

2026 Rosewood Pond Outlet Improvements

Project Feasibility Report

City Project Number 11236

July 7, 2026



Project Feasibility Report

2026 Rosewood Pond Outlet Improvements
City of Mankato

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City of Mankato

II. CERTIFICATION PAGE

CERTIFICATION

I hereby certify that this report 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.



Kasey S. Burns, P.E.
License Number: 60594
City Water Resources Engineer

Date: July 7, 2026

III. PROJECT CONTACTS

TITLE	NAME	PHONE	EMAIL
Mayor	Najwa Massad	507.387.9693	nmassad@mankatomn.gov
Councilor at Large	Mike Laven	507.720.8674	mlaven@mankatomn.gov
Councilor Ward 1	Michael McLaughlin	507.720.1093	mmclaughlin@mankatomn.gov
Councilor Ward 2	Dennis Dieken	507.720.1817	ddieken@mankatomn.gov
Councilor Ward 3	Kevin Mettler	507.995.0070	kmettler@mankatomn.gov
Councilor Ward 4	Jenn Melby-Kelley	507.720.2502	jmelby-kelley@mankatomn.gov
Councilor Ward 5	Jessica Hatanpa	507.613.8067	jhatanpa@mankatomn.gov
City Manager	Susan Arntz	507.387.8695	sarntz@mankatomn.gov
City Engineer	Cory Bienfang	507.387.8643	cbienfang@mankatomn.gov
Construction & Facilities Services Director	Jim Tatge	507.387.8504	jtatge@mankatomn.gov
Construction Manager	Luke Pederson	507.387.8541	lpederson@mankatomn.gov

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IV. EXECUTIVE SUMMARY

The 2026 Rosewood Pond Outlet Improvements Project proposes improvements to existing storm sewer outlet infrastructure on South Brook Circle between Alexander Court and South Brook Way.

This report will present preliminary investigations, discoveries, design considerations, and cost estimates for use in determining the engineering feasibility of the proposed pond outlet improvements.

This report was prepared to determine the feasibility of drainage infrastructure improvements on the pond listed above. The location of the proposed improvements is shown in **Appendix A**.

The existing pond was built between 2000 and 2001 to satisfy stormwater requirements triggered by the development of phase 1 of South Brook Circle (City Project #97005) and expanded between 2001 and 2002 as part of Rosewood Drive phase 1 (City Project #01015) in anticipation of future development of the surrounding land. Several minor maintenance and improvement projects have been completed in the years that followed to mitigate documented flooding of adjacent residential homes and property. Despite efforts, high water levels and flooding risks have persisted and increased in frequency the last few years. Recent storm events in June 2024 and July 2025 caused significant pond level rises, similar to flooding observed in 2014, demonstrating an increasing frequency and severity of rainfall events and the need for mitigation.

Suggested improvements include a revised outlet control structure (OCS) at Rosewood Pond, achieved by lowering the primary weir elevation, expanding outlet capacity, and replacing the existing overflow with a larger arch pipe. These improvements were determined through a review and evaluation of city infrastructure and hydraulic models. Detailed maps of the project areas are provided in **Appendix B**.

The estimated project cost of these necessary improvements is approximately **\$328,185.00**.

From an engineering standpoint, the proposed improvements are necessary, cost effective, and feasible. These improvements can best be accomplished by letting competitive bids for the work. It is recommended that the council accept this project feasibility report and authorize the city manager to advertise for bids.

V. PROJECT INTRODUCTION

This report recommends a revised outlet control structure (OCS) at Rosewood Pond, including lowering the primary weir elevation, expanding outlet capacity, and replacing the existing overflow with a larger arch pipe.

The improvements are being proposed for the summer and fall of 2026. The specific objectives of this preliminary engineering report are to:

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- Evaluate the need for this project
- Determine the necessary improvements
- Provide information on the estimated costs for the proposed project
- Determine the project schedule
- Determine the feasibility of the proposed project

This project, as proposed, is approximately 90 linear feet of roadway and 150 linear feet of pipe. Specific items that will be included in the construction are summarized by:

- Storm sewer infrastructure reconstruction
- Concrete curb & gutter, bituminous pavement, and aggregate base reconstruction

VI. EXISTING CONDITIONS

A. STREET

- South Brook Circle is a residential roadway with concrete curb & gutter and bituminous surfacing. The existing roadway is 36-feet wide, measured between curb faces. Records indicate this section of the street and underlying utilities were constructed between 2000 and 2001.

B. STORM SEWER AND POND

- As built plans from December 2000 and September 2001 and detailed topographic and bathymetric survey were collected to build area-elevation curves to quantify pond storage volume. This includes the sediment delta forming along the west tributary inflow.
- The OCS includes a grate/weir wall, OCS drainage structure, and overflow culvert. The OCS has an invert of 944.87 ft and internal weir set at elevation 949.5 ft with a 12" orifice at the invert, intended to be used for drawdown during maintenance, but now left fully open. The structure has a 48" grate on top of an 8' diameter bottom barrel section at elevation 956.79 ft. The 36" RCP overflow culvert is perched with an upstream elevation of 956.19 ft.
- The design normal water level is 949.5 ft. Surveyed normal water level was 947.0 +/- . The design high water level is noted at 956.5 (original plans) with as-built redlines noting 958.0 ft as the HWL. The roadway acts as the EOF with an approximate overtopping elevation of 961.0 based on road centerline survey. Prior to road overtopping, the pond could back up through storm sewer into Rosewood Dr, which has a surveyed CB rim elevation of 959.93 ft. This does not have a natural outlet and would inundate Rosewood Dr until the pond levels recede.

C. WATERMAIN

- The existing watermain in the proposed project area is 8" polyvinylchloride (PVC) installed between 2000 and 2001. The existing 8" PVC is within its expected service life and functions as intended.

D. OTHER UTILITIES

- Other non-municipal-owned utilities may be present in the right-of-way. These include natural gas, electric, and telecommunications. The condition of these utilities is unknown, and their replacement is beyond the scope of this report.

VII. PROPOSED IMPROVEMENTS

A. STREET

The proposed street improvements include removing and replacing the existing bituminous pavement, aggregate base, and concrete curb & gutter. The typical bituminous pavement section proposed is shown in **Appendix B** and is consistent with City standards and the in-place roadway.

Project Feasibility Report

2026 Rosewood Pond Outlet Improvements
City of Mankato

The purpose of the street improvement is to replace the necessary removal of the existing roadway for storm sewer improvements.

Appendix B shows the location of the proposed concrete curb & gutter, bituminous pavement, and aggregate base.

B. STORM SEWER AND POND

Finished Floor Elevations (FFE) for properties adjacent to Rosewood Pond were surveyed in 2026. From low to high, these include walkout basements including: 957.81 ft, 960.77 ft, 961.62 ft, 961.65 ft, 962.84 ft, and 964.43 ft. The lowest home is immediately adjacent to the pond outlet, and the homeowner has installed a retaining wall to an elevation of 961.8 ft. The second lowest home has an unprotected FFE on Sunburst Circle. For the purposes of this report, target high water level is 958.77 ft, or 2 ft below the lowest unprotected home FFE.

The following summarizes the revised Rosewood Pond outlet control modeling:

- The 12" side orifice at the existing OCS invert remains open, despite it's original purpose to be used solely for pond drawdown and maintenance.
- The existing OCS weir is revised to an elevation of 947.0 ft.
- The OCS 8' diameter bottom barrel is extended to the rim, replacing the existing 48" diameter upper barrel section. This rim is lowered to elevation 956.0 ft.
- Inlet and outlet pipes for the existing OCS remain the same.
- The existing 36" overflow pipe is removed and replaced with a 3.75' x 6.08' reinforced concrete arch pipe. Inverts are set to 952.5 ft on the upstream side and 946.0 ft on the downstream side. This is lowered by approximately 4.3 ft compared to existing conditions.

The proposed storm sewer and pond improvements are shown in **Appendix B**. Hydraulic results are shown in **Appendix C**.

C. WATERMAIN

The existing 8" PVC is within its expected service life and functions as intended, however the required elevation, size, and grade of the proposed relief culvert to provide adequate flood protection is in direct vertical conflict. A segment of the watermain will be reconstructed and incorporate a vertical offset to avoid the new relief culvert. The length of the watermain replacement will be determined by required vertical and horizontal separation with storm sewer and the configuration of bends and fittings.

The proposed watermain improvements are shown in **Appendix B**.

D. OTHER UTILITIES

The design of the proposed improvements will be coordinated with the owners of private utilities such as natural gas, electric, and telecommunications. A design coordination meeting will be held with all private utility companies to identify conflicts with the proposed improvements. Private utility companies will be requested to submit proposed designs and construction schedules for any relocation. The construction schedule for the proposed improvements will be coordinated with the utility relocation schedule to avoid unnecessary delays.

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VIII. RIGHT-OF-WAY AND EASEMENT

All improvements will be contained to existing right-of-way and easements.

IX. APPROVALS/PERMITS

Approvals and permits are required from various agencies for the construction of the project. They include:

- City of Mankato Land Disturbance
- Contractor may be required to obtain DNR Water Use Permit if discharging greater than 10,000 gallons/day for construction operations

X. PROJECT COST ESTIMATE AND FINANCING

Estimated projections for the cost of this project are summarized below.

ITEM	COST
Street and Landscaping	\$75,754.00
Stormwater Pollution Prevention	\$5,259.00
Storm Drainage Construction	\$152,416.00
Sanitary Sewer Construction	\$0.00
Watermain Construction	\$15,186.00
TOTAL CONSTRUCTION	\$248,615.00
Construction Contingency	\$24,870.00
Administration	\$27,350.00
Engineering	\$27,350.00
TOTAL PROJECT COST	\$328,185.00

Funding for the proposed improvements is shown in the table below.

FUNDING SOURCE	AMOUNT	PERCENT
Special Assessments	\$0.00	0.0%
Stormwater Revenue	\$328,185.00	100.0%
Sewer Revenue	\$0.00	0.0%
Water Revenue	\$0.00	0.0%
General Obligation Bonds	\$0.00	0.0%
TOTAL FUNDS	\$328,185.00	100.00%

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City of Mankato

XI. POSSIBLE SCHEDULE

The following is a possible schedule for the proposed improvements:

7/13/2026	Resolution receiving report, ordering improvement, preparation of plans & specifications, and authorizing advertisement for bids.
7/14/2026	Advertise for bids.
8/4/2026	Open bids.
8/10/2026	Award bids.
August/September 2026	Begin construction.
November 2026	Construction substantially complete.

XII. CONCLUSION AND RECOMMENDATIONS

The proposed outlet design lowers 100-year high water levels by 3.15 ft and maintains a vertical offset from the lowest unprotected residential structure of 1.76 ft in the 100-year storm. The design increases downstream flow rates to accomplish this, with the greatest increases occurring during smaller storms and flows. Velocities are decreased due to additional open area at the Rosewood Pond outlet, despite an increase in flows. The proposed design does provide protection for the back-to-back 10-year storm but still leaves some structures at risk during the back-to-back 100-year storm. However, if improvements are not made, the risk of flooding and property damage will remain for more frequent rainfall events.

While it is understood that the proposed improvements will increase flow rates downstream, City staff have identified an alternative project to provide erosion correction, prevention, and protection measures within the greater Indian Creek watershed, including the area surrounding Rosewood Pond. It is expected that any project(s) for this purpose will be completed by the end of 2028.

Based on the findings in this report, the proposed improvements are necessary, cost-effective, and feasible. The best way to accomplish this project is by letting competitive bids for the work. Feasibility is contingent upon City Council findings with respect to project financing.

XIII. APPENDIX

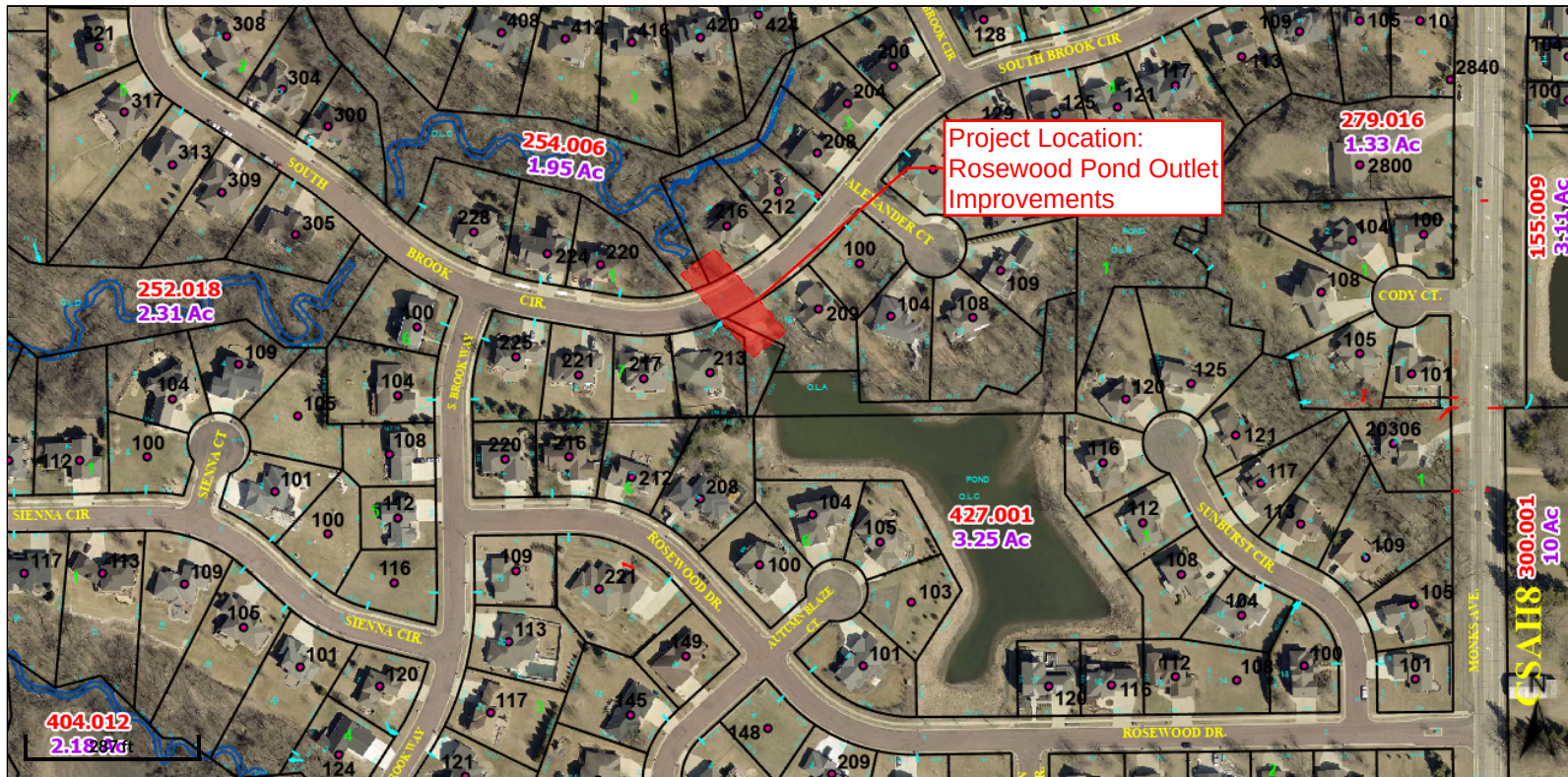
- Appendix A – Location Map
- Appendix B – Proposed Improvements Plan Sheets
- Appendix C – Drainage Report

APPENDIX A

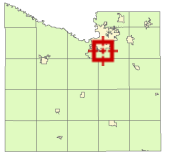
Location Map

City Project Number 11236





Overview



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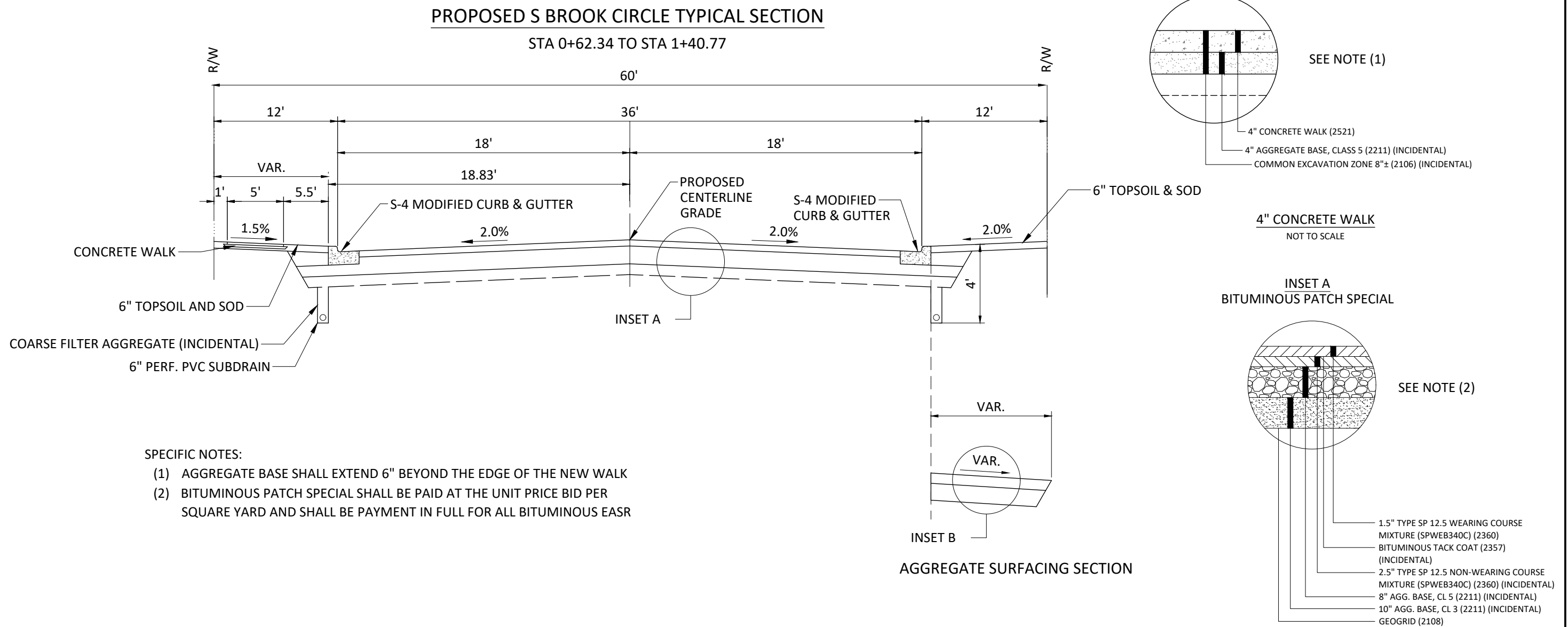
APPENDIX B

Proposed Improvements Plan Sheets

City Project Number 11236



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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.

KASEY S BURNS
LIC. NO. 60594 DATE 05/29/2026



1960 PREMIER DRIVE
MANKATO, MN 56001
Phone: (507) 625-4171
Email: Mankato@bolton-menk.com
www.bolton-menk.com



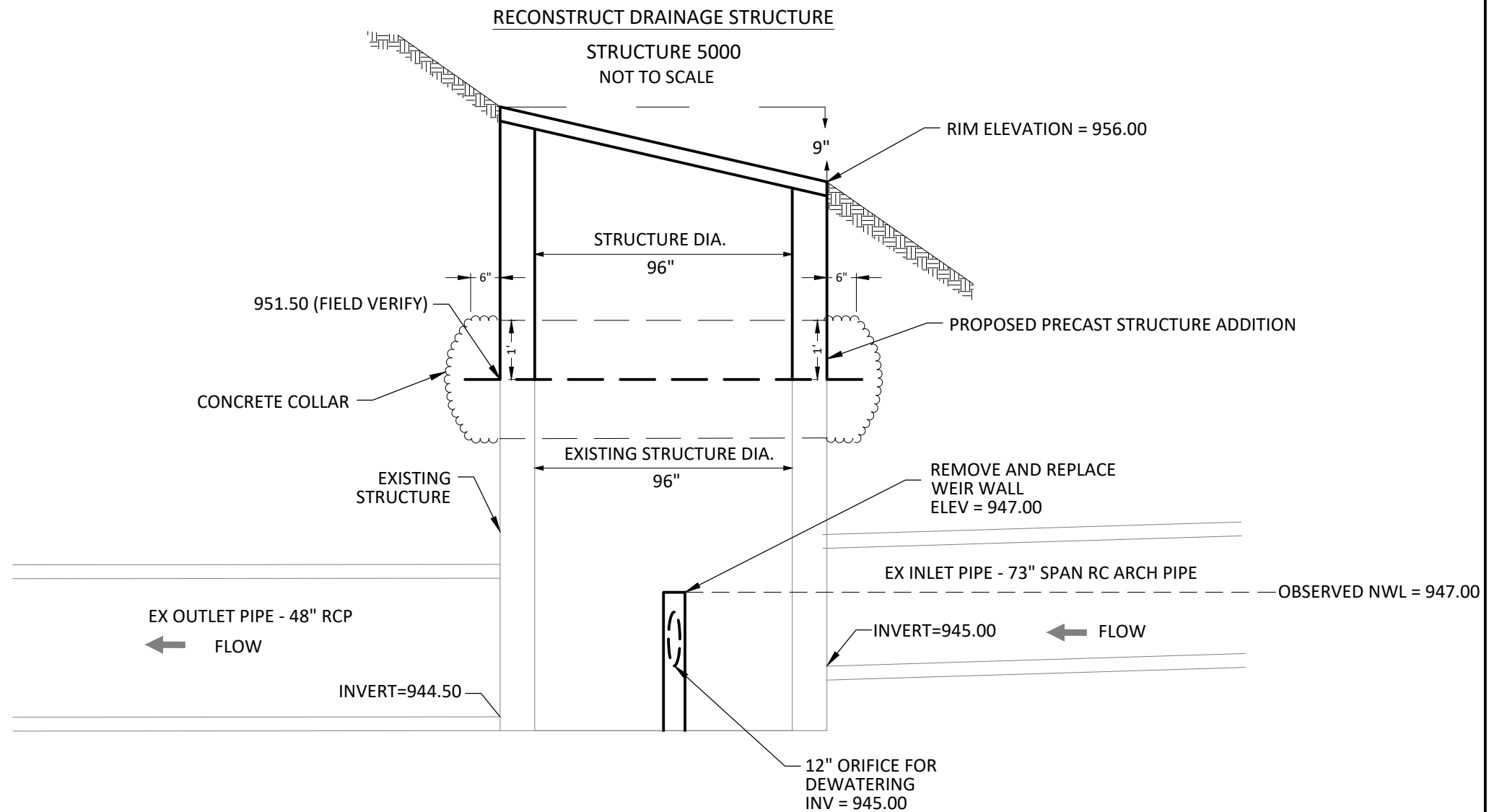
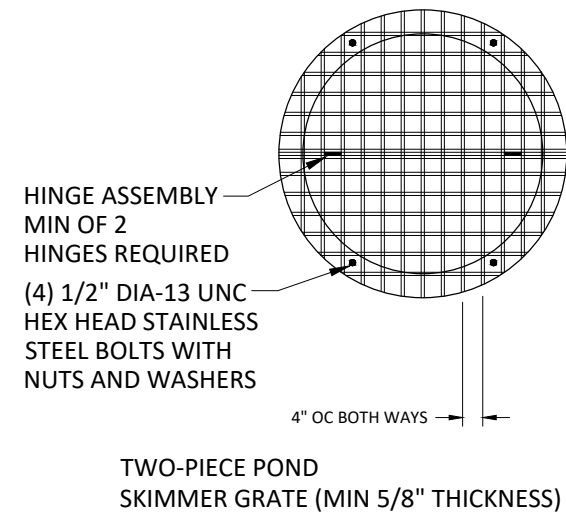
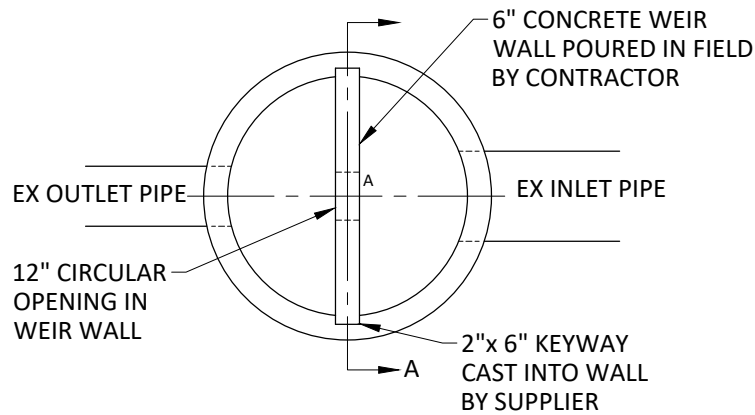
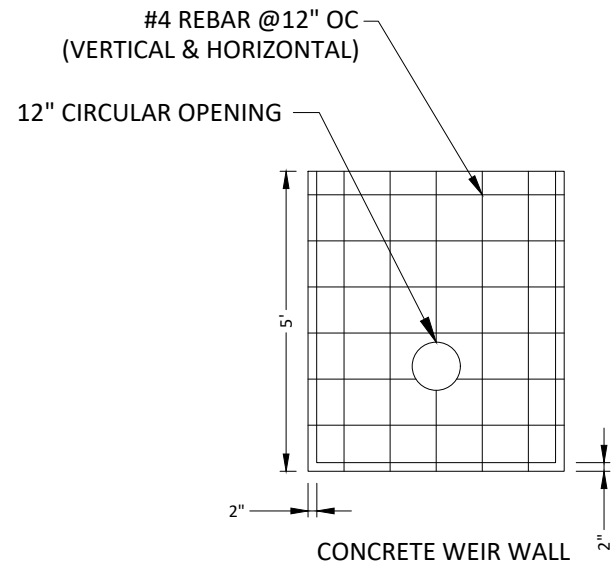
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CITY OF MANKATO, MN
ROSEWOOD POND OUTLET IMPROVEMENTS
TYPICAL SECTIONS

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- NOTES:
THE BID ITEM FOR RECONSTRUCT DRAINAGE STRUCTURE SHALL INCLUDE ALL ITEMS OF WALK SHOWN ON THIS DETAIL, INCLUDING BUT NOT LIMITED TO:
- REMOVAL OF EXISTING 48" BARREL, SKIMMER GRATE AND TOP SLAB(S)
 - RE-GROUTING OF STORM SEWER INVERTS AND STRUCTURE BOTTOM
 - FIELD VERIFYING DIMENSIONS OF EXISTING STRUCTURE
 - REMOVAL AND REPLACEMENT OF WEIR WALL, INCLUDING REINFORCEMENT AND OTHER MATERIALS AS APPROVED BY THE ENGINEER.
 - SKIMMER GRATE AND RELATED MATERIALS AS REQUIRED BY THE MANUFACTURER.
 - PRECAST CONCRETE STRUCTURE ADDITION AND EXTENSION OF EXISTING STRUCTURE
 - PROTECTING EXISTING DOWNSTREAM INVERT FROM SILT, SEDIMENT, & DEBRIS
 - STRUCTURE BARREL(S) SHALL BE GASKETED/SEALED WITH APPROVED MASTIC
 - JOINT BETWEEN EXISTING AND PROPOSED BARREL SECTIONS SHALL BE ENCASED WITH CAST IN PLACE CONCRETE COLLAR IN ACCORDANCE WITH DETAIL. CONCRETE SHALL MEET MNDOT SPEC 2461 - MIX 3G52
 - ADDITIONAL REPAIRS, MATERIALS, OR WORK SHALL BE APPROVED BY THE ENGINEER PRIOR TO COMMENCEMENT.



