MINNEHAHA CREEK
WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE

Meeting: Board of Managers
Meeting date: 8/14/2025
Agenda Item #: 10.1
Item type: Permit

Title:	Permit #25-262: Lake Zumbra/Sunny Culvert Replacement, Victoria
Applicant:	Three Rivers Park District
Prepared by:	Name: Abigail Couture, Permitting Technician Phone: (952) 641-4587 acouture@minnehahacreek.org

Recommendation:
Approval of MCWD permit 25-262 in accordance with the submitted plans, and on the following conditions:

- Permit issuance on execution of an Agreement or Programmatic Agreement to maintain the replacement culvert in accordance with the Waterbody Crossings and Structures Rule
- Notify above MCWD staff, by email, at least five business days before actual culvert placement
- Submit contractor contact information for inspections

Project Location and Scope:
Project Purpose and Scope:
Three Rivers Park District (TRPD, Applicant), by Moore Engineering (Applicant's Engineer), has applied for a Minnehaha Creek Watershed District (MCWD) permit to replace an existing 24" corrugated steel pipe (CSP) culvert 50 feet in length that is at the end of its serviceable life underneath a bike trail berm between Lakes Sunny and Zumbra. As a part of the culvert replacement, the new culvert will be repositioned slightly more in the middle of the berm, southeast of the current location, to avoid clogging and maintenance issues which occur now. The new culvert will be a 50-foot, 24" CSP set at the same elevations as the existing culvert. The culvert diameter, material, and invert elevations will be maintained from the existing to proposed conditions. This permit is being reviewed for MCWD's Erosion Control, Waterbody Crossings and Structures, and Floodplain Alteration rules related to the culvert replacement.

Location and Hydrology:
The Project is located at 7023 Nature Center Drive, Victoria, in the Carver Park Nature Preserve within the Six-Mile Creek subwatershed. The Project is hydrologically located within the Zumbra-Sunny complex, which is considered one MN DNR public water basin (100041-00) due to historic connection and a consistent ordinary high-water level (OHW). Water from Lake Zumbra drains into Lake Sunny, through a first-order stream that was enclosed in the existing culvert in about 1963. Lake Sunny drains Lake Zumbra and Stone Lake and outlets southeast through a 36" culvert which eventually flows under Highway 11 into Lake Auburn. The site location, waterbodies, and a drainage map can be found in Attachment A.

The Zumbra Ridge neighborhood is situated on a peninsula in Lake Zumbra and has a longstanding interest in lake levels and related water issues. Given this history, any project that could influence the 100-year floodplain elevation or the OHW draws particular attention from residents. Their engagement on these matters has been consistent and will be further discussed later in this memo.

Regulatory Framework and Triggers:
The MCWD's Erosion Control, Waterbody Crossings and Structures, and Floodplain Alteration rules are applicable for this Project. MCWD staff and the District Engineer have reviewed the Project and the site plans (Attachment B) and concluded it meets the applicable MCWD rules. The Project is before the Board of Managers due to public requests with concerns about high water levels on Lake Zumbra and requests that high water levels be alleviated by culvert design and attention to land use in the surrounding area.

MCWD Rule Analysis:

Erosion Control Rule

MCWD's Erosion Control Rule applies to projects that propose to disturb more than 5,000 square feet or move greater than 50 cubic yards of material. The Project proposes to disturb 2,415 square feet and excavate 80 cubic yards of material; therefore, under Section 2(c), the rule applies. The Project is also subject to erosion and sediment control measures under Section 5(c) of the Waterbody Crossings and Structures and Section 5(f) of the Floodplain Alteration Rules. The Applicant has provided an erosion control plan and restoration plan in the submittals, as required by Section 3(b). The Applicant proposes a double floating silt curtain around the Project limits. All stockpiles will be surrounded by biologs and trees will be protected during construction. Turf grass seed will be placed on disturbed soils and a Category 20 erosion control blanket will be utilized on seeded areas. On the disturbed banks around the culvert, river bulrush plugs will be placed for stabilization. Staff have reviewed the permit and have found it to be complete and compliant with all Erosion Control Rule requirements.

Waterbody Crossings and Structures Rule

MCWD's Waterbody Crossings and Structures Rule (WBX Rule) is applicable when a roadway, bridge, boardwalk, utility, conveyance, or associated structure is to be placed below the top of bank of a waterbody.

There is currently one failing 24" CSP culvert underneath the berm between Lake Zumbra and Lake Sunny. The Project proposes to move the culvert approximately 60 feet southeast underneath the berm for easier access and maintenance. The new culvert will be a 24" CSP set at the same invert elevations. Therefore, a permit will be required underneath Section 2 of the WBX rule. Because the Project is a replacement proposed by a public agency, this Project falls under Section 6 of the rule allowing for a fast-track permit without need for public notice under Section 6 of the Procedural Requirements Rule or the minimal impact analysis under 3(f) of the WBX Rule. However, ordinary public notice has been provided as it was required under the Floodplain Alteration Rule.

Section 3(a) states that the Project must serve a public purpose within public waters. Since the Project is located within public waters, it will serve a public purpose by keeping the culvert between the two lakes functioning properly to convey water and serve as an outlet for Lake Zumbra. The existing culvert is beyond its serviceable life and needs to be replaced so it does not fail and require emergency replacement.

Section 3(b) requires that the project retain hydraulic capacity; also, a project in a watercourse may not increase upstream or downstream flood stage. The Project is in a watercourse and the Applicant has modeled the proposed culvert and found there is no increase in upstream or downstream flood stage. There is no change in the floodplain elevations from the existing to proposed conditions, as outlined in Table 1, below.

Location	Existing 100-Year Elevation (ft)	Proposed 100-Year Elevation (ft)	Change in 100-Year Elevation (ft)
Lake Zumbra	943.65	943.65	-0.00
Lake Sunny	946.43	946.43	-0.00

Table 1. 100-Year High Water Level Summary

Section 3(c) requires that the project preserve navigational capacity. There is no navigational capacity in the existing condition, which is a berm with a 24-inch culvert for water conveyance. Lakes Sunny and Zumbra used to be connected by a navigational channel, but by 1963, a berm with a culvert was installed between the two lakes.

Section 3(d) requires that aquatic and upland wildlife passage be preserved. Due to the existing culvert, there is limited aquatic and wildlife passage in the existing condition and hydraulic capacity will be the same, therefore, the passage capacity will be the maintained from the existing to proposed conditions.

Section 3(e) requires that the crossing be designed to not promote erosion or scour, or otherwise affect bed or bank stability or water quality within the waterbody. The Project proposes to install Class III riprap on both ends of the new culvert to disperse flow and protect against erosion. The design has been reviewed by the District engineer to ensure that the proposed design will not promote erosion, scour, or adversely affect water quality.

Section 3(f) requires that the crossing be the "minimal impact" solution to the specific need. However, as stated above, because the Project falls under Section 6 for a fast-track permit, a "minimal impact" solution was not required for rule compliance. The applicant did, however, provide multiple alternatives, and these are referenced within the public request section below.

The MCWD Engineer has reviewed the analysis and finds it meets Waterbody Crossings and Structures rule requirements.

Floodplain Alteration Rule

MCWD's Floodplain Alteration Rule is applicable when a project proposes to fill, excavate, or grade within the floodplain of a waterbody. Because the Project proposes excavation and fill within the floodplain of the lakes for the culvert replacement, the rule is triggered underneath Section 2(a). 34.4 cubic yards of soil will be excavated, and the same volume will be replaced for the purpose of the culvert replacement, so there will be no net fill within the floodplain and no loss in flood storage.

Section 2(b) of the Floodplain Alteration Rule states that a structure intended for residential occupancy must be constructed so that door and window openings are at least two feet above the 100-year high water elevation of the waterbody or hydraulic disconnection be met. No structures intended for residential, commercial, industrial or institutional occupancy will be constructed with this permit; therefore, the 2-foot freeboard requirement is not applicable.

Section 4(a) states that any floodplain fill must be offset so there is no loss in flood storage between the ordinary high water (OHW) and 100-year floodplain elevations. The Project proposes 34.4 cubic yards of fill within the 100-year floodplain to remove and replace the culvert. To offset the fill, the Applicant proposes 34.4 cubic yards of compensatory storage within the 100-year floodplain of the lakes. The cut and fill will occur in the same location.

Section 4(c) states that fill within a watercourse must meet the following criteria:

1. No impervious surface may be placed within the 10-year floodplain or within 25 feet of the watercourse centerline, whichever greater, unless the surface is: (1) no more than 10% of the site 10-year floodplain area; or (2) a linear component of a public roadway or trail. The Project proposes impervious surface for the trail within 25 feet of the centerline of the stream. However, the proposed impervious surface is not within the 10-year floodplain of the stream as the berm and trail elevation are above the 100-year floodplain elevation. Therefore, the Project conforms to Section 4(c)1, as there is no proposed impervious surface within the site's 10-year floodplain area.

2. The Applicant must meet the No-Rise Standard: The Applicant has submitted modeling confirming that the culvert replacement meets the No-Rise standard on both waterbodies. The 100-year floodplain elevation will not change from the existing to the proposed condition. As shown in Table 1, the floodplain elevation will not increase, meeting the No-Rise standard.

The MCWD Engineer has reviewed the analysis and finds it meets Floodplain Alteration rule requirements.

Public Request for Board Review:

Pursuant to MCWD's Procedures Rule, a public notice is to be sent to all properties within 600 feet of the project. Historically, Zumbra Ridge residents have had an interest in the culvert between Lakes Sunny and Zumbra. For this reason, MCWD staff opted to expand the public notice geography to include all Zumbra Ridge residents. The public notice (Attachment C) was mailed on June 30, 2025, and the review period concluded on July 14, 2025.

Background

In June 2014, 13.24 inches of rain fell, more than triple the normal monthly total. These events caused flooding and high water on many lakes across the District where 17 lakes experienced record-breaking high-water levels. One of those lakes was Zumbra. Sixteen properties on Lake Zumbra were affected in 2014, with over half of the damage to landscaping. Five principal residential structures were impacted, with total damage estimated at $118,000.

Following the 2014 flooding event, in response to resident requests that TRPD modify the Lake Zumbra outlet which they own and maintain, MCWD was asked to assume a lead role in a multi-jurisdictional partnership alongside the Department of Natural Resources (DNR), Carver County, the City of Victoria, and TRPD, to gather and analyze information related to the system hydraulics.

In a July 9, 2015, Report adopted by the MCWD Board of Managers, and in supplemental analyses and a flood study conducted between 2016 and 2017 (Attachment D), the partners found that:

- A review of historical aerials showed that the natural system was altered, potentially increasing hydraulic connectivity between Lake Zumbra and downgradient lakes, between 1937 and 1957.
- A historical review of lake management, crossing elevations, and development within the Zumbra-Sunny watershed found that no feasible changes would have prevented impacts from the 2014 events.
- A review of MNDNR and TRPD records indicate that the overall hydraulic capacity between Lake Zumbra and Lake Auburn has not changed significantly in over 45 years.
- Several properties riparian to Lake Zumbra have land, low floor, or low openings at or below the 100-year high water level.
- Sunny's water levels rise faster and higher than Zumbra's creating a backflow effect, and therefore, requests to expand the Zumbra outlet would worsen flooding and not improve it.
- Modifications to increase the capacity of the Zumbra/Sunny culvert may cause an unacceptable increase in water levels to downstream landowners.
- In 2017, MCWD met with residents at Victoria City Hall with Carver County elected officials, the Victoria Mayor, staff and consultants, and representatives from TRPD. Residents were advised that, while there may be significant permitting and landowner challenges, a flap gate to prevent backflow may provide measured relief from backwater effects. Based on feedback from residents at that time, this solution was not advanced.

During the public notice period for Permit 25-262, MCWD reviewed public comments from four property owners in the Zumbra Ridge neighborhood (Attachment E). The following concerns were raised:

1. Increased activity and development near Lake Zumbra contributes to greater runoff and rising lake levels
   MCWD received comments regarding concerns regarding other projects in the Lake Zumbra watershed, their change in land-use, and the potential effects these may have on lake levels. A few of the projects mentioned by residents are the Woodland Cove subdivision development, permitted in 2011, which converted agricultural use into housing; and the fiber optic cable installation projects along Highway 7 which commenters noted to have removed trees.

   To address the effects of stormwater runoff, MCWD rules contain provisions that require the treatment of runoff volumes, rates and water quality. Both projects referenced above secured MCWD permits. The fiber optic cable installation was exempt from stormwater requirements as it did not create impervious surface, and in coordination with local municipalities MCWD's regulatory scope has been designed to not regulate tree removal. The permitting of these past projects also falls outside of the scope of review for this permit application proposing an "in-kind" culvert replacement.

2. Modify the design to mitigate flooding and reduce high water levels in Lake Zumbra
   Commenters also reflected on the proposed replacement of the culvert, noting that the current culvert design acts as a "chokepoint" between Lakes Zumbra and Sunny, restricting water flow out of Lake Zumbra, which increases water levels.

   Comments were made regarding alternatives that MCWD should consider or impose on TRPD's proposed "in-kind" replacement of the culvert. The Zumbra Ridge homeowner's association (HOA) leadership requested that MCWD require a flap gate, identified as one potential solution in the 2017 Zumbra Flood Study to mitigate backflow from downstream. Another comment received from a different member of the HOA requested that the existing culvert be removed and replaced with a bridge.

   MCWD does not own or operate the land or infrastructure in question, and its regulatory responsibility is to review the project proposed by TRPD for compliance with MCWD rules and not specify a different scope for the

proposed improvements. As proposed, the “in-kind” replacement of the culvert meets MCWD rules and has been modeled to demonstrate no exacerbation of flooding upstream or downstream.

While the proposed culvert replacement is “in-kind”, and the Applicant was not required to provide alternatives analysis under Section 3(f) of the WBX Rule, TRPD did complete a modeling analysis to simulate the 100-year storm event on Lake Zumbra with various infrastructure scenarios that would expand conveyance beyond the current 24” CSP (Attachment F). Due to backflow hydraulics from downstream Sunny, the analysis demonstrated that increasing the capacity of the Sunny/Zumbra hydraulic system, by installing a bridge, box culvert, or larger pipe, would raise the flood elevation on Lake Zumbra during a 100-year design storm compared to the existing 24” culvert. Based on this information, and to avoid exacerbating flooding on Lake Zumbra, TRPD has proposed to replace the culvert “in kind.”

During the public comment period, MCWD and Three Rivers Park District (TRPD) met with Zumbra Ridge HOA leadership on July 17, 2025. MCWD and TRPD addressed questions about the project’s scope, design and regulatory responsibilities. HOA leadership asked if it would be possible to explore installing a flap gate to prevent backflow into Lake Zumbra. Due to the culvert’s failing condition, the “in-kind” project must proceed as proposed, but TRPD is open to a feasibility analysis of a flap gate retrofit in the future.

Summary:
The Applicant has applied for a Minnehaha Creek Watershed District permit under the Erosion Control, Waterbody Crossings and Structures, and Floodplain Alteration Rules.

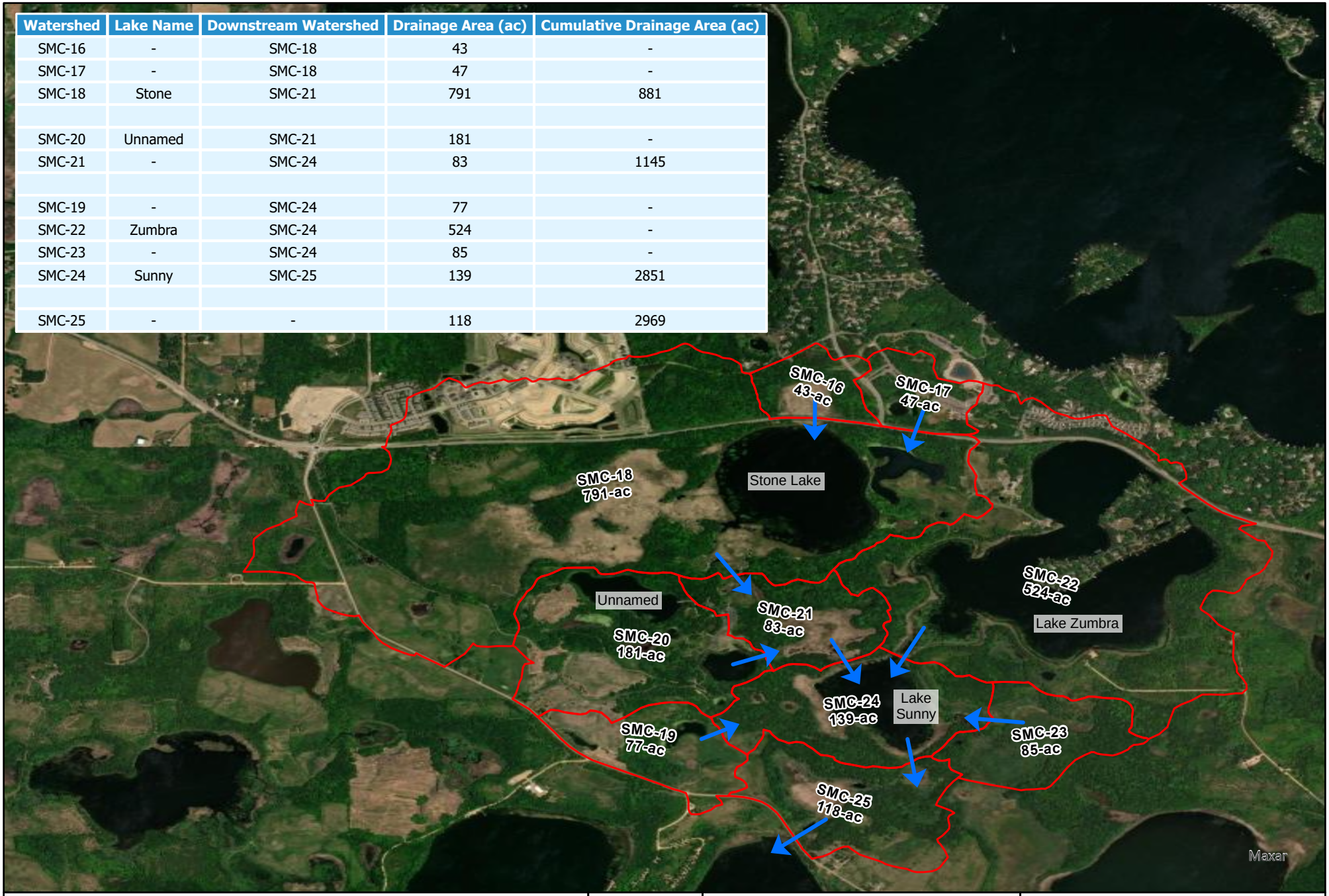
Based on staff and MCWD Engineer analysis of the Applicant’s submittals, the application meets all of the criteria for all applicable rules.

Therefore, staff recommend approval of the permit application, with the conditions listed at the beginning of the report.

Attachments:
Attachment A – Project Location and Drainage Map
Attachment B – Site Plans
Attachment C – Public Notice
Attachment D – Flood Study and Supplemental Background Information
Attachment E – Public Comments and Request for Board Consideration
Attachment F – TRPD 100-Year Floodplain Modeling Analysis

Attachment A:
Project Location and Drainage Map

Watershed	Lake Name	Downstream Watershed	Drainage Area (ac)	Cumulative Drainage Area (ac)
SMC-16	-	SMC-18	43	-
SMC-17	-	SMC-18	47	-
SMC-18	Stone	SMC-21	791	881
SMC-20	Unnamed	SMC-21	181	-
SMC-21	-	SMC-24	83	1145
SMC-19	-	SMC-24	77	-
SMC-22	Zumbra	SMC-24	524	-
SMC-23	-	SMC-24	85	-
SMC-24	Sunny	SMC-25	139	2851
SMC-25	-	-	118	2969



WATERSHED DRAINAGE FLOWPATHS
LAKE ZUMBRA OUTLET

Created By: GIS Date Created: XX/XX/20 Date Saved: 05/22/24 Date Plotted: N/A Date Exported: 06/05/24
Plotted By: Parcel Date: XX/XX/20 Aerial Image: 2019 County NAIP SIDS Elevation Data: Lidar
Horizontal Datum: GCS WGS 1984 Vertical Datum: NAVD1988
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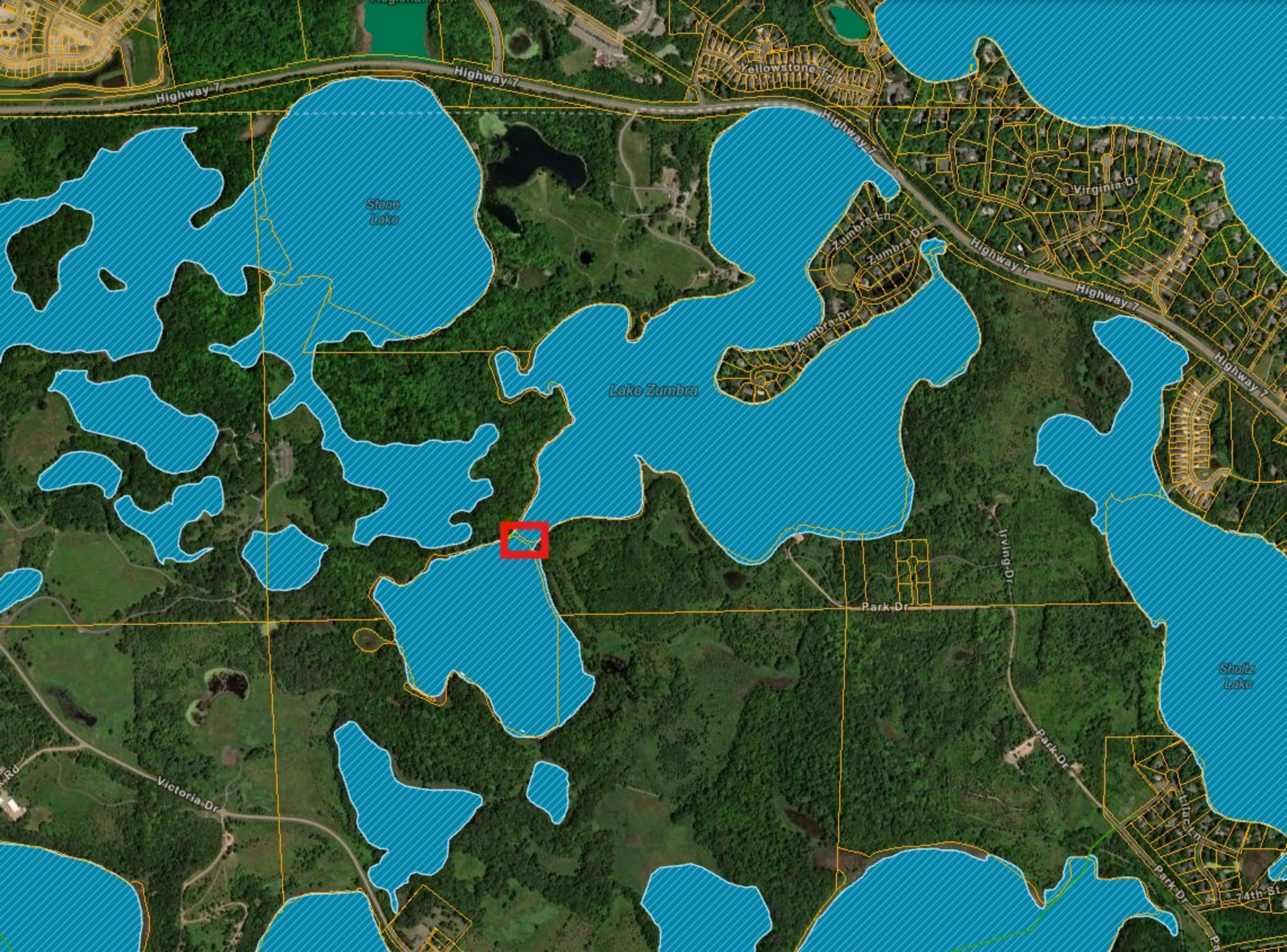
moore engineering, inc.


Highway 7
Highway 7
Yellowstone Trl
Highway 7
Virginia Dr
Zumbra Ln
Zumbra Dr
Zumbra Dr
Highway 7
Highway 7
Highway 7
Stone Lake
Lake Zumbra
Irving Dr
Park Dr
Park Dr
Shultz Lake
Victoria Dr
Lilac Ln
Park Dr
74th St

Attachment B:
Site Plans

90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT PROJECT

THREE RIVERS PARK DISTRICT

CARVER COUNTY, MINNESOTA

moore engineering, inc.
Consulting Engineering • Land Surveying
www.mooreengineeringinc.com

VICINITY MAP

TABLE OF CONTENTS

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PROJECT No. 22309E

PRELIMINARY

CIVIL LEGEND

EXISTING

- BENCHMARK
- IRON MONUMENT FOUND
- EXISTING GAS LINE MARKER
- EXISTING GAS GATE VALVE
- EXISTING POWER POLE
- EXISTING LIGHT POLE
- EXISTING LIGHT POLE W/SIGN
- EXISTING GUY WIRE
- EXISTING TRAFFIC SIGNAL ARM
- EXISTING SIGN
- EXISTING CULVERT W/FLARED END SECTION (F.E.S.)
- EXISTING FLARED END SECTION (F.E.S.)
- EXISTING CURB STOP
- EXISTING HYDRANT W/GATE VALVE
- EXISTING GATE VALVE
- EXISTING PROPANE TANK
- EXISTING SANITARY SEWER MANHOLE
- EXISTING SANITARY SEWER CLEANOUT
- EXISTING STORM SEWER CATCH BASIN
- EXISTING STORM SEWER MANHOLE
- EXISTING WATER MAIN
- EXISTING WATER SERVICE W/CURB STOP
- EXISTING SANITARY SEWER
- EXISTING SANITARY SEWER (RELINE W/ CIPP)
- EXISTING SANITARY FORCEMAIN
- EXISTING SANITARY SEWER SERVICE
- EXISTING STORM SEWER
- EXISTING STORM SEWER FORCEMAIN
- EXISTING STEAM PIPE
- EXISTING AIR CONDITIONER
- EXISTING UTILITY PEDESTAL
- EXISTING UTILITY MANHOLE
- EXISTING UTILITY VAULT
- EXISTING UNDERGROUND COMMUNICATIONS
- EXISTING UNDERGROUND FIBER
- EXISTING UNDERGROUND TELEPHONE
- EXISTING OVERHEAD TELEPHONE
- EXISTING UNDERGROUND TELEVISION
- EXISTING OVERHEAD TELEVISION
- EXISTING UNDERGROUND GAS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING OVERHEAD POWER
- EXISTING BARBED WIRE FENCE
- EXISTING CHAIN LINK/STEEL FENCE
- EXISTING PVC/WOOD FENCE
- EXISTING SHRUB
- EXISTING STUMP
- EXISTING BOULDER
- EXISTING TREE/TREE CLUSTER
- EXISTING SPRINKLER HEAD
- EXISTING CLUSTER BOX UNIT (CBU)
- EXISTING MAILBOX
- EXISTING CURB AND GUTTER

PROPOSED

- NEW LIGHT POLE
- NEW LIGHT POLE W/SIGN
- NEW GUY WIRE
- NEW SIGN
- TRAFFIC CONTROL – DRUM
- TRAFFIC CONTROL – TUBULAR MARKER
- NEW CULVERT W/FLARED END SECTION (F.E.S.)
- NEW FLARED END SECTION (F.E.S.)
- NEW CURB STOP
- NEW HYDRANT W/GATE VALVE
- NEW GATE VALVE
- NEW TAPPING SLEEVE
- NEW FITTINGS
- NEW PLUG
- NEW SANITARY SEWER MANHOLE
- NEW SANITARY SEWER CLEANOUT
- NEW STORM SEWER CATCH BASIN
- NEW STORM SEWER MANHOLE
- NEW WATER MAIN
- NEW WATER SERVICE W/CURB STOP (S.B. ELEV.)
- NEW SANITARY SEWER
- NEW SANITARY FORCEMAIN
- NEW SANITARY SEWER SERVICE (S.S. ELEV.)
- NEW STORM SEWER
- NEW STORM SEWER FORCEMAIN
- NEW STEAM PIPE
- INSULATION PER DETAIL
- NEW BARBED WIRE FENCE
- NEW CHAIN LINK/STEEL FENCE
- NEW PVC/WOOD FENCE
- NEW CLUSTER BOX UNIT (CBU)
- NEW MAILBOX
- NEW LARGE DECIDUOUS TREE
- NEW SMALL DECIDUOUS TREE
- NEW SHRUB
- NEW LARGE EVERGREEN TREE
- NEW SMALL EVERGREEN TREE

REMOVALS

- INDICATES REMOVAL
- REMOVE CURB AND GUTTER
- REMOVE ASPHALT PAVEMENT
- REMOVE CONCRETE PAVEMENT
- REMOVE AGGREGATE SURFACE

PAVEMENT REHAB

- UNIFORM MILL & OVERLAY
- TAPERED MILL & OVERLAY
- LEVELING COURSE
- RECLAIM
- ASPHALT PATCH
- CHIP SEAL

PAVEMENT

- NEW INFLOW CURB AND GUTTER
- NEW OUTFLOW CURB AND GUTTER
- NEW ASPHALT SURFACE
- NEW CONCRETE SURFACE
- NEW GRANULAR SURFACE
- NEW CRUSHED CONCRETE SURFACE
- NEW DECORATIVE COLORED CONCRETE
- NEW ASPHALT SIDEWALK/MULTI–USE PATH
- NEW CONCRETE SIDEWALK/MULTI–USE PATH
- NEW CONCRETE APPROACH/DRIVEWAY
- NEW DETECTABLE WARNING PANEL
- NEW GRAVEL APPROACH/DRIVEWAY
- NEW CONCRETE VALLEY GUTTER
- NEW MEDIAN NOSE APRON
- NEW ADA RAMP W/WARNING PANEL

SOIL DISTURBANCE

- DISTURBANCE AREA / TOPSOIL REMOVAL
- REMOVE STOCKPILE
- EXISTING STOCKPILE
- TEMPORARY STOCKPILE
- PERMANENT STOCKPILE
- REAR YARD GRADING
- GRASS BUFFER STRIP

SOIL STABILIZATION

- DISTURBED SOIL STABILIZATION
- STRAW MULCH
- SEEDING & STRAW MULCH
- SEEDING & HYDRO MULCH
- TOPSOIL, SEEDING & STRAW MULCH
- TOPSOIL, SEEDING & HYDRO MULCH
- TOPSOIL, SEEDING & BLANKET

MISCELLANEOUS

- EXISTING RIPRAP
- NEW RIPRAP
- EXISTING LANDSCAPING AREA
- NEW LANDSCAPING AREA
- EXISTING WATER SURFACE
- NEW WATER SURFACE
- EXISTING WETLAND

EROSION CONTROL

- DRAINAGE BREAK LINE
- EXISTING DRAINAGE DIRECTION
- FINISHED DRAINAGE DIRECTION & SLOPE (2.0%)
- FINISHED GRADE (4:1)
- EXISTING CONTOUR ELEVATION (895)
- FINISHED CONTOUR ELEVATION (895)
- GRADE ELEVATIONS (FL: 900.07)
- SEDIMENTATION CONTROL WATTLE
- SEDIMENTATION CONTROL FENCE
- ROCK CHECK
- STABILIZED CONSTRUCTION ENTRANCE (S.C.E.)
- CONCRETE WASHOUT
- INLET PROTECTION DEVICE

ABBREVIATIONS:

BOC = BACK OF CURB
BOW = BACK OF WALK
C = COMMUNICATION
CB# = STORM SEWER CATCH BASIN
CIPP = CURED IN PLACE PIPE
CL = CENTERLINE
CSP = CORRUGATED STEEL PIPE
CO# = SANITARY SEWER CLEANOUT
CS# = CONTROL STRUCTURE
DIA = DIAMETER
DIP = DUCTILE IRON PIPE
E = ELECTRICAL
ECC = EDGE OF CRUSHED CONCRETE
EG = EXISTING GRADE
EOC = EDGE OF CONCRETE
EOG = EDGE OF GRAVEL
EOP = EDGE OF PAVEMENT
EOW = EDGE OF WALK
EX = EXISTING
F = FIBER OPTIC
FES = FLARED END SECTION
FG = FINISHED GRADE
FL = FLOWLINE
FM = FORCEMAIN
G = GAS LINE
HP = HIGH POINT
INV = INVERT
LP = LOW POINT
MA = MATCH
M# = STORM SEWER MANHOLE
MT# = STORM SEWER TEE MANHOLE
MM# = STORM SEWER MULTI–MANHOLE
MC = MIDPOINT OF CURVE
OHP = OVERHEAD POWER
OHT = OVERHEAD TELEPHONE
OHTV = OVERHEAD TELEVISION
PC = POINT OF CURVATURE
PRC = POINT OF REVERSE CURVE
PVC = POLYVINYL CHLORIDE PIPE
PT = POINT OF TANGENCY
RIM = RIM OF STRUCTURE
S# = SANITARY SEWER MANHOLE
S.B. ELEV. = STOP BOX ELEVATION
S.S. ELEV. = SANITARY SEWER SERVICE INVERT
SS = SANITARY SEWER
ST = STORM SEWER
STA = ALIGNMENT STATION
T = TELEPHONE
TOC = TOP OF CONCRETE
TOP = TOP OF PAVEMENT
TOP = TOP OF PIPE
TOW = TOP OF WALK
TR# = SANITARY TELEVISING RISER
TRANS = TRANSFORMER
TV = TELEVISION
U = UTILITY (UNKNOWN UTILITY)

PRELIMINARY

moore engineering, inc.

CIVIL
90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT PROJECT
THREE RIVERS PARK DISTRICT
CARVER COUNTY, MINNESOTA
CIVIL LEGEND

DATE:	05.22.2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	22309E
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

C-001

THE FOLLOWING PLAN NOTES SUPPLEMENT AND AMEND THE PLAN SHEETS, SPECIFICATIONS AND MNDOT REFERENCES AS FOLLOWS:

GENERAL NOTES:

1. Take necessary precautions required to protect adjacent properties during the construction operations.
2. Notify Engineer where section, subsection or property monuments are encountered, before such monuments are removed. Protect and carefully preserve all property markers and monuments until the engineer and authorized surveyor has witnessed or otherwise referenced the location.
3. The removal and reinstallation of existing street signs are incidental to the installation of the new utility. Replace any damaged signs.
4. The drawings designate those existing items for removal, replacement, or improvement. If not designated for removal, replacement, or improvement, all other existing items within the site to be protected.
5. Any construction traffic damage to roads or trails to be repaired by the contractor.
6. Mobilization will be paid for based on the schedule shown in Section 01 2000, Paragraph 1.2.

UNDERGROUND NOTES:

1. Coordinate any utility relocations.
2. Unless otherwise noted, any removal, relocation, replacement, or bracing of power poles or any other utilities is the responsibility of the Contractor.
3. Existing utilities (both public and private) shown on the plans are approximate and may not be complete. It will be the contractor's responsibility to verify and locate any utilities prior to excavation. There will be no additional payment for exploratory time.
4. There is a potential for water on the project. It shall be the contractor's responsibility to dewater for constructability.
5. No extra payment will be made for bedding material for pipe, structures, or fittings.
6. The subsurface utility information in this plan is Utility Quality Level D. This quality level was determined according to the guidelines of ASCE 38-02 entitled "Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data".
7. Not all fittings required for a complete installation may be shown on the plans. Provide all required fittings.

REMOVAL NOTES

1. All miscellaneous debris, fittings, pipe material, appurtenances etc. Resulting from construction operations shall be first right of refusal to the owner. Otherwise, it will become the property of the contractor and shall be properly disposed of off-site.
2. All removals shall be saw cut. Saw cuts must be full depth.

TRAFFIC CONTROL NOTES:

1. The contractor will be responsible for maintaining access to all public facilities outside construction limits at all times. This is included by not limited to the parking lot/staging area, and trails used to access the construction site. This would include building & maintaining any required temporary access roadways.
2. Contractor must follow the current M.U.T.C.D. for traffic control for any and all construction operations that interfere with traffic.
3. Contractor to give no less than 48 hour notice prior to any work being done on the project. All no parking signs and any traffic control shall be posted at least 48 hours prior to work commencing.
4. See sheet C-101 for additional traffic control and site access requirements.
5. Traffic Control will be paid for based on the schedule shown in Section 01 5000, Paragraph 1.2.

SURVEY NOTES:

1. Horizontal control: MN County Coordinate System, all coordinates are Carver County Ground Coordinates.
2. Vertical Control: North American Vertical Datum of 1988 (NAVD88)
3. Prior to project start, owner will set and establish benchmarks and survey control for the project.

PRELIMINARY

moore engineering, inc.

CIVIL
90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT PROJECT
THREE RIVERS PARK DISTRICT
CARVER COUNTY, MINNESOTA
GENERAL NOTES

DATE:	05.22.2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	22309E
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

C-002

FILE LOCATION: R:\Projects\22000\22300\22309E\CIVIL\PRODUCTION\22309E_ProjectLayouts.dwg

1. DUMP TRUCKS AND STEEL TRACKED VEHICLES ARE NOT ALLOWED TO DRIVE ON TRAIL. ANY AND ALL IMPORTED MATERIAL MUST BE MOVED FROM PARK ROAD VIA SKIDSTEER WITH NON-METAL WHEELS OR TREADS, PICKUP TRUCK TOWED DUMP TRAILERS, OR OTHER APPROVED METHOD.
2. NO MORE THAN 10 TONS OF MATERIAL AT A TIME MAY BE HAULED FROM THE PARK ROAD TO THE PROJECT AREA.
3. EXISTING CONDITIONS OF THE TRAIL HAVE BEEN DOCUMENTED BY PHOTO AND VIDEO. ANY AND ALL DAMAGE TO THE TRAIL SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

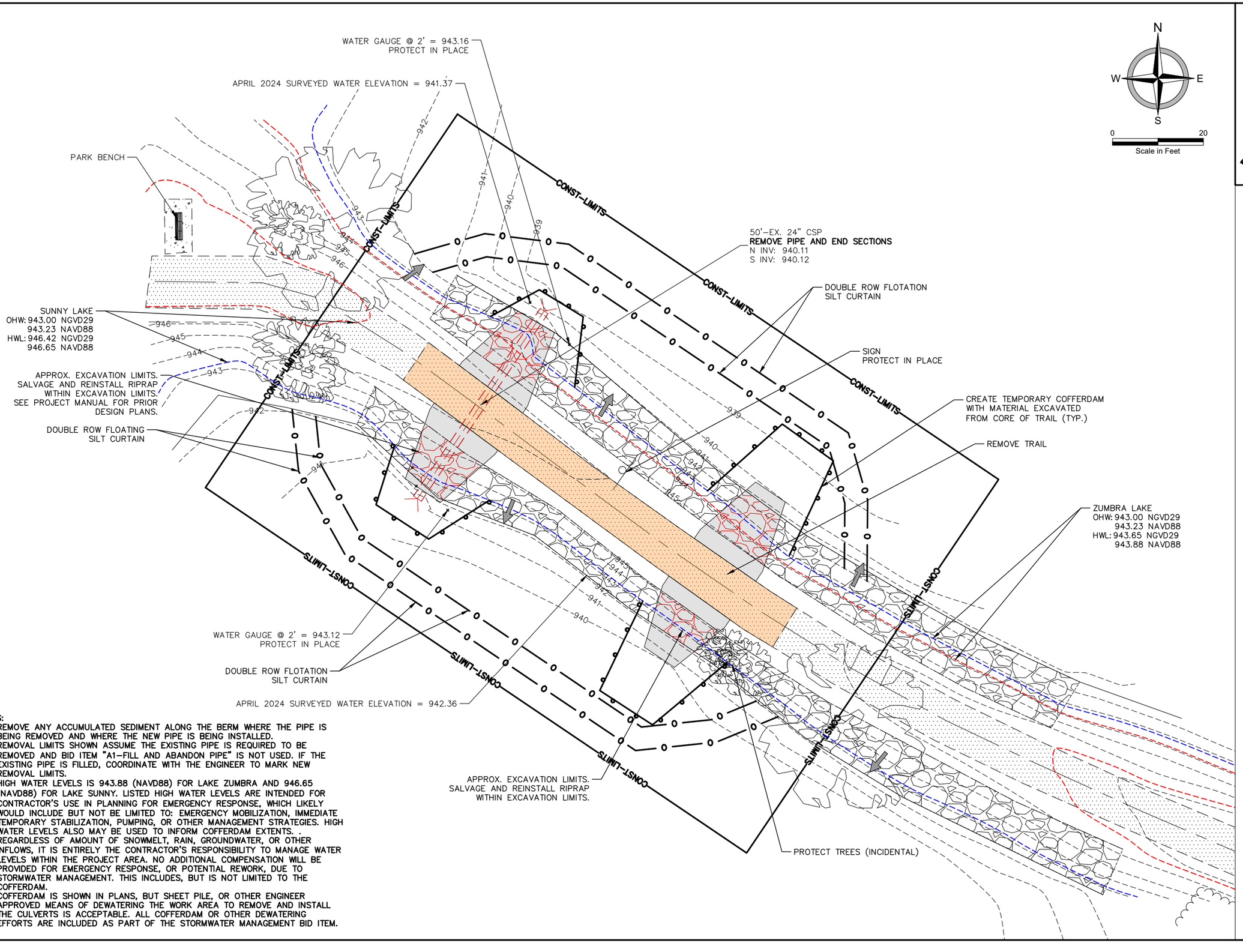
PRELIMINARY

moore engineering, inc.

PROJECT LAYOUTS
90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT PROJECT
THREE RIVERS PARK DISTRICT
CARVER COUNTY, MINNESOTA
SITE ACCESS AND TRAFFIC CONTROL

DATE:	05.22.2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	22309E
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

C-101



NOTES:

1. REMOVE ANY ACCUMULATED SEDIMENT ALONG THE BERM WHERE THE PIPE IS BEING REMOVED AND WHERE THE NEW PIPE IS BEING INSTALLED.
2. REMOVAL LIMITS SHOWN ASSUME THE EXISTING PIPE IS REQUIRED TO BE REMOVED AND BID ITEM "A1-FILL AND ABANDON PIPE" IS NOT USED. IF THE EXISTING PIPE IS FILLED, COORDINATE WITH THE ENGINEER TO MARK NEW REMOVAL LIMITS.
4. HIGH WATER LEVELS IS 943.88 (NAVD88) FOR LAKE ZUMBRA AND 946.65 (NAVD88) FOR LAKE SUNNY. LISTED HIGH WATER LEVELS ARE INTENDED FOR CONTRACTOR'S USE IN PLANNING FOR EMERGENCY RESPONSE, WHICH LIKELY WOULD INCLUDE BUT NOT BE LIMITED TO: EMERGENCY MOBILIZATION, IMMEDIATE TEMPORARY STABILIZATION, PUMPING, OR OTHER MANAGEMENT STRATEGIES. HIGH WATER LEVELS ALSO MAY BE USED TO INFORM COFFERDAM EXTENTS. .
5. REGARDLESS OF AMOUNT OF SNOWMELT, RAIN, GROUNDWATER, OR OTHER INFLOWS, IT IS ENTIRELY THE CONTRACTOR'S RESPONSIBILITY TO MANAGE WATER LEVELS WITHIN THE PROJECT AREA. NO ADDITIONAL COMPENSATION WILL BE PROVIDED FOR EMERGENCY RESPONSE, OR POTENTIAL REWORK, DUE TO STORMWATER MANAGEMENT. THIS INCLUDES, BUT IS NOT LIMITED TO THE COFFERDAM.
6. COFFERDAM IS SHOWN IN PLANS, BUT SHEET PILE, OR OTHER ENGINEER APPROVED MEANS OF DEWATERING THE WORK AREA TO REMOVE AND INSTALL THE CULVERTS IS ACCEPTABLE. ALL COFFERDAM OR OTHER DEWATERING EFFORTS ARE INCLUDED AS PART OF THE STORMWATER MANAGEMENT BID ITEM.

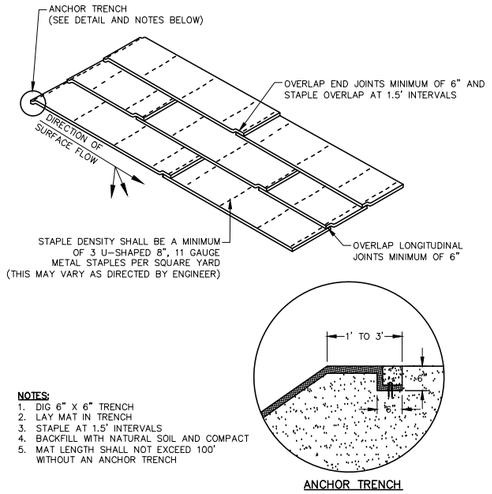
PRELIMINARY

moore engineering, inc.

PROJECT LAYOUTS
90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT PROJECT
THREE RIVERS PARK DISTRICT
CARVER COUNTY, MINNESOTA
REMOVALS AND TEMPORARY EROSION CONTROL

DATE:	05.22.2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	22309E
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

C-102

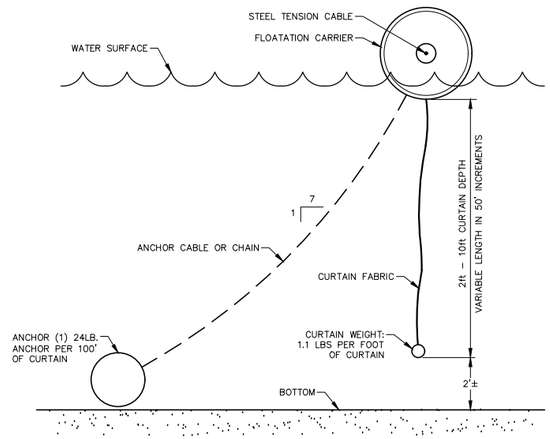


ANCHOR TRENCH

NOTES:
1. DIG 6" X 6" TRENCH
2. LAY MAT IN TRENCH
3. STAPLE AT 1.5' INTERVALS
4. BACKFILL WITH NATURAL SOIL AND COMPACT
5. MAT LENGTH SHALL NOT EXCEED 100' WITHOUT AN ANCHOR TRENCH

EROSION STABILIZATION MAT

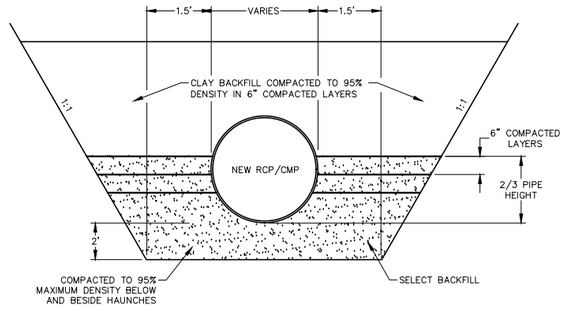
NO SCALE EPSC-FI-5 10.19.20



NOTES:
1. DOUBLE SILT CURTAINS SHOULD BE SPACED 10' APART
2. CONSTRUCT IN ACCORDANCE WITH (NDDOT SECTION 262) (MnDOT SECTION 2573 AND 3887.)

FLOATING SILT CURTAIN DETAIL

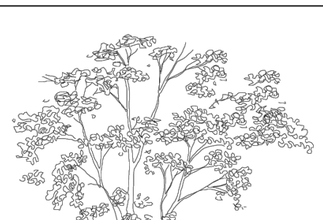
NO SCALE *MUNI-312500-8 06.21.18*



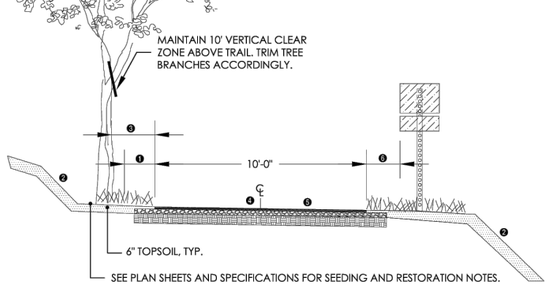
NOTES:
1 EXTRA PRECAUTIONS SHALL BE TAKEN TO THOROUGHLY SHAPE THE FILL BENEATH THE BOTTOM OF THE PIPE OUT TO THE HAUNCHES TO FIT THE PIPES CURVED FORM.
2 THE ABOVE DIMENSIONS ARE SHOWN TO ESTABLISH MINIMUM REQUIREMENTS. NO EXTRA PAYMENT SHALL BE GIVEN FOR GOING OUTSIDE THOSE MINIMUMS.

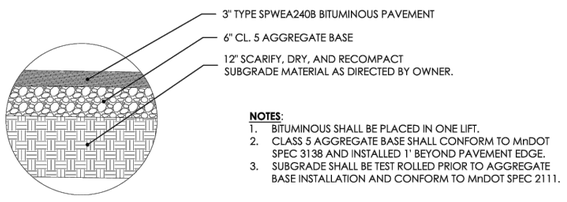
SECTION A-A (SINGLE PIPE)

NO SCALE *XXXXX-XX 02.15.17*



KEY NOTES:
1. 2' WIDTH AT MAX. 2% SLOPE ON SHOULDER.
2. 3:1 MAXIMUM SLOPE (H:V) OUTSIDE OF 2' SHOULDER.
3. PREFERRED 3' CLEARANCE, 2' MIN. FROM TREES OR OTHER OBSTRUCTION.
4. SEE PLAN SHEETS FOR TRAIL STRIPING.
5. MAX. CROSS SLOPE 2%. SEE CROSS SECTIONS FOR SLOPE DIRECTION.
6. MIN. 3' CLEARANCE BETWEEN EDGE OF TRAIL AND EDGE OF SIGN.

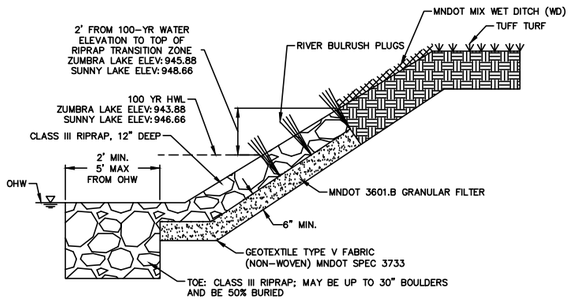




NOTES:
1. BITUMINOUS SHALL BE PLACED IN ONE LIFT.
2. CLASS 5 AGGREGATE BASE SHALL CONFORM TO MnDOT SPEC 3138 AND INSTALLED 1' BEYOND PAVEMENT EDGE.
3. SUBGRADE SHALL BE TEST ROLLED PRIOR TO AGGREGATE BASE INSTALLATION AND CONFORM TO MnDOT SPEC 2111.

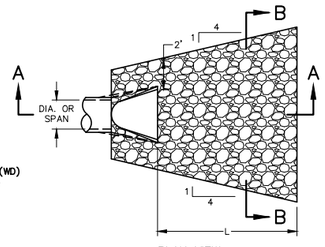
TR-2 TYPICAL TRAIL SECTION 10' OFF-ROAD

NTS

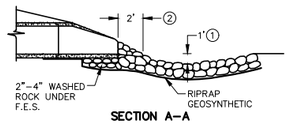


BANK EROSION CONTROL

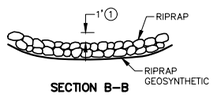
NO SCALE



PLAN VIEW



SECTION A–A



SECTION B–B

RIPRAP AT ROUND PIPE OUTLETS

DIA. OF ROUND PIPE (IN.)	L (FT.)	CLASS II d50 = 6" 12" DEPTH RIPRAP (CU. YDS.)	CLASS III d50 = 9" 18" DEPTH RIPRAP (CU. YDS.)	CLASS IV d50 = 12" 24" DEPTH RIPRAP (CU. YDS.)
12	8	2.8	4.1	5.5
15	8	2.9	4.4	5.8
18	10	3.9	5.9	7.8
21	10	4.2	6.3	8.4
24	12	5.5	8.3	11.0
27	12	5.8	8.7	11.6
30	14	7.3	10.9	14.5
36	16	9.2	13.8	18.3
42	18	10.9	16.3	21.7
48	20	12.9	19.4	25.8

RIPRAP AT ARCH PIPE OUTLETS OR BOXES OF EQUIVALENT SPAN WIDTH

SPAN OF PIPE ARCH (IN.)	L (FT.)	CLASS II d50 = 6" 12" DEPTH RIPRAP (CU. YDS.)	CLASS III d50 = 9" 18" DEPTH RIPRAP (CU. YDS.)	CLASS IV d50 = 12" 24" DEPTH RIPRAP (CU. YDS.)
22	10	3.9	5.9	7.8
28	12	5.5	8.2	10.9
36	14	7.2	10.8	14.3
43	16	9.2	13.7	18.3
51	18	10.9	16.3	21.7
58	20	12.7	19.0	25.4

NOTES:
A. REQUIREMENTS FOR RIPRAP SIZE AND THICKNESS SHALL BE DESIGNATED IN THE PLANS.

