACH	20	\$	300	\$	6,000
3	Evergreen Tree	EACH	30	\$	450	\$	13,500
4	Shrub/Perennial Beds	SF	20,000	\$	5	\$	100,000
5	Pedestrian Lights	EACH	10	\$	5,000	\$	50,000
6	6' Wood/Metal Benches	EACH	2	\$	1,000	\$	2,000
7	Entry Monument	EACH	1	\$	100,000	\$	100,000
8	Colored Concrete (4" Walk)	SF	5,025	\$	2	\$	10,050
9	Colored Concrete (8" Road)	SF	5,025	\$	8	\$	40,200
10	CIP Wall (with Formliner - 5' HT Max.)	LF	250	\$	125	\$	31,250
11	Ornamental Rail (on CIP Wall)	LF	200	\$	80	\$	16,000
							\$ 385,000
							\$ 39,000
							\$ 424,000
							\$ 127,000
							<b>\$ 551,000</b>

*Entry/Gateway (County Rd I)*

1	Overstory Tree	EACH	40	\$	400	\$	16,000
2	Understory Tree	EACH	20	\$	300	\$	6,000
3	Evergreen Tree	EACH	30	\$	450	\$	13,500
4	Shrub/Perennial Beds	SF	20,000	\$	5	\$	100,000
5	Pedestrian Lights	EACH	4	\$	5,000	\$	20,000
6	Entry Monument	EACH	1	\$	75,000	\$	75,000
7	Colored Concrete (4" Walk)	SF	6,000	\$	2	\$	12,000
8	Colored Concrete (8" Road)	SF	6,000	\$	8	\$	48,000
							\$ 290,500
							\$ 29,000
							\$ 319,500
							\$ 96,000
							<b>\$ 416,000</b>

*Pedestrian Nodes*

1	Overstory Tree	EACH	18	\$	400	\$	7,200
2	Understory Tree	EACH	30	\$	300	\$	9,000
3	Shrub/Perennial Beds	SF	1,100	\$	5	\$	5,500
4	Bollard Lights	EACH	22	\$	2,500	\$	55,000
5	6' Wood/Metal Benches	EACH	16	\$	1,000	\$	16,000
6	Interpretive Sign	EACH	5	\$	5,000	\$	25,000
7	Colored Concrete (4" Walk)	SF	1,700	\$	2	\$	3,400
8	Shade Structure w/ Vegetated Wall	EACH	5	\$	15,000	\$	75,000
							\$ 196,100
							\$ 20,000
							\$ 216,100
							\$ 65,000
							<b>\$ 281,000</b>



**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE**

*Natural Resources Corridor*

1	Landscaping (160,000 SF)	LS	1	\$	350,000	\$	350,000
2	Waterfall-Creek Treatments (15,000 SF)	LS	1	\$	225,000	\$	225,000
3	Pedestrian Lights	EACH	14	\$	5,000	\$	70,000
4	6' Wood/Metal Benches	EACH	4	\$	1,500	\$	6,000
5	Wood Trash Receptacles	EACH	4	\$	500	\$	2,000
6	Bike Racks	EACH	4	\$	800	\$	3,200
7	Interpretive Sign	EACH	8	\$	5,000	\$	40,000
8	Colored Concrete (4" Walk)	SF	1,200	\$	2	\$	2,400
9	CIP Wall (1,200 LF)	LS	1	\$	200,000	\$	200,000
10	Standard Handrail (on CIP Walls)	LF	1,200	\$	40	\$	48,000
11	Rip Rap-Interactive (1,700 SF)	LS	1	\$	175,000	\$	175,000
12	Rip Rap-Standard (1,700 SF)	LS	1	\$	75,000	\$	75,000
							\$ 1,196,600
	<i>Subtotal</i>						\$ 1,196,600
							\$ 120,000
	<i>10% Construction Contingency</i>						\$ 120,000
							\$ 1,316,600
	<i>Total Construction Cost</i>						\$ 1,316,600
							\$ 395,000
	<i>30% Indirect Cost</i>						\$ 395,000
							\$ 1,712,000
	<b><i>Estimated Project Cost</i></b>						\$ 1,712,000
							\$ 6,461,000
	<b>Total Estimated Project Cost</b>						\$ 6,461,000

**Notes:**

1. Landscape architecture/urban design enhancement estimates do not include any irrigation costs.

**TCAAP SITE REDEVELOPMENT  
INFRASTRUCTURE  
REGIONAL TRAIL IMPROVEMENTS**

**ESTIMATED COSTS**

<u>Item No.</u>	<u>Item</u>	<u>Units</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1	Mobilization	LS	1	\$ 15,000	\$ 15,000
2	Excavation - Common (CV)	CY	12,212	\$ 6	\$ 73,272
3	Aggregate Base (CV) Class 5	CY	2,794	\$ 22	\$ 61,468
4	Bituminous Pavement	TON	1,729	\$ 70	\$ 121,030
5	Erosion Control Blanket - Type 1	SY	20,193	\$ 2	\$ 43,415
6	Seeding	ACRE	4	\$ 1,000	\$ 4,170
7	Signing	LS	1	\$ 10,000	\$ 10,000
	Subtotal				\$ 328,000
	10% Construction Contingency				\$ 33,000
	Total Construction Cost				\$ 361,000
	30% Indirect Cost				\$ 108,000
	<b>Estimated Project Cost</b>				<b>\$ 469,000</b>

**Notes:**

1. Assumes a 12' wide trail and a pavement section of 2.5" bituminous and 6" of aggregate base.

# IMPLEMENTATION SCHEDULE

**Ramsey County**  
**TCAAP Site Redevelopment Infrastructure Development and Design**  
**Preliminary Implementation Schedule**  
**June 2015**