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KASEY S BURNS
LIC. NO. 60594 DATE 05/29/2026

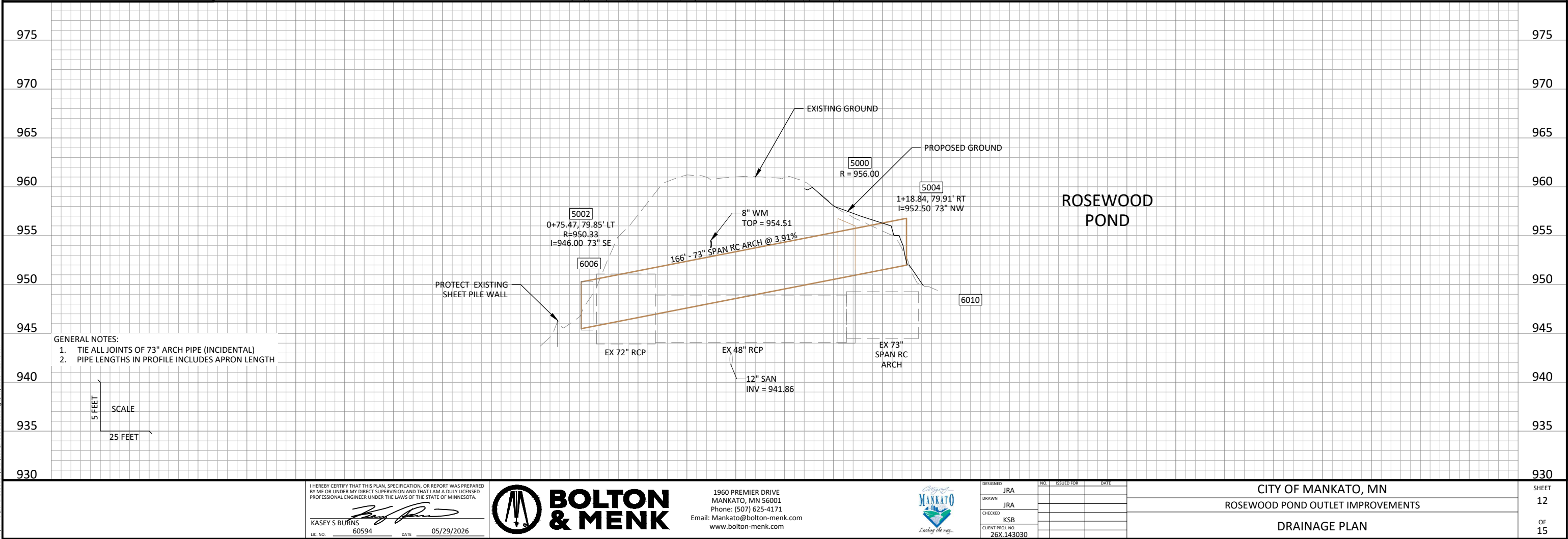
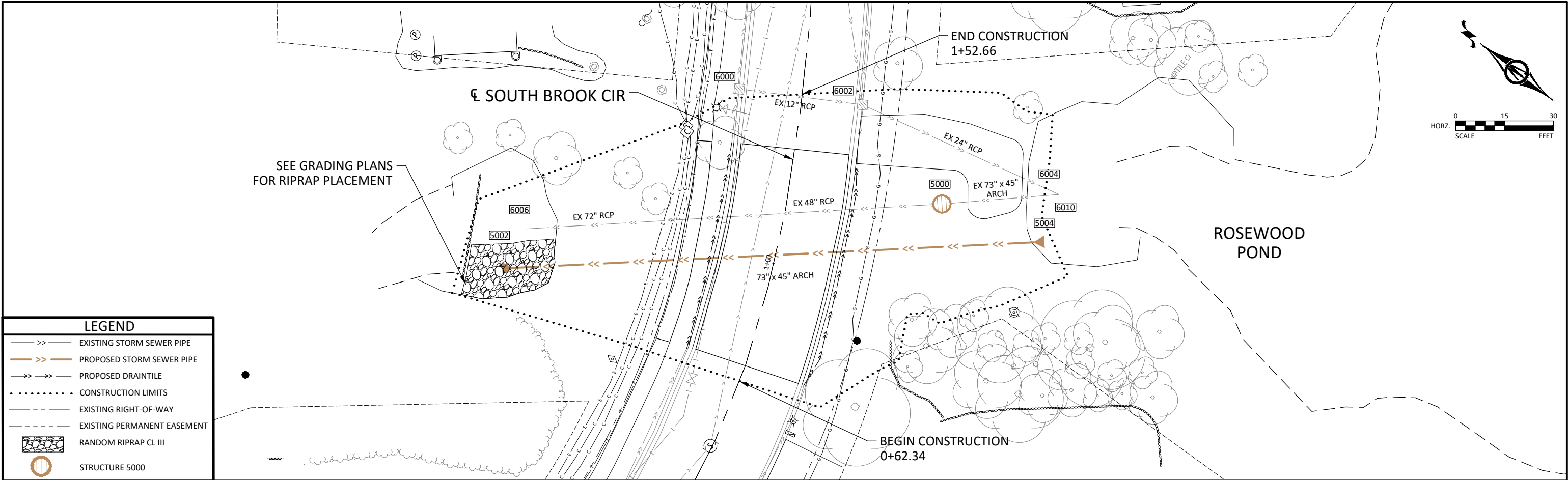


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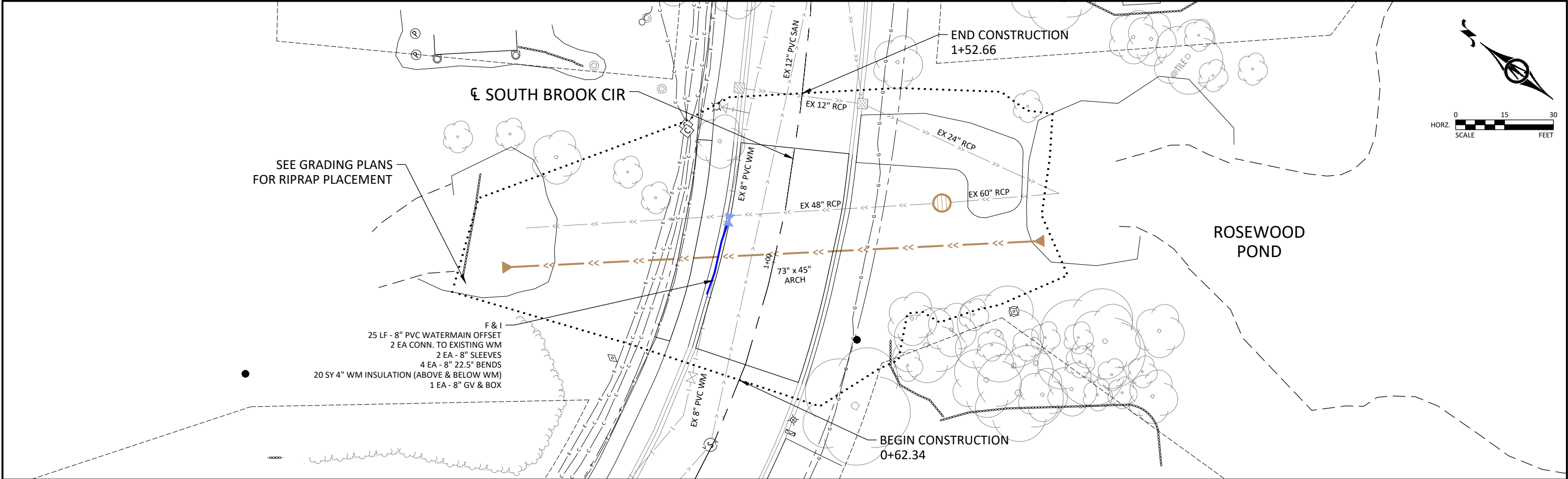
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CITY OF MANKATO, MN
ROSEWOOD POND OUTLET IMPROVEMENTS
DETAILS

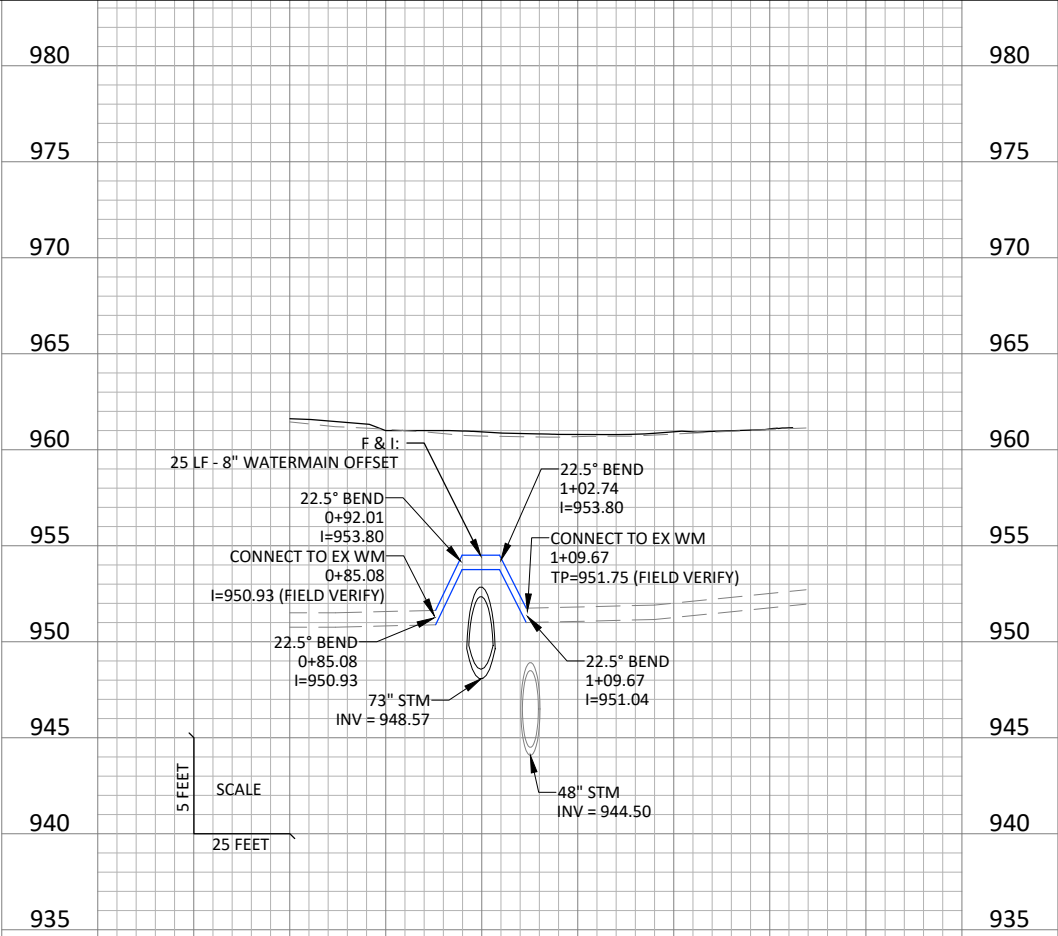
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GENERAL NOTES:
- THE CONTRACTOR SHALL PROVIDE 24-HOUR MINIMUM NOTICE TO THE ADJACENT RESIDENTS THAT WILL BE WITHOUT WATER DURING WATERMAIN OFFSET CONSTRUCTION. THE WATER SHUT DOWN SHALL LAST NO LONGER THAN 6 HOURS. IF THE WATERMAIN SHUTDOWN WILL BE LONGER THAN 6 HOURS, TEMPORARY WATER SERVICE SHALL BE PROVIDED. (INCIDENTAL)



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KASEY S BURNS

LIC. NO. 60594 DATE 05/29/2026



1960 PREMIER DRIVE
MANKATO, MN 56001
Phone: (507) 625-4171
Email: Mankato@bolton-menk.com
www.bolton-menk.com



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CITY OF MANKATO, MN

ROSEWOOD POND OUTLET IMPROVEMENTS

WATERMAIN PLAN & PROFILE

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OF
15

APPENDIX C

Drainage Report

City Project Number 11236



2026 Rosewood Pond Outlet Improvements

Preliminary Engineering Report

City of Mankato
May 2026



Real People. Real Solutions.

Submitted by:

Bolton & Menk, Inc.
1960 Premier Dr
Mankato, MN 56001
P: 507-625-4171

Certification

Preliminary Engineering Report

For

2026 Rosewood Pond Outlet Improvements



City of Mankato
26X.143030.000

May 22, 2026

PROFESSIONAL ENGINEER

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: Kasey S. Burns, PE
Date: 05/22/2026 License Number: 60594

PROFESSIONAL ENGINEER

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: Brady A. Nahkala, PE
Date: 05/22/2026 License Number: 62456

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Appendix

Appendix A: Hydrologic Data

Appendix B: Construction Plan Data

Appendix C: PCSWMM Workmap

I. EXECUTIVE SUMMARY

The City of Mankato commissioned this Preliminary Engineering Report to evaluate flooding issues within the Rosewood Pond system and develop improvements to reduce high water levels that currently impact adjacent residential properties. Recent storm events in June 2024 and July 2025 caused significant pond level rises, similar to flooding observed in 2014, demonstrating an increasing frequency and severity of rainfall events and the urgent need for mitigation.

This study completed a detailed hydrologic and hydraulic analysis of Rosewood Pond and its contributing watershed, which includes upstream facilities such as University Park Pond, Monk's Pond, and Oak Marsh Ponds. A refined PCSWMM model was developed using updated land cover, soil data, and surveyed pond geometry, and calibrated to observed high water levels from recent storm events. The contributing watershed includes approximately 761 acres, comprised of 60% agricultural row crops and the remainder urban residential and streets.

Modeling evaluated existing and proposed conditions under multiple design scenarios, including 2-year, 10-year, and 100-year 24-hour storms, as well as back-to-back storm events to account for evolving climate conditions and system resiliency. A higher level engineering review incorporated extreme rainfall scenarios (up to 14.5 inches in 48 hours) to reflect observed regional storm intensities.

Results indicate that the existing outlet configuration at Rosewood Pond is insufficient to protect nearby structures, with modeled 100-year water levels exceeding multiple residential finished floor elevations. Similar risks are present at Monk's Pond due to limited outlet control and overflow capacity.

To address these issues, we recommend a revised outlet control structure (OCS) at Rosewood Pond, including lowering the primary weir elevation, expanding outlet capacity, and replacing the existing overflow with a larger arch pipe. These improvements significantly enhance conveyance while maintaining pond storage functionality.

The proposed improvements yield the following key benefits:

Reduced flood levels: Up to 3.15 feet reduction in Rosewood Pond 100-year high water levels and up to 3.9 feet at Monk's Pond for smaller events.

Improved residential protection: Provides approximately 1.8 feet of freeboard above the lowest unprotected home during the 100-year event.

Enhanced system resiliency: Improved performance under back-to-back storm events, though some risk remains under extreme (back-to-back 100-year) conditions.

Reduced outlet velocities: Despite increased flows, velocities are generally reduced due to expanded outlet geometry.

These benefits come with tradeoffs. The proposed design increases downstream peak flow rates, particularly for smaller storm events, which will require additional stabilization measures within downstream ravines. The City has identified and is planning for these improvements.

In conclusion, the recommended outlet improvements at Rosewood Pond provide a practical and effective solution to reduce flood risk to adjacent properties under current and future conditions. However, long-term system performance would benefit from additional upstream storage and continued investment in downstream channel stabilization to fully manage increased runoff associated with larger and more frequent storm events.

II. INTRODUCTION

A. Purpose and Need

The primary purpose of this study is to conduct a detailed hydrologic and hydraulic analysis of Rosewood Pond to recommend and design a new outlet configuration that lowers high water levels within the pond, which currently impact adjacent residential properties. Secondary goals of the study include evaluating the upstream ponds based on current and future conditions within Rosewood Pond's contributing watershed, including University Park Pond, Monk's Pond, and Oak Marsh Pond (North and South). In particular, Monk's Pond does not have a typical outlet control structure or usable emergency overflow route, resulting in impacts to adjacent properties. Finally, the city wishes to develop a citywide stormwater model, and this study allows the city to take a first step at developing consistent software and methodologies for that future modeling effort.

The evaluation of these ponds is urgent and necessary to protect private property. In June 2024 and July 2025, Rosewood Pond rose to notable high-water levels, impacting adjacent residential structures (**Figure 1**). These impactful floods continue to increase in frequency, as similar floods were observed in June 2014. Considering the frequency of intense rainfall continues to increase in the region, immediate action is needed to mitigate flooding impacts at this location.



Figure 1: June 2024 (left) and July 2025 (right) high water levels at Rosewood Pond.

B. Prior Studies

- **Hydrology and Hydraulic Report: Upper Indian Creek Storm Water Study, SEH, March 14, 2017.** This recommended 2 alternative outlet configurations each for University Park Pond and Rosewood Pond. However, the report recommended further study of downstream impacts if either pond outlet was reconfigured.
- **Erosion Management Plan: Indian Creek Watershed, SEH, September 20, 2018.** This includes erosion and pollutant loading estimates and preliminary recommendations for load reductions within Viking and Indian Creek ravines. Prior to these recent studies, the following were also conducted:
- **Detailed Storm Water Study, East Portion of Upper Indian Creek Watershed, Barr Engineering, June 1997.** This report reports a normal water elevation of 952.0 ft in Rosewood Pond and a flood elevation of 958.0 ft. The report also indicates the need for additional storage areas within the agricultural portion of the watershed when those areas are developed.

- ***Rosewood One Preliminary Engineering Report, I & S Engineers & Architects, Inc., April 2001.*** This report notes that the Rosewood Pond outlet was constructed in 2000.
- ***Eastern Portion of the Upper Indian Creek Watershed Drainage Study, I & S Engineers & Architects, Inc., April 2002.*** This hydrologic study reported a reduced storage needed in Rosewood Pond (33 acre-feet to 30.1 acre-feet) but a 3.1 acre-feet deficiency despite the reduced storage needed. The report also noted the Copperfield development contains more impervious area than was assumed in prior designs and a portion of the development is not routed to Rosewood Pond. These items combined would require an additional storage volume of 7.6 acre-feet. The study recommended construction of a storm water pond in the Copperfield development, conversion of the University Park pond to a wet pond, and construction of additional storm water storage in the Stenzel Property (ponds are now referred to as Oak Marsh North Pond and Oak Marsh South Pond. The recommended improvements would result in the re-routing of storm water from the Wilson Creek watershed to the Indian Creek watershed.
- ***Eastern Portion of the Upper Indian Creek Watershed Drainage Study - Revised, I & S Engineers & Architects, Inc., February 2006.*** This hydrologic study considered total storage requirements for the upper portion of the watershed focusing on University Park Pond and the Oak Marsh ponds. This study recommended that the Oak Marsh ponds provide a minimum of 6 acre-feet of storage, and that they be interconnected to the University Park Pond for additional storage capacity.
- ***Copperfield Area Stormwater Master Planning Memorandum, I & S Engineers & Architects, Inc., March 2008.*** This memorandum recommended a trunk storm sewer pipe on Timberwolf Court and Heron Drive to accommodate future development.

III. ENGINEERING ANALYSIS

A. Existing Conditions

The existing conditions XPSWMM model previously developed by SEH (SEH, 2017) was used as the basis for modeling and updated to explicitly model more specific subbasin, storm sewer, and pond characteristics. The model was converted to PCSWMM.

1. Hydrology

Subbasins were imported to PCSWMM and utilize SCS Curve Number methodology. Time of Concentration was assigned based on prior study (SEH, 2017). Curve Numbers were recomputed based on the 2023 National Land Cover Database (NLCD) and NRCS SSURGO soils data. Curve Numbers were assigned to each land cover-soil group combination, and the area-weighted average was computed for each subbasin.

There are 761 acres of predominantly agricultural land draining from the southeast. A 36" drain tile receives flow from a private agricultural ditch at the center of the field bounded by Monks Ave, 200th St, and Pohl Rd (PID R43.09.29.300.003). This tile has been observed to flow a third to half full nearly constantly. To establish an equilibrium normal water level in the pond, this flow was estimated assuming a 0.5% slope on the drain tile to establish a baseflow into Rosewood Pond and applied in the modeling as a direct inflow. This is estimated to be 4.2 cfs, which based on the Rosewood Pond outlet configuration, results in a NWL of 1046.5 to 1047 ft, corroborating surveyed conditions in dry weather.

2. Hydraulics

The trunk line storm sewer for the Rosewood Pond contributing watershed was imported from the XPSWMM model and reviewed. No major issues were found with pipe sizes or inverts when comparing to as built plans and the city GIS database. Overflows were added to manhole junctions to properly evaluate flood volumes and drawdown times during extreme flooding scenarios.

Pond storage curves and outlet control structure modeling were revised in the PCSWMM model. Pipes, orifices, and weir walls were explicitly modeled as part of the model as opposed to using a specified rating curve developed with external hydraulic software, as done in the XPSWMM model.

Rosewood Pond

As built plans from December 2000 and detailed topographic and bathymetric survey were collected to build area-elevation curves to quantify pond storage volume. This includes the sediment delta forming along the west tributary inflow.

The OCS includes a grate/weir wall, OCS drainage structure, and overflow culvert. The OCS has an invert of 944.87 ft and internal weir set at elevation 949.5 ft with a 12" orifice at the invert, intended to be used for drawdown during maintenance, but now left fully open. The structure has a 48" grate on top of an 8' diameter bottom barrel section at elevation 956.79 ft. The 36" RCP overflow culvert is perched with an upstream elevation of 956.19 ft.

The design normal water level is 949.5 ft. Surveyed normal water level was 947.0 +/- . The design high water level is noted at 956.5 (original plans) with as-built redlines noting 958.0 ft as the HWL. The roadway acts as the EOF with an approximate overtopping elevation of 961.0 based on road centerline survey. Prior to road overtopping, the pond could back up through storm sewer into Rosewood Dr, which

has a surveyed CB rim elevation of 959.93 ft. This does not have a natural outlet and would inundate Rosewood Dr until the pond levels recede.

Monk's Pond

Monks Pond is a regional stormwater detention facility serving the Copperfield Subdivision and adjacent contributing drainage areas. The pond was originally constructed in 2002. The design established a maintained normal water level (NWL) at Elevation 961.0, with a basin bottom elevation of 957.0. Normal water level is controlled by a negatively sloped 42" pipe run with an invert of 961.0 ft along Copperfield Drive. Side slopes are generally 4H:1V with a 10H:1V safety bench at the normal water level. The pond provides water quality treatment and peak flow attenuation for the contributing watershed. The 100-year design water surface elevation is elevation 967.0, with emergency overflow provided at approximately elevation 967.5 to safely convey extreme events without overtopping adjacent infrastructure.

University Pond

The original stormwater outfall was established in the 1980s via a reverse-grade conveyance system along South Hudson Drive, discharging to Monks Avenue. At that time, the facility functioned as a dry detention basin. The City does not have as-built records for the original 1980s basin configuration.

Improvements completed in 2003 deepened the basin and added a secondary outlet extending south along Heron Drive. These modifications altered the basin's operational characteristics from a dry detention basin to a wet detention basin. The initial basin expansion implemented during this improvement included a normal water level (NWL) of Elevation 987.40 and a basin bottom elevation of 983.00.

Further improvements and expansion were constructed in 2018, including a third outlet tied into the existing Heron Drive conveyance system. This work included construction of a 24-inch outlet pipe with an invert elevation of 984.0, conveying flow to a downstream structure equipped with a weir wall with a crest elevation of 985.0. For reasons that are not documented, a 6-inch tile drainage system was also installed beneath the basin expansion area. This tile system discharges freely downstream of the weir wall at an outlet elevation of 981.14.

Oak Marsh Pond

Oak Marsh Construction Plans dated 2006 are available in city archives and the pond was constructed in 2007. Oak Marsh Pond North has a normal water level of 992.0 ft and a bottom of 988.00 ft. It is controlled by a weir set at 992.0 ft leading to a 24" trunk line storm sewer. Oak Marsh Pond South has a bottom elevation of 985.0 ft and a normal water level of 989.0 ft. It is controlled by a perched 36" storm sewer outlet at 989.0 ft.

3. Calibration

The model was calibrated to the June 2024 and July 2025 storm events due to availability of rainfall data and known high water levels based on photos collected at Rosewood Pond, which were then correlated to site survey completed in 2026 (**Table 1**). Calibration was completed by adjusting curve numbers within the watershed to match observed high water levels.

Table 1: Estimated High Water Levels for Calibration Storms

Time / Date of Photo	Estimated High Water Level
	<i>ft</i>
6/21/2024 - 11:46	961.0
6/21/2024 - 15:38	959.3
7/23/2025 - 23:51	959.0

Rainfall data for the two storm events were sourced from multiple rain gages. The DNR Cooperative Stream Gaging network includes gages with tipping bucket rain gages recording at 15-minute intervals, offering high resolution rainfall distributions and depths. Gage IDs 32076001 (Le Sueur River nr Rapidan, CR8) and 32072001 (Maple River nr Rapidan, CR35) rainfall data for each event are shown in **Figure 2**. The Le Sueur River gage is 3.1 miles straight south of Rosewood Pond. The Maple River gage is 4.8 miles southwest of Rosewood Pond. Rainfall depths between the two gages are in agreement until approximately 6/21/24 at 8:00, where the Le Sueur River gage then recorded an additional 0.66 inches of rainfall by 1 pm compared to the Maple River gage. The Le Sueur gage was used for calibration due to proximity to the target watershed. Between June 20, 2024 and the 6/21 calibration time, the gage recorded 5.13 inches of rain, with 4.3 inches falling in 12 hours (~20-year storm).

