INTERCEPTOR 8253-327 SANITARY SEWER IMPROVEMENTS

Draft Facility Plan

METROPOLITAN COUNCIL

November 2025

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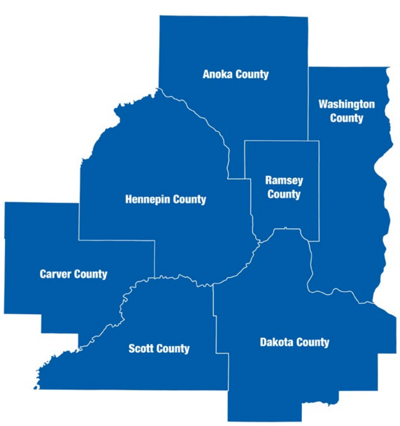

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Glossary of Terms

The following terms and abbreviations are used in this report and are provided here for reference.

ADF. Average Daily Flow. The 24-hour wastewater volume for a 24-hour day without precipitation.

BCE. Business Case Evaluation. A discipline used to systematically evaluate a perceived need then determine how best to address this need by considering financial and non-financial factors.

CIPP. Cured-in-Place Pipe. A trenchless rehabilitation technique that restores an existing damaged pipe to a new structurally sound condition.

DIP. Ductile Iron Pipe. A pipe made from an iron alloy that is commonly used for water infrastructure.

EAW. Environmental Assessment Worksheet. A report that documents potential environmental impacts from a project and is required as part of a facility plan.

ESA. Environmental Site Assessment. A report prepared for a landowner that identifies potential or existing contamination liabilities.

FM. Forcemain. A pipe conveying pumped (forced) wastewater under pressure. Forcemains are used where gravity flow is not feasible (e.g. uphill).

GIS. Geographic Information System. A computer system designed to display geographically referenced data, usually in the form of a map.

Gopher State One Call (GSOC). The Minnesota call-before-you-dig utility locating and notification system.

GPM. Gallons per minute, a unit of measurement for rate of water flow by volume.

HP. Horsepower. A pump motor’s power rating, which determines the pump’s capability to move water.

HDPE. High Density Polyethylene. A type of plastic used to manufacture pipes commonly used for water infrastructure.

I/I. Inflow/Infiltration. Inflow is the entry of water, other than wastewater, entering a sewer collection system, often from maintenance structure covers or cross connections between the storm sewer and sanitary sewer systems. Infiltration is water, other than wastewater, that enters a collection system from the ground through pipe defects or leaking maintenance structures.

Lift (Pump) Station. A pumping station for wastewater or storm water. Often identified as “L-XX”

Meter (Flume or Magnetic). Wastewater flowing through a gravity pipe is measured (metered) using either a specially shaped channel called a flume which measures flow rate based on the water depth or a magnetic meter or "mag meter" which measures flow rate by detecting variations in a magnetic field.

MGD. Millions of Gallons per Day, a unit of measurement for flow rate of water by volume

MnDOT. Minnesota Department of Transportation.

MnDNR. Minnesota Department of Natural Resources.

MPCA. Minnesota Pollution Control Agency.

NPV. Net Present Value. NPV is a representation of future costs in terms of a single present-day amount.

NWI. National Wetland Inventory. A listing of all wetlands recognized by the US Fish and Wildlife Service.

NPDES. National Pollutant Discharge Elimination System. A permit program that addresses water pollution. Wastewater treatment plants have NPDES permits that require monitoring of specific constituents discharged. Construction projects have NPDES construction stormwater permits that regulate sediment in construction site runoff.

O&M. Operations and Maintenance

PFA. Public Facilities Authority. A unit of State government that administers financing programs for public infrastructure projects.

PVC. Polyvinyl Chloride. A plastic that is commonly used to manufacture water pipes.

ROW. Right of Way. A public land corridor reserved for public uses such as roads, sidewalks, and utilities.

SHPO. Minnesota State Historic Preservation Office. A unit of State government responsible for inventorying and protecting historic sites.

SWPPP. Stormwater Pollution Prevention Plan. A site-specific document that details the methods and practices used to prevent stormwater runoff from carrying pollutants offsite.

TDH. Total Dynamic Head. How much pressure a pump can generate to move water.

PWI. Public Waters Inventory. A listing of state-protected waterbodies compiled by the Minnesota Department of Natural Resources.

WWTP/WRRF. Wastewater Treatment Plant/Water Resource Recovery Facility. A facility which removes impurities from wastewater so the water can be safely returned to the environment

Executive Summary

Background and Objectives

The Interceptor 8253-327 Sanitary Sewer Improvements Facility Plan (Facility Plan) identifies and quantifies improvements to the Blue Lake Water Resource Recovery Facility (Blue Lake WRRF) service area of the regional interceptor system (Figure 1) which will provide a long-term, integrated solution for wastewater conveyance and ultimate treatment in the Lake Minnetonka area (Blue Lake WRRF service area). This Facility Plan develops alternatives and recommended improvements that will allow design and construction of needed infrastructure improvements in a timely and coordinated manner for maintaining service to communities with system improvements funded through the Clean Water Revolving Loan Fund (PFA funding). Construction of these improvements is scheduled to be implemented within the next five years; however, the actual schedule for construction may vary as design progresses.

Inspections, condition assessments, flow projections, hydraulic analyses, and recent emergency repairs show the need for facility replacement and/or rehabilitation of Metropolitan Council Environmental Services' regional Interceptor 8253-327, located in the cities of Chanhassen, Shorewood and Victoria. The primary objectives of the project are to maintain and improve the wastewater assets comprising the regional wastewater system; maintain system capacity, improve system reliability, minimize potential for overflows and service interruptions that could pose a threat to public safety, health, and the environment; and increase operational flexibility.

Existing Conditions

Flow from Lift Station L21, located in Shorewood, is conveyed primarily by Forcemain Interceptor 8253-327 (Figure 2). Interceptor 7017 functions as a low-flow backup facility. Forcemain 8253-327 was constructed in 1988 and is comprised of approximately 15,000 feet of 30-inch diameter ductile iron pipe (DIP). It originates at Lift Station L21 on the northern shore of Lake Virginia in Shorewood and runs generally eastward along 62nd Street and State Highway 7 to State Highway 41 where it turns south and discharges into Gravity Interceptor 8253-328 at Lake Lucy Drive, approximately one-half mile south of State Highway 7. In 2023, the downstream 1,900 feet of the original DIP was replaced with fiberglass reinforced polymer mortar pipe (RPMP) due to a failure of the DIP due to internal corrosion. This new segment of pipe was reconfigured as a gravity sanitary sewer system and will not be modified as part of the project covered by this Facility Plan.

Lift Station L21's low flow backup, a 725-foot-long, 24-inch diameter DIP forcemain (Forcemain Interceptor 7017) discharges into a 24-inch diameter reinforced concrete pipe (RCP) gravity line (Gravity Interceptor 7017). This interceptor has limited capacity and can only convey flow from one of the six L21 pumps. This is due to the low capacity of the 24-inch gravity pipe. This gravity pipe also serves as the local sewer for properties along West 62nd Street. Overfilling it can result in flows backing up into basements.

Recommendations

Based upon the review of the net present value of alternatives and non-monetary factors, the following improvement is recommended.

The recommended project alternative (Alternative 3) is to construct one new, fully redundant forcemain for the entire length of the existing 8253-327 forcemain pipe, as shown in (Figure 3). The new pipe will run along an alignment independent of the existing 8253-327 forcemain and consist of a 30-inch diameter forcemain plus access structures. See Appendix A for a detailed business case analysis of all five alternatives.

Table ES-1: **Facility Improvement Recommendation and Cost Summary**

Alternative	Estimated Total Capital Cost	O&M Costs	Total Project NPV*
Alternative 3 – One new forcemain. Repurpose existing 7017 forcemain.	$25.9M	$2.5M	$28.4M

*NPV: Net present value.

Proposed Project Schedule

The Interceptor 8253-327 Sanitary Sewer Improvements Project is planned to be implemented within the next 5 years. The construction schedule will be further developed as design progresses.

Table ES-2: **Project Implementation Schedule**

Activity	Schedule
Facility Plan and Environmental Documentation	2025-2026
Final Design	2026-2027
Bidding	2027
Construction	2028-2030
Commissioning	2030

1. Introduction

1.1. Problem Statement

The Metropolitan Council Environmental Services (Met Council) provides regional wastewater conveyance services to the communities in the Lake Minnetonka area. Wastewater flowing from the Lake Minnetonka area is conveyed to the Blue Lake Water Resource Recovery Facility (WRRF) in Shakopee through a system of 21 lift stations and 106 miles of interceptor pipes. The Blue Lake WRRF service area is shown in Figure 1.

The Interceptor 8253-327 Sewer Improvements Facility Plan (Facility Plan) focuses on the Met Council's L21 forcemain system, consisting of two forcemains, 7017 and 8253-327, as shown in Figure 2. Although L21 has two forcemains, the 7017 system has significantly less hydraulic capacity than Interceptor 8253-327 and cannot convey flow from more than a single L21 pump without filling beyond capacity and causing wastewater spills. Therefore, the overall L21 forcemain system has redundancy only under low flow conditions. In the event of an outage to the 8253-327 system, the only long-term backup would be an above-ground temporary conveyance pipe. Such a pipe would be costly and take two to three days to set up. Also, neither a trucking operation nor the 7017 system would be feasible as long-term backups.

If a long-term outage of 8253-327 were to occur, especially during wet weather, it would be unlikely that service to communities upstream of L21 could be maintained.

1.2. Objective

The purpose of this Facility Plan is to evaluate the findings from previous studies, provide a summary of the existing Council-owned infrastructure included in the project, and to implement the preferred alternative, with the goal of providing a long-term, integrated solutions for wastewater conveyance and ultimate treatment. Alternatives are intended to:

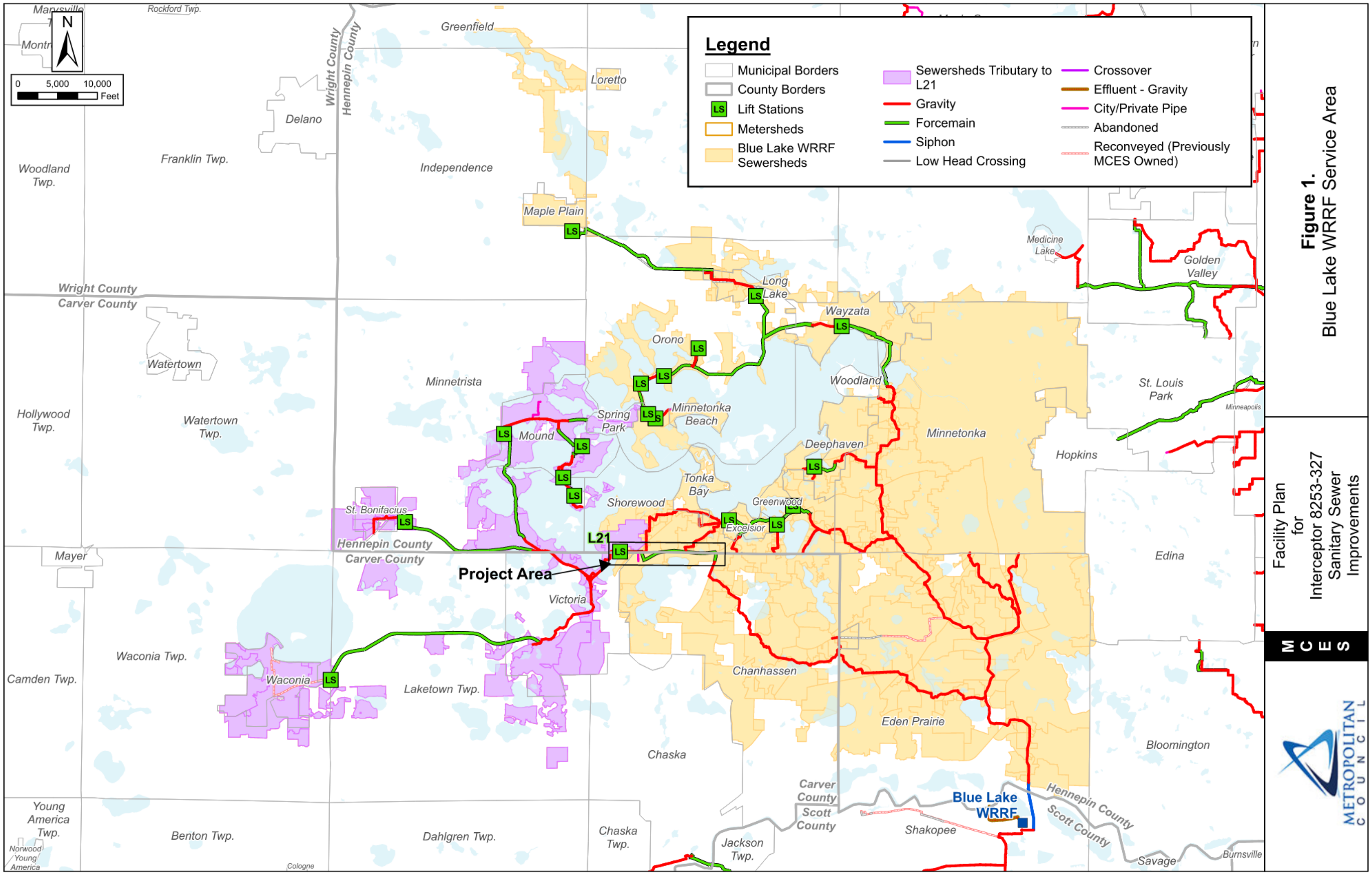
- Maintain system capacity
- Improve system reliability
- Minimize the potential for overflows and service interruptions that could pose a threat to public safety, health, and the environment
- Increase operational flexibility.

These improvements are anticipated to be funded through the Clean Water Revolving Loan Fund (PFA funding).

1.3 Planning Area

The service area studied by this facility plan includes portions of Chanhassen, Laketown Township, Minnetrista, Mound, Shorewood, Spring Park, St. Bonifacius, Victoria, and Waconia. See (Figure 1).

Figure 1: Blue Lake WRRF Service Area



2. Existing and Future Conditions

2.1. Existing Facilities Inventory

The information below summarizes the existing interceptor facilities included in this Facility Plan.

Table 1: Existing Lift Station Infrastructure

Location	Lift Station	Pumps	Pump Capacity (gpm)	TDH (ft)	HP	Firm Capacity (MGD)	Year Built	Year Rehab
Shorewood	L21	6-Fairbanks Morse Dry Pit	3,300	65	100	15.1	1971	1989

Table 2: Existing Interceptor Infrastructure

Interceptor	Conveyance Type	Diameter (in)	Material	Length (ft)	Capacity (MGD)	Year Built	Year Rehab
7017	Forcemain	24	DIP	725	12.2*	1971	n/a
7017	Gravity	24	RCP	7,400**	5.0	1971	n/a
8253-327	Forcemain	30	DIP	14,300***	19.0*	1988	n/a

*Forcemain capacity is based on a flow velocity of 6 feet per second.
**At the end of this segment, the pipe changes to 30-inch RCP.
***At the end of this segment, the pipe discharges into the 30-inch RPMP gravity system.

2.2. Service Area Characteristics

The Metropolitan Council Imagine 2050 Water Policy Plan calculated the previous, existing, and future average daily flow conditions in the Lake Minnetonka area using the assumptions shown Table 3. Flow projections for cities in the L21 sewershed are shown in Table 4. These communities are all serviced by the Blue Lake WRRF located at 6951 County Rd 101 in Shakopee, MN along the Minnesota River. The Blue Lake WRRF is the fourth largest plant operated by Metropolitan Council Environmental Services treating an average of 29 million gallons per day.

In July 2024, the engineering consulting firm Brown and Caldwell performed hydraulic modeling for historic and future flow scenarios to determine system flow conditions and identify areas for improvements within the Lake Minnetonka area. Although observed peaking factors for 8253-327 exceeded standard peaking factors, the observed conditions did not exceed the capacity of 8253-327. This analysis is included in Appendix B and summarized in Table 5.

In December 2024, flow projections for interceptor 8253-327 were updated. These projections are summarized in Table 6.

In December 2021, the engineering consulting Short Elliot Hendrickson (SEH) performed a condition assessment of the 8253-327 forcemain in 2021. Their findings are included in Appendix C. This assessment included metal thickness testing and soil corrosivity analysis. SEH concluded that the only area of significant metal thickness loss occurred in the area that was subsequently repaired in 2023. After SEH's assessment, Brown and Caldwell performed a more comprehensive condition assessment of the 8253-327 forcemain in 2022. Brown and Caldwell found two possible instances of metal thickness loss in the areas tested. Considering also SEH's findings, Brown and Caldwell concluded that the existing 8253-327 pipe had sufficient years of remaining service life that it could continue to be utilized through 2050, barring the discovery of any defects resulting from a future internal CCTV inspection. Such inspection will only be possible after construction of the fully redundant forcemain for L21 proposed by this project.

Table 3: Flow Projection Assumptions

Factor	Value Used
Household population water usage	60 gallons per capita per day
Employer usage	15 gallons per employee per day
Peaking factors:	Met Council flow variation factors for sewer design**
Water conservation reduction per decade	0%

** available in Appendix G of the Imagine 2050 Water Policy Plan

Table 4: Existing and Future Flows for Communities in the L21 Service Area.

Community	Existing ADF (MGD)	2030 ADF (MGD)	2040 ADF (MGD)	2050 ADF (MGD)
Chanhassen	2.51	2.75	2.89	3.08
Laketown Twp	0.06	0.12	0.12	0
Minnetrista	0.36	0.47	0.54	0.61
Mound	0.72	0.83	0.80	0.79
Shorewood	0.88	1.07	1.08	1.09
Spring Park	0.22	0.24	0.24	0.26
St. Bonifacius	0.25	0.26	0.26	0.27
Victoria	0.80	1.00	1.16	1.39
Waconia	1.01	1.29	1.39	1.63

Table 5: L21 Forcemain Projected Flows.

Interceptor	2030 ADF (MGD)	2030 Peak (MGD)	2040 ADF (MGD)	2040 Peak (MGD)	2050 ADF (MGD)	2050 Peak (MGD)	2050 Percent Utilization*
7017 FM	n/a	4.0	n/a	4.0	n/a	4.0	100%**
7017 Gravity (at MH11-2)	0.2	0.85	0.22	0.91	0.24	1.0	17%***
8253-327 FM	4.4	14.6	4.9	16.2	5.4	18.2	77%
8253-327 Gravity	4.4	14.6	4.9	16.2	5.4	18.2	73%

* Forcemain capacity is based on a flow velocity of 6 feet per second.
** The capacity of forcemain 7017 is limited by the capacity of the pipe it discharges into. Flows exceeding this rate can cause surcharging and backups in the downstream system.

***Utilization is based on standard operating conditions and not when being used as a backup to L21.

Table 6: Forcemain 8253-327 Current and Projected Flows.

Year	Average Daily Flow (ADF) (MGD)	Observed Peak Factor (PF)*	Observed PF Flow (MGD)	Standard Peak Factor (PF)**	Standard PF Flow (MGD)
Current	3.5	3.33	11.7	2.5	8.8
2030	4.4	3.33	14.6	2.4	10.5
2040	4.9	3.33	16.2	2.4	11.6
2050	5.4	3.33	18.2	2.3	12.5

*Observed peaking factors are multipliers determined by dividing historic observed flows by the average daily flow (ADF).

**Standard peaking factors are flow multipliers used by Environmental Services to establish thresholds for excessive inflow/infiltration (I/I).

3. Development of Alternatives

3.1 Description of Alternatives

The following design parameters were used to develop project alternatives. Redundancy: provide a fully redundant system with each forcemain being capable of conveying future peak wet weather flows and interconnections between the two forcemains.

- Maintain existing hydraulic conditions: each alternative's pipe profile and length should be similar to the existing system so pumping rates at L21 remain the same for each of the redundant forcemains.
- Ability to divert flow: each alternative must be capable of diverting up to 4 MGD (one full speed pump at L21) to L19 in Excelsior to provide relief to the gravity system downstream of 8253-327.
- Consistent number of maintenance structures: alternatives must not require more maintenance structures than the existing system to avoid increasing operation and maintenance costs.
- Maximize use of existing easements and right-of-way
- Minimize the number of private driveway impacts
- Avoid waterbodies and wells wherever possible
- Maintain specified distance from feature to pipe centerline:
  - Well, 50 ft
  - Habitable buildings, 35 feet
  - Detached garage, pool, outbuilding, 25 feet
  - Electrical transmission power poles, 15 feet
  - Watermain and high-pressure gas main, 12 feet
  - Local gas, existing sanitary sewer, power poles, and edge of MnDOT Highways, 10 feet

Five alternatives were developed for 8253-327 improvements, including the status quo alternative. Alternatives that retain the existing 8253-327 forcemain include rehabilitation of the existing access structures but not rehabilitation of the existing pipe.

Alternative 1, Status Quo. This alternative leaves the existing system in place (see Figure 2). In this alternative, maintenance, rehabilitation of maintenance structures, and cleaning and inspection would be required to extend the system's useful life. Furthermore, the system would need to be taken out of service every 10 years for cleaning and inspection to determine if any internal defects exist. Without a fully redundant system available, such actions would need to be performed during sustained periods of dry weather to avoid the requirement for temporary flow conveyance.

Alternative 1 does not meet the project objectives of reliability and operational flexibility. Furthermore, due to the environmentally sensitive nature of the Lake Minnetonka area, a release of wastewater in the event of a facility failure would create a threat to public safety and health, the environment, and threaten private property and economic activity. Therefore, the “status quo” alternative was not selected.

Alternative 2, One New Forcemain on new alignment. Alternative 2 involves constructing approximately 13,700 ft of new 30-inch forcemain following a new alignment. The proposed alignment of the new pipe is shown in Figure 3. In this alternative, the existing forcemain and gravity interceptors remain in use, and no temporary conveyance is necessary for construction. This alternative includes cleaning and inspecting the existing 8253-327 forcemain, as well as maintenance structure rehabilitation once the new forcemain is put into service. The addition of one new forcemain meets project objectives by providing a fully redundant forcemain system.

Alternative 3, One New Forcemain on existing 7017 alignment. Alternative 3 includes the addition of approximately 13,500 LF of 30-inch forcemain. In this alternative, the new pipe is placed in a similar alignment to the existing gravity interceptor 7017 as shown in Figure 3. Therefore, the existing 7017 gravity interceptor on W 62nd St. is removed and the reinstalled 7017 gravity interceptor is placed in a new alignment and is no longer connected to L21. This alternative requires temporary gravity service coordination for cutover piping during construction. As with Alternative 2 this alternative includes cleaning and inspecting the existing 8253-327 forcemain, as well as manhole rehabilitation once the new forcemain is put into service. The addition of one new forcemain meets project objectives by providing a fully redundant forcemain system.

Alternative 4, Two New Forcemains on existing 8253-327 alignment. This alternative constructs approximately 27,100 LF of two new 30-inch forcemain pipes on a the existing forcemain alignment as shown in Figure 4. Because this alternative removes the existing 8253-327 forcemain within W 62nd St during new pipe construction, temporary conveyance is needed in that area. The remainder of the alignment constructs two new pipes within the same trench in a different alignment from the existing 8253-327 forcemain and then requires removal of the existing 8253-327 forcemain after the new forcemains are put into service. The addition of two new forcemains meets project objectives by providing a fully redundant forcemain system.

Alternative 5, Two New Forcemains. This alternative constructs approximately 27,300 LF of two new 30-inch forcemain pipes in a different alignment from the existing 8253-327 forcemain as shown in Figure 4. The two new pipes would be constructed within the same trench. Since the existing forcemain remains in place during construction no temporary conveyance is needed. The existing 8253-327 forcemain is removed after construction of the new forcemains. The addition of two new forcemains meets project objectives by providing a fully redundant forcemain system.

Figure 2: L21 System Layout and Status Quo Alternative

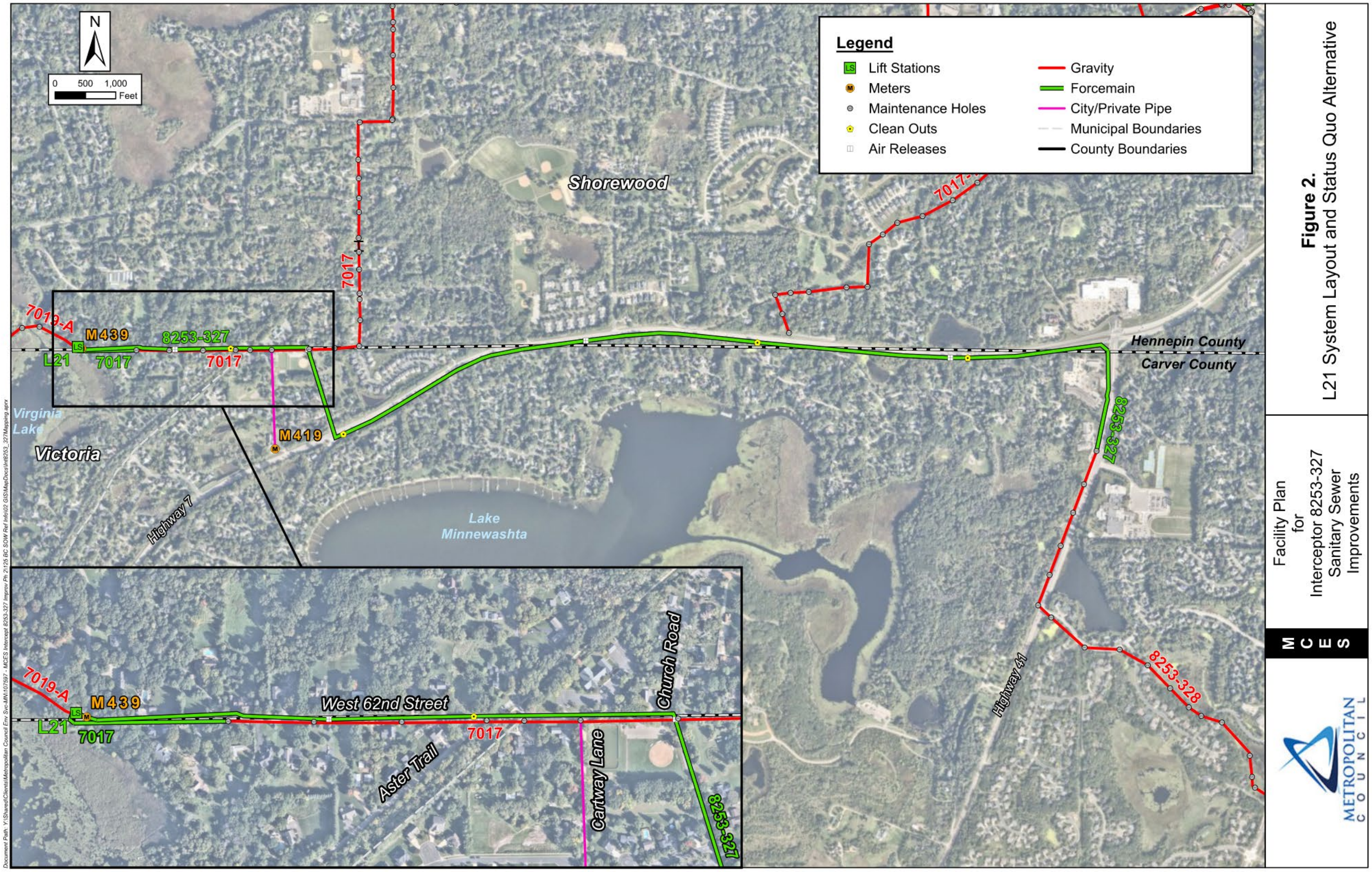


Figure 3: Alternatives 2 and 3

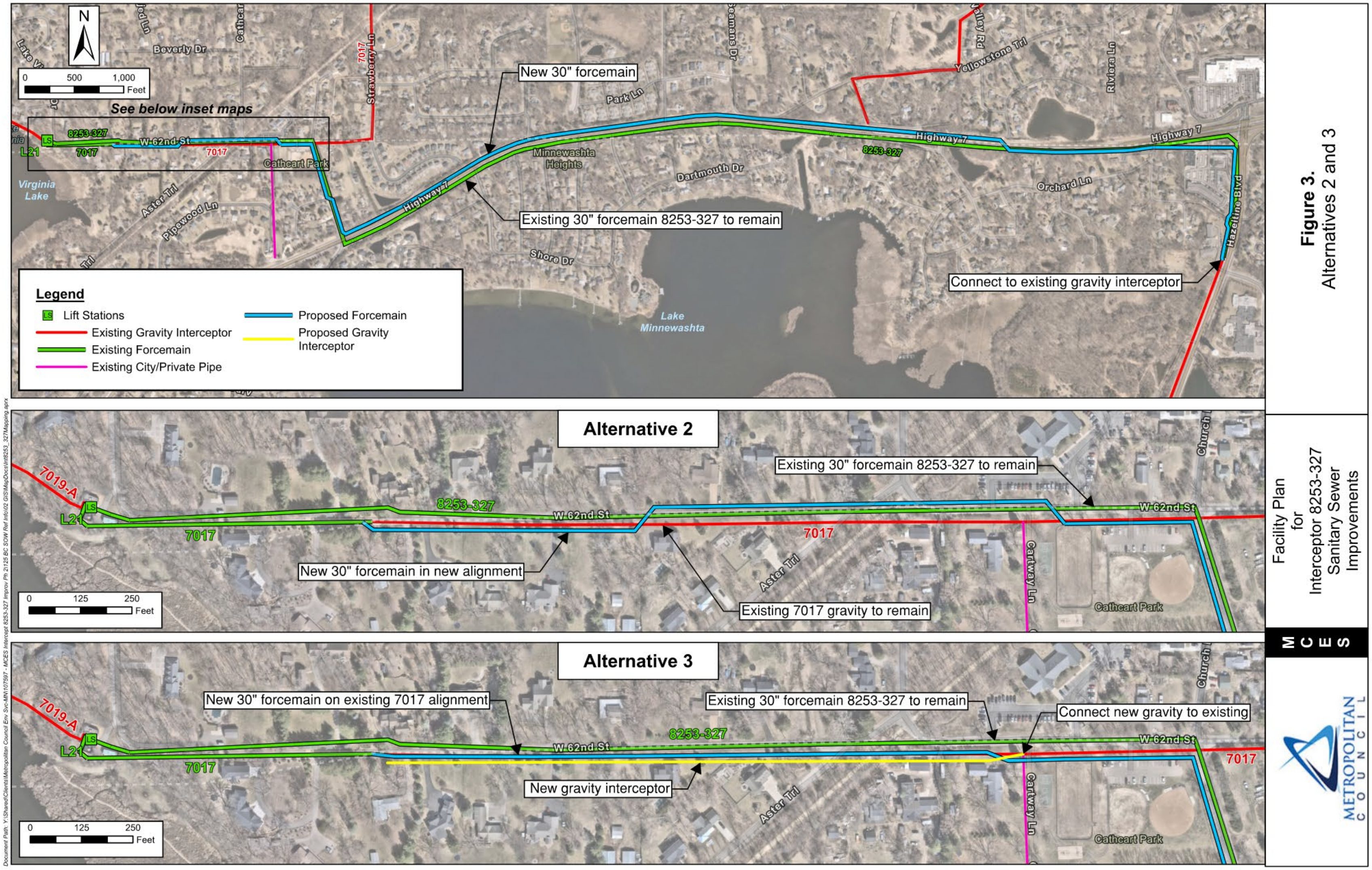
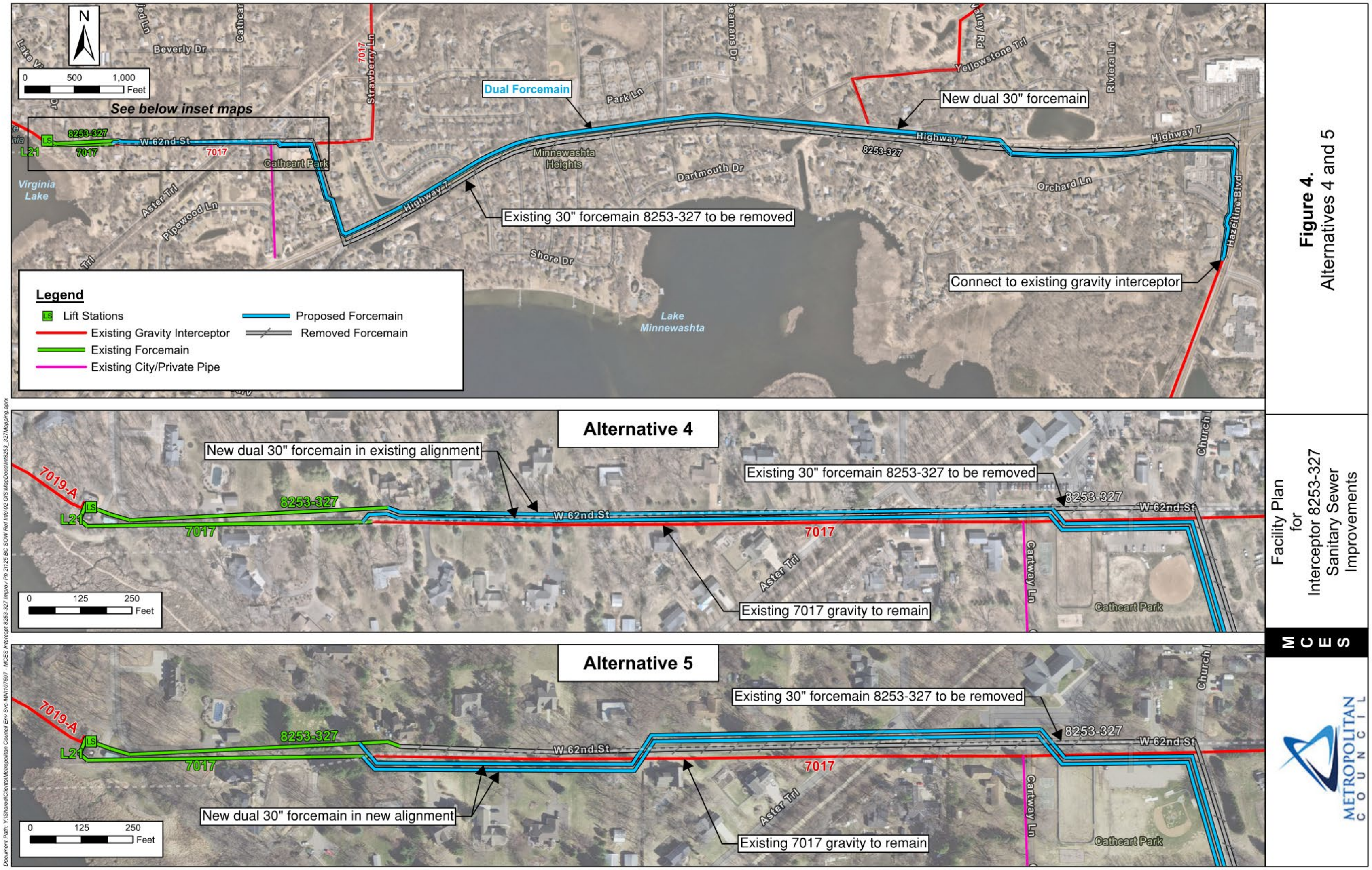


Figure 4: Alternatives 4 and 5



3.2. Non-monetary Factors

Nonmonetary factors must be identified and addressed in addition to the traditional monetary factors since they impact the project implementation schedule and the overall cost. Nonmonetary factors can include constructability, environmental impacts, and community concerns. This section discusses the impacts of non-monetary factors on project alternatives.

3.2.1. Community Impacts

Community impacts cover topics such as disruption to local communities, property, recreational areas, and roads. Impacts to roads and recreational facilities are generally the same for all but Alternative 1. Table 7 depicts the number of parcels impacted of each alternative on properties, wells and trees/landscaping. Note that impacts are subject to change depending on final pipe alignment. Impacted wells will likely require relocation by Metropolitan Council Environmental Services.

Table 7: Community Construction Impact Summary

Alternative	Temporary and/or permanent easements required	Wells within 50 feet of new pipe construction	Locations with two or more large diameter trees	Gas or electric utility relocation required	Total Number of Parcels Impacted
1	0	2	0	0	2
2	23	2	13	1	25
3	26	2	15	0	28
4	35	3	13	7	35
5	32	4	22	0	33

3.2.2. Environmental Impacts

Environmental impacts associated with the proposed projects are documented fully in the Environmental Assessment Worksheet (EAW) which will be submitted separately. The following sections summarize key topics that are addressed by the EAW.

3.2.3. Contaminated Properties and Hazardous Materials

A review of data available on the Minnesota Pollution Control Agency's online GIS database entitled "What's in My Neighborhood" to identify properties or events with the potential to impact the specified portions of the project was conducted in June 2025. Twelve sites were identified, eleven on which were considered low risk and one that was considered medium risk, see Table 8 for details and Figure 5 for locations.

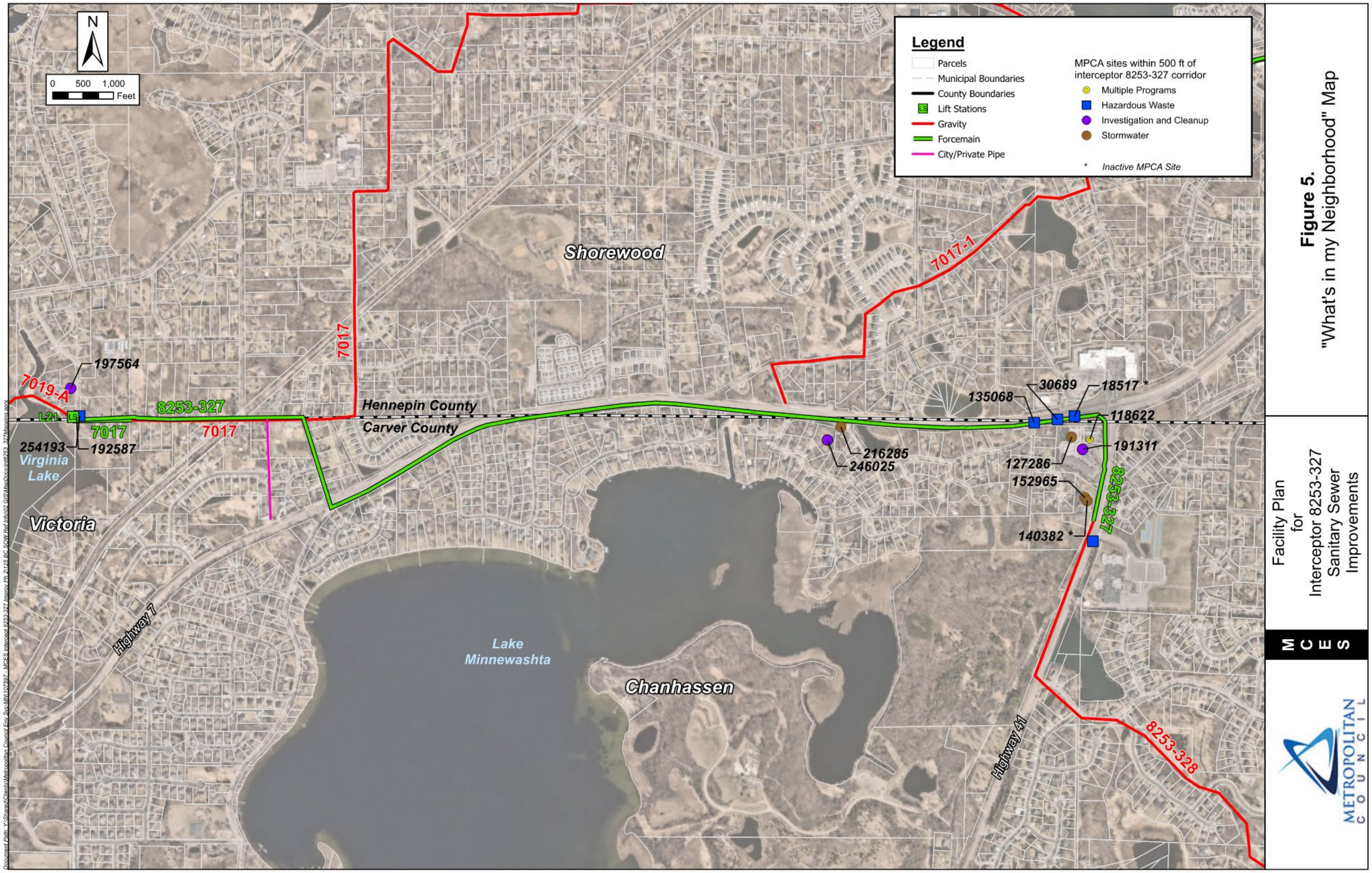
The separate EAW will include a more detailed MPCA file review which will identify any potential high-risk sites in the corridor and recommend any appropriate actions such as a Phase II Environmental Site Assessment or development of a management plan to develop best practices for handling impacted soil and or groundwater encountered during construction.

Based on the information from the "What's in My Neighborhood" site, it is not possible to determine whether any release has encroached into the project corridor. Therefore, the focus of this Facility Plan is to identify sites that have the greatest potential to impact the project corridor. Most of the sites likely won't impact construction, however petroleum products could be encountered during construction through excavation or dewatering activities. A closer examination of these sites will be made during final design.

Table 8: MPCA Database Search Results

Risk Classification	Site ID	Site Type	Contamination of Concern	Media Impacted	Location	Site Status
Low	192587	Leak Remediation	Petroleum	Soil or Groundwater	Lift Sta L21, 6198 Lake Virginia Dr	Inactive
Low	254193	Haz Mat Generator	Hazardous Materials	n/a	Lift Sta L21, 6198 Lake Virginia Dr	Active
Low	216285	Stormwater	Sediment/ Pollutants	Runoff	North Manor Road Reconstruction Project 2016	Permit C00045957 Active
Low	135068	Haz Mat Generator	Hazardous Materials	Soil or Groundwater	Walgreen’s, 2499 Highway 7	Active
Low	30689	Haz Mat Generator	Hazardous Materials	Soil or Groundwater	Career Cleaners, 2425 Highway 7	Inactive
Low	18517	Haz Mat Generator	Petroleum products	Soil or Groundwater	SuperAmerica, 2391 Highway 7	Inactive
Low	118622	Leak Remediation	Petroleum	Soil or Groundwater	SuperAmerica, 2391 Highway 7	Inactive
Medium	191311	Brownfield/ VIC	Pollutants	Soil or Groundwater	7 & 41 Crossing, 2401-2497 State Hwy 7	Active, NFA issued and site closed 2014
Low	152965	Stormwater	Sediment/ Pollutants	Runoff	Beehive Homes, 6330 Hazeltine Blvd	Permit C00041551 Active
Low	140382	Stormwater	Sediment/Pollutants	Runoff	Beehive Homes, 6330 Hazeltine Blvd	Permit C00035011 Terminated 2014, Inactive
Low	17725	Haz Mat Generator	Hazardous Materials	Soil or Groundwater	Gardeneer, 6421 Hazeltine Blvd	Inactive
Low	197564	Leak Remediation	Petroleum	Soil or Groundwater	27475 Maple Ridge Lane	Inactive
Low	246025	Leak Remediation	Petroleum	Soil or Groundwater	2841 N Manor Dr	Inactive
Low	127286	Stormwater	Sediment/Pollutants	Runoff	2401 State Highway 7	Permit C00026659 Active

Figure 5: "What's in My Neighborhood" Map



3.2.4. Cultural Resources

In June 2023 a Phase 1A Cultural Resources Desktop Review was performed for the project corridor by InSitu / Bolton & Menk. It identified 12 sites within one mile of the project. These sites consist of burial mounds, artifact scatters, ghost towns and farmsteads. Two of these are within 500-feet of the project.

The EAW, which will be submitted separately from this Facility Plan, will include a more detailed discussion of cultural resources in the corridor. This will include a review of the National Register of History Places database, a request for review of the State Historic Preservation Office (SHPO) database through *datarequestshpo@state.mn.us*, and consultation under Section 106. Since this Facilities Plan is limited to discussion of planning and preliminary design the EAW will be used to formally address Section 106 requirements. Furthermore, any change to the EAW's project area may require further consultation with the SHPO to ensure that cultural resources are adequately identified and protected from disturbance.

3.2.5. Wetland and Floodplain Review

In February 2025, a Level 2 Aquatic Resources Delineation Report was prepared for the project corridor by KLJ, Inc. See Appendix D. This report was prepared in accordance with the 1987 United States Army Corps of Engineers (USACE) Wetland Delineation Manual, USACE August 2010 Regional Supplement: Midwest Region (Version 2.0), and the 2015 Guidance for Submittal of Delineation Reports to the St. Paul District Army Corps of Engineers and Wetland Conservation Act Local Government Units in Minnesota (Version 2.0). The routine approach with onsite inspection was utilized, including the standard multi-parameter approach (vegetation, hydrology, and soils) for wetland identification. Areas identified on the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps along with sites which visually supported a hydrophytic plant community were examined during the field survey. Two wetlands, one stormwater pond, and ten wet ditches were identified and delineated within the Project limits.

The project corridors pass through or are adjacent to numerous water resources identified on the NWI and Public Waters Inventory (PWI). The project corridors also pass through or are adjacent to the 100-year floodplain. The floodplain area elevations may need to be updated based on Atlas 14 rainfall data, after the Federal Emergency Management Agency (FEMA) accepts the new Hydrologic and Hydraulic studies. Underground utility projects are generally exempt from wetland replacement requirements under *Minn. R. 8420.0122, subp.6a.* but above ground facilities such as lift stations are subject to wetland replacement.

This project involves only underground utility construction and does not include lift station construction. While portions of the project corridor may be in the floodplain, the current construction limits do not indicate any permanent impacts to wetlands and floodplains. However, if the construction limits change during final design, additional wetland delineations may be required to accurately assess impacts.

The EAW will include a more detailed discussion of wetland and floodplain impacts and mitigations.

3.2.6. Endangered Species

A request for a MnDNR review of the Natural Heritage Information System (NHIS) for the project area was initially made in 2023. The MnDNR did not report any known occurrences of state-listed species within the project area, nor any critical habitats present within or adjacent to the project area. Another request will be submitted in 2025. The MnDNR response will be included in the EAW.

The US Fish and Wildlife Service (USFWS) noted the potential habitats for monarch butterflies, bats, and salamander mussels within or near the project area. Potential impacts to such habitats will be addressed in the EAW.

3.2.7. Constructability

Constructability issues that are not directly monetary include unknown subsurface conditions; surface issues such as weather, traffic, existing utilities; the need for temporary conveyance of wastewater, and worker safety. Not all such factors are typically addressed in a contractor's bid.

It is anticipated that the project will include open cut and tunneling construction techniques typical to utility construction. The most significant risks relate to trench excavations include the proximity to cohesionless soils, highly developed areas, existing utilities and groundwater. The presence of wetlands that contain soft, compressible organic deposits may cause pipe settlement, misalignment, uneven stress, or pipe cracking and fracture. Boulders and cobbles in glacial tills may obstruct tunneling or other trenchless pipe installation methods in certain instances. As the project progresses, a detailed geotechnical investigation will be conducted to address these risks.

3.2.8. Implementation

Implementation includes property acquisition, design, permitting, coordination with local communities, and construction schedule. Table 9 lists the anticipated permits required.

Table 9: Anticipated List of Required Permit

Governmental Unit	Type of Application
Minnesota Pollution Control Agency (MPCA)	• Review of Construction Plans and Specification (CWRF Requirement) • NPDES Construction Stormwater and Erosion Control Permit • Approval of Response Action Plan (if contaminated soils are present) • Sewer Extension Permit • Approval of plans and specifications, etc.
Minnesota Department of Transportation (MnDOT)	• Utility Accommodation on Trunk Highway ROW; Permit Form 2525
Minnesota Department of Natural Resources (MnDNR)	• Water Appropriations Permit for Temporary Construction Dewatering • Water Appropriations Permit for new well construction
Minnesota Department of Health (MDH)	• Water supply well jurisdiction • Variance Request Application
Minnesota State Historic Preservation Office (SHPO)	• Cultural Resources Coordination
Hennepin County Regional Rail Authority (HCRRA)	• License agreement for construction within HCRRA ROW (Lake Minnetonka regional Trail)
Three River Park District	• Temporary Trail Access Permit
City of Chanhassen	• Work in the ROW/Underground Utilities Permit • Vegetation Management Permit • Earthwork (Excavation/Grading) Permit

Governmental Unit	Type of Application
City of Shorewood	• Right of Way (ROW) Excavation Permit
City of Victoria	• ROW Permit and Public Easement Application • Grading, Filling, Excavation Permit • Tree/Vegetation Removal and Replacement Application
Minnehaha Creek Watershed District	• Minnesota Wetland Conservation Act Certificate of No-loss or Exemption Grading and Erosion Control Permit • Replacement Plan Approval (If permanent wetland impacts occur) • Wetland delineation concurrence • Stormwater permit • Erosion control permit
U. S. Army Corps of Engineers (USACE)	• Utility Regional General Permit, if applicable

3.2.10. Operability/Maintainability

Operability is an indication of the ease of operation. Reliability, flexibility, and safety are also considered as components of operability. Reliability is the use of proven and reliable equipment and design approaches. Flexibility considers the ability to accommodate current and future conditions and allows for different operating scenarios. Safety impacts would include potential safety concerns related to operation and maintenance of the facility.

All alternatives other than Alternative 1 (Status Quo) present improved protection of the existing 7017 gravity system that has private sewer services connected to it, whether the gravity system is reconstructed per Alternative 3 or not per other alternatives. The 7017 forcemain discharging to the 7017 gravity system will no longer be the only backup system since alternatives 2-5 all present fully redundant full-length forcemains discharging to 8253-328. This significantly improves Metropolitan Council Environmental Services' personnel's ability to safely operate and maintain system flows with limited future risk of interruption.

Maintainability considers accessibility for cleaning and maintenance activities that would be required for a given alternative. Maintainability also includes the ease of Gopher State One Call (GSOC) underground utility locating. Pipe alignments that meander and cross each other within a corridor are more difficult to locate than straighter and more parallel pipe alignments. By providing a fully redundant forcemain, the system will be far easier to maintain due to greater ease of cleaning and inspection.

Operational flexibility will be increased because two separate systems will serve Lift Station L21. In addition, interconnection structures will allow flow to be switched between forcemains at certain locations along each forcemain.

Finally, this project will utilize well established equipment, materials, and designs that will be reviewed by Environmental Services' O&M staff to ensure Operability/Maintainability.

3.3. Project Cost Estimates

Estimated capital and life-cycle costs will form the basis of the economic comparison of feasible alternatives. Planning level costs are presented for each of the proposed alternative projects in Table 10.

The capital cost estimates developed for the various alternatives include construction costs, as well as administrative costs and contingencies. The cost estimates shown have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. The final costs of the project will depend on actual labor, equipment, materials, market conditions, implementation schedule, and other variables. As a result, the final project costs may vary from the estimates presented here. Therefore, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to ensure proper project evaluation and adequate funding. A summary of each alternative's costs is presented below. Detailed capital costs and life-cycle costs for each alternative are included in Appendix A. Alternative project costs that are within 10% of each other are within the accuracy limits of the cost estimating data and are therefore considered equal.

The project alternatives present worth of capital costs, present worth of O&M costs, and total present worth are compared by alternative in Table 11.

Table 10: **Cost estimates for Alternatives 1-5:**

Item	Alternative 1 Cost	Alternative 2 Cost	Alternative 3 Cost	Alternative 4 Cost	Alternative 5 Cost
Site Preparation*	$292,000	$3,159,000	$3,526,000	$4,229,000	$4,394,000
Existing System Modifications	$1,900,000	$1,545,000	$1,727,000	$1,679,000	$1,966,000
New Pipe and Structures	n/a	$11,506,000	$12,549,000	$18,495,000	$18,617,000
Restoration	n/a	$1,378,000	$1,819,000	$1,491,000	$1,340,000
Well Relocation	n/a	$100,000	$100,000	$150,000	$150,000
Subtotal	$2,192,000	$17,688,000	$19,721,000	$26,044,000	$26,467,000
30% Construction Contingency	$658,000	$5,307,000	$5,917,000	$7,814,000	$7,941,000
Easements	n/a	$233,000	$173,000	$283,000	$337,000
Subtotal Capital Costs	**$2,850,000**	**$23,228,000**	**$25,811,000**	**$34,141,000**	**$34,745,000**
20% Engineering and Finance	$439,000	$4,646,000	$5,163,000	$5,209,000	$5,294,000
Total	**$3,289,000**	**$27,874,000**	**$30,974,000**	**$39,350,000**	**$40,039,000**

* Includes construction contractor mobilization/demobilization, administration, clearing and grubbing, road removals, etc.

Table 11: Project alternatives 20-year Net Present Worth (rounded up)

Project Alternative	Capital Costs	O&M Costs	Routine Cleaning Costs	Total NPV
Alternative 1 – Status Quo	$2.9	$1.2	$1.2	$5.3
Alternative 2 –One New Forcemain on new alignment	$23.3	$0.6	$1.9	$25.8
Alternative 3 – One New Forcemain on existing 7017 alignment	$25.9	$0.6	$1.9	$28.4

Project Alternative	Capital Costs	O&M Costs	Routine Cleaning Costs	Total NPV
Alternative 4 – Two New Forcemains on existing 8253-327 alignment	$34.2	$0.3	$1.5	$36.0
Alternative 5 – Two New Forcemains on new alignment	$34.8	$0.3	$1.5	$36.6

3.4 Cost Effectiveness

3.4.1 Asset Management Plan

The Met Council's Asset Management Plan is provided in Appendix E. Met Council documents and tracks its assets under the direction of the Environmental Services Management Team (ESMT). The ESMT's goal of asset management is to formalize business practices that will help Met Council minimize the life cycle cost of assets required to sustainably meet expected customer service levels while effectively managing risks. The ESMT designated the Asset Management Team (AMT) to ensure that the asset management strategies are implemented properly. The AMT recommends and provides guidance to the Task Forces in the areas of Business Case Evaluations (BCE), Reliability-Centered Maintenance (RCM), and Facility Ownership and Accountability (FOA).

The Met Council uses BCEs when developing alternatives for capital projects. The Environmental Services Maintenance and Operations staff utilize RCM to mitigate risks to infrastructure and equipment; they also use the Work and Asset Management (WAM) Work Order system for tracking the status of work orders, procurement, timekeeping, maintenance actions, and associated costs.

3.4.2 Energy Conservation Opportunities

Since this project does not include any powered equipment, there are no opportunities for energy conservation.

3.4.3 Renewable Energy Opportunities

Metropolitan Council Environmental Services did not consider renewable energy as a viable opportunity for these projects due to power source reliability. However, the Blue Lake WRRF employs many different renewable energy technologies, including six acres of solar farm to power the plant and the reuse of effluent wastewater for non-potable use in the facility.

3.4.4 Water Reuse Options

This project does not provide any opportunities for wastewater reuse within the project. However, once treated at the Blue Lake WRRF, the effluent water is reused for non-potable use throughout the plant.

3.4.5 Water Efficient Devices

Since this project does not include any fixtures that use potable water. Therefore, there are no opportunities for water conservation. Refer to the Comprehensive Plans prepared by each community for further water information on devices and programs.

3.4.6 Water Meters

While this project will replace a small number of private wells, this project does not affect any existing water meters. Therefore, there are no opportunities for updating water meters. Refer to the

Comprehensive Plans prepared by each community for further water information on devices and programs.

3.4.7 Water Audits and/or Conservation Plans

There is no opportunity to perform water audits as part of this project. Refer to the Comprehensive Plans prepared by each community for further water information on devices and programs.

3.4.8 Nonmonetary Analysis

3.4.8.1 Sustainability and Climate Resilience

Under this facility plan, the system improvements include numerous strategies to address reliability and resiliency, including sewer flow modeling to estimate impact of wet weather flows. In addition, Metropolitan Council Environmental Services (Met Council) uses SCADA to monitor system flows. This allows Met Council to compare peak wet weather flow to average flows, identify emerging wet weather flow trends, and detect excessive inflow and infiltration. Met Council also uses a backup generator at lift station L21 to ensure 8283-327 remains in service in the event of a weather-related power outage. These tools and strategies ensure that the project will be reliable and resilient in the event of an extreme weather event.

3.4.8.2 Water Quality Objectives

This project will strengthen the reliability of the collection system, thereby ensuring that the sewer system can convey all the wastewater in the Lake Minnetonka service area to the Blue Lake WRRF for treatment that meets the effluent limits in their NPDES permit.

4. Evaluation of Alternatives

This section provides a comparison of life cycle (present worth) cost estimates for the alternatives and an assessment of each alternative including nonmonetary criteria identified here, and project phasing.

4.1. Evaluation Factors

Considering the design parameters and other factors, four proposed new forcemain alternatives were developed for evaluation against the status quo, as discussed below. Both monetary and non-monetary characteristics for the alternatives were considered.

Due to the environmentally sensitive nature of the Lake Minnetonka area, a release of wastewater due to a facility failure would create a threat to public safety and health, the environment, as well as pose a threat to private property and economic activity. Therefore, the “status quo” alternative is not recommended. Conversely, major construction for complete facility replacement involves greater community disruption, construction time, environmental risks, and capital cost than rehabilitation.

Alternative 1, This status quo alternative leaves the existing system as is (Figure 2). In this alternative, maintenance, rehabilitation of maintenance structures, and cleaning and inspection would be required to extend the system's useful life. In to extend the system's useful life, the system would need to be taken out of service every 10 years for cleaning and inspection to determine if any internal defects exist. Without a fully redundant system available, such actions would require construction of a temporary conveyance each time such maintenance is performed.

Alternate 1 does not meet the project objectives of reliability and operations flexibility. Furthermore, due to the environmentally sensitive nature of the Lake Minnetonka area, a release of wastewater in the event of a facility failure would create a threat to public safety and health, the environment, and also threaten private property and economic activity. Therefore, the “status quo” alternative was not further developed.

Alternative 2, One New Forcemain on New Alignment. Alternative 2 involves constructing approximately 13,700 ft of new 30-inch forcemain following a new alignment. The proposed alignment of the new pipe (Figure 3). In this alternative, the existing 7017 forcemain and gravity interceptor remain in use, and no temporary conveyance is necessary for construction. This alternative includes cleaning and inspection of the existing 8253-327 forcemain, as well as maintenance structure rehabilitation. The addition of one new forcemain meets project objectives by providing a fully redundant forcemain system.

Alternative 3, One New Forcemain in Existing 7017 Alignment. Alternative 3 includes the addition of approximately 13,500 LF of 30-inch forcemain (Figure 3). In this alternative, the new pipe is placed in a similar alignment to the existing gravity interceptor 7017. Therefore, the existing 7017 forcemain is removed and the existing 7017 gravity pipe is no longer connected to L21. This requires a temporary conveyance pipe during construction. This alternative includes cleaning and inspection of the existing 8253-327 forcemain, as well as maintenance structure rehabilitation. The addition of one new forcemain meets project objectives by providing a fully redundant forcemain system.

Alternative 4, Two New Forcemains on Existing 8253-327 Alignment. This alternative constructs approximately 27,100 LF of two new 30-inch forcemain pipes on a the existing forcemain alignment (Figure 4). Because this alternative removes the existing 8253-327 forcemain during new pipe construction, temporary conveyance is needed. The addition of two new forcemains meets project objectives by providing a fully redundant forcemain system.

Alternative 5, Two New Forcemains on New Alignment. This alternative constructs approximately 27,300 LF of two new 30-inch forcemain pipes in a different alignment from the existing 8253-327 forcemain (Figure 4). The two new pipes would be constructed within the same trench. Since the existing forcemain remains in place during construction no temporary conveyance is needed. The existing 8253-327 forcemain is removed after construction of the new forcemains. The addition of two new forcemains meets project objectives by providing a fully redundant forcemain system.

4.1.1. Costs

Capital construction and life-cycle costs for each of the alternatives were calculated using costing tools provided by the planning team (construction costs) and by the Metropolitan Council Environmental Services (Life-cycle Cost Tool). A summary of construction costs for the alternatives is shown in Tables 10 and 11. The tables shown under each alternative provide a comparison of each alternative’s costs. All cost estimates are expected to be accurate within -15% to +30%.

Cost analysis assumptions:

- 80-year useful life for gravity sewers
- 40-year useful life for lift stations and forcemains.
- O&M on the existing forcemain alone: 8 operator hours per week
- O&M on one new and one existing forcemain: 4 operator hours per week.
- O&M on two new forcemains: 2 operator hours per week.
- Cleaning and inspection of existing DIP forcemain (once every 10 years): $27 per foot
- Cleaning and inspection of new PVC forcemain (once every 10 years): $18 per foot

Factors such as corrosion, damage, and excessive inflow/infiltration may shorten the service lives of facilities leading to the need for replacement before their anticipated service life has elapsed.

4.1.2. Nonmonetary Factors

Nonmonetary factors are key components of each alternative's evaluation process. Non-monetary criteria are listed below.

4.1.2.1. Nonmonetary Analysis

Table 12 summarizes the monetary and nonmonetary factors for each alternative. Alternatives 2 and 3 had the more favorable nonmonetary rankings. In the table (+) is an advantage, (o) is neutral, (-) is a disadvantage

Table 12: Non-monetary Factors for Each Alternative

Criteria	Alternative 1 Status Quo	Alternative 2 1 New FM on New Alignment	Alternative 3 1 New FM on 7017 Alignment	Alternative 4 2 New FMs on 8253-327 Alignment	Alternative 5 2 New FMs on New Alignment
Meets Project Goals	No	**Yes**	**Yes**	**Yes**	**Yes**
Nonmonetary Factors		(-)	**(+)**	**(+)**	**(+)**
Community-Easements/Wells		Medium (o)	Medium (o)	High (-)	High (-)
Community-Traffic		**Medium/Low (+)**	Medium (o)	Medium (o)	**Medium/Low (+)**
Community -Trees		Medium (o)	Medium (o)	Medium (o)	High (-)
Environmental Impact		Medium (o)	Medium (o)	High (-)	High (-)
Contamination/Haz. Materials		**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**
Cultural Resources		**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**
Wetland and Floodplain		**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**
Endangered Species		**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**
Constructability-Geotechnical		Medium (o)	**Medium/Low (+)**	Medium (o)	High (-)
Constructability-Temp. Conv.		**Low (+)**	Medium (o)	High (-)	**Low (+)**
Constructability-Utilities		Medium (o)	**Medium/Low (+)**	High (-)	Medium (o)
Implementation-Schedule		Medium (o)	Medium (o)	Long (-)	Long (-)
Implementation-Permitting		Medium (o)	Medium (o)	Medium (o)	Medium (o)
Operability/Maintainability		**Low (+)**	Medium (o)	**Best (+)**	**Best (+)**
Capital Cost		**Lowest (+)**	Low (o)	High (-)	Highest (-)
O&M Cost		Medium (o)	Medium (o)	**Low (+)**	**Low (+)**
Life Cycle		Medium (o)	Medium (o)	**High (+)**	**High (+)**
Conclusion	**Not Recommended**		**Recommended**		

5. Recommended Plan

The alternative evaluation in Section 4 resulted in the recommended alternative discussed below.

5.1. Description of Recommended Project

To maintain system capacity, improve system reliability, minimize potential for overflows and service interruptions that could pose a threat to public safety, health, and the environment; and increase operational flexibility it is recommended that Alternative 3 be implemented.

Alternative 3 includes the addition of approximately 13,500 LF of 30-inch forcemain (Figure 3). In this alternative, the new pipe is placed in a similar alignment to the existing gravity interceptor 7017. Therefore, the existing 7017 forcemain is removed and the existing 7017 gravity pipe is no longer connected to L21. This requires a temporary conveyance pipe during construction. This alternative includes cleaning and inspection of the existing 8253-327 forcemain, as well as maintenance structure rehabilitation. The addition of one new forcemain meets project objectives by providing a fully redundant forcemain system. In this alternative, the new pipe is placed in a similar alignment to the existing gravity interceptor from MH 11 10 to Cartway Lane. On W 62nd St., the new pipe will parallel the existing forcemain, with a 10-ft distance between centerlines. Gravity Interceptor 7017 will be relocated approximately 10-ft off centerline of the new 30-inch forcemain pipe. Near Cartway Lane, the gravity interceptor will be reconnected to an existing MH for continuation of gravity system 7017 eastward along W 62nd St., and the new pipe will continue in a new alignment for the remainder of the 11,900 LF, matching Alternative 2.

This alternative includes cleaning and inspection of the existing forcemain, as well as MH rehabilitation as necessary. In addition, both temporary conveyance for gravity service interruptions and temporary road placement on W 62nd St. will be required to construct the new forcemain.

5.2. Project Cost Estimates

The capital cost estimate for the recommended alternative for the Interceptor 8253-327 Sanitary Sewer Improvements Project is $25.9 million. See Table 11.

This project will be funded by Public Facilities Authority loans. The loans will be paid by regional sanitary sewer connection Service Availability Charge (SAC) fees and sewer user charges. This project results in a net increase to Municipal Wastewater rates (region wide annual sewer cost per household) of $0.77 per household to pay for capital costs. These projects also add $33.14 to the SAC rate. Increased SAC rates and Municipal Wastewater rates on capital costs are paid until debt service is paid off after 20 years.

5.3. Project Delivery and Schedule

Interceptor 8253-327 Sanitary Sewer Improvements Project is programmed as a 10-year capital improvements project extending from 2024 to 2029, with final design beginning in 2025 as shown in Table 13 below. Details of construction schedules will be further developed during the design phase.

Table 13: Project Implementation Schedule

Activity	Project Schedule
Metropolitan Council Authorizes Public Hearing	October 2025
30 Day Comment Period	November-December 2025
Public Hearing	December 2025
Facility Plan Revised in response to public comments	December 2025-January 2026
Metropolitan Council Adopts Facility Plan	January 2026
Facility Plan Submittal Deadline	March 6, 2026
MPCA Facility Plan and EAW Approval	June 2026
Final Design	2026-2027
Construction	2028-2030

Details of construction schedules will be developed during the design phase, and will consider issues such as:

- Type of construction (e.g. horizontal directional drilling or open cut).
- Coordination with other nearby projects (e.g. City of Shorewood, City of Chanhassen, City of Victoria, Hennepin County, Carver County, MnDOT, Hennepin County Regional Rail Authority, Three Rivers Park District and the Minnehaha Creek Watershed District.).
- Coordination with other Metropolitan Council Environmental Services projects and staff availability.
- Community considerations (e.g. school schedules, parks and recreation peak use periods, special events, traffic disruption, snow removal).
- Maintaining emergency route access.
- Land acquisition and well relocation.
- Paving/surface restoration periods.
- Environmental issues.

This facility plan will be submitted to the Minnesota Pollution Control Agency (MPCA) in 2026 for review in conjunction with an application for placement on the Project Priority List for funding through the Clean Water Revolving Loan Fund beginning in fiscal year 2027.

Appendix A

Alternatives Business Case Evaluation

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Technical Memorandum

Prepared for: Metropolitan Council Environmental Services

Project Title: Interceptor 8253-327 Improvements Phase 2 (MCES Project No. 802806)

Project No: 195494.200.201

Technical Memorandum

Subject: Forcemain 8253-327 Business Case Evaluation

Date: June 13, 2025

To: Daniel Fick, P.E., Metropolitan Council Environmental Services Project Manager

From: Julie Benadum, P.E., Brown and Caldwell Project Manager

Copy to: Adam Gordon, P.E., Metropolitan Council Environmental Services
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Peter C. Glashagel, P.E., Sr. Principal Engineer

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Maya L. Linn, Staff Environmental Engineer

Reviewed by: ______________________
Julie E. Benadum, P.E., Project Manager

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

Signature: ______________________

Name: Peter C. Glashagel

Date: 06/13/25 License No. 42905

Limitations:

This document was prepared solely for the Metropolitan Council Environmental Services (MCES) in accordance with professional standards at the time the services were performed and in accordance with the contract between MCES and Brown and Caldwell dated September 7, 2023. This document is governed by the specific scope of work authorized by MCES; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by MCES and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Executive Summary

This technical memorandum presents the results of the business case evaluation (BCE) for improvements to the sanitary sewer forcemain (FM) Interceptor 8253-327. The evaluation considered several alternatives on both an economic and non-economic basis.

Interceptor 8253-327 conveys about 3.5 million gallons of sanitary sewer daily from Lift Station L21 in Victoria to the Metropolitan Council Environmental Services (MCES) Blue Lake Water Resource Recovery Facility. It is a critical component of the West Area collection system. However, the system currently relies on a single forcemain, lacking redundancy and operational flexibility, which pose risks to the environment.

Improvements to the system will address the lack of resiliency by adding redundancy with constructing a second 30-inch FM barrel, thereby increasing future capacity.

The total net present value (NPV) and non-economic considerations for each of the developed alternatives are summarized in Table ES-1.

Table ES 1. BCE Alternative Evaluation Summary

Alternative Description	Total NPV	Operation and Maintenance (O&M) Considerations	Comments
Alternative 1 – Status Quo	$5.3M	• Existing FM remains the main barrel. • Significant O&M required to extend life.	• Does not meet the level of service objectives. • Exceeds the FM useful life.
Alternative 2 – One New FM	$25.8M	• New, redundant FM lessens O&M required. • Existing FM remains as a redundant barrel.	• Construction impacts the least number of parcels. • Requires multiple crossings of the existing FM while the existing FM remains in service.
Alternative 3 – One New FM on Existing 7017 Alignment	$28.4M	• New, redundant FM lessens O&M required. • Existing FM remains as a redundant barrel. • Provides new local gravity system along 62nd St.	• Reduces unwanted crossings of existing FM presented within Alternative 2 above • Requires more temporary parcel impacts than Alternative 2 above, but concentrates permanent facilities within existing ROWs and easements.
Alternative 4 – Two New FMs on Existing 8253 Alignment	$36.0M	• Provides two new FM barrels and a completely renewed system. • Places new FMs within common structures.	• Construction impacts largest number of parcels. • Temporary conveyance and partial utility relocations required within 62nd St. • Requires removal of existing Hwy 7 FM post-construction to avoid having three FMs.
Alternative 5 - Two New FMs	$36.6M	• Provides two new FM barrels and complete renewed system. • Places new FMs within common structures.	• Requires multiple crossings of existing FM while existing FM remains in service during construction. • Places the largest amount of structures w/in private parcel easements. • Requires removal of entire existing FM post-construction to avoid having three FMs.

Section 1: Introduction

This technical memorandum (TM) provides alternatives for adding redundancy and resiliency to the Metropolitan Council Environmental Services (MCES) Interceptor 8253-327 L21 forcemain (FM) system. This section aims to provide an overview of the L21 FM system and identify project drivers in addition to the problem statement under review.

1.1 System Overview

The existing MCES L21 FM system consists of two main interceptors: FM 8253-327 and FM 7017.

FM 8253-327. This single FM is approximately 14,300 linear feet (LF) in length and conveys the L21 flow downstream under normal operating conditions. The 30-inch ductile iron pipe (DIP) discharges to gravity interceptor 8253-328, also known as the Lake Ann Interceptor.

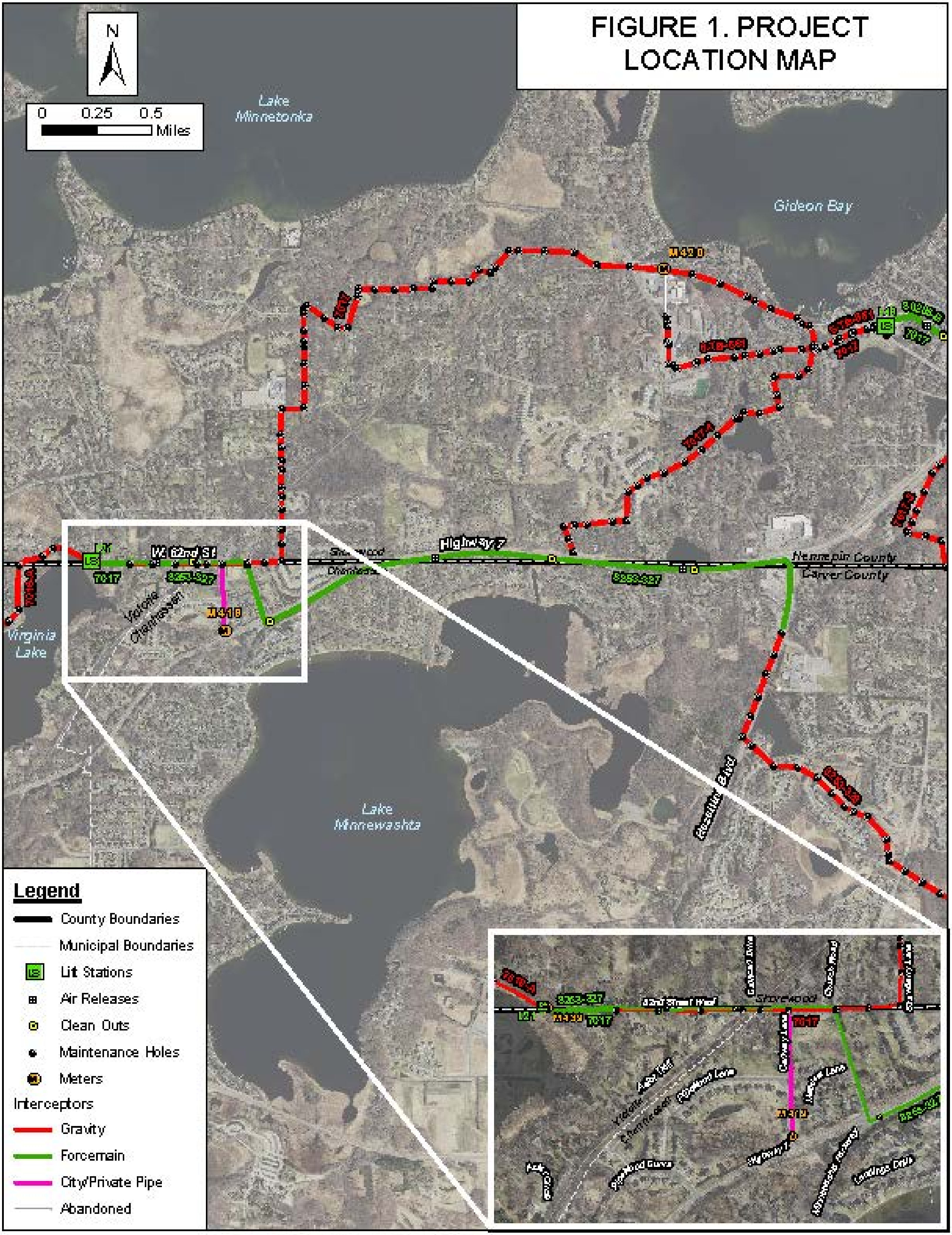
FM 7017. This FM is approximately 750 LF in length and discharges to the gravity interceptor 7017. This 24-inch-diameter DIP FM is used when flow must be diverted away from Interceptor 8253-327. The 24-inch reinforced concrete pipe (RCP) gravity interceptor 7017 conveys sewage to Lift Station L19 in Excelsior.

Interceptor 7017's capacity is limited to approximately 4.8 million gallons per day (mgd). Not all flows from L21 can be directed to FM 7017 when FM 8253-327 is taken out of service. This poses a risk to the system. However, the system can store flow upstream in the 72-inch-diameter Victoria Tunnel, providing temporary capacity and mitigating risks during peak wet weather flow conditions or maintenance outages.

Both gravity interceptors 7017 (downstream of L19) and 8253-328 convey sewage through Chanhassen and Eden Prairie to the Blue Lake Water Resource Recovery Facility.

Figure 1 presents a system overview.

FIGURE 1. PROJECT LOCATION MAP



1.2 Background

In 2021, the existing MCES Interceptor 8253-327 L21 FM system was evaluated for potential corrosion and remaining service life considerations. The assessment identified the downstream 2,000 LF as a concern, while other segments were found in fair condition. Before MCES could align capital improvement planning with the results of the 2021 evaluation, the downstream 2,000-LF of FM segment experienced a failure in 2023, resulting in a pipe collapse and a surface sinkhole.

MCES Operations utilized the existing tunnel storage system upstream of L21 and redirected flow via Interceptor 7017. This operational flexibility safeguarded the environment, public health, and safety and allowed for the reconstruction of 2,000 LF of pipe around the failed segment. The project replaced the FM with new, corrosion-resistant gravity interceptor piping and structures, effectively shortening the FM system length. However, the capacity of the 7017 system limits L21's ability to pump all necessary flows downstream when larger flows are present in the system. Therefore, the existing MCES L21 FM system has vulnerabilities requiring improvements to provide redundancy for peak flow capacity.

During the emergency construction in 2023, Brown and Caldwell (BC) re-evaluated the remainder of the 8253-327 L21 FM and found results aligning with the 2021 evaluation.

1.3 Project Drivers

The existing MCES Interceptor 8253-327 L21 system is the largest within the MCES west metro system and is facing significant challenges that require attention to ensure continued operational reliability and capacity. The main issues include:

Aging Infrastructure. The existing L21 FM system is comprised of some of the oldest FM pipes and manhole (MH) structures with assets reaching 40- to 55-year-old.

Lack of Redundancy. The existing L21 FM system lacks redundant barrels capable of meeting peak flow conditions, which poses a risk of sewage backups and environmental hazards.

Capacity Limitations. The existing system has capacity restrictions that prevent it from handling peak flows, leading to potential operational failure.

Operational Flexibility. Improvements are needed to enhance the system's ability to effectively redirect flows and manage emergencies.

The combination of the FM system age and limitations presents resiliency inadequacies, putting this system at risk of being unable to handle and pass peak flows downstream.

1.4 Problem Statement

The main objective of this evaluation is to determine cost-effective, constructible, and permitted means of improving the existing MCES L21 FM system for resiliency and future capacity considerations.

Section 2: Field Investigation

2.1 Forcemain Wall Thickness Testing

Once the 2023 emergency work was under construction, BC coordinated with MCES for pump-out and person-entry into eight 8253-327 30-inch DIP FM structures over the approximately 2.5-mile-long pipeline. Ultrasonic technology (UT) metal thickness testing was performed by cleaning off the existing piping within each structure and grinding off the coating to expose bare metal for the most accurate testing. Note that all cleaned/exposed metal was coated with Denso paste for corrosion protection once the testing was done.

UT testing was attempted around the pipe near a wall penetration, on as many clock positions as could be accessed within a given FM structure. The eight possible clock positions are depicted in Figure 2.

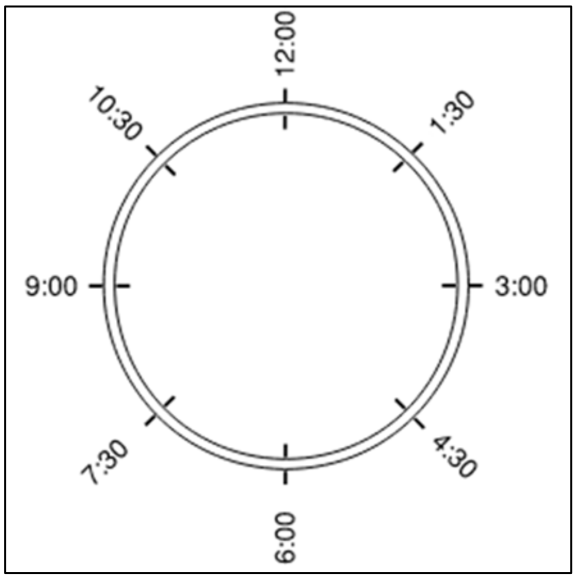


Figure 2. Clock positions facing downstream

According to Metropolitan Waste Control Commission (MWCC) historical records from the 1987 installation, 30-inch DIP metal thickness is expected to be within the range of 0.43 inches to 0.49 inches. UT testing results within FM structure air release (AR) 8 were compared with the 2021 Short Elliott Hendrickson (SEH) testing and found to be consistent with one another, reflecting a median metal thickness of 0.45 inches. AR 8 is the only structure that SEH tested in 2021 that remained in 2023-2024.

Given the anticipated accuracies of the UT thickness gauge model TI-CMXDL used by BC, together with the 30-inch DIP metal thickness range according to historical records, BC determined that metal thickness values below 0.31 inches should be considered as a concern. The accuracy range should be considered the testing gauge value +/- 0.03 inches. BC found single clock position metal thicknesses at AR 2 and clean out (CO) 10 to be on the edge of concern (0.29 to 0.30 inches); whereas all other measurements within these two FM structures were not of concern. Additionally, all other FM structure metal thickness testing results reflected values at or above the anticipated metal thickness.

It should also be noted that during the 2023 emergency construction work, the contractor removed pipe to the point of fully submerged FM (pipe full of sewage upstream of the highest FM elevation point) and found the DIP wall unaffected with its original liners/coatings. This suggest that much of the remaining FM should be in good condition with available remaining service life.

Therefore, the existing 8253-327 30-inch DIP should be considered to have available life, with a low risk of future failure due to metal deterioration from corrosive sewer gases. For this reason, alternatives utilizing all or part of the existing 8253-327 30-inch DIP FM barrel are considered viable. However, it is important to note that the metal thickness testing has only been conducted within eight FM structures and two buried pothole locations, and should not be considered a comprehensive assessment of the entire FM. Consequently, any alternative utilizing all or part of the existing 8253-327 30-inch DIP FM barrel includes costs to fully clean and closed-circuit televise (CCTV) the entire FM's length and fully rehabilitate all existing 8253-327 FM structures. Such work will provide a better understanding of the existing 8253-327 30-inch DIP FM barrel's entire condition and help estimate a reasonable lifespan; plus anticipated future pipeline rehabilitation needs (i.e. lining feasibility).

FM wall thickness testing results are presented in Table 1. See Attachment A for additional information related to FM wall thickness testing.

Table 1. 2023 Metal Thickness Testing Results

Structure	Thickness at Clock Position Facing Downstream inches[a,b]						Range with +/-0.03 tolerance, Median[b]
	9:00	10:30	12:00	1:30	3:00	4:30	
AR 2	0.32	0.49	0.51	0.49	0.36	0.49	**0.29** - 0.54, 0.42
CO 3	0.42	0.39	0.41	0.41	0.41	0.42	0.36 - 0.45, 0.41
AR 4	0.52	0.49	0.49	0.51	0.49	-	0.46 - 0.55, 0.51
CO 6	0.47	0.48	0.48	0.48	0.48	0.48	0.43 - 0.51, 0.47
AR 8	0.45	0.44	0.45	0.45	0.45	-	0.41 - 0.48, 0.45
CO 10	-	0.37	0.35	0.33	0.40	0.41	**0.30** - 0.44, 0.37
AR 15	0.50	0.50	0.49	0.49	0.49	-	0.46 - 0.53, 0.50
CO 12	0.42	0.41	0.41	0.41	0.41	0.40	0.38 - 0.45, 0.42

a. *Results from Ultrasonic Thickness Gauge Model TI-CMXDL.*

b. *Values less than 0.31 inches with tolerance considerations may be of concern.*

2.2 Survey

Between March 2024 and March 2025 Houston Engineering performed a detailed survey of the following elements within the project corridor (along W 62nd St., Church Rd., and Highway 7):

- FM 8253-327 location and MH rim elevations
- Landscaping/trees and topography of private resident and right-of-way (ROW) properties within approximately 50 ft of existing sewer
- Residential water supply wells on properties adjacent to existing or proposed FM
- Existing utilities, using a Gopher State One Call (GSOC) locate and mapping request

Houston Engineering's work also included property research to determine ROW and easement locations. BC personnel further developed the survey by collecting pipe inverts and MH sump elevations in December of 2023 and performing a utility review in March of 2024. Figure 3 shows the wells near the existing L21 system, both surveyed and from the Minnesota Well Index (MWI). The impacts to potable wells is identified for each of the proposed alternatives in Section 5.3.1 of this TM.

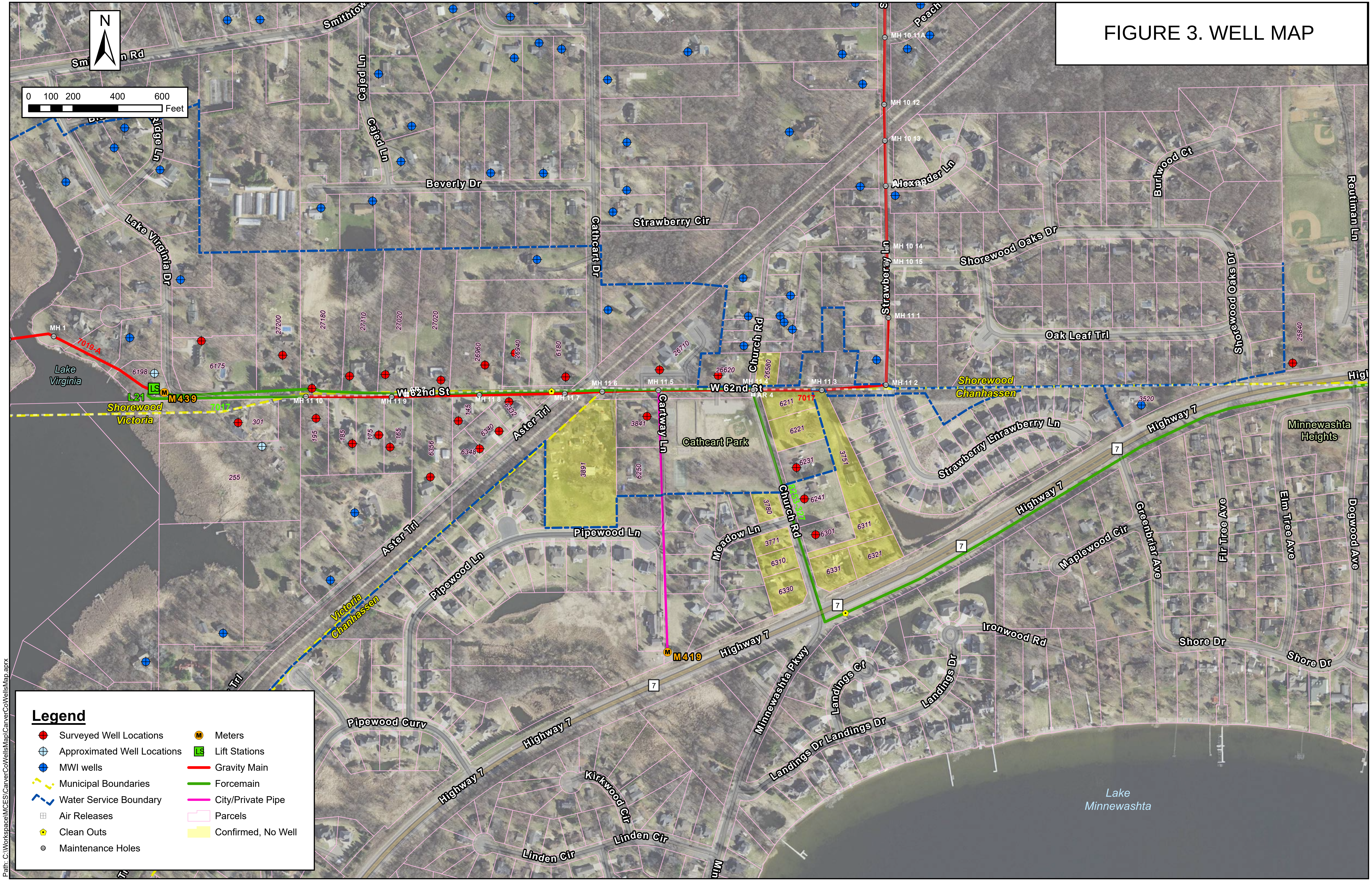


FIGURE 3. WELL MAP

Path: C:\Workspace\MCES\CarverCoWellsMap\CarverCoWellsMap.aprx

Section 3: Alternative Development

3.1 Business Case Evaluation Main Assumptions

The following baseline assumptions are applicable to all alternatives developed.

Assumption 1: Redundancy

- Provide dual 30-inch FM system(s) from L21 to gravity interceptor 8253-328.
- Provide interconnection valve structures between FM barrels at an interval that allows L21 to meet peak wet weather flow capacities with the longest segment out of service; assume two interconnect structures for all alternatives.

Assumption 2: Maintain Existing Hydraulic Conditions

- Maintain L21 FM capacity with 30-inch FM pipe diameter and with no new peak elevations higher than what currently exist within the FM system.
- Overall FM length should be within 10 percent of the existing system length.
- No added pumping head resulting in reduced system capacity.

Assumption 3: Ability to Divert Flow

- Maintain the ability to discharge up to one L21 pump at full speed (capacity) to gravity Interceptor 7017.
- If deemed necessary by MCES during detailed design, allow FM system to discharge to the newly installed gravity interceptor piping that conveys to L19 from the former L20 sewer shed in the future.

Assumption 4: Number of Manholes

- Up to ten MH structures were included in the cost assumptions of each alternative. These structures include air relief valves, clean-outs, valve vaults, and FM discharge MHs.
- Alternatives 4 and 5 evaluations assumed dual MH structures where both new FM barrels pass through the same MH.

3.2 Permits and Stakeholders

Table 2 presents a summary of the known regulatory agencies that have jurisdiction over the project area and anticipated stakeholder involvement that will be required during design.

Table 2. Summary of Permits and Stakeholders

Stakeholder	Permitting or Agreement Requirements
City of Victoria	• ROW Permit and Public Easement Application • Grading, Filling, Excavation Permit • Tree/Vegetation Removal and Replacement Application
City of Shorewood	• ROW Permit
City of Chanhassen	• Work in the ROW/Underground Utilities Permit • Vegetation Management Permit • Earthwork (Excavation/Grading) Permit
Hennepin County Regional Railroad Authority (HCRRA)	• License agreement for construction within HCRRA ROW (Aster Trail)
Minnehaha Creek Watershed District (MCWD)	• Submittals under the Wetland Protection Rule
Minnesota Department of Health (MDH)	• Water supply well jurisdiction • Variance Request Application
Minnesota Department of Natural Resources (DNR)	• Water Appropriation Permit • Joint Application Form
Minnesota Department of Transportation (MnDOT)	• Utility Accommodation on Trunk Highway ROW; Permit Form 2525
Minnesota Pollution Control Agency (MPCA)[a]	• NPDES - Construction Stormwater and Erosion Control

a. No widespread contamination is anticipated for this project and therefore a response Action Plan (RAP) or Construction Contingency Plan (CCP) is not listed as a permitting requirement.

3.2.1 Stakeholder Engagement

BC personnel met with several entities listed in Table 2 to better understand the restrictions and/or potential collaborations that needed to be considered for the scope of this project. Further engagement with these entities will be necessary throughout the design.

3.2.1.1 City Engagement

In August 2024, MCES and BC personnel met with representatives from the cities of Victoria, Shorewood, and Chanhassen to discuss the potential for watermain extensions to serve homes along W 62nd St. and Church Rd. Representatives from each city reviewed their capital improvement plans and identified if a watermain extension project occurring in conjunction with the FM 8253-327 improvements was feasible.

The cities of Victoria and Shorewood confirmed they have no plans to extend water supply to the homes within the project corridor. The City of Chanhassen was open to the idea of implementing a watermain extension project in conjunction with the FM 8253 improvements. However, further details and coordination would be necessary. This issue is further complicated since any water to be supplied in W 62nd St. could also serve residents in Victoria and Shorewood.

Limited, available property surveys and well information were provided to BC by all three cities.

3.2.1.2 Minnesota Department of Health (MDH)

MCES and BC personnel initiated conversations with MDH regarding the following topics:

- 50 ft minimum requirement for distance between a buried municipal sewer pipe and a water supply well per Minnesota Statute, section 1031.205, subdivision 6 (effective August 2008).
- Potential variance provisions for cases where existing wells are less than 50 ft from existing sanitary sewers (FM or gravity).
  - MDH will review each well on a case-by-case basis and will evaluate based on details such as date of home construction, date the well was drilled, status of the well code at time of well drilling, distance to proposed sewer, past variance applications, etc.
  - A variance may not be granted for existing wells that violate the statute.
  - A stipulation agreement could be issued for instances in which a variance would have been granted due to lack of feasible alternatives, though this is very uncommon.
- Potential variance provisions to allow new gravity sanitary sewers to be closer than 50 ft (i.e. a gravity pipe that is then “double-walled” or “within a casing” to further protect against leaks).
  - MDH did not indicate any one type of construction that would allow variance but may be inclined to consider a variance with robust pressure testing, pipe lining, or other measures.

Parcels within the project area that have been identified with less than the required 50 ft distance to either existing or proposed sanitary sewer are further discussed in Section 5 of this TM.

3.2.1.3 Minnesota Department of Transportation (MnDOT)

In June 2024, the project team met with MnDOT traffic and utility contacts to clarify what would be permitted within their ROW. The discussions revealed that two upcoming MnDOT projects could impact the MCES construction timeline for a new FM within Highway 7 ROW.

These projects are:

- 2027 Highway 5 construction project plans to detour Highway 5 traffic onto Highway 7.
- 2029 pavement preservation project consisting of mill and overlay on Highway 7 between the intersections of Christmas Lake Rd. in Excelsior and Main St. in St. Bonifacius.
  - 2026 corridor study may influence the 2029 or other future MnDOT projects.
  - Roundabouts are likely to be constructed along Highway 7 as a result of this study, either as part of the 2029 project, or as part of projects further into the future. Therefore, new buried municipal sewer should avoid passing through the center area of intersections, where possible, to limit the need for relocation in the future.

3.3 Design Considerations

The alignments for each new FM alternative were determined based on design parameters identified in Table 3. These parameters were maintained to the extent possible.

Table 3. New FM Design Parameters

Well	50
Habitable buildings (house, office, etc.)	35
Detached garage, pool, outbuilding, etc.	25
Watermain and high-pressure gas main	12
Local gas and existing sanitary sewer	10
Electrical transmission power poles	15
Local power poles (OHU lines)	10
Edge of pavement along MnDOT Highways	10
Other Design Parameters	
Maximize proposed alignment(s) to be within existing easements and ROW	
Minimize number of private driveways impacted	
Avoid ponds, lakes, and potable wells	

Utilities such as water mains, sanitary sewers, and overhead electrical poles played a significant role in developing alternatives for the new FM. However, communication lines were not avoided due to their exact location not being well known at the time of evaluation.

Potable wells were identified as a significant impact to the chosen alternative and were avoided to the extent possible without leading to additional disturbances. MDH prohibits constructing, placing, or installing an interceptor or buried municipal sewer any less than 50 ft from a well (MDH, 2019). The number of parcels where wells are predicted to be impacted is identified for each alternative in Section 5 of this TM. The life-cycle costs include the cost of well abandonment and replacement.

Section 4: Alternative Evaluation

Considering the design criteria and other factors, four proposed new FM alternatives were developed for evaluation against the status quo. The following sections describe each alternative. Refer to the attachments at the end of this document for detailed drawings of each alternative.

4.1 Alternative 1: Status Quo

Alternative 1 is to leave the existing system as is. In this alternative, the initial capital costs presented are to clean the existing 8253-327 FM piping and rehabilitate MHs, as described in detail as part of Alternative 2. This work for the Status Quo alternative must be accomplished during dry weather periods, redirecting allowable flows to interceptor 7017, without any temporary conveyance piping. Thereafter, this alternative presents more frequent valve maintenance, and cleaning and inspection of piping and MHs, required to extend the system's useful life. Attachment B shows the existing FM alignment in further detail.

The original FM was installed in 1987 and is assumed to have a useful life of 40 years (ending in 2027). While the FM metal thickness testing results are favorable, reliance on this existing 8253-327 30-inch DIP FM barrel alone presents risks and does not meet the project drivers.

Figure 4 illustrates the existing system.

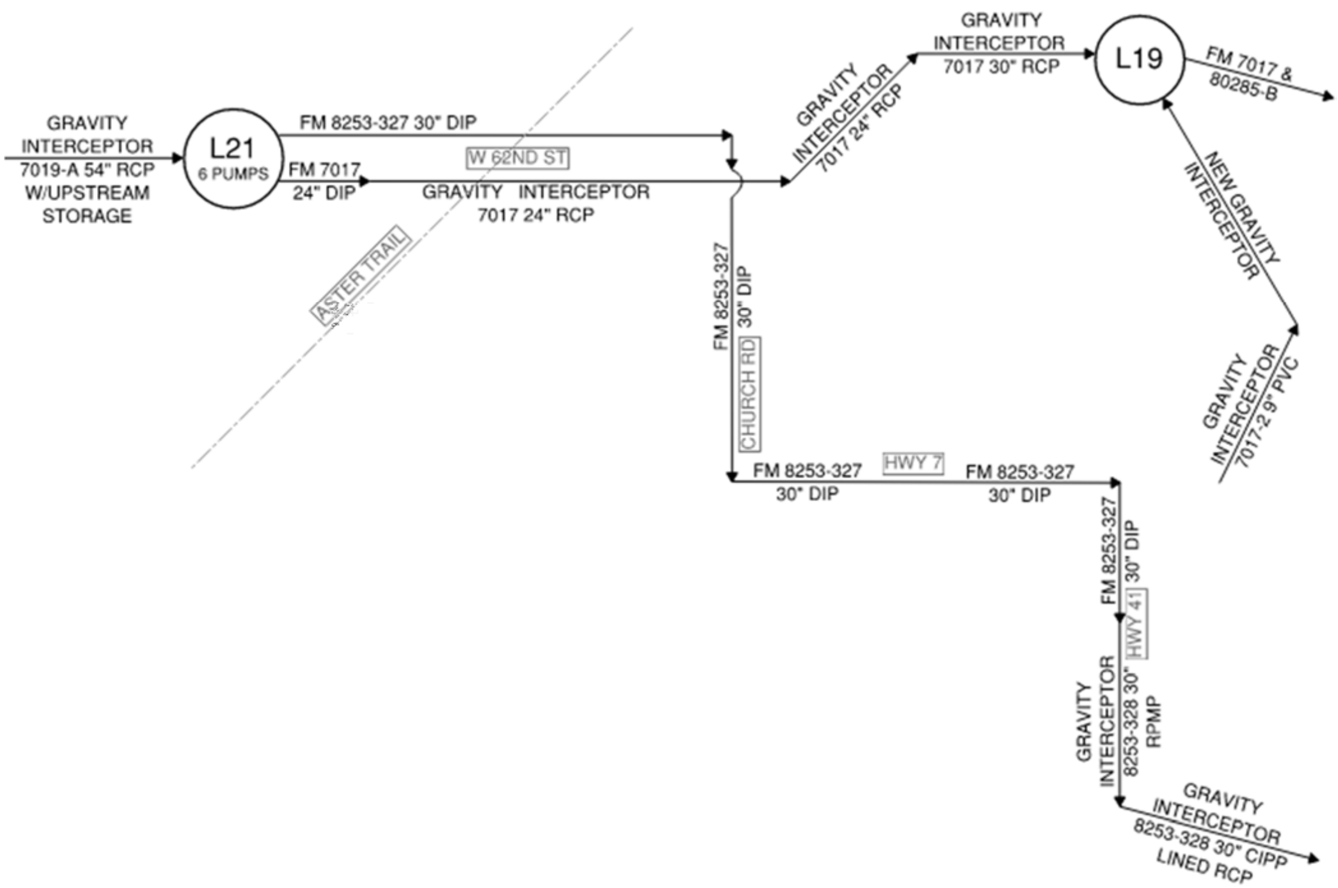


Figure 4: Alternative 1 existing L21 FM system schematic

4.2 Alternative 2: One New Forcemain

Alternative 2 involves adding approximately 13,700 ft of 30-inch FM following a new alignment. The proposed alignment of the new barrel is shown in Attachment C.

In this alternative, the existing FM and gravity interceptor remain in use, and no temporary conveyance is necessary for construction. The BCE assumes that cleaning and inspection of the existing FM, as well as MH rehabilitation, will be necessary. MH rehabilitation will include gutting the structure while replacing the tees, valves, fittings, and the top slab of each MH along the 8253-327 alignment.

The addition of one new FM will provide the system with redundancy so that all flow can be directed through the new barrel when the existing interceptor 8253-327 FM needs to be temporarily taken out of service. Given the limited existing city street ROW of W 62nd St. and Church Rd., with existing utilities and interceptors, as well as the large number of utilities, interceptors, and trails within the MnDOT Highway 7 ROW, the alignment of a proposed new FM requires crossing existing utilities and roadways multiple times. Along W 62nd St. and Church Rd., the proposed new FM alignment falls mostly outside of city street ROWs, requiring easements on private properties.

Figure 5 shows a schematic of this alternative.

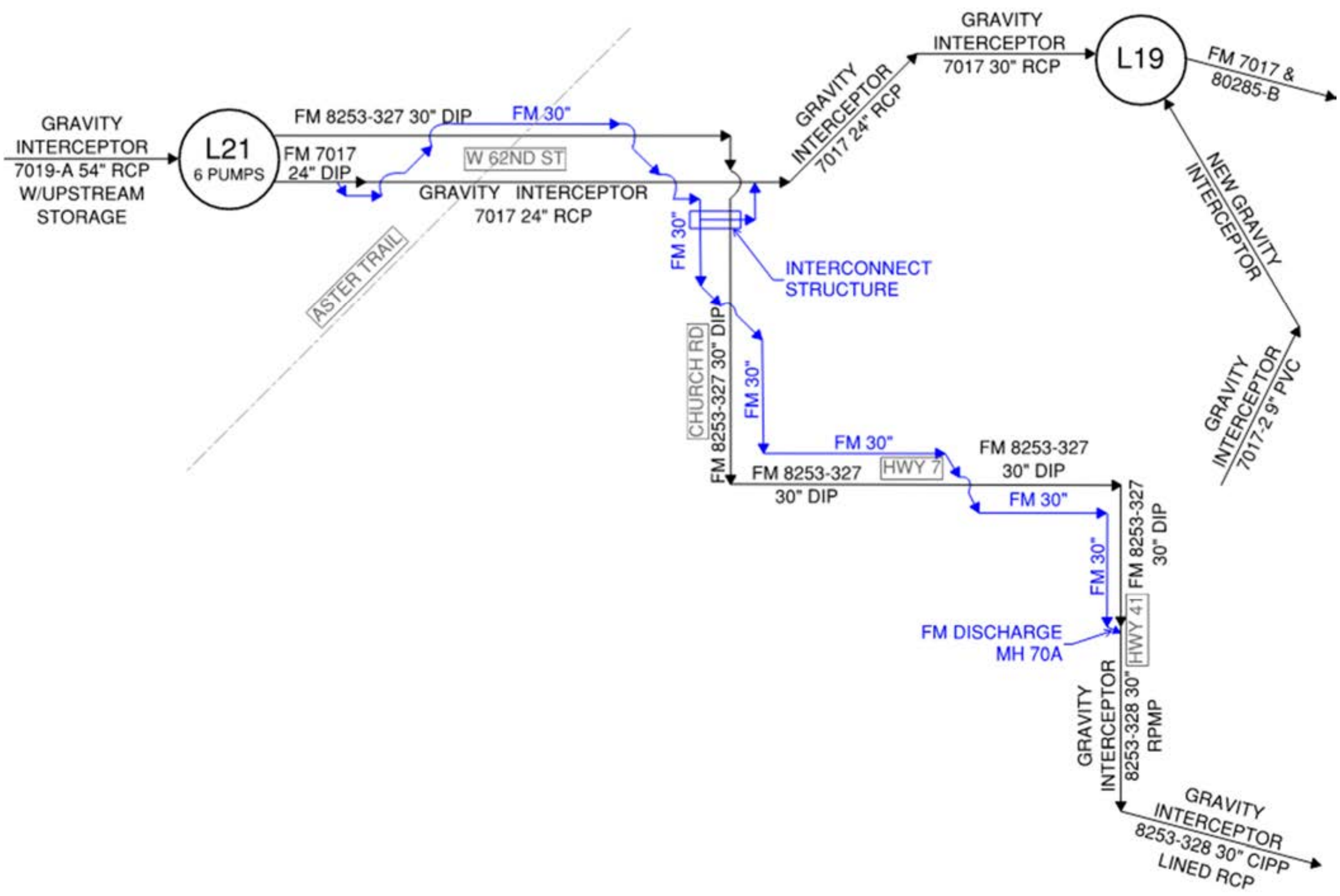


Figure 5: Alternative 2 proposed L21 FM system schematic

4.3 Alternative 3: One New Forcemain on Existing 7017 Alignment

Alternative 3 includes the addition of approximately 13,500 LF of 30-inch FM where the upstream-most 1,600 LF is constructed on the existing 7017 gravity interceptor alignment. The proposed alignment of the new barrel is shown in Attachment D.

In this alternative, the new barrel is placed in a similar alignment to the existing gravity interceptor from MH 11 10 to Cartway Lane. On W 62nd St., the new barrel will parallel the existing FM, with a 10-ft distance between centerlines. Gravity Interceptor 7017 will be relocated approximately 10-ft off centerline of the new 30-inch FM barrel. Near Cartway Lane, the gravity interceptor will be reconnected to an existing MH for continuation of gravity system 7017 eastward along W 62nd St., and the new barrel will continue in a new alignment for the remainder of the 11,900 LF, matching Alternative 2.

The BCE assumes cleaning and inspection of the existing FM and MH rehabilitation will be necessary, in the same fashion as Alternative 2, but only for the 11,900 LF remaining. In addition, both temporary conveyance for gravity service interruptions and temporary road placement on W 62nd St. will be required to construct the new FM.

Figure 6 shows a schematic of this alternative.

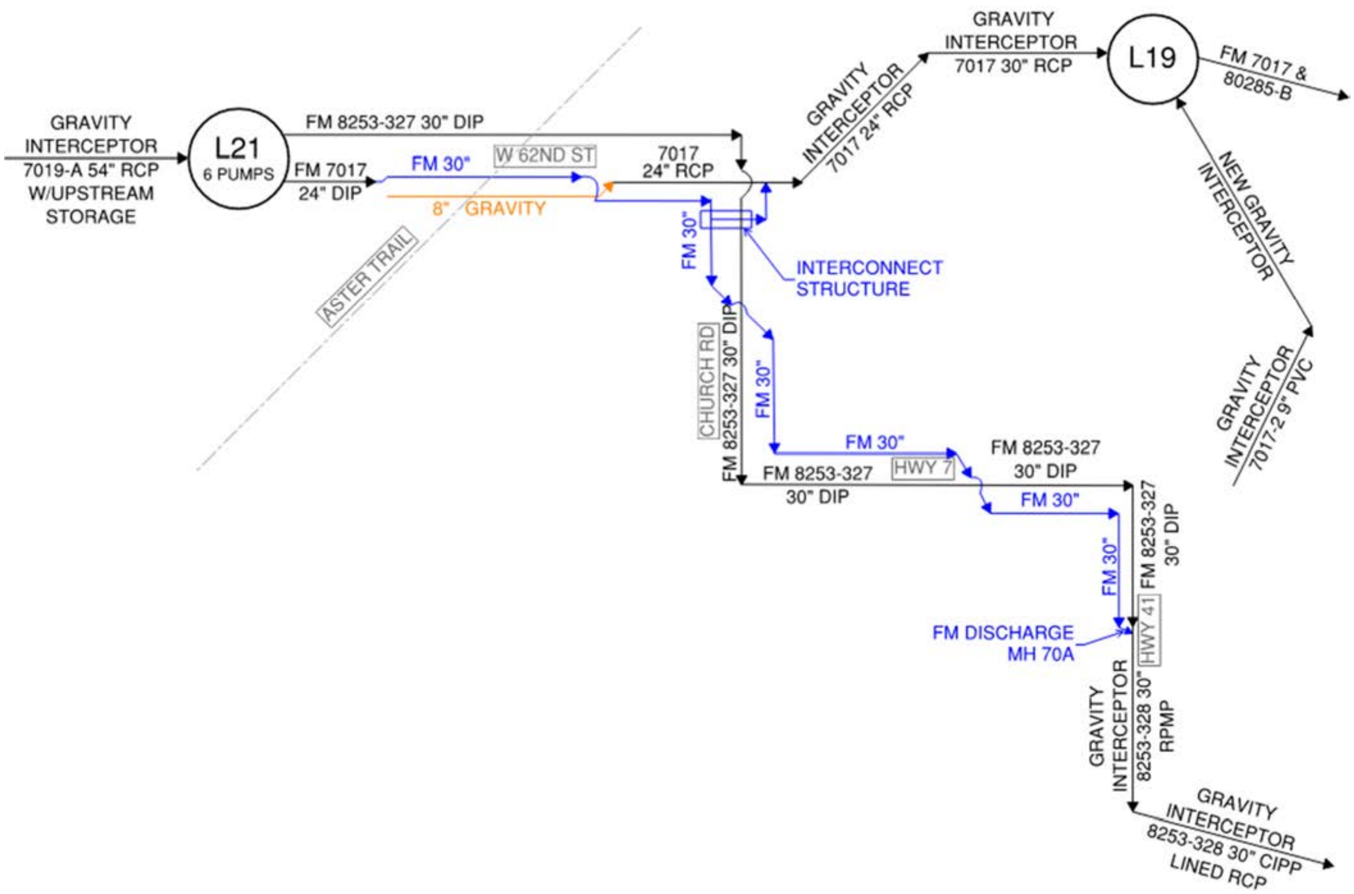


Figure 6: Alternative 3 proposed L21 FM system schematic

4.4 Alternative 4: Two New Forcemains on Existing 8253 Alignment

Alternative 4 is the addition of approximately 27,100 LF of two new 30-inch FM barrels, where the upstream-most 1,600 LF of trench (3,200 LF of pipe) is constructed on the existing FM 8253-327 alignment. Attachment E shows the proposed alignment of the two new barrels.

Since a portion of the existing FM on W 62nd St. will be removed and replaced, this alternative requires the use of partial temporary conveyance FM piping. Additionally, some temporary and/or permanent relocation of utilities is needed to construct new dual FM barrels within the existing FM 8253-327 alignment. The Church Rd. and Highway 7 portions of this alternative are constructable off-line without temporary conveyance with new barrels installed within the same trench, at least 5 ft off centerline from each other.

The BCE assumes full removal of the remaining FM 8253-327 after construction of the new barrels is completed and operational to avoid any existence of three FM barrels.

Figure 7 shows a schematic of Alternative 4.

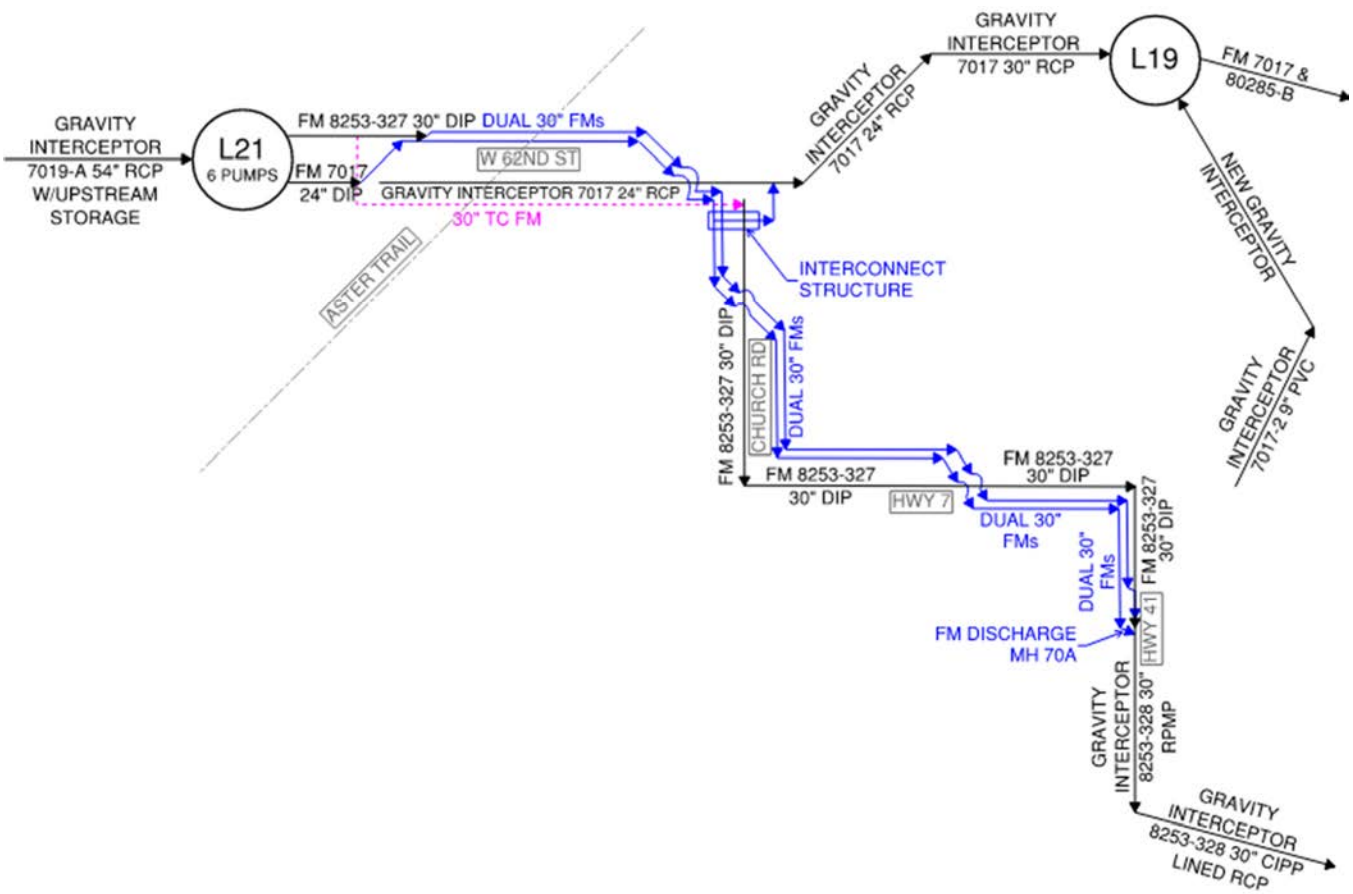


Figure 7: Alternative 4 proposed L21 FM system schematic

4.5 Alternative 5: Two New Forcemains

Alternative 5 is the addition of approximately 27,300 LF of two new 30-inch FM barrels in a different alignment from the existing FM. Attachment F shows the proposed alignment of the two new barrels.

In this alternative, the new barrels would be placed within the same trench, at least 5 ft off centerline from each other. This alternative does not require the use of temporary conveyance piping but results in a significant impact on properties on W 62nd St. and Church Rd. Like Alternative 2 but more pronounced with two pipes, aligning two proposed new FMs without impacting existing systems requires crossing existing utilities and roadways multiple times. Along W 62nd St. and Church Rd., the proposed new FMs' alignment falls mostly outside of city street ROWs, within private yards requiring large easements.

The BCE assumes complete removal of existing FM 8253-327 following installation of the new dual FM barrels.

Figure 8 depicts a schematic of Alternative 5.

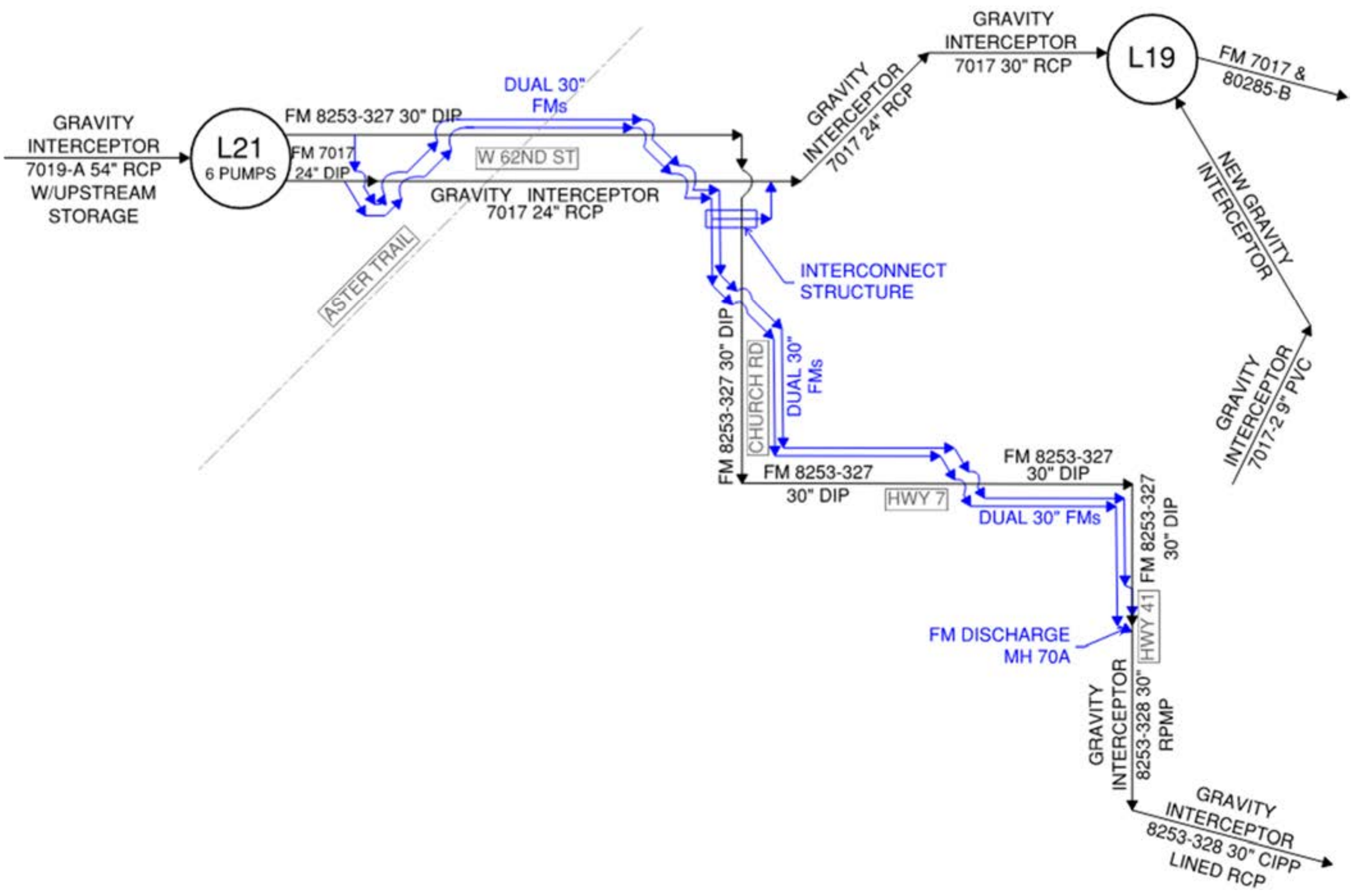


Figure 8: Alternative 5 proposed L21 FM system schematic

Section 5: Alternative Analysis

The following section provides both an economic and non-economic analysis of the alternatives described in Section 4. In this BCE, the most significant difference between the five alternatives is the number and location of new FMs. The location of each alternative heavily influences both the cost and non-economic impact due to the need for tunneling, easements, and private well relocations.

5.1 Cost Estimating and Assumptions

Cost assumptions for material and construction were drawn from several comparable MCES projects constructed over the past decade. An annual inflation rate of 3.0 percent was assumed to convert costs per linear foot to 2026-dollar equivalence. The pipes of each alternative were analyzed based on lineal feet of impact.

- Alternatives 2 and 3 costs include cleaning and assessing the existing FM and rehabilitating 15 structures.
- Alternative 3 assumes removing and replacing the existing gravity interceptor along W 62nd St.
- Alternative 4 assumes the removal and replacement of the existing FM along W 62nd St. and includes the additional cost of temporary conveyance piping during construction.
- All alternatives will require a temporary road for local access and varying levels of restoration to roadways and trails.

Additionally, the costs of easements, both temporary and permanent, were estimated for each alternative. For this evaluation, it was assumed that 10 ft of permanent easement from the centerline of the pipe would be required, with an additional 10 ft of temporary easement needed for a 2-year construction period. Table 4 lists the assumptions for determining the cost associated with each easement acquisition.

Table 4. Easement Assumptions

Description	Value
Percent Cost of Land for Permanent Easement[a]	75%
Percent Cost of Land for Temporary Easement[b]	10%/year
Years of Construction	2
Cost of Residential Land[c]	$4.38/square foot
Cost of Commercial Land[d]	$13.98/square foot

a. *Percentage based on recommendations from MCES private real estate consultants.*
b. *Percentage based on recommendation from MCES.*
c. *Average residential land value per square foot along W 62nd St. and Church Rd.*
d. *Average commercial land value per square foot along Highway 7 and Highway 41.*

Table 5 lists the assumptions used to evaluate the life-cycle costs of each alternative.

Table 5. BCE Main Assumptions[a]

Description	Value
Base year	2026
Planning period end	2064
Analysis horizon (number of years)[b]	39
Annual labor inflation (including benefits)	3.5%
Annual non-labor, other costs inflation	3.0%
Annual construction inflation	3.0%
Undeveloped design details	30%
Construction contingency	20%
Forcemain useful life	40 years

a. *Values based on MCES 2024 Finance Analysis Guidance.*
b. *Number of years in service, not accounting for the year in which FM replacement is warranted (year 40).*

Table 6 presents the O&M requirements that were assumed for this evaluation. Since the existing system is reaching the end of its useful life, it is considered to have significantly more O&M requirements than either of the new FM barrel options.

Table 6. O&M Assumptions[a]

Description	Maintenance (hours/week)
Existing FM system	8
One new FM, keep existing	4
Two new FM, remove existing	2

a. *Routine cleaning every ten years was considered separately*

In addition to the above O&M requirements, each alternative was evaluated assuming that routine cleaning would occur every ten years, beginning in 2038. Costs for this vary based on material and length of pipe between FM access structures. This assumptions are summarized in Table 7.

Table 7. Routine Cleaning Assumptions

Material Description	Cost per LF
Existing DIP	$27
New PVC pipe	$18

Furthermore, the costs associated with Alternative 1 assume that cleaning would occur during low flow, with L21 discharging to gravity interceptor 7017, and no temporary conveyance is necessary.

5.2 Life-cycle Cost Comparison

Table 8 summarizes the BCE results, including capital costs, O&M, and total net present value (NPV) of each alternative. This evaluation does not include costs associated with licensing, permitting, and construction administration. Results of the economic analysis are provided in Attachment G.

Table 8. Alternative Evaluation Cost Comparison

Alternative Description	Capital Costs	O&M Costs	Routine Cleaning Costs	Total NPV[a]
Alternative 1 – Status Quo	$2.9M	$1.2M	$1.2M	$5.3M
Alternative 2 – One New FM	$23.2M	$0.6M	$1.9M	$25.7M
Alternative 3 – One New FM on Existing 7017 Alignment	$25.8M	$0.6M	$1.9M	$28.3M
Alternative 4 – Two New FMs on Existing 8253 Alignment	$34.1M	$0.3M	$1.5M	$35.9M
Alternative 5 – Two New FMs	$34.7M	$0.3M	$1.5M	$36.5M

a. *NPV includes initial capital costs, ongoing O&M costs, and routine cleaning and condition assessment costs (which vary based on pipe material and length).*

5.3 Non-economic Evaluation

Non-economic evaluation is a qualitative approach that describes each alternative's key differences and potential risks. Non-economic criteria considered for this evaluation include:

- Impacts to parcels, including:
  - Easement acquisition
  - Well relocation
  - Tree removal
  - Utility relocation
- O&M considerations, including system reliability
- Operational flexibility
- Constructability

5.3.1 Parcel Impact Summary

The alternatives presented have varying degrees of impact on residential properties, water supply wells, trees, and local utilities. Table 9 summarizes these impacts.

Table 9. Alternative Impact Summary

Alternative Description	Anticipated Number of Parcels with Impacts				Total Number of Parcels Impacted
	Easements[a]	Wells[b]	Trees[c]	Utilities[d]	
Alternative 1: Status Quo	0	2	0	0	2
Alternative 2: One New FM	23	2	13	1	25
Alternative 3: One New FM on Existing 7017 Alignment	26	2	15	0	28
Alternative 4: Two New FM on Existing 8253 Alignment	35	3	13	7	35
Alternative 5: Two New FMs	32	4	22	0	33

a. *Parcels where either or both temporary and permanent easements are required.*

b. *Parcels where surveyed well location is within MDH prohibited limits (less than 50 ft from buried municipal sewer).*

c. *Parcels where approximately two or more medium to large-diameter trees are within anticipated work limits.*

d. *Parcels where utility relocation is necessary (i.e. local gas or power poles). Communication/fiber lines were not considered.*

Two existing wells currently violate the 50-ft MDH separation requirement from the existing MCES sanitary sewer interceptors (FM, gravity, or both).

These wells are located at the following addresses:

- 27180 W 62nd St. in Shorewood
- 6332 Aster Trail in Victoria

According to MDH records, no variance has been issued for either of these wells. Based on research to date, both of these wells were drilled after the construction of the 8253-327 FM. While the impact summary (Table 9) includes these two wells, the cost of relocating them was not included in any of the developed alternatives. It is assumed that both well drillers are out of business and it is unknown who will take responsibility for the well relocation.

Furthermore, up to four existing wells (including the two listed above) were identified as being within the MDH limits of a proposed interceptor alternative. The two additional wells are located at the following addresses:

- 6301 Church Rd. in Chanhassen
- 6180 Aster Trail in Shorewood

See Figure 3 and the attached alternative drawings for the identification of wells within proximity to existing and/or proposed FM alignments.

5.3.2 O&M Requirements and Reliability

Alternatives described in Section 4 each present a different level of required O&M effort to sustain the L21 FM combined system.

Alternative 1, Status Quo

- O&M Considerations
  - Significant O&M efforts are required to maintain the FM system which already exceeds the anticipated lifespan and does not meet project driver requirements for a redundant system that can meet peak wet weather flow.
- Reliability
  - Alternative 1 does not present significant reliability improvements. While FM pipe, fittings, valves, etc. within existing FM structures will be replaced, and the condition of the existing FM will be known; long-term reliability will not change, and the system will still be beyond its useful life.

Alternatives 2 and 3, One New Forcemain

- O&M Considerations
  - Both single FM alternatives present similar O&M efforts to maintain a system that contains one new and one old FM. In both alternatives, the two FMs have separate access structures (ARVs, COs, etc.), increasing the O&M efforts compared to those of combined structures. However, the design intent would be to provide structures, valves, interconnect means, etc., that would optimize the operability and reduce maintenance, where feasible.
  - Alternative 3 presents FM structures within W 62nd St. that will match the existing 30-inch DIP 8253-327 FM with structures adjacent to the roadway. In contrast, Alternative 2 presents FM barrels that do not perfectly align with each other (new FM crossing existing FM multiple times).
- Reliability
  - These two alternatives present matching levels of reliability, maintaining an L21 FM system that contains one new and one old FM. Such reliability meets project driver requirements and minimizes both capital and overall NPV costs.
  - Alternative 3 also presents improved local gravity system reliability for W 62nd St.

Alternatives 4 and 5, Two New Forcemains

- O&M Considerations
  - Both dual FM alternatives present similar O&M efforts to maintain a system that contains two new FMs with common access structures (both pipes through the same ARV, CO, or other structure).
- Reliability
  - These two alternatives present the greatest level of reliability, providing two new FMs and all new structures, valves, fittings, etc.

5.3.3 Operational Flexibility

All alternatives assume that the L21 system continues to have storage available upstream of the lift station and the ability to discharge to either the 7017 gravity interceptor or the 8253-328 gravity interceptor for emergency operation.

Under normal operations, the 8253-327 FM discharges to gravity interceptor 8253-328. Any discharge to gravity interceptor 7017 from L21 shall be considered temporary, and flows should be limited to a single pump running at full speed.

Past discharge(s) to 7017 have resulted in surcharging and/or backups into private sanitary sewer service connections along W 62nd St. Discharge to Interceptor 7017 requires notification(s) and monitoring during use; plus, verification of no negative impacts thereafter when normal L21 pumping has reverted to 8253-327/328.

In addition, the storage available upstream of the L21 station requires added O&M measures during and after a backup event, including:

- Monitoring conditions either remotely or in person
- Verifying that upstream piping and the L21 wet-well are empty, clean, and reverted to normal operations

The L21 lift station is the largest in the west metro area with upstream tunnel storage capacity and the ability to split flows downstream. These features present significant opportunities to manage emergency situations effectively. Therefore, it is crucial for MCES to maintain this operational flexibility. As such, all alternatives presented in this BCE aim to retain the existing operational flexibility, including future capability to discharge to the newly installed gravity interceptor piping that conveys flow to L19 from the former L20 sewershed.

5.3.4 Constructability

All five alternatives presented are constructable but afford varying degrees of ease of construction, permitting, and sequencing as follows.

Alternative 1, Status Quo

- This alternative requires a contractor to clean and CCTV the existing 30-inch DIP FM and rehabilitate FM structures during low flow only. L21 would discharge to gravity interceptor 7017 and no temporary conveyance would be planned. The following steps would have to be completed throughout a low flow period for each FM pipe reach and associated structure.
  - FM segment valved off and dewatered; taking at least two days.
  - FM structure top slab removed, structure internals gutted/rehabilitated, and FM pipe reaches each direction from such structure, cleaned and CCTV’d for assessment, taking at least a week.
  - FM structure internals put back together with new parts, fittings, etc. and FM pipe re-valved open for service, taking at least a week.
- If flows increased (i.e. a storm event occurred), the work must be stopped and 8253-327 FM barrel placed back into service, or a backup event into storage upstream of L21 allowed.
- Multiple starts and stops of this type of work due to limited low flow timing windows available, would increase the potential cost(s) presented within this BCE for the Status Quo, Alternative 1. Additionally, low flow periods are typically experienced during winter months, slowing the progression of work and presenting FM structure access challenges such as snow plowing along City streets and MnDOT Highways.