ID	Task Name	Start	Finish	2015												2016												2017								
				Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
1	<b>BID PACKAGE #1 - RICE CREEK REMEANDER</b>	<b>Mon 2/2/15</b>	<b>Fri 7/15/16</b>																																	
2	<b>PRELIMINARY AND FINAL DESIGN</b>	Mon 2/2/15	Fri 7/15/16																																	
3	30% DESIGN	Mon 2/2/15	Fri 2/27/15																																	
4	60% DESIGN	Mon 3/2/15	Fri 5/1/15																																	
5	90% DESIGN	Mon 5/4/15	Fri 5/29/15																																	
6	95% PLANS	Mon 6/1/15	Fri 6/19/15																																	
7	FINAL PLAN REVIEW AND UPDATES	Mon 6/22/15	Wed 7/8/15																																	
8	BIDDING	Wed 7/8/15	Thu 8/13/15																																	
9	PRESOLICITATION MEETING	Thu 7/23/15	Thu 7/23/15																																	
10	BID OPENING	Thu 8/13/15	Thu 8/13/15																																	
11	CONTRACT AWARD	Fri 8/14/15	Fri 9/4/15																																	
12	CONSTRUCTION	Mon 9/7/15	Fri 7/15/16																																	
13	<b>ENVIRONMENTAL ASSESSMENT WORKSHEET (EAW) AND PERMITTING</b>	Mon 2/2/15	Fri 9/4/15																																	
14	PREPARE EAW	Mon 2/2/15	Fri 6/5/15																																	
15	COUNTY REVIEW AND EAW UPDATES	Mon 6/8/15	Mon 6/15/15																																	
16	EAW NOTICE TO EQB MONITOR	Mon 6/15/15	Mon 6/15/15																																	
17	EAW COMMENT PERIOD	Mon 6/22/15	Wed 7/22/15																																	
18	RESPOND TO EAW COMMENTS AND PREPARE FINDING OF FACT DOCUMENT	Thu 7/23/15	Fri 8/14/15																																	
19	ARMY CORPS OF ENGINEERS PERMIT	Mon 6/15/15	Fri 9/4/15																																	
20	Submit Permit Application	Mon 6/15/15	Mon 6/15/15																																	
21	Permit Application Review and Approval	Mon 6/15/15	Fri 9/4/15																																	
22	DNR PERMIT	Mon 6/22/15	Fri 9/4/15																																	
23	Submit Permit Application	Mon 6/22/15	Mon 6/22/15																																	
24	Permit Application Review and Approval	Mon 6/22/15	Fri 9/4/15																																	
25	RCWD PERMIT	Mon 6/29/15	Fri 9/4/15																																	
26	Submit Permit Application	Mon 6/29/15	Mon 6/29/15																																	
27	Permit Application Review and Approval	Mon 6/29/15	Fri 9/4/15																																	
28																																				
29	<b>BID PACKAGE #2 - SPINE ROAD</b>	<b>Mon 4/6/15</b>	<b>Fri 12/30/16</b>																																	
30	60% DESIGN	Mon 4/6/15	Fri 7/31/15																																	
31	95% DESIGN	Mon 8/3/15	Fri 10/30/15																																	
32	STATE AID (METRO) REVIEW AND APPROVAL	Mon 11/2/15	Fri 1/1/16																																	
33	RCWD PERMITTING	Mon 9/7/15	Fri 1/1/16																																	
34	ARMY CORPS OF ENGINEERS PERMITTING	Mon 9/7/15	Fri 1/1/16																																	
35	BIDDING	Mon 1/4/16	Fri 2/12/16																																	
36	CONTRACT AWARD	Mon 2/15/16	Fri 4/1/16																																	
37	CONSTRUCTION	Mon 4/4/16	Fri 12/30/16																																	
38																																				
39	<b>BID PACKAGE #3 - THUMB ROAD/COUNTY ROAD I</b>	<b>Mon 9/1/14</b>	<b>Fri 10/27/17</b>																																	
40	PREPARE PRELIMINARY LAYOUT	Mon 9/1/14	Fri 11/7/14																																	
41	PRELIMINARY LAYOUT REVIEW AND APPROVAL	Mon 11/10/14	Fri 7/3/15																																	
42	60% DESIGN	Mon 11/10/14	Fri 1/30/15																																	
43	95% DESIGN	Mon 2/2/15	Fri 9/2/16																																	
44	STATE AID (METRO) REVIEW AND APPROVAL	Mon 9/5/16	Fri 10/28/16																																	
45	STATE AID (CO) REVIEW AND APPROVAL	Mon 10/31/16	Fri 12/30/16																																	
46	MnDOT COOPERATIVE AGREEMENT	Mon 9/5/16	Fri 12/30/16																																	
47	RCWD PERMITTING	Mon 9/5/16	Fri 12/30/16																																	
48	ARMY CORPS OF ENGINEERS PERMITTING	Mon 9/5/16	Fri 12/30/16																																	
49	BIDDING	Mon 1/2/17	Fri 2/17/17																																	
50	CONTRACT AWARD	Mon 2/20/17	Fri 3/31/17																																	
51	CONSTRUCTION	Mon 4/3/17	Fri 10/27/17																																	



SANITARY SEWER  
PRELIMINARY ENGINEERING ANALYSIS



## Technical Memorandum

To: Terry Maurer - Public Works Director - City of Arden Hills  
John Anderson - Assistant City Engineer - City of Arden Hills

From: Curt Neft, PE  
Thomas J. Lincoln, PE

Date: June 18, 2015

Subject: Sanitary Sewer Preliminary Engineering Analysis  
TCAAP Site Redevelopment Infrastructure

### Introduction

The purpose of this technical memorandum is to document the sanitary sewer feasibility analysis and preliminary engineering design, performed as a part of Task 7 of the TCAAP Site Redevelopment Infrastructure Project for Ramsey County per contract PW2014-24.

### Existing Sanitary Sewer System at TCAAP

The existing Twin Cities Army Ammunition Plant (TCAAP) trunk sanitary sewer system consists of an 18" PVC gravity sanitary sewer installed in 1994 by the U.S Department of the Army (Army) installed on MnDOT property under Permit No. MO-UL-93-127. Refer to the Sanitary Sewer Improvement Plans, prepared by MSA, and dated October 1, 1993. The existing sanitary sewer crosses under Rice Creek with a dual 8" HDPE inverted siphon, extends west from the TCAAP site to the intersection of County Road H and County Road 10 in the City of Mounds View, where it discharges into a sanitary interceptor owned by the City of Mounds View. The interceptor connects to Lift Station L-35 west of County Road 10 on County Road H, which is owned and maintained by the Metropolitan Council of Environmental Services (MCES). MCES Lift Station L-35 discharges to MCES Interceptor 4-NS-524.

The Sanitary Sewer Connection and Use Agreement was established with the City of Arden Hills, City of Mounds View and the Army when the sanitary sewer improvements were installed in 1994. The agreement established terms and conditions for the construction of the sewer system and a billing agreement for sewage discharge. Under the existing agreement the Army made monthly payments to the City of Mounds View for the volume of sewage metered at the standard City rate for industrial/commercial users within the City. A metering station was installed west of the TCAAP site on MnDOT property between MH 11 and MH 12, as required by the agreement.

The Army was responsible for installing and maintaining the flow meter and the City of Mounds View was responsible for taking monthly flow readings and sending invoices to the Army. The agreement also included a requirement for the City of Mounds View to send the



City of Arden Hills quarterly flow reports. The agreement also established a maximum discharge rate of 1,000 gallons per minute (gpm).

This existing trunk sanitary sewer system has not been operational for several years. Bolander, under contract to Ramsey County for site demolition and remediation, has removed all on-site sanitary sewer trunk and laterals up to MH 8.

### **Inspection of Existing Sanitary Sewer System**

The City of Arden Hills conducted sewer televised inspection of the existing trunk sanitary sewer system from MH 10 to the connection point at the northeast corner of County Road 10 and County Road H. This inspection was done on August 21, 2014, and the televised footage was provided to Kimley-Horn. The televised inspection of the 1,483 LF of 18" PVC identified 4 sags within the gravity sewer. Three sags were classified as a severity level 2 and one as a severity level 3. Refer to the Sanitary Sewer Televising Report, dated September 2014.

With the exception of the noted pipe sags, the existing trunk sanitary sewer system is in excellent condition and will support the development of the TCAAP site. As discussed later, the meter station manhole will need to be retrofitted. After the Parshall flume and other equipment is removed, a new invert will need to be poured between the resulting pipe ends. The Spine Road and Public Utilities construction package will include inspection and reconstruction of manhole adjusting rings, as required.

### **TCAAP Water/Sewer Demand**

A water/sewer demand analysis was performed for the TCAAP site based on the TCAAP Master Plan – Option B and the Metropolitan Council, Sewer Availability Charge, 2014 Procedure Manual. A maximum design development scenario was developed based on the AUAR and refinements suggested by City of Arden Hills staff. The design development scenario included the following land uses:

- 1700 residential dwelling units
- 550,000 SF of retail
- 1,450,000 SF of general office
- 350,000 SF of warehouse,
- 150,000 SF of general light industrial

Based on this forecast land use, an average daily demand of 701,000 GPD or an average daily flow of 487 GPM. Utilizing an assumed peaking factor of 3.3, the peak daily flow is 1607 GPM. Refer to the TCAAP Water Demand, dated August 8, 2014.