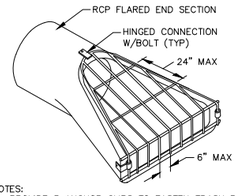
(1) FOR PIPES GREATER THAN OR EQUAL TO 30", USE 1.5'.

(2) MATCH TOP OF RIPRAP TO TOP EDGE (SIDES) OF FLARED END SECTION. MATCH FLOWLINE OF RIPRAP TO FLOWLINE OF FLARED END SECTION.

RIPRAP AT FLARED END SECTION OUTLET

NO SCALE *MUNI-334000-6 06.21.18*

TRASH RACK SIZING		
PIPE SIZE	BARS	BOLTS
12"–18"	3/4ø	5/8"
21"–42"	1"ø	3/4"
48"–72"	1 1/4"ø	1"



NOTES:
1. PROVIDE 3 ANCHOR CLIPS TO FASTEN TRASH RACK TO FLARED END SECTION. HOT DIP GALVANIZE AFTER FABRICATION.
2. TIE LAST 3 PIPE JOINTS. USE 2 TIE BOLT FASTENERS PER JOINT. INSTALL AT 60 DEGREES FROM TOP.
3. ALL PARTS SHALL BE HOT DIP GALVANIZED PER ASTM A153.

END SECTION - R.C.P. WITH TRASH RACK

NO SCALE *UTILITY-ST-32 10.30.19*

PRELIMINARY

moore engineering, inc.

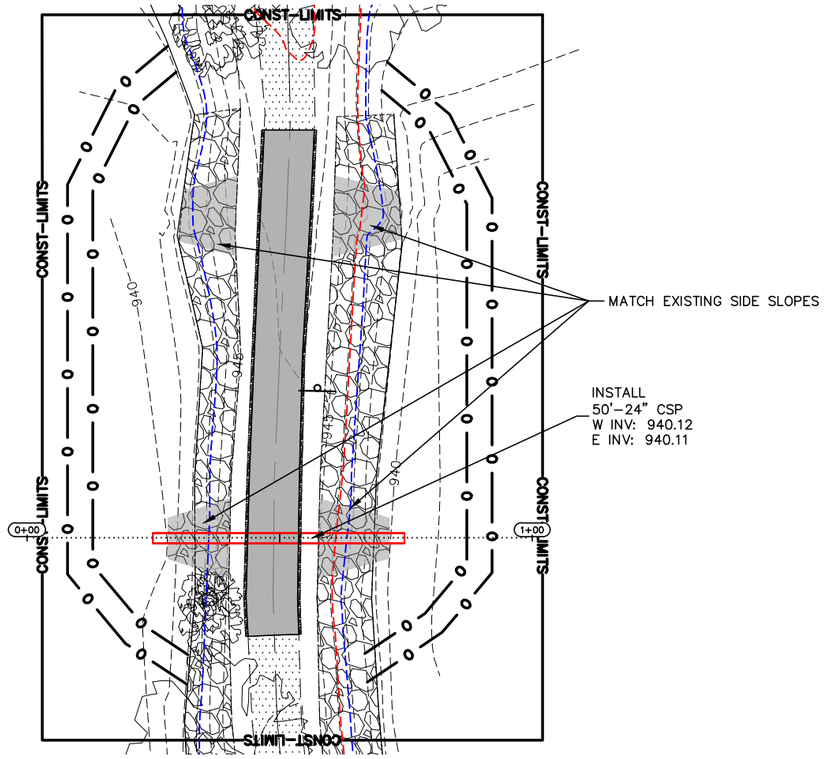
DETAILS
90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT PROJECT
THREE RIVERS PARK DISTRICT
CARVER COUNTY, MINNESOTA
TYPICAL DETAILS

DATE:	7.3.2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	22309E
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

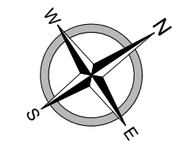
C-201

PRELIMINARY

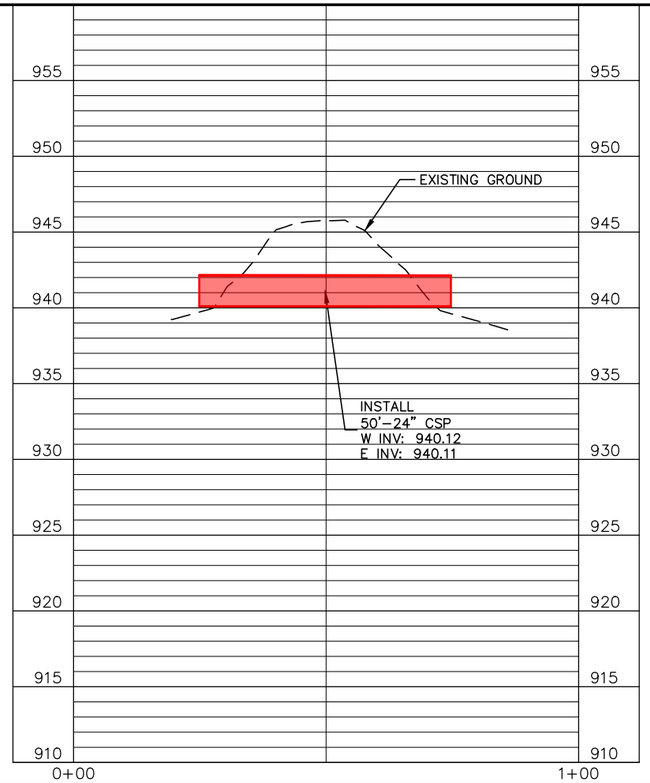
SUNNY LAKE
OHW: 943.00 NGVD29
943.23 NAVD88
HWL: 946.43 NGVD29
946.66 NAVD88



ZUMBRA LAKE
OHW: 943.00 NGVD29
943.23 NAVD88
HWL: 943.65 NGVD29
943.88 NAVD88



NOTES:
1. PIPE LENGTH INCLUDES FLARED END SECTIONS

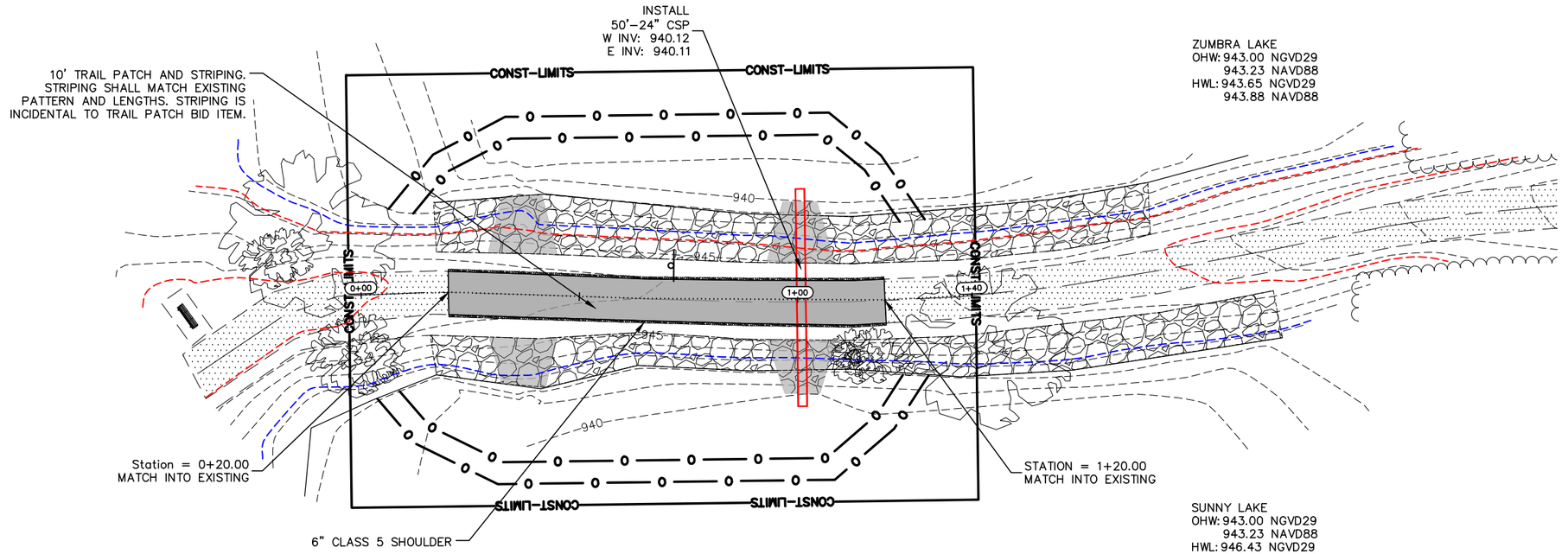


moore engineering, inc.

UNDERGROUND
90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT
PROJECT
THREE RIVERS PARK DISTRICT
CARVER COUNTY, MINNESOTA
PLAN & PROFILE

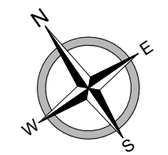
DATE:	7.3.2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	22309E
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

C-401



NOTES:
1. PIPE LENGTH INCLUDES FLARED END SECTIONS

PRELIMINARY



moore engineering, inc.

UNDERGROUND
90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT
PROJECT
THREE RIVERS PARK DISTRICT
CARVER COUNTY, MINNESOTA
TRAIL CENTERLINE PLAN AND PROFILE

DATE:	7.3.2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	22309E
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

C-402

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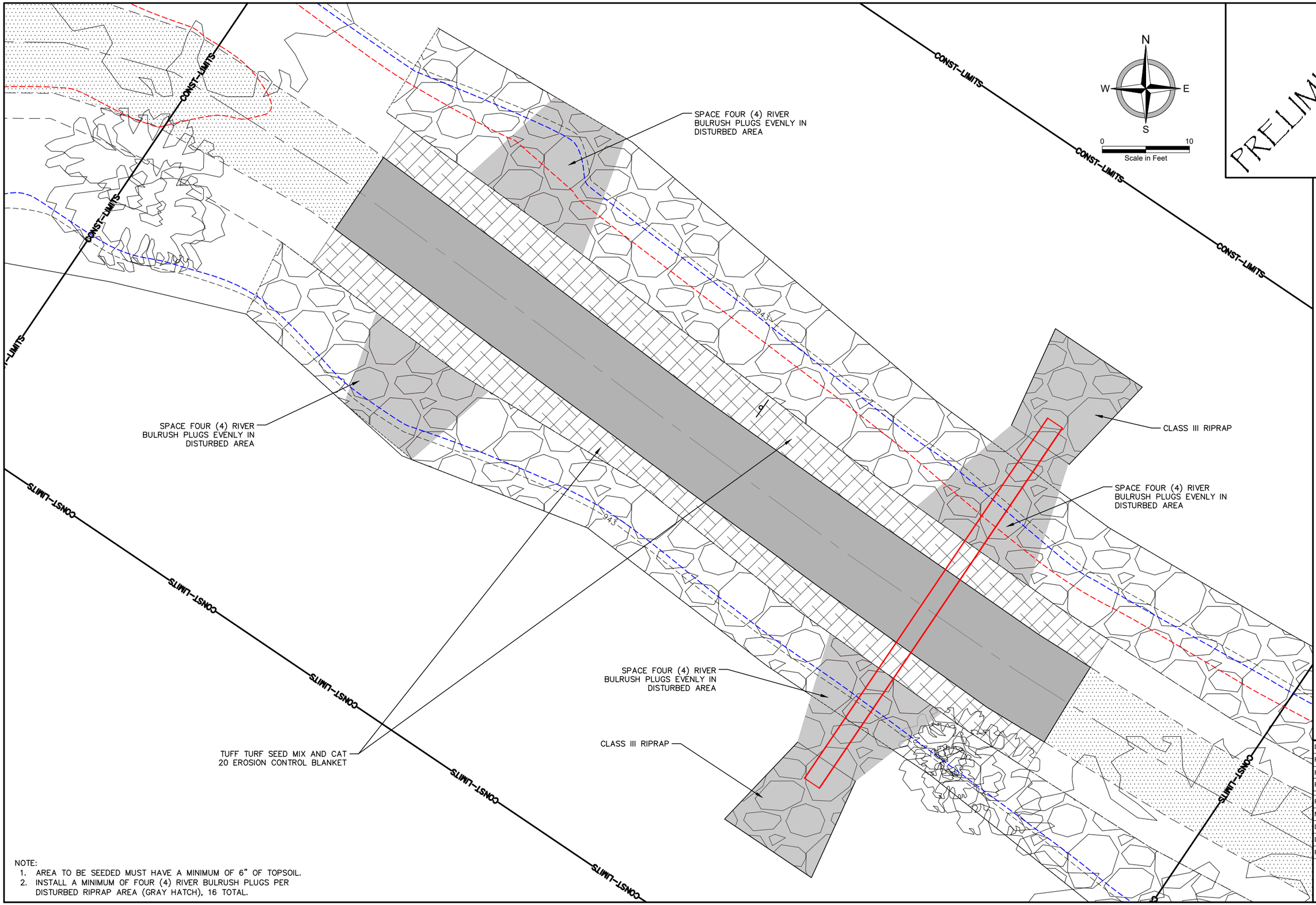


PRELIMINARY

NOTE:
1. AREA TO BE SEEDED MUST HAVE A MINIMUM OF 6" OF TOPSOIL.
2. INSTALL A MINIMUM OF FOUR (4) RIVER BULRUSH PLUGS PER DISTURBED RIPRAP AREA (GRAY HATCH), 16 TOTAL.

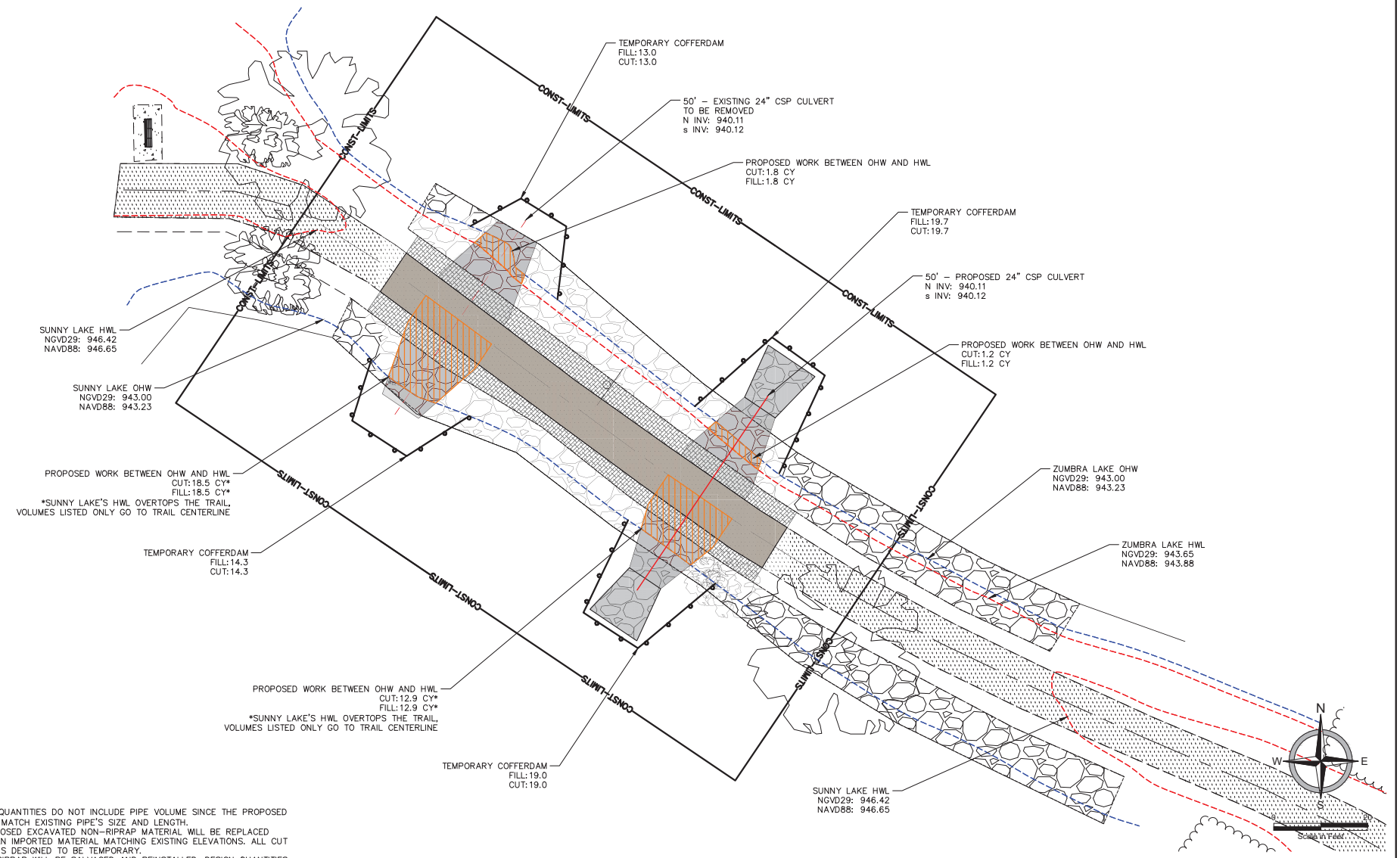
moore engineering, inc.

SITE PLANS
90% CONSTRUCTION PLANS ZUMBRA-SUNNY LAKE CULVERT REPLACEMENT PROJECT
THREE RIVERS PARK DISTRICT
CARVER COUNTY, MINNESOTA
RESTORATION PLAN

DATE:	05.22.2025
REV DATE:	----
REV NUM:	----
RECORD:	----
PROJECT No.	22309E
MANAGER:	JCM
DESIGNER:	QDS
DRAFTER:	DWA
REVIEWER:	DTE

C-601

FILE LOCATION: R:\Projects\22000\22300\22309E\CIVIL\PRESENTATION\22309E_PermitFigure.dwg



NOTES:
1. CUT/FILL QUANTITIES DO NOT INCLUDE PIPE VOLUME SINCE THE PROPOSED PIPE WILL MATCH EXISTING PIPE'S SIZE AND LENGTH.
2. ANY PROPOSED EXCAVATED NON-RIPRAP MATERIAL WILL BE REPLACED WITH CLEAN IMPORTED MATERIAL MATCHING EXISTING ELEVATIONS. ALL CUT AND FILL IS DESIGNED TO BE TEMPORARY.
3. EXISTING RIPRAP WILL BE SALVAGED AND REINSTALLED. DESIGN QUANTITIES ASSUME 80% OF ON SITE RIPRAP WILL BE SALVAGED WITH 20% NEW RIPRAP TO FILL IN WHERE EXISTING RIPRAP COULD NOT BE SALVAGED.
4. TEMPORARY COFFERDAMS ARE SUGGESTED FOR STORMWATER MANAGEMENT. IF COFFERDAMS ARE USED, EXCAVATED MATERIAL FROM THE TRAIL CORE WILL BE USED TO CONSTRUCT THEM.

EXCAVATION QUANTITIES WITHIN OHW AND HWL
ZUMBRA CULVERT REPLACEMENT
CARVER PARK RESERVE

PROJECT No.	22309E
DATE:	06.12.2025
REVISED:	–
DRAFTER:	QDS
REVIEWER:	DTE

moore engineering, inc.

Attachment C:
Public Notice

MINNEHAHA CREEK
WATERSHED DISTRICT

15320 Minnetonka Blvd
Minnetonka, MN 55345

PERMIT INFORMATION

Tax 1
Tax 2
Tax 3
Tax 4

MINNEHAHA CREEK
WATERSHED DISTRICT

15320 Minnetonka Blvd
Minnetonka, MN 55345

PERMIT INFORMATION

CHANLEY G PHILLIPS
5531 ZUMBRA LN
EXCELSIOR, MN 55331-

MINNEHAHA CREEK
WATERSHED DISTRICT

15320 Minnetonka Blvd
Minnetonka, MN 55345

PERMIT INFORMATION

BEVERLY C CAMPBELL REV TRUST
5724 ZUMBRA DR
EXCELSIOR, MN 55331-

MINNEHAHA CREEK
WATERSHED DISTRICT

15320 Minnetonka Blvd
Minnetonka, MN 55345

PERMIT INFORMATION

ANDREW TERWILLIGER
5580 ZUMBRA LN
EXCELSIOR, MN 55331-

The Minnehaha Creek Watershed District (MCWD) is currently reviewing a permit application for a project at 7023 Nature Center Drive in Victoria. The project, proposed by Three Rivers Park District, involves replacement of an existing culvert between Lake Zumbra and Sunny Lake. You are receiving this notice because your property is located within 600 feet of the project site.

MCWD reviews for compliance only with applicable MCWD rules. The city, county, or another public agency may require other permits or approvals.

Site plans and additional information can be found on our website under Public Notices – Permit #25-262 or by following the QR code.

If you have questions or wish to request Board consideration regarding the project's compliance with MCWD rules, please contact Abigail Couture at acouture@minnehahacreek.org before July 14th at 4:30 p.m.

MINNEHAHA CREEK WATERSHED DISTRICT
QUALITY OF WATER QUALITY OF LIFE
www.minnehahacreek.org

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QUALITY OF WATER QUALITY OF LIFE
www.minnehahacreek.org

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MINNEHAHA CREEK WATERSHED DISTRICT
QUALITY OF WATER QUALITY OF LIFE
www.minnehahacreek.org

Attachment D:
Flood Study and Supplemental Background Information

October 19, 2017

VIA ELECTRONIC MAIL

Re. Lake Zumbra Water Levels

Dear all,

Thank you again for your participation in the meeting on Wednesday, October 4 to discuss the residents' concern regarding high water levels on Lake Zumbra. As I have said before, the District greatly appreciates the cross-agency coordination that has been executed to date to understand the issue, define possible solutions, and map out agency roles and process for executing these solutions.

Below is a recap of the meeting. Please let me know if you see any needed clarification.

At the meeting, we covered:

- The chronology over the last two years including information generated, roles and responsibilities defined, meetings held, and actions taken
- New information, including updated field survey data from the DNR and and permit information
- The impact this information had on the hydraulic model and understanding of the system
- Possible next steps

Much of the specific information discussed and within this letter is available in the attachments, which include:

- The meeting agenda, containing a table of the updated hydraulic model results
- Summary chronology
- The 2015 and 2017 Wenck Memos
- Several letters from 1992, one from an attorney on behalf of the residents to the District and TRPD (then Hennepin County Parks Preserve) and one from the DNR to the City regarding construction of new homes on Zumbra
- Zumbra Ridge HOA's original service request, dated January 12, 2017
- Letter's between Victoria's Mayor and the District following the March 1, 2017 interagency meeting
- Zumbra Ridge HOA's request for services submitted to the DNR
- Zumbra Ridge HOA's maintenance request submitted to TRPD
- Results of the DNR's most recent survey
- Permit Information distributed from MCWD September 27, 2017

Please let me know if you have questions about any of these attachments, or if you would like to suggest any revisions to the chronology. I view that as a living document that we will continue to adjust and add to, as additional information becomes available.

Below is a summary of our discussion. Please review and let me know if there are any clarifications you would like to make.

Roles and Responsibilities
The most recent history of this cross-agency coordination began shortly after the 2014 flood of record when the then president of the Zumbra Ridge HOA, Jerry Martin, issued a letter to MCWD, Carver County, Victoria, and TRPD requesting evaluation of, and modifications to, the structures within this drainage area to prevent flooding in events similar to the 2014 event. That request is attached, as is a detailed chronology of the response since that event.

Since that time, we have worked collectively to understand system dynamics in flooding events. We have been consistent about each agency's respective role, though they have come into increasing focus as we have discussed advancing technical solutions. At the October 4 meeting, we reviewed again the following definition of roles:

- Carver County:
  - Involved from the beginning as a constituent issue closely tracked by County policy makers
  - Owns and maintains the culvert under County Road 11, one of the primary structures of concern by the residents

- City of Victoria:
  - Designated flood response agency through the National Flood Insurance Program (NFIP)
  - More recently, staff offered to serve as applicant for any structural solution and advance an engineering scope of services through City Council on behalf of the HOA
  - At the meeting, Cara noted that they are in a unique situation in this case as they do not own or have maintenance obligations over any of the infrastructure

- MnDNR:
  - Establishes and regulates OHW via MN statute 103G.401 and permits modifications to the OHW under Rule 6115.0150-0280
  - Provides technical assistance to residents/other agencies through survey work and permit review
  - Reviews and concurs in regional floodplain models approved by FEMA

- MCWD:
  - Convener of cross agency group
  - Coordinate analysis of issues, potential solutions, and agency roles, and communicate that information to the public
  - Regulatory authority over Wetland Conservation Act, waterbody crossings and structures, development (stormwater, erosion control), etc.

- Regional water quantity management, specifically through (from 2017 Comprehensive Plan):
  - management of the Lake Minnetonka/Minnehaha Creek regional conveyance system through the operation of Grays Bay Dam;
  - providing cities and the public with flood prediction data using the District's Hydraulic and Hydrologic model;
  - preserving local flood storage volume by regulating floodplain fill during development permitting; and
  - implementing and promoting stormwater management practices to address pollutant loading, prevent local peak flow increase and provide for volume reduction

Everyone agreed that these continue to be an accurate working depiction of agency roles.

Jenny mentioned that if we do follow up with a letter to the HOA, and in future correspondence and meetings, it may also be valuable to outline restrictions or limitations in each agency's roles.

System Understanding:
The principal goal of the 2015 of the Wenck analysis, attached, was to provide a coarse picture of system dynamics leading to flood conditions by employing the District's XP-SWMM watershed model, which incorporated historic culvert size and elevation data provided by Three Rivers. The analysis was completed for both the 100 year event and a modeled simulation of the 2014 event. The residents are increasingly raising concerns about the lake under "normal" conditions, which has not been analyzed because the original inquiry from the HOA (attached) referenced flooding concerns specifically.

The system dynamics under flood conditions can be generally summarized as follows:

- Zumbra, Sunny, and Sunny's downstream wetland have very similar normal water levels, partially due to the fact that there is very little elevation difference across the drainage area
- Lake Zumbra has a very small drainage area when compared with Sunny, and especially when compared with Lake Auburn, which receives drainage from all of the upstream Six Mile system
- Because Sunny receives so much more drainage than Zumbra, under high water conditions Sunny's water levels rise faster and higher than that of Zumbra
- This situation causes Sunny to backflow into Zumbra, essentially simultaneously discharging water upstream to Zumbra and downstream to the wetland and ultimately Auburn
- This occurs until conditions water elevations equalize across the system
- The system saturation also slows the rate at which water levels come back down after a backflow event

This first phase analysis concluded that no changes in lake management, crossing elevations, or development within the watershed would have proliferated the flooding event beyond the impact caused by the record precipitation. It also identified those homes not meeting two-foot freeboard above the 100 year lake elevation, the level required in zoning code.

Second Phase Analysis
Following up on the 2015 Wenck analysis, the District, at the request of the HOA, initiated a second phase analysis again utilizing the watershed model to evaluate a range of modifications to structures in the system, to

depict the impact they would have on Lake levels on Zumbra during the 100 year event, and to identifiy the potential impacts on other waterbodies within the system. The results are summarized in the attached, but generally found that:

- Every analyzed structural solution would impact water levels to some degree on adjacent property
- Because of system hydraulics driving backwater into Zumbra and equalization between Zumbra and Sunny, changes to culvert sizes are projected to lead to only modest relief on Zumbra under 100 year conditions
- The solution that the model indicated may provide the greatest benefit to Zumbra under 100 year conditions is the construction of a flap gate on the culvert between Zumbra and Sunny, which could be designed to prevent the backflow effect
- None of the modeled solutions would prevent high water under events similar to the 2014 flood of record, in which all structures are breached and in most cases the roads and trails were overtopped

The results of those analyses were presented to the residents in March of 2017 in a meeting at Victoria City Hall attended by the members of the HOA and agencies. Attendees included:

- HOA: Dick Hawley, Rod Kern, Dick Hackett
- MCWD: Anna Brown, James Wisker
- Carver County: Paul Moline, Commissioner Tom Workman
- City of Victoria: Cara Geheren, Mayor Tom Funk
- Three Rivers Park District: Angie Smith, Rich Brasch, Brian Vlach

At that time, the residents were advised that any solution would need to be accepted by Three Rivers Park District, who own much of the infrastructure and whose property would be impacted by any of these changes.

Follow up with the HOA

On May 30, 2017, MCWD, the City, TRPD and the HOA met at Lowry Nature Center. The meeting was called by the HOA to request TRPD consider allowing the construction of a flap gate on the outlet between Zumbra and Sunny, the identified lowest cost and highest impact structural solution.

At that meeting, roles and responsibilities were outlined should the HOA pursue implementation of the flap gate solution. The roles were delineated as follows:

- The City would solicit proposals and advance an engineering scope of work to provide additional feasibility and design of the flap gate and bring it before Council for consideration. The resultant deliverables would be used to prepare a permit application to advance the solution.
- The District would provide an outline of the permitting framework and requirements to progress such a solution in advance of City scope execution, and would continue to advise and facilitate permitting throughout feasibility and design.
- Three Rivers would review permit information prepared by the City and make a determination as to whether the impact on their property would be acceptable.

Following the meeting, on June 2, the District provided an overview outlining the rules likely triggered by the flap gate solution, and recommended continued meetings across agencies to coordinate on application submittals, following the City's execution of an engineering contract.

Focus Engineering, on behalf of the City, worked with Barr Engineering to develop a scope of work to initiate the design. That scope was placed on a City Council agenda for a Council decision on June 12, 2017. City staff and consultants reported that the residents requested the scope of services be pulled from the agenda due to a perceived conflict of interest between the agencies and Barr Engineering. They have subsequently not followed up with City staff regarding a scope of work to advance the flap gate or any other solution.

I did heard from Scott Leonard (HOA) on July 31 when he called to discuss our Comprehensive Plan, and during that phone call he suggested the HOA had subsequently determined that they did not believe the flap gate would adequately address the issue and were no longer interested in advancing that solution. I advised him at that time that the inter-agency approach and roles would be nearly identical regardless of which solution they choose to advance.

DNR Analysis

On August 10, Dick Hawley (HOA) submitted a written request to the DNR for hydrologic modeling, also attached. The letter cited a lack of cooperation from the District and questions the modeling analyses done to date. The DNR informed him that the DNR did not have the capacity to perform hydrologic modeling and trusted the work done to date by the District, but did commit to the following:

- Requesting permit information from the District
- Resurveying the culverts in Carver Park Reserve (the HOA's request had suggested that the culverts were higher than previously reported)

Permit Results

The response to the request for permit information from the DNR was distributed to this group on September 27, 2017. MCWD staff conducted a search of permits within Carver Park Reserve that may contain information pertinent to the hydraulic connection of Stone Lake, Lake Sunny, Lake Zumbra, and Lake Auburn. The review revealed two proposed culvert modifications, within the 2005 and 2006 Carver Park Trail Rehabilitation and Reclamation Project.

1. The culvert between Sunny Lake and the Auburn Lake wetland (Culvert 2 in the Wenck report) was proposed to be lengthened to accommodate the proposed trail widening, with no proposed change to the hydraulic capacity.
2. An existing outlet control structure between Maple Marsh and Sunny Lake was proposed to be modified to replace a 24-inch corrugated metal pipe with a 24-inch reinforced concrete pipe. The modification also proposed to replace the existing pre-cast grate with a beehive grate at the existing elevation. There was no proposed change to pipe diameter, invert elevation, or hydraulic capacity.

The review of information within the District's permit database did not reveal records pertaining to the culvert between Lake Zumbra and Sunny Lake, the Stone Lake Outlet, nor the culvert under County Road 11. These findings, along with plan sets, were distributed to the DNR on September 27, as well as agency representatives from this group. See attached.

Survey Results and Model Update
The results of the resurvey conducted by the DNR are attached. The survey identified some areas where the model could be updated to improve information accuracy. In all cases however, the survey found culvert elevations to be lower than thought, not higher, as suggested by the HOA.

Wenck updated the District's hydrologic model with this higher resolution data. The resultant change in 100 year elevations are summarized below. Note that with the updates Zumbra's modeled elevation does not change substantially, though both Sunny and the wetland are lower as more water is held back in Stone than previously estimated.

Atlas-14, 10day 100-yr HWLs (ft)						
Scenario	Stone Lake	Marsh	Sunny	Zumbra	Wetland*	E. Auburn
Existing	947.7	945.1	945.1	943.1	944.7	943.0
Updated 10/3/17	948.1	945.0	944.1	943.0	944.1	943.1

*This refers to the wetland between Sunny and East Auburn

The results of survey and permit review reaffirm that no changes to structures in the system are exacerbating lake levels on Zumbra based on known historic and current elevations.

New Information – District Comprehensive Plan Hearing
On Thursday October 12, Dick Hawley and Scott Leonard (HOA) attended the MCWD Board Meeting to issue public comment on our Draft Comprehensive Plan. The HOA had previously issued a comment letter in response to the release of the Draft Comprehensive Plan which included the following recommendations to the District:

- "Find a permanent solution and take a leadership role in rectifying the underlying flooding issues at Lake Zumbra-Sunny, resulting in elimination of the excessive level fluctuations, the back flowing, and extended draw down periods following cycles of heavy rainfall; and
- Work with the Association, City of Victoria, Carver County and DNR to facilitate permitting of physical infrastructure and hydrologic changes required to normalize lake levels in a timely manner to prevent further flooding."

The District records all Board hearings and you can watch their statement to the Board here (or available through our website). Mr. Leonard's testimony begins just after the 16 minute mark. Their principal request the Board for the Comprehensive Plan to be amended to include a "permanent solution" to Zumbra's high water issues, and requested additional dedicated District human and financial resources to implement changes in the watershed, and to memorialize those resources in the Comprehensive Plan. Some of the issues they raised were:

- Stated that their concerns are related to drainage in both normal and high water conditions and do not step from the 2014 flooding event

- Stated that the current hydrologic conditions lead to shoreline erosion, damage to vegetation, and reduced recreation enjoyment on the property
- Stated that the District had managed updates to three culverts in 2012 that exacerbated problems, while in fact there is no record of any changes to structures in 2012, that is just the year TRPD surveyed
- Said that District staff had intentionally misled the Board as to the nature of the issue on Zumbra
- Took issue with staff's characterization of the meeting at the Lowry Nature Center on May 30 and the roles and next steps determined at that meeting

Our Board did not elect to make any modifications to the Comprehensive Plan. Staff expressed a commitment to continue working within the role defined throughout the process thus far.

Next Steps
At the October 4 meeting, this group agreed to the follow actions as next steps:

- TRPD will review the maintenance request and respond to the HOA directly on that request. TRPD may engage the Watershed District to provide some technical review of that request.
- MCWD will develop a follow up statement to the HOA for review and signature by all agency staff.
- With the new information now assembled and reviewed, the group agreed that it is timely to schedule an informational meeting to review information and affirm roles and responsibilities.

Again, I would like to extend my gratitude to this group for their engagement on the issue thus far. Please let me know if you have additional questions.

Sincerely,

Anna Brown
Planner-Project Manager
Minnehaha Creek Watershed District

c/ James Wisker, Minnehaha Creek Watershed District; Cara Geheren, Focus Engineering and City of Victoria; Brian Vlach, Three Rivers Park District; Jennie Skancke, Minneosta Department of Natural Resources; Paul Moline, Carver County Water Management Organization.

Attachment 1: Inter-Agency Meeting Agenda October 4, 2017

Lake Zumbra Meeting Agenda

October 4, 2017

1:00 – 2:00 pm

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1. Introductions and Meeting Purpose

2. Review Chronology

    - 2014 Flood Analysis
    - 2017 Solutions Modeling
    - May 2017 Meeting with Residents

3. Roles and Responsibilities

4. New Information/Information Requests
    - Open Agency Discussion
    - Permit search results
    - 2017 Model Update results

Atlas-14, 10day 100-yr HWLs (ft)						
Scenario	Stone Lake	Marsh	Sunny	Zumbra	Wetland*	E. Auburn
Existing	947.7	945.1	945.1	943.1	944.7	943.0
Updated 10/3/17	948.1	945.0	944.1	943.0	944.1	943.1

*This refers to the wetland between Sunny and East Auburn

5. Next Steps
    - Issue letter to HOA
        - Chronology
        - Roles and responsibilities
        - Next steps
    - Meeting with HOA
    - Advancing Engineering services
    - All requests and communications to be routed through this group

Handouts:

- Chronology
- DNR field survey
- Phase II Analysis Summary: Solutions Modeling

Attachment 2: Chronology

ZUMBRA LAKE LEVEL RESPONSE

Chronology:

2014: highest water year on record, flooding across the District

- Total reported damage across 16 properties of $371,000, 4 homes report structural damage

January 29, 2015: MCWD Board authorizes staff to execute a contract with Wenck to examine flooding problems in Zumbra Ridge

- Study purpose was to develop scientifically informed analysis to guide decision making moving forward
- Found no changes to lake management, crossing elevations, or development that would have proliferated the 2014 flooding beyond the record precipitation
- Recommendation to monitor and respond to culvert clogging and that City develop robust monitoring and flood response plan
- Briefly explored flap-gate, which was not advanced because it would modify OHW

July 9, 2015: following a public meeting with residents of Zumbra Ridge NA, the District board adopted to the Zumbra report (res 15-063) and pledged to continue to work with City staff

September 2016: Zumbra Ridge residents reengaged with the District seeking clarity on report recommendations and next steps

January 2017: Public agencies reconvene to discuss new questions from residents; decides to issues a second phase analysis looking at the impact of modifying culvert elevations and sizes

- Study finds that all solutions impact water levels on TRPD property

March 1, 2017: Agencies meet with Zumbra Ridge HOA. At the meeting:

- District recapped the events of 2014 and subsequent Wenck report
- Presented the structure modification options and their impact across all system waterbodies
- Defined agency roles of District, DNR, City, Three Rivers, and County
- Victoria Mayor volunteered to lead on convening policy makers from each agency to discuss advancing a solution

March 8, 2017: Mayor issues letter stating that they are supportive of District taking the lead in coordinating government agencies and identifying possible solutions

April 8, 2017: District responds restating the work done to date and the need for the City and TRPD to coordinate to determine whether and to what extent TRPD is willing to accept changes to lake and wetland elevations on their property, no entity can advance any solution without this understanding reached

May 31, 2017: District attends a meeting with TRPD, Victoria, and residents to discuss issues and TRPD/City role in advancing solution. Meeting has been called by residents seeking to advance the flap-gate solution. Outcomes:

- City volunteers to bring a scope of engineering services to council to advance a solution and serve as lead on preparing a permit application
- District commits to providing City with an outline of permitting requirements, and guidance through process
- TRPD commits to responding to a specific proposal as to whether they are willing to accept modified water levels in Carver Park caused by that solution

June 12, 2017: At homeowner request, City pulls engineering scope of work from agenda that would develop conceptual project and permitting framework.

August 12, 2017: HOA issues request for services to DNR

Attachment 3: 2015 Wenck Memo

Technical Memo

WENCK ASSOCIATES

Responsive partner.
Exceptional outcomes.

To: Renae Clark, Planner – Project Manager, Minnehaha Creek Watershed District

From: Chris Meehan, Wenck Associates, Inc.
Erik Megow, Wenck Associates, Inc.

Copy: Carver County, Three Rivers Park District, City of Victoria

Date: May 29, 2015

Subject: Lake Zumbra High Water Level Investigation

In the spring and early summer of 2014, a record amount of precipitation was experienced throughout the Minnehaha Creek Watershed District (MCWD). Chaska received 13.24 inches of rain in June, more than triple the precipitation normally received for the month. Throughout the District, flooding and high water issues resulted in many of the lakes and streams. Seventeen lakes in the District experienced record breaking high water levels. One of those lakes was Lake Zumbra.

The water level of Lake Zumbra reached a peak elevation of 944.91 on July 3, 2014 which is 1.61 feet above the lake's ordinary high water level (OHW) of 943.3, established by Minnesota Department of Natural Resources. The 944.91 elevation was the highest recorded since 1958 when the record began. The high lake level caused flooding on improved properties and residences on Zumbra Drive and Zumbra Circle and several of them experienced surface flooding issues and wet basements. Several had been installing sand bags supplied by the City of Victoria to limit structure impacts.

Minnehaha Creek Watershed District (MCWD) received communications from the City of Victoria regarding complaints from residents with flooding issues. MCWD representatives met with residents, City staff and representatives from Three Rivers Park District to share information and discuss issues being experienced by homeowners. Homeowners were seeking relief from the high water condition and were looking for help to increase the outlet capacity of Lake Zumbra. While that sounds straightforward, there are many complexities involved like determining and communicating what downstream impacts would be and seeking emergency approvals from the Minnesota Department of Natural Resources and Three Rivers Park District.

MCWD is not an emergency response authority, but it's high level of water resources expertise was offered to methodically investigate the behavior of the lake outlet and help inform homeowners and local partner agencies about Lake Zumbra water levels. MCWD agreed to review the hydrology of Lake Zumbra and its outlet, and to collect lake level information on both Lake Zumbra and Sunny Lake. The purpose of the review was to understand the lake level response and to inform all parties involved of the facts.

Wenck Associates, Inc. completed a review of lake levels and precipitation, constructed an XP-SWMM hydrologic response model, ran multiple model scenarios including the actual precipitation time series received, both TP-40 and Atlas 14 storm precipitation, reviewed past water level issues on Lake Zumbra, and surveyed low lying residences sensitive to lake level rises. The balance of this memorandum discusses the results of this hydrologic review.

Lake Zumbra Lake Levels

Since 1958, Lake Zumbra has experienced water levels that have fluctuated almost 8 feet. Figure 1 shows the recorded water levels through the past 57 years showing elevations between 936.7 in 1958 and 944.9 in 2014.

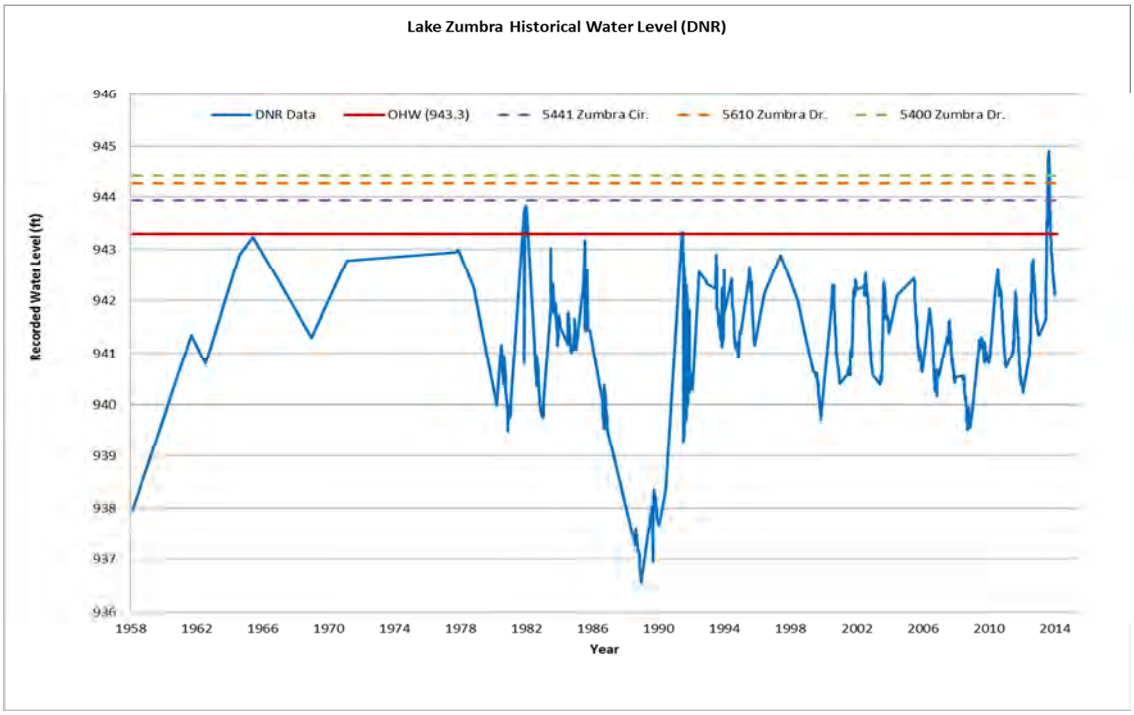


Figure 1. Lake Zumbra water level from 1958 to 2015

To understand the water level fluctuations, the hydrology and hydraulics of both Lake Zumbra and Sunny Lake were investigated. Many of the fluctuations are seasonal, however Figure 1 shows a low lake level period between 1986 and 1992. Lake Minnetonka was also low during this period reflect less than normal precipitation. The high peak during the summer of 2014 demonstrates a large range of lake levels and is the result of an extended period of wet weather.

Lake Zumbra Hydrology

Lake Zumbra is a 207 acre lake located in Carver County. It has a watershed area of 524 acres that is comprised primarily of wetlands and maple-basswood forest. Adjacent to Lake Zumbra is Sunny Lake which has always been hydraulically connected to Zumbra. A large portion of the Lake Zumbra and Sunny Lake watersheds lie in the Carver Park Reserve. Currently, only a small portion around Lake Zumbra is developed for residential use while the rest is made up of wetlands, forest, and other water features such as ponds and Stone Lake. Figure 2 shows the watersheds for Lake Zumbra, Sunny Lake, and an unnamed wetland that is located between Sunny Lake and Lake Auburn. Table 1 shows a comparison of the three waterbodies and their watersheds. It is interesting and informative to note Lake Zumbra has a watershed to lake area ratio of 2.53:1 while Sunny Lake, the tail water on the Lake Zumbra outlet, has a ratio of 45.2:1. Sunny Lake is a much smaller water body yet it receives a great deal more runoff compared to Lake Zumbra.

Table 1. Waterbody Comparisons

Waterbody	NWL (ft)	Lake Surface Area at NWL (ac)	Watershed Area (ac)
Lake Zumbra	941.1	207	524
Sunny Lake	941.1	32	1,445
Unnamed Wetland	940.3	22	118

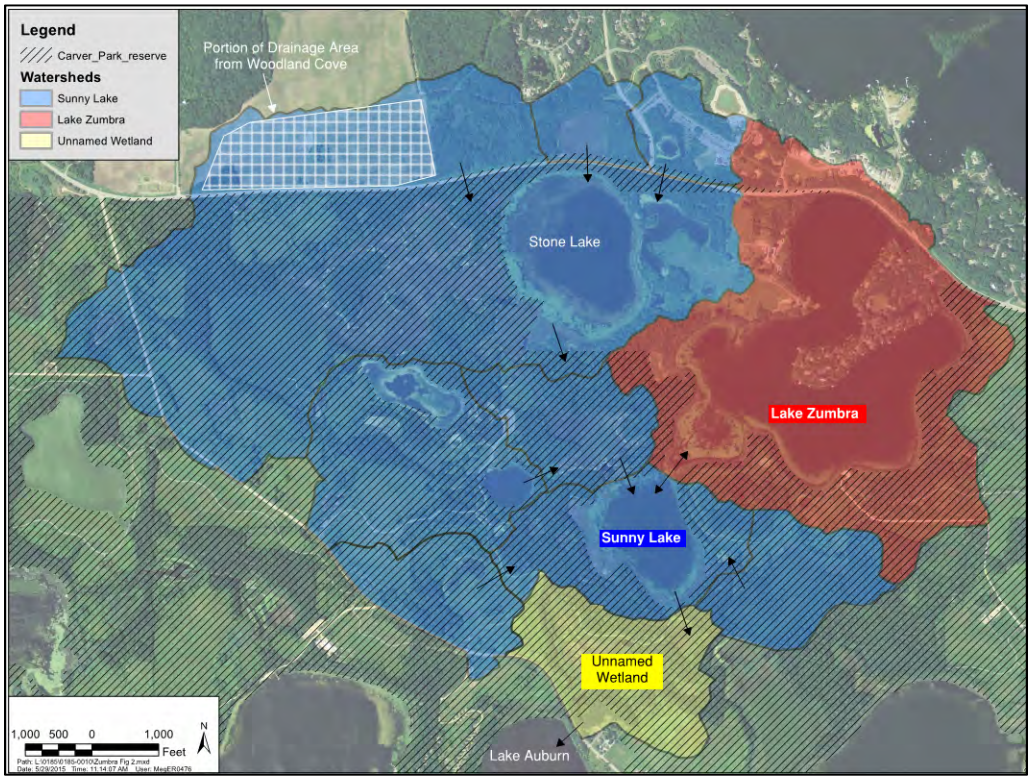


Figure 2. Lake Zumbra and Sunny Lake watersheds *See Appendix E, Figure 3 for the Lake Auburn watershed.*

Looking at historical aerial photos (Appendix A), there does not seem to be many critical changes in hard surfaces in these watersheds. Very little residential development has occurred within the watersheds that would create increases in runoff rates and volumes.

It should also be noted that future developments within these watersheds will be regulated by MCWD's Stormwater Management Rules. These rules make sure that developments include stormwater abstraction BMPs that reduce the runoff rates and volumes leaving a site, for 1-, 10-, and 100-year storm events, ensuring runoff volumes and rates do not increase to Sunny Lake and Lake Zumbra.

Woodland Cove, a development on Lake Minnetonka and contributing runoff to Sunny Lake, can be used as an example for how the stormwater rules will restrict future development. To meet the District's stormwater requirements, the development included a total of 51 sedimentation basins and 58 infiltration basins designed to reduce runoff rates and volumes and increase water quality. Table 2 shows the pre-development and proposed runoff and water quality parameters that were reviewed and permitted in 2011.

Table 2. Woodland Cove Runoff Reductions

Runoff Parameter	*Pre-development*	*Proposed*	*Reduction*
Total Phosphorus Load (lbs/yr)	35.53	5.82	83.2%
Total Suspended Solids (lbs/yr)	9,614.8	284.4	97.0%
Runoff Volume (ac-ft)	34.80	18.41	47.1%

From the aerial photo review and additional historical documents, an increase in runoff rates and volume to Lake Zumbra, due to residential development, does not appear likely based on current stormwater regulations.

Lake Zumbra Outlet Hydraulic Capacity

Through a review of the Minnesota Department of Natural Resources and Three Rivers Park Board records, the overall hydraulic capacity between Lake Zumbra and Lake Auburn has not changed significantly in the past 45 years. The most significant change in the watersheds were the installations of trail and road crossings between Zumbra and Sunny in the early 1960s and the changing culverts at the trail and County Road 11 crossing downstream (see Table 3, Pg. 5)

Since the 1960s, Lake Zumbra has discharged to Sunny Lake and Sunny Lake has discharged to Lake Auburn through an unnamed wetland. Figure 3 shows how water flows from Lake Zumbra to Lake Auburn and where flows from sub-watersheds enter the system at Sunny Lake. Figure 3 also shows the three critical crossings/culverts that regulate flow through the system.

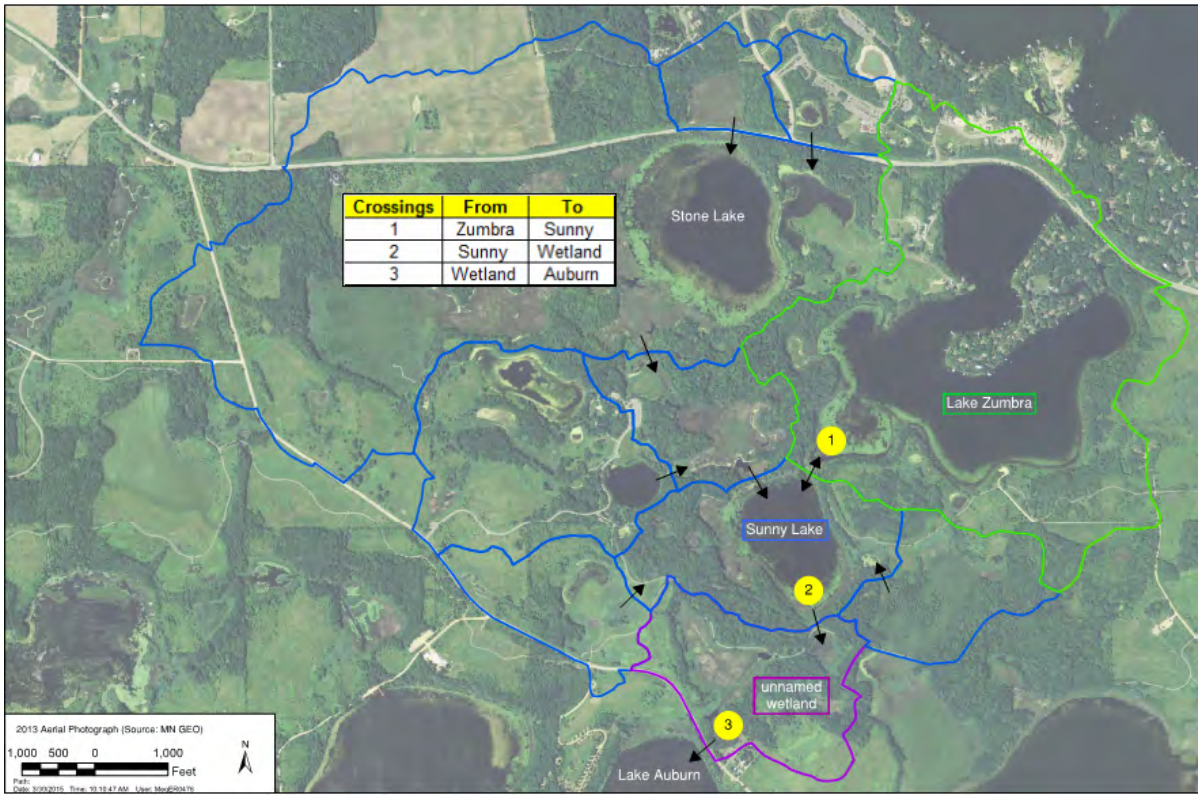


Figure 3. Flow direction of water from Zumbra to Auburn and the three critical crossings

The three crossings shown in Figure 3 regulate flow in between Lake Zumbra and Lake Auburn. A review of historical documents and aerial photos reveals that these three crossings have changed since 1966. Table 3 lists recorded elevations and culvert sizes and how they have changed over time.