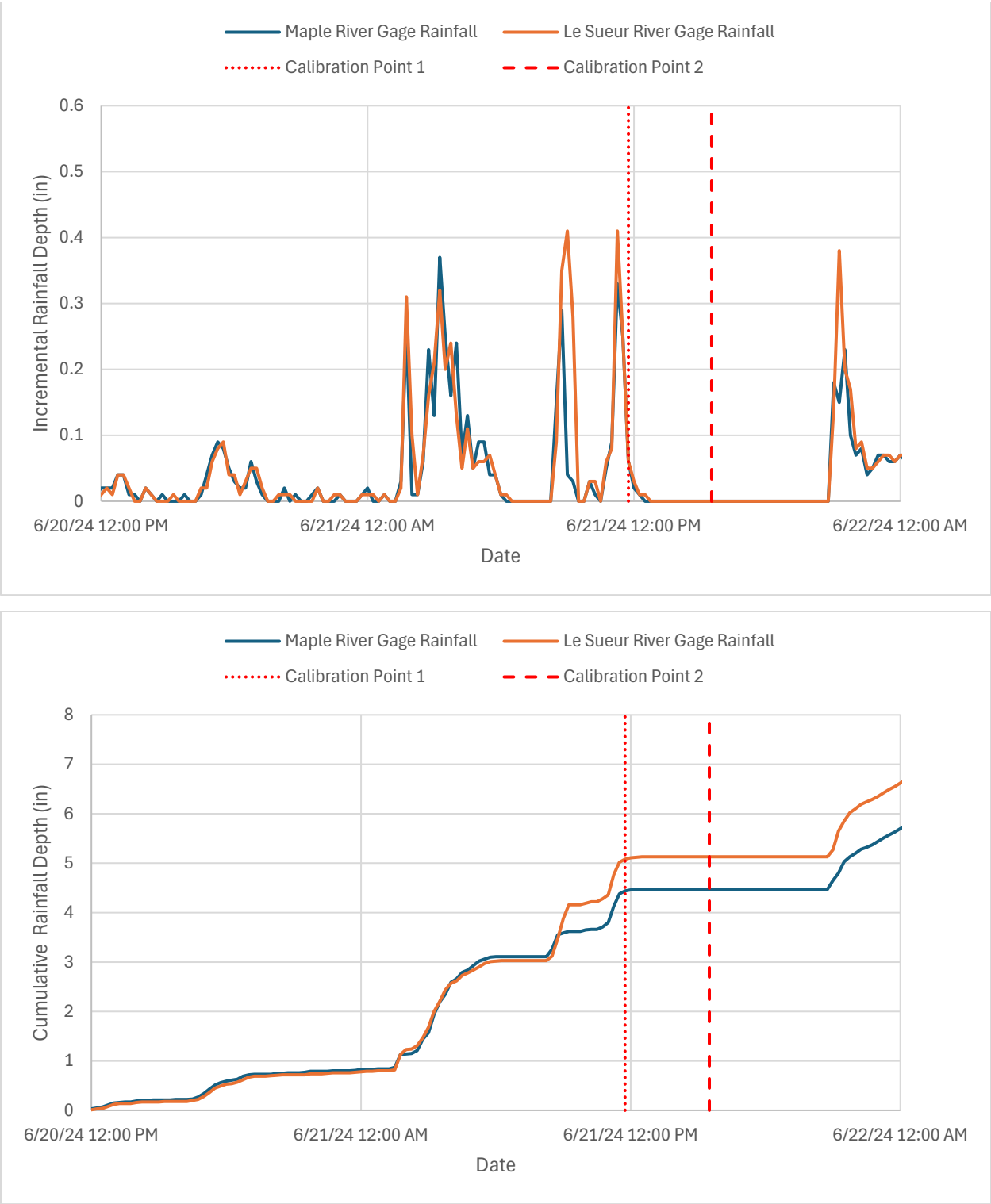


Figure 2: Incremental (top) and cumulative (bottom) rainfall depths for June 2024 storm.

4. Design Storm Simulation Parameters

Drainage conditions were evaluated in PCSWMM v7.7.3920 (SWMM v5.0.013-5.2.4) using the 24-hour 2-year, 10-year 100-year, and back-to-back 10-year storms using Atlas 14 rainfall depths and an MSE 3 temporal distribution per City of Mankato Grading Manual standards. For a higher level of engineering review, back-to-back 100-year storms were also modeled. Precipitation depths are reported in **Table 2**. Back-to-back storms were modeled as two successive standard 24-hour MSE 3 storms over a 48-hour duration. The model was run for a 7-day simulation to ensure all ponds within the system can fully drain and route through the downstream boundary condition. A routing time step of 5 seconds using Dynamic Wave methodology was used.

Table 2: Design Storm Precipitation Depths

Design Storm	Duration	Precipitation (inches)
2-year	24-hour	2.88
10-year	24-hour	4.31
100-year	24-hour	7.25
10-year (Back to Back)	48-hour	8.62
100-year (Back to Back)	48-hour	14.50

B. Proposed Conditions

1. Design Standards

a) City Grading Manual

The City of Mankato's stormwater hydrologic and hydraulic design standards, as outlined in the City Grading Manual, emphasize downstream protection, system resiliency, and compliance with State of Minnesota stormwater requirements. Hydrologic analyses are required to use NOAA Atlas 14 precipitation data and a MSE 3 rainfall distribution. The primary design event for stormwater conveyance and storage facilities is the 10-year, 24-hour storm, with additional evaluation of the 2-year, 24-hour storm under frozen ground conditions to account for reduced infiltration and higher runoff volumes common in early spring.

To ensure resiliency, the City requires evaluation of back-to-back 10-year storm events occurring within a 48-hour period, verifying adequate storage recovery and outlet performance between events. Post-development peak discharge rates must be controlled to pre-development levels for the 2-, 10-, and 100-year storm events.

Water quality treatment must meet Minnesota Pollution Control Agency MIDS requirements, specifically the capture and treatment of 1.1 inches of runoff volume from impervious surfaces. This volume is intended to be managed through infiltration, filtration, or other approved volume-reduction practices. As an alternative, the City may allow the required 1.1-inch volume to be provided below the normal water level (NWL) of a wet pond, functioning as a filtration or water quality zone rather than peak detention storage, provided the water quality volume drains within a maximum of 72 hours.

Hydraulic design standards limit culvert outlet velocities to 5 feet per second

unless acceptable energy dissipation is provided. Stormwater ponds are required to include a clearly defined emergency overflow (EOF) capable of safely conveying the 100-year storm event. The EOF crest must be set at least 0.5 feet below the top of berm, and the system must maintain a minimum 2 feet of freeboard between the 100-year water surface elevation and the berm crest or building structures. To enhance detention effectiveness and accommodate sequential storm events, the City may require the primary outlet capacity to be reduced, typically to approximately 20 percent of full capacity, with larger events routed through secondary or emergency outlets.

2. Higher Level Engineering Review

Due to the known flood concerns at Rosewood and Monks Ponds, a higher-level engineering review was deemed necessary to ensure proper mitigation of flood risk to the extent practicable. In particular, increased rainfall intensity has been observed locally and is expected to continue to increase based on future climate modeling. This is reinforced by the recent city experience dealing with the Rapidan Dam breach on the Blue Earth River in 2024, where the region experienced a 50- to 100-year 48-hour storm intensity but up to a 200- to 500-year event from June 14 – 23 (**Figure 3**). Recognizing the increasing frequency of these intense storms, this analysis includes back-to-back 100-year 24-hour storms totaling 14.5 inches of rain in 48 hours.

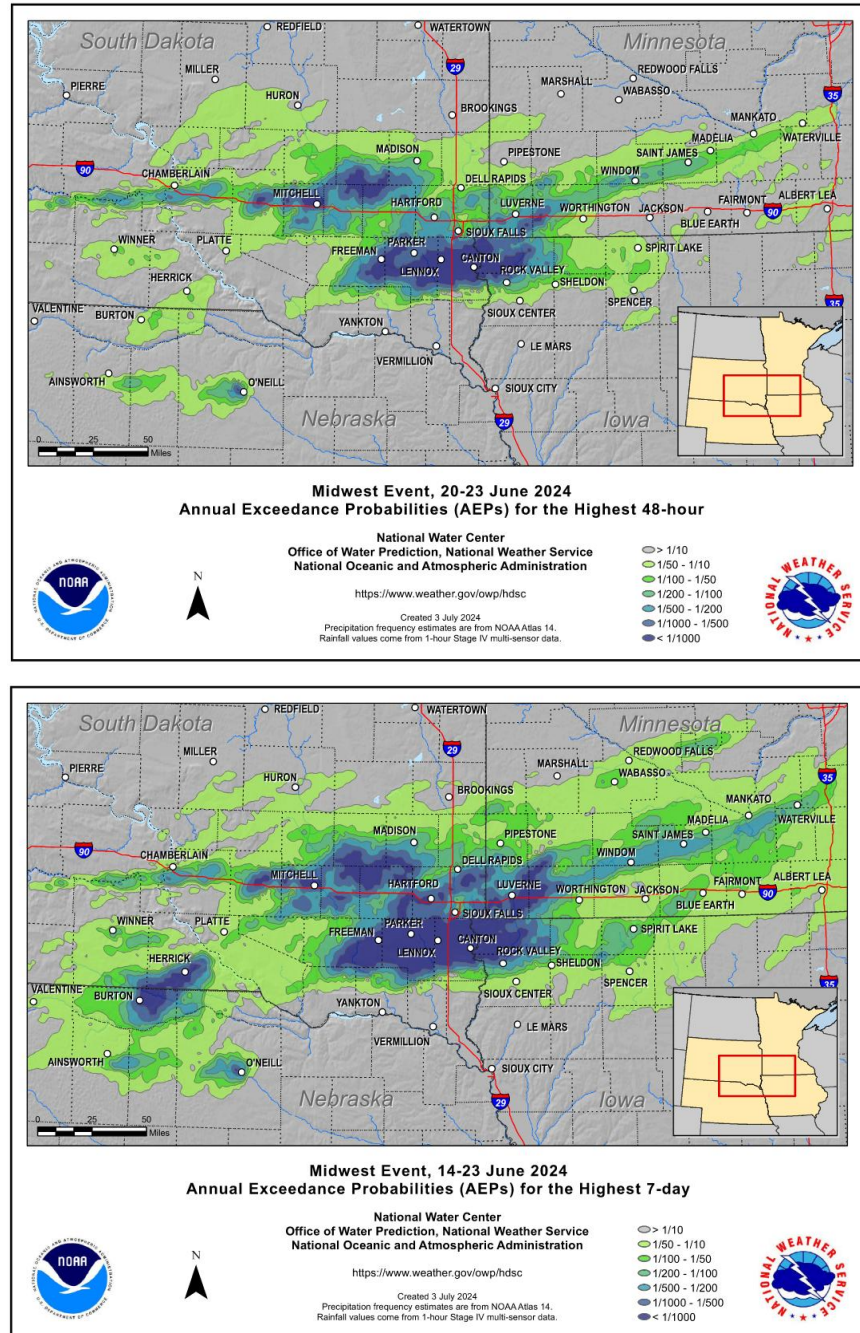


Figure 3: NOAA/NWS Estimated AEPs for June 2024 Storms

3. Proposed Conditions PCSWMM Modeling

a) Future Buildout Considerations

Future development in the watershed currently includes buildout of PID R01.09.291.000.13. Portions of this development would drain to Monks Pond. However, considering ongoing flood concerns, it is assumed that this development will have its own rate control and volume BMP requirements to manage downstream impacts. This parcel is shown in **Figure 4**.

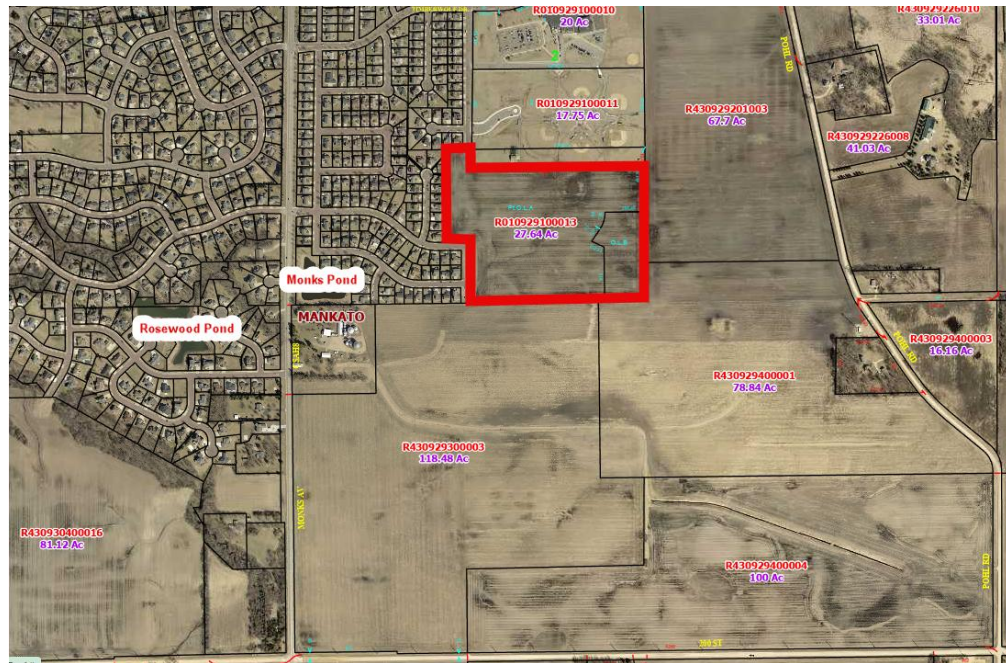


Figure 4: Future Lot Buildout

For the purposes of this assessment, the BMP is not explicitly modeled, assuming that any changes in this development will match rates to Monks Pond.

In addition, upstream detention in the agricultural portions of the watershed have been recommended in multiple prior studies. There are no current plans to install upstream detention and none have been modeled for this analysis.

b) Monk's Pond

During the 2024 storm, water flooded the basement of 101 Wickfield Dr prior to inundating Monks Ave. The bottom window well elevation of the west side of this home is 968.4 ft. The target 100-year HWL for a future Monk's pond outlet design is 967.4 ft to provide 1 ft of freeboard. This is despite Monk's Ave providing minimal to nonexistent overflow routes. For the purposes of this modeling, a preliminary OCS design for Monk's Pond was completed which maintained the desired 100-year HWL, ensuring that the Rosewood Pond OCS design properly accounted for known future flows. The final design of this outlet is uncertain and thus specific outlet configurations are not discussed in detail for this report.

c) Rosewood Pond

Finished Floor Elevations (FFE) for properties adjacent to Rosewood Pond were surveyed in 2026. From low to high, these include walkout basements including: 957.81 ft, 960.77 ft, 961.62 ft, 961.65 ft, 962.84 ft, and 964.43 ft. The lowest home is immediately adjacent to the pond outlet, and the homeowner has installed a retaining wall to an elevation of 961.8 ft. The second lowest home has an unprotected FFE on Sunburst Circle. For the purposes of this modeling, target high water level is 958.77 ft.

The following summarizes the revised Rosewood Pond outlet control modeling:

- The 12" side orifice at the existing OCS invert remains open, despite it's original purpose to be used solely for pond drawdown and maintenance.
- The existing OCS weir is revised to an elevation of 947.0 ft.
- The OCS 8' diameter bottom barrel is extended to the rim, replacing the existing 48" diameter upper barrel section. This rim is lowered to elevation 956.0 ft.
- Inlet and outlet pipes for the existing OCS remain the same.
- The existing 36" overflow pipe is removed and replaced with a 3.75' x 6.08' reinforced concrete arch pipe. Inverts are set to 952.5 ft on the upstream side and 946.0 ft on the downstream side. This is lowered by approximately 4.3 ft compared to existing conditions.

IV. RESULTS

The following tables compare existing and proposed results at Monk's Pond, Rosewood Pond, and the Rosewood pond outlet channel to show decreases to pond high water levels and known and planned increases in downstream flow rates. These increases in flow will require additional future ravine stabilization measures, for which the city currently has funding. Velocities are decreased due to additional flow area with the revised secondary outlet of Rosewood Pond.

Table 3: High Water Level Comparison

Storm	High Water Level (ft) - Rosewood			High Water Level (ft) - Monks Pond		
	<i>Existing</i>	<i>Proposed</i>	<i>Impact</i>	<i>Existing</i>	<i>Proposed</i>	<i>Impact</i>
Low FFE	960.77			968.4		
100-year Target	958.77			967.4		
2-year Storm	955.1	953.48	-1.62	968.13	964.23	-3.9
10-year Storm	958.29	955.52	-2.77	968.3	965.22	-3.08
100-year Storm	962.16	959.01	-3.15	968.51	967.24	-1.27
Back to Back 10-year	960.69	956.75	-3.94	968.39	965.56	-2.83
Back to Back 100-year	963.84	961.38	-2.46	968.52	967.57	-0.95

Table 4: Downstream Peak Flow Rate Comparison

Storm	Peak Rate (cfs) - DS of Rosewood Pond		
	<i>Existing</i>	<i>Proposed</i>	<i>Impact</i>
2-year Storm	138.4	231.7	93.3
10-year Storm	278.4	407.6	129.2
100-year Storm	518.9	555.6	36.7
Back to Back 10-year	340.2	488.3	148.1
Back to Back 100-year	580.1	631.2	51.1

Table 5: Rosewood Pond Outlet Velocity Comparison

Storm	Peak Velocity (fps) - Primary Outlet			Peak Velocity (fps) - Secondary Outlet		
	<i>Existing</i>	<i>Proposed</i>	<i>Impact</i>	<i>Existing</i>	<i>Proposed</i>	<i>Impact</i>
2-year Storm	11.01	10.4	-0.61	0	7.96	7.96
10-year Storm	16.28	12.26	-4.02	16.65	14.58	-2.07
100-year Storm	19.53	17.2	-2.33	18.92	19.18	0.26
Back to Back 10-year	18.35	14.9	-3.45	17.64	16.7	-0.94
Back to Back 100-year	20.51	18.56	-1.95	20.25	20.69	0.44

V. SUMMARY AND RECOMMENDATIONS

We recommend installing the revised Rosewood Pond OCS configuration as modeled. The proposed design lowers 100-year high water levels by 3.15 ft and maintains a vertical offset from the lowest unprotected residential structure of 1.76 ft in the 100-year storm. The design increases downstream flow rates to accomplish this, with the greatest increases occurring during smaller storms and flows. The proposed design does provide protection for the back-to-back 10-year storm, but still leaves some structures at risk during the back-to-back 100-year storm. Velocities are decreased due to additional open area at the Rosewood Pond outlet, despite an increase in flows.

Overall, this system would benefit from additional flood storage upstream. This design will result in known ravine impacts downstream due to increased flows. The city is in the process of planning, designing and implementing stabilization measures that mitigate for increased flow downstream.

Appendix A: Hydrologic Data

This map displays the Hydrologic Soil Group (HSG) for Blue Earth County, Minnesota, specifically the Rosewood area. The map is overlaid on an aerial photograph and includes a coordinate grid. The map is divided into various soil types, each represented by a different color and labeled with a number (e.g., 110, 211, 230, 238B, 238C, 238D, 238E, 238F, 238G, 238H, 238I, 238J, 238K, 238L, 238M, 238N, 238O, 238P, 238Q, 238R, 238S, 238T, 238U, 238V, 238W, 238X, 238Y, 238Z, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000). The map is bordered by a red line, and the background is a light gray color. The map is titled "Hydrologic Soil Group—Blue Earth County (Rose

0 300 700 1400 2100 Feet

5/1/2026
Page 1 of 5

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Blue Earth County, Minnesota
 Survey Area Data: Version 23, Sep 9, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 2, 2023—Aug 8, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
18	Comfrey clay loam	B/D	9.5	0.3%
84	Brownton silty clay loam, 0 to 2 percent slopes	C/D	56.3	1.8%
94B	Terril loam, 2 to 6 percent slopes	B	2.1	0.1%
102C	Clarion loam, 6 to 10 percent slopes	B	6.2	0.2%
105B	Kamrar clay loam, 2 to 6 percent slopes	D	55.2	1.7%
105C	Kamrar silty clay, 6 to 12 percent slopes	C	9.0	0.3%
105D	Kamrar silty clay, 12 to 18 percent slopes	C	6.9	0.2%
106C	Lester loam, 6 to 10 percent slopes	C	30.4	1.0%
106D	Lester loam, 10 to 16 percent slopes	C	1.8	0.1%
109	Cordova clay loam, 0 to 2 percent slopes	C/D	354.4	11.1%
110	Marna silty clay loam, 0 to 2 percent slopes	C/D	1,197.6	37.4%
114	Glencoe silty clay loam, 0 to 1 percent slopes	C/D	15.8	0.5%
211	Lura silty clay, 0 to 1 percent slopes	C/D	137.1	4.3%
219	Rolfe silt loam, 0 to 1 percent slopes	C/D	31.7	1.0%
230	Guckeen silty clay loam, 1 to 3 percent slopes	C/D	179.0	5.6%
238B	Kilkenny clay loam, 2 to 6 percent slopes	D	270.0	8.4%
238C	Kilkenny clay loam, 6 to 10 percent slopes, moderately eroded	D	67.4	2.1%
238D	Kilkenny clay loam, 10 to 16 percent slopes, moderately eroded	C	20.9	0.7%
239	Le Sueur loam, 1 to 3 percent slopes	C/D	36.3	1.1%
281	Darfur loam	B/D	0.5	0.0%



Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
286	Shorewood silty clay loam, 1 to 6 percent slopes	C/D	140.4	4.4%
287	Minnetonka silty clay loam	C/D	309.5	9.7%
310	Beauford clay, 0 to 2 percent slopes	D	17.5	0.5%
316	Baroda silty clay loam	C/D	4.6	0.1%
319	Barbert silt loam	C/D	0.9	0.0%
414	Hamel loam, 0 to 2 percent slopes	C/D	18.7	0.6%
525	Muskego soils, 0 to 1 percent slopes	C/D	31.4	1.0%
539	Klossner muck, lake plain, depression, 0 to 1 percent slopes	C/D	38.7	1.2%
854	Cordova-Urban land complex, 0 to 3 percent slopes	C/D	50.3	1.6%
921D	Omsrud-Storden complex, 10 to 16 percent slopes, moderately eroded	B	2.6	0.1%
961	Storden complex, very steep	B	22.5	0.7%
961F	Storden complex, 24 to 45 percent slopes	B	19.4	0.6%
997	Marna-Barbert complex	C/D	3.9	0.1%
1053	Marsh	B/D	22.1	0.7%
L113B	Reedslake-Le Sueur complex, 1 to 6 percent slopes	C	27.0	0.8%
W	Water		3.5	0.1%
Totals for Area of Interest			3,200.9	100.0%



Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher





NOAA Atlas 14, Volume 8, Version 2
Location name: Mankato, Minnesota, USA*
Latitude: 44.13°, Longitude: -93.9924°
Elevation: 946 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.378 (0.298-0.491)	0.450 (0.355-0.585)	0.572 (0.449-0.744)	0.676 (0.527-0.883)	0.824 (0.622-1.10)	0.942 (0.693-1.27)	1.06 (0.755-1.46)	1.19 (0.808-1.67)	1.36 (0.888-1.94)	1.50 (0.949-2.16)
10-min	0.553 (0.436-0.719)	0.659 (0.519-0.857)	0.837 (0.657-1.09)	0.990 (0.772-1.29)	1.21 (0.910-1.62)	1.38 (1.02-1.86)	1.56 (1.10-2.14)	1.74 (1.18-2.44)	2.00 (1.30-2.85)	2.19 (1.39-3.16)
15-min	0.675 (0.532-0.876)	0.804 (0.633-1.04)	1.02 (0.801-1.33)	1.21 (0.942-1.58)	1.47 (1.11-1.97)	1.68 (1.24-2.28)	1.90 (1.35-2.61)	2.13 (1.44-2.98)	2.43 (1.59-3.47)	2.67 (1.69-3.85)
30-min	0.912 (0.719-1.18)	1.09 (0.859-1.42)	1.39 (1.09-1.81)	1.65 (1.29-2.15)	2.02 (1.52-2.70)	2.31 (1.70-3.12)	2.61 (1.85-3.59)	2.93 (1.99-4.10)	3.36 (2.19-4.79)	3.69 (2.34-5.31)
60-min	1.18 (0.929-1.53)	1.40 (1.10-1.82)	1.78 (1.40-2.32)	2.12 (1.65-2.77)	2.62 (1.98-3.53)	3.02 (2.23-4.10)	3.45 (2.45-4.76)	3.90 (2.66-5.48)	4.54 (2.96-6.49)	5.04 (3.19-7.25)
2-hr	1.44 (1.15-1.85)	1.71 (1.36-2.19)	2.17 (1.73-2.79)	2.59 (2.05-3.34)	3.22 (2.47-4.29)	3.74 (2.79-5.02)	4.29 (3.09-5.86)	4.88 (3.36-6.79)	5.72 (3.78-8.11)	6.39 (4.09-9.10)
3-hr	1.62 (1.30-2.06)	1.91 (1.53-2.42)	2.42 (1.94-3.08)	2.89 (2.30-3.69)	3.61 (2.80-4.80)	4.22 (3.18-5.64)	4.87 (3.54-6.62)	5.58 (3.87-7.73)	6.59 (4.38-9.30)	7.41 (4.77-10.5)
6-hr	1.91 (1.56-2.38)	2.24 (1.82-2.80)	2.85 (2.28-3.64)	3.41 (2.68-4.40)	4.28 (3.28-5.64)	5.02 (3.74-6.64)	5.83 (4.28-7.84)	6.71 (4.71-9.19)	7.97 (5.36-11.1)	9.00 (5.85-12.6)
12-hr	2.17 (1.80-2.68)	2.56 (2.11-3.15)	3.26 (2.68-4.03)	3.91 (3.19-4.84)	4.90 (3.90-6.34)	5.74 (4.43-7.47)	6.65 (4.94-8.82)	7.64 (5.42-10.3)	9.05 (6.16-12.5)	10.2 (6.71-14.1)
24-hr	2.48 (2.07-3.00)	2.88 (2.41-3.50)	3.62 (3.02-4.40)	4.31 (3.57-5.26)	5.37 (4.33-6.85)	6.27 (4.91-8.06)	7.25 (5.46-9.50)	8.32 (5.98-11.1)	9.85 (6.78-13.5)	11.1 (7.38-15.1)
2-day	2.87 (2.44-3.43)	3.25 (2.75-3.88)	3.96 (3.34-4.74)	4.64 (3.89-5.57)	5.71 (4.68-7.20)	6.64 (5.28-8.44)	7.67 (5.86-9.94)	8.81 (6.42-11.7)	10.5 (7.29-14.2)	11.8 (7.95-16.1)
3-day	3.15 (2.69-3.72)	3.53 (3.01-4.18)	4.25 (3.61-5.04)	4.94 (4.17-5.88)	6.02 (4.97-7.52)	6.97 (5.57-8.77)	8.00 (6.15-10.3)	9.15 (6.70-12.0)	10.8 (7.58-14.5)	12.2 (8.24-16.4)
4-day	3.37 (2.89-3.95)	3.77 (3.23-4.43)	4.52 (3.86-5.32)	5.22 (4.44-6.18)	6.32 (5.23-7.82)	7.26 (5.84-9.07)	8.30 (6.40-10.6)	9.43 (6.94-12.3)	11.1 (7.79-14.8)	12.4 (8.44-16.7)
7-day	3.90 (3.39-4.52)	4.37 (3.79-5.06)	5.20 (4.50-6.05)	5.96 (5.12-6.96)	7.10 (5.91-8.62)	8.05 (6.51-9.88)	9.06 (7.05-11.4)	10.2 (7.53-13.1)	11.7 (8.30-15.5)	13.0 (8.88-17.3)
10-day	4.41 (3.86-5.07)	4.94 (4.31-5.68)	5.84 (5.09-6.74)	6.64 (5.75-7.69)	7.81 (6.54-9.38)	8.77 (7.13-10.6)	9.77 (7.64-12.1)	10.8 (8.07-13.8)	12.3 (8.77-16.1)	13.5 (9.30-17.9)
20-day	6.06 (5.37-6.84)	6.72 (5.96-7.61)	7.82 (6.91-8.87)	8.74 (7.67-9.96)	10.0 (8.45-11.7)	11.0 (9.05-13.1)	12.0 (9.48-14.6)	13.0 (9.80-16.3)	14.4 (10.4-18.5)	15.4 (10.8-20.2)
30-day	7.48 (6.69-8.37)	8.29 (7.41-9.28)	9.59 (8.53-10.8)	10.6 (9.41-12.0)	12.1 (10.2-14.0)	13.1 (10.9-15.4)	14.2 (11.3-17.1)	15.2 (11.5-18.9)	16.6 (12.0-21.1)	17.5 (12.3-22.8)
45-day	9.28 (8.37-10.3)	10.3 (9.29-11.4)	11.9 (10.7-13.3)	13.2 (11.8-14.8)	14.9 (12.7-17.0)	16.1 (13.4-18.7)	17.2 (13.8-20.5)	18.3 (13.9-22.5)	19.7 (14.3-24.9)	20.6 (14.6-26.7)
60-day	10.8 (9.81-11.9)	12.0 (10.9-13.3)	14.0 (12.6-15.4)	15.5 (13.9-17.2)	17.4 (14.9-19.7)	18.8 (15.7-21.7)	20.1 (16.1-23.7)	21.2 (16.2-25.9)	22.7 (16.5-28.4)	23.6 (16.8-30.4)