### **Downstream System Capacity**

A downstream capacity analysis was performed for the existing City of Mounds View interceptor that connects the TCAAP trunk sanitary sewer system at MH 38 (northeast corner of County Road H and County Road 10) to MCES Lift Station L-35. This sanitary system is comprised of PVC and RCP pipe, increasing from 18" at MH 38 to 21" at L-35. The existing flows used in this analysis were obtained from MCES. MCES conducted a capacity analysis in 2011 when the TCAAP site was considered for the Vikings Stadium, and gathered average daily flow information. The analysis added the projected average daily flows from TCAAP to the existing average flows in the system and applied the peaking factor of 3.3. The results of this analysis indicate that the existing interceptor has adequate capacity to accommodate the TCAAP Redevelopment Site. Refer to the Pipe Capacity Analysis, dated August 8, 2014.

In MCES's Arden Hills Viking Stadium Site: Flow vs Capacity Analysis Summary Memo, dated February 17, 2011, the firm capacity of MCES Lift Station L-35 is 5.8 MGD. MCES has the capacity to accommodate the TCAAP Redevelopment Site.

### **TCAAP Sanitary Sewer Design**

The proposed sanitary sewer system for TCAAP is made up of two systems. The land north of the County Road H roundabout will be served by a gravity sanitary sewer system that remains north of Rice Creek and connects to the existing trunk system near MH 10. The proposed sanitary sewer system will consist of an 8" PVC gravity system within the public roadway right-of-way and extend to a high point located about 400' south of the north property line. A 4" PVC force main extends from the high point to the north property line in order to provide future sanitary service to the MnDOT facilities located north of the property.

The land south of the County Road H roundabout must cross under Rice Creek. Several options were considered for providing sanitary sewer service south of County Road H. One option is to utilize the existing dual 8" HDPE inverted siphon under existing Rice Creek. The proposed Rice Creek remeander is in direct conflict with the existing inverted siphon, eliminating it as an option to serve the TCAAP Redevelopment Site. The second option considered is the installation of a new inverted siphon under the remeandered Rice Creek. An advantage of this option is the low upfront and operating costs. For this project, there were a number of disadvantages:

- An inverted siphon requires a minimum average daily flow rate of about 260 gpm in order to maintain the minimum design velocity of 3.0 feet per second. This equates to a 50% build-out based on the anticipated water demand. The lower flow rates during the first half of building out would require regular maintenance and be prone to result in odor issues from septicity in the siphon.
- The inverted siphon option would limit the depth of the proposed sanitary sewer. Based on the current Spine Road profile, the sanitary sewer would have a minimal



cover of about 7' at the low point. This would limit the ability to provide sanitary services to developments and lead to crossing conflicts with storm sewer and water main.

- An inverted siphon would have a fixed capacity making it inflexible to the wide range of flows anticipated for the TCAAP Redevelopment Site during built-out.

The final option considered is a lift station located south of the County Road H roundabout. The lift station force main would cross under the remeandered Rice Creek and tie into a manhole structure near MH 10. The lift station option has several advantages:

- A lift station can be designed to accommodate a wide range of flow rates. A cursory pump has been selected that can be adjusted through the use of a VFD, variable frequency drive. Essentially, the pumping power can be decreased without changing the size of the pump. This allows the lift station to grow as the development grows.
- A lift station allows the gravity sewer to be as deep as necessary to serve the proposed developments.
- The maintenance for a lift station will be less frequent and more predictable than an inverted siphon making it easier to program and budget a maintenance program.
- A lift station can be equipped with a septicity treatment system, if needed.

The proposed sanitary sewer system serving the southerly part of the site consists of a gravity collection system with a lift station. The gravity collection system consists of PVC piping ranging from 8" to 18" in size and connected with 48" manholes located within the Spine Road right-of way. A lift station is proposed near the low point of Spine Road at location near the MnDOT I-35W right-of-way. Two parallel force mains will connect the lift station to a new manhole near MH 10, running under the remeandered Rice Creek. The force mains will be 6" and 12" HDPE within a 30" casing pipe under Rice Creek. The casing pipe will be installed with the Rice Creek Remeander Project. The 12" force main will be closed during initial build-out. The City would like to be able to remove or abandon the 6" force main in the future.

### **Lift Station Design**

The proposed lift station design will utilize a duplex submersible pump system with variable frequency drives (VFD) in order to allow for greater flexibility in adjusting the capacity of the lift station as the development is phased out.

The average flow used for design of the lift station is 500 gpm with a peaking factor of 3.3. The pump size was selected to handle the peak full developed flow with only one pump operating and the second pump serving as a back-up. The proposed lift station will also be backed up with an on-site generator.

The peak flow anticipated for the design of the lift station is 1600 gpm or 3.6 cfs.

### **Joint Powers Agreement**

The Sanitary Sewer Connection and Use Agreement executed in 1994 is no longer valid. The acquisition of the TCAAP site from the Army may or may not have transferred the Army's interests in this sanitary sewer system and agreement to Ramsey County. That being said, the new sanitary system proposed will be the City of Arden Hills' system. A new joint power agreement needs to be prepared between the City of Arden Hills, the City of Mounds View, and MCES. This joint power agreement will address ownership, maintenance, and billing.

During discussions with MCES a conclusion was reached that the existing flow meter will not be able to be used for the metering of the TCAAP Redevelopment Site. The existing flow meter is designed to measure relatively steady sewage flow rates in a gravity sewer system. The proposed lift station will introduce intermittent flows through the meter resulting in unreliable flow data. MCES is open to establishing a new agreement with provisions allowing MCES to meter the sewage discharge from the southerly portion of the TCAAP site at the lift station and billing the City of Arden Hills directly. The flows discharging from the lift station will be measured by a magnetic flow meter installed on the force main. The sewage discharge from the northerly portion of the site would too small to measure with a gravity flow meter. A proposed method would be to measure metered water usage on the northerly portion of the site. A separate water meter would be necessary for irrigation.



# WATER DISTRIBUTION SYSTEM MODELING RESULTS

## TECHNICAL MEMORANDUM

**TO:** Terry Maurer, Public Works Director - City of Arden Hills  
John Anderson, Assistant City Engineer - City of Arden Hills

**FROM:** Matt Bowers  
Brandon Gebhart

**COPY:** Tom Lincoln, Kimley-Horn

**DATE:** June 18, 2015

**SUBJECT:** Water Distribution System Modeling Results  
TCAAP Site Redevelopment Infrastructure

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### Introduction

The purpose of this technical memorandum is to present and discuss the findings of the water distribution modeling performed to predict and analyze the adequacy of the water distribution in Arden Hills, particularly its extension into the proposed TCAAP site redevelopment area. The software program WaterCad V8i was used to develop the distribution model. Information obtained from Arden Hills provided the pipe sizing and locations, pumping facilities and water storage facilities making up the City's existing distribution system. Historical water usage data were also provided by Arden Hills and the City of Roseville. This information was used to estimate demand data to be input into the model.