Table 3. Culvert sizes at critical crossings

Crossing	From	To	Year[1] Surveyed	Type	Diameter (in.)	Capacity (cfs)	Upstream Elev. (ft)	Downstream Elev.(ft)
1	Zumbra	Sunny	1966	CMP	18	6.3	940.71	940.10
			2012[2]	CMP	24	6.5	940.70	940.80
2	Sunny	Wetland	1966	CMP	18	Unknown	943.80	Not Surveyed
			1978	CMP	24	Unknown	942.50	Not Surveyed
			2012	CMP	30	19.7	941.17	941.46
3	Wetland	Auburn	1976	CMP	24	6.8	941.10	940.00
			2012	HDPE	18	8.3	940.27	939.55

[1]These years represent the years which these crossing were surveyed and not the year they were installed.
[2]According to the Three Rivers Park District, this culvert was installed sometime between 2005 & 2006

The 2012 survey from the Three Rivers Park Department is the most recent survey collected for the crossings. No work at these crossing has been performed since 2012. Table 2 does show that there have been some changes in the size and elevation of the culverts during the last 50 years;

- *Crossing 1 – Zumbra to Sunny*
  - A review of aerial photos (Appendix A) shows that prior to the early 1960s, Lake Zumbra and Sunny Lake were connected without impediment. Sometime during the early 1960s an earthen berm was constructed and an equalization pipe was placed in the berm to connect the two lakes hydraulically. It is assumed the culvert placed in the berm was the 18" CMP Culvert listed in Table 2. At some time between 1966 and 2012, the CMP Culvert was increased to 24 inches, but the slope was decreased such that capacity of the pipe has remained the same.
- *Crossing 2 – Sunny to Unnamed Wetland*
  - A review of aerial photos shows that a trail of some sort has always been at this location. Over the past 50 years the culvert has been both increased in size from 18 inches to 30 inches and has been constructed at a lower invert elevation.
- *Crossing 3 – Unnamed Wetland to Lake Auburn*
  - The culvert under County Road 11 (Victoria Drive) was reduced from a 24" CMP culvert to an 18" HDPE sometime between 1976 and 2012, but the capacity of the pipe was increased by using HDPE, reducing the friction losses.

To evaluate the hydraulic interaction between the different waterbodies, an existing XPSWMM hydrologic and hydraulic model was updated to represent the current hydrology and hydraulics.

XPSWMM Modeling

The 2013 DNR FEMA XPSWMM model was updated with the most current impervious surface calculations and the 2012 TRPD survey of the crossings. The updated model was used to evaluate two scenarios:

1. A 100-year, 24-hour event using an Atlas-14 rainfall distribution and
2. The 2014 Flooding event from April to July using 15-minute rainfall data from Carver County.

Scenario 1:
The 100-year, Atlas 14 storm was modeled first to see how the system responded during an intense rainfall event. Table 4 shows a summary of the Atlas 14, 100-year modeling results, along with the 1-year & 10-year scenarios for comparison. The hydrographs for the lakes and crossings during the Atlas 14 100-year event can be found in Appendix B.

Table 4. Atlas 14 1-, 10-, & 100-year XPSWMM Results

Waterbody	*100-year*		*10-year*	*1-year*
	Peak Elev. (ft)	*Peak Outflow (cfs)*	*Peak Elev. (ft)*	*Peak Elev. (ft)*
Lake Zumbra	943.37	5.98	942.28	941.83
Sunny Lake	945.96	36.71	943.94	942.86
Wetland	945.15	11.71	943.37	942.13

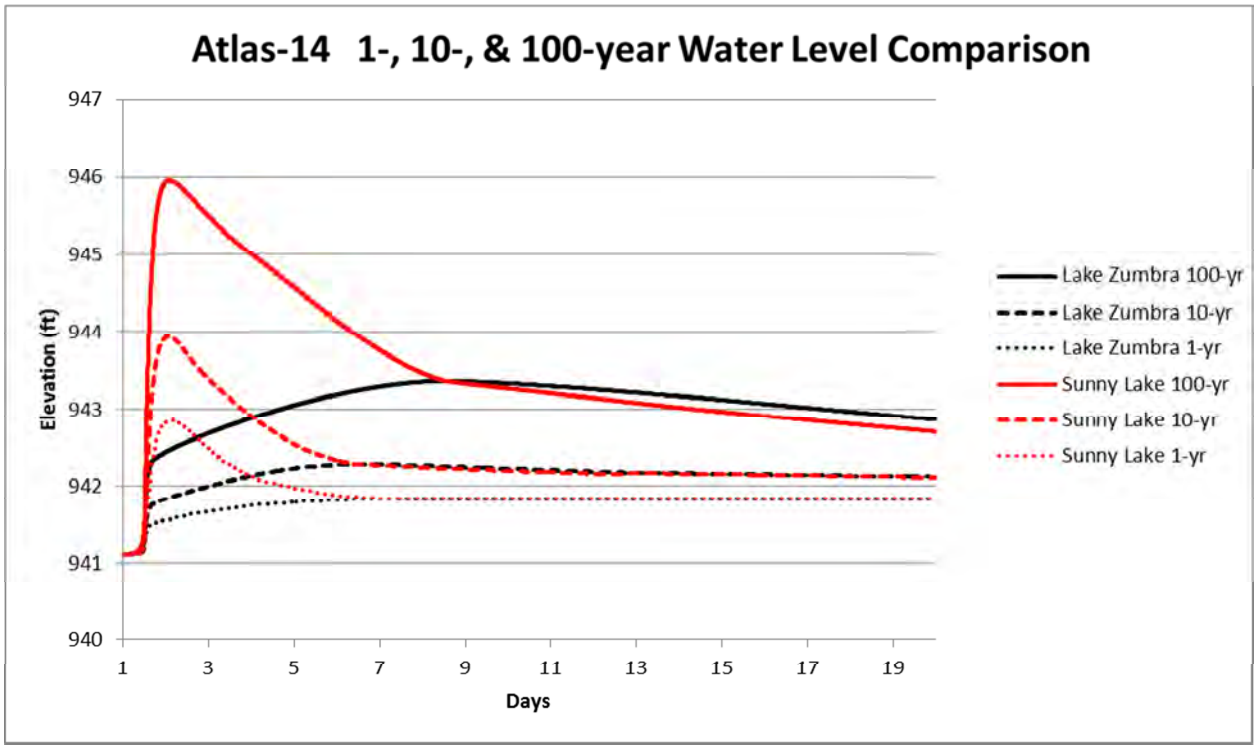


Figure 4. Lake hydrographs from XPSWMM showing the Atlas-14 1-, 10-, and 100-year storm events as modeled in XPSWMM.

The HWL during the Atlas-14, 100-year storm is expected to be 943.37 which is just above Lake Zumbra's OHW of 943.3. More importantly, the HWL of Sunny Lake reaches 945.96. This water level is important, because it shows that Sunny Lake's water level rises faster and higher than Lake Zumbra's and actually creates a backflow of water into Lake Zumbra. As was determined in the 1983 report from E.A. Hickok and Associates (Appendix D), Lake Sunny and the Unnamed wetland rise quickly and begin discharging to Lake Auburn and Lake Zumbra simultaneously. During the Atlas-14, 100-year storm Lake Sunny discharges a total of 229 ac-ft of water through the equalization culvert. This amount of water dispersed over the surface area of Lake Zumbra (207 ac) results in a rise of about 1.1 feet. Indicating that by making the equalization pipe between the two lakes larger would not reduce the HWLs of Lake Zumbra.

Scenario 2:
The summer of 2014 saw record precipitation in the first half of the year. Between January 1 and June 30, Carver County recorded 25.98 inches of precipitation. This precipitation led to many lakes within the watershed district recording record high water elevations, including Lake Zumbra where a water level of 944.91 was recorded.

To determine how the system would handle multiple intense storms, the 2014 Flooding event was modeled. Modeling the 2014 storm event also provides a benchmark to see how high water levels could be compared to recorded water levels. Using rainfall data from Carver County between late April and early July, the model shows that this fast rise of Sunny Lake and the Unnamed wetland drove the HWL of Lake Zumbra higher and higher. Table 5 shows a summary of the 2014 Flooding Event model using Carver County rainfall data. The hydrographs for the lakes and crossings during the 2014 Flooding event can be found in Appendix C.

Table 5. 2014 Flooding XPSWMM Results

Waterbody	*Peak Elevation (ft.)*	*Peak Outflow (cfs)*
Lake Zumbra	944.29	6.47
Sunny Lake	945.47	27.73
Wetland	945.02	10.91

The XPSWMM 2014 Flooding model showed that Lake Zumbra would rise to an elevation of 944.29 which is a foot higher than its OHW (943.3). Additionally, Sunny Lake and the downstream wetland would rise above 945.0 restricting the outflow of Lake Zumbra for extended periods of time. Included in Figure 5 are elevation data from the DNR and MCWD during the summer months.

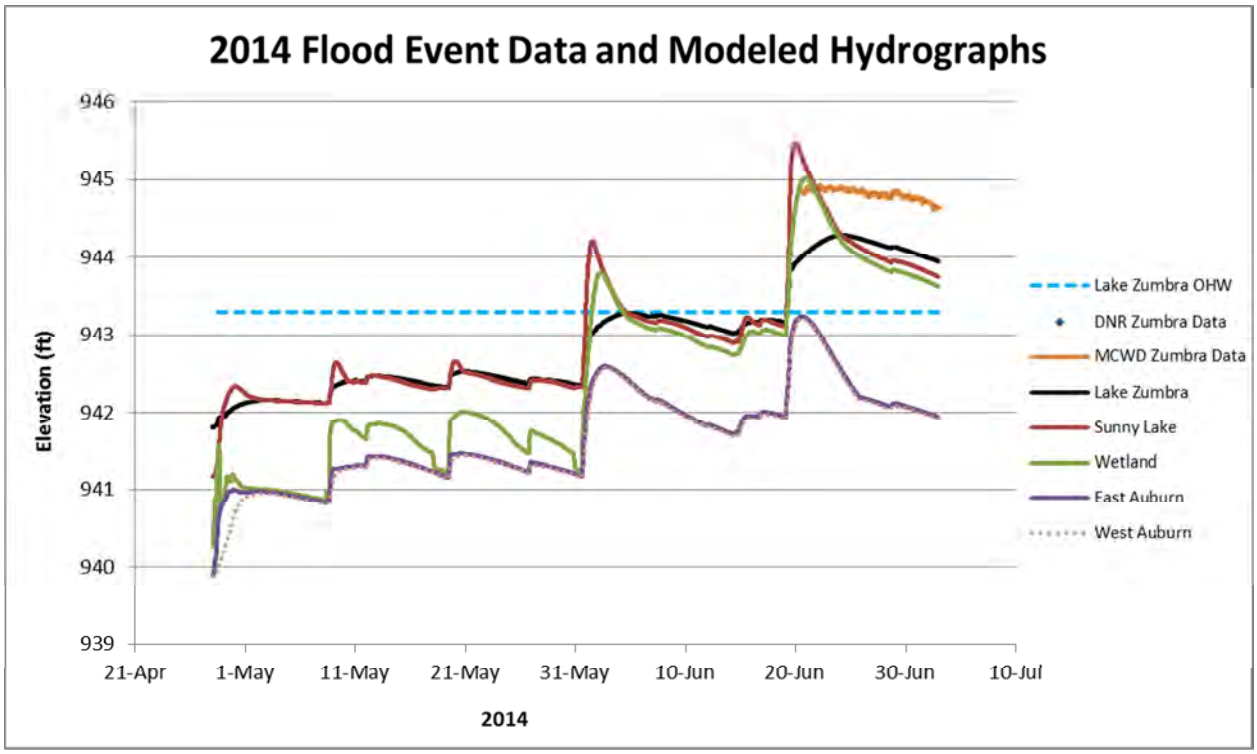


Figure 5. Lake hydrographs from XPSWMM showing the 2014 Flooding event using Carver County precipitation data.

Figure 5 shows how high Lake Auburn, Sunny Lake, and the Unnamed wetland bounced over a foot during the intense rain events at the end of May and on June 19th. These three waterbodies bouncing so high permitted flow out of the system backing up into Lake Zumbra. The model shows that Sunny Lake discharged 251 ac-ft to Lake Zumbra between April 28 and July 3. This amount of water dispersed over the surface area of Lake Zumbra (207 ac) results in a rise of about 1.2 feet. Even with the high elevations that were modeled, the recorded elevations from the DNR data set show that the levels were even higher, possibly alluding to other phenomena that proliferated the water levels even higher. The Three Rivers Park Board noticed that there might have been some clogging due at the outlet of Sunny Lake due to cattail mats and beaver activity. These observations were made in June and early July, with TRPB staff hiring someone to remove the beaver blockage in mid-to-late July.

2014 Flooding Overview and Summary

During the 2014 Flooding event, 16 property owners on Lake Zumbra experience impacts due to high water levels. Five of the 16 properties had structural impacts in the homes due to the Lake Zumbra water rising above their lowest opening. It is estimated that the flooding caused $371,000 in costs which equates to about $23,000 per property (Appendix E). Additionally, the City of Victoria provided $20,000 of sandbagging efforts bringing the total cost to just under $400,000. Figure 6 shows the 16 parcels along Lake Zumbra that experienced damage due to the flooding.

Figure 5. Flood damaged parcels and the 944.0 contour elevation (LiDAR). *See Appendix E, Figure 2 for a more detailed breakdown of the parcel damage.*

A breakdown of the property damage assessment shows that a majority of the damage (64%) was due to landscaping and 32% was due to structural/housing damage. A breakdown of the property damage is shown in Table 6. A detailed breakdown of the damage per parcel is listed in Appendix E.

Table 6. Property Damage Assessment Breakdown

Type of Damage	*Costs*[1]	*% of Total*
Landscape	$237,600	64%
Equipment	$14,900	4%
Structural[2]	$118,500	32%
Total	***$371,000***	***100%***

1. Costs were provided by the Zumbra HOA (Appendix E)
2. Structural elements refer to flooring, falls, furniture, and the exterior of homes

According to a 2015 Survey, low opening elevations along Lake Zumbra are as low as 943.93. Table 7 lists the low opening elevations for parcels which requested to be surveyed. A map of these elevations are shown in Appendix F.

Table 7. 2015 Surveyed Low Opening Elevations

Parcel Address	*Low Opening Elevation (ft)*	*Low Opening Type*
5400 Zumbra Dr.	944.44	Garage
5429 Zumbra Cir.	946.32	Garage
5441 Zumbra Cir.	943.93	Floor
5451 Zumbra Dr.[1]	945.59	Garage
5471 Zumbra Cir.	946.41	Window
5610 Zumbra Dr.	944.26	Floor
5430 Zumbra Dr.[2]	939.23	Floor

1. The basement floor is located at a lower elevation than the lowest opening.
2. Flooding of this residence is caused by flooding in the park and not Lake Zumbra.

Going Forward

A historical review of lake management, crossing elevations, and development within the Zumbra-Sunny watershed does not indicate any changes that would have proliferated the 2014 flooding beyond the record precipitation. The high water levels have been a problem since 1970s and solutions were explored in the 1980s.

Modeling results show that an Atlas-14, 1-year and 10-year storm would not produce flooding elevations above the low openings that were surveyed. MCWD's high water elevation rule states that there should be at least two vertical feet of separation between low openings of structures and the 100-year high water elevations of waterbodies. For events where 2 feet of freeboard is not present, the City of Victoria and homeowners should look into flood protection/proofing measures, such as sandbagging or berming. Table 8 shows which houses would be affected for which storm events and the expected costs of sandbagging for these events.

Table 8. Property Damage Assessment Breakdown

Atlas-14 Event	*Lake Zumbra Elevation (ft)*	*2ft of freeboard (ft)*	*Houses Needing protection*[1]	*Cost of Sandbagging*[2]
1-year	941.83	943.83	**None**	$0
10-year	942.28	944.28	**2** - 5610 Zumbra Drive & 5441 Zumbra Cir.	$4,000
100-year	943.37	945.37	**3** - 5610 Zumbra Drive, 5441 Zumbra Cir., 5400 Zumbra Dr.	$6,000

1. Houses in which 2ft of freeboard are not available
2. The City of Victoria estimates the costs of sandbagging (labor and materials) to be $2,000/home

Modeling results show that Lake Zumbra does not reach its peak elevation for about 7 days after large rain events, which would provide the homeowners and the City of Victoria time to implement flood proofing measures. Additional measures to look at monitoring lake levels on Sunny Lake would help identify potential flooding events when water would flow into Lake Zumbra.

Beyond sandbagging, the City of Victoria and the Three Rivers Park District will add additional measure to make sure the outlet to Lake Zumbra is clear of debris. This will include more regular maintenance inspections by park staff along with implementing a solution to limit the potential of future blockage due to beaver activity.

Appendix D

1983 E.A. Hickok Report

MEMORANDUM

TO: Minnehaha Creek Watershed District
Board of Managers

FROM: Mike Panzer
E. A. Hickok and Associates

DATE: August 1, 1983

SUBJECT: Lake Zumbra/Sunny Lake Outlet Investigation

As directed by the Managers, I have investigated and reviewed the existing outlet system for Lake Zumbra and Sunny Lake in the Hennepin County Park Preserve District (HCPRD), Carver Park Reserve. This investigation was undertaken at the request of HCPRD and authorized by the Board of Managers on July 21, 1983.

The outlet system was analyzed based upon information provided by HCPRD, information contained in the report entitled "Carver Park Reserve Water Management Plan", E. A. Hickok and Associates, February 1975 and miscellaneous information in the Districts files.

1. Overview

Lake Zumbra borders the Carver Park Reserve and outlets through Sunny Lake and into Lake Auburn via a system of culverts, open channel and ponds. Lake Zumbra is connected to Sunny Lake by culvert which acts as a water level equalizer.

Residents who live on Zumbra Lake have frequently complained of high water and have requested HCPRD to increase the capacity of the existing connection between Lake Zumbra and Sunny Lake to relieve high water conditions. It is believed by some residents that the connection restricts flow from Lake Zumbra to Sunny Lake thereby aggravating high water problems on Lake Zumbra.

HCPRD modified the Sunny Lake Outlet after the park property was acquired. The existing Sunny Lake Outlet is lower than the previous outlet and is lower than the outlet elevation stipulated by the DNR permit issued to HCPRD to perform the work. The outlet invert would have to be raised substantially to conform with DNR requirements.

The existing Sunny Lake Outlet is higher than the outlet elevation recommended in the 1975 report. This report takes into account the interrelationships of all lakes within Carver Park Reserve and recommends control elevations. The Managers have reviewed and approved the 1975 report.

The HCPRD wishes to implement recommendations in the 1975 report, cooperate with residents on Lake Zumbra, and meet the requirements of the District and DNR. However, the improvement requested by the residents, in

the opinion of HCPRD, may not be sufficient to adequately address the problem. In addition, the DNR may not allow the work unless the existing outlet invert elevation for Sunny Lake is also raised to comply with DNR permit No. 79-6120 conditions. Finally, HCPRD is hesitant to proceed with any further work until it is known whether DNR requirements, Minnehaha Creek Watershed District requirements and concerns of the residents can all be met.

2. Analyses

Culvert sizes and invert elevations within the Carver Park Reserve were confirmed with HCPRD staff.

Hydrologic model data from the 1975 report were used to estimate runoff hydrographs, and their relationship with time, for Lake Zumbra and Sunny Lake. The runoff hydrographs were routed through the system by a reservoir routing procedure to estimate high water levels, outflow hydrographs and their relationship with time.

3. Conclusions

A. Runoff hydrographs resulting from intense rainfall cause Sunny Lake to rise higher and more quickly than Lake Zumbra. For this reason, Sunny Lake can simultaneously discharge to both Lake Auburn and Lake Zumbra. Under these reverse flow conditions, the modifications requested by residents would cause an increase in the volume of runoff to Lake Zumbra and a slight increase in the high water elevation. This is contrary to the effects anticipated by the residents on Lake Zumbra who have requested modifications.

B. The existing outlet culvert for Sunny Lake has adequate capacity to prevent damaging high water conditions on Lake Zumbra for a 100 year - 24 hour storm. However, channel capacity of the Sunny Lake outlet downstream is inadequate and causing a tailwater condition to develop that restricts flow.

C. The outlet elevation of Sunny Lake is presently higher than that recommended in the 1975 report and is substantially lower than the elevation stipulated by the DNR. It is apparent that raising the outlet elevation to conform with DNR requirements would also require a control structure and improvements to increase the capacity of the waterway between Sunny Lake and Lake Auburn. This would be necessary to prevent increased high water levels on Sunny Lake and Lake Zumbra.

4. Recommendations

A. Sunny Lake Outlet

The outlet channel between Sunny Lake and Lake Auburn controls water levels on Sunny Lake and Lake Zumbra. HCPRD should investigate the feasibility of improvements to increase channel capacity for the purpose of relieving high water problems upstream.

Under no circumstances should the existing Sunny Lake outlet control elevation be raised to conform with requirements set forth by the DNR unless additional improvements are implemented downstream to assure that high water levels on Sunny Lake and Lake Zumbra are not increased.

B. Lake Zumbra/Sunny Lake Culvert Connection

The capacity of the culvert connection between Lake Zumbra and Sunny Lake should not be increased unless the capacity of the Sunny Lake outlet system is also increased.

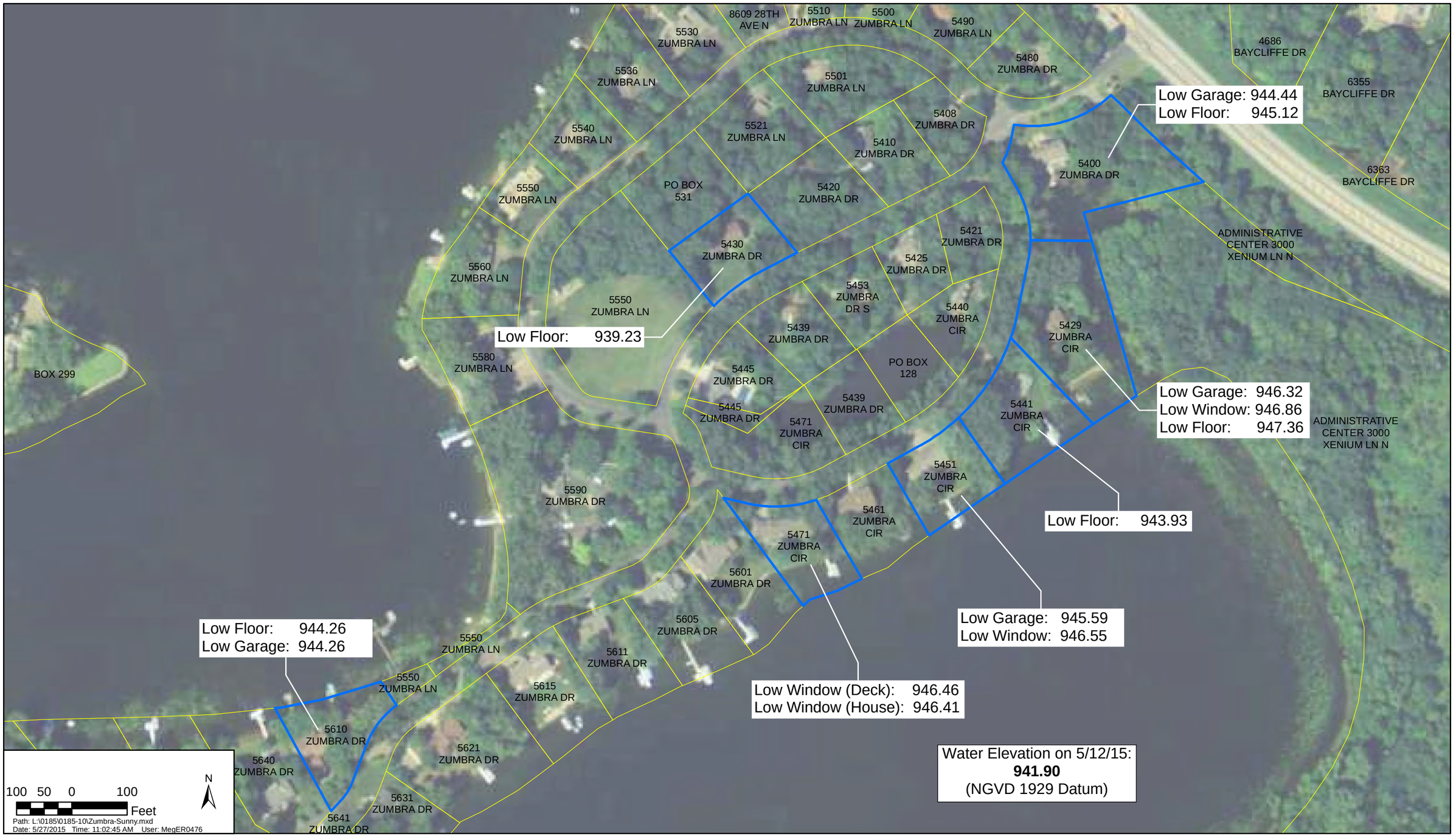
C. Lake Auburn - Auburn East/West Connection

The capacity of the open water connection between Lake Auburn East and Lake Auburn West should be verified by field surveys in conjunction with Item A above.

It is recommended that the Board of Managers accept the conclusions and staff recommendations herein and direct that they be forwarded to HCPRD.

Appendix E

Figures



MINNEHAHA CREEK WATERSHED DISTRICT

Lake Zumbra Survey

WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.

MAY 2015

Figure 1

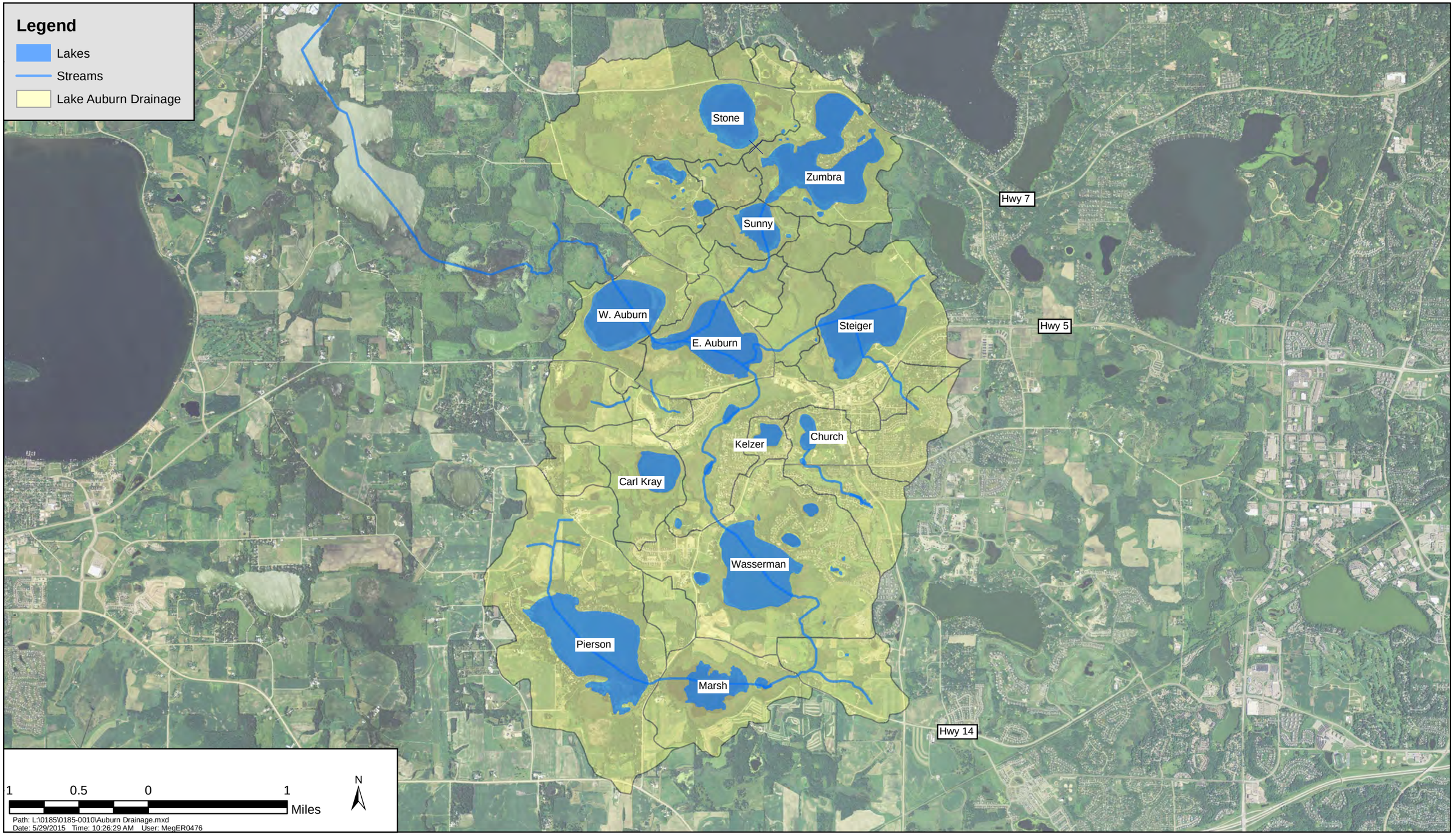
MINNEHAHA CREEK WATERSHED DISTRICT

Lake Zumbra 2014 Flooding Damage

WENCK ASSOCIATES
Responsive partner. Exceptional outcomes.

MAY 2015

Figure 2



MINNEHAHA CREEK WATERSHED DISTRICT

Lake Auburn Drainage Area

WENCK ASSOCIATES

Responsive partner. Exceptional outcomes.

MAY 2015

Figure 3

Appendix F

Property Damage Assessments

Zumbra Ridge Homeowners Association

Property Damage Assessments
June 2014 Lake Zumbra High Water

Bigalke, 5645 Zumbra Drive:	Equipment:	$1400
	Landscape:	4600
Hackett, 5430 Zumbra Drive:	Flooring/Walls:	15000
	Landscape:	24000
Haroldson, 5691 Zumbra Drive:	Landscape:	7500
Irene, 5730 Zumbra Drive:	Landscape:	10000
Jorgenson, 5441 Zumbra Circle:	Flooring/Walls:	35000
	Landscape:	15000
Kemppainen, 5611 Zumbra Drive:	Landscape:	10000
Kroiss, 5605 Zumbra Drive:	Landscape:	5000
Langva, 5590 Zumbra Lane:	Landscape:	17500
Larson, 5451 Zumbra Circle:	Flooring/Walls:	12000
	Furniture:	2500
	House Exterior:	10000
	Equipment:	7000
	Landscape:	5000
Lee, 5610 Zumbra Drive:	Floors/Walls:	24000
	Landscape:	44000
Leonard, 5601 Zumbra Drive:	Landscape:	16500
	Equipment:	4000
Nauman, 5720 Zumbra Drive:	Equipment:	2500
	Landscape:	7500
Nelson, Charlson Meadows:	Landscape:	28000
Running, 5510 Zumbra Lane:	Landscape:	15000
Steadman, 5429 Zumbra Circle:	Flooring/Walls:	20000
	Landscape:	10000
Swenson, 5530 Zumbra Lane:	Landscape:	18000

Attachment 4: 2017 Wenck Scenario Analysis

Technical Memo

WENCK ASSOCIATES

Responsive partner.
Exceptional outcomes.

To: Minnehaha Creek Watershed District Staff

From: Erik Megow, Wenck Associates, Inc.
Chris Meehan, Wenck Associates, Inc.

Date: March 31, 2017

Subject: Lake Zumbra High Water Level (HWL) Investigation Modeling Scenarios

In 2015, a report[1] was created outlining the hydrologic and hydraulic (H&H) characteristics of Lake Zumbra in Victoria. The report focused on the Lake's outlet, the downstream lakes and hydraulics, and the damage caused from the 2014 flood events. As a follow-up to the 2015 Report, this memo outlines scenarios that were investigated and modeled to lower Lake Zumbra's 100-yr HWL.

The H&H analysis outlined in the 2015 showed that the outlet of Lake Zumbra was not undersized, but rather high water levels in downstream waterbodies (Lake Sunny) provided backflow to Lake Zumbra and limited outflow. Figure 1 (attached) shows flow direction and profile of the waterbodies around and downstream of Lake Zumbra. Figure 2 shows the Lake Zumbra Watershed in relation to the greater Six-mile Creek Watershed, upstream of Lake Auburn. During large storm events, flow from Stone Lake and wetlands upstream of Sunny Lake quickly flow into Sunny and bounce the small (in comparison to Zumbra) lake above the outlet to Zumbra resulting in water flowing into Zumbra and restricting Zumbra from drawing down. To lower the high water level of Lake Zumbra during large storm events, four scenarios were modeled in XPSWMM.

The first three of these Scenarios aimed to lower the Lake Zumbra high water level by reducing the bounce of Sunny Lake and the backflow entering Lake Zumbra. The first three scenarios tried to reduce the Sunny Lake bounce by holding more water and runoff in Stone Lake, upstream of Sunny Lake and by increasing hydraulic crossings downstream of Sunny Lake to increase outflows. The fourth scenario aimed to lower Lake Zumbra's high water level by permitting any flow from Sunny to Zumbra during all storm events. Following, is a description of the 4 Scenarios that were modeled:

- **Scenario 1**: This scenario added a second culvert underneath County Road 11 (CR 11). The culvert added underneath CR 11 was a second 18-inch HDPE culvert at the same inverts as the existing culvert underneath the Road. This additional culvert was modeled with the idea that the increased flow to Lake Auburn would lower Sunny Lake and the amount of backflow entering Zumbra.

- **Scenario 2**: This scenario adjusted the outlet of Stone Lake by increasing the height of the weir. The outlet of Stone lake was altered from a 100ft long weir at 946.9 to a 100-ft long weir at 948.0 with notches at 946.9 and 947.5 to maintain the existing runout elevation. This scenario aimed to limit the bounce of Sunny Lake to limit backflow to Lake Zumbra more than in Scenario 1.

- **Scenario 3**: This scenario (a) added a culvert underneath CR 11 as in scenario 1, (b) adjusted the outlet of Stone Lake as in Scenario 2, and (c) enlarged the outlet of Lake Sunny from a 30" to a 42" culvert. The outlet of Stone lake was altered from a 100ft long weir at 946.9 to a 100-ft long weir at 948.0 with notches at 946.9 and 947.5 to maintain the existing runout elevation. The combination of these three hydraulic changes aimed to limit backflow to Lake Zumbra by both holding water back and drawing down Sunny Lake as quickly as possible.

- **Scenario 4**: This scenario modeled the outlet culvert of Lake Zumbra as a one-way flow connection to Sunny Lake. This option permitted backflow entirely, mimicking a culvert or outlet with a backflow valve or gate. The scenario bounced Sunny Lake and other downstream waterbodies by permitting backflow to Lake Zumbra entirely. In this scenario, the only water entering Lake Zumbra is the runoff from its direct watershed.

All four scenarios outlined above were modeled in XP-SWMM using the most recent (2012) survey data of the hydraulic connections shown in Figure 1 (attached). The scenarios were modeled using a 100-year, 10-day rainfall event using a TP40 rainfall (10.3 inches). Table 1, below, shows the results of the 4 modeled scenarios by comparing the increases in HWLs. The results for each of the Scenarios are shown, visually, in Figures 3-6 (attached).

Scenario	100-yr, 10-day HWLs and Increases (ft)					
	Zumbra	Stone	Sunny	Wetland	E. Auburn	W. Auburn
Existing HWLs	943.1	947.7	945.1	944.7	943.0	943.0
1	-0.1	0.0	0.0	-0.5	0.0	0.0
2	-0.2	0.5	-1.3	-1.2	0.0	0.0
3	-0.3	0.5	-1.4	-1.5	0.0	0.0
4	-0.7	0.0	0.3	0.4	0.0	0.0

As shown in Table 1, all four scenarios will have a minimal effect on East and West Auburn lakes downstream. The lakes that would be effected the most would be Stone Lake during Scenarios 2 & 3 and Sunny Lake during Scenario 4. The Table also shows that the only Scenario that would make a noticeable difference for residents on Lake Zumbra is Scenario 4 which would lower the 100-year HWL by 0.7 feet from 943.1 to 942.4.

References:

1. Technical Memo, 'Lake Zumbra High Water Level Investigation', by Wenck Associates, dated July 6, 2015. Available electronically, here: http://www.minnehahacreek.org/sites/minnehahacreek.org/files/agendas/10.6%20-%20Zumbra%20Report%20Acceptance_reduced.pdf

Attachment 5: 1992 Letters r.e. Zumbra Development

GRAY, PLANT, MOOTY, MOOTY & BENNETT, P.A.

INCLUDING THE FORMER FIRM OF HARSTAD & RAINBOW

3400 CITY CENTER
THIRTY THREE SOUTH SIXTH STREET
MINNEAPOLIS, MINNESOTA 55402-3796
TELEPHONE 612 · 343 · 2800
FAX 612 · 333 · 0066
TWX 910 · 576 · 2778

DIRECT DIAL 343-2874

May 1, 1992

Minnehaha Creek Watershed District
Attn: Mr. Ron Quanbeck
P.O. Box 387
Wayzata, Minnesota 55391

Hennepin County Parks Preserve
Attn: Mr. Tim Marr, District Engineer
12615 County Road 9
Plymouth, Minnesota 55441-1248

Re: <u>Lake Zumbra Water Level</u>

Dear Sirs:

Thank you for taking the time to discuss the high water situation of Lake Zumbra with me last month. As I indicated in our phone conversation, I have been asked by some homeowners on Lake Zumbra to contact you with respect to this situation. Many homes have flooded back yards, and there is a real risk of basement flooding if the lake's level rises.

I have now had a chance to talk with the Department of Natural Resources (DNR), as well as with your organizations. I would like to summarize these conversations, and then request that you and a group of homeowners meet to discuss what steps can be taken to re-examine Lake Zumbra's drainage and determine the alternatives for regulating its level.

As you know, Lake Zumbra flows into Sunny Lake, which in turn flows through Carver Park to Lake Auburn. Ultimately this area drains through Six Mile Creek into Lake Minnetonka. Originally Sunny Lake was part of Lake Zumbra. At some point in the last 25 years, a causeway was built, separating the two lakes. There is a small culvert under the causeway between Zumbra and Sunny Lake. This culvert is the only outlet for the

lake. One issue is the level of this culvert and whether the size of the culvert is adequate. I do not entirely understand why the level of this convert is important inasmuch as the entire causeway is man-made, and interrupts the natural flow of the lake. The causeway has also caused that end of the lake to become weed-choked. As a starting point, it would seem that the flow of water under the causeway could improve.

There is a second culvert at the end of Sunny Lake which drains that lake under a bike path. From Sunny Lake, there is a very shallow slope towards Lake Auburn. Water drains into Lake Auburn through a third culvert under County Road 11.

The DNR informed me that the ordinary high water level of the lake has been set at 943.3' above sea level. Their file contains a letter from Doug Barr of Barr Engineering stating that in the last 35 years, the lake level has been anywhere from 938' to 943.24' above sea level. Mr. Barr's letter also stated that prior to 1930, the lake's level was 944'. (It is not clear whether Mr. Barr's statements with respect to recent lake levels were based on personal observations. However, Mr. Barr is a client of this firm, and, given his age, I can safely assume he did not make personal observations prior to 1930.) The DNR stated that changing the ordinary lake level is complicated but that they may be willing to re-examine this issue if there were evidence that the 100 year flood elevation would cause flooding of the basements of homes along the lake.

Tim Marr seemed well-versed on the history of the Lake Zumbra water level controversy. He indicated that part of the problem concerned a dispute between the DNR and the watershed district as to the proper level for the lake, and that this dispute had in the past prevented the construction of an appropriate outlet for the lake. A second problem concerned downstream obstructions to the flow of water. The basin between Lake Zumbra and Lake Auburn is flat and, as noted above, there are a number of obstacles to the flow of water. Finding a solution for Lake Zumbra depends in part on resolving these obstacles.

Currently the lake level is at approximately 942'. (This observation is based on survey stakes at a recent new home construction site.) At this level, there is flooding of all beaches and the back yards of some homes. One home owner reports basement flooding. However, if the lake rises another foot, there will be flooding of several homes. A major storm could easily raise the lake level by a foot.

The residents can accept periodic flooding of yards and beaches, but they do not believe that homes that have been on the lake for thirty years should be subject to flooding. They recognize that nature is not always predictable and that minor flooding will occur. However, the current situation is not simply the result of nature but of man-made obstacles that have changed the natural pattern of lake levels and discharge.

We would appreciate a review of this matter by your organizations. If the watershed district has data with respect to the 100 year flood levels, it would be useful to share this data with the DNR. Let us try to take a fresh look at the problem and resolve this matter once and for all.

In the meantime, some residents of Zumbra Ridge are checking the culverts to make sure that the drainage culverts are free of debris which may be restricting the flow.

Please contact me if you feel that it would be useful to meet with the residents of Zumbra Ridge to discuss this matter.

Very truly yours,

Richard A. Hackett

RAH/rsp

2326Y

cc: State Representative Larry D. Bodahl

Richard Hawley, President
Zumbra Ridge Homeowners Association

10-41P
Zumbra

METRO WATERS - 1200 WARNER ROAD, ST. PAUL, MN 55106
772-7910

November 25, 1992

Mr. Bill Thibault
City of Victoria
7951 Rose
Victoria, MN 55386

RE: GEZEL REQUEST, LAKE ZUMBRA (10-41P), CITY OF VICTORIA, CARVER COUNTY

Dear Mr. Thibault:

I am responding to your letter of November 9, 1992 in which you pose several questions regarding the Gezel variance request. I have also reviewed the materials you forwarded September 1, 1992 and I viewed the site on August 28, 1992.

1. In general, we do not believe it is appropriate for the city to grant the requested variance. It is unclear whether the 1988 filling was legal and whether the site would be buildable without illegally placing fill.

2-4. It has not been verified that the pond in question is a separate basin from Lake Zumbra. The ordinary high water elevation (OHW) of Lake Zumbra is 943.3' (NGVD, 1929). If there is a strip of land below the 943.3' elevation that connects the pond and Lake Zumbra, the pond is officially considered part of Lake Zumbra. The 9/25/92 survey shows that over half the lot is below the 942 foot contour and that the 942 foot contour line crosses Zumbra Circle. Based on this survey, it is quite possible that the pond is officially connected to Lake Zumbra. I would speculate that if we could find historical aerial photos or survey information, that the pond in question was clearly part of Lake Zumbra and has become separated from the lake by filling for the roads on the peninsula.

The pond water surface elevation of 936.79' on 9/25/92 doesn't tell us anything about the OHW since the water level can fluctuate widely even during a short period of time. (Lake Zumbra fluctuated between 941.4 and 943.2 in 1986)In order to determine an OHW we evaluate the type and elevations of vegetation, slope changes, controlling elevations at outlets, wash lines, stain marks, etc.

5. The Lake Zumbra historical water elevations are very spotty, especially before 1983. The only Lake Zumbra water level elevation I have from 1965 is 942.9' sometime in June (from Minnehaha Creek Watershed District records). The DNR has

recorded higher water elevations on several occasions: 943.0 on 9/19/78, 943.24 on 4/19/66 and 943.34 on 4/14/92. The WSD recorded an elevation of 943.18 on 5/19/86. The 1907 USGS quad showed a water level of 947 (and the 1955 USGS quad showed a water level of 940).

6. Legally, the floor elevation of the proposed structure would need to meet the city's requirement to be 4 feet above the OHW of 943.3' (same as Lake Zumbra), or 947.3' unless it is demonstrated that the two are not connected below the OHW.

   If the city had a state approved floodplain ordinance, the minimum low floor (including basement) elevation would be 1 foot above the 100 year flood elevation. No official 100 year flood elevation has been determined. Based on notes from a meeting involving the DNR, Minnehaha Creek Watershed District (WSD), Hennepin Parks, and the U.S. Army Corps of Engineers back in November 1979, the WSD estimated that the lake would rise 0.85 feet with the 100 year flood. This would indicate a 100 year flood elevation of approximately 944.15 and a minimum lowest floor elevation of 945.15. Since 100 year flood elevations are typically 1-2 feet higher than OHW elevations, a 100 year flood elevation in the 944 range is possibly on the low end.

7. A house built on this property at the proposed elevations (943 range) would have a high risk of flooding damage. The lowest basement we know of on Lake Zumbra is 943.3 (from the November 1979 meeting notes). The filling that has already occurred destroyed valuable habitat and any additional filling would add to the amount of habitat that has been destroyed.

8. Current regulations apply to all lots. The DNR prohibits filling below the OHW if the area is connected below the OHW to Lake Zumbra. The Minnehaha Creek Watershed District regulates wetland filling (of all types and sizes of wetlands) in accordance with the Wetland Conservation Act of 1991 and filling in the floodplain. The District is unlikely to permit any filling for purposes of constructing structures. The filling that occurred on the Gezel property in 1988 was, most likely, a violation of WSD rules and possibly a violation of DNR regulations. The U.S. Army Corps of Engineers also regulates wetland filling (in all types and sizes of wetlands). If filling is required to fit the size of structure requested, that's unfortunate for the owner.

   The lot owners may contend that they have a right to build a house on the lot since it was a legally platted lot, but that is

not the case. The landowners must meet the regulations in effect at the time they build. I can show you hundreds of lots which were legally platted in wetlands or lakes (including Forest Lake in Orono and Minnehaha Creek Marsh just west of T.H. 169 in Minnetonka). The legal case history has supported the local units of governments which did not permit construction that was not in conformance with existing regulations. (The case history is especially clear for situations where a structure has never been built, but less so if an existing structure is destroyed.)

The applicant has the burden of proof that the pond is not connected to Lake Zumbra (or was not as of April 4, 1986 when the protected waters inventory for Carver County was made official). We could treat the 1988 filling as a potential violation and have the DNR-Waters survey crew check the elevations in the area. However, if we found that a violation had occurred we would order the fill to be removed and charge the violator for the cost of the survey and our field inspection time.

Let me know if you have further questions on this matter.

Sincerely,

CS

Ceil Strauss
Area Hydrologist

cc: Ellen Klanderman, Minnehaha Creek Watershed District
Victoria Shoreland file

Attachment 6: 2015 HOA Request for Service

Zumbra Ridge Homeowners Association

January 12, 2015

From: Jerry Martin
President

To: Bill Olson, MCWD Board of Managers
Randy Maluchnik, Carver County Commissioner
Tom Workman, Carver County Commissioner
Tom O'Connell, Mayor, City of Victoria
John Barten, Director of Natural Resources, Three Rivers Park District

Subject: Lake Zumbra Outflow

As is well documented, Zumbra Ridge property owners experienced severe flooding in the Spring of 2014 due to high water levels in Lake Zumbra. Damage to homes and property exceeded $400,000 and residents are still working to finish repairs.

Lake Zumbra experiences inflow from surrounding land much of which is higher in elevation. Historically, the Lake drained into a large watershed to the south. This natural watershed has been altered with the construction of elevated roadways and hiking/biking trails. The natural watershed drainage is now restricted to culverts installed under the roadways and trails.

Lake Zumbra outflow is restricted to a single 24" culvert draining into Sunny Lake and Sunny Lake outflow is restricted to a single 24" culvert that drains into a watershed.

Prior to construction of the trails in Carver Park Reserve, Lakes Zumbra and Sunny were connected as part of the natural watershed. Construction of the trials brought major changes. The trails are elevated above the natural terrain thus blocking and redirecting natural drainage into and through the watershed. Culverts were installed under the elevated roads/trails to allow water to drain but these are limited in capacity and subject to blockage. When inflow to any one or more of the culverts is higher than the culvert can accommodate or the culvert becomes blocked or clogged, little to no water can flow through causing water to backup within the watershed.

This is what occurred in the Spring of 2014. Due to heavy rainfall throughout the watershed, the culverts were unable to handle the water flowage due to inadequate capacity and blockage. Adding to the problem, the outflow culvert for Lake Zumbra, that has limited capacity, was blocked and unable to allow water to drain out of Lake Zumbra. In addition, the outflow culvert from Sunny Lake was unable to handle the water flow causing Sunny Lake water levels to rise and create back pressure on the Lake

Zumbra outflow culvert. This resulted in historically high lake water levels in both Zumbra and Sunny. On Lake Zumbra, the water exceeded it's banks resulting in flooding and considerable damage to Zumbra Ridge homes and property.

To further exacerbate the problem, once water levels in surrounding lakes and watershed began receding Lake Zumbra remained at a very high level due to the clogged outflow culvert. This significantly extended the psychological and physical misery for affected homeowners. Added to his, was a prolonged no wake restriction depriving all Zumbra Ridge property owners the opportunity of enjoying the lake for which they pay a premium to live on.

The Zumbra Ridge Homeowners Association considers the outflow restrictions to Lake Zumbra to be a significant threat to our property and way of life. Therefore we are requesting you, as representatives of responsible agencies, to work together to find a permanent solution so we don't have a repeat of the 2014 flooding. If a watershed drainage study was completed prior to construction of the hiking/biking trails then this study needs to be revisited to determine why it was inadequate. If a study was not completed, we question why as major changes were made to the watershed that had significant impact on the drainage. If there is no study, we request that one be initiated immediately so as to come up with a permanent solution. This could be elevated hiking/biking trails, additional culverts, an adjustable weir or other improvements. It is our understanding that a weir system has been discussed previously but not acted upon.

At a meeting of responsible agencies, MCWD, city of Victoria, Carver County and Three Rivers Park District with the Zumbra Ridge Homeowners Association representatives in June 2014 to discuss the situation, MCWD voiced support of budgeting for a watershed study to come up with a solution to the problems. Our Association feels MCWD should take the lead on this issue as they are ultimately responsible for the watershed. Carver County and the City of Victoria should be closely involved as local government agencies. In that the drainage restrictions and culverts are on Three Rivers Park District property they will need to be involved also.

Zumbra Ridge Homeowners experienced major damage to real property and impact to lives due to the 2014 high water levels in the Lake and surrounding flooding. Without permanent changes to the Lake Zumbra outflow this could very likely happen again. We urgently request immediate action on finding a permanent solution.

Sincerely,

Jerry Martin
President
Zumbra Ridge Homeowners Association

Attachment 7: Victoria Mayor and District Correspondence

City of Victoria

1670 Stieger Lake Lane
P.O. Box 36
Victoria, MN 55386
952.443.4210

James Wisker
Director of Planning Projects and Land Conservation
Minnehaha Creek Watershed District
15320 Minnetonka Blvd
Minnetonka, MN 55345

March 8, 2017

Dear Mr. Wisker,

In March 2015, the City of Victoria and the Minnehaha Creek Watershed District entered into a Memorandum of Understanding that provided the opportunity for the District and the City to formalize their mutual commitment to integrating efforts and aligning resources. The City has been pleased with the range of projects that have been undertaken since that time and appreciates our relationship.

We are writing today specifically in reference to Item 1/b/ii: Technical Assessment of Zumbra Lake. The City understands that the Watershed District is willing to take the lead in coordinating all government agencies (Carver County, Three Rivers District, City of Victoria) to find a solution(s) to the Lake Zumbra flooding issue. The City is supportive of the District taking that role and appreciates your efforts.