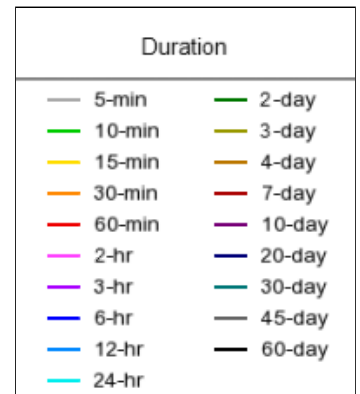
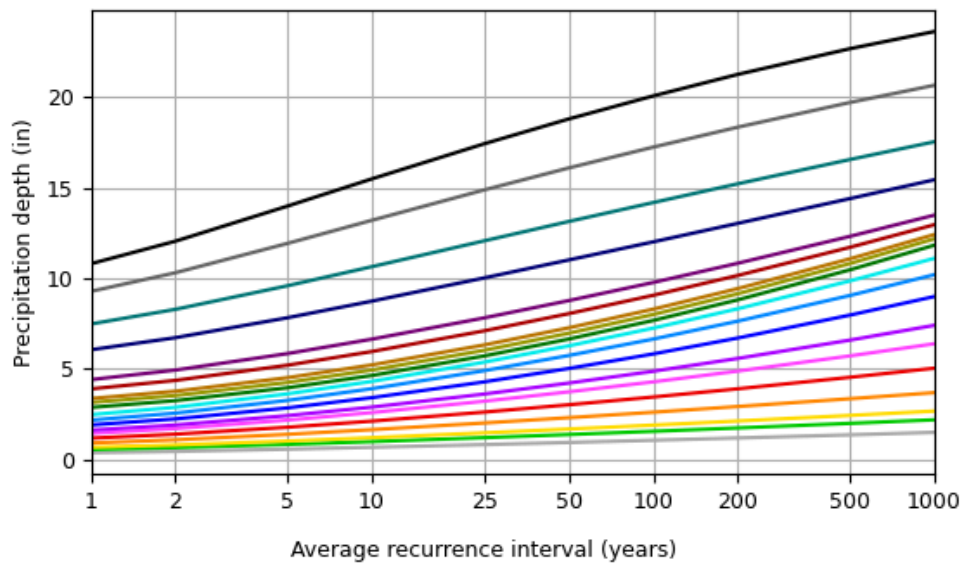
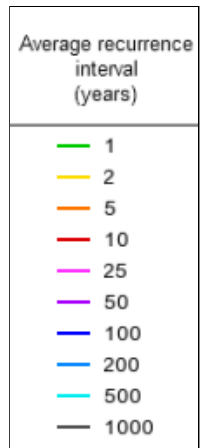
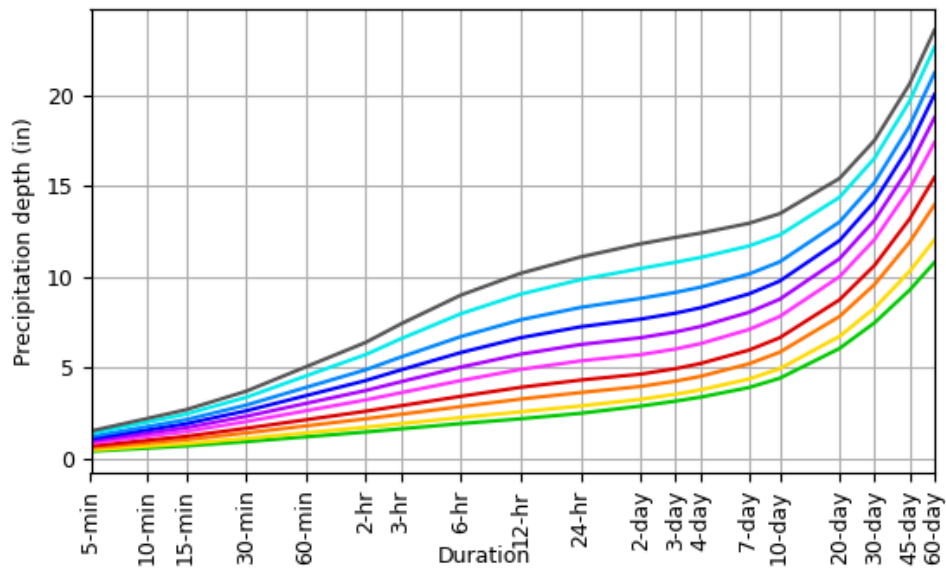
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

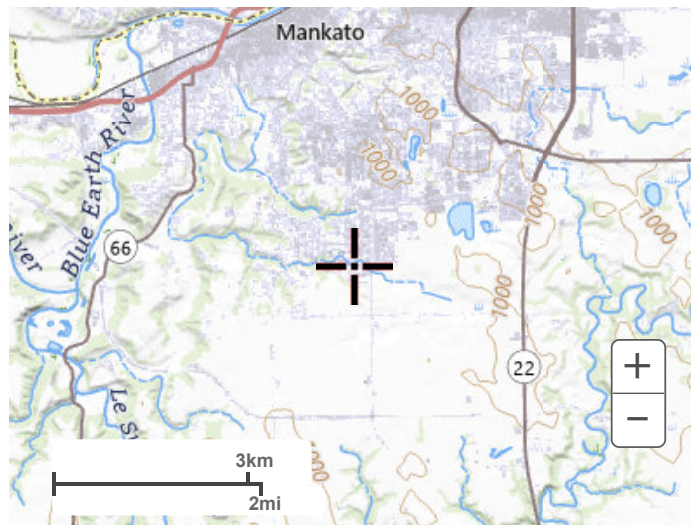
[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 44.1300°, Longitude: -93.9924°

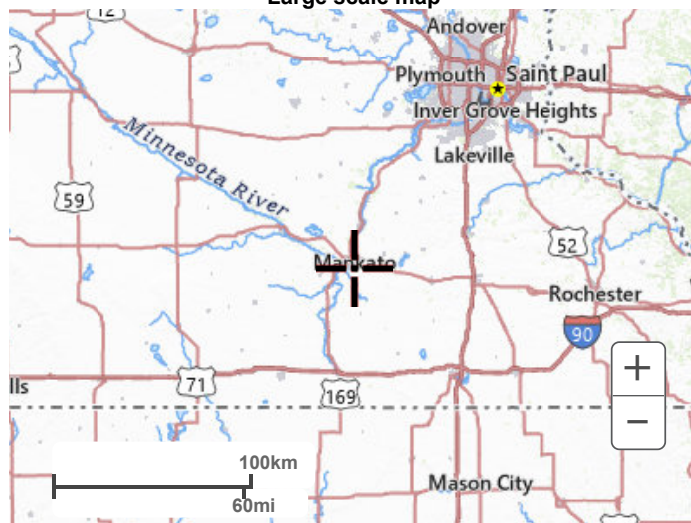
[Back to Top](#)**Maps & aerials****Small scale terrain**



Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

Appendix B: Construction Plan Data

CITY OF MANKATO

ENGINEERING DEPARTMENT

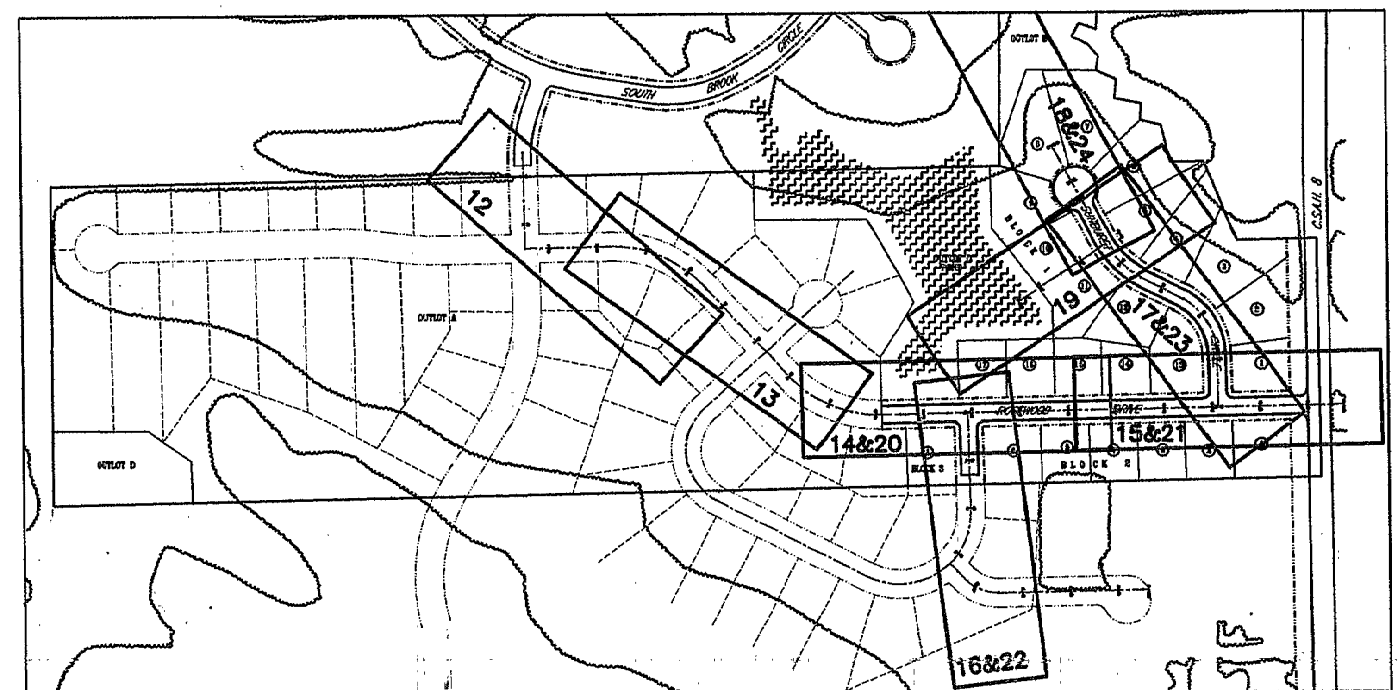
CONSTRUCTION PLAN

ROSEWOOD DRIVE, SUNBURST CIRCLE
& HIDDEN OAK CIRCLE

SANITARY SEWER, STORM DRAINAGE, WATERMAIN
PAVEMENT AND CURB & GUTTER

FROM SOUTH BROOK WAY SOUTH AND EAST
TO MONKS AVENUE (C.S.A.H. 8)

SHEET LOCATOR



INDEX OF SHEETS

- | | | | |
|-----|------------------------------------|-------|----------------------|
| 1 | TITLE SHEET | 9-10 | GRADING PLAN |
| 2-4 | ESTIMATED QUANTITIES AND SCHEDULES | 11-12 | GRADING SECTION |
| 5-8 | SECTIONS AND DETAILS | 13-20 | PLANNED CONSTRUCTION |
| | | 21-25 | PAVING PLAN |

APPROVED: *[Signature]* DATE: *9/5/2001*
CITY ENGINEER
BLUE EARTH / NICOLLET COUNTY REGISTRATION NUMBER *9056*

BEGIN CITY PROJECT 01015

END CITY PROJECT 01015

AS BUILT 3-3-03 S. RADZAK

I&S Engineers & Architects, Inc.
CIVIL • MECHANICAL • STRUCTURAL
ARCHITECTURAL • MARINE • ELECTRICAL
1409 NORTH PHOENIX DRIVE, P.O. BOX 1026
MANKATO, MN 56002
PH (507) 387-6551 FAX (507) 387-3553

CITY OF MANKATO
ENGINEERING
DEPARTMENT

[Signature]
DATE *4 SEPT 2001* REG. NO. 25443

40
SCALE

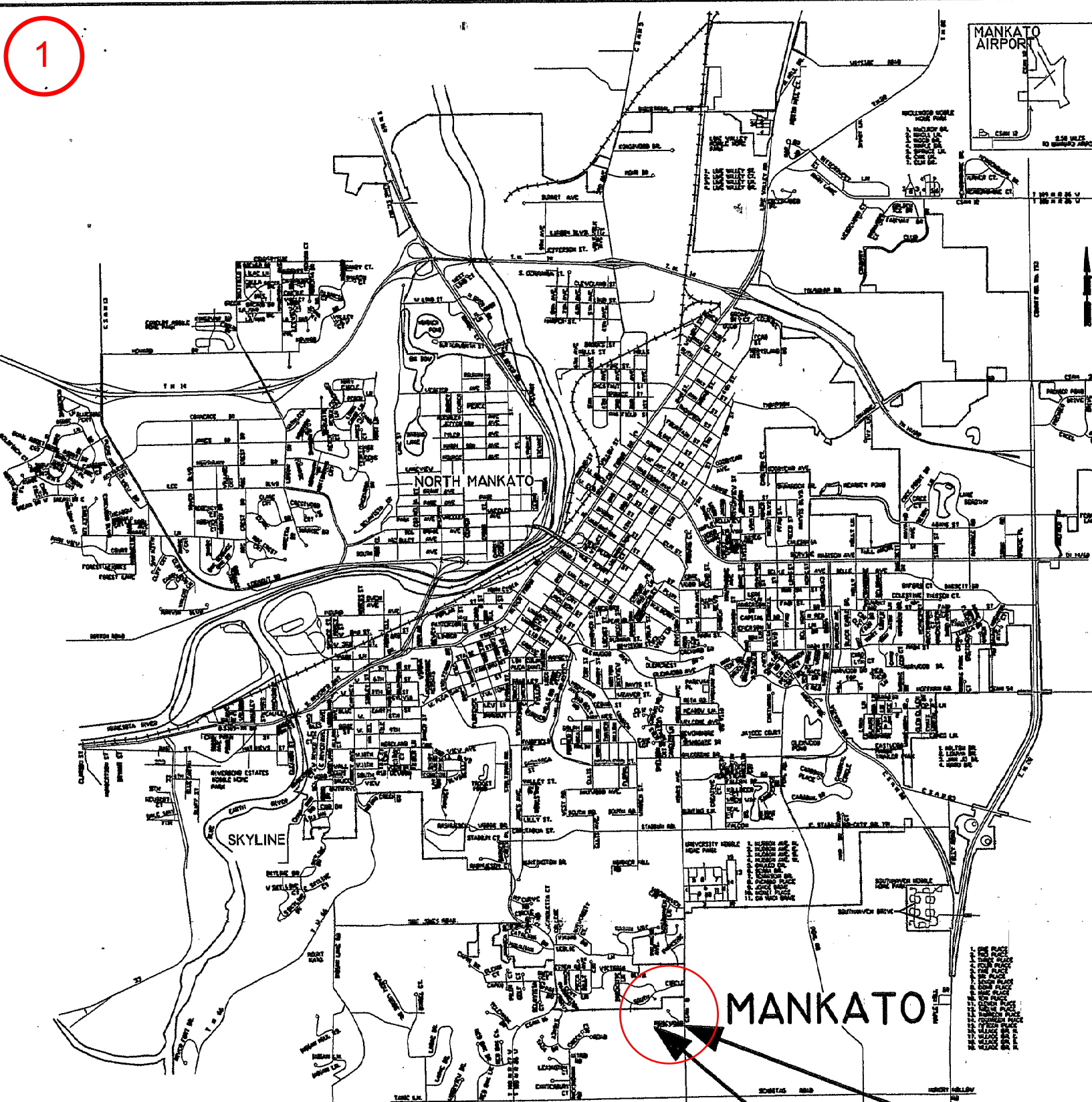
REVISIONS
INITIAL DATE

TITLE SHEET
PARKSIDE ADDITION
MANKATO, MN

ENG. PROJECT NUMBER 01-5897

CITY PROJECT NUMBER 01015

SHEET 1 OF 25 SHEETS



SPECIFICATIONS REFERENCE
THE 2000 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, AND THE STANDARD SPECIFICATIONS FOR SANITARY SEWER, STORM DRAIN AND WATERMAIN INSTALLATIONS AS PROPOSED BY THE CITY ENGINEERS ASSOCIATION OF MINNESOTA 1988 EDITION SHALL GOVERN.

THE CONTRACTOR SHALL VERIFY ALL EXISTING UNDERGROUND UTILITY LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION. ALL INPLACE UTILITIES MAY NOT BE SHOWN ON THIS PLAN.
GOPHER STATE ONE CALL 1-800-252-1166

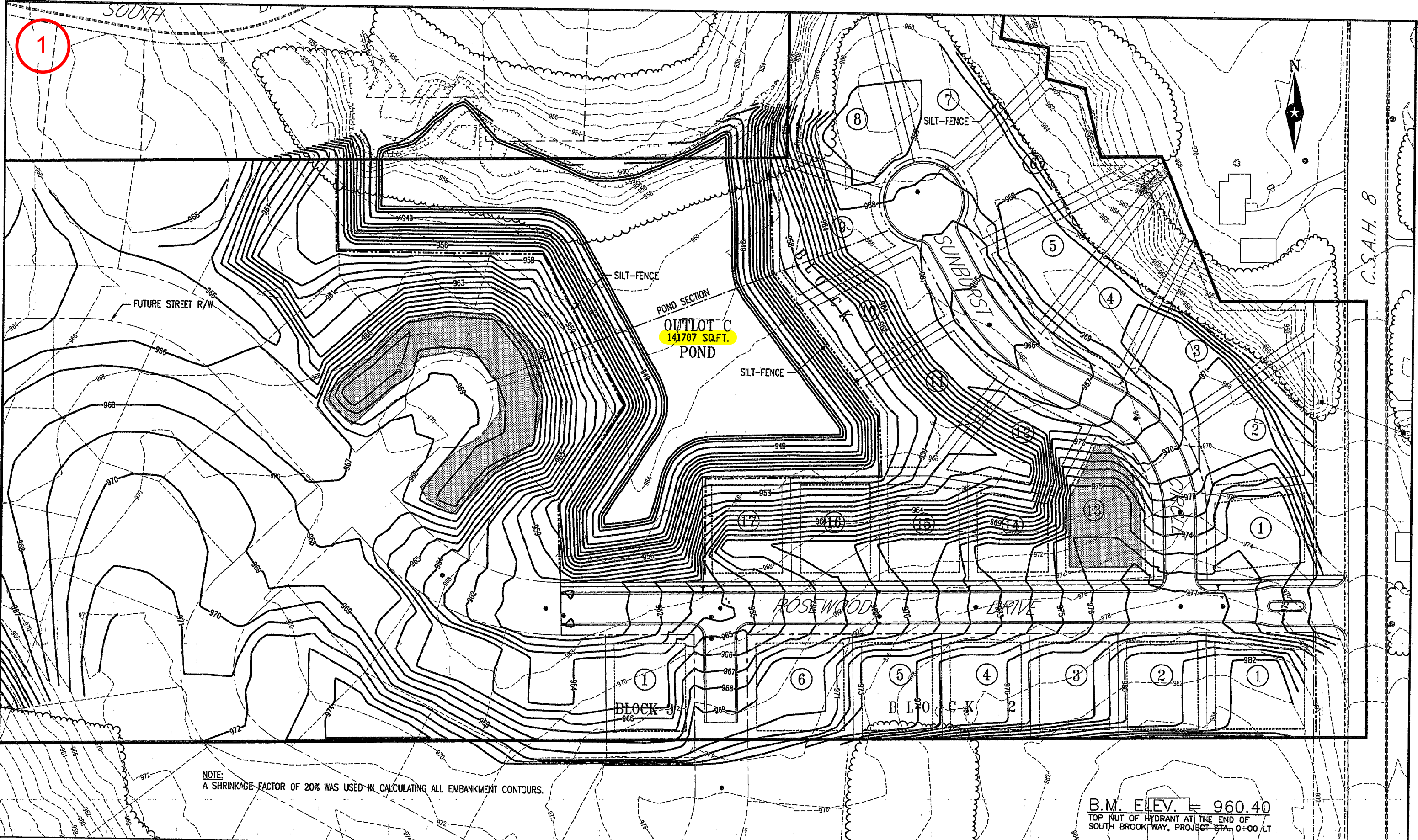
PUBLIC UTILITY COMPANIES
CHECK THOSE COMPANIES THAT ARE INVOLVED IN THIS PROJECT

CHARTER
HTC
RELIANT
XCEL
SPRINT
OTHER

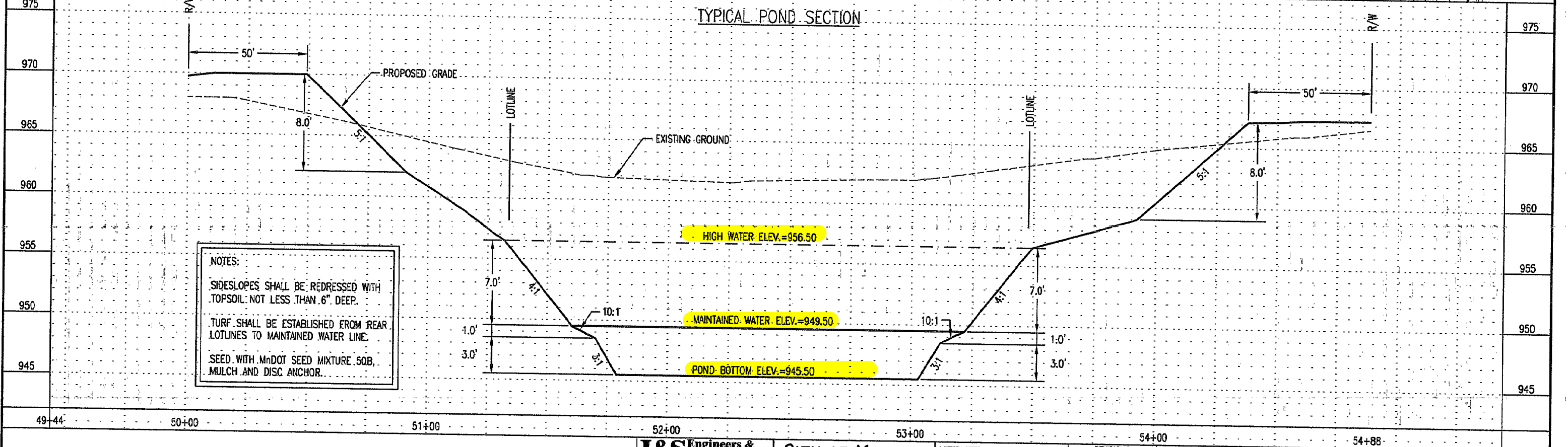
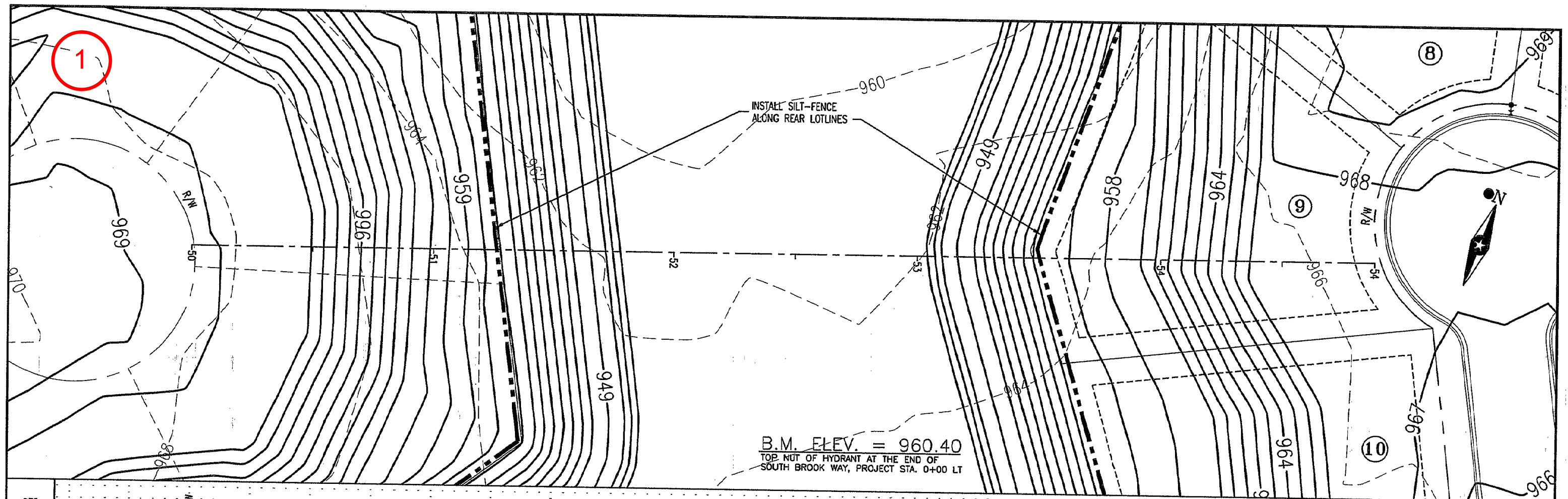
AS BUILT DATA
INSPECTOR *S. RADZAK*
GEN. CONTRACTOR *S.M.C.*
SANITARY PIPE *500-26-35*
WATERMAIN *C-500 American*
WATER VALVES *U.S.*
HYDRANTS *Waters*
DATE *3-3-03*