### Model Development

The information provided was used to develop the system layout, locations of storage facilities and booster station. Following the construction of the layout and system facilities, demands were calculated and imposed on the modeled system. The data provided by Arden Hills and Roseville was used to develop the average day water demand (ADD) and the maximum day water demand (MDD) to be used in the model. Metered data from the City of Roseville from the years 2004 through 2011 indicated ADD's ranging from 1.10 to 1.27 million gallons (MG) per day. A higher-end value of 1.25 MG per day was selected as the ADD for the existing system. To allow for a little future growth within the existing developed area of Arden Hills, the average day demand used for the model was increased to 1.5 MG per day (a 20% increase). The amount of increase for future growth will be further considered as part of final design, and may potentially be reduced. A factor of three times the average day demand was used to develop the maximum day demand resulting in a demand of 4.5 MG per day. A peak hour demand multiplier was also used to determine the peak hour water usage for the model. The peak hour demand factor was two times the maximum day demand, or six times the ADD. Kimley-Horn has determined



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that the average day demand anticipated for TCAAP would add, approximately, an additional 0.75 MG per day to the water system. Using the same multiplier factors, the maximum day demand anticipated for the TCAAP development is 2.25 MG per day, with 4.5 MG per day for a peak hour demand.

The next step in model development was to determine the accuracy of the model compared to the actual system. A model analysis was performed to replicate the existing system. Using the results of this analysis, modeled pressures were compared to pressures from field collections obtained from provided data. The references used for pressure comparisons were from multiple hydrant tests performed at various locations throughout the City and from the Water System Master Plan prepared for the City of Arden Hills by Maier Stewart and Associates, Inc., 1990. No new field data was collected during the development of this model.

### Comparison of Model to Available Data

Comparing the model results to the field data information presented in the Water System Master Plan indicated that the model reasonably represents the distribution system. The comparison between model results and field data were performed by comparing pressures at nodes within the model representing locations at or near the locations of the field data. The results of this comparison are shown below for an average day demand simulation of the existing system:

Test		*Measured Static Pressure	*Modeled Static Pressure	Modeled Static Pressure	Model
<u>No.</u>	<u>Location</u>	<u>(PSI)</u>	<u>(PSI)</u>	<u>(PSI)</u>	<u>Node</u>
1	I35W & HWY 96	95	94	98	J-170
2	I35W & Transfer Rd	100	100	99	J-17
3	Snelling Ave. & McClung Dr	85	87	90	J-114
4	Royal Lane & Floral Dr.	70	72	70	J-407
5	Pleasant Lk. Dr. & Darth Lk Dr	78	73	78	J-292
6	Lexington Ave & Red Fox Rd	58	54	59	J-620
7	Chatham Ave W of Chatham Ct.	62	63	68	J-332
8	Cty Rd F & Moundsvew HS	70	71	72	J-298
9	Cty Rd E & Tony Schmidt Park	83	84	88	J-111
10	Cleveland Ave & Kattie Lane	71	71	70	J-378
11	Hamline Ave. & Tiller Lane	79	78	86	J-364
12	Lexington Ave. & Lakeview Ave.	62	64	69	J-437
13	Cleveland Ave. & Glen Paul Ave	75	75	75	J-458
14	Lake Johanna Ave. & Glen Paul Ave.	68	67	69	J-100
15	Hamline Ave. & Glenhill Rd.	76	84	77	J-46

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\*Obtained from Exhibit 3 in the 1990 Water System Master Plan by Maier Stewart and Associates, Inc.

Comparisons were also made to numerous hydrant tests provided by Arden Hills. Generally, the model results were similar to the information contained in the hydrant tests. However, some of the supplied hydrant tests were very old and, in some cases, significant modifications to the distribution system have been constructed since the hydrant testing was accomplished, which could significantly affect the interpretation of these older results. Another general uncertainty with hydrant test data is that tank levels, pump operations, and flow conditions were not recorded at the time of the field data collection, which could also significantly affect the interpretation of these results.

These results indicate a reasonable comparison between the model results and the provided field data. The model was then used to evaluate the integration of the proposed TCAAP redevelopment site to determine the system's ability to meet consumptive water use and its ability to provide water for firefighting purposes on the expanded system. As part of the evaluation, pipe sizes, new storage facilities and improvements to the existing system were analyzed to develop all of the components required to meet the demands of the system.

### Modeling for Evaluation of TCAAP Redevelopment Site

To evaluate the system's ability to provide water under several different conditions, the extended period simulation (EPS) function of WaterCad was used. This type of allows the modeling of tank level operations, the system's pressure and flow rate changes and pump station operations under varying demand conditions. For the purposed of this model, the maximum day demand was used as the basis for the EPS analysis. A diurnal curve was developed to provide the demand multipliers in a stepwise manor with a different multiplier for each hour over a period of 24 hours, with the highest multiplier equal to two times the maximum day demand (as noted previously). This method essentially predicts tank levels, pump function, pipe flows and resulting system pressures at each hour of a single maximum water usage day.

The results of several EPS simulations were evaluated and used to determine several key system requirements to adequately provide water and firefighting supplies. Initially it was assumed that the target requirement for the system would be to meet target fire flows in the proposed development and that if the fire flows were able to be satisfied, the consumptive water use would also be met. Since the development plan includes the potential for industrial sites along much of the Spine Road and through Outlot A (the "thumb"), in essence from north to south, an industrial fire flow has been targeted through much of the development. For initial modeling purposes, the selected target for industrial development was a 3-hour, 5,000 gpm fire flow, which is also consistent with the prior (1990) water plan. This fire flow criteria will be evaluated during final design, and may potentially be reduced. To determine the required system components to meet the fire flow, a worst case scenario was developed.



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To develop the worst case scenario, an EPS simulation was performed. Assuming that a fire would place the largest burden on the system at a point when the storage volumes within the system were at their lowest levels, the period of time in which the total stored volume was at its lowest became the start time for the fire flow simulation. This corresponded to starting a fire flow EPS when the storage tanks were approximately half full.

## Results

The results of the fire flow simulation discussed above were used to determine what facilities and improvements are needed to satisfy the water demands. To evaluate this, the system was required to satisfy the 3-hour, 5,000 gpm fire flows while maintaining a minimum residual pressure of 20 psi everywhere within the system at a point in time when the modeled available storage was the lowest. This fire flow criteria will be evaluated during final design, and may potentially be reduced. The initial analysis was performed without additional storage or pumping facilities, and then these facilities were added until the fire flow demand and pressure requirements were met. The results of these analyses indicate that a 1.0 to 1.5 MG storage facility in the TCAAP development is required, as well as an additional pumping facility within the existing Arden Hills system. The most logical location for a storage tank was at the highest ground elevation within the TCAAP redevelopment area, which is located near the southeastern part thereof, near the border with the Arden Hills Army Training Site (AHATS). A suitable pump station location was determined to be on the existing 12" water main crossing I-694 near Snelling Avenue, which is also a location that provides additional benefits to the higher pressure zone within Arden Hills, including redundancy of critical infrastructure. Adding these two facilities, the system was capable of supplying the target fire flow while maintaining the residual pressure requirement. After the fire flow duration, the proposed tank's storage volume was nearly depleted but then rebounded to approximately 55% of its available capacity by the end of the 24-hour EPS simulation.

After determining the tank and pumping facility requirements, the EPS simulation was performed on the system to determine the resulting pressures for the system. Figure 1 shows the pressure contours resulting from this analysis. The highest resulting pressure in the system occurred at the lowest lying area near Rice Creek in the TCAAP development at approximately 108 psi. Although this pressure is near the high end of a desirable range, creating a separate pressure zone in this area would create a closed distribution system and is not recommended. Also, it should be noted that the pressures near Rice Creek will be fairly close to those currently observed in the Round Lake vicinity. Operating the separate pressure zone would add considerably complexity versus the minimal benefit achieved.