Alternative 2, One New Forcemain

- This alternative requires land acquisition for temporary and permanent easements throughout the alignment, placing much of the new FM along W 62nd St. within private, newly acquired, permanent easement(s).
- Cleaning and CCTV work of the existing 30-inch DIP FM and rehabilitation of the existing FM structures would be allowed to occur after the new FM barrel is fully constructed and operational.
- Construction of the new FM along W 62nd St. and Church Rd. requires the installation of new FM piping crossing beneath existing utilities at least three times.
  - This presents added construction risk with temporary support of live utilities in multiple locations, including but not limited to gravity sanitary sewers and the existing FM.

Alternative 3, One New Forcemain on Existing 7017 Alignment:

- This alternative lessens land acquisition for permanent easements and eliminates two locations of new FM pipe installation crossing beneath existing utilities, when compared to Alternative 2.
- The new local gravity sanitary sewer (7017 replacement) would be placed closer to existing homes, keeping the new FM between the existing FM and the 7017 gravity sewer replacement. Most of this work would be maintained within roadway and out of private properties.
- BC anticipates that this alternative will provide the least problematic project approach from an environmental and permitting perspective.
  - This is especially true for W 62nd St. which currently presents the most challenging corridor with closest proximity of sewer pipes to private potable water supply wells.
- Like Alternative 2, Alternative 3 allows for the clean and CCTV the existing 30-inch DIP FM and rehabilitate existing FM structures, to occur after the new FM barrel is fully constructed and operational.
- Following construction, the location of the new FM would allow MCES Operations access to the facilities with little impact to private residents.

Alternative 4, Two New Forcemains on Existing 8253 Alignment:

- This alternative requires both temporary conveyance and private utility relocations ahead of the FM removal within W 62nd St. and installation of two new FM barrels back into the same/common trenched area.
- The new dual FM would be placed adjacent to the existing 7017 gravity sewer within W 62nd St., requiring the largest single trenching within a very confined roadway.
  - The large trench and temporary conveyance combination presents significant impacts due to the need for a temporary road granting access to more than 15 residential properties.
- BC anticipates that this alternative requires the greatest amount of public outreach, and coordination with residents, cities, and private utilities.
- Following construction and startup, removal of the remainder of existing 8253-327 FM barrel within Church Rd and along Highway 7 would be required to free up space within existing public ROWs.
- Like Alternative 3, Alternative 4 presents MCES facility access for O&M, which is the least impactful for private residents.

Alternative 5, Two New Forcemains:

- This alternative requires the greatest amount of land acquisition for temporary and permanent easements throughout the alignment.
- Like Alternative 2, Alternative 5 requires new FM piping crossing beneath existing utilities at least three times and with larger dual pipe trenching.

  - This presents added construction risk with widened temporary support of live utilities in multiple locations, beyond that of Alternative 2.
- Once the two new FMs are constructed and commissioned, removing the existing 8253-327 FM barrel would be required, including removal within W 62nd St.

5.3.5 Non-economic Summary

Table 10 provides a non-economic comparison of the five alternatives presented in this TM.

Table 10. Non economic Alternatives Comparison		
Alternative Description	Advantages	Disadvantages
Alternative 1: Status Quo	• Minimum initial capital cost to clean existing 8253-327 FM piping, and rehabilitate MHs, during dry weather periods, transmitting flows to interceptor 7017.	• FM will surpass its useful life. • Requires significant O&M and cleaning. • No redundancy to meet peak flow capacity.
Alternative 2: One New FM	• Least impact to residents per Table 9 • Least roadway construction impacts	• Existing FM will serve as second barrel and requires future rehabilitation (i.e. lining) to extend useful life to match two new FM alternative lifespans.
Alternative 3: One New FM on Existing 7017 Alignment	• Less impact to residents per Table 9 • New local gravity system within W 62nd St. • Dual FM barrels parallel along W 62nd St.	• Existing FM will serve as second barrel and requires future rehabilitation to extend useful life to match two new FM alternative lifespans.
Alternative 4: Two New FM on Existing 8253 Alignment	• Less tree impacts per Table 9 • Dual FM barrels will be parallel along the entire corridor. • Free up space within Hwy 7 ROW for other utilities.	• Results in 3-FM-barrels where existing FM will require removal after construction of new barrels. • Requires temporary conveyance. • Largest number of parcels needing easements.
Alternative 5: Two New FM	• Dual FM barrels will be parallel along the entire corridor. • Free up space within W 62nd St., Church Rd., and Hwy 7 for other utilities, especially WM within city streets.	• Results in 3-FM-barrels where existing FM will require removal after construction of new barrels. • Largest initial capital cost and highest NPV.

Section 6: Recommendation

Based on the field investigations done to date, the alternatives analysis presented herein, and various discussions with MCES Operations, Alternative 3 is the recommended alternative to address the project drivers as a cost-effective, constructible, and permitted means of improving the existing MCES L21 FM system for resiliency and redundancy. With this alternative, the 7017 gravity interceptor is relocated as local gravity within W 62nd St to keep the new FM parallel to the existing 8253-327 FM and keep structures out of residential property as much as possible.

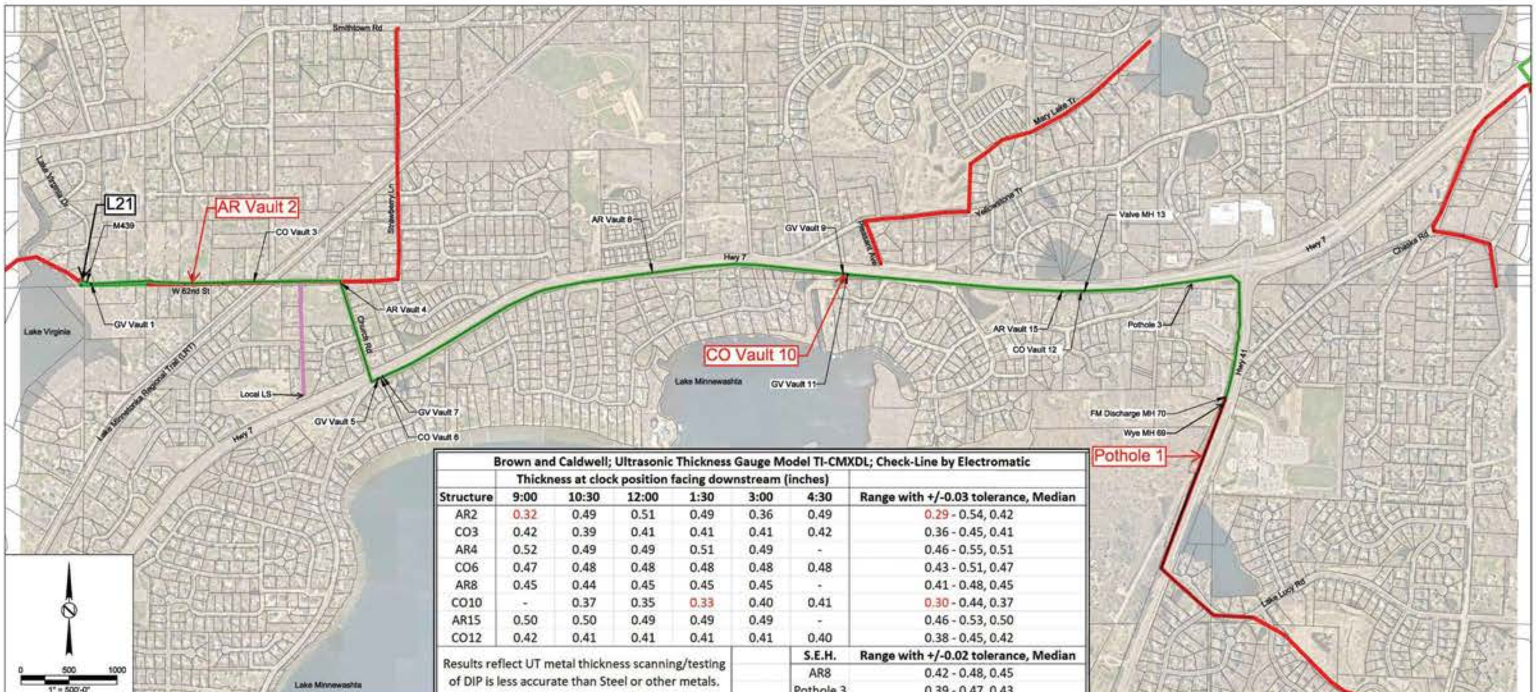
Alternatives 2 and 5 present undesired additional crossings of the existing FM. Furthermore, the combined cost of installing two new FM along with removing the existing 8253-327 FM thereafter (Alternatives 4 and 5) is not favorable given the existing FM has remaining service life.

The recommendation of Alternative 3 is made with the understanding that MCES will execute a specialty FM contract to pass a condition assessment tool internally through the 30-inch DIP 8253-327 FM sometime within the next year. Additional information collected from this specialty tool will help confirm the condition of the existing FM barrel.

References

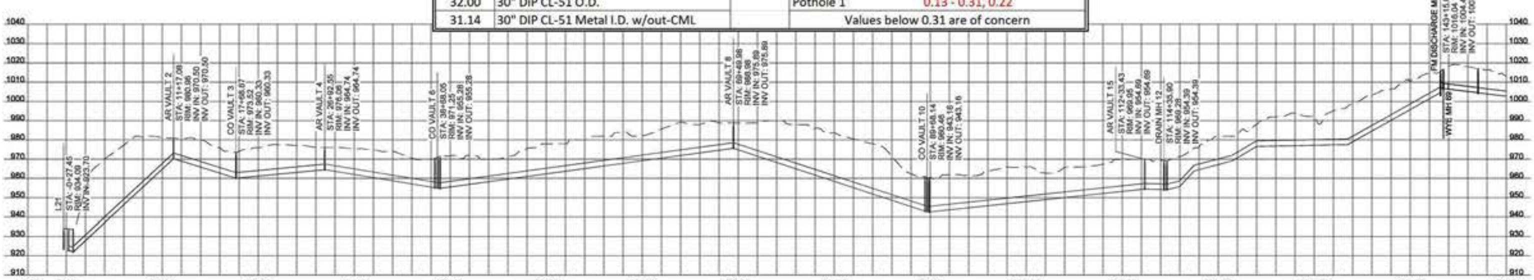
Isolation Distances from a Water-Supply Well, Minnesota Department of Health (MDH), 2019.

Attachment A: Metal Thickness Testing

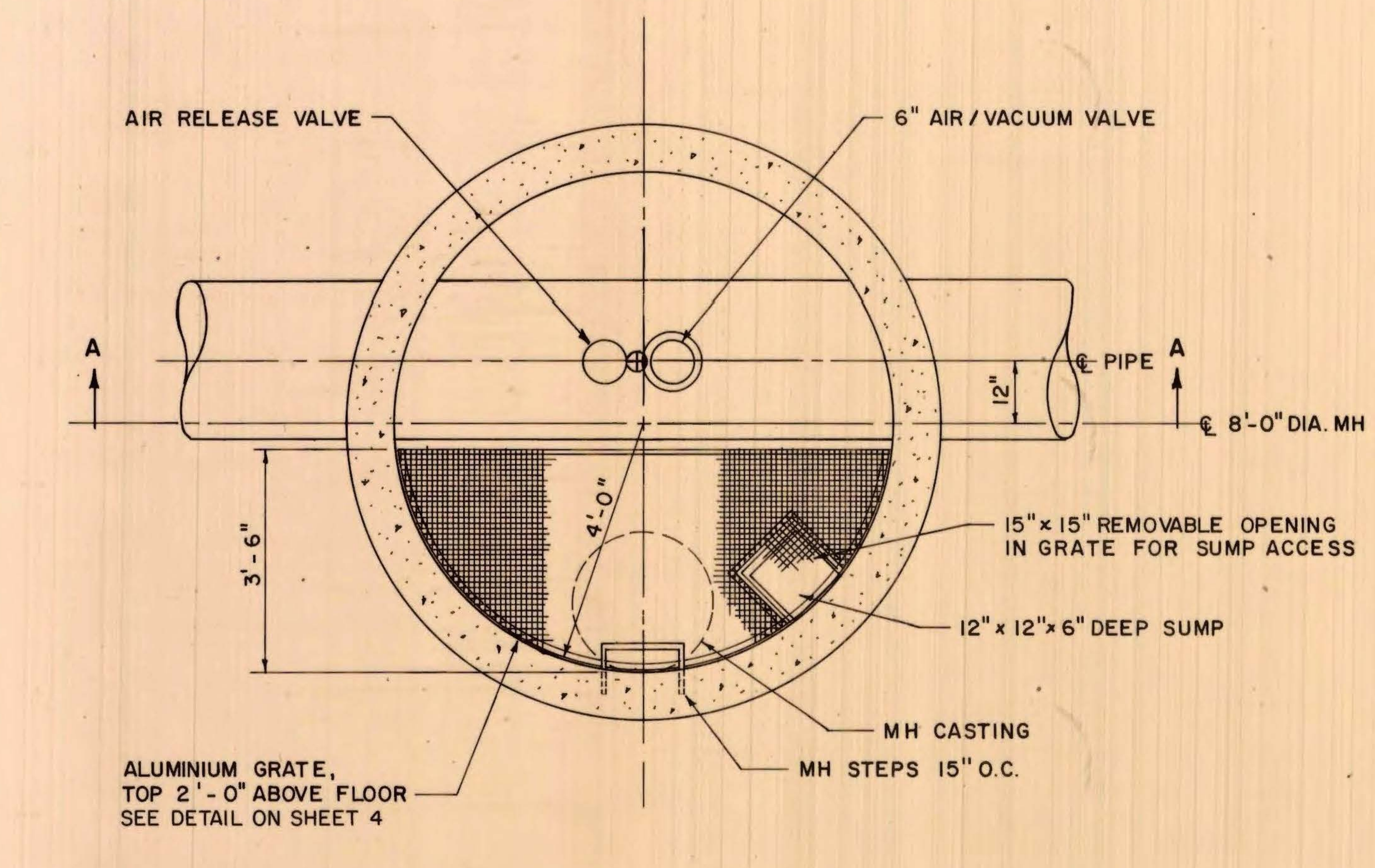


Brown and Caldwell; Ultrasonic Thickness Gauge Model TI-CMXDL; Check-Line by Electromatic							
	Thickness at clock position facing downstream (inches)						
Structure	9:00	10:30	12:00	1:30	3:00	4:30	Range with +/-0.03 tolerance, Median
AR2	0.32	0.49	0.51	0.49	0.36	0.49	0.29 - 0.54, 0.42
CO3	0.42	0.39	0.41	0.41	0.41	0.42	0.36 - 0.45, 0.41
AR4	0.52	0.49	0.49	0.51	0.49	-	0.46 - 0.55, 0.51
CO6	0.47	0.48	0.48	0.48	0.48	0.48	0.43 - 0.51, 0.47
AR8	0.45	0.44	0.45	0.45	0.45	-	0.41 - 0.48, 0.45
CO10	-	0.37	0.35	0.33	0.40	0.41	0.30 - 0.44, 0.37
AR15	0.50	0.50	0.49	0.49	0.49	-	0.46 - 0.53, 0.50
CO12	0.42	0.41	0.41	0.41	0.41	0.40	0.38 - 0.45, 0.42

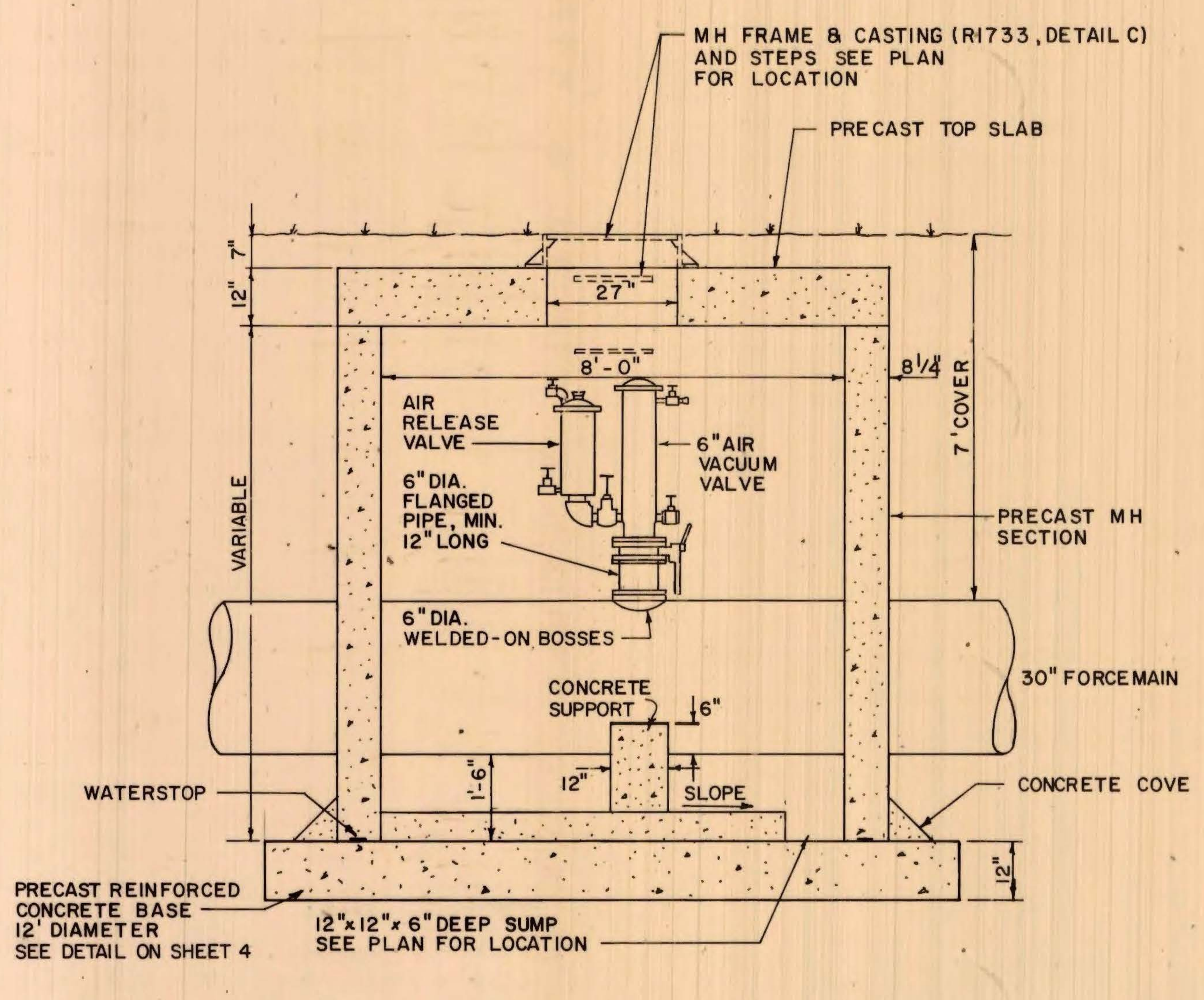
Results reflect UT metal thickness scanning/testing of DIP is less accurate than Steel or other metals.		S.E.H.	Range with +/-0.02 tolerance, Median
		AR8	0.42 - 0.48, 0.45
		Pothole 3	0.39 - 0.47, 0.43
0.43	30" DIP Class 51 (CL-51) pipe thickness	AR14	0.45 - 0.54, 0.50
32.00	30" DIP CL-51 O.D.	Pothole 1	0.13 - 0.31, 0.22
31.14	30" DIP CL-51 Metal I.D. w/out-CML	Values below 0.31 are of concern	



METROPOLITAN WASTE CONTROL COMMISSION
Twin Cities Area



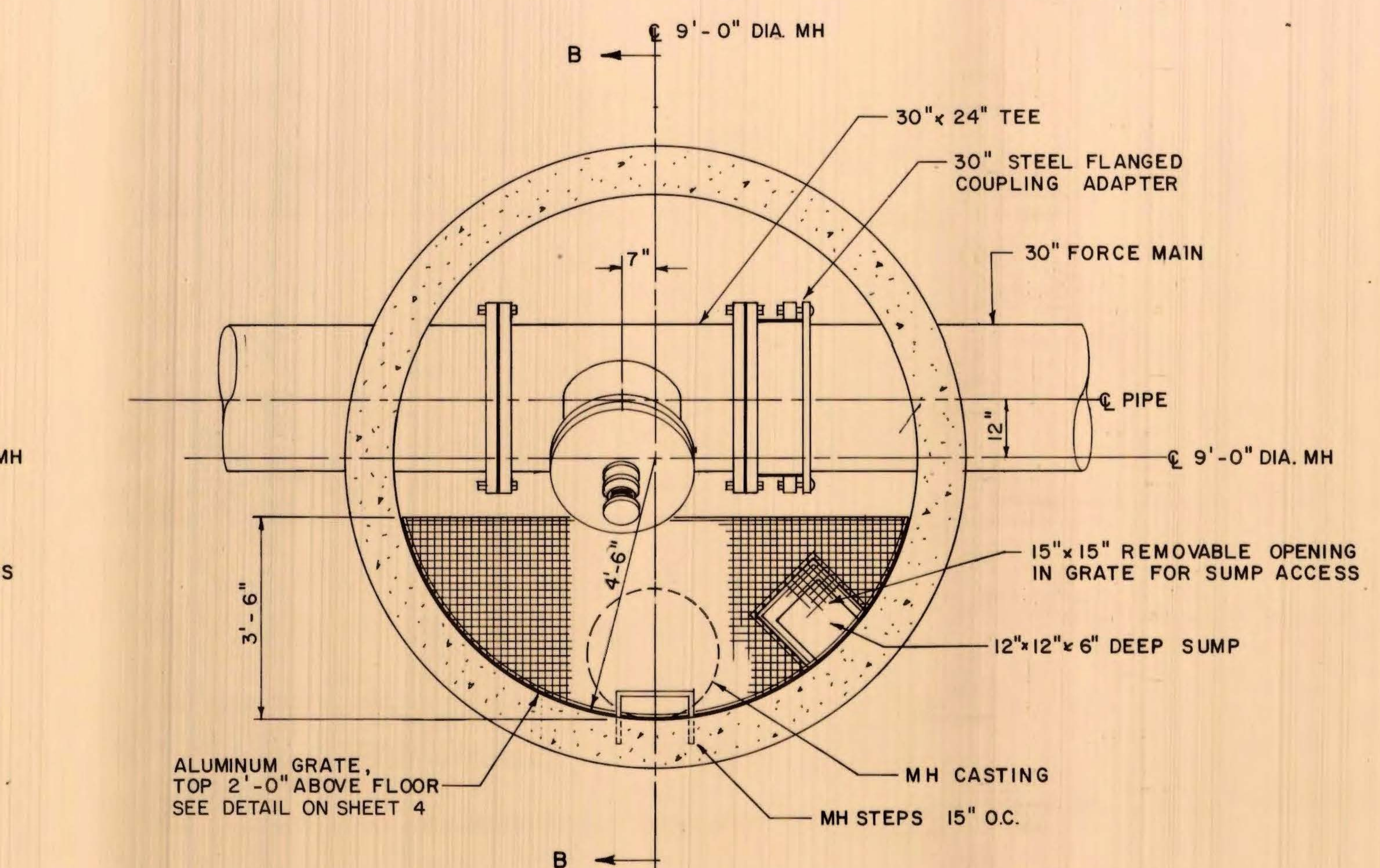
PLAN



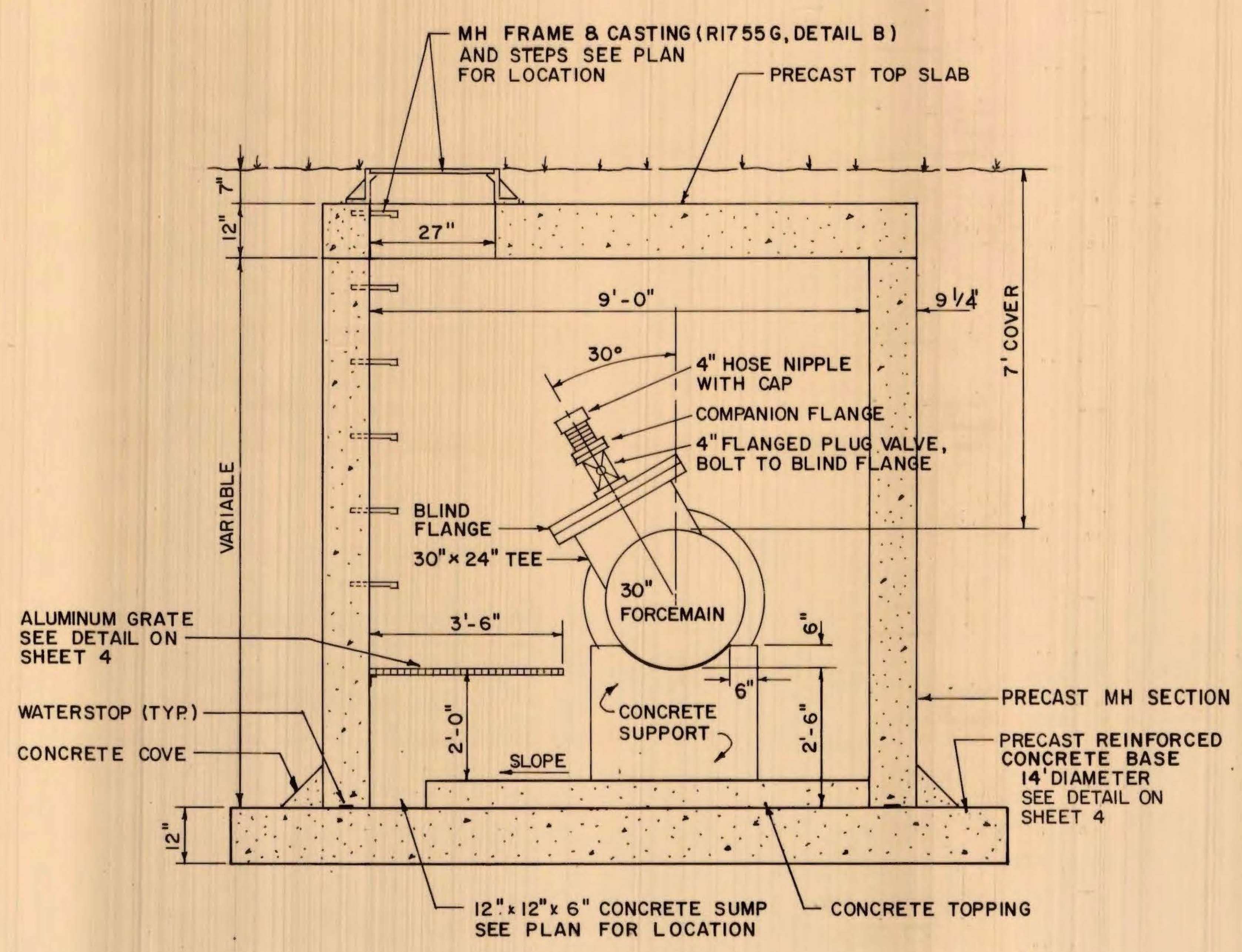
SECTION AA

AIR/VACUUM RELEASE MANHOLE

SCALE: 1/2"=1'-0"



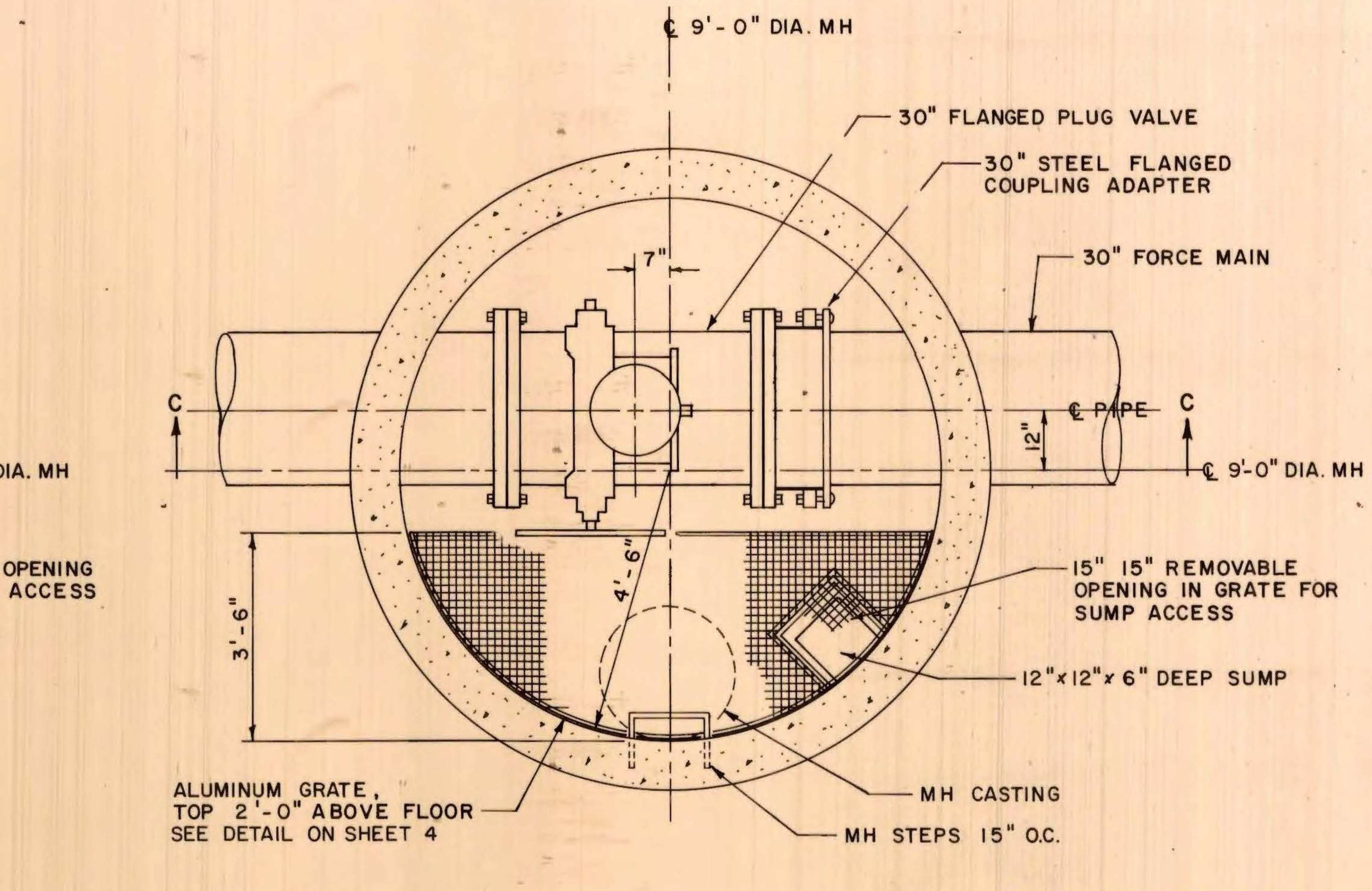
PLAN



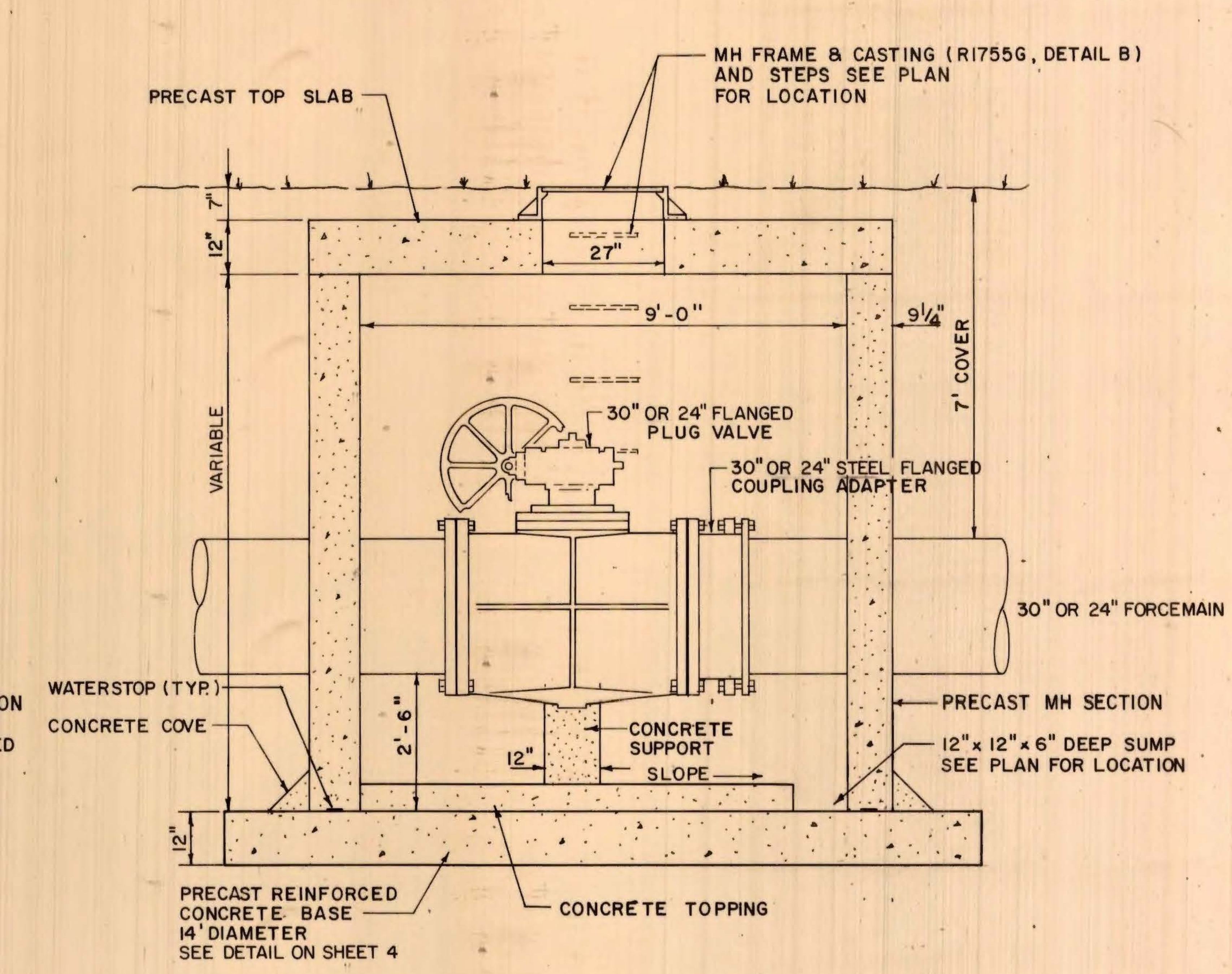
SECTION BB

Cleanout (CO) DRAIN MANHOLE

SCALE: 1/2"=1'-0"



PLAN



SECTION CC

VALVE MANHOLE

SCALE: 1/2"=1'-0"

NOTE:

- SEE DETAIL ON SHEET 4 FOR BOTTOM SLAB REINFORCING AND ALUMINUM GRATE
- CAST MH SECTIONS INTEGRAL WITH BASE
- PROVIDE WATERTIGHT FLEXIBLE SLEEVE CONNECTIONS, A-LOK OR EQUAL, AT ALL PIPE OPENINGS.

RECORD PLAN
2-8-89 D.A.Z.

NO.	DATE	BY	REMARKS
REVISIONS			

DESIGNED	KAG
DRAWN	SY, RJL
DATE	9/10/87
CHECKED	RGS
APPROVED	RGS
COMM.	0614

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
Robert J Schunicht
DATE 9/10/87 REG. NO. 12105

BONESTROO, ROSENE, ANDERLIK AND ASSOCIATES INC.
ENGINEERS & ARCHITECTS
ST. PAUL, MINNESOTA

APPROVED RECORD DRAWING
Keith A. Bachmann CONSULTING ENGR. DATE 6-15-89
MWCC CONSTRUCTION DEPT. REP. DATE 6/21/89
MWCC ENGR. DEPT. REP. DATE 7/12/89

METROPOLITAN WASTE CONTROL COMMISSION

PROJECT NO. 82-58-327
DIVISION
JOB

LAKE VIRGINIA FORCEMAIN
MANHOLE DETAILS

SHEET 3 OF 20
REV.

MWCC-8253-327 P.3

AR Vault 15

CO Vault 12

CO Vault 6

AR Vault 8

CO Vault 10

CO Vault 3 - Flange

Class 52 DIP (new w/CML)

Existing CO-3 Flange and new CL-52 DIP used for calibration

1.05 SEQUENCING AND SCHEDULING

A. Do not pursue work causing shut off of utility service (gas, water, electric, telephone, TV, etc.) to consumers until the utility owner is contacted and all consumers are notified of the shut-off schedule 24 hours prior to shut off.

B. Adjust structures within asphalt pavement areas that are paved as a part of this contract after the pavement of the asphalt mix base. Ramp manholes after adjustment and remove ramps prior to installation of asphalt mix wear.

PART 2 - PRODUCTS

2.01. MATERIALS

A. Pipe and Fittings: Ductile iron pipe must be used for sanitary sewage force main. Contractor may use ductile iron or cast iron fittings. Pipe and fittings shall conform to the appropriate portions of Article 2.02 of this section.

B. Concrete Materials:
1. Use Standard Portland Cement Type 1, clean washed sand and crushed rock and gravel free from deleterious materials for monolithic concrete manholes and all manhole bases.
2. Portland cement: Comply with the requirements of A.S.T.M. C150.
3. Gradation: Subject to the approval of the Engineer. Use proper water-cement ratio to obtain 3000 psi in 28 days.

C. Mortar Materials:
1. Cement: Use Type 1 Standard Portland Cement conforming to A.S.T.M. C150.
2. Lime: Use normal finishing hydrated lime meeting the requirements of A.S.T.M. C206 or C141.
3. Gradation: Subject to the approval of the Engineer.
4. Mix proportions
   a. Use one part cement to three parts of suitable plaster sand for mortar used for plastering, adjusting rings and lift holes. Use lime or mortar mix in the amount necessary to make a suitable mixture for plastering purposes, but not to exceed 15% by volume.
   b. Use one part Portland cement to two parts of sand to which lime or mortar mix may be added but not to exceed 15% by volume for mortar used for laying concrete block.

2.02. MANUFACTURED UNITS

A. Ductile Iron Pipe:
1. General Requirement: AWWA C151.
2. Class: 51

3. Cement mortar lining: AWWA C104.
4. Mechanical or push on joint: AWWA C111.
5. Joint gaskets designed and manufactured to exact dimensions to assure a liquid tight joint.
6. All joints of force main pipe to have electrical contact through every joint.
7. All ductile iron pipe to have polyethylene encasement in accordance with AWWA C105.

B. Fittings:
1. Requirements: AWWA C110. Mechanical joint.
2. Working pressure: 350 psi.
3. Lining: AWWA C104. Standard thickness cement mortar.
4. Ductile iron complying with AWWA C153 is acceptable in lieu of cast iron.

C. Reinforced Concrete Pipe:
1. General Requirement: ASTM C76.
2. Class of pipe: Shown on plan.
3. Pipe joints: ASTM C361, Bureau of Reclamation Type R-4.

D. Manholes and Catch Basins:
1. Requirements: ASTM C478, detail on plans.
2. Diameter and special requirements shown on the plans.
3. Manhole base to be case integrally with manhole section.
4. Provide watertight sleeve connections similar to A-LOK at all pipe openings for force main.

E. Manhole Frames & Covers:
1. Requirement: ASTM A-48.
2. Material: Class 35 cast iron. Best grade. Free from injurious defects and flaws.
3. Finish: Coal tar pitch varnish.
4. Finish Preparation: Sandblast.
5. Machine cover and frame contact surface for non-rocking protection.
6. Cast labels "SANITARY SEWER" on each cover. Use 2 inch letters.
7. Non-watertight covers to have two concealed pick holes.
8. Type of each casting is shown on the detail on the plans.

F. Air/Vacuum Release, Drain and Valve Manholes:
1. Requirements: ASTM C478, Detail on plans.

G. Steps: May be cast iron or polypropylene coated.
1. Cast Iron: Requirements: ASTM C478, minimum tensile strength 35,000 psi. Neenah Foundry Step No. R-1981J, Badger F-15 or equal.
2. Polypropylene Coated: M. A. Industries SP-1-PF, or equal. Design: Similar to cast iron specifications (see detail on plans).

H. Plug Valves
   1. Valves to be non-lubricated, eccentric type with resilient-faced plugs suitable for sewage service.
   2. Valves to have flanged ends, corrosion resistant seals (AWWA C504, C507) and replaceable sleeve type bearings is upper and lower journals.
   3. Pressure rating to be 175 psi working pressure (ANSI Standard B16.1) with drip tight shut-off to full valve rating.
   4. Specific Requirement for valve: DeZurik, Homestead or equal.
   5. Furnish gear operator with handwheel and valve position indicator.

I. Air/Vacuum Release Valve
   1. Air/Vacuum release valve to include a combination large orifice air/vacuum valve and an independent small orifice air release valve. Valves shall maintain air gaps to retard clogging from waste solids and shall be suitable for sewage service.
   2. Valves shall have 6' hose with quick disconnect coupling for flushing.
   3. Working pressure: 150 psi.
   4. Air and vacuum release valve: 6"
   5. Air release valve: 1/2" outlet.
   6. Specific Requirements: APCO Series 400C, Golden Anderson Fig. No. HCAR, Crispin Model S61AB, or equal.

J. Hose Nipple and Cap
   1. 4" nipple with National Standard threads.

K. Coupling Adaptor
   1. Specific Requirement: Steel flange coupling adapter Rockwall 913, Dresser 128 or equal - 250 psi rating.
   2. Secure coupling with the rods to provide restraint for 250 psi rating. Rods to be as close to flange as possible.

L. Cast Iron Soil Pipe:
   1. General Requirements: ASTM A47.
   2. Pipe shall be extra strength.

M. Insulation
   1. General Requirements: Extruded polystyrene insulation board having a compressive strength of 35 psi, similar to DOW (see detail)
   2. Size: Shall be 4" thick by 8' wide.

N. Polyethylene Encasement:
   1. General Requirements AWWA C105, Polyethylene film in tube form.

2.03 SOURCE QUALITY CONTROL

A. All materials are subject (at the discretion of the CAR) to inspection and approval at the plant of the manufacturer.

AMERICAN Ductile Iron Pipe

ANSI/AWWA C150/A21.50
and
ANSI/AWWA C151/A21.51
Standard Pressure Classes – Wall Thickness and Nominal Wall Thickness

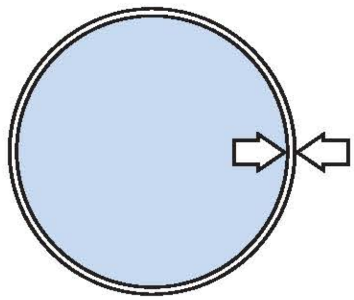


Table No. 3-8

Size in.	Outside Diameter in.	Pressure Class 150	200	250	300	350
		Nominal Thickness in Inches				
4	4.80	-	-	-	-	0.25
6	6.90	-	-	-	-	0.25
8	9.05	-	-	-	-	0.25
10	11.10	-	-	-	-	0.26
12	13.20	-	-	-	-	0.28
14	15.30	-	-	0.28	0.30	0.31
16	17.40	-	-	0.30	0.32	0.34
18	19.50	-	-	0.31	0.34	0.36
20	21.60	-	-	0.33	0.36	0.38
24	25.80	-	0.33	0.37	0.40	0.43
30	32.00	0.34	0.38	0.42	0.45	0.49
36	38.30	0.38	0.42	0.47	0.51	0.56
42	44.50	0.41	0.47	0.52	0.57	0.63
48	50.80	0.46	0.52	0.58	0.64	0.70
54	57.56	0.51	0.58	0.65	0.72	0.79
60	61.61	0.54	0.61	0.68	0.76	0.83
64	65.67	0.56	0.64	0.72	0.80	0.87

Pressure classes are defined as the rated water working pressure of the pipe in psi. The thicknesses shown are adequate for the rated water working pressure plus a surge allowance of 100 psi. Calculations result in net thicknesses and are based on a minimum yield strength in tension of 42,000 psi and 2.0 safety factor times the sum of working pressure and 100 psi surge allowance.

Thickness can be calculated for rated water working pressure and surges other than the above by use of equation 1 in ANSI/AWWA C150/A21.50.

AMERICAN Ductile Iron pipe is available for water working pressures greater than 350 psi. Check AMERICAN for details.

These are standard pressure classes as given in AWWA C150 and C151. AMERICAN can furnish any thickness in between these standard thicknesses if deemed economical for major projects.

AMERICAN Ductile Iron pipe is also available with thicknesses greater than Pressure Class 350. For special applications, contact AMERICAN.

AMERICAN Ductile Iron Pipe

ANSI/AWWA C150/A21.50
and
ANSI/AWWA C151/A21.51
Nominal Wall Thicknesses for Special Thickness Classes

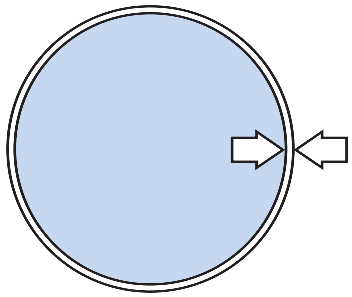


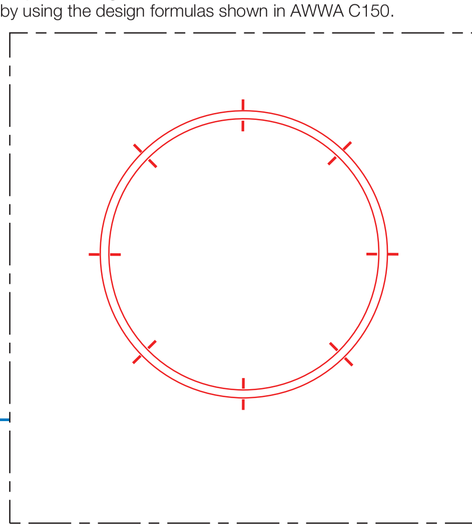
Table No. 3-12

Size in.	Outside Diameter in.	SPECIAL THICKNESS CLASSES—Wall Thickness in Inches*						
		50	51	52	53	54	55	56
4	4.80	-	.26	.29	.32	.35	.38	.41
6	6.90	.25	.28	.31	.34	.37	.40	.43
8	9.05	.27	.30	.33	.36	.39	.42	.45
10	11.10	.29	.32	.35	.38	.41	.44	.47
12	13.20	.31	.34	.37	.40	.43	.46	.49
14	15.30	.33	.36	.39	.42	.45	.48	.51
16	17.40	.34	.37	.40	.43	.46	.49	.52
18	19.50	.35	.38	.41	.44	.47	.50	.53
20	21.60	.36	.39	.42	.45	.48	.51	.54
24	25.80	.38	.41	.44	.47	.50	.53	.56
30	32.00	.39	.43	.47	.51	.55	.59	.63
36	38.30	.43	.48	.53	.58	.63	.68	.73
42	44.50	.47	.53	.59	.65	.71	.77	.83
48	50.80	.51	.58	.65	.72	.79	.86	.93
54	57.56	.57	.65	.73	.81	.89	.97	1.05

*These are Special Thickness Classes as shown in AWWA C150 and C151. They were previously designated standard thickness classes. AMERICAN can furnish any thickness in between these Special Thicknesses if deemed economical for major projects.

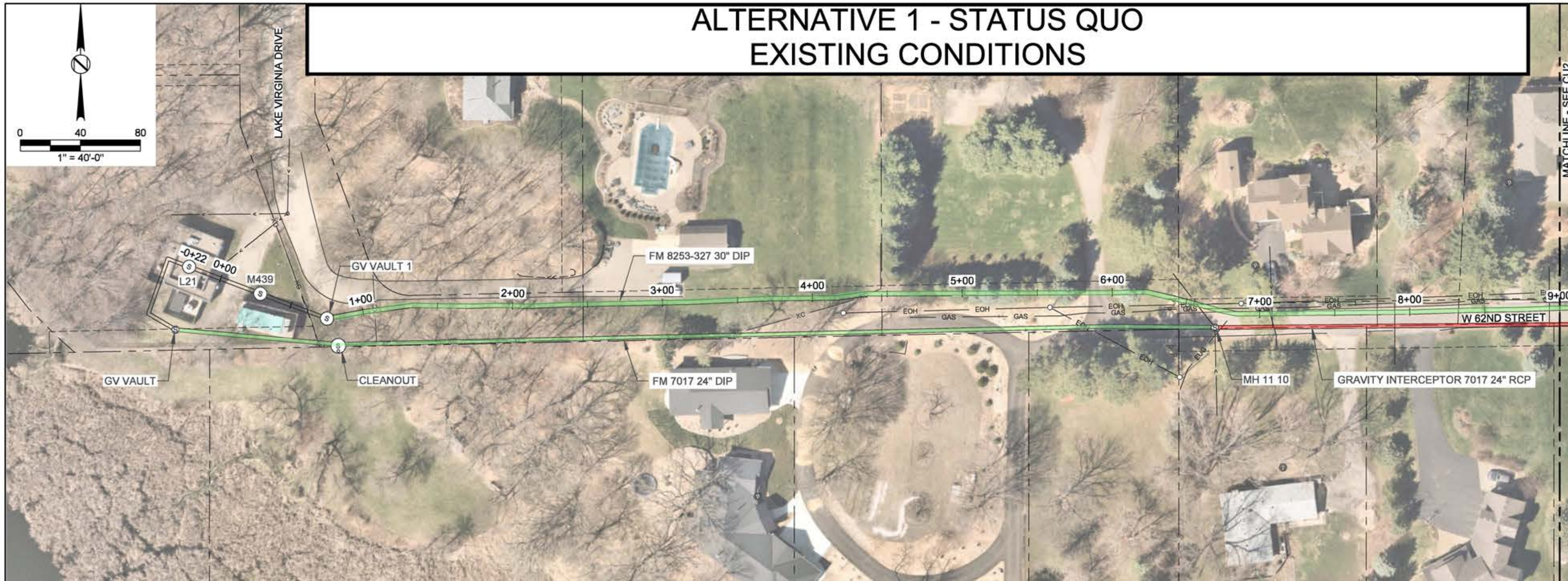
Special classes are most appropriately used for some threaded, grooved, or ball and socket pipes or for extraordinary design conditions, and they are generally less available than standard pressure class pipe.

For pressure rating and maximum depth of cover capabilities of Special Thickness Classes, check AMERICAN. These capabilities can be estimated by comparing metal thickness and capabilities of those of Pressure Classes in Table No. 3-11, or may be calculated by using the design formulas shown in AWWA C150.



Attachment B: Alternative 1 – Status Quo Exhibits

ALTERNATIVE 1 - STATUS QUO
EXISTING CONDITIONS



GENERAL NOTES:

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KEY NOTES:

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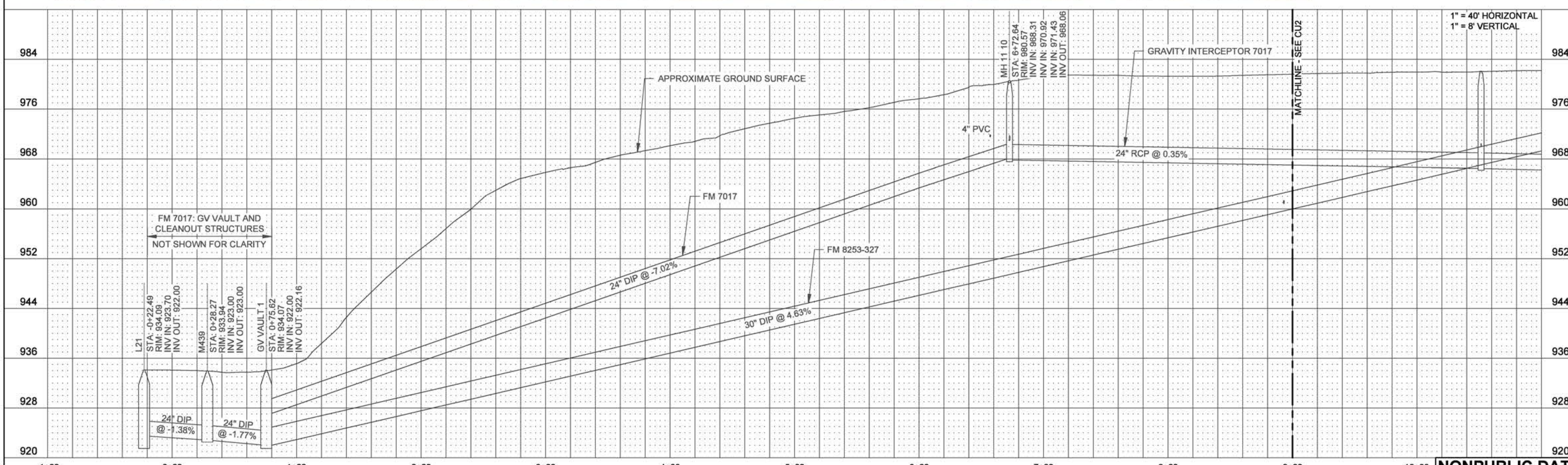

NONPUBLIC DATA

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MODIFIED: 2/6/2025 2:54:22 PM

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED: PCG
DRAWN: TEP
CHECKED: JEB

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE: ______
TYPED OR PRINTED NAME: ______
DATE ______ REG NO ______

Brown AND Caldwell

PROJECT
FILE NAME: CU001

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 0+00 TO STA 9+00

CU1

4 OF XX

C:\USERS\APERRY1\DC\ACCDOCS\BC ACC PROJECT HUB\107597 - MCES INTERCEPT 8253-327 IMPROV PH2\PROJECT FILES\300 DESIGN\CAD_802XXX\SHEETS\CU002.DWG
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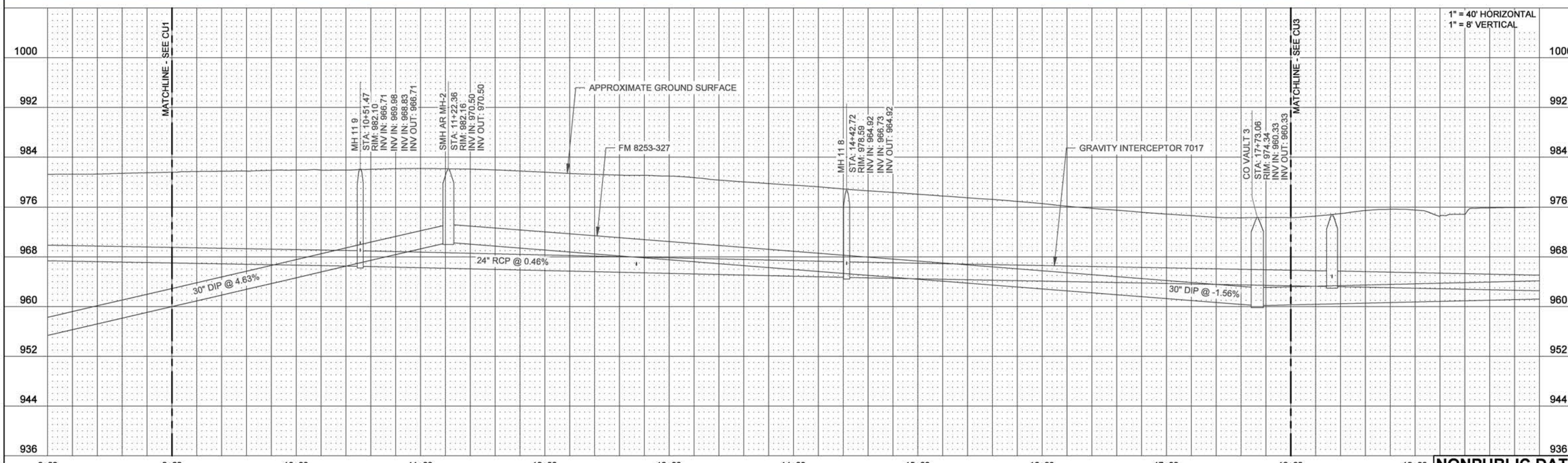
MODIFIED: 2/26/2025 3:00:27 PM

GENERAL NOTES:

1.

KEY NOTES:

1.



NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE:
TYPED OR PRINTED NAME:
DATE: REG NO.

Brown AND Caldwell

PROJECT

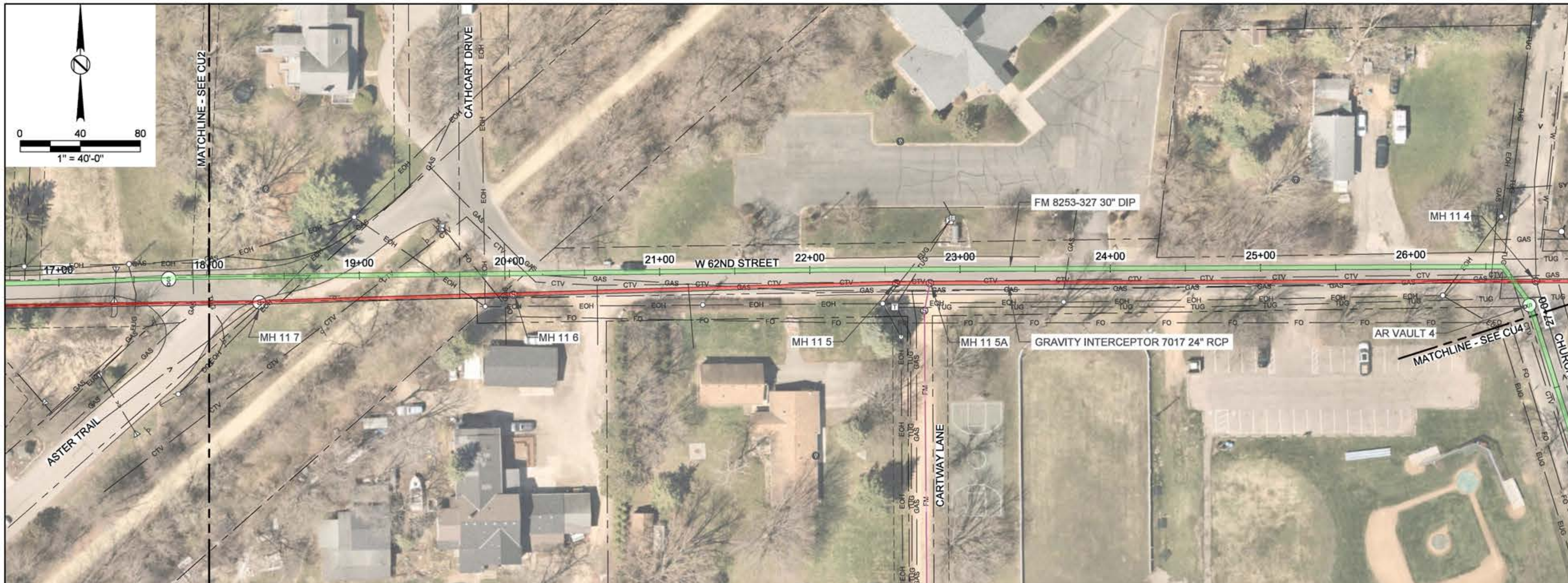
FILE NAME: CU002

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 9+00 TO STA 18+00

CU2

5 OF XX



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KEY NOTES:

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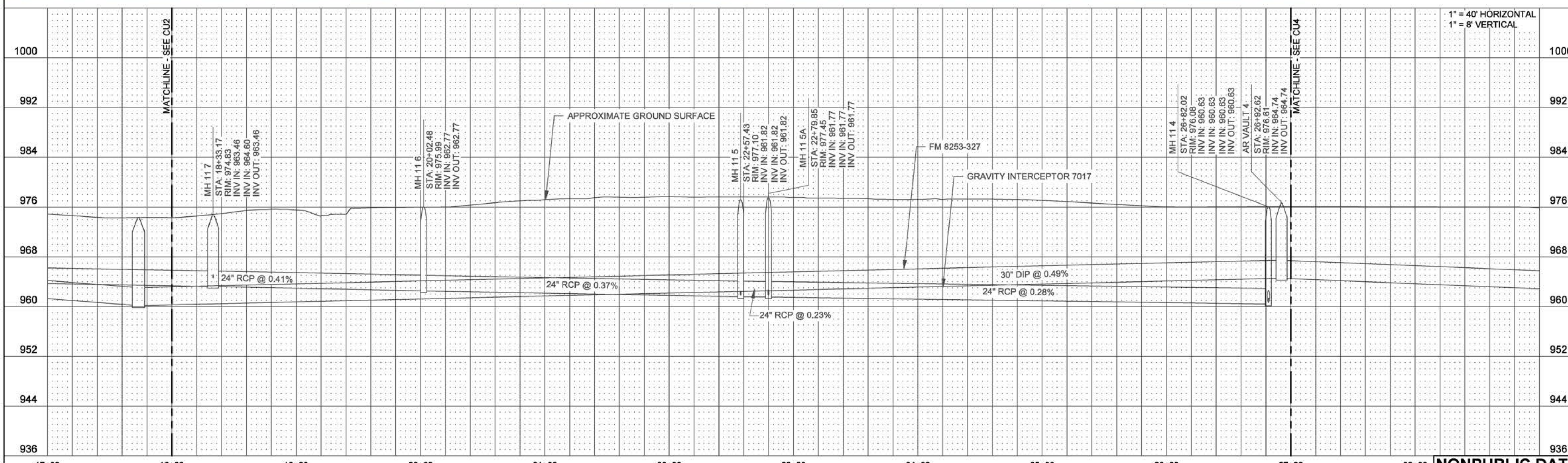

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REVISIONS				REVISIONS			

DESIGNED

DRAWN

CHECKED

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE:

TYPED OR PRINTED NAME:

DATE ______ REG NO ______

Brown AND Caldwell

PROJECT

FILE NAME

CU003

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 18+00 TO STA 27+00

CU3

6 OF XX

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KEY NOTES:

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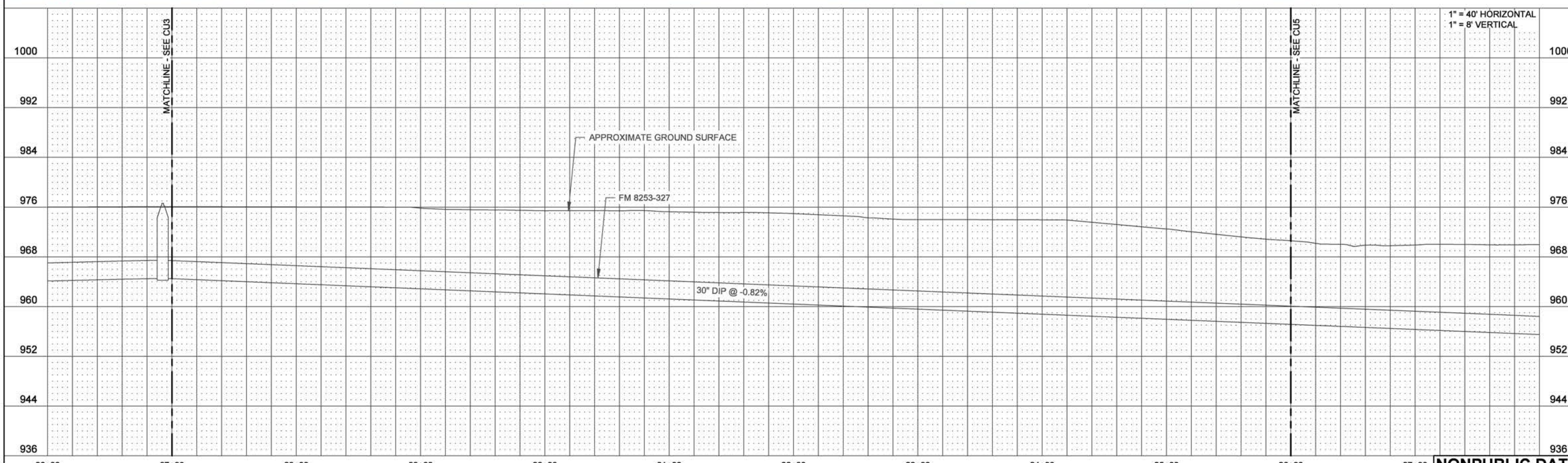

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REVISIONS				REVISIONS			

DESIGNED

DRAWN

CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU004

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 27+00 TO STA 36+00

CU4

7 OF XX

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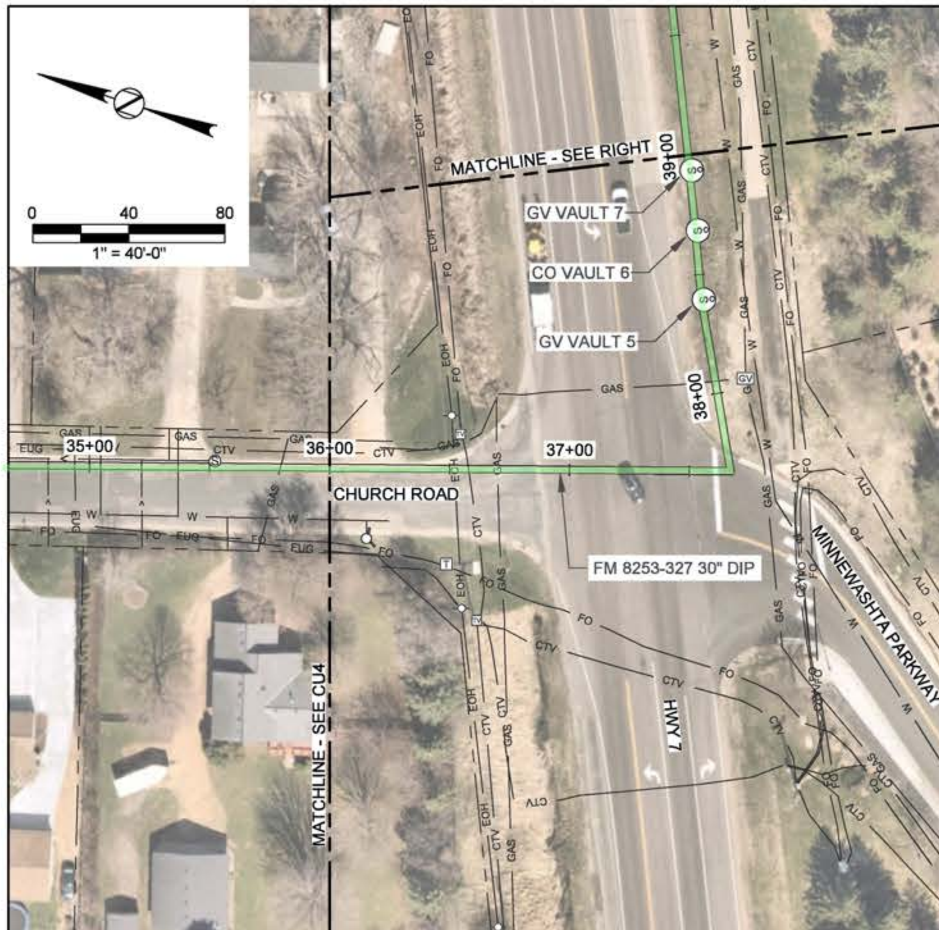

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KEY NOTES:

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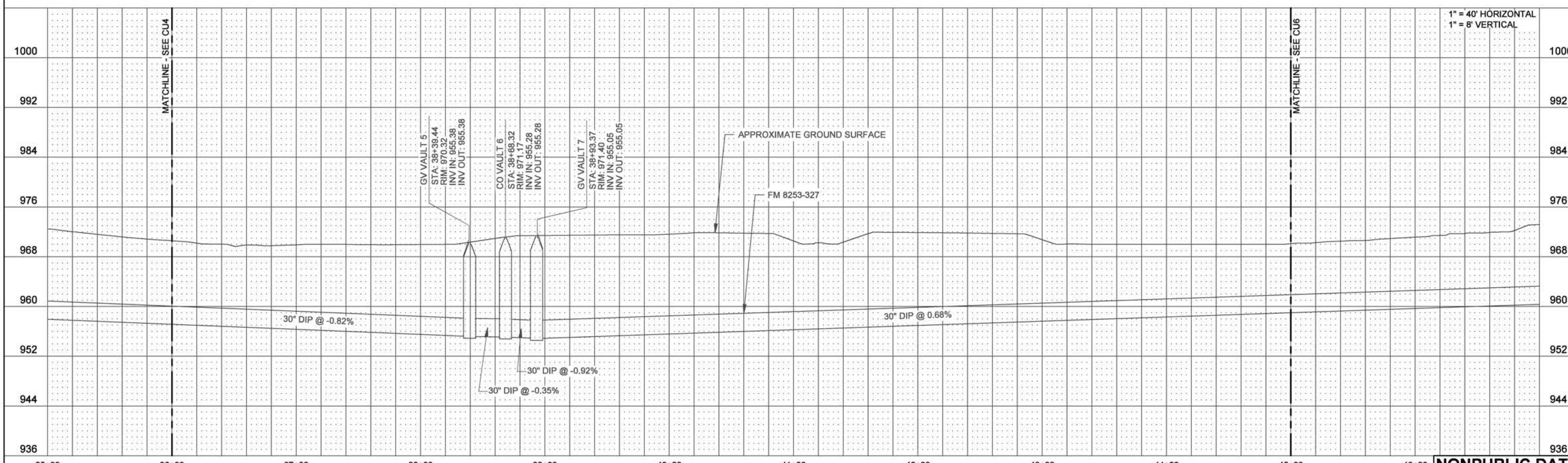

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REVISIONS REVISIONS

DESIGNED / DRAWN / CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU005

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 36+00 TO STA 45+00

CU5

8 OF XX

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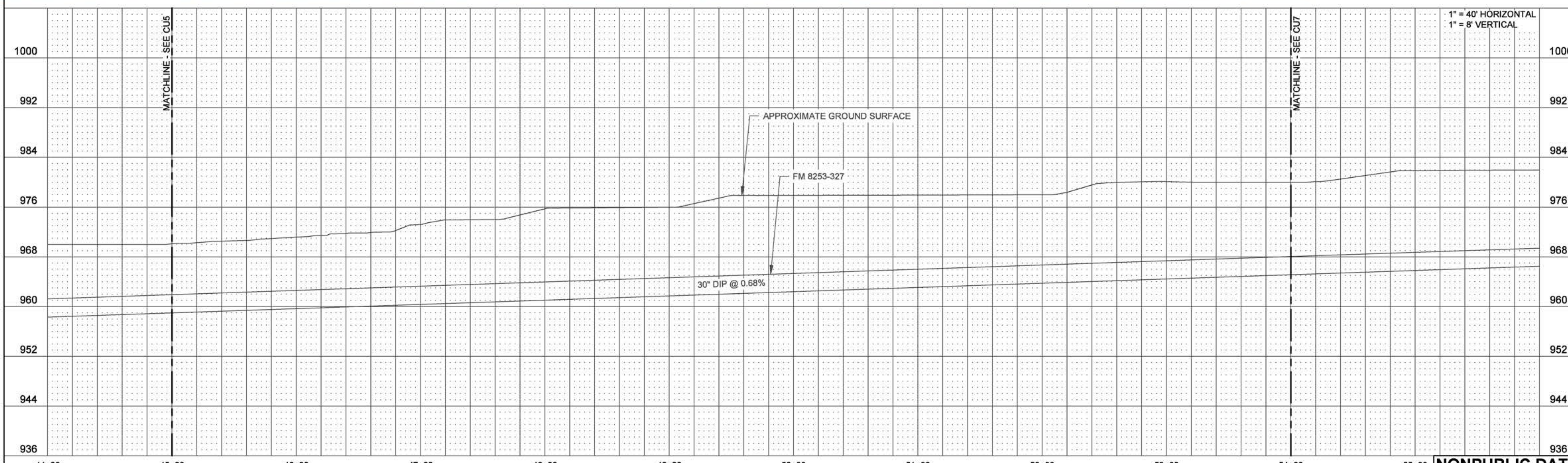

NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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SIGNATURE: ____________
TYPED OR PRINTED NAME: ____________
DATE ________ REG NO ________

Brown AND Caldwell

PROJECT

FILE NAME
CU006

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 45+00 TO STA 54+00

CU6

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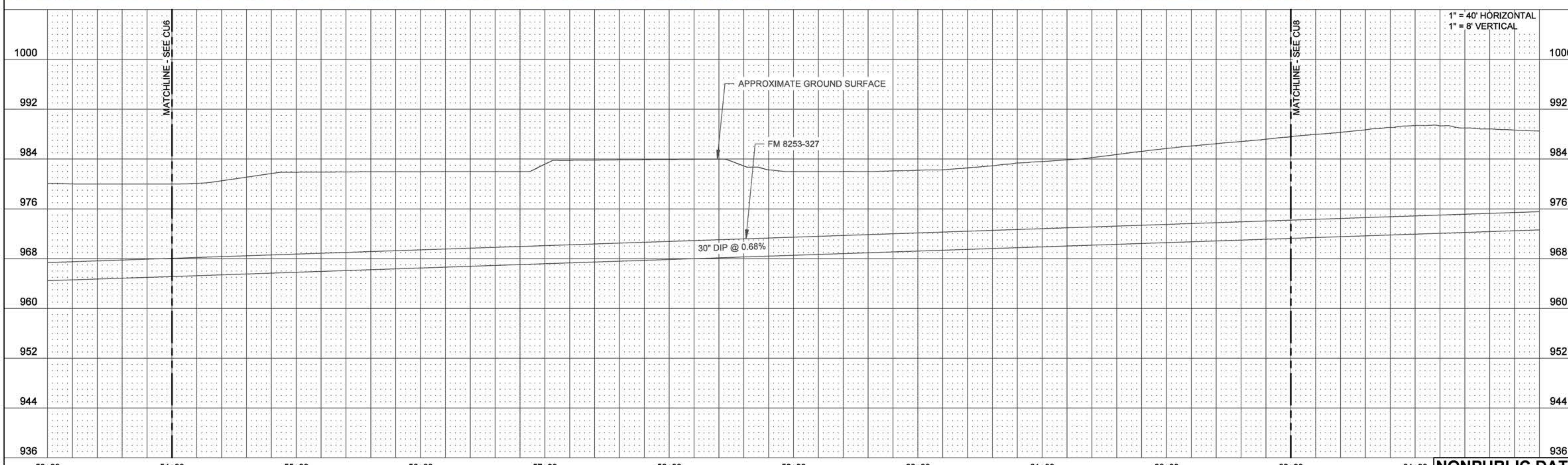

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REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE: REG NO:

Brown AND Caldwell

PROJECT

FILE NAME
CU007

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 54+00 TO STA 63+00

CU7

10 OF XX

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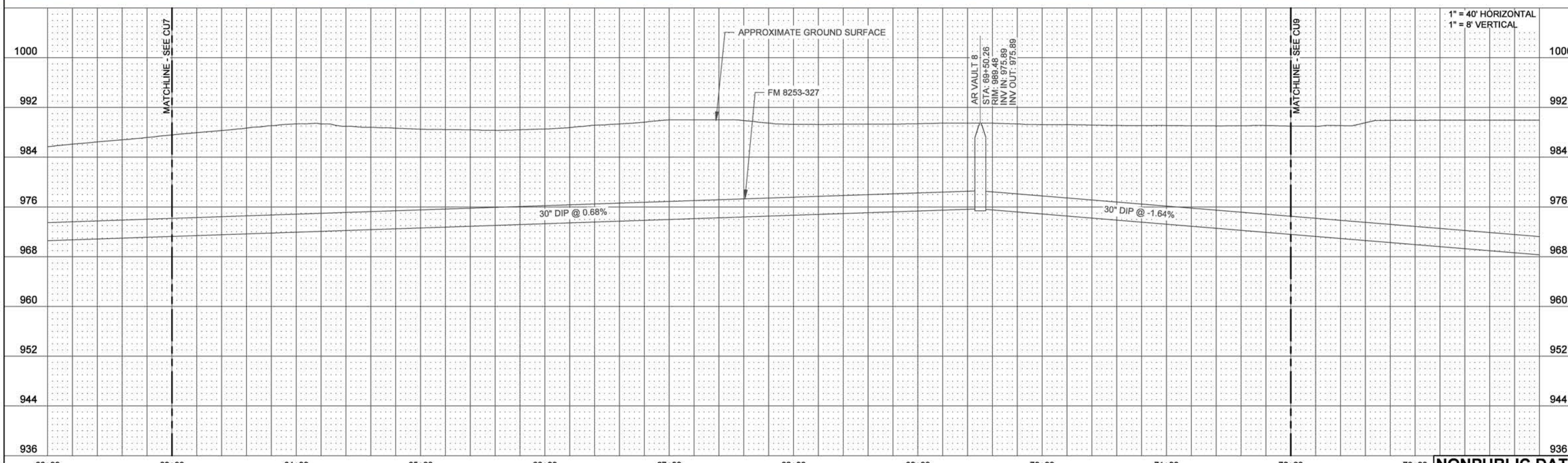

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT
FILE NAME CU008

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 63+00 TO STA 72+00

CU8

11 OF XX

GENERAL NOTES:

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KEY NOTES:

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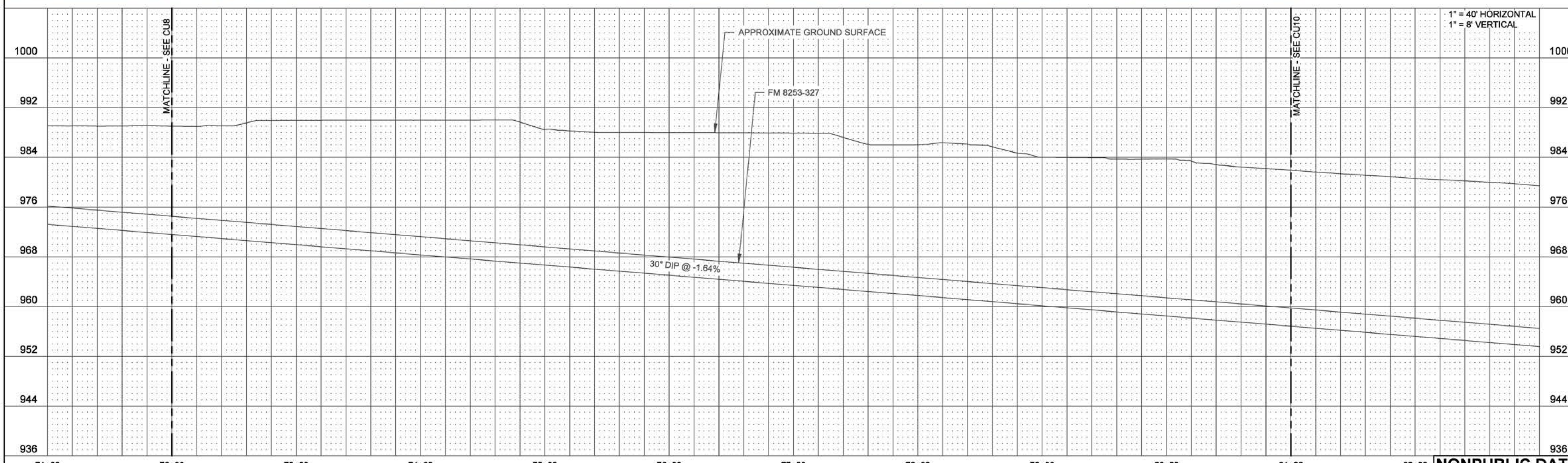

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS

REVISIONS | REVISIONS

DESIGNED
DRAWN
CHECKED

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE:

TYPED OR PRINTED NAME:

DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU009

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 72+00 TO STA 81+00

CU9

12 OF XX

C:\USERS\APERRY1\DC\ACCDOCS\BC ACC PROJECT HUB\107597 - MCES INTERCEPT 8253-327 IMPROV PH2\PROJECT FILES\300 DESIGN\CAD_802XX\SHEETS\CU009.DWG
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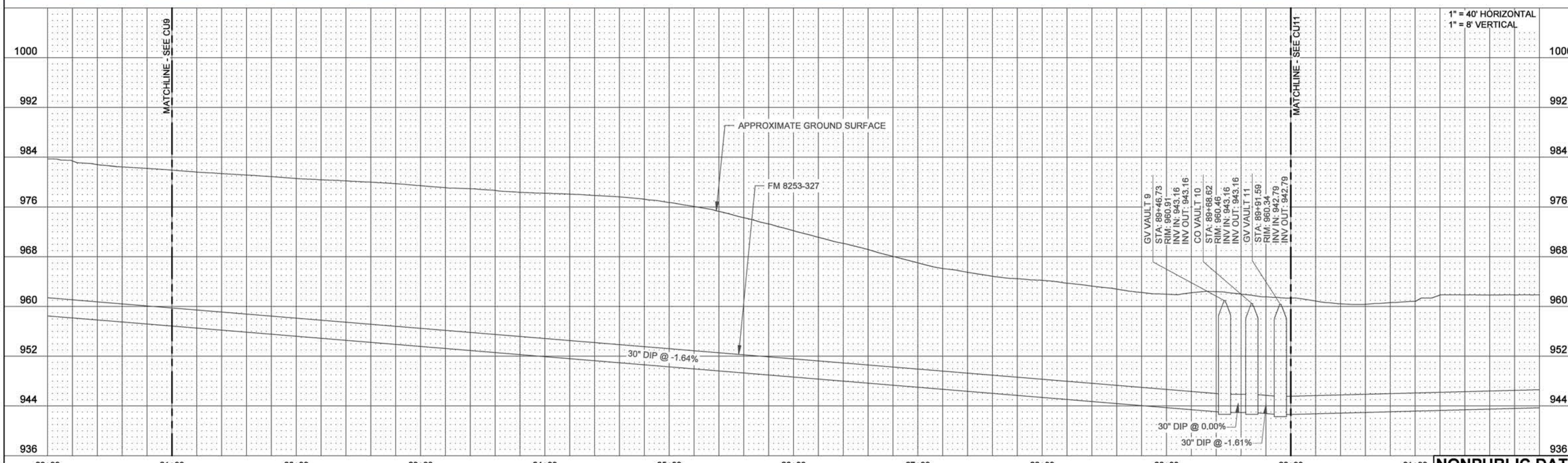

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REVISIONS				REVISIONS			

DESIGNED

DRAWN

CHECKED

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SIGNATURE: ____________

TYPED OR PRINTED NAME: ____________

DATE ____________ REG NO ____________

Brown AND Caldwell

PROJECT

FILE NAME
CU010

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 81+00 TO STA 90+00

CU10

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KEY NOTES:

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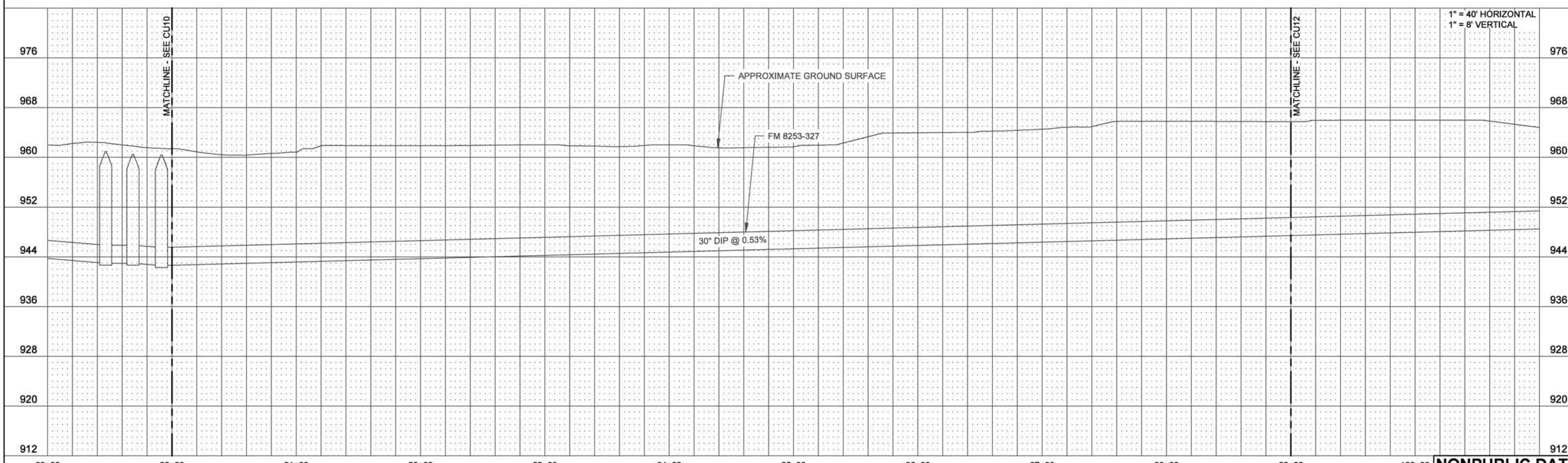

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REVISIONS				REVISIONS			

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DRAWN

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DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU011

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 90+00 TO STA 99+00

CU11

14 OF XX

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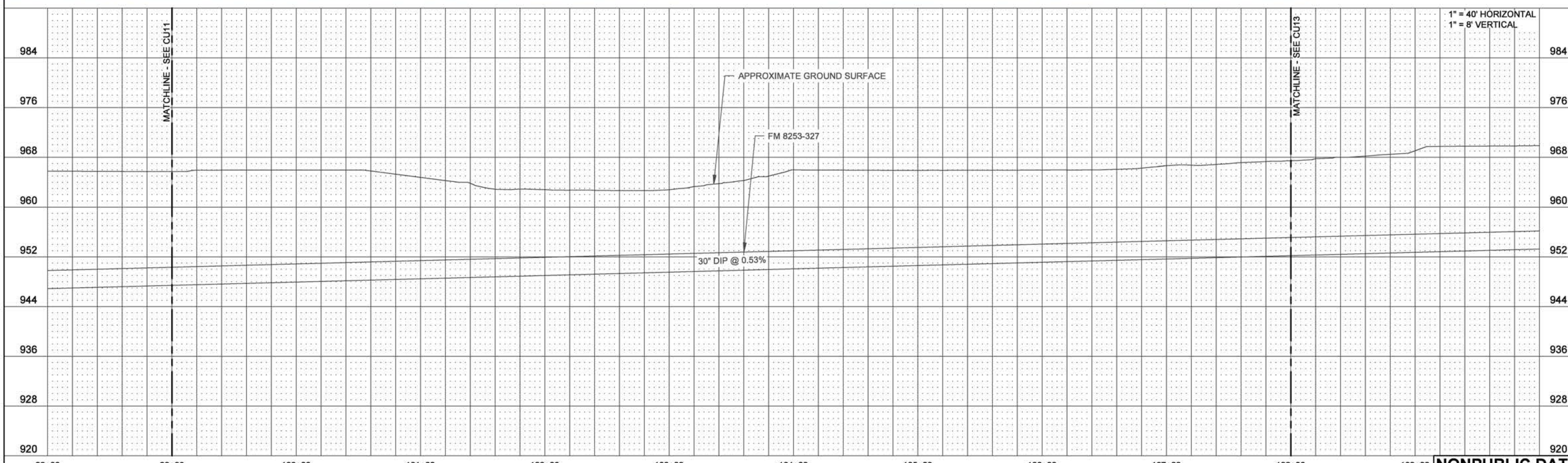

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REVISIONS			

NO	DATE	BY	REMARKS
REVISIONS			

DESIGNED
DRAWN
CHECKED

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DATE: REG NO

Brown AND Caldwell

PROJECT

FILE NAME: CU012

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 99+00 TO STA 108+00

CU12

15 OF XX

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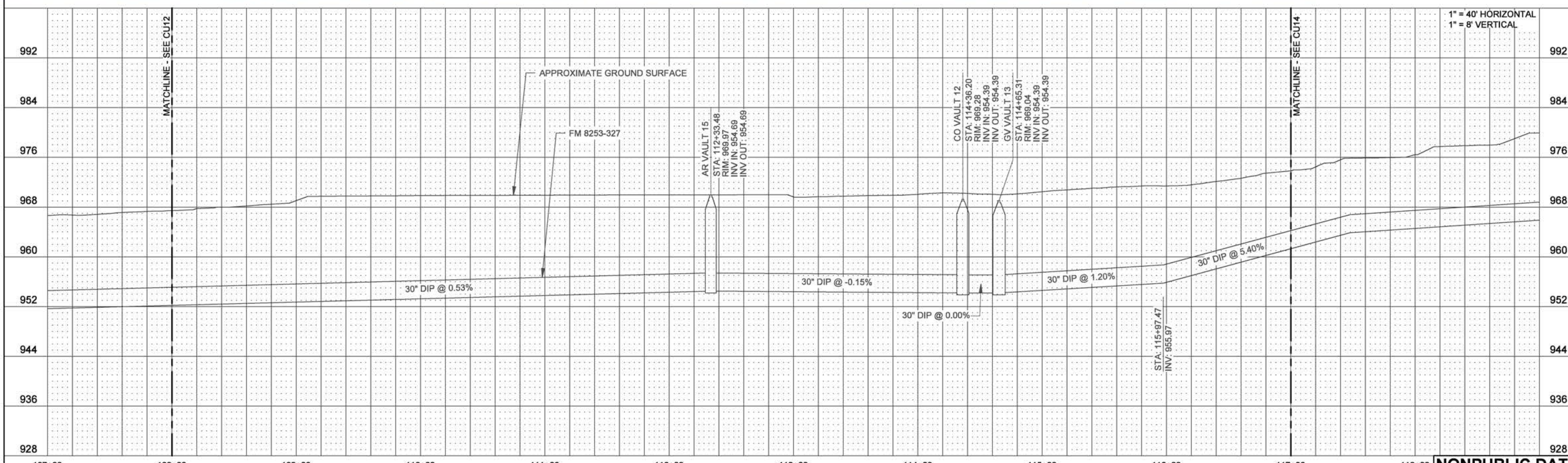

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DESIGNED
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TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME
CU013

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 108+00 TO STA 117+00

CU13

16 OF XX

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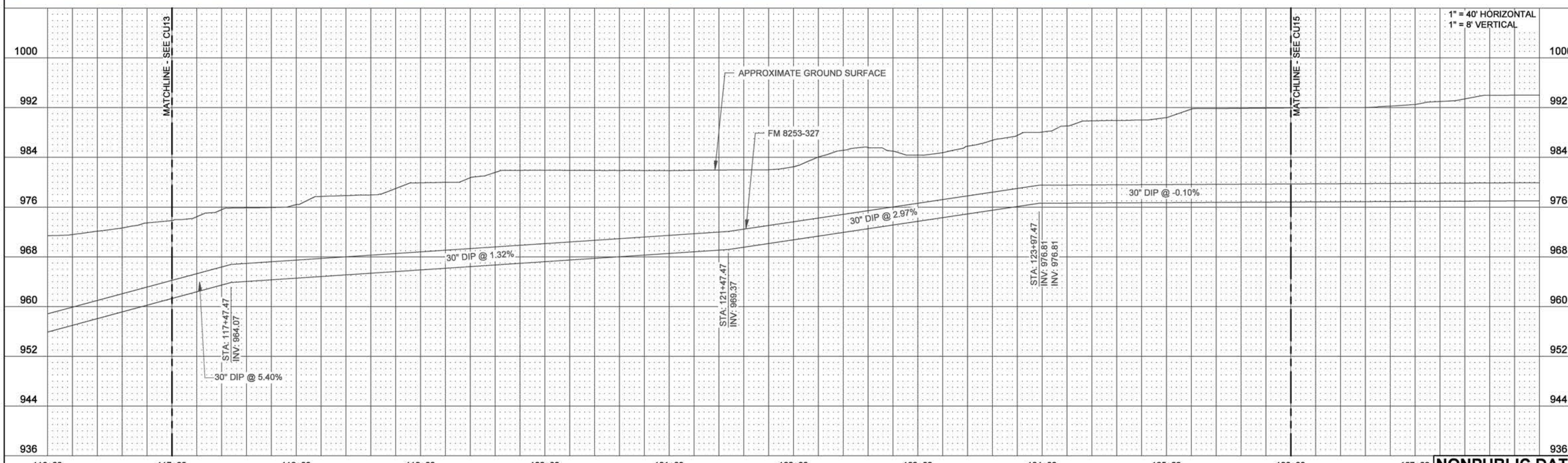

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED

DRAWN

CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME

CU014

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 117+00 TO STA 126+00

CU14

17 OF XX

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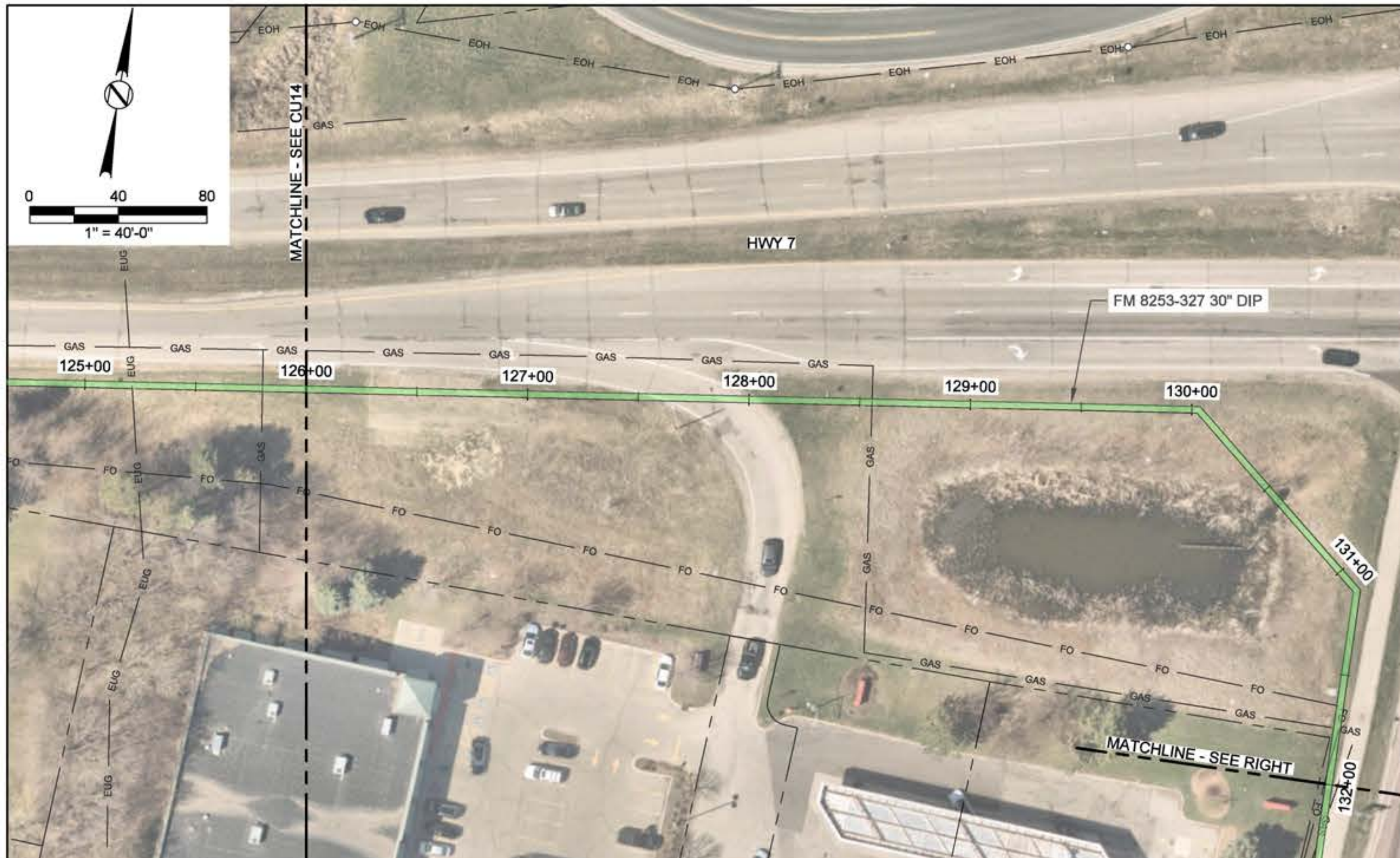

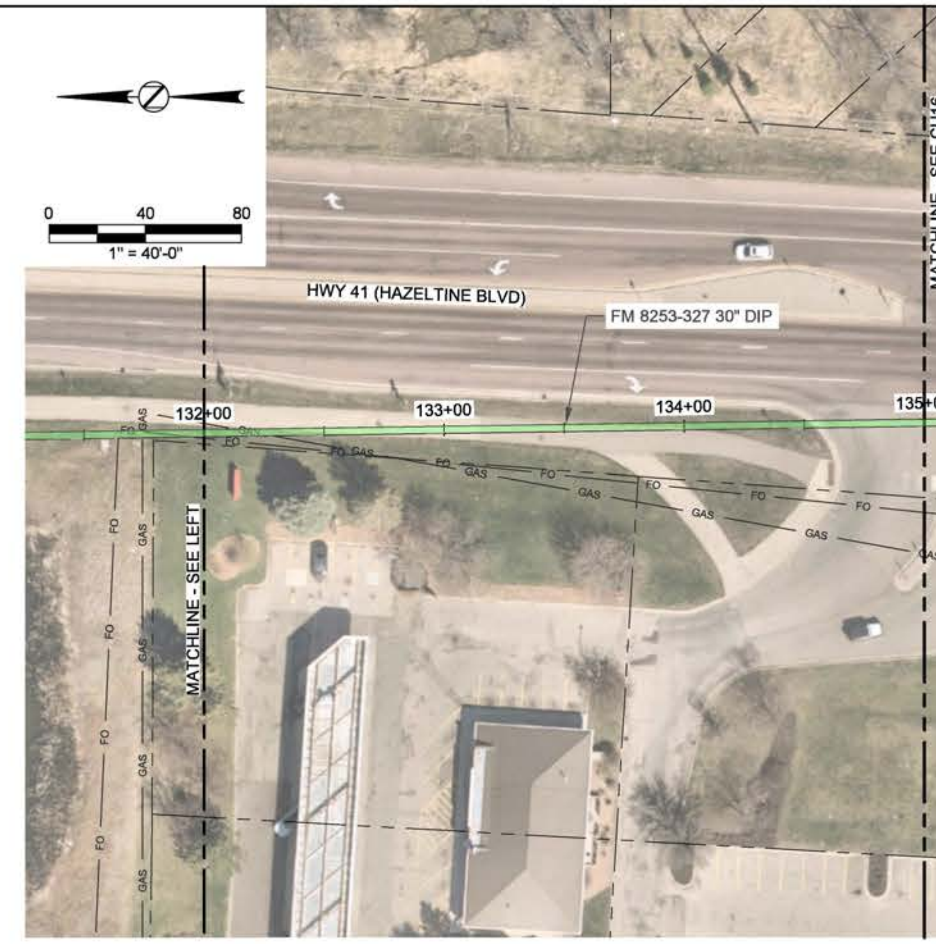

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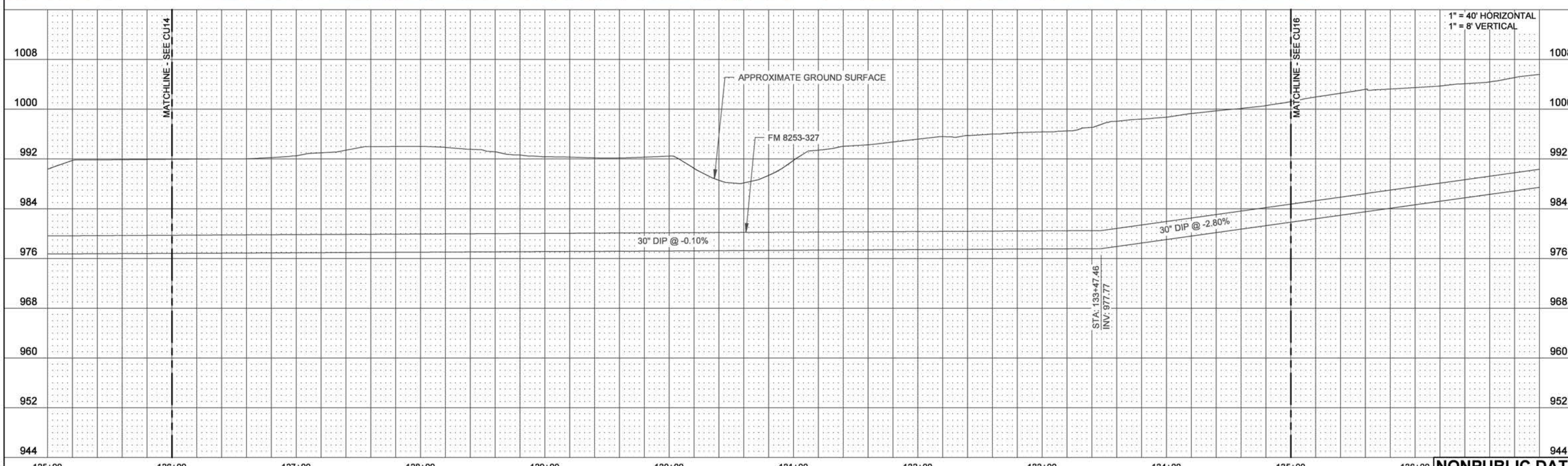

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REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME
CU015

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 126+00 TO STA 135+00

CU15

GENERAL NOTES:

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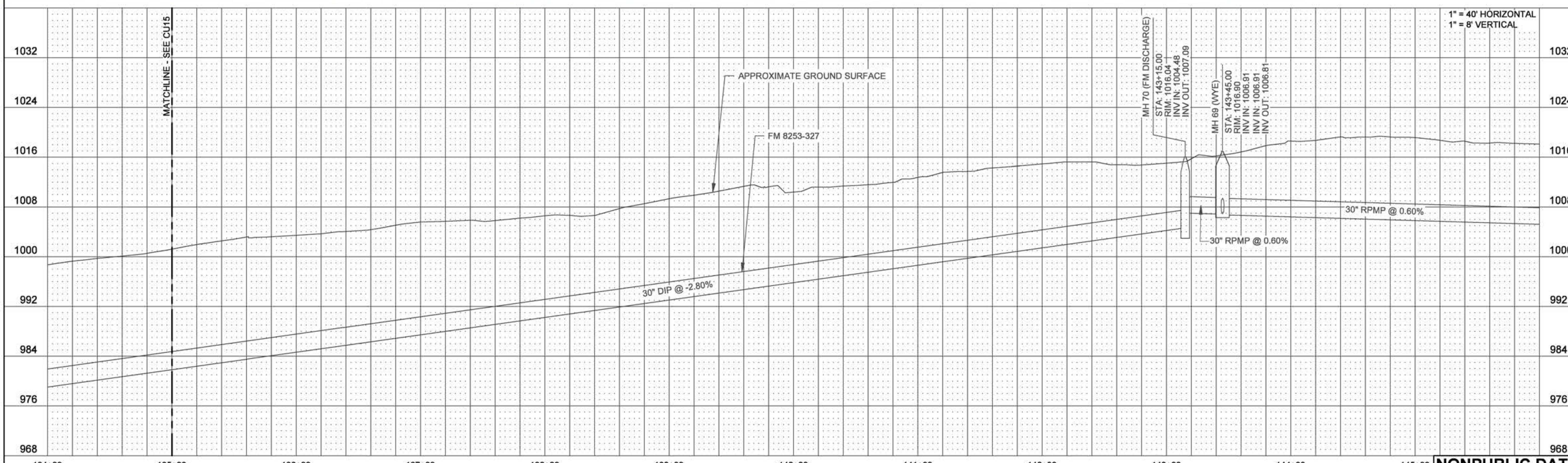

NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS

REVISIONS REVISIONS

DESIGNED

DRAWN

CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU016

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 135+00 TO STA 143+15

CU16

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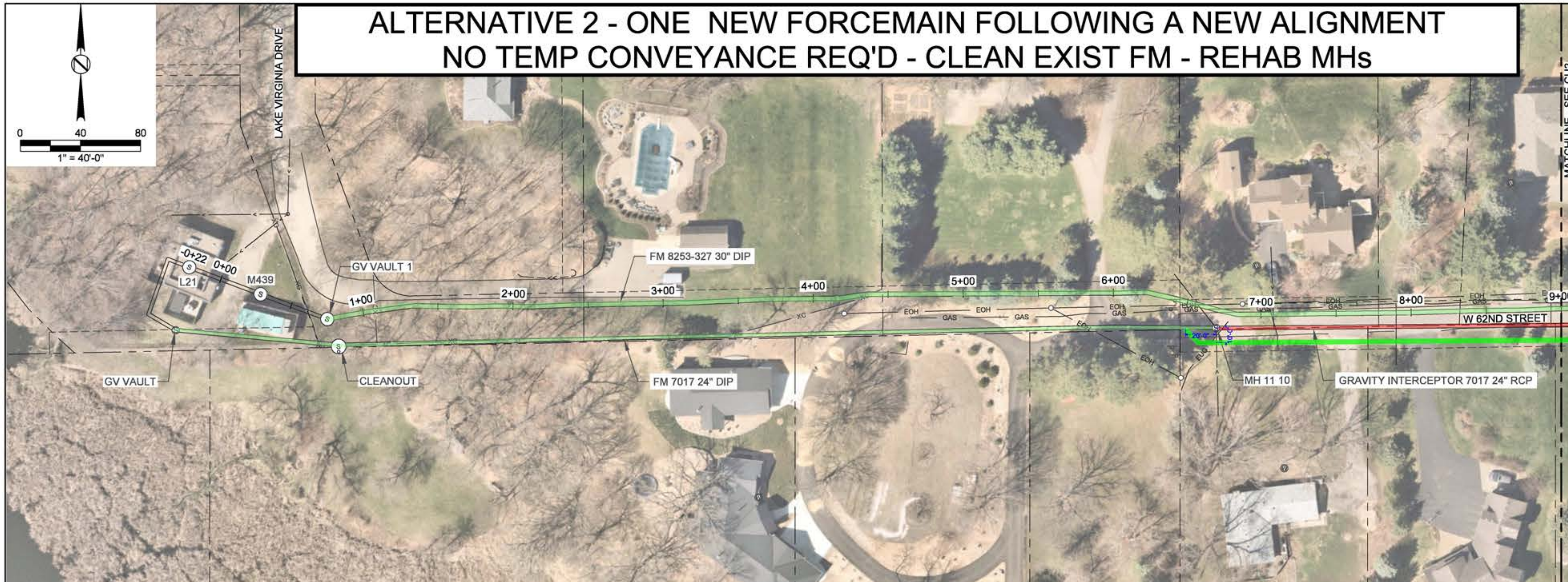
MODIFIED: 2/24/2025 4:58:10 PM

Attachment C: Alternative 2 – One New Forcemain – Proposed Alignment

ALTERNATIVE 2 - ONE NEW FORCEMAIN FOLLOWING A NEW ALIGNMENT
NO TEMP CONVEYANCE REQ'D - CLEAN EXIST FM - REHAB MHs



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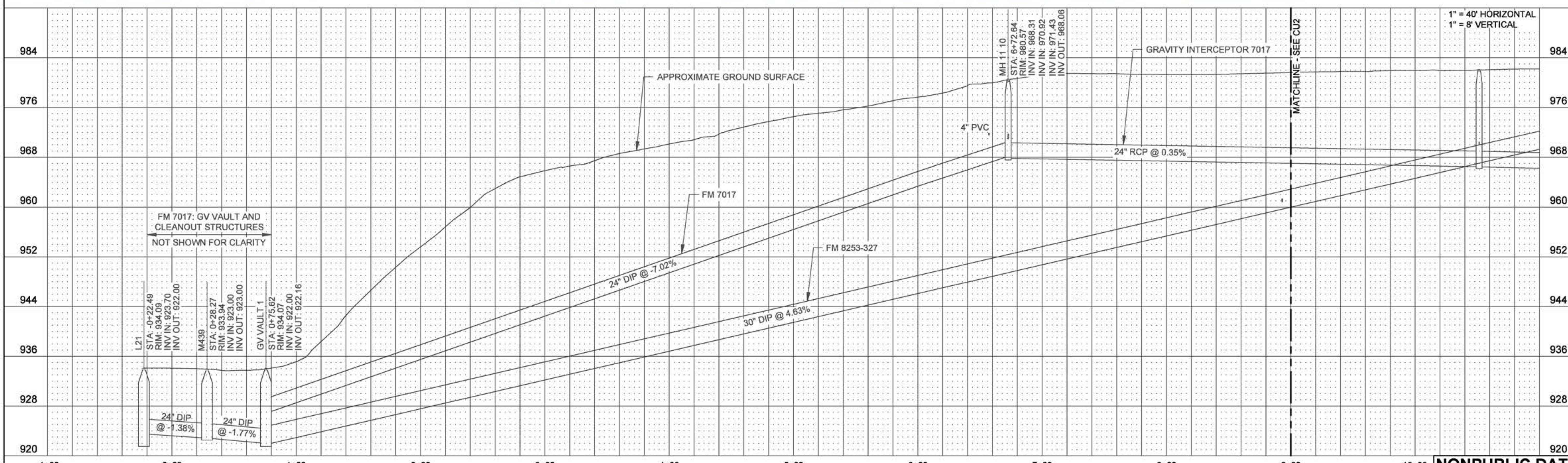

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED: PCG
DRAWN: TEP
CHECKED: JEB

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE: REG NO

Brown AND Caldwell

PROJECT

FILE NAME: CU001

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 0+00 TO STA 9+00

CU1

4 OF XX

GENERAL NOTES:

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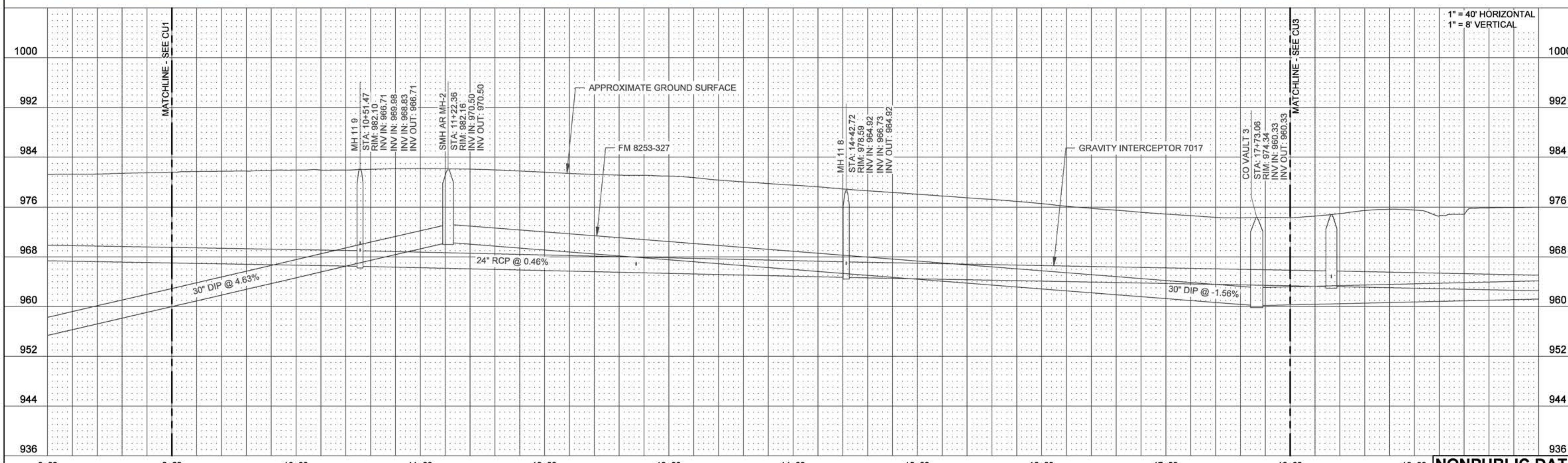

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REVISIONS				REVISIONS			

DESIGNED

DRAWN

CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE: REG NO:

Brown AND Caldwell

PROJECT

FILE NAME CU002

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 9+00 TO STA 18+00

CU2

5 OF XX

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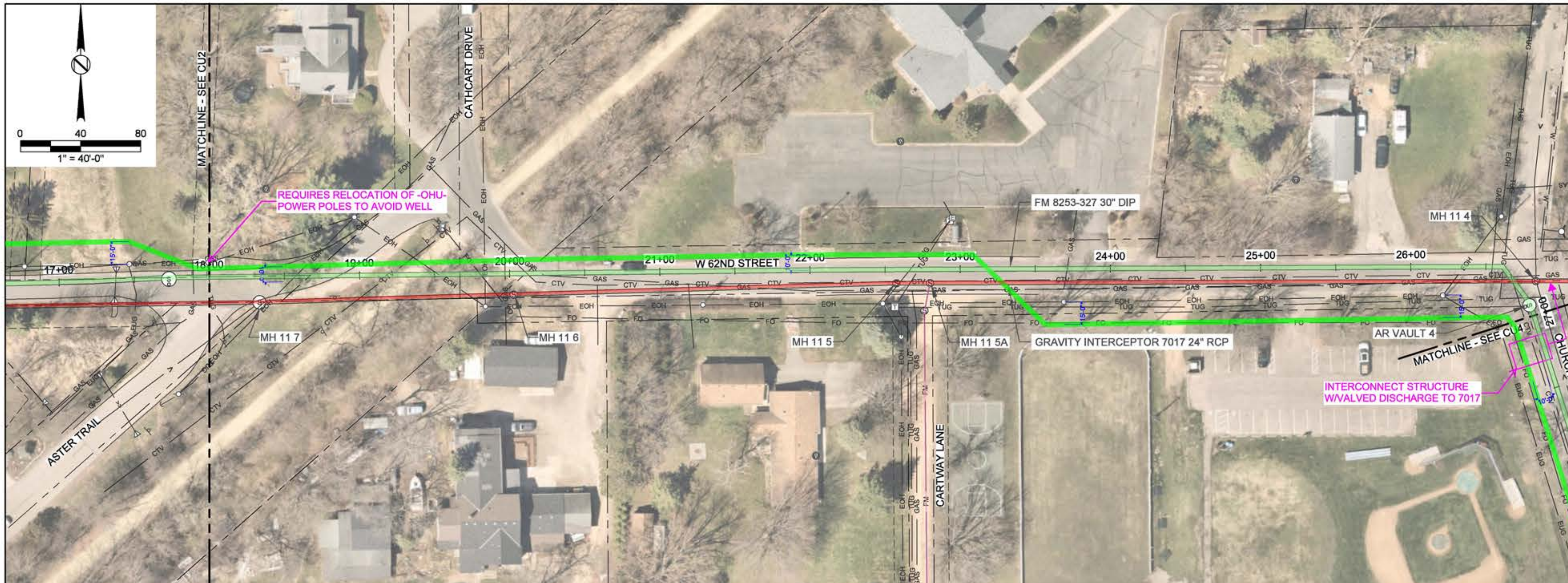

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KEY NOTES:

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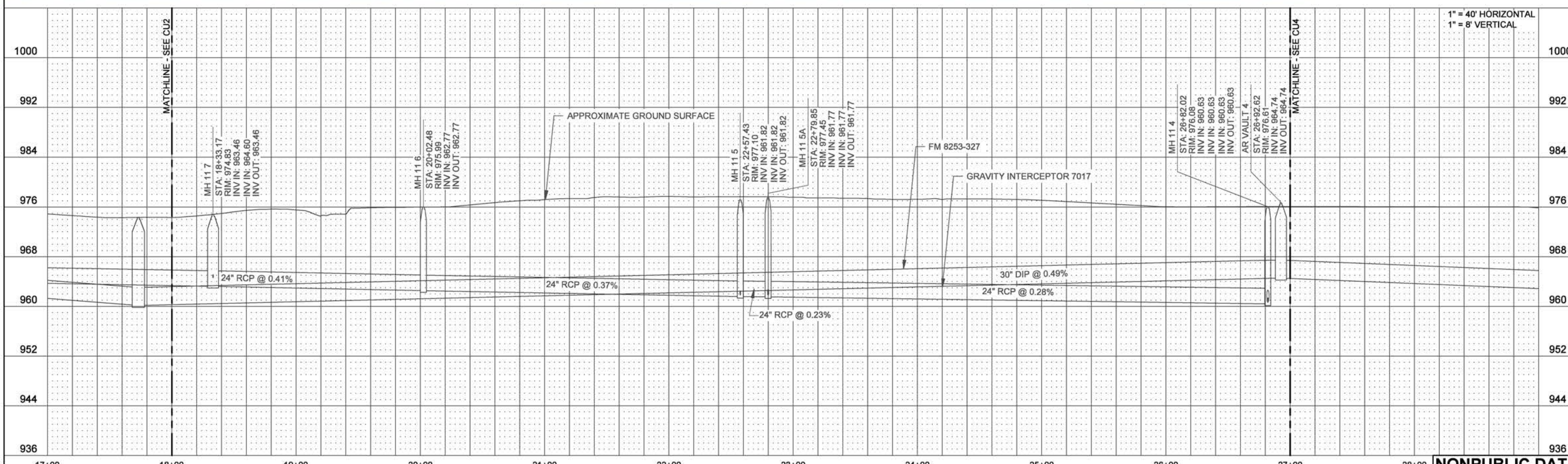

NONPUBLIC DATA

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REVISIONS				REVISIONS			

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DRAWN
CHECKED

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE ____ REG NO

Brown AND Caldwell

PROJECT

FILE NAME
CU003

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 18+00 TO STA 27+00

CU3

6 OF XX

C:\USERS\APERRY1\DC\ACCDOCS\BC ACC PROJECT HUB\107597 - MCES INTERCEPT 8253-327 IMPROV PH2\PROJECT FILES\300 DESIGN\CAD_802XX\SHEETS\CU003.DWG
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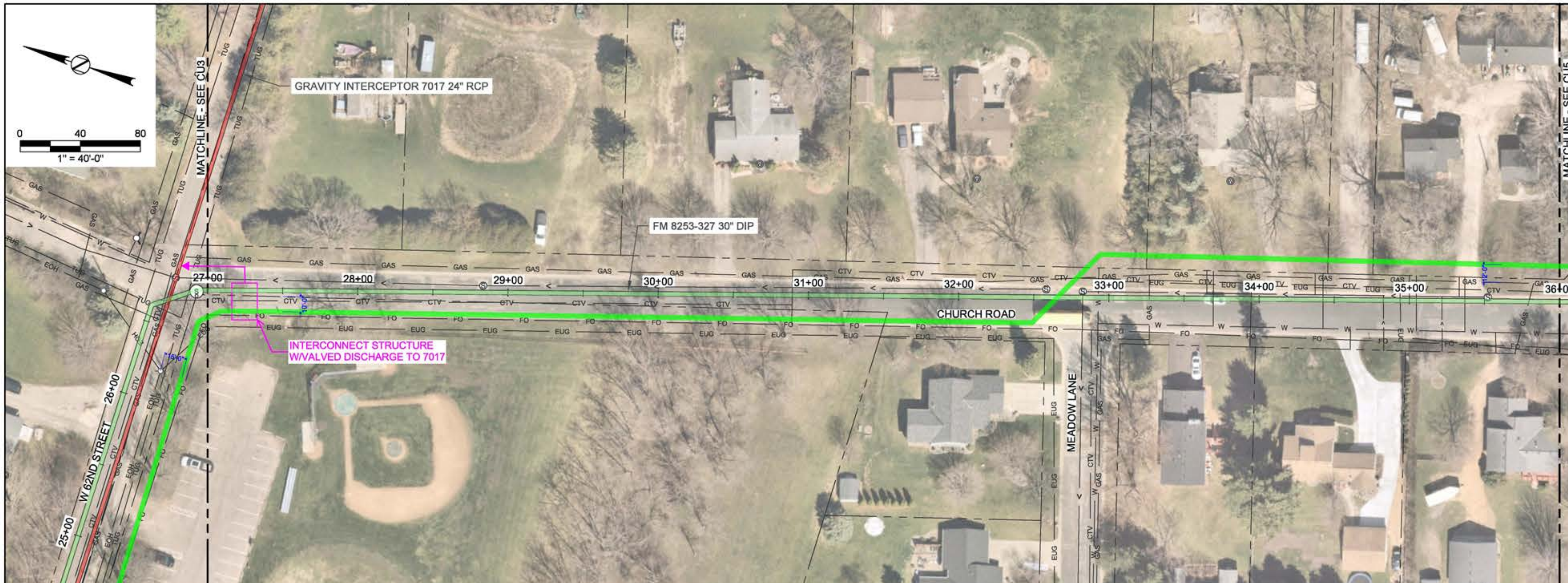

GENERAL NOTES:

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KEY NOTES:

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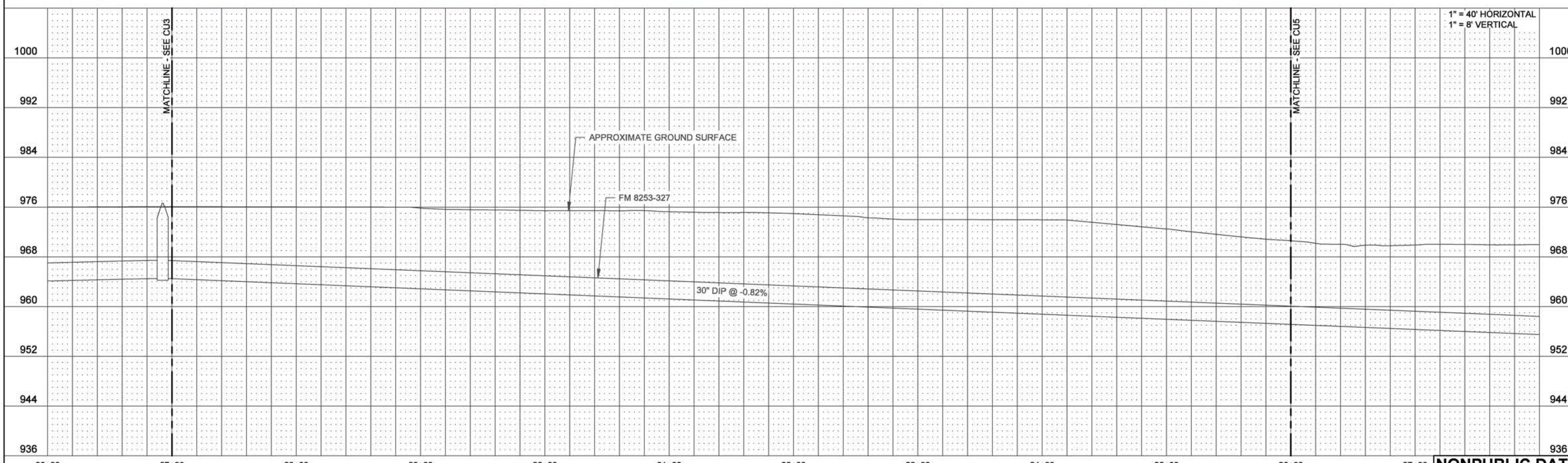

NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

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TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME: CU004

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 27+00 TO STA 36+00

CU4

7 OF XX

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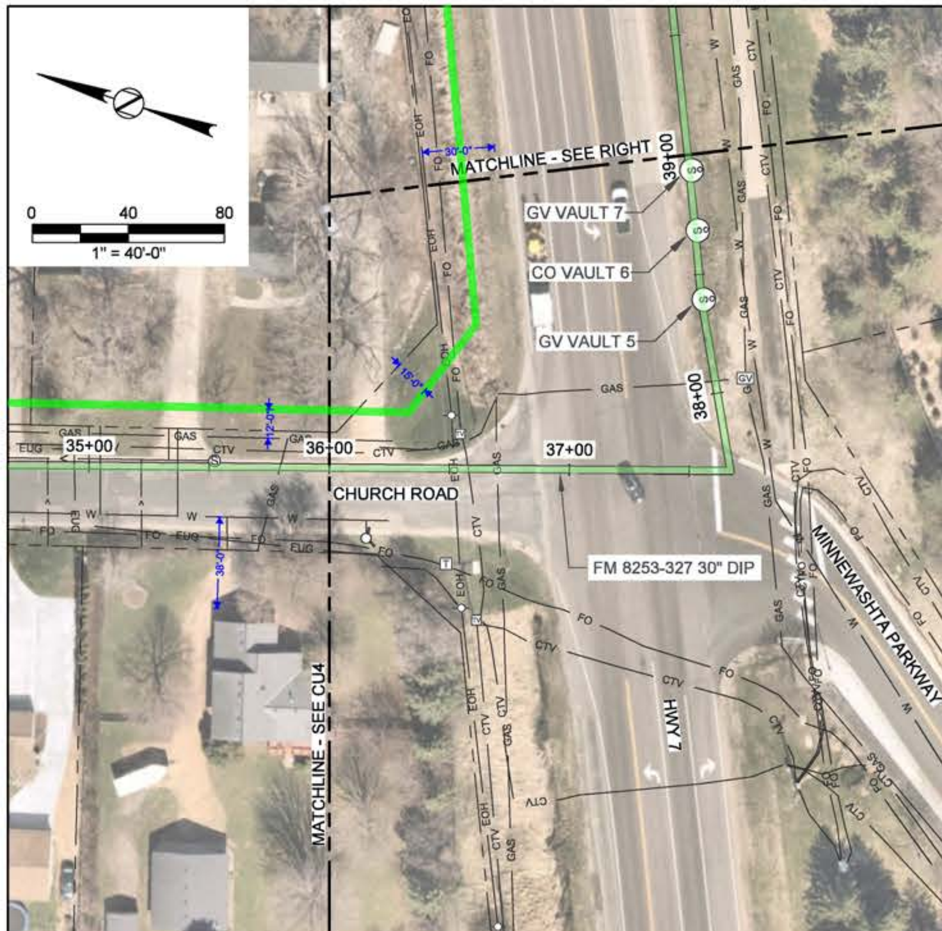

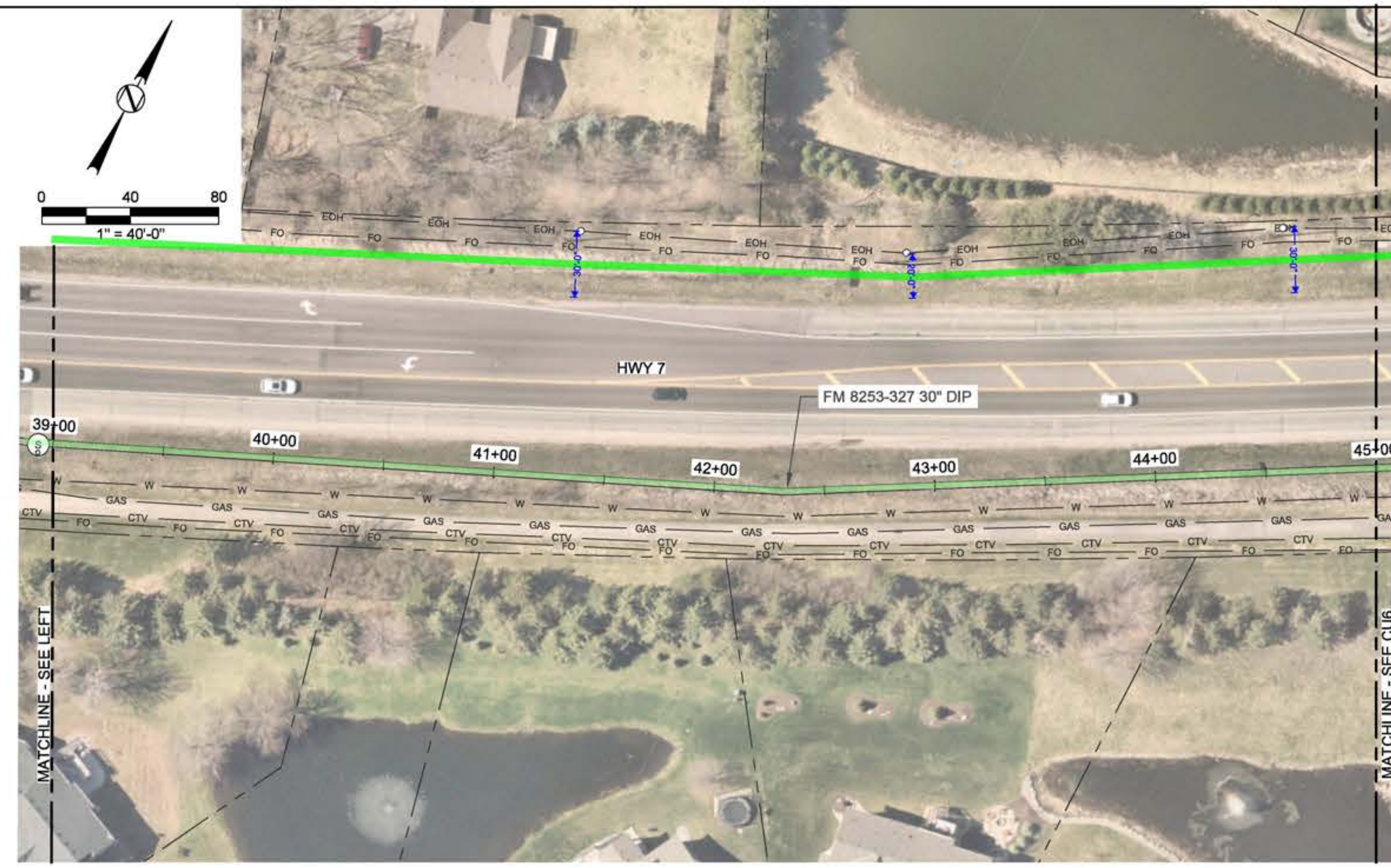

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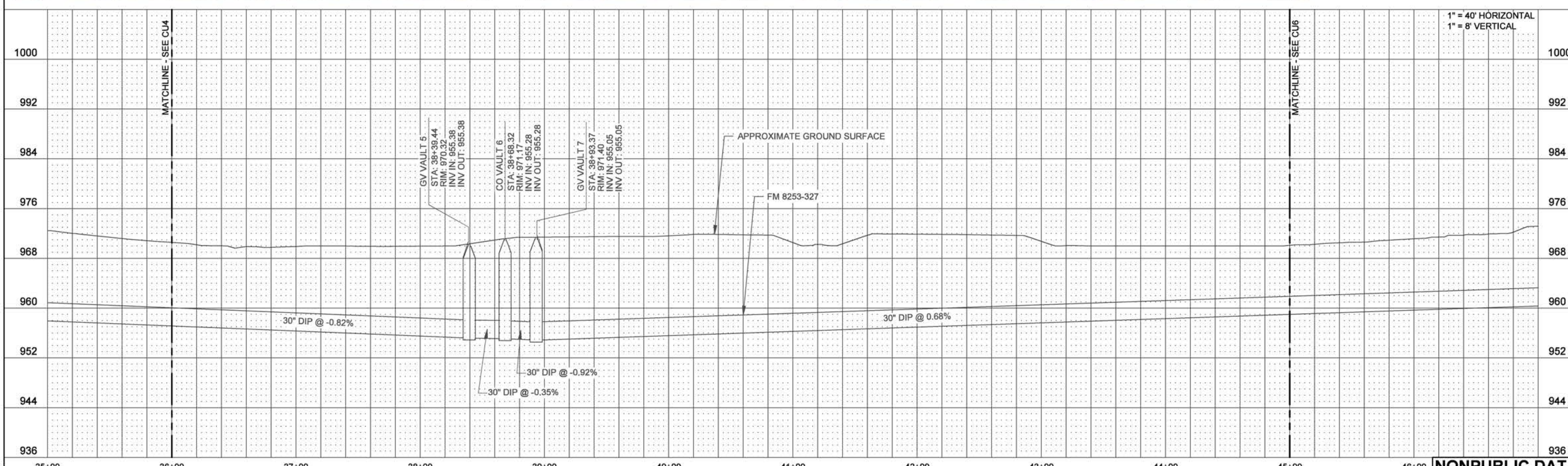