If you have any questions, please do not hesitate to contact me or Cara Geheren, City Engineer.

Sincerely,

Thomas C. Funk
Mayor

CC: Bill Olson, MCWD Board of Managers

MINNEHAHA CREEK WATERSHED DISTRICT

QUALITY OF WATER QUALITY OF LIFE

April 18, 2017

Honorable Mayor Funk
City of Victoria
1670 Stieger Lake Lane
P.O. Box 36
Victoria, MN 55386

RE: Zumbra Lake High Water

Dear Mayor,

Thank you for your letter regarding the flooding issues on Lake Zumbra, received on March 15.

As you know, the Minnehaha Creek Watershed District (MCWD or District) and the City of Victoria enjoy a very strong working partnership. The District and the City have worked closely over the last two years to advance a number of initiatives that benefit the taxpayers and natural resources of Victoria and the MCWD.

These efforts have included a privately funded wetland restoration project within the Laketown Development, which exceeded regulatory requirements, and a recently awarded $262,520 Clean Water Grant to upgrade municipal stormwater facilities to treat stormwater runoff from downtown and improve water quality in East Auburn Lake. This past week, the City Council expressed its support for a partnership with the District to acquire land to improve water quality in Wasserman Lake while creating new parkland, both identified priorities for the City of Victoria.

Also, as you noted in your letter, pursuant to the MOU the District committed to performing a technical assessment of Zumbra Lake outlet, water level issues and options. Since 2014, the District has assembled historic data, published technical memoranda outlining the issue, and facilitated community meetings with the Zumbra Ridge Homeowners Association, Three Rivers Park District, the Department of Natural Resources, and the City of Victoria.

Most recently, at the request of stakeholders, the District presented an additional round of analysis at a public meeting at Victoria City Hall on March 1, 2017. The focus of this meeting was to (1) refine a mutual technical understanding of the high water issues; (2) outline potential solutions and their respective benefits and impacts; and (3) provide a forum for additional input from the Zumbra Ridge Homeowners Association.

As outlined during the public meeting, no options exist which completely eliminate the risk of flooding on Zumbra Lake due to the elevation at which many of the homes were constructed. Moreover, options that provide some relief during high water conditions also increase high water elevations on downstream properties, including property owned and operated by Three Rivers Park District.

MINNEHAHA CREEK WATERSHED DISTRICT

QUALITY OF WATER QUALITY OF LIFE

As we discussed at the meeting, consent of downstream property owners would be required to advance any structural solution. Given the District's role has been limited to technical assessment and discussion facilitation, I was pleased that you volunteered to take a lead role in advancing the next steps on behalf of the Zumbra Ridge Homeowners Association.

As you are aware, the most immediate next step is obtaining consent for a particular solution from Three Rivers Park District. The District values its partnership with the City of Victoria and remains committed to providing technical assistance, once you have reached agreement with Three Rivers Park District.

I look forward to following up with you as you advance this initiative. Please feel free to call me with any questions.

Warm Regards.

James Wisker
Director of Planning
Minnehaha Creek Watershed District
15320 Minnetonka Boulevard
Minnetonka, MN 55345

CC: Commissioner Workman, Carver County
David Hemze, Carver County
Boe Carlson, Three Rivers Park District
Jennie Skancke, Department of Natural Resources
Laurie Hokkanen, City of Victoria
Zumbra Ridge Homeowners Association

Attachment 8: HOA Request for Service to DNR

August 10, 2017

Dear Jennie Skancke , Area Hydrologist MNDNR and
Ceil Strauss, State Floodplain Manager MNDNR

Rod Kern approached you for assistance with our ongoing flooding issues on Lake Zumbra- Sunny. You responded with your belief that "the watershed district has done a really great job of obtaining technical analysis of all the complex hydrologic issues associated with this lake" and that "it's rare that a single lake receives the amount of staff time and funding that's been dedicated to this issue". You also attached an email from Ceil Strauss' recollections of Lake Zumbra history. We would not have requested your review if either of these documents accurately reflected our historic situation or depicted a complete set of facts and solutions.

MCWD Denial of Service

You asked us to work through MCWD to arrange meetings and engage your services. Unfortunately after meeting directly with MCWD in March of 2017 and refuting many of the underlying technical report facts, MCWD denied a City of Victoria Mayor's request to aide in resolving the flooding issues.

This denial of service by MCWD has made our Lake Association extremely frustrated that MCWD would not pursue a solution to a problem identified nearly 50 years ago and budgeted to be fixed in 1970's. Lake Zumbra Association has become even more resolute due to the MCWD refusal and it has prompted our research into many unanswered questions. Since March we have discovered additional inaccuracies and physical issues, unrecognized by MCWD and Wenck Engineering, one in direct contrast to the descriptions of Woodland Cove agreements and assurances of quantity and quality resultants and another depicting culvert installation and performance issues. With lack of cooperation from MCWD, we desired to engage hydrologic service from the DNR, as the oversight agency to MCWD.

Purpose of Requested DNR Services

While the DNR delegates permitting and management to MCWD, we expect that ultimate responsibility and governance for State services resides within the DNR. We would like to review our perspectives and findings with the two of you. We are prepared to present the same information provided to MCWD and Wenck & Associates in our March meeting and disclose to you our more recent findings.

It is believed that: existing illegal, cross water body and wetland structures inhibit natural watershed flows; culverts have been errantly installed; culvert throughputs overlook debris and vegetation blockages; culverts are inadequately sized for water volumes and recovery; and water quality is being aggravated by recent developments.

Initial Shortcomings of MCWD Analyses

While numerous hours of staff time and funding have been focused on the water control issues on Lake Zumbra –Sunny, 'quantity of hours' does not reflect 'quality of work' or 'sound outcomes'. This referenced MCWD/Wenck Technical Memo did not recognize:

1. the root causes uncovered in the 1970's by prior hydrological analyses,
2. prior engineering designs of a proposed weir in the early 1970's, and
3. data incorporated into their hydrology modeling studies was tainted from time periods negatively impacted by these long existing problems.

The resultant report conclusions were adversely impacted by artificially high lake elevations and flow data.

This alone would normally be enough to question the conclusions and the quality of the report, but the recommendations turned a weak document into a ludicrous one. MCWD and Wenck proposed that the City should support the lake shore owners with sandbagging to be triggered by predictable 5 to 7 day delays in the rise of lake elevations and that earthen berms could be deployed against high waters on other properties. Sandbagging was quickly denounced by the City as impractical. MCWD was then reminded of regulations for berms, which they oversee, and no answers were provided by them for waiving restrictions listed in their own documented procedures.

Without cooperative permitting and project management by MCWD, Lake Zumbra was forced to assume project leadership and was left to pursue permitting processes on its own. We requested some outline of normal permitting processes and agency approval requirements from MCWD. In the response from James Wisker of MCWD, he added additional commentary to support their original analysis and findings, to which we responded and further clarified our perspective. This email with my response is attached. Please be mindful that the response was prior to two new discoveries detailed below, Woodland Cove and Culvert 2 elevations.

Newly Identified MCWD Shortcomings

Subsequent to these discussions, our Lake Association made discoveries that further discredit the Technical Memo findings, but MCWD is not responding to our requests for additional meetings. Two major oversights recently uncovered are incomplete Woodland Cove facts and an errant 2012 culvert replacement. Two other factors need consideration: Interconnections to Stieger and State Highway 7 erosion.

Woodland Cove Misleading Runoff Assumptions

While MCWD, the City of Minnetrista, MPCA, Three Rivers Park, and other agencies have negotiated a meaningful agreement with the developers of Woodland Cove and are toting their laurels and successes in reducing the overall storm water runoff; this is not a complete and true picture of results. Prior to its purchase, this property was used for agricultural purposes and supported corn fields. The Developer's Agreement does not take full effect until construction is initiated in each of the individual phases of the development. Ground has been broken in the first Phase, which flows toward Lake Minnetonka, and holding ponds and basins are evident. In this section roads and wetland areas are well identified and runoff is now controlled.

Unfortunately, neither Phase 2 nor 3 have commenced construction and may not for 10 to 15 years. Interim agricultural use of the property has not been required of the property owner and developer.

Phase 2 properties flow toward a catch pond near the roundabout intersection of State Hwy 7 and County Road 11 and then proceeds through wetlands to Lake Zumbra-Sunny. In heavy storm conditions this basin overflows.

Runoff from Phase 3 properties flows east into the Three Rivers Park property and then down ravines to the wetland adjacent to Stone Lake, then through a culvert under Hwy 7 into Stone. Following the 2014 heavy rain conditions, Three Rivers Park reinforced these ravines to prevent erosion, creating a stone lined creek bed which channels the water directly to the culvert into Stone, eliminating prior absorption of water in the forested area. Last Spring this Phase 3 section was an unfarmed raw field and storm water runoff rushed off its barren field carrying sediment on an accelerated basis to Stone Lake. It can be inferred from these observations that nutrient loaded storm runoff is further contaminating Stone Lake, a previously targeted Lake, identified for nutrient loading issues.

Both of these Phase 2 and 3 alterations do not reduce the volume of storm water flowing to Lake Zumbra-Sunny, in fact more water runs off a barren field then an active corn field. Both of these new flow patterns are reducing the absorption of water along its downstream travel path and facilitating an increased rate of flow from the upland properties into Lake Zumbra-Sunny.

2012 Culvert Errant Placement

In July the Zumbra Lake Association uncovered and verified another key issue exacerbating our high lake elevations. As the water has been receding, we have continued to monitor the rate of decline and the flow in the 3 key culverts draining our sub-watershed into Lake Auburn. The rate of discharge began to reduce. At a level of 942.63 on July 17 lake level decline virtually stopped. Upon examination of the culverts, we noticed presence of water but no flow through Culverts 1 & 3. Culvert 2 revealed the heart of the problem and cause. While water was present on the inlet side and in the ditch coming out of Sunny, the outlet side of Culvert 2 was blocking the flow of any downstream water. In fact the ditch to the wetland and Lake Auburn held minimal water and was stagnant.

Our inference is that Culvert 2 replacement of 2012 was not installed at the elevations reported in MCWD engineering documents and is in fact higher. Furthermore the bottom of ditch exiting Culvert 2 has not been maintained; has accumulated sediment, wood and debris; and consequently restricts flow. This blockage is taking place at 942.63 feet of elevation. Allow me to elaborate more about Lake Zumbra-Sunny levels. The only drop below this new level will be resultant of evaporation, which occurs at an estimated rate of .01 feet per day. This prevents the lake from dropping to its DNR Recorded Average elevation of 940.99 ft and is far from the lowest recorded lake level of 936.56 ft during the drought of 1989. So our lowest level is about 6 feet below this new Culvert 2 barrier and our average level is about 1.6 feet below this new artificial elevation. OHW (Ordinary High Water) which is 943.3, only .7 feet higher than this height.

According to the MCWD/Wenck Technical Memo all three culverts were replaced in 2012. We are unsure of the correct placement of Culverts and their permitted levels.

The resultants of a raised culvert and ditch are blockage of downstream flow, an artificially high low water level, slower discharges with extended recovery durations, and a condition which precariously facilitates future flood water levels. The scenario for this conclusion is:

1. Culvert 2 and its associated ditch maintain the Lake at an artificially high elevation, now until the end of the year.
2. Heavy precipitation normally occurs in the Spring, further raising water levels.
3. As previously described in assessments and provided photographic evidence to MCWD, Culvert 3 restricts water flow and quick level recovery. Culvert 3 is undersized and unable to handle blockages from debris, branches and weeds. We recommended replacement with an arched or flood plain culvert design capable of relieving OWHL elevations more rapidly and minimizing obstructions from debris and weed clogging.
4. Unable to exit the sub-watershed, water accumulates and backs up. With any additional precipitation, the Zumbra-Sunny elevation quickly exceeds OWHL, creating flooding conditions.

This strategy of 'holding back water' and 'allowing backup' is contrary to accepted hydrology management practices and adversely impacts natural watershed flows. Yet MCWD in their April 2007 Six Mile Marsh Subwatershed Plan on page 62 confirm this to be their strategy. Goal 13.1 Action C. states "Work cooperatively with the Three Rivers Park to evaluate and implement strategies for operating control structures in the Carver Park Reserve to maximize storage capacities and manage flows." Action D.i. further states "Promote the acceptability of minor flooding within the floodplain."

Today the system of culverts appears to be engineered to hold water in our section of the watershed, causing our flood prone conditions. Improper placements of culverts could readily refute and invalidate any hydrology modeling results from MCWD and Wenck & Associates. We are inclined now to believe that this scenario exacerbated the flood levels of 2014, when rainfalls exceeded normal intensities and durations, causing both home and property damage.

From the DNR we would like an expedited verification of the culvert placements and a clarification of properly permitted culvert levels based on historic Lake Zumbra-Sunny elevation data, to validate our observations and avoid any additional high water problems in Spring 2018.

Blocked Connection to Lake Stieger

References by MCWD recognized previous historic natural outflow from Zumbra-Sunny to Lake Stieger, but failed to document any flow characteristics. Members of the Zumbra Lake Association have uncovered further evidence of previous interconnections between Zumbra-Sunny and Stieger and current restrictions and encumbrances to present day water flow. Two wetland paths between the two water bodies have been traced with exploratory walks and physical observation.

One pathway exists from Sunny, proceeding east and then turning south through a recognized bog. In the past it interconnected with a wetland on the north side of Stieger, now obstructed by the bike path a few hundred yards east of Culvert 2.

The second pathway originates right at the exit of Culvert 2. To carry water from Culvert 2 toward Culvert 3, a ditch was created along the bike path as it proceeded west and south to a wetland

extending north from Culvert 3. Directly adjacent to the ditch as it leaves Culvert 2 is a wetland on the east side of the ditch. Unfortunately when the ditch exiting Culvert 2 was dug, the fill from the ditch was deposited as a wall on the east and south side of the ditch along its entire length to the wetland extending to Lake Auburn and Culvert 3. This wall now prevents the natural historic water flow into the eastside wetland immediately next to ditch. This wetland proceeds south and bends around to the east, where it previously interconnected with Stieger. This interconnection point is the same north side Stieger wetland to which the earlier described bog interconnects for first pathway above.

In summary, both of these natural historic wetland interconnections out of Lake Zumbra – Sunny to Stieger are encumbered by man-made cross wetland constructs. Current MCWD maps do not depict the correct topography departing Zumbra –Sunny to the east for pathway 1, nor recognize the pathway 2 wetland and its interconnection. The Lake Zumbra Association can provide photographic evidence in support of these pathways.

Unrecognized Highway 7 Erosion

In the follow-up email from Mr. Wisker of MCWD, he questions the Return on Investment of replacing Culvert 3 to correct the flooding issues on Lake Zumbra-Sunny. (Attached email) Contrary to this MCWD response, flood levels and prolonged periods of lake elevations above OHWL do have financial impacts. Unrecognized has been the impact to State Highway 7 on the north side of Lake Zumbra-Sunny. Prolonged water elevations above OHWL have undercut the banks along Highway 7 and an erosion slide has occurred. Costs of repairs to the current erosion are being finalized by MNDOT, but they will not be the only costs. Indirect costs will be incurred by rerouted highway users. Under evaluation is the need for redesign and construction changes for the entire Highway segment along Lake Zumbra –Sunny, involving major capital costs and extended traffic disruptions.

The recent erosion slide is only a small segment of the high Zumbra banks along the Highway, which support the highways foundation. But the repair will be quite involved. The steepness of the bank and a minimum width highway shoulder do not facilitate easy examination or easy repair of the underlying road foundation. The current slide is scheduled for an immediate stop gap repair, which involves placement of stones to re-enforce the existing foundation and prevent interim deterioration. It also includes extracting the eroded materials, shrubs and trees from the 20 foot deep waters of the lake. The permanent solution under design is more protracted. Per MNDOT engineers, it will in likelihood involve a curb and gutter approach to assure no further incidents.

As the Highway has minimum shoulder width on the lake side, repairs will be a major disruption for commuters. This is a critical section of transportation infrastructure interlinking cities of Victoria, Minnetrista, Mound and other western areas to the major metro area with only a few inconvenient alternative routes. Known alternative routes such as Hwy 5 through the City of Victoria or county roads north around Lake Minnetonka are not well suited for major traffic density increases. This will be a financial and inconvenience impacts to commuters.

The Lake has been exceeding normal water levels for an extended period of time, the worst of which has been described as a 500 year event that occurred in 2014. This year was again witness to elevations near or above Ordinary High Water Levels (OWHL) for over 2 months, and as you know this should only happen 1% of the time or once in a 100 year time period.

This is not the only time an erosion slide has occurred during past years and unfortunately may not be the last. Water elevations on this water body fluctuate wildly (up to 8 feet) and have not been corrected by the Watershed District since identification of the cause in the early 1970's.

The protracted periods of high water are having detrimental impact on the banks and there are signs of undercutting that have merited MNDOT's attention and further assessment of the entire stretch of highway along Lake Zumbra-Sunny. Under assessment and evaluation is the need to replace and repair the entire lakeshore bank along Highway 7 in this section. It is expected to be a major cost and budget expense, as well as a major disruption to transportation in the western areas..

Historical Commentary

With regard to Lake Zumbra-Sunny history, my residency on Lake Zumbra began in 1975. This was the period of great contention about lake elevations in the aftermath of the illegal construction by a farmer of a causeway separating the long connected Zumbra and Sunny water bodies. This property became park property in 1973, currently called Three Rivers Park District. We purchased our home from Dale Palmatier, a respected founder and contributor to MCWD. As a young engineer I was elected to President of the Zumbra Association to oversee road and sewer construction and the City of Victoria initiatives to Annex the Zumbra neighborhood from Laketown Township. Subsequently the issues and history pertaining to water levels were learned first-hand from long time neighbors and knowledgeable sources, many of these landowners were residents and home builders from the late 1950's to the early 1960's. For example my current home was custom built and originally completed in 1962 on a plot, specified prior to its purchase in a development defined in a 1957 agreement on real-estate owned by Northwest National Bank. It is with this first hand history that I have added commentary to Ceil Strauss's email attachment in an Addendum at the end of this document.

To Jennie's comments in her email about homes not having been built to current FEMA requirements, I personally object to this misleading information and careless statement. No homes built in the 1950's and 1960's would have had codes requiring these FEMA standards. In fact FEMA mapping in Carver County was only partially completed this year and still are not scheduled for Lake Zumbra-Sunny. Ceil can probably recall numerous conversations between us this year regarding FEMA map schedules. It should be noted that improperly sized and placed culverts were in place in the late 1960's and have been an identified problem since the early 1970's. These known infrastructure shortcomings have disrupted historical and normal lake discharges and resulted in artificially high elevations, including the established OHWL. Also of note is the absence of any home flooding until the 2014 record level, described now as a 500 year event.

It is with this background that I believe that I can bring some clarity to the nearly 50 year old Lake Zumbra-Sunny water level control issues. Initially these elevation issues were cooperatively undertaken by MCWD, the Park, the residents, and the DNR in the early 1970's until contentious litigation amongst the Agencies sabotaged the planned weir and funding disappeared. Lack of consensus amongst government units has prevented any corrective action since then.

Attempts to rejuvenate this early root cause driven solution, have repeatedly failed. Now instead of re-examining the situation in an open and impartial manner and rectifying the real issues, the problem is being swept under a rug of rhetoric and push back has even included clouded facts and disparaging comments about the residents.

This is a source of extreme frustration for the Zumbra residents, especially in the face of the 2014 flooding and recent extended periods with lake elevations above OWHL.

Lake Zumbra-Sunny Hydrological Summary

Natural watershed flows for Lake Zumbra-Sunny have numerous man-made obstructions which result in prolonged periods above OHWL and persistent flooding. The flooding is avoidable by eliminating backwater flows, removing barriers to normal Recorded Average lake elevations, and enabling reasonably short duration draw downs of high water.

Flooding elevations above the 100 year or 1% levels are recently being exceeded frequently. This is a relatively new phenomenon. Key to understanding why is two of the culverts replaced in 2012. The One – Two punch repeatedly delivered to Lake Zumbra-Sunny is directly attributable to Culvert 2 at the lake outlet and Culvert 3, the funnel point for sub-watershed drainage into Lake Auburn.

First Culvert 2 sets up the knockout punch by forcing artificially high lake elevations above known, historical average elevations. This culvert and its associated run out ditch are too high. Water is being held in the Lake and is restricted from naturally flowing through its outlet, Culvert 2 its ditch proceeding toward Culvert 3. This first punch reduces resiliency by reducing the capacity of the Lake to absorb any incoming water loads prior to reaching OHWL. The present engineered holding level is less than 1 is a foot below OWHL, setting up the second punch.

The knockout punch is then delivered by Culvert 3. Culvert 3 is undersized and prone to blockages and debris. This 18 inch culvert must drain a watershed area of over 2000 acres before the next rainfall to prevent elevation increases. When higher periods of heavy precipitation are experienced in the Spring, the intensity of rain and frequency of occurrence increase. Culvert 3 backs up. It is over whelmed by the volume of water it is expected to handle and is unable to draw down in a timely matter. The next rainfall adds to the backup. Subsequent storms cause the upward stair stepping of lake elevations, quickly surpassing OHWL.

This scenario was modeled in engineering studies by Hickok & Associates in the 1970's and again in 1985. In that analysis a reconstructed outlet was modeled at an elevation of 942.5 and concluded: if constructed "flooding will occur" This is precisely what is now being observed and experienced today following the Culvert 2 replacement in 2012.

This 1985 study also modeled changes in Culvert 3 increasing its size to a 65 inch by 40 inch CPM Arch culvert. It concluded that: "Improvements to Sunny Lake outlet and downstream will not drastically lower the 100-year level in Lake Zumbra –Sunny. However, the improvements can reduce, by about one-half, the time for draining the lakes to their normal water level thereby substantially increasing the probability that full storage capacity will exist prior to occurrence of a major runoff event."

Additionally options and alternatives for reducing storm water runoff directly into Lake Zumbra- Sunny may merit examination. Temporary retention of storm water in Stone Lake and its adjacent wetlands would reduce bounce and wide fluctuations in Zumbra-Sunny elevations and smooth discharge rates to other downstream water bodies during critical high water events.

These historical engineering conclusions reaffirm our Zumbra Association analyses. Eliminating backwater flows, removing barriers to achieving normal Recorded Average lake elevations, and enabling reasonably

short duration draw downs of high water can alleviate the probability of flooding. The key issues are the Culvert 2 outlet elevation and the Culvert 3 designed capacity.

Appeal for DNR Support

We need your engagement and assistance to rectify this long time known problem and avoid any additional hardship!!

Our request is based on the background and details presented above. We have not received the level of professional and technical assistance merited by our situation, have not had open minded and critical thinking exchanges, and have been refused first line services from MCWD.

It is probably obvious that we are frustrated by 50 years and no resolution. Admittedly we are resolute and not going away. What we need is an open minded partner, not hamstrung by past actions, and committed to rectifying man-made flooding problems.

You are being approached as the best suited organization to start a fresh, objective review of facts and apply today's known best practices to the physical environment. There currently are multiple man-made obstructions to open public waters and wetlands that violate State laws and yet have not been addressed. These same cross water body obstructions are inhibiting natural discharge of water down the sub-watershed and exacerbating flooding conditions and erosion.

Our requested and required support can be appropriately addressed technically by professional hydrologists and pertinent regulatory issues reviewed by DNR staff.

We would prefer to meet with you directly so that any arising questions may be readily clarified, subsequent actions may be prioritized, and solutions may be pursued efficiently by all involved.

Sincerely,

Dick Hawley

President Ridge Lands Inc

Lake Zumbra Lake and Home Association

Addendum Attached.

Addendum Historical Comments Pertaining to Ceil Strauss email

Ceil's recollection of cabins is inaccurate. Northwestern National Bank had been a single owner of the center peninsula of Zumbra and contracted with Zumbra Ridge, Inc establishing in October of 1957 the conditions, covenants, and restrictions for the subsequent development of residential homes, not cabins. These covenants included the surveyed plot plans with associated registered land surveys and defined formal approval processes for all construction and building plans. It cited minimum construction and building codes, minimal square footage requirements, defined roadways and utility easements. Listed were Construction Committee members and their responsibilities, which included a known Builder, who also became a Zumbra property owner. Lake setbacks and minimal foundation elevations were not specified in this original 1957 document. Unspecified requirements were covered by a general requirement to comply with Carver County and other authorized governmental bodies.

With regard to FEMA, Ceil is accurate and no digital maps have yet been generated as of this date, nor have they been requested by the City of Victoria. With Ceil's wonderful training course and guidance, I have educated the neighborhood about FEMA and had numerous conversations with the City and Carver County regarding ordinance development and administration of shoreland properties within their jurisdictions. These conversations included discussion of Internet based FEMA services for residents. General City ordinance work for sections of the City with FEMA maps has been initiated, but not completed.

The overall permitting of various water related structures is unclear to us as residents. Some items we can provide background. Water levels were an issue in the late 1960's. In the early 1970's a weir was proposed and funding set aside, based on a 1975 Water Management Plan and engineering studies completed by E.A. Hickok & Associates. A summary of the study is remembered. With a 100 year record rainfall of 12 inches, Lake Zumbra would bounce 4 feet and Six Mile Creek would bounce 8-9 feet. These wild fluctuations prompted the proposal of physical water controls. The DNR, the Park and MCWD disagreed on the appropriate level of the weir. Litigation was initiated and E.A. Hickok & Associates was appointed as the arbitrator/mediator, based on their expertise and knowledge. The resultant base level elevation was not available to the home owners association; but in the delay, the funding disappeared.

In 1983, the Park began a review of the previous work with E.A. Hickok & Associates. A 1983 memo from the Hickok firm is included as an attachment within the Wenck Technical Memo. Without consensus from the other Agencies, the Park decided not to continue and dropped any further action.

A copy of a Phase 1 1985 Hickok "Investigation of Zumbra Lake–Sunny Lake Outlet" to determine the adequacy of the existing outlet and investigate the feasibility of reconstructing the outlet as required by a DNR permit No.79-6120 at 942.5 feet MSL, concluded that would "result in significant flooding problems which would be compounded by the time requirement of four to five weeks for drawdown." It also stated that should the Sunny Outlet capacity be increased, the capacity of downstream waterway must also be increased to avoid new problems (referencing Culvert 3 under County 11).

Another culvert mentioned in Ceil's between the main lake and a south bay, would be Culvert 1 under the causeway separating Zumbra and Sunny. Hickok in 1985 recommended no reconstruction of this culvert for hydraulic capacity, as it had no effect on high water levels. As mentioned before this causeway is a cross-

body structure separating the previously two connected water bodies, referred to as Zumbra and Sunny. This was the illegal and non permitted action of a farmer who wanted an easy way to move between his two owned properties on both sides of Zumbra – Sunny. When the Park took ownership of the property, nothing was done to remove the illegal causeway. In fact the Park has re-enforced it as a maintenance path and more recently converted it in to a bicycle pathway. The causeway and culvert restrict water flow, fish migrations, and navigation between the two water areas.

With regard to Ceil's permit notes on the outlet elevations, our Association has many questions regarding culvert elevations. Per the DNR Lakes data for Zumbra-Sunny the Recorded Average is 940.99. In 1985 Hickok states the normal elevation as 940.87 feet. The culvert levels in the Wenck report show a number of changes and variations. Ceil's notes list permit requests for outlets at 942.5 and 941.5. If the base culvert level is set above the Average elevation, are you not engineering the elevation to remain above the lake's natural average level? If the outlet level does not permit outflow below the average, does the subsequent decade result in a new raised Average? Is this not restricting normal watershed discharge rates? If the Lake is held above its normal levels, does it not lose capacity to handle a 100 year storm event without resultant flooding? What are normal draw down time periods for a Lake regulated by culvert with a fixed capacity?

Attachment 9: Maintenance Request to TRPD

MEETING OUTLINE

Date:

August 21, 2017

Location:

- Three Rivers Park District, Administrative Center, Plymouth

Attendees:

- Boe Carlson, Superintendent, Three Rivers Park District
- Scott Leonard, Lake Committee, Ridge Lands Inc., (Lake Association for Lake Zumbra).

Purpose:

- To present and seek approval for several maintenance requests related to flow of water that runs from Lake Zumbra through Three Rivers Park.

Notes:

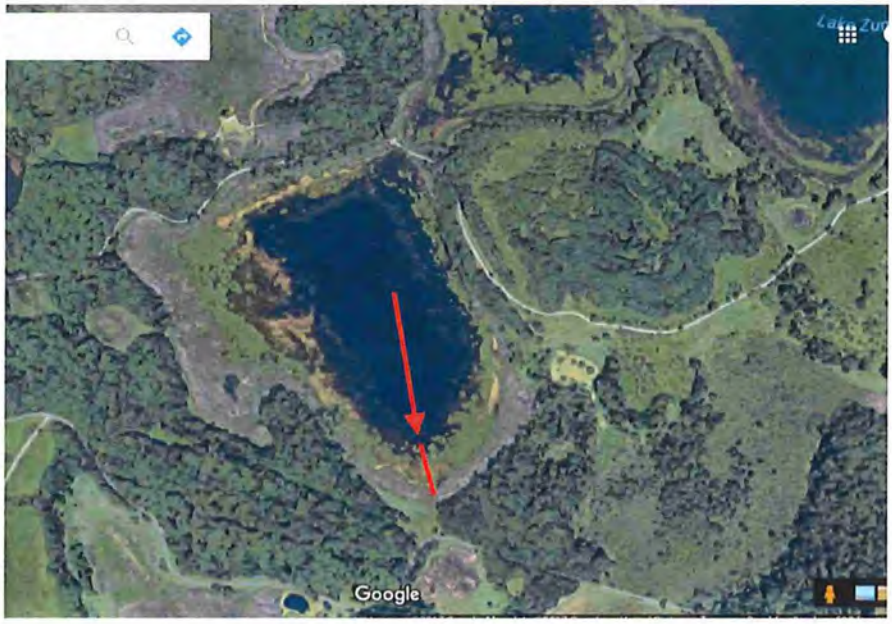
- The homeowners of Ridge lands, Inc., respectfully submit the attached requests for maintenance to the existing watershed located in Three Rivers Park in Carver County.
- We are seeking approval by Boe Carlson for implementation of these maintenance requests.
- We are asking that Park staff, or other designated contractors, perform this maintenance either during the Fall of 2017, but definitely before the 2018 Spring thaw.
- These requests, we believe, will help better prepare the water level of Lake Zumbra for anticipated heavy Spring rains; which often result in extremely high water conditions, slow lake drainage, subsequent flood damage and loss of recreational use of Lake Zumbra during prime summer time periods.

LOCATION: CULVERT #1 - CAUSEWAY BETWEEN ZUMBRA AND SUNNY LAKES

REQUEST: Remove debris fence to allow for unimpeded flow and migration of fish.

LOCATION: SUNNY LAKE OUTLET – TO CULVERT #2 & DRAINAGE DITCH

REQUEST: Cut a distinct 15-foot path through existing cattail bog to allow for a direct, more unimpeded flow from Sunny into Culvert #2 and drainage ditch to wetlands.



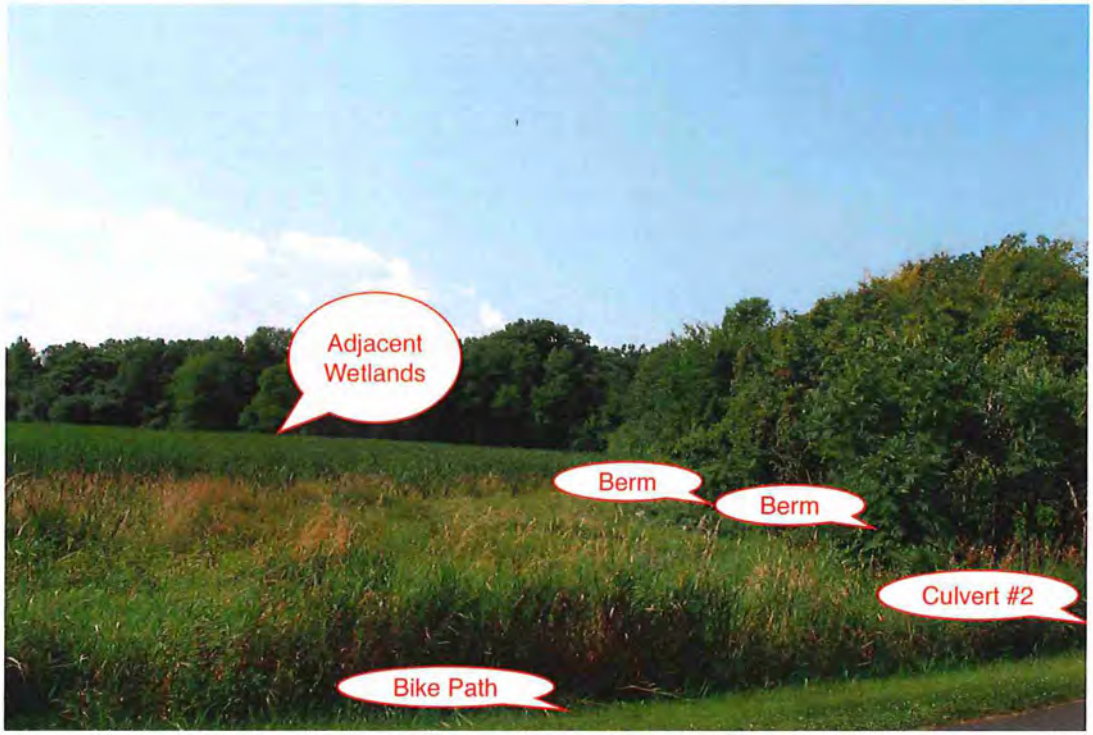
NOTE: A 15-foot channel to open water is permitted by the DNR, without the requirement of a DNR permit.

LOCATION: DRAINAGE DITCH - FROM CULVERT #2 TO UNNAMED WETLANDS

REQUEST: Clean out built-up sediment, bank erosion and debris from the ditch, to allow for a more unrestricted flow from Culvert #2 into the unnamed wetlands.

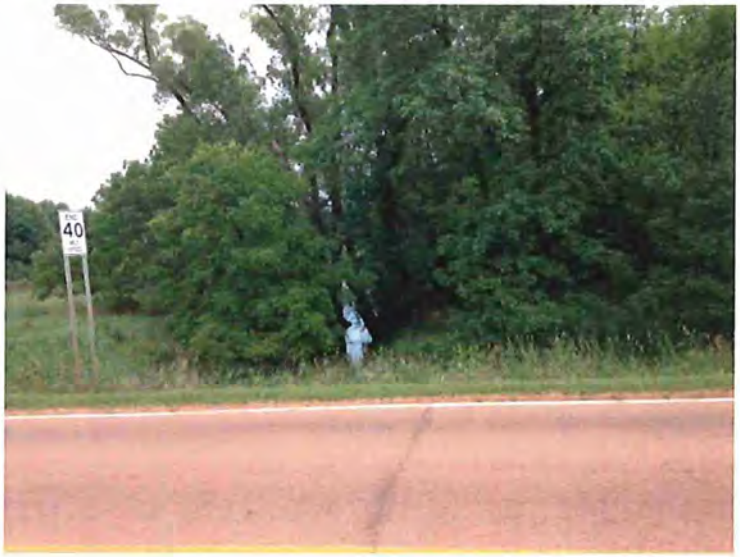
LOCATION: DITCH BERM – BETWEEN CULVERT #2 OUTLET AND ADJACENT WETLANDS SOUTH OF PATHWAY

REQUEST: Remove berm barrier along ditch way at the outlet of Culvert #2, allowing water to flow naturally into adjacent wetlands resulting in more storage capacity downstream and faster drainage of Sunny & Lake Zumbra



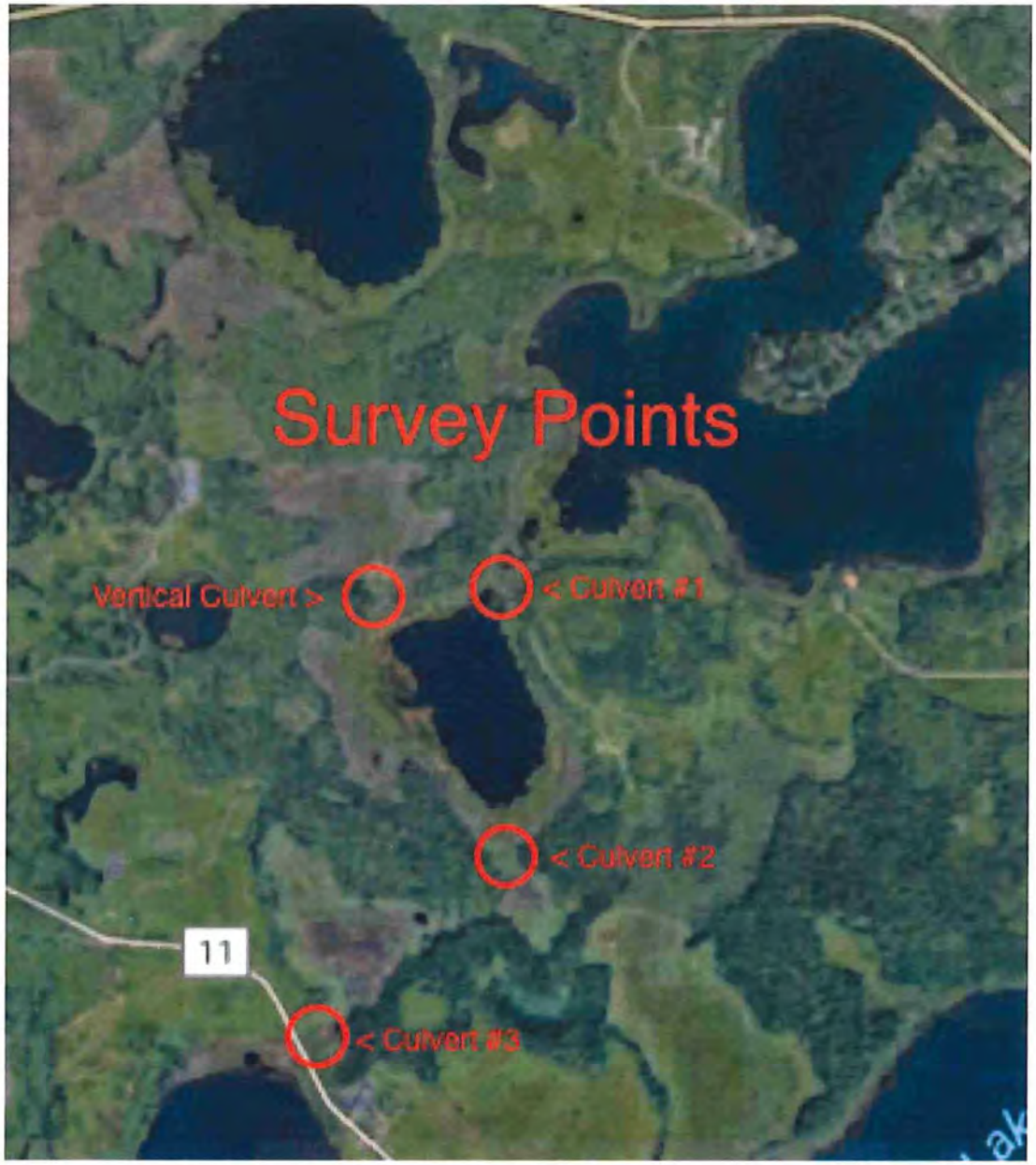
LOCATION: CULVERT #3 - CREEK AREA JUST EAST OF CULVERT #3 AT CO. RD. 11

REQUEST: Remove source of constant debris that clogs the culvert. Remove trees and brush that exist between the culvert and the open wetlands area so water can flow unencumbered to and through Culvert #3. This will allow for proper and faster drainage of Sunny and Lake Zumbra.



LOCATION: FOUR SURVEY POINTS WITHIN THE SUBWATERSHED

REQUEST: Provide permission to an independent surveyor to conduct a survey of the heights of four existing culverts for further study and data clarification. Survey company name, contact information, date of survey and duration on park property would be provided to Three Rivers Park staff prior to commencing survey.



Attachment 10: DNR Survey Results

Minnesota
DEPARTMENT OF NATURAL RESOURCES

REQUISITION FOR TECHNICAL SERVICES

Project: culvert and OHW survey – Zumbra to Auburn			**Lake No.** PW #10-41, 10-56
City: Victoria	**County:** Carver		**Req. No.** 2018-29
Sec. 2	**Twp.** 116	**Rng.** 24	**Quad No.**

Statement of Problem/Situation (Provide detailed information)

Zumbra residents and City of Victoria are concerned about chronic high water on Zumbra. Culvert between Sunny/Zumbra was replaced in 2012 and maybe surveyed by the park, but we don't have that survey data. Also, multiple culverts have been replaced since the 1978 OHW survey for Zumbra/Sunny, so a new OHW is needed. The flood elevations are determined by the OHW as well as modeling for potential actions.
Our 1979-19 and 1982-38 surveys don't show the same elevations as those in Table 3 of the Wenck report. Please see attached table.

Services Requested (Attach map as necessary)
-Check on current outlet control from Stone (10-56). 2012-53 says it was a beaver dam.
-Invert elevations for equalizer between Sunny/Zumbra – changed since 1978 survey
-OHW for Sunny/Zumbra
-Outlet invert elevations from Sunny to south.

Landowner:
Three Rivers Park District

Permission obtained for access:
Yes

Requested By: Jennie Skancke	**Date:** 9/5/2017	**Phone No.** 651-259-5790
Manager/Supervisor Approval by: Jeanne M. Daniels		**Date** 9/7/17
Assigned By:		**Date** 9/18/2017

Minnesota DNR Waters
Field Survey Report

Project Zumbra/Sunny Lake			**Lake No. 10-41**
City Near Victoria	**County Carver**		**Req. No. 2018-29**
Sec. 1,2,11	**Twp. 116**	**Rng. 24**	**Watershed**

SURVEY DATE: 9/19/2017
SURVEY CREW: Woodrich/Schaffer/Schmitt

LAKE SIZE

Meandered Area 496 Acres — Non-meandered
Planimetered Area 221 Acres — ☐ Unknown

DATUM ADJUSTMENT

Assumed 1912 X 1929 1988 Source: DNR B.M. at public access from MNDOT "2704 F"

CONTROL BENCHMARK

Location: SW-SE-SE, Sec. 2-116-24
Elevation: 945.00 (add 0.13 to equate to NAVD 88)
Description: at public access on south side of Zumbra Lake, vertical 3/8 x 8" pike in lakeside root of 4.0' cottonwood, approx. 30' from water's edge in the NE corner of parking area at PA.

SURVEY WORK COMPLETED

X levels topography cross sections profiles X OHW
establish benchmarks X outlet elevations X other: GPS/VRS/RTK survey

WATER LEVELS

Highest Recorded: 944.91 7/3/14
Lowest Recorded: 936.56 10/19/89
Range: 8.35
Water Surface: 942.69
OHW Elev: 943.0
Highest Known:

OUTLET

General Description: on south end of SW bay/Sunny Lake, NE-SW-NW, Sec. 11-116-24
Runout Elevation and Description: 942.1 top on debris in upstream end of 36" CMP under bike path at south side of SW bay/Sunny lake.

BENCHMARKS SET

Location:
Elevation:
Description:
Location:
Elevation:
Description:

Prepared By Kurt Woodrich	Title Sr. Engineering Specialist	Date 9/21/2017

On 9/19/17 we completed a survey to reevaluate the OHW level of Zumbra-Sunny Lake. The OHW was previously established at 943.3 per a 9/19/78 survey by DNR Division of Water's survey. The OHW level of Zumbra Lake obtained on the recent survey is based on the average reduced elevation of the best 22 of the 25 trees (ash, elm, oak, and cottonwoods) we documented around the main (north) portion of Zumbra-Sunny Lake. We recorded washlines at elevation 943.2 and recorded stainlines at 943.2-943.3. The lake is shown at elevation 940 on the 1958 USGS quadrangle.

Zumbra-Sunny Lake outlets to the south towards Auburn Lake. We obtained elevations on the culverts between Zumbra and the southwest portion of Zumbra (Sunny Lake) and elevations on the outlet culvert from Sunny Lake under the bike path. There is a bike path separating Zumbra to the north and Sunny Lake. In addition we obtained an elevation on the beaver dam downstream of Stone Lake.

Following are the pertinent elevations we obtained:

Headwater of beaver dam just downstream of Stone Lake	946.29
Top on 3' wide opening in beaver dam controlling Stone Lake	945.8
Water level at downstream side of bike path at water control structure CV12	942.78
At bike path crossing between Zumbra and Sunny	
Water surface Zumbra Lake	942.69
Top upstream (N) end of 24" CMP under bike path between Zumbra and Sunny (SW bay)	942.45
Flowline on rocks at upstream/north end of 24"CMP	940.5
Top centerline of trail over culvert	946.1
Top downstream (S) end of 24" CMP under bike path between Zumbra and Sunny	942.61
Downstream/south invert of 24" CMP	940.58
Downstream end of apron	940.48
Water surface Sunny Lake/SW bay	946.29
At outlet of Sunny Lake/SW bay	
Water surface in cattails=Sunny Lake	942.69
Channel bottom where channel leaves basin and suts thru higher ground	941.4
Headwater at culvert under bike path	942.68
Flowline at upstream end of apron	941.5
Top on debris at upstream end of culvert (present runout)	942.1
Flowline at upstream end of culvert upstream side of debris	941.7
Top upstream end of 36" CMP under bike path	943.85
Top centerline of bike path over culvert	947.3
Top downstream end of 36" CMP under bike path	943.86
Downstream invert of 36" CMP	940.98
Downstream flowline at end of apron	941.5
Tailwater at culvert	942.18
Channel bottom 10' downstream on sand buildup-steady flow from here downstream	941.7
Water surface at above	942.17

Additionally we tied into Three Rivers Park District CV 12 water control structure and the benchmark they used for their surveys MNDOT "2704 B" within .01' and 0.06', within tolerance of a GPS survey. Additional survey information can be found from Three Rivers Park District surveys and previous DNR surveys on 9/19/78 requisition #79-19 and 10/15/81 requisition #82-38.

Attachment 11: MCWD Permit Results

September 27, 2017

Jennie Skancke
Minnesota Department of Natural Resources
1200 Warner Road
St. Paul, MN 55106

Re: Minnehaha Creek Watershed District (MCWD) Permit Files- Carver Park Reserve

Dear Ms. Skancke,

The enclosed is in response to your request for historical information that may further advance the analysis of high water conditions on Lake Zumbra.

In 2014, record rain events resulted in flooding throughout the District. This flooding led to damage across 16 properties in the Zumbra Ridge Neighborhood, including 4 homes reporting structural damage. As you know, the Minnehaha Creek Watershed District (the District), Carver County, the City of Victoria, Three Rivers Park District (TRPD), the Department of Natural Resources (DNR), and Zumbra Ridge Homeowners Association (HOA) have been working since that event to identify the causes of high water on Lake Zumbra and identify a range of potential solutions. In playing a coordinating role, the District organized a joint meeting with the HOA and our agency partners to discuss the District's preliminary findings and collective next steps. Notable information gathered and discussed to date includes:

- A modeling analysis of high water conditions leading to the 2014 event
- Modeling of downstream impacts and anticipated high water alleviation on Lake Zumbra for a range of potential high water solutions

These analyses are summarized in a Technical Memo dated May 26, 2015 which was subsequently reviewed by agency partners and was distributed and discussed with the HOA through a series of meetings. The modeling analyses conducted were based on data that TRPD provided for the three culverts identified as Crossings 1, 2, and 3 in the memo. Based on our recent discussions, I understand the DNR conducted a survey to verify current field conditions for Crossings 1 and 2 and the Stone Lake Outlet. You have outlined that the DNR intends to use the survey data, accompanied with historical permit information, to assist in the calibration of modeling and continue refining the partners' understanding of system hydraulics, causes of high water conditions, and the benefit and impact of potential solutions.

In response to your request, MCWD staff performed a search of permits within Carver Park Reserve that may contain information pertinent to the hydraulic connection of Stone Lake, Lake Sunny, Lake Zumbra,

and Lake Auburn. The review revealed two proposed culvert modifications, within the 2005 and 2006 Carver Park Trail Rehabilitation and Reclamation Project.

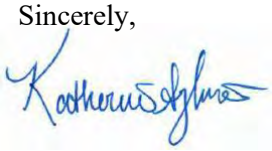
1. The culvert between Sunny Lake and the Auburn Lake wetland (Culvert 2 in the Wenck report) was proposed to be lengthened to accommodate the proposed trail widening, with no proposed change to the hydraulic capacity. (Depicted on Sheet 18/26 of Attachment 1)

2. An existing outlet control structure between Maple Marsh and Sunny Lake was proposed to be modified to replace a 24-inch corrugated metal pipe with a 24-inch reinforced concrete pipe as shown on Sheets 9 and C501/02 of Attachment 2. The modification also proposed to replace the existing pre-cast grate shown in Attachment 3 with a beehive grate at the existing elevation as shown on Sheet C502 of Attachment 2. There was no proposed change to pipe diameter, invert elevation, or hydraulic capacity.

The review of information within the District's permit database did not reveal records pertaining to the culvert between Lake Zumbra and Sunny Lake, the Stone Lake Outlet, nor the culvert under County Road 11.

We look forward to continuing to partner with you, TRPD, Carver County, the City of Victoria, and the HOA to discuss this issue and identify potential solutions.