To help define minimum system pressures, a 5,000 gpm demand was imposed at the north end of the TCAAP development and was modeled for a duration of 3 hours to simulate a fire. Pressure contours were generated to display the system's pressures immediately following the 3 hour fire and are shown on Figure 2.

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The fire flow EPS simulation was also used to verify the appropriate pipe sizing for the new development. Original plans included the installation of a 16" and two 12" diameter pipes connections to the existing system to service TCAAP. During the simulation, it was determined that downsizing the 16" to a 12" would result in adequate flows and allow a 3-hour, 5,000 gpm fire flow while maintaining a minimum residual pressure of about 40 psi. Results of the available fire flow throughout the system are shown in Figure 3.

### Additional Analyses

An additional analysis was performed to estimate the level of fire protection that could be provided for a situation in which a single 12" pipe is initially installed to service the Outlot A area of the development for a short period of time before the full expansion is constructed. The results of this analysis indicate that this pipe, connecting to the Arden Hills system near Prior Avenue and Highway 10 at the north end of Arden Hills, would produce a 3-hour, 2,200 gpm fire flow. Also, additional fire flow could be obtained with an emergency connection to Mound View (a normally-closed gate valve "interconnection" between the Arden Hills and Mounds View systems that would only be opened in the event of a water emergency). Information provided by Mounds View was analyzed, and it is expected that by opening this emergency connection, a target fire flow of 5,000 gpm will be attainable throughout most of the Outlot A area. Only the very northernmost portion of Outlot A may be slightly reduced, providing fire flows in the 4,000 to 5,000 gpm range.

Another analysis was performed to determine the full-development system's service ability in the event that one of the supply lines into TCAAP would be out of service. The results of this analysis indicate that additional pumping could overcome the loss of flow through the out of service transmission pipe; hence, it does not appear that an emergency connection to Mounds View or AHATS is required. However, for Mounds View, if there is an early development in the Outlot A area, the interconnection will be beneficial both in terms of improved fire flow and also simply to provide an alternate water supply in the event water service via the single 12" pipe from the south is inadvertently interrupted.

These results also indicate that adequate water supply would still be available if the 12" connection on the southeast side of TCAAP were omitted. However, without knowing the sequencing of the planned construction, and given the possibility that one of the other connecting pipelines could be out of service, it would be beneficial to construct the southeast 12" pipe (going south from the water tower) in order to loop the water tower location. This is particularly true given that complete construction of the 12" pipe going north from the water tower is not likely until some of the later phases of TCAAP redevelopment have been completed, making the completely-connected pipe unavailable for some time.

### Infrastructure Phasing



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Additional modeling was also performed to estimate when the proposed system would require the addition of the proposed tank and pump station in respect to increases in system demands. This is intended to determine when the tank and pump station may be needed depending on the future demands as the development expands.

To estimate these needs it was assumed that water service to Outlot A would be constructed initially followed by the addition of the Spine Road transmission pipeline. Areas east of the Spine Road service area were not included in these analyses, making the assumption that the initial development growth will occur in the areas serviced by Spine Road and Outlot A. Demands were sequentially increased in these areas and the results were analyzed to approximate when the tank and pump station would be needed by determining the system's ability to provide the target fire flow for a 3 hour period.

Incremental demands were added to the system during maximum day demand scenarios. The incremental demands were added to the system were 0.6 MGD, 0.75 MGD, 1.0 MGD, 1.5 MGD and 2.25 MGD (full build out). The amount of fire flow the system could provide for the 3 hour duration was determined for each of the demand scenarios. An initial analysis determined the fire flow availability without the addition of the tank or pump station. The results of this analysis estimate that the system can provide approximately 3,340 gpm fire flow when the maximum day demand for TCAAP is 0.6 MGD (approximately 27% of the anticipated total future demand). For a 0.75 MGD demand, the available fire flow is approximately 3,200 gpm. At 1.0 MGD, fire flow is approximately 2,940 gpm; and 2,280 at 1.5 MGD.

Adding a 1.5 MG tank indicated that the system could provide in excess of 5,000 gpm fire flows for the growth scenarios up through the 1.5 MGD demand, but was not sufficient to provide the needed fire flows for full development. The addition of the pump station would also be required to provide adequate service beyond this demand.

Finally, a scenario was analyzed where the addition of the pump station occurred without the addition of the tank. The results of this scenario indicate that fire flows when the system demand is 0.6 MGD are approximately 4,350 gpm. At a TCAAP demand of 0.75 MGD, 4,210 gpm fire flow can be supplied; 4,100 gpm at 1.0 MGD; and 3,840 gpm at 1.5 MGD.

Adding the 1.5 MG tank and the proposed pump station indicate that the system could adequately supply the future full-development demands and provide a 5,000 gpm fire flow for three hours.

As noted above, the allowance for future growth and the fire flow criteria / simulation parameters will be evaluated with City of Arden Hills staff during final design in order to finalize the required volume of water storage. Allowing for potential reductions in these parameters, the required volume of storage is anticipated to be 1.0 to 1.5 MG.