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

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SIGNATURE: ____________
TYPED OR PRINTED NAME: ____________
DATE ________ REG NO ________

Brown AND Caldwell

PROJECT
FILE NAME
CU005

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 36+00 TO STA 45+00

CU5

8 OF XX

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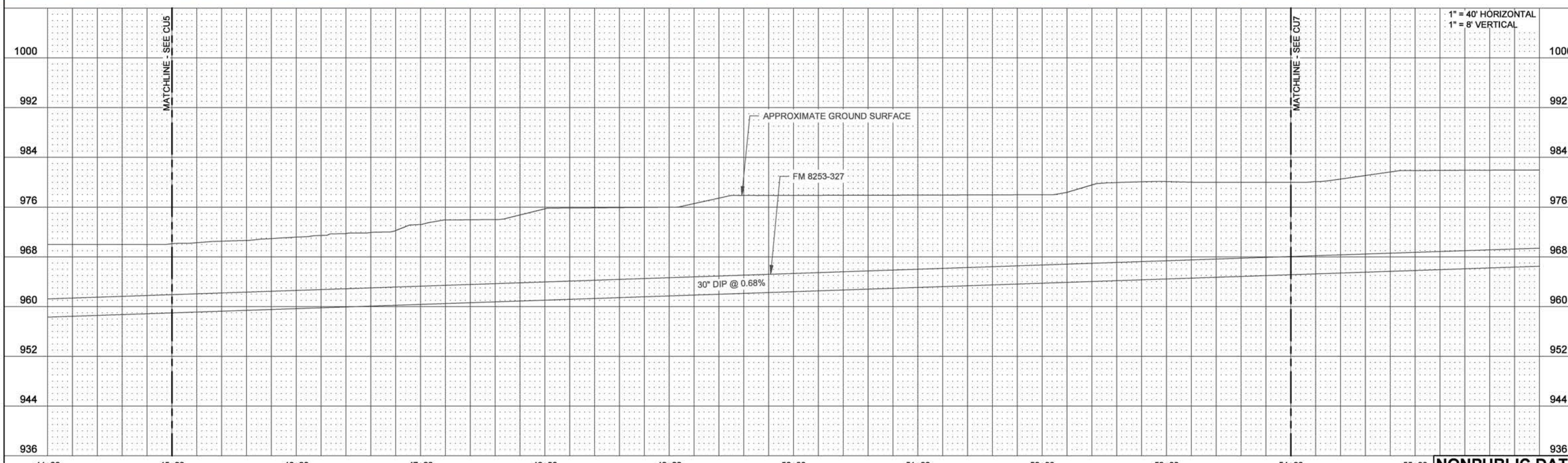

NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU006

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 45+00 TO STA 54+00

CU6

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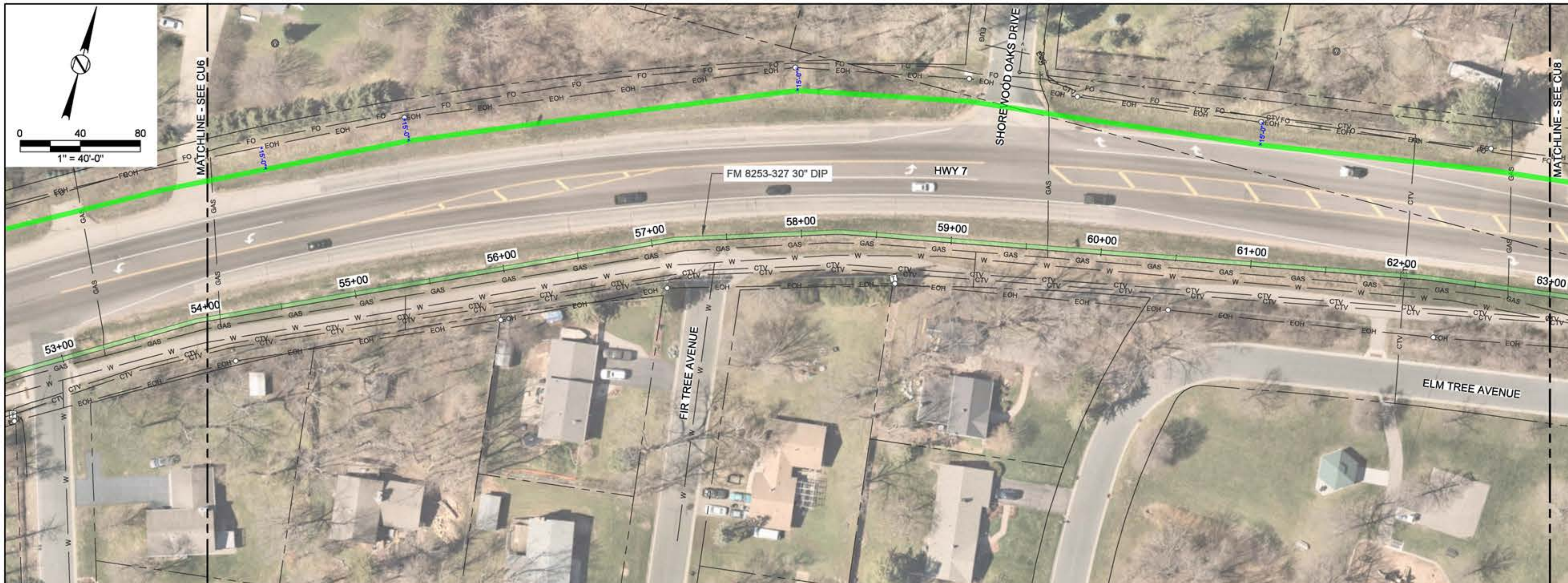

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KEY NOTES:

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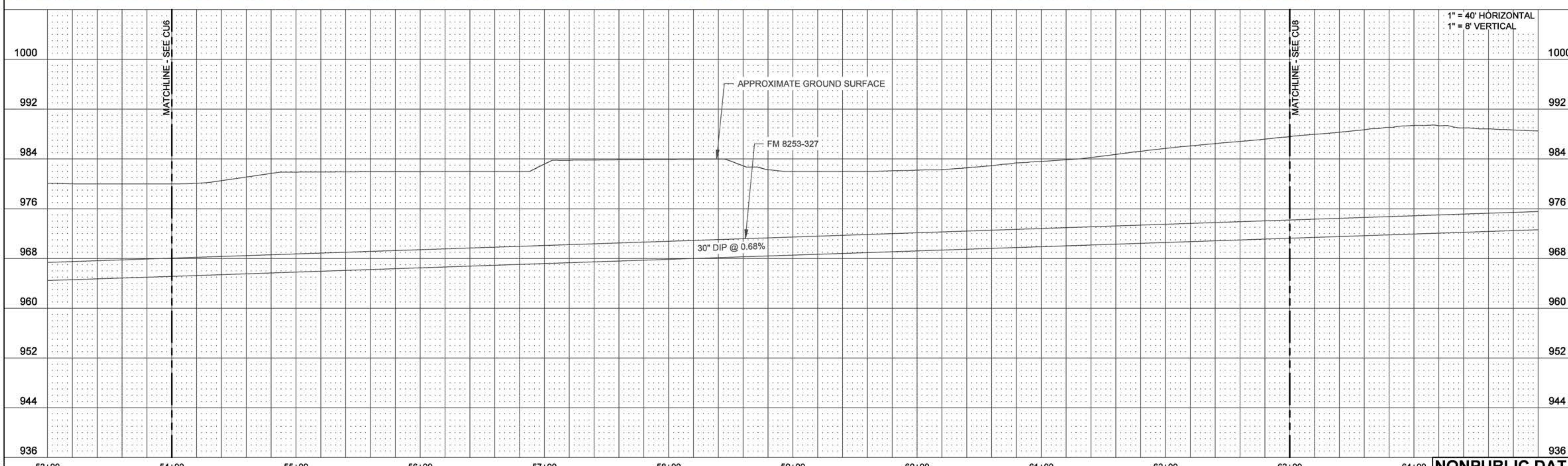

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REVISIONS				REVISIONS			

DESIGNED

DRAWN

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU007

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 54+00 TO STA 63+00

CU7

10 OF XX

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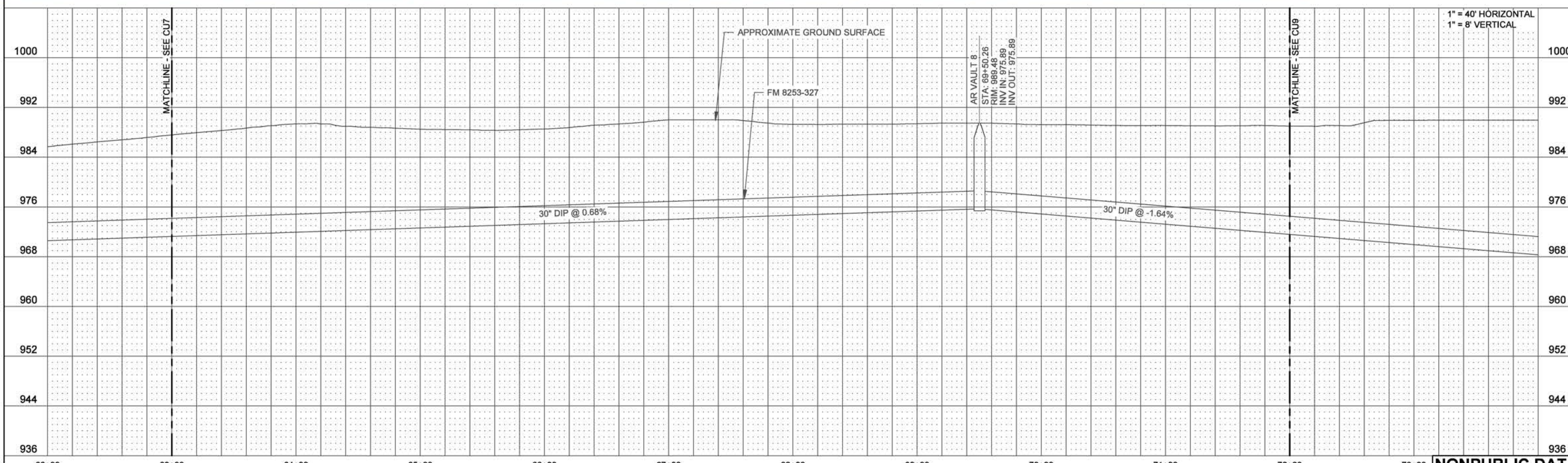

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MODIFIED: 2/26/2025 3:14:58 PM

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
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SIGNATURE:
TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

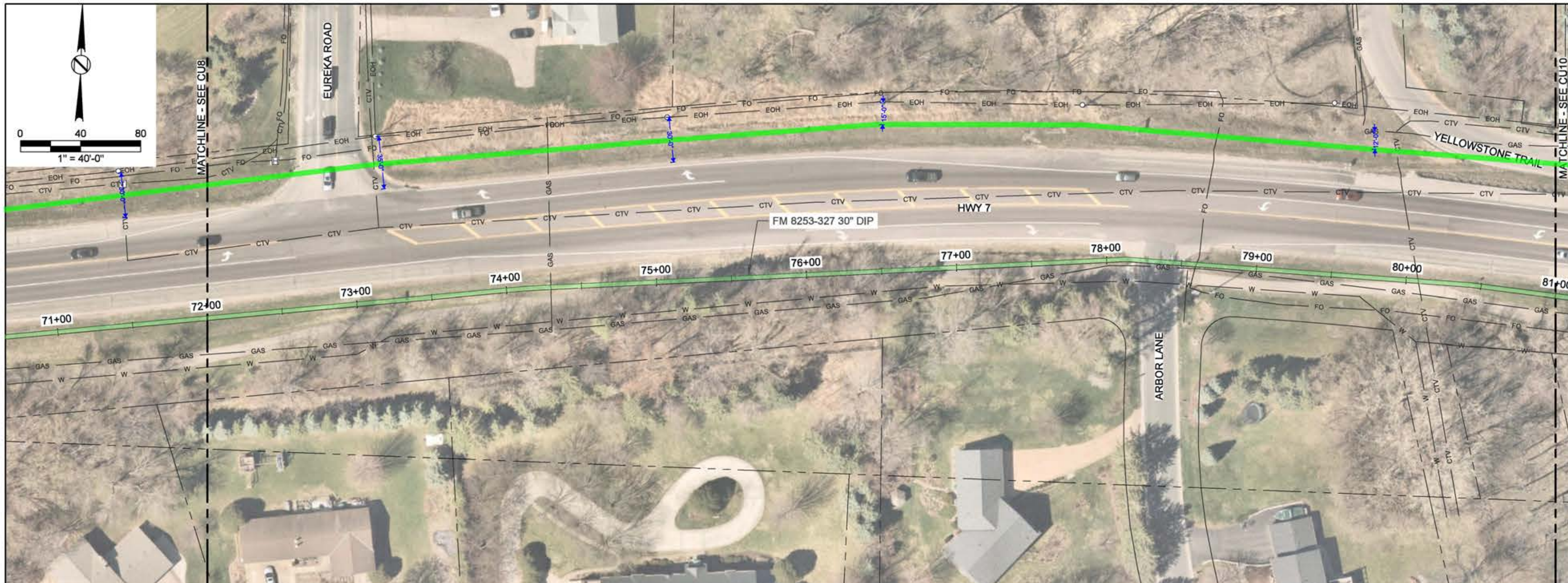
FILE NAME
CU008

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 63+00 TO STA 72+00

CU8

11 OF XX



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KEY NOTES:

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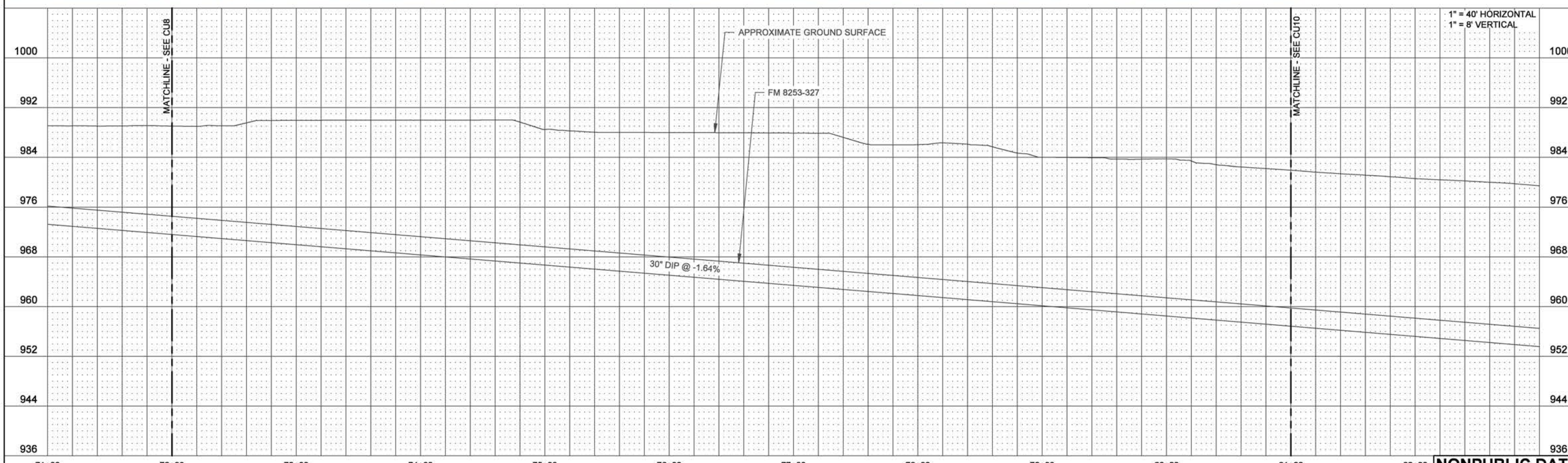

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

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TYPED OR PRINTED NAME:
DATE: REG NO

Brown AND Caldwell

PROJECT
FILE NAME: CU009

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 72+00 TO STA 81+00

CU9

12 OF XX

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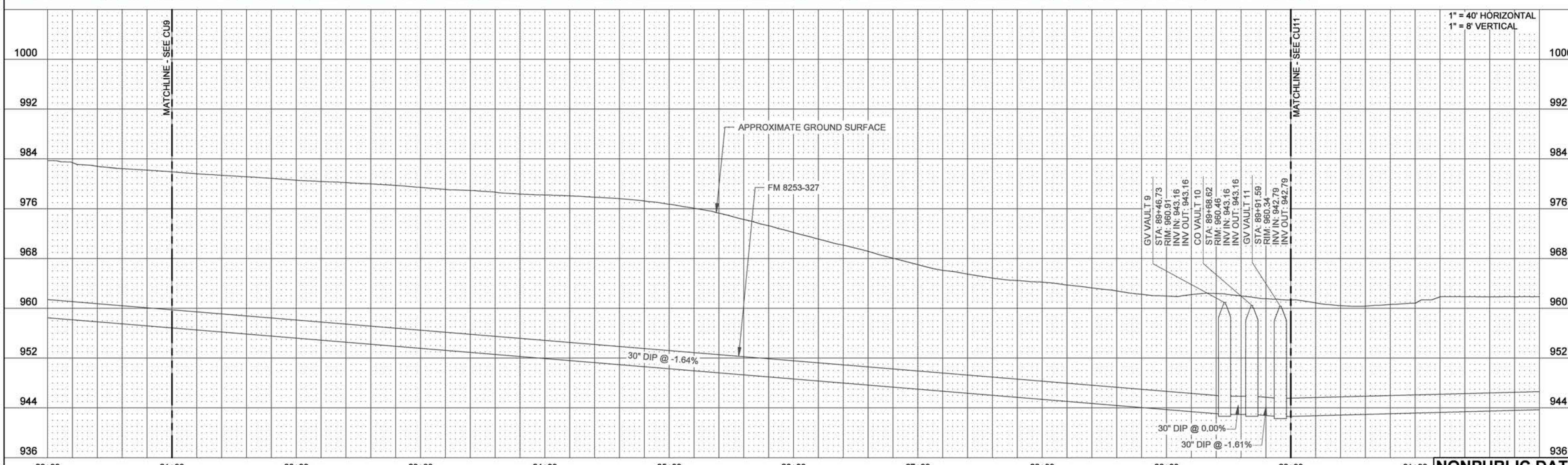

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

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SIGNATURE: ____________

TYPED OR PRINTED NAME: ____________

DATE ____________ REG NO ____________

Brown AND Caldwell

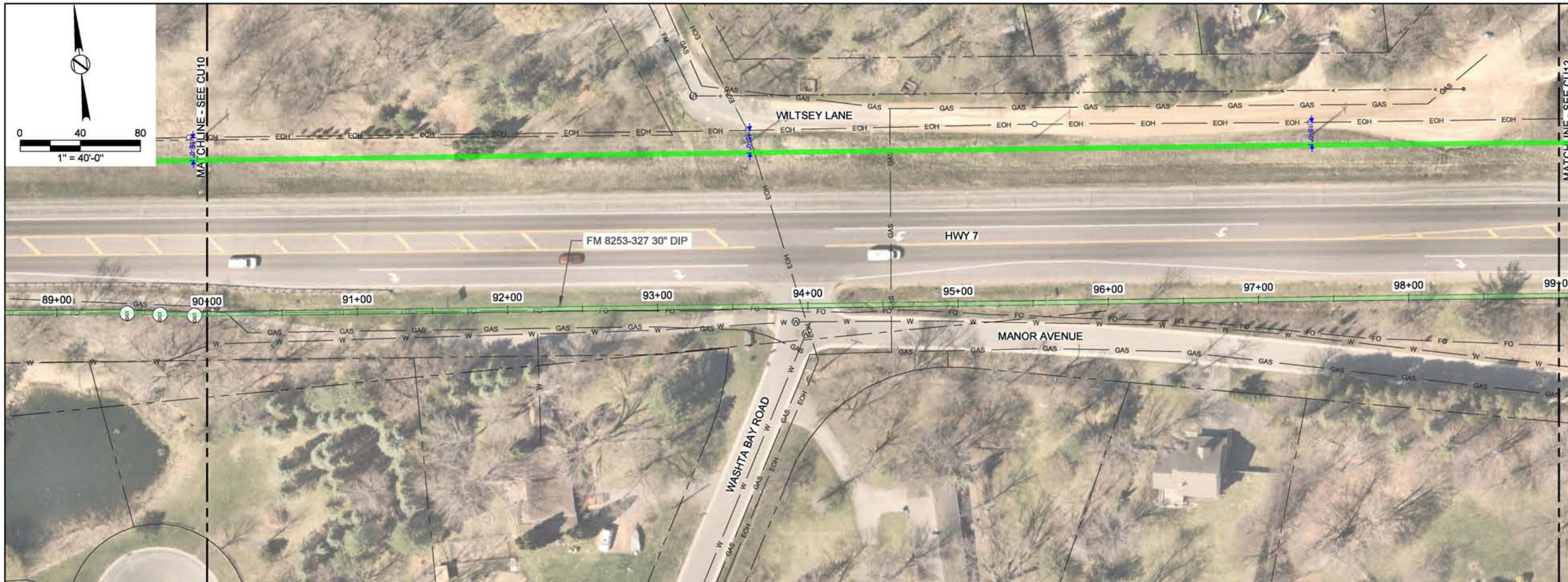
PROJECT

FILE NAME
CU010

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 81+00 TO STA 90+00

CU10



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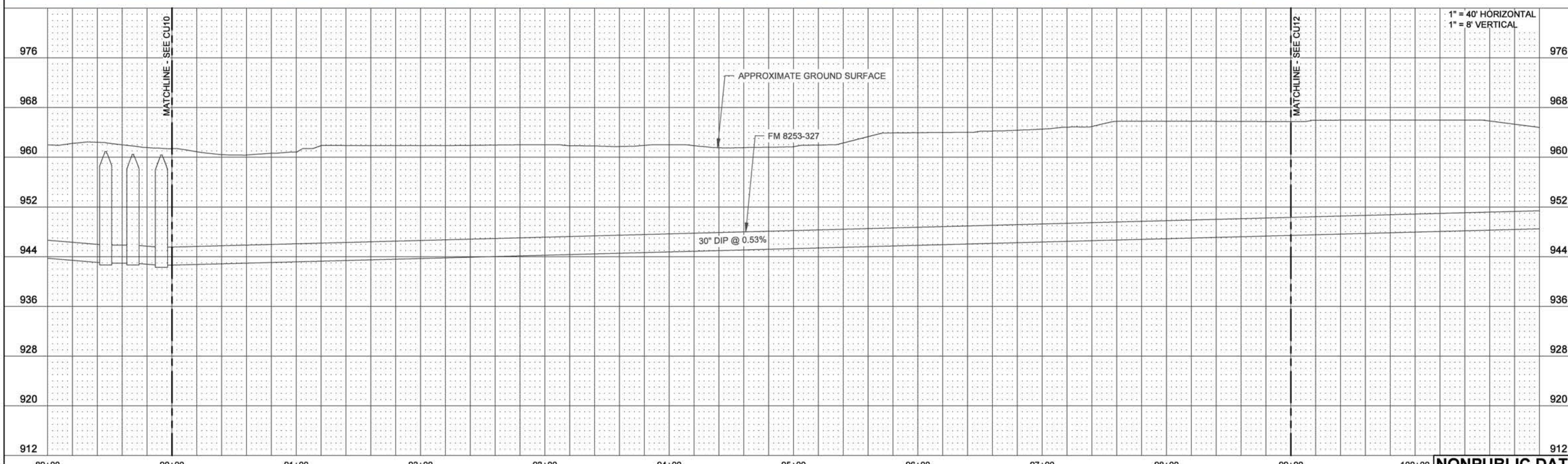

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REVISIONS				REVISIONS			

DESIGNED
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SIGNATURE: ______
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DATE ______ REG NO ______

Brown AND Caldwell

PROJECT
FILE NAME
CU011

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 90+00 TO STA 99+00

CU11

14 OF XX

GENERAL NOTES:

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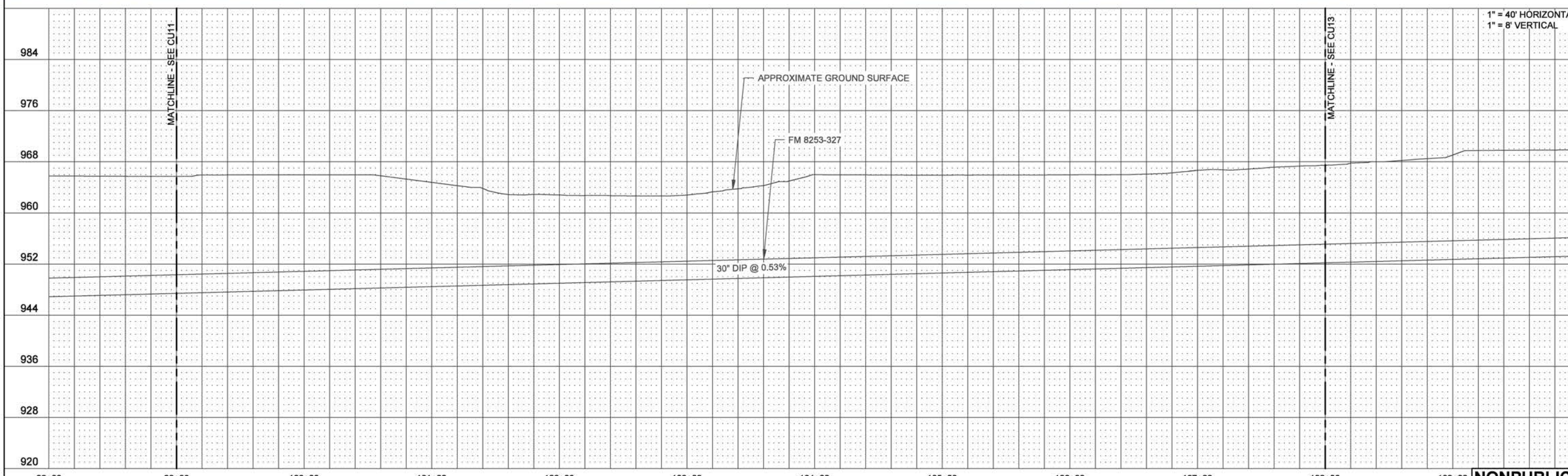

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS

REVISIONS

REVISIONS

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TYPED OR PRINTED NAME: ____

DATE ____ REG NO ____

Brown AND Caldwell

PROJECT

FILE NAME

CU012

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 99+00 TO STA 108+00

CU12

15 OF XX

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KEY NOTES:

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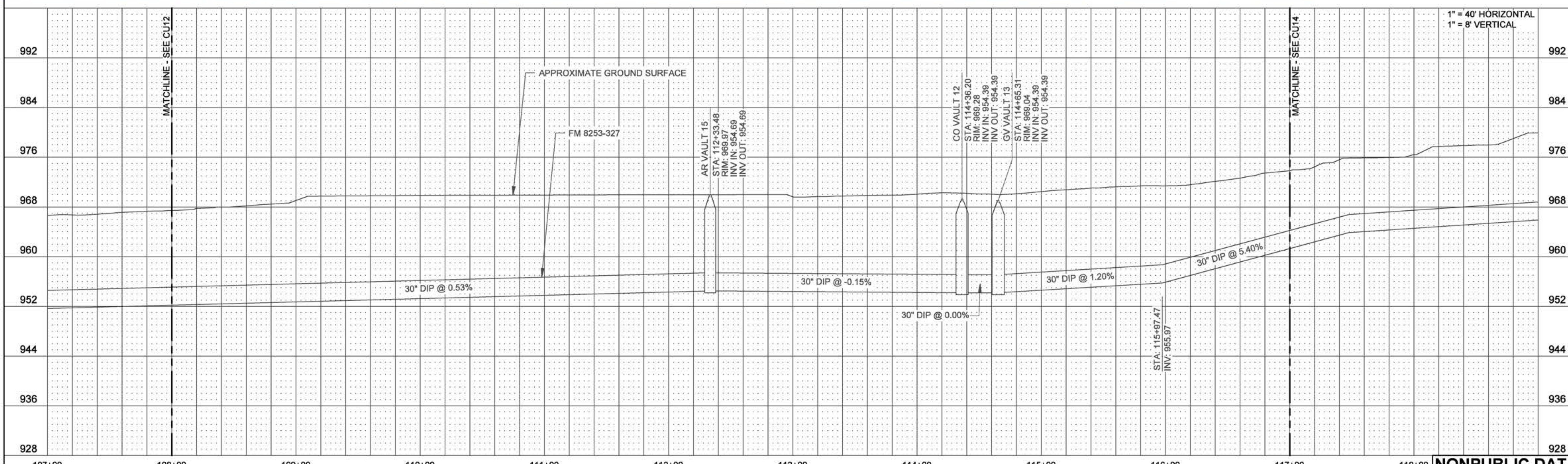

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MODIFIED: 2/24/2025 4:55:48 PM

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REVISIONS				REVISIONS			

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DRAWN

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DATE REG NO

Brown AND Caldwell

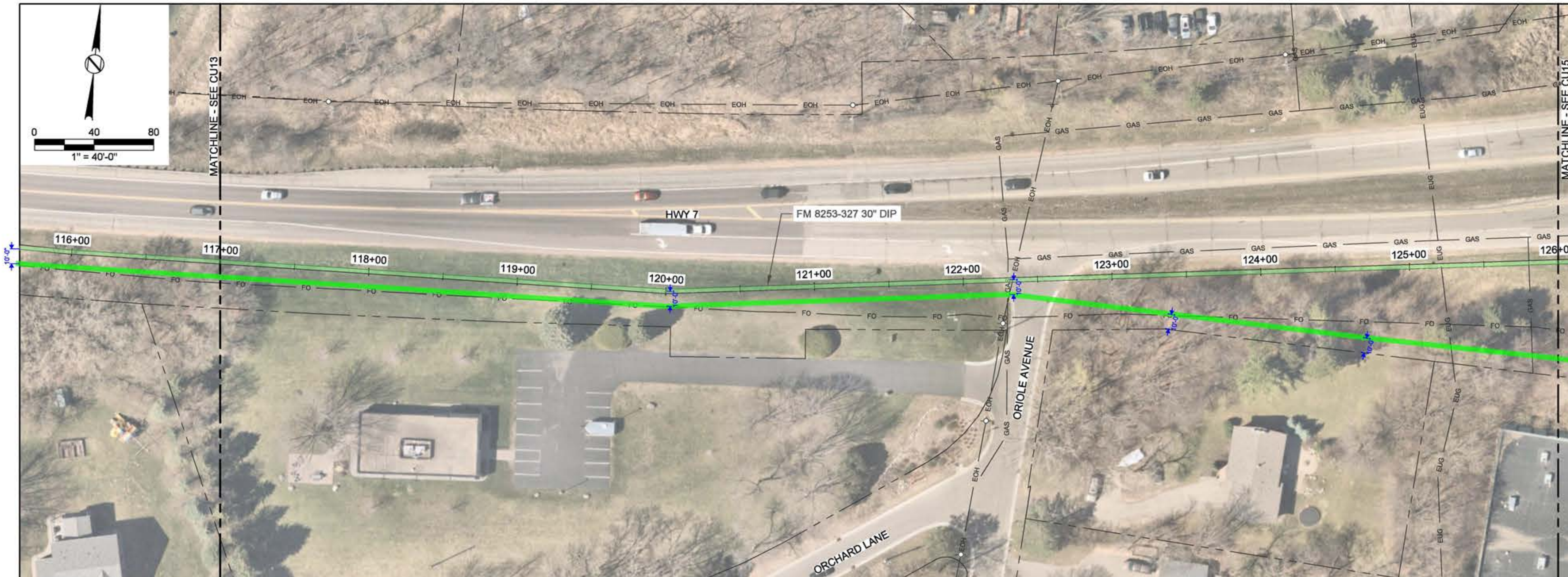
PROJECT

FILE NAME CU013

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 108+00 TO STA 117+00

CU13



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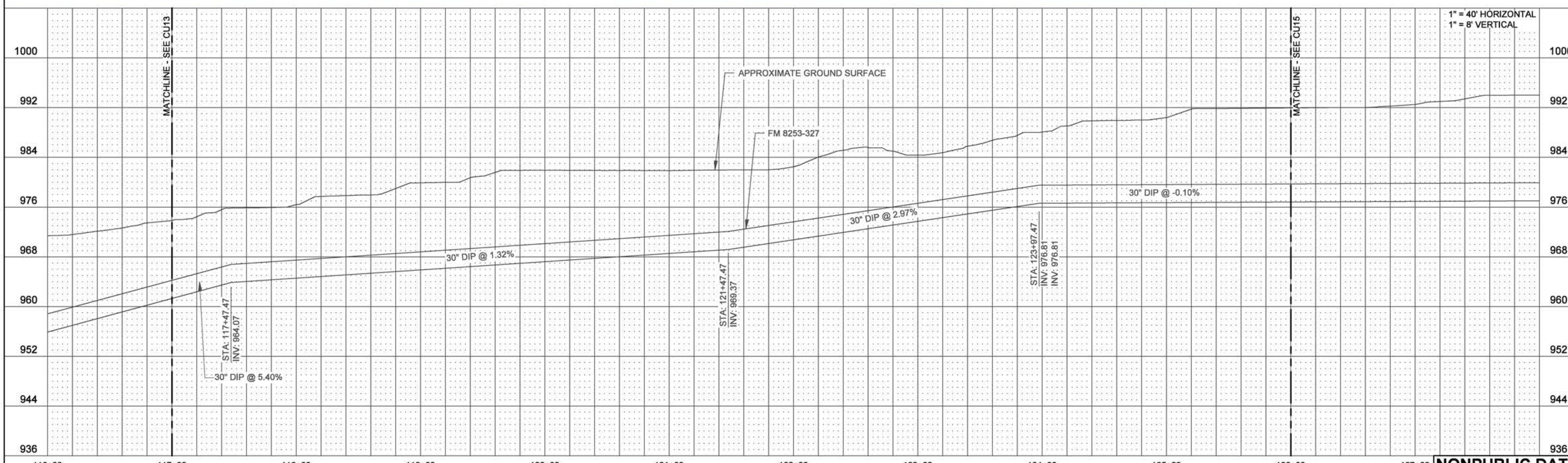

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MODIFIED: 2/24/2025 4:56:29 PM

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REVISIONS				REVISIONS			

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DATE REG NO

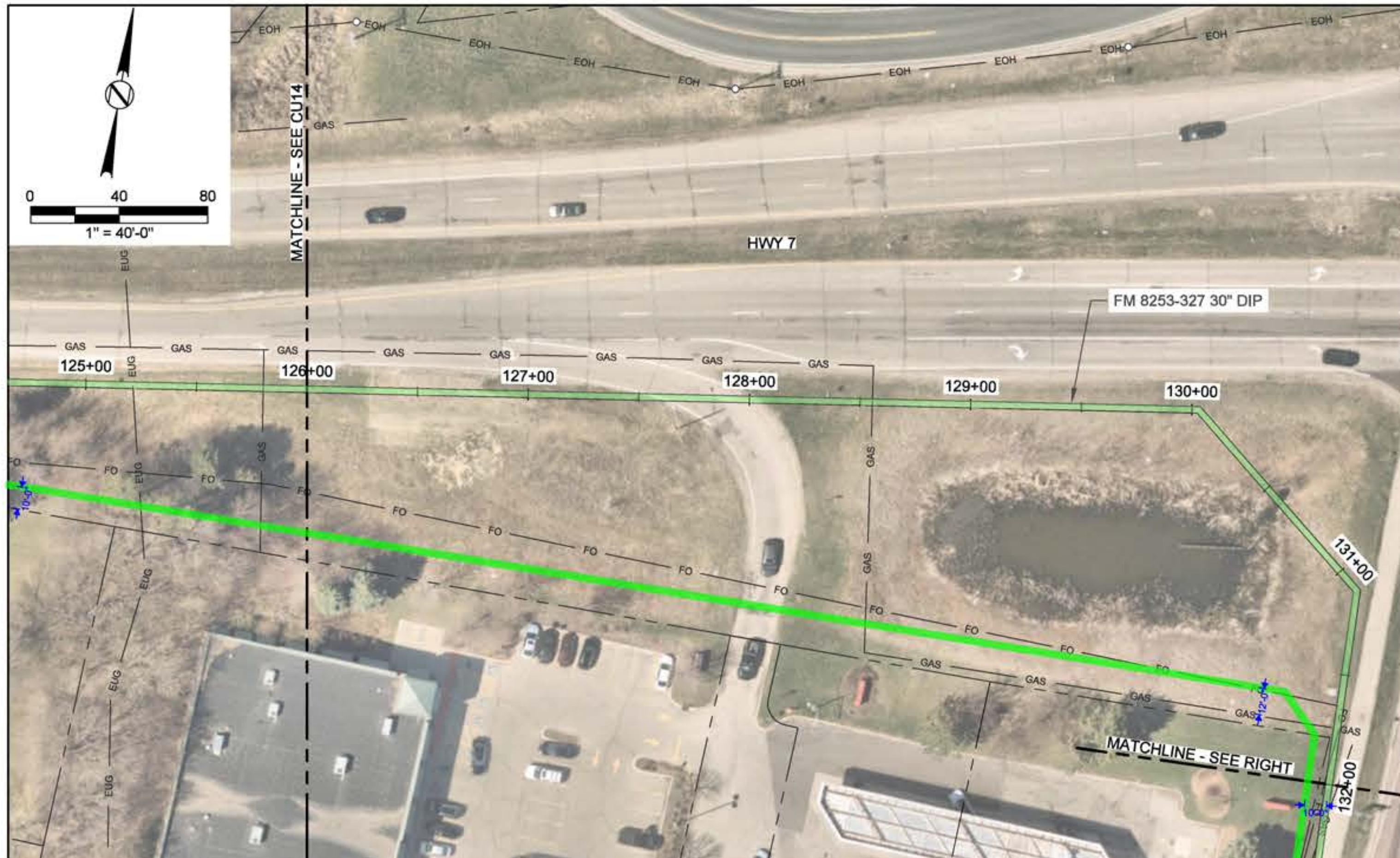
Brown AND Caldwell

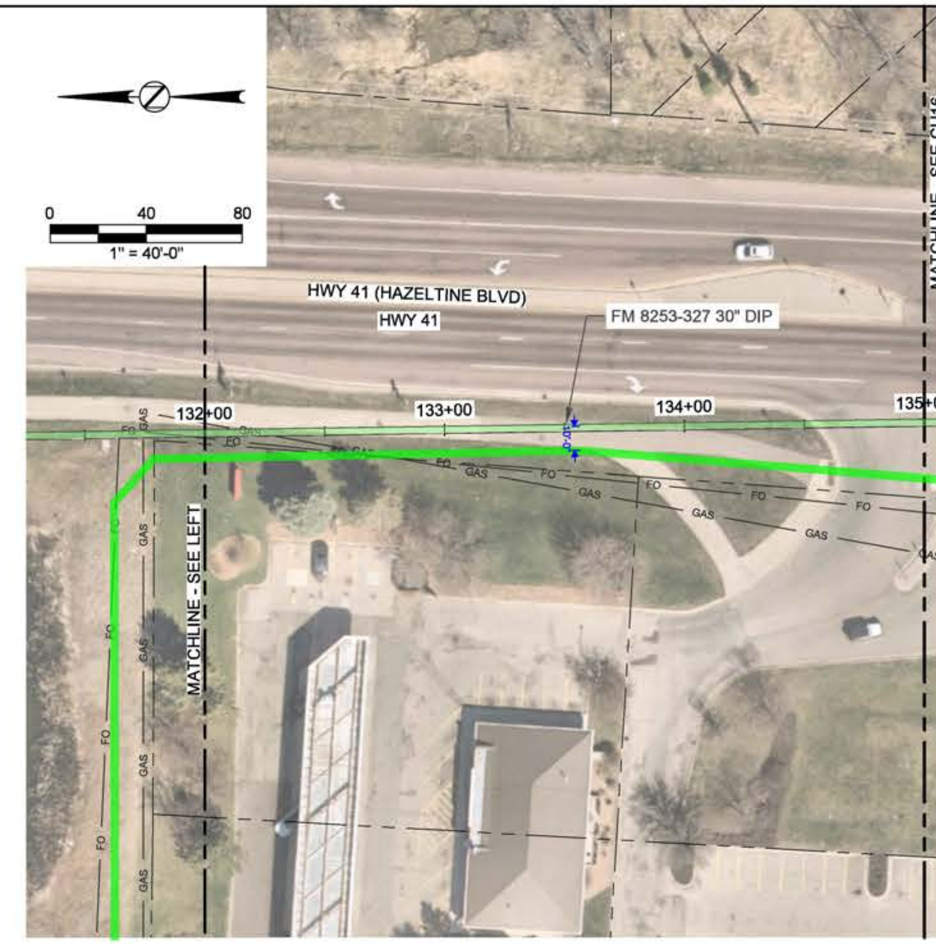
PROJECT
FILE NAME CU014

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 117+00 TO STA 126+00

CU14





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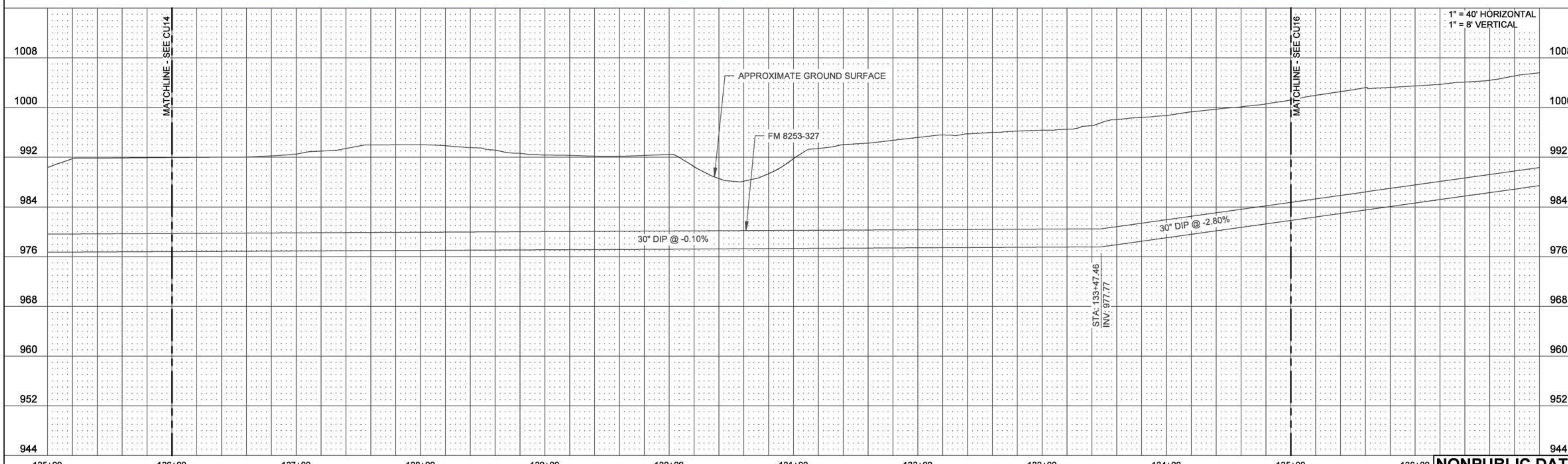

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REVISIONS				REVISIONS			

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DRAWN
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TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU015

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 126+00 TO STA 135+00

CU15

18 OF XX

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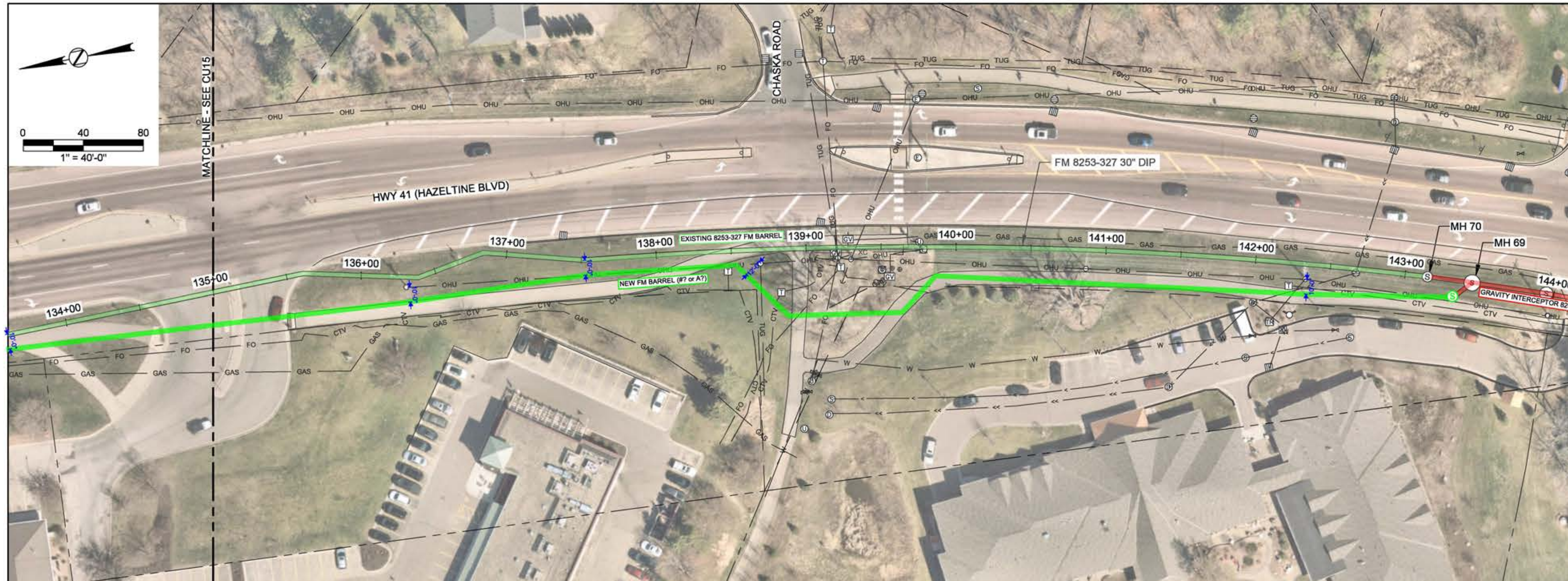

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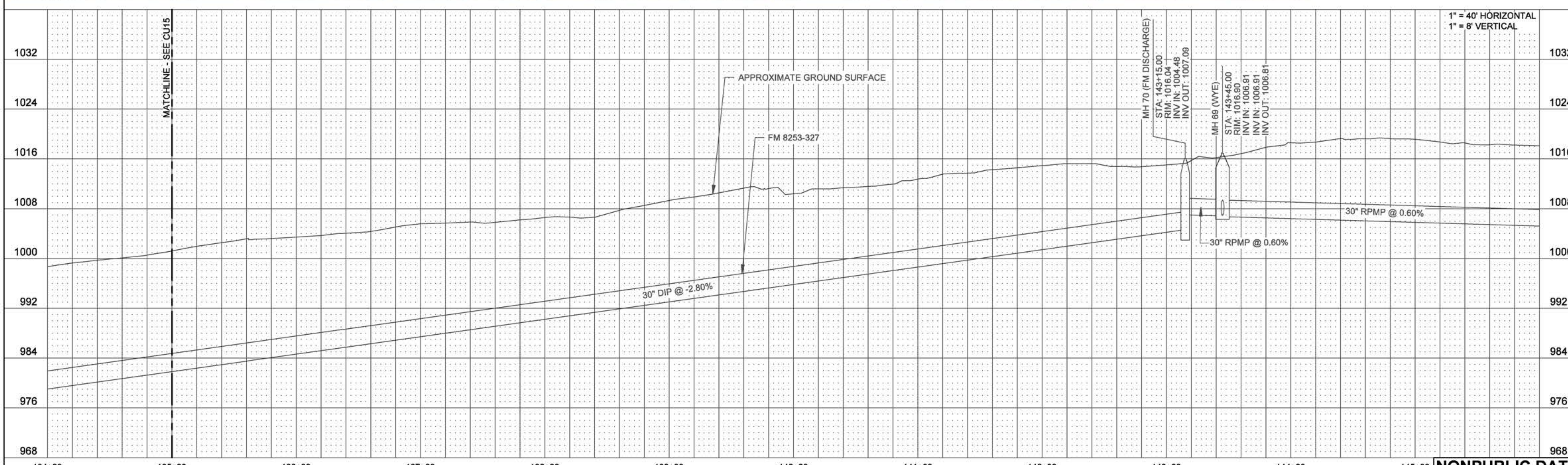

NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME: CU016

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 135+00 TO STA 143+15

CU16

Attachment D: Alternative 3 – One New Forcemain on Existing 7017 Alignment

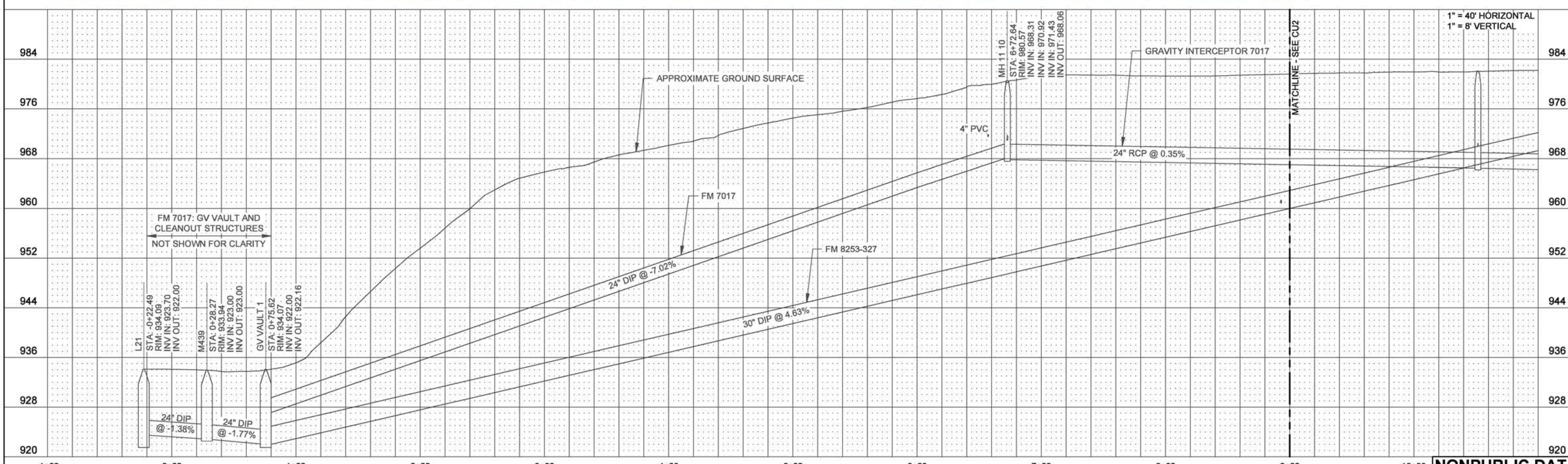
ALTERNATIVE 3 - ONE NEW FORCEMAIN ON 7017 ALIGNMENT
CLEAN EXISTING FM 8253-327 - REHAB MHs - RELOCATE 7017 GRAVITY

GENERAL NOTES:

1.

KEY NOTES:

1.



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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
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DESIGNED: PCG
DRAWN: TEP
CHECKED: JEB

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE: REG NO:

Brown AND Caldwell

PROJECT

FILE NAME: CU001

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 0+00 TO STA 9+00

CU1

4 OF XX

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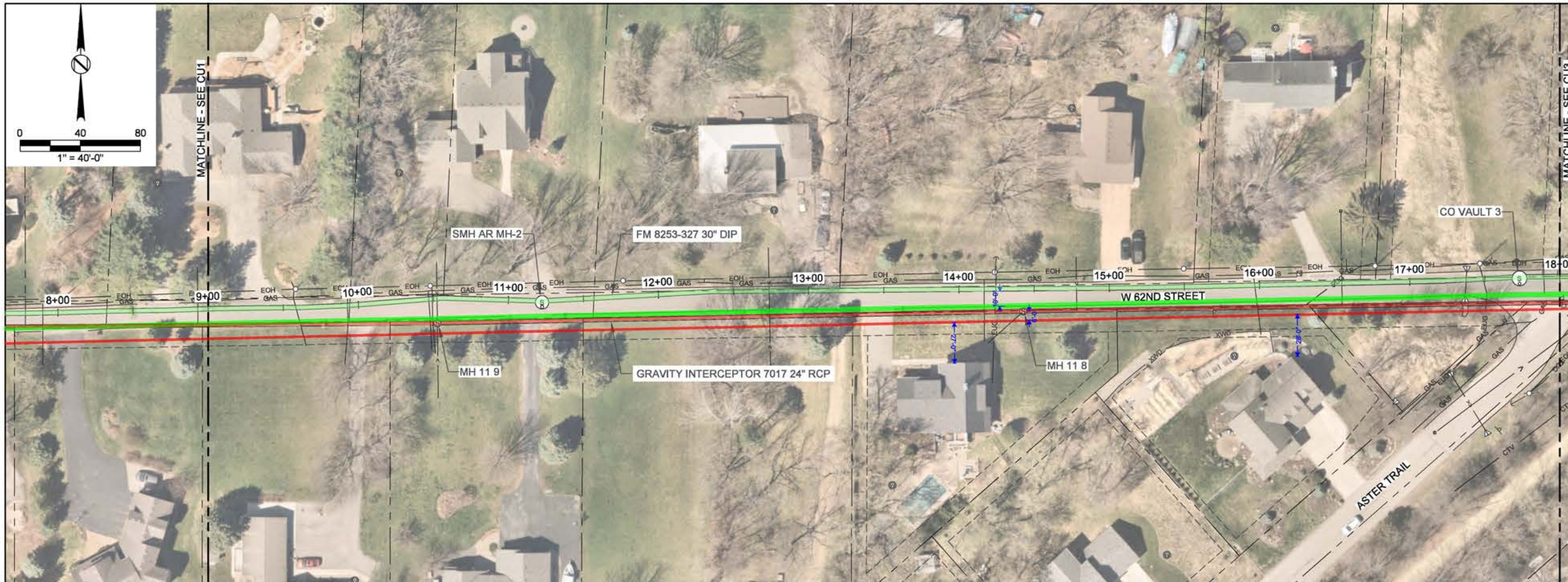

GENERAL NOTES:

1.

KEY NOTES:

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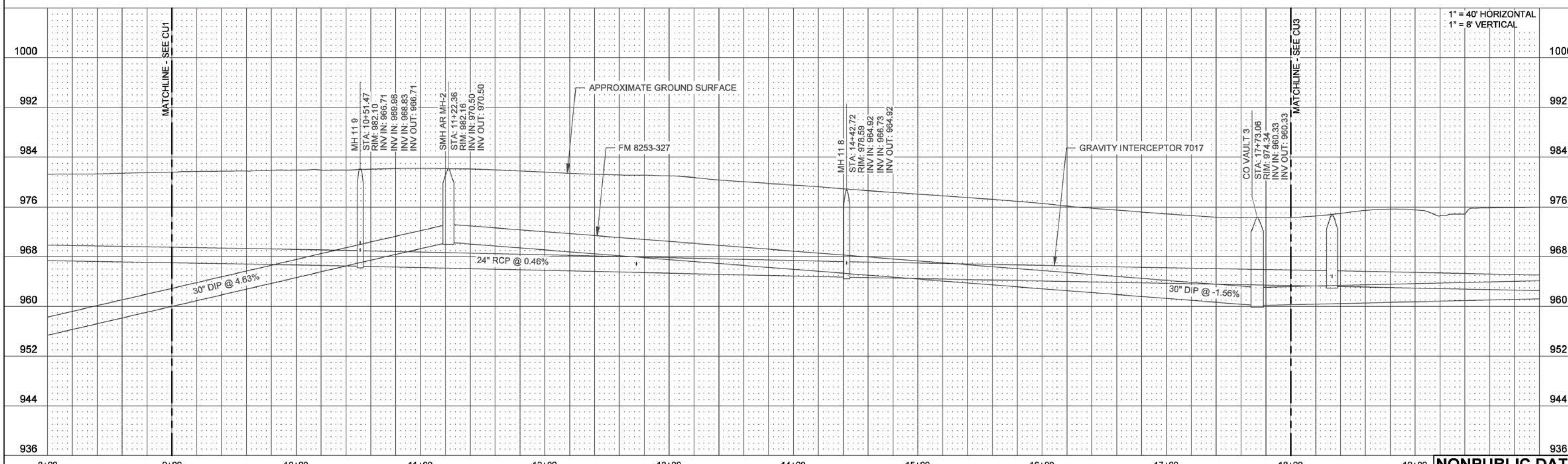

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

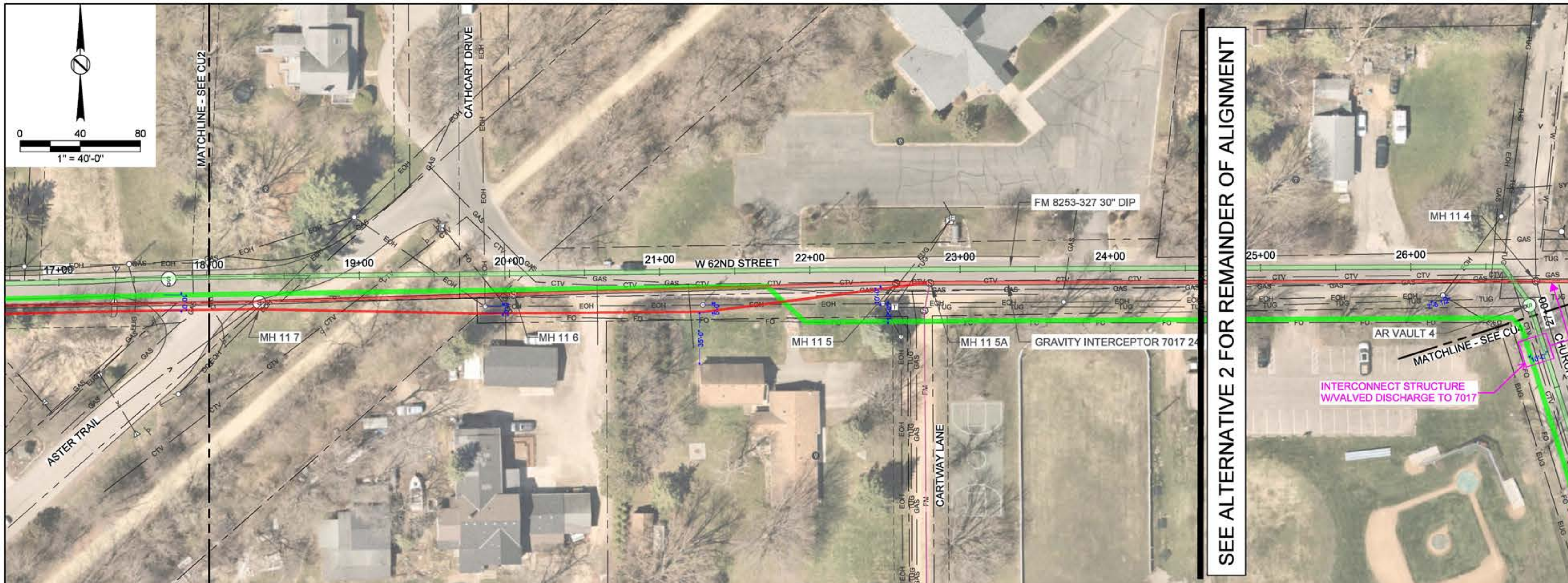
PROJECT
FILE NAME
CU002

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 9+00 TO STA 18+00

CU2

5 OF XX



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KEY NOTES:

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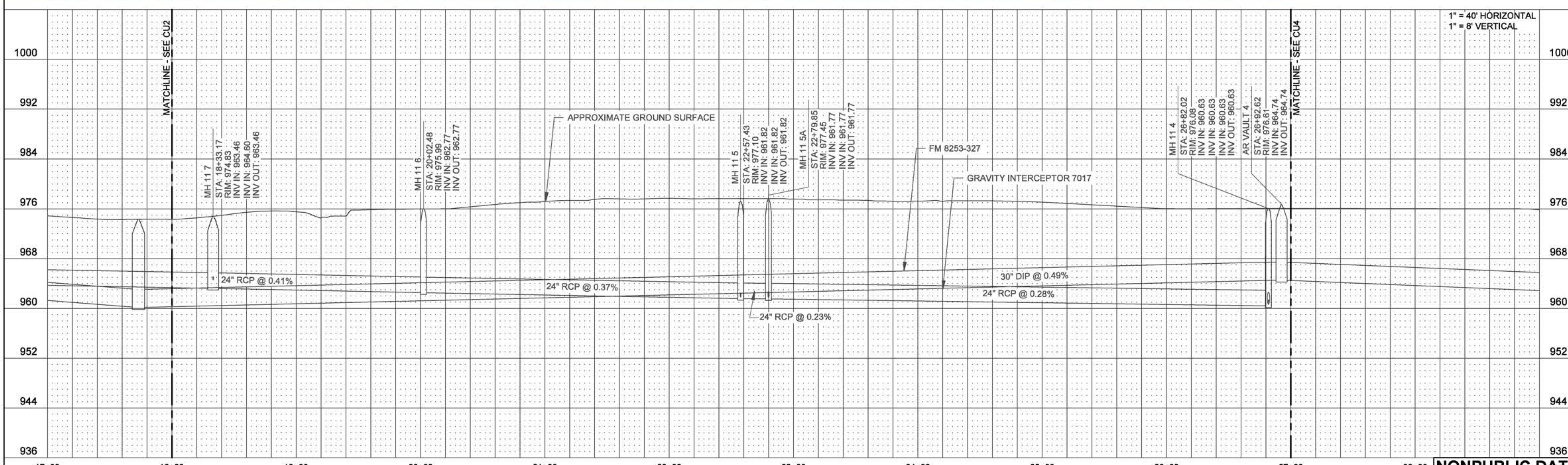

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MODIFIED: 2/24/2025 4:37:18 PM

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME
CU003

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 18+00 TO STA 27+00

CU3

6 OF XX

Attachment E: Alternative 4 – Two New Forcemains on Existing 8253 Alignment

ALTERNATIVE 4 - TWO NEW FORCEMAINS ON 8253 ALIGNMENT
REPLACE PART OF EXISTING 8253-327 FM WITH TEMPORARY CONVEYANCE AND REMOVE REMAINDER OF EXISTING 8253-327 FM AFTER NEW FMs ARE IN SERVICE

GENERAL NOTES:

1.

KEY NOTES:

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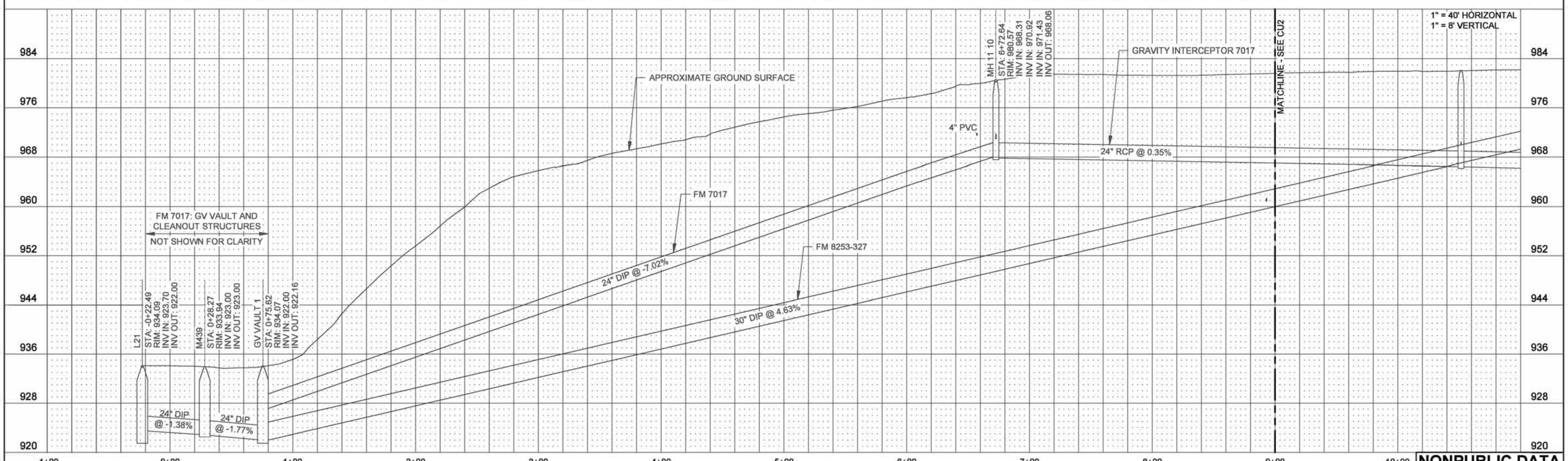

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MODIFIED: 2/26/2025 2:54:22 PM

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED PCG
DRAWN TEP
CHECKED JEB

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SIGNATURE: ______
TYPED OR PRINTED NAME: ______
DATE ______ REG NO. ______

Brown AND Caldwell

PROJECT
FILE NAME CU001

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 0+00 TO STA 9+00

CU1

4 OF XX

GENERAL NOTES:

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KEY NOTES:

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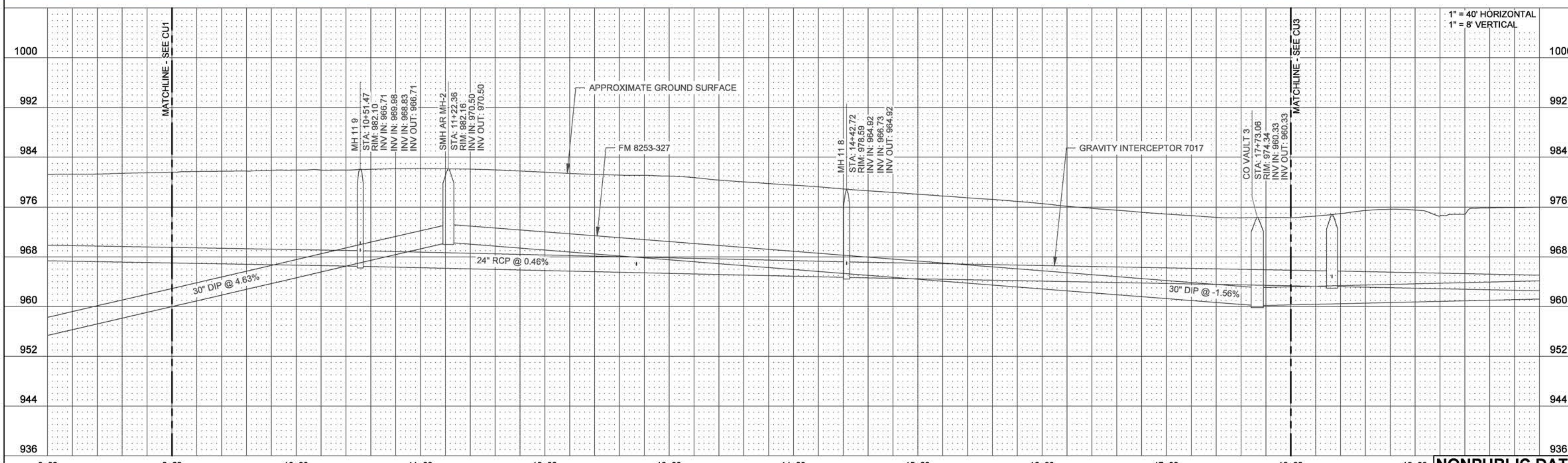

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REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE: ____

TYPED OR PRINTED NAME: ____

DATE ____ REG NO ____

Brown AND Caldwell

PROJECT

FILE NAME
CU002

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 9+00 TO STA 18+00

CU2

5 OF XX

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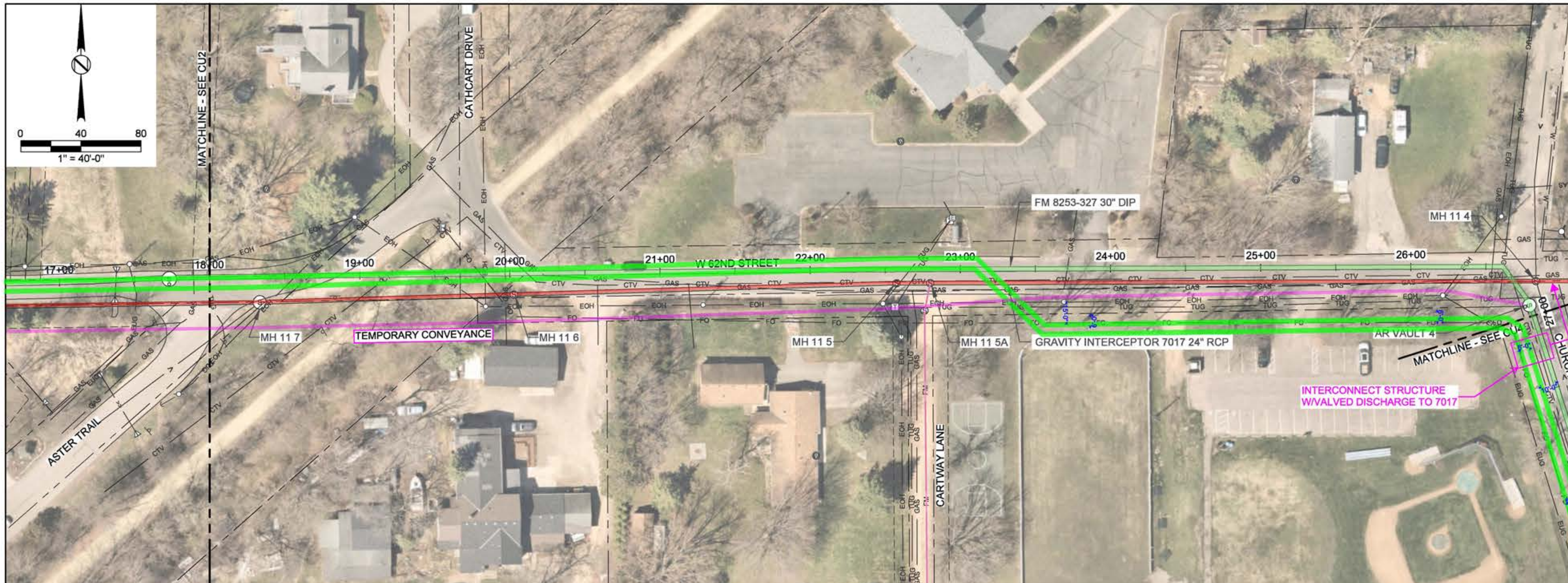

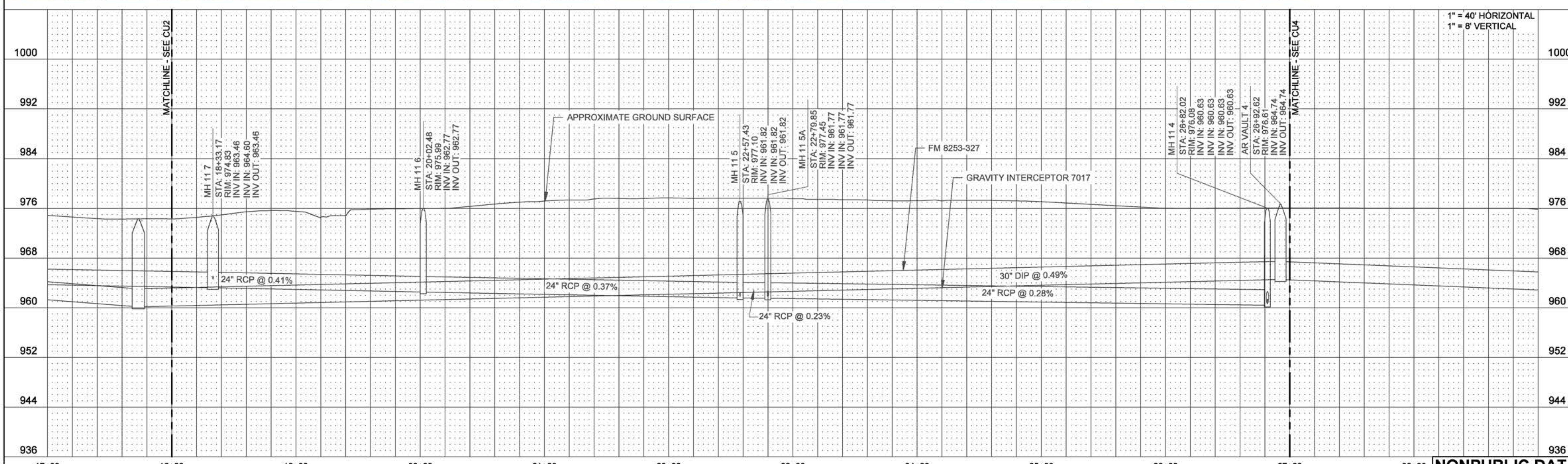

NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED

DRAWN

CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME: CU003

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 18+00 TO STA 27+00

CU3

6 OF XX

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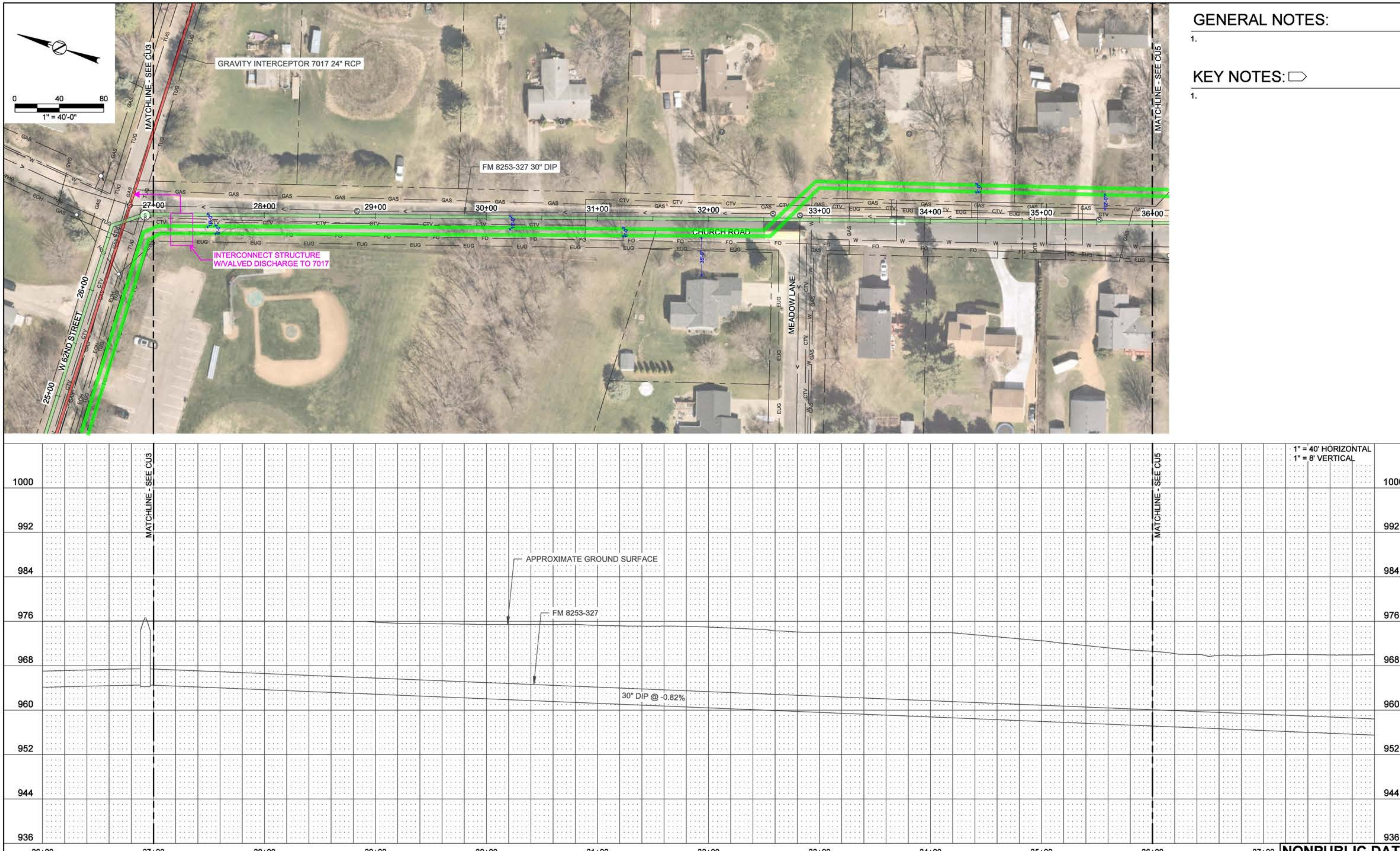

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KEY NOTES:

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REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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TYPED OR PRINTED NAME:
DATE REG NO

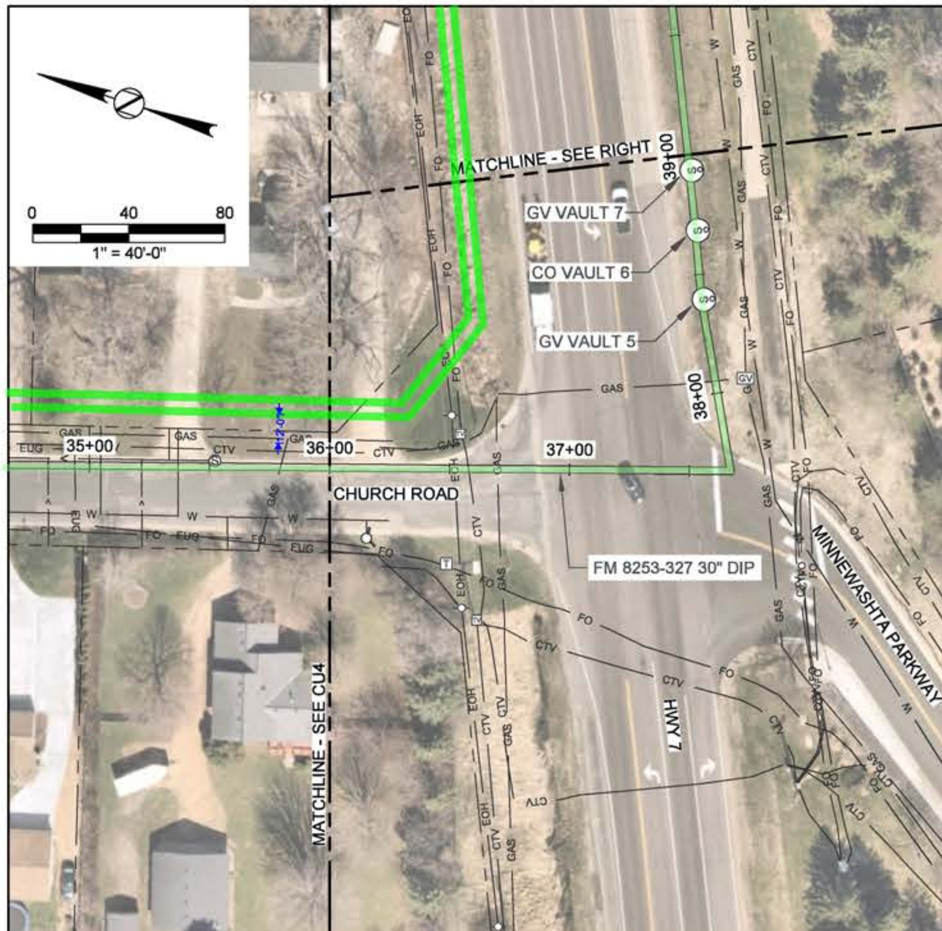
Brown AND Caldwell

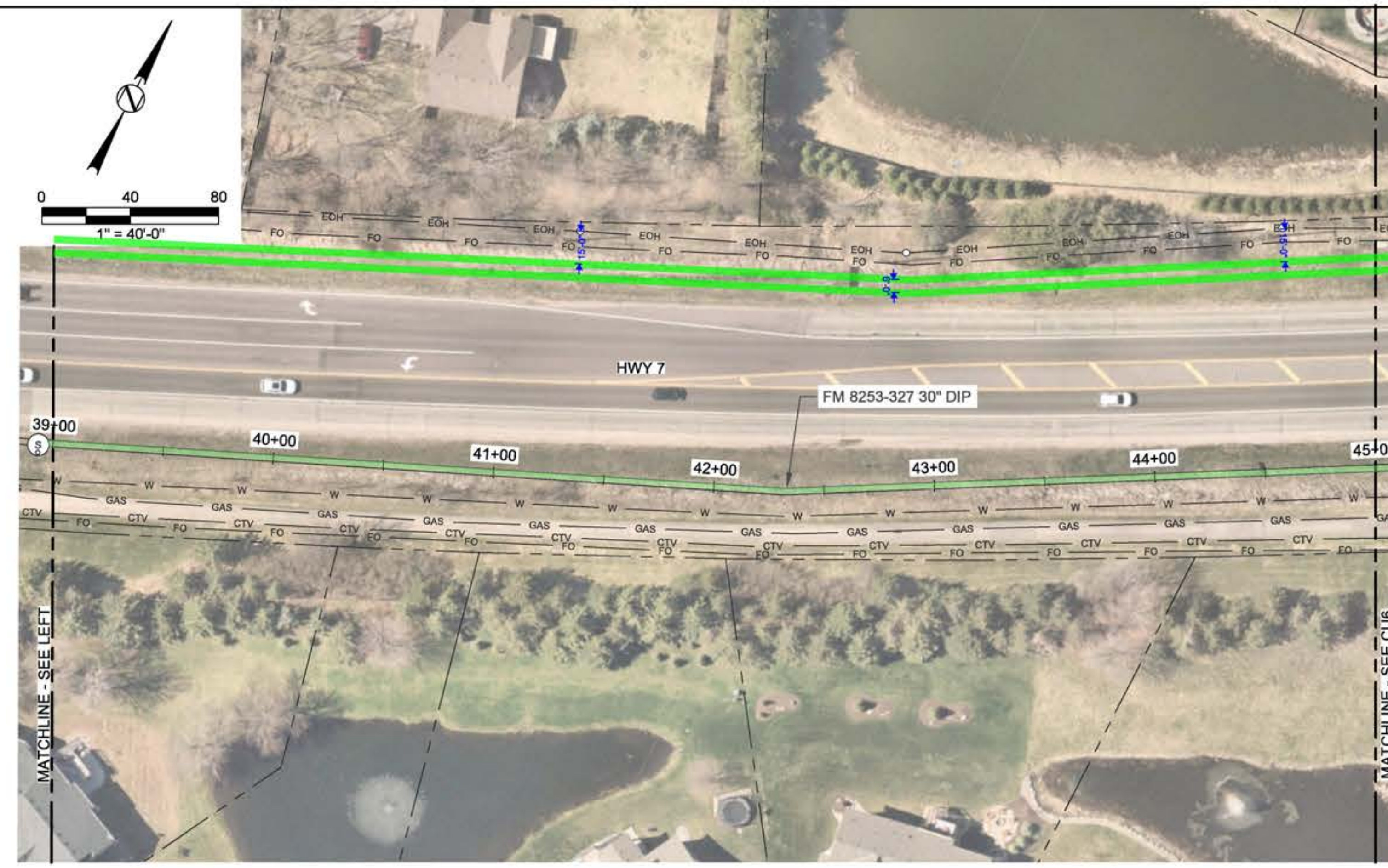
PROJECT
FILE NAME CU004

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 27+00 TO STA 36+00

CU4





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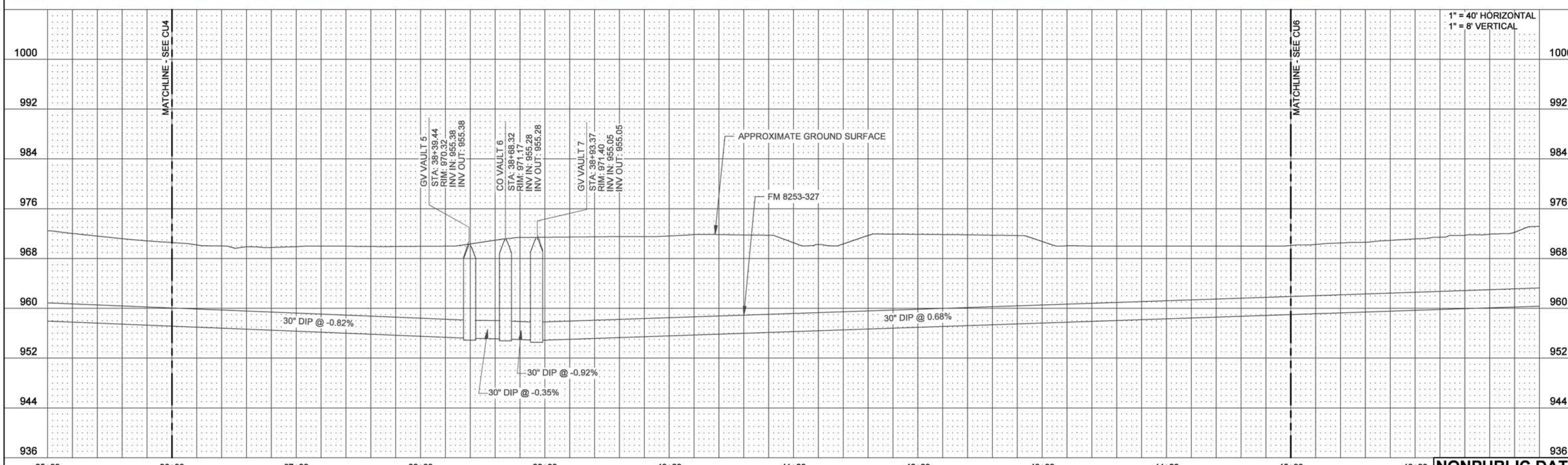

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU005

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 36+00 TO STA 45+00

CU5

8 OF XX

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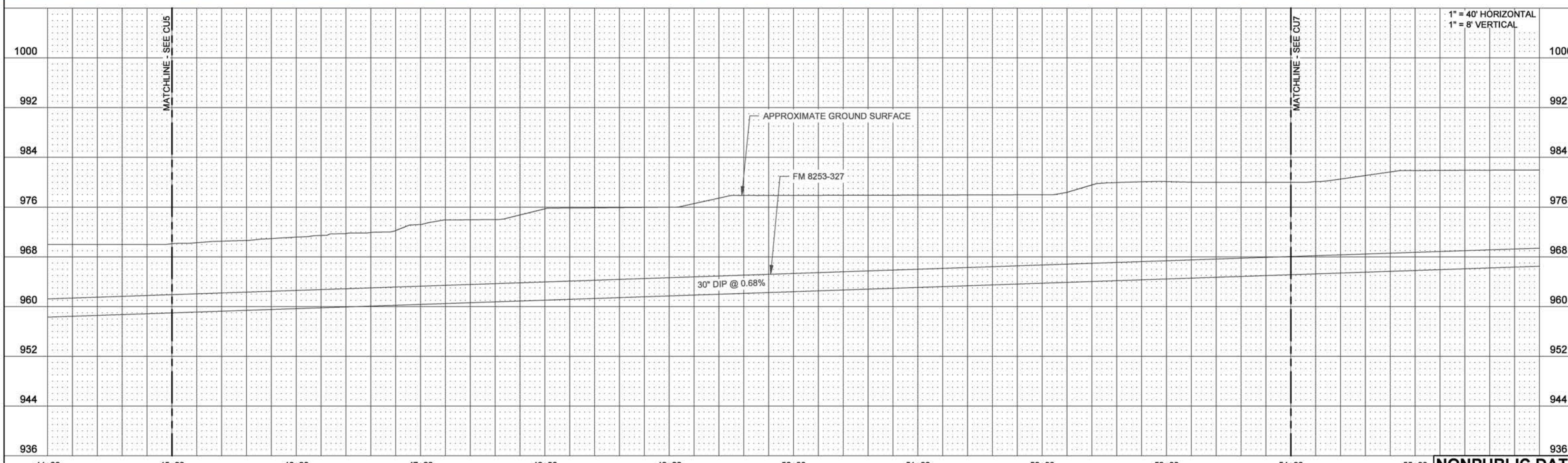

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REVISIONS				REVISIONS			

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CHECKED

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT
FILE NAME CU006

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 45+00 TO STA 54+00

CU6

9 OF XX

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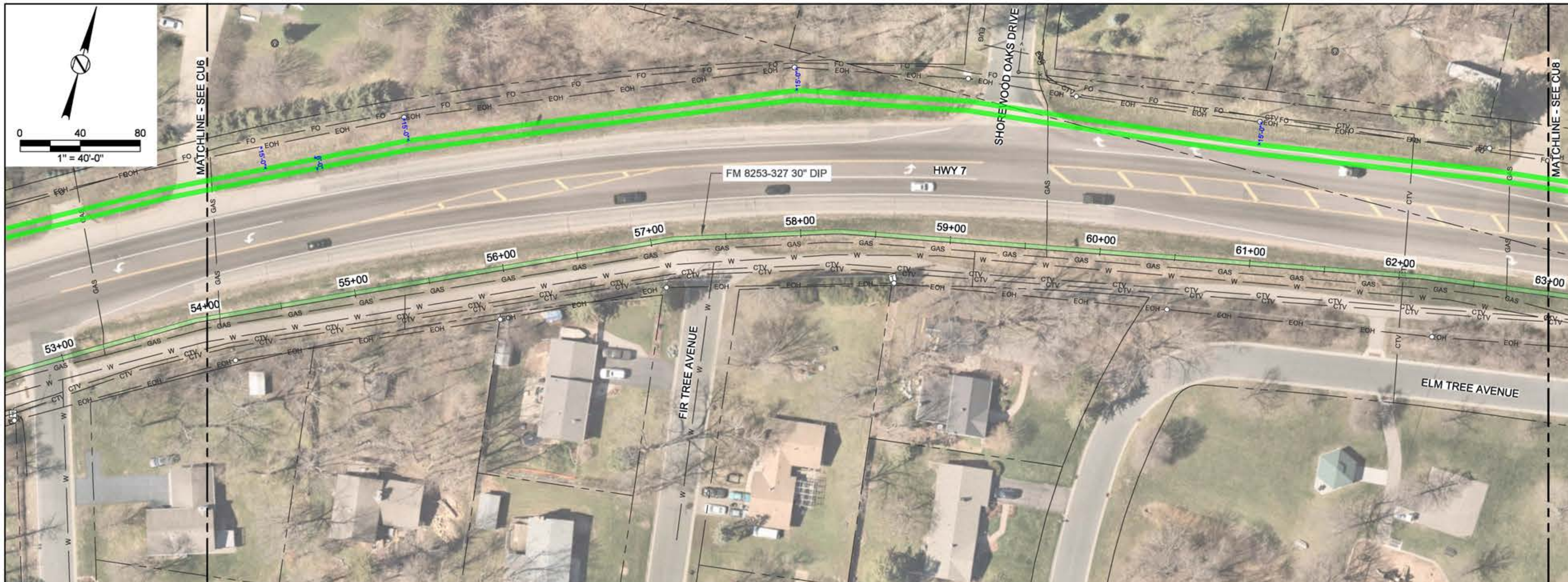

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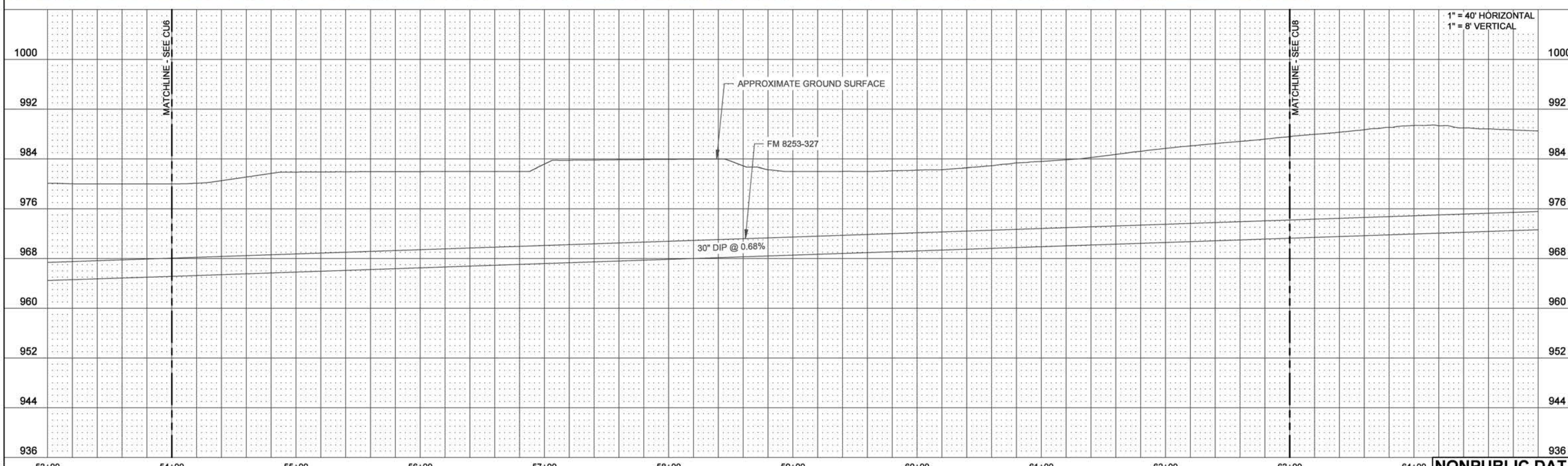

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS

REVISIONS

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TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU007

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 54+00 TO STA 63+00

CU7

10 OF XX

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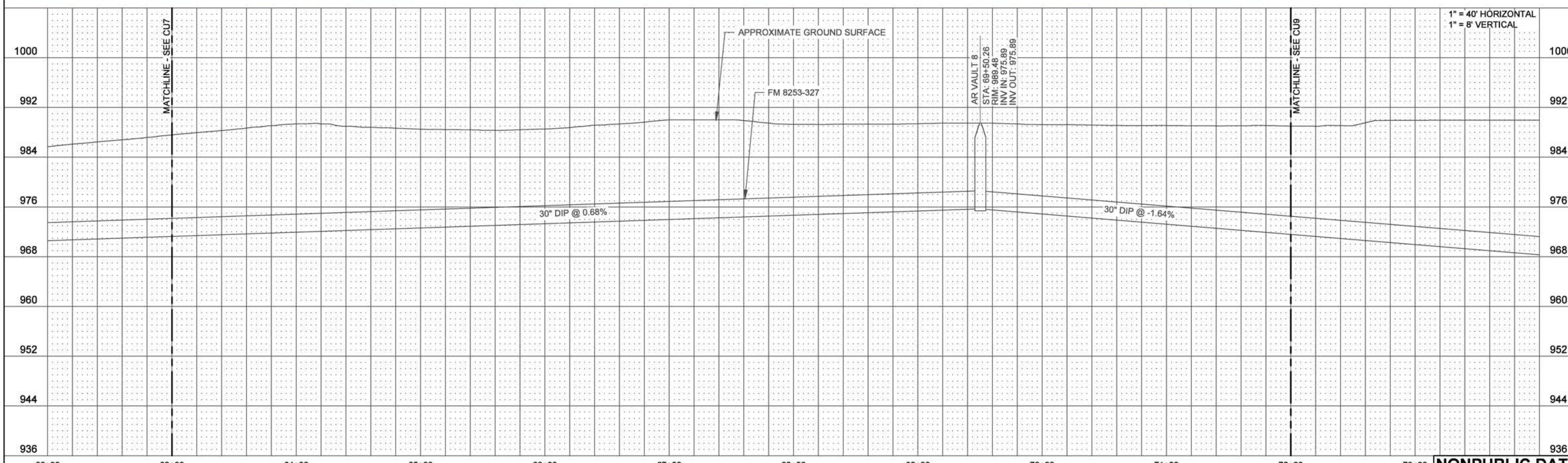

NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS

REVISIONS | REVISIONS

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DRAWN

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE ____ REG NO ____

Brown AND Caldwell

PROJECT

FILE NAME: CU008

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 63+00 TO STA 72+00

CU8

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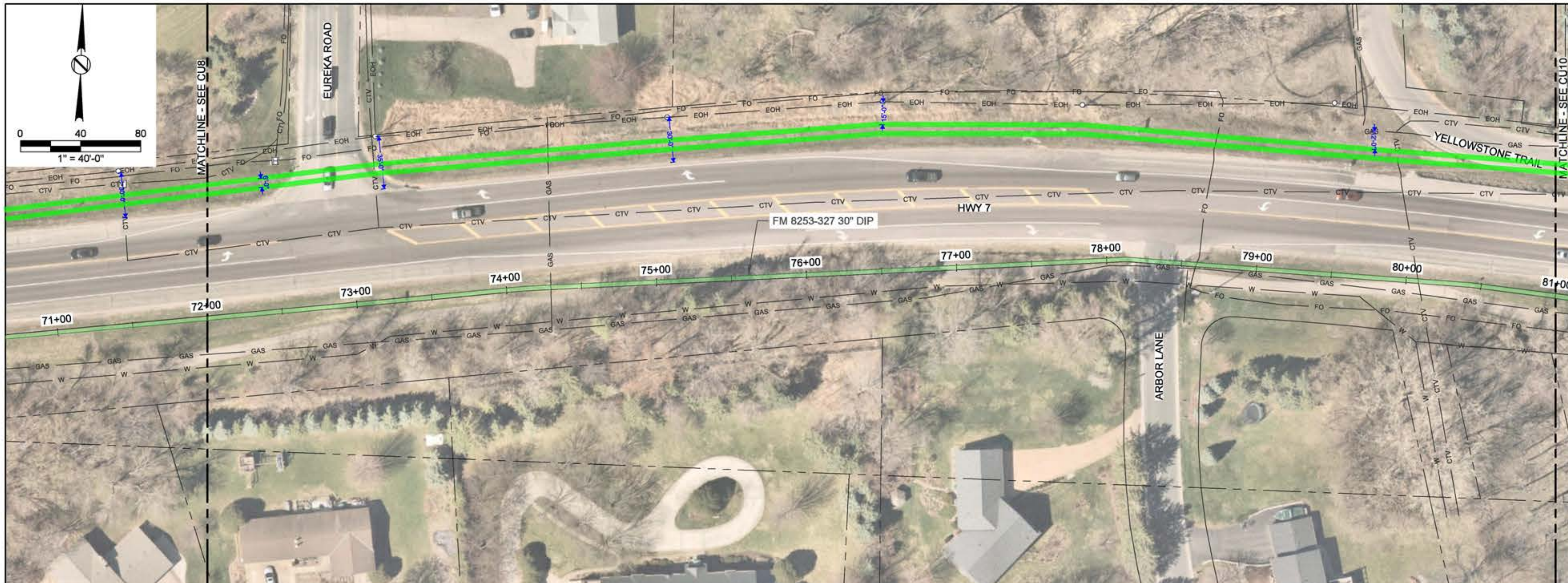

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KEY NOTES:

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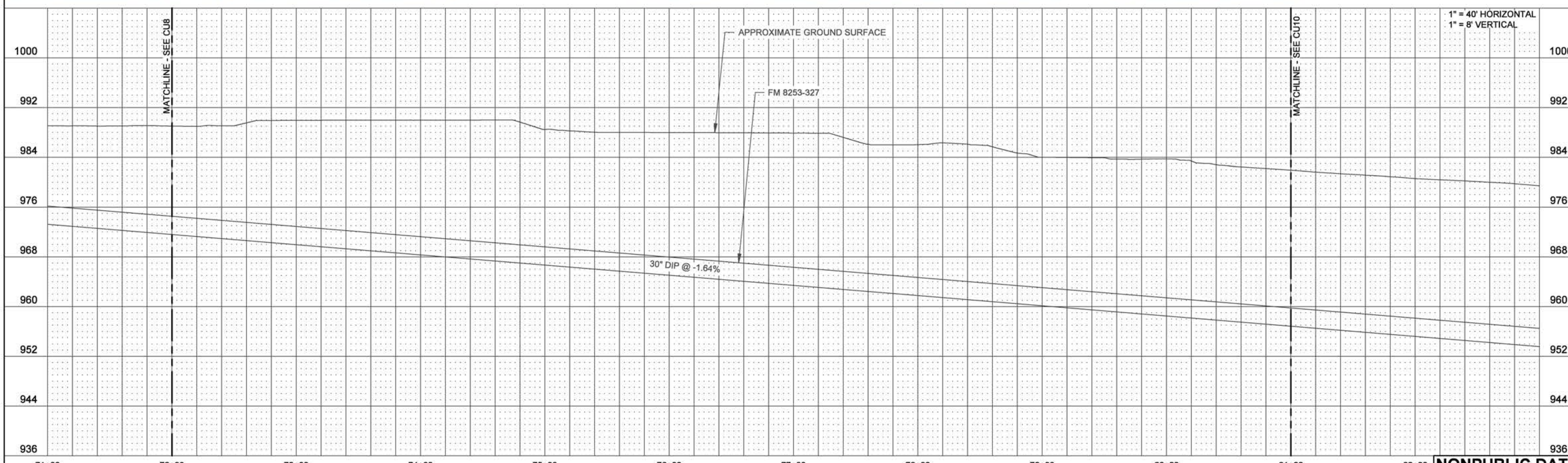

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REVISIONS				REVISIONS			

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DATE
REG NO

Brown AND Caldwell

PROJECT
FILE NAME CU009

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 72+00 TO STA 81+00

CU9

GENERAL NOTES:

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KEY NOTES:

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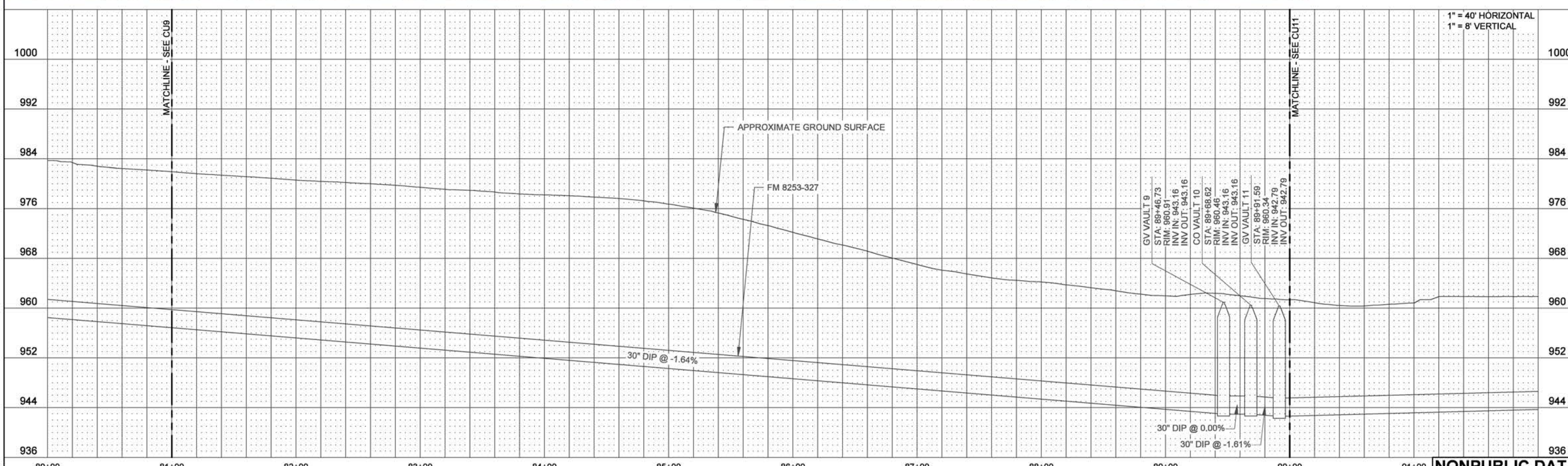

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REVISIONS				REVISIONS			

DESIGNED

DRAWN

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SIGNATURE: ____________________

TYPED OR PRINTED NAME: ____________________

DATE ____________ REG NO ____________

Brown AND Caldwell

PROJECT

FILE NAME
CU010

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 81+00 TO STA 90+00

CU10

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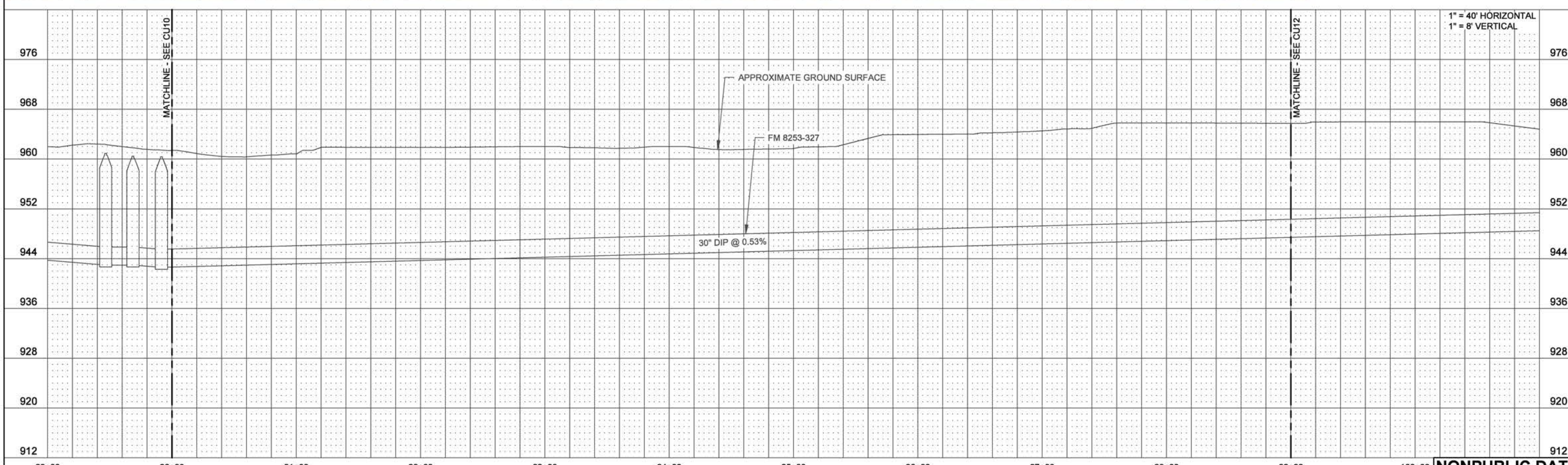

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REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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TYPED OR PRINTED NAME:
DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU011

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 90+00 TO STA 99+00

CU11

GENERAL NOTES:

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KEY NOTES:

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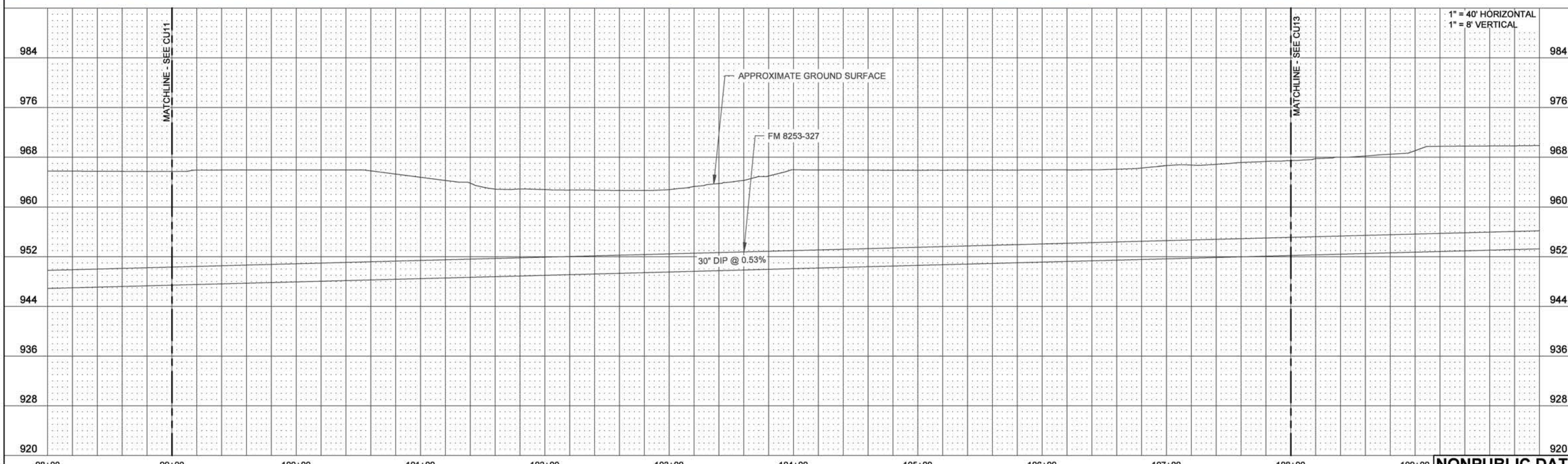

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NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED

DRAWN

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SIGNATURE: ____________

TYPED OR PRINTED NAME: ____________

DATE ________ REG NO ________

Brown AND Caldwell

PROJECT

FILE NAME

CU012

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 99+00 TO STA 108+00

CU12

15 OF XX

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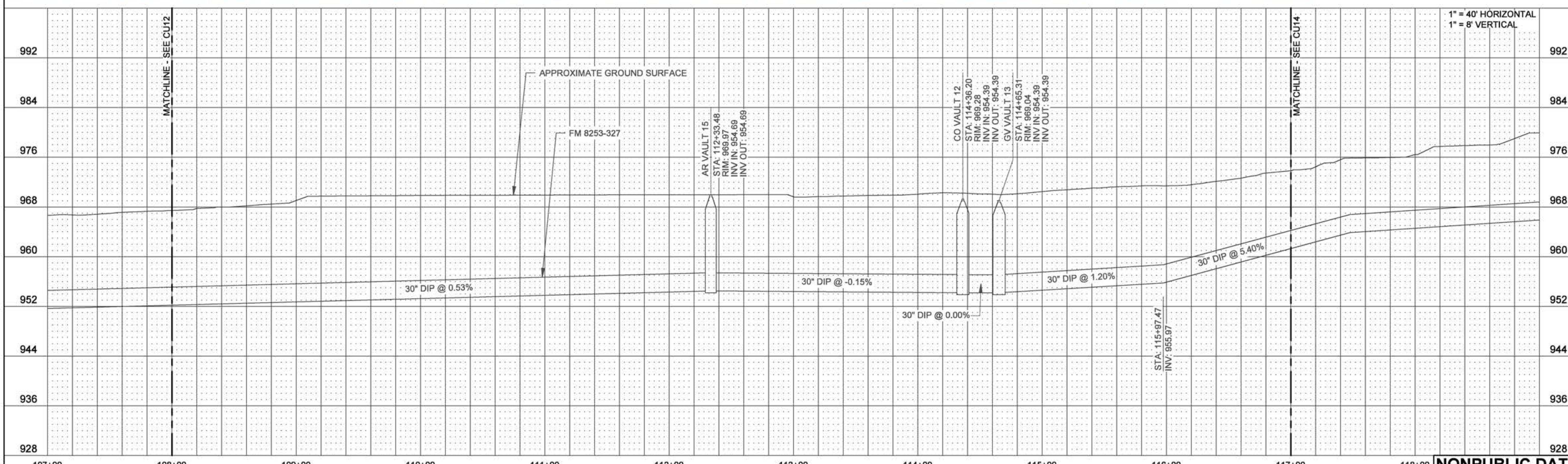

NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

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CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE ______ REG NO ______

Brown AND Caldwell

PROJECT

FILE NAME
CU013

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 108+00 TO STA 117+00

CU13

16 OF XX

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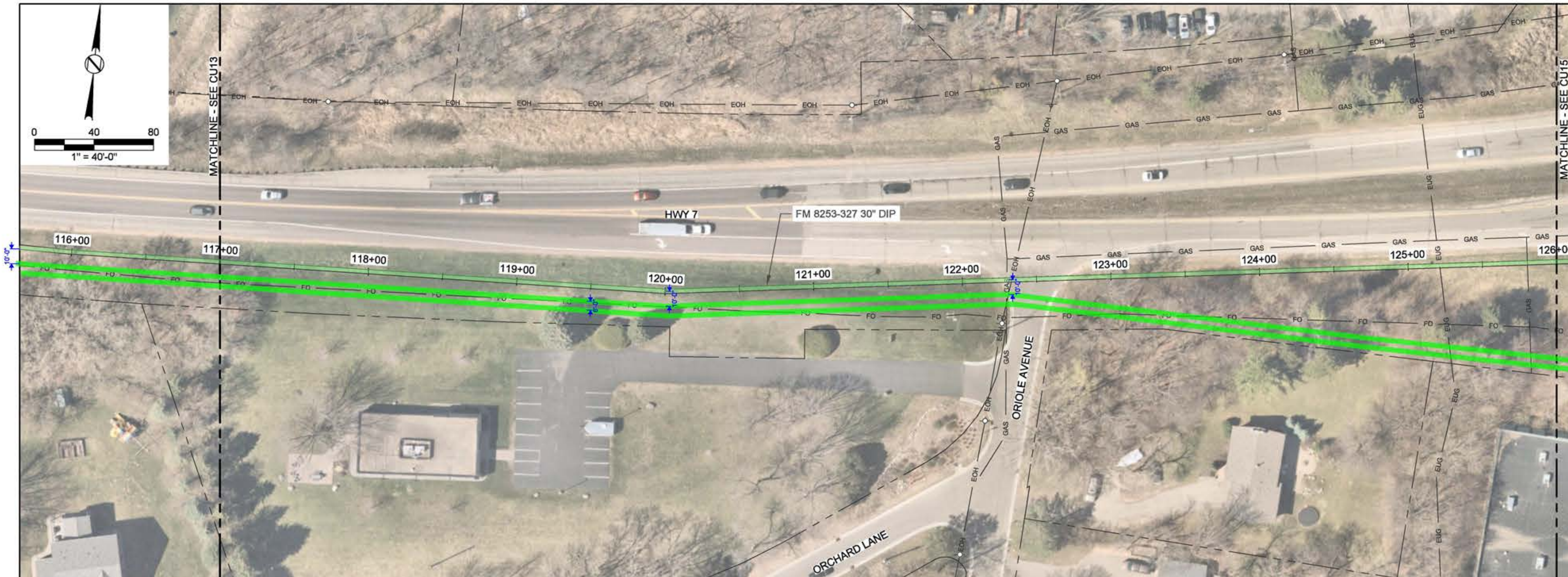

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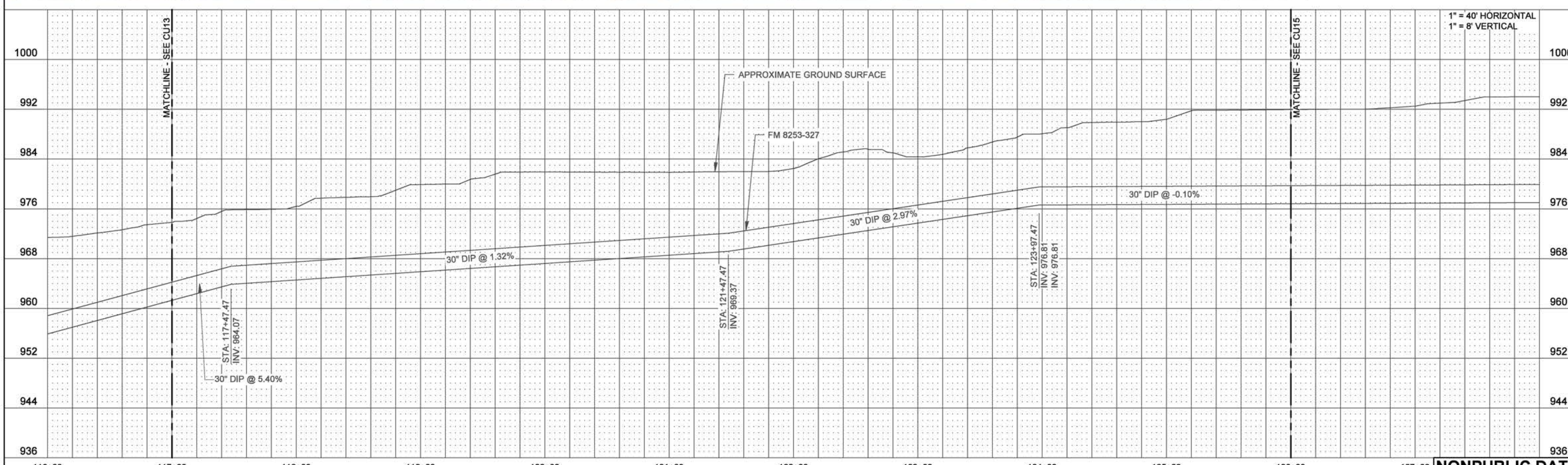

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REVISIONS				REVISIONS			

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DATE REG NO

Brown AND Caldwell

PROJECT

FILE NAME CU014

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 117+00 TO STA 126+00

CU14

17 OF XX

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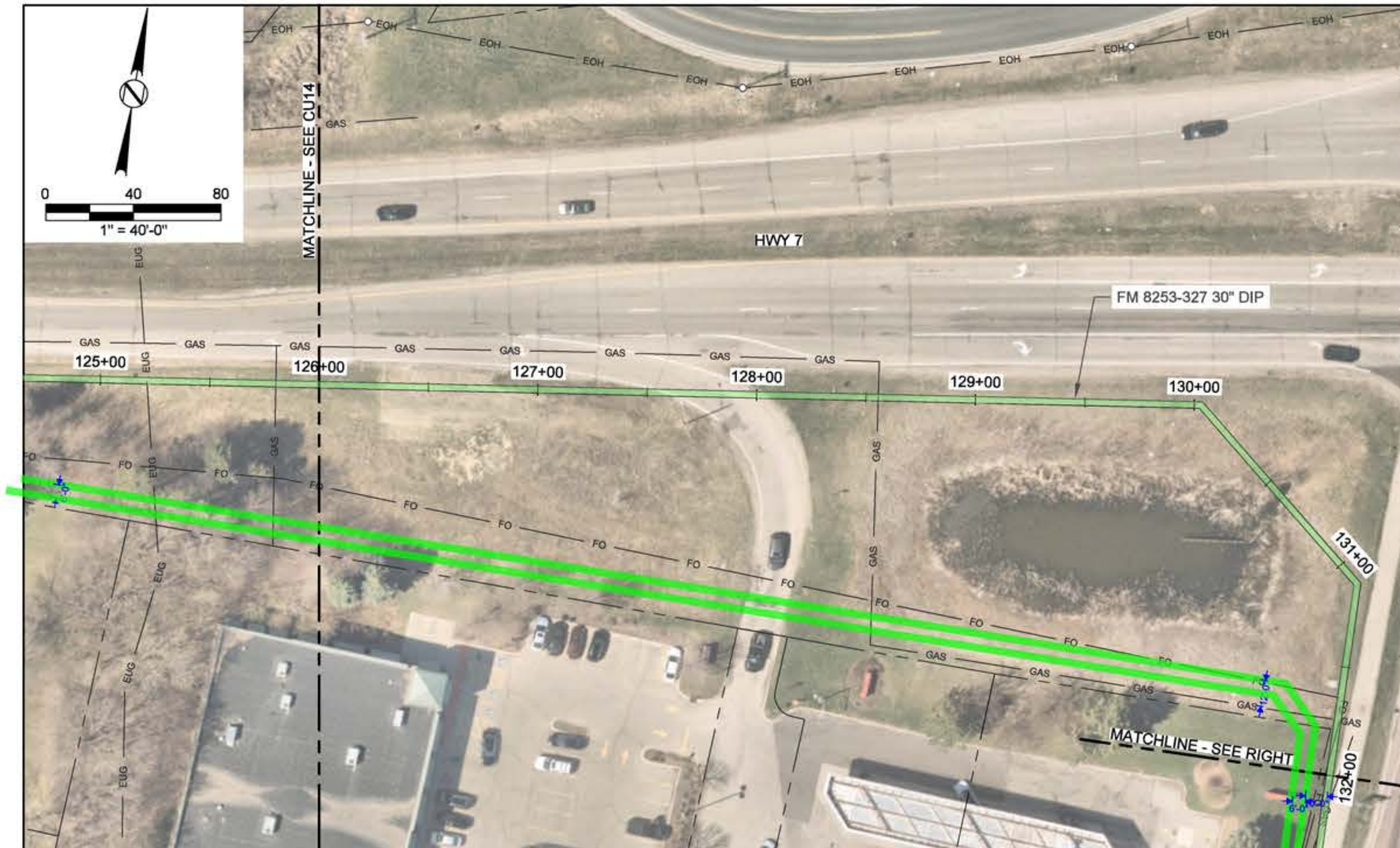

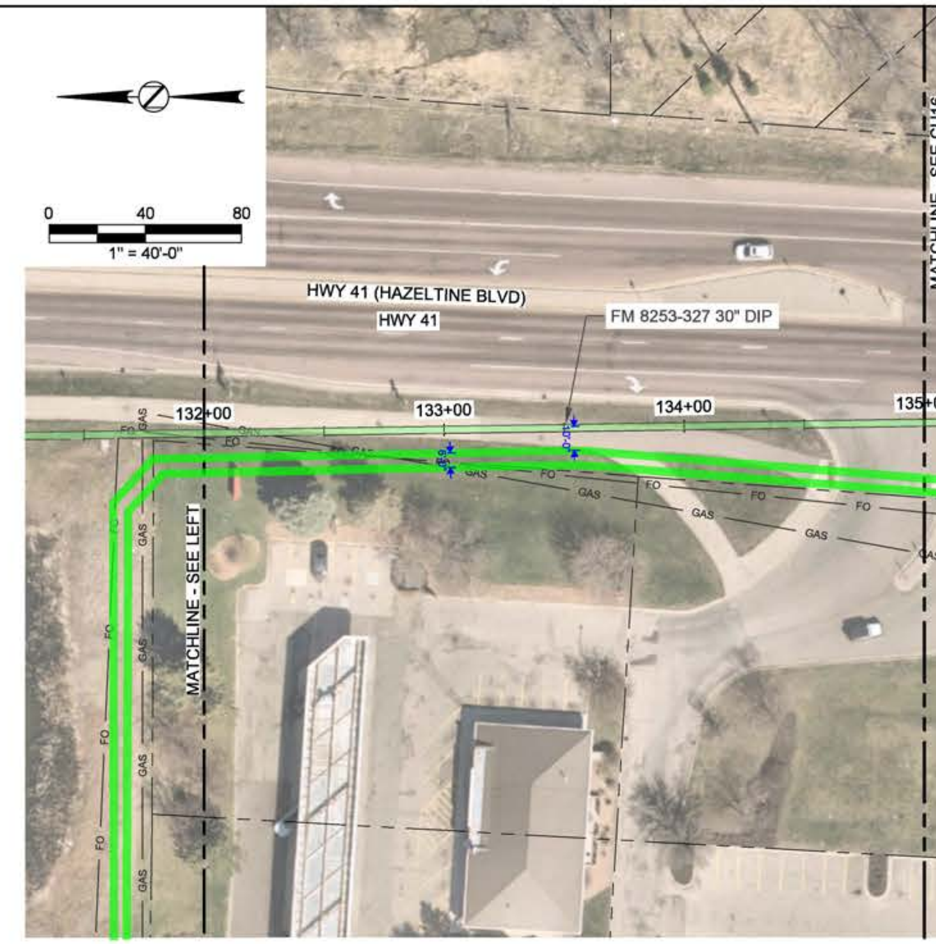

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KEY NOTES:

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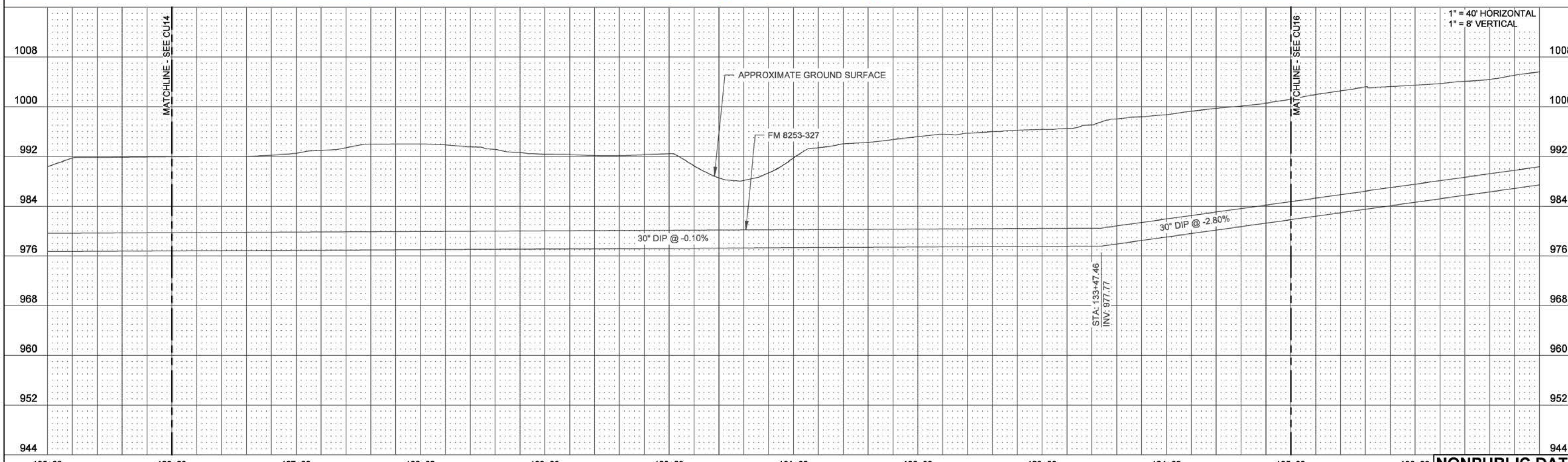

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MODIFIED: 2/24/2025 4:57:30 PM

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED
DRAWN
CHECKED

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SIGNATURE:

TYPED OR PRINTED NAME:

DATE ________ REG NO ________

Brown AND Caldwell

PROJECT

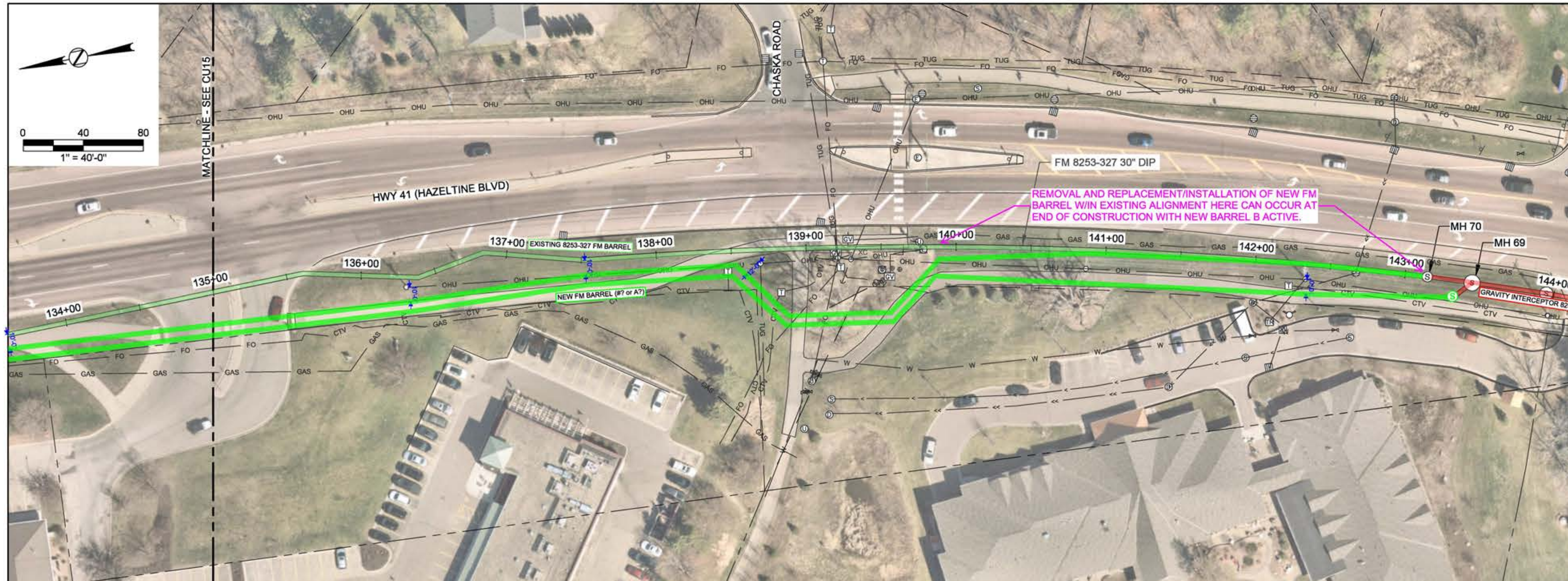
FILE NAME: CU015

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 126+00 TO STA 135+00

CU15

18 OF XX



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KEY NOTES:

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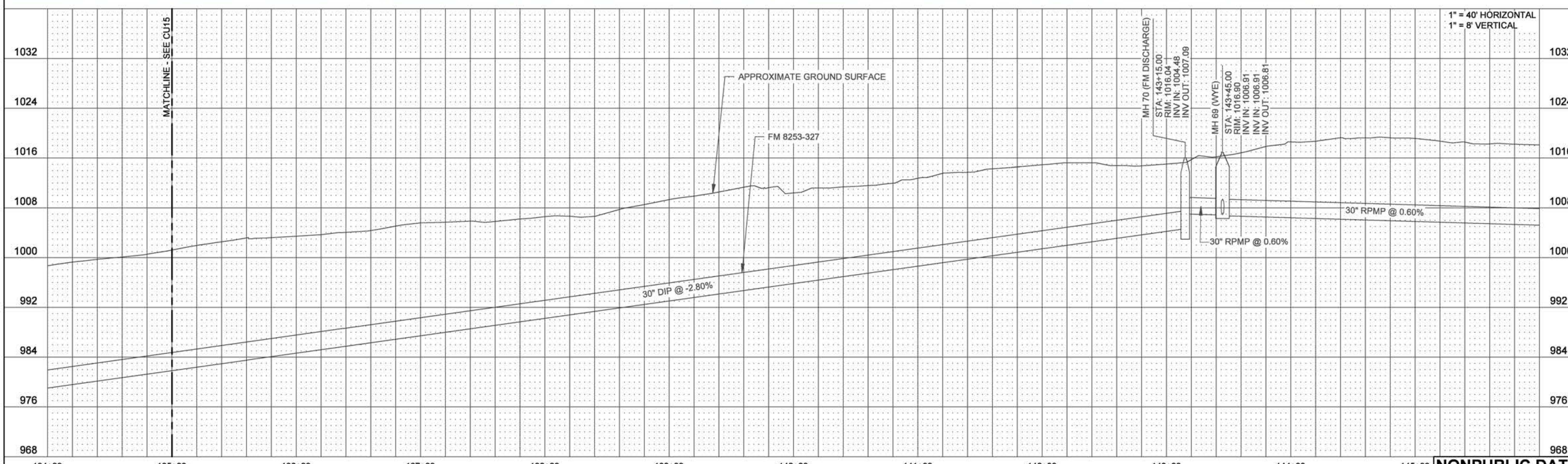

NONPUBLIC DATA

NO	DATE	BY	REMARKS

REVISIONS

NO	DATE	BY	REMARKS

REVISIONS

DESIGNED

DRAWN

CHECKED

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SIGNATURE: ______

TYPED OR PRINTED NAME: ______

DATE ______ REG NO ______

Brown AND Caldwell

PROJECT

FILE NAME
CU016

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 135+00 TO STA 143+15

CU16

19 OF XX

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PLOTTED: 2/26/2025 3:33:12 PM
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Attachment F: Alternative 5 – Two New Forcemains – Proposed Alignment

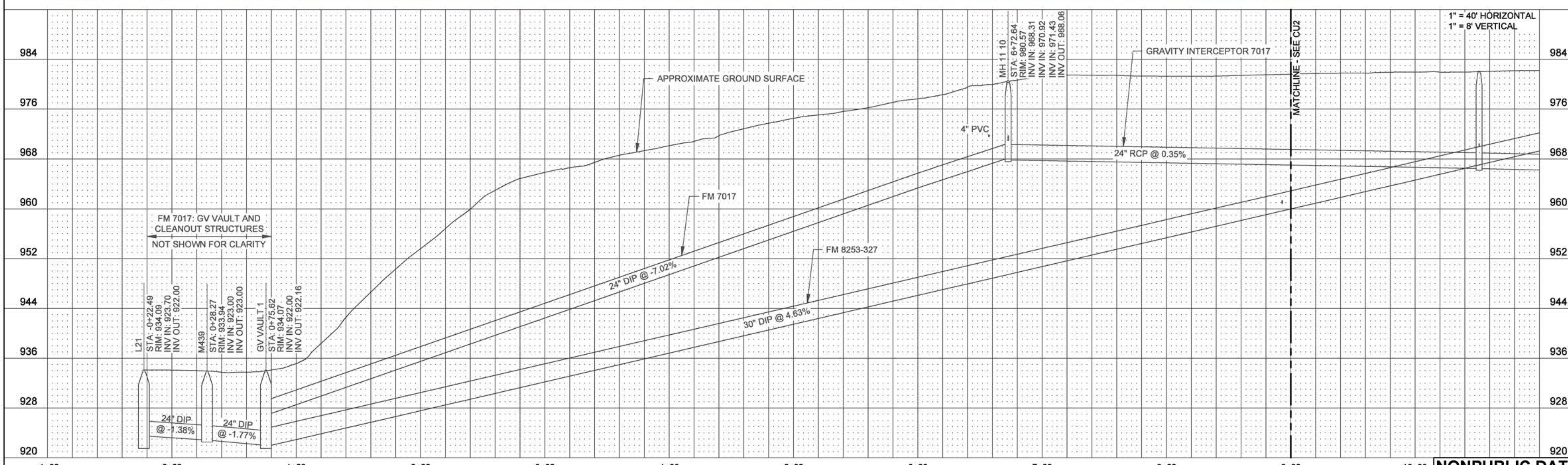
ALTERNATIVE 5 - TWO NEW FORCEMAINS - NEW ALIGNMENT
REMOVE EXISTING 8253-327 FM AFTER NEW FMs ARE IN SERVICE

GENERAL NOTES:

1.