Sincerely,



Katherine Sylvia
Permitting Program Lead

CC: Anna Brown, MCWD
James Wisker, MCWD
Paul Moline, Carver County
Cara Geheren, City of Victoria
Brian Vlach, TRPD

Attachment 1- Permit 05-130 Plan Set
Attachment 2- Permit 06-097 Plan Set
Attachment 3- TRPD Inventory of Water Control Structures, 2009

ATTACHMENT 1

Permit 05-130 Plan Set

LEGEND

EXISTING
- STREET CENTERLINE
- CORPORATE LIMITS
- RIGHT OF WAY
- PERMANENT EASEMENT
- PROPERTY LINE
- CULVERT
- BULKHEAD
- UNDERGROUND ELECTRIC CABLE OR CONDUIT
- UNDERGROUND ELECTRIC DUCT
- GAS MAIN
- UNDERGROUND TELEPHONE CABLE OR CONDUIT
- UNDERGROUND TELEPHONE DUCT
- UNDERGROUND TELEVISION CABLE OR CONDUIT
- UNDERGROUND TELEVISION DUCT
- ELECTRIC CONTROL CABINET/BOX
- ELECTRIC MANHOLE
- ELECTRIC TRANSFORMER/PEDESTAL
- POWER POLE & GUY ANCHOR
- LIGHT POLE
- GAS VALVE, GAS SIGN & GAS VENT
- TRAFFIC SIGNAL, STANDARD
- HAND HOLE
- TELEPHONE MANHOLE
- TELEPHONE PEDESTAL
- CABLE TV PEDESTAL
- SOIL BORING
- TRAVERSE POINT
- CONCRETE CURB AND GUTTER
- EXISTING BIT TRAIL TRAIL
- EXISTING ROAD EDGE
- EXISTING GRAVEL EDGE
- TRUF TRAIL
- EXISTING PAVEMENT OR SIDEWALK
- SIGN (HWY, PARK, STOP, ETC.)
- STREET SIGN
- DITCH
- RAILROAD TRACKS
- BARBED WIRE FENCE
- CHAIN LINK FENCE
- ELECTRIC WIRE FENCE
- WOOD FENCE
- WOVEN WIRE FENCE
- GUARD RAIL
- TREE (DECIDUOUS)
- TREE (CONIFEROUS)
- BUSH-SHRUB
- WOODS DRIPLINE
- BUILDING
- WETLAND DELINEATIONI
- WATERS EDGE

PROPOSED
- NEW RIGHT OF WAY
- PERMANENT EASEMENT
- TEMPORARY EASEMENT
- CONSTRUCTION LIMITS
- CONSTRUCTION FENCE
- CULVERT
- BULKHEAD
- DRAIN TILE
- CONCRETE CURB AND GUTTER
- TRAIL CENTERLINE ALIGNMENT
- SILT FENCE
- HAYBALES
- LIGHT POLE
- SIGN (HWY, PARK, STOP, ETC.)
- REMOVE TREE

THREE RIVERS PARK DISTRICT

PRELIMINARY NOT FOR CONSTRUCTION

CONSTRUCTION PLANS FOR TRAIL RECLAMATION AND REHABILITATION CARVER PARK RESERVE

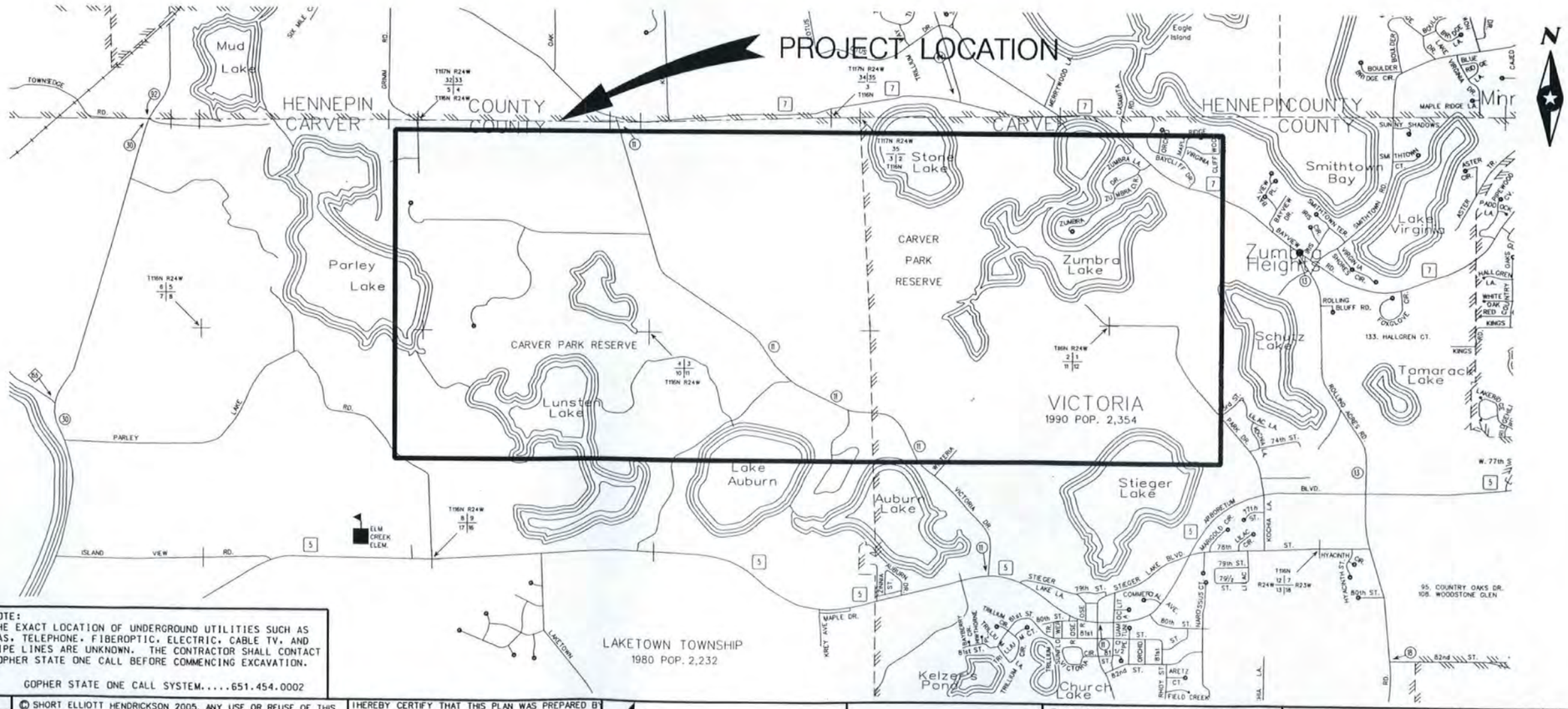
PHASE I & WETLAND RESTORATION PROJECT

RECEIVED MAR 1 0 2005

INDEX

SHEET NO.	DESCRIPTION
	PHASE I
1	TITLE SHEET
2	GENERAL LAYOUT
3	STATEMENT OF ESTIMATED QUANITIES
4	DETAILS AND TYPICAL SECTIONS
5	DETAILS AND TYPICAL SECTIONS
6	EARTHWORK TABULATION, GENERAL NOTES AND STANDARD PLATES
7	SIGNING DETAILS AND TABULATION
8	STATION 1+00 TO 32+75
9	STATION 32+75 TO 49+75
10	STATION 49+75 TO 66+50, 200+00 TO 204+00
11	STATION 66+50 TO 86+00
12	STATION 86+00 TO 101+50, 120+75 TO 125+50
13	STATION 101+50 TO 116+10
14	STATION 204+00 TO 220+50
15	STATION 220+50 TO 236+50, 291+00 TO 291+50
16	STATION 338+00 TO 354+00
17	STATION 354+00 TO 372+00
18	STATION 372+00 TO 389+00
19	STATION 389+00 TO 418+75
20	STATION 418+75 TO 435+50
21	STATION 435+50 TO 450+50
22	STATION 450+50 TO 466+25
23	STATION 466+25 TO 565+50, 473+00 TO 474+00
	WETLAND RESTORATION PROJECT
24	SITE LAYOUT
25	WETLAND AND CULVERT PLAN AND PROFILE
26	WETLAND PLANTING PLAN

THIS PLAN CONTAINS 26 SHEETS.



GOVERNING SPECIFICATIONS

THE 2000 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION SHALL GOVERN, EXCEPT AS MODIFIED BY THE SPECIFICATIONS FOR THIS PROJECT.

ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MMUTCD, INCLUDING FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS, JANUARY 2001.

NOTE:
THE EXACT LOCATION OF UNDERGROUND UTILITIES SUCH AS GAS, TELEPHONE, FIBEROPTIC, ELECTRIC, CABLE TV, AND PIPE LINES ARE UNKNOWN. THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL BEFORE COMMENCING EXCAVATION.

GOPHER STATE ONE CALL SYSTEM.....651.454.0002

DESIGNER: ATD
CHECKED BY: RSH
APPROVED BY: RSH

DESIGN TEAM	NO.	BY	DATE	REVISIONS

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: 3/xx/05
signature:
AARON T. DITZLER
printed signature:
Reg. No. 42003

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE BIKE / HIKE TRAIL IMPLEMENTATION PHASE I

TITLE SHEET

FILE NO. ATHRIV0410.01
DATE 3/xx/05

1 / 26

STONE LAKE

GRIMM FARM HISTORIC SITE

LOWRY NATURE CENTER

LAKE ZUMBRA

SPRINGVIEW PICNIC AREA

LAKE 2

BASIN 'A'

SUNNY LAKE

SCHUTZ LAKE

CAMPION OVERLOOK SPUR

KING OVERLOOK SPUR

LUNSTEN LAKE

MAINTENANCE FACILITY

LAKE AUBURN

CAMPGROUND

LAKE AUBURN

STEIGER LAKE

DESIGNER ATD					© SHORT ELLIOTT HENDRICKSON 2005 ANY USE OR REUSE OF THIS PLAN/DRAWING AND THE CORRESPONDING COMPUTER AIDED DESIGN/DRAFTING FILES WITHOUT THE EXPRESS WRITTEN CONSENT OF SEH IS PROHIBITED SEH SHALL NOT BE RESPONSIBLE FOR ANY UNAUTHORIZED USE OR REUSE OF THESE MATERIALS, OR DAMAGES RESULTING THEREFROM	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 3/xx/05 signature AARON T. DITZLER printed signature Reg No 42003	SEH 10901 RED CIRCLE DRIVE, SUITE 200 MINNETONKA, MN 55343-9100 PH 952 912 2600 FAX 952-912-2601 PH 800 734-6757	Three Rivers PARK DISTRICT	CARVER PARK RESERVE BIKE / HIKE TRAIL IMPLEMENTATION PHASE I	GENERAL LAYOUT	FILE NO. ATHRIV0410.01	2
CHECKED BY: RSH												DATE 3/xx/05	26
APPROVED BY: RSH													
DESIGN TEAM	NO	BY	DATE	REVISIONS									

3/3/2005 3:57:04 PM

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STATEMENT OF ESTIMATED QUANTITIES

ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL PROJECT QUANTITIES		Ⓐ WEST TRAIL LOOP STA 1+00 TO XXX+00		Ⓐ EAST TRAIL LOOP STA XXX+00 TO XXX+00		Ⓐ CHAMPION OVERLOOK SPUR STA XX+00 TO XX+00		Ⓐ KING OVERLOOK SPUR STA XX+00 TO XX+00		Ⓑ WETLAND RESTORATION PROJECT	
			ESTIMATED	FINAL	ESTIMATED	FINAL	ESTIMATED	FINAL	ESTIMATED	FINAL	ESTIMATED	FINAL	ESTIMATED	FINAL
1	MOBILIZATION	LUMP SUM	1.0		0.5		0.5							
2	CLEARING	TREE	1		0		1							
3	GRUBBING	TREE	1		0		1							
4	REMOVE PIPE STORM SEWER CULVERT	LIN FT	60		30		30							
5	REMOVE BITUMINOUS PAVEMENT	SQ YD	139		139		0							
6	REMOVE AND REPLACE CONCRETE CURB AND GUTTER	LIN FT	20		20		0							
7	REMOVE AND REPLACE BOLLARDS	EACH	8		4		4							
8	SALVAGE AND REINSTALL FLARED END SECTION	EACH	4		2		2							
9	SAWING BITUMINOUS PAVEMENT	LIN FT	84		50		34							
10	SALVAGE TOPSOIL - STANDARD TRAIL	SQ YD	25,040		12915		12025		100					
11	SALVAGE TOPSOIL - GRADING IMPACTS	SQ YD	7,314		4217		2555		542					
12	COMMON EXCAVATION - REMOVE NON SALVAGEABLE TOPSOIL - STANDARD TRAIL	CU YD	464		239		223		2					
13	COMMON EXCAVATION - REMOVE NON SALVAGEABLE TOPSOIL - GRADING IMPACTS	CU YD	135		78		47		10					
14	COMMON EXCAVATION - NEW TRAIL ALIGNMENTS	SQ YD	0											
15	COMMON EXCAVATION - LOWER TRAIL PROFILE	SQ YD	0											
16	COMMON EXCAVATION - STANDARD TRAIL	CU YD	911		466		445							
17	COMMON EXCAVATION - GRADING IMPACTS	CU YD	3,941		2624		935		249		133			
18	COMMON EXCAVATION - WETLAND	CU YD	15,000										15000	
19	COMMON BORROW (CV)	CU YD	2,382		890		1049		179				264	
20	SUBGRADE CORRECTION	CU YD	1,362		680		612		50		20			
21	SUBGRADE PREPARATION	ROAD STA	66		35		29		1		1			
22	SELECT TOPSOIL BORROW (LV)	CU YD	2,700		1560		940		200					
23	ROCK CONSTRUCTION ENTRANCE	EACH	8		5		3		0					
24	AGGREGATE BASE, CLASS 5	TON	11,706		5957		5309		301		139			
25	AGGREGATE BASE, CLASS 7, FULL DEPTH RECYCLED PRODUCTION	SQ YD	26,205		13468		12248		489					
26	RECLAIMED AGGREGATE CLASS 7 PLACED, 12' WIDTH (STANDARD TRAIL)	SQ YD	33,168		17067		16101							
27	RECLAIMED AGGREGATE CLASS 7 SALVAGED AND PLACED - GRADING IMPACTS	SQ YD	5,380		3147		2233							
28	TYPE 41A WEARING COURSE MIXTURE	TON	6,013		3062		2779		111		61			
29	MAINTENANCE ROAD CROSSINGS	SQ YD	574		373		201		0					
30	CRUSHED ROCK PIPE FOUNDATION	TON	50		25		25							
31	12-INCH RC PIPE CULVERT	LIN FT	40		20		20							
32	12-INCH CS PIPE CULVERT	LIN FT	40		20		20							
33	12-INCH RC PIPE APRON	EACH	4		2		2							
34	12-INCH CS PIPE APRON	EACH	4		2		2							
35	12-INCH HDPE PIPE CULVERT	LIN FT	60		30		30							
36	CONNECT TO EXISTING STORM SEWER	EACH	4		2		2							
37	ROOT PROTECTION	LIN FT	1,870		1870									
38	RANDOM RIPRAP CL III	CU YD	40		20		20							
39	GEOTEXTILE FILTER TYPE IV	SQ YD	120		60		60							
40	GEOTEXTILE FILTER TYPE V	SQ YD	442		225		204		8		5			
41	PEDESTRIAN CURB RAMP	SQ FT	166		166									
42	TRAFFIC CONTROL	LUMP SUM	1		0.5		0.5							
43	FURNISH & INSTALL SIGN PANEL - TYPE "C"	SF	240		120		120							
44	4-INCH BROKEN LINE YELLOW, EPOXY	LIN FT	6,554		2875		3466		138		75			
45	ZEBRA CROSSWALK WHITE, EPOXY	SQ FT	995		620		375							
46	BALE CHECK	EACH	20		10		10							
47	EROSION CONTROL SILT FENCE, HEAVY DUTY	LIN FT	12,691		4799		6092						1800	
48	MULCH MATERIAL, TYPE 1	TON	16		7		6		1				2.4	
49	DISK ANCHORING	ACRE	7.20		3.3		2.7		0.1				1.1	
50	WOOD FIBER BLANKET	SQ YD	1,400		1400									
51	SEEDING	ACRE	7.2		3.3		2.7		0.1				1.1	
52	SEED, MIXTURE 600	POUND	360		165		135		5				55	
53														
54														
55														
56														
57														
58														
59														
60														

Ⓐ BID ALTERNATE A

Ⓑ BID ALTERNATE B

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DESIGNER: ATD
CHECKED BY: RSH
APPROVED BY: RSH
DESIGN TEAM

NO	BY	DATE	REVISIONS

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.
signature Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

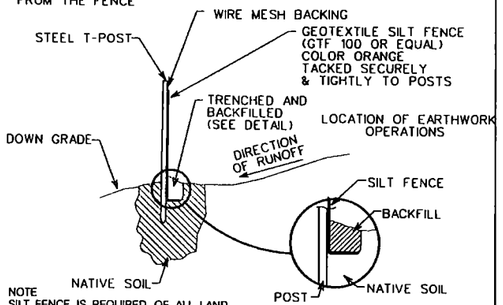
CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

STATEMENT OF ESTIMATED QUANTITIES

FILE NO. ATHRIV0410.01
DATE 3/xx/05

NOTES
SILT FENCE SHALL BE PLACED PARALLEL TO THE CONTOUR OF THE TERRAIN, WITH THE ENDS WRAPPED UPHILL TO PREVENT FLOW AROUND THEM

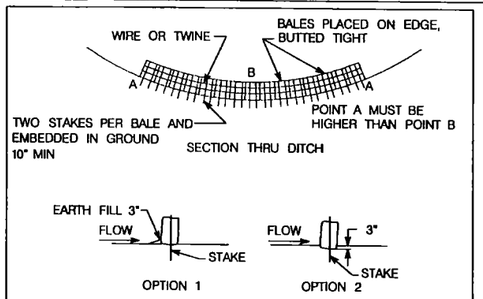
NO EARTHWORK SHALL BE PERFORMED DOWN GRADE FROM THE FENCE



NOTE
SILT FENCE IS REQUIRED OF ALL LAND DISTURBANCES (ON EACH SIDE OF TRAIL) WHEREVER THE DISTURBANCE IS LOCATED WITHIN A WETLAND OR DRAINAGE WAY AREA.

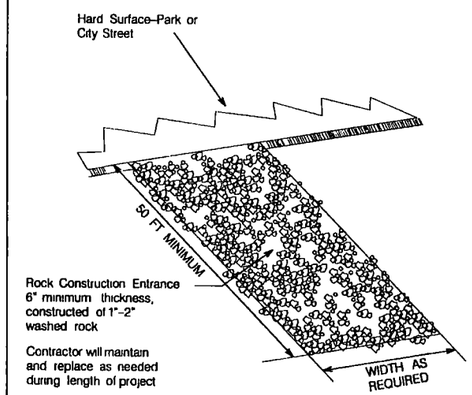
HEAVY DUTY SILT FENCE
MNDOT 3886

NO SCALE



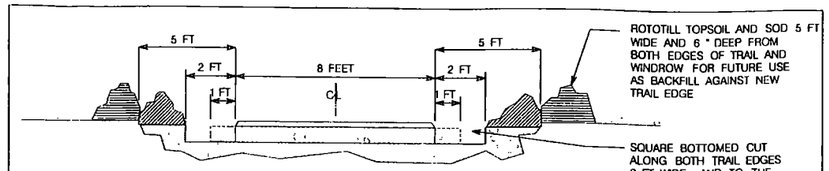
HAY OR STRAW BALE DITCH CHECK

NO SCALE



ROCK CONSTRUCTION ENTRANCE

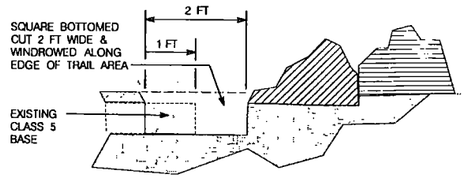
NO SCALE



EXISTING TRAIL AND EDGE CUTS

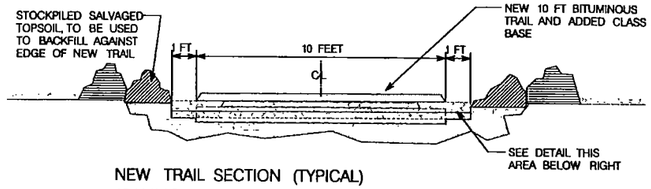
NO SCALE

NOTE
MATERIAL CANNOT BE WINDROWED OUTSIDE OF THE TRAIL EDGES WITHOUT EFFECTIVE SEDIMENT CONTROL. DO NOT STORE MATERIAL NEAR OR ADJACENT TO WETLANDS, WATERBODIES CULVERTS OR DRAINAGE WAYS



DETAIL OF CUT TOPSOIL

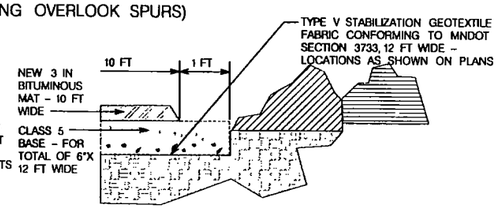
NO SCALE



NEW TRAIL SECTION (TYPICAL)
(CAMPION AND KING OVERLOOK SPURS)

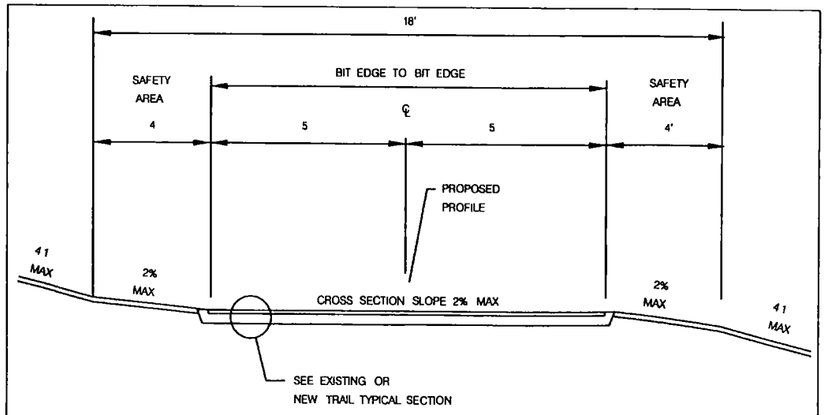
NO SCALE

NOTE
MATERIAL CANNOT BE WINDROWED OUTSIDE OF THE TRAIL EDGES WITHOUT EFFECTIVE SEDIMENT CONTROL. DO NOT STORE MATERIAL NEAR OR ADJACENT TO WETLANDS, WATERBODIES, CULVERTS OR DRAINAGE WAYS

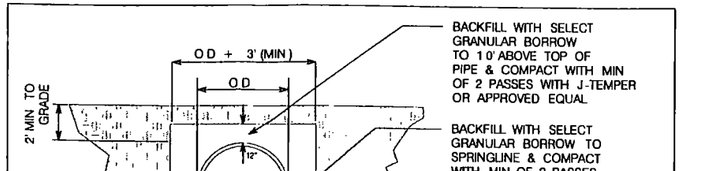


DETAIL OF NEW TRAIL SECTION

NO SCALE

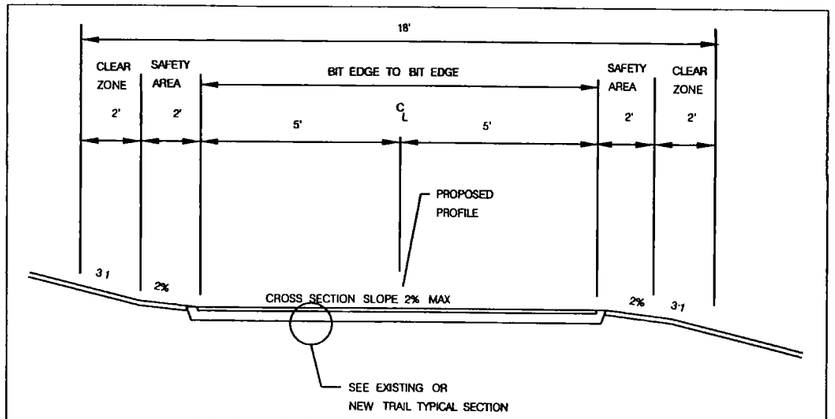


STANDARD SLOPES AND CLEAR ZONES

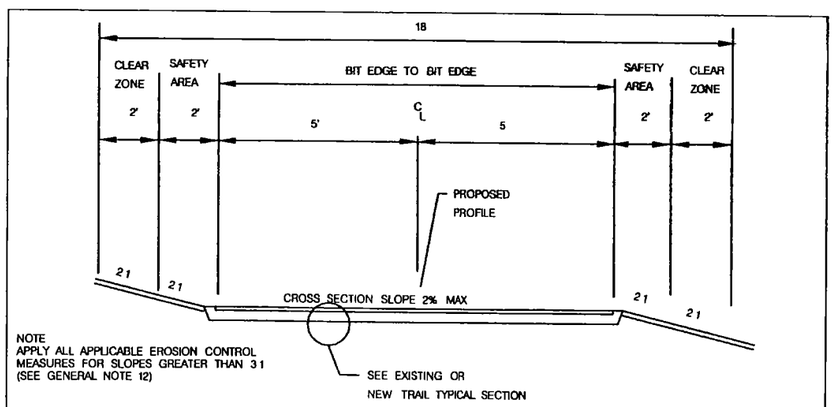


CULVERT DETAIL

NO SCALE



SLOPES AND CLEAR ZONES AT GRADING IMPACTS
(SEE PLANS FOR LOCATIONS)



NOTE
APPLY ALL APPLICABLE EROSION CONTROL MEASURES FOR SLOPES GREATER THAN 3:1 (SEE GENERAL NOTE 12)

SLOPES AND CLEAR ZONES NEAR WETLAND AREAS
(STATION 201+50 TO STATION 204+50
STATION 384+50 TO STATION 392+00)

	NO	BY	DATE	REVISIONS
DESIGNER: ATD	1	ATD	6/2/03	ADDED NOTE TO SILT FENCE DETAIL
CHECKED BY: RSH	2	ATD	6/2/03	ADDED NOTE TO TRAIL SECTION DETAILS
APPROVED BY: RSH				
DESIGN TEAM				

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 3/xx/05
signature:
AARON T DITZLER
printed signature
Reg No 42003

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
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PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL IMPLEMENTATION PHASE I

DETAILS / TYPICAL SECTIONS

FILE NO ATHRIV0410 01
DATE 3/xx/05

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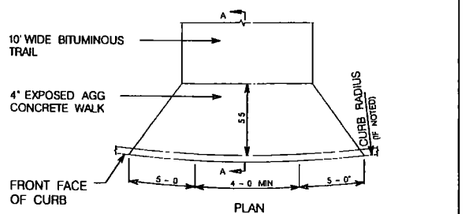
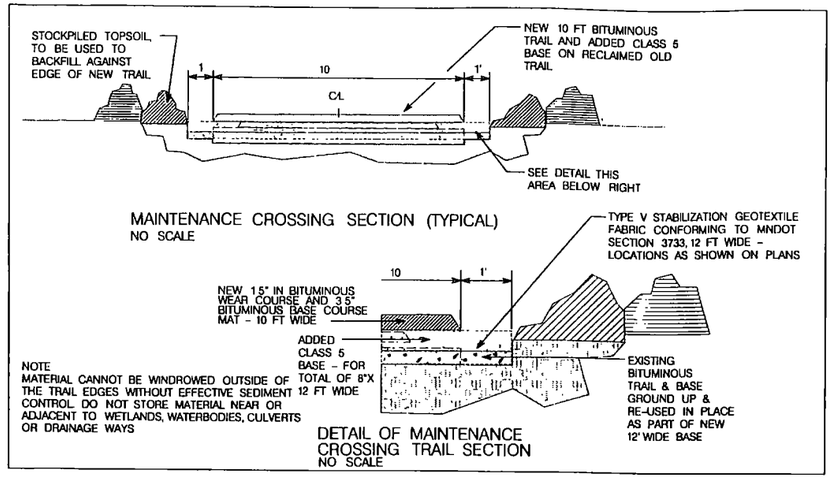
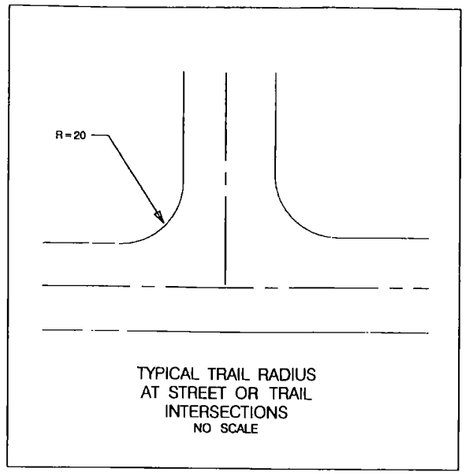
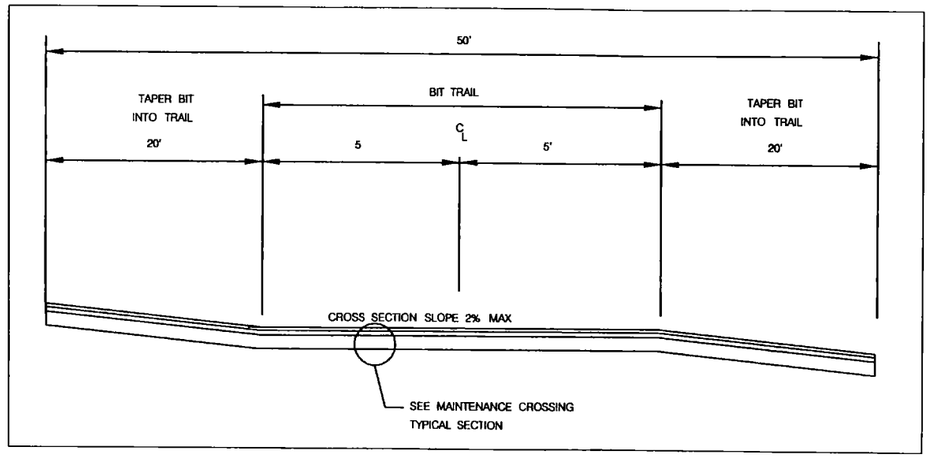
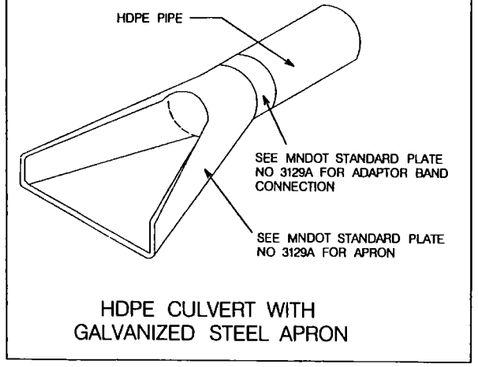


PEDESTRIAN CURB RAMP DETAIL
NO SCALE

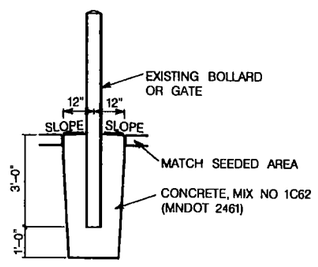




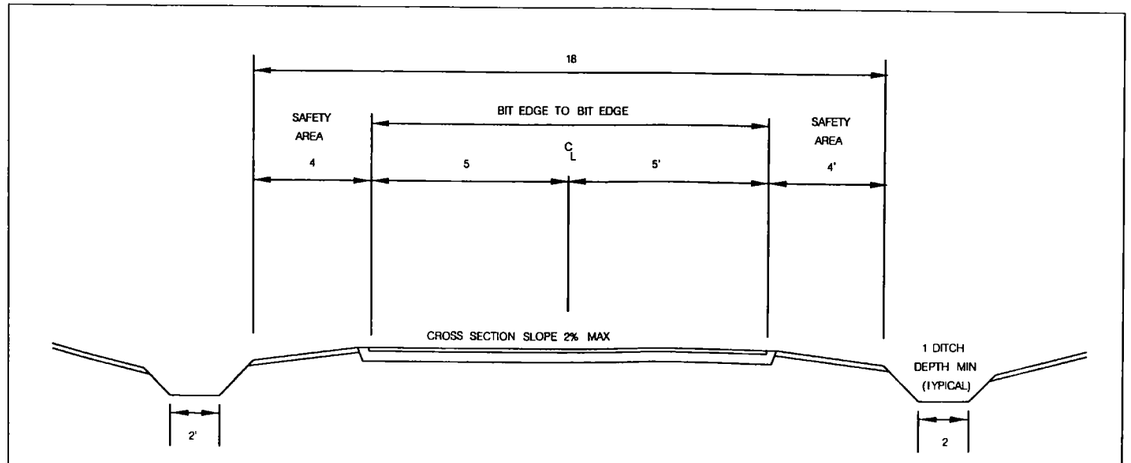


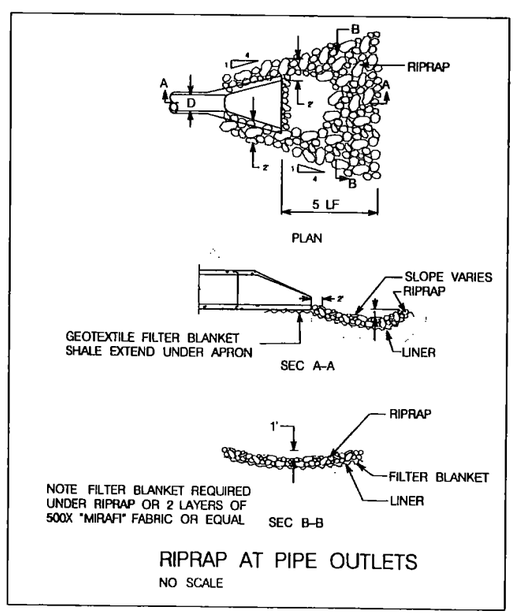


HDPE CULVERT WITH GALVANIZED STEEL APRON



REMOVE AND REPLACE BOLLARD OR GATE DETAIL
NO SCALE





RIPRAP AT PIPE OUTLETS
NO SCALE

DESIGNER: ATD				
CHECKED BY: RSH				
APPROVED BY: RSH				
DESIGN TEAM	NO	BY	DATE	REVISIONS
	1	ATD	6/2/03	ADDED NOTE TO TRAIL SECTION DETAIL

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.
signature Date 3/xx/05
AARON T DITZLER printed signature Reg No 42003

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343 9100
PH 952 912-2600 FAX 952 912 2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

DETAILS / TYPICAL SECTIONS

FILE NO ATHR1V0410 01
DATE 3/xx/05

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26

LOCATION	BIO ALTERNATE	STATION FROM	STATION TO	COMMON EXCAVATION - NON SALVAGEABLE TOPSOIL STANDARD TRAIL (CY)	COMMON EXCAVATION - NON SALVAGEABLE TOPSOIL GRADING IMPACTS (CY)	COMMON EXCAVATION - STANDARD TRAIL (CY)	COMMON EXCAVATION - GRADING IMPACTS (CY)	COMMON BORROW - GRADING IMPACTS (CY)	SALVAGE TOPSOIL - STANDARD TRAIL (SY)	SALVAGE TOPSOIL - GRADING IMPACTS (SY)	TOPSOIL BORROW (LV) (CY)
WEST LOOP		1+00	47+60	85.8		171.7			4635.0		
		47+60	49+25		4.7		0.0	28.5		251.5	
		49+25	73+50	44.4		88.9			2400.0		
		73+50	80+00		30.4		2287.2	241.2		1639.2	
		80+00	91+90	22.0		44.1			1190.0		
		91+90	94+00		5.8		0.0	16.0		311.0	
		94+00	105+65	21.6		43.1			1165.0		
		105+65	108+00		6.9		7.8	47.4		372.0	
		108+00	110+25	4.2		8.3			225.0		
		110+25	113+50		12.5		54.2	57.0		673.6	
		113+50	116+00	4.6		9.3			250.0		
		200+00	201+75	3.2		6.5			175.0		
		201+75	205+00	6.0		0.0		337.0	325.0		
		205+00	219+75	27.3		54.6			1475.0		
		219+75	223+50		8.2		223.2	44.5		440.6	
		223+50	233+00	17.6		35.2			950.0		
		233+00	236+50		9.8		51.5	118.5		528.6	
		290+00	291+25	2.3		4.6			125.0		
CAMPION		120+00	120+75	1.4		2.8			75.0		
		120+75	125+25		10.0		226.7	179.4		541.9	
		125+25	125+50	0.5		0.9			25.0		
EAST LOOP		336+50	347+00	19.4		38.9			1050.0		
		347+00	352+50		13.6		451.8	86.7		733.0	
		352+50	426+50	137.0		274.1			7400.0		
		426+50	433+50		22.7		217.3	832.9		1223.2	
		433+50	457+75	44.4		88.9			2400.0		
		457+75	462+00		11.1		266.0	129.1		598.4	
		462+00	474+00	21.8		43.5			1175.0		

NOTE: QUANTITIES LISTED IN THE EARTHWORK TABULATION ARE ESTIMATED BASED ON SOIL TESTING AND FIELD INSPECTIONS. ACTUAL QUANTITIES MAY VARY FROM THOSE DEPICTED DUE TO FIELD CONDITIONS.

GENERAL NOTES

1 MAINTENANCE OF THE STAKING AND STATIONING TO BE SOLELY THE CONTRACTOR'S RESPONSIBILITY

2 THE CONTRACTOR SHALL OBTAIN PAY, AND ADHERE TO ALL CONSTRUCTION PERMIT REQUIREMENTS REQUIRED FOR THIS PROJECT OWNER SHALL OBTAIN ALL REGULATORY PERMITS

3. CONTRACTOR SHALL STAY WITHIN CONSTRUCTION LIMITS UNLESS APPROVED OTHERWISE BY THE OWNER THE WORK ZONE SHALL BE KEPT AS MINIMAL AS POSSIBLE DURING CONSTRUCTION MOVEMENT AND PARKING OF EOUIPMENT SHALL STAY WITHIN WORK ZONE AND NOT CROSS AREAS OTHERWISE UNDISTURBED DURING CONSTRUCTION OPERATIONS

4 CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING STRUCTURES, UTILITIES TREES SITE AMENITIES ETC FROM DAMAGE DURING CONSTRUCTION CONTRACTOR TO WORK OUTSIDE OF DRIP ZONE OF TREES EXCEPT IN AREAS DESIGNATED BY OWNER CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTING ANY DAMAGE (AT CONTRACTORS EXPENSE)

5 STOCKPILE LOCATIONS, MATERIAL AND EQUIPMENT STORAGE LOCATIONS TO BE APPROVED BY OWNER

6 COORDINATION WITH OTHER ON-SITE CONTRACTORS IS CONSIDERED INCIDENTAL TO THE CONTRACT AND SHALL BE THE RESPONSIBLITY OF THE CONTRACTOR AS DESCRIBED IN THE PROJECT SPECIFICATIONS

7 THE CONTRACTOR SHALL MAINTAIN ADJACENT PROPERTY AND CITY STREETS AND CONTINUOUSLY CLEAN FROM CONSTRUCTION CAUSED DIRT AND DEBRIS DURING ALL OPERATIONS ON A DAILY BASIS PROPERTY AND STREET CLEANING SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT

8 APPLY BROKEN LINE TRAIL PAVEMENT MARKINGS IN A PATTERN OF 3 FEET OF MARKING AND 9 FEET OF SPACE

9 ALL PARK SIGNING SHALL BE COMPLETED BY THE OWNER TRAFFIC CONTROL SIGNING IS THE RESPONSIBILITY OF THE CONTRACTOR

10 IN AREAS WHERE EXISTING DRAINTILE IS DISTURBED REMOVE & REPLACE DRAINTILE AS NECESSARY (SEE DETAIL FOR DRAINTILE PLACEMENT)

11 PARK OWNED UTILITIES WILL BE LOCATED BY THE OWNER ONE TIME IT IS THE CONTRACTORS' RESPONSIBILITY TO MAINTAIN LOCATIONS THROUGHOUT THE PROJECT

12. TEMPORARY VEGETATION AND/OR MULCHING SHALL BE USED TO PROTECT THE AREAS EXPOSED DURING THE DEVELOPMENT NO AREA SHALL BE LEFT DENUDED FOR A PERIOD LONGER THAN THREE (3) DAYS AFTER INITIAL SITE GRADING AND OTHER LAND DISTURBING OPERATIONS ON SLOPES 3 1 AND GREATER THESE AREAS SHALL BE SEEDED, MULCHED AND STABILIZED WITH EROSION CONTROL BLANKET TEMPORARY SEED SHALL BE MNDOT MIX 130B @ 100 LBS PER ACRE OR APPROVED EQUAL MULCH SHALL BE MNDOT TYPE 1 (CLEAN OAT STRAW) @ 2 TONS PER ACRE AND DISK ANCHORED IN PLACE OR APPROVED EQUAL EROSION CONTROL BLANKET SHALL BE WOOD FIBER 1S BLANKET MEETING MnDOT SPECIFICATION 3885

13 PERMANENT VEGETATION AND STRUCTURES SHALL BE INSTALLED WITHIN FIVE (5) DAYS AFTER COMPLETION OF INITIAL SITE GRADING IF GRADING IS NOT COMPLETE UNTIL AFTER PLANTING SEASON HAS EXPIRED, TEMPORARY EROSION CONTROL MEASURES, INCLUDING DORMANT SEEDING AND MULCHING SHALL BE IMPLEMENTED PERMANENT SEED SHALL BE MNDOT MIX 50B @ 50 LBS PER ACRE OR APPROVED EQUAL (PLANTING DATES PER SPEC 2575) MULCH SHALL BE MNDOT TYPE 1 (CLEAN OAT STRAW) @ 2 TONS PER ACRE AND DISK ANCHORED IN PLACE OR APPROVED EOUAL

14 IF AFTER 3 (THREE) DAYS THE TEMPORARY VEGETATION AND/OR MULCHING IS NOT COMPLETE, THE SUBURBAN HENNEPIN REGIONAL PARK DISTRICT OR THEIR AUTHORIZED REPRESENTATIVE SHALL NOTIFY THE CONTRACTOR THAT HE HAS 24 HOURS TO COMPLETE THE TEMPORARY VEGETATION AND/OR MULCHING OR THE WORK WILL BE COMPLETED BY OTHERS WITH TWICE THE ACTUAL COST OF WORK BEING DEDUCTED FROM THE CONTRACTORS PAYMENT

15 ALL SEEDED AREAS TO HAVE 6" TOPSOIL EITHER EXISTING OR IMPORTED AND MUST BE TILLED TO REDUCE COMPACTION TO LESS THAN 1 5 MPA TO A DEPTH OF 18" (SITE REPRESENTATIVE AND OWNER TO VERIFY)

16 INSPECT SILT FENCE IMMEDIATELY AFTER EACH RUNOFF EVENT ANY REQUIRED REPAIRS SHOULD BE MADE IMMEDIATELY WHEN SEDIMENT DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE SILT FENCE, REMOVE SEDIMENT OR INSTALL A SECOND SILT FENCE

LIST OF STANDARD PLATES

NO.	TITLE
3000 L	REINFORCED CONCRETE PIPE
3006 G	GASKET JOINT FOR R C. PIPE
3040 F	CORRUGATED METAL PIPE CULVERT
3100 G	CONCRETE APRON FOR REINFORCED CONCRETE PIPE
3110 G	CONCRETE APRON FOR REINFORCED CONCRETE PIPE - ARCH
3123 J	METAL APRON FOR C S. PIPE
3124 B	METAL APRON CONNECTION
3129 A	METAL APRON FOR CORRUGATED POLYETHYLENE PIPE
3221 C	CORRUGATED STEEL PIPE COUPLING BAND
7035 L	CONCRETE WALK AND CURB RETURNS AT ENTRANCES
7100 G	CONCRETE CURB AND GUTTER
8000 I	STANDARD BARRICADES
9102 G	TURF ESTABLISHMENT AREAS (AT PIPE CULVERT ENDS)

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DESIGN TEAM		NO.	BY	DATE	REVISIONS
DESIGNER	ATD	1	ATD	6/2/03	DELETE GENERAL NOTE # 11
CHECKED BY:	RSH	2	ATD	6/2/03	ADD SCOTT COUNTY E & SC NOTES
APPROVED BY	RSH	3	ATD	6/2/03	ADD GENERAL NOTE #14
		4	ATD	6/2/03	ADD IMPLEMENTATION SCHEDULE

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.
signature Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

SEH 10901 RED CIRCLE DRIVE, SUITE 200 MINNETONKA, MN 55343 9100 PH 952 912-2600 FAX 952-912 2601 PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE BIKE / HIKE TRAIL IMPLEMENTATION PHASE I

EARTHWORK TABULATION\ GENERAL NOTES\ STANDARD PLATES

FILE NO ATHRIV0410 01

DATE 3/xx/05

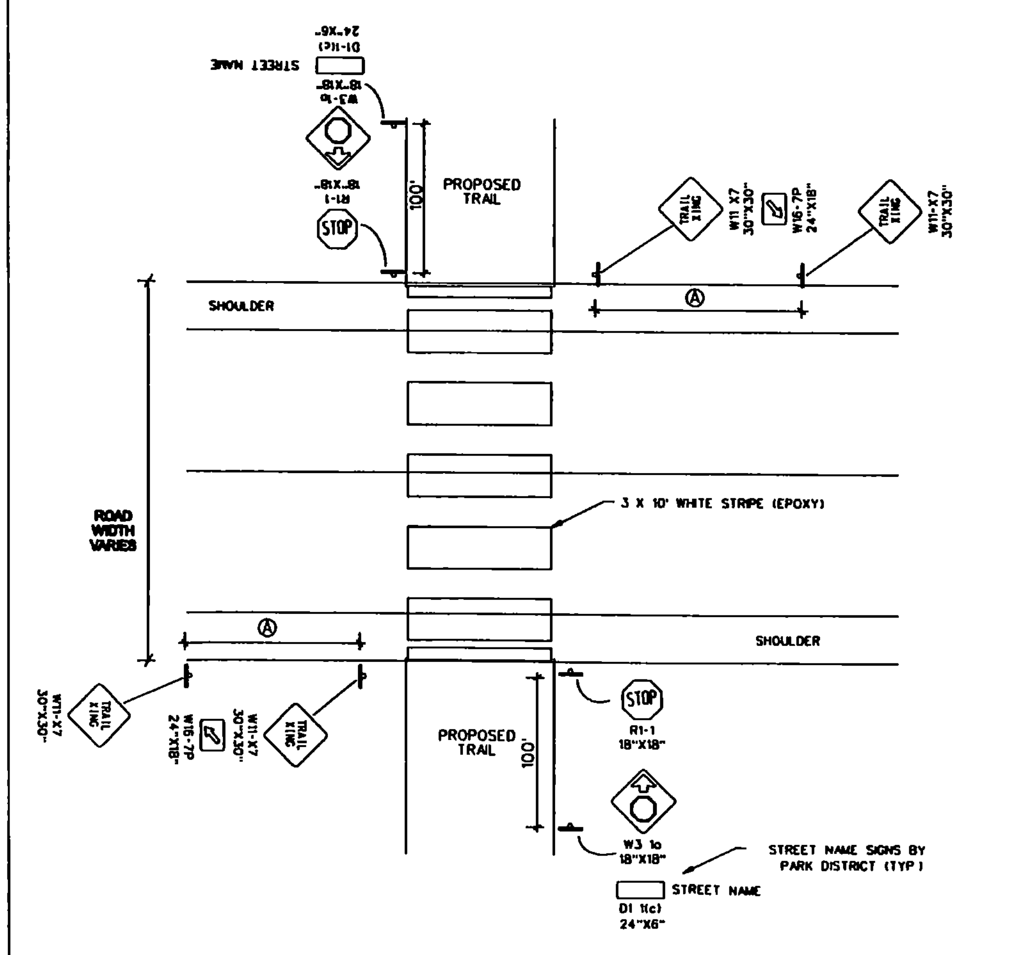
STREET CROSSING SIGNS AND MARKINGS

STREET NAME	MPH	STREET WIDTH	NUMBER OF LANES	TRAIL XING W11-X7 EACH	TRAIL XING W11-X7 DIST. (A)	TRAIL XING W11-X7 W16-7P EACH	TRAIL STOP R1-1 EACH	TRAIL W3-1a EACH	ZEBRA CROSSWALK SQ FT
GRIMM ROAD	30	36	2	2	100	2	2	2	180
SPRINGVIEW ROAD	30	44	2	2	100	2	2	2	220
CSAH 11	55	44	2	2	375	2	2	2	220
PARK ROAD	30	30	2	2	100	2	2	2	150
PARK ROAD	30	22	2	2	100	2	2	2	110
BOAT ACCESS ROAD	30	23	2	2	100	2	2	2	115

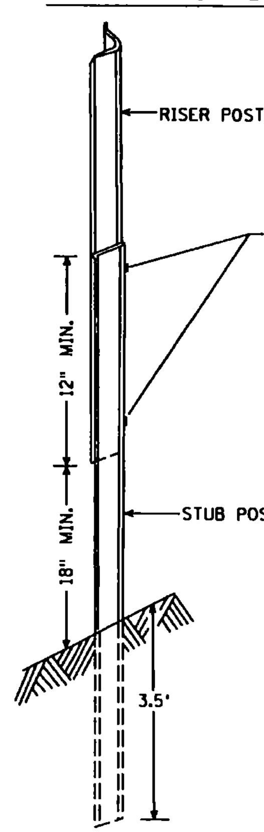
TYPE C SIGNS - FURNISH AND INSTALL

SIGN	QUANTITY	SIGN NO.	COLOR	SIZE (INCHES)	AREA (SQ FT)	NO. OF POSTS AND TYPE
TRAIL XING	24	W11-X7	BLACK ON YELLOW	30" x 30"	150	1-U
	12	W16-7P	BLACK ON YELLOW	24" x 18"	36	COMMON POST
STOP	12	R1-1		18" X 18"	27	SEE NOTE 1
	12	W3-1a		18" X 18"	27	SEE NOTE 1
TOTALS					240	48

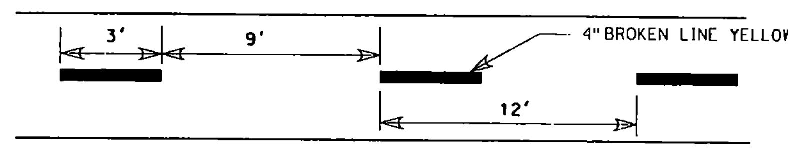
NOTE:
1. USE 8 OR 9 FOOT x 2.5 LB BLACK CHANNEL POSTS. POSTS SHALL BE $\frac{7}{16}$" PUNCHED ON 3" CENTERS.



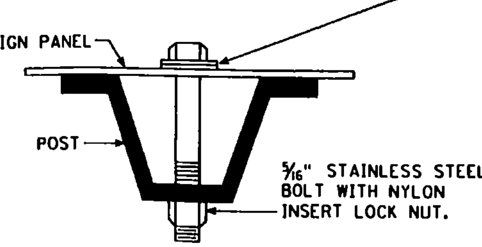
INTERSECTION SIGNING DETAILS
(2 LANE OR 4 LANE)



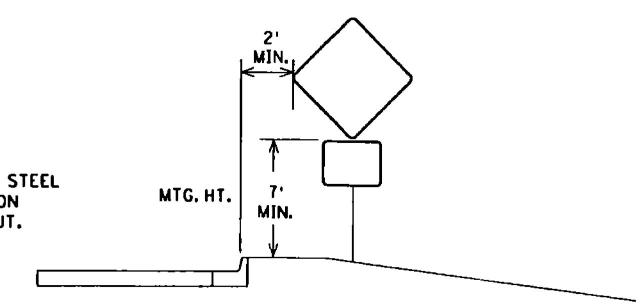
"U POST" SPLICE



TYPICAL STRIPING DETAIL
NOT TO SCALE



"U POST" MOUNTING
TYPE "C" SIGNS



TYPICAL MOUNTING

NOTES:

1. PAINTED AREAS TO BE CENTERED ON CENTERLINE AND LANE LINES.
2. USE 3# STUB POSTS, RISER POSTS, STRINGERS, KNEE BRACES, LATERAL BRACES AND KNEE BRACE STUB POSTS. ALL SHALL CONFORM TO MN/DOT 3401.
3. MOUNTING (PUNCHING CODE) FOR TYPE "C" SIGN PANELS SHALL BE AS INDICATED IN THE STANDARD SIGNS MANUAL UNLESS OTHERWISE SPECIFIED.
4. ALL RISER (VERTICAL) "U POSTS" SHALL BE SPLICED. DRIVEN STUB POSTS SHALL BE AT LEAST 7' LONG.
5. USE STAINLESS STEEL $\frac{5}{16}$" BOLTS, WASHERS, AND NYLON INSERT LOCK NUTS AS SHOWN FOR ALL GROUND MOUNTED AND OVERHEAD MOUNTED SIGNS.
6. STAINLESS STEEL WASHER WITH SAME DIMENSIONS SHALL BE PROVIDED BETWEEN ALL NYLON WASHERS AND BOLT HEADS.

PAVEMENT MARKING

ITEM	QUANTITY
4" BROKEN LINE YELLOW	XX LIN FT
ZEBRA CROSSWALK	995 SQ FT

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DESIGNER ATD	NO	BY	DATE	REVISIONS
CHECKED BY: RSH	1	ATD	9/11/03	ADDITION OF TRAIL SIGNING
APPROVED BY: RSH				
DESIGN TEAM				

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.
signature ______ Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

SIGNING DETAILS AND TABULATIONS

FILE NO ATHRIV0410 01
DATE 3/xx/05

REMOVE EXISTING CULVERT AND RE-GRADE TO MATCH EXISTING CONTOURS

GRIMM FARM HISTORIC SITE

REVISE CURRENT ALIGNMENT STA 1+45 THROUGH STA 2+90 TO MEET MINIMUM HORIZONTAL CURVE FOR 25 MPH DESIGN.

RCE

GRIMM ROAD

INSTALL 20 LF 8" HDPE CULVERT

RCE

RCE

PARLEY LAKE GROUP CAMP PARKING LOT

RELOCATE PROPOSED 10' TRAIL; USE RECLAIM FROM EXISTING TRAIL FOR PROPOSED TRAIL. RESTORE EXISTING BITUMINOUS TRAIL WITH 6" TOPSOIL AND SEED.