## Technical Memo

Water Distribution System Modeling Results

TCAAP Site Redevelopment Infrastructure

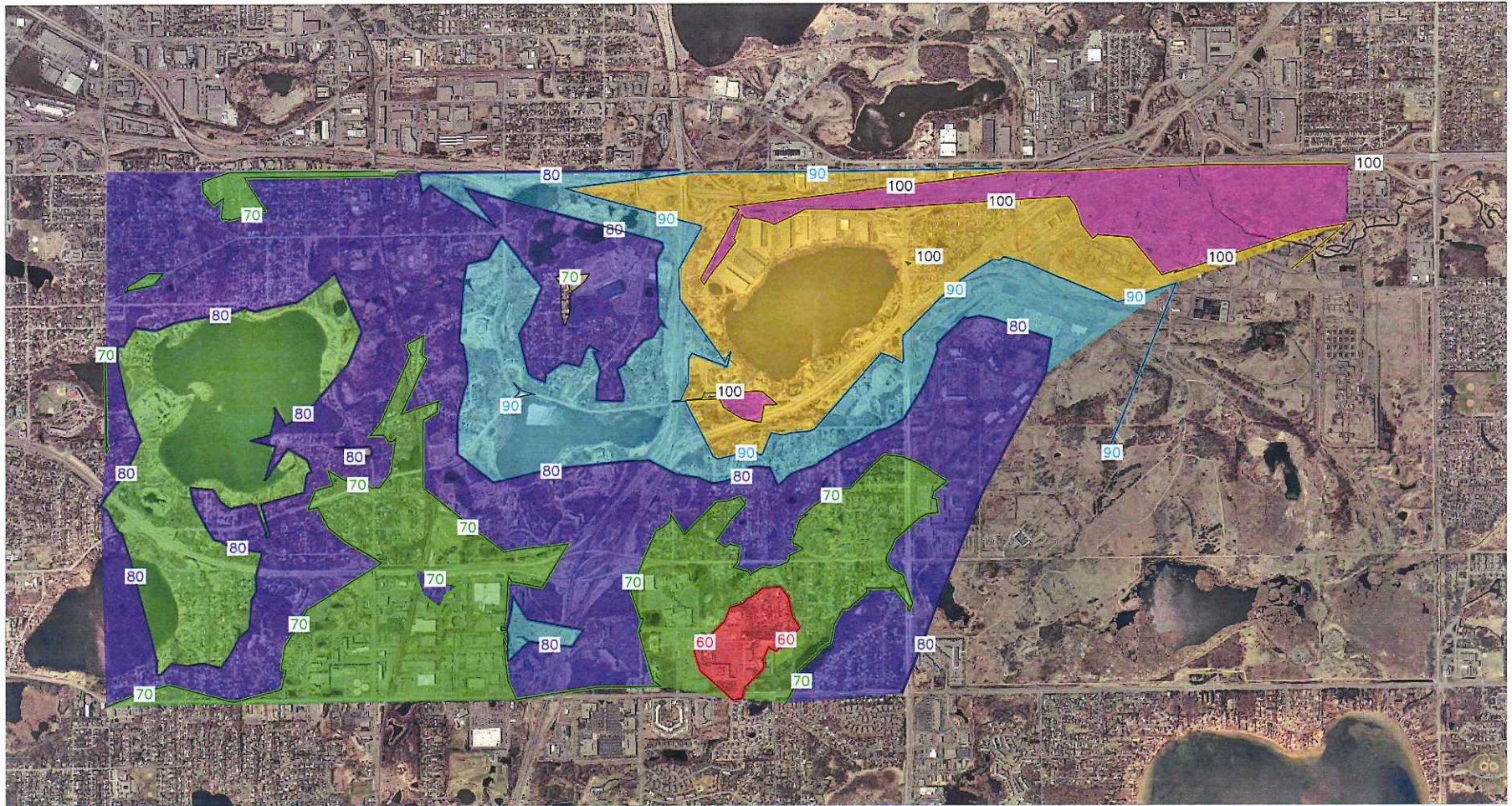
June 18, 2015

### Recommended Improvements

Based on the analyses above, the following recommendations are made:

1. Connect the TCAAP redevelopment area to the existing system from the south (across Highway 96 at the Spine Road) and from the west (across U.S. Highway 10) with a minimum of 12" diameter pipe. A third 12" pipe going south from the water tower (across Highway 96) would also be beneficial for phasing purposes (this would provide initial water tower looping), but is not included in the current estimates.
2. Construct a 1.0 to 1.5 MG water storage tower having the same high water elevation as Arden Hills' existing North Tower.
3. Construct an additional pumping system in the existing 12" pipe crossing I-694 near the intersection of I-694 and Snelling Avenue in Arden Hills, providing a similar pressure increase to Arden Hills' existing booster station.
4. Operate the TCAAP development in the same pressure zone as Arden Hills' existing high pressure zone.
5. If early water service to Outlot A is provided, simultaneously construct the interconnection with the Mounds View system.

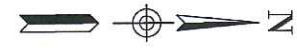
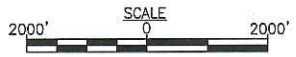




**LEGEND**

CONTOUR INTERVAL = 10 PSI

50 PSI	50 - 60 PSI
60 PSI	60 - 70 PSI
70 PSI	70 - 80 PSI
80 PSI	80 - 90 PSI
90 PSI	90 - 100 PSI
100 PSI	100 - 110 PSI



1	REPORT	BLG	MKB	11-13-2014
REV	REVISION DESCRIPTION	DWN	APP	REV DATE

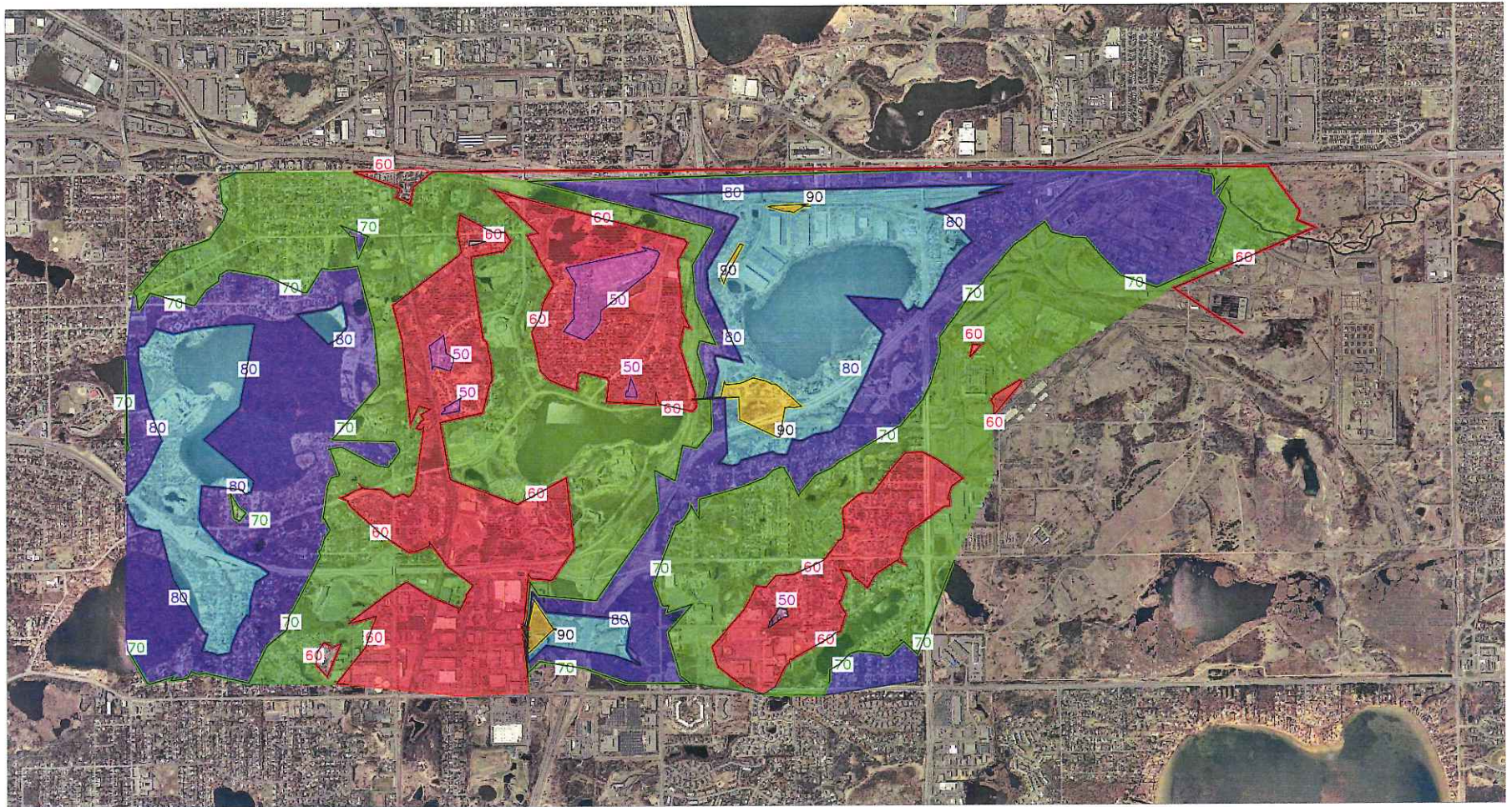
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DWN BY	CHK'D	APP'D
BLG	BLG	MKB
DWG DATE	11/2014	
SCALE	1"=2000'	