KEY NOTES:

1.



NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

DESIGNED PCG
DRAWN TEP
CHECKED JEB

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SIGNATURE:
TYPED OR PRINTED NAME:
DATE: REG NO

Brown AND Caldwell

PROJECT
FILE NAME CU001

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 0+00 TO STA 9+00

CU1

4 OF XX

C:\USERS\APERRY1\DC\ACCDOCS\BC ACC PROJECT HUB\107597 - MCES INTERCEPT 8253-327 IMPROV PH2\PROJECT FILES\300 DESIGN\CAD_802XXX\SHEETS\CU001.DWG
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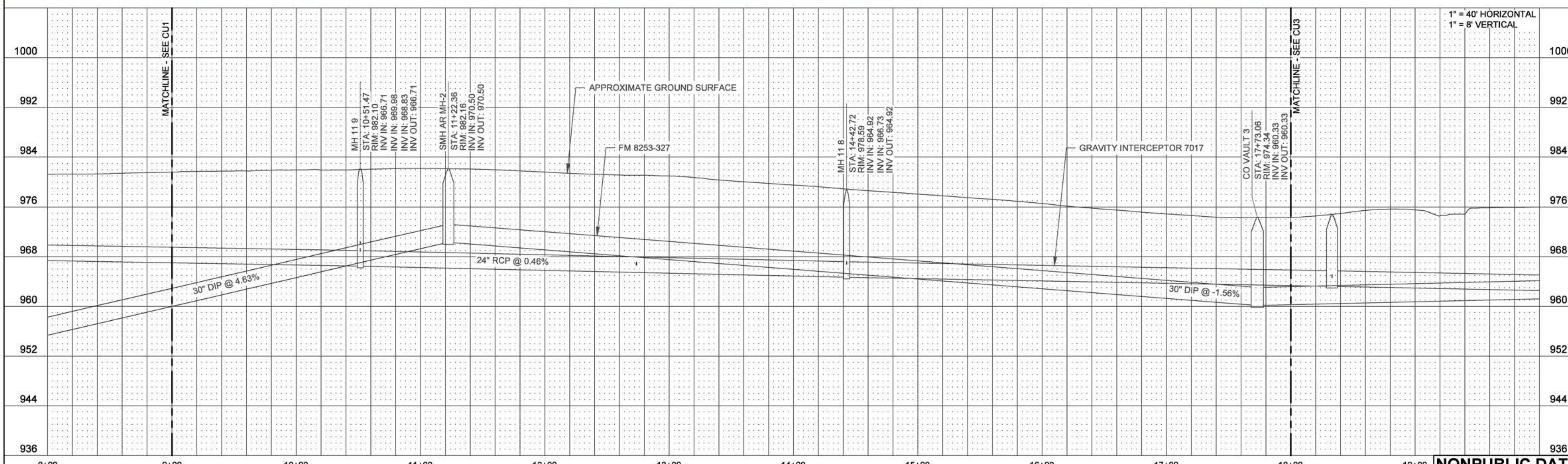
MODIFIED: 2/26/2025 2:54:22 PM

GENERAL NOTES:

1.

KEY NOTES:

1.



NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS

REVISIONS — REVISIONS

DESIGNED
DRAWN
CHECKED

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

SIGNATURE:
TYPED OR PRINTED NAME:
DATE — REG NO

Brown AND Caldwell

PROJECT

FILE NAME
CU002

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 9+00 TO STA 18+00

CU2

5 OF XX

C:\USERS\APERRY1\DC\ACCDOCS\BC ACC PROJECT HUB\107597 - MCES INTERCEPT 8253-327 IMPROV PH2\PROJECT FILES\300 DESIGN\CAD_802XXX\SHEETS\CU002.DWG
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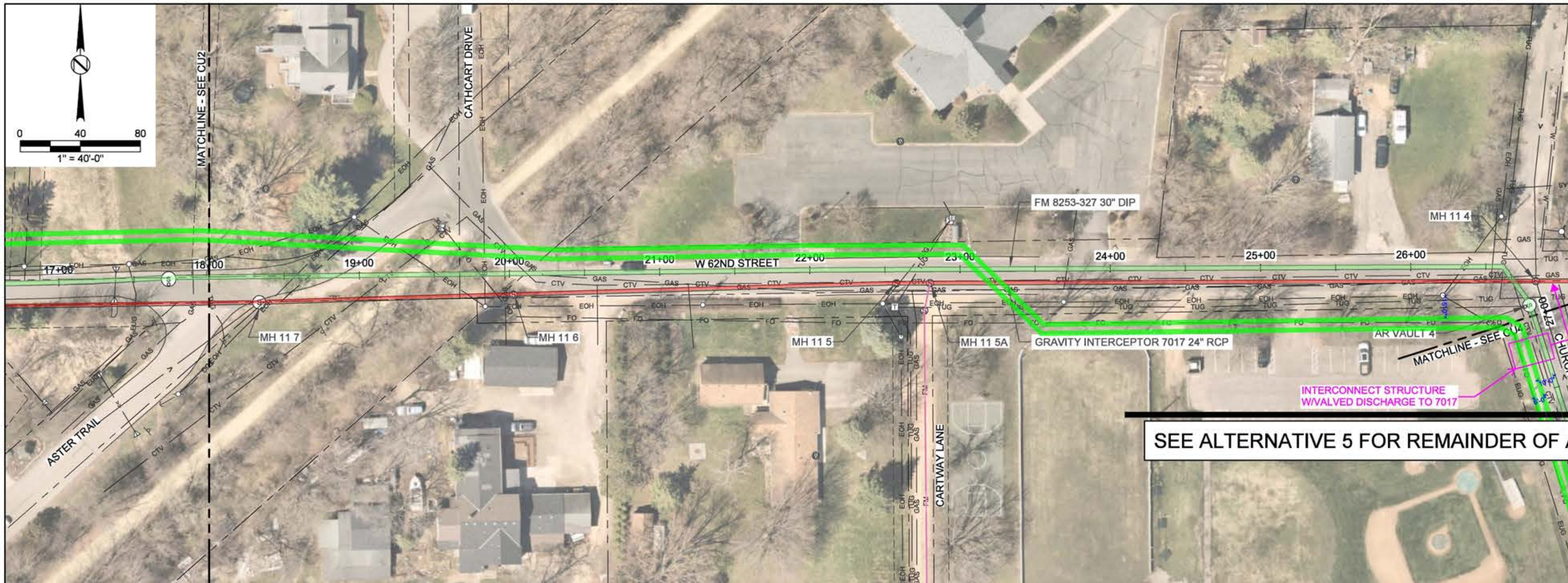


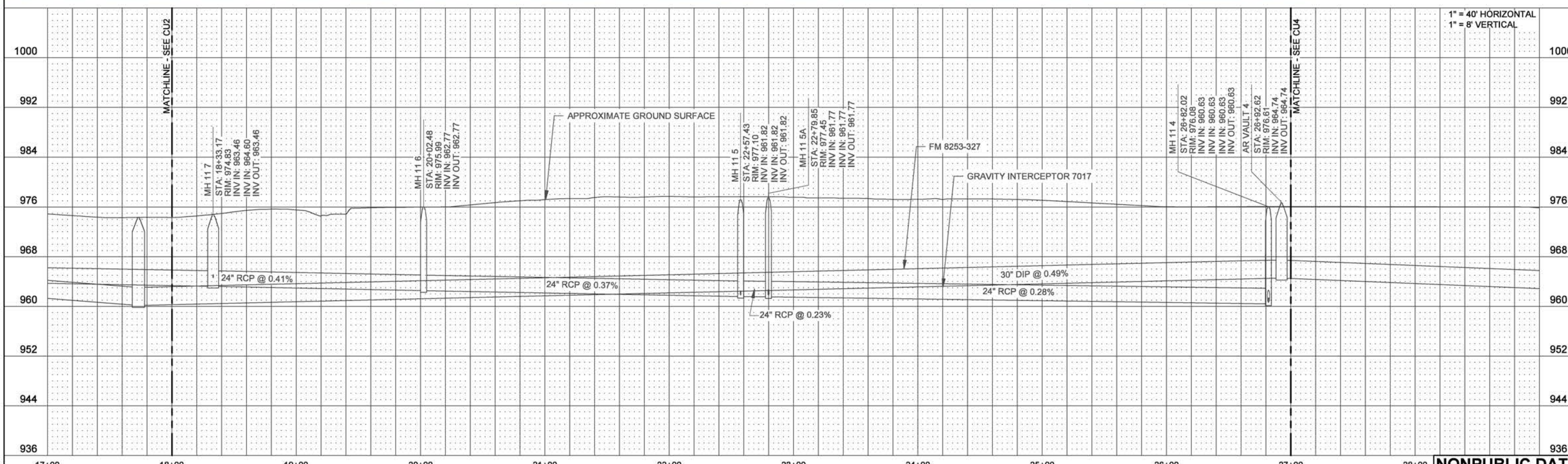
SEE ALTERNATIVE 5 FOR REMAINDER OF ALIGNMENT

GENERAL NOTES:

1.

KEY NOTES:

1.



NONPUBLIC DATA

NO	DATE	BY	REMARKS	NO	DATE	BY	REMARKS
REVISIONS				REVISIONS			

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DATE ____ REG NO ____

Brown AND Caldwell

PROJECT

FILE NAME
CU003

INTERCEPTOR 8253-327 L21 FM PHASE 2

FM PLAN & PROFILE - STA 18+00 TO STA 27+00

CU3

6 OF XX

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MODIFIED: 2/24/2025 4:37:18 PM

Attachment G: BCE Output

Project name **MCES Interceptor 8253-327 Improvements Phase 2**

ASSUMPTIONS

Engineering Economics Analysis Inputs	Value		Source/Comment
Base Year	2026		Common for all alternatives. Reference year for all cost data input. Year of NPV.
Planning Period End	2064		Common for all alternatives. Effort specific.
Analysis Horizon (number of years)	39		Please always check: https://metrocouncil.org/wastewater-water/funding-finance.aspx for current values for some assumptions indentified on this page
Annual Inflation (per year)			
Labor (including benefits)	3.5%		
Non Labor - Electricity	3.0%		
Non Labor - Other	3.0%		
Construction	3.0%		
Discount Rate	3.0%		
Undeveloped Design Details	30%		
Construction Contingency	20%		
Administrative Overhead for Operating Costs	0%		Includes: Admin, Safety, R/A, General Managers Office, Finance
Useful Lives (years) and Replacement Cost Factors	Useful Life (yr)	Replacement Cost Factor	
Building/Structures	40	1.25	Replacement Cost Factors for additional customizing and installation for replacement costs.
Gravity Sewers	80	1.25	
Forcemains	40	1.25	
Process Piping	30	1.25	
Mechanical Equipment	20	1.25	
Electrical Equipment	20	1.25	
Instrumentation and Control Equipment	15	1.25	
Computer Hardware and Software	4	1.25	
Mobile Equipmment	10	1.00	

Operation and Mainteance Cost Inputs Category	Unit	Unit Cost	Source/Comment
Labor (Operations)	FTE	$ 140,000	July 2024 MCES Financial Guidance Package
Labor (Maintenance)	FTE	$ 149,000	July 2024 MCES Financial Guidance Package
Energy			
Natural Gas	MMBTU	$ -	
Electricity	KWHr	$ 0.0990	
Fuel Oil	Gal	$ -	
Gasoline	Gal	$ -	
Diesel	Gal	$ 4.10	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
Chemicals			
Polymer	lbs	$ -	
Chlorine	Tons	$ -	
SO2	Tons	$ -	
Boiler Feed Chemicals	LS	$ -	
Aqueous Nitrate Salt (BioxideTM)	Gal	$ -	
Ferric Chloride Solution	Gal	$ -	
Alum (Aluminum Sulfate Solution)	Gal	$ -	
Potassium Permanganate	Gal	$ -	
Sodium Bisulfite	Gal	$ -	
Sodium Hypochlorite	Gal	$ -	
Sodium Hydroxide	lbs	$ -	
Carbon	Ea	$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
End-Product Disposal			
Land Application of Alk. Stab. Produ	Tons	$ -	
Ash Disposal	Tons	$ -	
Disposal of Grit	YD3	$ -	
Disposal of Screenings	YD3	$ -	
CKD (Cement Kiln Dust)	Tons	$ -	
Lime	Tons	$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
User Defined		$ -	
Annual Maintenance Requirements - Percentage of Initial Capital Equipment Cost			
Labor	LS	0.00%	Percent of Equipment Cost
Materials	LS	0.00%	Percent of Equipment Cost

Project name **MCES Interceptor 8253-327 Improvements Phase 2**

Business Case Evaluation Summary

Problem Statement (enter in text box below)

The main objective of this evaluation is to determine cost effective, constructible, and permitted means of improving the existing MCES L21 FM system for current redundancy and future increased capacity.

Alternative #	Descriptive Title	Total NPV with Adjustment	Capital Costs	O & M Costs	Other Costs	Risk Cost
1	Status Quo (always as Alt 1)	$ 5,228,000	$ 2,850,000	$ 1,217,000	$ 1,161,000	$ -
2	One New FM	$ 25,739,000	$ 23,228,000	$ 609,000	$ 1,902,000	$ -
3	One New FM on 7017 Alignment	$ 28,309,000	$ 25,810,000	$ 609,000	$ 1,890,000	$ -
4	Two New FMs on 8253 Alignment	$ 35,912,000	$ 34,140,000	$ 305,000	$ 1,467,000	$ -
5	Two New FMs	$ 36,525,000	$ 34,744,000	$ 305,000	$ 1,476,000	$ -

Required: Attach Graphic(s) to explain the Alternatives.

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 1: **Status Quo**

New Project/Improvement Time Line Input		Comments/Notes
Year of Planning Phase Expenditure	2024	
Year of Design Phase Expenditure	2026	
Year of Major Construction Cost	2027	Construction from 2027-2028
First Year of Operation	2028	

Summary of Alternative Results and Input of Sensitivity Adjustments

NPV Contributions:	Sensitivity Adjustment	NPV without Sensitivity Adjustment	NPV with Sensitivity Adjustment			Comments/Notes
Planning	100%	$ -	$ -			
Design	100%	$ -	$ -	Capital =	$ 2,850,000	
Construction Phase	100%	$ 2,850,000	$ 2,850,000			
Annual Operating Labor	100%	$ -	$ -			
Annual Operating Electricity	100%	$ -	$ -			
Annual Operating Non-Labor Other	100%	$ -	$ -			
Annual Maintenance Labor	100%	$ 1,217,000	$ 1,217,000	O & M =	$ 1,217,000	
Annual Maintenance Non-Labor	100%	$ -	$ -			
Maintenance Replacement	100%	$ -	$ -			
Salvage Value	100%	$ -	$ -			
Manually Added Externality Costs	100%	$ 1,161,000	$ 1,161,000	Other =	$ 1,161,000	
Manually Added Externality Benefits	100%	$ -	$ -			
Risk Costs	100%	$ -	$ -	Risk Costs =	$ -	
TOTAL NPV		**$ 5,228,000**	**$ 5,228,000**			

Project Planning, Design, Construction and Other Construction Phase Costs Input

Cost Item	Unit Description	No. of Units	Unit Cost	Extended Cost	NPV	Comments/Notes
Planning Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees				$0	-	
Contingency				$0	-	
Total Planning				**$0**	**$0**	Labor Inflation Rate Used
Design Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees				$0	-	
Contingency				$0	-	
Total Design				**$0**	**$0**	Labor Inflation Rate Used
Construction						
Building/Structures						
Input:				$0	-	
Gravity Sewers						
Input:				$0	-	
Forcemains						
Input:				$0	-	
Process Piping						
Input:				$0	-	
Mechanical Equipment						
Input:				$0	-	
Electrical Equipment						
Input:				$0	-	
Instrumentation and Control Equipment						
Input:				$0	-	
Computer Hardware and Software						
Input:				$0	-	
Mobile Equipmment						
Input:				$0	-	
Cleaning and Rehab						
Input:	LS	1	$1,900,000	$1,900,000	-	Includes cleaning, rehabilitation of structures (including ARVs, CO, etc)
Well Abandonment and Relocation						
Input:	EACH	0	$50,000	$0	-	Includes well abandonment and assumes drilling of a new well that is 360 ft deep and in bedrock
Other - Useful Life Category 3						
Input:				$0	-	
Subtotal Bare Construction				**$1,900,000**	-	
Contingencies	Input %	Default %				
Undeveloped Design Details		30%		$570,000	-	Uses Default % unless Input % is supplied
Construction Contingency		20%		$380,000	-	Uses Default % unless Input % is supplied
Subtotal Contingencies				**$950,000**	-	
Total Construction Cost				**$2,850,000**	**$2,850,000**	
Other Construction Phase Costs	**Unit Description**	**No. of Units**	**Unit Cost**			
Consultant Fees				$0	**$0**	
MCES				$0	**$0**	
Outside Fees - User Defined				$0	**$0**	
Total Construction Phase Cost				**$2,850,000**	**$2,850,000**	

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 1: **Status Quo**

Annual Operating Costs Input						
Category	**Unit of Measure**	**Unit Cost**	**Annual Units**	**Annual Cost**	**NPV**	**Comments/Notes**
						Only annual costs are allowed under operating costs
Labor (Operations)	FTE	$ 140,000.00	-	$ -	-	Costs recurring other than annually can be included in the ad-hoc addition table or as a non-annual maintenance item.
Energy						
Natural Gas	MMBTU	$ -	-	$ -	-	Increases in annual cost can be input in the ad-hoc annual cost addition table
Electricity	KWHr	$ 0.10	-	$ -	-	
Fuel Oil	Gal	$ -	-	$ -	-	
Gasoline	Gal	$ -	-	$ -	-	
Diesel	Gal	$ 4.10	-	$ -	-	
Chemicals						
Polymer	lbs	$ -	-	$ -	-	
Chlorine	Tons	$ -	-	$ -	-	
SO2	Tons	$ -	-	$ -	-	
Boiler Feed Chemicals	LS	$ -	-	$ -	-	
Aqueous Nitrate Salt (BioxideTM)	Gal	$ -	-	$ -	-	
Ferric Chloride Solution	Gal	$ -	-	$ -	-	
Alum (Aluminum Sulfate Solution)	Gal	$ -	-	$ -	-	
Potassium Permanganate	Gal	$ -	-	$ -	-	
Sodium Bisulfite	Gal	$ -	-	$ -	-	
Sodium Hypochlorite	Gal	$ -	-	$ -	-	
Sodium Hydroxide	lbs	$ -	-	$ -	-	
Carbon	Ea	$ -	-	$ -	-	
End-Product Disposal						
Land Application of Alk. Stab. Product	Tons	$ -	-	$ -	-	
Ash Disposal	Tons	$ -	-	$ -	-	
Disposal of Grit	YD3	$ -	-	$ -	-	
Disposal of Screenings	YD3	$ -	-	$ -	-	
CKD (Cement Kiln Dust)	Tons	$ -	-	$ -	-	
Lime	Tons	$ -	-	$ -	-	
Other - Non Labor						
Testing	LS	$ -	-	$ -	-	
Vehicles	vehicle	$ -	-	$ -	-	
Other Non Labor UD1	each	$ -	-	$ -	-	
Other Non Labor UD2	each	$ -	-	$ -	-	
Other Non Labor UD3	each	$ -	-	$ -	-	
Other - Labor						
Security	FTE	$ -	-	$ -	-	
Other Labor UD1	FTE	$ -	-	$ -	-	
Other Labor UD2	FTE	$ -	-	$ -	-	
Other Labor UD3	FTE	$ -	-	$ -	-	
Subtotal Operating Costs				**$ -**	-	
Administrative Overhead at 0 %				$ -	-	Treated as labor
Subtotal Labor Operating Costs				$ -	$ -	
Subtotal Non-Labor Operating Costs - Electricity				$ -	$ -	
Subtotal Non-Labor Operating Costs - Other				$ -	$ -	
Total Operating Costs				**$ -**	**$ -**	

Annual Maintenance Costs Input						
				Annual Cost	**NPV**	**Comments/Notes**
Annual Labor Maintenance Costs		FTE Cost:	FTE amount:			
Annual Labor Maintenance Costs		$ 149,000.00	0.20	$ 29,800	-	Assumes 8 hrs/week
Labor at 0% of Total Equip Cost		Total Equip Cost:	Applied %:			
☑ Check to include		$0	0.00%	$ -	-	Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details and Contrustruction contingencies
Annual Non-Labor Maintenance Costs		Total Equip Cost:	Applied %:			
Materials at 0% of Total Equip Cost		$0	0.00%	$ -		
☑ Check to include						Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details
Other Non-Labor Costs:	**Unit**	**Unit Cost**	**Annual Units**			and Contrustruction contingencies
Other Non-Labor UD1	each	$ -	-	$ -	-	
Other Non-Labor UD2	each	$ -	-	$ -	-	
Other Non-Labor UD3	each	$ -	-	$ -	-	
Other Non-Labor UD4	each	$ -	-	$ -	-	
Other Non-Labor UD5	each	$ -	-	$ -	-	
Other Non-Labor UD6	each	$ -	-	$ -	-	
Subtotal Annual Maintenance Costs				$ 29,800	-	
Administrative Overhead at 0 %				$ -	-	Treated as Labor
Subtotal Annual Labor Maintenance Costs				$ 29,800	$ 1,217,000	
Subtotal Annual Non-Labor Maintenance Costs				$ -	$ -	
Total Annual Maintenance Costs				**$ 29,800**	**$ 1,217,000**	

Major Cyclic Maintenance Replacement Costs and Salvage Values - Calculation and Input Selection to Include									
	Cyclic Replacement Costs						Salvage Value		
Project Componet Type	**Include (Y/N) Replacement Cost?**	**Useful Life (yr)**	**Replacement Cost Factor**	**Replacement Cost in Base Year $'s**	**Number of Replacements (Integer)**	**NPV of All Replacements**	**Include (Y/N) Salvage Value?**	**NPV of Salvage Value**	**Comments/Notes**
Building/Structures	Y	40	1.00	$ -	0	$ -	Y	$ -	Replacement cost factor will be 1 if there is no replacement over period and salvage value has to be based on initial construction
Gravity Sewers	Y	80	1.00	$ -	0	$ -	Y	$ -	
Forcemains	Y	40	1.00	$ -	0	$ -	Y	$ -	
Process Piping	Y	30	1.25	$ -	1	$ -	Y	$ -	
Mechanical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	Construction inflation rate used for inflation of all replacement costs and salvage values
Electrical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	
Instrumentation and Control Equipment	Y	15	1.25	$ -	2	$ -	Y	$ -	
Computer Hardware and Software	Y	4	1.25	$ -	9	$ -	Y	$ -	
Mobile Equipmment	Y	10	1.00	$ -	3	$ -	Y	$ -	
Cleaning and Rehab	N	10	0.50	$ 1,425,000	3	$ -	N	$ -	
Well Abandonment and Relocation	N	50	0.00	$ -	0	$ -	N	$ -	
Other - Useful Life Category 3	Y	1	0.00	$ -	37	$ -	Y	$ -	
Totals						**$ -**		**$ -**	

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 1: **Status Quo**

TABLE FOR MANUAL INPUT OF EXTERNALITY AND OTHER COSTS AND BENEFITS - YEAR BY YEAR

	Year	Costs					Benefits		
		Input Amounts (Base Year $'s)				NPV	Input Benefit (Base Year $'s)	NPV	Comments/Notes
Year Index		Labor Costs	Electricity Costs	Non-Labor Costs - Other	Construction Costs				
1	2026					$ -		$ -	
2	2027					$ -		$ -	
3	2028					$ -		$ -	
4	2029					$ -		$ -	
5	2030					$ -		$ -	
6	2031					$ -		$ -	
7	2032					$ -		$ -	
8	2033					$ -		$ -	
9	2034					$ -		$ -	
10	2035					$ -		$ -	
11	2036					$ -		$ -	
12	2037					$ -		$ -	
13	2038		$ 387,000			$ 387,000		$ -	Costs for pipe cleaning of 14315 LF of DIP every 10 years
14	2039					$ -		$ -	
15	2040					$ -		$ -	
16	2041					$ -		$ -	
17	2042					$ -		$ -	
18	2043					$ -		$ -	
19	2044					$ -		$ -	
20	2045					$ -		$ -	
21	2046					$ -		$ -	
22	2047					$ -		$ -	
23	2048					$ -		$ -	
24	2049		$ 387,000			$ 387,000		$ -	Costs for pipe cleaning of 14315 LF of DIP every 10 years
25	2050					$ -		$ -	
26	2051					$ -		$ -	
27	2052					$ -		$ -	
28	2053					$ -		$ -	
29	2054					$ -		$ -	
30	2055					$ -		$ -	
31	2056					$ -		$ -	
32	2057					$ -		$ -	
33	2058					$ -		$ -	
34	2059					$ -		$ -	
35	2060		$ 387,000			$ 387,000		$ -	Costs for pipe cleaning of 14315 LF of DIP every 10 years
36	2061					$ -		$ -	
37	2062					$ -		$ -	
38	2063					$ -		$ -	
39	2064					$ -		$ -	
40						$ -		$ -	
41						$ -		$ -	
42						$ -		$ -	
43						$ -		$ -	
44						$ -		$ -	
45						$ -		$ -	
46						$ -		$ -	
47						$ -		$ -	
48						$ -		$ -	
49						$ -		$ -	
50						$ -		$ -	
51						$ -		$ -	
52						$ -		$ -	
53						$ -		$ -	
54						$ -		$ -	

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 2: One New Forcemain

New Project/Improvement Time Line Input		Comments/Notes
Year of Planning Phase Expenditure	2024	
Year of Design Phase Expenditure	2026	
Year of Major Construction Cost	2027	
First Year of Operation	2028	

Summary of Alternative Results and Input of Sensitivity Adjustments						Comments/Notes
NPV Contributions:	Sensitivity Adjustment	NPV without Sensitivity Adjustment	NPV with Sensitivity Adjustment			
Planning	100%	$ -	$ -	Capital =	$ 23,228,000	
Design	100%	$ 233,000	$ 233,000			
Construction Phase	100%	$ 22,995,000	$ 22,995,000			
Annual Operating Labor	100%	$ -	$ -	O & M =	$ 609,000	
Annual Operating Electricity	100%	$ -	$ -			
Annual Operating Non-Labor Other	100%	$ -	$ -			
Annual Maintenance Labor	100%	$ 609,000	$ 609,000			
Annual Maintenance Non-Labor	100%	$ -	$ -			
Maintenance Replacement	100%	$ -	$ -			
Salvage Value	100%	$ -	$ -	Other =	$ 1,902,000	
Manually Added Externality Costs	100%	$ 1,902,000	$ 1,902,000			
Manually Added Externality Benefits	100%	$ -	$ -			
Risk Costs	100%	$ -	$ -	Risk Costs =	$ -	
TOTAL NPV		$ 25,739,000	$ 25,739,000			

Project Planning, Design, Construction and Other Construction Phase Costs Input						
Cost Item	Unit Description	No. of Units	Unit Cost	Extended Cost	NPV	Comments/Notes
Planning Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees				$0	-	
Contingency				$0	-	
Total Planning				$0	$0	Labor Inflation Rate Used
Design Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees	LS	1	$233,000	$233,000	-	Easement aquisition
Contingency				$0	-	
Total Design				$233,000	$233,000	Labor Inflation Rate Used
Construction						
Building/Structures						
Input:				$0	-	
Gravity Sewers						
Input:				$0	-	
Forcemains						
Input:	LS	1	$15,330,000	$15,330,000	-	Includes installation of new FM and structures. Assumes 10 structures (ARVs, CO) and 2 interconnect strutures. Inclusive of cleaning, rehabilitation, mobilization, allowances, and misc. items.
Process Piping						
Input:				$0	-	
Mechanical Equipment						
Input:				$0	-	
Electrical Equipment						
Input:				$0	-	
Instrumentation and Control Equipment						
Input:				$0	-	
Computer Hardware and Software						
Input:				$0	-	
Mobile Equipmment						
Input:				$0	-	
Well Abandonment and Relocation						
Input:	EACH	0	$60,000	$0	-	Includes well abandonment and assumes drilling of a new well that is 360 ft deep and in bedrock
Other - Useful Life Category 2						
Input:				$0	-	
Other - Useful Life Category 3						
Input:				$0	-	
Subtotal Bare Construction				$15,330,000	-	
Contingencies	Input %	Default %				
Undeveloped Design Details		30%		$4,599,000	-	Uses Default % unless Input % is supplied
Construction Contingency		20%		$3,066,000	-	Uses Default % unless Input % is supplied
Subtotal Contingencies				$7,665,000	-	
Total Construction Cost				$22,995,000	$22,995,000	
Other Construction Phase Costs	Unit Description	No. of Units	Unit Cost			
Consultant Fees				$0	$0	
MCES				$0	$0	
Outside Fees - User Defined				$0	$0	
Total Construction Phase Cost				$22,995,000	$22,995,000	

Project name MCES Interceptor 8253-327 Improvements Phase 2

Alternative 2: **One New Forcemain**

Annual Operating Costs Input						
Category	Unit of Measure	Unit Cost	Annual Units	Annual Cost	NPV	Comments/Notes
						Only annual costs are allowed under operating costs
Labor (Operations)	FTE	$ 140,000.00	-	$ -	-	Costs recurring other than annually can be included in the ad-hoc addition table or as
Energy						a non-annual maintenance item.
Natural Gas	MMBTU	$ -	-	$ -	-	Increases in annual cost can be input in the ad-hoc annual cost addition table
Electricity	KWHr	$ 0.10	-	$ -	-	
Fuel Oil	Gal	$ -	-	$ -	-	
Gasoline	Gal	$ -	-	$ -	-	
Diesel	Gal	$ 4.10	-	$ -	-	
Chemicals						
Polymer	lbs	$ -	-	$ -	-	
Chlorine	Tons	$ -	-	$ -	-	
SO2	Tons	$ -	-	$ -	-	
Boiler Feed Chemicals	LS	$ -	-	$ -	-	
Aqueous Nitrate Salt (BioxideTM)	Gal	$ -	-	$ -	-	
Ferric Chloride Solution	Gal	$ -	-	$ -	-	
Alum (Aluminum Sulfate Solution)	Gal	$ -	-	$ -	-	
Potassium Permanganate	Gal	$ -	-	$ -	-	
Sodium Bisulfite	Gal	$ -	-	$ -	-	
Sodium Hypochlorite	Gal	$ -	-	$ -	-	
Sodium Hydroxide	lbs	$ -	-	$ -	-	
Carbon	Ea	$ -	-	$ -	-	
End-Product Disposal						
Land Application of Alk. Stab. Product	Tons	$ -	-	$ -	-	
Ash Disposal	Tons	$ -	-	$ -	-	
Disposal of Grit	YD3	$ -	-	$ -	-	
Disposal of Screenings	YD3	$ -	-	$ -	-	
CKD (Cement Kiln Dust)	Tons	$ -	-	$ -	-	
Lime	Tons	$ -	-	$ -	-	
Other - Non Labor						
Testing	LS	$ -	-	$ -	-	
Vehicles	vehicle	$ -	-	$ -	-	
Other Non Labor UD1	each	$ -	-	$ -	-	
Other Non Labor UD2	each	$ -	-	$ -	-	
Other Non Labor UD3	each	$ -	-	$ -	-	
Other - Labor						
Security	FTE	$ -	-	$ -	-	
Other Labor UD1	FTE	$ -	-	$ -	-	
Other Labor UD2	FTE	$ -	-	$ -	-	
Other Labor UD3	FTE	$ -	-	$ -	-	
Subtotal Operating Costs				$ -	-	
Administrative Overhead at 0 %				$ -	-	Treated as labor
Subtotal Labor Operating Costs				$ -	$ -	
Subtotal Non-Labor Operating Costs - Electricity				$ -	$ -	
Subtotal Non-Labor Operating Costs - Other				$ -	$ -	
Total Operating Costs				**$ -**	**$ -**	

Annual Maintenance Costs Input						
				Annual Cost	NPV	Comments/Notes
Annual Labor Maintenance Costs		FTE Cost:	FTE amount:			
Annual Labor Maintenance Costs		$ 149,000.00	0.10	$ 14,900	-	Assumes 4 hrs/week
Labor at 0% of Total Equip Cost		Total Equip Cost:	Applied %:			
☑ Check to include		$0	0.00%	$ -	-	Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details and Contrustruction contingencies
Annual Non-Labor Maintenance Costs		Total Equip Cost:	Applied %:			
Materials at 0% of Total Equip Cost		$0	0.00%	$ -		
☑ Check to include						Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details
Other Non-Labor Costs:	Unit	Unit Cost	Annual Units			and Contrustruction contingencies
Other Non-Labor UD1	each	$ -	-	$ -	-	
Other Non-Labor UD2	each	$ -	-	$ -	-	
Other Non-Labor UD3	each	$ -	-	$ -	-	
Other Non-Labor UD4	each	$ -	-	$ -	-	
Other Non-Labor UD5	each	$ -	-	$ -	-	
Other Non-Labor UD6	each	$ -	-	$ -	-	
Subtotal Annual Maintenance Costs				$ 14,900	-	
Administrative Overhead at 0 %				$ -	-	Treated as Labor
Subtotal Annual Labor Maintenance Costs				$ 14,900	$ 609,000	
Subtotal Annual Non-Labor Maintenance Costs				$ -	$ -	
Total Annual Maintenance Costs				**$ 14,900**	**$ 609,000**	

Major Cyclic Maintenance Replacement Costs and Salvage Values - Calculation and Input Selection to Include									
	Cyclic Replacement Costs						Salvage Value		
Project Componet Type	Include (Y/N) Replacement Cost?	Useful Life (yr)	Replacement Cost Factor	Replacement Cost in Base Year $'s	Number of Replacements (Integer)	NPV of All Replacements	Include (Y/N) Salvage Value?	NPV of Salvage Value	Comments/Notes
Building/Structures	Y	40	1.00	$ -	0	$ -	Y	$ -	Replacement cost factor will be 1 if there is no
Gravity Sewers	Y	80	1.00	$ -	0	$ -	Y	$ -	replacement over period and salvage value has to
Forcemains	Y	40	1.00	$ 22,995,000	0	$ -	N	$ -	be based on initial construction
Process Piping	Y	30	1.25	$ -	1	$ -	Y	$ -	
Mechanical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	Construction inflation rate used for inflation of all
Electrical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	replacement costs and salvage values
Instrumentation and Control Equipment	Y	15	1.25	$ -	2	$ -	Y	$ -	
Computer Hardware and Software	Y	4	1.25	$ -	9	$ -	Y	$ -	
Mobile Equipmment	Y	10	1.00	$ -	3	$ -	Y	$ -	
Well Abandonment and Relocation	N	50	1.00	$ -	0	$ -	N	$ -	
Other - Useful Life Category 2	Y	1	0.00	$ -	37	$ -	Y	$ -	
Other - Useful Life Category 3	Y	1	0.00	$ -	37	$ -	Y	$ -	
Totals						**$ -**		**$ -**	

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 2: **One New Forcemain**

TABLE FOR MANUAL INPUT OF EXTERNALITY AND OTHER COSTS AND BENEFITS - YEAR BY YEAR

Year Index	Year	Costs - Input Amounts (Base Year $'s) - Labor Costs	Electricity Costs	Non-Labor Costs - Other	Construction Costs	NPV	Benefits - Input Benefit (Base Year $'s)	NPV	Comments/Notes
1	2026					$ -		$ -	
2	2027					$ -		$ -	
3	2028					$ -		$ -	
4	2029					$ -		$ -	
5	2030					$ -		$ -	
6	2031					$ -		$ -	
7	2032					$ -		$ -	
8	2033					$ -		$ -	
9	2034					$ -		$ -	
10	2035					$ -		$ -	
11	2036					$ -		$ -	
12	2037					$ -		$ -	
13	2038		$ 387,000		$ 247,000	$ 634,000		$ -	Costs for pipe cleaning of 14315 LF of DIP AND 13700 LF of PVC every 10 years
14	2039					$ -		$ -	
15	2040					$ -		$ -	
16	2041					$ -		$ -	
17	2042					$ -		$ -	
18	2043					$ -		$ -	
19	2044					$ -		$ -	
20	2045					$ -		$ -	
21	2046					$ -		$ -	
22	2047					$ -		$ -	
23	2048					$ -		$ -	
24	2049		$ 387,000		$ 247,000	$ 634,000		$ -	Costs for pipe cleaning of 14315 LF of DIP AND 13700 LF of PVC every 10 years
25	2050					$ -		$ -	
26	2051					$ -		$ -	
27	2052					$ -		$ -	
28	2053					$ -		$ -	
29	2054					$ -		$ -	
30	2055					$ -		$ -	
31	2056					$ -		$ -	
32	2057					$ -		$ -	
33	2058					$ -		$ -	
34	2059					$ -		$ -	
35	2060		$ 387,000		$ 247,000	$ 634,000		$ -	Costs for pipe cleaning of 14315 LF of DIP AND 13700 LF of PVC every 10 years
36	2061					$ -		$ -	
37	2062					$ -		$ -	
38	2063					$ -		$ -	
39	2064					$ -		$ -	
40						$ -		$ -	
41						$ -		$ -	
42						$ -		$ -	
43						$ -		$ -	
44						$ -		$ -	
45						$ -		$ -	
46						$ -		$ -	
47						$ -		$ -	
48						$ -		$ -	
49						$ -		$ -	
50						$ -		$ -	
51						$ -		$ -	
52						$ -		$ -	
53						$ -		$ -	

Project name — **MCES Interceptor 8253-327 Improvements Phase 2**

Alternative 3: **One New Forcemain on Existing 7017 Alignment**

New Project/Improvement Time Line Input		Comments/Notes
Year of Planning Phase Expenditure	2024	
Year of Design Phase Expenditure	2026	
Year of Major Construction Cost	2027	
First Year of Operation	2028	

Summary of Alternative Results and Input of Sensitivity Adjustments

NPV Contributions:	Sensitivity Adjustment	NPV without Sensitivity Adjustment	NPV with Sensitivity Adjustment			Comments/Notes
Planning	100%	$ -	$ -			
Design	100%	$ 173,000	$ 173,000	Capital =	$ 25,810,000	
Construction Phase	100%	$ 25,637,000	$ 25,637,000			
Annual Operating Labor	100%	$ -	$ -			
Annual Operating Electricity	100%	$ -	$ -			
Annual Operating Non-Labor Other	100%	$ -	$ -			
Annual Maintenance Labor	100%	$ 609,000	$ 609,000	O & M =	$ 609,000	
Annual Maintenance Non-Labor	100%	$ -	$ -			
Maintenance Replacement	100%	$ -	$ -			
Salvage Value	100%	$ -	$ -			
Manually Added Externality Costs	100%	$ 1,890,000	$ 1,890,000	Other =	$ 1,890,000	
Manually Added Externality Benefits	100%	$ -	$ -			
Risk Costs	100%	$ -	$ -	Risk Costs =	$ -	
TOTAL NPV		**$ 28,309,000**	**$ 28,309,000**			

Project Planning, Design, Construction and Other Construction Phase Costs Input

Cost Item	Unit Description	No. of Units	Unit Cost	Extended Cost	NPV	Comments/Notes
Planning Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees				$0	-	
Contingency				$0	-	
Total Planning				**$0**	**$0**	Labor Inflation Rate Used
Design Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees	LS	1	$173,000	$173,000	-	Easement acquisition
Contingency				$0	-	
Total Design				**$173,000**	**$173,000**	Labor Inflation Rate Used
Construction						
Building/Structures						
Input:				$0	-	
Gravity Sewers						
Input:	LS	1	$1,498,000	$1,498,000	-	Includes removal (where necessary) and installation of new FM and structures. Assumes 10 structures (ARVs, CO) and 2 interco Inclusive of cleaning, rehabilitation, mobilization, allowances, and misc. items.
Forcemains						
Input:	LS	1	$15,493,000	$15,493,000	-	Includes installation of new FM and structures. Assumes 10 structures (ARVs, CO) and 2 interconnect strutures. Inclusive of cleaning, rehabilitation, mobilization, allowances, and misc. items.
Process Piping						
Input:				$0	-	
Mechanical Equipment						
Input:				$0	-	
Electrical Equipment						
Input:				$0	-	
Instrumentation and Control Equipment						
Input:				$0	-	
Computer Hardware and Software						
Input:				$0	-	
Mobile Equipmment						
Input:				$0	-	
Gravity Service Cutovers						
Input:	LS	1	$100,000	$100,000	-	
Well Abandonment and Relocation						
Input:	EACH	0	$50,000	$0	-	Includes well abandonment and assumes drilling of a new well that is 360 ft deep and in bedrock
Other - Useful Life Category 3						
Input:				$0	-	
Subtotal Bare Construction				**$17,091,000**	-	
Contingencies	Input %	Default %				
Undeveloped Design Details		30%		$5,127,300	-	Uses Default % unless Input % is supplied
Construction Contingency		20%		$3,418,200	-	Uses Default % unless Input % is supplied
Subtotal Contingencies				**$8,545,500**	-	
Total Construction Cost				**$25,637,000**	**$25,637,000**	Rounded up to the nearest thousand $
Other Construction Phase Costs	**Unit Description**	**No. of Units**	**Unit Cost**			
Consultant Fees				$0	**$0**	
MCES				$0	**$0**	
Outside Fees - User Defined				$0	**$0**	
Total Construction Phase Cost				**$25,637,000**	**$25,637,000**	

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 3: **One New Forcemain on Existing 7017 Alignment**

Annual Operating Costs Input

Category	Unit of Measure	Unit Cost	Annual Units	Annual Cost	NPV	Comments/Notes
						Only annual costs are allowed under operating costs
Labor (Operations)	FTE	$ 140,000.00	-	$ -	-	Costs recurring other than annually can be included in the ad-hoc addition table or as a non-annual maintenance item.
Energy						
Natural Gas	MMBTU	$ -	-	$ -	-	Increases in annual cost can be input in the ad-hoc annual cost addition table
Electricity	KWHr	$ 0.10	-	$ -	-	
Fuel Oil	Gal	$ -	-	$ -	-	
Gasoline	Gal	$ -	-	$ -	-	
Diesel	Gal	$ 4.10	-	$ -	-	
Chemicals						
Polymer	lbs	$ -	-	$ -	-	
Chlorine	Tons	$ -	-	$ -	-	
SO2	Tons	$ -	-	$ -	-	
Boiler Feed Chemicals	LS	$ -	-	$ -	-	
Aqueous Nitrate Salt (BioxideTM)	Gal	$ -	-	$ -	-	
Ferric Chloride Solution	Gal	$ -	-	$ -	-	
Alum (Aluminum Sulfate Solution)	Gal	$ -	-	$ -	-	
Potassium Permanganate	Gal	$ -	-	$ -	-	
Sodium Bisulfite	Gal	$ -	-	$ -	-	
Sodium Hypochlorite	Gal	$ -	-	$ -	-	
Sodium Hydroxide	lbs	$ -	-	$ -	-	
Carbon	Ea	$ -	-	$ -	-	
End-Product Disposal						
Land Application of Alk. Stab. Product	Tons	$ -	-	$ -	-	
Ash Disposal	Tons	$ -	-	$ -	-	
Disposal of Grit	YD3	$ -	-	$ -	-	
Disposal of Screenings	YD3	$ -	-	$ -	-	
CKD (Cement Kiln Dust)	Tons	$ -	-	$ -	-	
Lime	Tons	$ -	-	$ -	-	
Other - Non Labor						
Testing	LS	$ -	-	$ -	-	
Vehicles	vehicle	$ -	-	$ -	-	
Other Non Labor UD1	each	$ -	-	$ -	-	
Other Non Labor UD2	each	$ -	-	$ -	-	
Other Non Labor UD3	each	$ -	-	$ -	-	
Other - Labor						
Security	FTE	$ -	-	$ -	-	
Other Labor UD1	FTE	$ -	-	$ -	-	
Other Labor UD2	FTE	$ -	-	$ -	-	
Other Labor UD3	FTE	$ -	-	$ -	-	
Subtotal Operating Costs				$ -	-	
Administrative Overhead at 0 %				$ -	-	Treated as labor
Subtotal Labor Operating Costs				$ -	$ -	
Subtotal Non-Labor Operating Costs - Electricity				$ -	$ -	
Subtotal Non-Labor Operating Costs - Other				$ -	$ -	
Total Operating Costs				**$ -**	**$ -**	

Annual Maintenance Costs Input

				Annual Cost	NPV	Comments/Notes
Annual Labor Maintenance Costs		FTE Cost:	FTE amount:			
Annual Labor Maintenance Costs		$ 149,000.00	0.10	$ 14,900	-	Assumes 4 hrs/week
Labor at 0% of Total Equip Cost		Total Equip Cost:	Applied %:			
☑ Check to include		$0	0.00%	$ -	-	Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details and Contrustruction contingencies
Annual Non-Labor Maintenance Costs		Total Equip Cost:	Applied %:			
Materials at 0% of Total Equip Cost		$0	0.00%	$ -		Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details
☑ Check to include	Unit	Unit Cost	Annual Units			and Contrustruction contingencies
Other Non-Labor Costs:						
Other Non-Labor UD1	each	$ -	-	$ -	-	
Other Non-Labor UD2	each	$ -	-	$ -	-	
Other Non-Labor UD3	each	$ -	-	$ -	-	
Other Non-Labor UD4	each	$ -	-	$ -	-	
Other Non-Labor UD5	each	$ -	-	$ -	-	
Other Non-Labor UD6	each	$ -	-	$ -	-	
Subtotal Annual Maintenance Costs				$ 14,900	-	
Administrative Overhead at 0 %				$ -	-	Treated as Labor
Subtotal Annual Labor Maintenance Costs				$ 14,900	$ 609,000	
Subtotal Annual Non-Labor Maintenance Costs				$ -	$ -	
Total Annual Maintenance Costs				**$ 14,900**	**$ 609,000**	

Major Cyclic Maintenance Replacement Costs and Salvage Values - Calculation and Input Selection to Include

	Cyclic Replacement Costs						Salvage Value		
Project Componet Type	**Include (Y/N) Replacement Cost?**	**Useful Life (yr)**	**Replacement Cost Factor**	**Replacement Cost in Base Year $'s**	**Number of Replacements (Integer)**	**NPV of All Replacements**	**Include (Y/N) Salvage Value?**	**NPV of Salvage Value**	**Comments/Notes**
Building/Structures	Y	40	1.00	$ -	0	$ -	Y	$ -	Replacement cost factor will be 1 if there is no
Gravity Sewers	Y	80	1.00	$ 2,247,000	0	$ -	N	$ -	replacement over period and salvage value has to
Forcemains	Y	40	1.00	$ 23,239,500	0	$ -	N	$ -	be based on initial construction
Process Piping	Y	30	1.25	$ -	1	$ -	Y	$ -	
Mechanical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	Construction inflation rate used for inflation of all
Electrical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	replacement costs and salvage values
Instrumentation and Control Equipment	Y	15	1.25	$ -	2	$ -	Y	$ -	
Computer Hardware and Software	Y	4	1.25	$ -	9	$ -	Y	$ -	
Mobile Equipmment	Y	10	1.00	$ -	3	$ -	Y	$ -	
Gravity Service Cutovers	N	1	0.00	$ -	37	$ -	N	$ -	
Well Abandonment and Relocation	N	50	0.00	$ -	0	$ -	N	$ -	
Other - Useful Life Category 3	Y	1	0.00	$ -	37	$ -	Y	$ -	
Totals						**$ -**		**$ -**	

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 3: **One New Forcemain on Existing 7017 Alignment**

TABLE FOR MANUAL INPUT OF EXTERNALITY AND OTHER COSTS AND BENEFITS - YEAR BY YEAR

Year Index	Year	Costs: Input Amounts (Base Year $'s) Labor Costs	Electricity Costs	Non-Labor Costs - Other	Construction Costs	NPV	Benefits: Input Benefit (Base Year $'s)	NPV	Comments/Notes
1	2026					$ -		$ -	
2	2027					$ -		$ -	
3	2028					$ -		$ -	
4	2029					$ -		$ -	
5	2030					$ -		$ -	
6	2031					$ -		$ -	
7	2032					$ -		$ -	
8	2033					$ -		$ -	
9	2034					$ -		$ -	
10	2035					$ -		$ -	
11	2036					$ -		$ -	
12	2037					$ -		$ -	
13	2038		$ 387,000		$ 243,000	$ 630,000		$ -	Costs for pipe cleaning of 14315 LF of DIP AND 13500 LF of PVC every 10 years
14	2039					$ -		$ -	
15	2040					$ -		$ -	
16	2041					$ -		$ -	
17	2042					$ -		$ -	
18	2043					$ -		$ -	
19	2044					$ -		$ -	
20	2045					$ -		$ -	
21	2046					$ -		$ -	
22	2047					$ -		$ -	
23	2048					$ -		$ -	
24	2049		$ 387,000		$ 243,000	$ 630,000		$ -	Costs for pipe cleaning of 14315 LF of DIP AND 13500 LF of PVC every 10 years
25	2050					$ -		$ -	
26	2051					$ -		$ -	
27	2052					$ -		$ -	
28	2053					$ -		$ -	
29	2054					$ -		$ -	
30	2055					$ -		$ -	
31	2056					$ -		$ -	
32	2057					$ -		$ -	
33	2058					$ -		$ -	
34	2059					$ -		$ -	
35	2060		$ 387,000		$ 243,000	$ 630,000		$ -	Costs for pipe cleaning of 14315 LF of DIP AND 13500 LF of PVC every 10 years
36	2061					$ -		$ -	
37	2062					$ -		$ -	
38	2063					$ -		$ -	
39	2064					$ -		$ -	
40						$ -		$ -	
41						$ -		$ -	
42						$ -		$ -	
43						$ -		$ -	
44						$ -		$ -	
45						$ -		$ -	
46						$ -		$ -	
47						$ -		$ -	
48						$ -		$ -	
49						$ -		$ -	
50						$ -		$ -	
51						$ -		$ -	
52						$ -		$ -	
53						$ -		$ -	
54						$ -		$ -	
55						$ -		$ -	
56						$ -		$ -	
57						$ -		$ -	
58						$ -		$ -	
59						$ -		$ -	
60						$ -		$ -	
61						$ -		$ -	
62						$ -		$ -	
63						$ -		$ -	
64						$ -		$ -	

Project name **MCES Interceptor 8253-327 Improvements Phase 2**

Alternative 4: **Two New Forcemains on Existing 8253 Alignment**

New Project/Improvement Time Line Input		Comments/Notes
Year of Planning Phase Expenditure	2024	
Year of Design Phase Expenditure	2026	
Year of Major Construction Cost	2027	
First Year of Operation	2028	

Summary of Alternative Results and Input of Sensitivity Adjustments

NPV Contributions:	Sensitivity Adjustment	NPV without Sensitivity Adjustment	NPV with Sensitivity Adjustment			Comments/Notes
Planning	100%	$ -	$ -			
Design	100%	$ 283,000	$ 283,000	Capital =	$ 34,140,000	
Construction Phase	100%	$ 33,857,000	$ 33,857,000			
Annual Operating Labor	100%	$ -	$ -			
Annual Operating Electricity	100%	$ -	$ -			
Annual Operating Non-Labor Other	100%	$ -	$ -			
Annual Maintenance Labor	100%	$ 305,000	$ 305,000	O & M =	$ 305,000	
Annual Maintenance Non-Labor	100%	$ -	$ -			
Maintenance Replacement	100%	$ -	$ -			
Salvage Value	100%	$ -	$ -			
Manually Added Externality Costs	100%	$ 1,467,000	$ 1,467,000	Other =	$ 1,467,000	
Manually Added Externality Benefits	100%	$ -	$ -			
Risk Costs	100%	$ -	$ -	Risk Costs =	$ -	
TOTAL NPV		**$ 35,912,000**	**$ 35,912,000**			

Project Planning, Design, Construction and Other Construction Phase Costs Input

Cost Item	Unit Description	No. of Units	Unit Cost	Extended Cost	NPV	Comments/Notes
Planning Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees				$0	-	
Contingency				$0	-	
Total Planning				**$0**	**$0**	Labor Inflation Rate Used
Design Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees	LS	1	$283,000	$283,000	-	Easement acquisition
Contingency				$0	-	
Total Design				**$283,000**	**$283,000**	Labor Inflation Rate Used
Construction						
Building/Structures						
Input:				$0	-	
Gravity Sewers						
Input:				$0	-	
Forcemains						
Input:	LS	1	$22,271,000	$22,271,000	-	Includes removal (where necessary) and installation of new FM and structures. Assumes 10 structures (ARVs, CO) a Inclusive of mobilization, allowances, and misc items (20% of total)
Process Piping						
Input:				$0	-	
Mechanical Equipment						
Input:				$0	-	
Electrical Equipment						
Input:				$0	-	
Instrumentation and Control Equipment						
Input:				$0	-	
Computer Hardware and Software						
Input:				$0	-	
Mobile Equipmment						
Input:				$0	-	
Temporary Conveyance of Wastewater						
Input:	LS	1	$250,000	$250,000	-	
Well Abandonment and Relocation						
Input:	EACH	1	$50,000	$50,000	-	Includes well abandonment and assumes drilling of a new well that is 360 ft deep and in bedrock
Other - Useful Life Category 3						
Input:				$0	-	
Subtotal Bare Construction				**$22,571,000**	-	
Contingencies	Input %	Default %				
Undeveloped Design Details		30%		$6,771,300	-	Uses Default % unless Input % is supplied
Construction Contingency		20%		$4,514,200	-	Uses Default % unless Input % is supplied
Subtotal Contingencies				**$11,285,500**	-	
Total Construction Cost				**$33,857,000**	**$33,857,000**	Rounded up to the nearest thousand $
Other Construction Phase Costs	Unit Description	No. of Units	Unit Cost			
Consultant Fees				$0	**$0**	
MCES				$0	**$0**	
Outside Fees - User Defined				$0	**$0**	
Total Construction Phase Cost				**$33,857,000**	**$33,857,000**	

Project name MCES Interceptor 8253-327 Improvements Phase 2

Alternative 4: **Two New Forcemains on Existing 8253 Alignment**

Annual Operating Costs Input

Category	Unit of Measure	Unit Cost	Annual Units	Annual Cost	NPV	Comments/Notes
						Only annual costs are allowed under operating costs
Labor (Operations)	FTE	$ 140,000.00	-	$ -	-	Costs recurring other than annually can be included in the ad-hoc addition table or as
Energy						a non-annual maintenance item.
Natural Gas	MMBTU	$ -	-	$ -	-	Increases in annual cost can be input in the ad-hoc annual cost addition table
Electricity	KWHr	$ 0.10	-	$ -	-	
Fuel Oil	Gal	$ -	-	$ -	-	
Gasoline	Gal	$ -	-	$ -	-	
Diesel	Gal	$ 4.10	-	$ -	-	
Chemicals						
Polymer	lbs	$ -	-	$ -	-	
Chlorine	Tons	$ -	-	$ -	-	
SO2	Tons	$ -	-	$ -	-	
Boiler Feed Chemicals	LS	$ -	-	$ -	-	
Aqueous Nitrate Salt (BioxideTM)	Gal	$ -	-	$ -	-	
Ferric Chloride Solution	Gal	$ -	-	$ -	-	
Alum (Aluminum Sulfate Solution)	Gal	$ -	-	$ -	-	
Potassium Permanganate	Gal	$ -	-	$ -	-	
Sodium Bisulfite	Gal	$ -	-	$ -	-	
Sodium Hypochlorite	Gal	$ -	-	$ -	-	
Sodium Hydroxide	lbs	$ -	-	$ -	-	
Carbon	Ea	$ -	-	$ -	-	
End-Product Disposal						
Land Application of Alk. Stab. Product	Tons	$ -	-	$ -	-	
Ash Disposal	Tons	$ -	-	$ -	-	
Disposal of Grit	YD3	$ -	-	$ -	-	
Disposal of Screenings	YD3	$ -	-	$ -	-	
CKD (Cement Kiln Dust)	Tons	$ -	-	$ -	-	
Lime	Tons	$ -	-	$ -	-	
Other - Non Labor						
Testing	LS	$ -	-	$ -	-	
Vehicles	vehicle	$ -	-	$ -	-	
Other Non Labor UD1	each	$ -	-	$ -	-	
Other Non Labor UD2	each	$ -	-	$ -	-	
Other Non Labor UD3	each	$ -	-	$ -	-	
Other - Labor						
Security	FTE	$ -	-	$ -	-	
Other Labor UD1	FTE	$ -	-	$ -	-	
Other Labor UD2	FTE	$ -	-	$ -	-	
Other Labor UD3	FTE	$ -	-	$ -	-	
Subtotal Operating Costs				$ -	-	
Administrative Overhead at 0 %				$ -	-	Treated as labor
Subtotal Labor Operating Costs				$ -	$ -	
Subtotal Non-Labor Operating Costs - Electricity				$ -	$ -	
Subtotal Non-Labor Operating Costs - Other				$ -	$ -	
Total Operating Costs				**$ -**	**$ -**	

Annual Maintenance Costs Input

				Annual Cost	NPV	Comments/Notes
Annual Labor Maintenance Costs		FTE Cost:	FTE amount:			
Annual Labor Maintenance Costs		$ 149,000.00	0.05	$ 7,450	-	Assumes 2 hrs/week
Labor at 0% of Total Equip Cost		Total Equip Cost:	Applied %:			
☑ Check to include		$0	0.00%	$ -	-	Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details and Contrustruction contingencies
Annual Non-Labor Maintenance Costs		Total Equip Cost:	Applied %:			
Materials at 0% of Total Equip Cost		$0	0.00%	$ -		
☑ Check to include						Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details
Other Non-Labor Costs:	Unit	Unit Cost	Annual Units			and Contrustruction contingencies
Other Non-Labor UD1	each	$ -	-	$ -	-	
Other Non-Labor UD2	each	$ -	-	$ -	-	
Other Non-Labor UD3	each	$ -	-	$ -	-	
Other Non-Labor UD4	each	$ -	-	$ -	-	
Other Non-Labor UD5	each	$ -	-	$ -	-	
Other Non-Labor UD6	each	$ -	-	$ -	-	
Subtotal Annual Maintenance Costs				$ 7,450	-	
Administrative Overhead at 0 %				$ -	-	Treated as Labor
Subtotal Annual Labor Maintenance Costs				$ 7,450	$ 305,000	
Subtotal Annual Non-Labor Maintenance Costs				$ -	$ -	
Total Annual Maintenance Costs				**$ 7,450**	**$ 305,000**	

Major Cyclic Maintenance Replacement Costs and Salvage Values - Calculation and Input Selection to Include

Project Componet Type	Cyclic Replacement Costs: Include (Y/N) Replacement Cost?	Useful Life (yr)	Replacement Cost Factor	Replacement Cost in Base Year $'s	Number of Replacements (Integer)	NPV of All Replacements	Salvage Value: Include (Y/N) Salvage Value?	NPV of Salvage Value	Comments/Notes
Building/Structures	Y	40	1.00	$ -	0	$ -	Y	$ -	Replacement cost factor will be 1 if there is no
Gravity Sewers	Y	80	1.00	$ -	0	$ -	Y	$ -	replacement over period and salvage value has to
Forcemains	Y	40	1.00	$ 33,406,500	0	$ -	N	$ -	be based on initial construction
Process Piping	Y	30	1.25	$ -	1	$ -	Y	$ -	
Mechanical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	Construction inflation rate used for inflation of all
Electrical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	replacement costs and salvage values
Instrumentation and Control Equipment	Y	15	1.25	$ -	2	$ -	Y	$ -	
Computer Hardware and Software	Y	4	1.25	$ -	9	$ -	Y	$ -	
Mobile Equipmment	Y	10	1.00	$ -	3	$ -	Y	$ -	
Temporary Conveyance of Wastewater	N	1	0.00	$ -	37	$ -	N	$ -	
Well Abandonment and Relocation	N	50	0.00	$ -	0	$ -	N	$ -	
Other - Useful Life Category 3	Y	1	0.00	$ -	37	$ -	Y	$ -	
Totals						**$ -**		**$ -**	

Project name MCES Interceptor 8253-327 Improvements Phase 2

Alternative 4: **Two New Forcemains on Existing 8253 Alignment**

TABLE FOR MANUAL INPUT OF EXTERNALITY AND OTHER COSTS AND BENEFITS - YEAR BY YEAR

	Year	Costs					Benefits		
		Input Amounts (Base Year $'s)				NPV	Input Benefit (Base Year $'s)	NPV	Comments/Notes
Year Index		Labor Costs	Electricity Costs	Non-Labor Costs - Other	Construction Costs				
1	2026					$ -		$ -	
2	2027					$ -		$ -	
3	2028					$ -		$ -	
4	2029					$ -		$ -	
5	2030					$ -		$ -	
6	2031					$ -		$ -	
7	2032					$ -		$ -	
8	2033					$ -		$ -	
9	2034					$ -		$ -	
10	2035					$ -		$ -	
11	2036					$ -		$ -	
12	2037					$ -		$ -	
13	2038		$ 489,000			$ 489,000		$ -	Costs for pipe cleaning of 27100 LF of PVC every 10 years
14	2039					$ -		$ -	
15	2040					$ -		$ -	
16	2041					$ -		$ -	
17	2042					$ -		$ -	
18	2043					$ -		$ -	
19	2044					$ -		$ -	
20	2045					$ -		$ -	
21	2046					$ -		$ -	
22	2047					$ -		$ -	
23	2048					$ -		$ -	
24	2049		$ 489,000			$ 489,000		$ -	Costs for pipe cleaning of 27100 LF of PVC every 10 years
25	2050					$ -		$ -	
26	2051					$ -		$ -	
27	2052					$ -		$ -	
28	2053					$ -		$ -	
29	2054					$ -		$ -	
30	2055					$ -		$ -	
31	2056					$ -		$ -	
32	2057					$ -		$ -	
33	2058					$ -		$ -	
34	2059					$ -		$ -	
35	2060		$ 489,000			$ 489,000		$ -	Costs for pipe cleaning of 27100 LF of PVC every 10 years
36	2061					$ -		$ -	
37	2062					$ -		$ -	
38	2063					$ -		$ -	
39	2064					$ -		$ -	
40						$ -		$ -	
41						$ -		$ -	
42						$ -		$ -	
43						$ -		$ -	
44						$ -		$ -	
45						$ -		$ -	
46						$ -		$ -	
47						$ -		$ -	
48						$ -		$ -	
49						$ -		$ -	
50						$ -		$ -	
51						$ -		$ -	
52						$ -		$ -	
53						$ -		$ -	
54						$ -		$ -	
55						$ -		$ -	
56						$ -		$ -	
57						$ -		$ -	

Project name — **MCES Interceptor 8253-327 Improvements Phase 2**

Alternative 5: **Two New Forcemains**

New Project/Improvement Time Line Input		Comments/Notes
Year of Planning Phase Expenditure	2024	
Year of Design Phase Expenditure	2026	
Year of Major Construction Cost	2027	
First Year of Operation	2028	

Summary of Alternative Results and Input of Sensitivity Adjustments

NPV Contributions:	Sensitivity Adjustment	NPV without Sensitivity Adjustment	NPV with Sensitivity Adjustment			Comments/Notes
Planning	100%	$ -	$ -			
Design	100%	$ 337,000	$ 337,000	Capital =	$ 34,744,000	
Construction Phase	100%	$ 34,407,000	$ 34,407,000			
Annual Operating Labor	100%	$ -	$ -			
Annual Operating Electricity	100%	$ -	$ -			
Annual Operating Non-Labor Other	100%	$ -	$ -			
Annual Maintenance Labor	100%	$ 305,000	$ 305,000	O & M =	$ 305,000	
Annual Maintenance Non-Labor	100%	$ -	$ -			
Maintenance Replacement	100%	$ -	$ -			
Salvage Value	100%	$ -	$ -			
Manually Added Externality Costs	100%	$ 1,476,000	$ 1,476,000	Other =	$ 1,476,000	
Manually Added Externality Benefits	100%	$ -	$ -			
Risk Costs	100%	$ -	$ -	Risk Costs =	$ -	
TOTAL NPV		**$ 36,525,000**	**$ 36,525,000**			

Project Planning, Design, Construction and Other Construction Phase Costs Input

Cost Item	Unit Description	No. of Units	Unit Cost	Extended Cost	NPV	Comments/Notes
Planning Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees				$0	-	
Contingency				$0	-	
Total Planning				**$0**	**$0**	Labor Inflation Rate Used
Design Phase						
Consultant Fees				$0	-	
MCES				$0	-	
Outside Fees	LS	1	$337,000	$337,000	-	Easement aquisition
Contingency				$0	-	
Total Design				**$337,000**	**$337,000**	Labor Inflation Rate Used
Construction						
Building/Structures						
Input:				$0	-	
Gravity Sewers						
Input:				$0	-	
Forcemains						
Input:	LS	1	$22,838,000	$22,838,000	-	Includes removal (where necessary) and installation of new FM and structures. Assumes 10 structures (ARVs, CO) a
Process Piping						Inclusive of mobilization, allowances, and misc items (20% of total)
Input:				$0	-	
Mechanical Equipment						
Input:				$0	-	
Electrical Equipment						
Input:				$0	-	
Instrumentation and Control Equipment						
Input:				$0	-	
Computer Hardware and Software						
Input:				$0	-	
Mobile Equipmment						
Input:				$0	-	
Well Abandonment and Relocation						
Input:	EACH	2	$50,000	$100,000	-	Includes well abandonment and assumes drilling of a new well that is 360 ft deep and in bedrock
Other - Useful Life Category 2						
Input:				$0	-	
Other - Useful Life Category 3						
Input:				$0	-	
Subtotal Bare Construction				**$22,938,000**	-	
Contingencies	Input %	Default %				
Undeveloped Design Details		30%		$6,881,400	-	Uses Default % unless Input % is supplied
Construction Contingency		20%		$4,587,600	-	Uses Default % unless Input % is supplied
Subtotal Contingencies				**$11,469,000**	-	
Total Construction Cost				**$34,407,000**	**$34,407,000**	
Other Construction Phase Costs	**Unit Description**	**No. of Units**	**Unit Cost**			
Consultant Fees				$0	**$0**	
MCES				$0	**$0**	
Outside Fees - User Defined				$0	**$0**	
Total Construction Phase Cost				**$34,407,000**	**$34,407,000**	

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 5: **Two New Forcemains**

Annual Operating Costs Input

Category	Unit of Measure	Unit Cost	Annual Units	Annual Cost	NPV	Comments/Notes
						Only annual costs are allowed under operating costs
Labor (Operations)	FTE	$ 140,000.00	-	$ -	-	Costs recurring other than annually can be included in the ad-hoc addition table or as a non-annual maintenance item.
Energy						
Natural Gas	MMBTU	$ -	-	$ -	-	Increases in annual cost can be input in the ad-hoc annual cost addition table
Electricity	KWHr	$ 0.10	-	$ -	-	
Fuel Oil	Gal	$ -	-	$ -	-	
Gasoline	Gal	$ -	-	$ -	-	
Diesel	Gal	$ 4.10	-	$ -	-	
Chemicals						
Polymer	lbs	$ -	-	$ -	-	
Chlorine	Tons	$ -	-	$ -	-	
SO2	Tons	$ -	-	$ -	-	
Boiler Feed Chemicals	LS	$ -	-	$ -	-	
Aqueous Nitrate Salt (BioxideTM)	Gal	$ -	-	$ -	-	
Ferric Chloride Solution	Gal	$ -	-	$ -	-	
Alum (Aluminum Sulfate Solution)	Gal	$ -	-	$ -	-	
Potassium Permanganate	Gal	$ -	-	$ -	-	
Sodium Bisulfite	Gal	$ -	-	$ -	-	
Sodium Hypochlorite	Gal	$ -	-	$ -	-	
Sodium Hydroxide	lbs	$ -	-	$ -	-	
Carbon	Ea	$ -	-	$ -	-	
End-Product Disposal						
Land Application of Alk. Stab. Product	Tons	$ -	-	$ -	-	
Ash Disposal	Tons	$ -	-	$ -	-	
Disposal of Grit	YD3	$ -	-	$ -	-	
Disposal of Screenings	YD3	$ -	-	$ -	-	
CKD (Cement Kiln Dust)	Tons	$ -	-	$ -	-	
Lime	Tons	$ -	-	$ -	-	
Other - Non Labor						
Testing	LS	$ -	-	$ -	-	
Vehicles	vehicle	$ -	-	$ -	-	
Other Non Labor UD1	each	$ -	-	$ -	-	
Other Non Labor UD2	each	$ -	-	$ -	-	
Other Non Labor UD3	each	$ -	-	$ -	-	
Other - Labor						
Security	FTE	$ -	-	$ -	-	
Other Labor UD1	FTE	$ -	-	$ -	-	
Other Labor UD2	FTE	$ -	-	$ -	-	
Other Labor UD3	FTE	$ -	-	$ -	-	
Subtotal Operating Costs				$ -	-	
Administrative Overhead at 0 %				$ -	-	Treated as labor
Subtotal Labor Operating Costs				$ -	$ -	
Subtotal Non-Labor Operating Costs - Electricity				$ -	$ -	
Subtotal Non-Labor Operating Costs - Other				$ -	$ -	
Total Operating Costs				**$ -**	**$ -**	

Annual Maintenance Costs Input

				Annual Cost	NPV	Comments/Notes
Annual Labor Maintenance Costs		FTE Cost:	FTE amount:			
Annual Labor Maintenance Costs		$ 149,000.00	0.05	$ 7,450	-	Assumes 2 hrs/week
Labor at 0% of Total Equip Cost		Total Equip Cost:	Applied %:			
☑ Check to include		$0	0.00%	$ -	-	Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details and Contrustruction contingencies
Annual Non-Labor Maintenance Costs		Total Equip Cost:	Applied %:			
Materials at 0% of Total Equip Cost		$0	0.00%	$ -		
☑ Check to include						Applied to Mechanical, Electrical and I&C Equipment with Undeveloped Design Details
Other Non-Labor Costs:	Unit	Unit Cost	Annual Units			and Contrustruction contingencies
Other Non-Labor UD1	each	$ -	-	$ -	-	
Other Non-Labor UD2	each	$ -	-	$ -	-	
Other Non-Labor UD3	each	$ -	-	$ -	-	
Other Non-Labor UD4	each	$ -	-	$ -	-	
Other Non-Labor UD5	each	$ -	-	$ -	-	
Other Non-Labor UD6	each	$ -	-	$ -	-	
Subtotal Annual Maintenance Costs				$ 7,450	-	
Administrative Overhead at 0 %				$ -	-	Treated as Labor
Subtotal Annual Labor Maintenance Costs				$ 7,450	$ 305,000	
Subtotal Annual Non-Labor Maintenance Costs				$ -	$ -	
Total Annual Maintenance Costs				**$ 7,450**	**$ 305,000**	

Major Cyclic Maintenance Replacement Costs and Salvage Values - Calculation and Input Selection to Include

	Cyclic Replacement Costs						Salvage Value		
Project Componet Type	Include (Y/N) Replacement Cost?	Useful Life (yr)	Replacement Cost Factor	Replacement Cost in Base Year $'s	Number of Replacements (Integer)	NPV of All Replacements	Include (Y/N) Salvage Value?	NPV of Salvage Value	Comments/Notes
Building/Structures	Y	40	1.00	$ -	0	$ -	Y	$ -	Replacement cost factor will be 1 if there is no
Gravity Sewers	Y	80	1.00	$ -	0	$ -	Y	$ -	replacement over period and salvage value has to
Forcemains	Y	40	1.00	$ 34,257,000	0	$ -	N	$ -	be based on initial construction
Process Piping	Y	30	1.25	$ -	1	$ -	Y	$ -	
Mechanical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	Construction inflation rate used for inflation of all
Electrical Equipment	Y	20	1.25	$ -	1	$ -	Y	$ -	replacement costs and salvage values
Instrumentation and Control Equipment	Y	15	1.25	$ -	2	$ -	Y	$ -	
Computer Hardware and Software	Y	4	1.25	$ -	9	$ -	Y	$ -	
Mobile Equipmment	Y	10	1.00	$ -	3	$ -	Y	$ -	
Well Abandonment and Relocation	N	50	0.00	$ -	0	$ -	N	$ -	
Other - Useful Life Category 2	Y	1	0.00	$ -	37	$ -	Y	$ -	
Other - Useful Life Category 3	Y	1	0.00	$ -	37	$ -	Y	$ -	
Totals						**$ -**		**$ -**	

Project name MCES Interceptor 8253-327 Improvements Phase 2
Alternative 5: **Two New Forcemains**

TABLE FOR MANUAL INPUT OF EXTERNALITY AND OTHER COSTS AND BENEFITS - YEAR BY YEAR

Year Index	Year	Costs: Input Amounts (Base Year $'s) Labor Costs	Electricity Costs	Non-Labor Costs - Other	Construction Costs	NPV	Benefits: Input Benefit (Base Year $'s)	NPV	Comments/Notes
1	2026					$ -		$ -	
2	2027					$ -		$ -	
3	2028					$ -		$ -	
4	2029					$ -		$ -	
5	2030					$ -		$ -	
6	2031					$ -		$ -	
7	2032					$ -		$ -	
8	2033					$ -		$ -	
9	2034					$ -		$ -	
10	2035					$ -		$ -	
11	2036					$ -		$ -	
12	2037					$ -		$ -	
13	2038		$ 492,000			$ 492,000		$ -	Costs for pipe cleaning of 27300 LF of PVC every 10 years
14	2039					$ -		$ -	
15	2040					$ -		$ -	
16	2041					$ -		$ -	
17	2042					$ -		$ -	
18	2043					$ -		$ -	
19	2044					$ -		$ -	
20	2045					$ -		$ -	
21	2046					$ -		$ -	
22	2047					$ -		$ -	
23	2048					$ -		$ -	
24	2049		$ 492,000			$ 492,000		$ -	Costs for pipe cleaning of 27300 LF of PVC every 10 years
25	2050					$ -		$ -	
26	2051					$ -		$ -	
27	2052					$ -		$ -	
28	2053					$ -		$ -	
29	2054					$ -		$ -	
30	2055					$ -		$ -	
31	2056					$ -		$ -	
32	2057					$ -		$ -	
33	2058					$ -		$ -	
34	2059					$ -		$ -	
35	2060		$ 492,000			$ 492,000		$ -	Costs for pipe cleaning of 27300 LF of PVC every 10 years
36	2061					$ -		$ -	
37	2062					$ -		$ -	
38	2063					$ -		$ -	
39	2064					$ -		$ -	
40						$ -		$ -	
41						$ -		$ -	
42						$ -		$ -	
43						$ -		$ -	
44						$ -		$ -	
45						$ -		$ -	
46						$ -		$ -	
47						$ -		$ -	
48						$ -		$ -	
49						$ -		$ -	
50						$ -		$ -	
51						$ -		$ -	
52						$ -		$ -	
53						$ -		$ -	
54						$ -		$ -	
55						$ -		$ -	
56						$ -		$ -	
57						$ -		$ -	
58						$ -		$ -	
59						$ -		$ -	

Appendix B

Hydraulic Modeling Study

370 Wabasha St. N., Suite 500
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T: 651.298.0710

DRAFT Technical Memorandum

Prepared for: Metropolitan Council Environmental Services (MCES)

Project Title: Lake Minnetonka System Planning Hydraulic Modeling

Project No.: 154593 (MCES Project No. 802898)

Technical Memorandum

Subject: Lake Minnetonka System Capacity Analysis

Date: July 1, 2024

To: Dan Chouinard, P.E., Principal Engineer, MCES

From: Julie Benadum, P.E., Managing Engineer

Copy to: Chris Remus, P.E., Assistant Manager, Interceptor Engineering Group

Adam Gordon, P.E., Manager, Interceptor Engineering

Prepared by: ______________________________________
Erica Schierholz, P.E., Principal Engineer, License No. 45420

Reviewed by: ______________________________________
Daniel P. Davis, P.E., Vice President, License No. 46969

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Section 1: Introduction

As part of their comprehensive system planning effort, MCES asked Brown and Caldwell (BC) to update and calibrate the collection system model for the Lake Minnetonka Service Area, tributary to the Blue Lake Wastewater Treatment Plant (WWTP). The Lake Minnetonka Service Area hydraulic model was initially developed in 2020 using PCSWMM. PCSWMM is a longstanding modeling environment that uses the U.S. EPA Storm Water Management Model (SWMM) Version 5 engine, a dynamic rainfall-runoff simulation model that was first developed in 1971 and continues to be widely used throughout the world.

This Technical Memorandum (TM) serves as an update to the *Lake Minnetonka System Capacity Analysis TM (July 2020).* It describes the calibration of the Lake Minnetonka Service Area hydrologic and hydraulic model, shown in Figure 1-1, and summarizes the capacity analysis results for both existing and future conditions.

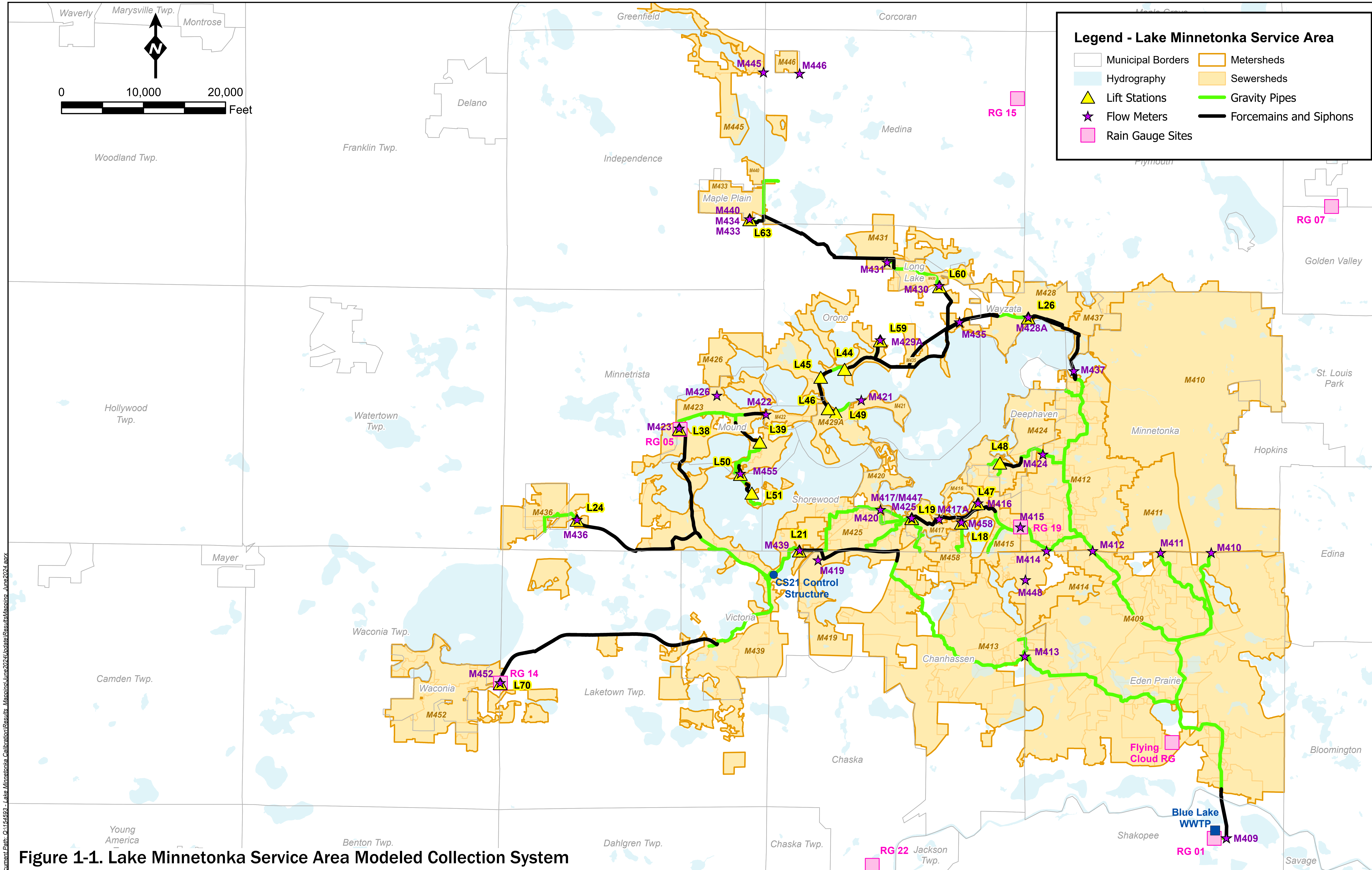


Figure 1-1. Lake Minnetonka Service Area Modeled Collection System

Section 2: Model Development Update

The Lake Minnetonka Service Area PCSWMM model was initially developed in 2020 using 2019 GIS information, pump station design data, O&M information, and record drawings. The latest GIS data (sewersheds, pipes, manholes, etc.) provided by MCES in September 2022 and January 2023 were used to update the hydraulic model, along with the latest record, design, and/or planning level drawings from the following projects:

- Minnetrista L51 Forcemain (MCES Project 802823)
- L48 Rehabilitation, Forcemain and 6-DH-645 Replacement (MCES Project 802834)
- Maple Plain, Medina, and Independence Improvements (MCES Project 808100)
- Waconia Interceptor 7508 Improvements (MCES Projects 808320 and 808330)
- Excelsior Area Improvements, 7017 and 7017-2 (MCES Project 802856)
- Forcemain 8567 Channel Crossings (MCES Project 802863)
- Orono Interceptor 7113 Replacement at Tanager Lake Bridge (MCES Project 802886)
- Orono Interceptor 7113 Relocation (MCES Project 802897)
- Orono Lift L46 and L49 Improvements (MCES Project 802831)
- M409 Meter Station Improvements and Headbox Modifications (MCES Project 805620)
- Chanhassen Interceptor Rehabilitation 8253-328 (MCES Project 802883)
- Chanhassen Interceptor 8253-327 Improvements Phase 1 (MCES Project 802816)

When the model was initially developed, pipe materials were incorporated into the model based on known associations between material and equivalent Manning's roughness. For this update, a uniform Manning's roughness of 0.013 and a uniform Hazen-William's coefficient of 100 were applied model-wide regardless of pipe material.

Figure 1-1 provides an overview of the hydraulic model and identifies the modeled lift stations, gravity pipes, forcemains, and siphons.

Table 2-1 summarizes the lift stations' modeled firm and peak capacities.

Table 2-1. Lift Station Summary			
Lift Station	Firm Capacity, mgd	Peak Capacity, mgd	Notes
L18 [a]	1.1 (2 of 3 pumps)	1.4 (3 of 3 pumps) [c]	
L19 [a]	9.4 (3 of 4 large)	10.7 (4 of 4 large pumps)	
L21	16.3 (5 of 6 pumps)	17.6 (6 of 6 pumps)	Peak capacity reflects measured maximum pump capacity
L24 [a]	4.5 (2 of 3 pumps)	4.7 (3 of 3 pumps) [c]	
L26 [a]	10.8 (2 of 3 pumps) [c]	12.7 (3 of 3 pumps) [c]	
L38 [a]	8.9 (3 of 4 pumps)	11.9 (4 of 4 pumps) [c]	
L39 [a]	2.2 (3 of 4 pumps) [c]	2.9 (4 of 4 pumps) [c]	
L44	3.7 (2 of 3 pumps)	4.2 (3 of 3 pumps)	
L45	3.8 (2 of 3 pumps)	4.2 (3 of 3 pumps)	
L46	2.3 (2 of 3 pumps)	2.9 (3 of 3 pumps)	Estimated capacities from upcoming project 802831
L47	1.1 (1 of 2 pumps)	1.5 (2 of 2 pumps)	

Table 2-1. Lift Station Summary			
Lift Station	Firm Capacity, mgd	Peak Capacity, mgd	Notes
L48	1.7 (3 of 4 pumps)	1.8 (4 of 4 pumps)	4th pump to be added by project 802834
L49	0.58 (2 of 3 pumps)	0.63 (3 of 3 pumps)	Estimated capacities from upcoming project 802831
L50	0.40 (1 of 2 pumps)	0.55 (2 of 2 pumps)	Peak capacity reflects measured maximum pump capacity
L51	0.37 (1 of 2 pumps)	0.45 (2 of 2 pumps)	
L59 [b]	3.8 (2 of 3 pumps)	6.5 (3 of 3 pumps)	Estimates capacities with proposed parallel force main
L60 [a]	7.2 (3 of 4 pumps)	7.6 (4 of 4 pumps)	
L63 [b]	3.0 (2 of 3 pumps)	3.6 (3 of 3 pumps)	
L70 [a]	4.3 (3 of 4 pumps)	4.9 (4 of 4 pumps)	Estimated capacities from tests completed on 5/30/2024

a. *Dual force main lift station*
b. *Planned/proposed dual force main lift station*
c. *Capacity estimated if system curve unavailable for all pumping scenarios*

Section 3: Monitoring Data

MCES provided 15-minute flow data at 34 locations and 15-minute rainfall data at seven locations for model calibration. In addition, the latest level data upstream and downstream of Victoria control structure CS21 were also provided. The flow meter locations and their associated metersheds, along with the rain gauge locations and CS21 control structure, are identified on Figure 1-1.

Table 3-1 summarizes the flow meter locations and the period available for calibration. BC provided general review of the data for consistency.

Table 3-1. Flow Meter Summary		
Flow Meter Name	Primary Community	Time Period Available
M409S [a]	Eden Prairie	January 2012 – September 2022
M410	Minnetonka	January 2012 – September 2022
M411	Minnetonka	January 2012 – September 2022
M412	Minnetonka	April 2012 – September 2022
M413	Chanhassen	January 2012 – September 2022
M414	Eden Prairie	January 2012 – September 2022
M415	Shorewood	January 2012 – September 2022
M416	Greenwood	January 2012 – September 2022
M417	Excelsior	January 2012 – September 2022
M417A	Excelsior	January 2012 – September 2022
M419	Chanhassen	January 2012 – September 2022
M420	Tonka Bay	January 2012 – September 2022
M421	Minnetonka Beach	January 2012 – September 2022
M422	Spring Park	January 2012 – September 2022
M423S [a]	Mound	July 2017 – September 2022

Table 3-1. Flow Meter Summary

Flow Meter Name	Primary Community	Time Period Available
M424	Deephaven	January 2012 – September 2022
M425S [a]	Shorewood	August 2012 – September 2022
M426	Minnetrista	October 2013 – September 2022
M428S [a]	Wayzata	April 2015 – September 2022
M429A	Orono	January 2012 – September 2022
M430	Long Lake	January 2012 – September 2022
M431	Orono	January 2012 – September 2022
M433	Maple Plain	January 2012 – September 2022
M434	Maple Plain	January 2012 – September 2022
M435S [a]	Orono	June 2017 – September 2022
M436	St. Bonifacius	January 2012 – September 2022
M437S [a]	Wayzata	June 2015 – September 2022
M439	Victoria	January 2012 – September 2022
M440	Medina	January 2012 – September 2022
M445	Independence	June 2020 – September 2022
M446	Loretto	August 2021 – September 2022
M452S [a]	Waconia	January 2012 – September 2022
M455	Minnetrista	January 2012 – September 2022
M458S [a]	Shorewood	February 2018 – September 2022

a. *An "S" indicates the meter is a summation meter. For example, M409S is the summation from individual meters M409, M409A, and M409B.*

MCES rainfall data are summarized in Table 3-2. These data are used as input to the model for the calibration process. The spatial orientation of the rain gauges provides important information regarding the variability of rainfall during the calibration process. Single point precipitation measurements are quite often not representative of the volume of precipitation falling over an entire tributary area during individual calibration events. A dense network of point measurements can provide a better representation of the true volume over a given area. MCES' network of precipitation measurements were applied to the drainage areas using a distance weighting technique from the closest gauges for each flow meter tributary area.

During periods when rain gauge data appeared to be questionable, data from the rain gauges were replaced with data from another nearby MCES gauge. Hourly data from the Flying Cloud Airport rain gauge were used to flag questionable periods. The rain gauge at the airport (KFCM) is part of the National Climatic Data Center's (NCDC) first-order network of climate stations.

Table 3-2. Rainfall Data Summary

Rain Gauge	Time Period Available
RG01	January 2012 – September 2022
RG05	January 2012 – September 2022

Table 3-2. Rainfall Data Summary	
Rain Gauge	Time Period Available
RG07	January 2012 – September 2022
RG14	January 2012 – September 2022
RG15	January 2012 – September 2022
RG19	January 2012 – September 2022
RG22	January 2012 – September 2022
KFCM (Flying Cloud Airport)	January 2000 – December 2022

Section 4: Model Calibration

Calibration is the process of modifying model parameters and comparing model results to actual flow measurements at key points in the collection system. Calibration of dry and wet-weather flows was based on the meter data obtained from the locations identified in Table 3-1.

Model calibration included identifying dry-weather diurnal flow patterns and average daily flows for each meter basin and adjusting the model to match these data. A typical example of the calibration results for dry-weather flow is shown in Figure 4-1 at the downstream M409S location for a period during January 2021. The metered data is shown in blue while the modeled data is shown in red. The figure shows a good match of the diurnal patterns that were measured and modeled.

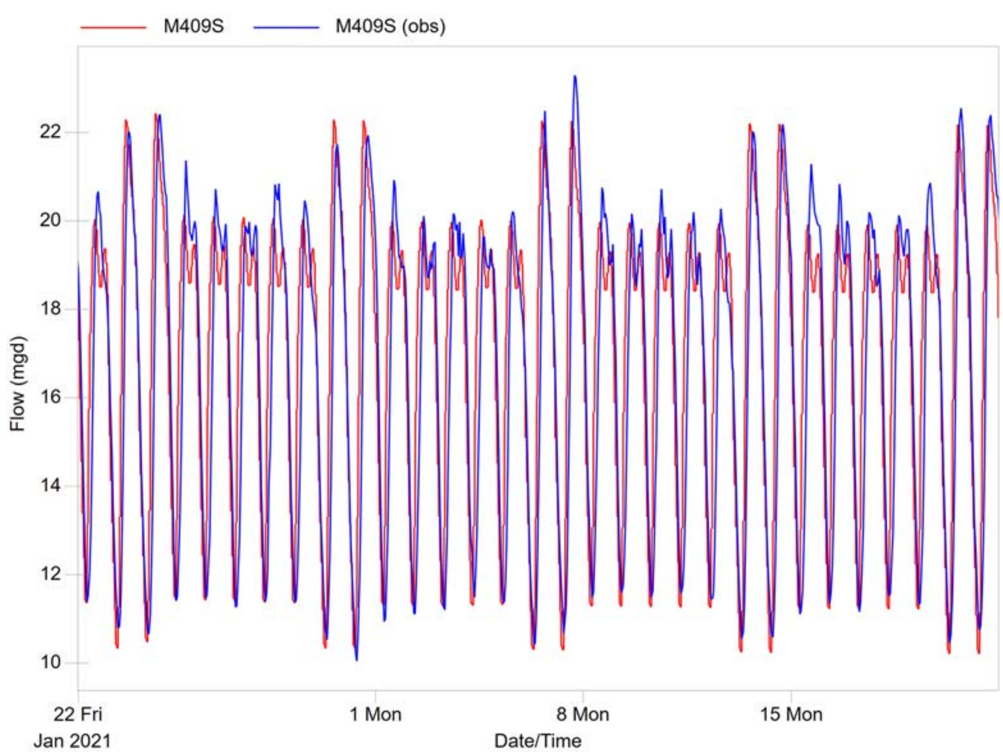


Figure 4-1. Example dry weather flow calibration

Calibration of wet-weather flows in the model was performed based on the meter data, as well as rainfall data from the various gauge locations listed in Table 3-2. It includes assigning groundwater and I/I model simulation parameters to match the varying responses of the basins to rain events over the monitoring period.

Rainfall data collected represent a variety of characteristics including total rainfall volume, peak intensity, and duration. The model was calibrated using distant-weighted composite rainfall data from the closest gauges for each basin; however, rainfall events vary in velocity, direction, volume, and intensity, which will affect a drainage area's response. An example of the variation in storm intensity from gauge to gauge is shown in Figure 4-2. Significant variation in peak intensity within a single event creates challenges in the calibration process due to the spatial variability of the input to the model. These conditions influence model calibrations and were taken into consideration during the calibration process. Often the higher the intensity, the greater the disparity in measured values between rain gauges.

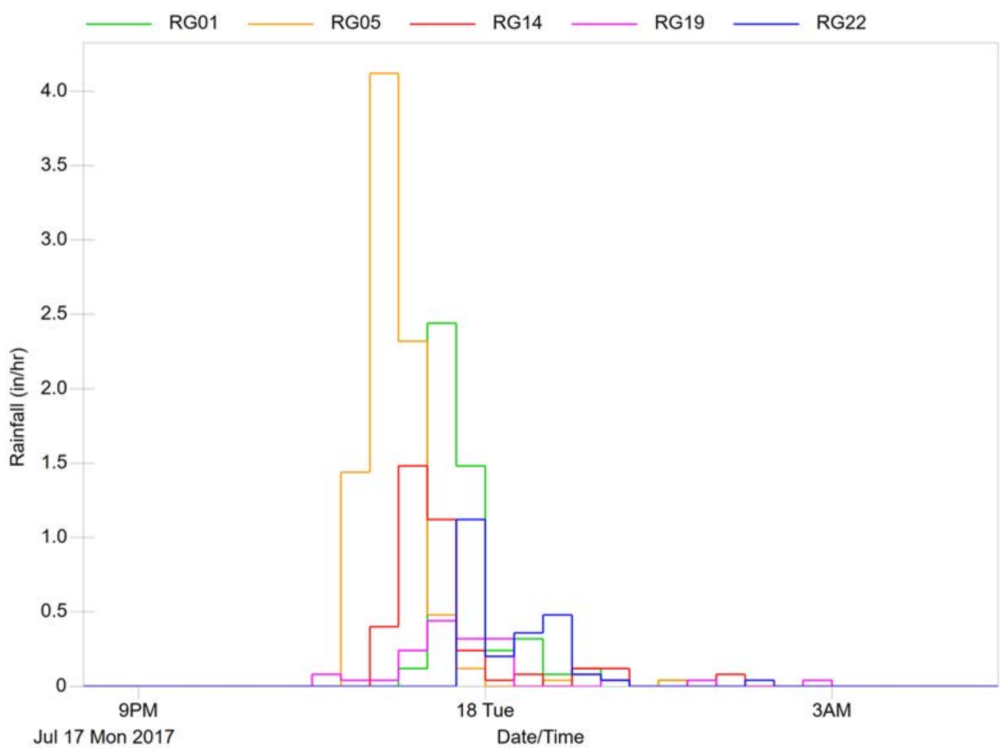


Figure 4-2. Example of rainfall variability; 7/17/17 event showing 15-minute comparison of intensity

Figures 4-3 through 4-11 are examples of model-simulated data (red) versus measured flow data (blue) for the M409S, M439, and M452S flow basins. These graphs show that the peak flow rate and total volume of water, as well as the general shape of the hydrograph, closely match the measured data. The figures show varying time scales to illustrate the level of detail that was considered in calibration; they depict example excerpts of years of calibration data that encompass millions of data points that make up the complete calibration data sets. The scale of the calibration sets is very large and represents numerous seasonal variations that occur in the system over a period of years and includes numerous rain events that were included in the system calibration. The greater number of quality calibration events results in a greater confidence in calibration and the ability of the model to be representative of the wet weather response of the collection system.

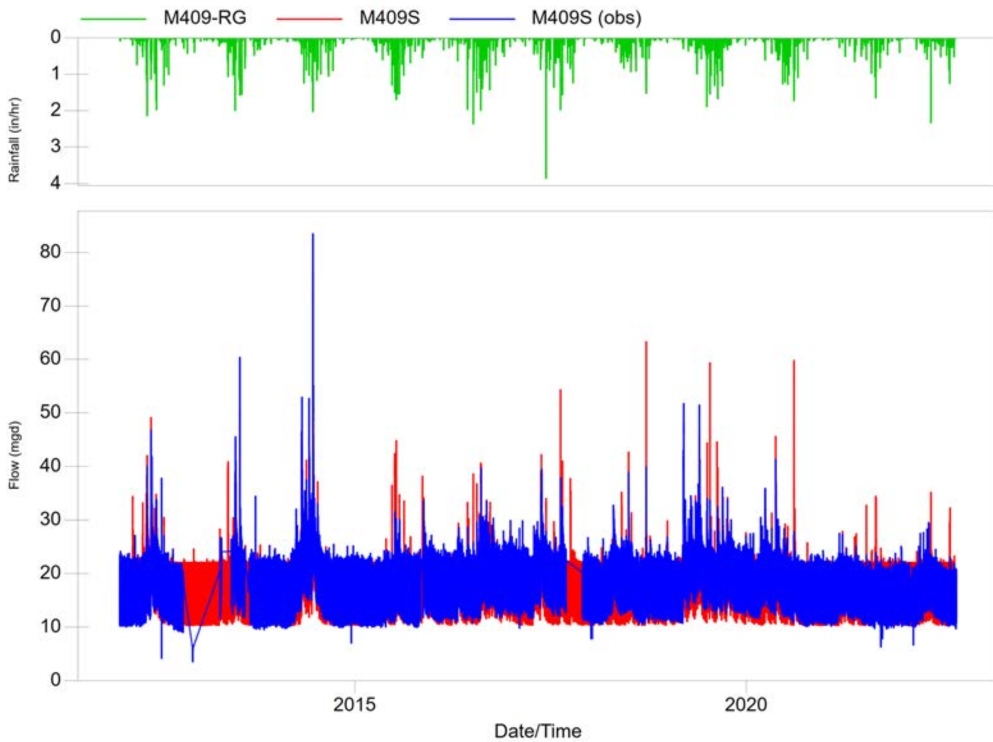


Figure 4-3. M409S calibration period, January 2012 – September 2022

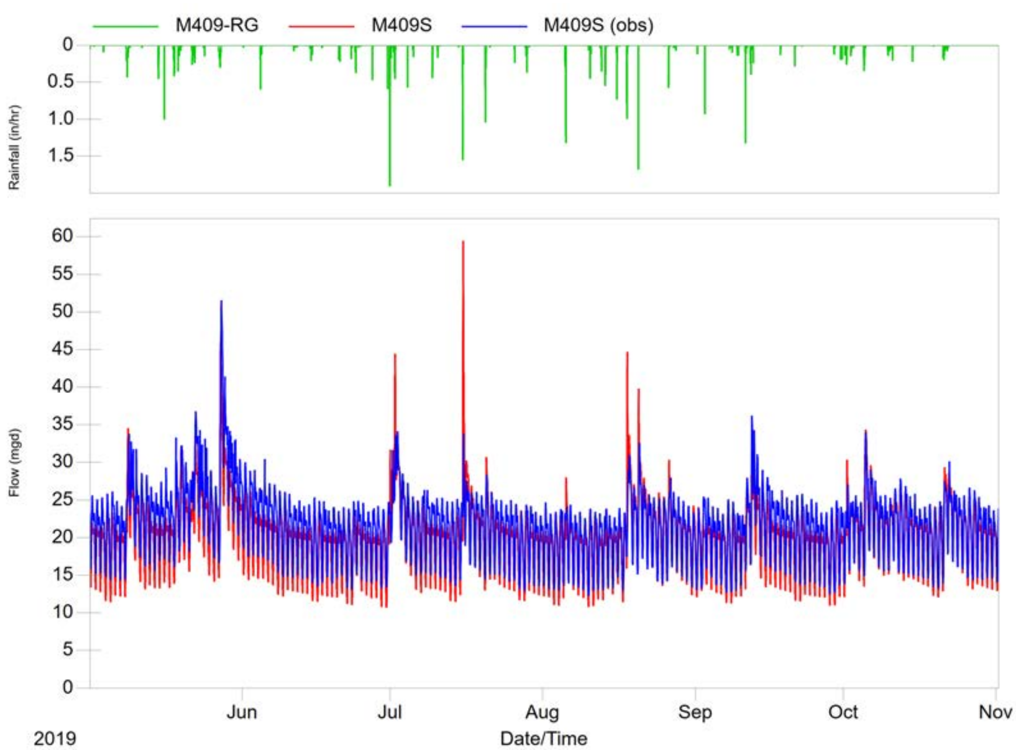


Figure 4-4. M409S 6-month calibration window, May – October 2019

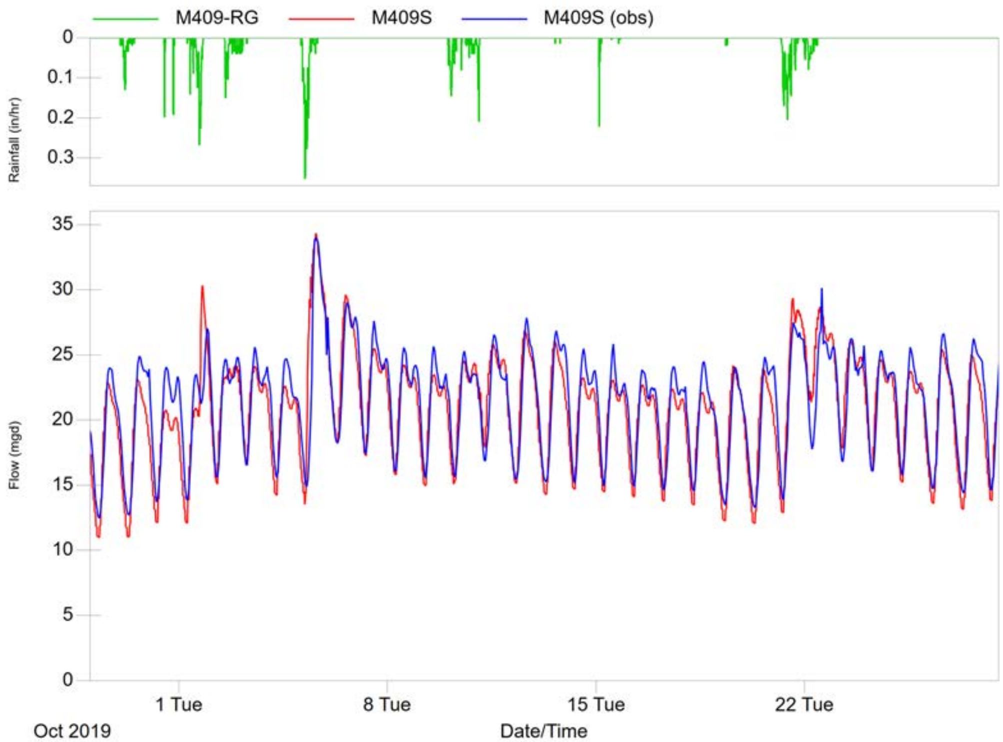


Figure 4-5. M409S 1-month calibration window, October 2019

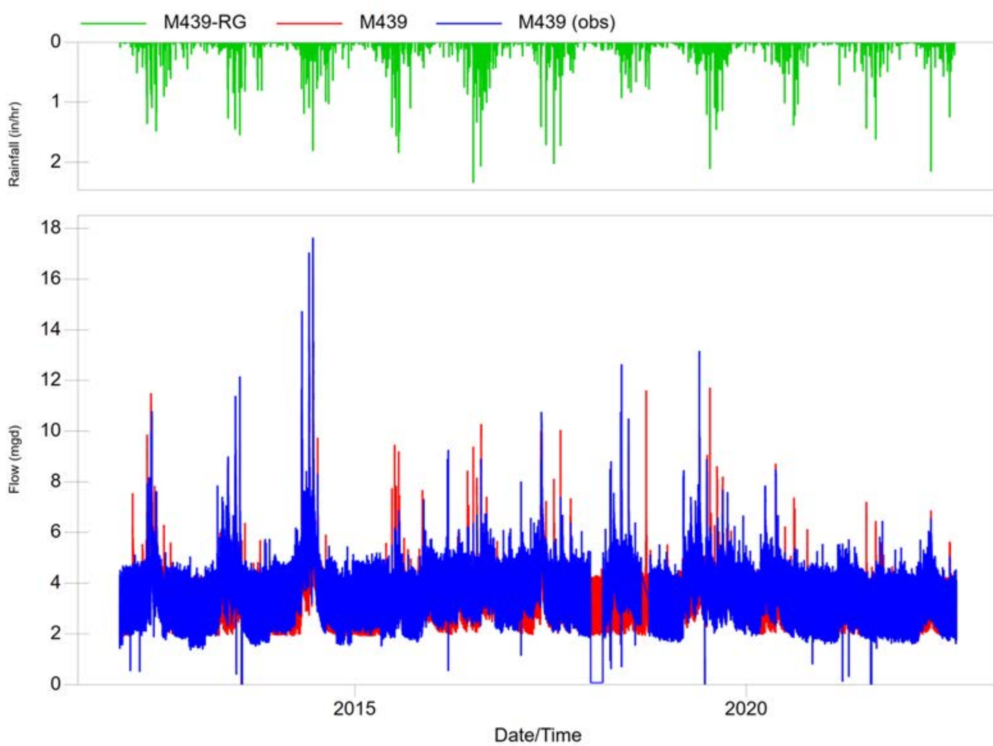


Figure 4-6. M439 calibration period, January 2012 – September 2022

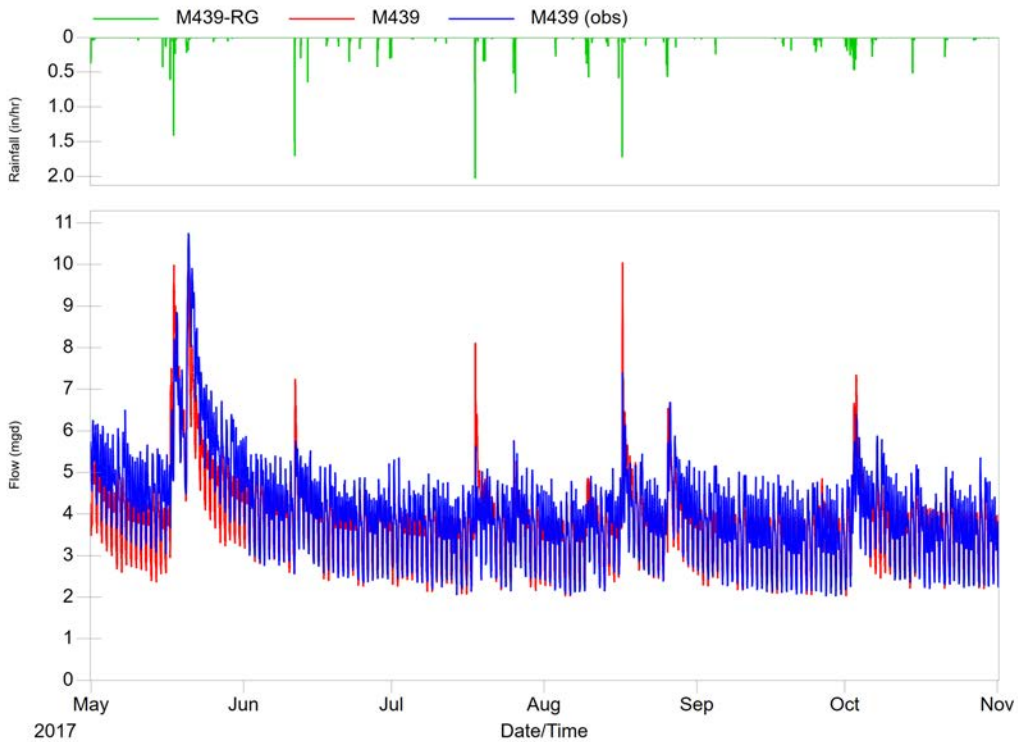


Figure 4-7. M439 6-month calibration window, May – October 2017

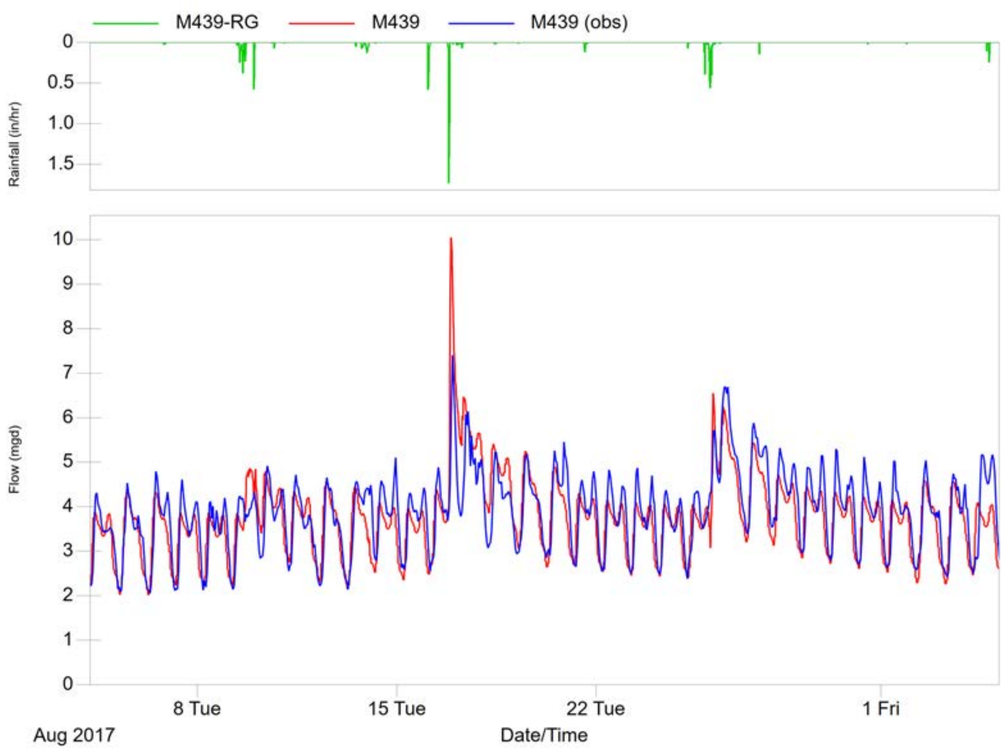


Figure 4-8. M439 1-month calibration window, August 2017

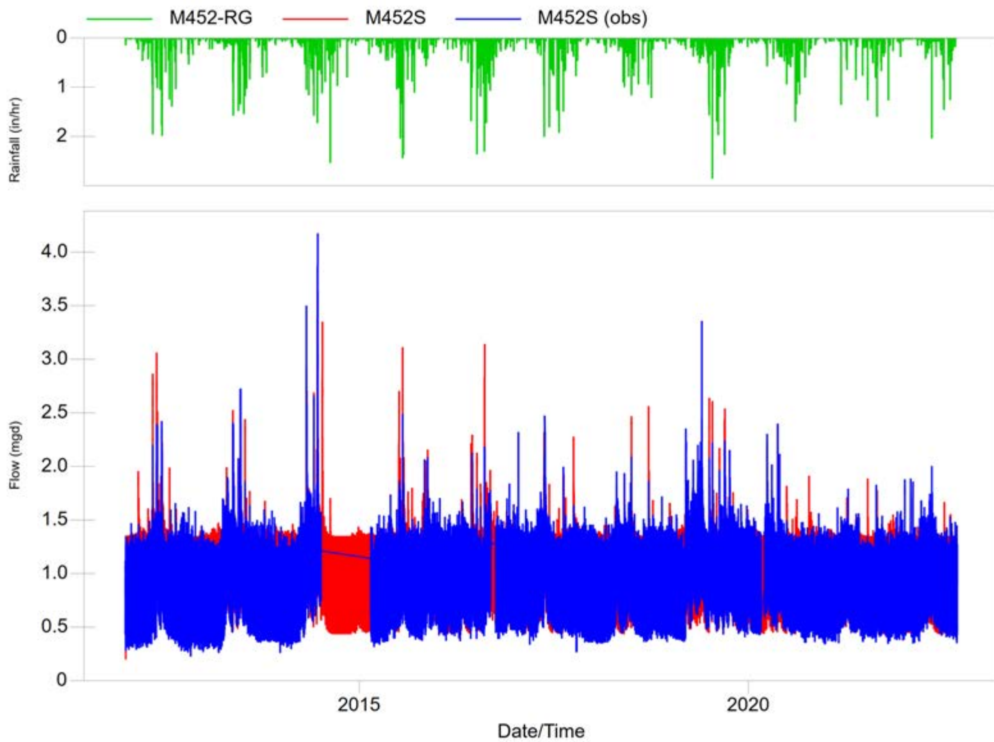


Figure 4-9. M452S calibration period, January 2012 – September 2022

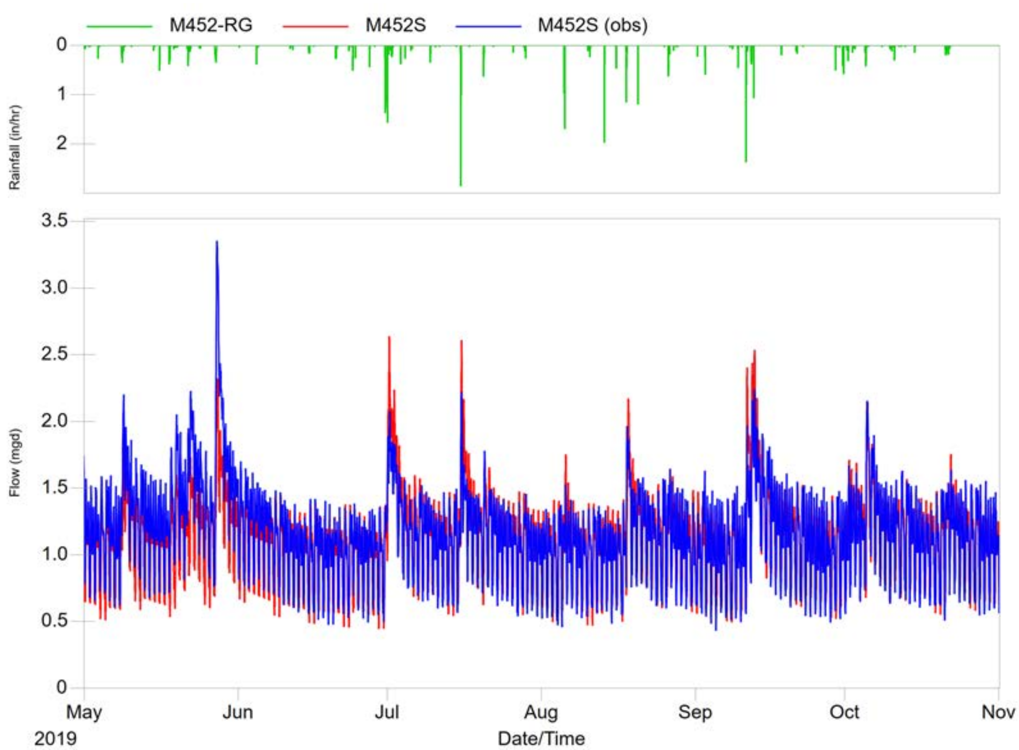


Figure 4-10. M452S 6-month calibration window, May – October 2019

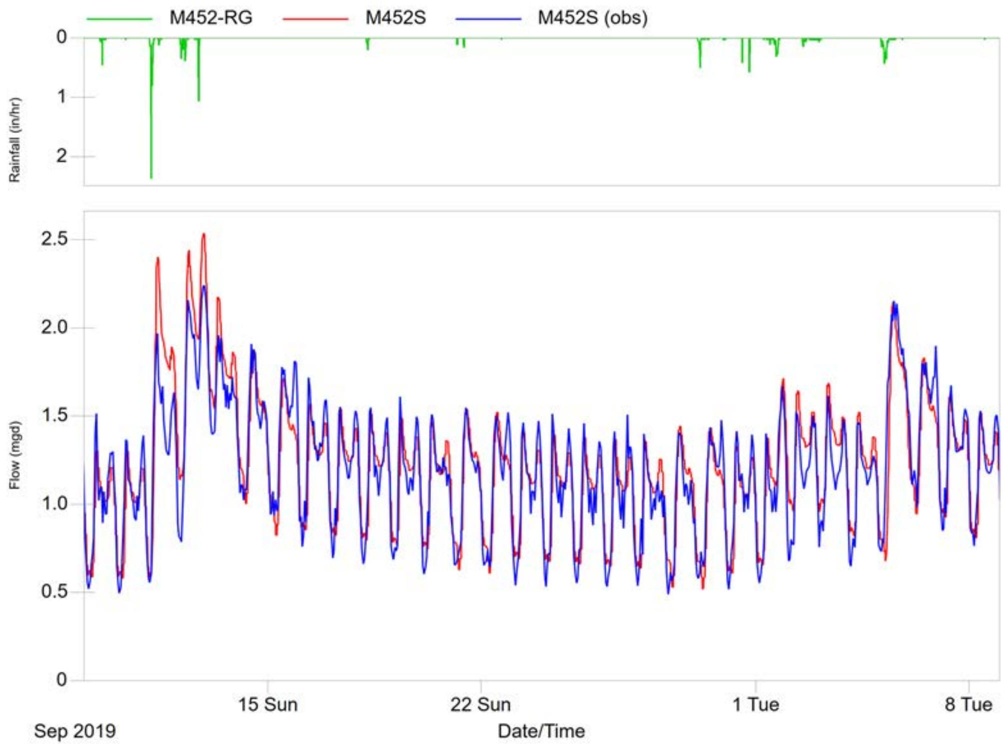


Figure 4-11. M452S 1-month calibration window, September 2019

The validity of the complete calibrations was established using volume and peak error percentages derived from differences between measured and modeled values for the selected wet weather calibration events. In general, calibration events were selected based on minimum rainfall criteria (0.25 inches per hour intensity and 0.5 inches volume) during the months May through October. Due to model limitations simulating snowmelt conditions, events during cold weather months and during spring snowmelt conditions were not used.

Table 4-1 summarizes the volume and peak error percentages, as well as the average daily flow used, for each metered flow basin. A negative number indicates the simulated data under-predicted the measured data while a positive number indicates the simulated data over-predicted the measured data. The calibrations were deemed good if the errors were within 10 percent for both volume and peak flow analyses. The calibrations generally erred on the conservative side with a priority on peak flow since that has a more direct impact on capacity.

Table 4-1. Calibration Summary

Meter Basin	Average Dry Weather Flow, mgd	Peak Flow Error, %	Volume Error, %	Comments
M409S	4.00	7%	-3%	Most downstream meter, includes calibrations from all upstream meters
M410	3.17	4%	-3%	Large metershed, timing of peaks more difficult to match
M411	0.34	1%	3%	Spikes of flow in data indicate possible local lift stations/storage upstream
M412	0.94	10%	-2%	
M413	1.78	7%	-2%	
M414	0.36	9%	-2%	

Table 4-1. Calibration Summary				
Meter Basin	Average Dry Weather Flow, mgd	Peak Flow Error, %	Volume Error, %	Comments
M415	0.27	5%	-5%	
M416	0.05	4%	-3%	Non-rainfall related spikes in the data early on (2012-2014), bad data in 2015, meter improvement starting in 2016
M417	0.14	9%	0%	Non-rainfall related spikes in the flow data (sometimes sustained) started in October 2014
M417A	0.05	10%	3%	Small metershed
M419	0.14	7%	4%	
M420	0.14	9%	-8%	Groundwater and snow melt a big part of the flow; metershed surrounded by water; difficult to match volumes for a lot of events
M421	0.04	4%	-2%	Small metershed area surrounded by water; difficult to get a good calibration match; closest rain gauges ~4-5 miles away
M422	0.20	10%	6%	
M423S	0.60	6%	-2%	
M424	0.48	5%	-1%	Possible storage upstream of meter; some events have elevated flows after the event peak that last a couple days and then drop off
M425S	0.35	9%	-1%	Data starting in August 2015
M426	0.10	4%	1%	
M428S/M435S	0.14	3%	2%	M435 upstream of M428; M435 generally always greater than M428; created a combined dataset using data from both meters. Minimal difference between upstream meters M430+M429 and M428/M435; added DW flow but no groundwater or wet weather flow.
M429A	0.36	2%	0%	Flume metering location, data not recorded during portions of three events. Metershed area surrounded by water; difficult to get a good calibration match; closest rain gauges ~5 miles away.
M430	0.18	12%	-3%	Rainfall does not seem very representative (closest rain gauges ~5-6 miles away)
M431	0.09	6%	1%	Data not recorded during portions of four events. Difficult to get a good calibration match; rainfall does not seem very representative (closest rain gauges ~5-6 miles away)
M433	0.15	6%	-5%	Flume metering location, data not recorded during portions of five events. Difficult location to calibrate; a lot of groundwater and flow variation; rainfall does not seem very representative (closest rain gauges ~5-7 miles away)
M434	-	9%	1%	M433 and M440 are on the influent side of L63, M434 is on the discharge side
M436	0.30	3%	6%	
M437S	0.41	9%	-3%	
M439	0.94	7%	-1%	

Table 4-1. Calibration Summary				
Meter Basin	Average Dry Weather Flow, mgd	Peak Flow Error, %	Volume Error, %	Comments
M440 [a]	0.09	4%	-1%	Flume metering location, data not recorded during portions of three events. Difficult location to calibrate; a lot of groundwater and flow variation; rainfall does not seem very representative (closest rain gauges ~5-7 miles away)
M452S	0.92	9%	5%	
M455	0.07	-3%	-8%	Small metershed area surrounded by water
M458S	0.13	7%	-2%	Meter not in place until 2018

a. M440 includes M445 and M446 upstream.

It was concluded that the calibrations were successful based on the extent of data and limitations noted above.

Calibrated flows were allocated (or distributed) to sewersheds as previously described in the July 2020 TM. Average daily sanitary flows were distributed by population density (the latest 2020 census block populations were assigned to residential parcels within each census block and then the parcels were assigned to a sewershed based on location). Groundwater and wet weather inflow and infiltration (I/I) parameters were distributed by sewershed area.

Section 5: Future Flow Projections

Table 5-1 summarizes by community the modeled existing average dry weather flow values (updated based on recent measured flow data) and their respective MCES-projected average daily flow values for Years 2020, 2030, and 2040. The flow projections provided are from Attachment A, Table A-4 of the *MCES Thrive MSP 2040 Water Resources Policy Plan (amended May 2018).*

For Years 2030 and 2040, each community's modeled existing average dry weather flow values were adjusted up, where necessary, to align with MCES' 2030 and 2040 projected flow values. If community future flow values were less than existing, existing flow values were used in the model. Increased flow projections and wet weather I/I parameters were distributed only to modeled sewersheds assigned to interceptors identified as having growth based on community comprehensive plans, as described in the July 2020 TM.