MATCH LINE SEE BELOW LEFT

MATCH LINE SEE ABOVE RIGHT

1ST WETLAND IMPACT - 192 SF

GRIMM ROAD

SPRING ROAD

RCE

RCE

2ND WETLAND IMPACT - 192 SF

SEE FIGURE NO. 8

MATCH LINE SEE SHEET 9 LEFT

LEGEND

- PEDESTRIAN CURB RAMP (SEE DETAIL)
- RCE — ROCK CONSTRUCTION ENTRANCE (SEE DETAIL)
- ROOT BARRIER (CONFIRM LOCATIONS WITH OWNER)
- MAINTENANCE CROSSING LOCATION (SEE TYPICAL SECTION)
- GRADING IMPACTS BASED ON 18' TYP W/3:1 SLOPES
- ① EXTEND EXISTING CULVERT
- ② CLEAN EXISTING CULVERT

scale: 25 — 50 0 50 100 feet

3:57:23 PM 3/3/2005

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DESIGNER	ATD
CHECKED BY:	RSH
APPROVED BY	RSH
DESIGN TEAM	

NO	BY	DATE	REVISIONS

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: 3/xx/05

signature

AARON T DITZLER

printed signature

Reg No 42003

SEH
10901 RED CIRCLE DRIVE SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

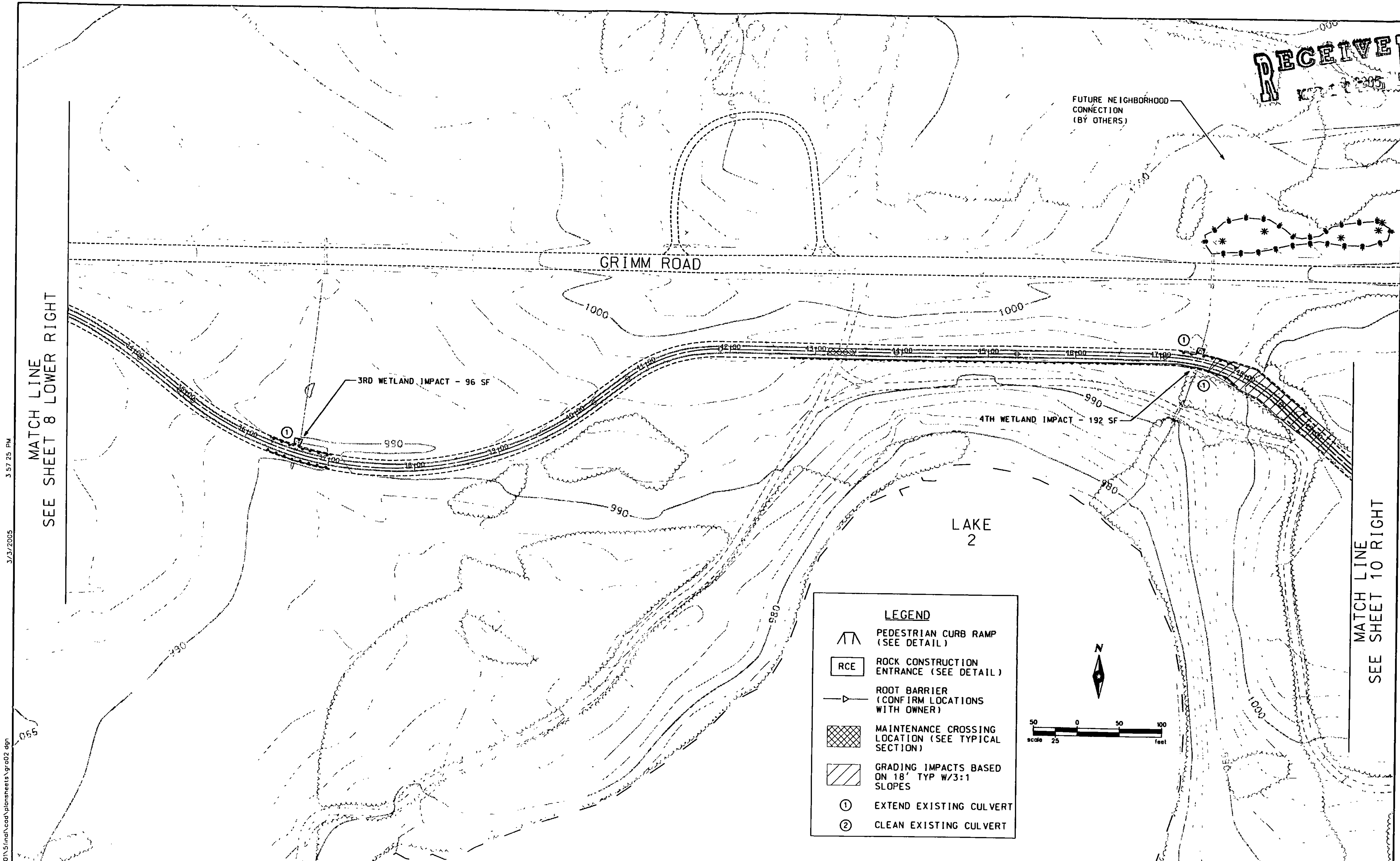
CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

WEST TRAIL LOOP
STA 1+00 TO 32+75

FILE NO. ATHRIV0410 01

DATE 3/xx/05

8 / 26



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DESIGNER ATD				
CHECKED BY: RSH				
APPROVED BY RSH				
DESIGN TEAM	NO	BY	DATE	REVISIONS

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.
signature Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

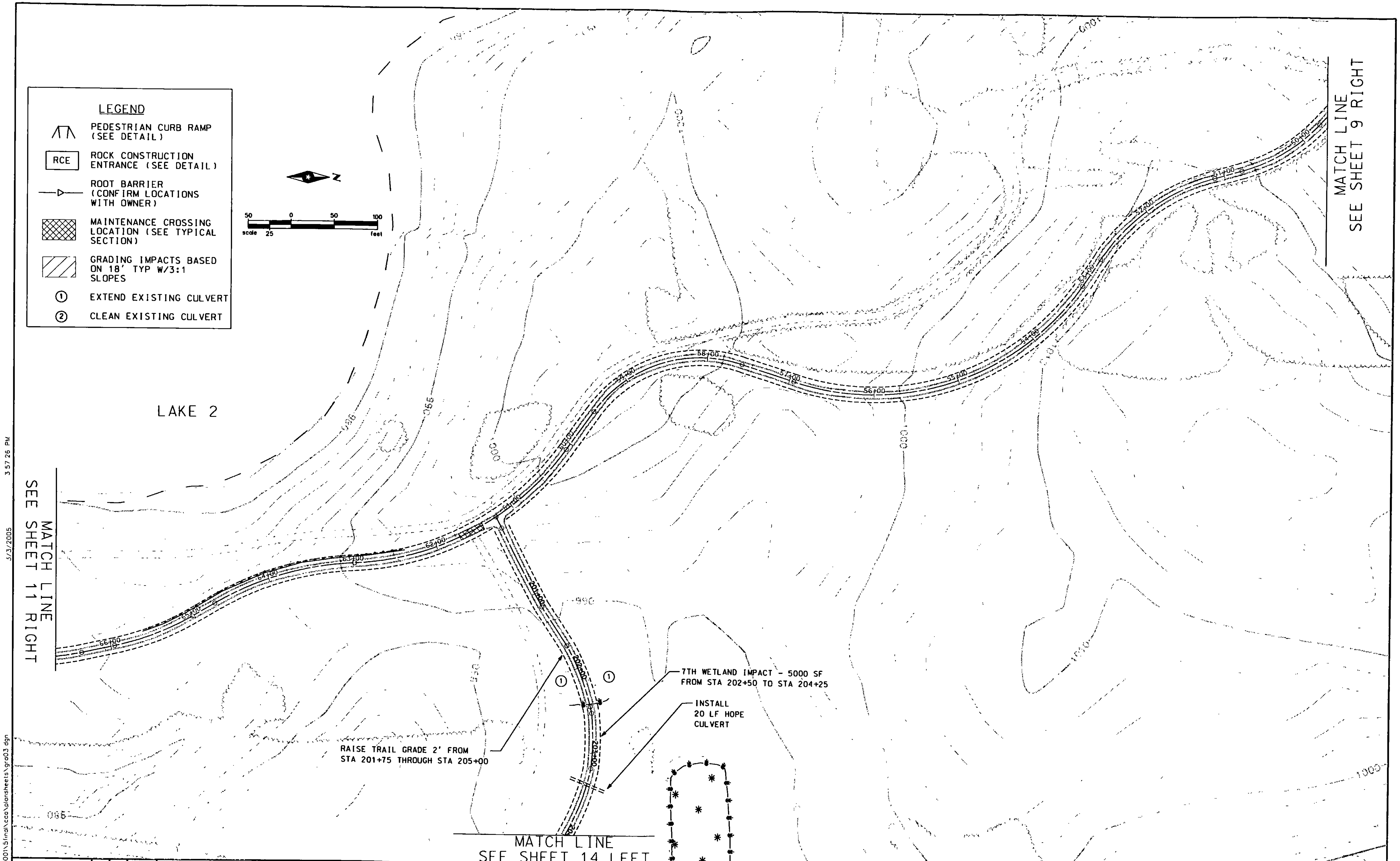
SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912 2600 FAX 952 912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

WEST TRAIL LOOP
STA 32+75 TO 49+75

FILE NO ATHRIV0410.01
DATE 3/xx/05



DESIGNER	ATD	NO	BY	DATE	REVISIONS
CHECKED BY:	RSH				
APPROVED BY:	RSH				
DESIGN TEAM					

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.
signature Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

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10901 RED CIRCLE DRIVE SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952 912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

WEST TRAIL LOOP
STA 49+75 TO 66+50
STA 200+00 TO 204+00

FILE NO. ATHRIV0410 01
DATE 3/xx/05

MATCH LINE
SEE SHEET 12 RIGHT

LEGEND

- PEDESTRIAN CURB RAMP (SEE DETAIL)
- RCE — ROCK CONSTRUCTION ENTRANCE (SEE DETAIL)
- ROOT BARRIER (CONFIRM LOCATIONS WITH OWNER)
- MAINTENANCE CROSSING LOCATION (SEE TYPICAL SECTION)
- GRADING IMPACTS BASED ON 18' TYP W/3:1 SLOPES
- ① EXTEND EXISTING CULVERT
- ② CLEAN EXISTING CULVERT

N

scale 50 0 50 100 feet
25

LAKE 2

MATCH LINE
SEE SHEET 10 LEFT

KING OVERLOOK SPUR

TURF TRAIL ALIGNMENT TO BE DETERMINED DURING THE DESIGN PHASE. RESTORE WITH TOPSOIL AND SEED AREAS OF TURF TRAIL REALIGNMENT.

5TH WETLAND IMPACT = 96 SF

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3/3/2005
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DESIGNER: AID				
CHECKED BY: RSH				
APPROVED BY: RSH				
DESIGN TEAM	NO	BY	DATE	REVISIONS

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.
signature Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

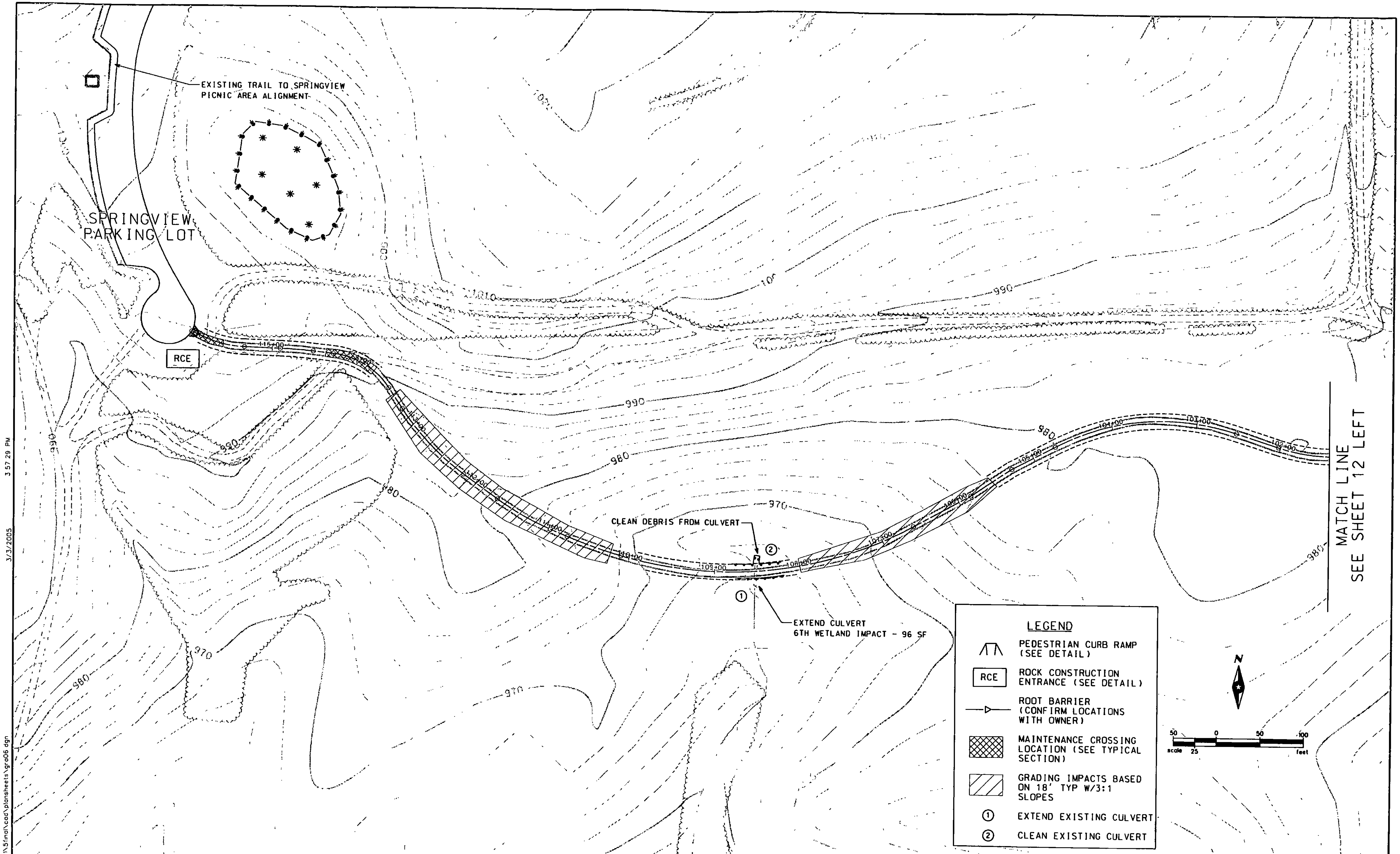
Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

WEST TRAIL LOOP
STA 66+50 TO 86+00
KING OVERLOOK SPUR
STA XX+XX TO XX+XX

FILE NO ATHRIVD410 01
DATE 3/xx/05

11
26



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DESIGNER	ATD	NO.	BY	DATE	REVISIONS
CHECKED BY	RSH				
APPROVED BY	RSH				
DESIGN TEAM					

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.

signature ______ Date 3/xx/05

AARON T DITZLER Reg No 42003
printed signature

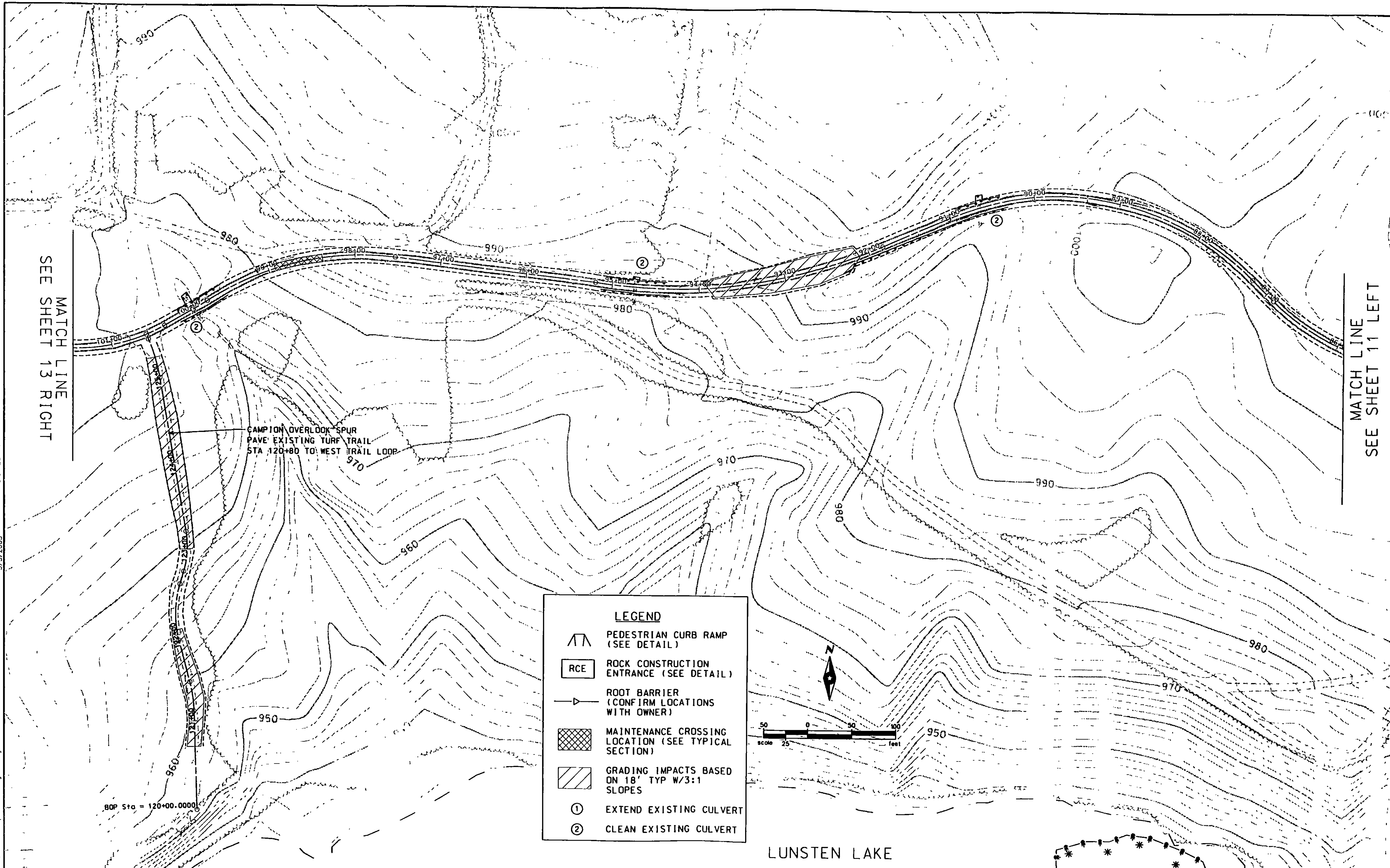
SEH
10901 RED CIRCLE DRIVE SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912 2600 FAX 952 912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

WEST TRAIL LOOP
STA 101+50 TO 116+10

FILE NO ATHRIV0410 01
DATE 3/xx/05



DESIGNER. ATD				
CHECKED BY. RSH				
APPROVED BY RSH				
DESIGN TEAM	NO	BY	DATE	REVISIONS

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.

signature ______ Date 3/xx/05

AARON T DITZLER Reg No 42003

printed signature

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343 9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

WEST TRAIL LOOP
STA 86+00 TO 101+50
CAMPION OVERLOOK SPUR
STA 120+75 TO 125+50

FILE NO ATHRIV0410 01

DATE 3/xx/05

CSAH 11

MATCH LINE SEE SHEET 10 LOWER

MATCH LINE SEE SHEET 15 LEFT

7TH WETLAND IMPACT - 5000 SF
FROM STA 202+50 TO STA 204+25

LEGEND

- PEDESTRIAN CURB RAMP (SEE DETAIL)
- RCE — ROCK CONSTRUCTION ENTRANCE (SEE DETAIL)
- ROOT BARRIER (CONFIRM LOCATIONS WITH OWNER)
- MAINTENANCE CROSSING LOCATION (SEE TYPICAL SECTION)
- GRADING IMPACTS BASED ON 18' TYP W/3:1 SLOPES
- ① EXTEND EXISTING CULVERT
- ② CLEAN EXISTING CULVERT

N

scale 25 — 50 — 0 — 50 — 100 feet

3/3/2005 3:57:30 PM

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DESIGNER: ATD
CHECKED BY: RSH
APPROVED BY: RSH
DESIGN TEAM

NO	BY	DATE	REVISIONS

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

signature — Date 3/xx/05
AARON T DITZLER — Reg No 42003
printed signature

SEH
10901 RED CIRCLE DRIVE SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912 2601
PH 800 734 6757

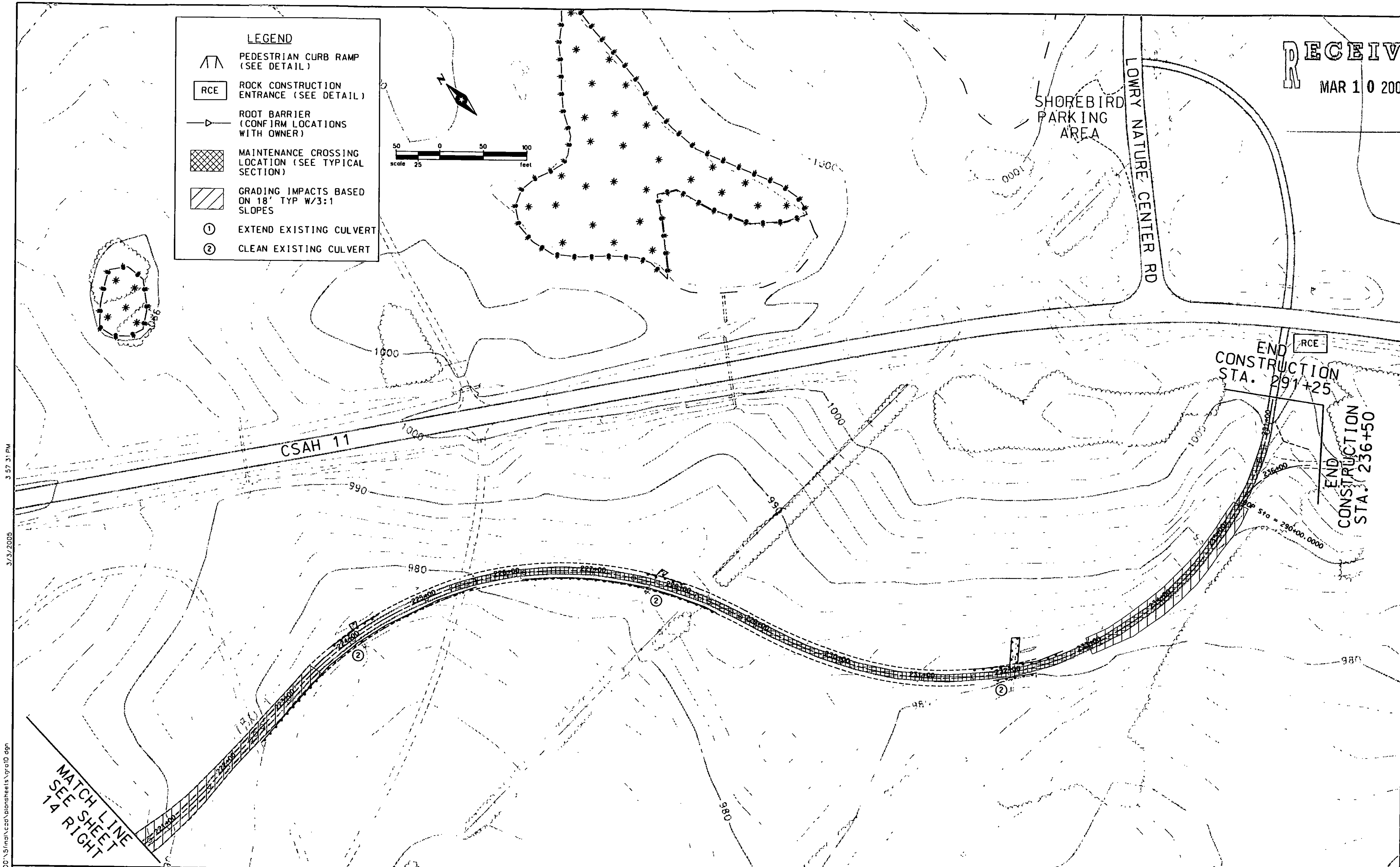
Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL IMPLEMENTATION PHASE I

WEST TRAIL LOOP
STA 204+00 TO 220+50

FILE NO ATHR1V0410.01
DATE 3/xx/05

14
26



RECEIVED
MAR 10 2005

DESIGNER: ATD				
CHECKED BY: RSH				
APPROVED BY: RSH				
DESIGN TEAM	NO	BY	DATE	REVISIONS

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.

signature: Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

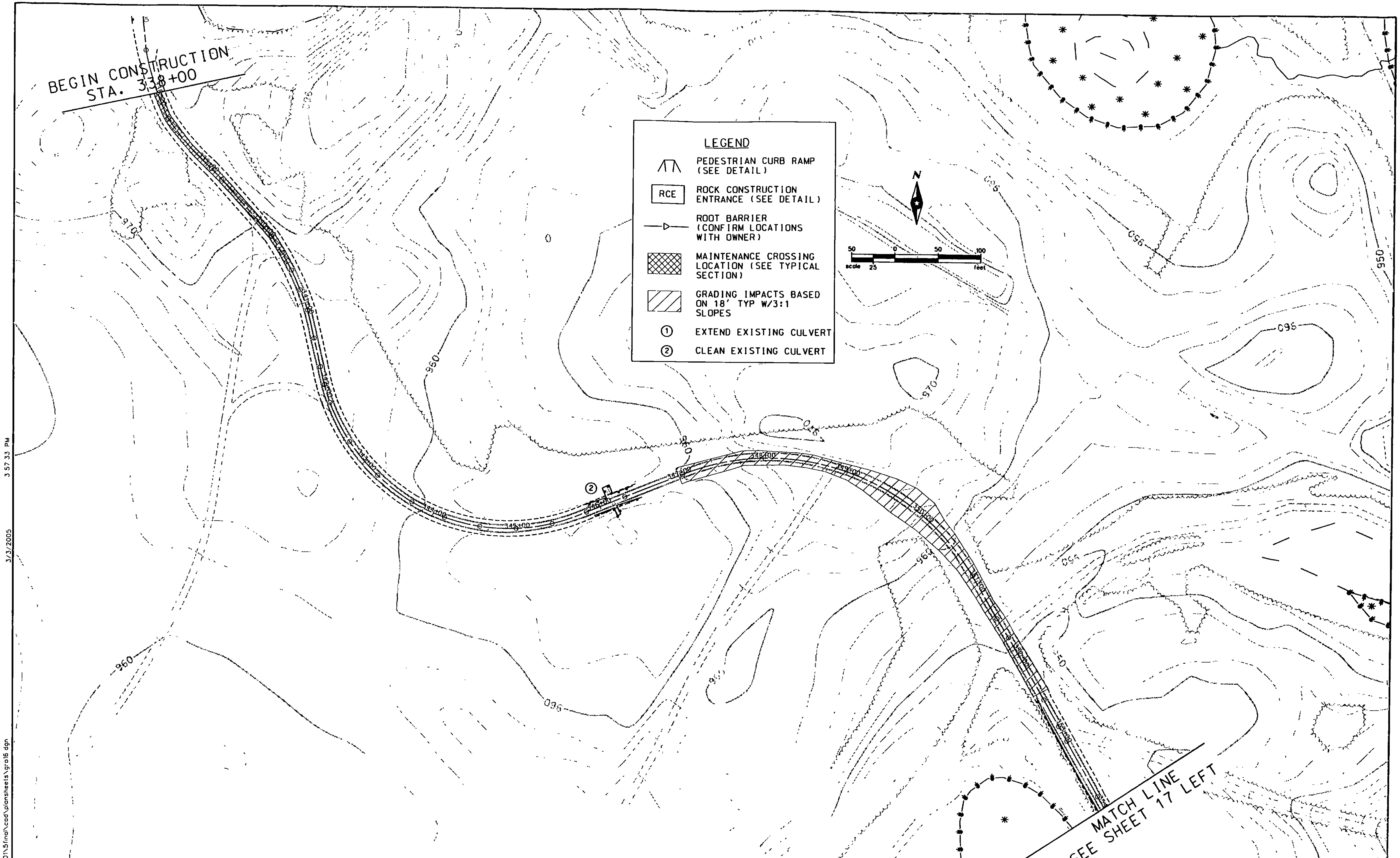
SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952 912-2601
PH 800 734 6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

WEST TRAIL LOOP
STA 220+50 TO 236+50
STA 290+00 TO 291+50

FILE NO. ATHRIV0410 01
DATE 3/xx/05



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DESIGNER	ATD	NO	BY	DATE	REVISIONS
CHECKED BY	RSH				
APPROVED BY	RSH				
DESIGN TEAM					

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.

signature ______ Date 3/xx/05

AARON T DITZLER Reg. No 42003

printed signature

SEH
10901 RED CIRCLE DRIVE SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

EAST TRAIL LOOP
STA 338+00 TO 354+00

FILE NO. ATHRIV0410 01

DATE 3/xx/05

MATCH LINE
SEE SHEET 16 RIGHT

MATCH LINE
SEE SHEET 18 LEFT

LEGEND

- PEDESTRIAN CURB RAMP (SEE DETAIL)
- RCE — ROCK CONSTRUCTION ENTRANCE (SEE DETAIL)
- ROOT BARRIER (CONFIRM LOCATIONS WITH OWNER)
- MAINTENANCE CROSSING LOCATION (SEE TYPICAL SECTION)
- GRADING IMPACTS BASED ON 18' TYP W/3:1 SLOPES
- ① EXTEND EXISTING CULVERT
- ② CLEAN EXISTING CULVERT

N

scale 25 — 50 0 50 100 feet

DESIGNER	ATD
CHECKED BY	RSH
APPROVED BY	RSH

DESIGN TEAM	NO	BY	DATE	REVISIONS

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.
signature
AARON T DITZLER
printed signature
Date 3/xx/05
Reg No 42003

SEH
10901 RED CIRCLE DRIVE SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952 912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

EAST TRAIL LOOP
STA 354+00 TO 372+00

FILE NO ATHRIV0410.01
DATE 3/xx/05

17
26

8TH WETLAND IMPACT - .192 SF

MATCH LINE
SEE SHEET 17
RIGHT

MATCH LINE
SEE SHEET 19
UPPER LEFT

LEGEND

- PEDESTRIAN CURB RAMP (SEE DETAIL)
- RCE — ROCK CONSTRUCTION ENTRANCE (SEE DETAIL)
- ROOT BARRIER (CONFIRM LOCATIONS WITH OWNER)
- MAINTENANCE CROSSING LOCATION (SEE TYPICAL SECTION)
- GRADING IMPACTS BASED ON 18' TYP W/3:1 SLOPES
- ① EXTEND EXISTING CULVERT
- ② CLEAN EXISTING CULVERT

N

50 0 50 100
scale 25 feet

DESIGNER. ATD
CHECKED BY: RSH
APPROVED BY RSH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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 3/xx/05
signature:
AARON T DITZLER Reg No 42003
printed signature:

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952 912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

EAST TRAIL LOOP
STA 372+00 TO 389+00

FILE NO ATHRIV0410.01
DATE 3/xx/05

18 / 26

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MATCH LINE
SEE SHEET 18 RIGHT

LEGEND

- PEDESTRIAN CURB RAMP (SEE DETAIL)
- RCE — ROCK CONSTRUCTION ENTRANCE (SEE DETAIL)
- ROOT BARRIER (CONFIRM LOCATIONS WITH OWNER)
- MAINTENANCE CROSSING LOCATION (SEE TYPICAL SECTION)
- GRADING IMPACTS BASED ON 18' TYP W/3:1 SLOPES
- ① EXTEND EXISTING CULVERT
- ② CLEAN EXISTING CULVERT

N

scale 50 0 50 100 feet
25

50SC

MATCH LINE
SEE BELOW LEFT

9TH WETLAND IMPACT - 96 SF

END ② CONSTRUCTION

MATCH LINE
SEE ABOVE RIGHT

MATCH LINE
SEE SHEET 20 LEFT

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3/3/2005
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DESIGNER. ATD				
CHECKED BY RSH				
APPROVED BY RSH				
DESIGN TEAM	NO	BY	DATE	REVISIONS

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.
signature/ Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

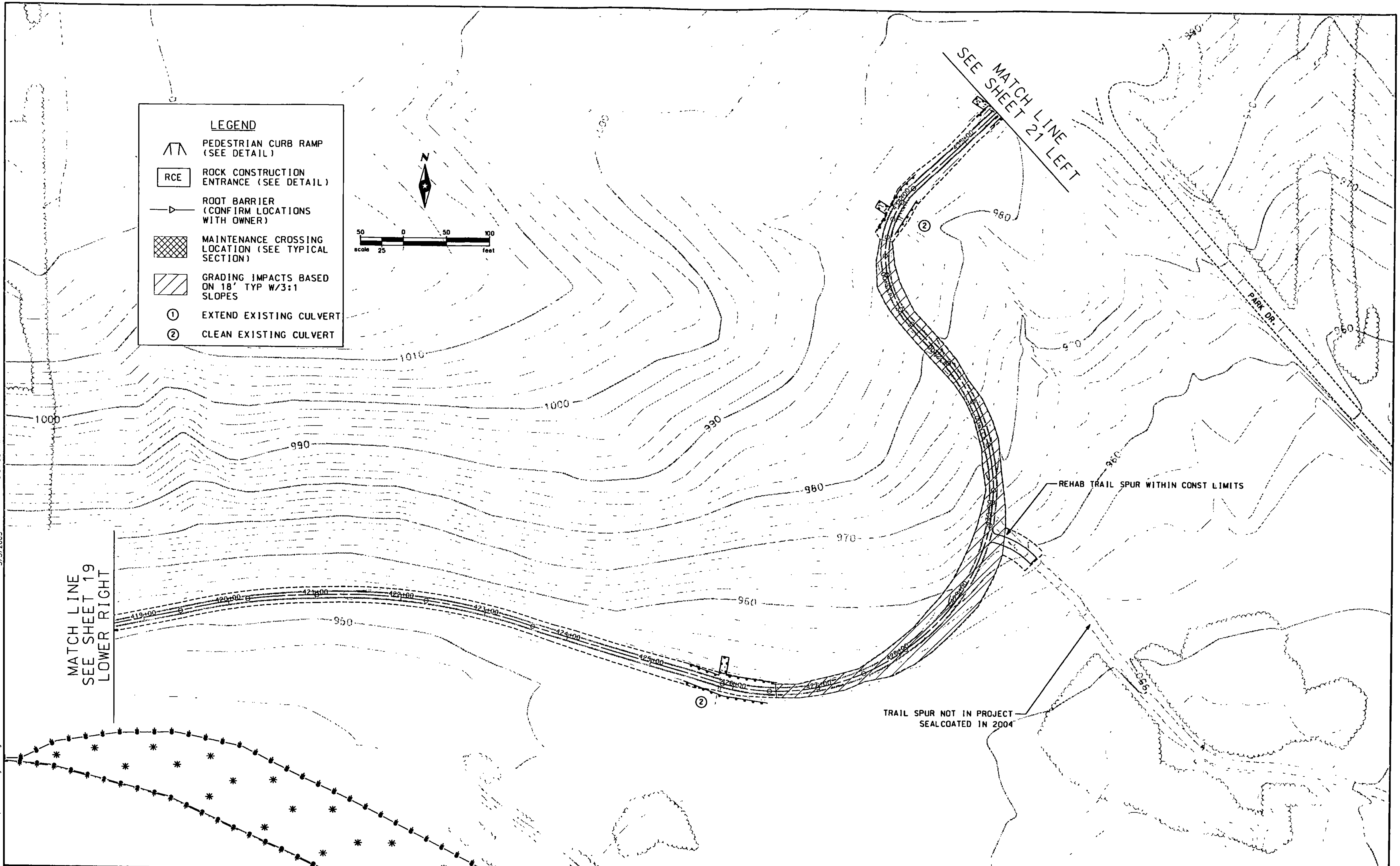
Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

EAST TRAIL LOOP
STA 389+00 TO 418+75

FILE NO. ATHRIV0410 01
DATE 3/xx/05

19 / 26



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DESIGNER.	ATD
CHECKED BY.	RSH
APPROVED BY	RSH
DESIGN TEAM	

NO	BY	DATE	REVISIONS

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.
signature ______ Date 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

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10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

EAST TRAIL LOOP
STA 418+75 TO 435+50

FILE NO. ATHRIV0410 01
DATE 3/xx/05

SCHUTZ LAKE

MATCH LINE
SEE SHEET 21 RIGHT

MATCH LINE
SEE SHEET 23 RIGHT

LAKE ACCESS ROAD

LEGEND

- PEDESTRIAN CURB RAMP (SEE DETAIL)
- RCE — ROCK CONSTRUCTION ENTRANCE (SEE DETAIL)
- ROOT BARRIER (CONFIRM LOCATIONS WITH OWNER)
- MAINTENANCE CROSSING LOCATION (SEE TYPICAL SECTION)
- GRADING IMPACTS BASED ON 18' TYP W/3:1 SLOPES
- ① EXTEND EXISTING CULVERT
- ② CLEAN EXISTING CULVERT

N

50 0 50 100
Scale 25 feet

3:57:41 PM
3/3/2005
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DESIGNER: ATD
CHECKED BY: RSH
APPROVED BY: RSH
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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 3/xx/05
signature: AARON T DITZLER Reg No 42003
printed signature

SEH
10901 RED CIRCLE DRIVE SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952 912-2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

EAST TRAIL LOOP
STA 450+50 TO 466+25

FILE NO. ATHRIV0410.01
DATE 3/xx/05

22
26

MATCH LINE
SEE SHEET 22 RIGHT

MATCH LINE
SEE SHEET 20 RIGHT

PARK DR.

SCHUTZ
LAKE

RCE

RCE

LEGEND

- PEDESTRIAN CURB RAMP (SEE DETAIL)
- RCE — ROCK CONSTRUCTION ENTRANCE (SEE DETAIL)
- ROOT BARRIER (CONFIRM LOCATIONS WITH OWNER)
- MAINTENANCE CROSSING LOCATION (SEE TYPICAL SECTION)
- GRADING IMPACTS BASED ON 18' TYP W/3:1 SLOPES
- ① EXTEND EXISTING CULVERT
- ② CLEAN EXISTING CULVERT

N

scale 50 0 50 100 feet
25

DESIGNER. ATD
CHECKED BY: RSH
APPROVED BY: RSH
DESIGN TEAM

NO	BY	DATE	REVISIONS

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.
Signature: AARON T DITZLER
printed signature
Date 3/xx/05
Reg No 42003

SEH
10901 RED CIRCLE DRIVE SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912 2600 FAX 952-912-2601
PH 800 734 6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

EAST TRAIL LOOP
STA 435+50 TO 450+50

FILE NO. ATHRIV0410.01
DATE 3/xx/05

21
26

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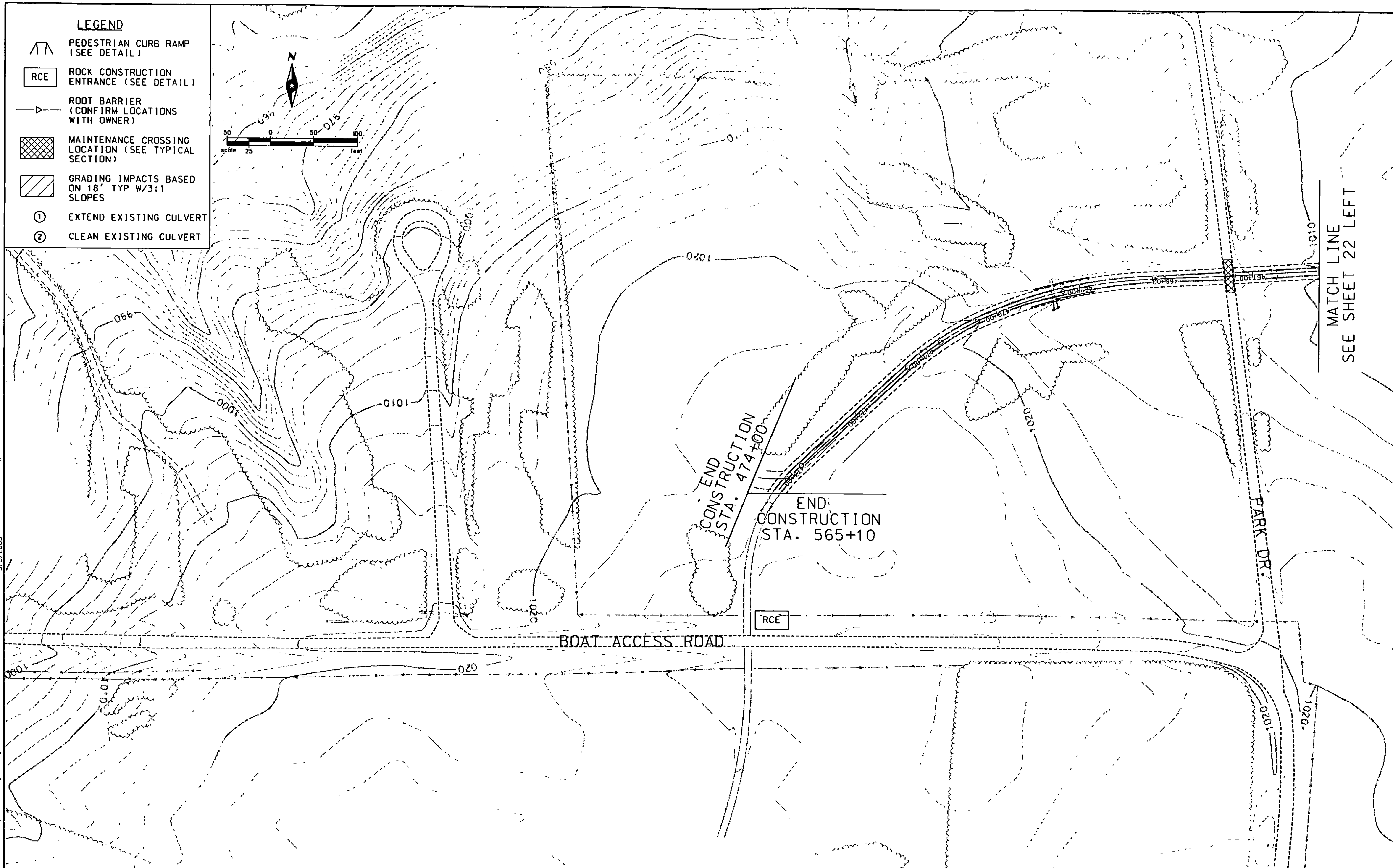

DESIGNER:	ATD	NO	BY	DATE	REVISIONS
CHECKED BY:	RSH				
APPROVED BY:	RSH				
DESIGN TEAM					

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.
signature Date: 3/xx/05
AARON T DITZLER Reg No 42003
printed signature

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912 2601
PH 800 734-6757

Three Rivers PARK DISTRICT

CARVER PARK RESERVE
BIKE / HIKE TRAIL
IMPLEMENTATION
PHASE I

EAST TRAIL LOOP
STA 466+25 TO 565+10
STA 473+00 TO 474+00

FILE NO. ATHRIV0410.01
DATE 3/xx/05

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3/4/2005

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EAST TRAIL LOOP ALIGNMENT

HAUL ROAD

SOIL STOCKPILE GRADING LIMITS

SILT FENCE

ACCESS

CSAH 11

N

Scale 1" = 50'

100 0 100 200 feet

DESIGN TEAM	NO	BY	DATE	REVISIONS
DRAWN BY: GRB				
DESIGNER: TU				
CHECKED BY: TU				

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

Certified By: _____ Lic No 00000
Licensed Professional Engineer

Printed Name ENGINEER'S NAME Date: 3/4/2005

SEH
PHONE: (651)490-2000
3535 VADNAIS CENTER DR
ST PAUL MN 55110

THREE RIVERS PARK DISTRICT
CARVER PARK RESERVE
WETLAND MITIGATION

SITE LAYOUT

FILE NO. ATHRIV0410

DATE X/XX/04

WETLAND MITIGATION NOTES:

1. THE UPPER 6 INCHES OF SOIL FROM THE WETLAND RESTORATION AREA THAT IS DOMINATED BY REED CANARY GRASS. SHALL BE REMOVED AND STOCKPILED. SEE SHEET 24 OF 26 FOR STOCKPILE LOCATION.

2. ANY STOCKPILED MATERIAL SHALL BE SECURED FROM EROSION BY COVERING WITH MN/DOT SEED MIX NO. 50B.

3. THE MITIGATION SITE SHALL BE EXCAVATED TO THE ELEVATIONS SHOWN.

4. SLOPES WITHIN THE MITIGATION AREA SHALL NOT EXCEED 10:1. UNLESS OTHERWISE NOTED.

5. INSTALL SAFETY AND SILT FENCE ALONG THE EDGE OF THE EXISTING WETLAND AREAS AS SHOWN BEFORE CONSTRUCTION BEGINS. AND ALONG NEWLY CREATED WETLAND AREAS IMMEDIATELY FOLLOWING COMPLETION. REMOVE ALL FENCING WHEN CONSTRUCTION IS COMPLETE AND VEGETATION IN THE MITIGATION SITE HAS BEEN ESTABLISHED.

6. EXISTING TILE WILL BE BROKEN WITHIN THE WETLAND RESTORATION AREA AS DIRECTED BY THE ENGINEER.

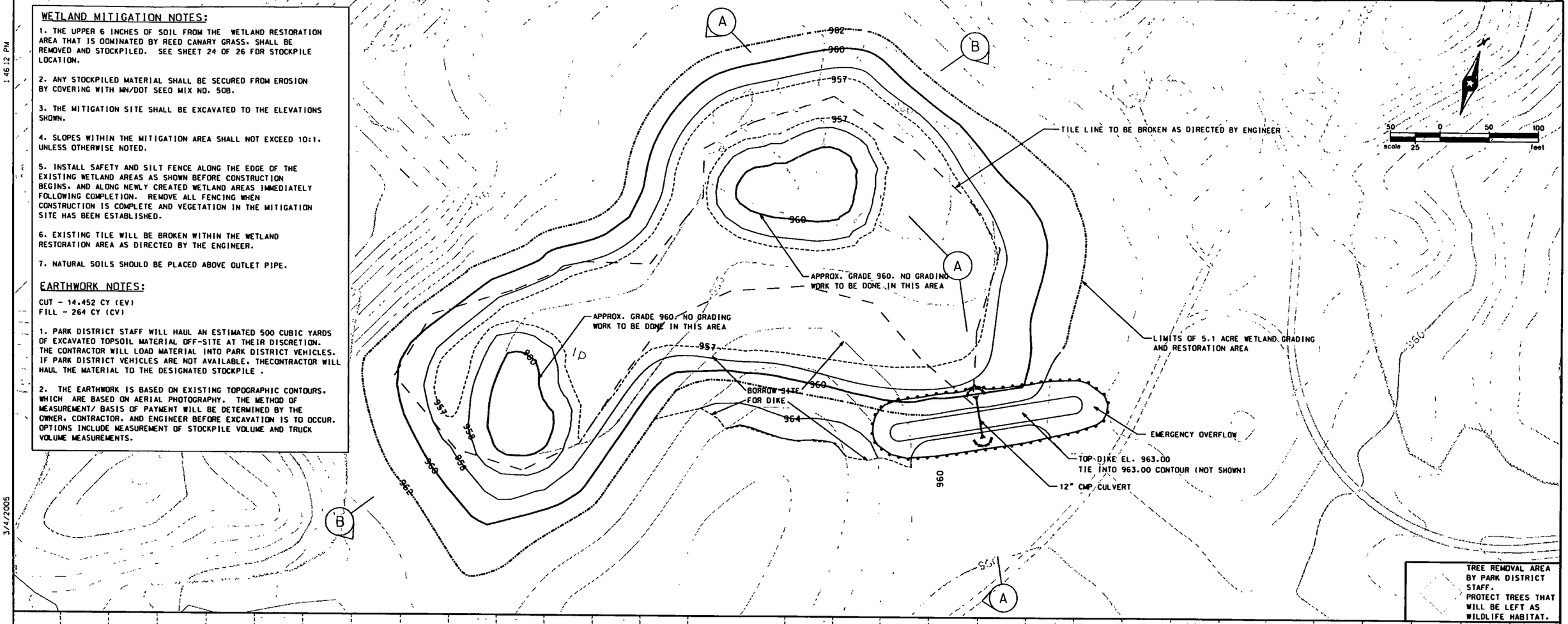
7. NATURAL SOILS SHOULD BE PLACED ABOVE OUTLET PIPE.

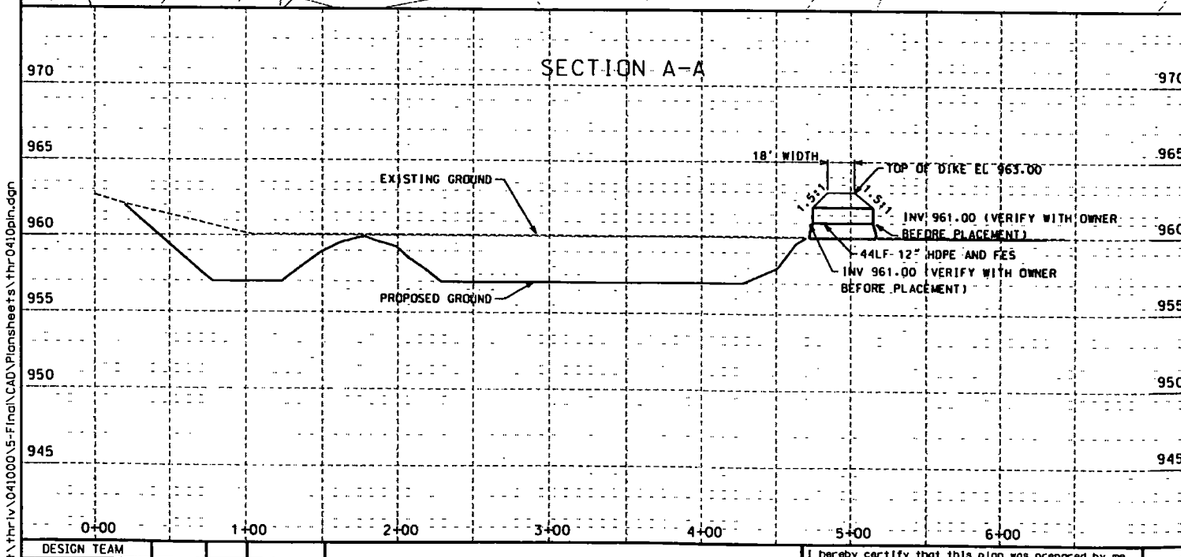
EARTHWORK NOTES:

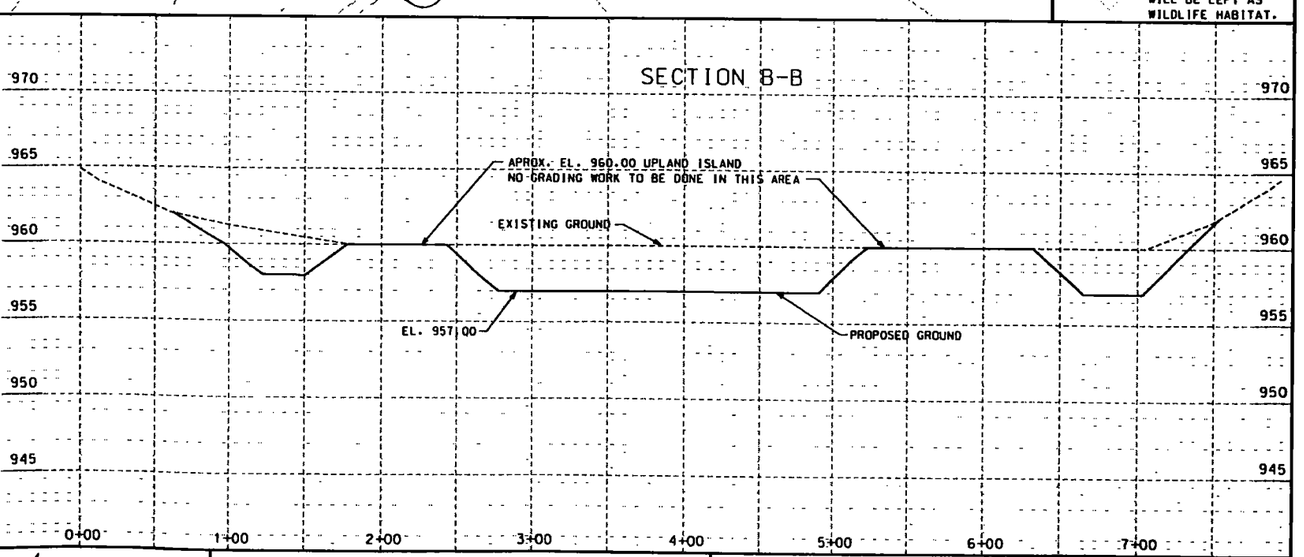
CUT - 14,452 CY (EV)
FILL - 264 CY (CV)

1. PARK DISTRICT STAFF WILL HAUL AN ESTIMATED 500 CUBIC YARDS OF EXCAVATED TOPSOIL MATERIAL OFF-SITE AT THEIR DISCRETION. THE CONTRACTOR WILL LOAD MATERIAL INTO PARK DISTRICT VEHICLES. IF PARK DISTRICT VEHICLES ARE NOT AVAILABLE. THECONTRACTOR WILL HAUL THE MATERIAL TO THE DESIGNATED STOCKPILE .

2. THE EARTHWORK IS BASED ON EXISTING TOPOGRAPHIC CONTOURS. WHICH ARE BASED ON AERIAL PHOTOGRAPHY. THE METHOD OF MEASUREMENT/ BASIS OF PAYMENT WILL BE DETERMINED BY THE OWNER. CONTRACTOR. AND ENGINEER BEFORE EXCAVATION IS TO OCCUR. OPTIONS INCLUDE MEASUREMENT OF STOCKPILE VOLUME AND TRUCK VOLUME MEASUREMENTS.