PROJECT	TCAAP SITE REDEVELOPMENT INFRASTRUCTURE
CLIENT	KIMLEY-HORN

SHEET TITLE	PRESSURE FOR MAX DAY DEMAND	
PROJECT NO.	SHEET NO.	REV NO.
1382	FIG. 1	

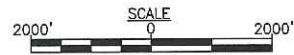




**LEGEND**

CONTOUR INTERVAL = 10 PSI

- |         |              |
|---------|--------------|
| 50 PSI  | 40 - 50 PSI  |
| 60 PSI  | 50 - 60 PSI  |
| 70 PSI  | 60 - 70 PSI  |
| 80 PSI  | 70 - 80 PSI  |
| 90 PSI  | 80 - 90 PSI  |
| 100 PSI | 90 - 100 PSI |



1	REPORT	BLG	MKB	11/13/2014
REV	REVISION DESCRIPTION	DWN	APP	REV DATE

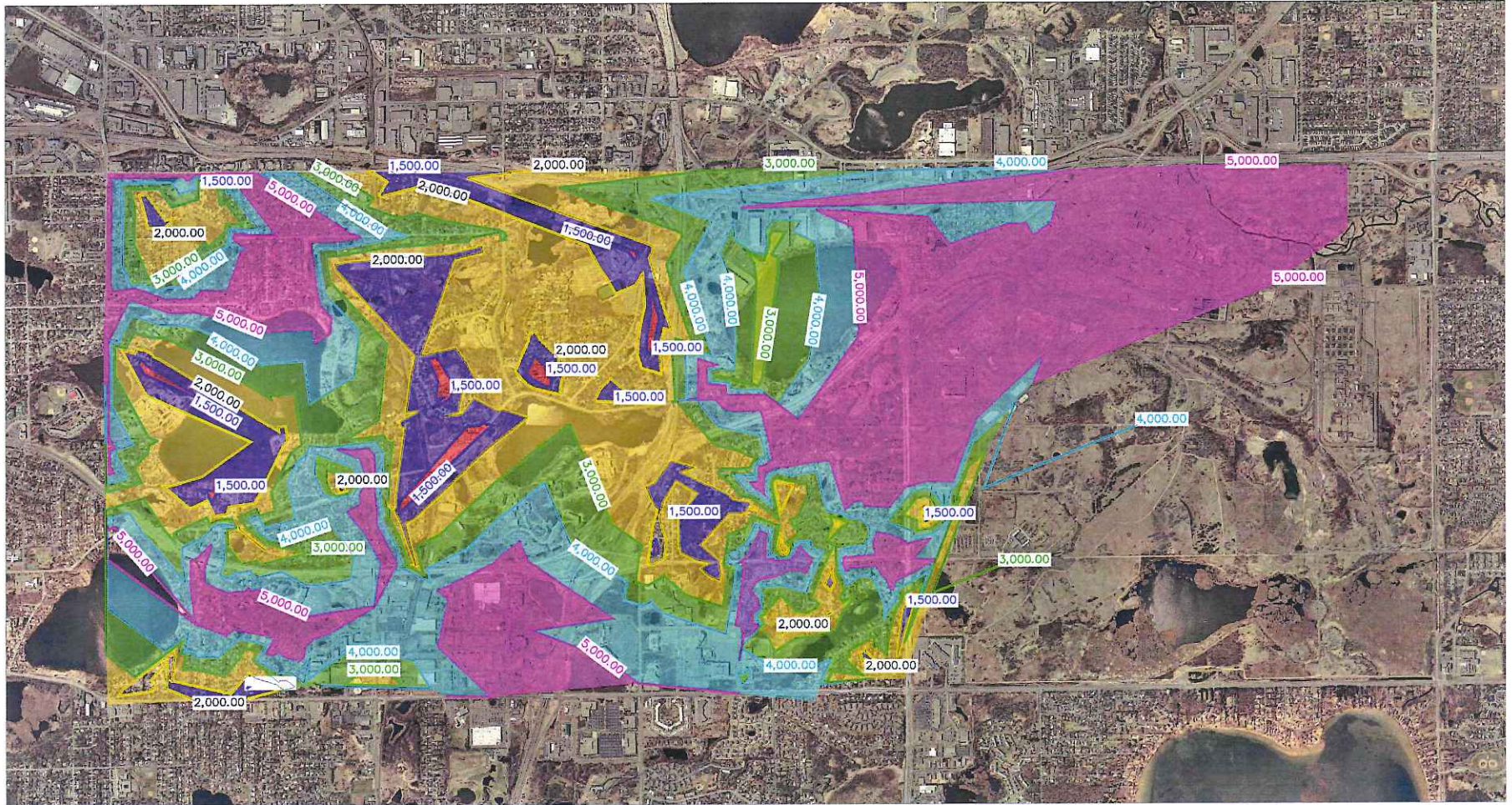
**Wenck**  
Wenck Associates, Inc.  
Consulting Engineers  
Web Site: www.wenck.com

DWN BY	CHK'D	APP'D
BLG	BLG	MKB
DWG DATE	11/2014	
SCALE	1" = 2000'	

PROJECT	TCAAP SITE REDEVELOPMENT INFRASTRUCTURE
CLIENT	KIMLEY-HORN

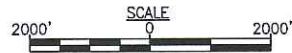
SHEET TITLE	PRESSURE FOLLOWING 3-HR 5000 GPM FIRE	
PROJECT NO.	SHEET NO.	REV NO.
1382	FIG. 2	





**LEGEND**

- < 1500 GPM
- 1500 - 2000 GPM
- 2000 - 3000 GPM
- 3000 - 4000 GPM
- 4000 - 5000 GPM
- > 5000 GPM



REV	REVISION DESCRIPTION	DWN	APP	REV DATE
1	REPORT	BLG	MKB	11/2014



**Wenck**  
 Consulting Engineers  
 Web Site: www.wenck.com

DWN BY	CHK'D	APP'D
BLG	BLG	MKB
DWG DATE	11/2014	
SCALE	1"=2000'	

PROJECT	TCAAP SITE REDEVELOPMENT INFRASTRUCTURE
CLIENT	KIMLEY-HORN

SHEET TITLE	FIRE FLOW AVAILABLE MAX DAY DEMAND	
PROJECT NO.	SHEET NO.	REV NO.
1382	FIG. 3	

## DESIGN CHARRETTE SUMMARY





## TCAAP Charrette Summary

November 19, 2014

JDA members, city and county staff, and citizens attended a 3 ½ hour work session on Friday October 31, 2014 at the Ramsey County Public Works building. The work session focused on an overall discussion about preferred character and identity for the TCAAP redevelopment project. JDA Chair David Sand opened the meeting and welcomed everyone. Kimley-Horn staff facilitated the workshop process. The attendees participated in three structured exercises that were organized to gather ideas, words, and preferences about the overall image of the development and in particular how this feedback would inform and direct a concept design for the project infrastructure including the interchanges, spine road, thumb road, landscape and stormwater components.

The charrette included a vision word exercise, a slide image survey, and topical roundtable discussions based on three categories: Gateway & Identity; Spine Road & Infrastructure; and Community & Civic Spaces.

Attendees: Matthew Bachler, Phil Belfiori, Beth Engum, Blake Huffman, Jill Hutmacher, Patrick Klaers, Terry Maurer, Rafael Ortega, Anna Potter, Katie Roth, Ryan Streff, James Tolaas, Heather Worthington, Scott Yonke, Rich Straumann, Lyle Salmela, Jon Horn, Mitch Workman, Brian Smalkoski, Tom Lincoln, Mike Lamb, Beth Kunkel, Tom Harrington, Bret Johnson

### Summary of Results

Exercise #1 - Vision word exercise - Participants were asked to write down three words that describe their vision for the TCAAP site. All the words provided are listed below; the number indicates the frequency the word was used. Similar words are associated by grouping.