Table 5-1. Comparison of Modeled and Projected Flows by Community					
Community	Blue Lake Contributing Area (acres)	Modeled Existing Average Dry Weather Flow (mgd)	MCES-Projected Average Daily Flow (mgd)		
			2020	2030	2040
Bloomington [a]	13	0.00	0.00	0.00	0.00
Chanhassen	8,493	2.25	2.30	2.56	2.84
Deephaven	1,508	0.40	0.38	0.37	0.36
Eden Prairie	17,375	4.27	5.54	5.97	6.30
Edina [a]	48	0.00	0.00	0.00	0.00
Excelsior	438	0.17	0.23	0.23	0.23
Greenfield	125	0.01	0.01	0.01	0.01
Greenwood	234	0.05	0.04	0.04	0.04
Hopkins [a]	166	0.04	0.04	0.04	0.04
Independence	1,067	0.04	0.04	0.07	0.07
Laketown Township	720	0.10	0.02	0.00	0.00
Long Lake	544	0.16	0.24	0.24	0.24
Loretto	159	0.03	0.08	0.08	0.08
Maple Plain	621	0.15	0.28	0.29	0.30
Medina [b]	227	0.04	0.09 (20%)	0.10 (20%)	0.11 (20%)
Minnetonka	17,726	4.40	5.61	5.80	5.92
Minnetonka Beach	294	0.05	0.05	0.05	0.05
Minnetrista	2,689	0.50	0.34	0.41	0.47
Mound	1,745	0.55	0.93	0.92	0.90
Orono	3,521	0.48	0.59	0.65	0.72
Plymouth [a]	222	0.03	0.03	0.03	0.03
Shorewood	3,450	0.73	0.93	0.91	0.89
Spring Park	228	0.20	0.23	0.23	0.23
St. Bonifacius	594	0.14	0.24	0.23	0.22
Tonka Bay	484	0.14	0.23	0.23	0.22
Victoria	3,153	0.64	0.76	0.90	1.06
Waconia	2,660	0.92	1.19	1.56	1.76
Wayzata	1,689	0.43	0.53	0.54	0.53
Woodland	40	0.01	0.01	0.01	0.01
Total	70,232	16.93	20.97	22.48	23.64

a. *The majority of Bloomington, Edina, Hopkins, and Plymouth is connected to the Metro system. No growth was assumed in the areas connected to the Blue Lake system.*

b. *In Medina ~20% of its existing flow and growth is connected to the Blue Lake system and ~80% is connected to the Metro system.*

Section 6: Modeled Rain Events

MCES selected two rainfall events for the purposes of capacity evaluation. These include the ES Interceptor 10-year, 24-hour Planning Event and the National Oceanic and Atmospheric Administration (NOAA) 10-year, 24-hour Rainfall Event. The ES Interceptor Planning Event was developed by HDR and is documented in the *MCES Minneapolis Interceptor Study Storm Event Analysis Report (April 2021).* The NOAA 10-year, 24-hour Event is a synthetic rainfall event based on NOAA Atlas 14 precipitation frequency estimates in the Lake Minnetonka area. The rainfall characteristics for each event are summarized in Figure 6-1 and Table 6-1.

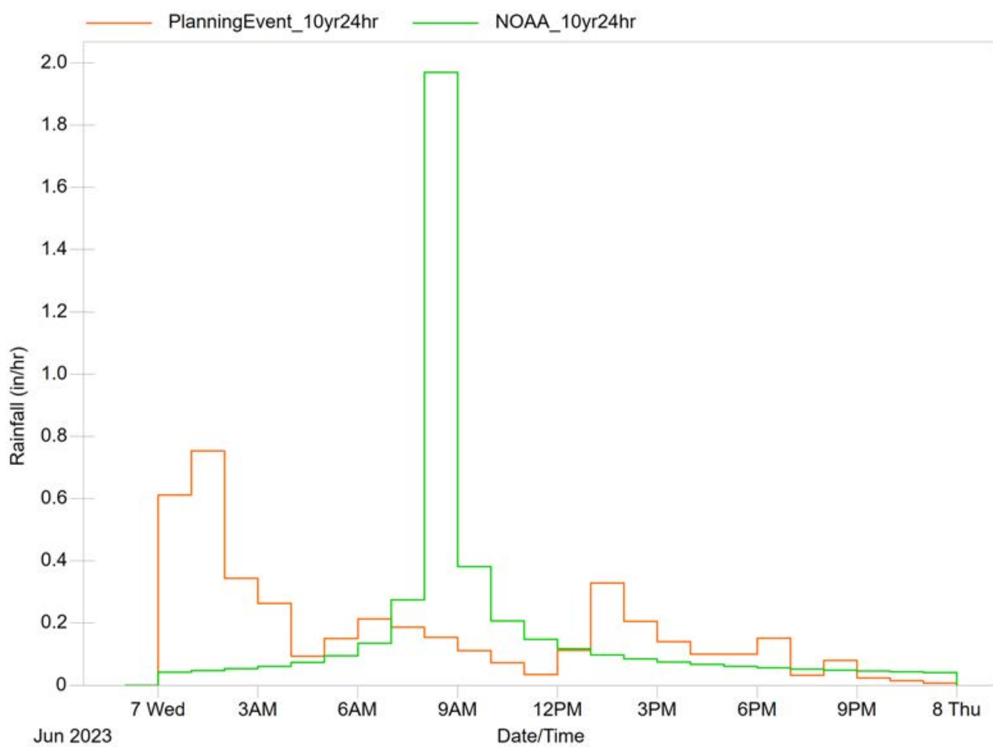


Figure 6-1. Rainfall data for modeled events.

Table 6-1. Rainfall Summary			
Event	Peak Intensity, in/hr	Total Rainfall, inches	Event Duration, hrs
ES Interceptor 10-yr, 24-hr Planning Event	0.75	4.28	24
NOAA 10-yr, 24-hr Event	1.97	4.28	24

Section 7: Modeling Results

A hydraulic modeling evaluation was performed to assess system capacity and identify hydraulic restrictions in the collection system. Results from the evaluations for existing, 2030, and 2040 future flow conditions are summarized in the following section and in Attachments A, B, C, D, and E.

Figures 7-1 and 7-2 present the capacity results graphically for the 2040 ES Interceptor Planning Event using both firm and peak capacities at MCES lift stations. Qmax/Qdes is the ratio of peak modeled flow to

Manning's full pipe capacity and dmax/D is the maximum fraction full based on flow depth during the peak of the storm.

Capacity summaries for the modeled events are provided in Table 7-1 for the lift station firm capacity scenarios and in Table 7-2 for the lift station peak capacity scenarios. For example, in the existing condition lift station firm capacity model, only 0.1 percent of the gravity pipes exceed the 90 and 85 percent thresholds for peak flow and depth for the Planning Event and 2.1 percent for the NOAA Event. This increases to 2.1 percent for the 2040 Planning Event and 6.7 percent for the 2040 NOAA Event.

Table 7-1. Capacity Results (Based on Flow and Depth) for Gravity Pipes (Percent of Gravity Pipes) Lift Station Firm Capacities

Capacity	Existing Condition		2030 Condition		2040 Condition	
	Planning Event	NOAA Event	Planning Event	NOAA Event	Planning Event	NOAA Event
Q_{max}/Q_{des} > 60% AND d_{max}/D > 60%	3.2	13	12	20	12	20
Q_{max}/Q_{des} > 90% AND d_{max}/D > 85%	0.1	1.9	1.1	3.7	1.5	3.2
Q_{max}/Q_{des} > 100% AND Surcharge > 2'	0.0	0.2	0.5	2.6	0.6	3.5

Table 7-2. Capacity Results (Based on Flow and Depth) for Gravity Pipes (Percent of Gravity Pipes) Lift Station Peak Capacities

Capacity	Existing Condition		2030 Condition		2040 Condition	
	Planning Event	NOAA Event	Planning Event	NOAA Event	Planning Event	NOAA Event
Q_{max}/Q_{des} > 60% AND d_{max}/D > 60%	3.2	14	11	20	12	23
Q_{max}/Q_{des} > 90% AND d_{max}/D > 85%	0.1	2.3	2.0	4.1	2.0	4.1
Q_{max}/Q_{des} > 100% AND Surcharge > 2'	0.0	0.0	0.5	3.0	0.6	3.4

Peak hydraulic profiles for pipe segments that are over capacity (based on both flow and depth for the 2040 ES Interceptor Planning Events) are shown in Figures 7-3 through 7-6. For the pipe segments identified as over capacity, maximum fraction full ratios (dmax/D) are provided for the following scenarios:

- 2040 Average Dry Weather Flow (shown as dark blue)
- 2040 ES Interceptor Planning Event – Lift Station Firm Capacities (shown as light green)
- 2040 ES Interceptor Planning Event – Lift Station Peak Capacities (shown as dark green)
- 2040 NOAA Event – Lift Station Firm Capacities (shown as orange)
- 2040 NOAA Event – Lift Station Peak Capacities (shown as red)

Additional peak hydraulic profiles in areas of interest are shown in Figures 7-7 through 7-10.

Resulting capacity maps (based on flow and depth) are provided in Attachment A. Resulting capacity maps based on flow only are provided in Attachment B; capacity maps based on depth only are provided in Attachment C. Resulting velocity maps are provided in Attachments D and E for both gravity pipes and force mains.

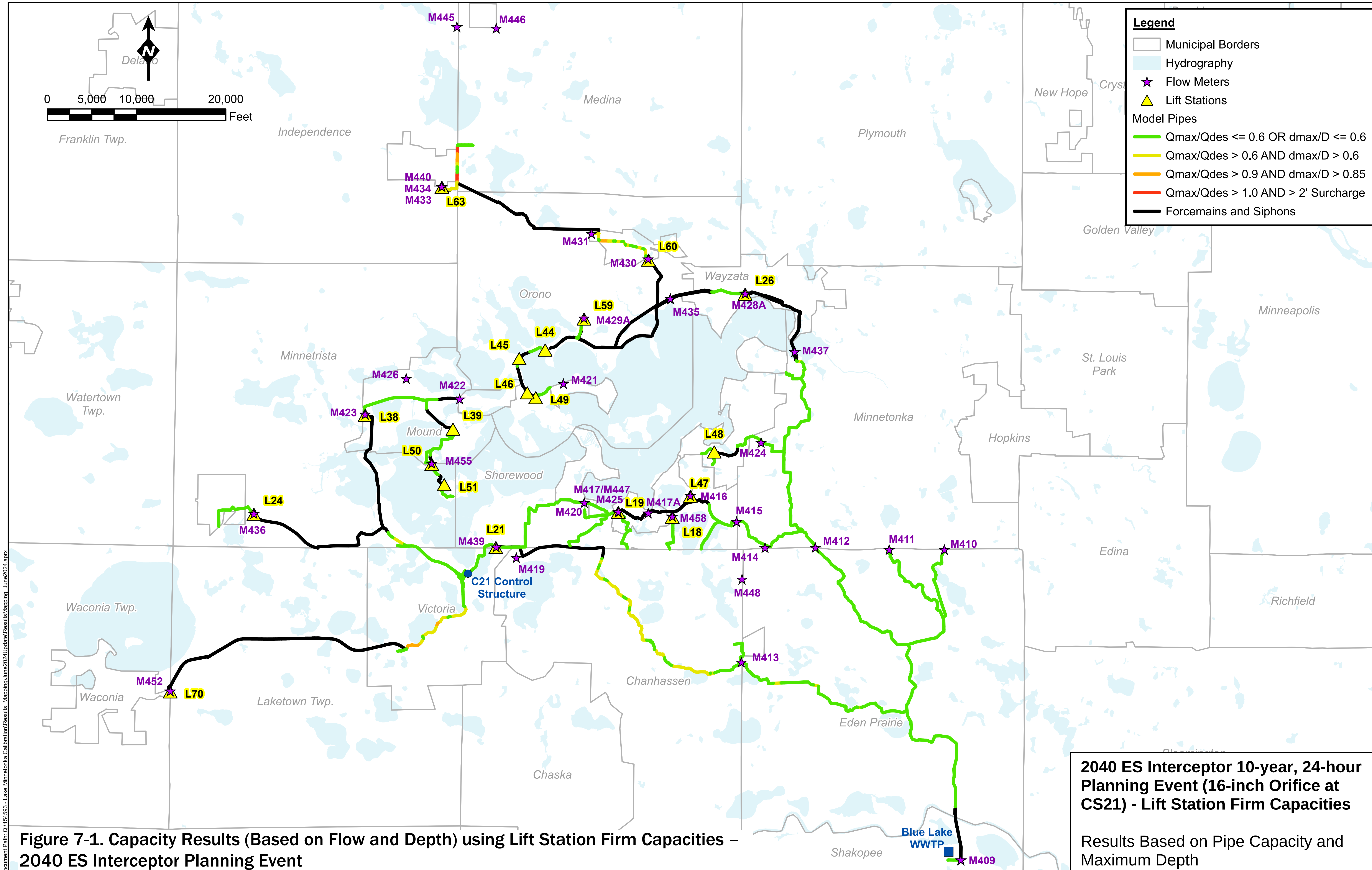


Figure 7-1. Capacity Results (Based on Flow and Depth) using Lift Station Firm Capacities – 2040 ES Interceptor Planning Event

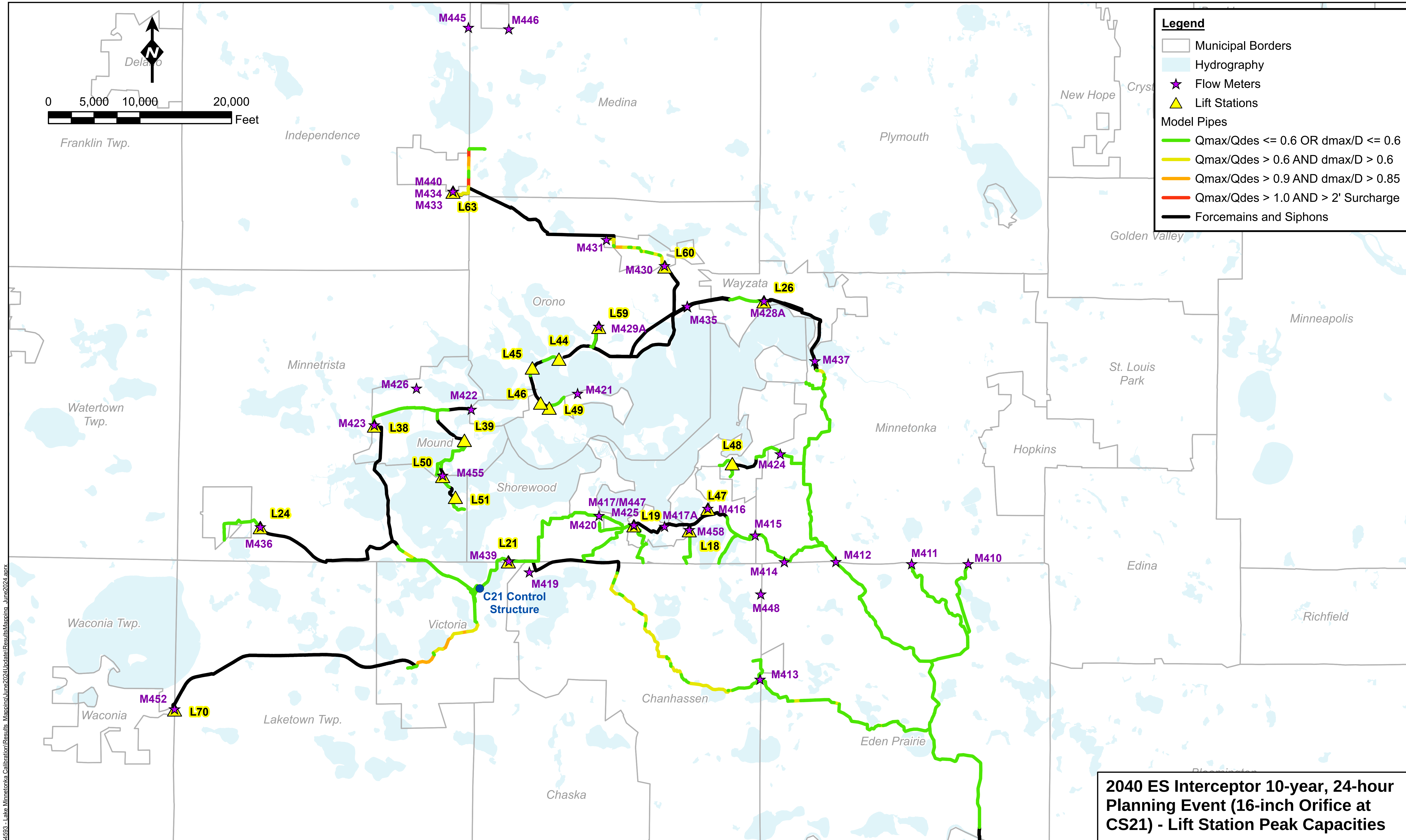


Figure 7-2. Capacity Results (Based on Flow and Depth) using Lift Station Peak Capacities – 2040 ES Interceptor Planning Event

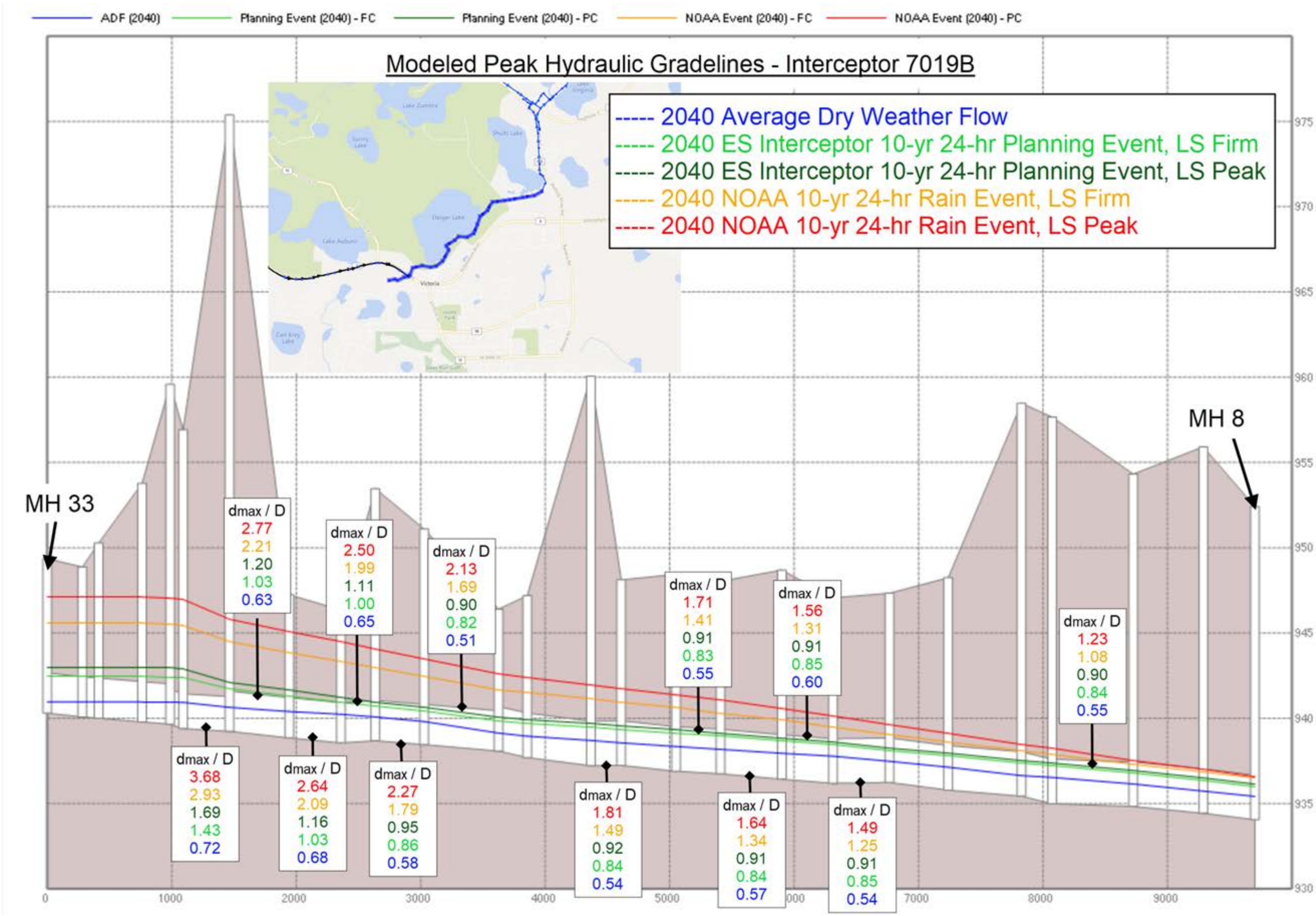


Figure 7-3. Interceptor 7019-B Profile Showing Peak Hydraulic Gradelines

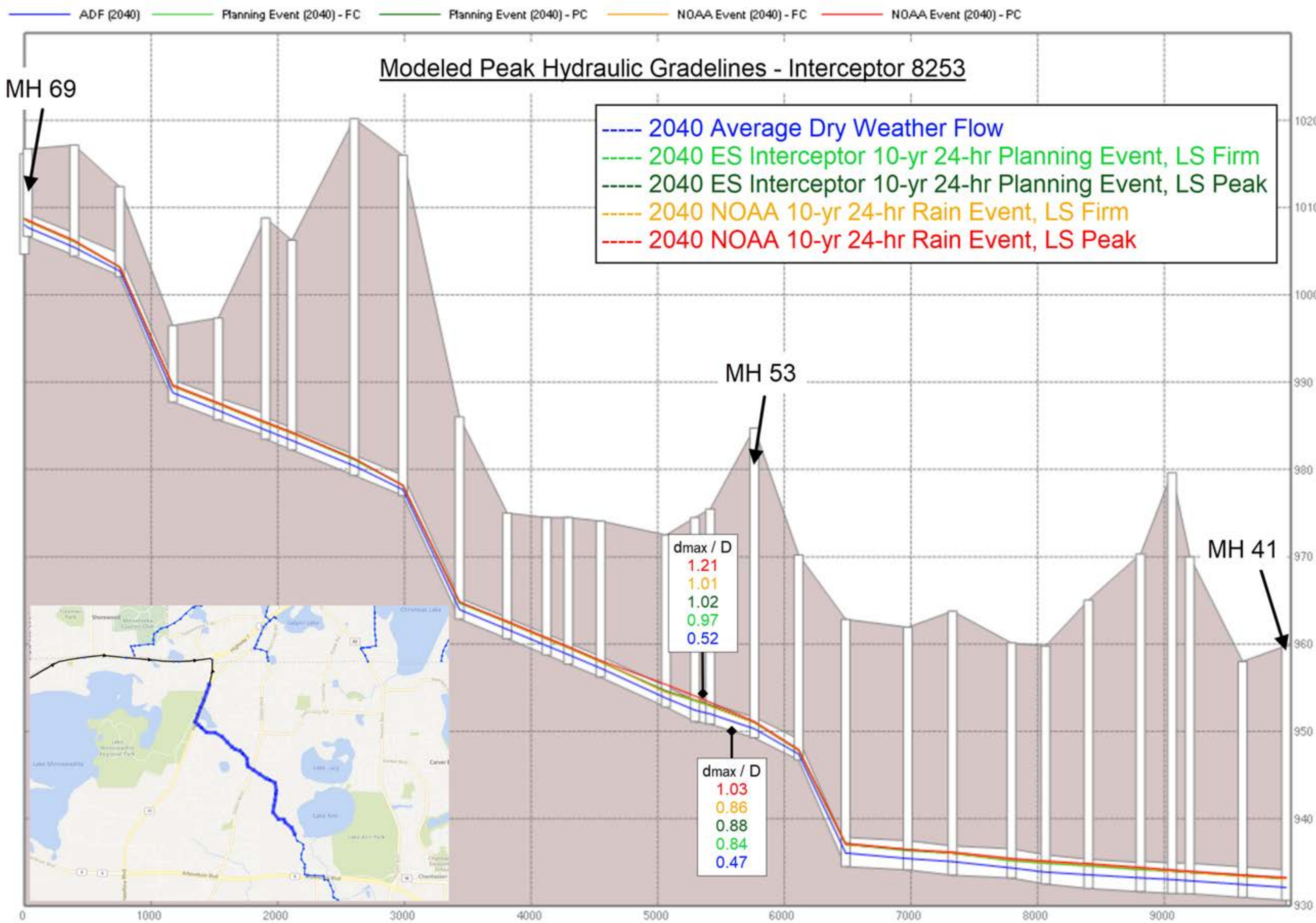


Figure 7-4. Interceptor 8253-327,328 Profile Showing Peak Hydraulic Gradelines

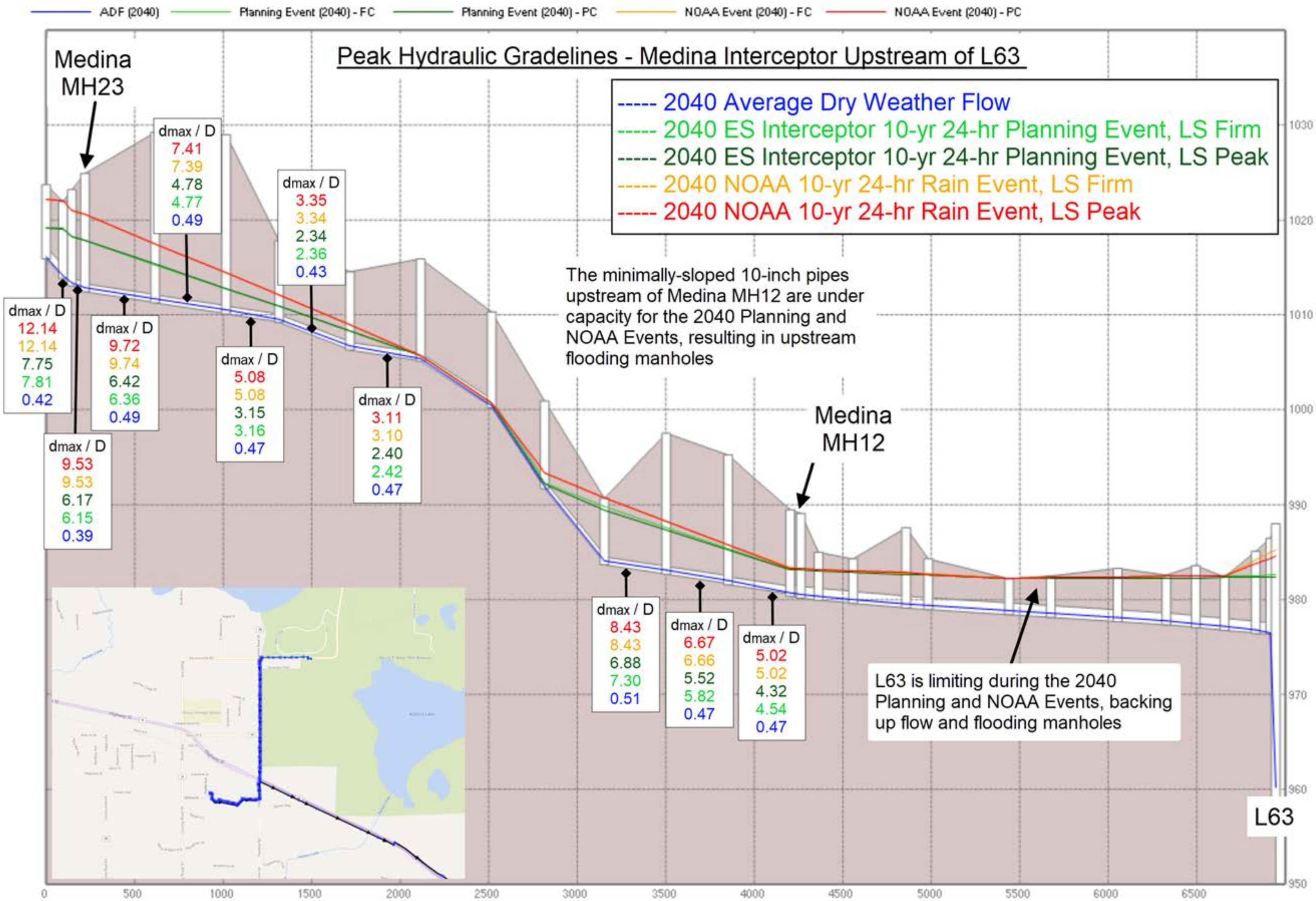


Figure 7-5. Medina Interceptor Profile Showing Peak Hydraulic Gradelines

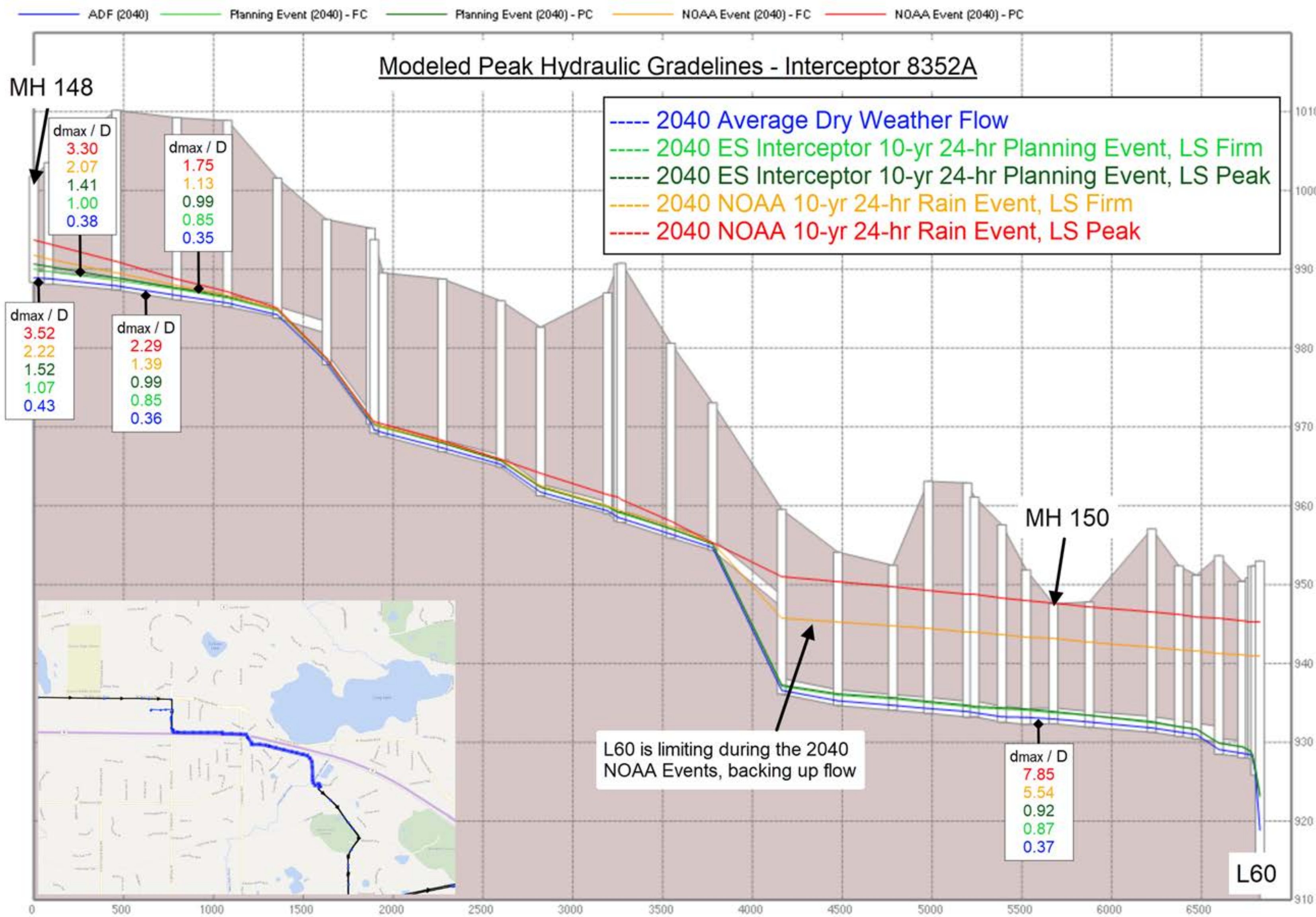


Figure 7-6. Interceptor 8352A Profile Showing Peak Hydraulic Gradelines

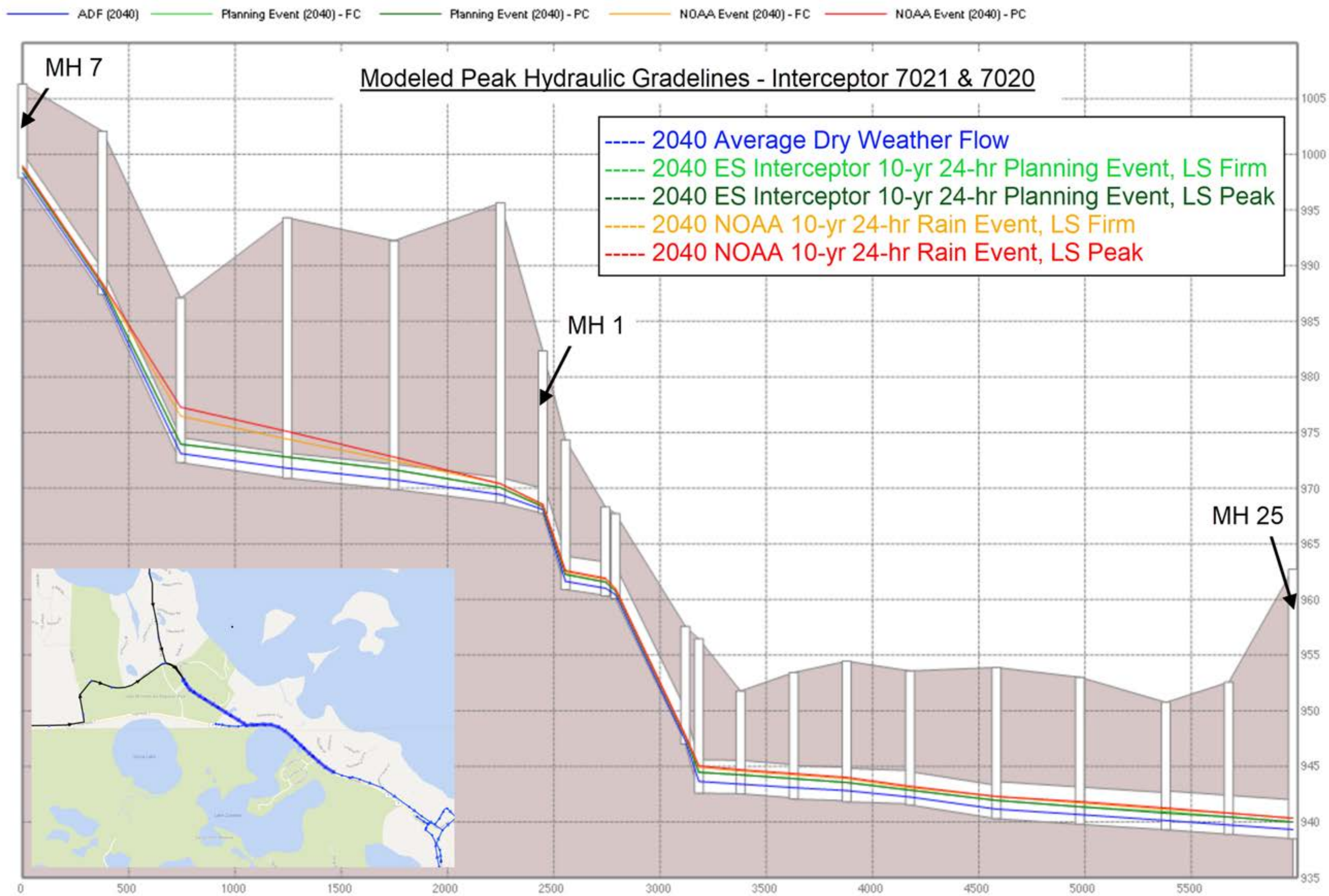


Figure 7-7. Interceptor 7021 and 7020 Profile Showing Peak Hydraulic Gradelines

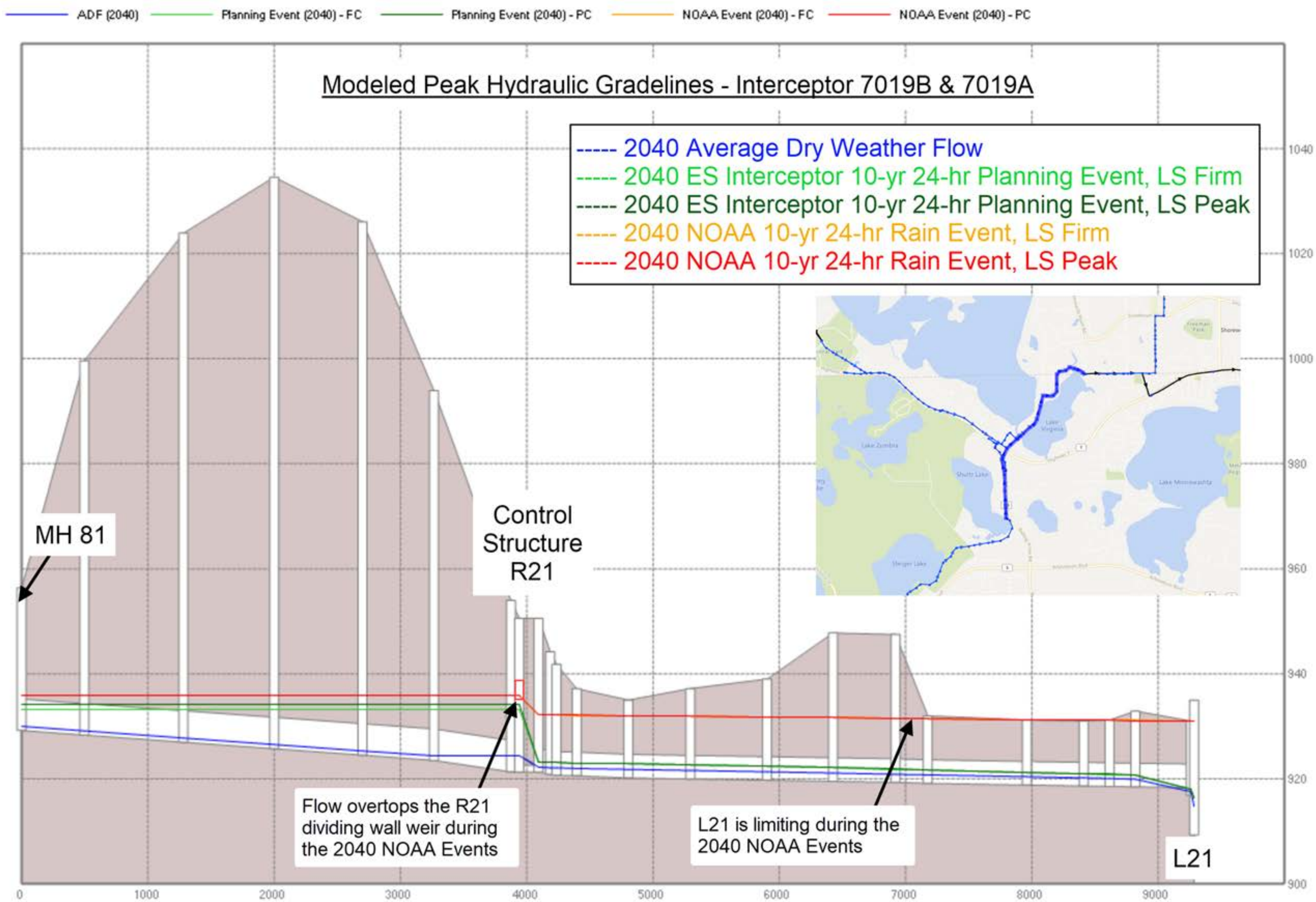


Figure 7-8. Interceptor 7019B and 7019A Profile Showing Peak Hydraulic Gradelines

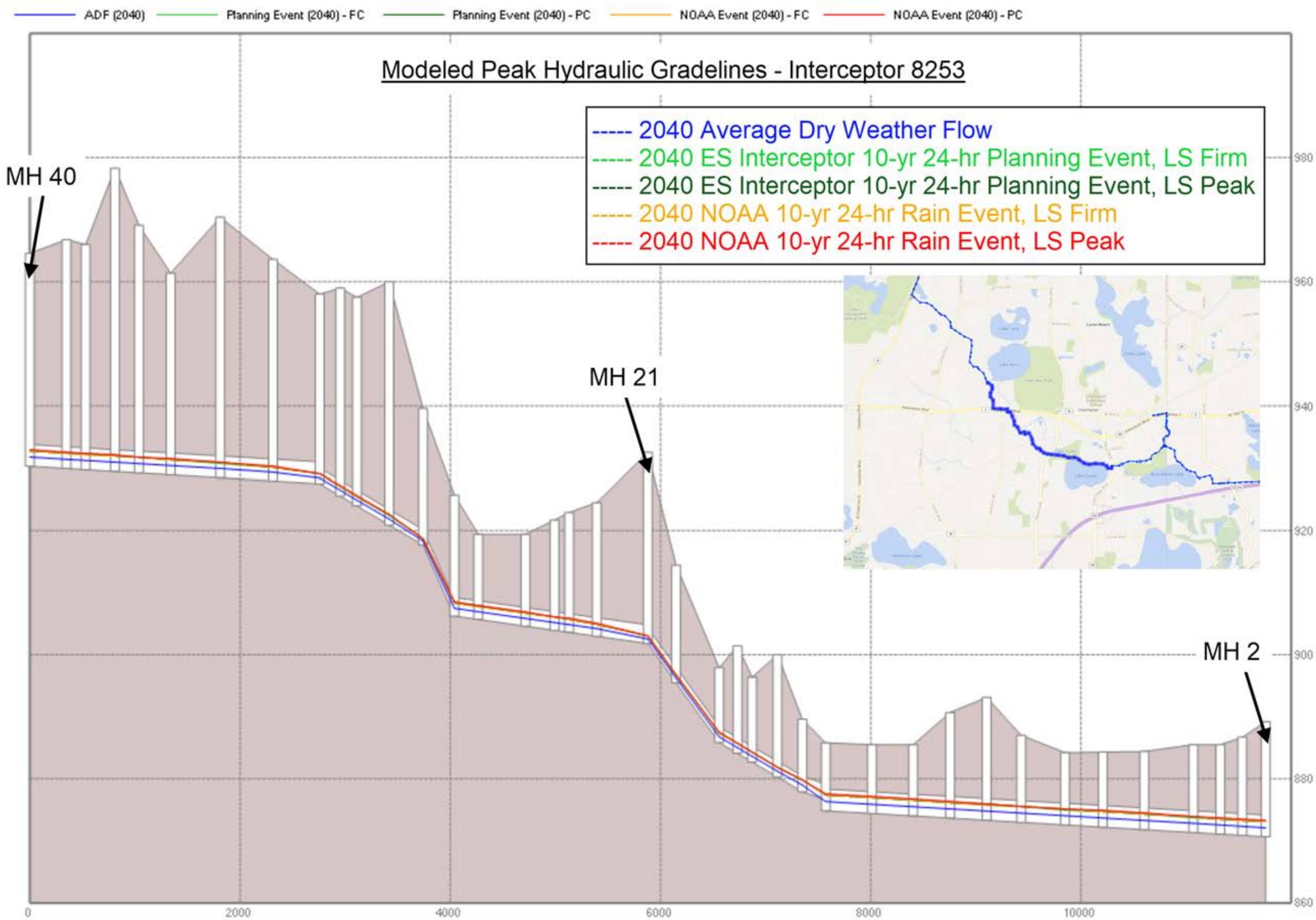


Figure 7-9. Interceptor 8253-328 Profile Showing Peak Hydraulic Gradelines

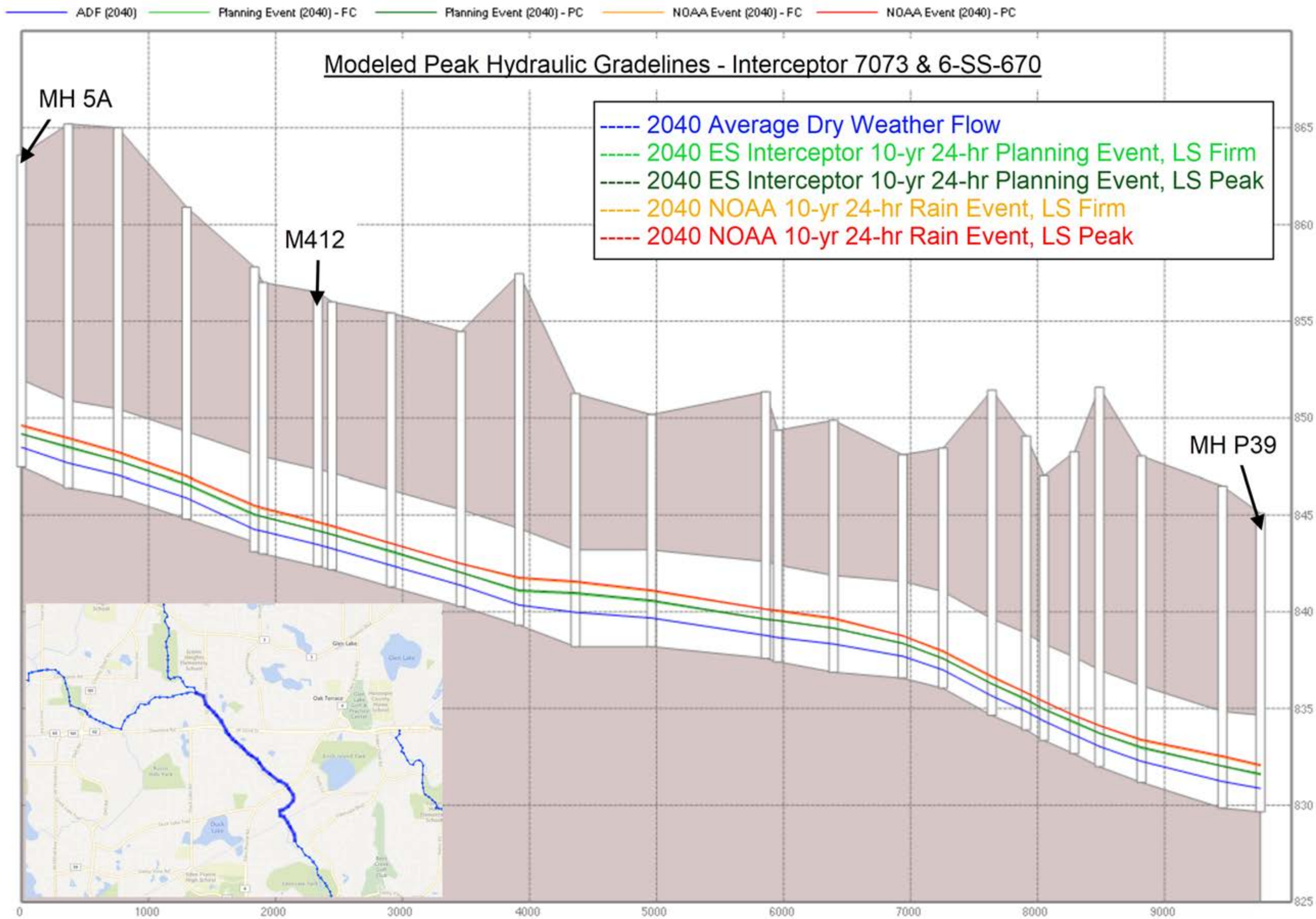


Figure 7-10. Interceptor 7073 and 6-SS-670 Profile Showing Peak Hydraulic Gradelines

Lift Station Results

Peak effluent (pumped) flow results for the lift stations are summarized in Tables 7-3 and 7-4. The peak values in bold text indicate the lift station's maximum modeled capacity is being used for the event. Hydraulic capacity restrictions at the lift station and/or upstream of the lift station are throttling flows in the model, in some instances causing manhole flooding.

Table 7-3. Lift Station Firm Capacity Peak Effluent Flow Results

Lift Station	Modeled Firm Capacity, mgd	Existing Condition		2030 Condition		2040 Condition	
		Planning Event	NOAA Event	Planning Event	NOAA Event	Planning Event	NOAA Event
L18	1.1	0.6	**1.1**	0.6	**1.1**	0.6	**1.1**
L19	9.4	2.8	4.1	3.7	5.4	3.7	5.4
L21 [a]	16.3	11.2	13.7	15.3	**16.3**	16.0	**16.3**
L24	4.5	1.0	1.4	1.5	2.1	1.6	2.2
L26	10.8	6.3	10.3	8.4	**10.8**	8.6	**10.8**
L38	8.9	4.5	6.9	6.6	**8.9**	6.6	**8.9**
L39	2.2	0.9	1.4	1.5	**2.2**	1.4	**2.2**
L44	3.7	1.9	3.3	2.3	3.7	2.4	**3.7**
L45	3.8	1.4	2.5	1.7	3.0	1.8	3.2
L46	2.3	0.8	1.5	1.0	1.7	1.0	1.8
L47	1.1	0.2	0.4	0.2	0.4	0.2	0.4
L48	1.7	0.6	0.9	0.6	1.0	0.6	0.9
L49	0.58	0.30	0.54	0.33	**0.58**	0.33	**0.58**
L50	0.40	0.18	0.30	0.22	0.36	0.22	0.35
L51	0.37	0.11	0.20	0.13	0.23	0.13	0.23
L59	3.8	2.1	3.7	2.5	**3.8**	2.7	**3.8**
L60	7.2	4.2	6.6	5.8	**7.2**	5.9	**7.2**
L63	3.0	2.5	**3.0**	**3.0**	**3.0**	**3.0**	**3.0**
L70	4.3	3.4	**4.3**	**4.3**	**4.3**	**4.3**	**4.3**

a. Control structure CS21 and storage tunnels upstream of lift station.

Table 7-4. Lift Station Peak Capacity Peak Effluent Flow Results							
Lift Station	Modeled Peak Capacity, mgd	Existing Condition		2030 Condition		2040 Condition	
		Planning Event	NOAA Event	Planning Event	NOAA Event	Planning Event	NOAA Event
L18	1.4	0.6	1.1	0.6	1.2	0.6	1.2
L19	10.7	2.8	4.1	3.7	5.4	3.7	5.4
L21 [a]	17.6	11.2	13.8	16.0	**17.6**	16.7	**17.6**
L24	4.7	1.0	1.4	1.5	2.1	1.6	2.2
L26	12.7	6.0	10.6	8.8	12.4	9.2	**12.7**
L38	11.9	4.5	6.9	6.6	10.0	6.6	9.9
L39	2.9	0.9	1.4	1.5	2.2	1.4	2.2
L44	4.2	1.9	3.3	2.3	4.0	2.4	**4.2**
L45	4.2	1.4	2.5	1.7	3.0	1.8	3.2
L46	2.9	0.8	1.5	1.0	1.7	1.0	1.8
L47	1.5	0.2	0.4	0.2	0.4	0.2	0.4
L48	1.8	0.6	0.9	0.6	1.0	0.6	0.9
L49	0.63	0.30	0.54	0.33	0.59	0.33	0.59
L50	0.55	0.18	0.30	0.22	0.36	0.22	0.35
L51	0.45	0.11	0.20	0.13	0.23	0.13	0.23
L59	6.5	2.1	3.8	2.5	4.7	2.7	4.8
L60	7.6	4.2	7.1	6.3	**7.6**	6.4	**7.6**
L63	3.6	2.5	**3.6**	**3.6**	**3.6**	**3.6**	**3.6**
L70	4.9	3.4	4.3	**4.9**	**4.9**	**4.9**	**4.9**

a. *Control structure CS21 and storage tunnels upstream of lift station.*

Section 8: Summary

The Lake Minnetonka Service Area collection system model has been updated and calibrated using years of flow and rainfall data provided by MCES.

Two rainfall events, the ES Interceptor 10-year, 24-hour Planning Event and the NOAA 10-year, 24-hour Rainfall Event, were simulated using the calibrated model for existing, 2030, and 2040 conditions using both firm and peak capacities at MCES lift stations.

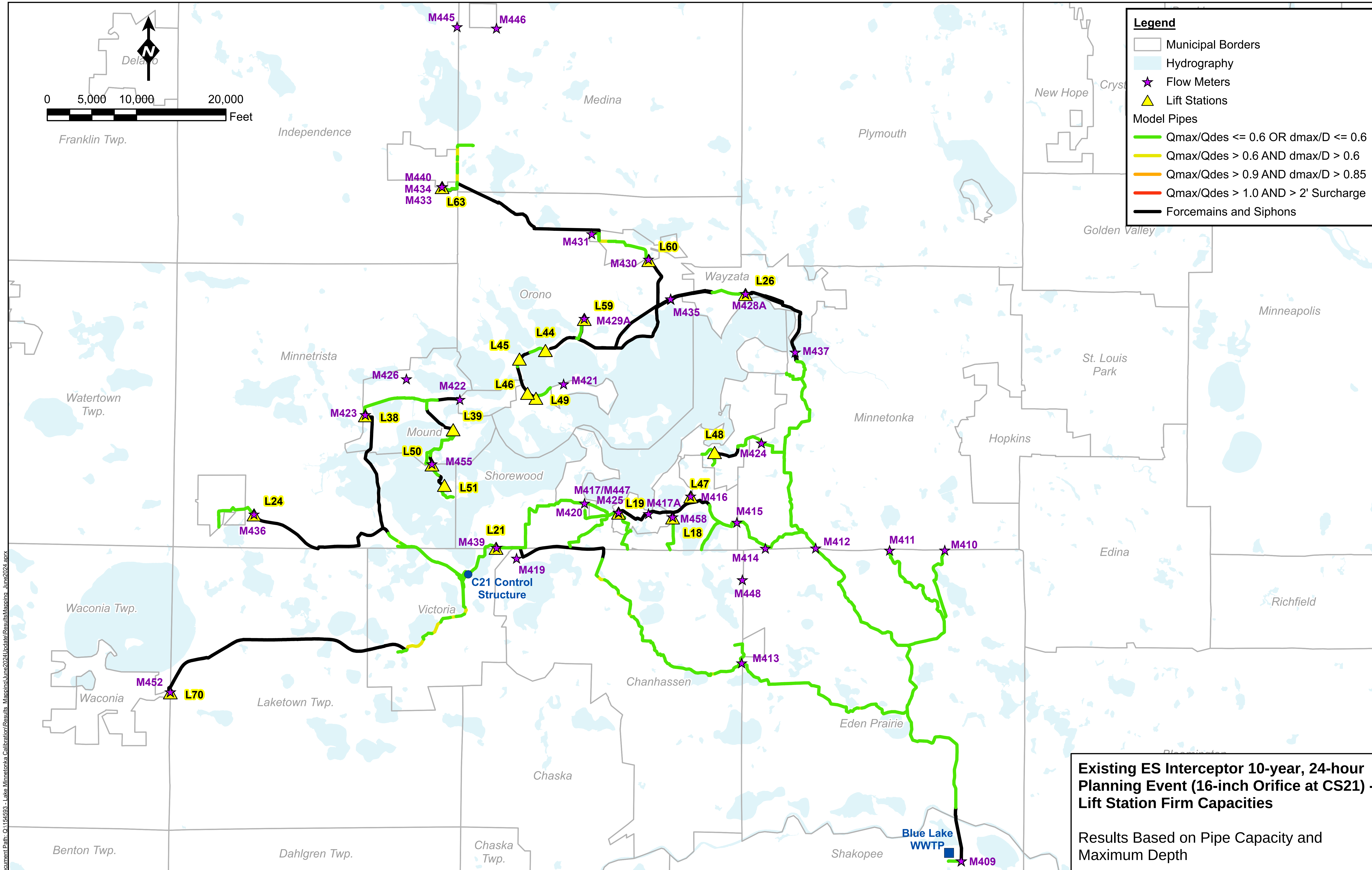
Results for the 2040 ES Interceptor Planning Event indicate the following:

- Approximately 2.1 percent of the modeled gravity pipes use greater than 90 percent of their full capacity and 85 percent of their full depth for the lift station firm capacity scenario.
- Approximately 2.6 percent of the modeled gravity pipes use greater than 90 percent of their full capacity and 85 percent of their full depth for the lift station peak capacity scenario.
- The existing modeled firm and peak capacities at lift stations L63 and L70 are not adequate, resulting in elevated hydraulic gradelines and manhole flooding upstream of the lift stations.

Results for the 2040 NOAA Event indicate the following:

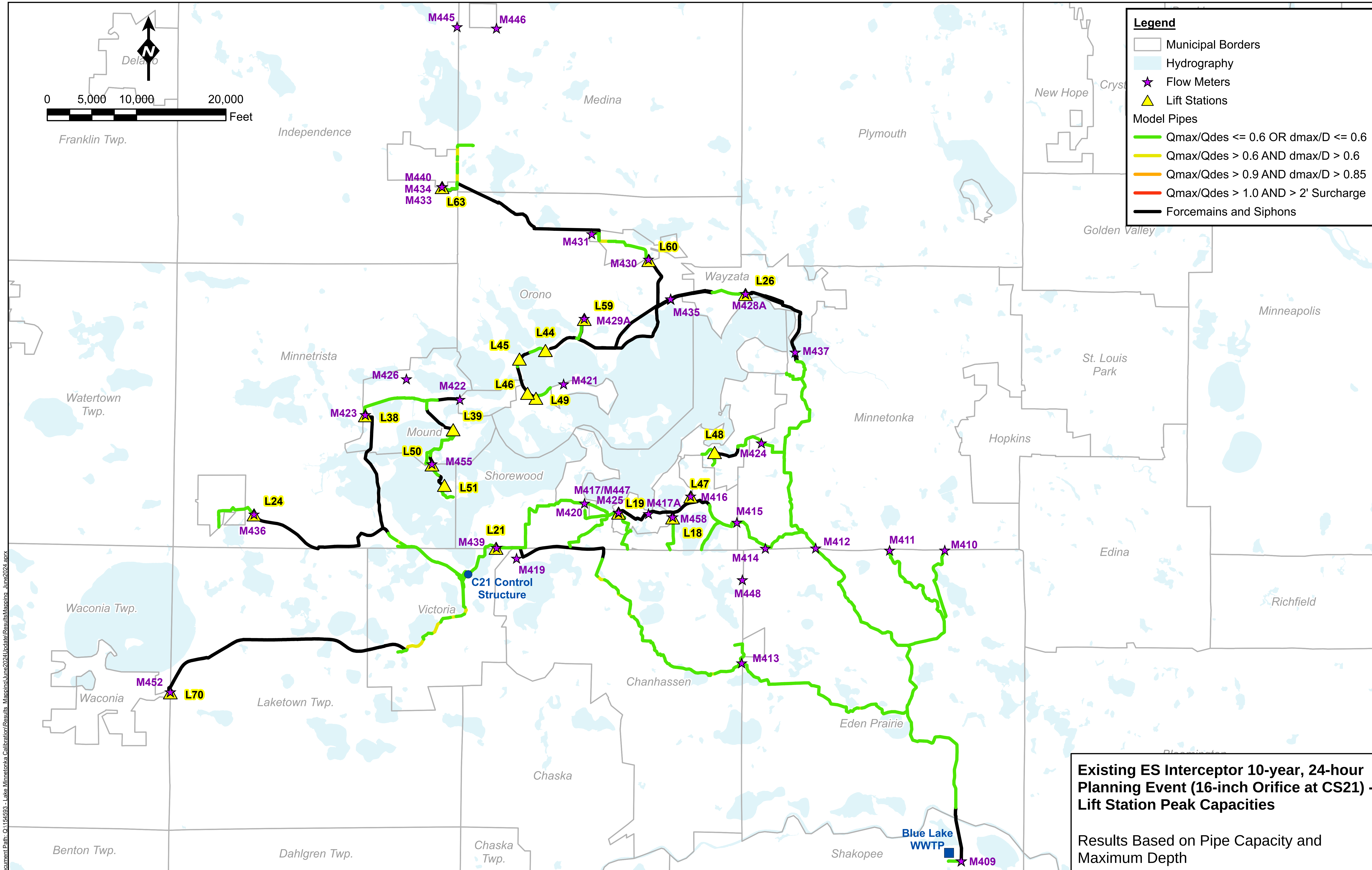
- Approximately 6.7 percent of the modeled gravity pipes use greater than 90 percent of their full capacity and 85 percent of their full depth for the lift station firm capacity scenario.
- Approximately 7.5 percent of the modeled gravity pipes use greater than 90 percent of their full capacity and 85 percent of their full depth for the lift station peak capacity scenario.
- The existing modeled firm capacities at lift stations L21, L26, L44, L59, L60, L63, and L70 are not adequate, resulting in elevated hydraulic gradelines and manhole flooding upstream of lift stations L21, L59, L60, L63, and L70.
- The existing modeled firm capacities at lift stations L18, L38, L39, and L49 are reached during the peak of the event, but little or no surcharging occurs upstream.
- The existing modeled peak capacities at lift stations L21, L60, L63, and L70 are not adequate, resulting in elevated hydraulic gradelines and manhole flooding upstream of the lift stations.
- The existing modeled peak capacities at lift stations L26 and L44 are reached during the peak of the event, but little or no surcharging occurs upstream.

Attachment A: Capacity Result Maps (Based on Flow and Depth)



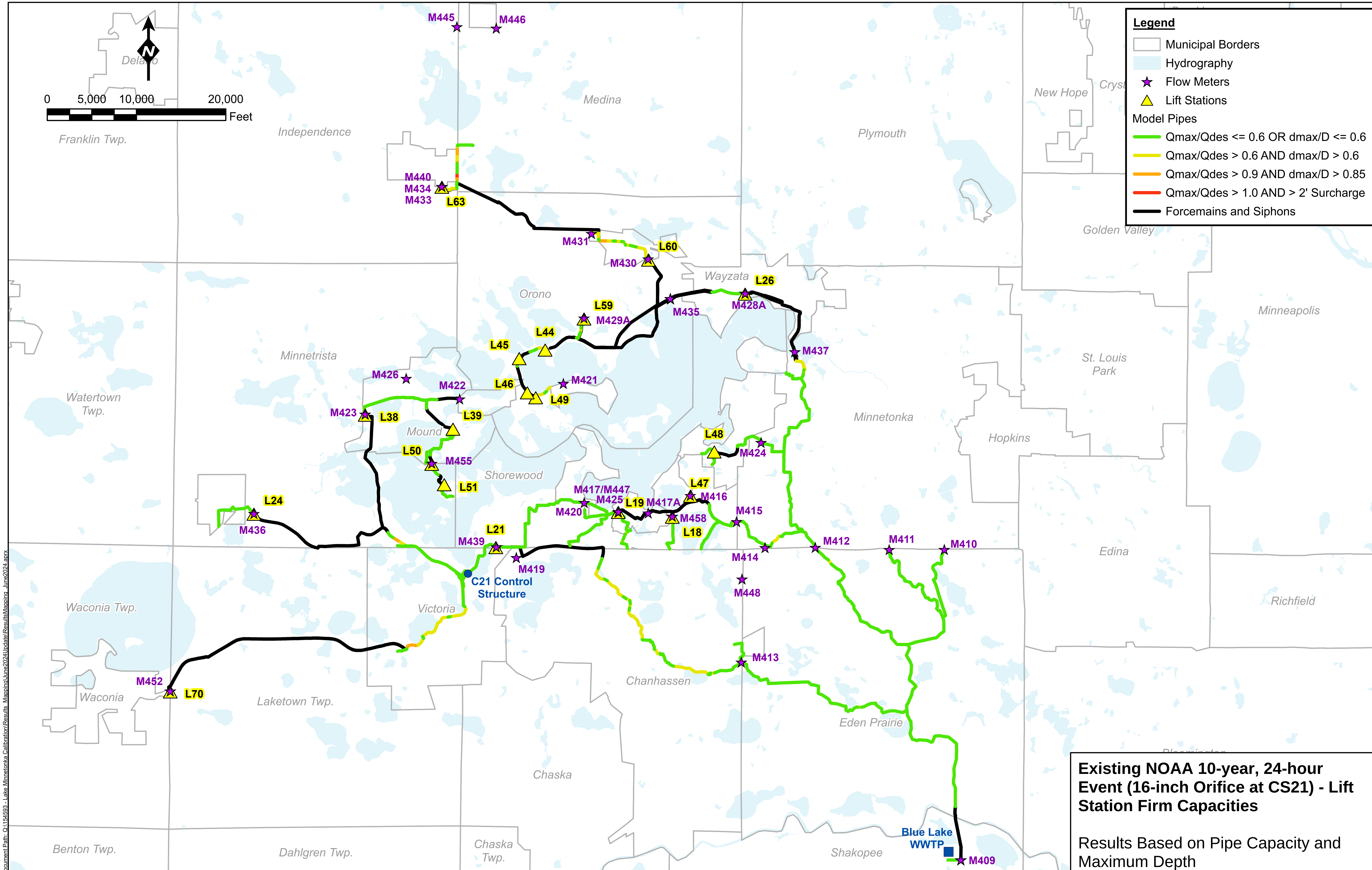
Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Capacity and Maximum Depth



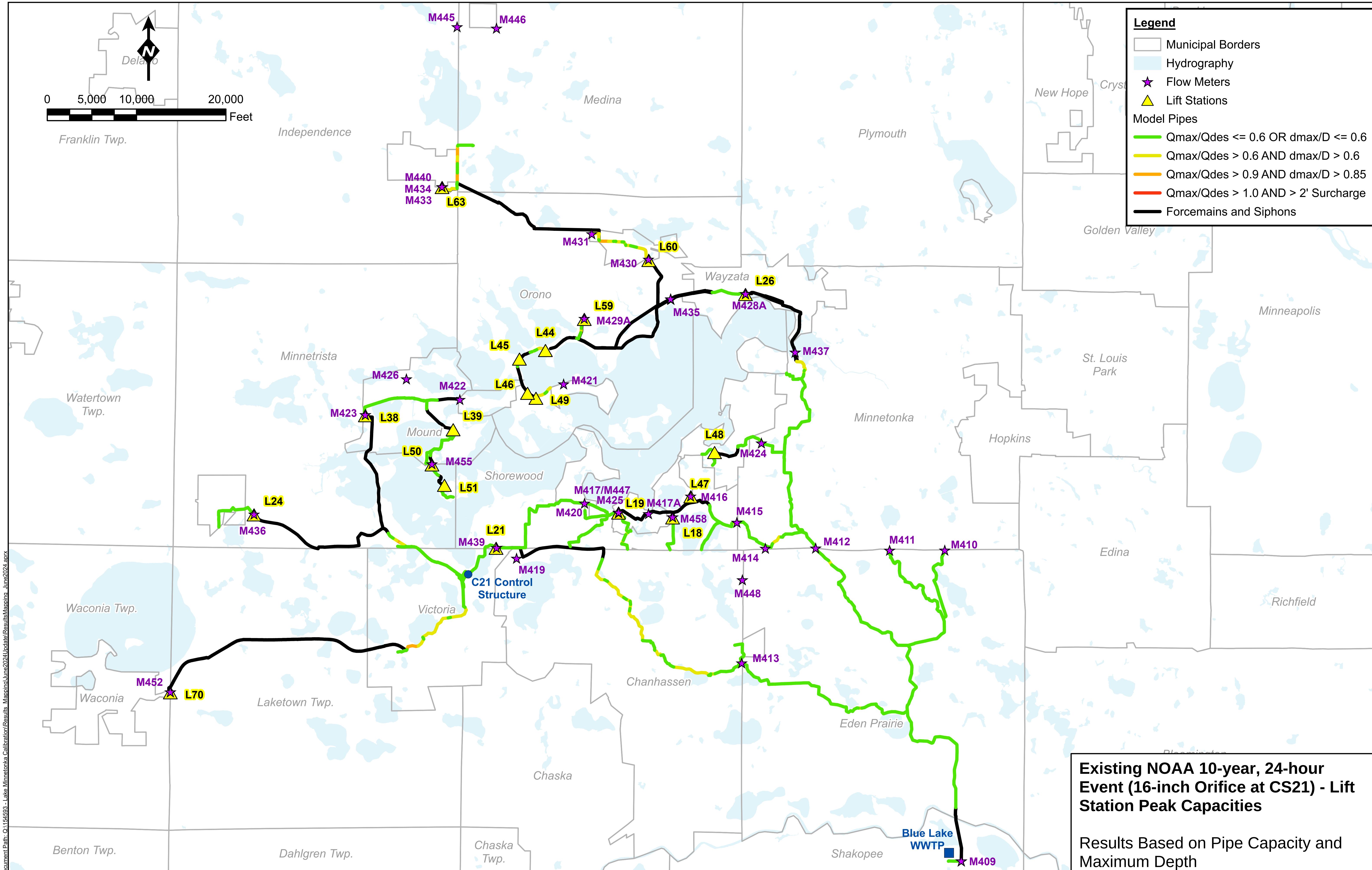
Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity and Maximum Depth



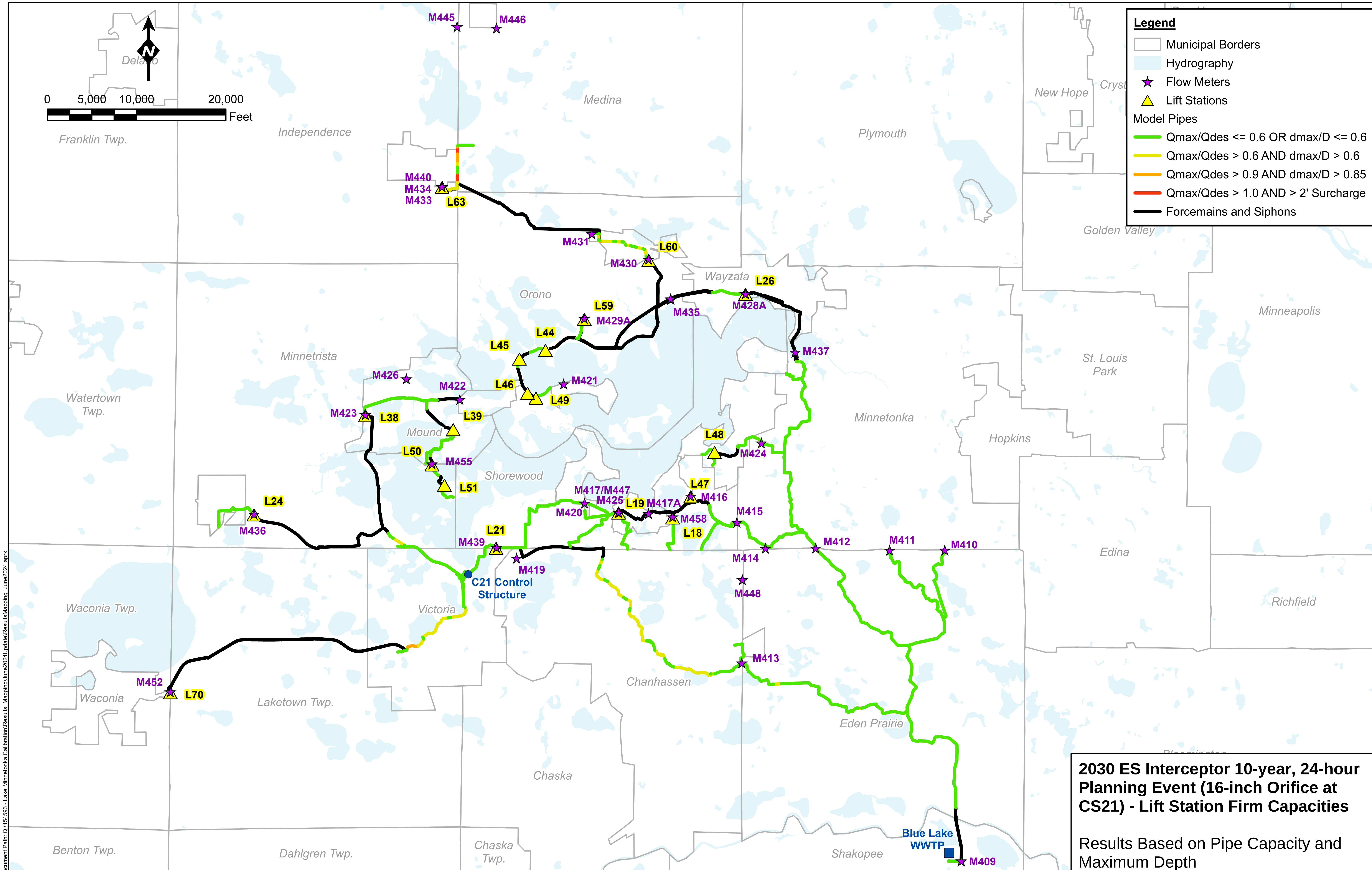
Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Capacity and Maximum Depth



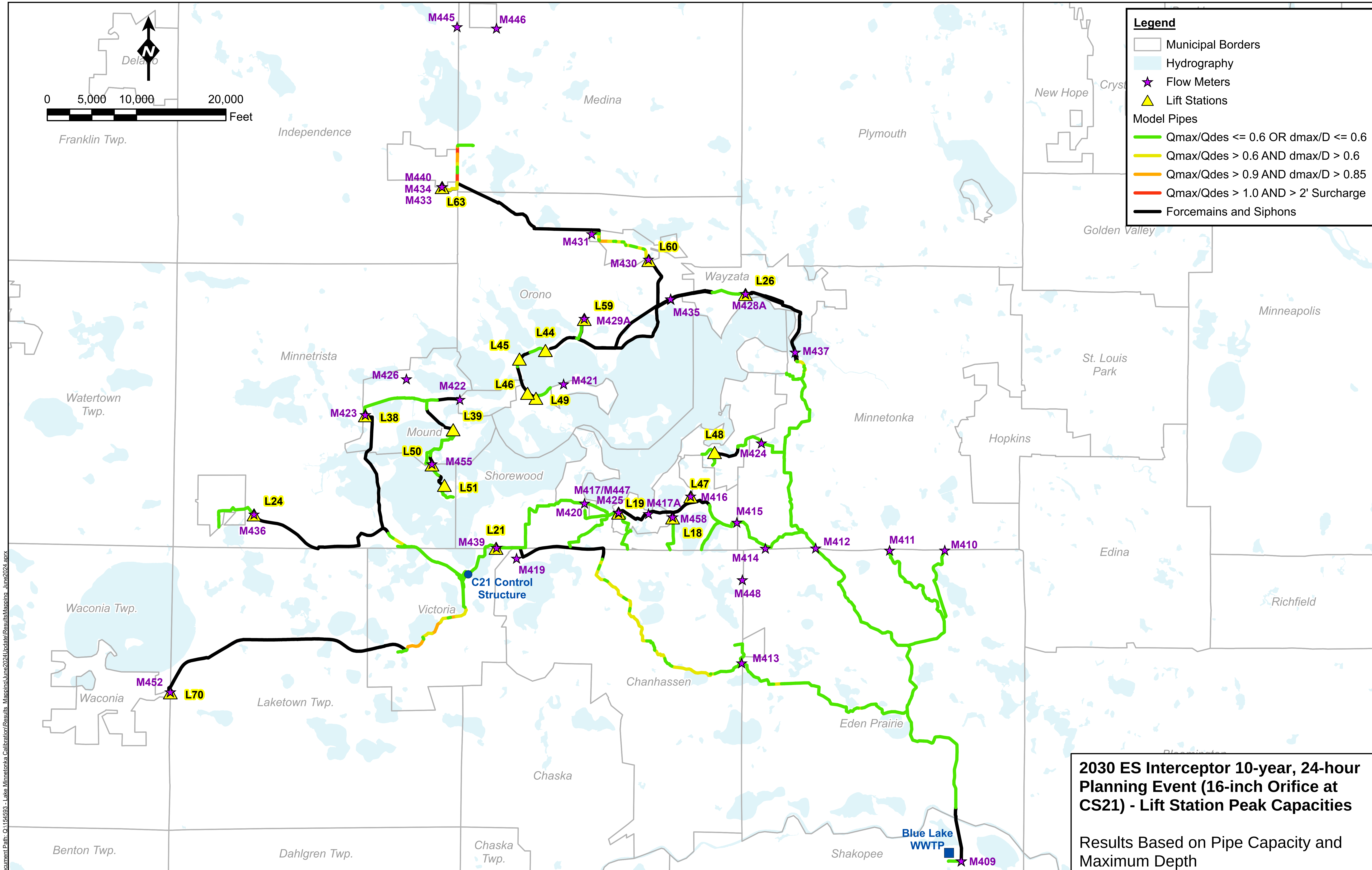
Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity and Maximum Depth



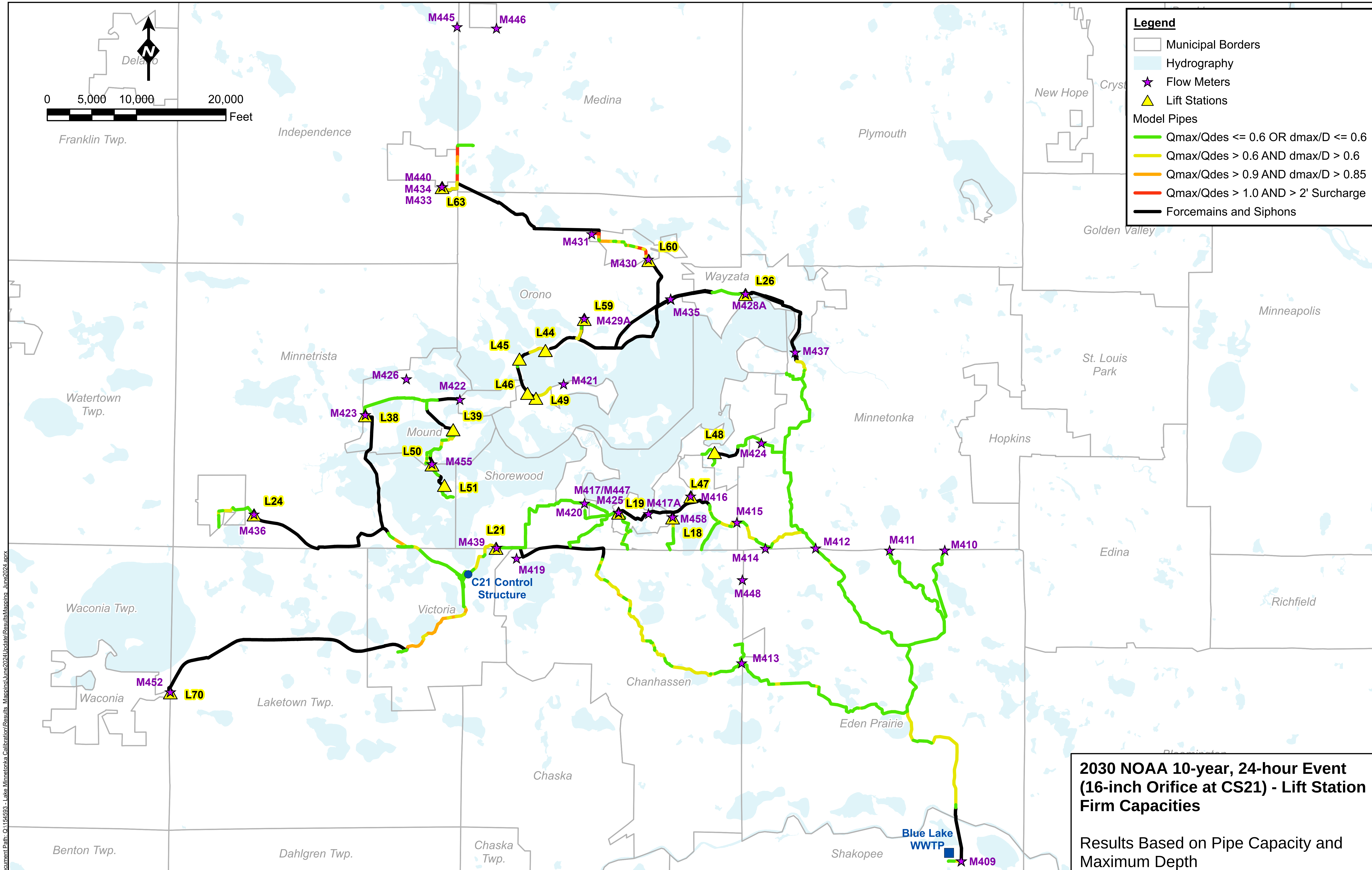
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Capacity and Maximum Depth



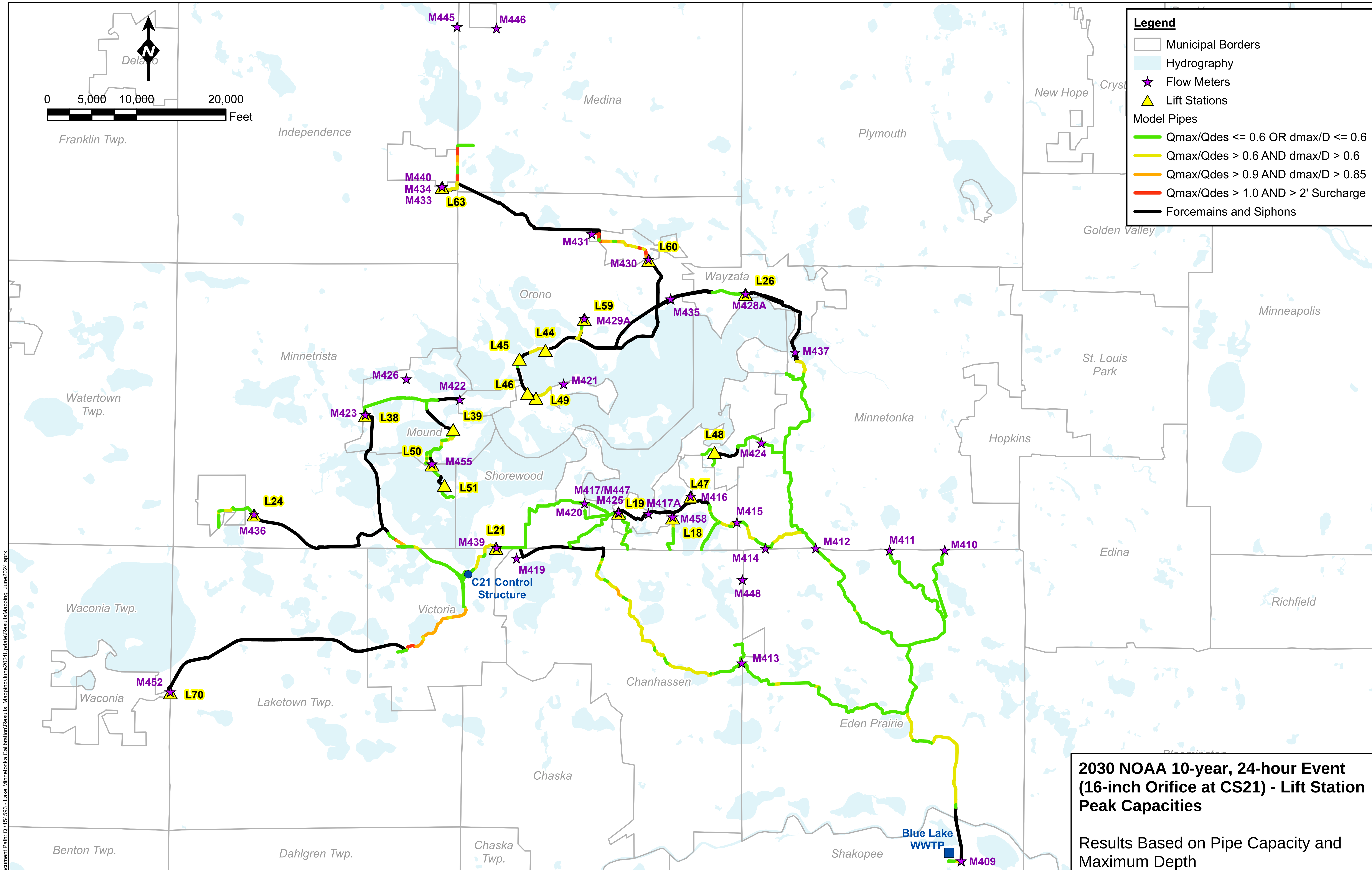
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity and Maximum Depth



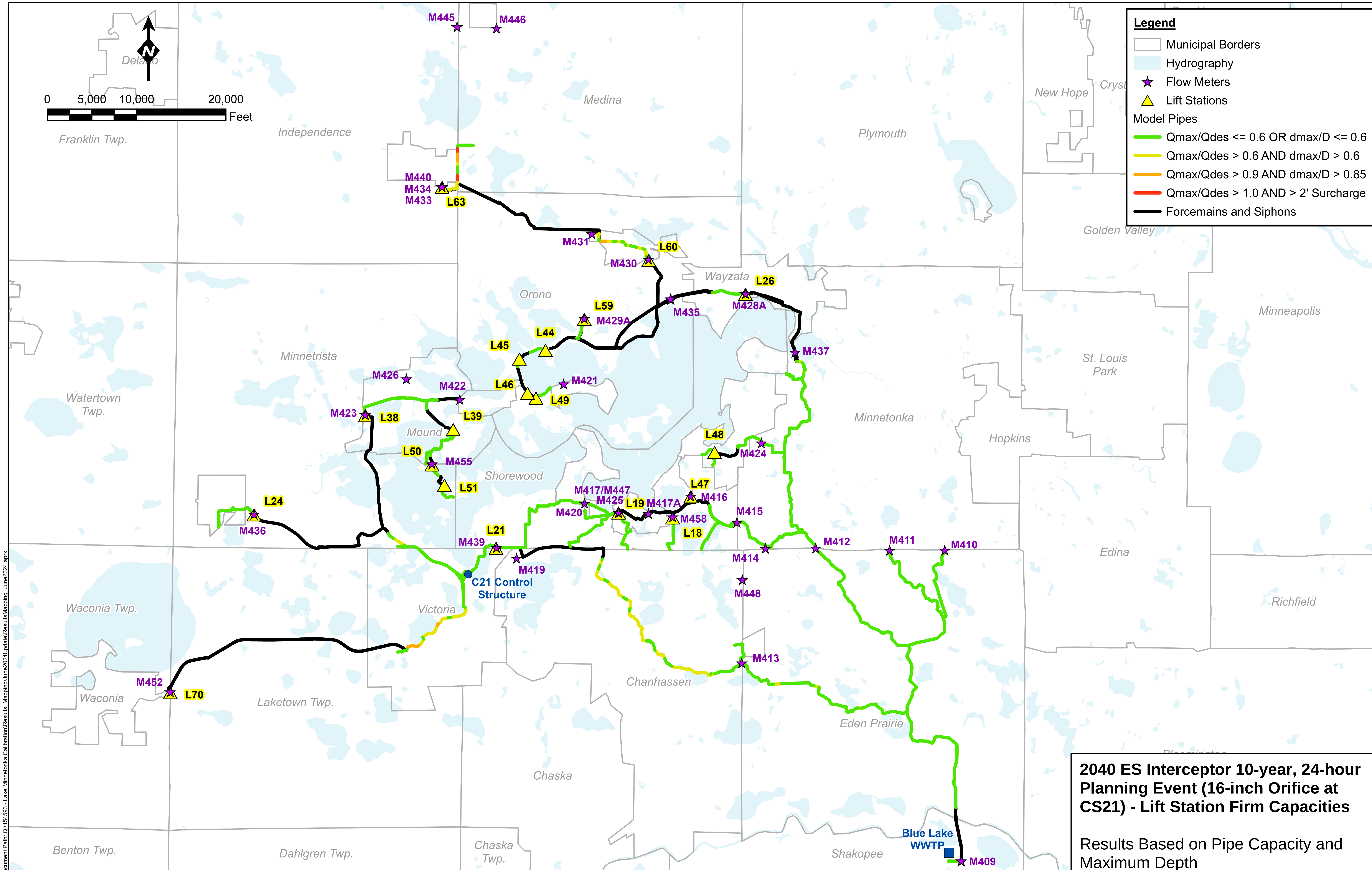
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Capacity and Maximum Depth



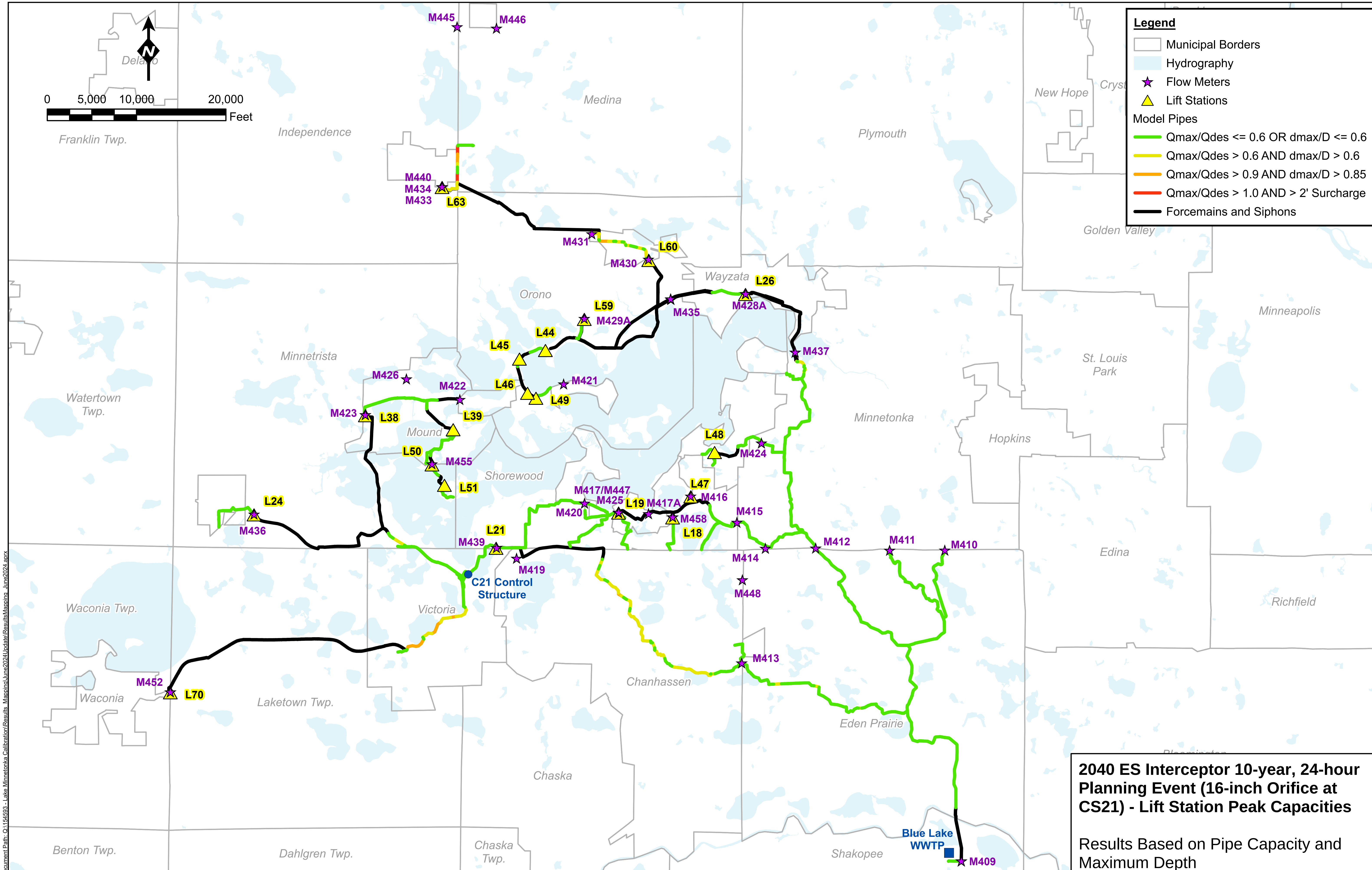
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity and Maximum Depth



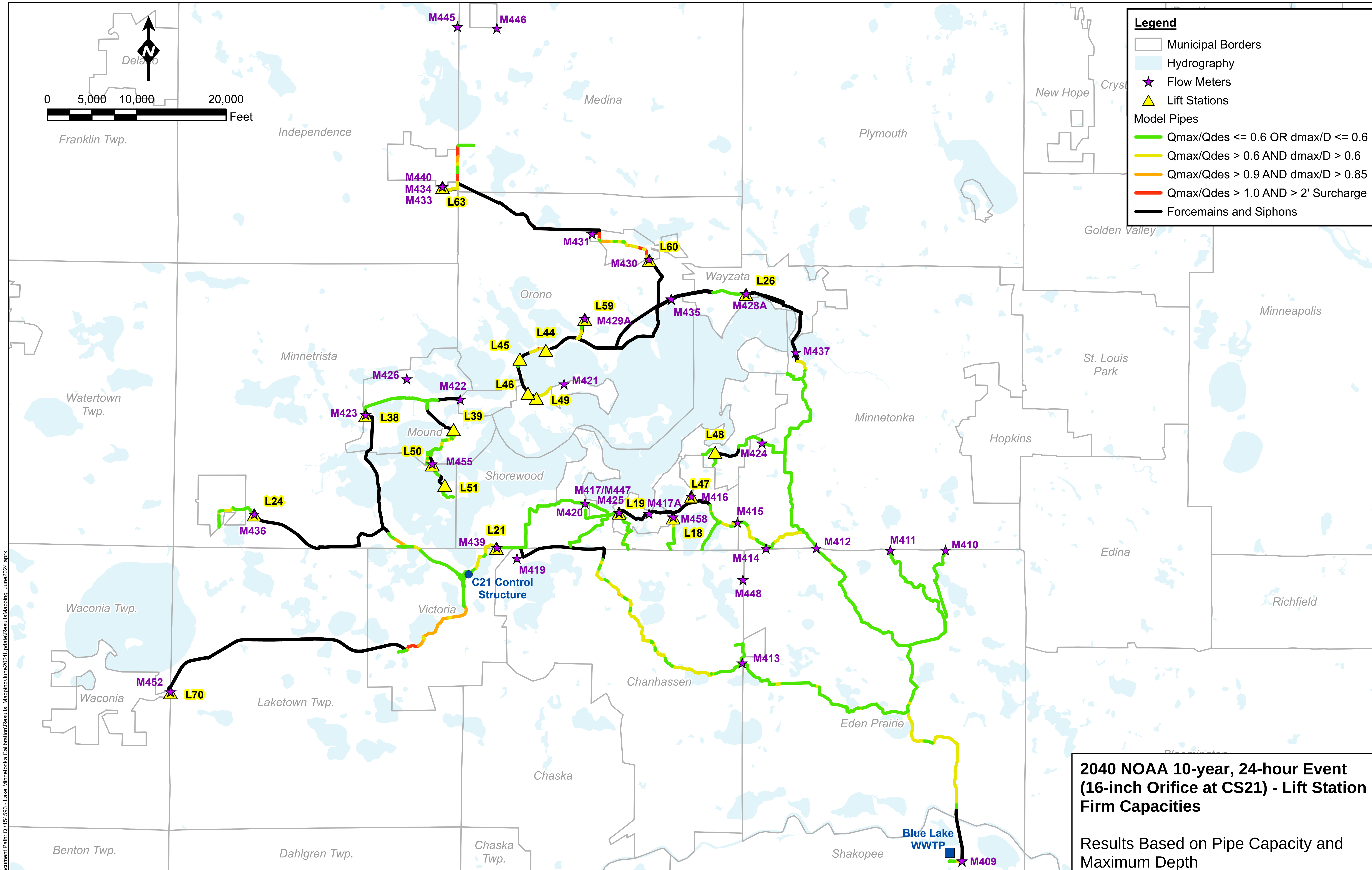
2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Capacity and Maximum Depth



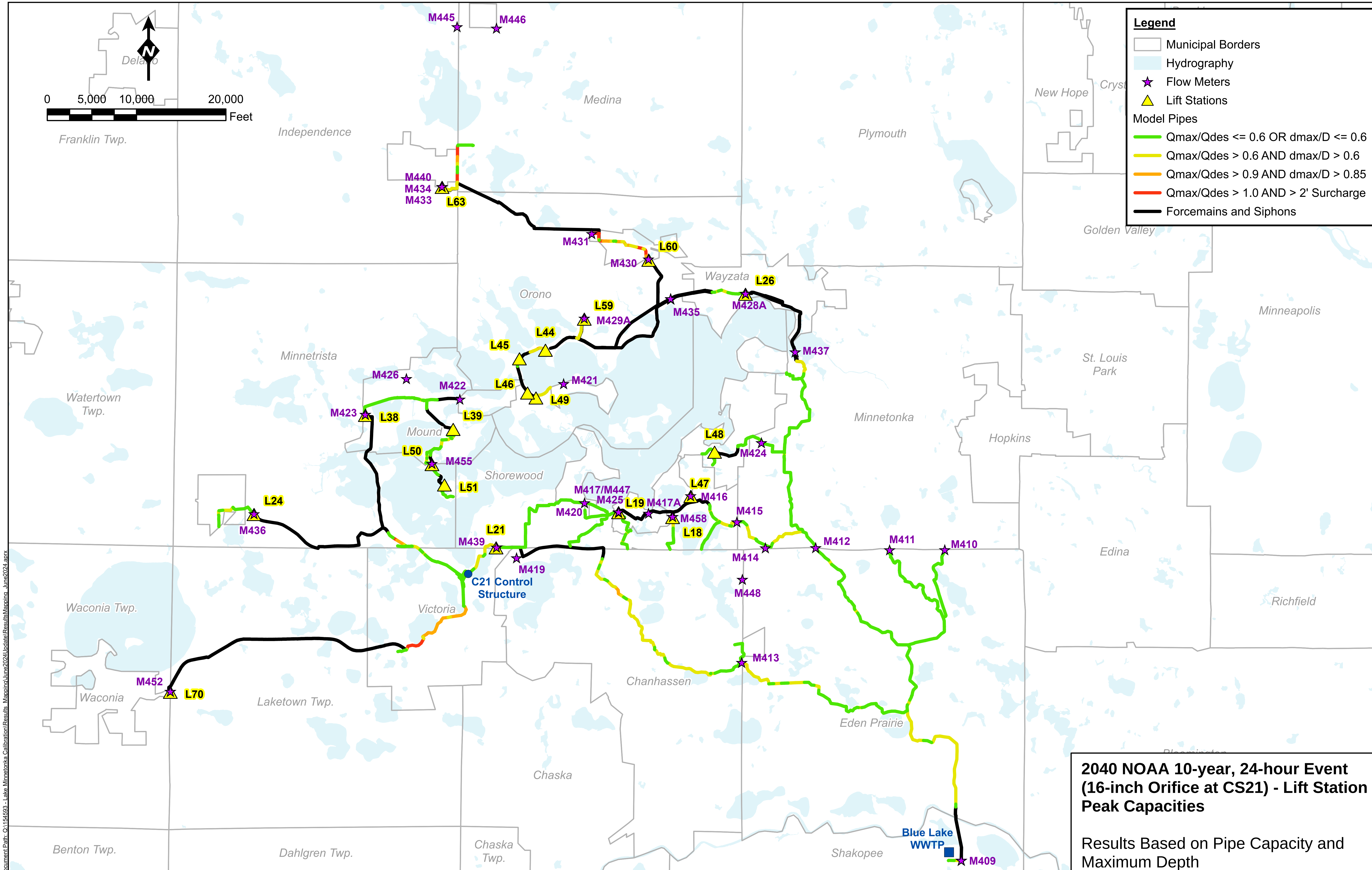
2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity and Maximum Depth



2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

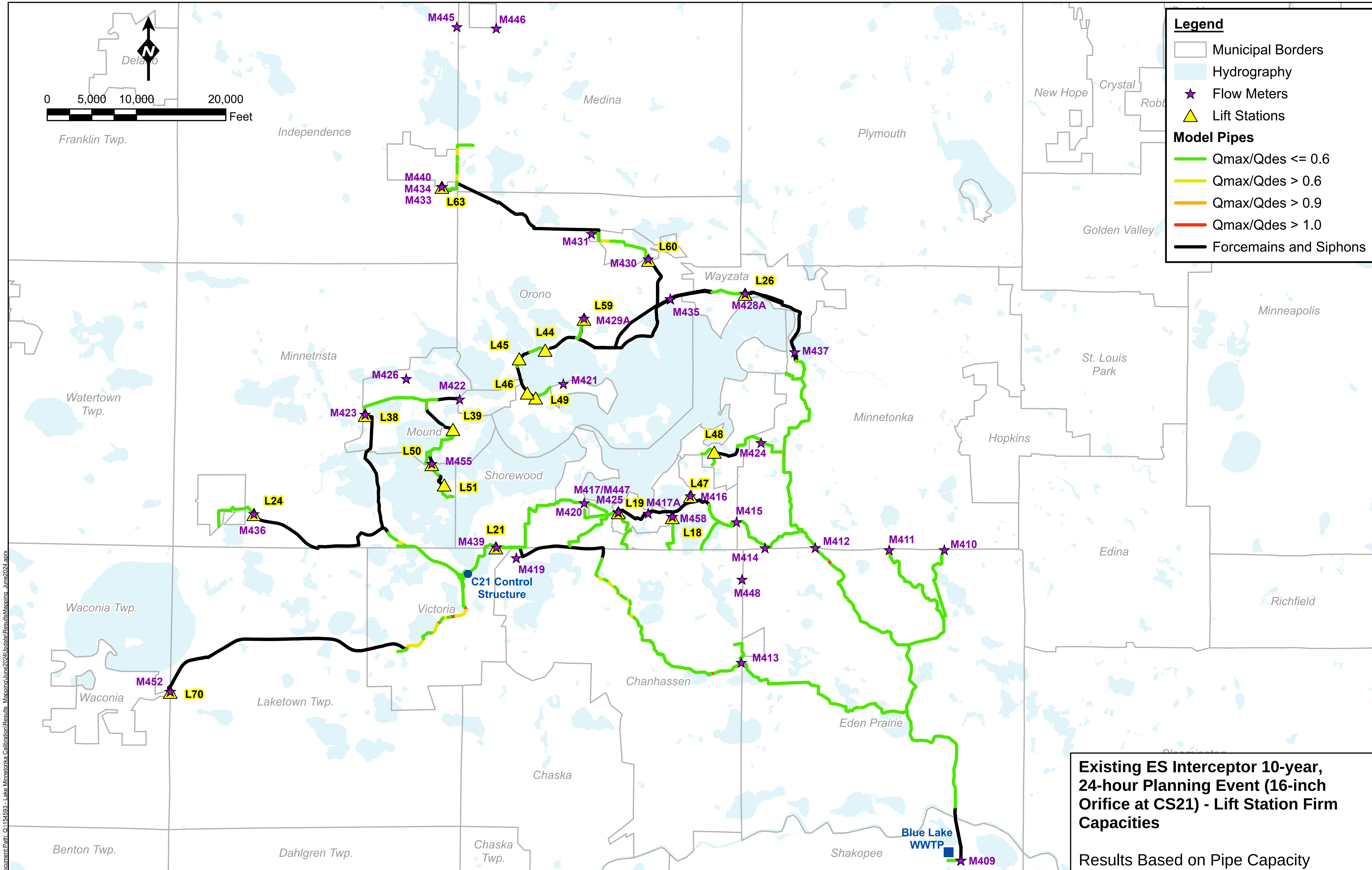
Results Based on Pipe Capacity and Maximum Depth



2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity and Maximum Depth

Attachment B: Capacity Result Maps (Based on Flow Only)



Legend
Municipal Borders
Hydrography
Flow Meters
Lift Stations
Model Pipes
Qmax/Qdes <= 0.6
Qmax/Qdes > 0.6
Qmax/Qdes > 0.9
Qmax/Qdes > 1.0
Forcemains and Siphons
0
5,000
10,000
20,000
Feet
Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities
Results Based on Pipe Capacity
Franklin Twp.
Independence
Medina
Plymouth
New Hope
Crystal
Golden Valley
Wayzata
Orono
Minnetrista
Watertown Twp.
Mound
Shorewood
Minnetonka
St. Louis Park
Minneapolis
Hopkins
Edina
Richfield
Waconia Twp.
Victoria
Waconia
Laketown Twp.
Chanhassen
Eden Prairie
Chaska
Chaska Twp.
Benton Twp.
Dahlgren Twp.
Shakopee
C21 Control Structure
Blue Lake WWTP
M445
M446
M440
M434
M433
L63
M431
M430
L60
L26
M435
M428A
L59
M429A
L44
L45
M437
M426
M422
M421
L46
L49
M423
L38
L39
L48
M424
L50
M455
L51
M417/M447
M425
L47
M416
M420
L19
M417A
M458
L18
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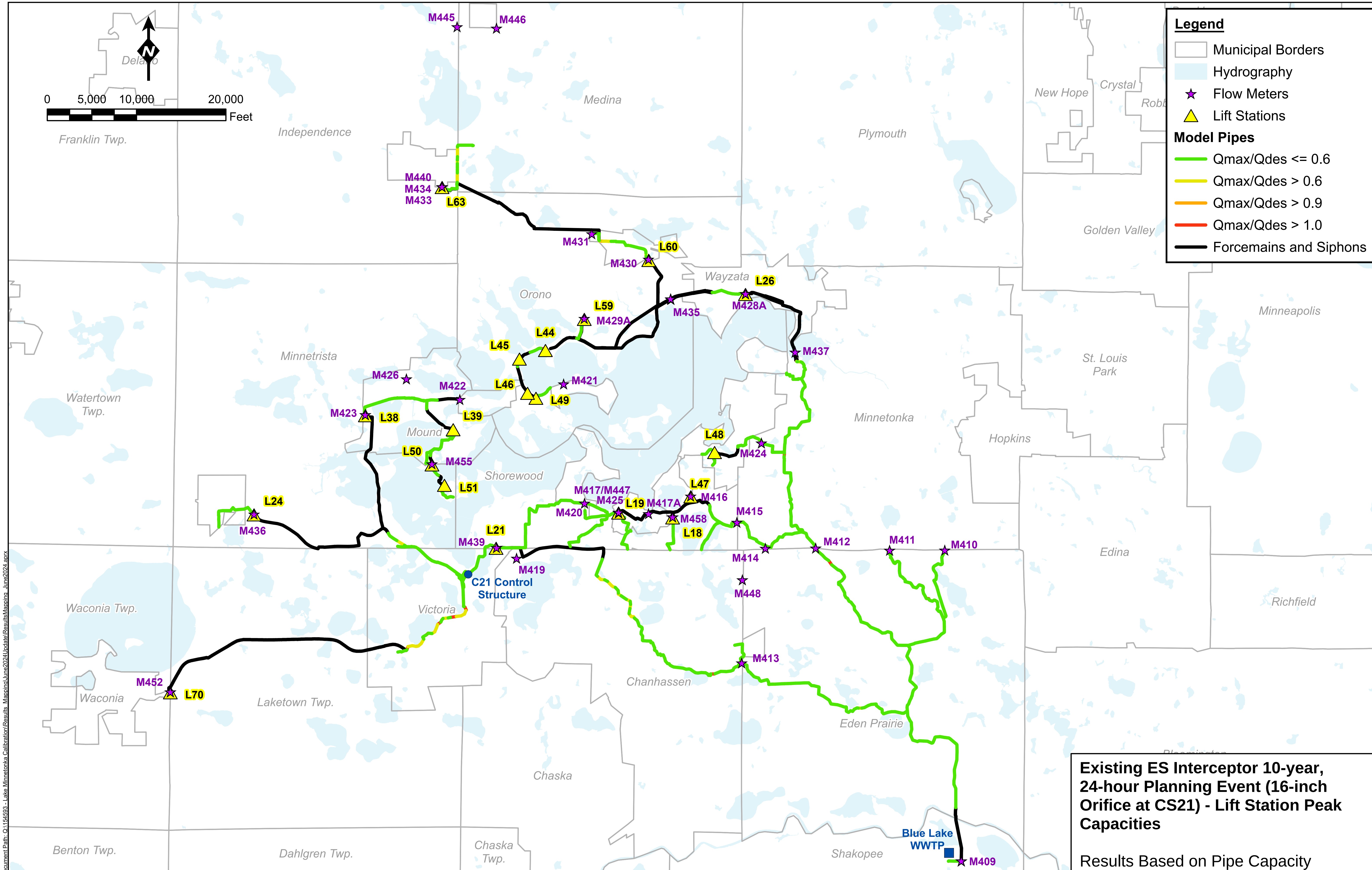
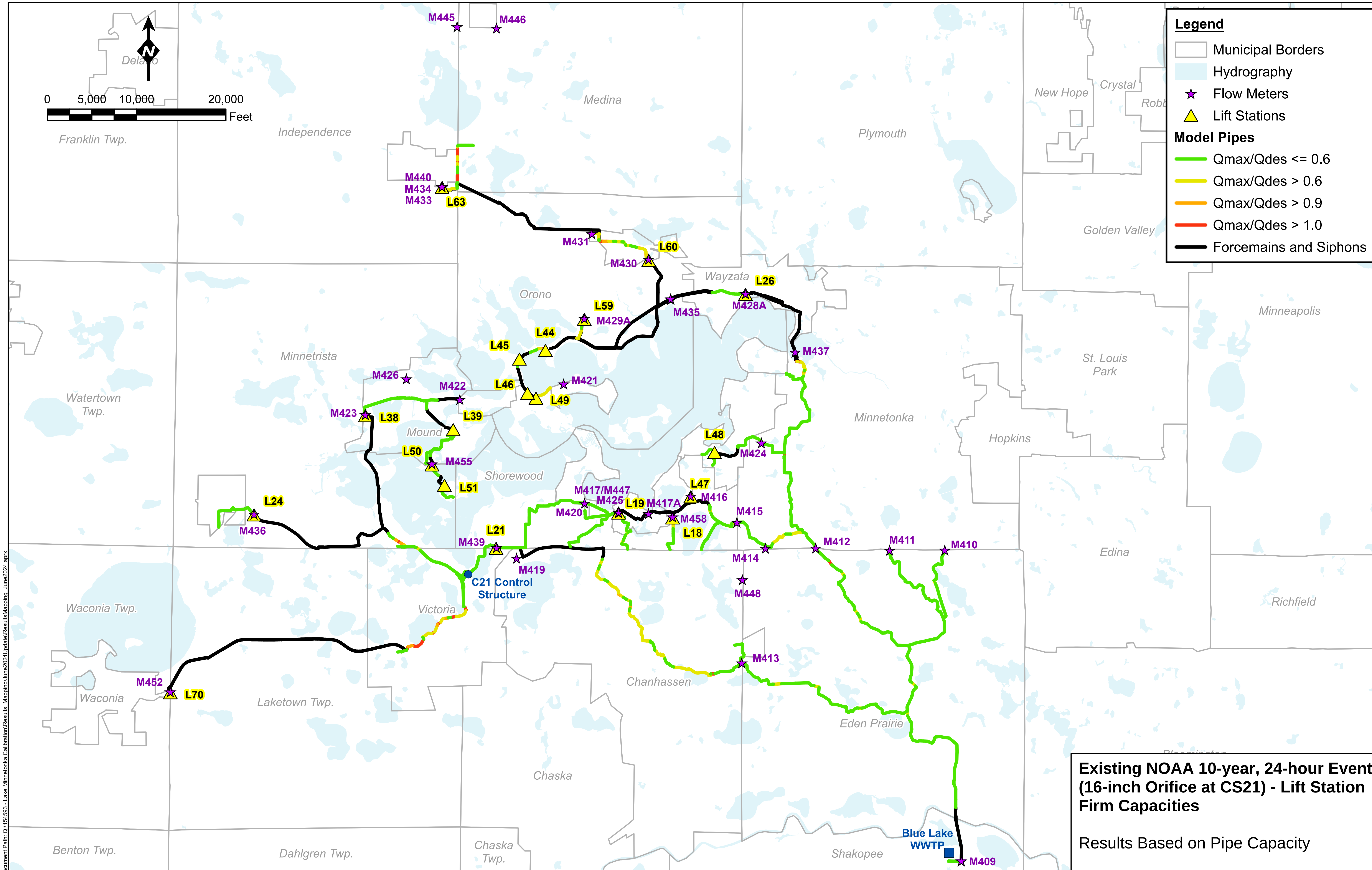
M413
M452
L70
M409



Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

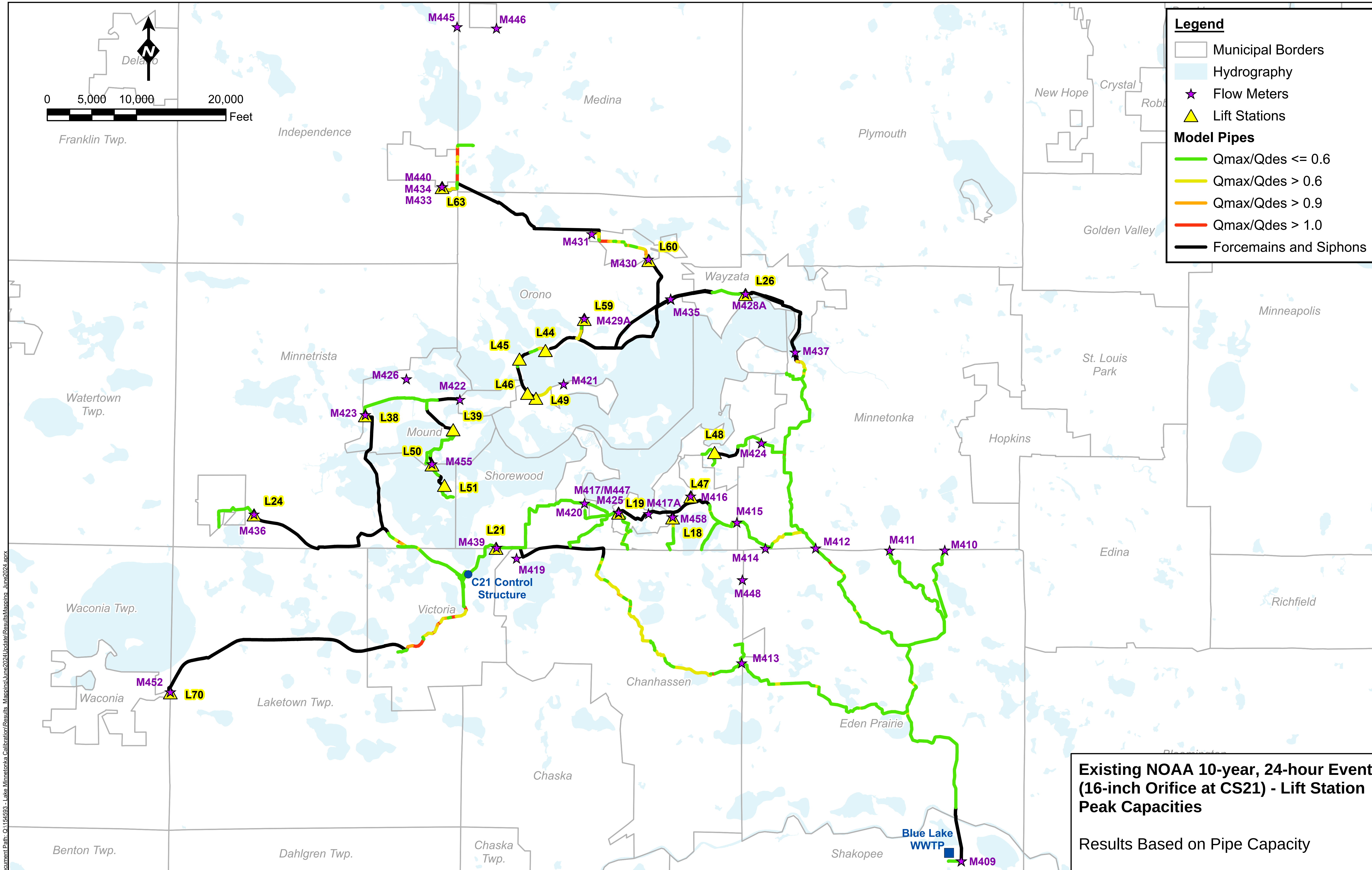
Results Based on Pipe Capacity



Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

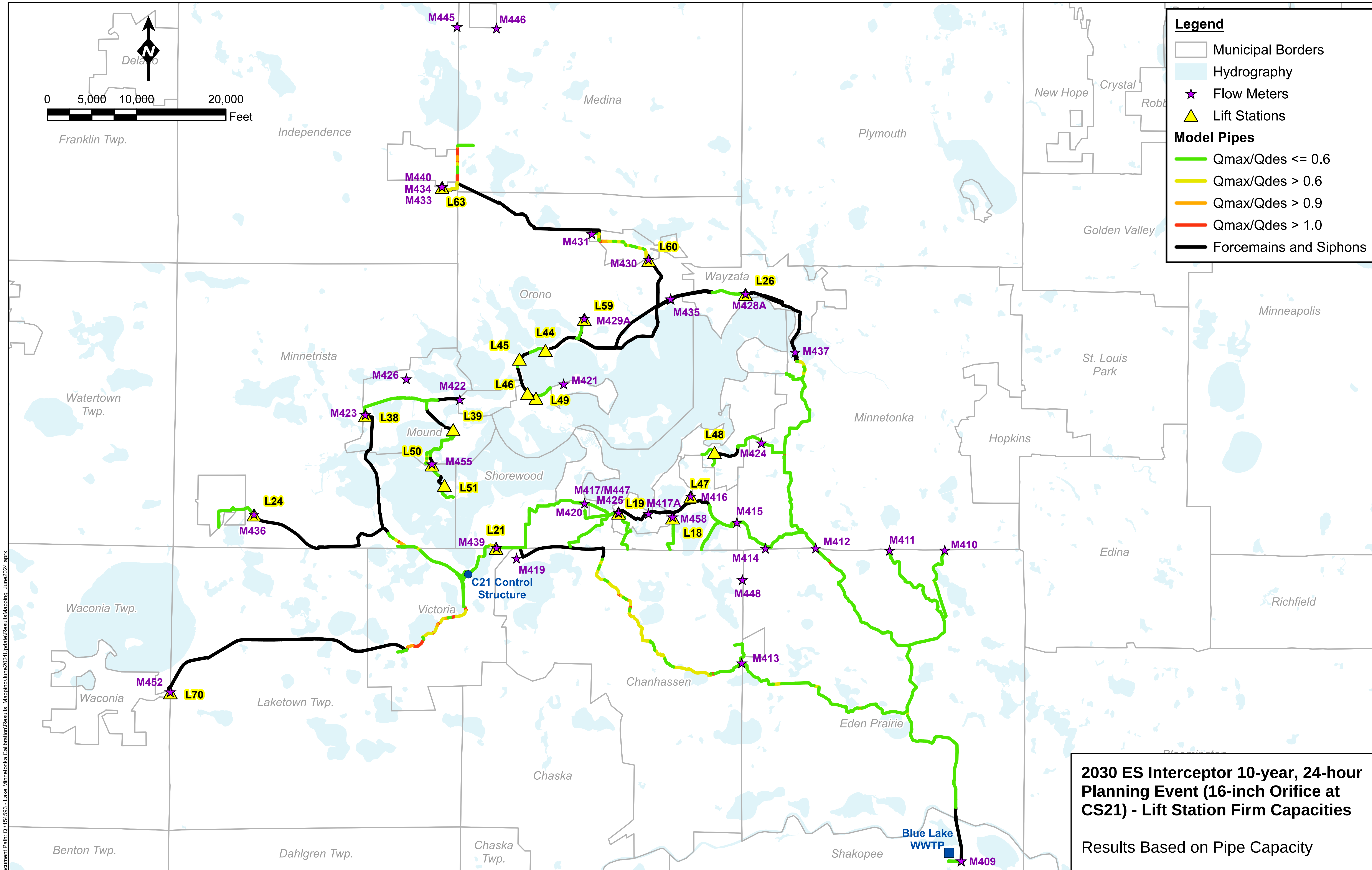
Results Based on Pipe Capacity

Document Path: Q:\154593 - Lake Minnetonka Calibration\Results Mapping\June2024Update\ResultsMapping_June2024.aprx



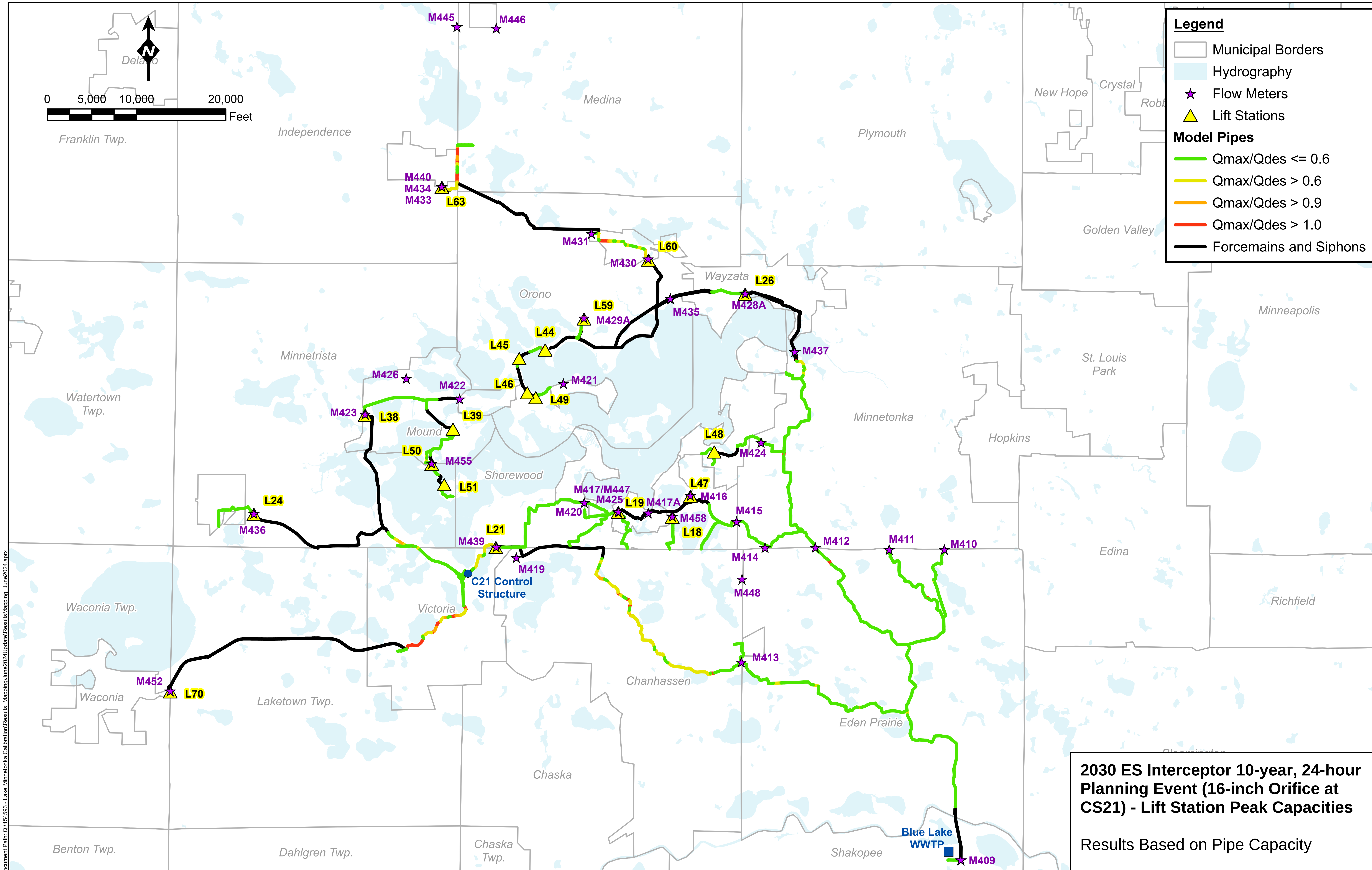
Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity



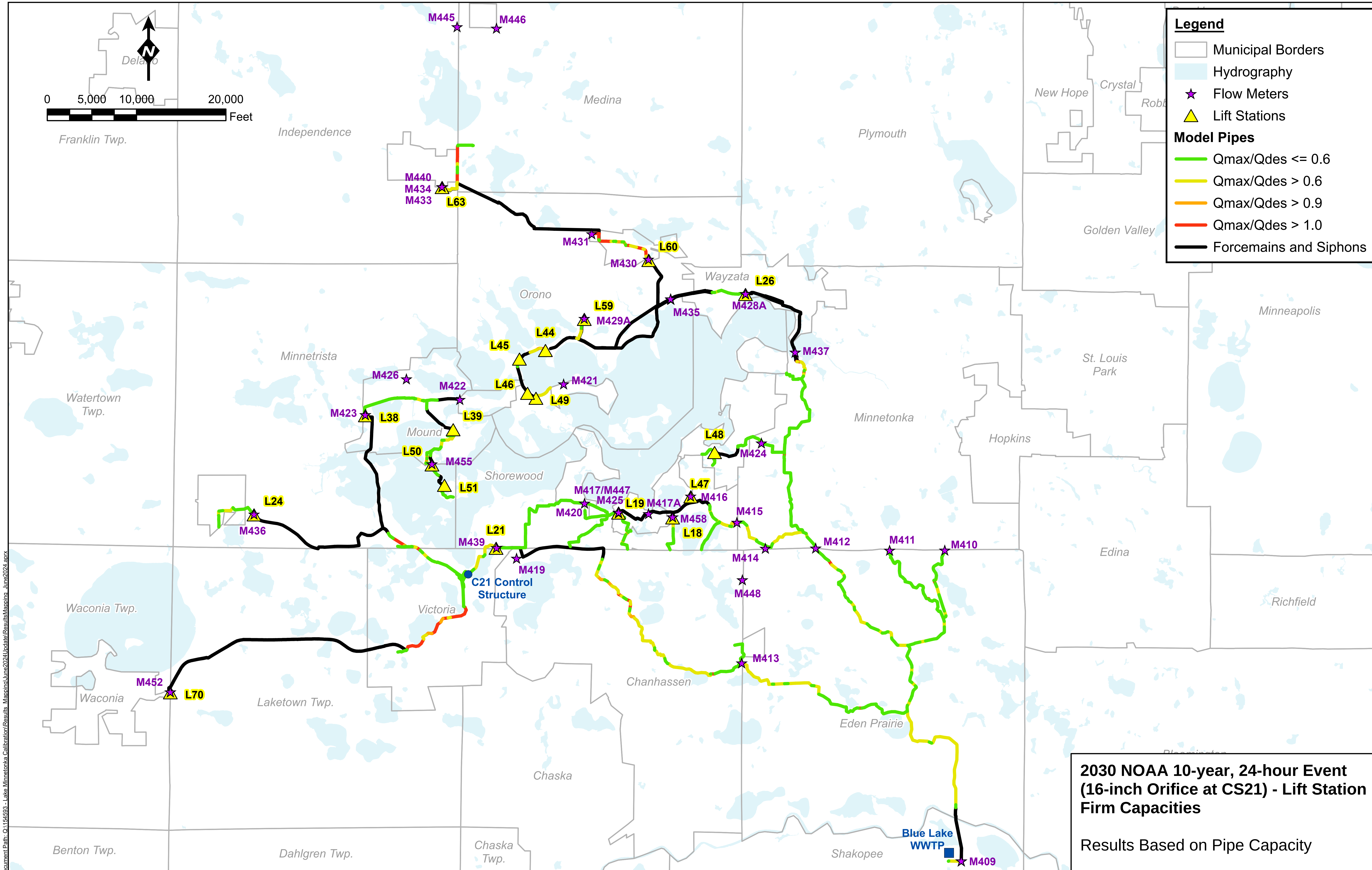
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Capacity



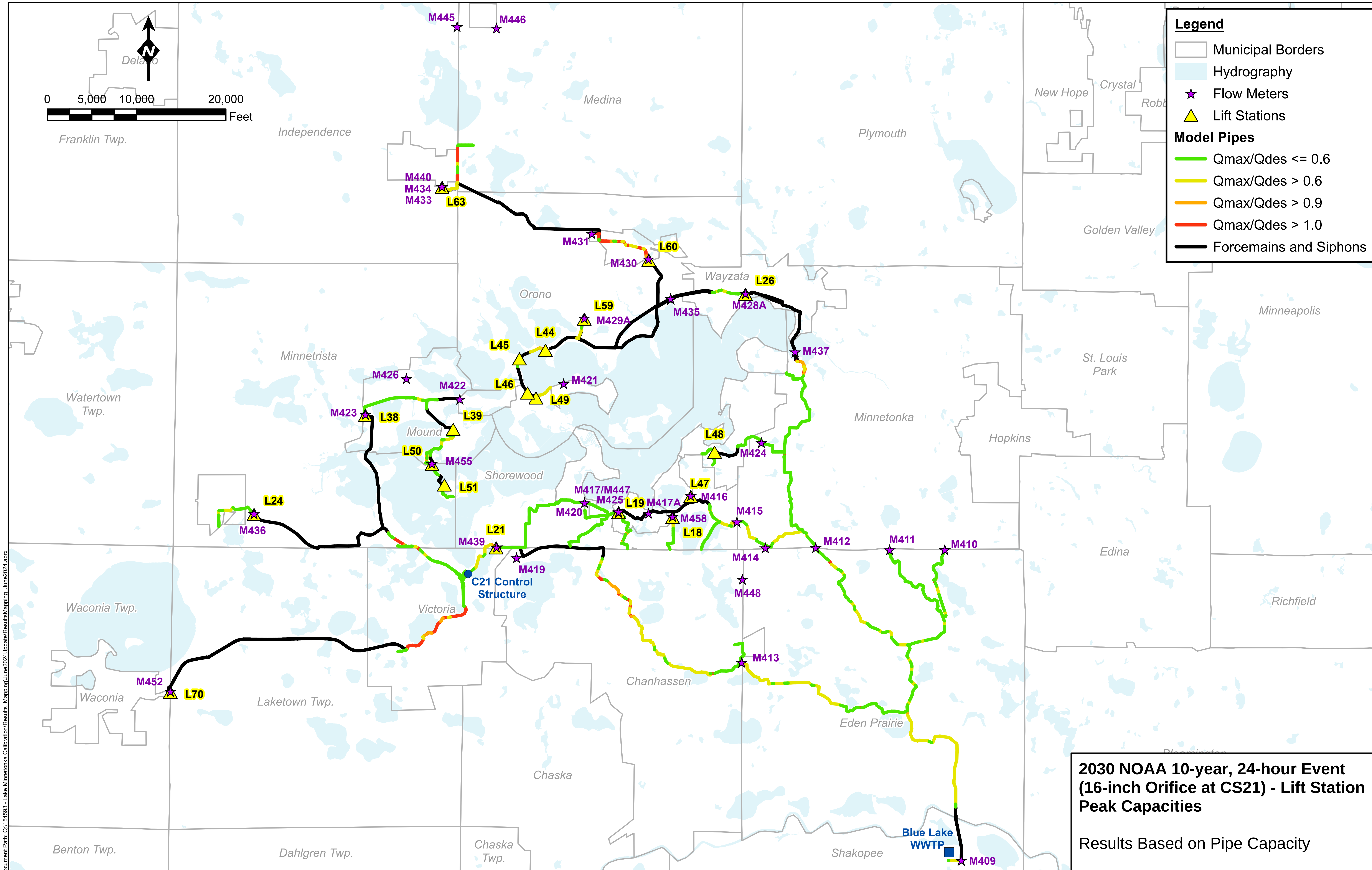
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity



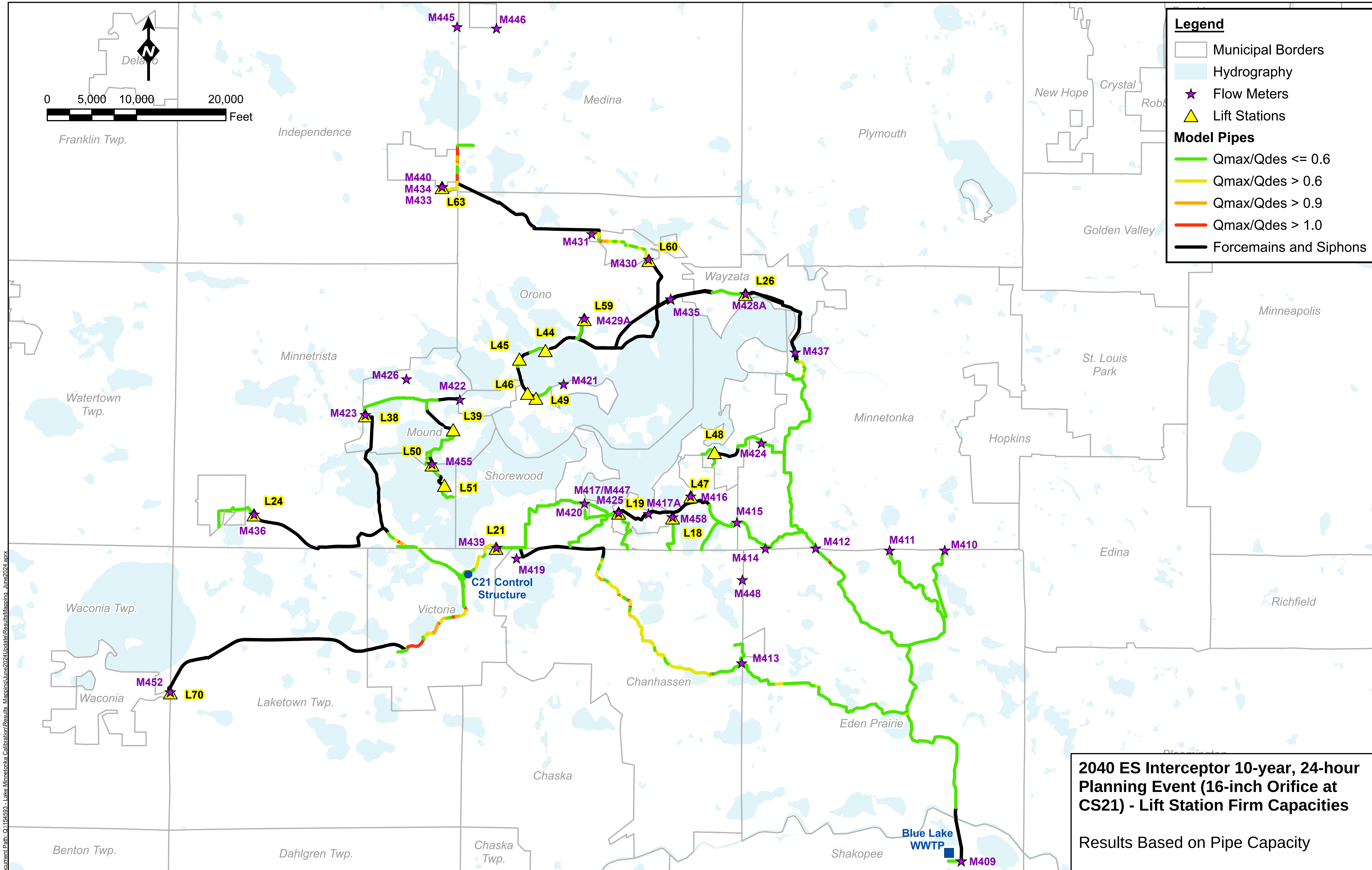
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Capacity



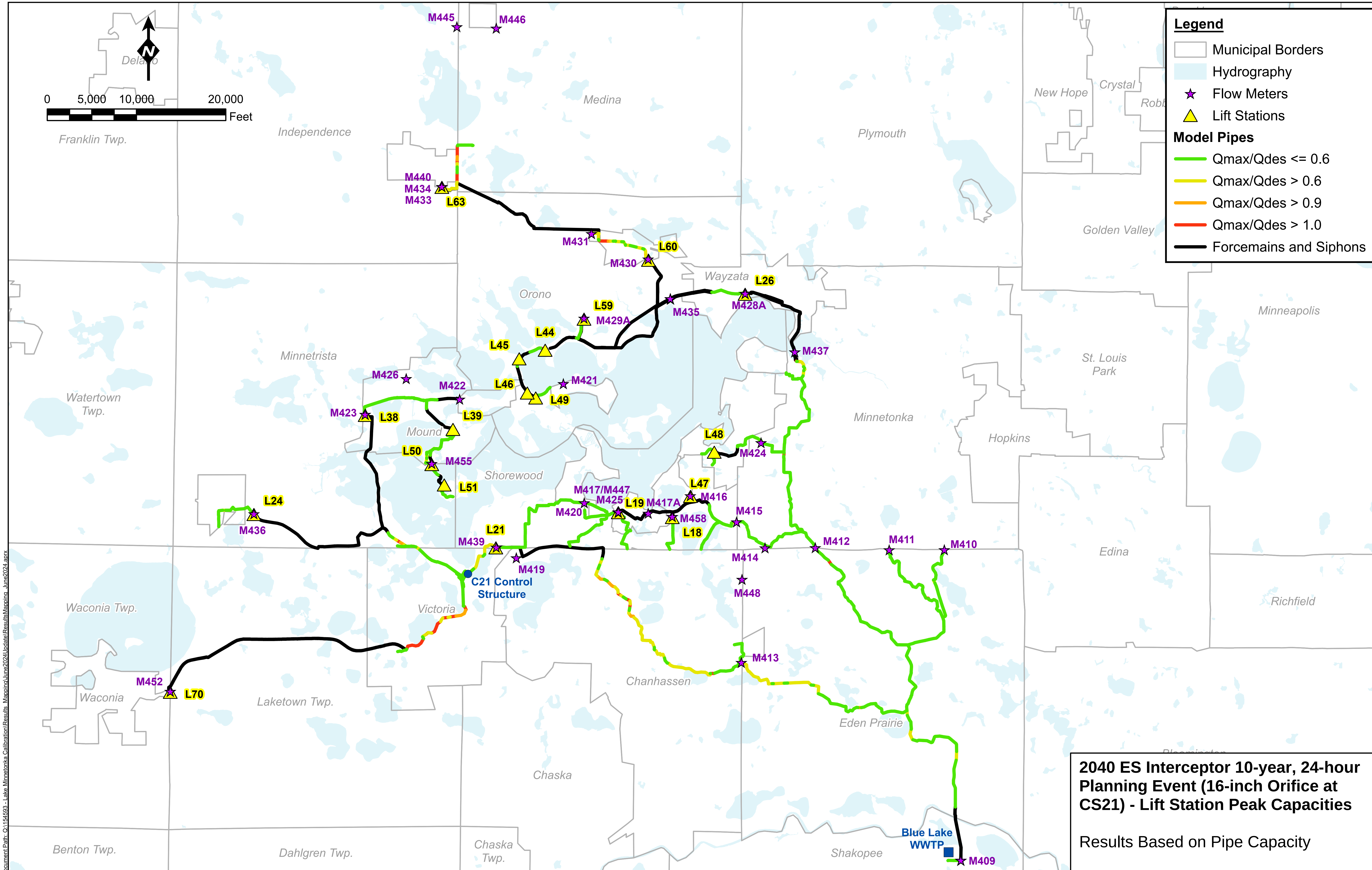
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity



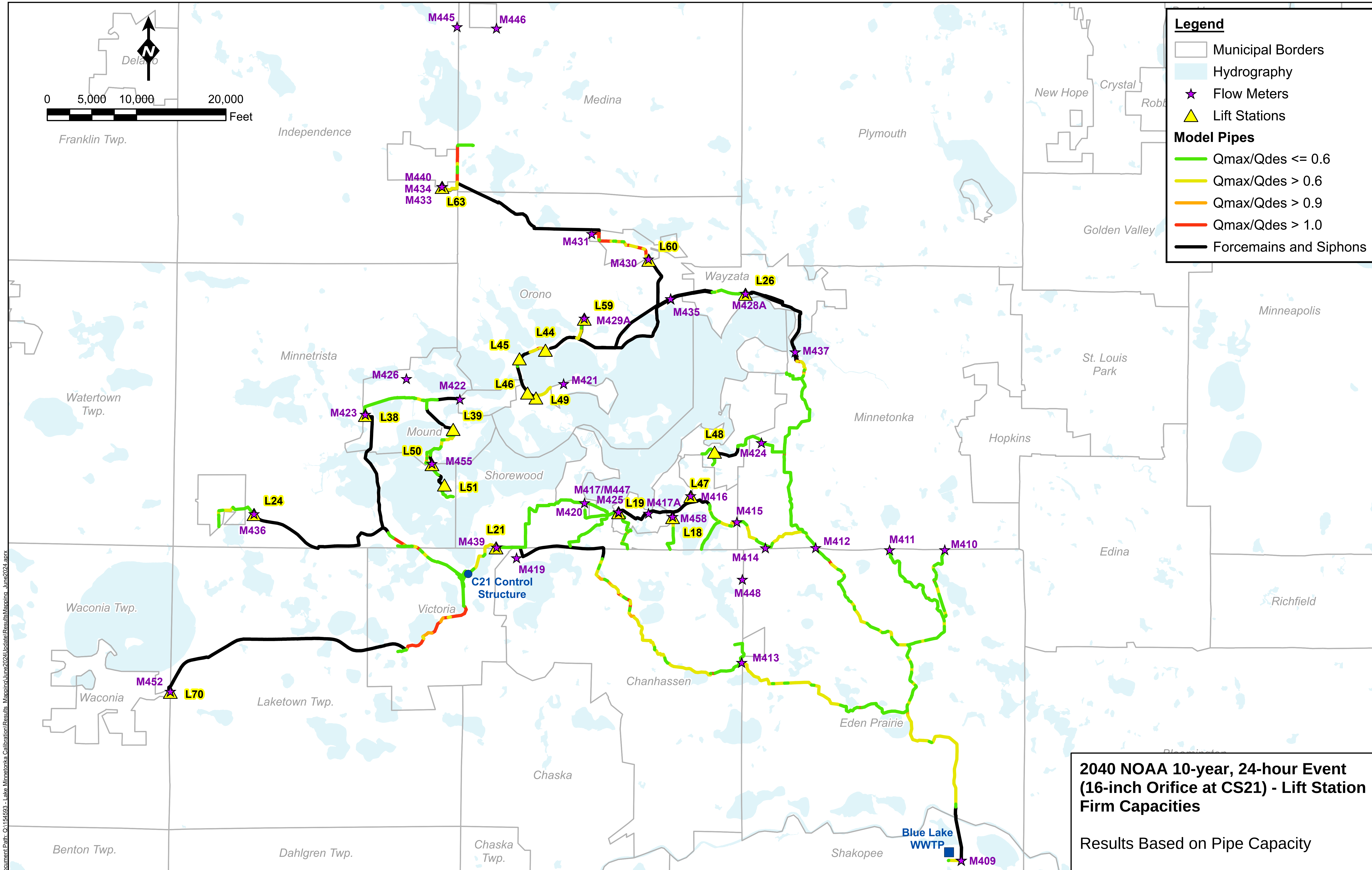
2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Capacity

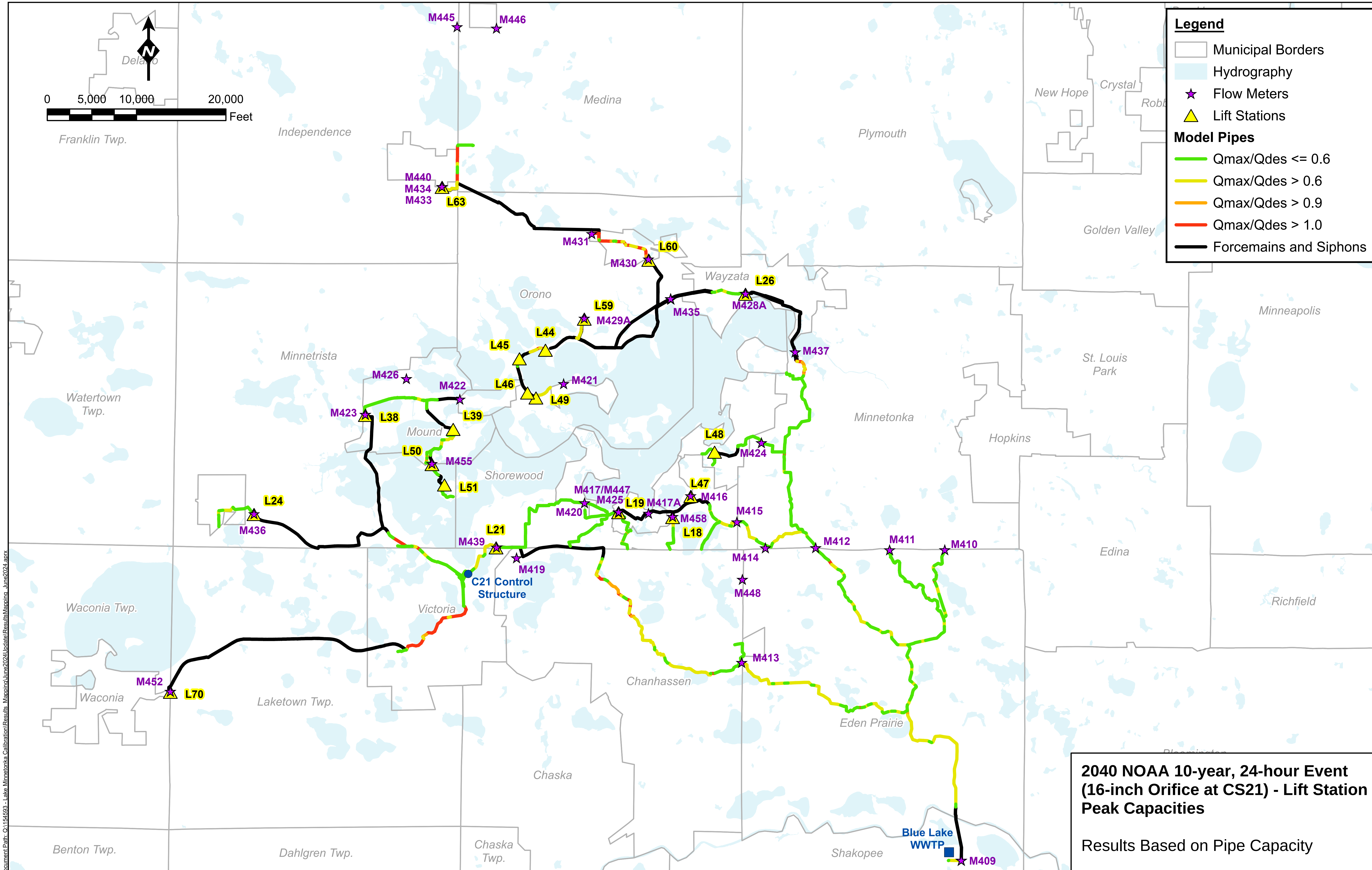


2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Capacity



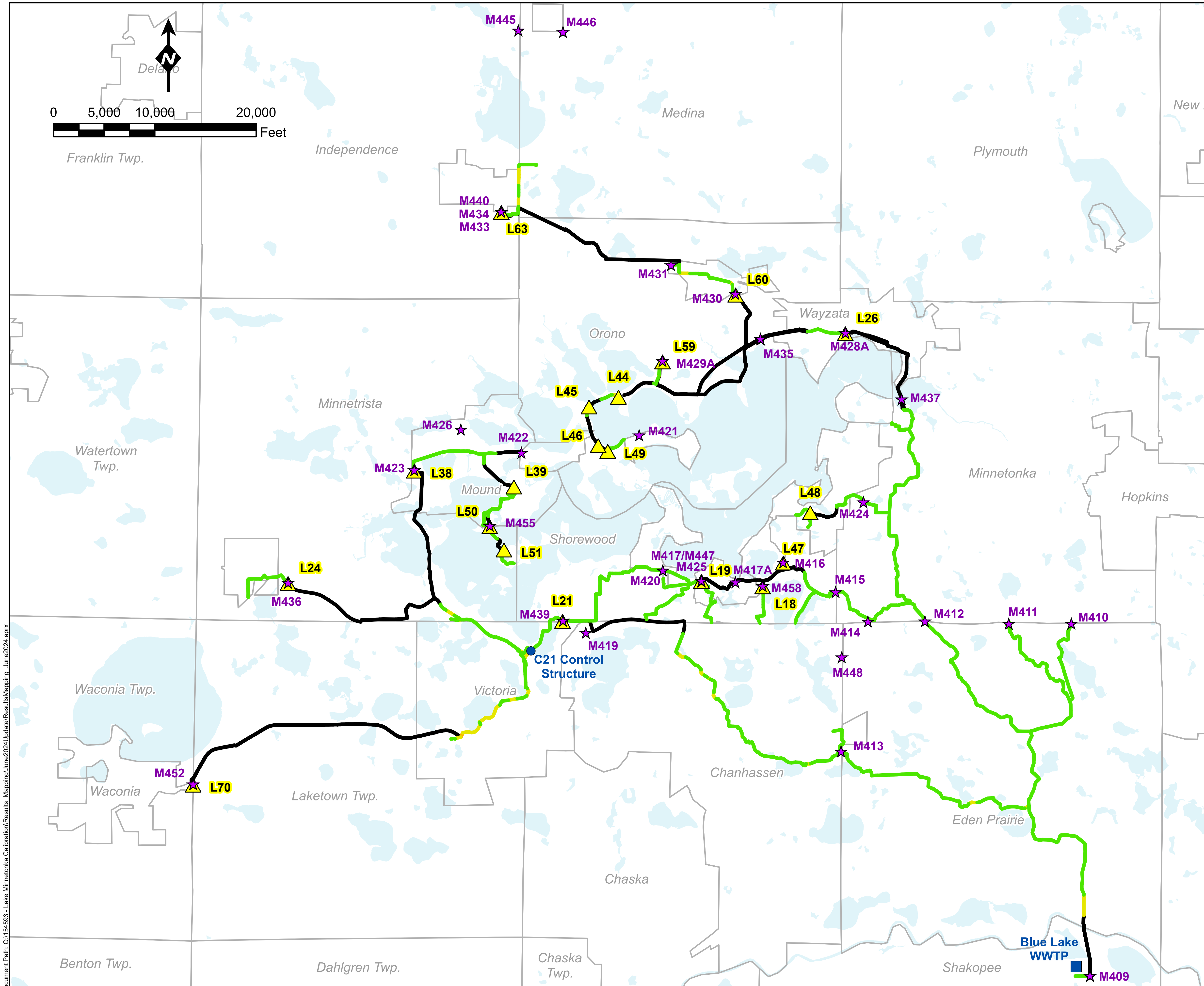
Legend
Municipal Borders
Hydrography
Flow Meters
Lift Stations
Model Pipes
Qmax/Qdes <= 0.6
Qmax/Qdes > 0.6
Qmax/Qdes > 0.9
Qmax/Qdes > 1.0
Forcemains and Siphons
0
5,000
10,000
20,000
Feet
2040 NOAA 10-year, 24-hour Event
(16-inch Orifice at CS21) - Lift Station Firm Capacities
Results Based on Pipe Capacity
Franklin Twp.
Independence
Medina
Plymouth
New Hope
Crystal
Golden Valley
Minneapolis
St. Louis Park
Wayzata
Orono
Minnetrista
Watertown Twp.
Mound
Shorewood
Minnetonka
Hopkins
Edina
Richfield
Waconia Twp.
Victoria
Waconia
Laketown Twp.
Chanhassen
Eden Prairie
Chaska
Benton Twp.
Dahlgren Twp.
Chaska Twp.
Shakopee
C21 Control Structure
Blue Lake WWTP
M445
M446
M440
M434
M433
L63
M431
L60
M430
L26
M435
M428A
L59
M429A
L44
L45
M437
M426
M422
M421
L46
L49
M423
L38
L39
L48
M424
L50
M455
L51
M417/M447
M425
L47
M416
L24
M420
L19
M417A
M458
M415
L18
M436
L21
M439
M419
M414
M412
M411
M410
M448
M413
M452
L70
M409



2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

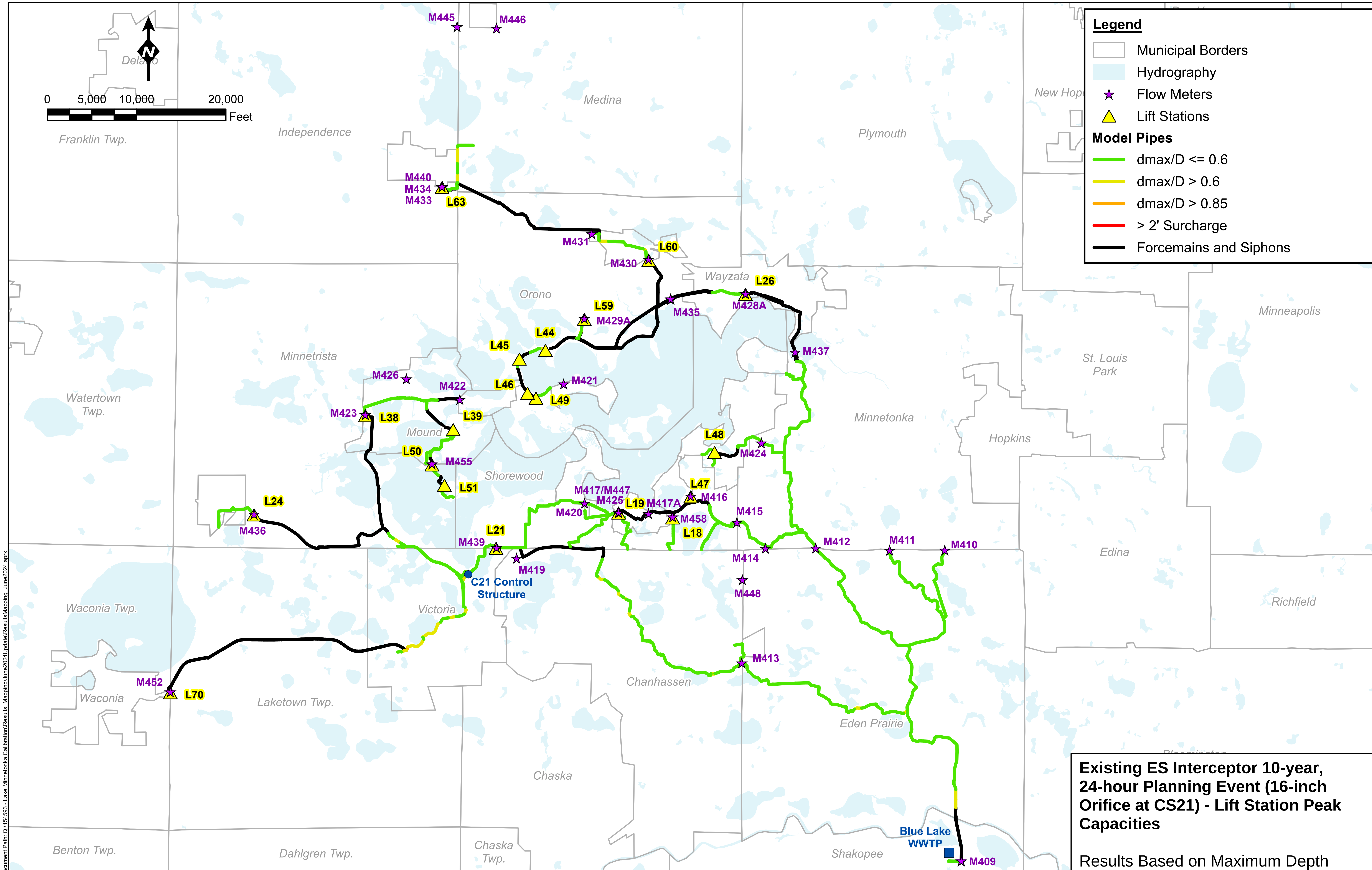
Results Based on Pipe Capacity

Attachment C: Capacity Result Maps (Based on Depth Only)



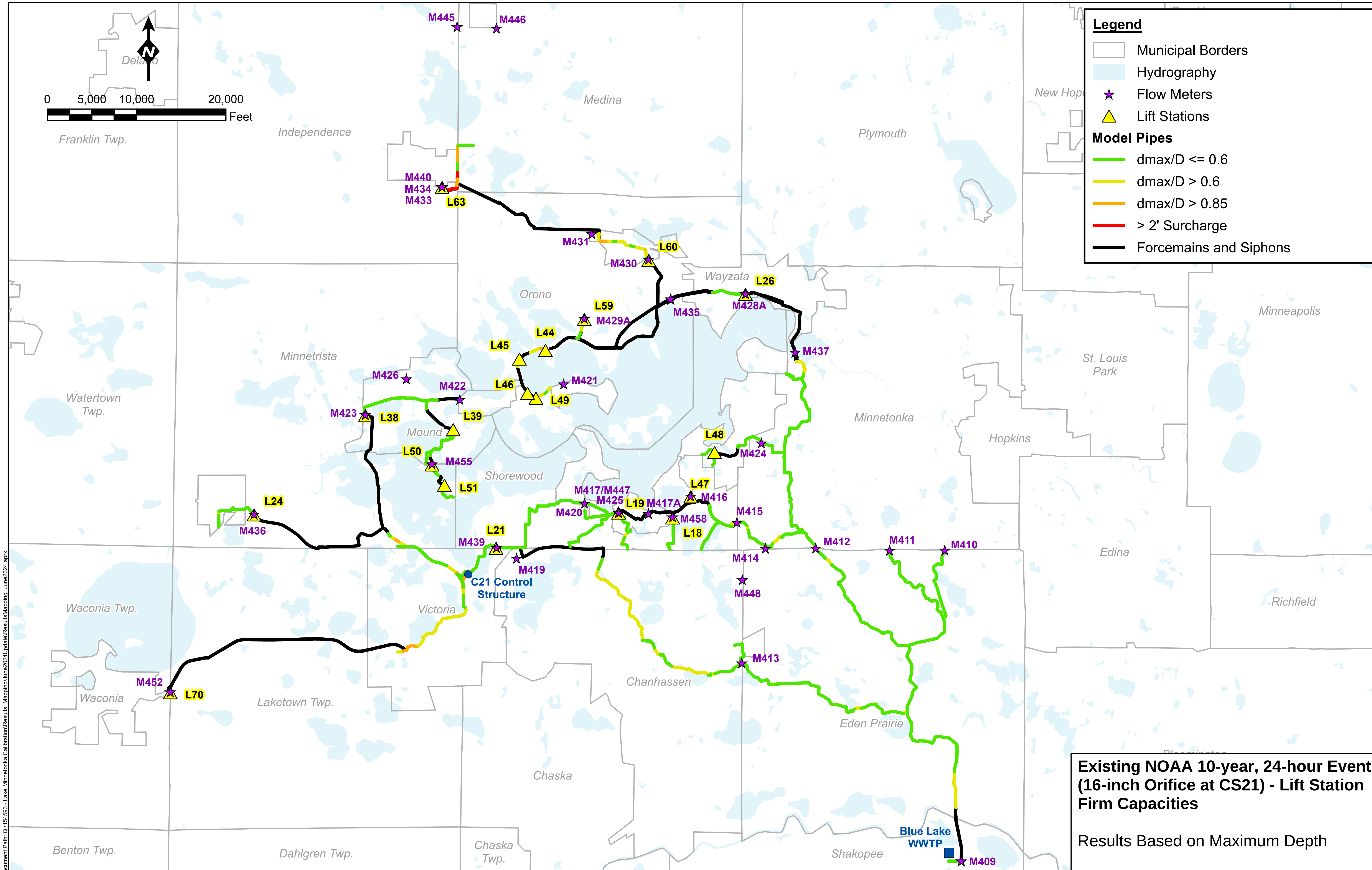
Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Maximum Depth



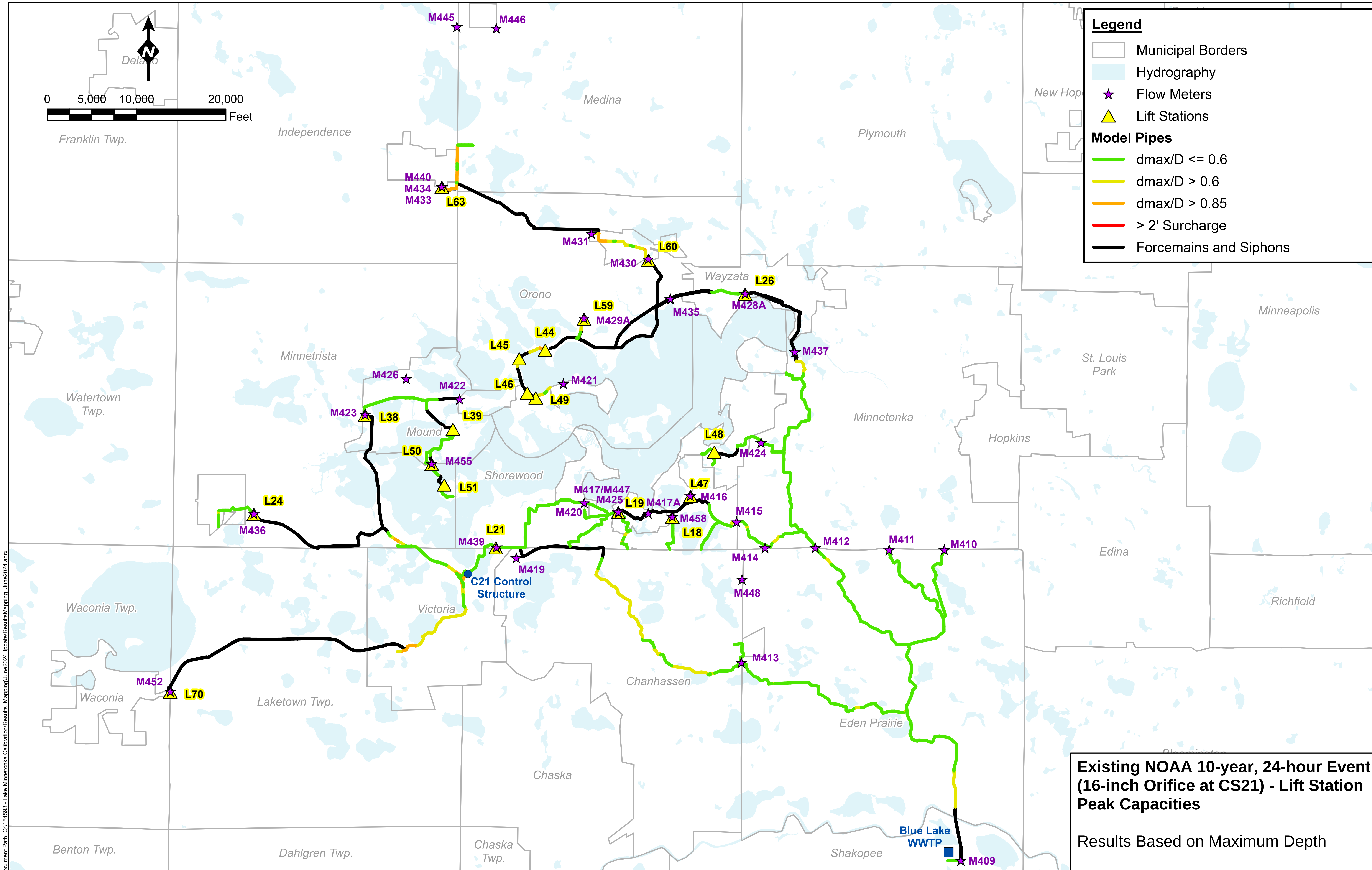
Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Maximum Depth



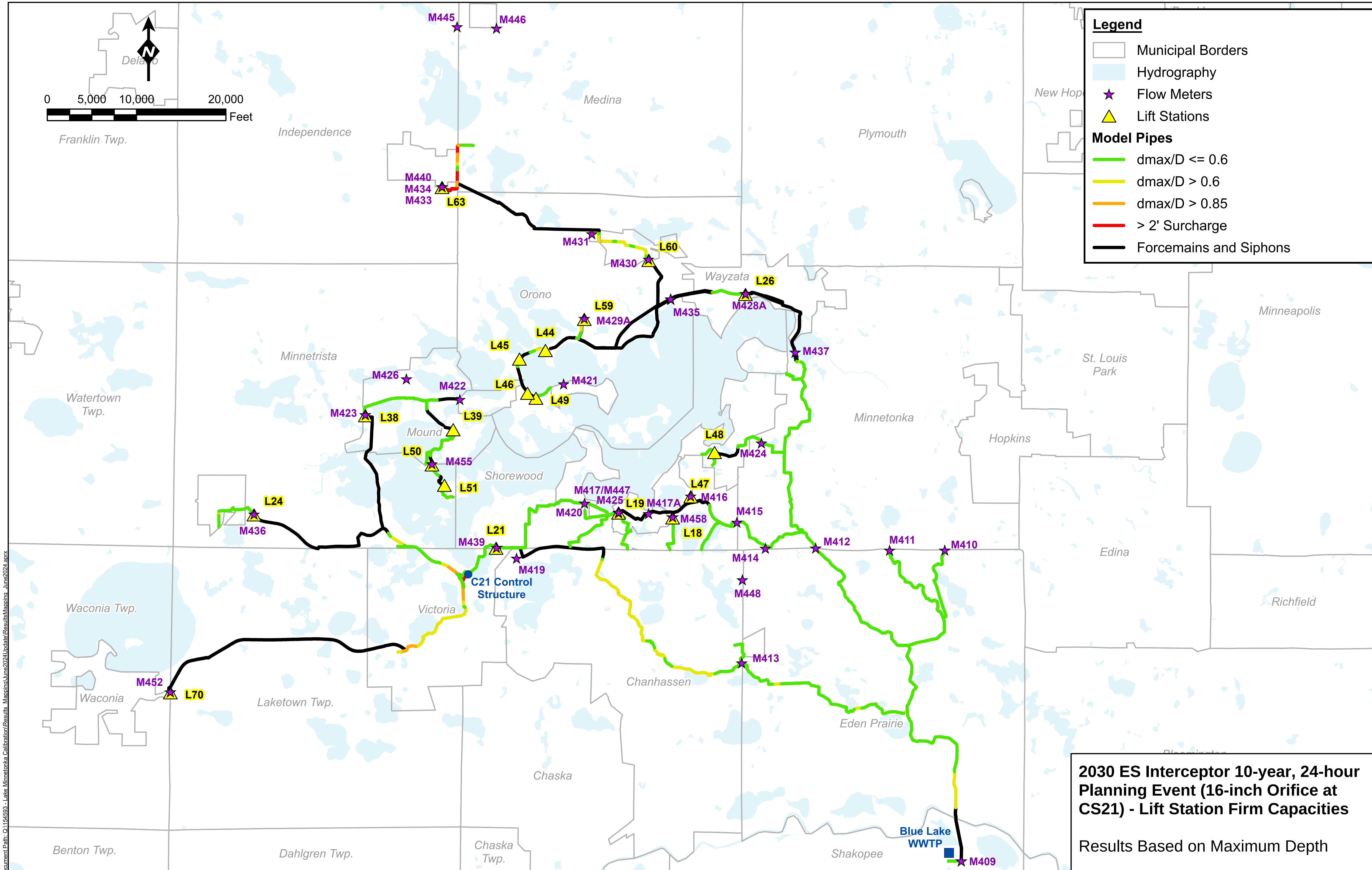
Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Maximum Depth



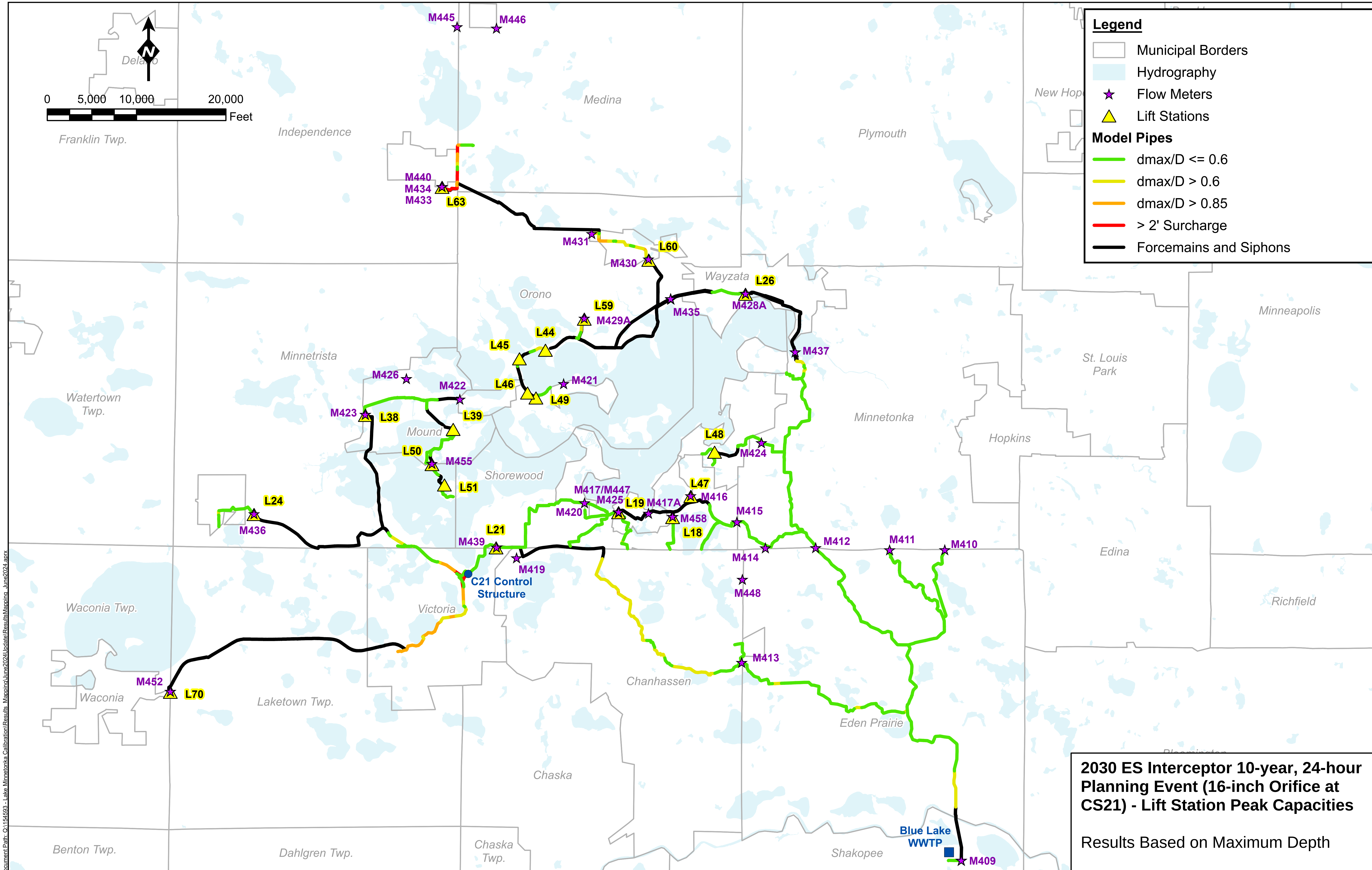
Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Maximum Depth



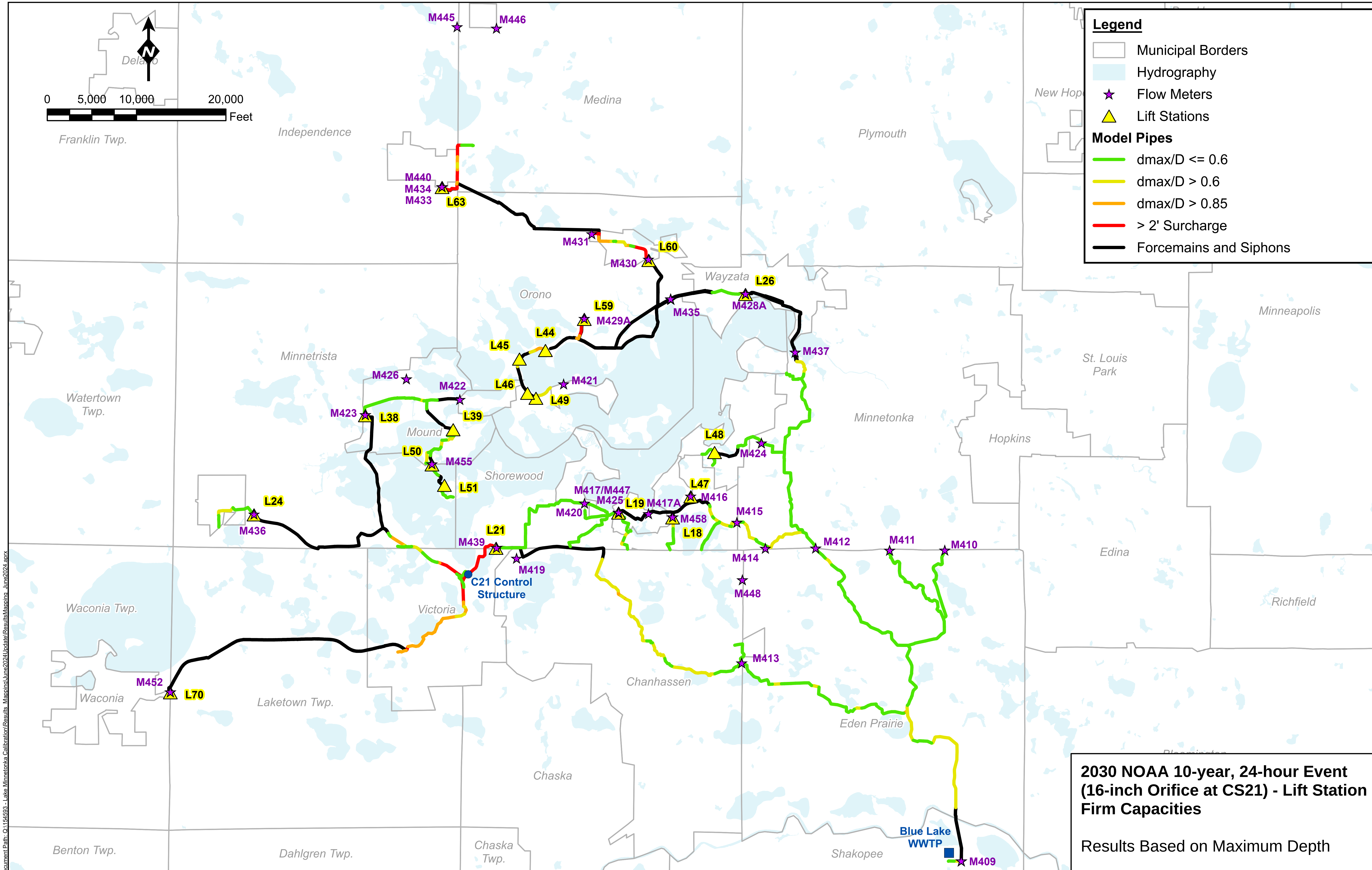
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Maximum Depth



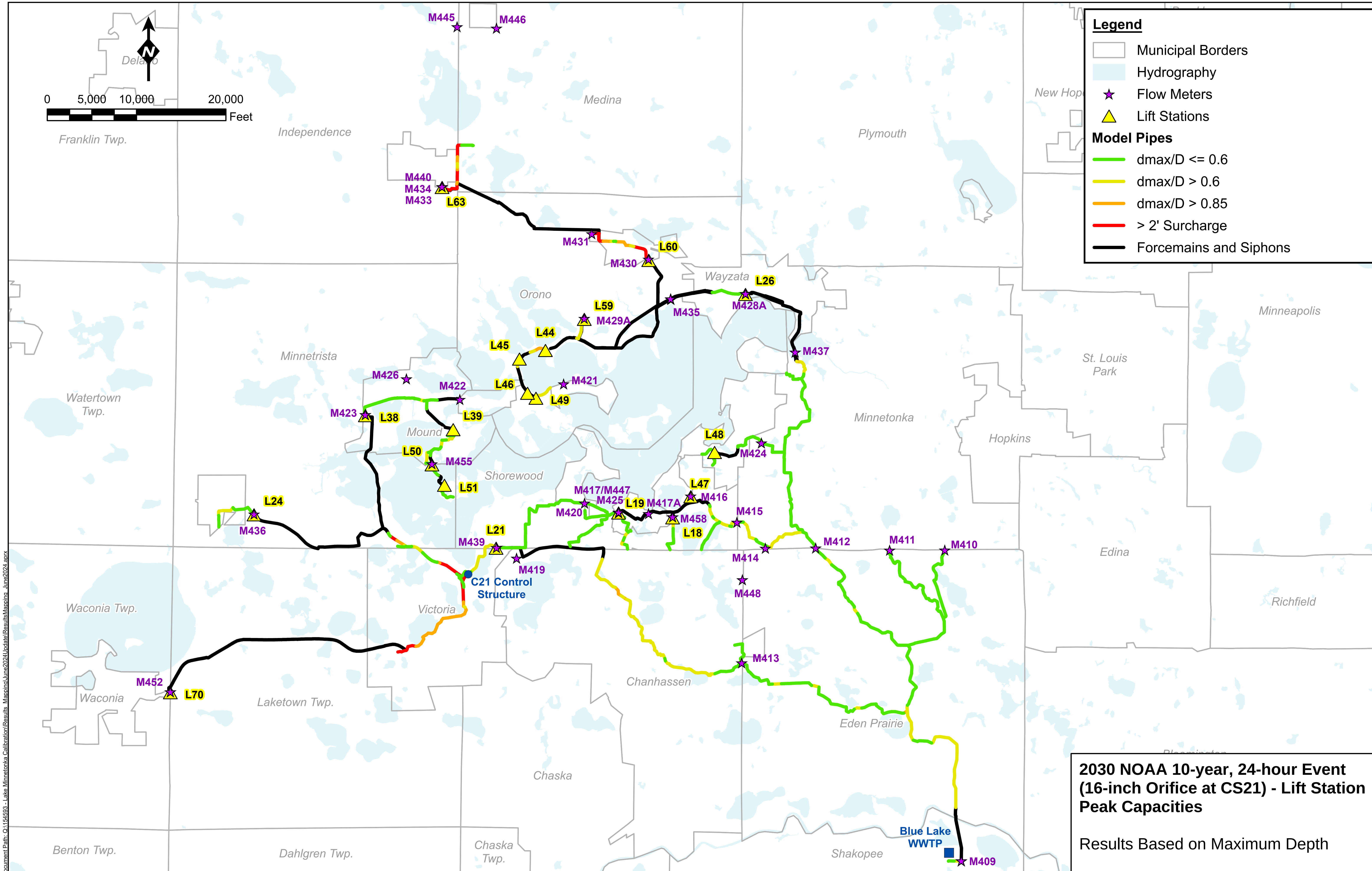
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Maximum Depth



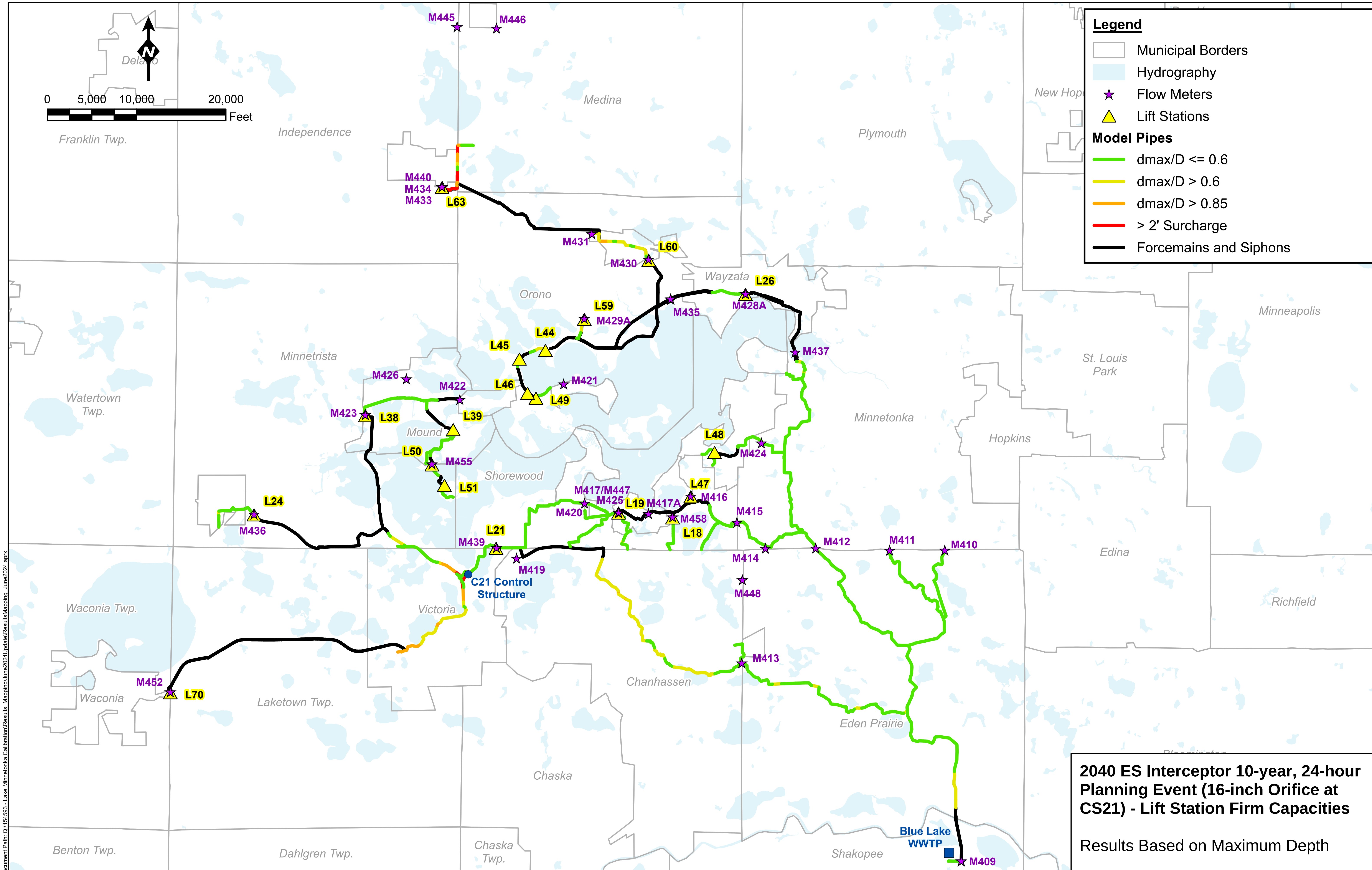
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Maximum Depth



2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Maximum Depth


2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities
Results Based on Maximum Depth
Legend
Municipal Borders
Hydrography
Flow Meters
Lift Stations
Model Pipes
dmax/D <= 0.6
dmax/D > 0.6
dmax/D > 0.85
> 2' Surcharge
Forcemains and Siphons
0
5,000
10,000
20,000
Feet
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Delano
Franklin Twp.
Independence
Medina
Plymouth
New Hope
Wayzata
Orono
Minnetrista
Watertown Twp.
Mound
Shorewood
Minnetonka
St. Louis Park
Minneapolis
Hopkins
Edina
Richfield
Waconia Twp.
Waconia
Victoria
Laketown Twp.
Chanhassen
Eden Prairie
Chaska
Chaska Twp.
Benton Twp.
Dahlgren Twp.
Shakopee
C21 Control Structure
Blue Lake WWTP
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L63
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M455
L51
M417/M447
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M417A
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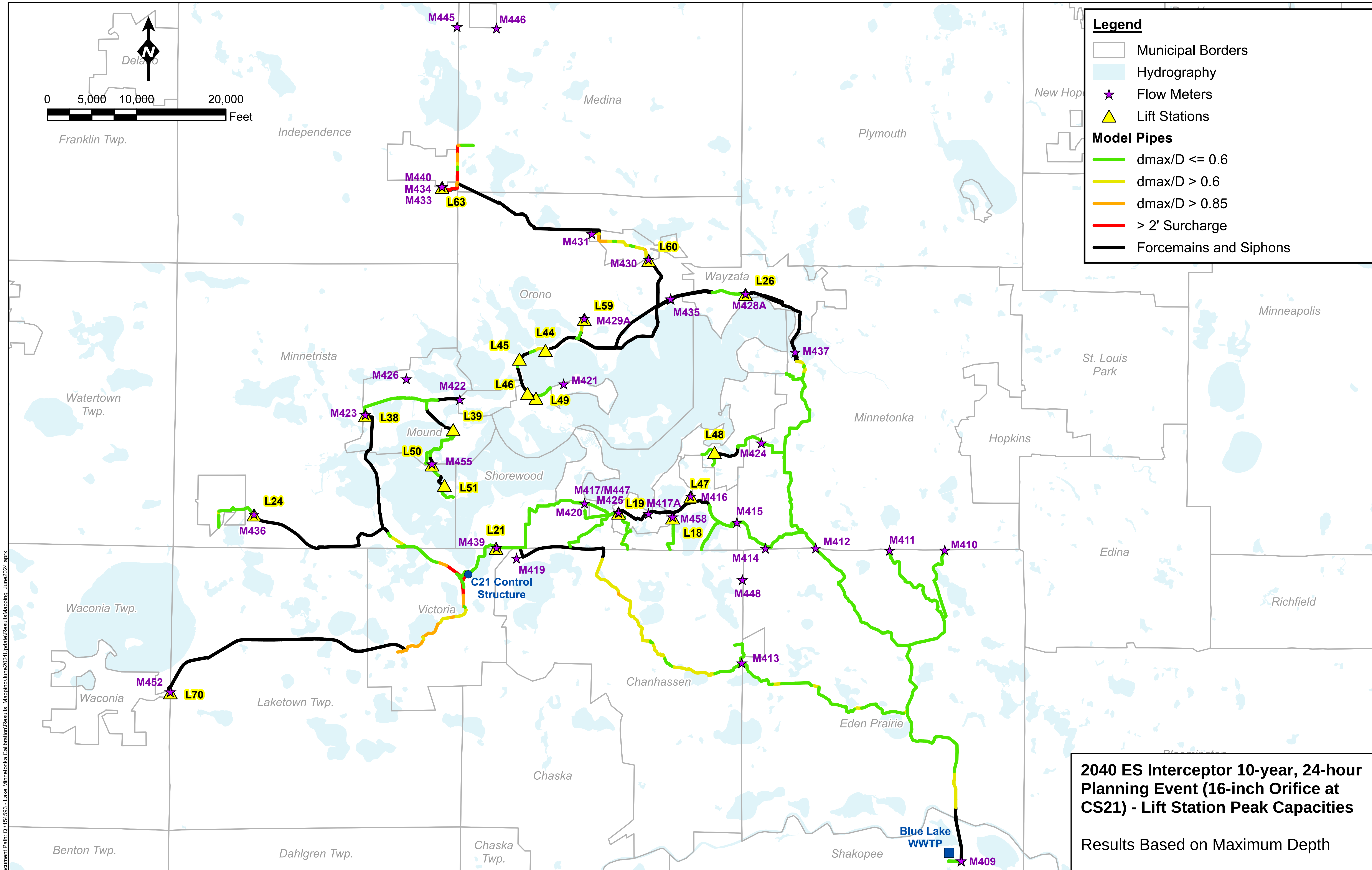
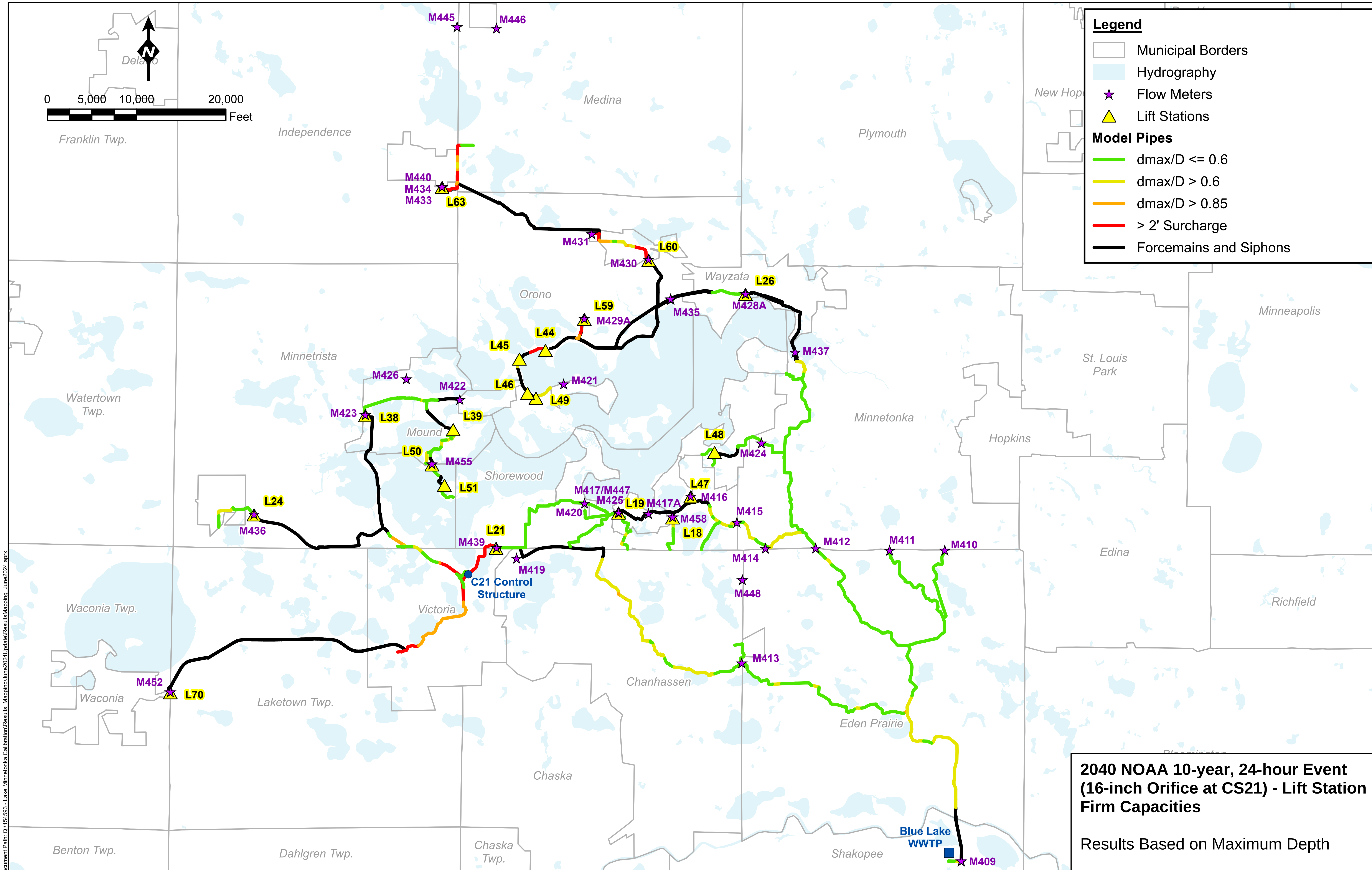


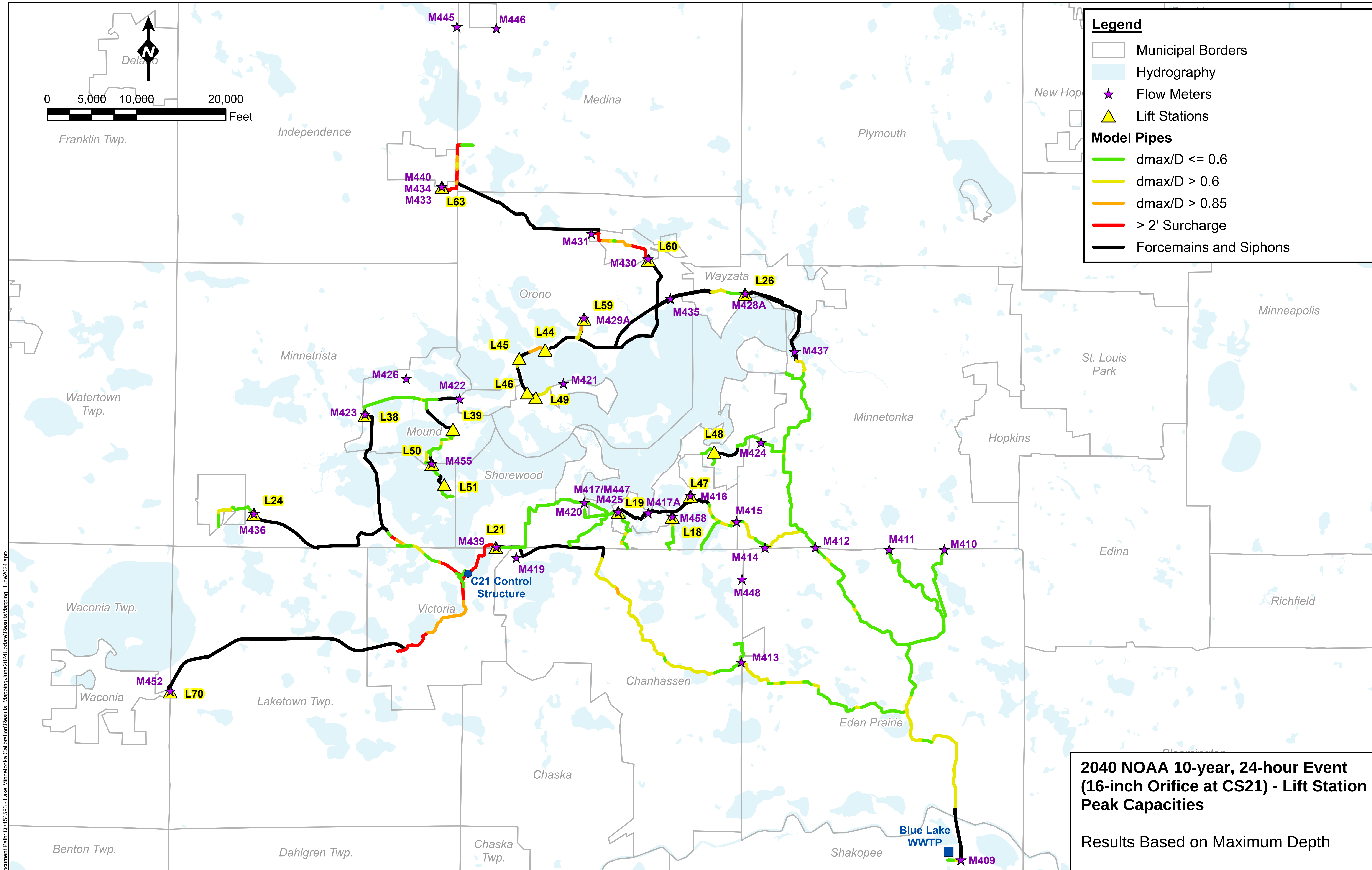
2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Maximum Depth



2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Maximum Depth


Legend
Municipal Borders
Hydrography
Flow Meters
Lift Stations
Model Pipes
dmax/D <= 0.6
dmax/D > 0.6
dmax/D > 0.85
> 2' Surcharge
Forcemains and Siphons
0 5,000 10,000 20,000 Feet
N
Delano
Franklin Twp.
Independence
Medina
Plymouth
New Hope
Minneapolis
Wayzata
Orono
Minnetrista
Watertown Twp.
Mound
Shorewood
St. Louis Park
Minnetonka
Hopkins
Edina
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Waconia Twp.
Victoria
Waconia
Laketown Twp.
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Dahlgren Twp.
Chaska Twp.
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M439
M419
C21 Control Structure
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M410
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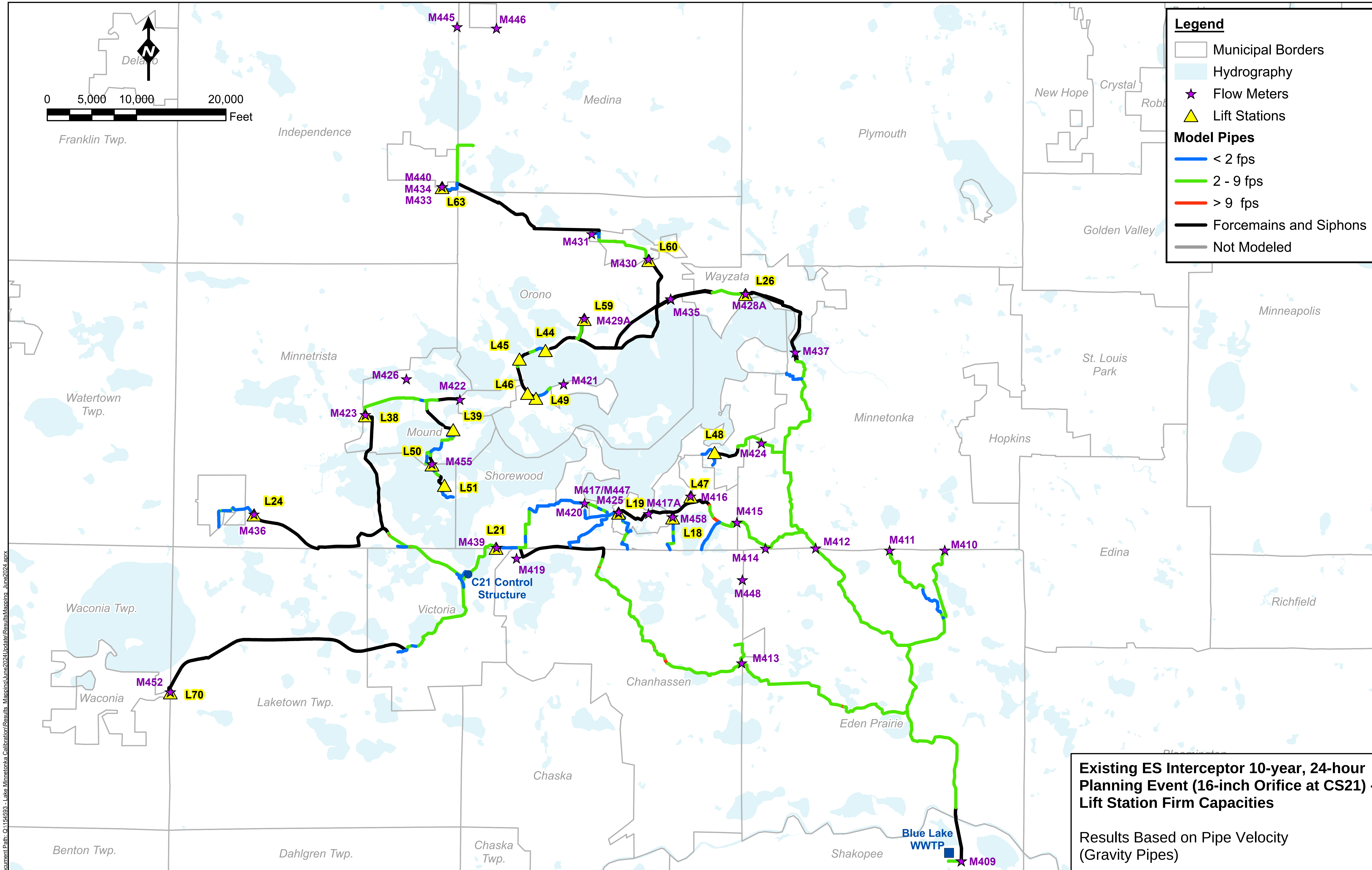
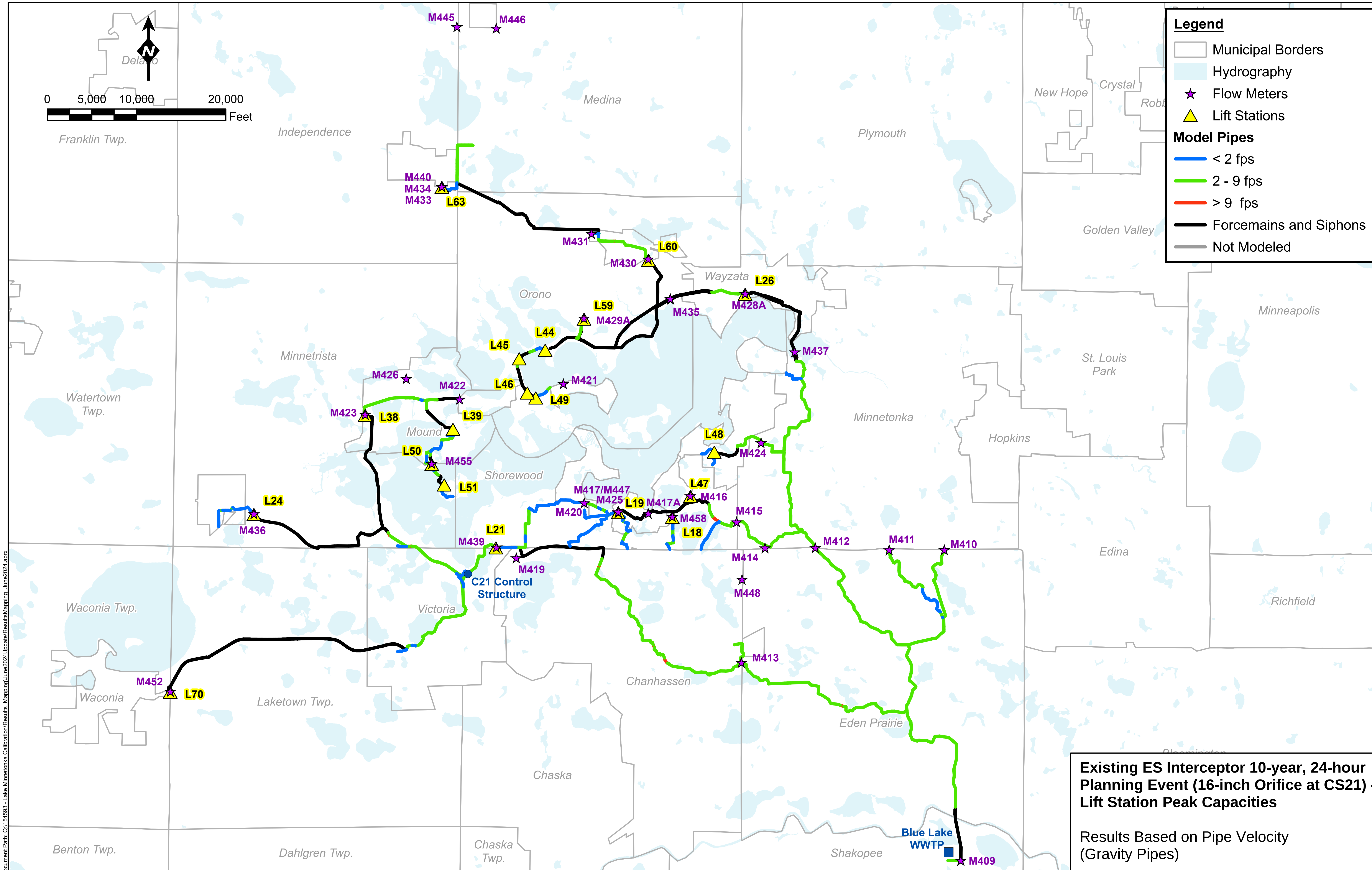
M413
M452
L70
Blue Lake WWTP
M409
2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities
Results Based on Maximum Depth

Attachment D: Velocity Result Maps – Gravity Pipes



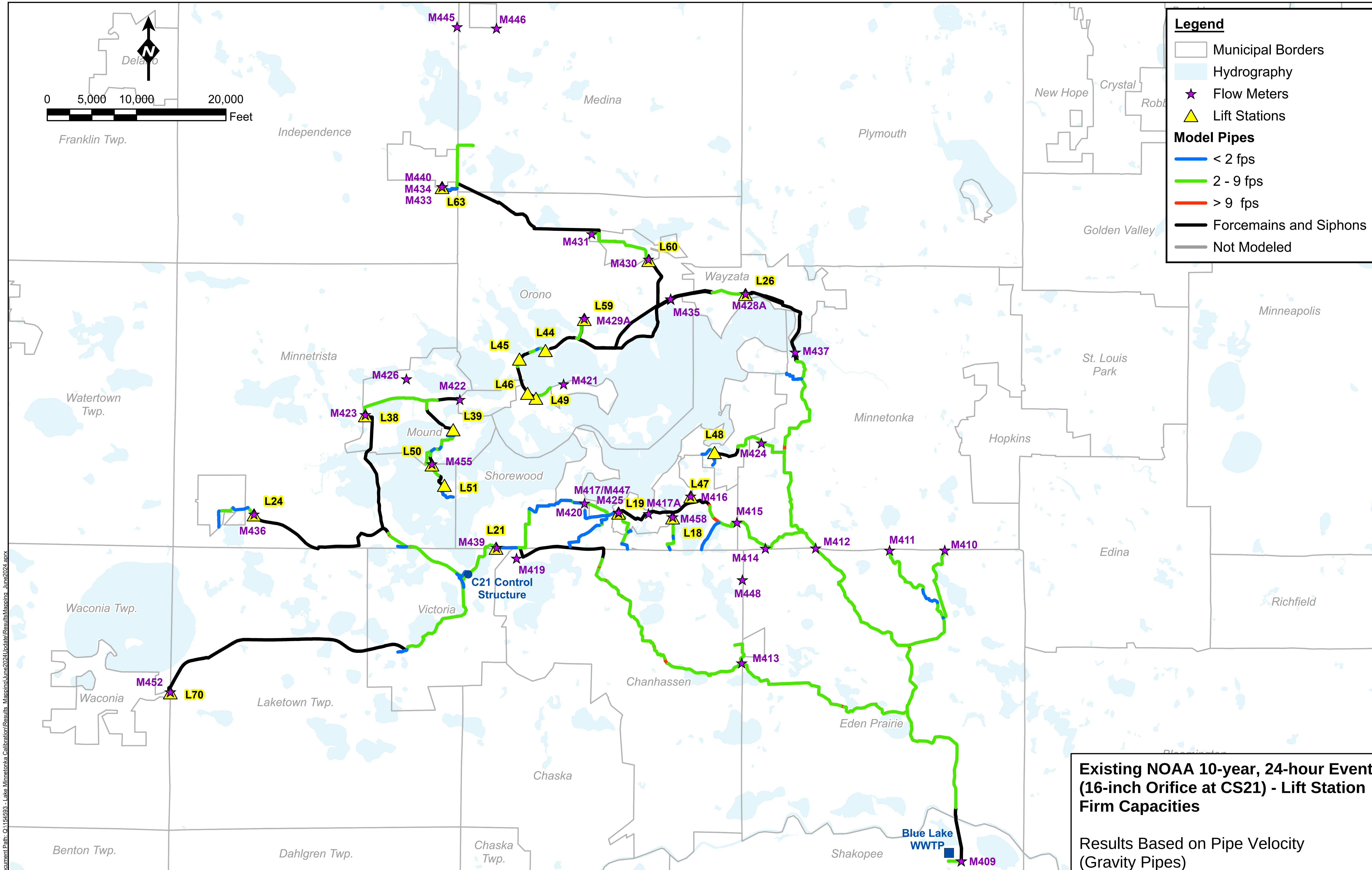
Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Gravity Pipes)



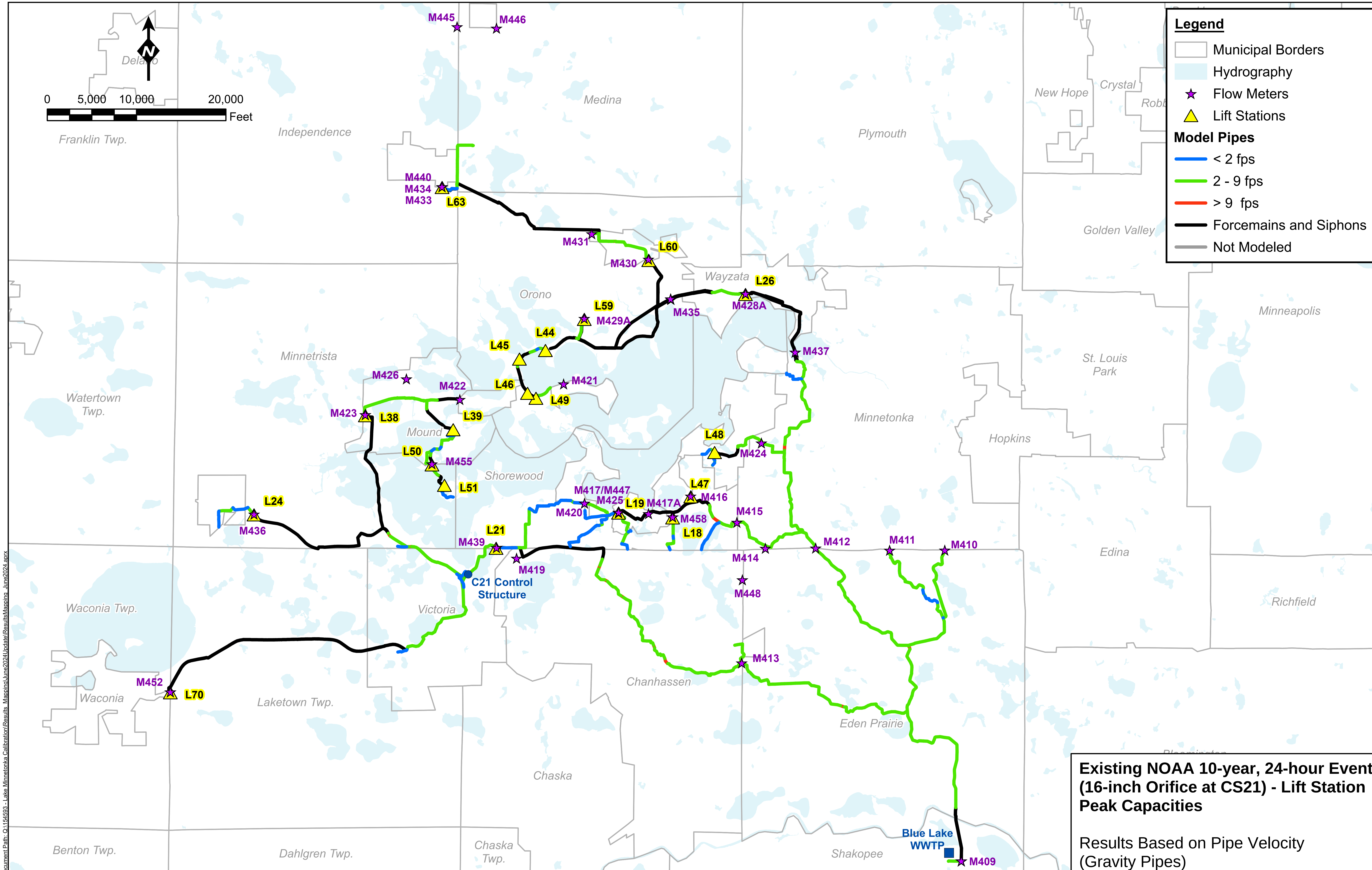
Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Gravity Pipes)



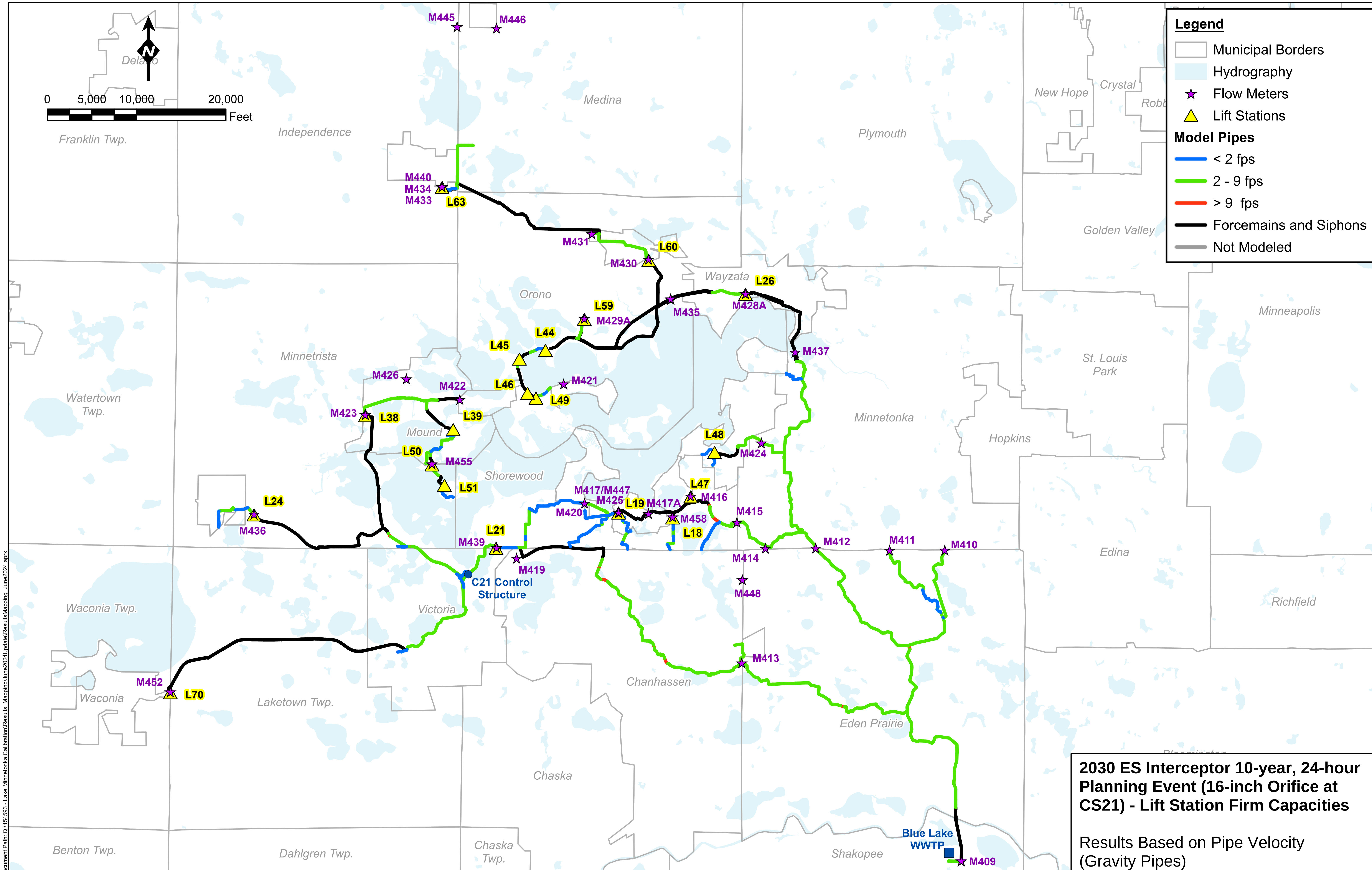
Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Gravity Pipes)



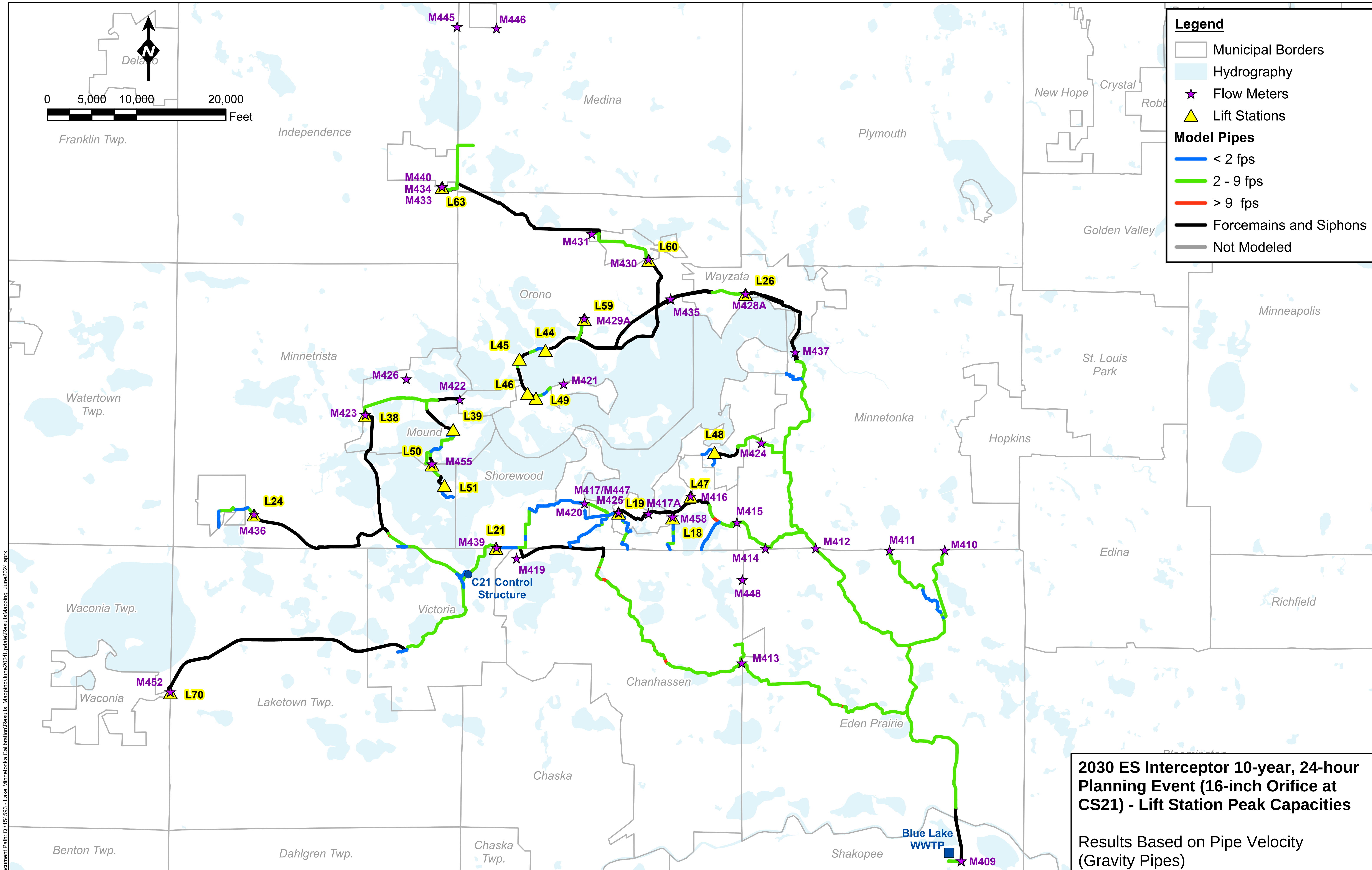
Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Gravity Pipes)



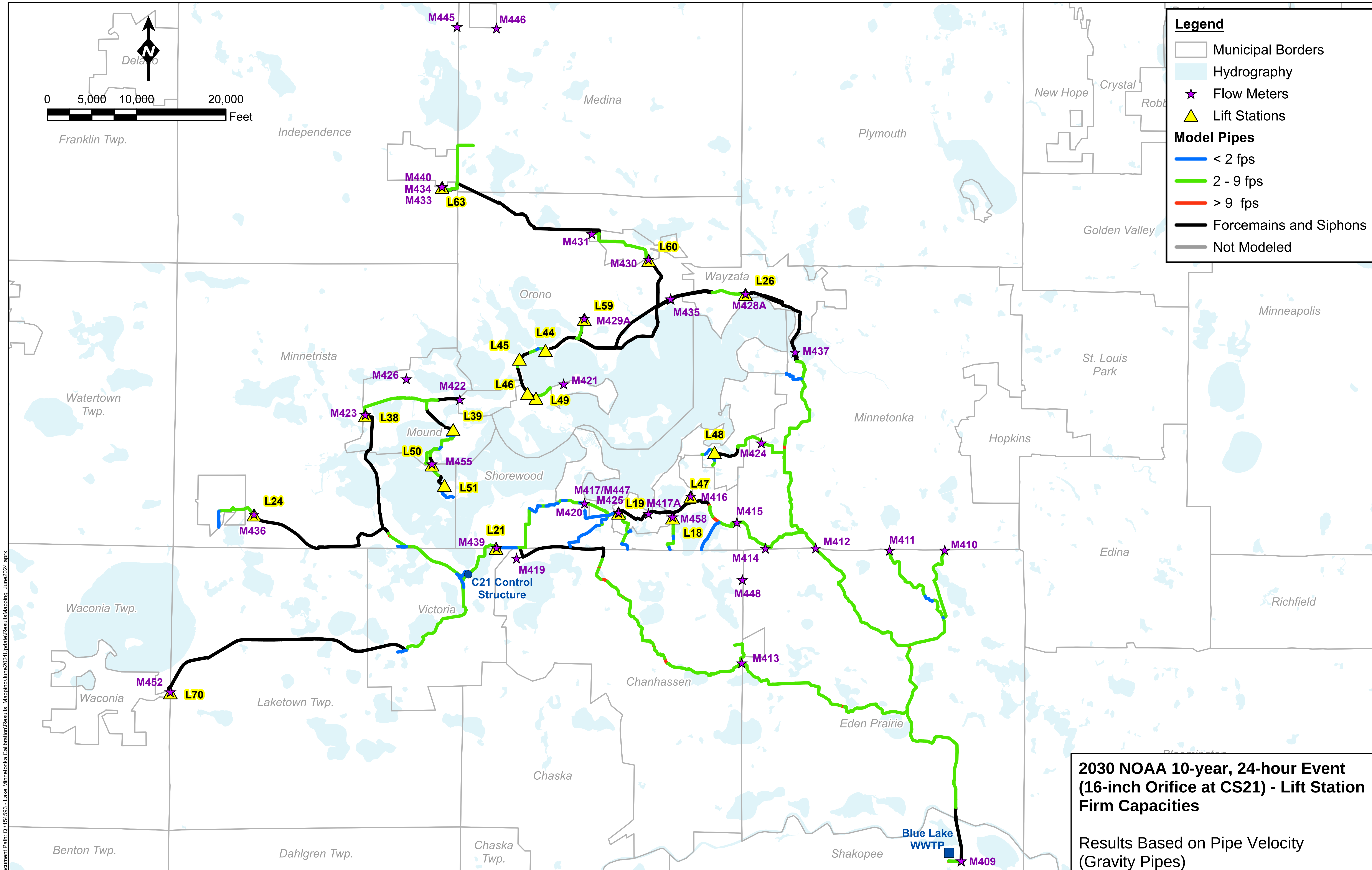
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Gravity Pipes)



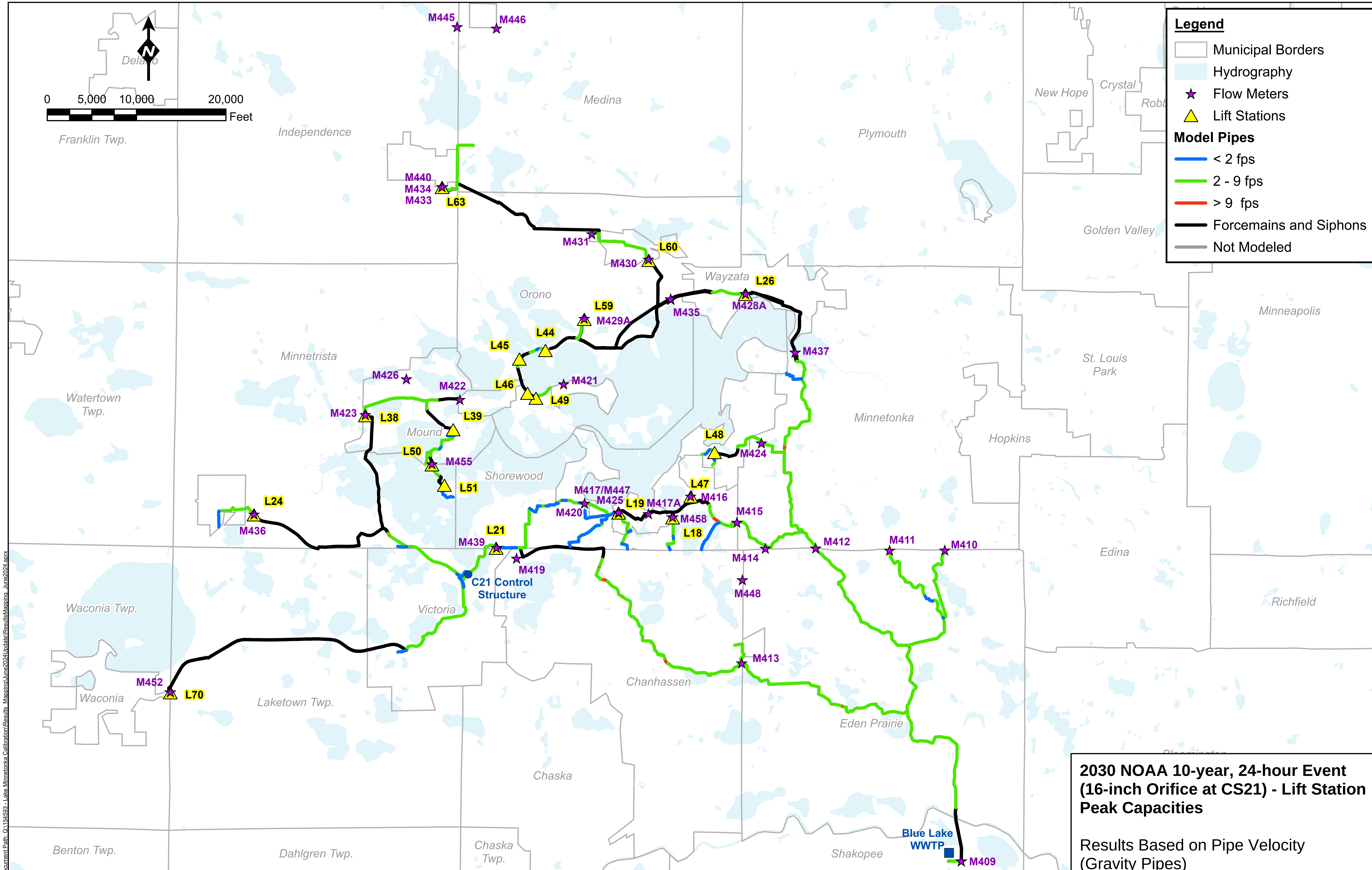
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Gravity Pipes)



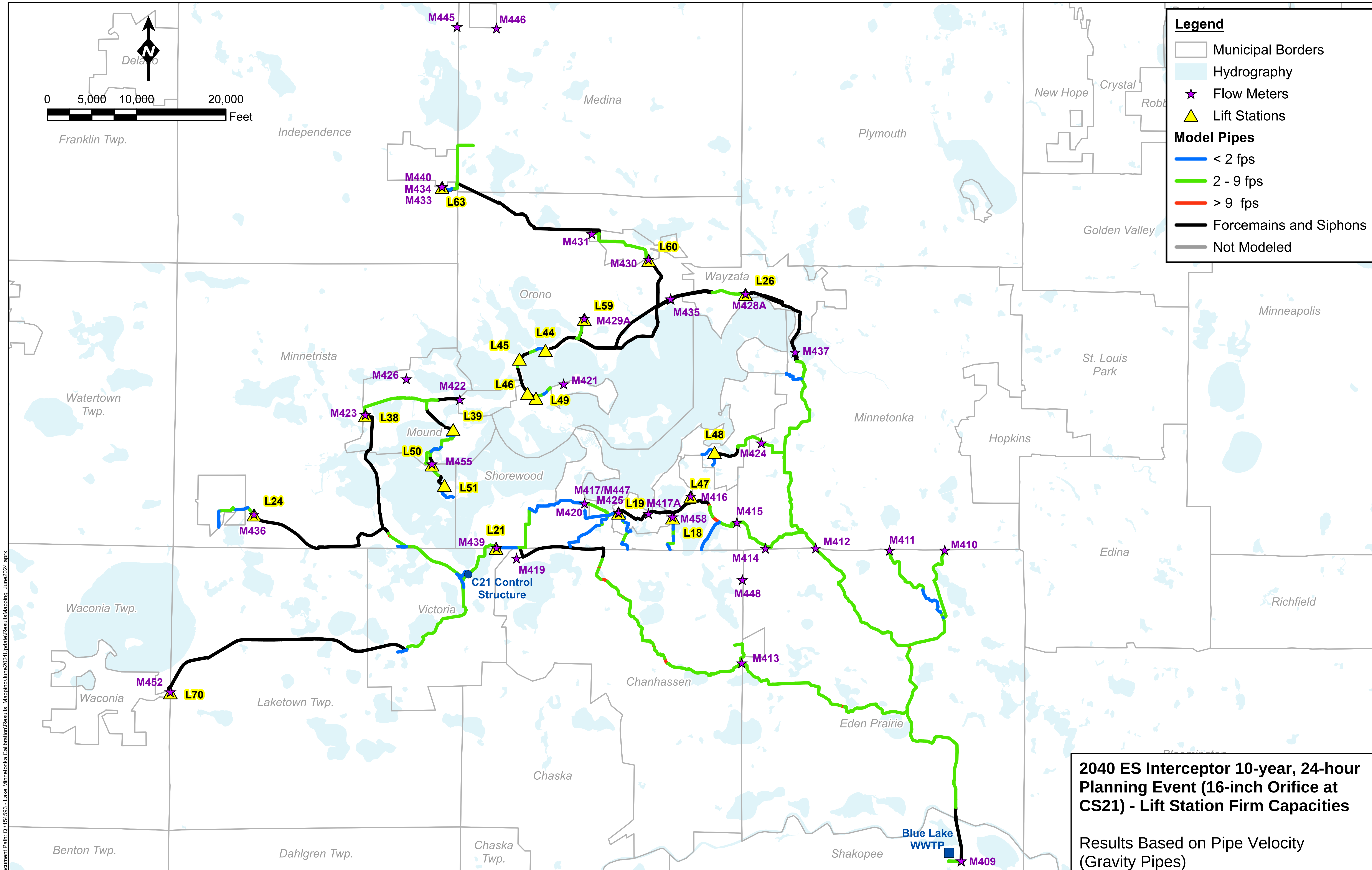
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Gravity Pipes)



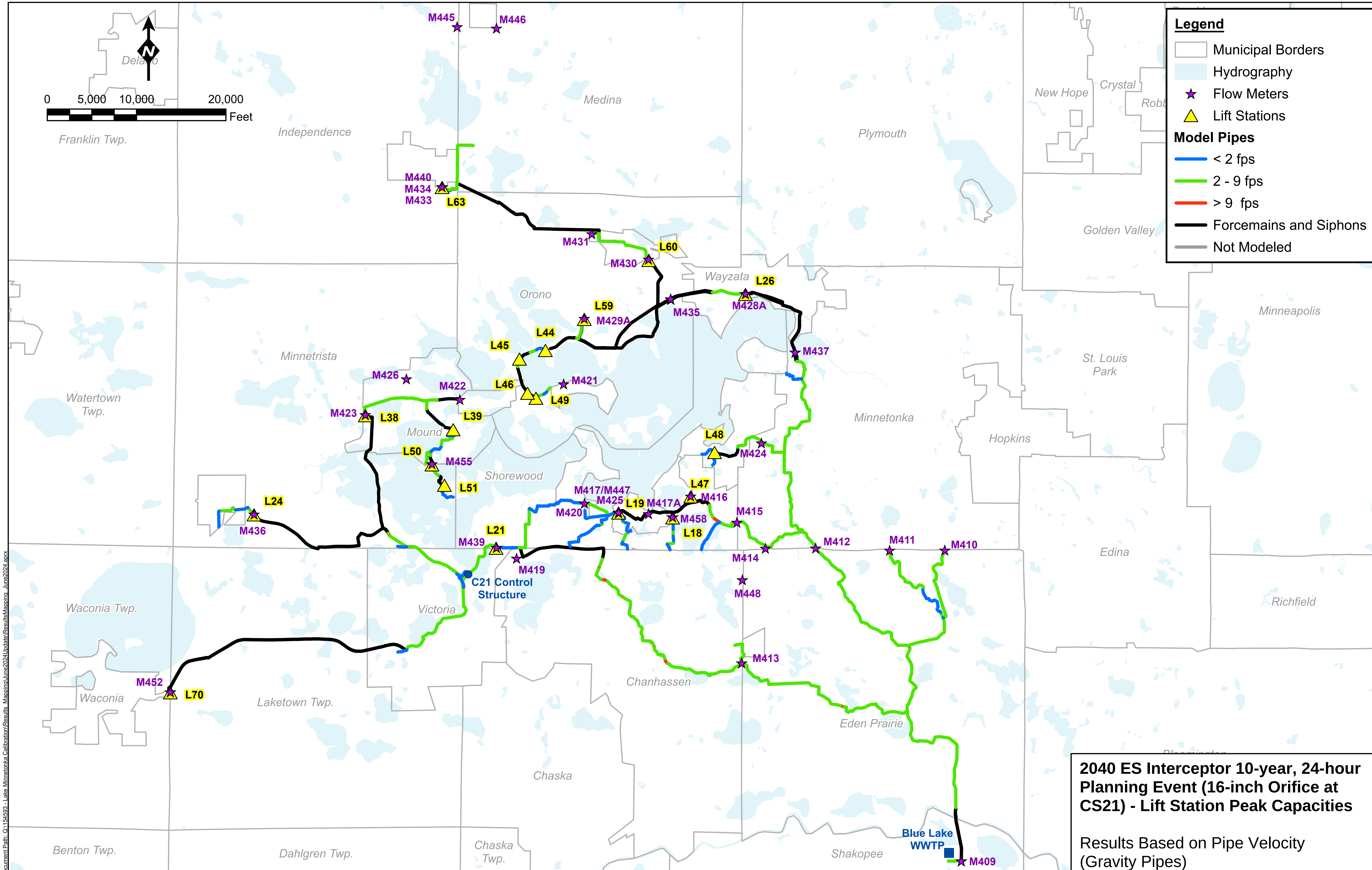
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Gravity Pipes)



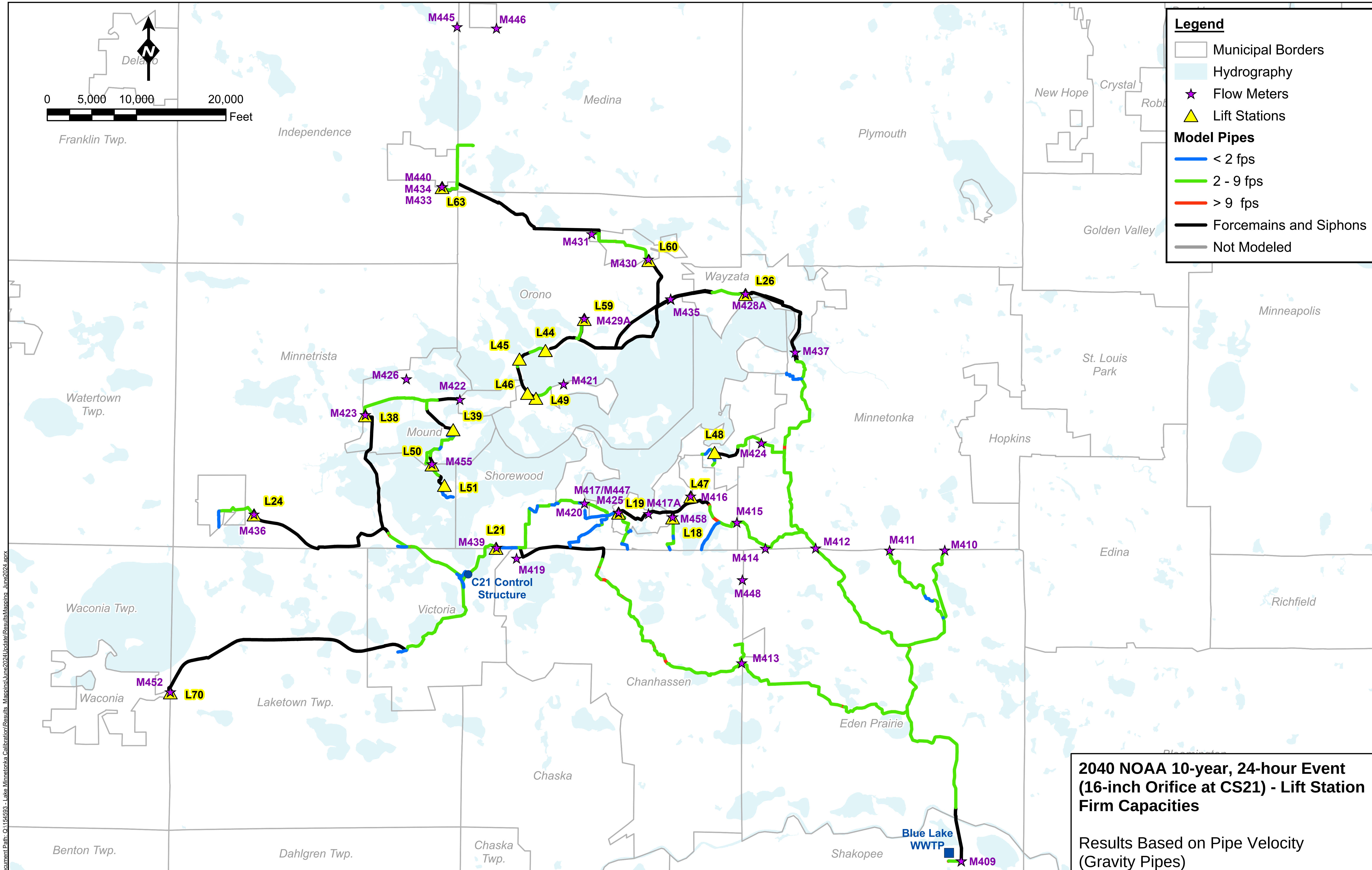
2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Gravity Pipes)



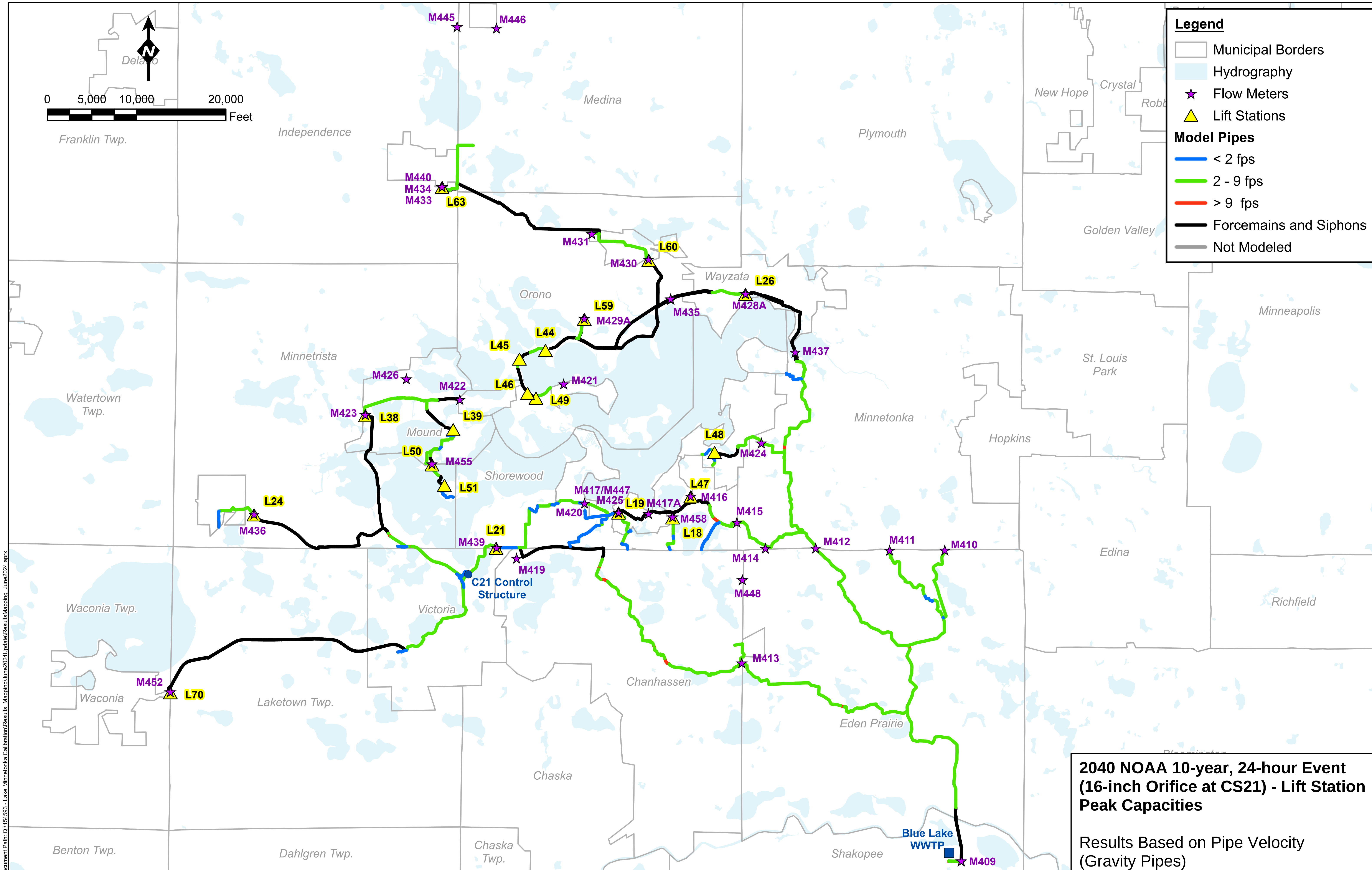
2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Gravity Pipes)



2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

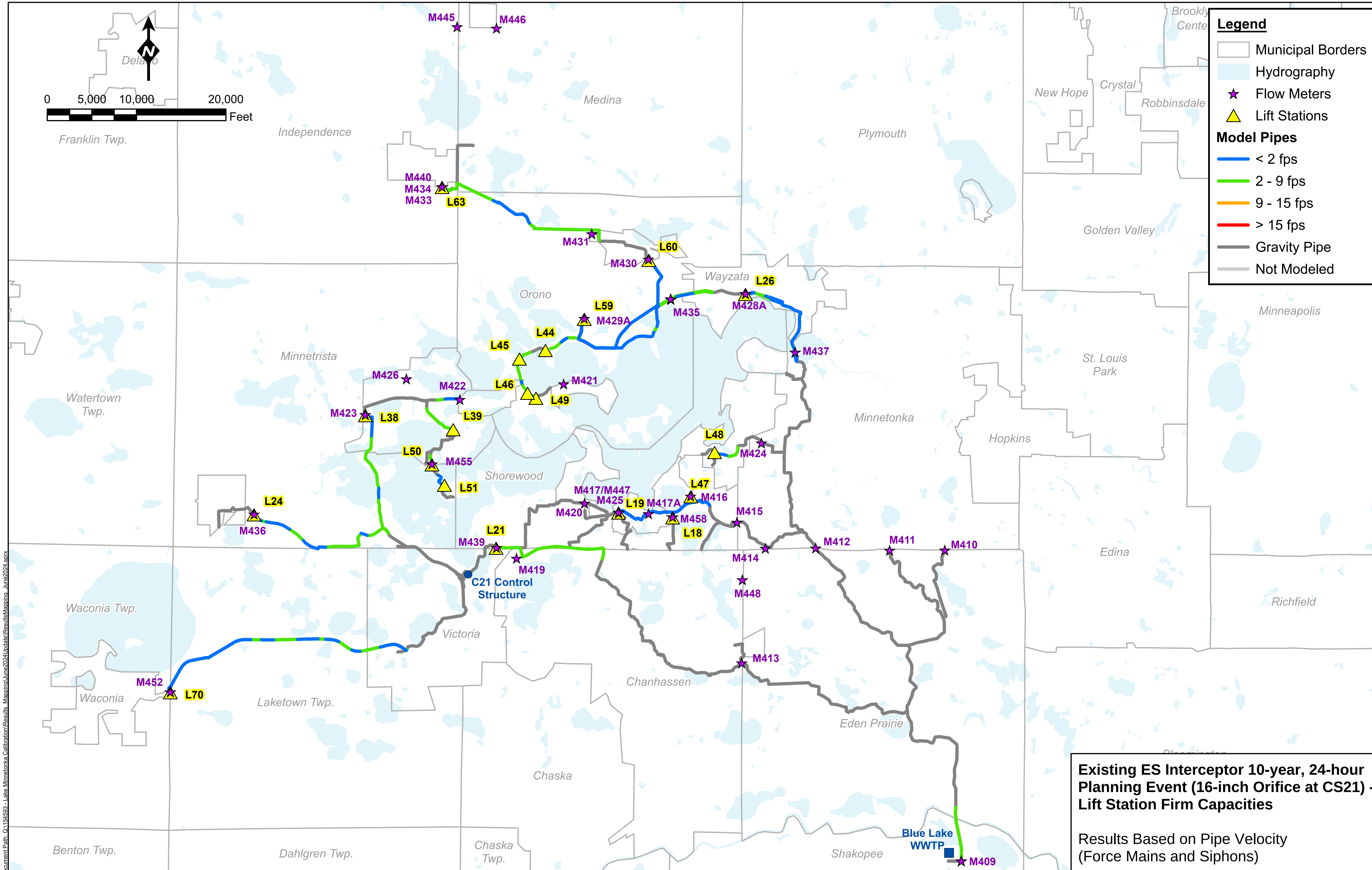
Results Based on Pipe Velocity (Gravity Pipes)



2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

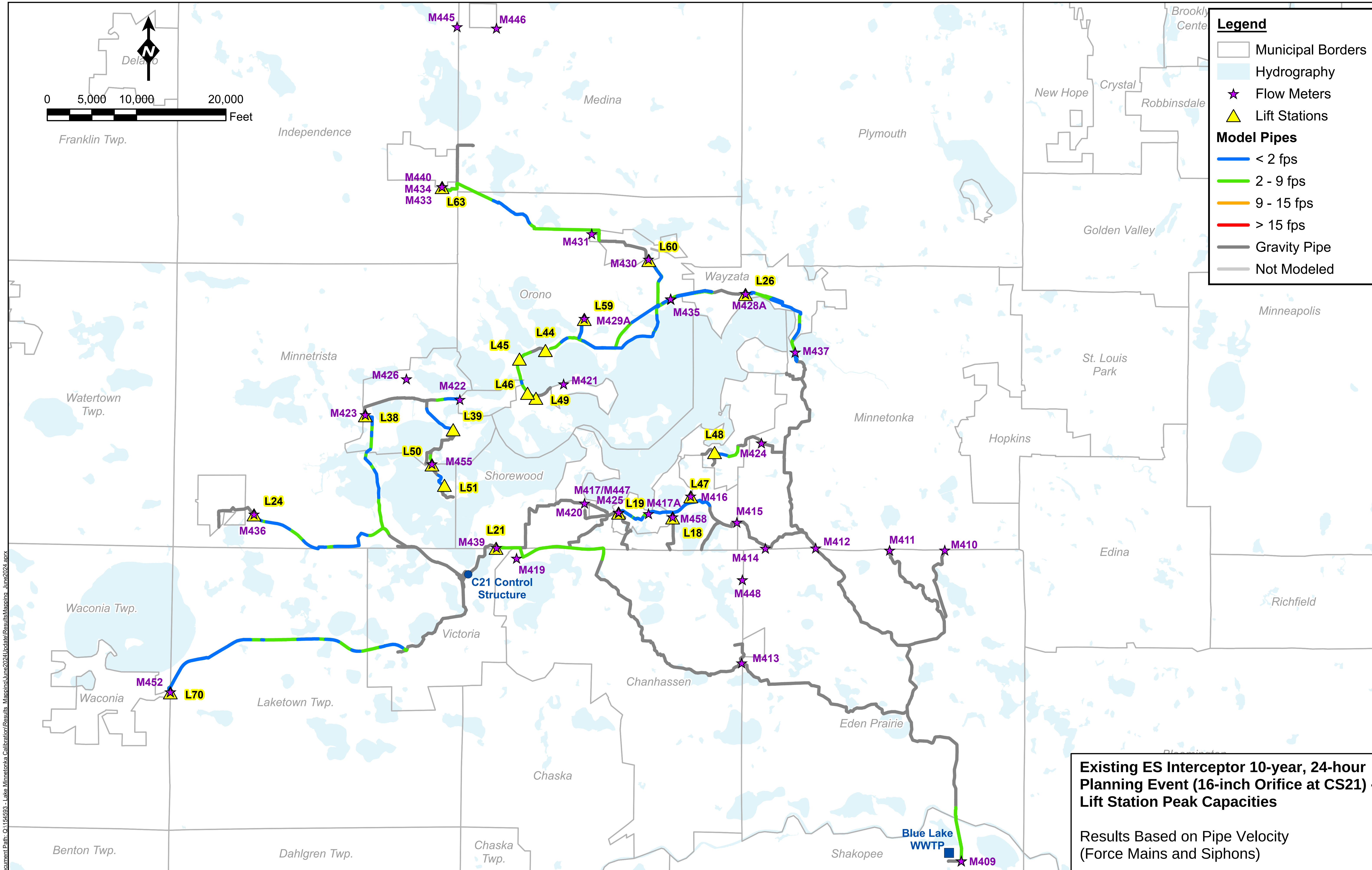
Results Based on Pipe Velocity (Gravity Pipes)

Attachment E: Velocity Result Maps – Force Mains



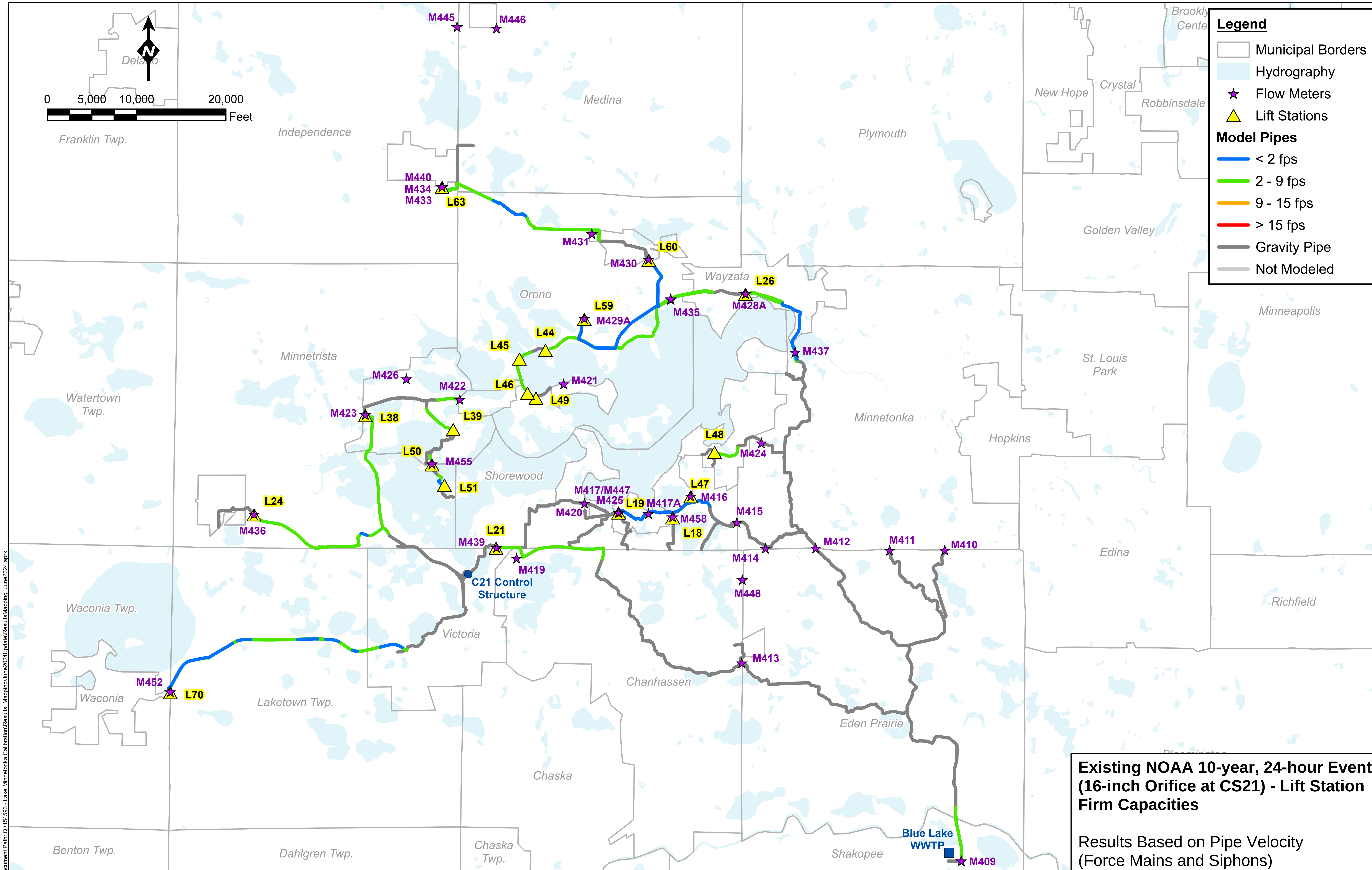
Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)



Existing ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)


Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities
Results Based on Pipe Velocity (Force Mains and Siphons)
Legend
Municipal Borders
Hydrography
Flow Meters
Lift Stations
Model Pipes
< 2 fps
2 - 9 fps
9 - 15 fps
> 15 fps
Gravity Pipe
Not Modeled
0
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10,000
20,000
Feet
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Franklin Twp.
Independence
Medina
Plymouth
New Hope
Crystal
Robbinsdale
Golden Valley
Wayzata
Orono
Minnetrista
Watertown Twp.
Minnetonka
St. Louis Park
Minneapolis
Hopkins
Shorewood
Edina
Richfield
Waconia Twp.
Victoria
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Laketown Twp.
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M455
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M416
M417/M447
M425
L19
M417A
M420
M458
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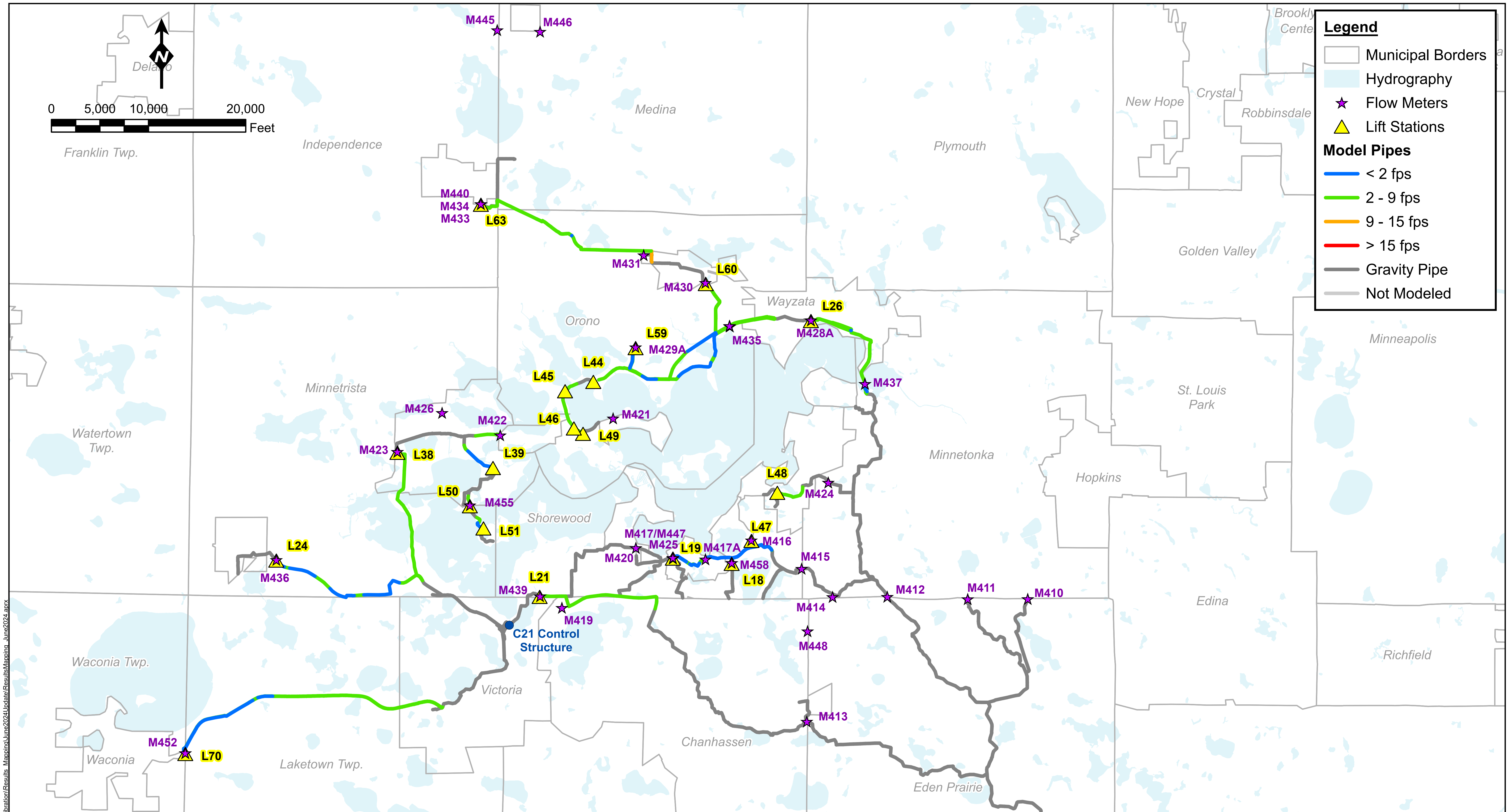
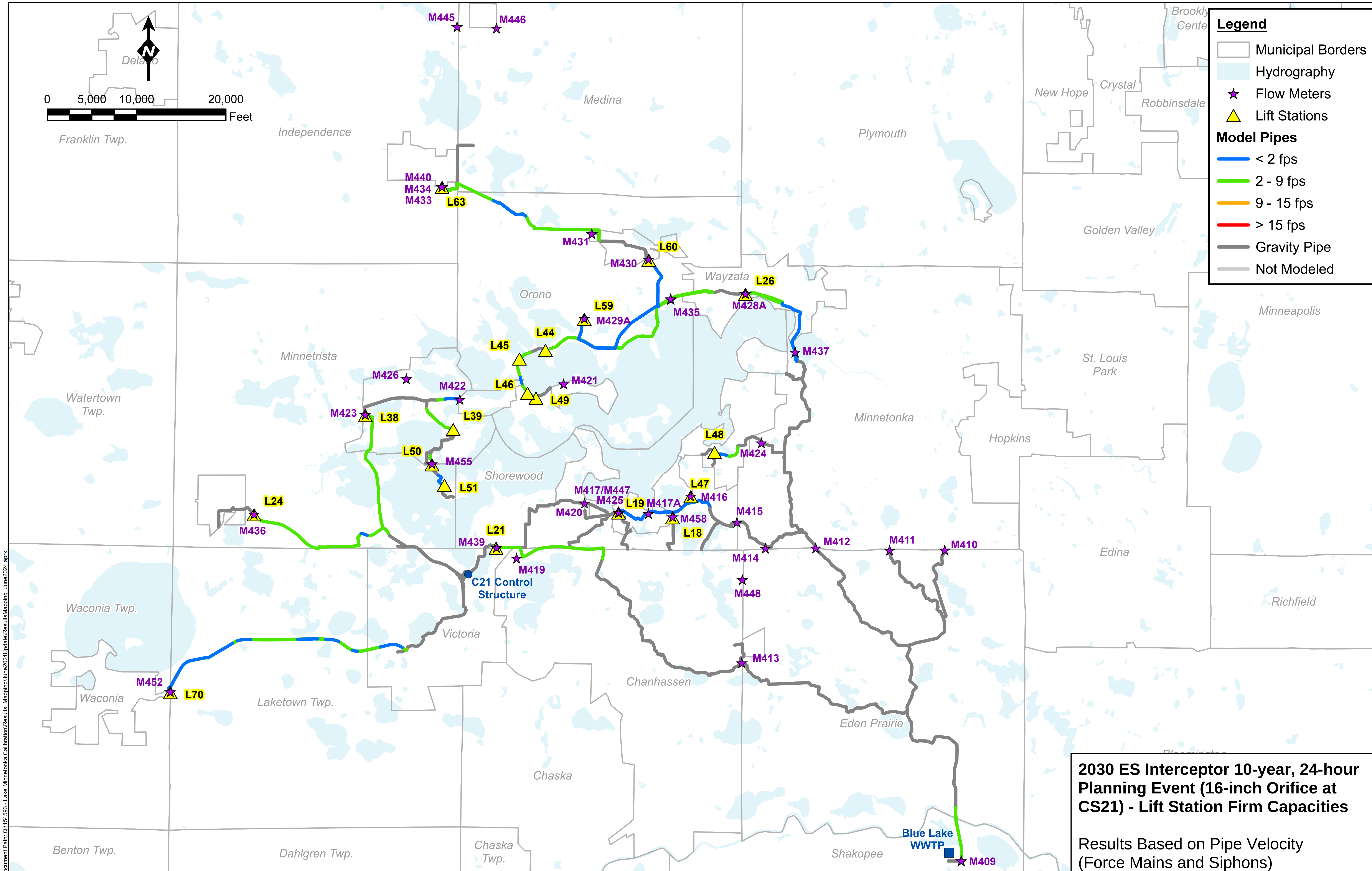