DESIGN TEAM	NO.	BY	DATE	REVISIONS
DRAWN BY: GRB				
DESIGNER: TU				
CHECKED BY: TU				

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
Certified By: _____ Licensed Professional Engineer Lic No 00000
Printed Name: ENGINEER'S NAME Date: 3/4/2005

SEH
PHONE: (651)490-2000
3535 VADNAIS CENTER DR
ST. PAUL MN 55110

THREE RIVERS PARK DISTRICT
CARVER PARK RESERVE
WETLAND MITIGATION

WETLAND AND CULVERT PLAN AND PROFILE

FILE NO ATHRIV0410
DATE X/XX/04
25 / 26

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3/4/2005

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PLANTING NOTES:

1. WETLAND SEEDING AND PLANTING SHALL BE CONDUCTED IN THE FALL OF 2005 AND THE SPRING/SUMMER OF 2006.

2. ACQUISITION OF PLANTING MATERIALS SHALL BE ARRANGED FOR AS SOON AS POSSIBLE AND NATIVE SEEDS SHALL BE PREPARED FOR PLANTING ACCORDING TO THE SPECIFIC REQUIREMENTS OF EACH SPECIES.

3. PLANTS AND SEEDS OF EACH SPECIES SHALL BE SUBJECT TO AVAILABILITY AND ON THE PARK DISTRICTS LIST.

4. WETLAND SEEDING BY THE CONTRACTOR SHALL OCCUR WITHIN ELEVATION 961 AND 960. SEEDING AND PLANTING BELOW ELEVATION 960 SHALL BE BY PARK DISTRICT STAFF.

▨ WETLAND SEEDING BY CONTRACTOR MNDOT MIX 508

5. IF THE COVER CROP OR ANNUAL WEEDS GROW TO A HEIGHT OF 19 INCHES OR MORE. MOW THE SITE TO A HEIGHT OF NOT LESS THAN 6 INCHES WITH A ROTARY MOWER OR SIMILAR MOWING.

6. EQUIPMENT SHALL BE WASHED PRIOR TO USE AND CLEAN TO AVOID FOREIGN VEGETATION CONTAMINATION IN PARK.

EROSION CONTROL NOTES:

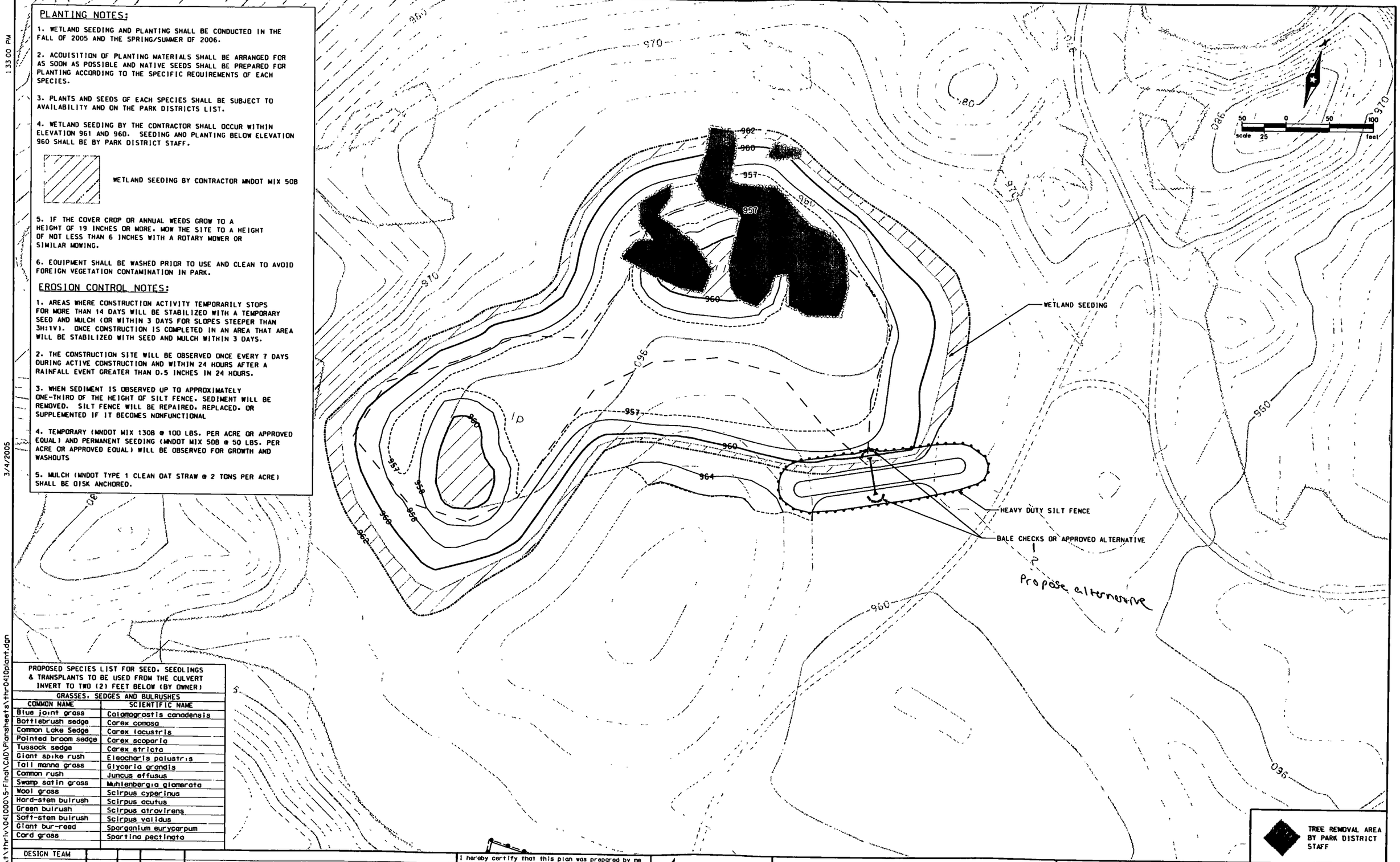
1. AREAS WHERE CONSTRUCTION ACTIVITY TEMPORARILY STOPS FOR MORE THAN 14 DAYS WILL BE STABILIZED WITH A TEMPORARY SEED AND MULCH (OR WITHIN 3 DAYS FOR SLOPES STEEPER THAN 3H:1V). ONCE CONSTRUCTION IS COMPLETED IN AN AREA THAT AREA WILL BE STABILIZED WITH SEED AND MULCH WITHIN 3 DAYS.

2. THE CONSTRUCTION SITE WILL BE OBSERVED ONCE EVERY 7 DAYS DURING ACTIVE CONSTRUCTION AND WITHIN 24 HOURS AFTER A RAINFALL EVENT GREATER THAN 0.5 INCHES IN 24 HOURS.

3. WHEN SEDIMENT IS OBSERVED UP TO APPROXIMATELY ONE-THIRD OF THE HEIGHT OF SILT FENCE. SEDIMENT WILL BE REMOVED. SILT FENCE WILL BE REPAIRED. REPLACED. OR SUPPLEMENTED IF IT BECOMES NONFUNCTIONAL

4. TEMPORARY (MNDOT MIX 130B @ 100 LBS. PER ACRE OR APPROVED EQUAL) AND PERMANENT SEEDING (MNDOT MIX 508 @ 50 LBS. PER ACRE OR APPROVED EQUAL) WILL BE OBSERVED FOR GROWTH AND WASHOUTS

5. MULCH (MNDOT TYPE 1 CLEAN OAT STRAW @ 2 TONS PER ACRE) SHALL BE DISK ANCHORED.



◆ TREE REMOVAL AREA BY PARK DISTRICT STAFF

PROPOSED SPECIES LIST FOR SEED. SEEDLINGS & TRANSPLANTS TO BE USED FROM THE CULVERT INVERT TO TWO (2) FEET BELOW (BY OWNER)

GRASSES. SEDGES AND BULRUSHES

COMMON NAME	SCIENTIFIC NAME
Blue joint grass	Calamagrostis canadensis
Bottlebrush sedge	Carex comosa
Common Lake Sedge	Carex lacustris
Pointed broom sedge	Carex scoparia
Tussock sedge	Carex stricta
Giant spike rush	Eleocharis palustris
Tall manna grass	Glyceria grandis
Common rush	Juncus effusus
Swamp satin grass	Muhlenbergia glomerata
Wool grass	Scirpus cyperinus
Hard-stem bulrush	Scirpus acutus
Green bulrush	Scirpus atrovirens
Soft-stem bulrush	Scirpus validus
Giant bur-reed	Sparganium eurycarpum
Cord grass	Spartina pectinata

DESIGN TEAM
DRAWN BY: GRB
DESIGNER: TU
CHECKED BY TU

NO	BY	DATE	REVISIONS

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
Certified By: ______ Lic No 00000
Licensed Professional Engineer
Printed Name ENGINEER'S NAME Date: 3/4/2005

SEH
PHONE: (651)490-2000
3535 VADNAIS CENTER DR
ST PAUL, MN 55110

THREE RIVERS PARK DISTRICT
CARVER PARK RESERVE
WETLAND MITIGATION

WETLAND
PLANTING PLAN

FILE NO ATHRIV0410
DATE X/XX/04
26
26

ATTACHMENT 2

Permit 06-097 Plan Set

THREE RIVERS PARK DISTRICT

CONSTRUCTION PLANS FOR

TRAIL RECLAMATION AND REHABILITATION

SUNNY LAKE REFUGE TRAIL DEVELOPMENT

AT CARVER PARK RESERVE

BID DOCUMENT

RECEIVED
MAR 30 2009

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	GENERAL LAYOUT
3	DETAILS AND TYPICAL SECTIONS
4	GENERAL NOTES, STANDARD PLATES, EARTHWORK
5	STORM WATER POLLUTION PREVENTION PLAN
6	EAST LOOP TRAIL STATION 100+00 TO 116+00
7	EAST LOOP TRAIL STATION 116+00 TO 128+00
8	EAST LOOP TRAIL STATION 128+00 TO 143+66
9	SUNNY LAKE TRAIL STATION 400+00 TO 431+00
10	SUNNY LAKE TRAIL STATION 431+00 TO 445+50
11	SUNNY LAKE TRAIL STATION 445+50 TO 461+00
12	SUNNY LAKE TRAIL STATION 461+00 TO 474+00
13	SUNNY LAKE TRAIL STATION 474+00 TO 480+50
14	SUNNY LAKE TRAIL STATION 480+05 TO 489+74

THIS PLAN CONTAINS 14 SHEETS.

LEGEND

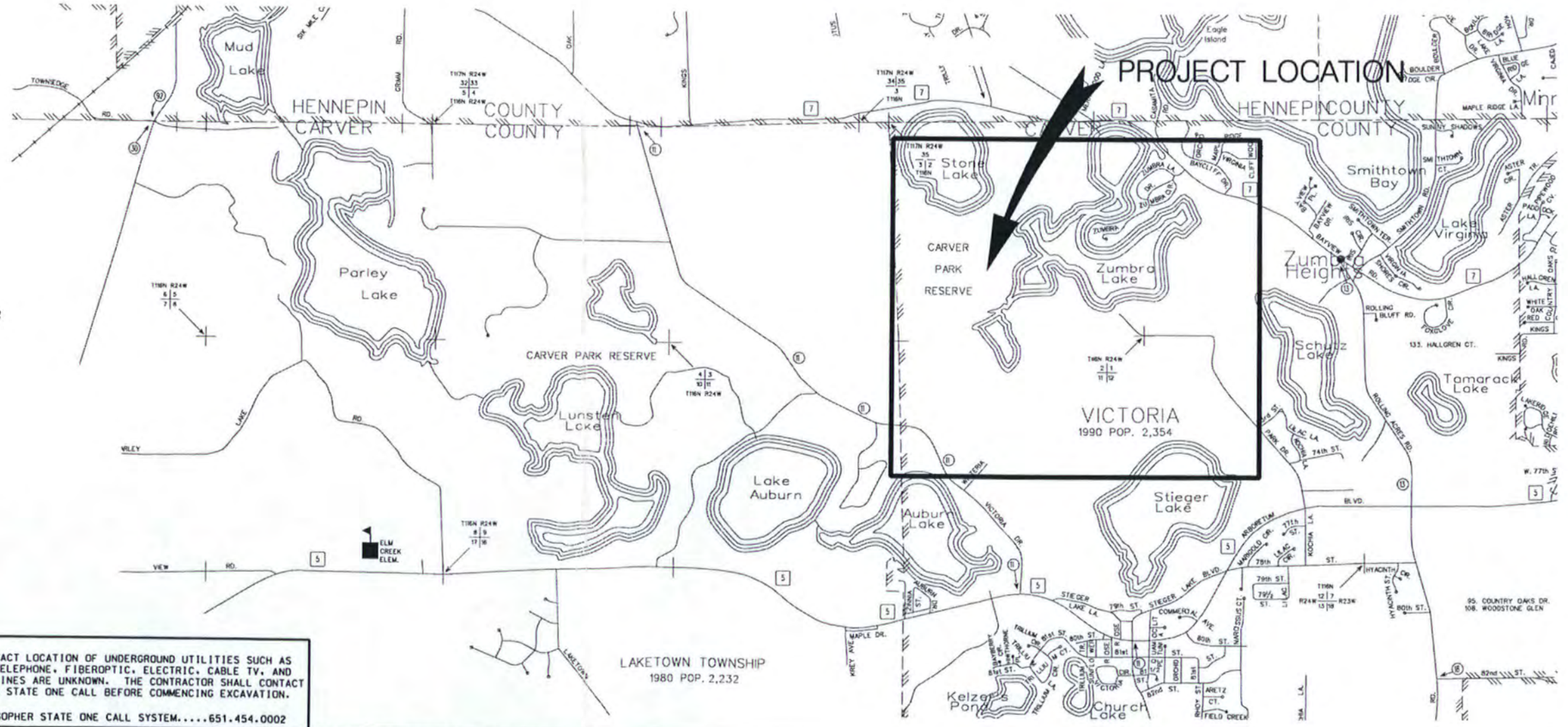
14+00 — TRAIL CENTERLINE ALIGNMENT

EXISTING

- CORPORATE LIMITS
- RIGHT OF WAY
- PERMANENT EASEMENT
- PROPERTY LINE
- CULVERT
- T — UNDERGROUND TELEPHONE CABLE OR CONDUIT
- E — UNDERGROUND ELECTRIC CABLE OR CONDUIT
- P — UNDERGROUND ELECTRIC DUCT
- ELECTRIC TRANSFORMER/PEDESTAL; POWER POLE & GUY ANCHOR; LIGHT POLE
- SOIL BORING
- TRAVERSE POINT
- CONCRETE CURB AND GUTTER
- EXISTING BIT TRAIL EDGE
- EXISTING ROAD EDGE
- EXISTING GRAVEL EDGE
- EXISTING TURF TRAIL EDGE
- CONC / BIT — EXISTING PAVEMENT OR SIDEWALK
- SIGN (HWY, PARK, STOP, ETC.); STREET SIGN
- RAILROAD TRACKS
- BARBED WIRE FENCE
- XC — CHAIN LINK FENCE
- XE — ELECTRIC WIRE FENCE
- WOOD FENCE
- WOVEN WIRE FENCE
- GUARDRAIL
- TREE (DECIDUOUS)
- TREE (CONIFEROUS)
- TREE LINE
- BLDG — BUILDING
- WETLAND DELINEATION; WATERS EDGE

PROPOSED

- CONSTRUCTION LIMITS
- CULVERT w/ APRONS
- DRAIN TILE
- SILT FENCE
- FLOTATION SILT CURTAIN, TYPE STILL WATER
- CLEAR & GRUB TREES/SHRUBS BY AREA
- CLEAR BRUSH BY AREA
- X 12" — CLEAR & GRUB TREE BY EACH
- RCE — ROCK CONSTRUCTION ENTRANCE
- FILTER LOG, TYPE 2 WOOD FIBER BIOROLL
- CONSTRUCTION FENCE



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

GOPHER STATE ONE CALL TICKET NUMBER IS: 80636625

ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MMUTCD, INCLUDING FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS.

NOTE:
THE EXACT LOCATION OF UNDERGROUND UTILITIES SUCH AS GAS, TELEPHONE, FIBEROPTIC, ELECTRIC, CABLE TV, AND PIPE LINES ARE UNKNOWN. THE CONTRACTOR SHALL CONTACT GOPHER STATE ONE CALL BEFORE COMMENCING EXCAVATION.

GOPHER STATE ONE CALL SYSTEM.....651.454.0002

DESIGNER: TM
CHECKED BY: AD
APPROVED BY: TM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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.

signature: Toby P. Muse
Date: 03/20/09
TOBY P. MUSE
printed signature:
Reg. No. 43364

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE TRAIL DEVELOPMENT

TITLE SHEET

FILE NO. THRIV106209
DATE 03/20/09

1/14

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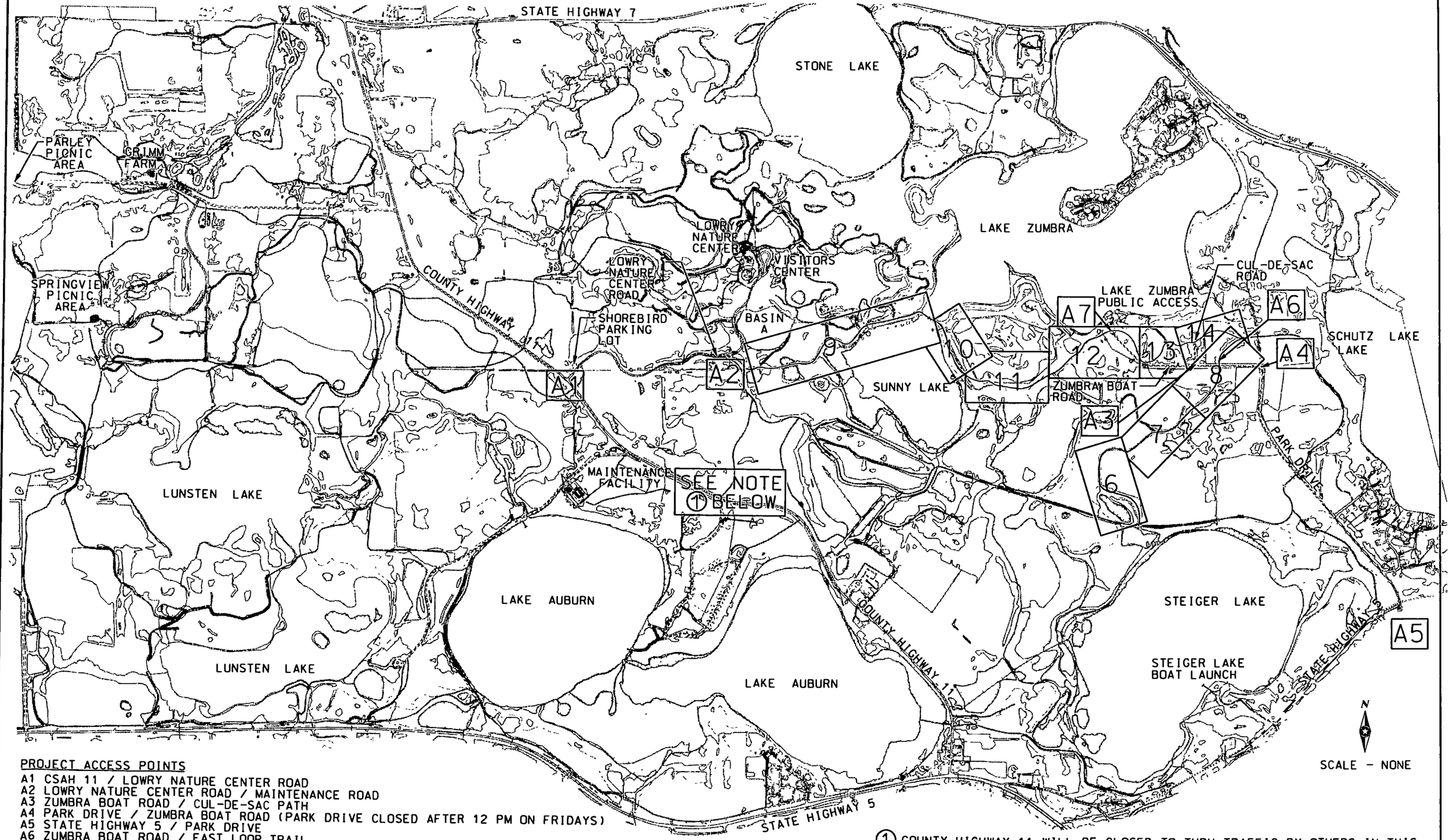

PROJECT ACCESS POINTS

A1 CSAH 11 / LOWRY NATURE CENTER ROAD
A2 LOWRY NATURE CENTER ROAD / MAINTENANCE ROAD
A3 ZUMBRA BOAT ROAD / CUL-DE-SAC PATH
A4 PARK DRIVE / ZUMBRA BOAT ROAD (PARK DRIVE CLOSED AFTER 12 PM ON FRIDAYS)
A5 STATE HIGHWAY 5 / PARK DRIVE
A6 ZUMBRA BOAT ROAD / EAST LOOP TRAIL
A7 ZUMBRA BOAT ROAD / SUNNY LAKE REFUGE TRAIL

① COUNTY HIGHWAY 11 WILL BE CLOSED TO THRU TRAFFIC BY OTHERS IN THIS AREA FOR A PERIOD OF APPROXIMATELY 7-14 DAYS BETWEEN JULY 4, 2009 AND SEPTEMBER 7, 2009. FOLLOW POSTED DETOUR SIGNAGE TO ACCESS CARVER PARK RESERVE.

DESIGNER: TM	NO.	BY	DATE	REVISIONS
CHECKED BY: AD				
APPROVED BY: TM				
DESIGN TEAM				

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.
signature: Toby P Muse
printed signature: TOBY P MUSE
Date: 03/20/09
Reg. No. 43364

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE TRAIL DEVELOPMENT

GENERAL LAYOUT

FILE NO. THRIV106209
DATE 03/20/09

2 / 14

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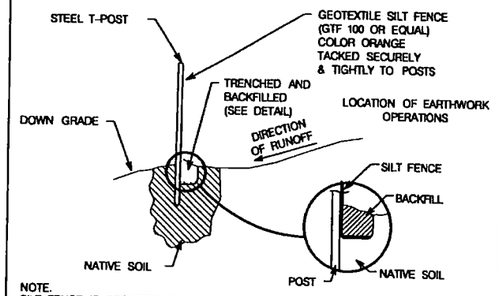
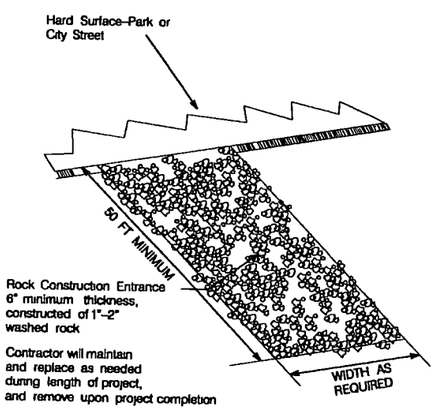
NOTES
SILT FENCE SHALL BE PLACED PARALLEL TO THE CONTOUR OF THE TERRAIN, WITH THE ENDS WRAPPED UPHILL TO PREVENT FLOW AROUND THEM

NO EARTHWORK SHALL BE PERFORMED DOWN GRADE FROM THE FENCE.



NOTE.
SILT FENCE IS REQUIRED IN ACCORDANCE WITH NPDES PERMIT, IN LOCATIONS OF LAND DISTURBANCES (ON EACH SIDE OF TRAIL) AND WHEREVER THE DISTURBANCE IS LOCATED WITHIN A WETLAND OR DRAINAGE WAY AREA.

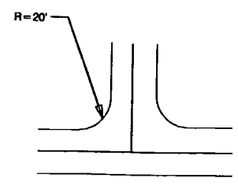
HEAVY DUTY SILT FENCE (MNDOT 3886)
NO SCALE



Rock Construction Entrance
6" minimum thickness, constructed of 1"–2" washed rock

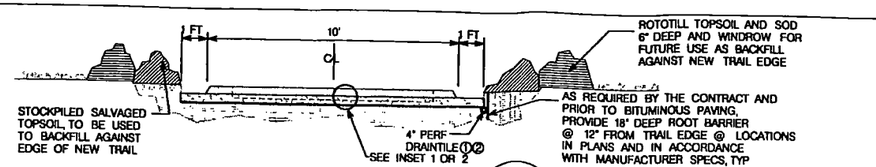
Contractor will maintain and replace as needed during length of project, and remove upon project completion

ROCK CONSTRUCTION ENTRANCE
NO SCALE



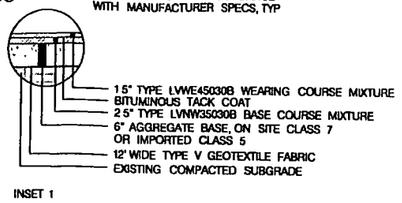
TYPICAL TRAIL RADIUS AT STREET OR TRAIL INTERSECTIONS

NO SCALE

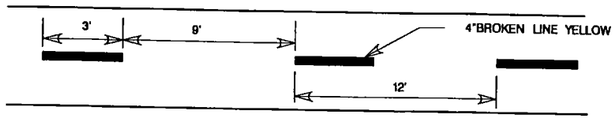


NEW TRAIL SECTION (TYPICAL)
NO SCALE

NOTE.
MATERIAL CANNOT BE WINDROWED OUTSIDE OF THE TRAIL EDGES WITHOUT EFFECTIVE SEDIMENT CONTROL. DO NOT STORE MATERIAL NEAR OR ADJACENT TO WETLANDS, WATERBODIES, CULVERTS OR DRAINAGE WAYS
① INSTALL DRAINTILE MIN 1 FT HORIZONTALLY FROM EDGE OF TRAIL & MIN 0.75 FT VERTICALLY FROM TOP OF BITUMINOUS TRAIL GRADE TO TOP OF PIPE IN LOCATIONS SHOWN IN PLANS OR AS DIRECTED BY THE ENGINEER
② USE 4-INCH PVC SCH 40 NON-PERFORATED DRAINTILE BENEATH THE PROPOSED TRAIL AT ALL CROSSING LOCATIONS



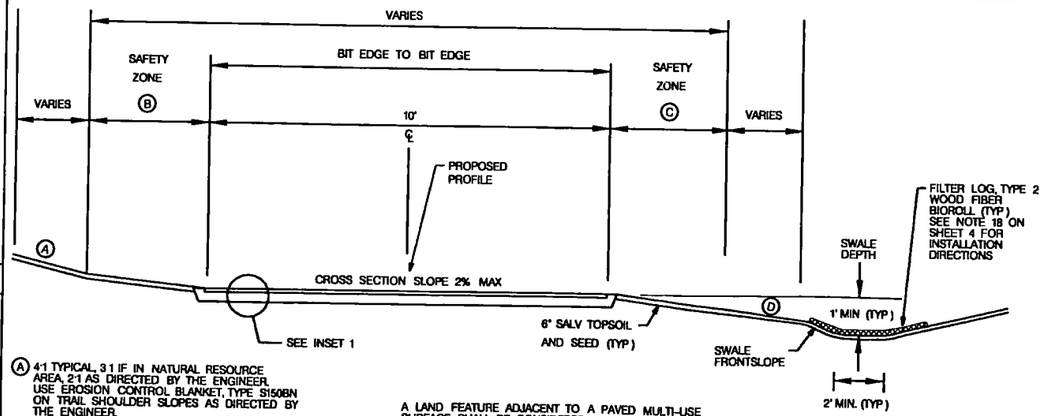
INSET 1



TYPICAL STRIPING DETAIL
NO SCALE

PAVEMENT MARKINGS

ITEM	QUANTITY	PURPOSE
4" BROKEN LINE YELLOW	2,244 LIN FT	TRAIL ℄ STRIPING



Ⓐ 4:1 TYPICAL, 3:1 IF IN NATURAL RESOURCE AREA, 2:1 AS DIRECTED BY THE ENGINEER. USE EROSION CONTROL BLANKET, TYPE SI50BN ON TRAIL SHOULDER SLOPES AS DIRECTED BY THE ENGINEER.

Ⓑ 2' AT 6:1 IN UPSLOPING SAFETY ZONES

Ⓒ 2' AT 50:1 IN DOWNSLOPING SAFETY ZONES
5' AT 50:1 IF ADJACENT TO DEEP SWALE*
SEE DEEP SWALE DEFINITION TO RIGHT

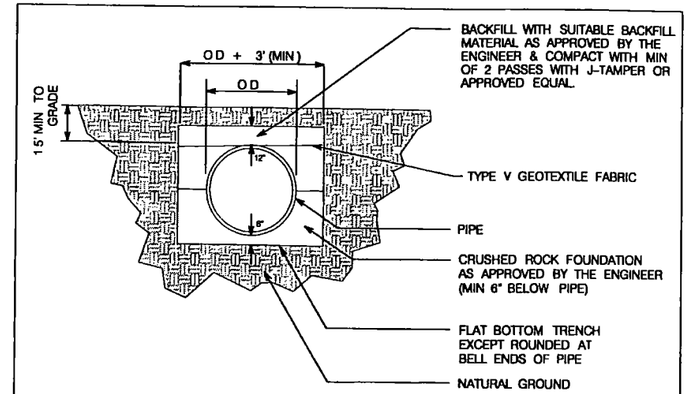
Ⓓ 4:1 TYPICAL, 3:1 IF IN NATURAL RESOURCE AREA, 2:1 IN WETLAND AREA
USE EROSION CONTROL BLANKET, TYPE SI50BN ON TRAIL SHOULDER SLOPES AS DIRECTED BY THE ENGINEER.

A LAND FEATURE ADJACENT TO A PAVED MULTI-USE SURFACE SHALL BE CONSIDERED A 'DEEP SWALE' IN ACCORDANCE WITH THE FOLLOWING CONDITIONS

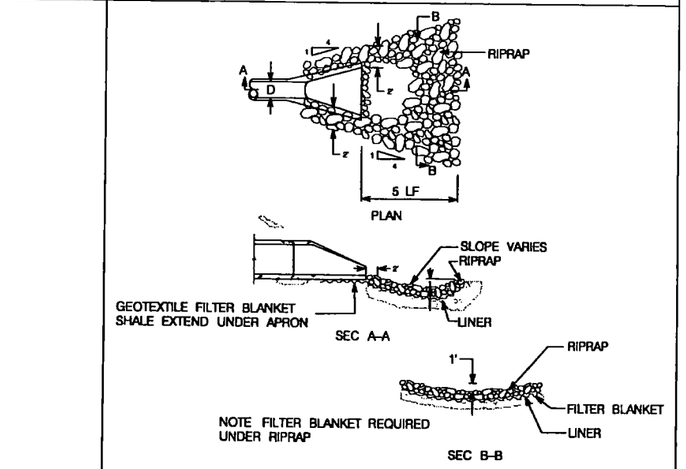
	FRONTSLOPE (H:V RATIO)		SWALE DEPTH (FT)	
IF	3:1 TO 2:1	AND	>6	THEN 'DEEP SWALE' REQUIREMENTS APPLY
	2:1 TO 1:1	AND	>4	
	>1:1	AND	>1	

* IF SHOULDER WIDTH LESS THAN 5' WIDE, PROVIDE SAFETY RAILING OR BARRICADE 2' FROM EDGE OF BITUMINOUS TRAIL IN ACCORDANCE WITH CONTRACT DOCUMENTS
NO RAILING IS ANTICIPATED FOR THIS PROJECT

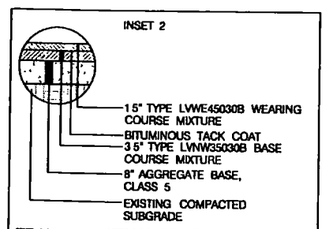
TRAIL CONSTRUCTION AND SAFETY ZONES
NO SCALE



CULVERT DETAIL
NO SCALE

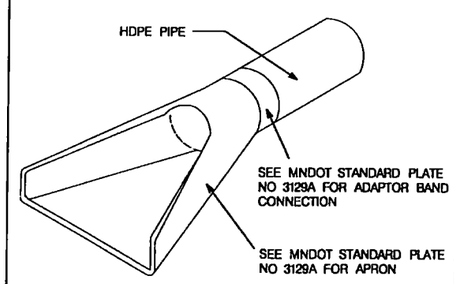


RIPRAP AT PIPE OUTLETS *
NO SCALE
* IF REQUIRED AS DIRECTED BY THE ENGINEER IN LIEU OF RIP RAP, AN EROSION STABILIZATION MAT, CLASS 2 MAY BE USED PER THE DIRECTION OF THE ENGINEER



TRAIL MAINTENANCE CROSSING TYPICAL SECTION
NO SCALE

NOTE
SEE PLANS FOR LOCATIONS
TRAIL MAINTENANCE TYPICAL SECTION SHALL BE CONSTRUCTED ON ALL ROADS A MIMIMUM OF 35' ON EACH SIDE OF THE TRAIL CENTERLINE AT ROAD CROSSINGS



HDPE CULVERT WITH GALVANIZED STEEL APRON

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DESIGNER: TM				
CHECKED BY: AD				
APPROVED BY: TM				
DESIGN TEAM	NO.	BY	DATE	REVISIONS

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.
signature
Date: 03/20/09
TOBY P MUSE
printed signature
Reg No 43364

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PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE
TRAIL DEVELOPMENT

DETAILS / TYPICAL SECTIONS

FILE NO. THRIV106209
DATE 03/20/09

EARTHWORK ①

EXCAVATION 3,738 CY
- COMMON EXCAVATION – REMOVE NON SALVAGEABLE TOPSOIL (LV) 156 CY ②
- COMMON EXCAVATION (TRAIL) (EV)(P) 3,071 CY ③
- SUBGRADE EXCAVATION (EV) 511 CY ④ (A)

EMBANKMENT 4,124 CY
- COMMON BORROW (CV)(P) 1,222 CY ⑤
- SELECT TOPSOIL BORROW (LV) 2,902 CY ⑥
  - SUNNY LAKE TRAIL – 1,933 CY
  - EAST LOOP TRAIL – 969 CY

RECLAIM & AGGREGATE BASE

ESTIMATED RECLAIM PRODUCTION DEPTH (IN) – 3 ——— EAST LOOP TRAIL ⑦ (B)

CLASS 7 RECYCLED AGGREGATE BASE PRODUCTION (SY) – 3,633 ——— EAST LOOP TRAIL ⑧ (C)

CLASS 7 RECYCLED AGGREGATE BASE SALVAGED & PLACED (CY) – 250 ——— SUNNY LAKE TRAIL ⑨ (D)

REQUIRED AGGREGATE BASE (CY) – 2,801 ——— SUNNY LAKE TRAIL ⑩ (E)

AGGREGATE BASE CLASS 5 (CY) – 2,551 ——— SUNNY LAKE TRAIL ⑪ ⑫

① QUANTITIES LISTED IN EARTHWORK TABULATION ARE ESTIMATED BASED ON SOIL TESTING AND FIELD INSPECTIONS ACTUAL QUANTITIES MAY VARY FROM THOSE DEPICTED DUE TO CHANGED FIELD CONDITIONS

② ESTIMATED TO BE 5% OF SALVAGE TOPSOIL QUANTITY

③ FOR AREAS WHERE TRAIL GRADES DID NOT CHANGE, QUANTITY BASED ON VOLUME OF TRAIL SECTION BY LENGTH TIMES WIDTH TIMES DEPTH FOR AREAS WHERE TRAIL GRADES CHANGED, QUANTITY BASED ON VOLUME OF MATERIAL IN ITS ORIGINAL POSITION BY AVERAGE END AREA METHOD

④ ESTIMATED TO BE 10% OF THE LENGTH OF TRAIL TIMES ONE (1) FOOT OF DEPTH

⑤ QUANTITY BASED ON VOLUME OF MATERIAL IN ITS FINAL POSITION BY AVERAGE END AREA METHOD

⑥ ESTIMATED TO BE 60% OF SALVAGE TOPSOIL QUANTITY AT SIX-INCH (6") DEPTH AND 100% OF NON SALVAGEABLE TOPSOIL QUANTITY

⑦ THE ESTIMATED RECLAIM PRODUCTION DEPTH IS BASED ON AN ASSUMED DEPTH THE CONTRACTOR SHALL VERIFY IN THE FIELD

⑧ QUANTITY BASED ON AVERAGE EXISTING BITUMINOUS PAVEMENT WIDTH MINUS 1/2 FOOT TIMES LENGTH OF TRAIL.

⑨ = (C) x (B) MINUS ESTIMATED 17 5% RECLAIM WASTE

⑩ QUANTITY BASED ON THE VOLUME REQUIRED BY THE TYPICAL SECTION AND THE VOLUME REQUIRED TO CORRECT (A)

⑪ QUANTITY BASED ON REQUIRED VOLUME OF IMPORTED AGGREGATE BASE WHERE RECLAIMED AGGREGATE BASE VOLUMES ARE INSUFFICIENT = (E) – (D)

⑫ BASIS FOR CONVERSION FROM CY TO TON = 105 LBS/CY/N

TYPE C SIGNS – FURNISH AND INSTALL BY CONTRACTOR

PLAN SYMBOL	COLOR	MMUTCD CODE	SIZE (INCHES)	SUNNY LAKE REFUGE TRAIL QUANTITY	SUNNY LAKE REFUGE TRAIL AREA (SQ FT)
	BLACK ON YELLOW	W2-2	18 x 18	2	4 50
STOP	WHITE ON RED	R1-1	18 x 18	2	4 50
	BLACK and RED ON YELLOW	W3-1	18 x 18	2	4 50
YIELD	WHITE ON RED	R1-2	18	1	1 13
TRAIL XING	BLACK ON YELLOW	W11-X7	30 x 30	4	25 00
	BLACK ON YELLOW	W16-7p	24 x 12	2	4 00
200 FEET	BLACK ON YELLOW	W16-2	18 x 12	2	3 00
TOTALS				15	46 63

NOTE THE CONTRACTOR SHALL REMOVE & SALVAGE SIGNS (REGULATORY) WITHIN THE PROJECT AREA.

THE OWNER SHALL REMOVE ALL PARK INFORMATIONAL AND DIRECTIONAL SIGNS WITHIN THE PROJECT AREA PRIOR TO CONSTRUCTION

THE CONTRACTOR SHALL COORDINATE A REGULATORY SIGN SALVAGE LOCATION WITH THE ENGINEER PRIOR TO CONSTRUCTION

THE OWNER SHALL DISPOSE OF ALL SALVAGED REGULATORY SIGNS

THE CONTRACTOR SHALL FURNISH AND INSTALL ALL PROPOSED REGULATORY SIGNS AS BID AND SHOWN IN THE PLANS

ALL TEMPORARY TRAFFIC CONTROL SIGNS AND CLOSURE SIGNS SHALL BE PAID FOR UNDER THE CONTRACT UNIT PRICE BID FOR TRAFFIC CONTROL AND PLACED AS SHOWN IN TECHNICAL SPECIFICATION 01 55 25.

GENERAL NOTES

1 MAINTENANCE OF THE STAKING AND STATIONING TO BE SOLELY THE CONTRACTOR'S RESPONSIBILITY

2 THE CONTRACTOR SHALL OBTAIN, PAY, AND ADHERE TO ALL CONSTRUCTION PERMIT REQUIREMENTS REQUIRED FOR THIS PROJECT THE OWNER SHALL OBTAIN ALL REGULATORY PERMITS

3 CONTRACTOR SHALL STAY WITHIN CONSTRUCTION LIMITS UNLESS APPROVED OTHERWISE BY THE OWNER THE WORK ZONE SHALL BE KEPT AS MINIMAL AS POSSIBLE DURING CONSTRUCTION MOVEMENT AND PARKING OF EQUIPMENT SHALL STAY WITHIN WORK ZONE AND NOT CROSS AREAS OTHERWISE UNDISTURBED DURING CONSTRUCTION OPERATIONS

4 CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING STRUCTURES, UTILITIES, TREES, SITE AMENITIES, ETC FROM DAMAGE DURING CONSTRUCTION CONTRACTOR TO WORK OUTSIDE OF DRIP ZONE OF TREES, EXCEPT IN AREAS DESIGNATED BY OWNER CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTING ANY DAMAGE (AT CONTRACTORS EXPENSE)

5 STOCKPILE LOCATIONS, MATERIAL AND EQUIPMENT STORAGE LOCATIONS ARE AS FOLLOWS
BOTH SIDES OF TRAIL BETWEEN STATIONS 402+00 AND 404+00 AND STATIONS 457+00 AND 463+00 AND IN THE CUL-DE-SAC NEAR TRAIL STATION 481+25
ALL OTHER LOCATIONS TO BE APPROVED BY OWNER

6 COORDINATION WITH OTHER ON-SITE CONTRACTORS IS CONSIDERED INCIDENTAL TO THE CONTRACT AND SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AS DESCRIBED IN THE PROJECT SPECIFICATIONS

7 THE CONTRACTOR SHALL MAINTAIN ADJACENT PROPERTY AND CITY STREETS AND CONTINUOUSLY CLEAN FROM CONSTRUCTION CAUSED DIRT AND DEBRIS DURING ALL OPERATIONS ON A DAILY BASIS ALL COSTS ASSOCIATED WITH PROPERTY AND STREET CLEANING SHALL BE CONSIDERED INCIDENTAL.

8 APPLY BROKEN LINE TRAIL PAVEMENT MARKINGS IN A PATTERN OF 3 FEET OF MARKING AND 9 FEET OF SPACE.

9 NOT USED

10 NOT USED

11 PRIVATE UTILITIES (NON GOPHER STATE ONE CALL) SHALL BE LOCATED BY THE CONTRACTORS PRIVATE UTILITY LOCATOR AND PAID ONCE AT THE CONTRACT UNIT PRICE AS LISTED ON THE BID FORM IT IS THE CONTRACTORS' REPSONSIBILITY TO MAINTAIN LOCATIONS THROUGHOUT THE PROJECT

12 ALL EXPOSED SOIL AREAS WITH A CONTINUOUS POSITIVE SLOPE WITHIN 200 LINEAL FEET OF A SURFACE WATER MUST HAVE TEMPORARY EROSION PROTECTION OR PERMANENT COVER FOR THE EXPOSED SOIL AREAS YEAR ROUND, ACCORDING TO THE FOLLOWING TABLE OF SLOPES AND TIME FRAMES

TYPE OF SLOPE	
STEEPER THAN 3 1	7 DAYS
10 1 TO 3 1	14 DAYS
FLATTER THAN 10 1	21 DAYS

THESE AREAS INCLUDE CONSTRUCTED STORM WATER MANAGEMENT POND SIDE SLOPES AND ANY EXPOSED SOIL AREAS WITH A POSITIVE SLOPE TO A STORM WATER CONVEYANCE SYSTEM, SUCH AS A CURB AND GUTTER SYSTEM, STORM SEWER INLET, TEMPORARY OR PERMANENT DRAINAGE DITCH OR OTHER NATURAL OR MAN-MADE SYSTEMS THAT DISCHARGE TO A SURFACE WATER. TEMPORARY STOCKPILES WITHOUT SIGNIFICANT SILT, CLAY OR ORGANIC COMPONENTS (e g , CLEAN AGGREGATE STOCKPILES, DEMOLITION CONCRETE STOCKPILES, SAND STOCKPILES) ARE EXEMPT FROM THIS REQUIREMENT BUT MUST COMPLY WITH PART IV C OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

13 PERMANENT VEGETATION AND STRUCTURES SHALL BE INSTALLED AFTER COMPLETION OF INITIAL SITE GRADING WITHIN SEVEN (7) DAYS ON SLOPES GREATER THAN 3·1, FOURTEEN (14) DAYS ON SLOPES BETWEEN 10 1 AND 3 1, AND TWENTY ONE (21) DAYS ON SLOPES FLATTER THAN 10 1 IF FINAL GRADING IS NOT COMPLETED WITHIN THESE TIME LIMITS OR UNTIL AFTER PLANTING SEASON HAS EXPIRED, TEMPORARY EROSION CONTROL MEASURES, INCLUDING MNDOT MIX 150 @ 40 LBS PER ACRE AND MULCHING SHALL BE IMPLEMENTED PERMANENT SEED SHALL BE MNDOT MIX 250 @ 70 LBS PER ACRE OR SHADE MIX @ 300 LBS PER ACRE (PLANTING DATES PER MNDOT SPEC 2575) MULCH SHALL BE MNDOT TYPE 1 (CLEAN OAT STRAW) @ 2 TONS PER ACRE AND DISK ANCHORED IN PLACE USE EROSION CONTROL BLANKET IN PLACE OF MULCH IN AREAS AS DIRECTED BY THE ENGINEER AND IN SWALE AREAS, EROSION CONTROL BLANKET SHALL BE TYPE S150BN WITH ALL NATURAL NETTING AND STITCHING AS MANUFACTURED BY NORTH AMERICAN GREEN OR APPROVED EQUAL.

14 IF THE CONTRACTOR DOES NOT COMPLETE TEMPORARY VEGETATION AND/OR MULCHING AS SPECIFIED, THREE RIVERS PARK DISTRICT OR THEIR AUTHORIZED REPRESENTATIVE SHALL NOTIFY THE CONTRACTOR IN WRITING THAT HE HAS 24 HOURS TO COMPLETE THE TEMPORARY VEGETATION AND/OR MULCHING OR THE CONTRACTOR SHALL BE SUBJECT TO $500 DEDUCTION PER DAY OF NON-COMPLIANCE

15 ALL SEEDED AREAS TO HAVE 6" TOPSOIL EITHER SALVAGED OR IMPORTED SUBSOIL SHALL BE IN A LOOSE CONDITION FOR A UNIFORM DEPTH OF AT LEAST 6" PRIOR TO TOPSOIL PLACEMENT (SITE REPRESENTATIVE AND OWNER TO VERIFY)

16 INSPECT SILT FENCE IMMEDIATELY AFTER EACH RUNOFF EVENT ANY REQUIRED REPAIRS SHOULD BE MADE IMMEDIATELY WHEN SEDIMENT DEPOSITS REACH APPROXIMATELY ONE-THIRD THE HEIGHT OF THE SILT FENCE, REMOVE SEDIMENT OR INSTALL A SECOND SILT FENCE

17 CONSTRUCT TEMPORARY ROCK CONSTRUCTION ENTRANCES AT ALL LOCATIONS WHERE VEHICLE ACCESS TO PUBLIC STREETS WILL BE PERMITTED REMOVE AT COMPLETION OF PROJECT AS PER PERMIT

18 TEMPORARY DITCH CHECKS SHALL BE A FILTER LOG, TYPE 2 WOOD FIBER BIOROLL INSTALLED IMMEDIATELY FOLLOWING SWALE CONSTRUCTION ACTIVITIES ALONG THE TRAILS TEMPORARY DITCH CHECKS SHALL BE PER MNDOT (2005 EDITION) SPECIFICATION 3897 AND INSTALLED AS SHOWN ON SHEET 3 AT A MINIMUM OF EVERY 150' PERPENDICULAR TO DITCH FLOW IN SWALES WHERE STEEP GRADES OR EROSION ARE CONCERNS, TEMPORARY DITCH CHECK SPACING MAY BE REDUCED AS DIRECTED BY THE ENGINEER

19 DURING CULVERT INSTALLATIONS, MINOR GRADING NEAR CULVERT ENDS MAY BE REQUIRED TO ENSURE POSITIVE DRAINAGE MINOR GRADING SHALL BE PERFORMED AS DIRECTED BY THE ENGINEER AND SHALL BE CONSIDERED INCIDENTAL TO CULVERT INSTALLATION

20 THE CONTRACTOR SHALL INSTALL PERMANENT SEEDING WITHIN 72 HOURS OF FINAL GRADING OPERATIONS

LIST OF STANDARD PLATES

NO	TITLE
3129 A	METAL APRON FOR CORRUGATED POLYETHYLENE PIPE
3131 C	PRECAST CONCRETE HEADWALL FOR SUBSURFACE DRAINS
3221 C	CORRUGATED STEEL PIPE COUPLING BAND
8000 I	STANDARD BARRICADES
9102 G	TURF ESTABLISHMENT AREAS (AT PIPE CULVERT ENDS)

DESIGNER: TM
CHECKED BY: AD
APPROVED BY: TM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE TRAIL DEVELOPMENT

GENERAL NOTES\ STANDARD PLATES\ EARTHWORK

FILE NO. THRIV106209
DATE 03/20/09

4 / 14

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STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

NPDES GENERAL STORMWATER PERMIT FOR
CONSTRUCTION ACTIVITY NO. MN R100001
JUNE 1, 2009

PROJECT: SUNNY LAKE REFUGE TRAIL DEVELOPMENT, CARVER COUNTY, MN

OWNER: THREE RIVERS PARK DISTRICT
3000 XENIUM LANE NORTH
PLYMOUTH, MN 55441-1299

CONTACT: AMY GURSKI (SENIOR CIVIL ENGINEER)

SWPPP SUMMARY/OVERVIEW
THIS STORM WATER POLLUTION PREVENTION PLAN (SWPPP) HAS BEEN DEVELOPED BY THREE RIVERS PARK DISTRICT TO ADDRESS THE REQUIREMENTS OF NPDES PERMIT MN R100001, PART III, SUBPART A. THIS SWPPP INCLUDES A COMBINATION OF NARRATIVE AND ATTACHED FIGURE(S) AND PLAN SHEETS THAT DESCRIBE THE TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL AND STORM WATER MANAGEMENT PLAN FOR THE PROJECT. THE NUMBERED SECTIONS BELOW CORRESPOND TO THE SAME SECTIONS OF THE NPDES PERMIT.

PART III.A. STORM WATER POLLUTION PREVENTION PLAN
NATURE OF CONSTRUCTION ACTIVITY:
THE PROJECT WILL CONSIST OF GRADING, CONSTRUCTION OF BITUMINOUS TRAIL AND CULVERTS.

SOIL DISTURBING ACTIVITIES:
CLEARING AND GRUBBING; REMOVALS; GRADING; EXCAVATION; PAVING; AND FINAL RESTORATION.

1. PERSON KNOWLEDGEABLE IN EROSION PREVENTION AND SEDIMENT CONTROL AND WHO WILL OVERSEE IMPLEMENTATION OF THE SWPPP:
CONTRACTOR SHALL APPOINT AN EROSION SUPERVISOR THAT IS CERTIFIED IN ACCORDANCE WITH MPCA REQUIREMENTS.

RESPONSIBLE FOR LONG-TERM OPERATION AND MAINTENANCE: MAINTENANCE SUPERVISOR, PETE HILL

2. NARRATIVE DESCRIBING TIMING OF INSTALLATION OF BMP'S IN PARTS III, IV, APPENDIX A:
SEE NOTES ON SHEET 4 - "GENERAL NOTES/STANDARD PLATES/EARTHWORK"

3. SWPPP REQUIREMENTS:
A. EROSION PREVENTION AND SEDIMENT CONTROL BMP'S
SEE ATTACHED PLANS FOR AREAS PROTECTED BY SILT FENCE.
CONTRACTOR WILL BE RESPONSIBLE FOR STREET SWEEPING.

ROCK CONSTRUCTION ENTRANCES OR EQUIVALENT SYSTEM MUST BE USED TO MINIMIZE TRACKING FROM SITE.
CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING EXISTING PAVED SURFACES CLEAN OF SEDIMENT BY STREET SWEEPING ROADWAYS WHEN ACCUMULATION OF SEDIMENT OCCURS ON THESE SURFACES. ANY SEDIMENT TRACKED OFF-SITE IS TO BE REMOVED WITHIN 24 HOURS (COST IS INCIDENTAL).

DURING CONSTRUCTION, STORMWATER WILL BE CONTAINED WITHIN TOPSOIL WINDROWS ALONG THE TRAIL SHOULDERS. SILT FENCE WILL BE INSTALLED AT LOW AREAS WHERE RUNOFF COULD POTENTIALLY OVERTOP TOPSOIL WINDROWS.