SCALE
PLAN 40
PROFILE: HORIZONTAL 40
PROFILE: VERTICAL 5
INDEX MAP 2000

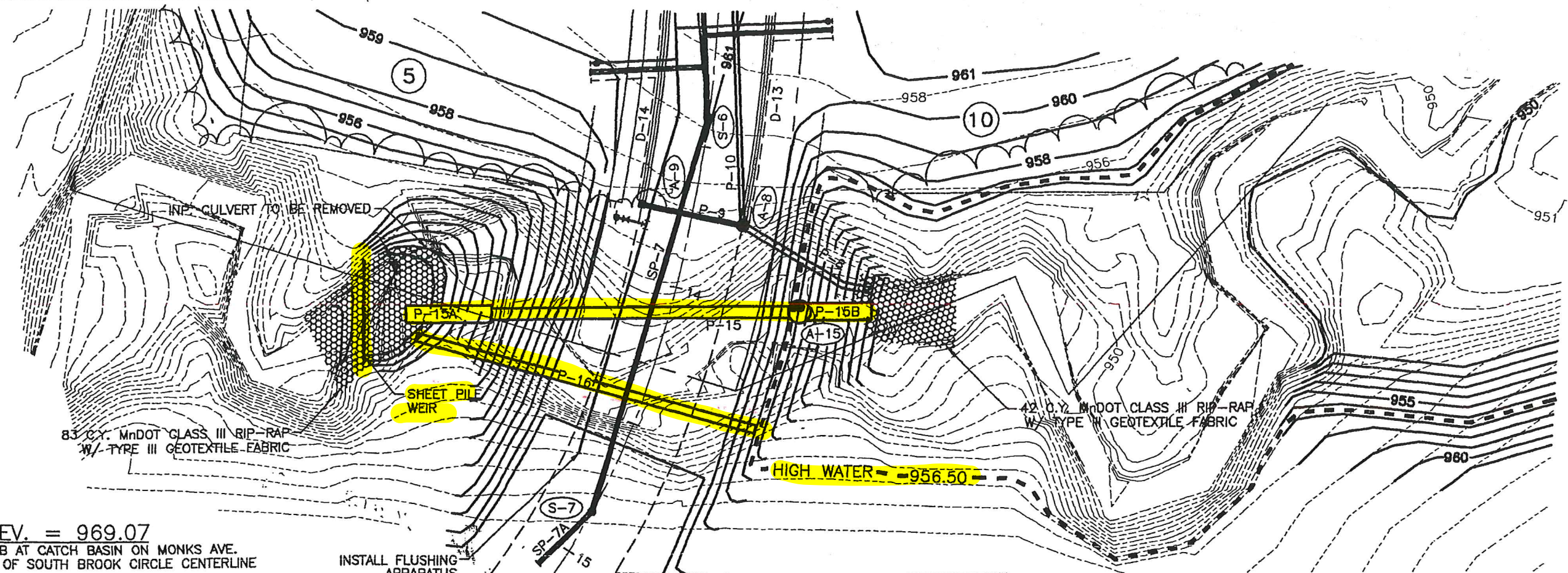
-TV CABLE
-TELEPHONE
-GAS
-ELECTRIC



Cod File Name: grading1		AS BUILT 3-3-03 S. RADZAK		I&S Engineers & Architects, Inc. CIVIL - MECHANICAL - STRUCTURAL ARCHITECTURAL - LANDSCAPE - ELECTRICAL 1400 NORTH BROADWAY DRIVE, P.O. BOX 1028 MANKATO, MN 56001 PH (507) 387-8613 FAX (507) 387-1383		CITY OF MANKATO ENGINEERING DEPARTMENT I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A QUALITY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF MINNESOTA DATE: 1 SEP 01 25445		REVISIONS DATE: 100' HORIZ. SCALE:		GRADING PLAN ROSEWOOD MANKATO, MN	
ENG. PROJ. No. 01-5897		C.S.A.H. PROJECT No.		FED. PROJ. No.		S.P. No.		CITY PROJ. No. 01015		SHEET 9 OF 25 SHEETS	



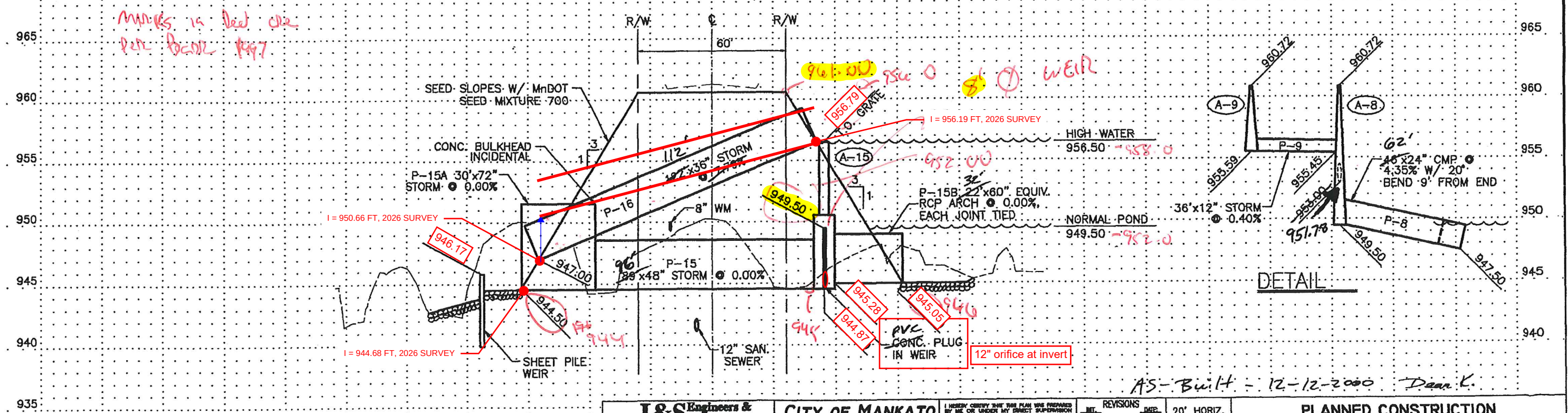
2



B.M. ELEV. = 969.07
TOP OF CURB AT CATCH BASIN ON MONKS AVE.
168' SOUTH OF SOUTH BROOK CIRCLE CENTERLINE

INSTALL FLUSHING APPARATUS

*MONKS IS DEED 012
PER DEED 1997*



I&S Engineers & Architects, Inc.
CIVIL - MECHANICAL - STRUCTURAL
ARCHITECTURE - INTERIOR - ELECTRICAL
1400 NORTH BROADWAY SUITE 200, P.O. BOX 1400
MANKATO, MN 56001
PH (507) 325-2211 FAX (507) 325-2212

**CITY OF MANKATO
ENGINEERING
DEPARTMENT**

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED
BY ME OR UNDER MY DIRECT SUPERVISION
AND THAT I AM A FULLY LICENSED
PROFESSIONAL ENGINEER UNDER THE LAWS OF
THE STATE OF MINNESOTA
David J. Anderson
21 MAR 2001 12:54:45

NO.	REVISIONS	DATE

20' HORIZ.
4' VERT.
SCALE:

PLANNED CONSTRUCTION
POND OUTLET STRUCTURE AND RAVINE CROSSING
SOUTH BROOK CIRCLE

City Original Set

CITY OF MANKATO ENGINEERING DEPARTMENT

CONSTRUCTION PLAN 2006 OAK MARSH SUBDIVISION

SANITARY SEWER, WATERMAIN, STORM SEWER
BITUMINOUS STREET AND GRADING

MARCH 2006

INDEX OF SHEETS

- 1 TITLE SHEET
- 2 ESTIMATED QUANTITIES
- 3 UTILITY TABLES
- 4-7 STANDARD DETAILS
- 8-9 GRADING AND EROSION CONTROL PLAN

UTILITY PLAN AND PROFILE SHEETS

- 9-12 OAK MARSH DRIVE
- 13 SOUTH STORM SEWER OUTLET
- 14 NORTH POND STORM SEWER
- 15 SOUTH POND OUTLET

STREET PLAN AND PROFILE SHEETS

- 16-18 OAK MARSH DRIVE
- 10B Watermain Detail
- 19 Service Locations

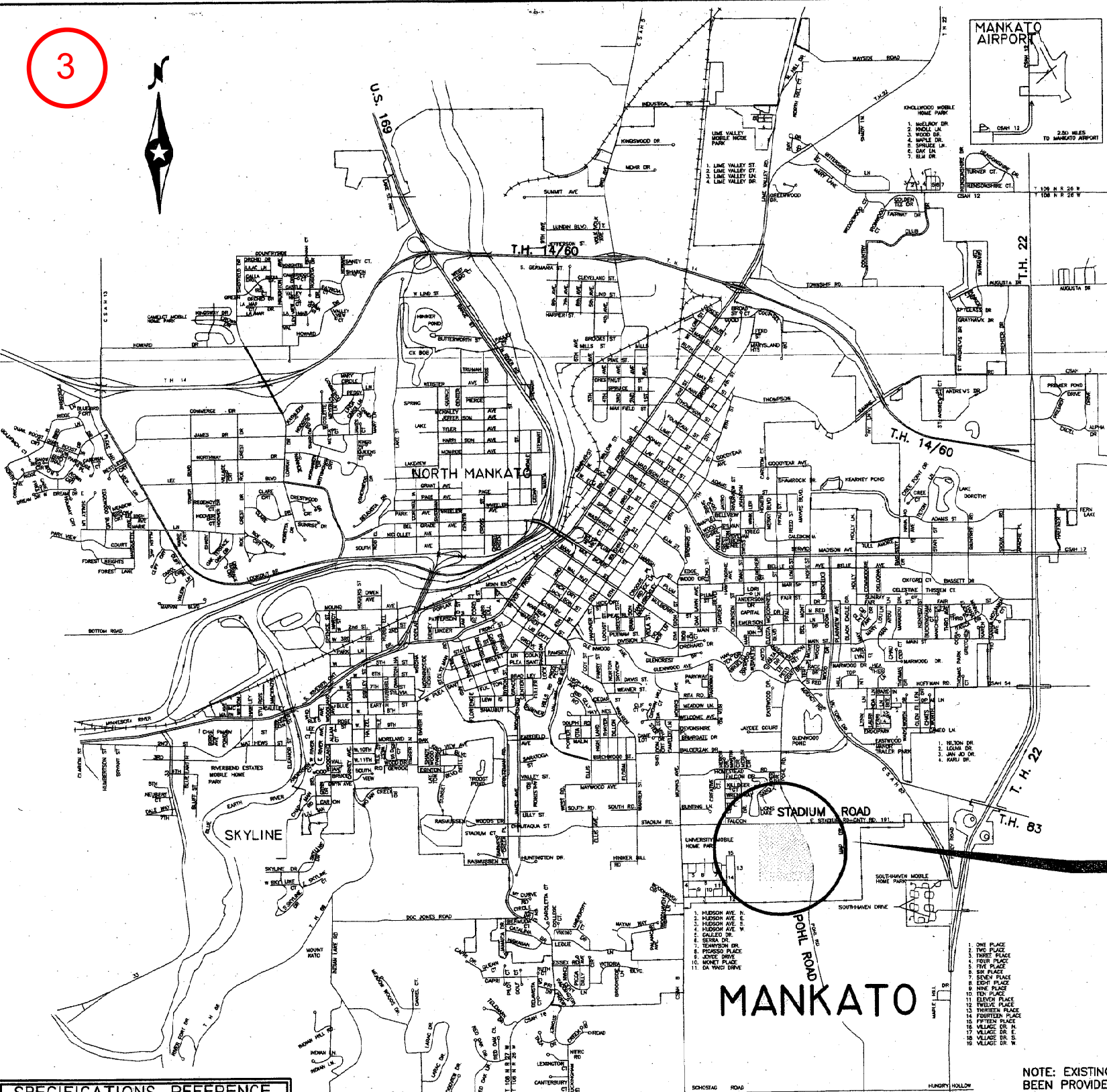
LOCATION CITY
PROJECT 06007

NOTE: EXISTING UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PROVIDED BY THE UTILITY OWNER. THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY GOPHER STATE ONE-CALL 1-800-252-1166 OR 612-454-0002.

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D. THIS UTILITY QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF C/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."

APPROVED: *[Signature]* DATE: 4/6/06
CITY ENGINEER
BLUE EARTH / NICOLLET COUNTY REGISTRATION NUMBER 9056

As Built 1-9-07 *[Signature]*



SPECIFICATIONS REFERENCE
THE 1988 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, AS AMENDED BY THE MAY 2, 1994 SUPPLEMENTAL SPECIFICATIONS, AND THE STANDARD SPECIFICATIONS FOR SANITARY SEWER, STORM DRAIN AND WATERMAIN INSTALLATIONS AS PROPOSED BY THE CITY ENGINEERS ASSOCIATION OF MINNESOTA 1988 EDITION SHALL GOVERN.

THE CONTRACTOR SHALL VERIFY ALL EXISTING UNDERGROUND UTILITY LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION. ALL INPLACE UTILITIES MAY NOT BE SHOWN ON THIS PLAN.
GOPHER STATE ONE CALL 1-800-252-1166

PUBLIC UTILITY COMPANIES

CHECK THOSE COMPANIES THAT ARE INVOLVED IN THIS PROJECT

BRESNAN - TV CABLE ☐
MCTC - TELEPHONE ☒
MINNEGASCO - GAS ☒
NSP - ELECTRIC ☒
SPRINT - ☐
OTHER - ☐

AS BUILT DATA

INSPECTOR *London Bode*
GEN. CONTRACTOR *Sammon & Sons Construction*
SANITARY PIPE *SDR 35*
WATERMAIN *C-900*
WATER VALVES *American*
HYDRANTS *Waterous*
DATE *1-9-07*

SCALE

PLAN 20
PROFILE: HORIZONTAL 20
PROFILE: VERTICAL 5
INDEX MAP 2000



BOLTON & MENK, INC
CONSULTING ENGINEERS & SURVEYORS
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN
BURNSVILLE, MN WILLMAR, MN AMES, IA LIBERTY, MO

Mankato Engineering Division

CITY PROJECT NUMBER 06007

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A FULLY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
[Signature]
NATHAN HUETTL
DATE 4/5/06 REG. NO. 42774

NO SCALE

REVISIONS
INITIAL DATE

TITLE SHEET
2006 OAK MARSH SUBDIVISION

SHEET 1 OF 18 SHEETS

3

CASTING	DESCRIPTION	NUMBER
C-1	NEENAH R-3501-TB	6
C-2	MnDOT 700-7 WITH 715 COVER	15

CATCHBASIN - TOP BACK OF CURB AT CENTER OF CASTING

CASTING	DESCRIPTION	NUMBER
C-4	MnDOT 700-7 WITH 715 COVER WITH SELF SEALING LID	9

STRUCTURE NUMBER	STRUCTURE DESIGN						
	SD-1	4020-48	4022-48	4020-54	4020-60	4020-66	4020-7
A-1	---	---	---	---	---	---	12.48
A-2	---	---	---	---	---	---	11.09
A-3	---	---	---	---	9.68	---	---
A-4	---	8.05	---	---	---	---	---
A-5	---	7.93	---	---	---	---	---
A-6	---	7.49	---	---	---	---	---
A-7	---	7.07	---	---	---	---	---
A-8	---	6.63	---	---	---	---	---
A-9	---	6.72	---	---	---	---	---
A-10	---	---	---	---	6.76	---	---
NORTH POND	---	---	---	---	---	---	---
A-11	---	---	---	5.83	---	---	---
A-12	---	5.20	---	---	---	---	---
A-13	4.35	---	---	---	---	---	---
A-14	4.35	---	---	---	---	---	---
A-20	---	---	5.43	---	---	---	---
A-21	4.74	---	---	---	---	---	---
A-22	3.74	---	---	---	---	---	---
A-30	---	---	---	---	---	7.31	---
A-31	---	---	---	---	6.92	---	---
A-32	---	---	---	---	---	6.71	---
A-33	---	---	---	---	8.66	---	---
SOUTH POND	---	---	---	---	---	---	---
TOTALS:	17.18	49.09	5.43	5.83	32.02	14.02	23.57

LOCATION		6"	8"	MJ GATE VALVE & BOX		HYDRANT	FITTINGS			REMARKS
STATION	OFFSET	WMN	WMN	6"	8"		BENDS	TEE	PLUG	
0+55.05	9.72' RT				1					
0+55.05 TO 1+17.81	9.72' RT TO 10.49' RT		63							WET TAP EXISTING 16" WATERMAIN
1+17.81	10.49' RT	11		1				8"x6"		
1+17.81 TO 3+12.95	10.49' RT TO 10.14' RT		193							
3+12.95	10.14' RT									
3+12.95 TO 3+72.18	10.14' RT		56							
3+72.18	10.14' RT									
3+72.18 TO 4+31.96	10.14' RT TO 10.06' RT		56							
4+31.96	10.06' RT									
4+31.96 TO 4+57.04	10.06' RT TO 10.29' RT		24							
4+57.04	10.29' RT	11		1				8"x6"		
4+57.04 TO 8+12.95	10.29' RT TO 9.20' RT		357							
8+12.95	9.20' RT	13		1				8"x6"		
8+12.95 TO 8+18.40	9.20' RT TO 10.28' RT		6							
8+18.40	10.28' RT									
8+18.40 TO 8+85.36	10.28' RT TO 10.37' RT		72							
8+85.36	10.37' RT									
8+85.36 TO 9+52.64	10.37' RT		72							
9+52.64	10.37' RT									
9+52.64 TO 10+19.93	10.37' RT		72							
10+19.93	10.37' RT									
10+19.93 TO 10+87.88	10.37' RT TO 9.99' RT		72							
10+87.88	9.99' RT									
10+87.88 TO 11+09.82	9.99' RT TO 10.23' RT		22							
11+09.82	10.23' RT	11		1				8"x6"		
11+09.82 TO 11+12.00	10.23' RT		2							
11+12.00	10.23' RT									
TOTALS:		46	1067	4	1	4			8"	

As Built
Landon Bode
1-9-07

REVISIONS		UTILITY TABLES
INITIAL	DATE	
NJH	5-26-06	

2006 OAK MARSH SUBDIVISION

UTILITY TABLES

SHEET 3A OF 18 SHEETS

H:\PRIV\M1337471\cod\37471t02.dwg 05-26-2006 12:29 pm

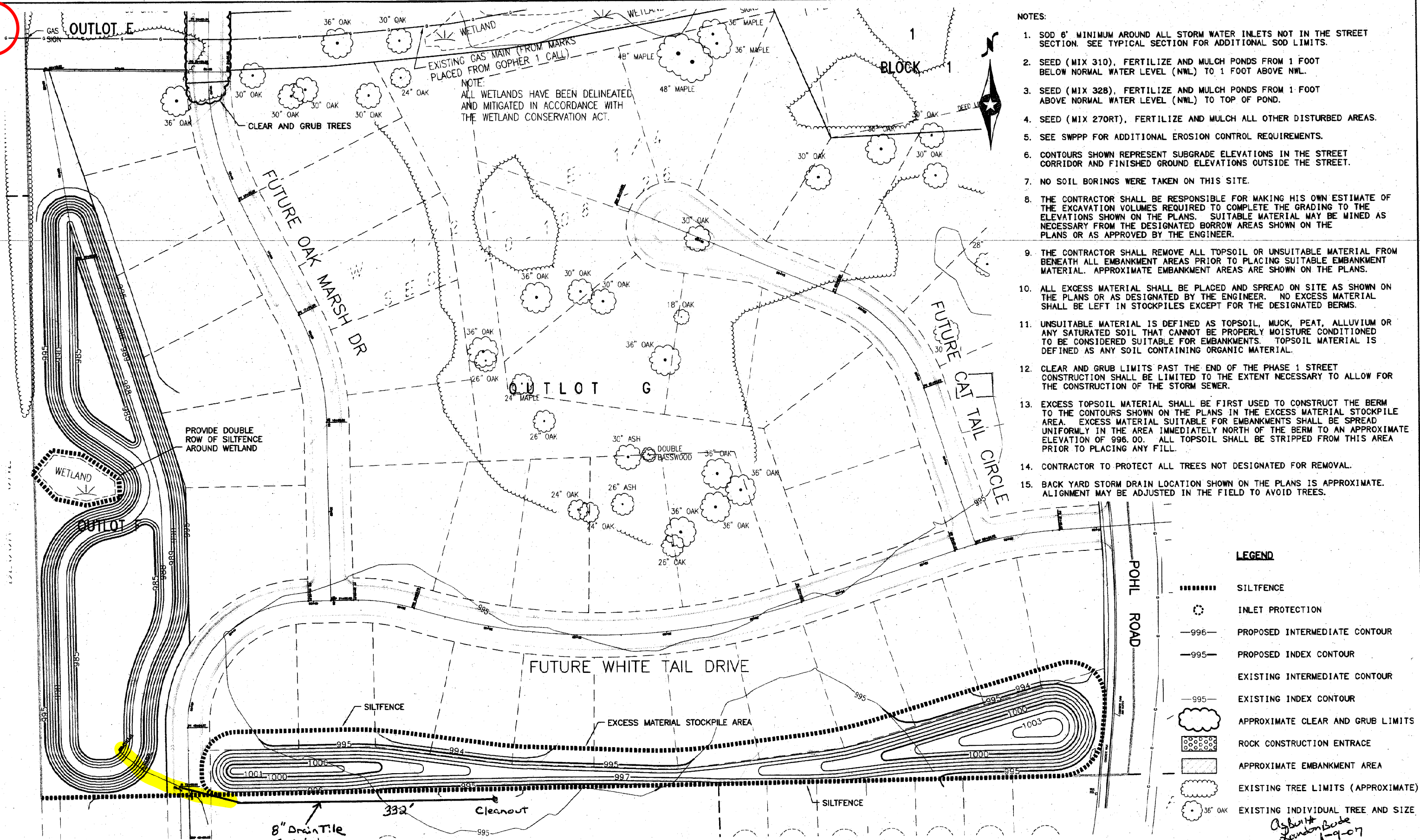


MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN AMES, IA

LIC. NO. 42774 DATE 5/26/04

**CITY OF MANKATO
ENGINEERING
DEPARTMENT**

NO
SCALE



NOTES:

1. SOD 6' MINIMUM AROUND ALL STORM WATER INLETS NOT IN THE STREET SECTION. SEE TYPICAL SECTION FOR ADDITIONAL SOD LIMITS.
2. SEED (MIX 310), FERTILIZE AND MULCH PONDS FROM 1 FOOT BELOW NORMAL WATER LEVEL (NWL) TO 1 FOOT ABOVE NWL.
3. SEED (MIX 328), FERTILIZE AND MULCH PONDS FROM 1 FOOT ABOVE NORMAL WATER LEVEL (NWL) TO TOP OF POND.
4. SEED (MIX 270RT), FERTILIZE AND MULCH ALL OTHER DISTURBED AREAS.
5. SEE SWPPP FOR ADDITIONAL EROSION CONTROL REQUIREMENTS.
6. CONTOURS SHOWN REPRESENT SUBGRADE ELEVATIONS IN THE STREET CORRIDOR AND FINISHED GROUND ELEVATIONS OUTSIDE THE STREET.
7. NO SOIL BORINGS WERE TAKEN ON THIS SITE.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING HIS OWN ESTIMATE OF THE EXCAVATION VOLUMES REQUIRED TO COMPLETE THE GRADING TO THE ELEVATIONS SHOWN ON THE PLANS. SUITABLE MATERIAL MAY BE MINED AS NECESSARY FROM THE DESIGNATED BORROW AREAS SHOWN ON THE PLANS OR AS APPROVED BY THE ENGINEER.
9. THE CONTRACTOR SHALL REMOVE ALL TOPSOIL OR UNSUITABLE MATERIAL FROM BENEATH ALL EMBANKMENT AREAS PRIOR TO PLACING SUITABLE EMBANKMENT MATERIAL. APPROXIMATE EMBANKMENT AREAS ARE SHOWN ON THE PLANS.
10. ALL EXCESS MATERIAL SHALL BE PLACED AND SPREAD ON SITE AS SHOWN ON THE PLANS OR AS DESIGNATED BY THE ENGINEER. NO EXCESS MATERIAL SHALL BE LEFT IN STOCKPILES EXCEPT FOR THE DESIGNATED BERMS.
11. UNSUITABLE MATERIAL IS DEFINED AS TOPSOIL, MUCK, PEAT, ALLUVIUM OR ANY SATURATED SOIL THAT CANNOT BE PROPERLY MOISTURE CONDITIONED TO BE CONSIDERED SUITABLE FOR EMBANKMENTS. TOPSOIL MATERIAL IS DEFINED AS ANY SOIL CONTAINING ORGANIC MATERIAL.
12. CLEAR AND GRUB LIMITS PAST THE END OF THE PHASE 1 STREET CONSTRUCTION SHALL BE LIMITED TO THE EXTENT NECESSARY TO ALLOW FOR THE CONSTRUCTION OF THE STORM SEWER.
13. EXCESS TOPSOIL MATERIAL SHALL BE FIRST USED TO CONSTRUCT THE BERM TO THE CONTOURS SHOWN ON THE PLANS IN THE EXCESS MATERIAL STOCKPILE AREA. EXCESS MATERIAL SUITABLE FOR EMBANKMENTS SHALL BE SPREAD UNIFORMLY IN THE AREA IMMEDIATELY NORTH OF THE BERM TO AN APPROXIMATE ELEVATION OF 996.00. ALL TOPSOIL SHALL BE STRIPPED FROM THIS AREA PRIOR TO PLACING ANY FILL.
14. CONTRACTOR TO PROTECT ALL TREES NOT DESIGNATED FOR REMOVAL.
15. BACK YARD STORM DRAIN LOCATION SHOWN ON THE PLANS IS APPROXIMATE. ALIGNMENT MAY BE ADJUSTED IN THE FIELD TO AVOID TREES.