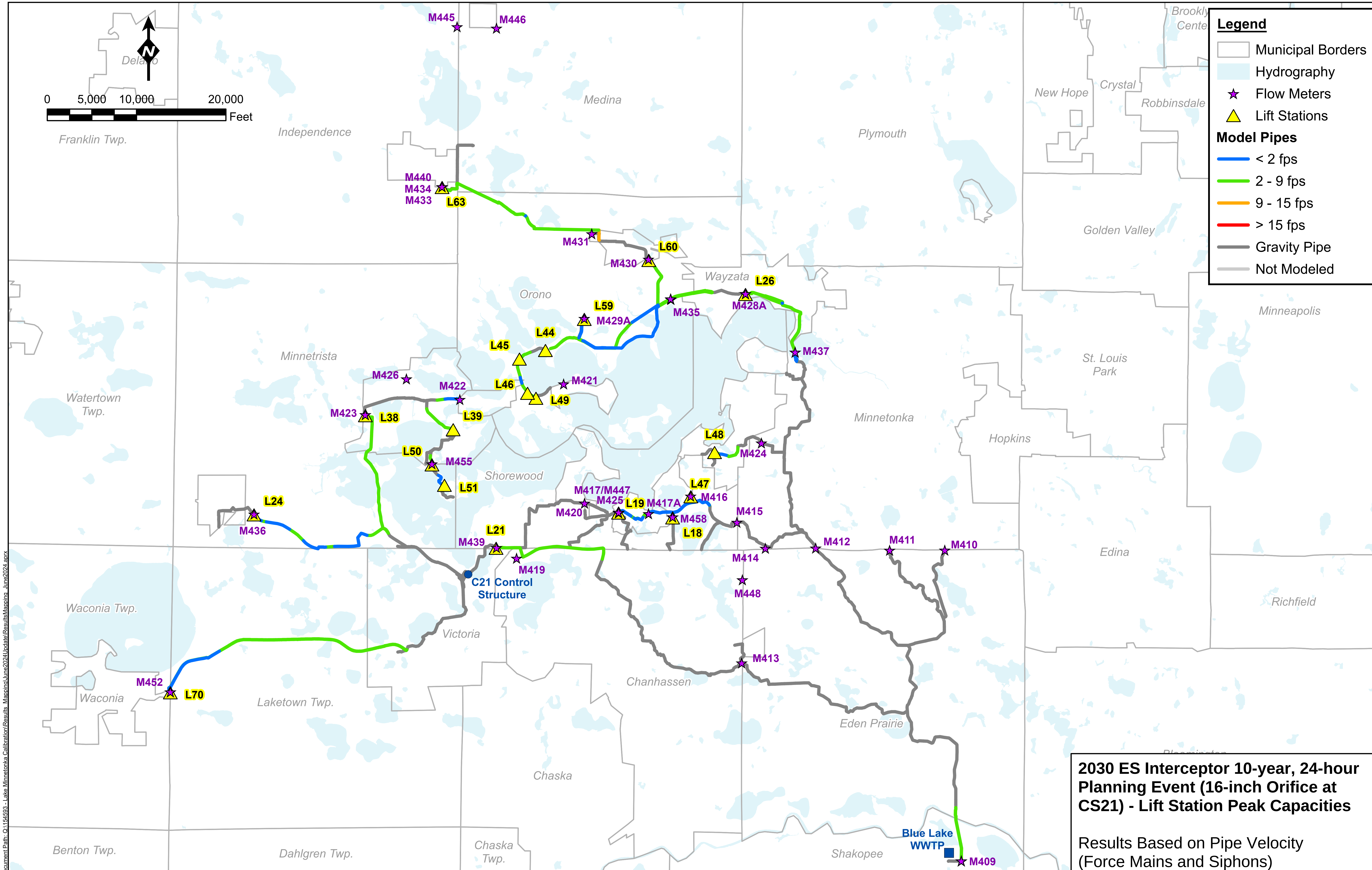
Existing NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)



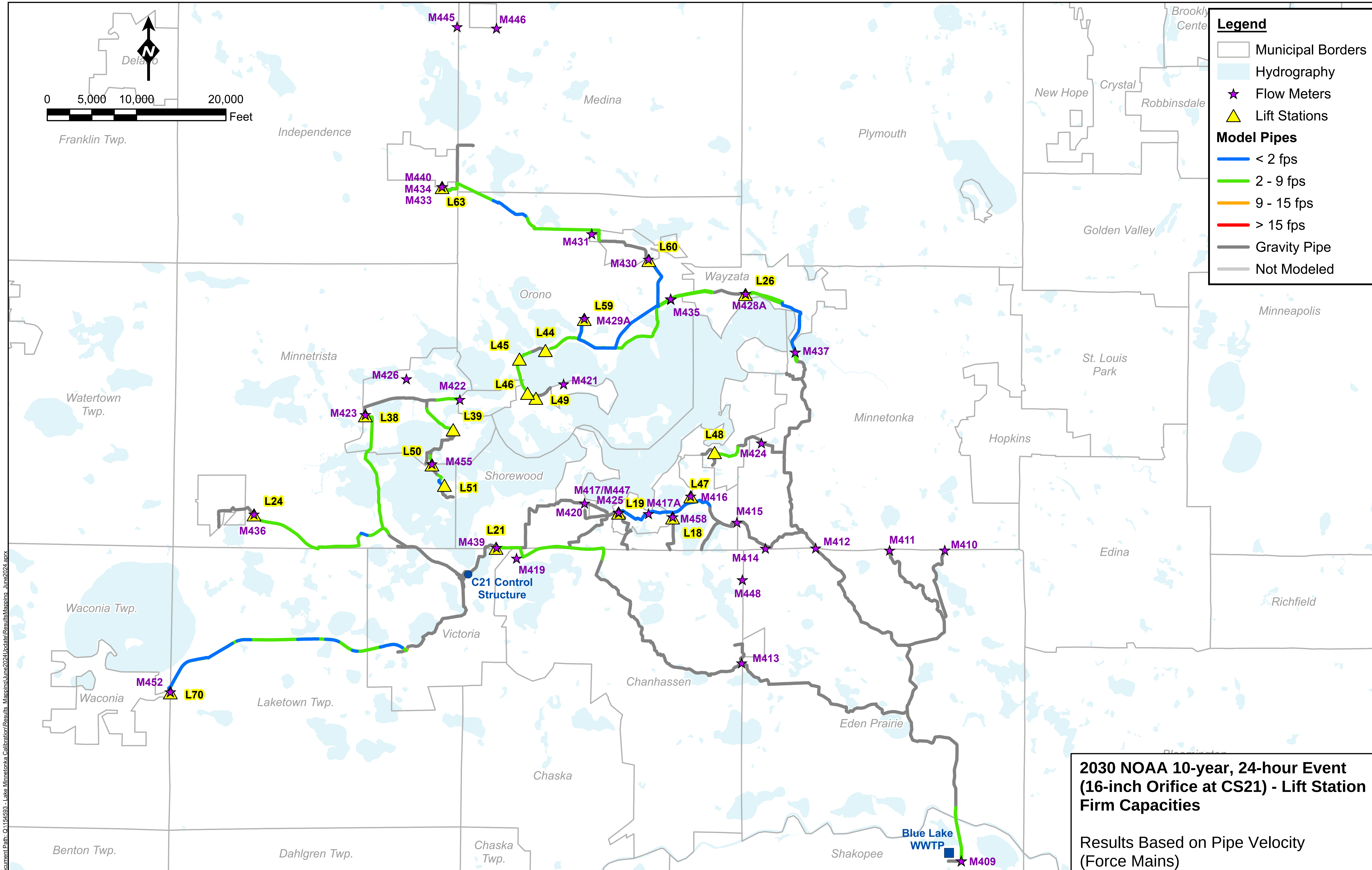
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)



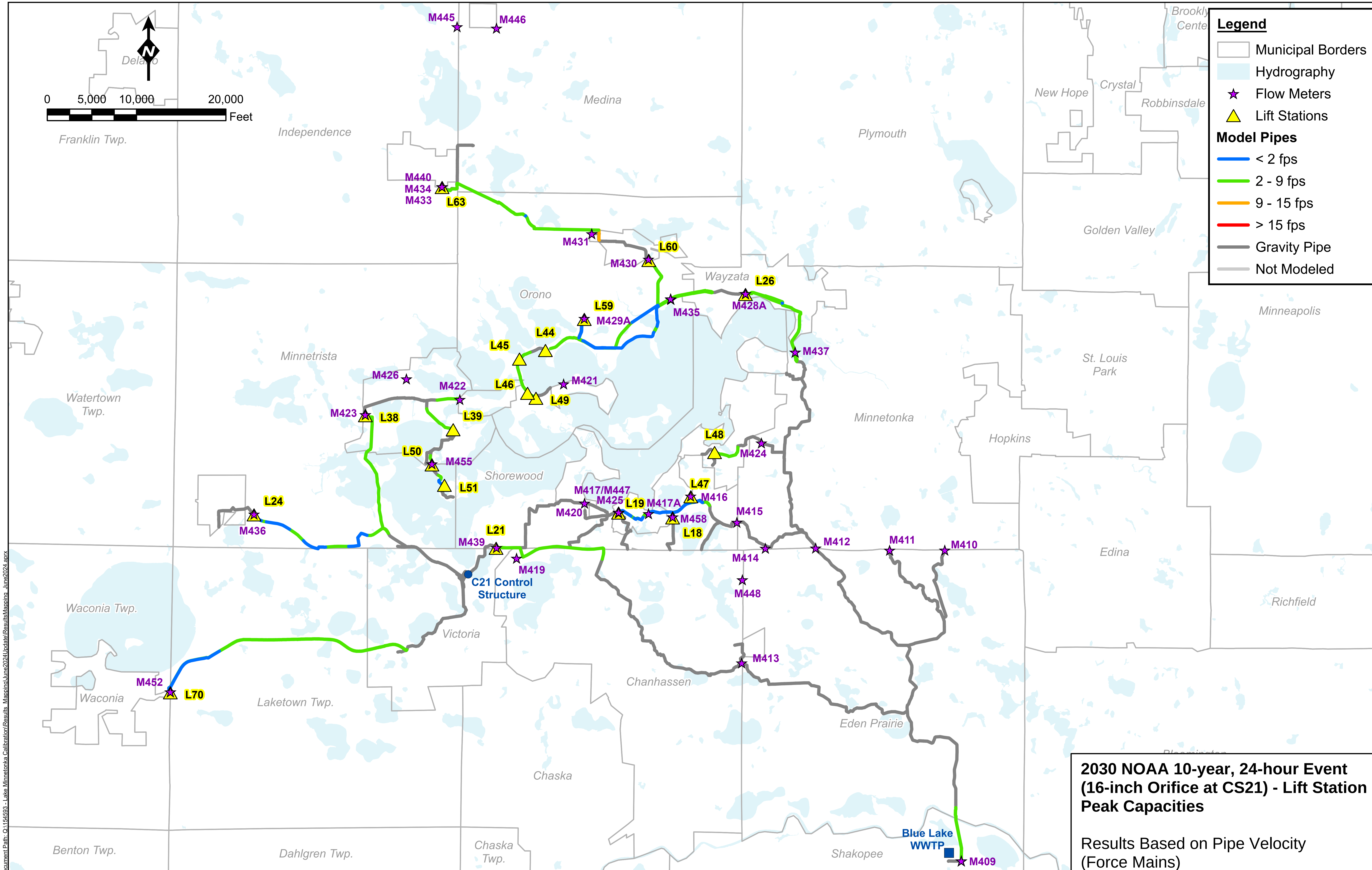
2030 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)



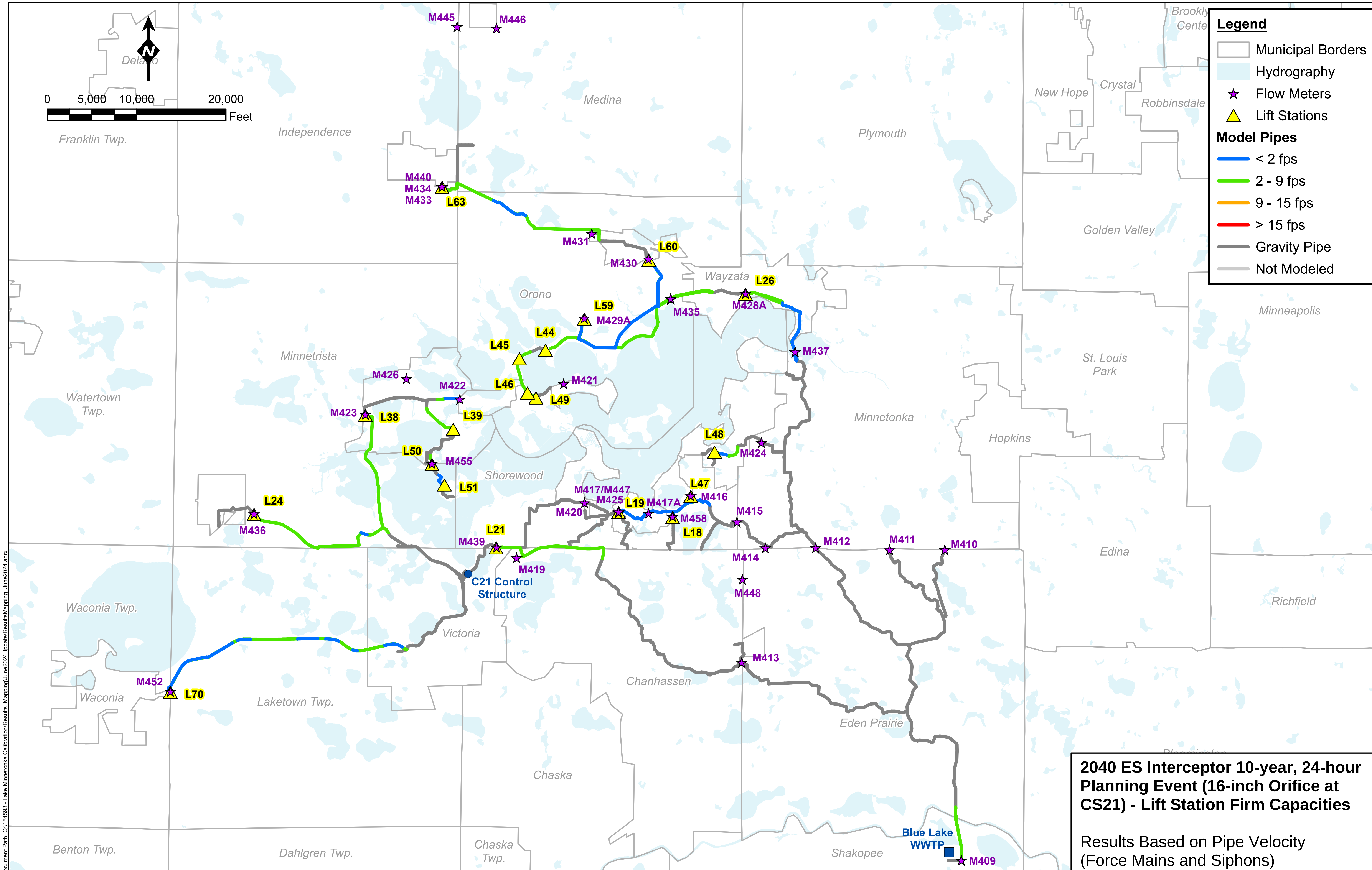
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Force Mains)



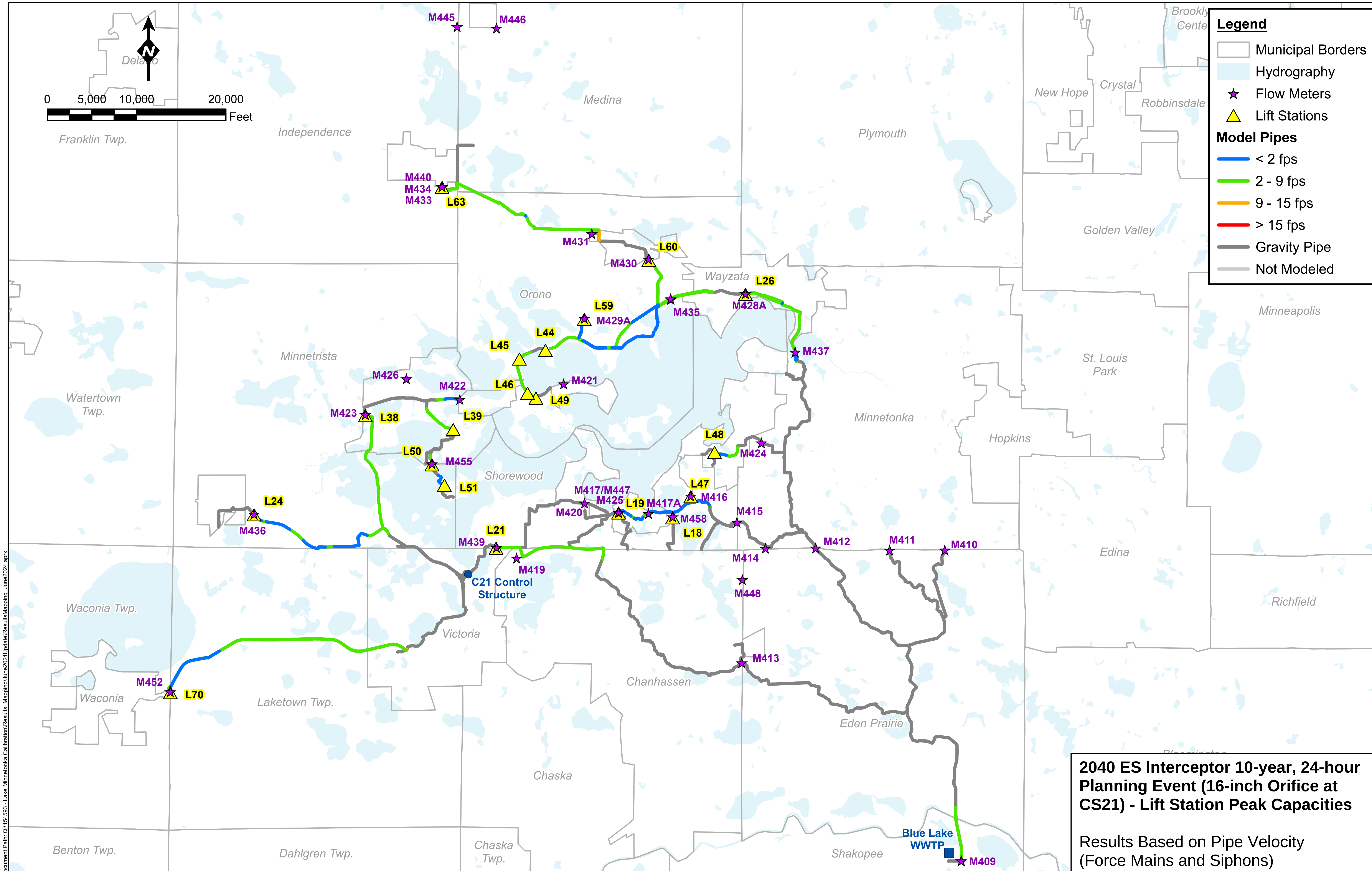
2030 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Force Mains)



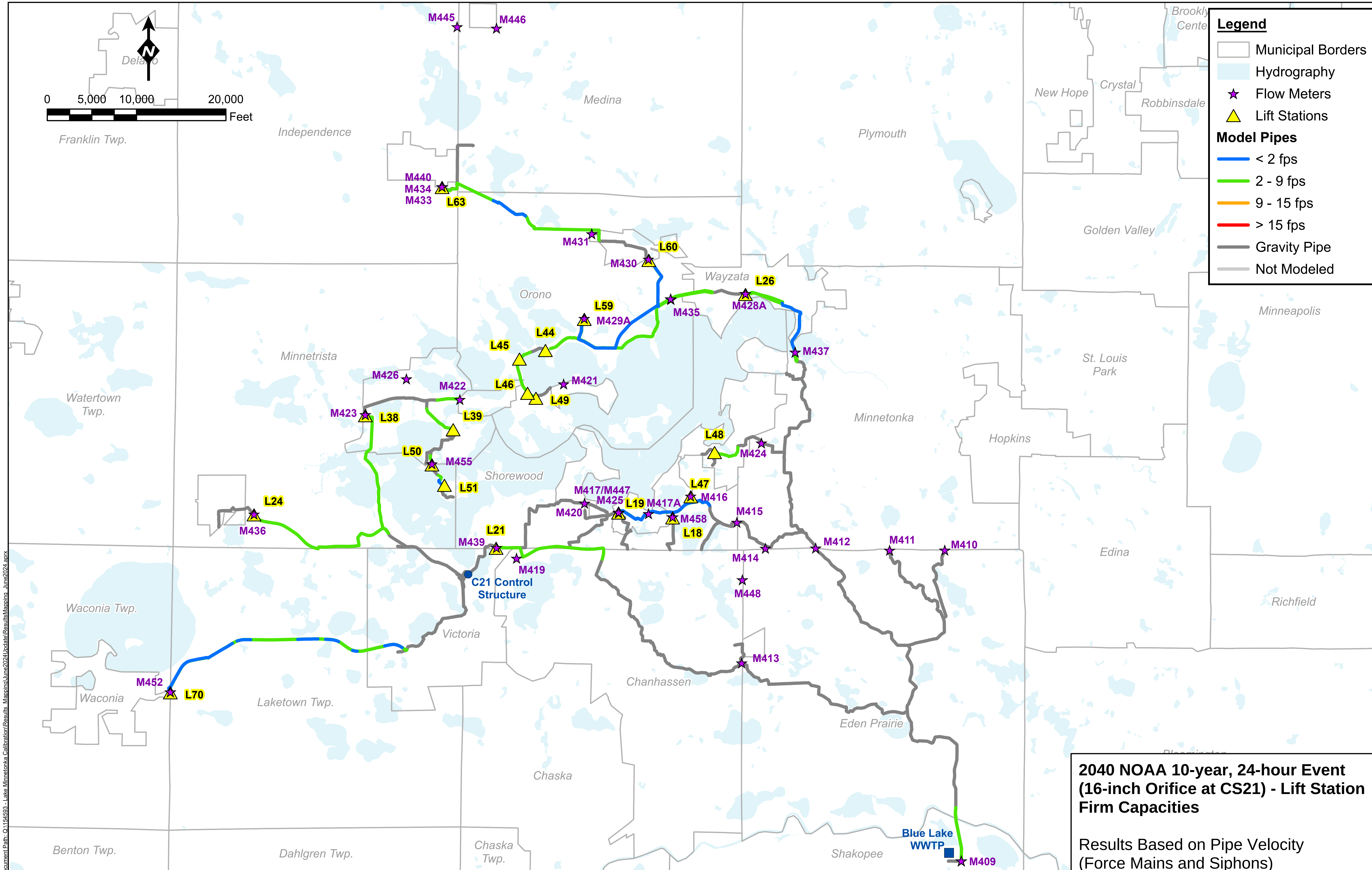
2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)



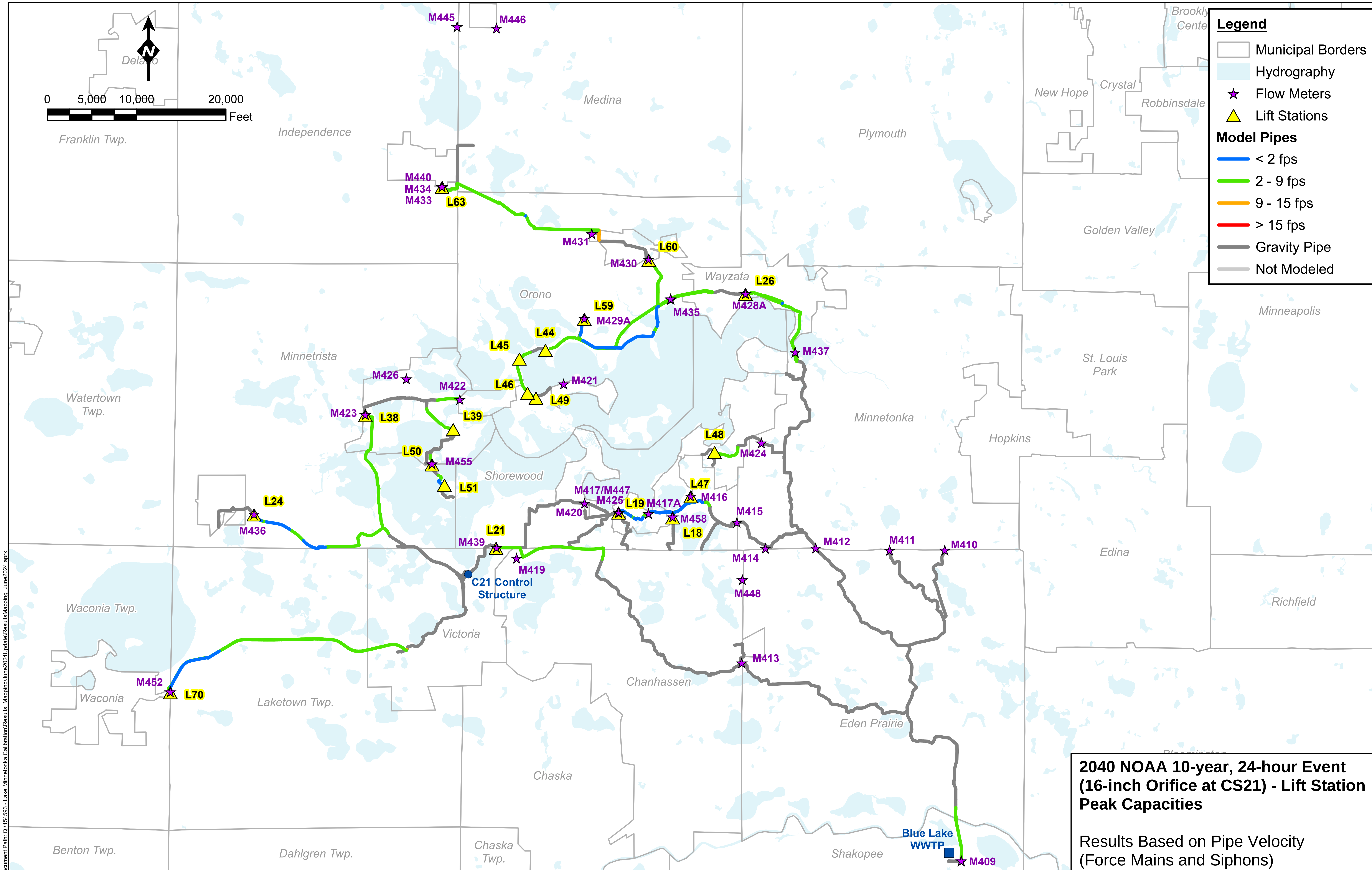
2040 ES Interceptor 10-year, 24-hour Planning Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)



2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Firm Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)



2040 NOAA 10-year, 24-hour Event (16-inch Orifice at CS21) - Lift Station Peak Capacities

Results Based on Pipe Velocity (Force Mains and Siphons)

Appendix C

Pipe Condition Assessment

Building a Better World
for All of Us®

MEMORANDUM

TO: Constantine Dimitracopoulos, PE

FROM: William Lueck, PE (Lic. MN)
Fasil Yitbarek, PE (Lic. MN)
Rafael Estrada Moncada, PE (Lic. MN, NE)

DATE: December 22, 2021

RE: Lake Virginia and Maple Plain Forcemain Condition Assessment
SEH No. 156151 14.00

1. INTRODUCTION

Metropolitan Council Environmental Services (MCES) utilized Minger Construction, under a separate contract (Project Number 802827, MCES Contract Number 15P304), to assist Short Elliott Hendrickson (SEH) perform condition assessment and potholing of Interceptor 8253 Lake Virginia Forcemain and Interceptor 8352 Maple Plain Forcemain. SEH completed nondestructive ultrasonic testing of the remaining thickness of the ductile iron forcemains at a number of pothole locations and within a number of existing forcemain air release maintenance holes. SEH also collected soil samples at these pothole locations and sent them to an independent third-party testing lab to test for soil corrosivity.

1.1 PURPOSE

The purpose of this condition assessment memorandum is to identify the observable condition of the FM8253 and FM8352 by measuring the remaining thickness of ductile iron pipe in six (6) existing air release maintenance holes and five (5) potholes. Based on the construction accessibility, groundwater, soils borings and dewatering of the forcemain, eleven (11) locations were investigated. These are shown in the attached Figure 1 – Lake Virginia Forcemain Condition Assessment and Figure 2 – Maple Plain Forcemain Condition Assessment.

1.2 EXISTING FORCEMAIN

The FM8253 in Lake Virginia was built using 24” class 51 ductile iron pipe (thickness = 0.41”) and 30” class 51 ductile iron pipe (thickness = 0.43”). While the FM8352 in Maple Plain was built using 12” class 52 ductile iron pipe (thickness = 0.37”).

2. CORROSION ASSESSMENT

2.1 DEWATERING IN FORCEMAIN

FM8253 in Lake Virginia begins at Lift Station 21 and discharges into maintenance hole 64 approximately 3 miles downstream. There are five (5) air release maintenance holes, at one of which dewatering of the forcemain occurs and thus there is a potential for internal corrosion due to the exposure of corrosive gasses to the pipe interior. Two (2) air release maintenance holes and two (2) potholes were inspected by SEH to determine the existing pipe thicknesses and compare them to the initial pipe thicknesses to assess the extent of corrosion in the forcemain. During the assessment it was noted that the forcemain measured 30” in diameter at all four (4) locations. The four (4) locations that were investigated are shown in the attached Figure 1.

FM8352 in Maple Plain begins at Lift Station 63 and discharges into a weir maintenance hole approximately 4 miles downstream. There are eight (8) air release maintenance holes, at two of which dewatering of the forcemain occurs and thus there is a potential for internal corrosion due to the exposure of corrosive gasses to the pipe interior. Four (4) air release maintenance holes and three (3) potholes were inspected by SEH to determine the existing pipe thicknesses and compare them to the initial pipe thickness to assess the extent of corrosion in the forcemain. During the assessment it was noted that the forcemain measured 12” at all seven (7) locations. The seven (7) locations that were investigated are shown in the attached Figure 2. Air release maintenance hole 2A contained a dual forcemain thus two (2) air release valves.

2.2 METHODS

An ultrasonic thickness gauge was used to determine the existing thickness of the forcemain from the outside of the pipe at six (6) existing air-release maintenance holes and five (5) potholes. The ultrasonic thickness gauge measures the thickness of a pipe through use of ultrasonic waves. The apparatus consisted of a probe, a PosiTector UTG (main device, with readout), and couplant.

The device was calibrated using the typical value for sound velocity in cast iron. The thickness of the cement lining as well as any water in the pipes is ignored in the measurements.

The pipe surfaces were cleared of all dirt, moisture, and loose material prior to administering the tests to minimize error. Probe location was strategically selected to avoid rough patches in the pipe and to select the flattest and smoothest surfaces.

The test was performed by placing the probe on a drop of couplant on the pipe surface. The probe was held in position until an echo was detected and the indicator confirmed probe contact with the surface of the pipe. The probe displayed the material thickness in inches, and the readings were recorded.

Several trials were administered at different locations on each pipe to account for reading error.

SEH collected two soil samples per pothole location for a total of ten (10) samples. The soil samples were taken by excavating the soil around the top or side of the pipe near the probe location. The samples were then sent to an independent third-party testing lab to test for soil corrosivity. The test results are summarized below, and a copy of the report can be found in Appendix 1.

3. CORROSIVE SOILS

3.1 SOIL TESTING RESULTS

Grab soil samples were obtained from the excavated pothole locations to determine the corrosivity of soils encountered around the existing pipe. Ten soils samples were collected from pothole locations at each site. The following is a brief description of the locations and approximate sample depths:

1. Lake Virginia Pothole #1: the excavation was completed near the ditch on the West side of Hazeltine Blvd. Two soil samples were taken at this location at an approximate depth of 7 ft.
2. Lake Virginia Pothole #3: the excavation was completed near the ditch on the South side of Highway 7. Two soil samples were taken at this location at an approximate depth of 10.5 ft.
3. Maple Plain Pothole #1: the excavation was completed on Townline Road. Two soil samples were taken at this location at an approximate depth of 6.5 ft.
4. Maple Plain Pothole #2: the excavation was completed near the ditch on the South side of Wayzata Blvd W. Two soil samples were taken at this location at an approximate depth of 7 ft.
5. Maple Plain Pothole #3: the excavation was completed near the ditch on the East side of Willow Dr N. Two soil samples were taken at this location at an approximate depth of 10 ft.

Photos of the excavations taken during the condition assessment can be found in Figure 3. A plan view showing the approximate excavation locations can be found in Figure 1 and 2.

All ten samples were submitted for analytical testing to CERCO Analytical. Each sample was tested for:

- Redox (ASTM D1498)
- pH (ASTM D4972)
- Resistivity (100% Saturated) ASTM G57
- Sulfide (ASTM D4658M)
- Chloride (ASTM D4327)
- Sulfate (D4327)

3.2 CORROSIVITY CONSIDERATIONS

In order to evaluate the relative corrosivity of the soils present around the exterior of the existing pipe at the test locations, the test results were applied using the 10-point soil evaluation procedure as outlined in the ANSI/AWWA C105/A21.5 Standard. The evaluation procedure is based upon test results and observations about soil resistivity, pH, oxidation reduction (redox) potential, sulfides, and moisture. For a given soil sample, each parameter is evaluated and assigned points according to its contribution to corrosivity. If the sum of total points equals or exceeds 10, the soil is considered corrosive to ductile iron pipe and protective measures should be taken. The results of soil tests performed in Lake Virginia are summarized below.

Table 1: Soil Test Results along MCES Interceptor 8253 Lake Virginia Forcemain

Pothole	Sample	Depth (ft)	pH	Chloride	Redox Potential (mv)	Sulfide	Resistivity (ohm-cm)	Moisture Condition	AWWA C105 Score
1	1	7	8.24	27	250	ND	2600	Moist	2
1	2	7	8.24	23	330	ND	2600	Moist	2
2	1	10.5	8.31	ND	340	ND	3600	Moist	1
2	2	10.5	8.35	ND	320	ND	4900	Moist	1

All samples are under a value 10 points indicating the soils encountered surrounding the existing pipe at the pothole locations are not especially corrosive to ductile iron pipe. The results of soil tests performed in Maple Plain are summarized below.

Table 2: Soil Test Results along MCES Interceptor 8352 Maple Plain Forcemain

Pothole	Sample	Depth (ft)	pH	Chloride	Redox Potential (mv)	Sulfide	Resistivity (ohm-cm)	Moisture Condition	AWWA C105 Score
1	1	6.5	7.86	ND	300	ND	1700	Wet	10
1	2	6.5	7.78	ND	310	ND	1600	Wet	10
2	1	7	8.31	480	300	ND	500	Wet	12
2	2	7	7.57	360	6.7	ND	390	Wet	12
3	1	10	8.05	160	250	ND	1000	Wet	16
3	2	10	7.9	170	330	ND	910	Wet	12

All samples equal or exceed 10 points indicating the soils encountered surrounding the existing pipe at the pothole locations are corrosive to ductile iron pipe.

4. REMAINING DUCTILE IRON FORCEMAIN THICKNESS

4.1 MCES INTERCEPTOR 8253 LAKE VIRGINIA FORCEMAIN

Two (2) air release maintenance holes and two (2) potholes were inspected by SEH to determine the existing pipe thicknesses and compare them to the initial pipe thicknesses to assess the extent of corrosion in the forcemain. During the assessment it was noted that the forcemain measured 30” at all four (4) locations. Table 3 summarizes the thicknesses measured.

Table 3: Pipe Thicknesses along MCES Interceptor 8253 Lake Virginia Forcemain

Location	Test	Standard Thickness Class 51, Nominal Thickness (in)	Reading (in)									Mean Thickness Measure (in)	Standard Deviation (in)	Range of Thickness (in)
			1	2	3	4	5	6	7	8	9			
AR 8	Upstream of Valve	0.43	0.445	0.435	0.433	0.440	-	-	-	-	-	0.438	0.005	0.427-0.449
	Downstream of Valve	0.43	0.424	0.453	0.456	0.450	-	-	-	-	-	0.446	0.01	0.416-0.475
Pothole 3	10.5' to Top of Pipe	0.43	0.428	0.466	0.418	0.413	0.428	-	-	-	-	0.431	0.02	0.389-0.472
AR 14	Upstream of Valve	0.43	0.487	0.482	0.468	0.492	0.529	-	-	-	-	0.492	0.02	0.446-0.537
	Downstream of Valve	0.43	0.463	0.467	0.470	0.476	0.479	-	-	-	-	0.471	0.007	0.458-0.484
Pothole 1	7' to Top of Pipe	0.43	0.280	0.233	0.233	0.194	0.206	0.198	0.133	0.240	0.268	0.221	0.04	0.132-0.309

With 2 standard deviations from the mean we assign a 95% confidence interval at each location to determine an “Range of Thickness” according to existing wall thickness. The standard deviation of the readings at all locations is 0.113 which is about two and a half times as large as the largest standard deviation. This shows that there is some statistical difference in wall thicknesses between the four (4) locations possibly due to corrosion.

4.2 MCES INTERCEPTOR 8352 MAPLE PLAIN FORCEMAIN

Four (4) air release maintenance holes and three (3) potholes were inspected by SEH to determine the existing pipe thicknesses and compare them to the initial pipe thickness to assess the extent of corrosion in the forcemain. During the assessment it was noted that the forcemain measured 12” at all seven (7) locations. Table 4 summarizes the thicknesses measured.

Table 4: Pipe Thicknesses along MCES Interceptor 8352 Maple Plain Forcemain

Location	Test	Standard Thickness Class 52, Nominal Thickness (in)	Reading (in)					Mean Thickness Measure (in)	Standard Deviation (in)	Range of Thickness (in)
			1	2	3	4	5			
Pothole 1	6.5' to Top of Pipe	0.37	0.348	0.348	-	-	-	0.348	0.000	0.3480-0.3480
AR 21	Upstream of Valve	0.37	0.400	0.396	0.414	0.426	-	0.409	0.01	0.3816-0.4364
	Downstream of Valve	0.37	0.384	0.390	0.370	0.402	-	0.387	0.01	0.3599-0.4131
AR 2A (North)	Upstream of Valve	0.37	0.398	0.395	0.382	-	-	0.392	0.009	0.3747-0.4087
	Downstream of Valve	0.37	0.432	0.435	0.426	0.425	-	0.430	0.005	0.4199-0.4391
AR 2A (South)	Upstream of Valve	0.37	0.410	0.404	0.416	-	-	0.410	0.006	0.3980-0.4220
	Downstream of Valve	0.37	0.351	0.355	0.360	-	-	0.355	0.005	0.3463-0.3644
AR 9	Upstream of Valve	0.37	0.390	0.362	0.382	-	-	0.378	0.01	0.3492-0.4068
	Downstream of Valve	0.37	0.345	0.375	0.362	0.330	0.340	0.350	0.02	0.3144-0.3864
Pothole 2	7' to Top of Pipe	0.37	0.308	0.310	0.308	-	-	0.309	0.001	0.3064-0.3110
AR 7	Upstream of Valve	0.37	0.373	0.399	0.398	-	-	0.390	0.01	0.3605-0.4195
	Downstream of Valve	0.37	0.450	0.441	0.452	0.440	-	0.446	0.006	0.4335-0.4580
Pothole 3	10' to Top of Pipe	0.37	0.301	0.262	0.317	-	-	0.293	0.03	0.2368-0.3499

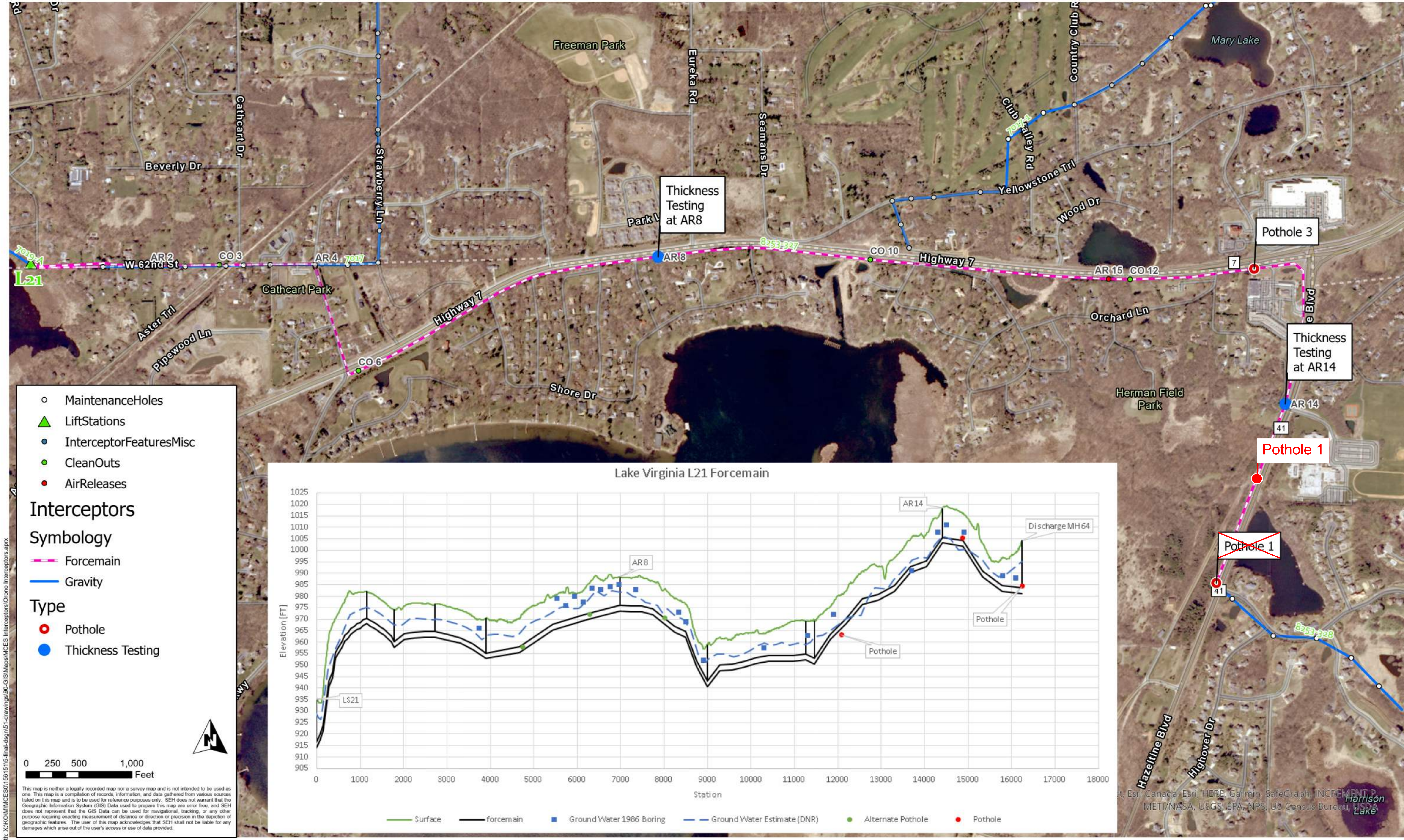
With 2 standard deviations from the mean we assign a 95% confidence interval at each location to determine a “Range of Thickness” according to existing wall thickness. The standard deviation of the readings at all locations is 0.0446 which is about one and a half times as large as the largest standard deviation. This shows that there is some statistical difference in wall thicknesses between the seven (7) locations possibly due to corrosion.

Attachment

Figure 1 – Lake Virginia Forcemain Condition Assessment, Figure 2 – Maple Plain Forcemain Condition Assessment, Figure 3 – Pictures, Appendix 1 – Lake Virginia and Maple Plain Corrosive Soils Report

x:\ko\m\mces0\156151\7-const-svcs\82-condition assessment report\condition assessment report.docx

Short Elliott Hendrickson Inc., 3535 Vadnais Center Drive, St. Paul, MN 55110-3507
651.490.2000 | 800.325.2055 | 888.908.8166 fax | **sehinc.com**

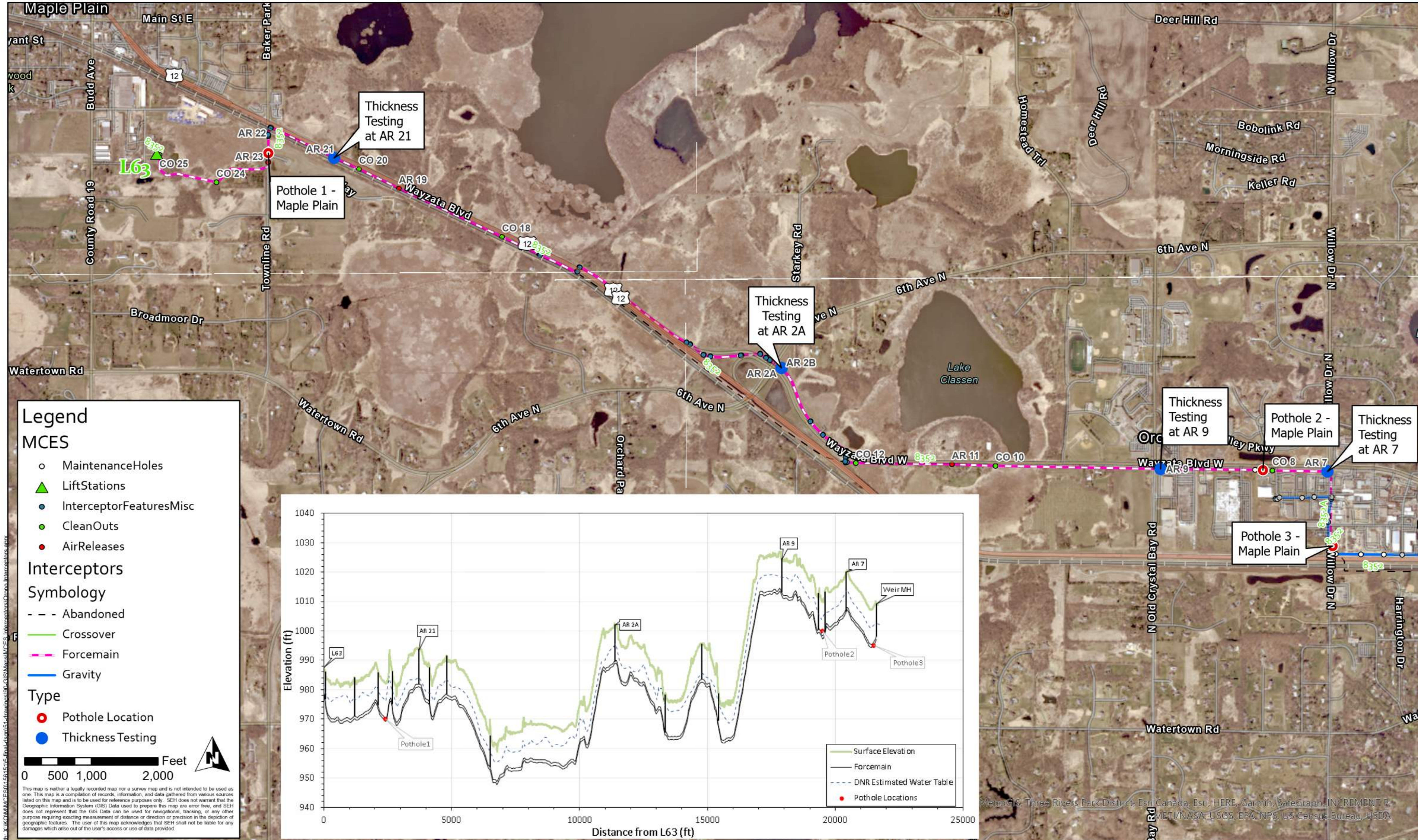


Project Number: MCES0 156151
Print Date: Print Date: 9/9/2021

Map by:
Projection:
Source:

Lake Virginia Forcemain Condition Assessment
MCES L21 and FM 8253-327

Figure 1



Project Number: XXXXX 000000
Print Date: Print Date: 9/9/2021

Map by:
Projection:
Source:

Maple Plain Forcemain Condition Assessment
MCES L60 & FM8352

Figure 2

Figure 3: Pictures

MCES Interceptor 8253 Lake Virginia Forcemain		
Location	**Test**	**Picture**
AR 8	Upstream of Valve	
	Downstream of Valve	
Pothole 3	10.5' to Top of Pipe	
AR 14	Upstream of Valve	
	Downstream of Valve	
Pothole 1	7' to Top of Pipe	

MCES Interceptor 8352 Maple Plain Forcemain		
Location	**Test**	**Picture**
Pothole 1	6.5' to Top of Pipe	-
AR 21	Upstream of Valve	-
	Downstream of Valve	
AR 2A (North)	Upstream of Valve	
	Downstream of Valve	
AR 2A (South)	Upstream of Valve	
	Downstream of Valve	
AR 9	Upstream of Valve	

<table>
<tr><th colspan="3">MCES Interceptor 8352 Maple Plain Forcemain</th></tr>
<tr><th>Location</th><th>Test</th><th>Picture</th></tr>
<tr><td></td><td>Downstream of Valve</td><td></td></tr>
<tr><td>Pothole 2</td><td>7' to Top of Pipe</td><td></td></tr>
<tr><td rowspan="2">AR 7</td><td>Upstream of Valve</td><td></td></tr>
<tr><td>Downstream of Valve</td><td></td></tr>
<tr><td>Pothole 3</td><td>10' to Top of Pipe</td><td></td></tr>
</table>

Appendix 1

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: SEH, Inc.
Client's Project No.: MCESO-156151
Client's Project Name: Forcemain Assessment, Lake Virginia and Maple Plain
Date Sampled: 11/05 & 10/21
Date Received: 29-Nov-21
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 13-Dec-2021

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Resistivity (As Rec'd) (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2111031-001	Lake Virginia, Pothole #1 Sample #1	250	8.24	4,700	2,600	N.D.	27	N.D.
2111031-002	Lake Virginia, Pothole #1 Sample #2	330	8.24	4,700	2,600	N.D.	23	N.D.
2111031-003	Lake Virginia, Pothole #3 Sample #1	340	8.31	2,900	3,600	N.D.	N.D.	N.D.
2111031-004	Lake Virginia, Pothole #3 Sample #2	320	8.35	5,700	4,900	N.D.	N.D.	N.D.
2111031-005	Maple Plain, Pothole #3 Sample #2	330	7.90	800	910	N.D.	170	N.D.
2111031-006	Maple Plain, Pothole #1 Sample #1	300	7.86	1,300	1,700	N.D.	N.D.	54
2111031-007	Maple Plain, Pothole #1 Sample #2	310	7.78	1,200	1,600	N.D.	N.D.	100
2111031-008	Maple Plain, Pothole #2 Sample #1	300	8.31	430	500	N.D.	480	N.D.
2111031-009	Maple Plain, Pothole #2 Sample #2	6.7	7.57	600	390	N.D.	360	224
2111031-010	Maple Plain, Pothole #3 Sample #1	250	8.05	1,000	1,000	N.D.	160	20

Method:	ASTM D1498	ASTM D4972	ASTM G57	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	-	-	50	15	15
Date Analyzed:	6-Dec-2021	6-Dec-2021	3-Dec-2021 & 9-Dec-2021	3-Dec-2021 & 9-Dec-2021	9-Dec-2021	6-Dec-2021	6-Dec-2021

Sheri Moore
for Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

Chain of Custody

MCESO - 156151

Page of

1100 Willow Pass Court
Concord, CA 94520-1006
925 462 2771
Fax: 925 462 2775
CERCO analytical

ckage: Generic COC
b No.: 211031 CU# 13326

Schedule
Analyte

Date Sampled | Date Due

Name: BRETT LARSEN
Fax: blarsen@sehinc.com
Phone
Cell: 612.730.8253
ıpany: SEH, INC
ple Source: Forcemain Assessment LAKE VIRGINIA and MAPLE PLAIN

ANALYSIS

lo.	Sample I.D.	Date	Time	Matrix	Contain.	Size	Preserv.	Qty.	REDOX	PH	SULFATE	CHLORIDE	SULFIDE	RESISTIVITY (AS IS)	RESISTIVITY (SATURATED)			
1	LAKE VIRGINIA POTHOLE #1 SAMPLE #1	11/05/21							X	X	X	X	X	X	X			
2	LAKE VIRGINIA POTHOLE #1 SAMPLE #2	11/05/21							X	X	X	X	X	X	X			
3	LAKE VIRGINIA POTHOLE #3 SAMPLE #1	11/05/21							X	X	X	X	X	X	X			
4	LAKE VIRGINIA POTHOLE #3 SAMPLE #2	11/05/21							X	X	X	X	X	X	X			
5	MAPLE PLAIN POTHOLE 3 SAMPLE 2	11/10/21							X	X	X	X	X	X	X			
6	MAPLE PLAIN POTHOLE 1 SAMPLE 1	11/10/21							X	X	X	X	X	X	X			
7	MAPLE PLAIN POTHOLE 1 SAMPLE 2	11/10/21							X	X	X	X	X	X	X			
8	MAPLE PLAIN POTHOLE 2 SAMPLE 1	11/10/21							X	X	X	X	X	X	X			
9	MAPLE PLAIN POTHOLE 2 SAMPLE 2	11/10/21							X	X	X	X	X	X	X			
10	MAPLE PLAIN POTHOLE 3 SAMPLE 1	11/10/21							X	X	X	X	X	X	X			

NOTES:

SAMPLE RECEIPT
Temp. at Lab -°C
Total No. of Containers
Rec'd Good Cond/Cold
Conforms to Record
Sampler CT

MATRIX
DW - Drinking Water
GW - Ground Water
SW - Surface Water
WW - Waste Water
Water
SL - Sludge
S - Soil

ABBREVIATIONS
HB - Hosebib
PV - Petcock Valve
PT - Pressure Tank
PH - Pump House
RR - Restroom
GL - Glass
PL - Plastic
ST - Sterile

Mgr. | Site Mgr.Tel# | Cell#
Access
. Name 1 | Emer.Phone 1
. Name 2 | Emer.Phone 2
. Name 3 | Emer.Phone 3
. Name 4 | Emer.Phone 4
. Name 5 *See file | EDT
ncy | Agency # | Fax#

	Date	Time
Relinquished By: BRETT LARSEN	11/17/21	1P
Received By: Dlang Jud	11/29/21	1300
Relinquished By:		
Received By:		
Relinquished By:		
Received By:		

Appendix D

Aquatic Resources Delineation Report

Aquatic Resource Delineation Report

of

Interceptor 8253-327

for

Brown & Caldwell

February 2025

EXECUTIVE SUMMARY

Brown & Caldwell (B&C) is contracted with the Metropolitan Council Environmental Services (MCES) for the rehabilitation of Interceptor 8253-327, which is located in the cities of Shorewood and Chanhassen, Hennepin and Craver counties, Minnesota. KLJ completed a Level 2 aquatic resources delineation of the Project limits in accordance with the 1987 United States Army Corps of Engineers (USACE) Wetland Delineation Manual, USACE August 2010 Regional Supplement: Midwest Region (Version 2.0), and the 2015 Guidance for Submittal of Delineation Reports to the St. Paul District Army Corps of Engineers and Wetland Conservation Act Local Government Units in Minnesota (Version 2.0). The routine approach with onsite inspection was utilized, including the standard multi-parameter approach (vegetation, hydrology, and soils) for wetland identification. Areas identified on the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps along with sites which visually supported a hydrophytic plant community were examined during the field survey. Three wetlands and ten wet ditches were identified and delineated within the Project limits.

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ACRONYMS AND ABBREVIATIONS

B&C	Brown & Caldwell
BSA	Bank Service Area
BWSR	Board of Water and Soil Resources
DNR	Department of Natural Resources
FAC	Facultative
FACU	Facultative Upland
FACW	Facultative Wetland
GPS	Global Positioning System
MCES	Metropolitan Council Environmental Services
MCWD	Minnehaha Creek Watershed District
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OAR	Other Aquatic Resource
OBL	Obligate Wetland
PWI	Public Waters Inventory
ROW	Right of Way
SSURGO	Soil Survey Geographic Database
SWCD	Soil and Water Conservation District
TEP	Technical Evaluation Panel
TNW	Traditional Navigable Water
UPL	Upland
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WCA	Minnesota Wetland Conservation Act

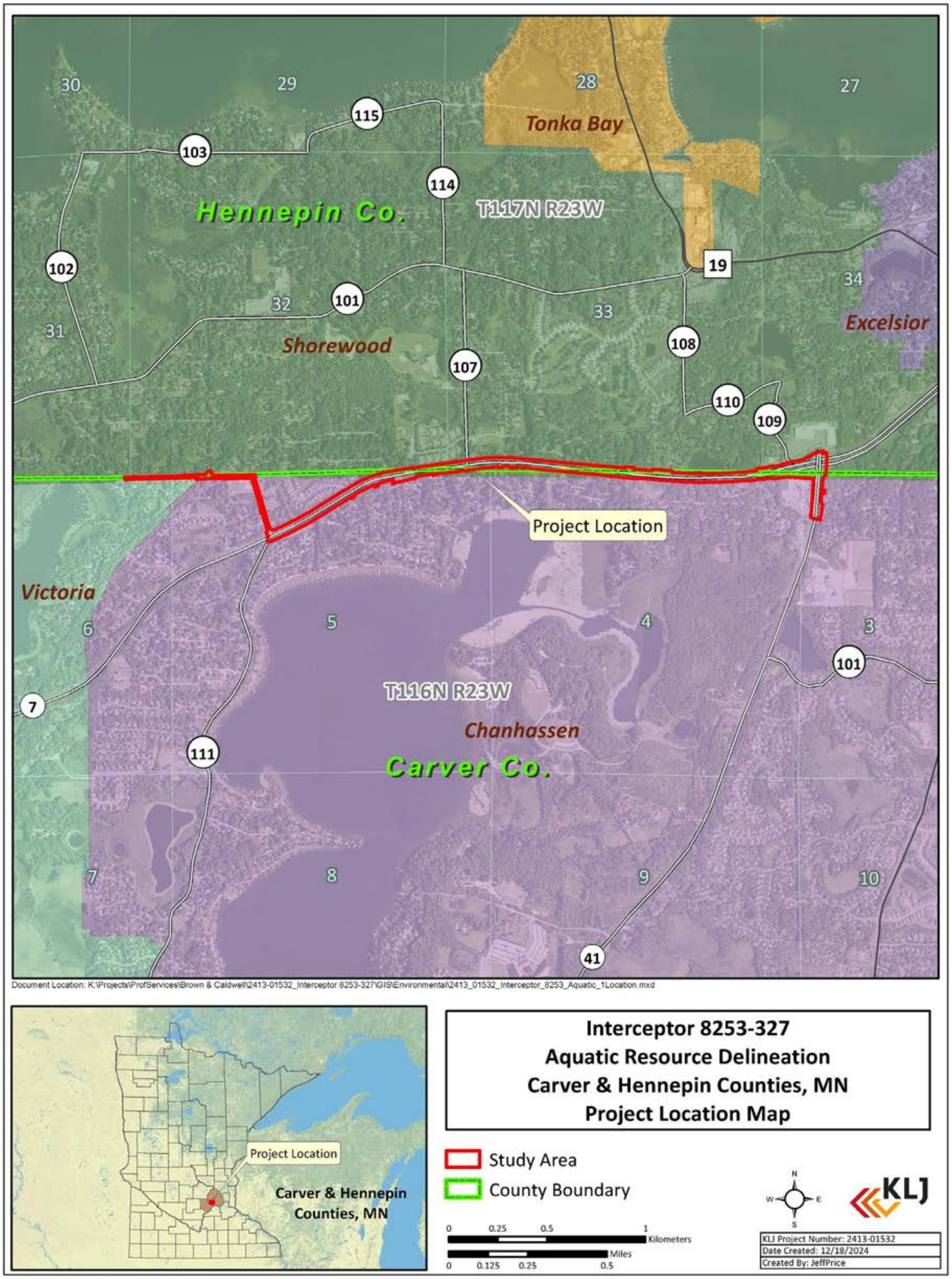
I. INTRODUCTION

KLJ has prepared this Level 2 Aquatic Resources Delineation Report for the Interceptor 8253-327 Project (Project), located in the cities of Shorewood and Chanhassen, Hennepin and Carver counties, Minnesota. Starting on the east end of the Project corridor, the Project begins at the intersection of Hazeltine Boulevard / Chaska Road within the City of Chanhassen, extends approximately 0.15 miles north to Highway 7 / Hazeltine Boulevard intersection, continuing westward along Highway 7 for approximately 1.80 miles to the Highway 7 / Church Road intersection, extending northward approximately 0.20 miles to the Church Road / W 62nd Street intersection, and extending to the western termini of W 62nd Street within the City of Shorewood. The Project varies in width between 35 and 350 ft throughout. The Project area is comprised of roadways, county ROW, and woodland areas.

Land use adjacent to the Project includes commercial, residential, and forested areas. The Project area is located in Bank Service Area #7; the Mississippi River – Twin Cities major watershed; and an unnamed minor watershed.

Fieldwork was completed on November 14, 2024. This Aquatic Resource Delineation Report is provided to the City of Chanhassen, Minnehaha Creek Watershed District (MCWD), and US Army Corps of Engineers (USACE) for the purpose of approving the boundaries of wetlands and other aquatic resources and as a resource for the permitting process.

Figure 1. Project Location Map



II. PURPOSE OF REPORT

The purpose of this Aquatic Resource Delineation Report is to:

- Present an accurate record of aquatic resources within the Project limits
- Provide a document to guide the Technical Evaluation Panel (TEP) members in a field review
- Solicit review and comment on aquatic resources from aquatic regulatory agencies early in the design process

This report is intended for the review of aquatic resource agencies such as the City of Chanhassen, MCWD, Hennepin County Environmental Services, Carver County Soil and Water Conservation District (SWCD), and Minnesota Board of Water and Soil Resources (BWSR), Minnesota Department of Natural Resources (DNR), and the USACE. This report is also intended to serve as a resource with which to guide a TEP in the wetland boundary verification exercise. As a result of the TEP, it is anticipated that the regulatory agencies will concur in agreement of the aquatic resources delineated and documented within the Project limits. This Aquatic Resource Delineation Report is intended so that engineers have the necessary information to avoid and minimize impacts to aquatic resources to the extent practicable.

III. REVIEW OF PUBLISHED RESOURCES

The review of published resources is relevant to any effort in assessing where wetland conditions may exist and their extents in an area. However, these resources should be considered only as a tool in identifying potential wetland conditions and should not substitute an on-site examination in the final determination of wetland conditions and their extents. Published resources used in the wetland delineation process of the Project included: LiDAR topography maps, Carver and Hennepin County Soil Surveys, the National Wetland Inventory (NWI) map, DNR Public Waters Inventory Map (PWI) for Carver and Hennepin Counties, precipitation data, and historical aerial photography.

LiDAR Topography Map

Topography for the Project was acquired from the DNR GIS Database (http://arcgis.dnr.state.mn.us/maps/mntopo/) and overlain on aerial photos to examine for indications of wetland conditions existing within the Project.

Carver and Hennepin County Soil Surveys

The Carver and Hennepin County Soil Surveys were examined for the Project. The Soil Survey Geographic Database (SSURGO) data were obtained and overlain on aerial photography for use during this review. Hydric soils are defined in the *Field Indicators of Hydric Soils in the United States: Guide for Identifying and Delineating Hydric Soils*, Version 8.2, 2018 (NRCS, 2018), *The 1987 Manual*, and the *Midwest Regional Supplement.*

Based on the Hydric Rating obtained from the Soil Surveys, soil types can be categorized into six categories:

- All hydric – all components listed for a given map unit are rated as being hydric,
- Predominantly hydric – 66% or more to less than 100% components are hydric,
- Partially hydric – more than 33% to less than or equal to 65% of components are hydric,
- Predominantly non-hydric – more than 0% and less than or equal to 33% of components are hydric,
- Non-hydric – all components are rated as non-hydric and,
- Unknown hydric – at least one component is not rated so a definitive rating for the map unit cannot be made.

Table 1 provides a summary of the mapped soil types within the Project.

Table 1. Mapped Soil Types within the Project

Map Unit Symbol	Map Unit Name	Hydric Soil Rating	Rating Description	Drainage Classification
CW	Cordova-Webster complex	100	Hydric	Poorly drained
KB	Kilkenny-Lester loams, 2 to 6 percent slopes	0	Non-hydric	Moderately well drained
KC	Lester-Kilkenny loams, 6 to 12 percent slopes	0	Non-hydric	Well drained
LS	Le Sueur loam, 1 to 3 percent slopes	15	Predominantly non-hydric	Somewhat poorly drained
L16A	Muskego, Blue Earth, and Houghton soils, ponded, 0 to 1 percent slopes	100	Hydric	Very poorly drained
L22C2	Lester loam, 6 to 10 percent slopes, moderately eroded	2	Predominantly non-hydric	Well drained
L22D2	Lester loam, 10 to 16 percent slopes, moderately eroded	0	Non-hydric	Well drained
L22E	Lester loam, 10 to 22 percent slopes	0	Non-hydric	Well drained
L23A	Cordova loam, 0 to 2 percent slopes	95	Predominantly hydric	Poorly drained
L24A	Glencoe clay loam, 0 to 1 percent slopes	100	Hydric	Very poorly drained
L25A	Le Sueur loam, 1 to 3 percent slopes	15	Predominantly non-hydric	Somewhat poorly drained
L36A	Hamel, overwash-Hamel complex, 0 to 3 percent slopes	45	Partially hydric	Somewhat poorly drained
L37B	Angus loam, 2 to 6 percent slopes	5	Predominantly non-hydric	Well drained

Map Unit Symbol	Map Unit Name	Hydric Soil Rating	Rating Description	Drainage Classification
L40B	Angus-Kilkenny complex, 2 to 6 percent slopes	5	Predominantly non-hydric	Well drained
L41C2	Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded	5	Predominantly non-hydric	Well drained
L41D2	Lester-Kilkenny complex, 10 to 16 percent slopes, moderately eroded	5	Predominantly non-hydric	Well drained
U3B	Udorthents (cut and fill land), 0 to 6 percent slopes	0	Non-hydric	Well drained

National Wetland Inventory

Digital NWI data were obtained from the Minnesota Geospatial Commons website (http://gisdata.mn.gov/), overlain on aerial photography and depicted on maps used during this review of the Project. This report depicts the most up-to-date NWI map.

Table 2. NWI Mapped Wetland within the Project

Location	Cowardin Classification	Delineated Resource
Eastern portion of study area, southwest quadrant of Highway 7/Hazeltine Blvd intersection	PUBHx	Stormwater Pond 1
Eastern portion of study area, north of Highway 7 and approximately 593 feet northwest of Highway 7/Oriole Ave intersection	PEM1A/PUBH	Wetland 1
Eastern portion of study area, south of Highway 7 approximately 585 feet east of Highway 7/N Manor Dr intersection	PEM1A	None
Eastern portion of study area, south of Highway 7 approximately 46 feet east of Highway 7/N Manor Dr intersection	PEM1C	Wetland 2

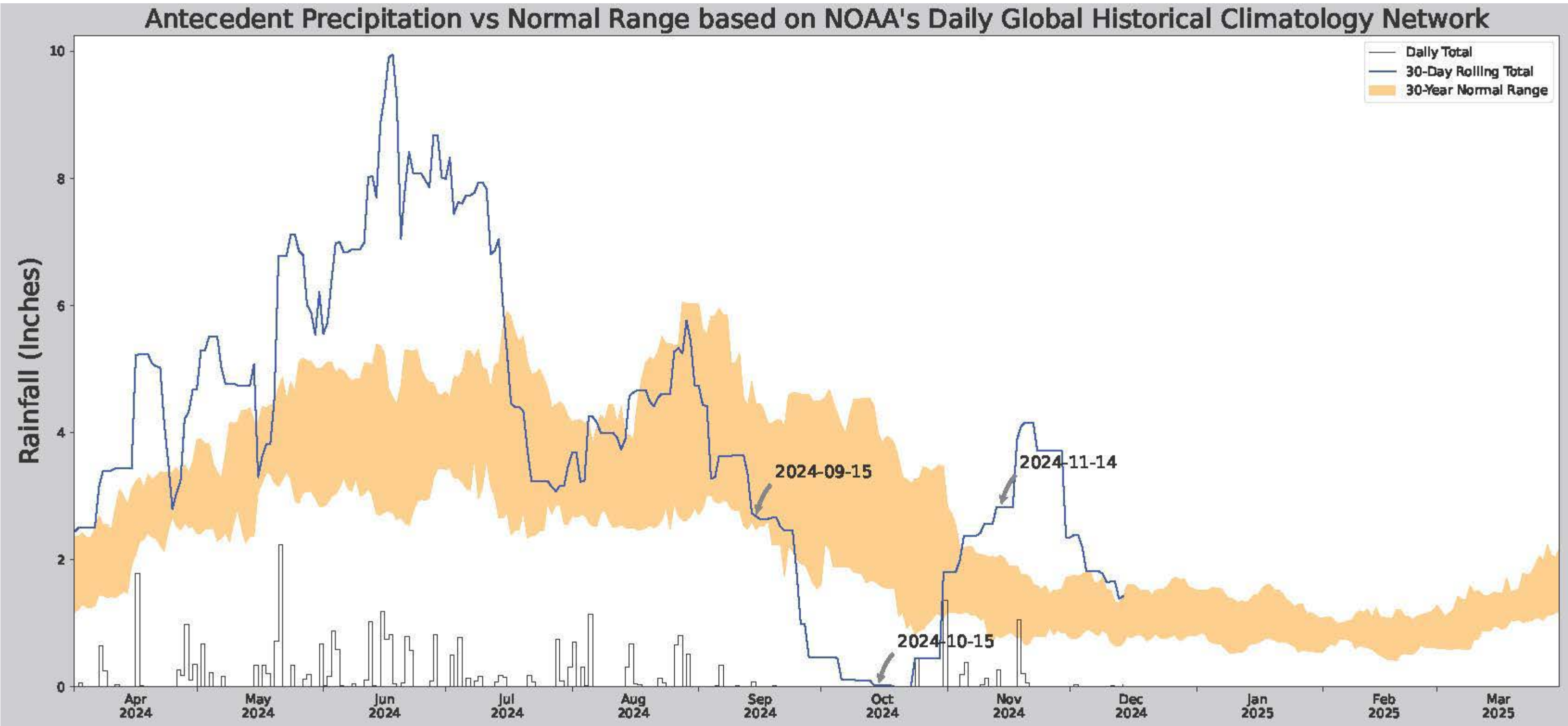
DNR Public Waters / Public Water Wetlands

Public Waters and Public Waters Wetlands are aquatic resources indicated on the PWI map and regulated by the DNR and are specifically excluded from jurisdiction under the Minnesota Wetland Conservation Act (WCA). One Public Water, unnamed public water wetland (ID #27090000), was identified within the eastern portion of the Project limits, north of Highway 7 approximately 593 feet northwest of Highway 7/Oriole Ave intersection.

Antecedent Precipitation Data

Analysis of antecedent precipitation data pertinent to the Project helps to determine whether the delineation was completed during "normal climatic conditions" for that time of year. Normal precipitation is based on the 30-year average. Abnormal precipitation is considered to be that below the 30th percentile (drier than normal) and above the 70th percentile (wetter than normal). For the purpose of this study, KLJ utilized the USACE Antecedent Precipitation Tool, which indicates that the antecedent precipitation as normal at the time of the field survey. This is inconsistent with the 30-day rolling total which indicated wetter than normal moisture conditions at the time of the November 14, 2024 field survey.

Table 3. Antecedent Precipitation Data



Coordinates	44.8919991, -93.6011343
Observation Date	2024-11-14
Elevation (ft)	987.113
Drought Index (PDSI)	Moderate drought
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2024-11-14	0.769291	2.070079	2.830709	Wet	3	3	9
2024-10-15	1.613386	3.994882	0.019685	Dry	1	2	2
2024-09-15	2.475591	4.443307	2.681102	Normal	2	1	2
Result							Normal Conditions - 13

US Army Corps of Engineers.

ERDC

Figures and tables made by the Antecedent Precipitation Tool Version 2.0

Developed by: U.S. Army Corps of Engineers and U.S. Army Engineer Research and Development Center

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
CHANHASSEN WSFO	44.8497, -93.5644	945.866	3.432	41.247	1.686	10500	90
CHASKA	44.8, -93.5833	720.144	3.557	225.722	2.404	851	0
MOUND	44.95, -93.65	935.039	8.098	10.827	3.732	2	0

WETLAND DELINEATION

Methodology

KLJ conducted a field investigation of all aquatic resources located within the Project. Delineated aquatic resources are defined as one of the following categories.

> Wetland: areas that are inundated or saturated by surface or ground water a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions
>
> Wet Ditch: A wet ditch is a linear, aquatic resource that exhibits wetland characteristics (indicators of hydric soil and wetland hydrology and a dominance of hydrophytic vegetation), which was constructed in an area that was historically non-wetland and not for the purpose of creating a wetland
>
> Other Aquatic Resource: an aquatic resource that includes a Traditional Navigable Water (TNW), rivers, streams, lakes, non-navigable tributaries of TNWs that are relatively permanent where the tributaries typically flow year-round, or have continuous flow at least seasonally (e.g. typically three months)
>
> Stormwater Pond: a constructed pond designed to capture stormwater runoff from impervious surfaces (e.g. streets, sidewalks, roofs), which was constructed in an area that was historically non-wetland and not for the purpose of creating a wetland

The delineation of aquatic resources in undisturbed areas was conducted in accordance with the Level 2 routine determination method described in *The 1987 Manual*. Data on soils, hydrology, and vegetation (the three parameters mandated in *The 1987 Manual*) were collected at each potential wetland. One sampling transect was established at each wetland, which included one sample point clearly on the upland side of the wetland boundary and another sample point clearly on the wetland side of the wetland boundary. The wetland boundary was established at the line where one or more of the mandatory parameters (hydric soils, indicators of wetland hydrology, and a predominance of hydrophytic vegetation) were not present.

The definition of hydric soils is per *Field Indicators of Hydric Soils in the United States: Guide for Identifying and Delineating Hydric Soils, Version 8.2, 2018* (NRCS 2020). *The 1987 Manual* provides additional information relevant to the definition and characteristics of hydric soils. Digital soil data for Carver and Hennepin County were overlain on aerial photos and reviewed for locations of mapped hydric soils, potential inclusions of hydric soils and non-hydric soils within the Project. Soil map units considered hydric in Carver and Hennpin County were based on the hydric rating for each map unit. The definitions of wetland hydrology and predominance of hydrophytic vegetation follow *The 1987 Manual* and *The Regional Supplement: Midwest*. The designation of Wetland Plant Indicator Status for plants observed in wetland and upland sampling pits follows *The National List of Plant Species that Occur in Wetlands – 2020 Update.* Boundaries of undisturbed wetlands were recorded with a Juniper Geode GPS unit, which provides sub-meter accuracy.

Results

KLJ implemented the Level 2 routine wetland delineation methodology and determined that three wetlands and ten wet ditches were present within the Project limits. Table 4 provides a summary of the aquatic resources that were delineated within the Project limits.

Table 4. Summary of Resources Delineated within the Project Limits

Resource ID	Location Description	Section, Township, Range	Area (acres)	Wetland Type Classification			Location (Decimal Degrees)
				Circular 39	Cowardin	Eggers & Reed	
Stormwater Pond 1	Eastern portion of study area, southwest quadrant of Highway 7/Hazeltine Blvd intersection	Sec. 3, 4, T116, R23W	0.29	Type 3	Shallow Marsh	PEM1Cx	44.891366, -93.581434
Wetland 1	Eastern portion of study area, north of Highway 7 and approximately 593 feet northwest of Highway 7/Oriole Ave intersection	Sec. 4, T116N, R23W	0.18	Type 2/ 5	Fresh (wet) meadow/ Shallow open water	PEM2B/ PUBH	44.891413, -93.587157
Wetland 2	Eastern portion of study area, south of Highway 7 and approximately 46 feet east of Highway 7/N Manor Dr intersection	Sec. 4, T116N, R23W	0.09	Type 1/2/5	Floodplain forest/ Fresh (wet) meadow/ Shallow open water	PFOA/ PEM2B/ PUBH	44.891258, -93.592027
Wet Ditch 1	Eastern portion of study area, southeast quadrant of the Highway 7/Hazeltine Blvd intersection	Sec. 3 & 34, T116 & 117N, R23W	0.06	Type 3	Shallow Marsh	PEM1C	44.891293, -93.580390
Wet Ditch 2	Eastern portion of study area, north of Highway 7 approximately 420 feet west of Highway 7/Hazeltine Blvd intersection	Sec. 34, T117N, R23W	0.01	Type 2	Fresh (wet) meadow	PEM2B	44.891784, -93.582472
Wet Ditch 3	Eastern portion of study area, north of Highway 7 approximately 580 feet west of Highway 7/Hazeltine Blvd intersection	Sec. 34, T117N, R23W	0.08	Type 3	Shallow Marsh	PEM1C	44.891735, -93.583040
Wet Ditch 4	Eastern portion of study area, north of Highway 7 approximately 550 feet east of Highway 7/N Manor Dr	Sec. 4, T116N, R23W	0.02	Type 3	Shallow Marsh	PEM1C	44.891437, -93.590187
Wet Ditch 5	Eastern portion of study area, south of Highway 7 approximately 35 feet west of Highway 7/N Manor Dr intersection	Sec. 4, T116N, R23W	0.13	Type 3	Shallow Marsh	PEM1C	44.891399, -93.593395

Resource ID	Location Description	Section, Township, Range	Area (acres)	Wetland Type Classification			Location (Decimal Degrees)
				Circular 39	Cowardin	Eggers & Reed	
Wet Ditch 6	Central portion of study area, north of Highway 7 approximately 64 feet north of Highway 7/Arbor Ln intersection	Sec. 33, T117N, R23W	0.03	Type 3	Shallow Marsh	PEM1C	44.892204, -93.601032
Wet Ditch 7	Western portion of study area, south of Highway 7 approximately 35 feet south of Highway 7/Shorewood Oaks Dr intersection	Sec. 5, T116N, R23W	0.07	Type 2/3	Fresh (wet) meadow/ Shallow marsh	PEM2B/ PEM1C	44.891244, -93.608558
Wet Ditch 8	Western portion of study area, south of Highway 7 approximately 30 feet east of Highway 7/Greenbriar Ave intersection	Sec. 5, T116N, R23W	0.09	Type 2/3	Fresh (wet) meadow/ Shallow marsh	PEM2B/ PEM1C	44.89088, -93.609984
Wet Ditch 9	Western portion of study area, south of Highway 7 approximately 60 feet southwest of Highway 7/Greenbriar Ave intersection	Sec. 5, T116N, R23W	0.46	Type 2/3	Fresh (wet) meadow/ Shallow marsh	PEM2B/ PEM1C	44.889546, -93.613208
Wet Ditch 10	Western portion of study area, north of Highway 7 approximately 75 feet east of Highway 7/Church Rd intersection	Sec. 5, T116N, R23W	0.16	Type 3	Shallow Marsh	PEM1C	44.889181, -93.614939

Stormwater Pond 1

Date of Delineation: November 14, 2024

Location: Eastern portion of study area, southwest quadrant of Highway 7/Hazeltine Blvd intersection

Section, Township, Range: Sec. 3, 4, T116, R23W

Description: Wetland 1 is an excavated depressional aquatic resource that consists of a shallow marsh community. Aerial imagery shows the pond was installed between 1991 and 2002 in an established upland area (see, Appendix C). The resource appears to be supported by a pipe and runoff from the surrounding landscape.

Delineated Wetland Type: Type 3, PEM1Cx, Shallow marsh

NWI: PUBHx

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Carver and Hennepin County Soil Survey: L41C2 – Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded (Predominantly non-hydric) & KC – Lester-Kilkenny loams, 6 to 12 percent slopes (Non-hydric)

Dominant Vegetation of Wetland: *Typha x glauca* (Hybrid cattail) – OBL

Basis of Delineated Boundary: The boundary was based on change in topography, dominant vegetation, and hydric soils.

Data Sheets: SWP1-1WET and SWP1-1UP

Photo:

Southwest of feature facing northeast

Wetland 1

Date of Delineation: November 14, 2024

Location: Eastern portion of study area, north of Highway 7 and approximately 593 feet northwest of Highway 7/Oriole Ave intersection

Section, Township, Range: Sec. 4, T116N, R23W

Description: Wetland 2 is wetland resource that consists of a fresh (wet) meadow fringe within the Project limits with a shallow open water wetland beyond the Project limits. The resource appears to be supported by groundwater and supplemented by runoff from the surrounding landscape.

Delineated Wetland Type: Type 2/5, PEM2B/PUBH, Fresh (wet) meadow/Shallow open water

NWI: PUBH & PEM1A

DNR Public Waters Map: Unnamed Public Water Wetland (ID # 27090000)

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Hennepin County Soil Survey: L41C2 – Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography, dominant vegetation of reed canary grass in the wetland to Canadian goldenrod in the upland, and hydric soils.

Data Sheets: WET1-1WET and WET1-1UP

Photo:

Facing northeast

Wetland 2

Date of Delineation: November 14, 2024

Location: Eastern portion of study area, south of Highway 7 and approximately 46 feet east of Highway 7/N Manor Dr intersection

Section, Township, Range: Sec. 4, T116N, R23W

Description: Wetland 3 is wetland resource that consists of forest in the eastern portion of the basin and a fresh (wet) meadow, and shallow open water community in the remainder. The resource appears to be primarily supported by groundwater and supplemented with runoff from the surrounding landscape.

Delineated Wetland Type: Type 1/2/5, PFOA/PEM2B/PUBH, Forested/Fresh (wet) meadow/Shallow open water

NWI: PEM1C

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Carver County Soil Survey: KC – Lester-Kilkenny loams, 6 to 12 percent slopes (Non-hydric)

Dominant Vegetation of Wetland: *Ulmus americana* (American elm) – FACW, *Fraxinus pennsylvanica* (Green ash) – FACW, *Frangula alnus* (Glossy false buckthorn) – FACW, *Carex lacustris* (Lakebank sedge) – OBL, and *Typha x glauca* (Hybrid cattail) - OBL

Basis of Delineated Boundary: The boundary was based on change in topography, dominant vegetation of lakebank sedge and hybrid cattail in the wetland to Kentucky bluegrass in the upland, and hydric soils.

Data Sheets: WET2-1WET and WET2-1UP

Photo:

Facing southeast

Wet Ditch 1

Date of Delineation: November 14, 2024

Location: Eastern portion of study area, southeast quadrant of the Highway 7/Hazeltine Blvd intersection

Section, Township, Range: Sec. 3 & 34, T116 & 117N, R23W

Description: Wet Ditch 1 is ditch resource that consists of a shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape and continues outside the project limits.

Delineated Wetland Type: Type 3, PEM1C, Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Carver and Hennepin County Soil Survey: L41C2 – Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded (Predominantly non-hydric) & KC – Lester-Kilkenny loams, 6 to 12 percent slopes (Non-hydric)

Dominant Vegetation of Wetland: *Typha x glauca* (Hybrid cattail) – OBL & *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography and dominant vegetation.

Data Sheets: Reference WET DITCH 5-1WET and WET DITCH 5-1UP

Photo:

Facing south

Wet Ditch 2

Date of Delineation: November 14, 2024

Location: Eastern portion of study area, north of Highway 7 approximately 420 feet west of Highway 7/Hazeltine Blvd intersection

Section, Township, Range: Sec. 34, T117N, R23W

Description: Wet Ditch 2 is ditch resource that consists of a fresh (wet) meadow community. The resource appears to be supported by runoff from the surrounding landscape.

Delineated Wetland Type: Type 2, PEM2B, Fresh (wet) meadow

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Hennepin County Soil Survey: L41C2 – Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography and dominant vegetation.

Data Sheets: Reference WET DITCH 7-1WET and WET DITCH 7-1UP

Photo:

Facing west

Wet Ditch 3

Date of Delineation: November 14, 2024

Location: Eastern portion of study area, north of Highway 7 approximately 580 feet west of Highway 7/Hazeltine Blvd intersection

Section, Township, Range: Sec. 34, T117N, R23W

Description: Wet Ditch 3 is ditch resource that consists of a shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape and continues outside the project limits.

Delineated Wetland Type: Type 3, PEM1C, Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Hennepin County Soil Survey: L41C2 – Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Typha x glauca* (Hybrid cattail) – OBL & *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography and dominant vegetation.

Data Sheets: Reference WET DITCH 5-1WET and WET DITCH 5-1UP

Photo:

Facing east

Wet Ditch 4

Date of Delineation: November 14, 2024

Location: Eastern portion of study area, north of Highway 7 approximately 550 feet east of Highway 7/N Manor Dr

Section, Township, Range: Sec. 4, T116N, R23W

Description: Wet Ditch 4 is ditch resource that consists of a shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape.

Delineated Wetland Type: Type 3, PEM1C, Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Hennepin County Soil Survey: L41C2 – Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Typha x glauca* (Hybrid cattail) – OBL & *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography and dominant vegetation.

Data Sheets: Reference WET DITCH 5-1WET and WET DITCH 5-1UP

Photo:

Facing east

Wet Ditch 5

Date of Delineation: November 14, 2024

Location: Eastern portion of study area, south of Highway 7 approximately 35 feet west of Highway 7/N Manor Dr intersection

Section, Township, Range: Sec. 4, T116N, R23W

Description: Wet Ditch 5 is ditch resource that consists of a shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape.

Delineated Wetland Type: Type 3, PEM1C, Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Carver County Soil Survey: KB – Kilkenny-Lester loams, 2 to 6 percent slopes (Non-hydric)

Dominant Vegetation of Wetland: *Typha x glauca* (Hybrid cattail) – OBL & *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography, dominant vegetation, and hydric soils.

Data Sheets: WET DITCH 5-1WET and WET DITCH 5-1UP

Photo:

Facing east

Wet Ditch 6

Date of Delineation: November 14, 2024

Location: Central portion of study area, north of Highway 7 approximately 64 feet north of Highway 7/Arbor Ln intersection

Section, Township, Range: Sec. 33, T117N, R23W

Description: Wet Ditch 6 is ditch resource that consists of a shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape and continues outside the project limits.

Delineated Wetland Type: Type 3, PEM1C, Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Hennepin County Soil Survey: L24A – Glencoe clay loam, 0 to 1 percent slopes (Hydric) & L25A – Le Sueur loam, 1 to 3 percent slopes (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Typha x glauca* (Hybrid cattail) – OBL

Basis of Delineated Boundary: The boundary was based on change in topography, dominant vegetation, and hydric soils.

Data Sheets: WET DITCH 6-1WET and WET DITCH 6-1UP

Photo:

Facing northwest

Wet Ditch 7

Date of Delineation: November 14, 2024

Location: Western portion of study area, south of Highway 7 approximately 35 feet south of Highway 7/Shorewood Oaks Dr intersection

Section, Township, Range: Sec. 5, T116N, R23W

Description: Wet Ditch 7 is ditch resource that consists of a fresh (wet) meadow and shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape.

Delineated Wetland Type: Type 2/3, PEM2B/PEM1C, Fresh (wet) meadow/Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Carver County Soil Survey: LS – Le Sueur loam, 1 to 3 percent slopes (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography, dominant vegetation, and hydric soils.

Data Sheets: WET DITCH 7-1WET and WET DITCH 7-1UP

Photo:

Facing southwest

Wet Ditch 8

Date of Delineation: November 14, 2024

Location: Western portion of study area, south of Highway 7 approximately 30 feet east of Highway 7/Greenbriar Ave intersection

Section, Township, Range: Sec. 5, T116N, R23W

Description: Wet Ditch 8 is ditch resource that consists of a fresh (wet) meadow and shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape.

Delineated Wetland Type: Type 2/3, PEM2B/PEM1C, Fresh (wet) meadow/Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Carver County Soil Survey: LS – Le Sueur loam, 1 to 3 percent slopes (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography and dominant vegetation.

Data Sheets: Reference WET DITCH 7-1WET and WET DITCH 7-1UP

Photo:

Facing southwest

Wet Ditch 9

Date of Delineation: November 14, 2024

Location: Western portion of study area, south of Highway 7 approximately 60 feet southwest of Highway 7/Greenbriar Ave intersection

Section, Township, Range: Sec. 5, T116N, R23W

Description: Wet Ditch 9 is ditch resource that consists of a fresh (wet) meadow and shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape.

Delineated Wetland Type: Type 2/3, PEM2B/PEM1C, Fresh (wet) meadow/Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Carver County Soil Survey: LS – Le Sueur loam, 1 to 3 percent slopes (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Phalaris arundinacea* (Reed canary grass) – FACW

Basis of Delineated Boundary: The boundary was based on change in topography and dominant vegetation.

Data Sheets: Reference WET DITCH 7-1WET and WET DITCH 7-1UP

Photos:

Facing southwest

Facing northeast

Wet Ditch 10

Date of Delineation: November 14, 2024

Location: Western portion of study area, north of Highway 7 approximately 75 feet east of Highway 7/Church Rd intersection

Section, Township, Range: Sec. 5, T116N, R23W

Description: Wet Ditch 10 is ditch resource that consists of a shallow marsh community. The resource appears to be supported by runoff from the surrounding landscape and continues outside the project limits.

Delineated Wetland Type: Type 3, PEM1C, Shallow marsh

NWI: None

DNR Public Waters Map: None

Bank Service Area, Major Watersheds, Minor Watersheds: #7, Mississippi River – Twin Cities major watershed, unnamed minor watershed

Carver County Soil Survey: LS – Le Sueur loam, 1 to 3 percent slopes (Predominantly non-hydric)

Dominant Vegetation of Wetland: *Typha x glauca* (Hybrid cattail) – OBL

Basis of Delineated Boundary: The boundary was based on change in topography and dominant vegetation.

Data Sheets: Reference WET DITCH 6-1WET and WET DITCH 6-1UP

Photo:

Facing northeast

IV. CONCLUSION

Two wetlands, ten wet ditches, and one stormwater pond were delineated within the Interceptor 8253-327 Project limits in Chanhassen and Shorewood, Carver and Hennepin County, Minnesota. All of the aquatic resources were delineated based on the three-parameter approach in accordance with *The 1987 Manual*. Field activities were completed on November 14, 2024.

The above-described wetland delineation was performed by KLJ's Environmental Specialist, Evelyn Ostrowski. The delineation was performed in accordance with *The 1987 Manual* and *The Regional Supplement: Midwest*. The delineation meets the standards and criterion described in *The 1987 Manual* and conforms to applicable standards and regulations in place at the time the delineation was completed.

V. REFERENCES

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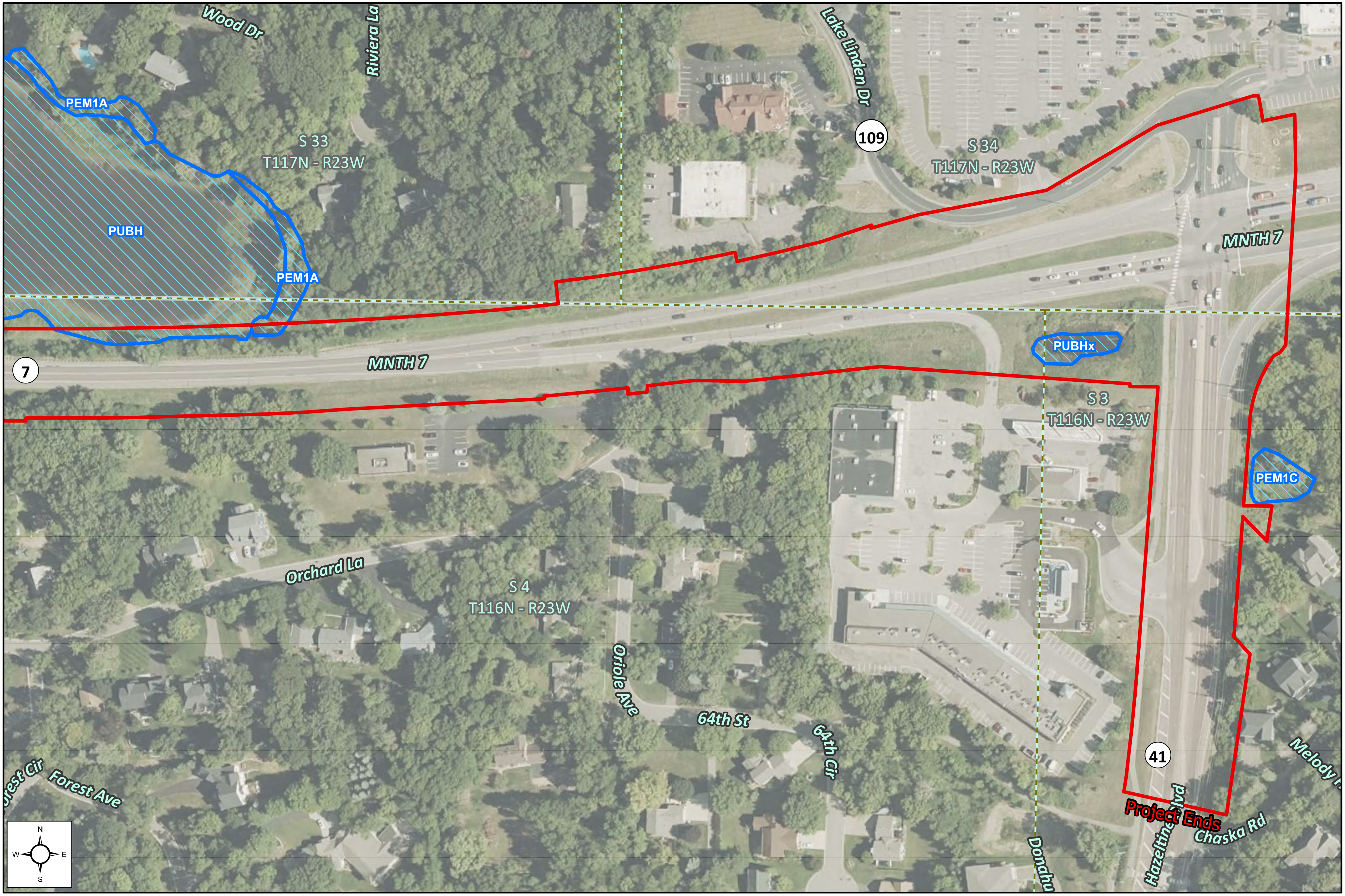
VI. DELINEATOR CREDENTIALS

EVELYN OSTROWSKI	
Education	UW River Falls – Conservation and Environmental Planning
Certifications	Minnesota Wetland Professional In-Training Certification Program
Training	Minnesota Wetland Professional In-Training Certification Program: Successfully completed training requirements for Wetlands Professional In-Training Course offered by the Minnesota Wetland Professional Certification Program.
Professional Memberships	Minnesota Wetland Professionals Association

Appendix A: Figures



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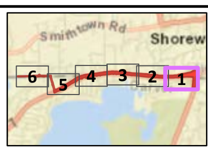
KLJ

Data Source: US Fish and Wildlife, State of MN, & KLJ
Imagery: ©2023 USDA-FSA-NAIP

KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

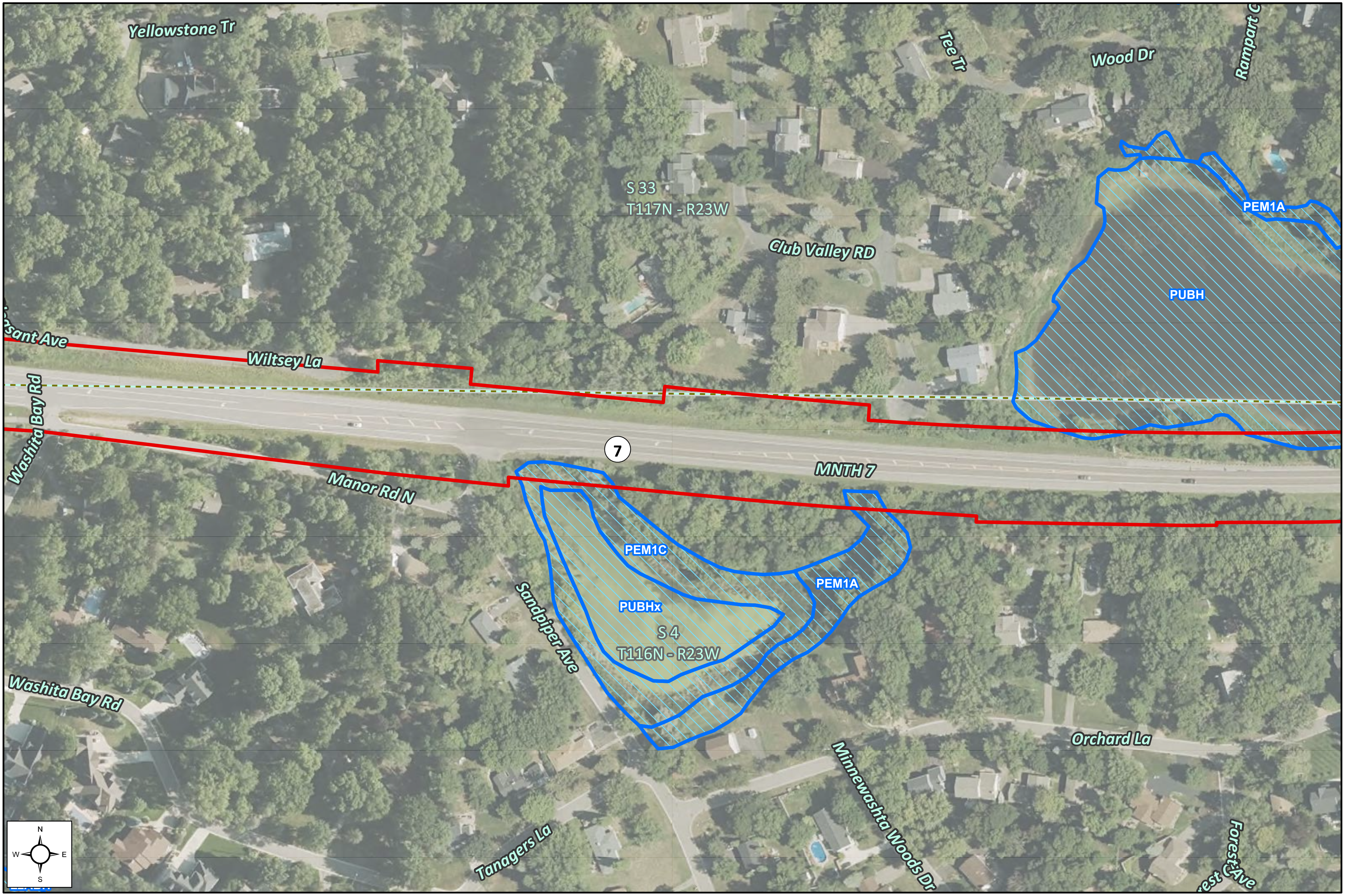


Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

NWI Mapped Wetlands

1:2,400
0 25 50 100 Feet

Study Area
NWI
Section Line
Township Line



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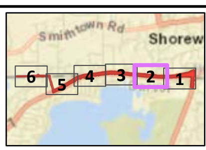
KLJ

Data Source: US Fish and Wildlife, State of MN, & KLJ
Imagery: ©2023 USDA-FSA-NAIP

KLJ Project Number: 2413-01532	
Date Created: 2/17/2025	Created By: JDP

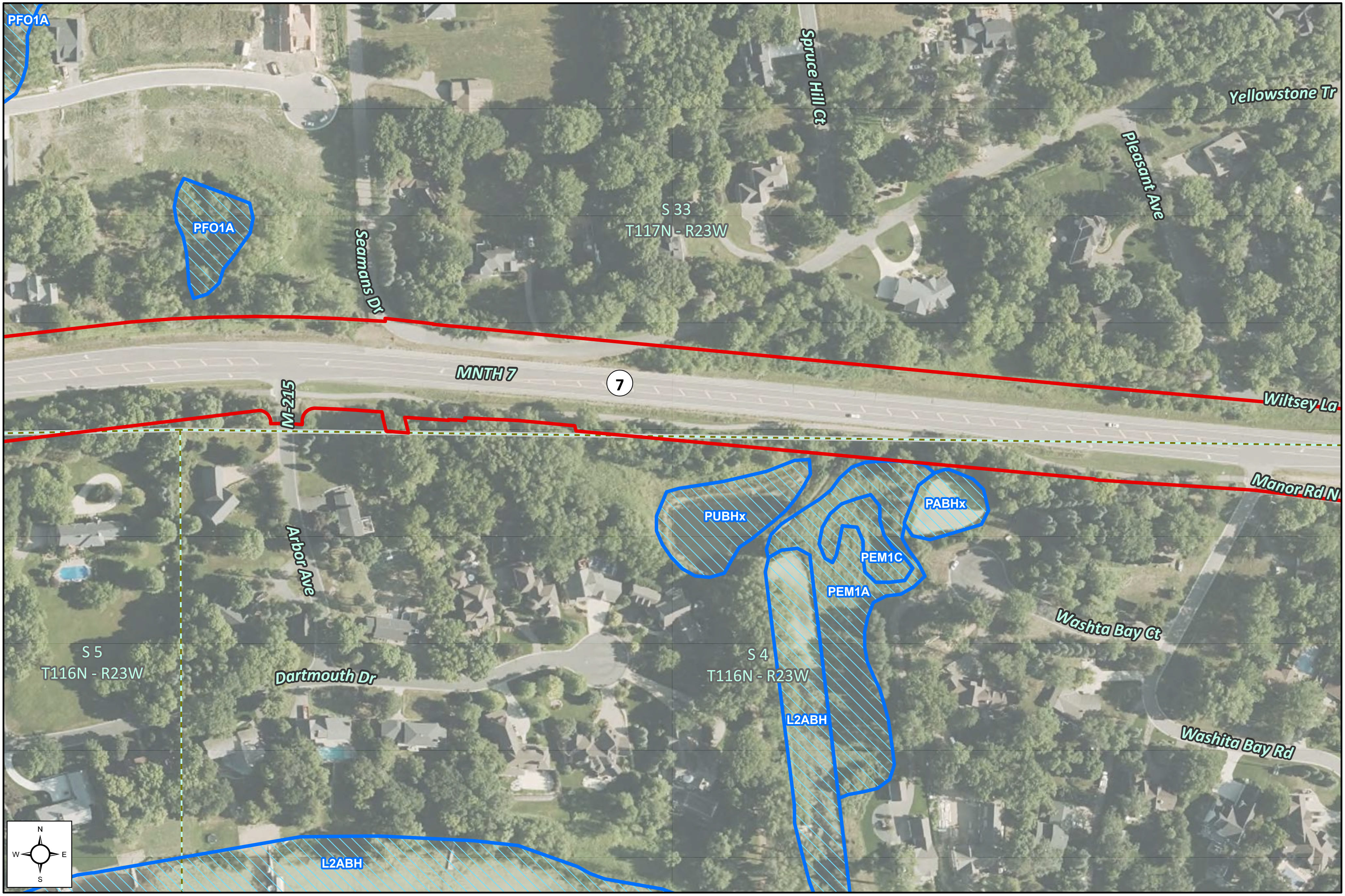


Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

NWI Mapped Wetlands

1:2,400
0 25 50 100
Feet

Study Area
NWI
Section Line
Township Line



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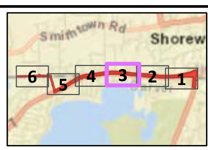

Data Source: US Fish and Wildlife, State of MN, & KLJ
Imagery: ©2023 USDA-FSA-NAIP

KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

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Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

NWI Mapped Wetlands

1:2,400
0 25 50 100 Feet

Study Area
NWI
Section Line
Township Line

Document Path: K:\Projects\ProfServices\Brown & Caldwell\2413-01532_Interceptor 8253-327\GIS\Environmental\ArcPro WorkMap\Brown&Caldwell_MCES_Interceptor_8253-327_20250214.aprx

KLJ

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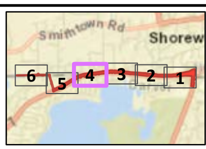
Date Created: 2/17/2025 | Created By: JDP



Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

NWI Mapped Wetlands

1:2,400
0 25 50 100 Feet

Study Area
NWI
Section Line
Township Line

Document Path: K:\Projects\ProfServices\Brown & Caldwell\2413-01532_Interceptor 8253-327\GIS\Environmental\ArcPro WorkMap\Brown&Caldwell_MCES_Interceptor_8253-327_20250214.aprx

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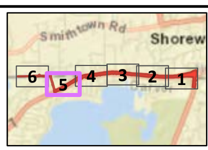
Data Source: US Fish and Wildlife, State of MN, & KLJ
Imagery: ©2023 USDA-FSA-NAIP



KLJ Project Number: 2413-01532	
Date Created: 2/17/2025	Created By: JDP

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

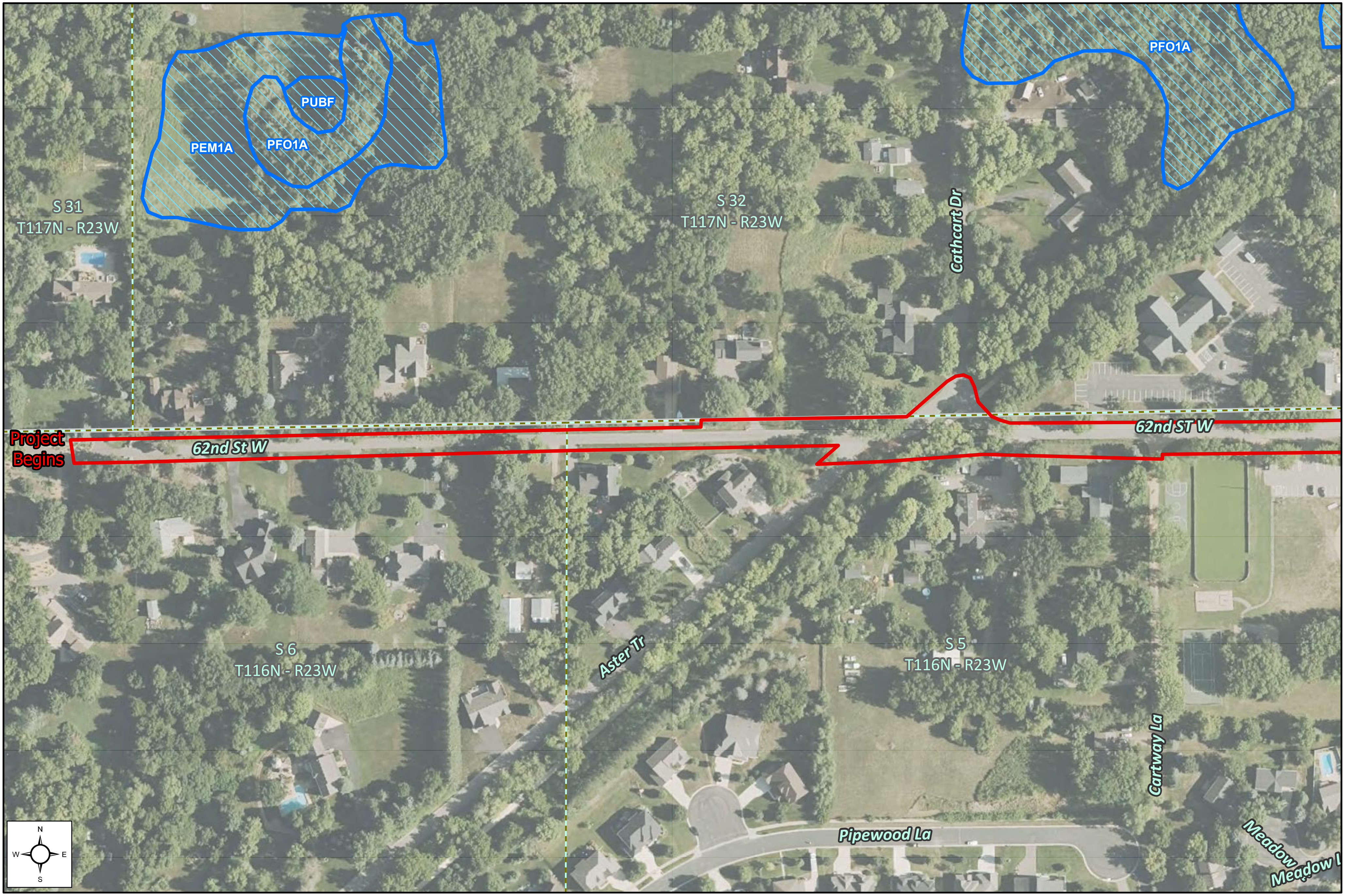
NWI Mapped Wetlands

N
W E
S

1:2,400

0 25 50 100
Feet

Study Area
NWI
Section Line
Township Line



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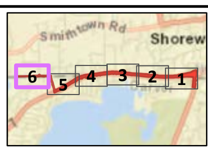
Data Source: US Fish and Wildlife, State of MN, & KLJ
Imagery: ©2023 USDA-FSA-NAIP



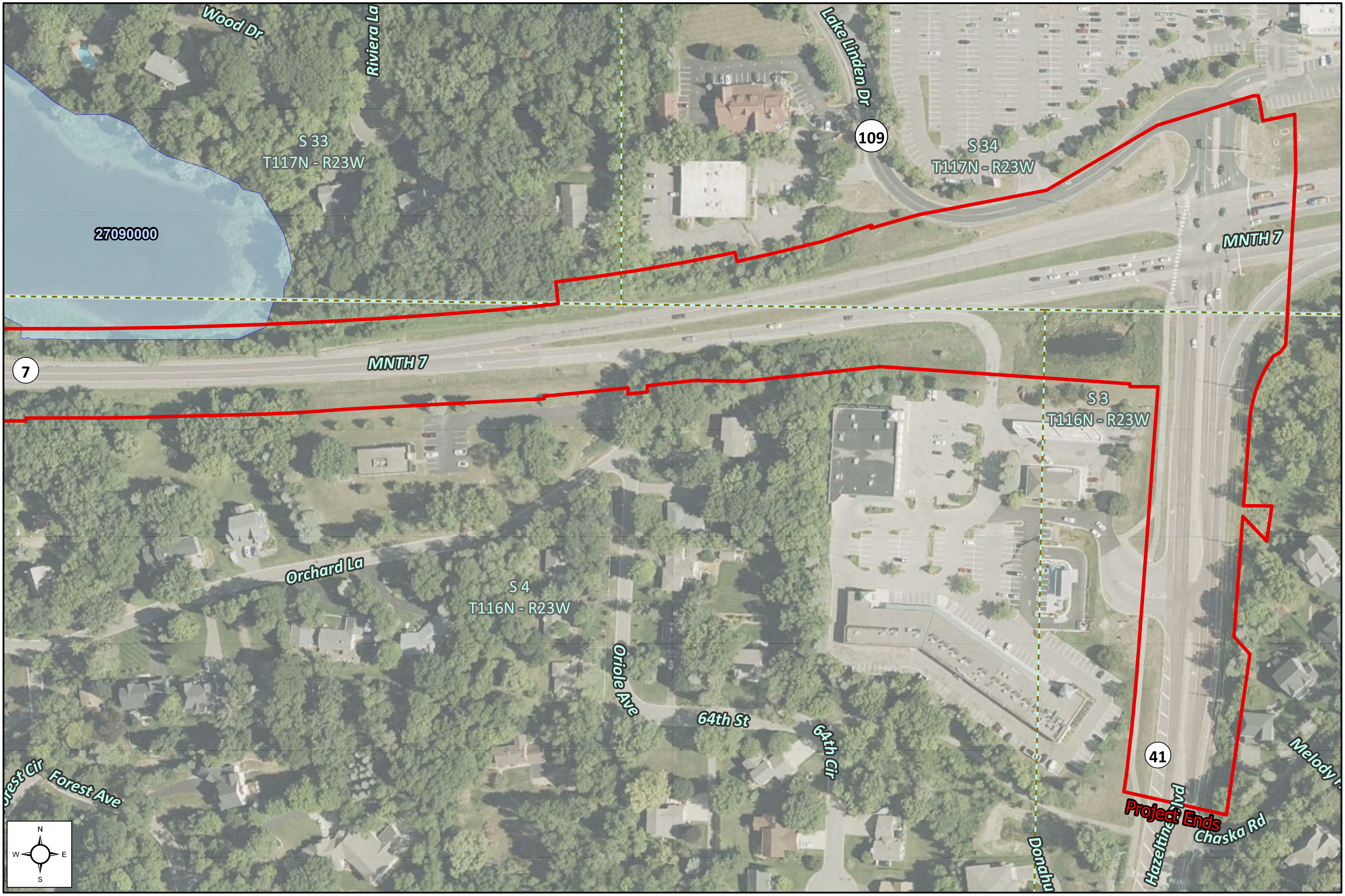
KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

NWI Mapped Wetlands

1:2,400
0 25 50 100
Feet

Study Area
NWI
Section Line
Township Line



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KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

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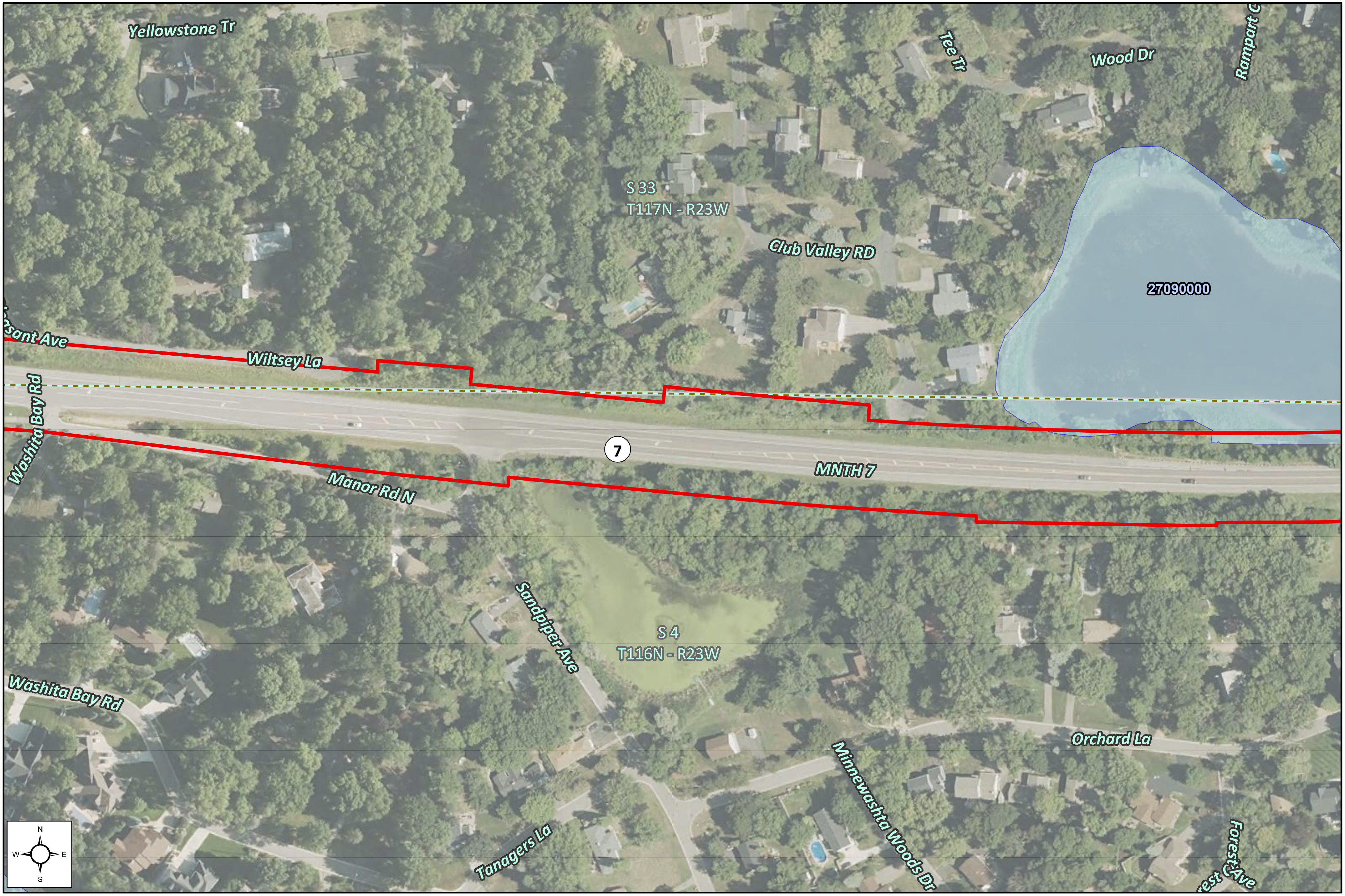
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

DNR Public Water Inventory

1:2,400
0 25 50 100 Feet

Study Area
Public Waters Basins
Section Line
Township Line



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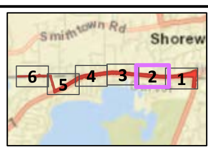
Date Created: 2/17/2025 | Created By: JDP

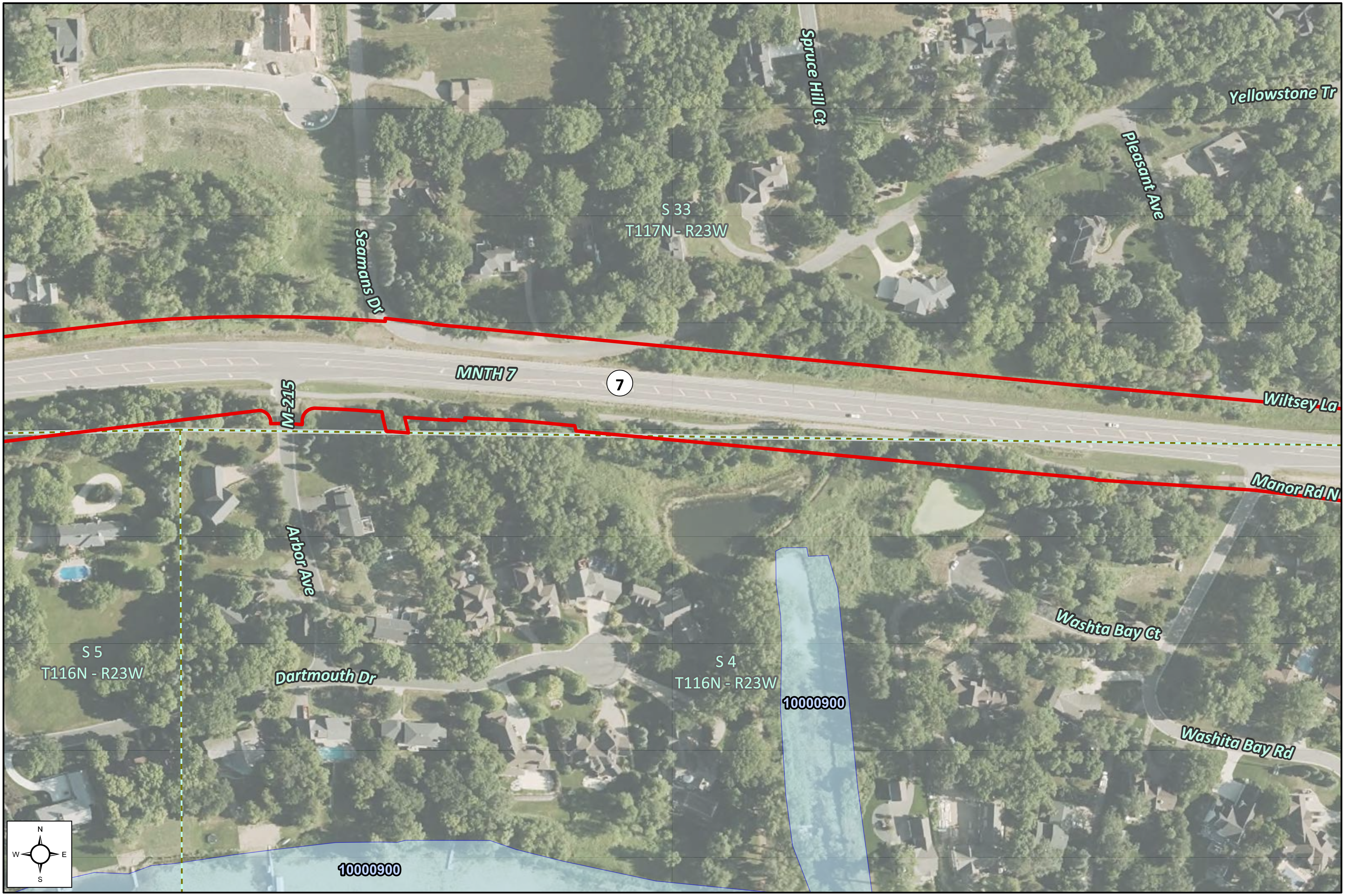


Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

DNR Public Water Inventory

1:2,400
0 25 50 100 Feet

Study Area
Public Waters Basins
Section Line
Township Line



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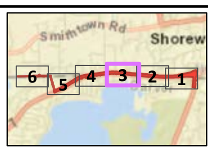

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

DNR Public Water Inventory

1:2,400
0 25 50 100 Feet

Study Area
Public Waters Basins
Section Line
Township Line

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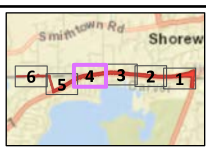

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Date Created: 2/17/2025	Created By: JDP

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Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

DNR Public Water Inventory

1:2,400
0 25 50 100
Feet

- Study Area
- Public Waters Basins
- Section Line
- Township Line

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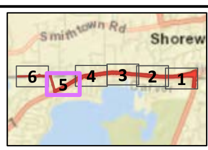

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Date Created: 2/17/2025 | Created By: JDP

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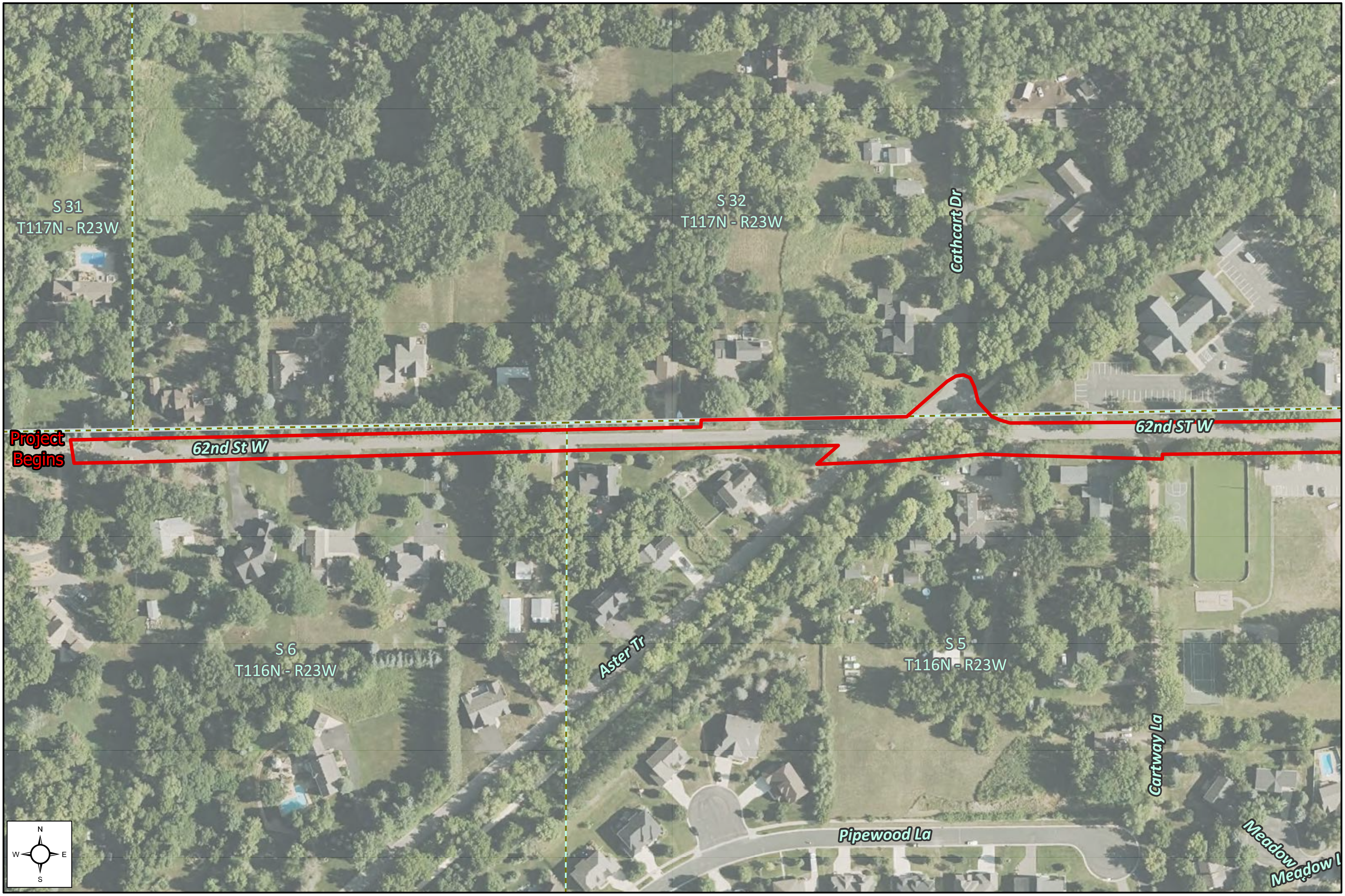
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

DNR Public Water Inventory

N W E S

1:2,400
0 25 50 100
Feet

Study Area
Section Line
Township Line



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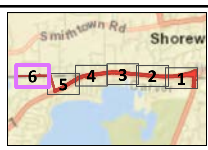
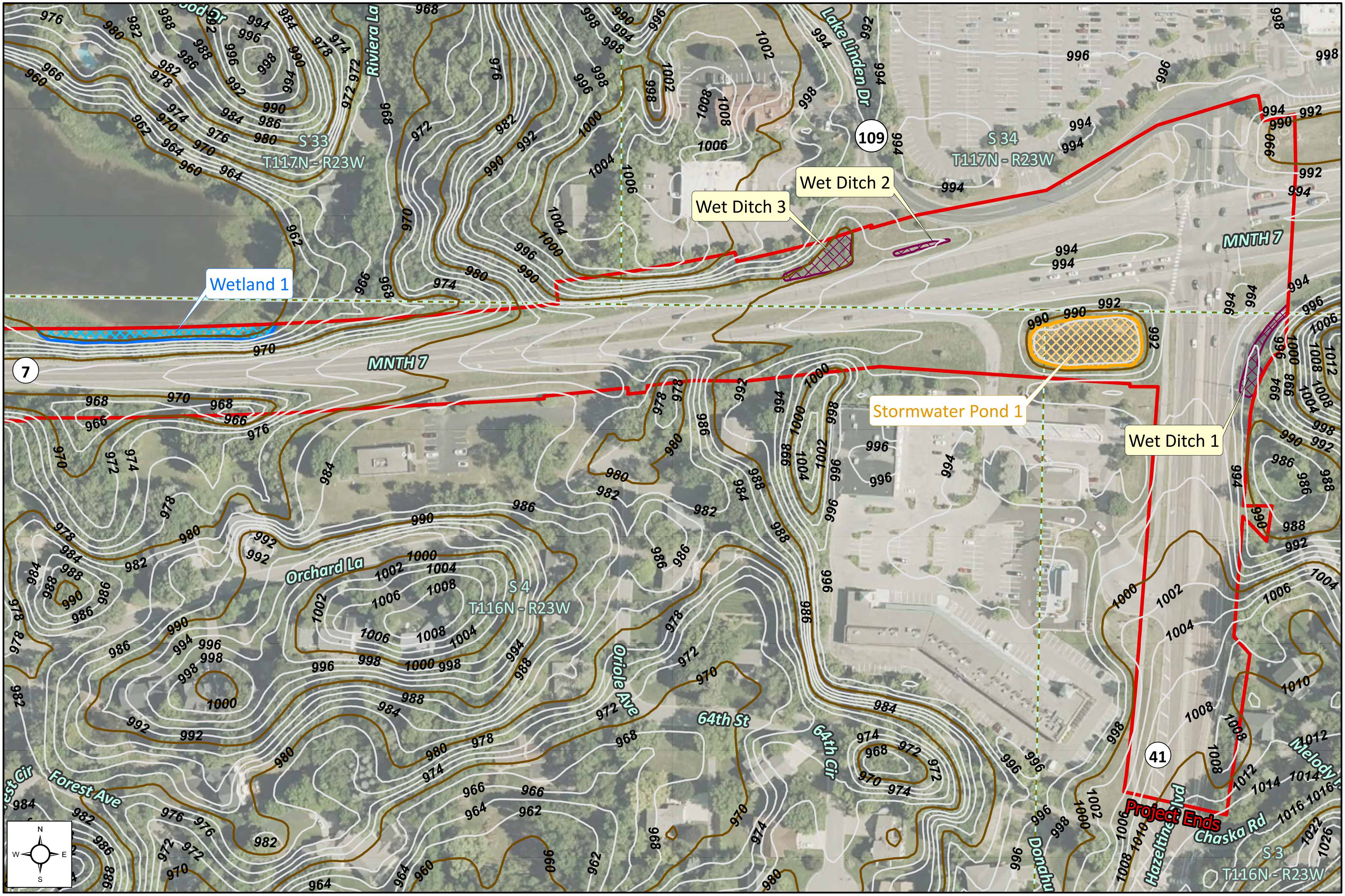


Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

DNR Public Water Inventory

1:2,400
0 25 50 100 Feet

Study Area
Section Line
Township Line



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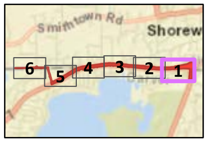

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KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

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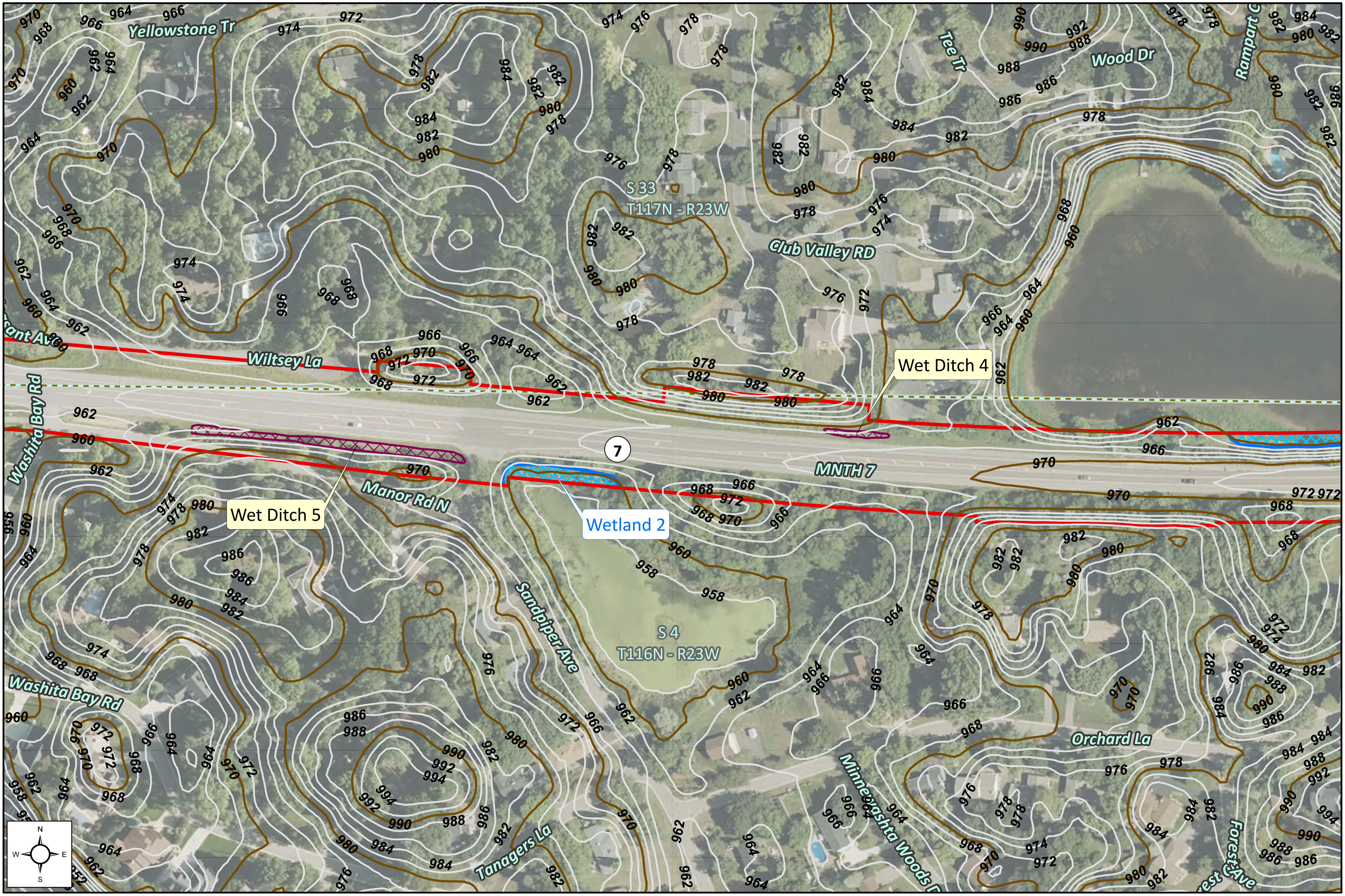
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Lidar Contours

1:2,400
0 25 50 100 Feet

Study Area
Stormwater Pond
Wetland
Wet Ditch
Index Contour (10')
Intermediate Contour (2')
Township Line
Section Line



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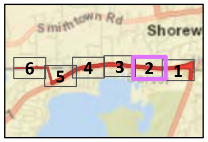

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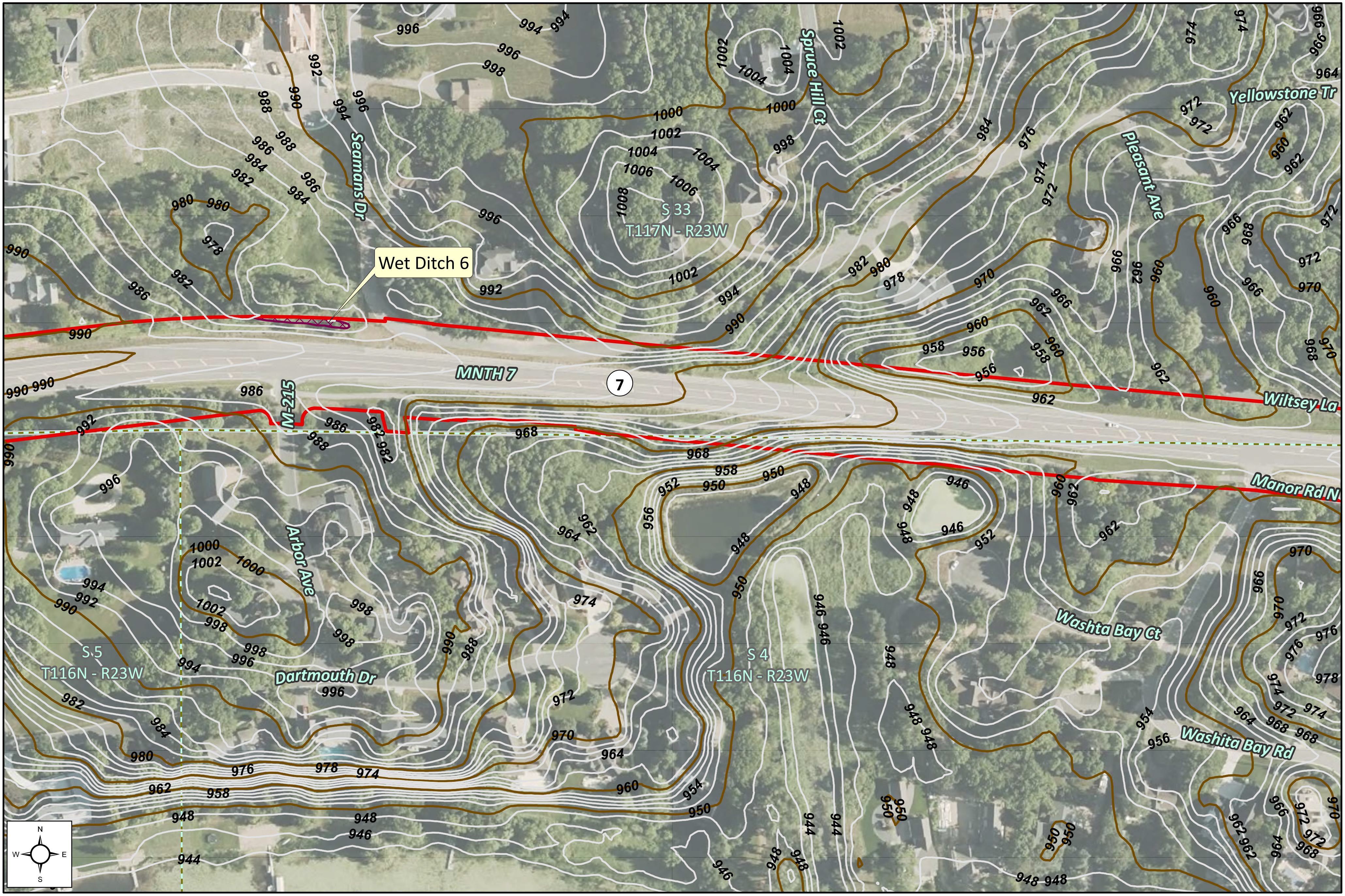
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Lidar Contours

1:2,400
0 25 50 100 Feet

Study Area
Wetland
Wet Ditch
Index Contour (10')
Intermediate Contour (2')
Township Line
Section Line



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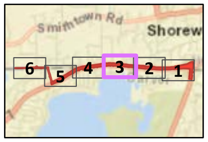

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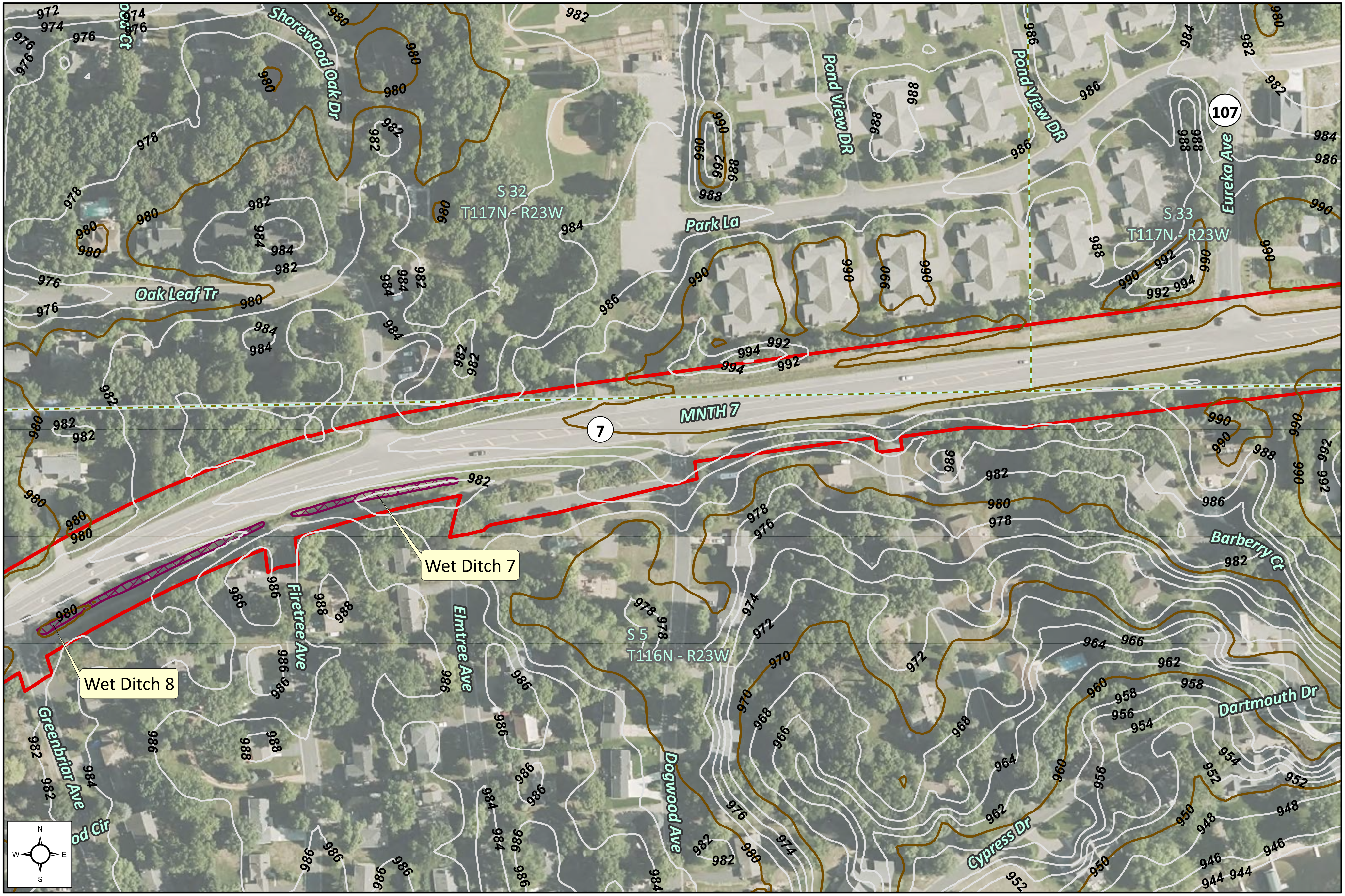
KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Lidar Contours

1:2,400
0 25 50 100
Feet

Study Area
Wet Ditch
Index Contour (10')
Intermediate Contour (2')
Township Line
Section Line



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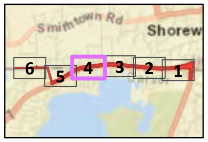

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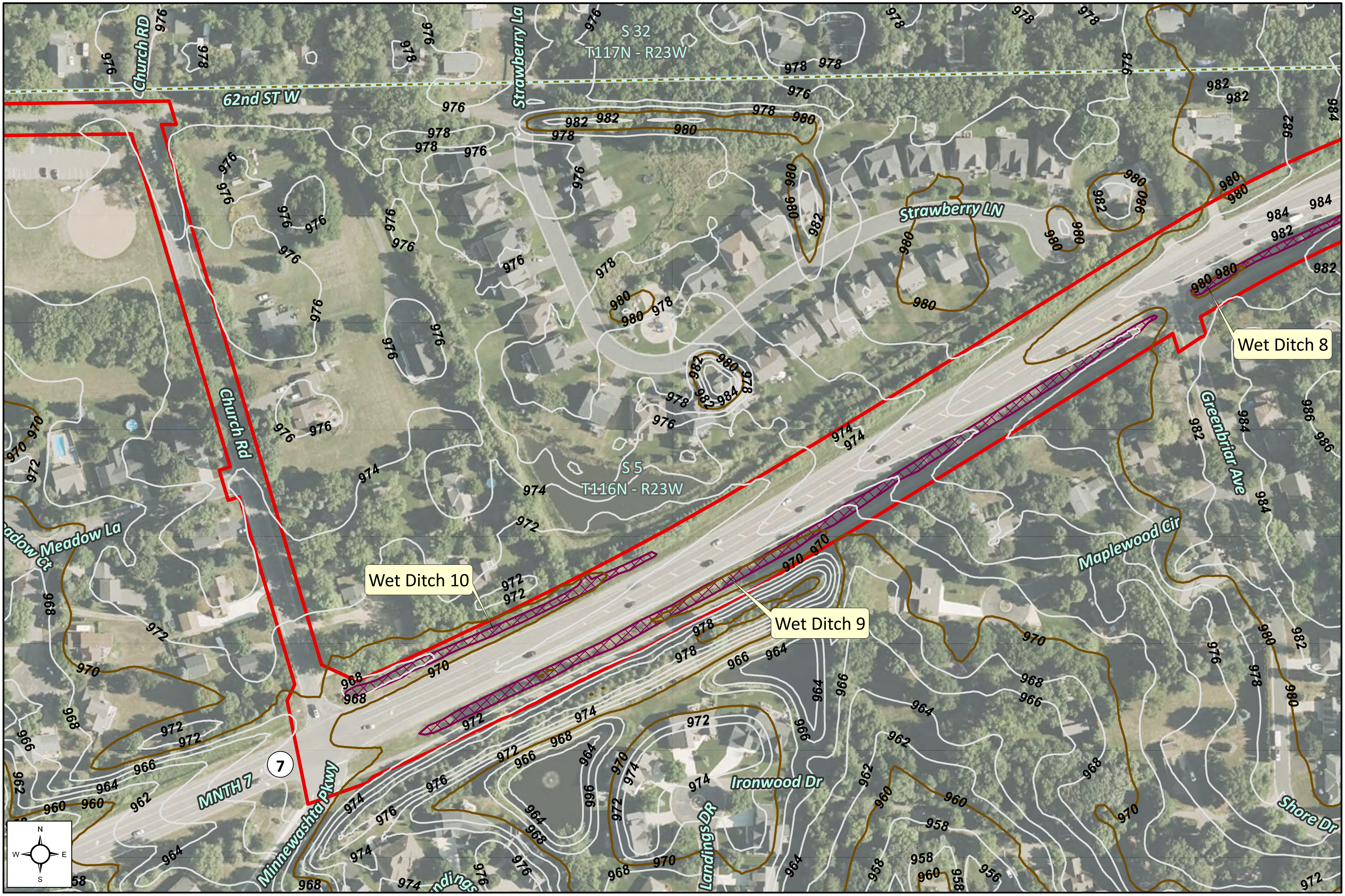
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Lidar Contours

1:2,400
0 25 50 100 Feet

Study Area
Wet Ditch
Index Contour (10')
Intermediate Contour (2')
Township Line
Section Line



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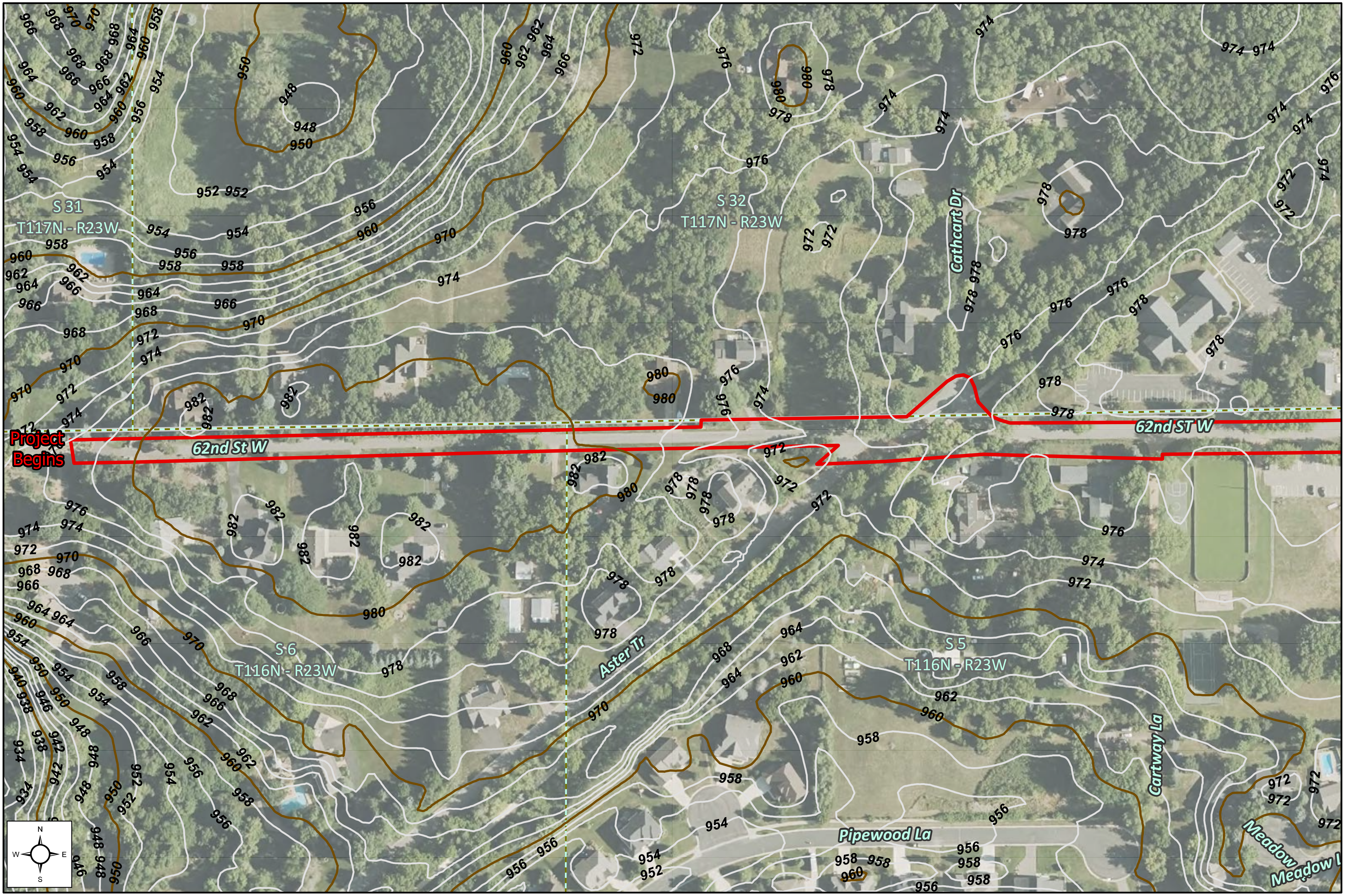
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Lidar Contours

1:2,400
0 25 50 100 Feet

Study Area
Wet Ditch
Index Contour (10')
Intermediate Contour (2')
Township Line
Section Line



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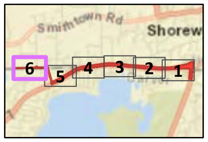

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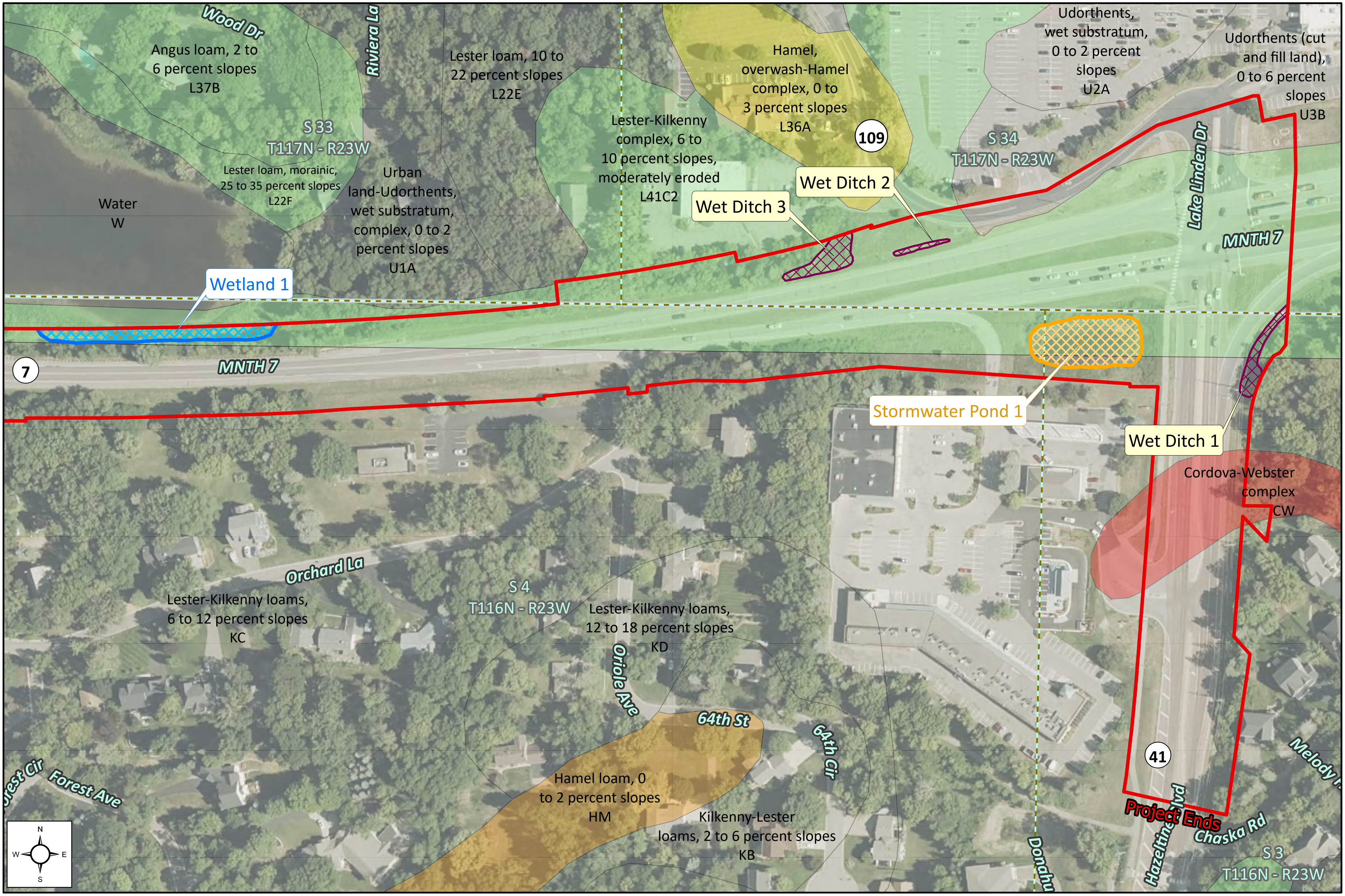
KLJ Project Number: 2413-01532
Date Created: 2/14/2025 | Created By: JDP

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Lidar Contours

1:2,400
0 25 50 100
Feet

Study Area
Index Contour (10')
Intermediate Contour (2')
Township Line
Section Line



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KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

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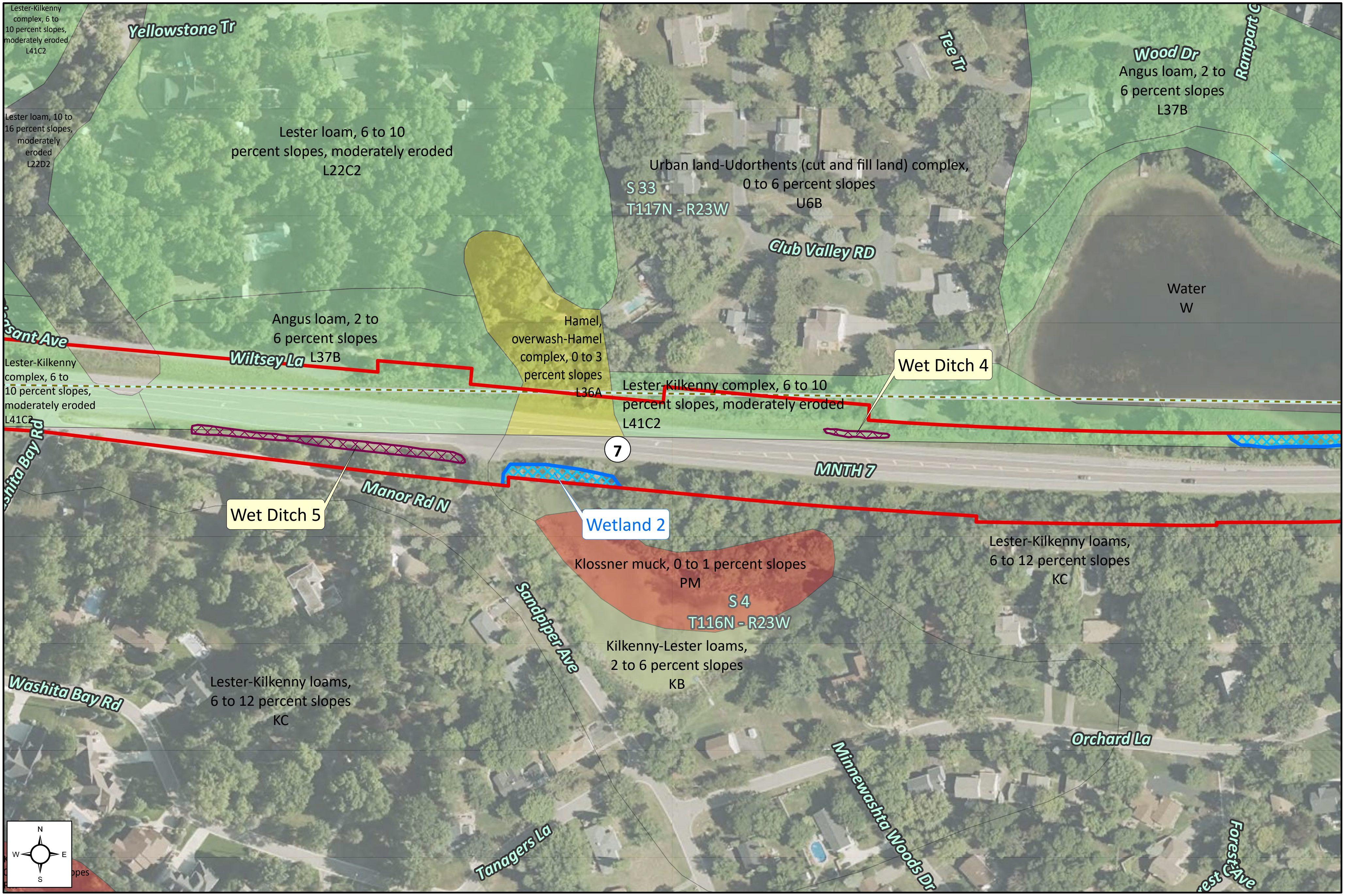
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Hydric Soils Rating

1:2,400
0 25 50 100 Feet

Study Area
Type
Stormwater Pond
Wetland
Wet Ditch
Section Line

Township Line
Soil Hydric Rating
Hydric (100%)
Predominantly Hydric (66 to 99%)
Partially Hydric (33 to 65%)
Predominantly nonhydric (1 to 32%)
Nonhydric (0%)



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Date Created: 2/17/2025 | Created By: JDP

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

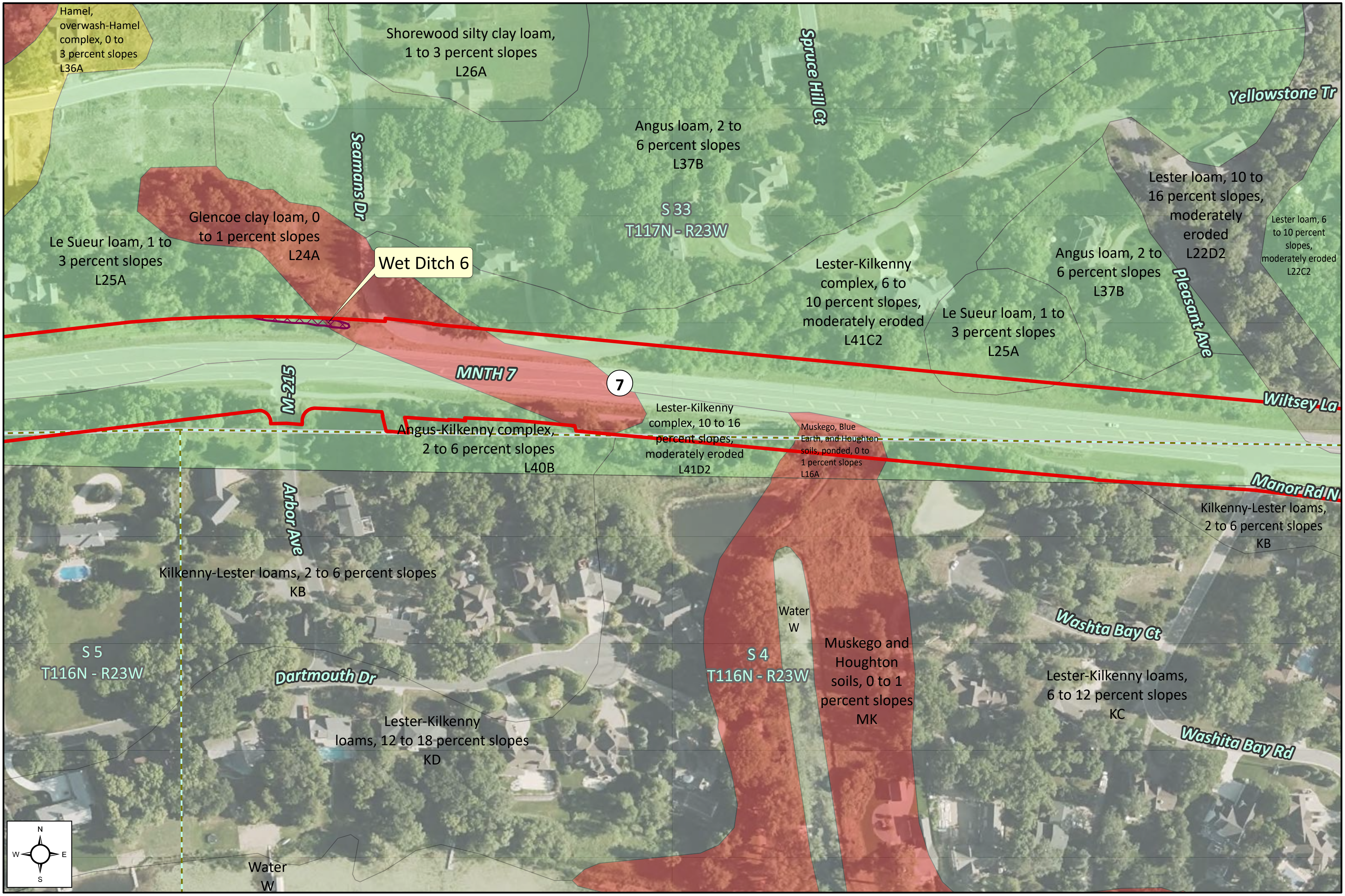
Hydric Soils Rating

1:2,400
0 25 50 100 Feet

Study Area

Type
Wetland
Wet Ditch
Section Line
Township Line

Soil Hydric Rating
Hydric (100%)
Predominantly Hydric (66 to 99%)
Partially Hydric (33 to 65%)
Predominantly nonhydric (1 to 32%)
Nonhydric (0%)



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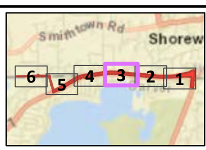

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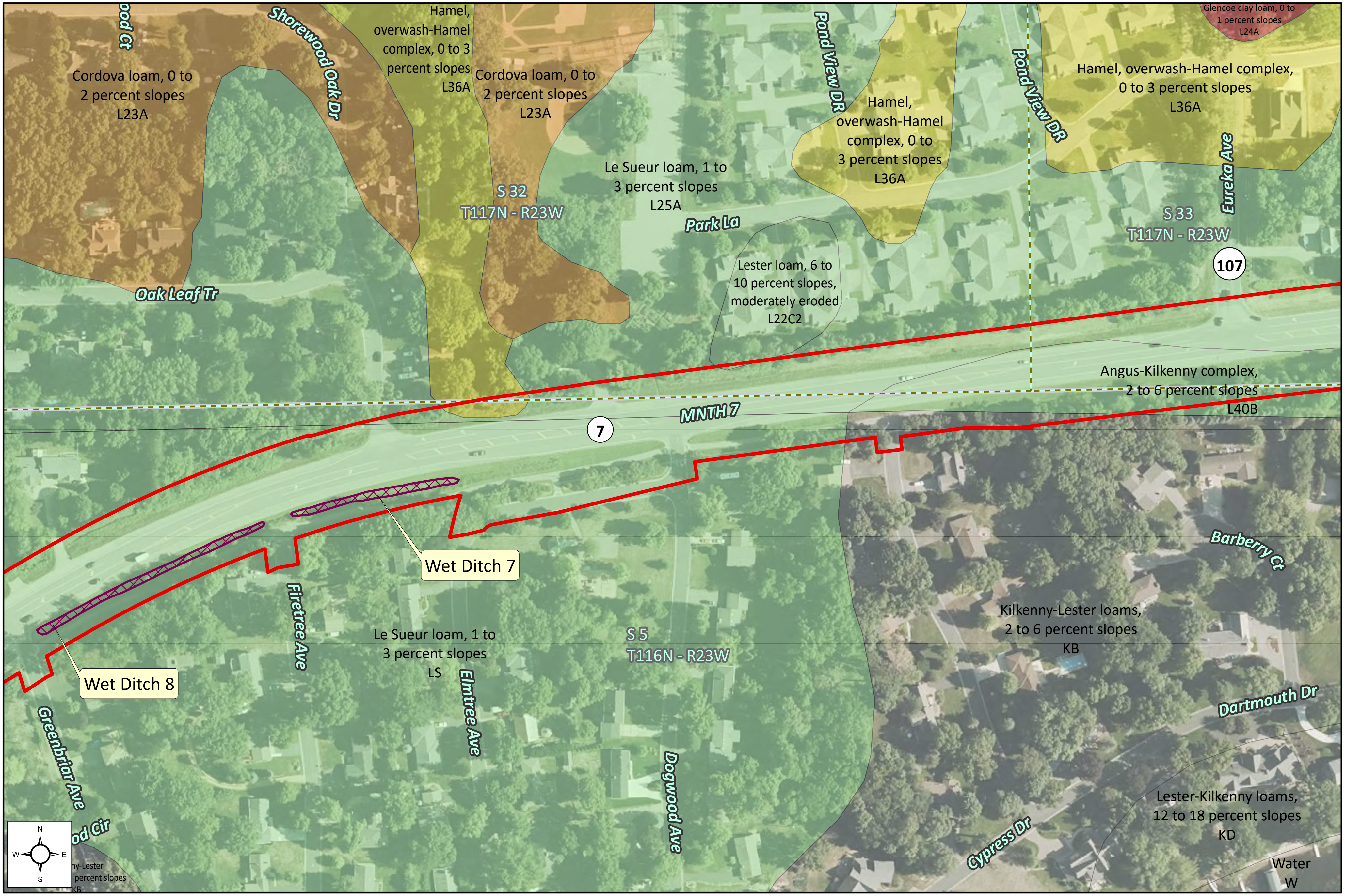
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Hydric Soils Rating

1:2,400
0 25 50 100 Feet

Study Area
Wet Ditch
Section Line
Township Line
Soil Hydric Rating
Hydric (100%)
Predominantly Hydric (66 to 99%)
Partially Hydric (33 to 65%)
Predominantly nonhydric (1 to 32%)
Nonhydric (0%)



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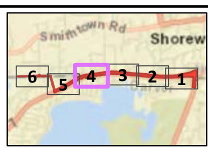

KLJ Project Number: 2413-01532	
Date Created: 2/17/2025	Created By: JDP

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Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

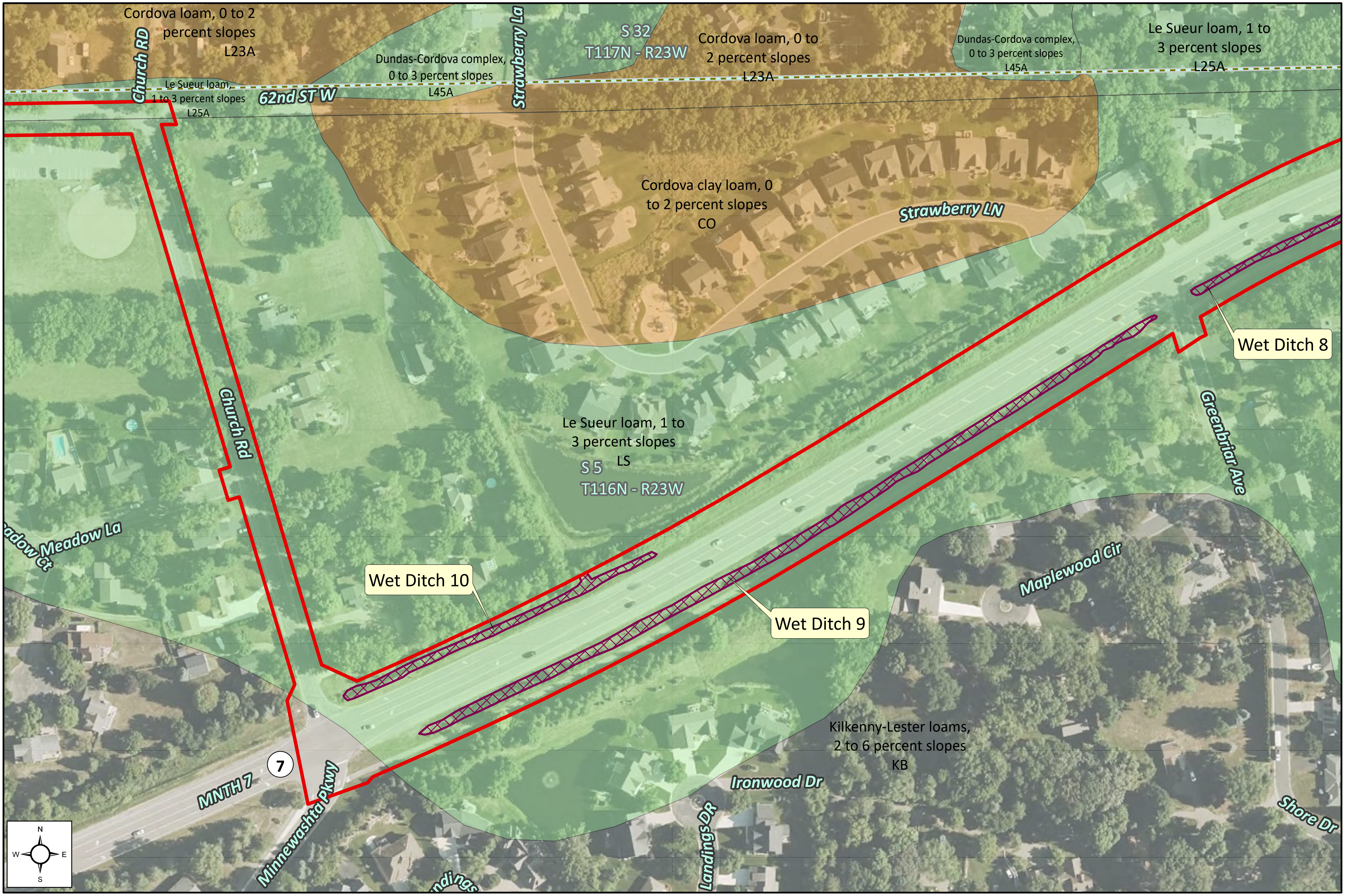
Hydric Soils Rating

1:2,400
0 25 50 100 Feet

- Study Area
- Wet Ditch
- Section Line
- Township Line

Soil Hydric Rating

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially Hydric (33 to 65%)
- Predominantly nonhydric (1 to 32%)
- Nonhydric (0%)



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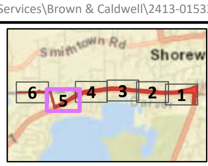

Data Source: US Fish and Wildlife, State of MN, NRCS, & KLJ
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KLJ Project Number: 2413-01532	
Date Created: 2/17/2025	Created By: JDP

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Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

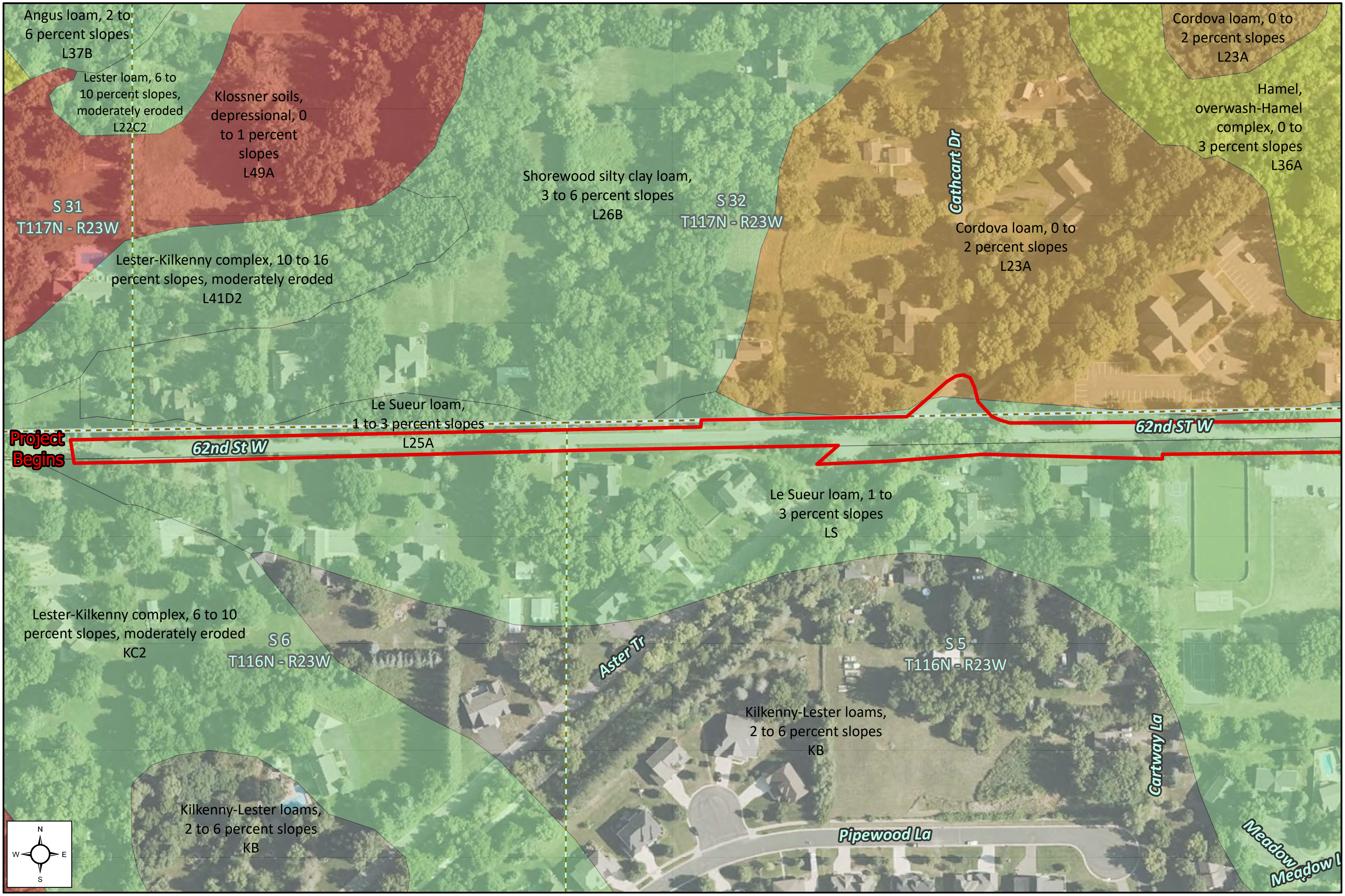
Hydric Soils Rating

1:2,400
0 25 50 100 Feet

- Study Area
- Wet Ditch
- Section Line
- Township Line

Soil Hydric Rating

- Hydric (100%)
- Predominantly Hydric (66 to 99%)
- Partially Hydric (33 to 65%)
- Predominantly nonhydric (1 to 32%)
- Nonhydric (0%)



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KLJ

Data Source: US Fish and Wildlife, State of MN, NRCS, & KLJ
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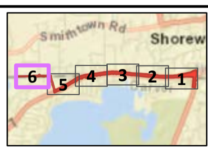
Date Created: 2/14/2025 | Created By: JDP



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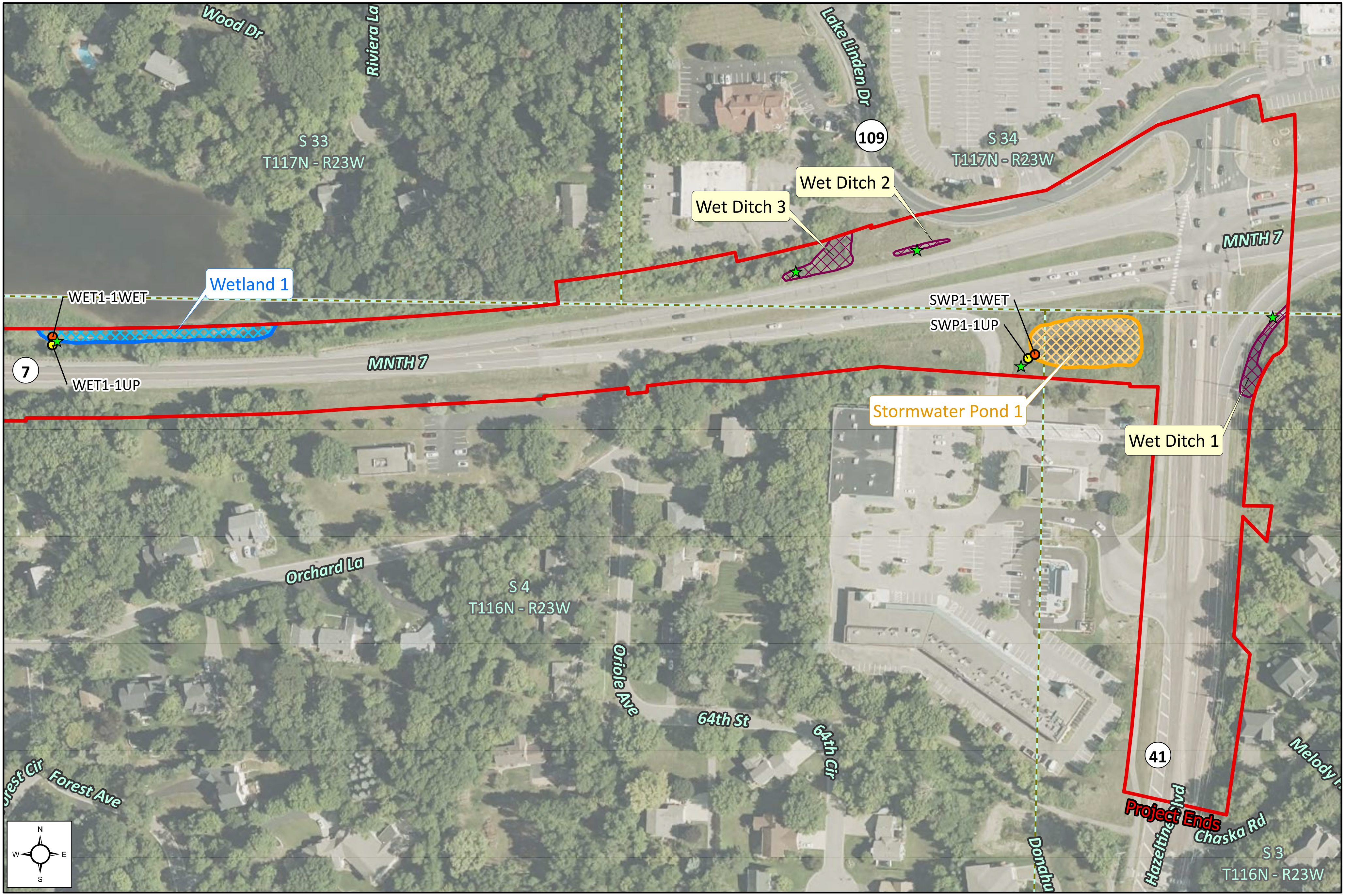
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Hydric Soils Rating

1:2,400
0 25 50 100 Feet

	Study Area		Predominantly Hydric (66 to 99%)
	Section Line		Partially Hydric (33 to 65%)
	Township Line		Predominantly nonhydric (1 to 32%)
Soil Hydric Rating			Nonhydric (0%)
	Hydric (100%)		



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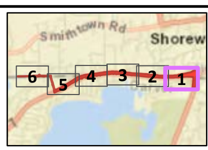

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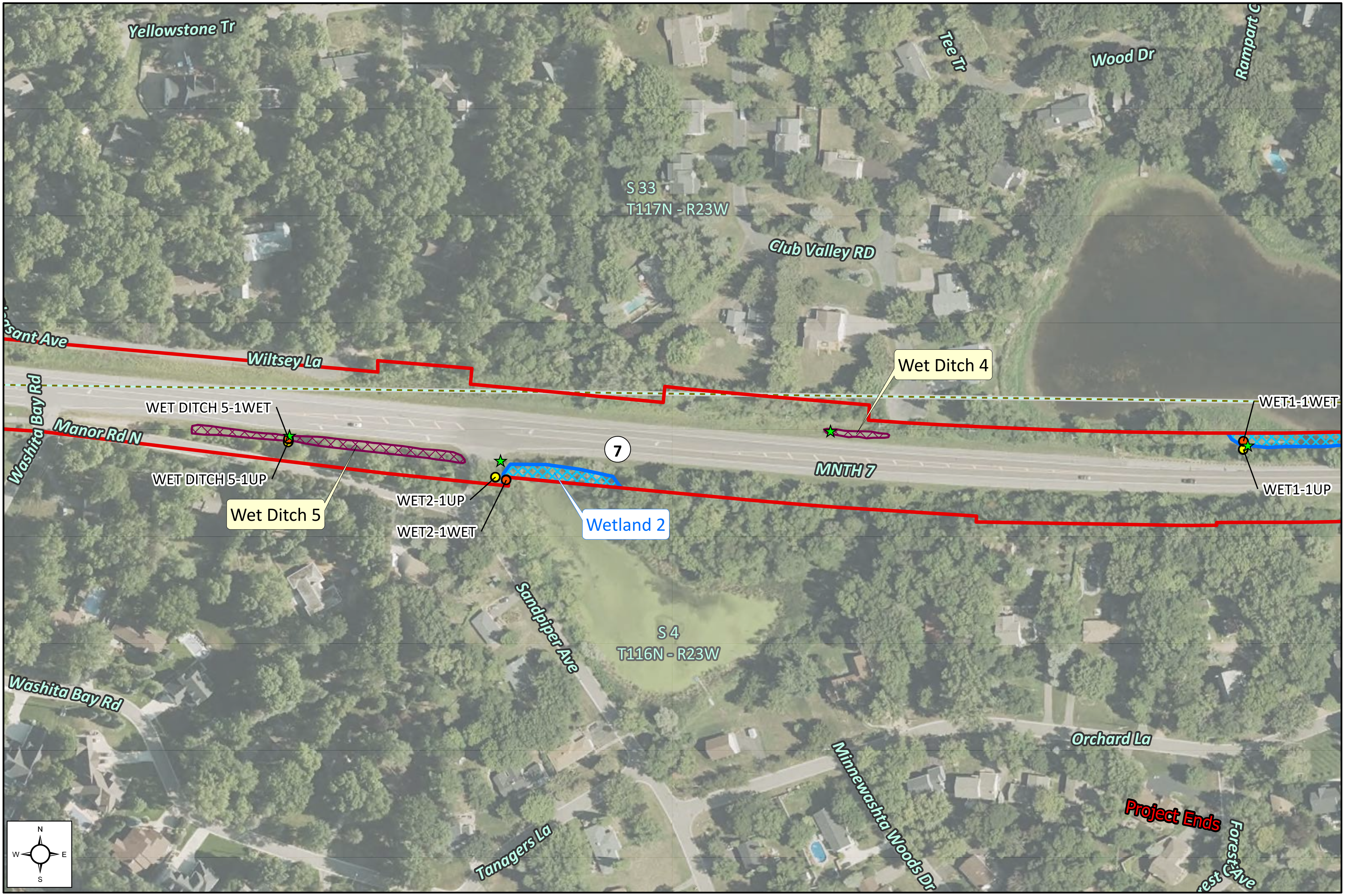
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Aquatic Resources

1:2,400
0 25 50 100 Feet

Study Area	Photo Point	Stormwater Pond
Section Line	Upland Test Hole	Wetland
Township Line	Wetland Test Hole	Wet Ditch



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KLJ

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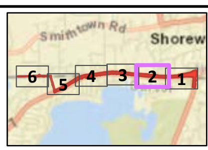

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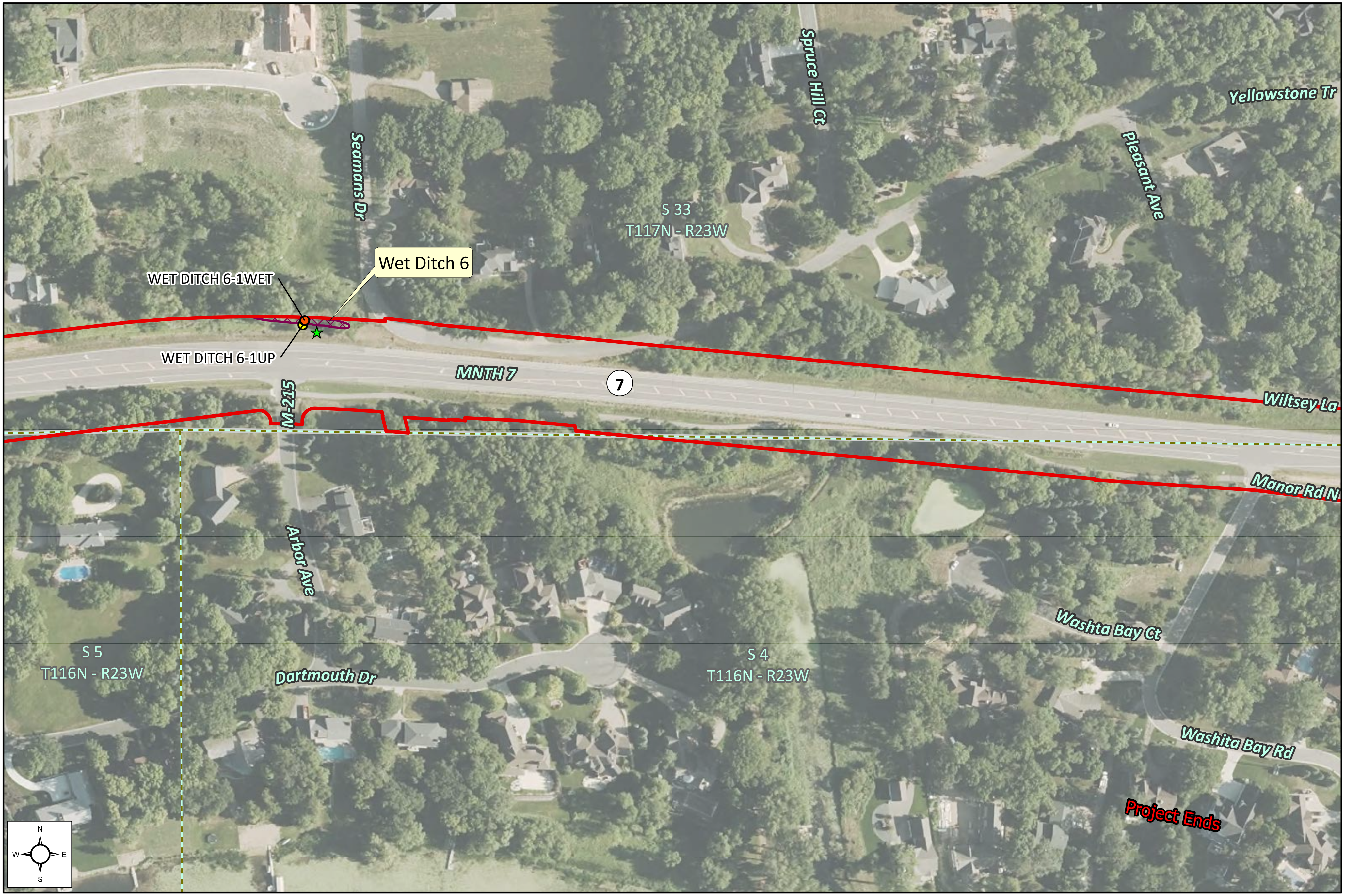
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Aquatic Resources

1:2,400
0 25 50 100
Feet

Study Area
Section Line
Township Line
Photo Point
Upland Test Hole
Wetland Test Hole
Wetland
Wet Ditch



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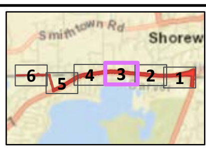

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Aquatic Resources

1:2,400
0 25 50 100
Feet

Study Area
Section Line
Township Line
Photo Point
Upland Test Hole
Wetland Test Hole
Wet Ditch

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Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Aquatic Resources

1:2,400
0 25 50 100 Feet

- Study Area
- Section Line
- Township Line
- Photo Point
- Upland Test Hole
- Wetland Test Hole
- Wet Ditch

Document Path: K:\Projects\ProfServices\Brown & Caldwell\2413-01532_Interceptor 8253-327\GIS\Environmental\ArcPro WorkMap\Brown&Caldwell_MCES_Interceptor_8253-327_20250214.aprx

KLJ

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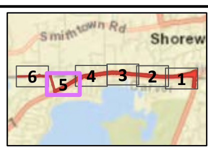
Date Created: 2/17/2025 | Created By: JDP

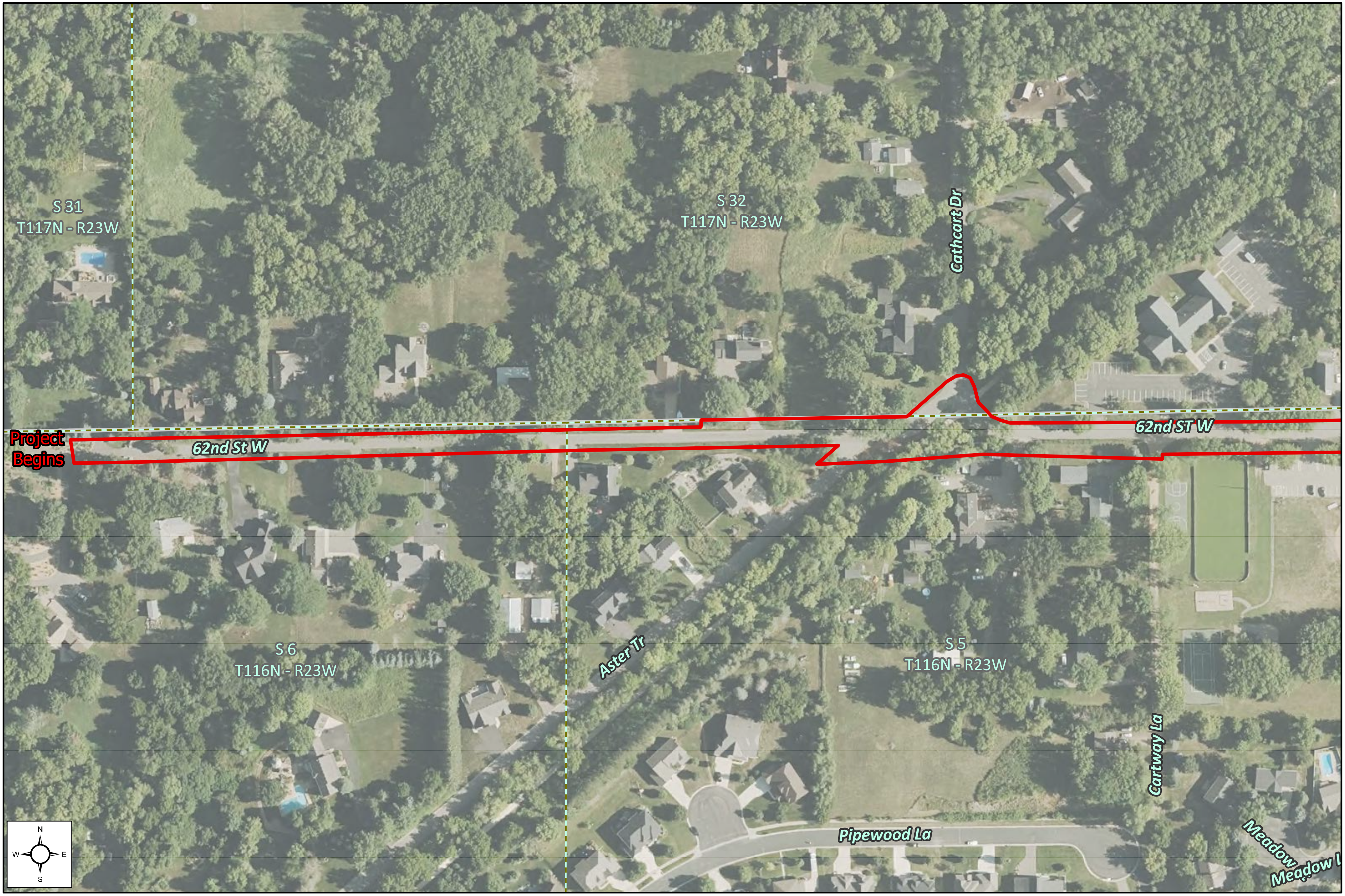


Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Aquatic Resources

1:2,400
0 25 50 100
Feet

Study Area
Section Line
Township Line
Photo Point
Wet Ditch



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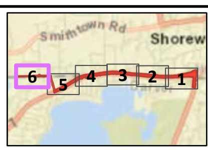
KLJ

Data Source: US Fish and Wildlife, State of MN, & KLJ
Imagery: ©2023 USDA-FSA-NAIP

KLJ Project Number: 2413-01532	
Date Created: 2/14/2025	Created By: JDP



Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Aquatic Resources

1:2,400
0 25 50 100
Feet

Study Area
Section Line
Township Line

Appendix B: Aquatic Resource Data Forms

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Hennepin County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: SWP1-1WET

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 04 T116N R023W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 0-2 Lat: 44.891317 Long: -93.581758 Datum: WGS84

Soil Map Unit Name: Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded NWI classification: PUBHx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?**	**Yes ✓ No ___**
Hydric Soil Present?	Yes ✓ No ___		
Wetland Hydrology Present?	Yes ✓ No ___		

Remarks:
Sample point located in depression adjacent to roadway, in mapped NWI.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Typha X glauca	95	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	95.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	95	x 1 = 95
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	95 (A)	95.00 (B)

Prevalence Index = B/A = 1.0

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
✓ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ✓ No ___**

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: SWP1-1WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					MUCK	
4-10	10YR 4/2	90	10YR 5/6	10	C	M	CL	
10-24	10YR 5/2	90	10YR 5/6	10	C	M	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ✓ 2 cm Muck (A10)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ✓ No ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ________

Water Table Present? Yes _____ No ✓ Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Hennepin County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: SWP1-1UP

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 34 T117N R023W

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): Convex

Slope (%): 3-7 Lat: 44.891336 Long: -93.581804 Datum: WGS84

Soil Map Unit Name: Lester-Kilkenny complex, 6 to 10 percent slopes, moderately eroded NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No ✓
Hydric Soil Present?	Yes ___	No ✓
Wetland Hydrology Present?	Yes ___	No ✓

Is the Sampled Area within a Wetland? **Yes ___** **No ✓**

Remarks:
Sample point located on slope approximately 3 feet upslope from SWP1-1WET.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Securigera varia	85	Y	FACU
2. Solidago canadensis	15	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	100	x 4 = 400
UPL species	0	x 5 = 0
Column Totals:	100 (A)	400.00 (B)

Prevalence Index = B/A = 4.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ___** **No ✓**

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: SWP1-1UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/2	100					SCL	
9-24	10YR 5/4	100					S	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ✓	Depth (inches): ______
Water Table Present?	Yes ____	No ✓	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes ____	No ✓	Depth (inches): ______

Wetland Hydrology Present? Yes ______ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Hennepin County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET1-1WET

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 04 T116N R023W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0-2 Lat: 44.891371 Long: -93.587760 Datum: WGS84

Soil Map Unit Name: Lester-Kilkenny loams, 6 to 12 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:
Sample point located in floodplain area between road and pond, adjacent to mapped NWI.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' radius)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	0		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	0		
Herb Stratum (Plot size: 5' radius)			
1. Phalaris arundinacea	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover	100.0		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
= Total Cover	0		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	100	x 2 = 200
FAC species	0	x 3 = 0
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	100 (A)	200.00 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
✓ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET1-1WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					SCL	
4-24	10YR 4/1	90	10YR 5/8	10	C	M/PL	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ✓ **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

Wetland Hydrology Present? **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Carver County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET2-1UP

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 04 T116N R023W

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): Convex

Slope (%): 8-15 Lat: 44.891364 Long: -93.587809 Datum: WGS84

Soil Map Unit Name: Lester-Kilkenny loams, 6 to 12 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No ✓
Hydric Soil Present?	Yes ___	No ✓
Wetland Hydrology Present?	Yes ___	No ✓

Is the Sampled Area within a Wetland? **Yes** ___ **No** ✓

Remarks:
Sample located on sloped wooded area, approximately 4 feet upslope from WET2-1WET.

VEGETATION – Use scientific names of plants.

Stratum / Species	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' radius)			
1. Fraxinus pennsylvanica	25	Y	FACW
2.			
3.			
4.			
5.			
	25.0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Solidago canadensis	65	Y	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	65.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	0	x 3 =	0
FACU species	65	x 4 =	260
UPL species	0	x 5 =	0
Column Totals:	90 (A)		310.00 (B)

Prevalence Index = B/A = 3.44

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ___ **No** ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET2-1UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 3/2	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ______ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No ✓ Depth (inches): ______

Water Table Present? Yes ______ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ______ No ✓ Depth (inches): ______

Wetland Hydrology Present? **Yes** ______ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Carver County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET2-1WET

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 04 T116N R023W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0-2 Lat: 44.891230 Long: -93.592340 Datum: WGS84

Soil Map Unit Name: Lester-Kilkenny loams, 6 to 12 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? Yes ✓ No ___

Remarks:
Sample point located in wooded floodplain, adjacent to road.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' radius)			
1. Ulmus americana	25	Y	FACW
2. Fraxinus pennsylvanica	15	Y	FACW
3.			
4.			
5.			
	40.0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. Frangula alnus	20	Y	FACW
2.			
3.			
4.			
5.			
	20.0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Carex lacustris	45	Y	OBL
2. Typha X glauca	15	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	60	x 1 = 60
FACW species	60	x 2 = 120
FAC species	0	x 3 = 0
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	120 (A)	180.00 (B)

Prevalence Index = B/A = 1.5

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET2-1WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					MUCK	
4-30	10YR 5/1	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ✓ 2 cm Muck (A10)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ **No** ___

Remarks:

Overcast/cloudy weather conditions

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No ✓	Depth (inches): ___
Water Table Present?	Yes ✓	No ___	Depth (inches): 1
Saturation Present? (includes capillary fringe)	Yes ✓	No ___	Depth (inches): 0

Wetland Hydrology Present? Yes ✓ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Standing water approximately 1 foot from sample site

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Carver County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET2-1UP

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 04 T116N R023W

Landform (hillslope, terrace, etc.): Shoulder Local relief (concave, convex, none): Convex

Slope (%): 3-7 Lat: 44.891247 Long: -93.592414 Datum: WGS84

Soil Map Unit Name: Lester-Kilkenny loams, 6 to 12 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___	Is the Sampled Area within a Wetland? Yes ___ No ✓
Hydric Soil Present?	Yes ___	No ✓	
Wetland Hydrology Present?	Yes ___	No ✓	

Remarks:
Sample point located on shoulder adjacent to road, approximately 4 feet upslope from WET2-1WET.

VEGETATION – Use scientific names of plants.

Stratum / Species	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' radius)			
1. Acer saccharinum	20	Y	FACW
2.			
3.			
4.			
5.			
	20.0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. Juglans nigra	15	Y	FACU
2.			
3.			
4.			
5.			
	15.0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Poa pratensis	85	Y	FAC
2. Bromus inermis	15	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	85	x 3 =	255
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	135 (A)		415.00 (B)

Prevalence Index = B/A = 3.07

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET2-1UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 3/2	100					SCL	Traces of gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Carver County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET DITCH 5-1WET

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 04 T116N R023W

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 0-2 Lat: 44.891419 Long: -93.593683 Datum: WGS84

Soil Map Unit Name: Kilkenny-Lester loams, 2 to 6 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ✓	No ___
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? **Yes ✓ No ___**

Remarks:
Sample point located in ditch along road.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Phalaris arundinacea	65	Y	FACW
2. Typha X glauca	20	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	85.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	65	x 2 =	130
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	85 (A)		150.00 (B)

Prevalence Index = B/A = 1.76

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
✓ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes ✓ No ___**

Remarks: (Include photo numbers here or on a separate sheet.)
15% bare ground/dead plant material

SOIL

Sampling Point: WET DITCH 5-1WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 4/1	95	10YR 5/6	5	C	M	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? **Yes** ✓ **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ______	No ✓	Depth (inches): ______
Water Table Present?	Yes ✓	No ______	Depth (inches): 1
Saturation Present? (includes capillary fringe)	Yes ✓	No ______	Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Carver County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET DITCH 5-1UP

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 04 T116N R023W

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): Convex

Slope (%): 8-15 Lat: 44.891404 Long: -93.593678 Datum: WGS84

Soil Map Unit Name: Kilkenny-Lester loams, 2 to 6 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	✓	
Hydric Soil Present?		✓
Wetland Hydrology Present?		✓
Is the Sampled Area within a Wetland?		✓

Remarks:
Sample point located on slope, approximately 3 ft upslope from WET DITCH 5-1WET.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30' radius)			
1. Rhamnus cathartica	15	Y	FAC
2.			
3.			
4.			
5.			
	15.0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1. Thuja occidentalis	10	Y	FACW
2.			
3.			
4.			
5.			
	10.0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Bromus inermis	85	Y	FACU
2. Solidago canadensis	15	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	10	x 2 = 20
FAC species	15	x 3 = 45
FACU species	100	x 4 = 400
UPL species	0	x 5 = 0
Column Totals:	125 (A)	465.00 (B)

Prevalence Index = B/A = 3.72

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET DITCH 5-1UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					SCL	
6-24	10YR 3/2	65					SCL	Mixed matrix/traces of gravel
	10YR 2/2	35					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ______

Water Table Present? Yes ___ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Hennepin County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET DITCH 6-1WET

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 33 T117N R023W

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 0-2 Lat: 44.892203 Long: -93.601048 Datum: WGS84

Soil Map Unit Name: Le Sueur loam, 1 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:
Sample point located in ditch along road.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Typha X glauca	95	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	95.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	95	x 1 =	95
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		95.00 (B)

Prevalence Index = B/A = 1.0

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET DITCH 6-1WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/1	100					SCL	
6-24	10YR 4/2	95	10YR 5/6	5	C	M	SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): 8

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 6

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Hennepin County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET DITCH 6-1UP

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 33 T117N R023W

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): Convex

Slope (%): 8-15 Lat: 44.892182 Long: -93.601065 Datum: WGS84

Soil Map Unit Name: Le Sueur loam, 1 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		✓
Hydric Soil Present?		✓
Wetland Hydrology Present?		✓

Is the Sampled Area within a Wetland? Yes ___ No ✓

Remarks:
Sample point located on slope, approximately 4 feet upslope from WET DITCH 6-1WET.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Bromus inermis	75	Y	FACU
2. Solidago canadensis	15	N	FACU
3. Euphorbia maculata	5	N	FACU
4. Phalaris arundinacea	3	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
	98.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	3	x 2 = 6
FAC species	0	x 3 = 0
FACU species	95	x 4 = 380
UPL species	0	x 5 = 0
Column Totals:	98 (A)	386.00 (B)

Prevalence Index = B/A = 3.94

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET DITCH 6-1UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-24	10YR 3/2	100					SCL	Traces of gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ______

Water Table Present? Yes _____ No ✓ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ______

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Carver County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET DITCH 7-1WET

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 05 T116N R023W

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 0-2 Lat: 44.891282 Long: -93.608374 Datum: WGS84

Soil Map Unit Name: Le Sueur loam, 1 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	**Is the Sampled Area within a Wetland?** Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks:
Sample point located in ditch along road.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Phalaris arundinacea	80	Y	FACW
2. Typha X glauca	10	N	OBL
3. Urtica dioica	5	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	95.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100.00	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	10	x 1 = 10
FACW species	85	x 2 = 170
FAC species	0	x 3 = 0
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	95 (A)	180.00 (B)

Prevalence Index = B/A = 1.89

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
✓ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET DITCH 7-1WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/1	100					SCL	
6-24	10YR 4/2	65	10YR 5/6	5	C	M	SCL	Mixed matrix/Traces of gravel
	10YR 2/1	30					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ✓ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ✓ **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		✓	
Water Table Present?	✓		10
Saturation Present? (includes capillary fringe)	✓		8

Wetland Hydrology Present? Yes ✓ **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Carver County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: WET DITCH 7-1UP

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 05 T116N R023W

Landform (hillslope, terrace, etc.): Slope Local relief (concave, convex, none): Convex

Slope (%): 3-7 Lat: 44.891315 Long: -93.608350 Datum: WGS84

Soil Map Unit Name: Le Sueur loam, 1 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		✓
Hydric Soil Present?		✓
Wetland Hydrology Present?		✓

Is the Sampled Area within a Wetland? Yes ___ No ✓

Remarks:
Sample point located on slope, approximately 2 ft upslope from WET DITCH 7-1WET.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Bromus inermis	60	Y	FACU
2. Cirsium arvense	25	Y	FACU
3. Solidago canadensis	5	N	FACU
4. Setaria pumila	5	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	95.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	90	x 4 =	360
UPL species	0	x 5 =	0
Column Totals:	95 (A)		375.00 (B)

Prevalence Index = B/A = 3.95

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WET DITCH 7-1UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	100					SCL	
12-24	10YR 3/2						SCL	Mixed matrix/gravelly
	10YR 4/2						SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ 2 cm Muck (A10)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ 5 cm Mucky Peat or Peat (S3)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ Coast Prairie Redox (A16)
___ Dark Surface (S7)
___ Iron-Manganese Masses (F12)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ True Aquatic Plants (B14)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Gauge or Well Data (D9)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): ________
Water Table Present? Yes _____ No ✓ Depth (inches): ________
Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): ________

Wetland Hydrology Present? Yes ______ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No hydrology indicators observed

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Interceptor 8253-327 City/County: Hennepin County Sampling Date: 2024-11-14

Applicant/Owner: Brown & Caldwell State: Minnesota Sampling Point: NO1-1UP

Investigator(s): Evelyn Ostrowski Section, Township, Range: sec 33 T117N R023W

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 0-2 Lat: 44.892089 Long: -93.603062 Datum: WGS84

Soil Map Unit Name: Le Sueur loam, 1 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___
Hydric Soil Present?	Yes ___	No ✓
Wetland Hydrology Present?	Yes ✓	No ___

Is the Sampled Area within a Wetland? **Yes** ___ **No** ✓

Remarks:
Sample point located in mowed ditch along road with evidence of wetland vegetation.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15' radius)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5' radius)			
1. Typha X glauca	45	Y	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	45.0 = Total Cover		
Woody Vine Stratum (Plot size: 30' radius)			
1.			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	45	x 1 = 45
FACW species	0	x 2 = 0
FAC species	0	x 3 = 0
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	45 (A)	45.00 (B)

Prevalence Index = B/A = 1.0

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation
✓ 2 - Dominance Test is >50%
✓ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Mowed down

SOIL

Sampling Point: NO1-1UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/1	100					SCL	
6-24	10YR 4/3	100					S	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ______	No ✓	Depth (inches): ______
Water Table Present?	Yes ✓	No ______	Depth (inches): 12
Saturation Present? (includes capillary fringe)	Yes ✓	No ______	Depth (inches): 10

Wetland Hydrology Present? Yes ✓ No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix C: Stormwater Pond Historic Aerials

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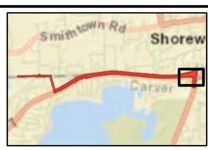
Data Source: US Fish and Wildlife, State of MN, MNDNR, & KLJ
Imagery: ©2023 USDA-FSA-NAIP



KLJ Project Number: 2413-01532	
Date Created: 2/17/2025	Created By: JDP

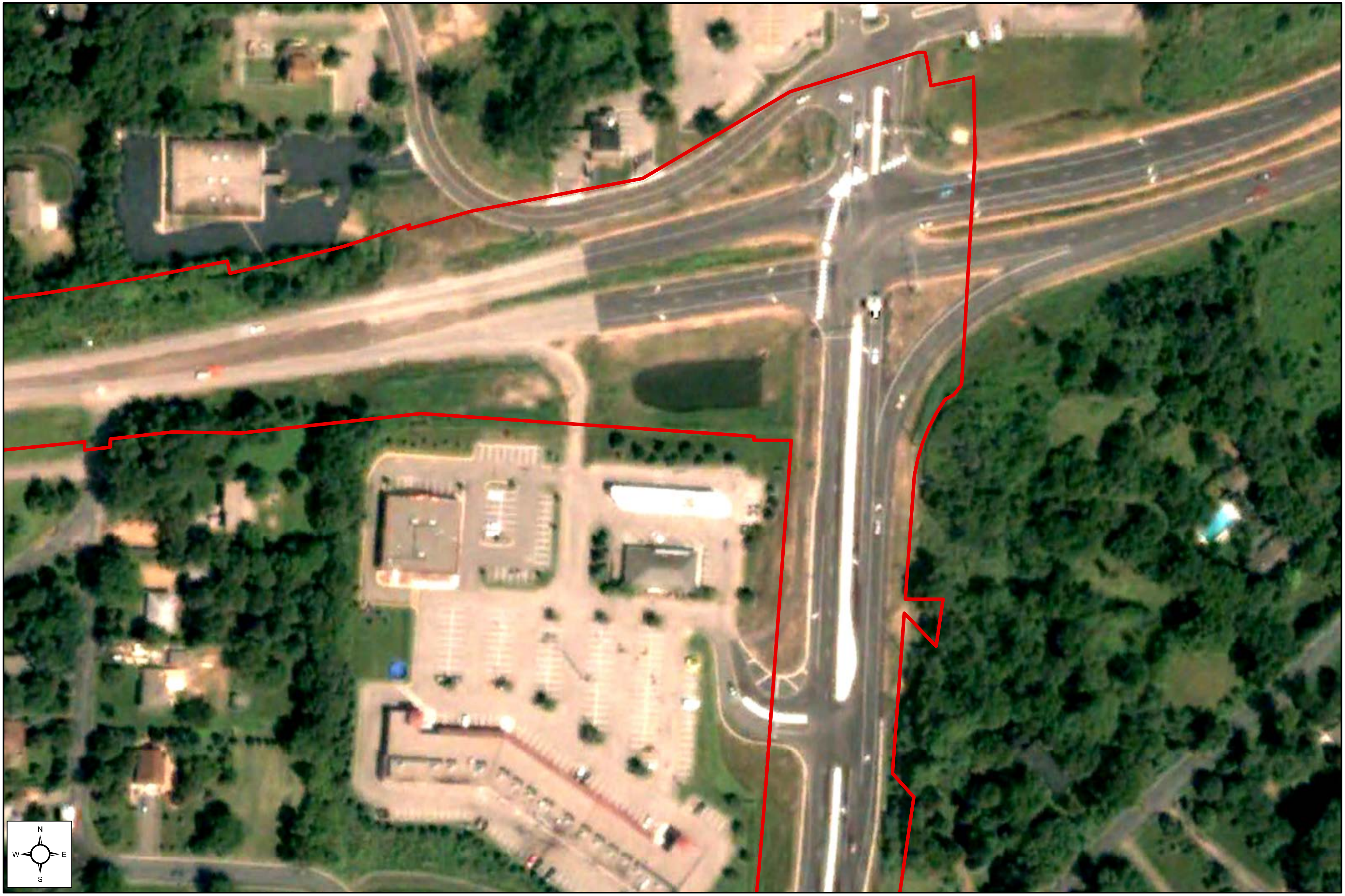
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Historic Aerial - 04/20/1991

1:1,800

0 37.5 75 150 Feet

Study Area



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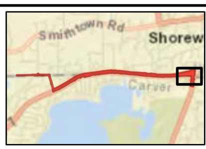
Data Source: US Fish and Wildlife, State of MN, MNDNR, & KLJ
Imagery: ©2023 USDA-FSA-NAIP



KLJ Project Number: 2413-01532	
Date Created: 2/17/2025	Created By: JDP

Page 1 of 1

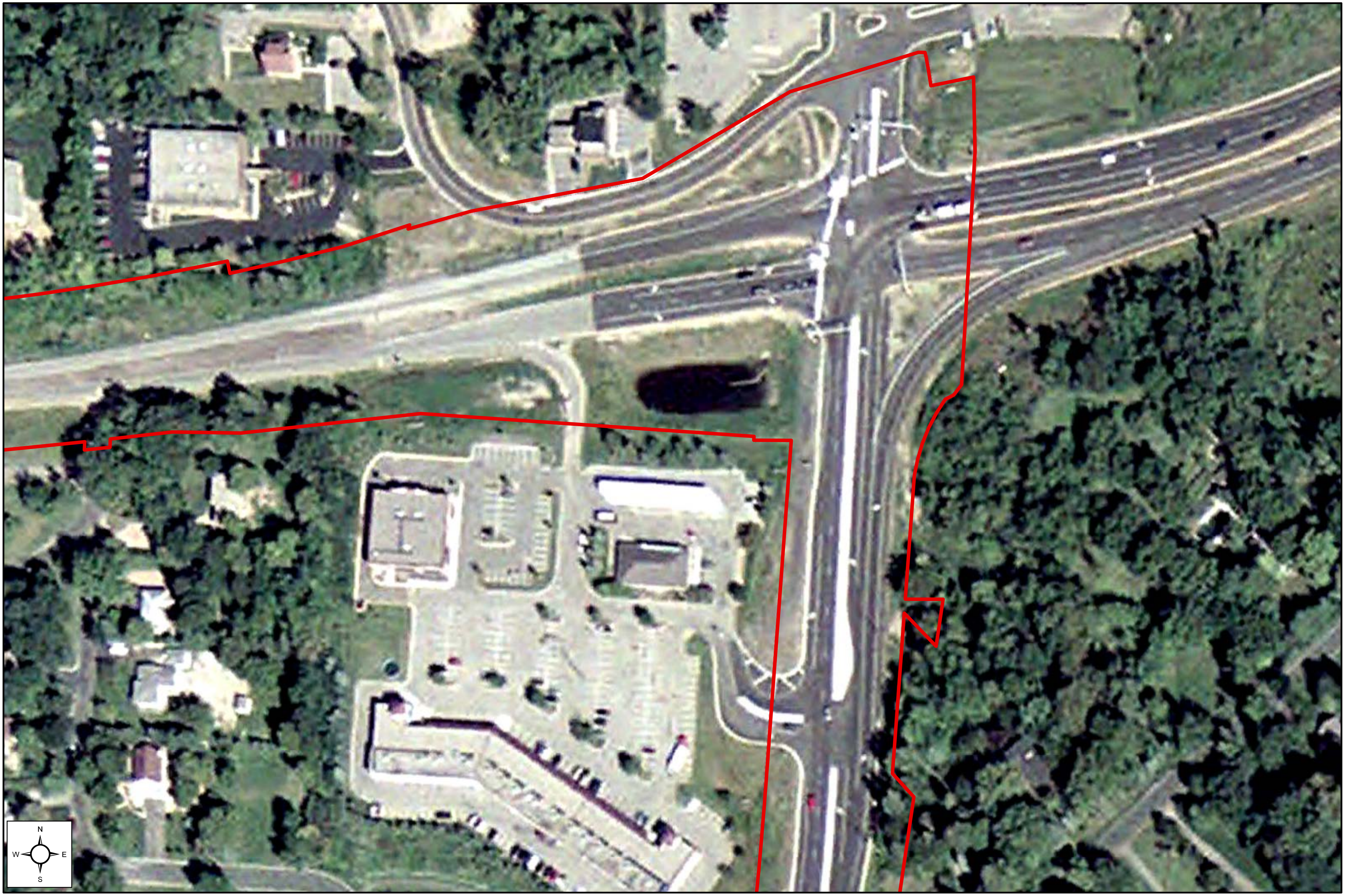
Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Historic Aerial - 08/27/2002

1:1,800

0 37.5 75 150 Feet

Study Area



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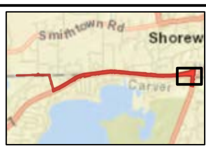
KLJ

Data Source: US Fish and Wildlife, State of MN, MNDNR, & KLJ
Imagery: ©2023 USDA-FSA-NAIP

KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP



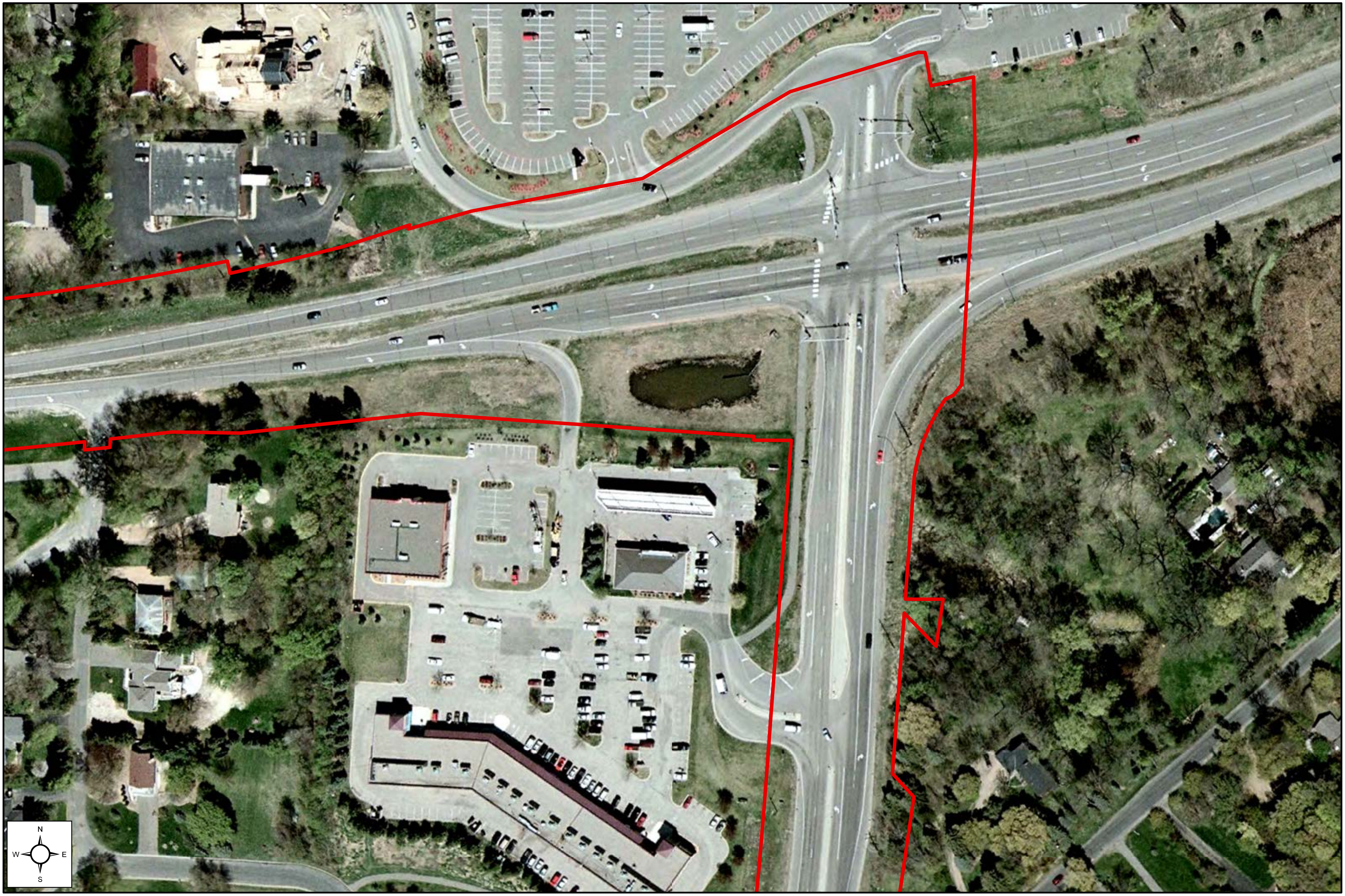
Page 1 of 1

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Historic Aerial - 03/31/2004

1:1,800
0 37.5 75 150 Feet

Study Area



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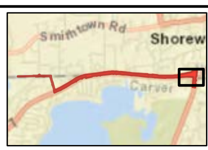


KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

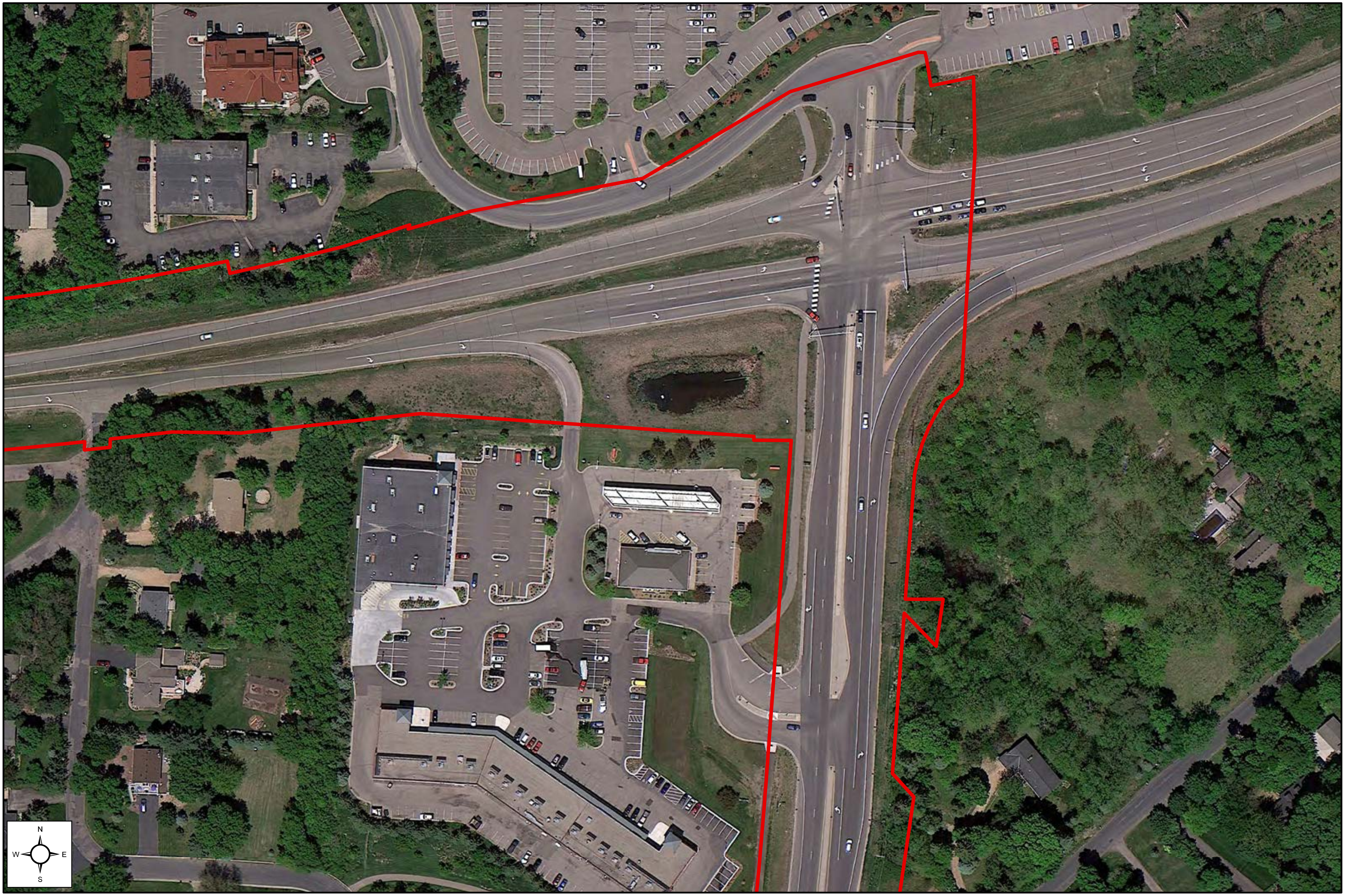
Historic Aerial - 02/28/2006

N
W E
S

1:1,800

0 37.5 75 150 Feet

Study Area



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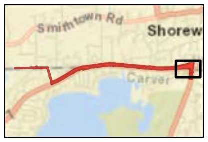

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KLJ Project Number: 2413-01532	
Date Created: 2/17/2025	Created By: JDP

Page 1 of 1

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

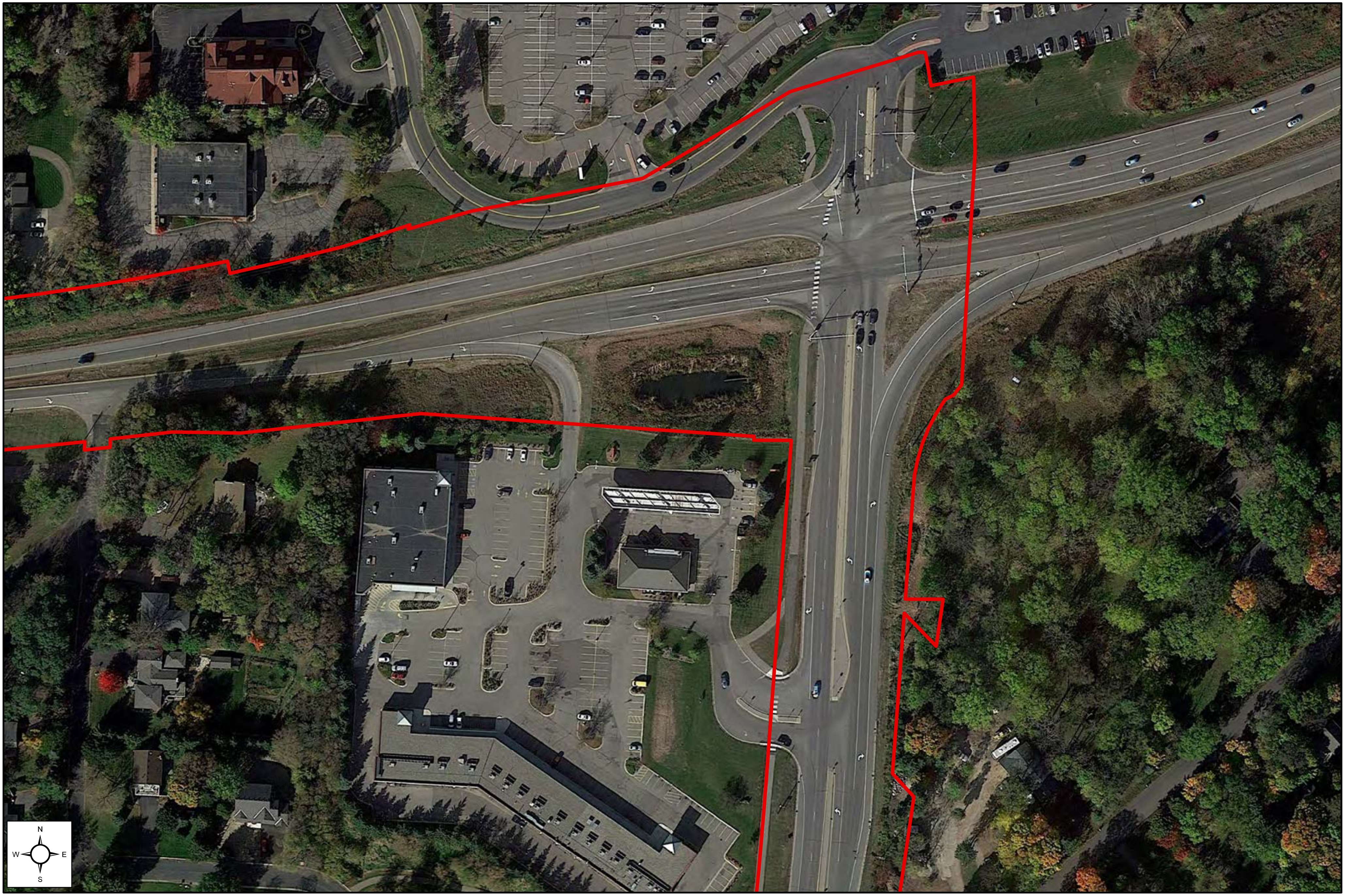
Historic Aerial - 05/18/2010

N W E S

1:1,800

0 37.5 75 150 Feet

Study Area



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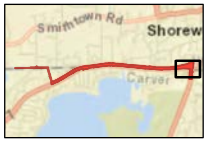
KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP



Page 1 of 1

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Historic Aerial - 10/11/2014

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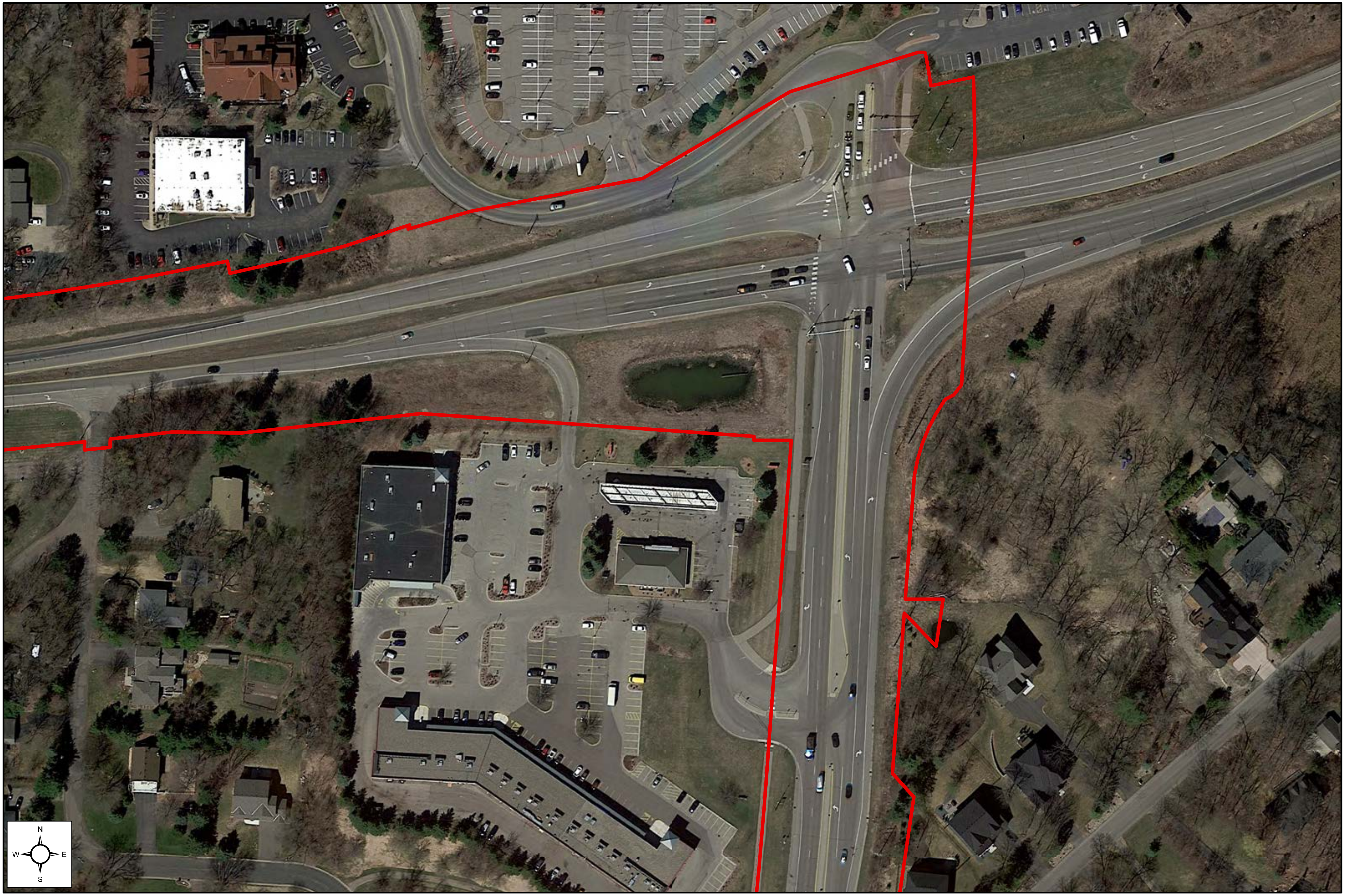
Study Area



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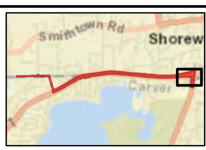

Data Source: US Fish and Wildlife, State of MN, MNDNR, & KLJ
Imagery: ©2023 USDA-FSA-NAIP

KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

Page 1 of 1

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Historic Aerial - 04/05/2017

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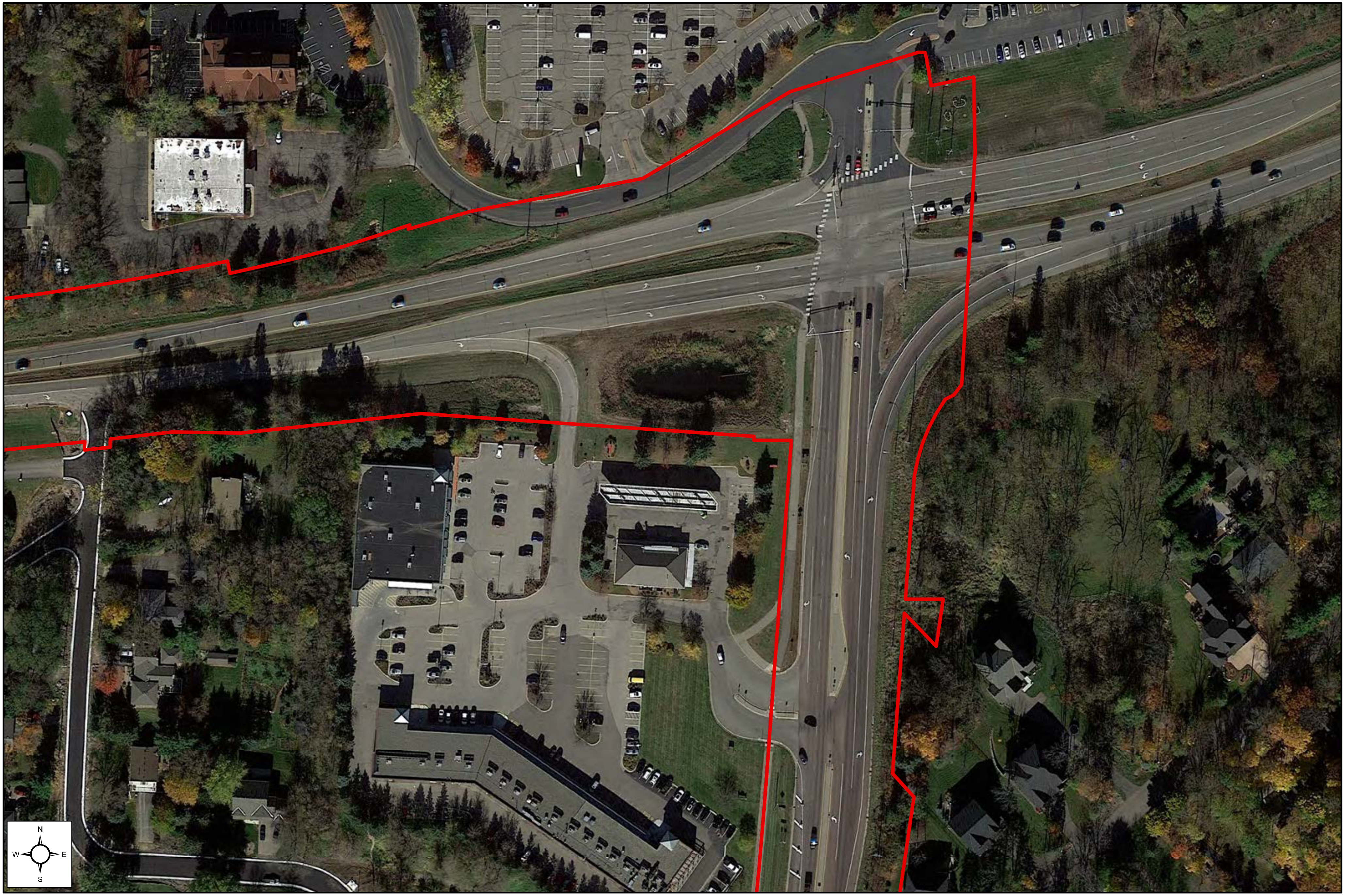
Study Area



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Data Source: US Fish and Wildlife, State of MN, MNDNR, & KLJ
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KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

Page 1 of 1

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Historic Aerial - 10/25/2019

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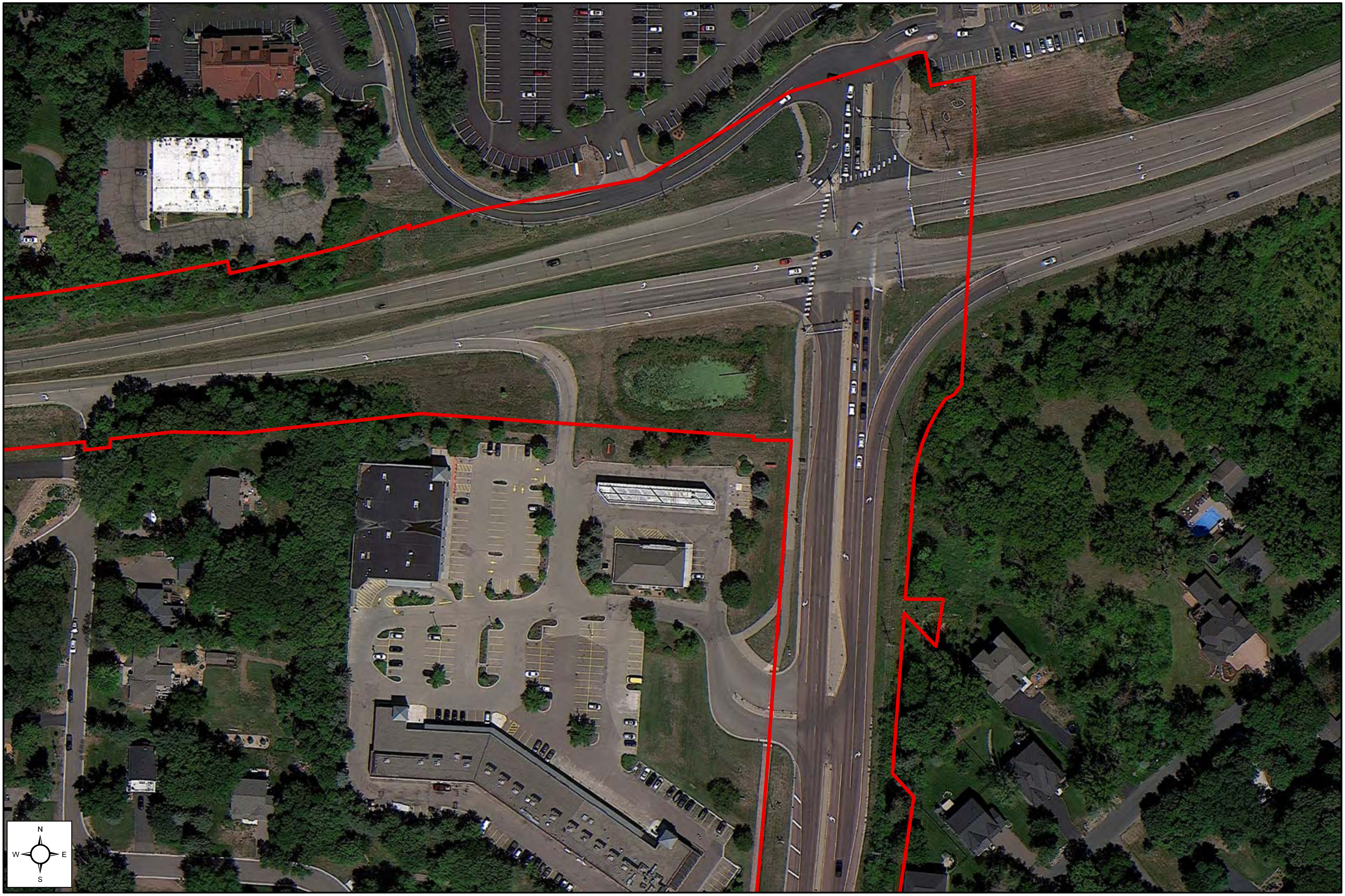
Study Area



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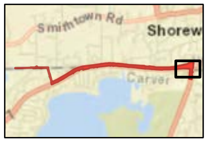

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KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

Page 1 of 1

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Historic Aerial - 08/13/2021

N W E S

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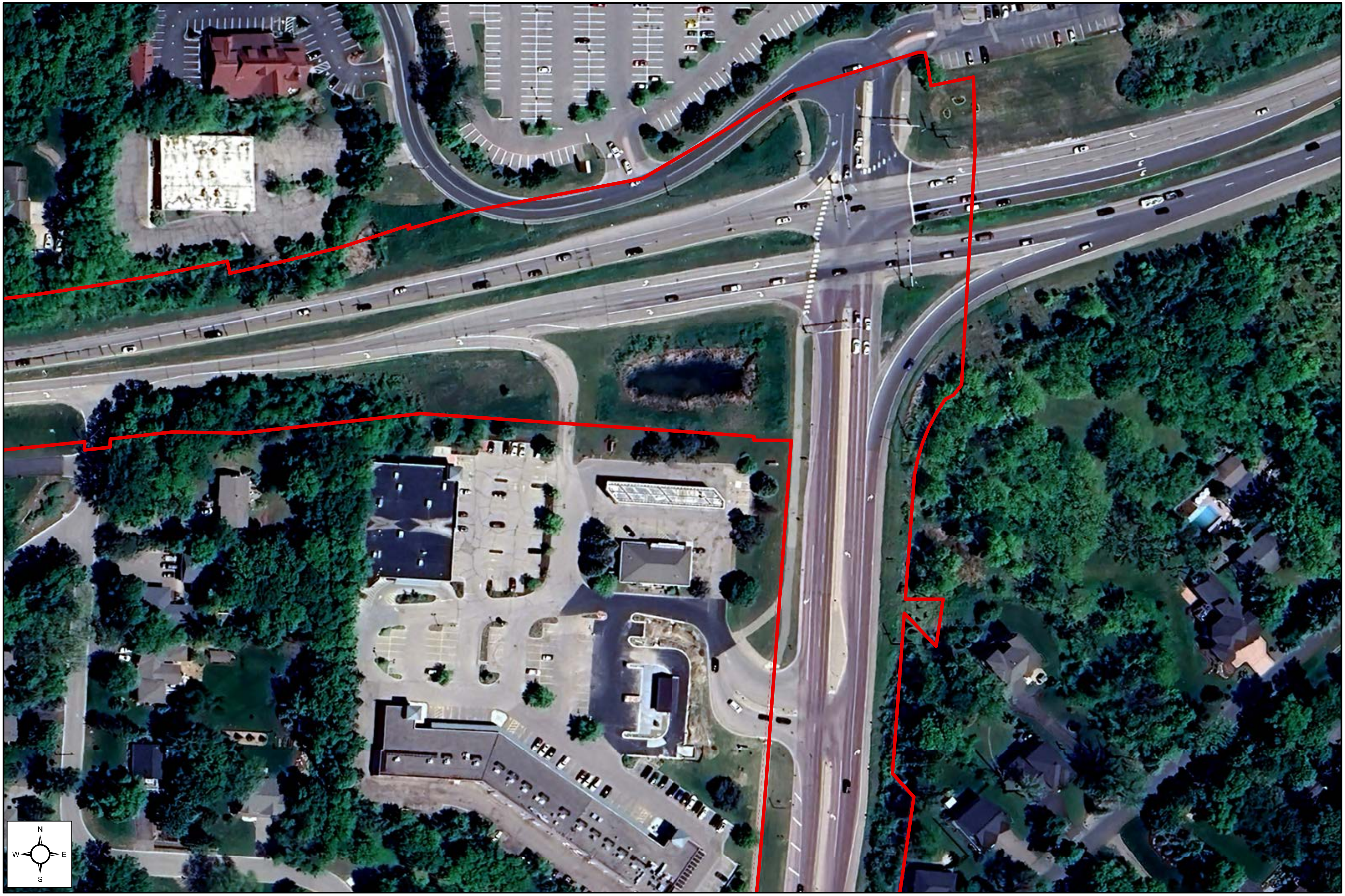
Study Area



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Data Source: US Fish and Wildlife, State of MN, MNDNR, & KLJ
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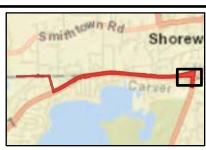

KLJ Project Number: 2413-01532
Date Created: 2/17/2025 | Created By: JDP

Page 1 of 1

Interceptor 8253-327
Aquatic Resource Delineation
Carver & Hennepin Counties, MN

Historic Aerial - 05/26/2023

1:1,800

0 37.5 75 150 Feet

Study Area

Appendix E

Metropolitan Council Asset Management Policy

Metropolitan Council

MCES Work Instruction: Asset Management

Section:	**507 - Capital Projects**	**Document:**	**507.02.01**
Subsection:	**2 - Asset Management**	**Total Pages:**	**4**
Issued By:	**Asset Management Team & Jason Willett**	**Issued Date:**	**08/14/2007**
		Revision No.	
Approved By:	**ESMT**	**Revision Date:**	

Policy Reference---

Council Policy FM 2-2 (Formerly 3): Finance and Asset Management

Council Policy FM 8-3 (Formerly 3-4): Management of Regional Assets

Standard Practices---

In order to manage, control, and protect the assets under its responsibility and provide optimal long-term value to the ratepayers of the Region, the Metropolitan Council Environmental Services (MCES) will follow this work instruction for asset management throughout the division.

The MCES vision and mission for Asset Management is to provide long-term value to the sewer rate payers of the region. Long-term means over the asset life of up to 50 years into the future, and value means the quality of service desired by our stakeholders provided at the lowest life-cycle cost.

Required Information---

Use the following sources of information to complete this work instruction:

MCES Work Instruction 501.03.16; Asset Disposition

MCES Work Instruction 506.01.01; Work Order Request, Work Order Task Procedures

Work Instruction---

A. Definitions

Asset Management (AM). A culture business suitable to agencies whose main mission is the delivery of service using large networks of expensive, long-lived assets at the same time minimizing the whole-life costs of the ownership of the assets. Asset Management includes, but is not limited to, business case evaluations, reliability-centered maintenance, and facility ownership/accountability.

Business Case Evaluation (BCE). A discipline used to systematically evaluate a perceived need then verify and determine how best to address this need considering financial, environmental, social, and political impacts. The process is highly quantitative and supports a business judgment decision on a proposed project. It requires considerations of alternatives (including do-nothing), risks, and in some cases externalities.

Reliability-Centered Maintenance (RCM). A process used to determine what must be done to ensure that any physical asset continues to do what its users want it to do in its present operating context. RCM objectively evaluates risks and consequences of failure to identify the optimal value, for example this may include identifying assets that we should run to failure.

Facility Ownership/Accountability (FOA). A management system that includes measurement and achievement of optimal cost of ownership at the facility level through: better optimization of costs of MCES facilities through comprehensive asset cost identification and planning, improved facility decisions and tracking of whole facility costs, and increased accountability for the costs of core services. This concept identifies some work units as service providers and others as facility owners and empowers the owners to determine the needed level of service from the service providers.

Information Technology (IT). Information Technology (IT) is used in MCES to capture various organizational data at various levels and provide information and reports for maintenance, equipment, facility, tracking, cost and financial decision-making at the appropriate level of the organization. MCES uses, but not exclusively, the following IT systems:

- WAM (Synergen). A technology tool used for capturing data on work orders, procurement, timekeeping, maintenance actions, andcosts associated with functions, etc.
- Enterprise Reporting Tools. Council-wide systems that collect data and provide reports on various levels of data entered into the systems.
- Mobile Computing. Use to capture information/data and import into the Enterprise systems to support maintenance, metering, and other field functions.
- Business Objects. Used to import data from data warehousing systems and display the data in a chart, graphs, “dashboard” or other business decision tool that will aid in monitoring and decision making at the business unit level.

B. Goals

The overall goal of Asset Management is to formalize business practices that will help MCES minimize the life cycle cost of assets required to sustainably meet expected customer service levels while effectively managing risks. This will be achieved through implementation of realistic and achievable actions that will enhance, improve or create new organizational processes, systems and tools to achieve a true life-cycle management environment.

MCES will achieve the Asset Management goal over three years by improvement of the areas selected below:

1. Improved validation of capital project related spending through use of the Business Case Evaluation (BCE) process,
2. Optimization of O&M activities through increased use of reliability-centered maintenance (RCM) techniques, and,
3. Better optimization and accountability for ownership costs of MCES facilities through an “ownership” mentality for management of facility units, service agreements, changed budget or accounting practices such that all costs are attributed to the facility owners, asset cost planning and measurement of ownership costs.

C. Duties and Responsibilities

The ESMT has determined that the implementation of the improvement areas listed in A, 1-3 above will be managed and monitored by:

1. The ESMT will make all decisions on BCE’s and asset management and will review, monitor, and update Asset Management goals and objectives, this work instruction, and the Asset Management plan tri-annually.
2. The Asset Management Team (AMT) will ensure that the asset management (AM) strategies are implemented and are the recommending body on AM to ESMT to include:

   a) Recommend and provide guidance to Task Forces and Workgroups in the areas of Business Case Evaluations (BCE), Reliability-Centered Maintenance (RCM), and Facility Ownership and Accountability (FOA),

   b) Provide recommendations on Task Force and Workgroup products which include work instructions, procedures, and standards,

c) Provide updates to the ESMT as needed or upon request,

d) Recommend updates to the strategies as necessary or at least annually,

e) Identify and recommend necessary resources to support AM implementation,

f) Identify and recommend data management requirements to support AM initiatives, and,

g) Review Business Case Evaluations results for recommendation to ESMT or approval where ESMT has delegated authority.

3. The Asset Management Coordinator is a member of the AM Team, is responsible for updating the ESMT on asset management initiatives progress, and will ensure AM implementation efforts are moving forward by:

   a) Assisting Task Forces and Workgroups with their objectives, which may include facilitation of meetings,

   b) Assure communications, training, and record keeping on AM, BCE, RCM and FOA matters and initiatives, as needed. Additionally, maintain an AM website on the intranet as necessary for this purpose,

   c) Provide updates on AM initiatives to the AMT and ESMT as requested or as needed,

   d) Manage and maintain data and measures pertinent to implementation efforts of AM strategies; maintain "action" lists for all AM groups,

   e) Produce, facilitate, document or update written communications such as work instructions, charters, AM plan, procedures and standards, etc. as needed,

   f) As necessary, act as facilitator between management and staff to communicate AM information and requirements, and,

   g) Update AM plan annually to include progress and measurement.

4. Technical Services Engineering and Construction staff will become familiar with, attend training as required, and use BCE's for Capital Projects.

5. Interceptor Services:

   - Engineering staff will become familiar with, attend training as required, and use BCE's for Capital Projects.
   - Maintenance Service Workers will become familiar with and use this Work Instruction and Work Instruction 506.01.01; Work Order Request, Work Order Task Procedures. Maintenance and Service Workers will also become familiar with Reliability-Centered Maintenance (RCM) techniques and tools as they become available.

6. Treatment Plant:

   - Maintenance Service and Operations will become familiar with and use this Work Instruction and Work Instruction 506.01.01; Work Order Request, Work Order Task Procedures. Maintenance Service Workers will also continue to use Reliability-Centered Maintenance (RCM) current applications, and as new techniques and tools become available, learn and use as well.

7. Task Forces: The Task Forces are chartered and responsible for providing implementation recommendations on actions associated with the three year Asset Management Asset Management strategies. The three task forces are:

   a. Business Case Evaluation (BCE) Task Force: Charter BCE workgroups to perform MCES-wide BCEs, create BCE guidance and processes, create or modify work instructions to include BCE guidance, and evaluate BCE process and improve as necessary.

   b. Facility Owner (FOA) Task Force: Identify service providers and facilities. Evaluate current processes and budget/accounting practices and recommend new or modified processes and guidance that will allow "Facility Owners" to increase decision-making and accountability at the facility level, including service agreements within ES, and accountability/reward for good management "ownership".

c. Reliability Centered Maintenance (RCM) Task Force: Provide recommendations for new or changes in maintenance guidance expenditures that optimize costs/risks for overall facility, process, and equipment reliability.

8. Assistant Business Unit Manager for Maintenance has responsibility for improving and standardizing the reporting from SPL Enterprise Asset and Work Management System.

9. Managers will become familiar with MCES asset management initiatives and support implementation efforts in their work areas. In addition, managers will ensure appropriate level actions are stressed within their work units/sections/areas, such as data collection, management and analysis of data, and appropriate reporting using data.

Questions---

Direct questions concerning this MCES work instruction to Deborah Rose at Ext. 1479.

POLICY

Management of Regional Assets Policy

FM 8-3

Category: Financial Management

Business Unit Responsible: RA: Finance

Policy Owner: Deputy Chief Financial Officer

Policy Contact: Mohamed Omar, Controller

Synopsis: Provides staff guidance for fulfilling their fiduciary responsibilities in managing regional assets.

POLICY

The management of the regional assets of the Metropolitan Council, which include goods, supplies, real estate, buildings, equipment and money, will be done responsibly and in accordance with the governing state and federal laws, rules, and regulations. The Metropolitan Council will take all prudent steps to manage, control and protect the assets under its responsibility.

PURPOSE OF POLICY

This policy provides staff guidance for fulfilling their fiduciary responsibilities in managing regional assets.

BACKGROUND & REASONS FOR POLICY

The Metropolitan Council as a public entity has a legal responsibility to manage its assets for the good of the region.

IMPLEMENTATION & ACCOUNTABILITY

The Regional Administrator will establish and assign the appropriate responsibilities.

RESOURCES

Related Policy

- *RF 7-2 Use of Council Property Policy*

Related Procedure

- *FM 8-1d MCES and Robert Street Fleet Management Procedure*
- *FM 8-1e Metro Transit Non-Revenue Fleet Management Procedure*
- *TECH 3-2c Records Management Procedure*

HISTORY

Version 2 – Template Update
10/12/2020 - Updated content into new template.

Version 1 – Approval Date
09/11/1998

Last Reviewed Date
09/11/1998

Next Content Review Date
07/15/2021

Former Reference #
3-4

Version
2

POLICY

Finance and Asset Management Policy

FM 2-2

Category: Financial Management

Business Unit Responsible: RA: Finance

Policy Owner: Deputy Chief Financial Officer

Policy Contact: Mohamed Omar, Controller

Synopsis: Provides staff guidance for consistent financial and asset management practices as endorsed by the Metropolitan Council in pursuit of its statutory responsibilities.

POLICY

The Metropolitan Council will manage its finances and assets in a conservative and responsible manner with the goal of meeting its over-all mission. The Metropolitan Council will expend public funds consistent with the *"public purpose doctrine."* Each expenditure must relate to the governmental purpose for which the Metropolitan Council is authorized, and the Metropolitan Council shall determine the expenditure is necessary and appropriate for the fulfillment of the Metropolitan Council's statutory responsibilities.

All of the assets of the Council shall be managed in the public interest and shall be considered property of the Council. Assets includes supplies, equipment (owned and leased), buildings and real property.

The Metropolitan Council shall restrict the use of financial resources to the appropriate organization unit, i.e., transit-related revenues are restricted to Metro Transit and Transportation Planning, Environmental Services revenues to Environmental Services, etc. Each unit is to be funded based on its ability to raise those revenues assigned to it by statute or those revenues received from other levels of governments. This policy authorizes the allocation of administrative and overhead costs to support the various entities. Each unit will respond to year-end deficits and surpluses generated by that particular unit. Any long-term deficits or funding imbalances will be dealt with from within the appropriate funding sources or by management action within the respective unit. This policy does not preclude further restriction of funds within an organizational unit.

Short-term loans may be made across units to meet temporary cash flow needs. Any loan for more than three months or $10 million must be approved by the Council. Units receiving loans will pay the cost of the borrowing.

PURPOSE OF POLICY

This policy provides staff guidance for consistent financial and asset management practices as endorsed by the Metropolitan Council in pursuit of its statutory responsibilities.

BACKGROUND & REASONS FOR POLICY

The Metropolitan Council is a public corporation and a political subdivision of the State of Minnesota and has statutory responsibility for performing regional planning functions, operating the regional wastewater treatment system and operating the regional bus and transit systems. The Minnesota Legislature has placed the Metropolitan Council under the "supervision and control" of a seventeen-member governing body. Therefore, the Council is granted the powers which may be "necessary or convenient" to enable the Metropolitan Council to perform and carry out the duties and responsibilities now existing or which may be imposed upon it by law.

IMPLEMENTATION & ACCOUNTABILITY

All Metropolitan Council staff are expected to abide by the guidelines in *Council Resolution No. 2016-26, Public Purpose*. The Metropolitan Council has delegated to the Regional Administrator the authority to see that the provisions of this Resolution are carried out. Division Directors and/or General Managers shall be responsible for financial planning, monitoring and performance of their respective units consistent with this policy. The Chief Financial Officer will have oversight and management responsibility for the financial issues for the agency.

RESOURCES

Related Procedures:

- *FM 5-1a Charging Method for Inter-Division Services Procedure*

Other Resources (training, relevant links):

- *Council Resolution No 2016-26, Public Purpose Doctrine*

HISTORY

Version 2 – Template Update
10/12/2020 - Updated content into new template.

Version 2 - Approval Date
12/05/2001

Original Adoption Date
09/11/1998

Last Reviewed Date
12/05/2001

Next Content Review Date
07/15/2021

Former Reference #
3

Version
3

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