- Walkable/Trails/Person-scaled - 4
- Jobs/Tax Base - 3
- Active - 3
- Vibrant/Cool/Lively - 3
- Resilient/Sustainable/Diverse - 3
- Nature/Natural/Habitat - 3
- Life Cycle - 2
- Model Community/Complete Neighborhood/Housing - 2
- Special/Welcoming/Beautiful/Unique - 2
- Developed
- Mixed use
- Opportunity
- Visionary/Future Thinking
- Historic
- Destination
- Connective/Connected/Corridor



RAMSEY COUNTY



# TCAAP Site Redevelopment Infrastructure

Exercise #2 - Slide image survey – Attendees were shown 34 slide images and were asked to rate each image on a scale of 1 (low) to 5 (high). Top 5 highest and lowest rated images are shown below.

## Lowest Rated Images



Average = 1.78



Average = 1.92



Average = 2.42



Average = 2.81

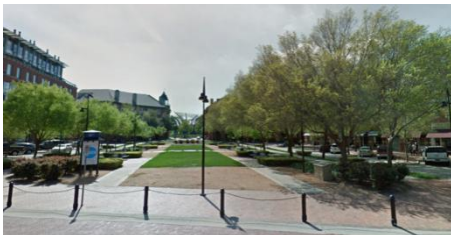


Average = 2.944



Average = 2.944

## Highest Rated Images



Average = 4.53



Average = 4.61



Average = 4.67



Average = 4.69



Average = 4.9





Exercise #3 - Topical roundtable discussions – Participants were organized into 3 groups. Each group spent about 30 minutes at each table discussing the topics through a facilitated discussion.

Table 1 - Gateway & Identity

Landscape

- o Landscaping is important and possibly the most important element for a strong gateway
- o Mature looking landscape that is full and thoughtful is important
- o There were differing opinions about natural landscape vs. more formal and organized landscapes
- o Color and seasonal interest is preferred and adds complexity
- o Landscaping for different scales: Vehicular, pedestrian, and an overarching character are important and may be different

Lighting

- o Overall lighting should be functional and serve safety concerns
- o LED lights seemed to be preferred
- o Historic/potentially more industrial or timeless looking fixtures; Stone bases are at times too over the top
- o Fixtures should not be over the top and artsy unless art is the main purpose of the piece
- o Lighting for different scales: Vehicular, pedestrian, and an overarching character are important and may be different

Branding

- o Timeless
- o Like a "Branch" of Arden Hills but not a stamp of Arden Hills
- o The landscape, lighting, monuments, textures, colors and overall design should make up the "Brand"
- o Don't like the idea of forcing a brand and trying to be something that we are not
- o Nothing "gimmicky" or temporary (example: banners were not preferred for the most part)

Monuments

- o More than the typical without being over the top
- o The bridge shall be part of the gateway and act as a monument
- o More meaning than just the words on the sign
- o Monuments for different areas: Main entrance vs a secondary vs tertiary entrance

Table 2 – Spine Road & Infrastructure

County Road H Interchange

- o General consensus was the standard diamond was preferred
- o Deals with the Rice Creek Remeander better, although the creek could be remeandered north
- o Better gateway to TCAAP
- o Better pedestrian access to and from TCAAP
- o Less impact to commercial property and better retail access
- o Standard diamond roundabout will be difficult to sign – five legs versus four

Landscaping

- o Varying along Spine Road
- o Extensive at entries
- o Town section should be different
- o General consensus is 1,2,and 3 from the images
- o Mix of native and formal – native should not be natural which is perceived as weeds
- o Diversity of trees in both the median and boulevard – no consensus on even or uneven spacing
- o Median and boulevard should work together



- o No roses and no coniferous
- o Irrigated
- o Natural resources corridor should be considered in landscape plan

Lighting

- o No shoe box – unique consistent fixture – nice design – timely
- o Not costly to maintain – durable and maintainable
- o LED – LED demonstration? – solar panels? – QLED?
- o No banners
- o Greater intensity at town center
- o Pedestrian lighting is very important - could be pedestrian lighting with intersections and town roadway lighting
- o Consider dual fixtures – pedestrian and roadway on same fixture

Bridges and Railings

- o Fit with theme of Interstate bridges, but higher design
- o Classic – timeless – not cluttered – simple railings
- o Rice Creek bridge could be a visual centerpiece – focal point
- o Design language could carry through TCAAP site
- o Lit train adjacent to creek
- o Wingwalls would be OK

Signage

- o Standard City street signs throughout – street signs should not distinguish TCAAP
- o Need entry and wayfinding signage
- o Simple is better
- o Want trail signage

Table 3 – Community & Civic Spaces

Parking

- o Smaller lots (re: Grand Avenue), small lots,
- o Creative, walkable, balanced
- o Angled at the street, on-street
- o Ramps vs. surface
- o Landscape edges, rain gardens, screened,
- o Stormwater BMPS
- o Mix of types, shared parking

Furnishings

- o Natural, native to the area
- o Bike function vs. form, not art
- o Use of recycled materials
- o Low maintenance
- o Safe
- o Benches with trash receptacles

Parks

- o Functional, multi-purpose
- o Natural vs. modern, natural theme
- o Small and mixed; passive and programmed





- Open, visible, focal connections
- Integrate architecture with nature
- Transitions
- Comfortable, appealing, inviting
- Simple but not plain
- Gathering spaces

#### Landscape

- Efficient, low maintenance
- Pedestrian safety, walkable, sidewalks
- Density
- Urban/wild interface
- Connections
- Natural, native; natural vs. modern
- Unique, welcoming, character, balance, purpose, variety, scaled
- Play
- Water features and the creek
- Themes for districts
- Mature trees
- Mix of types and uses
- Plantings that respond to character of the site





## Post-Charrette Design Summary

**Inclusions/Exclusions:** Based on the preferences and comments provided by the charrette participants in the precedent imagery review of Table Exercise #3, the following is a summary of the most consistent responses, expressed here as either included or excluded from the design:

Design Area	Include	Exclude
<u>Table 1 - Gateway &amp; Identity</u>	- Natural Landscaping/Water - Larger, Vertical Signage	- Banners - Expansive Pavements - Modern Design - Gimmicks
<u>Table 2 – Spine Road &amp; Infrastructure</u>	- Fully Landscaped (Median and Boulevards) - Diverse Landscape – by area - Natural Forms and Materials for Structures	- Shoebox (std.) Streetlights - Wire/Chain Link Fencing - Wooden Posts (signs)
<u>Table 3 – Community &amp; Civic Spaces</u>	- Ordered/Formal Design at Certain Locations - Flexible/Variable Spaces - Landscaping in Parking Lots	- Furnishings with Gimmicks - Excessive Un-Programmed Pavements - Large, Expansive Parking Lots

**General/Overall Themes:** From the 3 Table Exercises, general themes emerged which helps provide a general direction for design:

1. Design should respond to the character (natural features) and culture (history) of the site/place
2. Design should help promote healthy living – pedestrian scale; accessible; inviting; unique experiences
3. Design should celebrate and incorporate the natural resources corridor

**Applications:** The articulation of these general/overall themes will be expressed in the design of the 6 primary components:

- Landscaping
- Lighting
- Pavements
- Furnishings
- Structures
- Monuments