LEGEND

- SILTFENCE
- INLET PROTECTION
- 996— PROPOSED INTERMEDIATE CONTOUR
- 995— PROPOSED INDEX CONTOUR
- 995— EXISTING INTERMEDIATE CONTOUR
- 995— EXISTING INDEX CONTOUR
- ☁ APPROXIMATE CLEAR AND GRUB LIMITS
- ▨ ROCK CONSTRUCTION ENTRANCE
- ▨ APPROXIMATE EMBANKMENT AREA
- ☁ EXISTING TREE LIMITS (APPROXIMATE)
- 36\"/>

As built
London Bode
1-9-07

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN AMES, IA

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.
NATHAN J. MOETTL
UC NO. 42774 DATE 4/5/06

**Mankato
Engineering
Division**

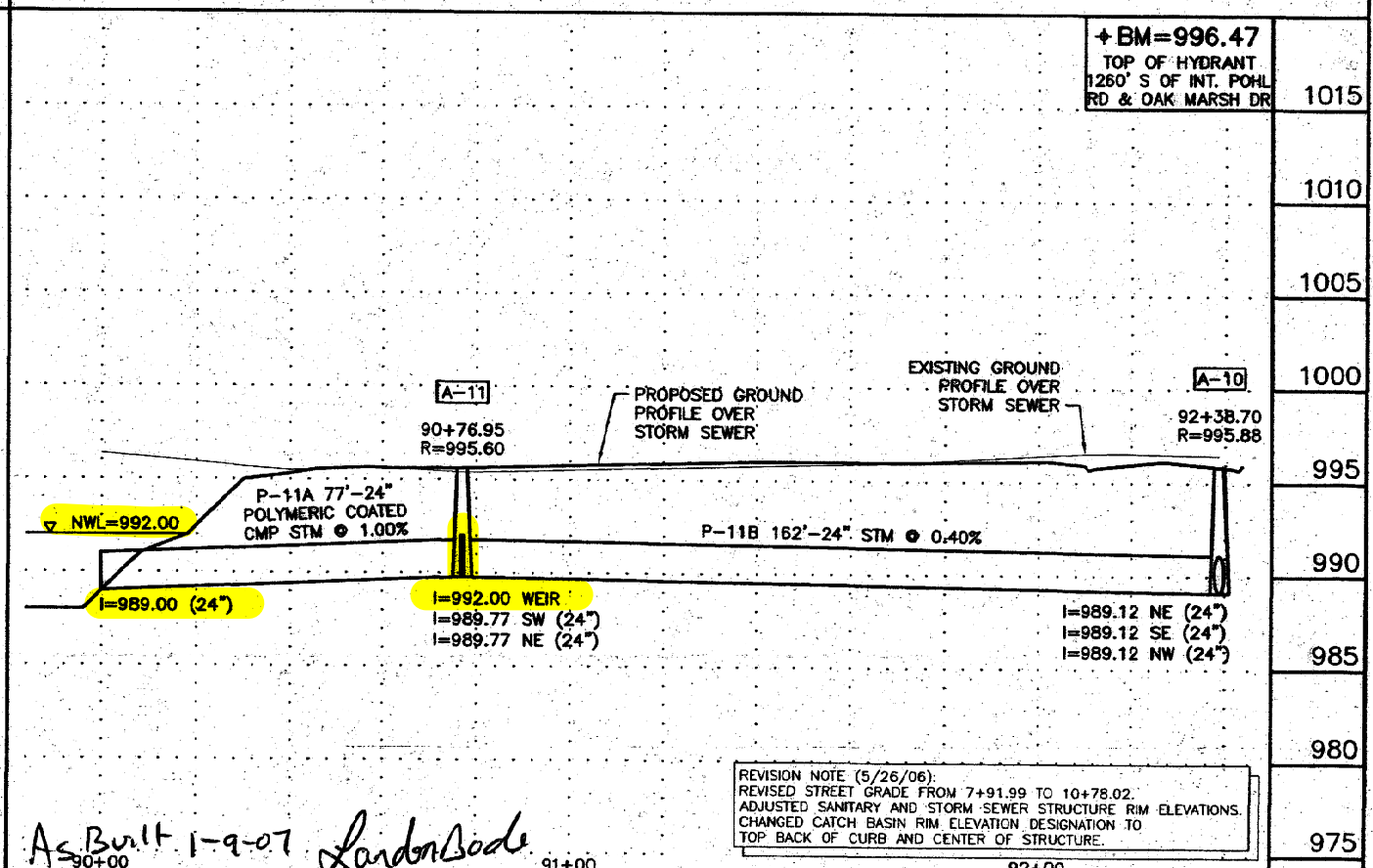
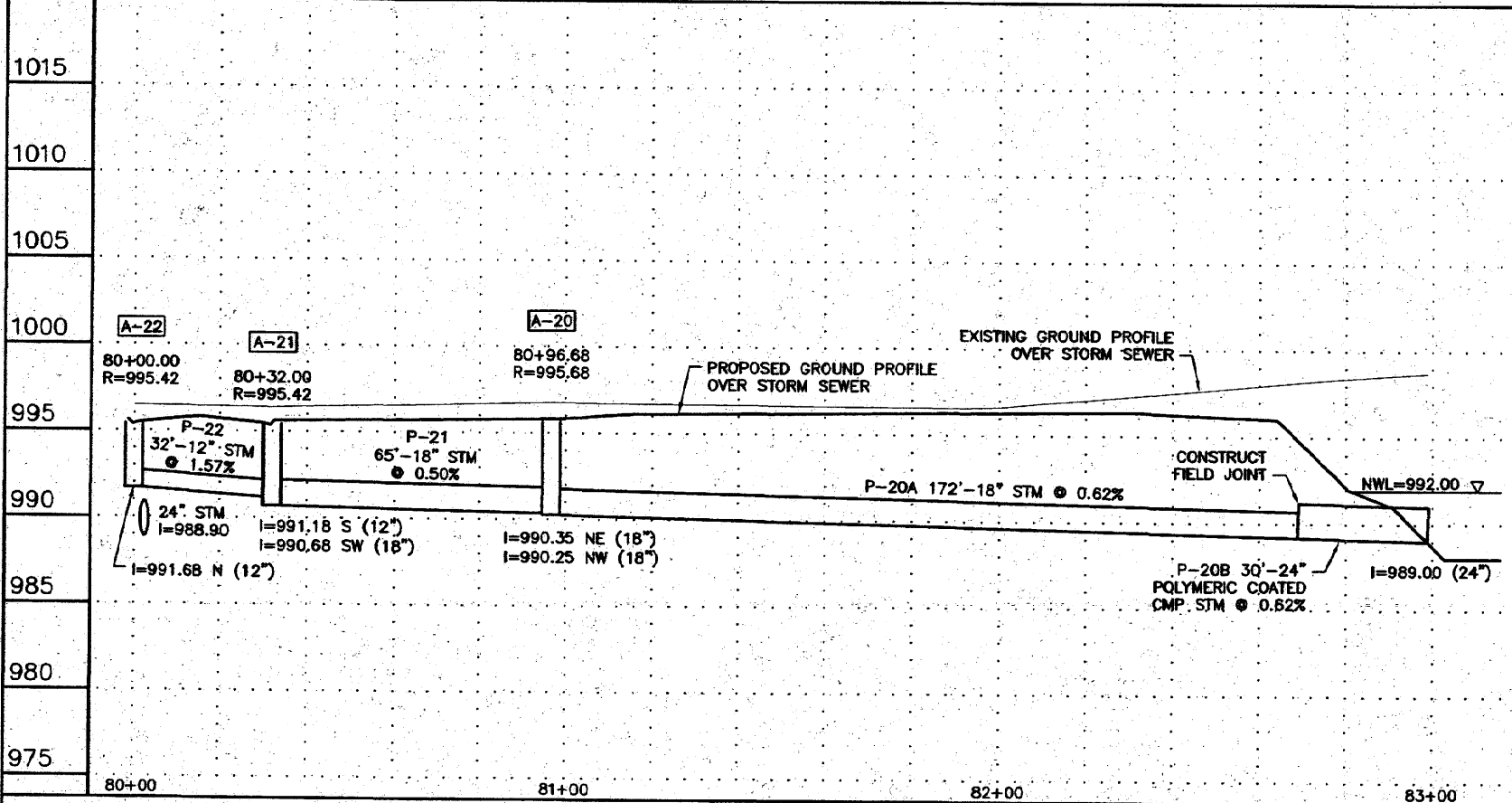
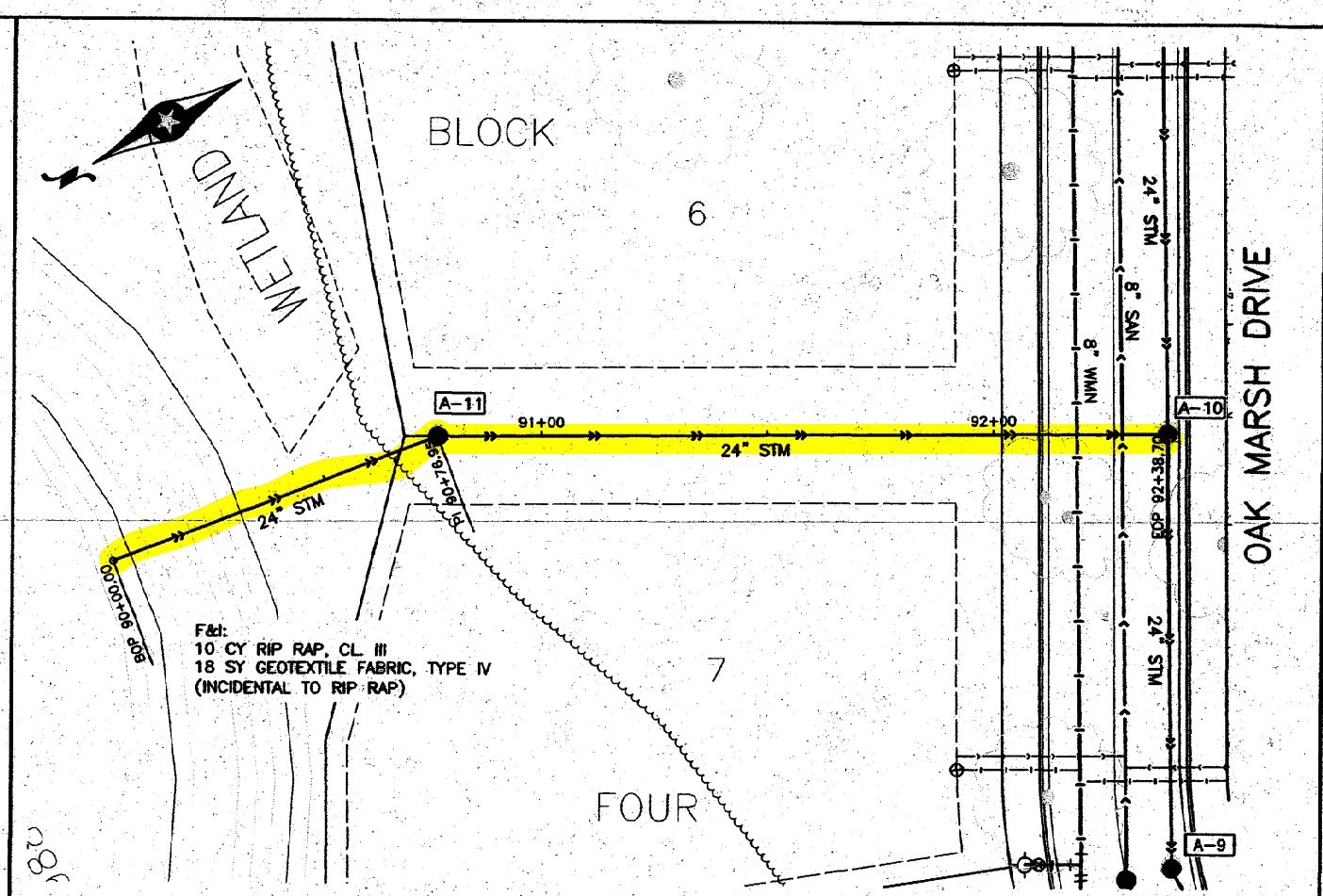
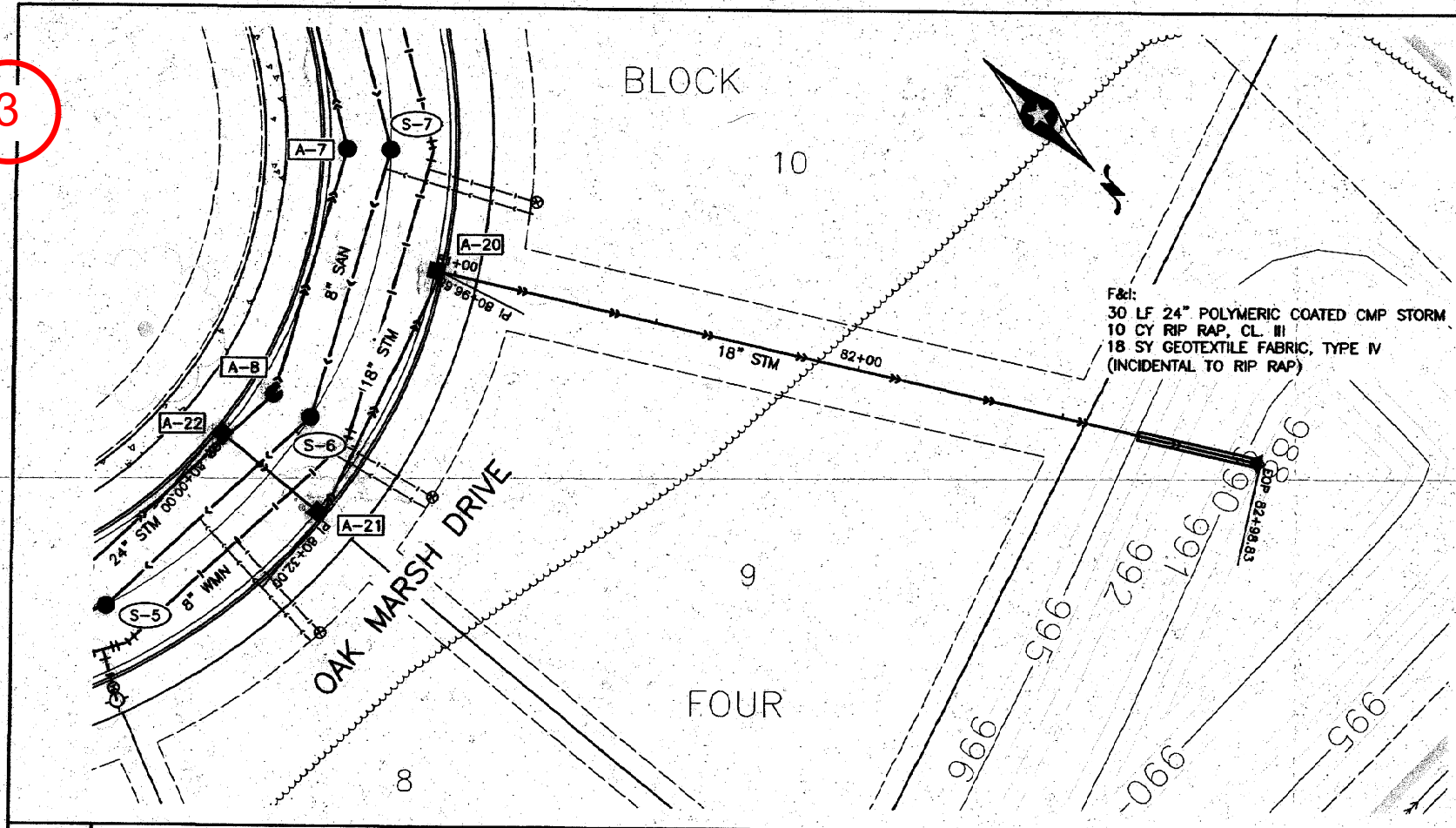
50
SCALE

REVISIONS
INITIAL DATE

GRADING AND EROSION CONTROL PLAN
2006 OAK MARSH SUBDIVISION

CITY PROJECT NUMBER 06007 SHEET 9 OF 18 SHEETS

3



BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN AMES, IA

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NATHAN J. JOETTL
LIC. NO. 42774 DATE 5/26/06

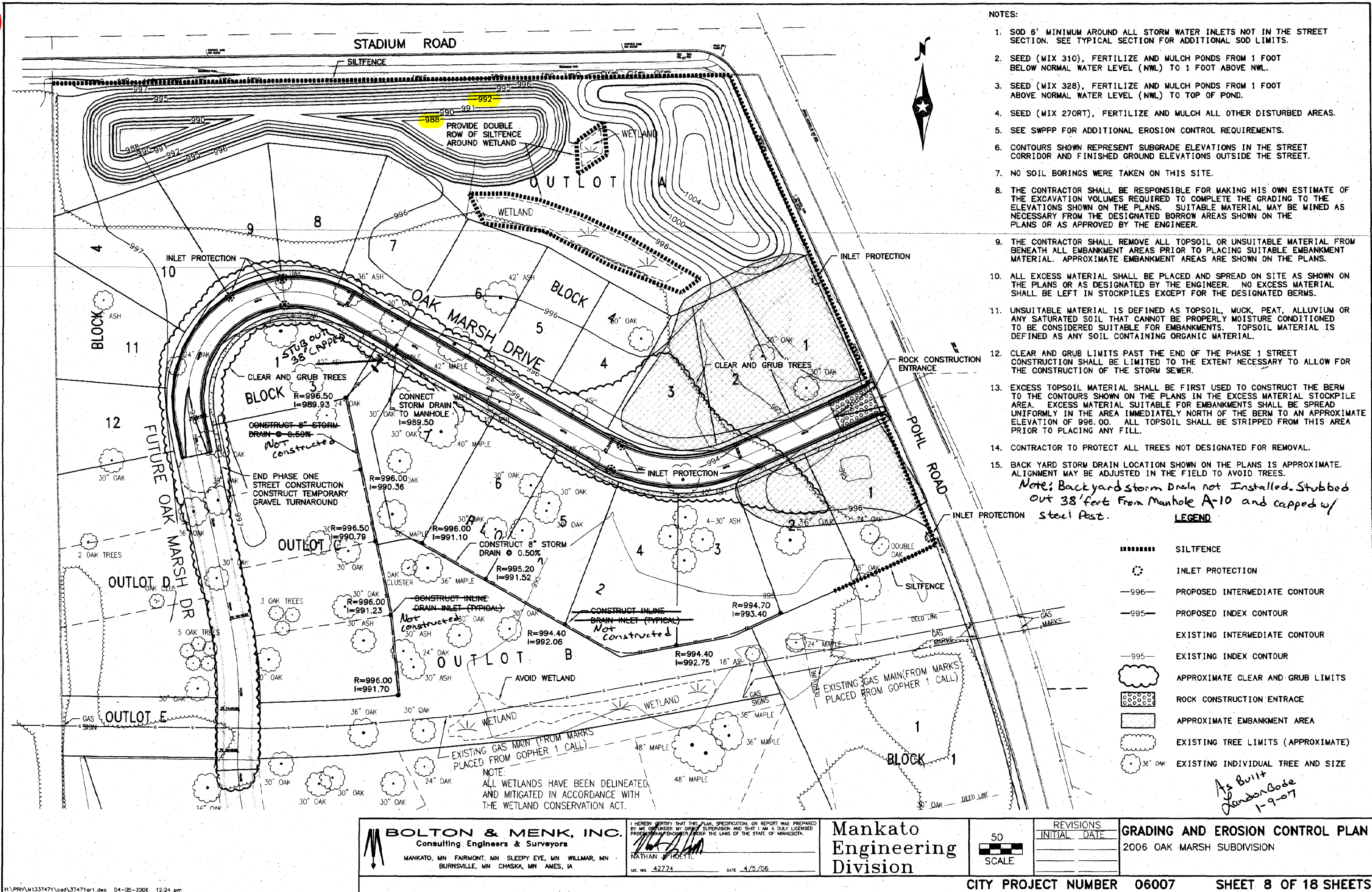
CITY OF MANKATO
ENGINEERING DEPARTMENT

20
SCALE

REVISIONS
INITIAL DATE
NJH 5-26-06

PLANNED UTILITY CONSTRUCTION
2006 OAK MARSH SUBDIVISION
NORTH POND STORM SEWER
STA 80+00 - 83+00, 90+00 - 92+00

CITY PROJECT NUMBER 06007 SHEET 14A OF 18 SHEETS



CITY OF MANKATO ENGINEERING DEPARTMENT

CONSTRUCTION PLAN FOR:

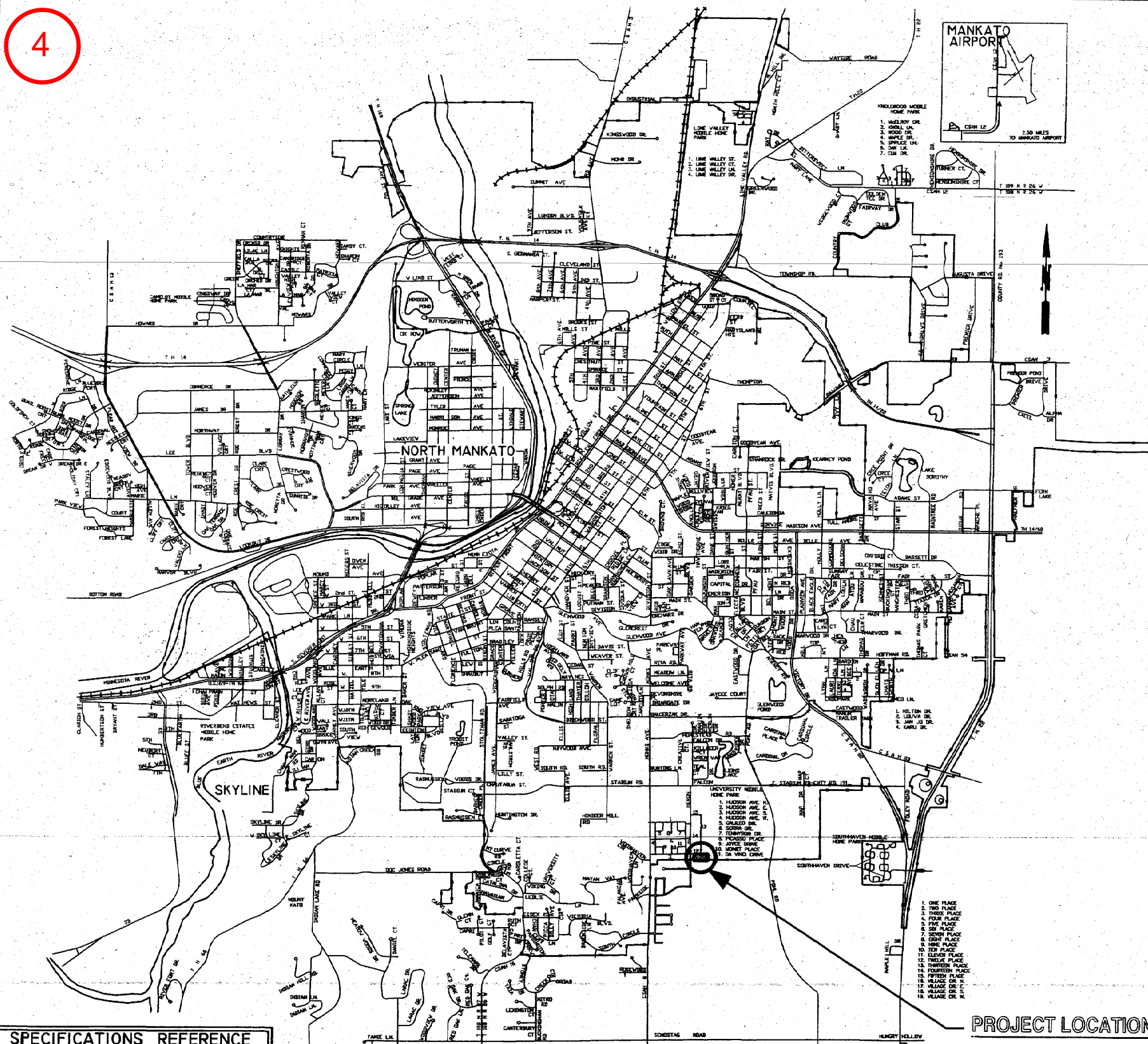
UNIVERSITY PARK POND

GRADING OF STORM WATER DETENTION POND

PROJECT - UNIVERSITY PARK DETENTION POND - CONSTRUCT WET DETENTION POND FROM DRY DETENTION POND

INDEX OF SHEETS

- 1 TITLE SHEET
- 2 HAUL ROAD PLAN, QUANTITIES & DETAILS
- 3 GRADING & EROSION CONTROL PLAN
- 4 UNIVERSITY PARK No. 6 FILL AREA PLAN



MANKATO

SPECIFICATIONS REFERENCE

THE 2000 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, AND THE STANDARD SPECIFICATIONS FOR SANITARY SEWER, STORM DRAIN AND WATERMAIN INSTALLATIONS AS PROPOSED BY THE CITY ENGINEERS ASSOCIATION OF MINNESOTA 1988 EDITION SHALL GOVERN.

THE CONTRACTOR SHALL VERIFY ALL EXISTING UNDERGROUND UTILITY LOCATIONS AND SPECIFICATIONS PRIOR TO CONSTRUCTION. ALL INPLACE UTILITIES MAY NOT BE SHOWN ON THIS PLAN.
GOPHER STATE ONE CALL 1-800-252-1166

PUBLIC UTILITY COMPANIES

CHECK THOSE COMPANIES THAT ARE INVOLVED IN THIS PROJECT

CHARTER
HICKORY TECH
CENTER POINT
XCEL
OTHER

-TV/CABLE
-TELE
-GAS
-ELECTRIC
-

AS BUILT DATA

INSPECTOR
GEN. CONTRACTOR
SANITARY PIPE
WATERMAIN
WATER VALVES
HYDRANTS
DATE

SCALE
PLAN 30' / 50'
PROFILE: HORIZONTAL 20'
PROFILE: VERTICAL 4'
INDEX MAP 2000'

APPROVED: *Kenneth R. Ricketts* DATE: 5/30/03
CITY ENGINEER
BLUE EARTH / NICOLLET COUNTY REGISTRATION NUMBER 9056

I&S Engineers & Architects, Inc.

CIVIL - MECHANICAL - STRUCTURAL
ARCHITECTURAL - LANDSCAPE - ELECTRICAL

1400 NORTH BROADWAY, SUITE 100, P.O. BOX 1000
MANKATO, MN 56001
PH (507) 325-0001 FAX (507) 325-0002

CITY OF MANKATO
ENGINEERING
DEPARTMENT

ENG. PROJECT NUMBER 03-7042

CITY PROJECT NUMBER 03062

DATE 16 MAR 2003 REG. NO. 25443

REVISIONS
INITIAL DATE

NO
SCALE

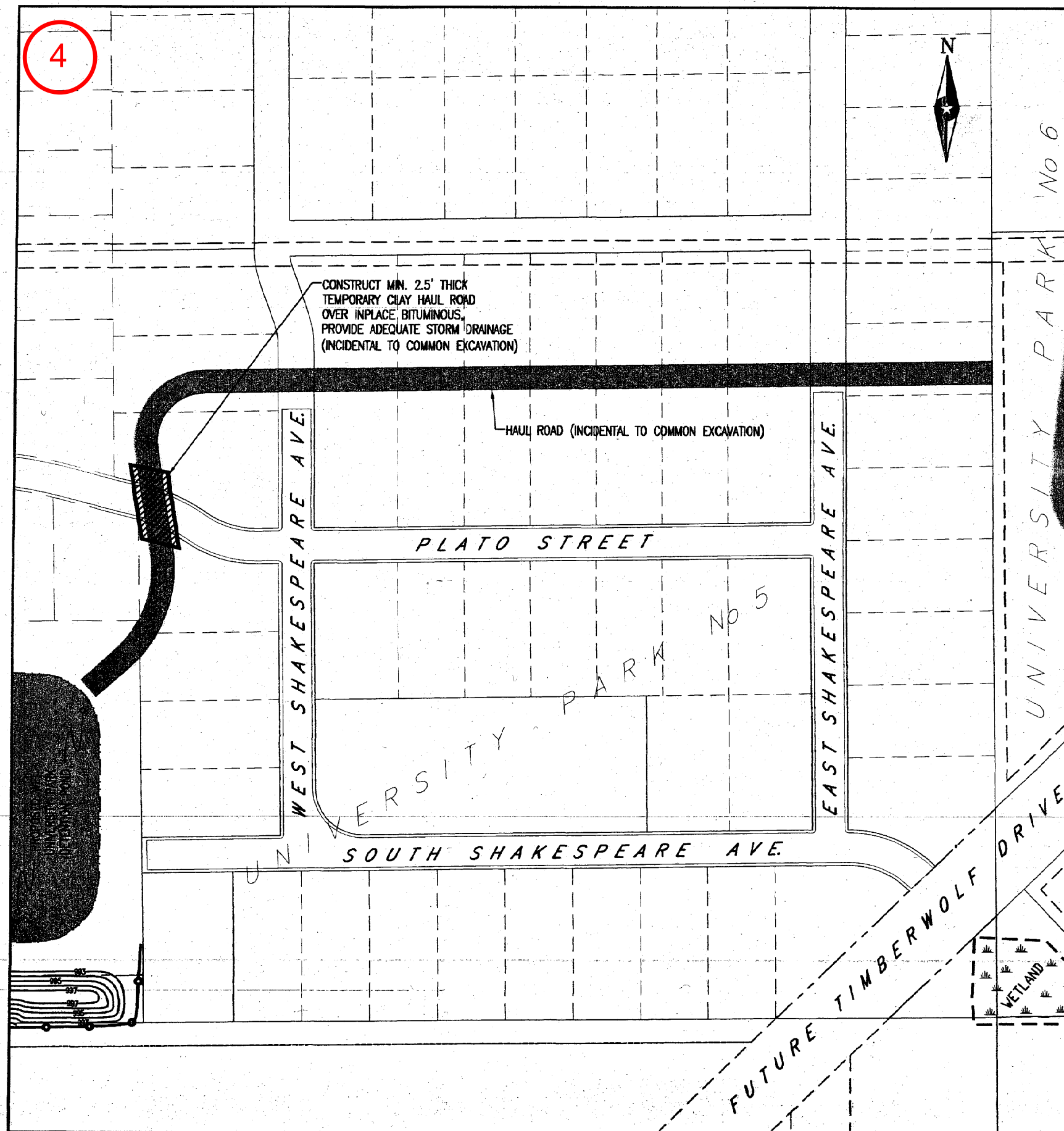
TITLE SHEET

UNIVERSITY PARK POND

MANKATO, MINNESOTA

SHEET 1 OF 4 SHEETS

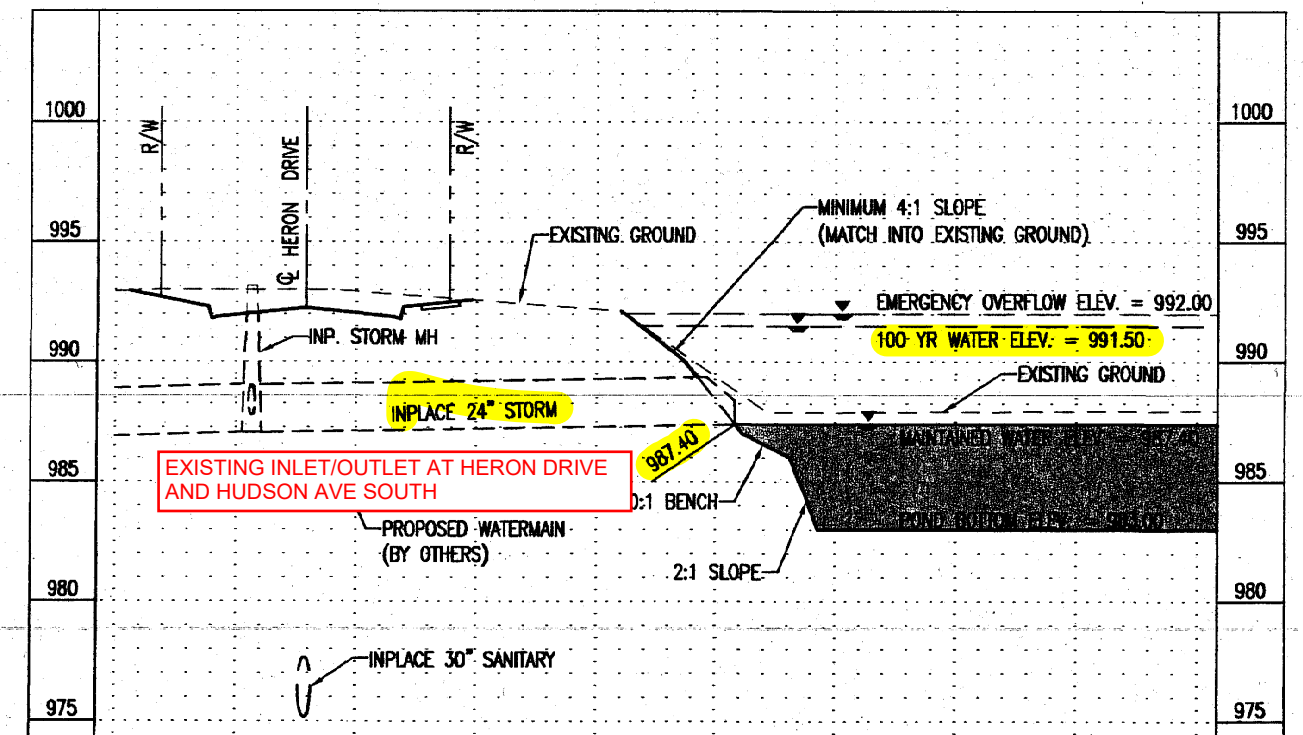
4



NOTE:
RESTORE HAUL ROAD TO
PRE-CONSTRUCTION CONDITIONS

STATEMENT OF ESTIMATED QUANTITIES

ITEM NO.	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITIES
2021.501	Mobilization	LS	1
2105.501	Common Excavation, (EV)(P)	CY	19,150
2105.501	Common Excavation, Topsoil Strip in Fill Areas (EV)(P)	CY	21,500
2511.501	Random Rip-Rap, Class III w/ Type IV Geotextile Fabric	CY	10
2573.503	Silt Fence, Pre Assembled	LF	720
2575.501	Seeding MnDOT 50B (Pond)	AC	0.98
2575.501	Seeding MnDOT 60B	AC	0.80

**POND SECTION 'A-A'**

20' HORIZONTAL
4' VERTICAL

I&S Engineers & Architects, Inc.
CIVIL - MECHANICAL - STRUCTURAL
ARCHITECTURAL - LANDSCAPE - ELECTRICAL
1400 HANCOCK AVENUE, SUITE 100, DAKOTA CITY, NE 68801
PH (402) 342-0001 FAX (402) 342-0003

**CITY OF MANKATO
ENGINEERING
DEPARTMENT**

I HEREBY CERTIFY THAT THIS PLAN 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.
DATE 16 MAR 2012 BY 25445

REVISIONS
DATE

50' HORIZ.
SCALE:

HAUL ROAD PLAN, QUANTITIES & DETAILS
UNIVERSITY PARK POND
MANKATO, MINNESOTA

ENG. PROJ. No. 03-7042

C.S.A.H. PROJECT No.

FED. PROJ. No.

S.P. No.

CITY PROJ. No. 03062

SHEET 2 OF 4 SHEETS

4

EROSION CONTROL NOTES:

CONSTRUCTION OF SILT FENCE AND ALL OTHER EROSION CONTROL MEASURES SHALL BE COMPLETE BEFORE OTHER CONSTRUCTION ACTIVITY OCCURS.

SILT FENCE AND OTHER EROSION CONTROL SHALL BE INSTALLED TO MEET RUNOFF REQUIREMENTS SET FORTH BY THE MPCA NPDES PERMIT AND BEST MANAGEMENT PRACTICES OR AS DIRECTED BY THE ENGINEER.

A ROCK CONSTRUCTION ENTRANCE SHALL BE CONSTRUCTED AT ENTRY POINT TO THE PROJECT SITE. ROCK CONSTRUCTION ENTRANCE SHALL BE 50'X40' OF 1.5" - 4" CRUSHED ROCK 12" DEEP.

SILT FENCE AND OTHER BMPs SHALL BE CHECKED EVERY 7 DAYS OR WITHIN 24 HOURS OF A 1/2" STORM EVENT OR ONCE A MONTH ON FINELY STABILIZED AREAS. ALL NON-FUNCTIONING BMPs SHALL BE REPAIRED OR REPLACED WHEN DISCOVERED.

ALL EXPOSED SOILS SHALL BE SEEDED OR SODDED AT THE EARLIEST POSSIBLE TIME TO PREVENT/REDUCE EROSION.

THE EROSION CONTROL MEASURES SHOWN ON THE PLANS SHALL BE CONSIDERED THE MINIMUM REQUIREMENTS. ADDITIONAL EROSION CONTROL MEASURES SHALL BE REQUIRED DEPENDING ON THE CONTRACTOR'S SCHEDULE AND SEQUENCING OF WORK.

GENERAL GRADING NOTES:

DRESS BERM WITH MINIMUM 6" TOPSOIL.

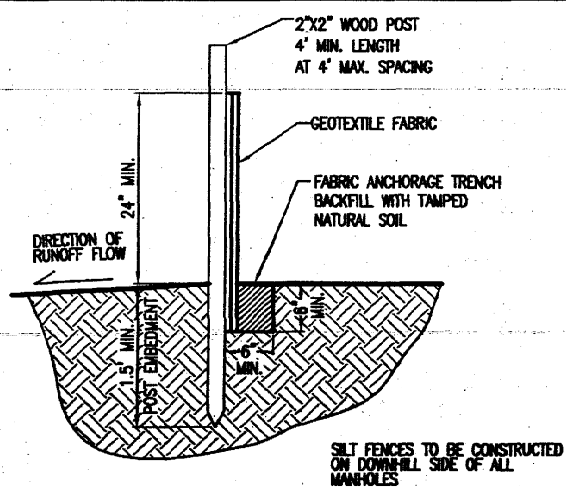
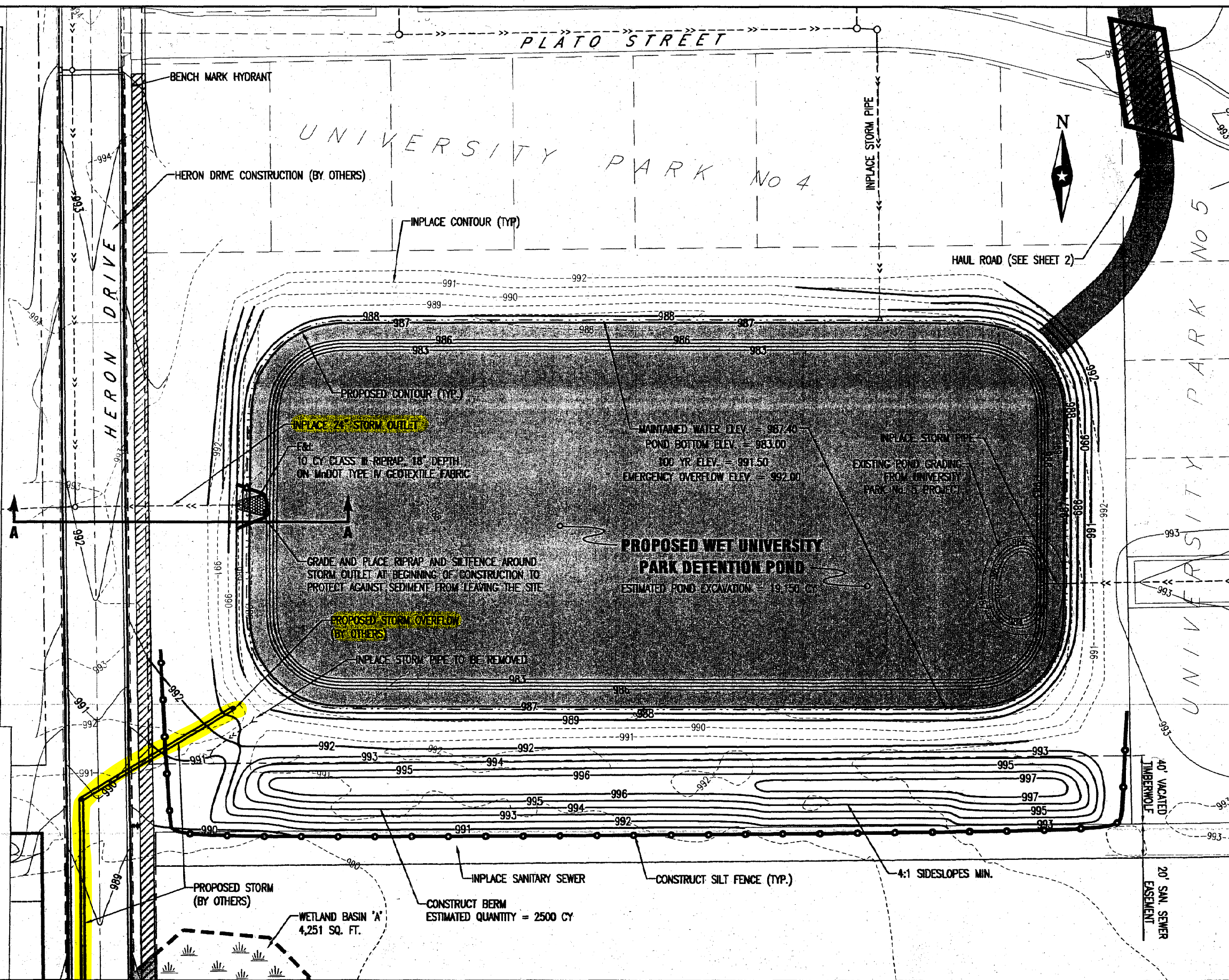
REDRESS SIDESLOPES OF POND WITH MINIMUM 6" OF TOPSOIL (DOWN TO ELEVATION 985.00)

TOPSOIL FOR BERM AND REDRESS OF POND SIDESLOPES SHALL BE EXCAVATED FROM UNDER PROPOSED BERM AND OR FROM INPLACE POND (INCIDENTAL TO COMMON EXCAVATION)

PROPOSED CONTOURS SHOW FINISHED GRADE ELEVATIONS.

ANY CLEARING & GRUBBING SHALL BE INCIDENTAL TO COMMON EXCAVATION.

ALL EXCESS MATERIAL SHALL BE HAULED FROM SITE, SEE UNIVERSITY PARK No. 6 FILL AREA PLAN.

**PREASSEMBLED SILT FENCE DETAIL**

B.M. ELEVATION = 996.50

TNTH SOUTHEAST CNR HERON DRIVE
AND PLATO DRIVE (ASSUMED)

I&S Engineers & Architects, Inc.

CIVIL - MECHANICAL - STRUCTURAL
ARCHITECTURAL - LANDSCAPE - ELECTRICAL
1400 NORTH UNIVERSITY DRIVE, P.O. BOX 1000
MANKATO, MN 56001
PH (507) 327-0051 FAX (507) 327-0052

**CITY OF MANKATO
ENGINEERING
DEPARTMENT**

I HEREBY CERTIFY THAT THIS PLAN 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.

REVISIONS

30' HORIZ.

SCALE:

GRADING & EROSION CONTROL PLAN

UNIVERSITY PARK POND
MANKATO, MINNESOTA

ENG. PROJ. No. 03-7024

C.S.A.H. PROJECT No.

FED. PROJ. No.

S.P. No.

CITY PROJ. No. 03062 SHEET 3 OF 4 SHEETS

4

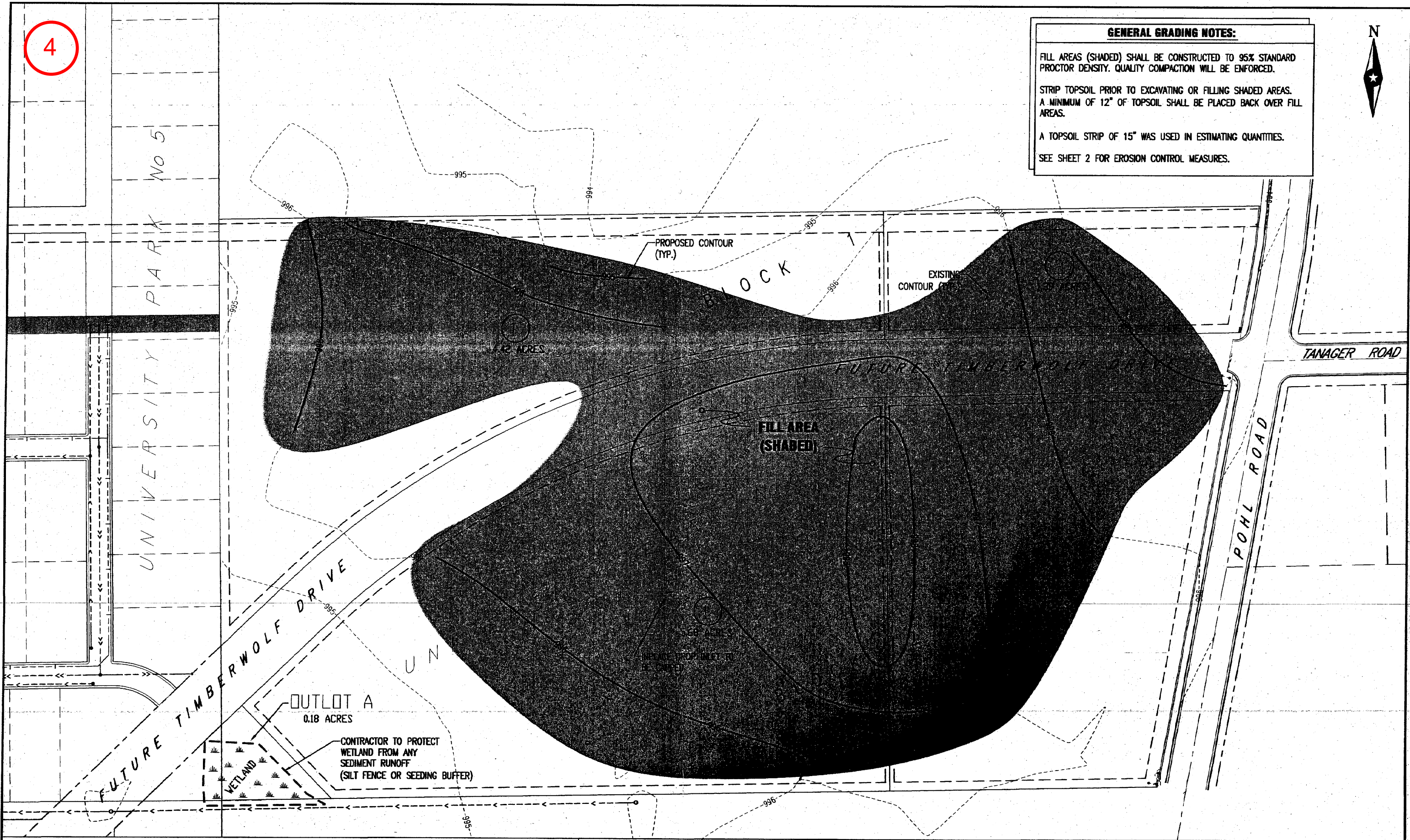
GENERAL GRADING NOTES:

FILL AREAS (SHADED) SHALL BE CONSTRUCTED TO 95% STANDARD PROCTOR DENSITY. QUALITY COMPACTION WILL BE ENFORCED.

STRIP TOPSOIL PRIOR TO EXCAVATING OR FILLING SHADED AREAS. A MINIMUM OF 12" OF TOPSOIL SHALL BE PLACED BACK OVER FILL AREAS.

A TOPSOIL STRIP OF 15" WAS USED IN ESTIMATING QUANTITIES.

SEE SHEET 2 FOR EROSION CONTROL MEASURES.



B.M. ELEVATION=996.50
TNFH SOUTHEAST CNR HERON DRIVE
AND PLATO DRIVE (ASSUMED)

I&S Engineers & Architects, Inc.
CIVIL - MECHANICAL - STRUCTURAL
ARCHITECTURAL - MUNICIPAL - ELECTRICAL
1400 KODIAK UNIVERSITY DRIVE, P.O. BOX 1000
MANKATO, MN 56001
PH (507) 337-0001 FAX (507) 337-3300

**CITY OF MANKATO
ENGINEERING
DEPARTMENT**

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A FULLY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
[Signature]
DATE: 10/14/03 EX. NO. 125442

REV.	REVISIONS	DATE

50' HORIZ.
SCALE:

UNIVERSITY PARK No. 6 FILL AREA PLAN
UNIVERSITY PARK POND
MANKATO, MINNESOTA

5

EROSION CONTROL LEGEND

SYMBOL	ITEM NO.	DESCRIPTION	UNITS	QUANTITY
PC		PERIMETER CONTROL	LF	845
	2573.530	STORM DRAIN INLET PROTECTION	EACH	7
	2573.535	STABILIZED CONSTRUCTION EXIT	EACH	1
		EXISTING DRAINAGE ARROW		
		PROPOSED DRAINAGE ARROW		

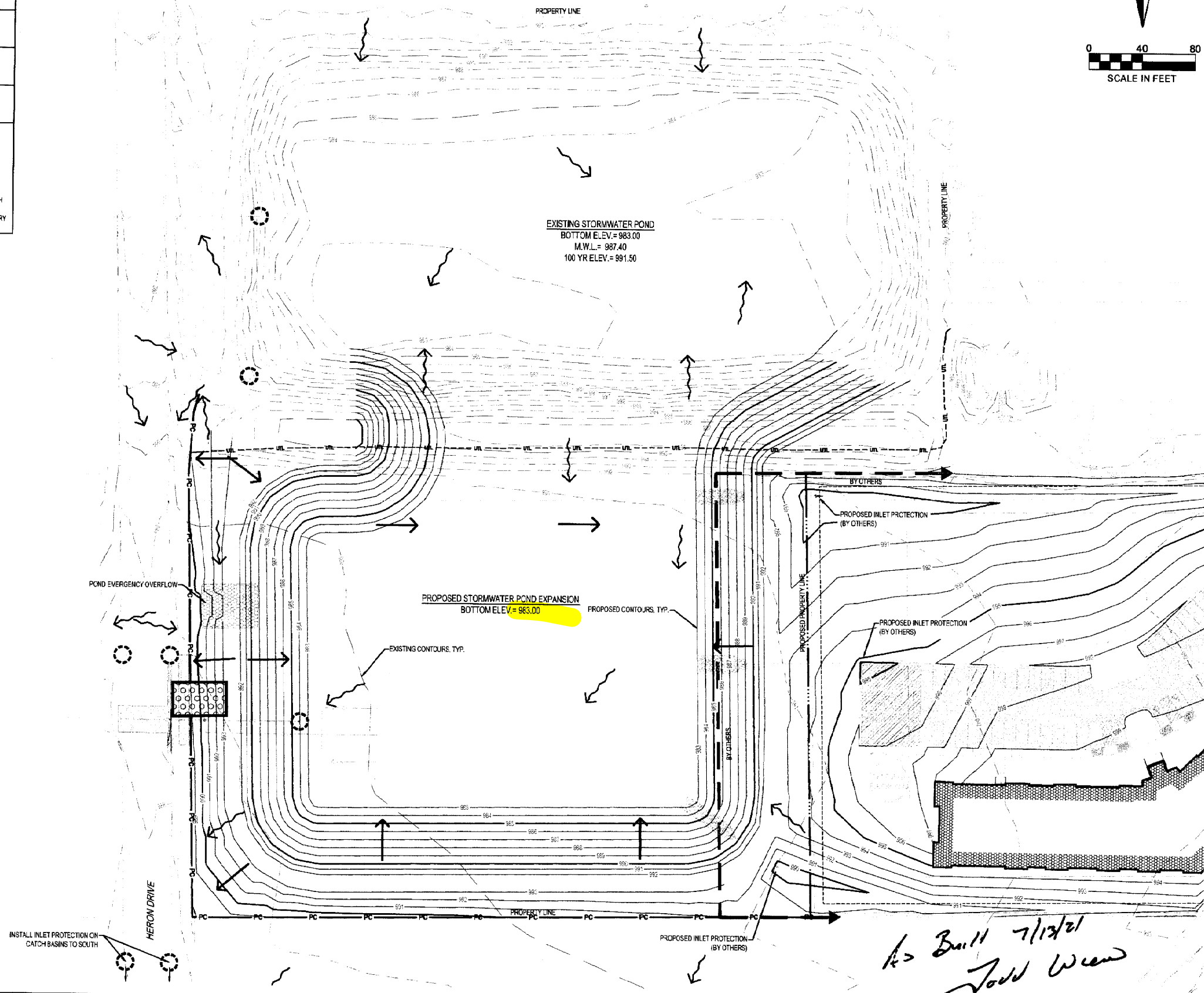
* PERIMETER CONTROL CAN BE SILT FENCE, BIO-ROLL OR WOOD MULCH.

** QUANTITIES ARE FOR INFORMATIONAL PURPOSES TO MEET THE REQUIREMENTS OF THE CONSTRUCTION STORMWATER PERMIT. NO GUARANTEE IS MADE TO THE ACTUAL QUANTITIES REQUIRED.

*** THE QUANTITIES SHOWN ARE TOTAL FOR THE ENTIRE PROJECT NOT SPECIFIC TO THIS SHEET.

**** SEE TURF RESTORATION PLAN FOR FINAL TURF ESTABLISHMENT

NOTE: SWPPP COVERAGE INCLUDES ELECTRIC, GAS, TELEPHONE, AND CABLE INSTALLATION. EACH COMPANY OR THEIR SUBCONTRACTOR IS RESPONSIBLE TO FOLLOW THE REQUIREMENTS OF THIS SWPPP INCLUDING PROVIDING THEIR OWN RESTORATION IF INSTALLATION OCCURS AFTER PRIMARY INSTALLATION OF SEEDING/SODDING/MULCHING DURING CONSTRUCTION OF EACH UTILITY.



As Built 7/13/21
Todd Wenz

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.

NATHAN J. HERMER

Nathan J. Hermer

DATE: 04/17/2018 L.C. NO.: 54848

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.

DATE: _____ LIC. NO.: _____

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PROJECT

CITY OF MANKATO

UNIVERSITY PARK POND EXPANSION

MANKATO MINNESOTA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	17-20419
CAD FILE NAME	20419 CITY POND SWPPP
DRAWN BY	SMW
DESIGNED BY	SMW/NUH
REVIEWED BY	NUH
ORIGINAL ISSUE DATE	04/17/2018
CLIENT PROJECT NO.	10024

TITLE

STORMWATER POLLUTION PREVENTION PLAN

SHEET

6 OF 11

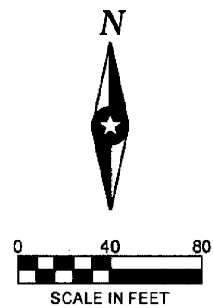
5

	EXISTING CONTOUR (MINOR INTERVAL)
	EXISTING CONTOUR (MAJOR INTERVAL)
	PROPOSED CONTOUR (MINOR INTERVAL)
	PROPOSED CONTOUR (MAJOR INTERVAL)
	PROPOSED SPOT ELEVATION
	PROPOSED TOP BACK OF CURB SPOT ELEVATION

EXCAVATED MATERIAL SHALL BE COMPACTED TO 100% PROCTOR DENSITY FOR THE UPPER 3" AND 95% PROCTOR DENSITY BELOW 3" IN ALL BUILDING PADS. REFER TO THE QUALITY COMPACTION METHOD IN ALL OTHER AREAS.

PROPOSED CONTOURS SHOW FINISHED GRADE ELEVATIONS. BUILDING PAD AND PAVEMENT HOLD DOWNS ARE NOT INCLUDED.

APPROXIMATE AMOUNT OF EXCAVATED MATERIAL TO BE STOCK PILED ON PROPERTY TO THE WEST.
TOPSOIL = 600 CY
FILL MATERIAL = 8,200 CY



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NATHAN J. HERMER

DATE 04/17/2018 LIC NO. 54848

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DATE _____ LIC. NO. _____

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PROJECT

CITY OF MANKATO

UNIVERSITY PARK POND EXPANSION

MANKATO MINNESOTA

[illegible]

PROJECT NO.	17-20419
-------------	----------

CAD FILE NAME 20419 CITY POND GRADING

DRAWN BY SMW

DESIGNED BY SMW/NJ

REVIEWED BY	NJH
-------------	-----

ORIGINAL ISSUE DATE	04/17/2018
---------------------	------------

TITLE

SITE AND GRADING PLAN

SHEET

10

OF 11

CITY OF MANKATO ENGINEERING DEPARTMENT

CONSTRUCTION PLAN FOR:

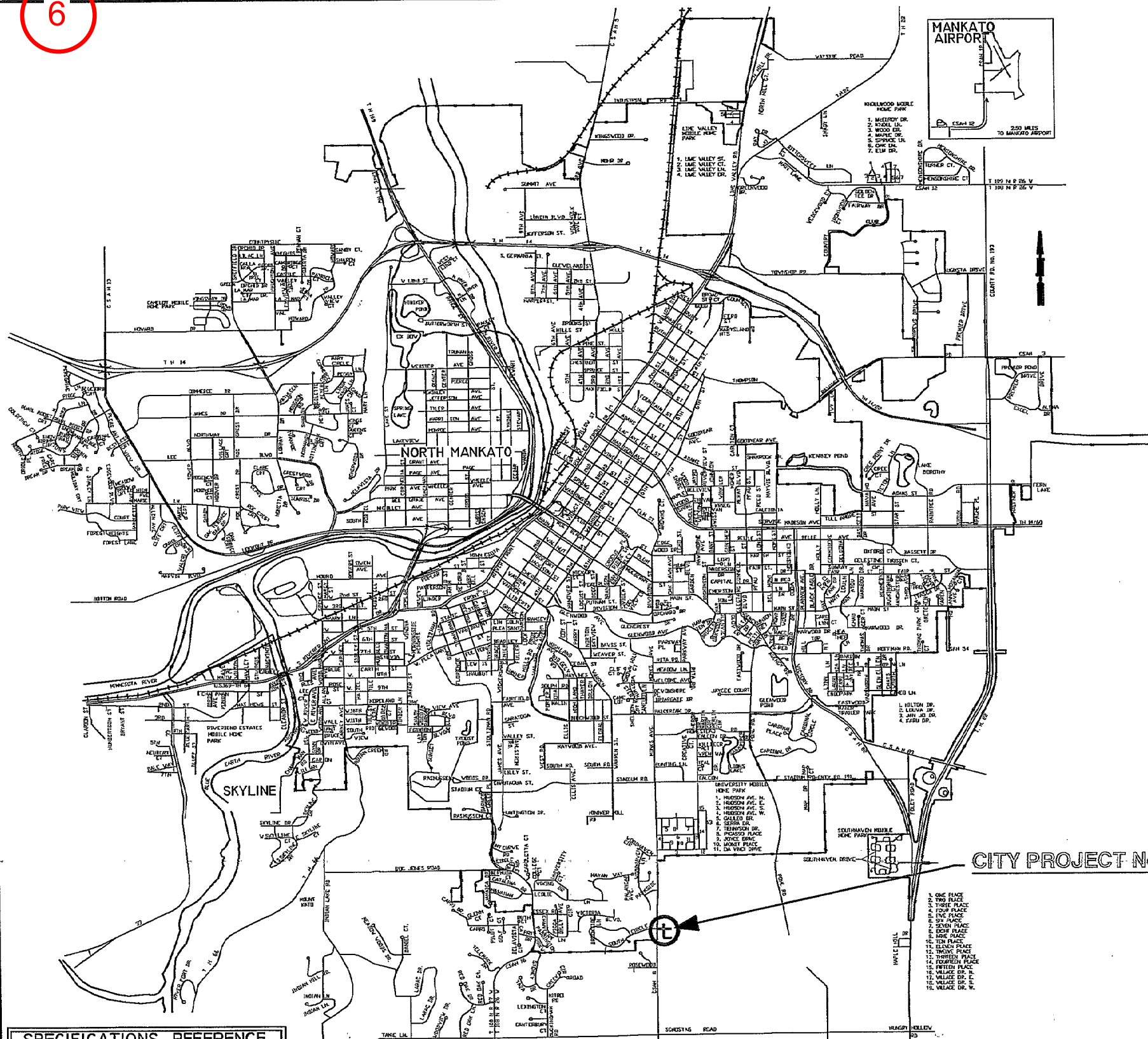
COPPERFIELD SUBDIVISION - PHASE IA

SANITARY SEWER, STORM DRAINAGE, WATERMAIN,
BASE, CURB & GUTTER, SURFACING, AND GRADING

CITY PROJECT NO. 02039 - COPPERFIELD DRIVE - MONKS AVENUE TO 450' EAST
MAVERICK DRIVE - 160' NORTH & 300' SOUTH OF
COPPERFIELD DRIVE
AREIA DRIVE - 260' EAST OF MAVERICK DRIVE

INDEX OF SHEETS

- | | |
|-------|-----------------------------------|
| 1 | TITLE SHEET |
| 2 | STATEMENT OF ESTIMATED QUANTITIES |
| 3-4 | SCHEDULES |
| 5 | TYPICAL SECTIONS |
| 6-8 | DETAILS |
| 9 | SHEET LOCATOR PLAN |
| 10 | GRADING & LANDSCAPING DETAILS |
| 11 | GRADING PLAN |
| 12 | LANDSCAPING & SIDEWALK PLAN |
| 13-18 | PLANNED UTILITY CONSTRUCTION |
| 19-21 | PAVING PLAN |



CITY PROJECT No. 02039 LOCATION

SPECIFICATIONS REFERENCE

THE 2000 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, AND THE STANDARD SPECIFICATIONS FOR SANITARY SEWER, STORM DRAIN AND WATERMAIN INSTALLATIONS AS PROPOSED BY THE CITY ENGINEERS ASSOCIATION OF MINNESOTA 1988 EDITION SHALL GOVERN.

PUBLIC UTILITY COMPANIES

CHECK THOSE COMPANIES THAT ARE INVOLVED IN THIS PROJECT

BRESNAN - TV CABLE ☐
MCTC - TELEPHONE ☐
MINNEGASCO - GAS ☐
NSP - ELECTRIC ☐
SPRINT - ☐
OTHER - ☐

AS BUILT DATA

INSPECTOR DEAN K.
GEN. CONTRACTOR OWATONNA - CRANE CREEK
SANITARY PIPE PVC
WATERMAIN PVC
WATER VALVES WATERLOUS
HYDRANTS WATERLOUS
DATE 07-2003

SCALE

PLAN 40
PROFILE: HORIZONTAL 20
PROFILE: VERTICAL 4
INDEX MAP 2000

MANKATO

THE CONTRACTOR SHALL VERIFY ALL EXISTING UNDERGROUND UTILITY LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION. ALL INPLACE UTILITIES MAY NOT BE SHOWN ON THIS PLAN.
GOPHER STATE ONE CALL 1-800-252-1166

APPROVED: Keith Reft DATE: 7/29/02
CITY ENGINEER

BLUE EARTH / NICOLLET COUNTY REGISTRATION NUMBER 9056

AS-BUILT 07-2003 Dean K.

I&S Engineers & Architects, Inc.
CIVIL - MECHANICAL - STRUCTURAL
ARCHITECTURAL - MUNICIPAL - ELECTRICAL

1409 NORTH WASHINGTON DRIVE, P.O. BOX 1028
MANKATO, MN 56001
PH (507) 387-0551 FAX (507) 387-3961

**CITY OF MANKATO
ENGINEERING
DEPARTMENT**

ENG. PROJECT NUMBER 02-6380

CITY PROJECT NUMBER 02039

SHEET 1 OF 21 SHEETS

REVISIONS

NO. INITIAL DATE

SCALE

TITLE SHEET

EARTHWORK SUMMARY:

COMMON EXCAVATION: 13,900 CY

TOPSOIL STRIP (WITHIN
EMBANKMENT AREAS): 12,400 CY**TEMPORARY ENTRANCE NOTE:**

A ROCK CONSTRUCTION ENTRANCE SHALL BE CONSTRUCTED AT ENTRY POINT TO THE PROJECT SITE. ROCK CONSTRUCTION ENTRANCE SHALL BE 50'X40' OF 1.5" - 4" CRUSHED ROCK 12" DEEP.

SILT FENCE AND OTHER EROSION CONTROL SHALL BE INSTALLED TO MEET RUNOFF REQUIREMENTS SET FORTH BY THE MPCA NPDES PERMIT AND BEST MANAGEMENT PRACTICES OR AS DIRECTED BY THE ENGINEER. (SEE SITE GRADING PLAN)

GENERAL GRADING NOTES:

SHADED AREAS AND BUILDING PADS SHALL BE CONSTRUCTED TO 98% STANDARD PROCTOR DENSITY. REFER TO QUALITY COMPACTION ELSEWHERE. QUALITY COMPACTION WILL BE ENFORCED.

STRIP TOPSOIL PRIOR TO EXCAVATING OR FILLING STREET, BUILDING PADS, AND POND AREAS. A MINIMUM OF 6" OF TOPSOIL SHALL BE PLACED IN AREAS OUTSIDE OF THE STREET AND BUILDING PADS.

LEAVE STREET DOWN 13" FROM FINISHED GRADES, ON MAVERICK AND AREA DRIVES FOR STREET SECTION.

LEAVE STREET DOWN 16" FROM FINISHED GRADES ON COPPERFIELD DRIVE FOR STREET SECTION.

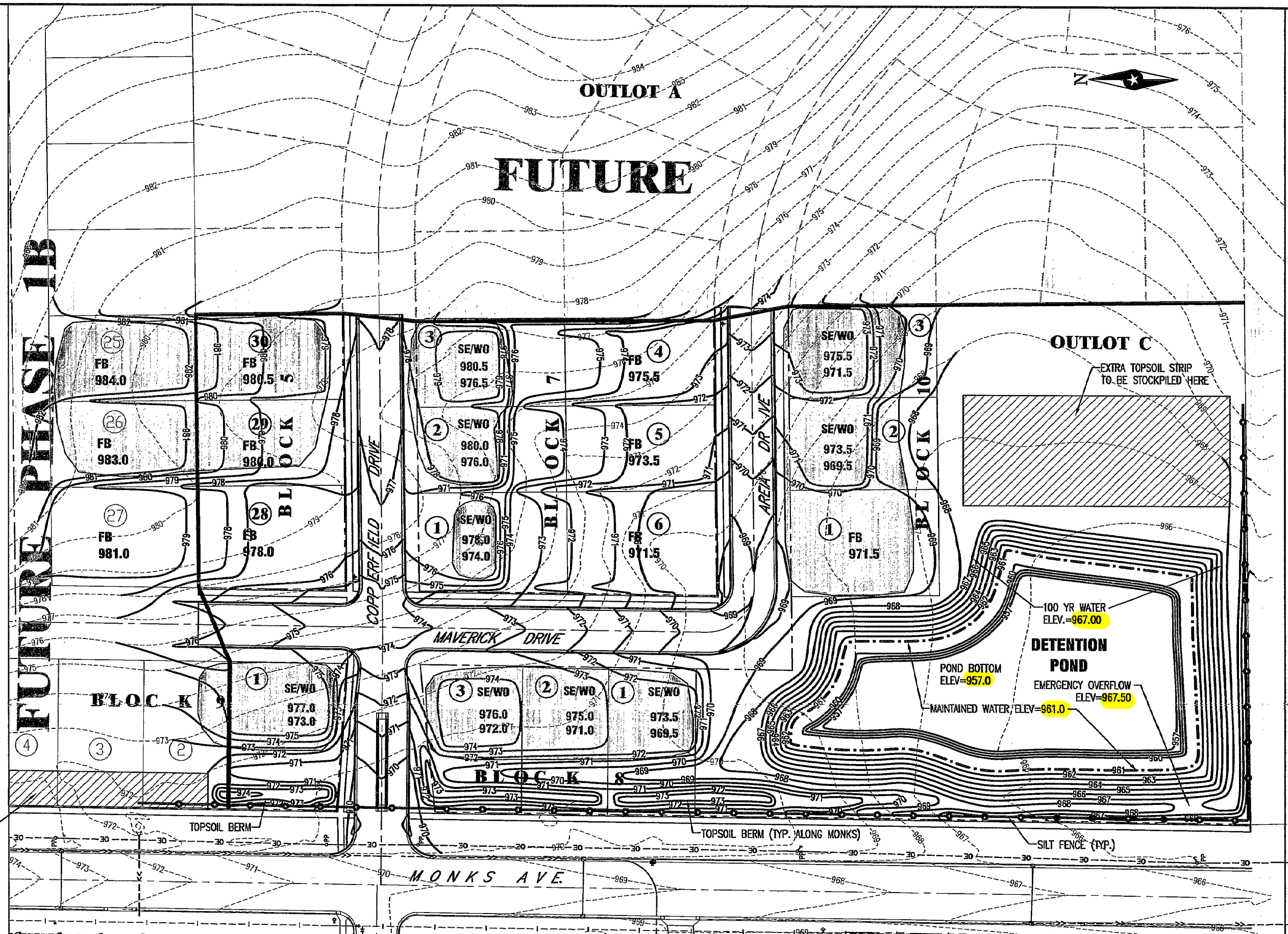
LEAVE BUILDING PADS DOWN 12" BELOW STATED FINISHED FLOOR ELEVATIONS.

A TOPSOIL STRIP OF 18" WAS USED IN ESTIMATING QUANTITIES

PROPOSED CONTOURS SHOW FINISHED GRADE ELEVATIONS.

ANY CLEARING & GRUBBING SHALL BE INCIDENTAL TO COMMON EXCAVATION.

EXTRA TOPSOIL STRIP TO BE PLACED ALONG MONKS AS TOPSOIL BERM, CONSTRUCT BERM SIMILAR TO PHASE 1A BERM



I&S Engineers & Architects, Inc.
 CIVIL - MECHANICAL - STRUCTURAL
 ARCHITECTURAL - MUNICIPAL - ELECTRICAL
 1408 NORTH UNIVERSITY DRIVE, P.O. BOX 1000
 MANKATO, MN 56002
 PH (507) 327-4051 FAX (507) 327-4053

**CITY OF MANKATO
 ENGINEERING
 DEPARTMENT**

I HEREBY CERTIFY THAT THIS PLAN 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.

DATE: 10/22/02

10/22/02

REVISIONS

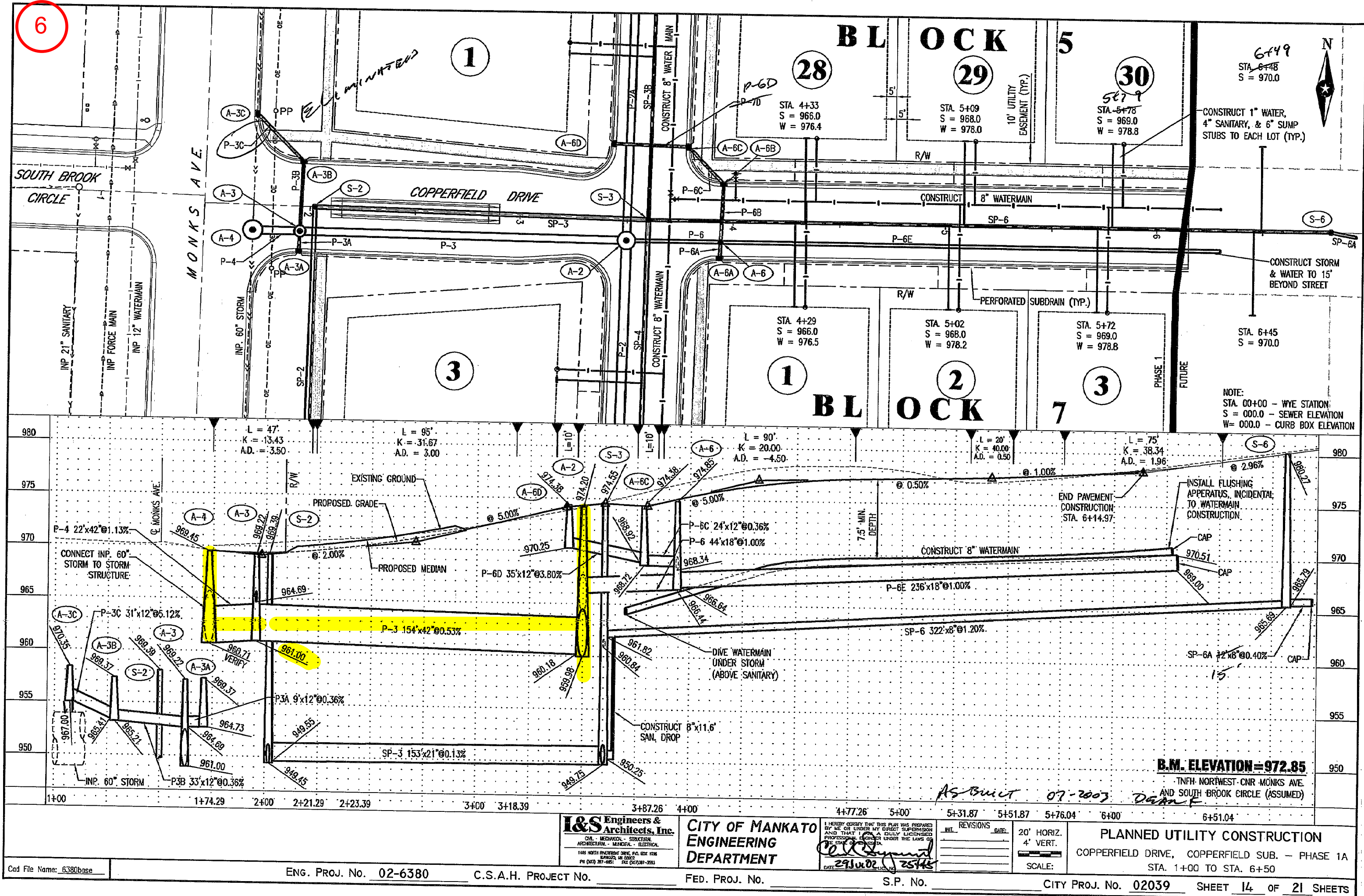
NO.	DATE	DESCRIPTION
1	10/22/02	10/22/02

40' HORIZ.

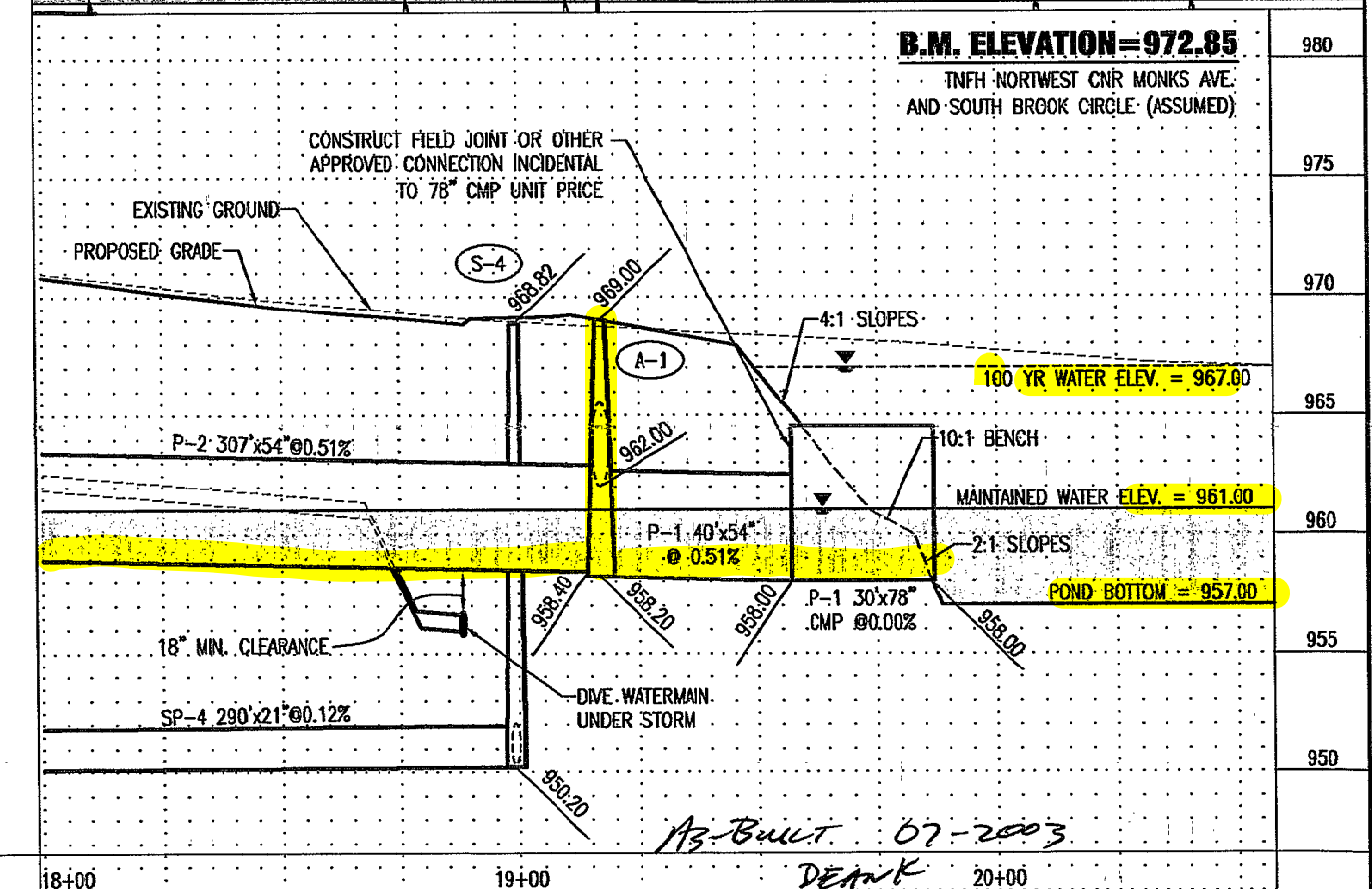
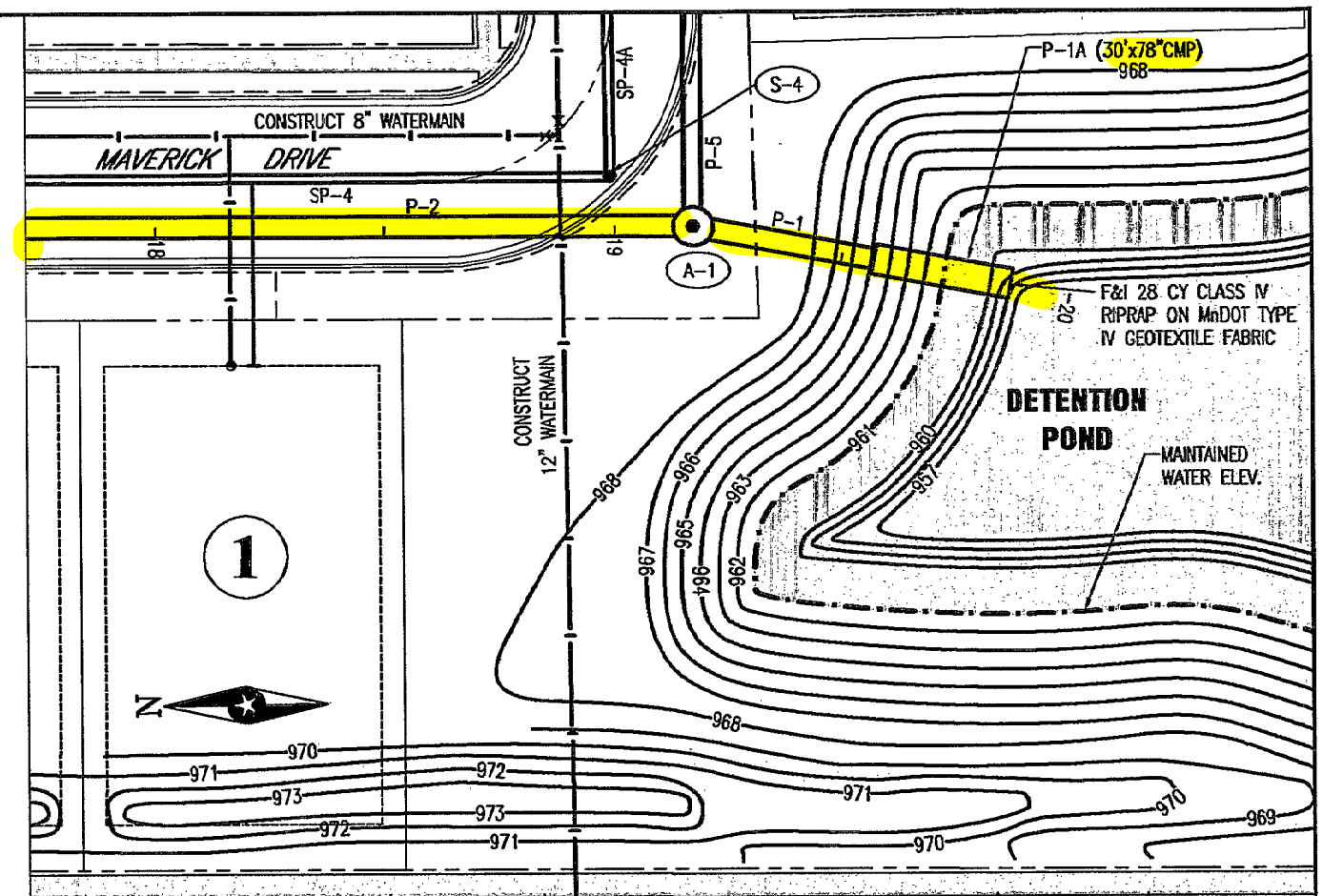
SCALE:

GRADING PLAN
 COPPERFIELD SUBDIVISION - PHASE 1A
 MANKATO, MINNESOTA

6



-00 TO STA. 19+00



I&S Engineers & Architects, Inc.
 CIVIL - MECHANICAL - STRUCTURAL
 ARCHITECTURAL - MUNICIPAL - ELECTRICAL
 1408 NORTH RACINE STREET, P.O. BOX 1028
 MADISON, WI 53702
 PH (608) 307-0851 FAX (608) 307-2583

**CITY OF MANKATO
 ENGINEERING
 DEPARTMENT**

I HEREBY CERTIFY THAT THIS PLAN 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 WISCONSIN.
 DATE 25 JUL 02 BY JES/HLS

REV.	REVISIONS	DATE

20' HORIZ.
 4' VERT.
 SCALE:

PLANNED UTILITY CONSTRUCTION
 STORM POND INLETS
 COPPERFIELD SUBDIVISION - PHASE 1A

Appendix C: PCSWMM Workmap