B. SITE MAP WITH EXISTING AND FINAL GRADES AND DRAINAGE AREAS, SOIL BORINGS AND TYPES AND IMPERVIOUS SURFACES:
SEE ATTACHED PLANS AND PROJECT MANUAL

C. LOCATIONS OF AREAS NOT TO BE DISTURBED:
SEE ATTACHED PLANS

D. LOCATIONS WHERE CONSTRUCTION WILL BE PHASED TO MINIMIZE EXPOSED SOIL AREA:
NA

E. SURFACE WATERS AND WETLANDS WITHIN 1/2 MILE THAT WILL RECEIVE STORM WATER:
SUNNY LAKE, LAKE ZUMBRA

F. METHODS FOR FINAL STABILIZATION OF EXPOSED SOILS:
SEE NOTES ON SHEET 4 - "GENERAL NOTES/STANDARD PLATES/EARTHWORK"

4. AMMENDMENTS TO THE SWPPP:
THE SWPPP WILL BE AMENDED AS NEEDED AND/OR AS REQUIRED BY PROVISIONS OF THE PERMIT.

5. MITIGATION MEASURES REQUIRED FROM PREVIOUS REVIEWS (EAW, EIS, LOCAL, ETC.)
NA

6. KARST AND DRINKING WATER SUPPLY MANAGEMENT AREA MEASURES:
NA

7. DISCHARGES TO WATERS WITH APPROVED TMDL:
NA

PART III. C. TEMPORARY SEDIMENT BASINS
NA

PART III. C. PERMANENT STORM WATER MANAGEMENT SYSTEM
THE PERMANENT STORM WATER MANAGEMENT SYSTEM WILL CONSIST OF A COMBINATION OF INFILTRATION (GRANULAR BACKFILL ALONG THE TRAIL WITH UNDERDRAINS TO PROMOTE INFILTRATION), BIOFILTRATION (GRASSY SWALES WHERE SEDIMENT WILL BE FILTERED OUT OF THE WATER) AND SHEET FLOW OF STORMWATER INTO NATIVE VEGETATION IN A 2,000 ACRE PARK RESERVE.

PART IV. CONSTRUCTION ACTIVITY REQUIREMENTS
A. STORM WATER POLLUTION PREVENTION PLAN
THE SWPPP AND BMP'S IDENTIFIED WILL BE IMPLEMENTED AND INSTALLED IN AN APPROPRIATE AND FUNCTIONAL MANNER.
B. EROSION PREVENTION PRACTICES
SEE PART III.A.3.A FOR EROSION PREVENTION AND SEDIMENT CONTROL BMP'S
C. SEDIMENT CONTROL PRACTICES
SEE PART III.A.3.A FOR EROSION PREVENTION AND SEDIMENT CONTROL BMP'S
D. DEWATERING AND BASIN DRAINING
NA
E. INSPECTIONS AND MAINTENANCE
THE CONSTRUCTION SITE WILL BE OBSERVED ONCE EVERY 7 DAYS DURING ACTIVE CONSTRUCTION AND WITHIN 24 HOURS AFTER A RAINFALL EVENT GREATER THAN 0.5 INCHES IN 24 HOURS.

A SUMMARY MAINTENANCE/CONSTRUCTION OBSERVATION REPORT WILL BE RECORDED AFTER EACH SITE VISIT/OBSERVATION.

TEMPORARY AND PERMANENT SEEDING WILL BE OBSERVED FOR GROWTH AND WASHOUTS.

F. POLLUTION PREVENTION MANAGMENT MEASURES
THE DISPOSAL AND/OR STORAGE OF HAZARDOUS WASTE AND MATERIALS WILL COMPLY WITH MPCA REGULATIONS
G. FINAL STABALIZATION
SEE PART III.A.3.A FOR EROSION PREVENTION AND SEDIMENT CONTROL BMP'S
THE PERMITTEE WILL SUBMIT A NOTICE OF TERMINATION (NOT) WITHIN 30 DAYS AFTER FINAL STABILIZATION IS COMPLETE.

APPENDIX A.

A. GENERAL REQUIREMENTS
ALL REQUIREMENTS IN THIS APPENDIX ARE IN addition TO BMP'S SPECIFIED. THE PROVISIONS IN THIS APPENDIX TAKE PRECEDENCE. NO SPECIAL REQUIREMENTS APPLY TO THIS PROJECT.

B. REQUIREMENTS FOR DISCHARGE TO SPECIAL WATER
NA

C. ADDITIONAL BMP'S FOR SPECIAL WATERS
NA

D. REQUIREMENTS FOR DISCHARGING TO WETLANDS
STORM WATER FROM THE SITE WILL DISCHARGE TO A BMP BEFORE ANY WETLANDS.
E. DISCHARGES REQUIRING ENVIRONMENTAL REVIEW
NA
F. DISCHARGES AFFECTING ENDANGERED OR THREATENED SPECIES
NA

G. DISCHARGES AFFECTING HISTORIC PLACES OR ARCHEOLOGICAL SITES
NA

DESIGNER: TM
CHECKED BY: AD
APPROVED BY: TM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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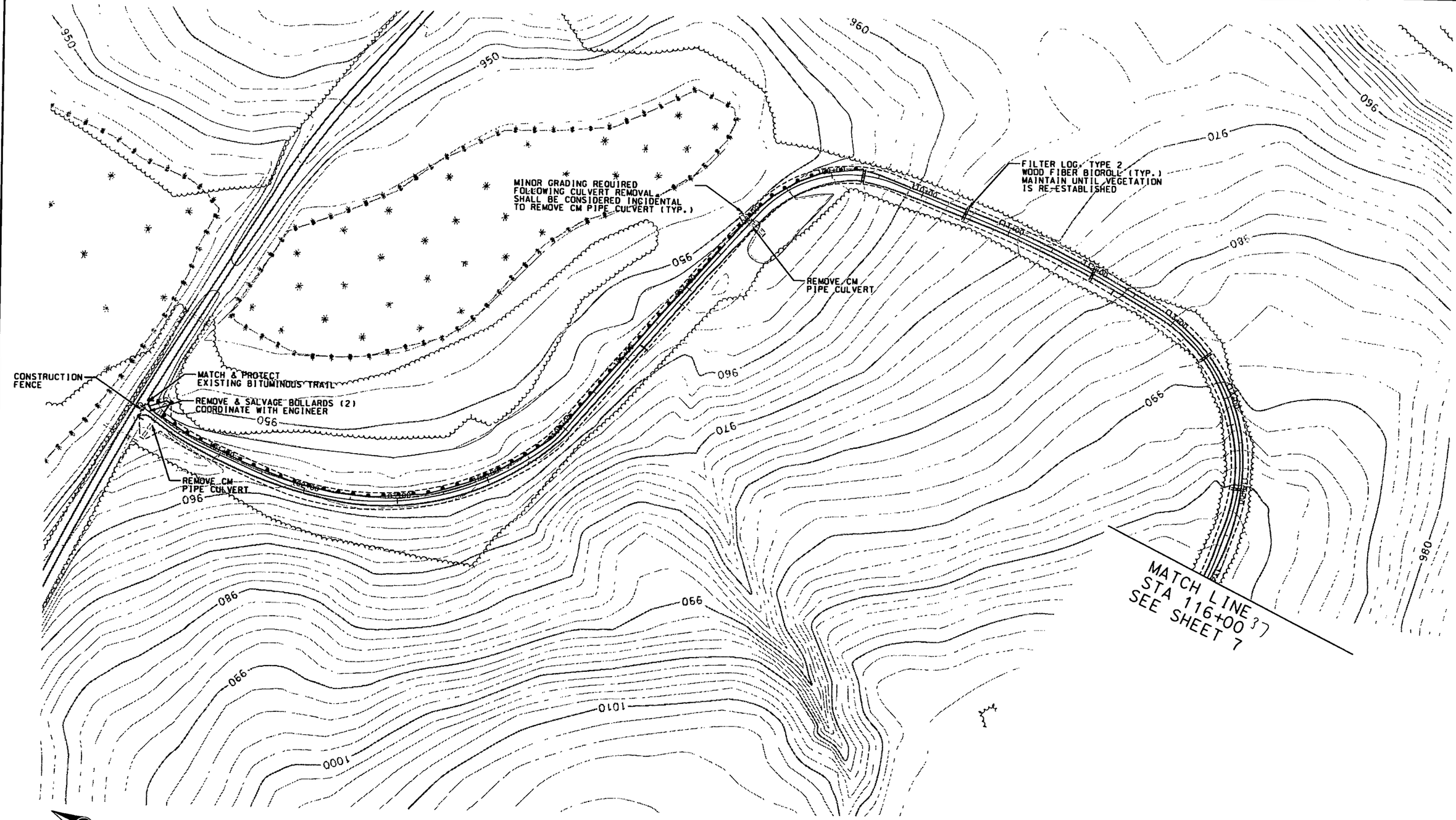
ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE TRAIL DEVELOPMENT

STORM WATER POLLUTION PREVENTION PLAN

FILE NO. THRIV106209
DATE 03/20/09



NOTE:

RECLAIM EXISTING BITUMINOUS TRAIL. SALVAGE AND TRANSPORT FOR USE ON SUNNY LAKE REFUGE TRAIL AS AGGREGATE BASE CL 7. RESTORE EAST LOOP TRAIL WITH MINIMUM 6" DEPTH OF TOPSOIL AND SEED.

PROVIDE EROSION CONTROL BLANKET IN LOCATIONS AS DIRECTED BY THE ENGINEER

DESIGNER: TM
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APPROVED BY: TM
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ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE TRAIL DEVELOPMENT

EAST LOOP TRAIL
STATIONS 100+00 – 116+00

FILE NO. THRIV106209
DATE 03/20/09

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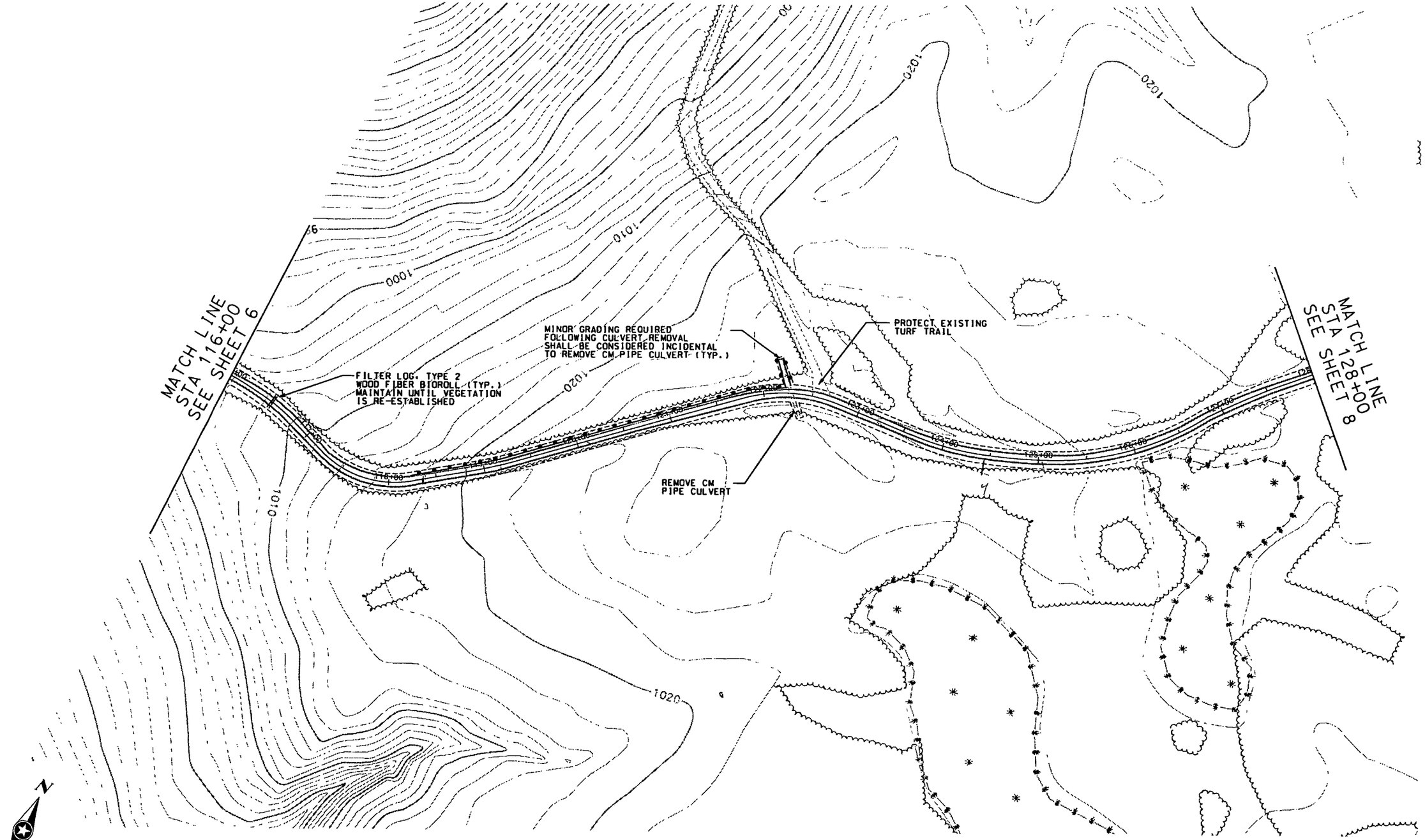

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ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE
TRAIL DEVELOPMENT

EAST LOOP TRAIL
STATIONS
116+00 – 128+00

FILE NO. THRIV106209
DATE 03/20/09

7
14

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MATCH LINE
STA 128+00
SEE SHEET 7

MATCH LINE
STA 486+00
SEE SHEET 14

PROPOSED SUNNY LAKE REFUGE
TRAIL ALIGNMENT SEE SHEET 14

REMOVE & SALVAGE BOLLARDS (4)
COORDINATE WITH ENGINEER

ACCEPTABLE CONTRACTOR
ACCESS POINT

ZUMBRA BOAT ROAD

PROTECT EXISTING
PIPE CULVERT

CONSTRUCTION
FENCE

MATCH & PROTECT
EXISTING TRAIL

PARK DRIVE

ACCEPTABLE CONTRACTOR
ACCESS POINT.
ACCESS ON PARK DRIVE NORTH
OF ZUMBRA BOAT ROAD IS PROHIBITED

1020

4320

N

50 0 50 100
scale 25 feet

NOTE:

RECLAIM EXISTING BITUMINOUS TRAIL. SALVAGE AND TRANSPORT FOR USE ON SUNNY LAKE REFUGE TRAIL AS AGGREGATE BASE CL 7. RESTORE EAST LOOP TRAIL WITH MINIMUM 6" DEPTH OF TOPSOIL AND SEED.

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SUNNY LAKE REFUGE
TRAIL DEVELOPMENT

EAST LOOP TRAIL
STATIONS
128+00 – 143+66

FILE NO. THRIV106209
DATE 03/20/09

8
14

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LOWRY NATURE CENTER ROAD

EXISTING GRAVEL MAINTENANCE ROAD - ACCEPTABLE CONTRACTOR ACCESS POINT

EXISTING BITUMINOUS TRAIL

SAWCUT AND REMOVE BITUMINOUS PAVEMENT AS REQUIRED TO OBTAIN 10' WIDE PAVED SURFACE AS MARKED BY THE ENGINEER

BEGIN SUNNY LAKE REFUGE TRAIL STA 400+00 MATCH EXISTING BITUMINOUS TRAIL

CONSTRUCTION FENCE

EXISTING BITUMINOUS TRAIL

STOCKPILE, MATERIAL AND EQUIPMENT STORAGE LOCATION BETWEEN TRAIL STATIONS 402+00 TO 404+00

CLEAN BOTH ENDS EXISTING CULVERT (INCIDENTAL)

4" DRAINTILE (TYP.)

SILT FENCE (TYP.)

PROTECT EXISTING TURF TRAIL

CONSTRCUTION FENCE

REMOVE CM PIPE CULVERT INSTALL 28 LF 12" HDPE CULVERT

MATCH LINE STA 415+50 SEE BELOW LEFT

NOTES:
1) ROOT BARRIER AND TREE PROTECTION (CONSTRUCTION) FENCE LOCATIONS TO BE PLACED AS DIRECTED BY THE ENGINEER.
2) THE PROPOSED TRAIL ALIGNMENT BETWEEN STA 400+00 AND 431+00 IS INTENDED TO CLOSELY MATCH BOTH HORIZONTAL AND VERTICAL GEOMETRY OF THE EXISTING MAINTENANCE PATH IN ORDER TO MINIMIZE CONSTRUCTION IMPACTS.

scale 25 50 0 50 100 feet

MAPLE MARSH

INSTALL SILT CURTAIN AS DIRECTED BY THE ENGINEER

EXISTING FENCE REMOVAL BY OWNER

MODIFY OUTLET STRUCTURE SEE FIGURES C501 AND C502 AT THE END OF TECHNICAL SPECIFICATION SECTION 33 44 20

FIELD VERIFY ELEVATIONS WITH ENGINEER PRIOR TO ORDERING MODIFY OUTLET STRUCTURE MATERIALS

PROTECT EXISTING TREES

PROTECT EXISTING TURF TRAIL

CONSTRCUTION FENCE

CROSS SLOPE TRAIL 2% MAX. TO SOUTH BETWEEN STA 420+00 AND 421+50

REMOVE CM PIPE CULVERT INSTALL 40 LF 24" RC CULVERT

INSTALL 100 SY EROSION STABILIZATION MAT, CLASS 2 ON SOUTH TRAIL SHOULDER BETWEEN STA 420+00 AND 421+50

SUNNY LAKE

4" DRAINTILE (TYP.)

CLEAN BOTH ENDS EXISTING CULVERT (INCIDENTAL)

LAKE ZUMBRA

REMOVE BRUSH AS DIRECTED BY ENGINEER FOR SIGHT LINE PURPOSES

INSTALL SILT CURTAIN AS DIRECTED BY THE ENGINEER

MATCH LINE STA 415+50 SEE ABOVE RIGHT

SILT FENCE (TYP.)

MATCH LINE STA 431+00 SEE SHEET 10

scale 25 50 0 50 100 feet

DESIGNER: TM
CHECKED BY: AD
APPROVED BY: TM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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.
signature
TOBY P MUSE
printed signature
Date: 03/20/09
Reg. No. 43364

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE TRAIL DEVELOPMENT

SUNNY LAKE TRAIL STATIONS 400+00 – 431+00

FILE NO. THRIV106209
DATE 03/20/09

9 / 14

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MATCH LINE
STA 431+00
SEE SHEET 9

MATCH LINE
STA 445+50
SEE SHEET 11

SILT FENCE (TYP.)

4" DRAINTILE (TYP.)

CLEAR AND GRUB TREES (TYP.)

CLEAR 2.00 ACRES BRUSH
(BUCKTHORN/BUCKBRUSH)
TO PROVIDE SCENIC VISTA.
PROTECT ALL TREES IN
BRUSH CLEARING AREA.

SUNNY LAKE

CONSTRUCT SWALE
STA 440+00 TO STA 445+50
LEFT SIDE OF TRAIL
(SEE SHEET 3 FOR SWALE
TYPICAL SECTION)

PROTECT TREES (3)

IMMEDIATELY FOLLOWING GRADING. TOPSOIL AND SEED PLACEMENT. PLACE EROSION CONTROL BLANKET. TYPE S150BN PER THE ENGINEER ON ABANDONED MAINTENANCE PATH (TYP.)

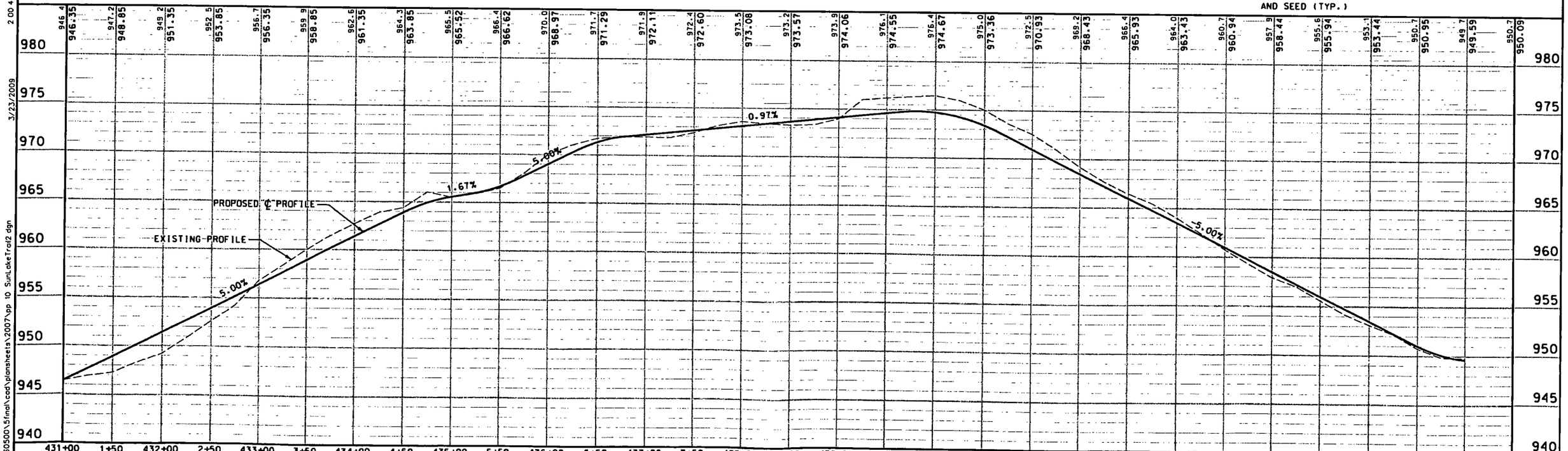
PLACE EXCESS TRAIL EXCAVATION GENERATED BETWEEN STA 439+00 AND 443+00 (228 CY) ON ABANDONED MAINTENANCE PATH TO DECREASE EXISTING SLOPES PER THE ENGINEER (PLACEMENT PAID FOR AS COMMON BORROW). RESTORE WITH MIN. 6" TOPSOIL AND SEED (TYP.)

FILTER LOG: TYPE 2 WOOD FIBER BIOROLL (TYP.)

NOTE:
1) ROOT BARRIER AND TREE PROTECTION (CONSTRUCTION) FENCE LOCATIONS TO BE PLACED AS DIRECTED BY THE ENGINEER.

N

50 0 50 100
scale 25 feet



DESIGNER: TM	NO.	BY	DATE	REVISIONS
CHECKED BY: AD				
APPROVED BY: TM				
DESIGN TEAM				

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.
signature
TODD P MUSE
printed signature
Date: 03/20/09
Reg. No 43364

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE
TRAIL DEVELOPMENT

SUNNY LAKE TRAIL
STATIONS
431+00 – 445+50

FILE NO. THRIV106209
DATE 03/20/09

10 / 14

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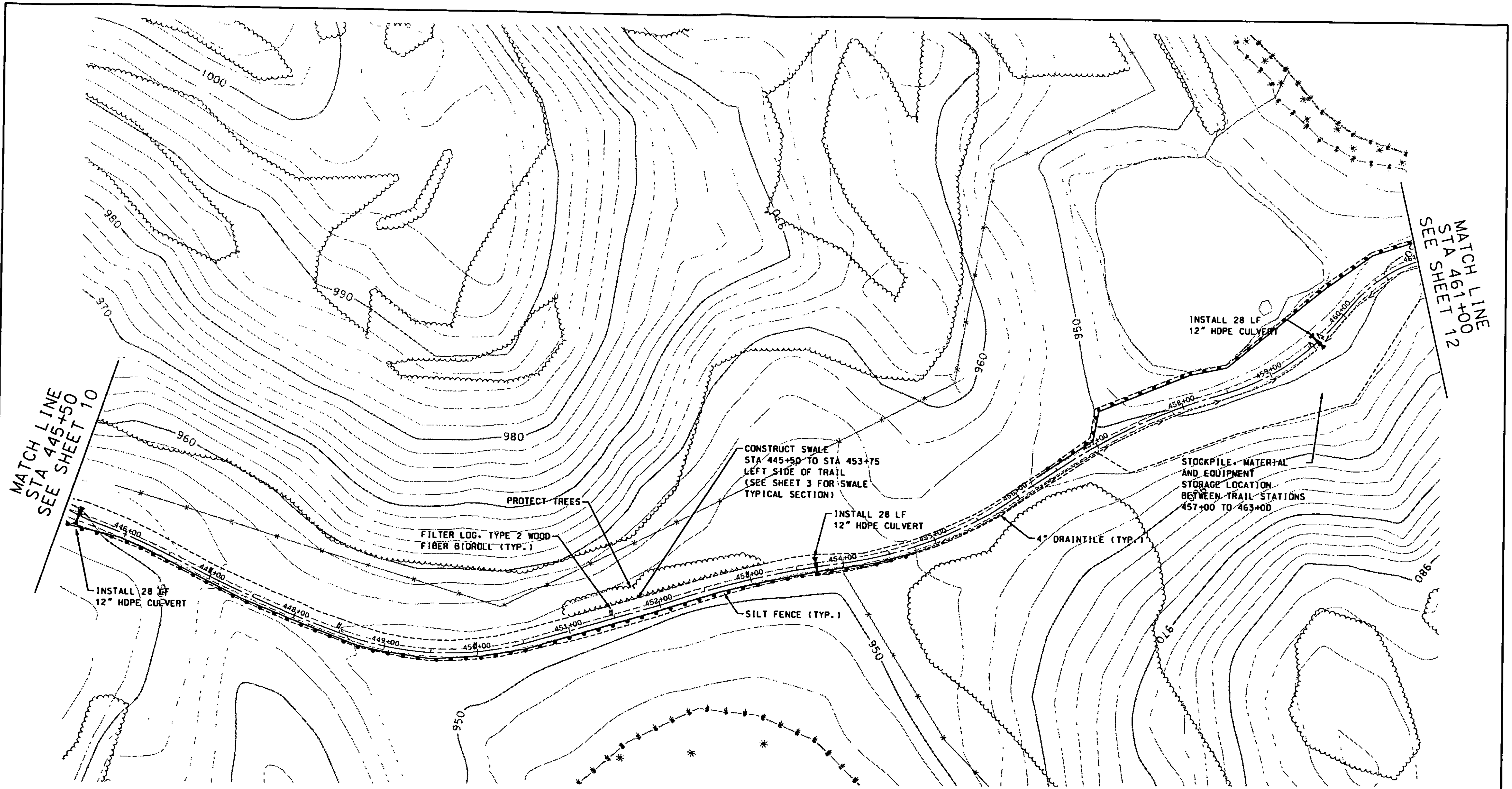

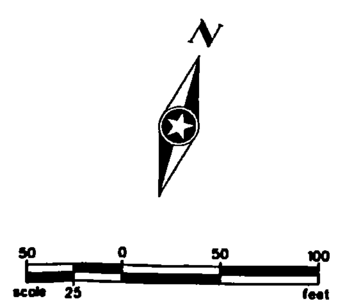

NOTES:

1) ROOT BARRIER AND TREE PROTECTION (CONSTRUCTION) FENCE LOCATIONS TO BE PLACED AS DIRECTED BY THE ENGINEER.

2) THE PROPOSED TRAIL ALIGNMENT BETWEEN STA 445+50 AND 461+00 IS INTENDED TO MATCH BOTH HORIZONTAL AND VERTICAL GEOMETRY OF THE EXISTING MAINTENANCE PATH IN ORDER TO MINIMIZE CONSTRUCTION IMPACTS.

DESIGNER: TM				
CHECKED BY: AD				
APPROVED BY: TM				
DESIGN TEAM	NO.	BY	DATE	REVISIONS

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.

signature: Toby P Muse — Date: 03/20/09

printed signature: TOBY P MUSE — Reg. No. 43364

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE

SUNNY LAKE REFUGE TRAIL DEVELOPMENT

SUNNY LAKE TRAIL STATIONS 445+50 - 461+00

FILE NO. THRIV106209

DATE 03/20/09

11 / 14

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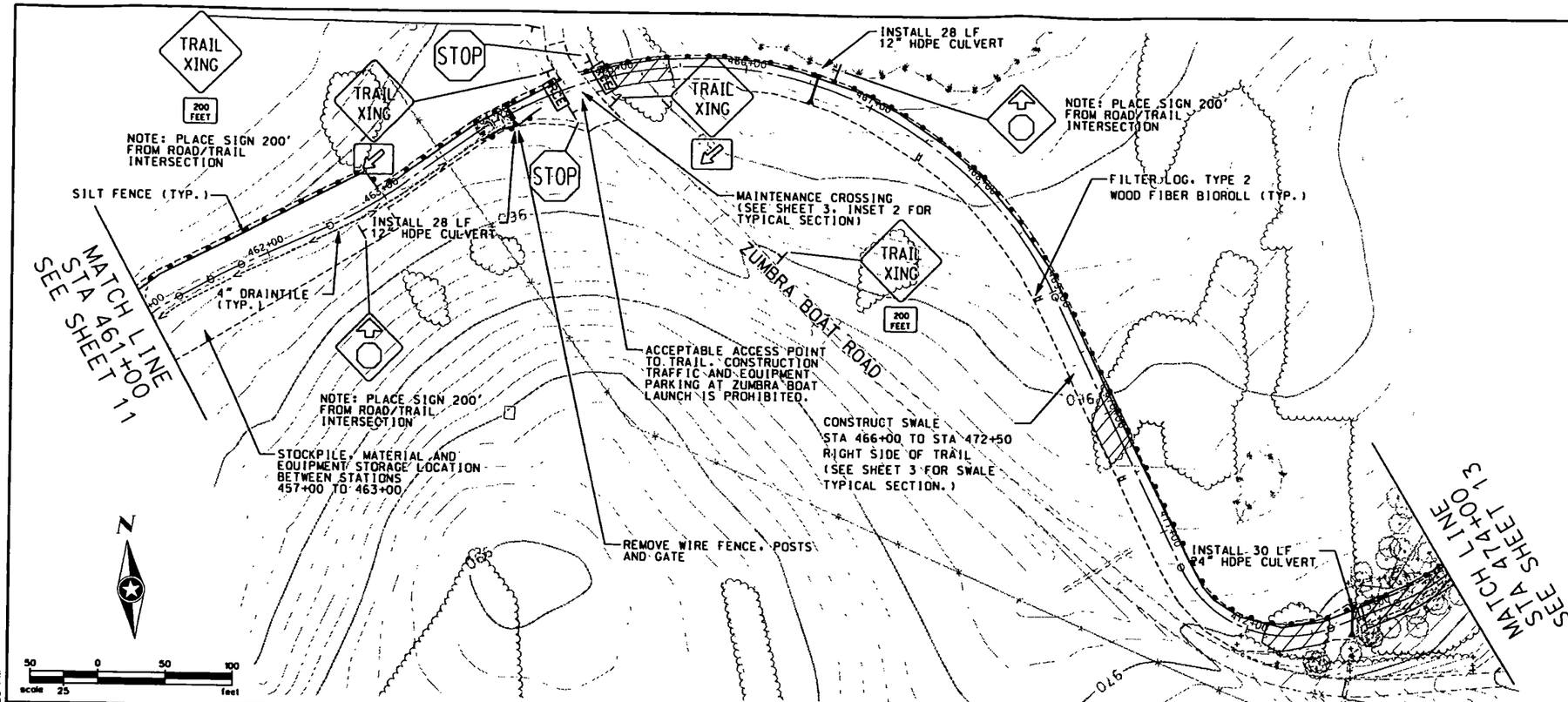
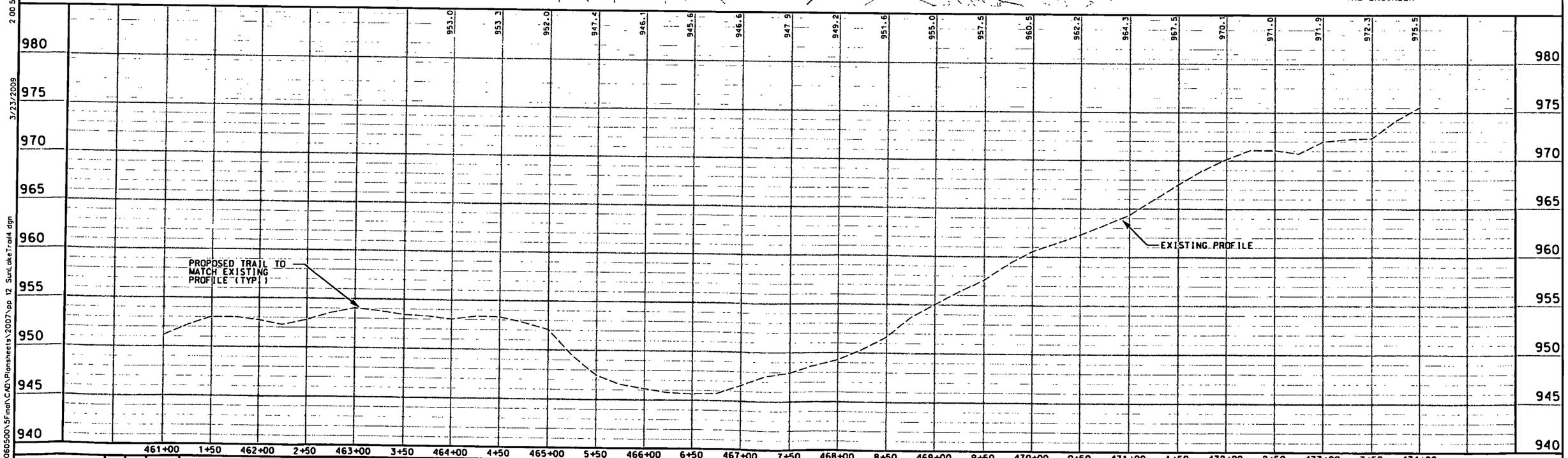


NOTE:

ROOT BARRIER AND TREE PROTECTION (CONSTRUCTION) FENCE LOCATIONS TO BE PLACED AS DIRECTED BY THE ENGINEER



DESIGNER: TM
CHECKED BY: AD
APPROVED BY: TM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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signature
TOBY P MUSE
printed signature

Date: 03/20/09
Reg. No 43364

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MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE
TRAIL DEVELOPMENT

SUNNY LAKE TRAIL
STATIONS
461+00 – 474+00

FILE NO. THRIV106209
DATE 03/20/09

12 / 14

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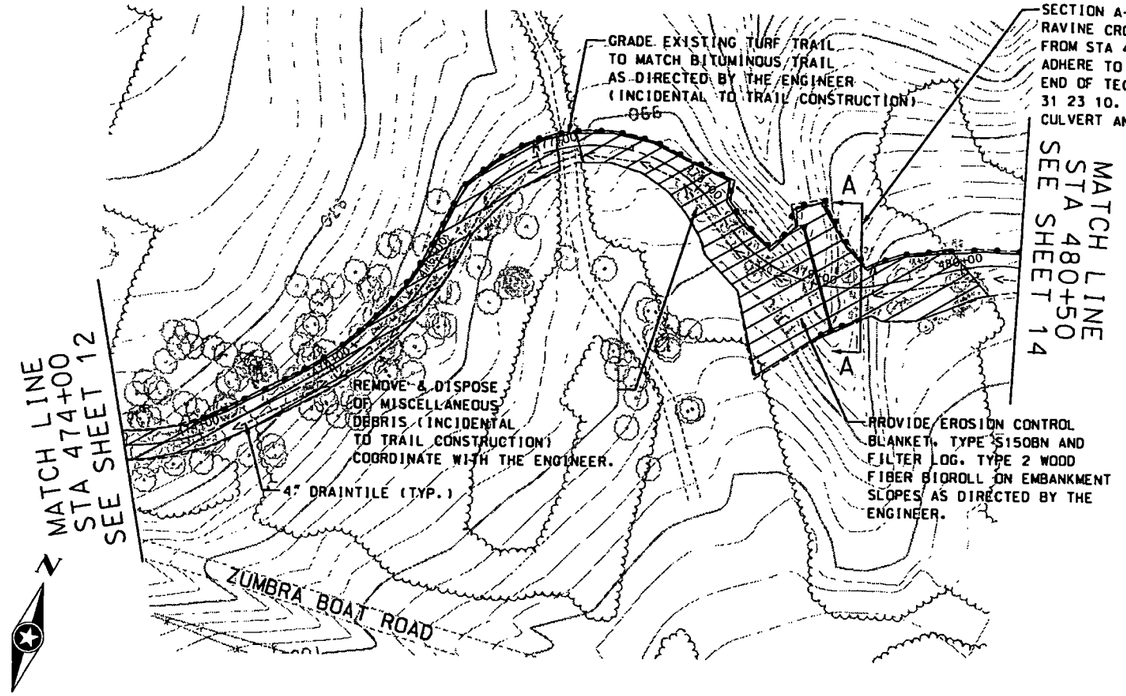
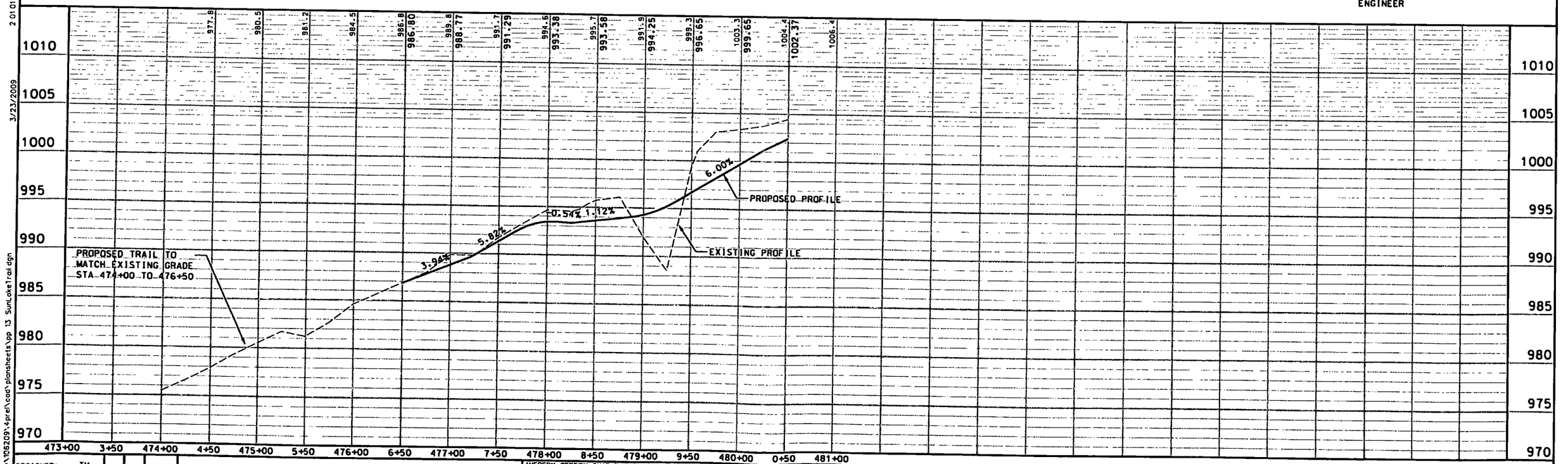


NOTE:

ROOT BARRIER AND TREE PROTECTION (CONSTRUCTION) FENCE LOCATIONS TO BE PLACED AS DIRECTED BY THE ENGINEER



DESIGNER: TM				
CHECKED BY: AD				
APPROVED BY: TM				
DESIGN TEAM	NO.	BY	DATE	REVISIONS

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signature
Date: 03/20/09
TOBY P. MUSE
printed signature
Reg No 43364

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MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE
TRAIL DEVELOPMENT

SUNNY LAKE TRAIL
STATIONS
474+00 TO 480+50

FILE NO. THRIV106209
DATE 03/20/09

13 / 14

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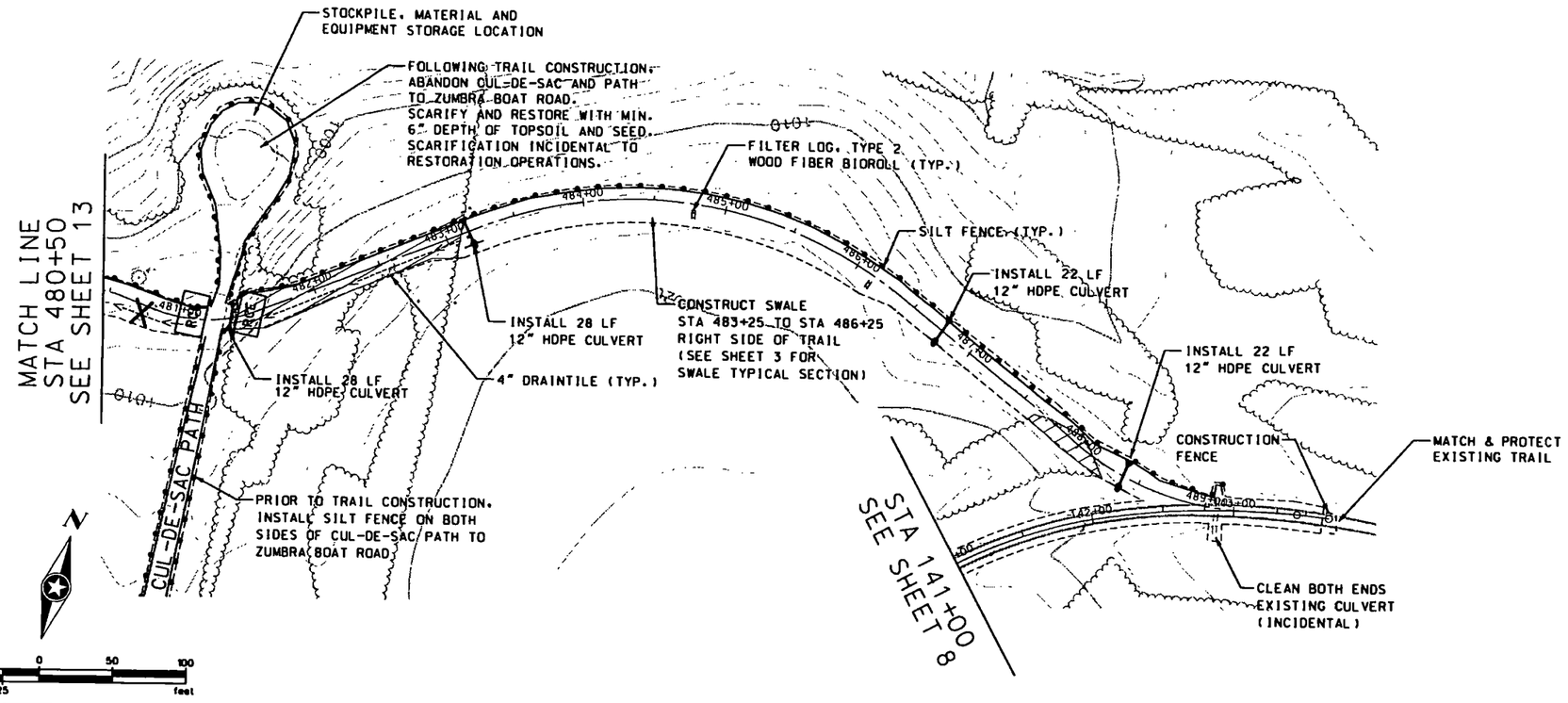

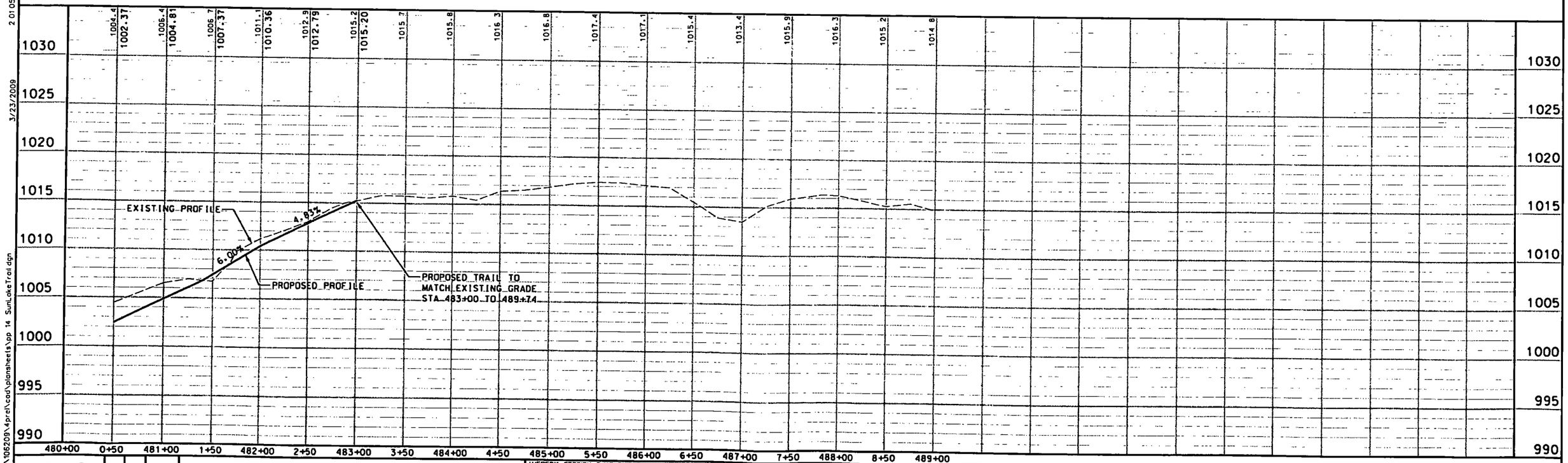

DESIGNER: TM
CHECKED BY: AD
APPROVED BY: TM
DESIGN TEAM

NO.	BY	DATE	REVISIONS

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Signature: Toby P Muse
Date: 03/20/09
printed signature: TOBY P MUSE
Reg. No 43364

SEH
10901 RED CIRCLE DRIVE, SUITE 200
MINNETONKA, MN 55343-9100
PH 952 912-2600 FAX 952-912-2601
PH 800 734-6757

ThreeRivers PARK DISTRICT

CARVER PARK RESERVE
SUNNY LAKE REFUGE
TRAIL DEVELOPMENT

SUNNY LAKE TRAIL
STATIONS
480+50 TO 489+74

FILE NO. THRIV106209
DATE 03/20/09

14 / 14

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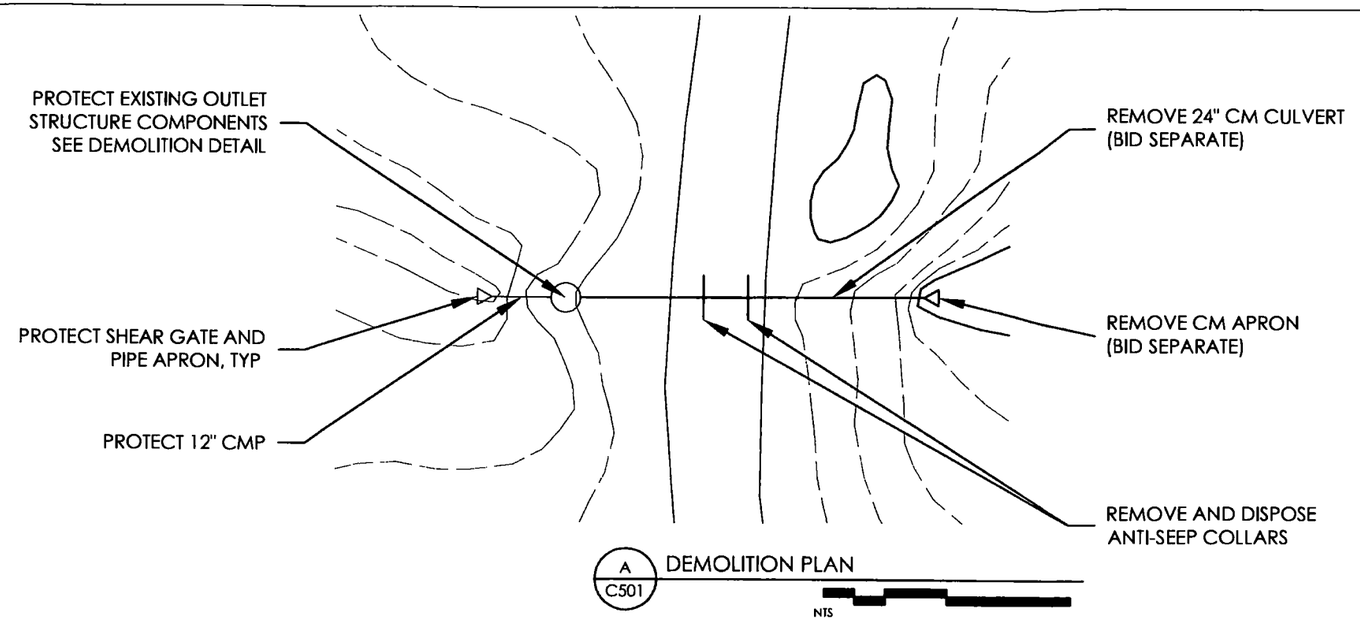
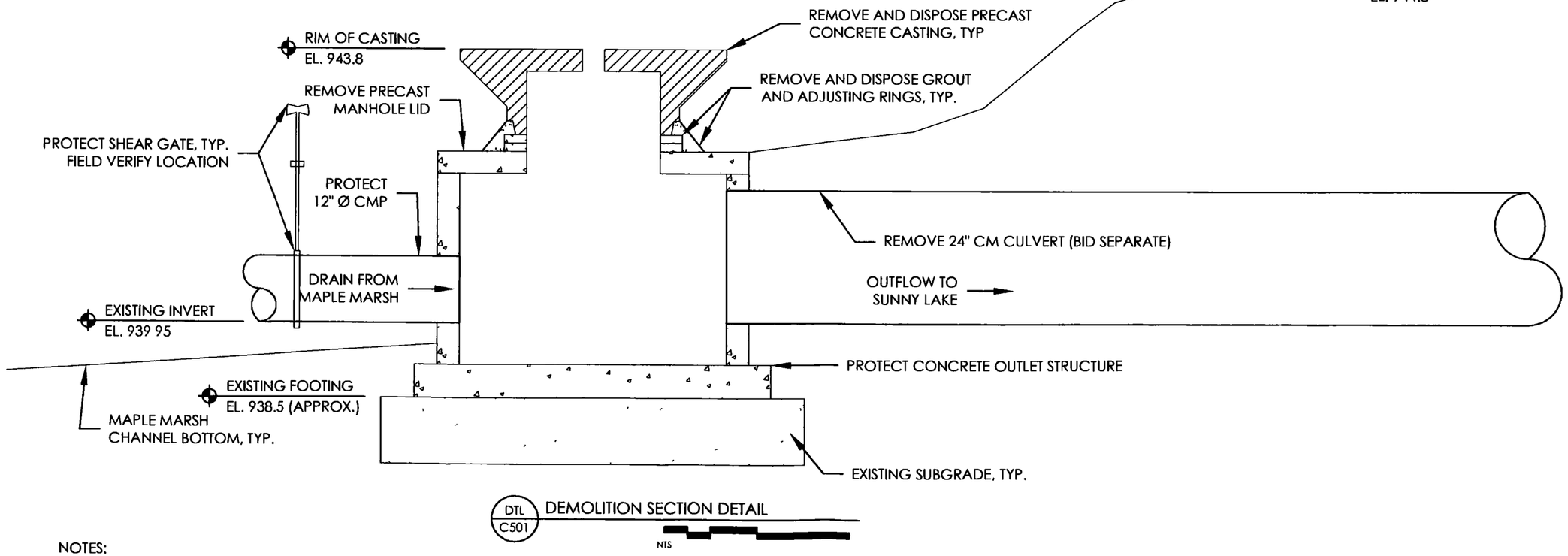


A / C501 DEMOLITION PLAN

NTS



DTL / C501 DEMOLITION SECTION DETAIL

NTS

NOTES:

1. ALL ELEVATIONS SHOWN ARE RELATIVE TO A HISTORICAL BENCHMARK ELEVATION THAT HAS SINCE BEEN DISTURBED. ENGINEER SHALL SET A NEW BENCHMARK ELEVATION AND CONFIRM EXISTING INVERT AND CASTING ELEVATIONS. THE CONTRACTOR SHALL CONFIRM ALL ELEVATIONS WITH THE FIELD ENGINEER PRIOR TO COMMENCING WORK AND SHALL MATCH TO EXISTING FIELD ELEVATIONS.
2. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER'S REVIEW AND APPROVAL FOR ALL PROVIDED OUTLET STRUCTURE COMPONENTS. CONTRACTOR SHALL RECEIVE ENGINEER'S REVIEW AND APPROVAL PRIOR TO ORDERING AND/OR FABRICATING COMPONENTS. CONTRACTOR COSTS INCURRED DUE TO REJECTED AND/OR RETURNED COMPONENTS SHALL BE INCIDENTAL TO THE CONTRACT.

REVISIONS

Mark	Date	Description

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL xxxx UNDER THE LAWS OF THE STATE OF MINNESOTA

NAME _____ REG. NO _____

DATE _____

ThreeRivers PARK DISTRICT
DEPARTMENT OF PLANNING AND DEVELOPMENT
3000 Xenium Lane North Ph 763-559-9000
Plymouth, Minnesota 55441 Fax 763-557-5248

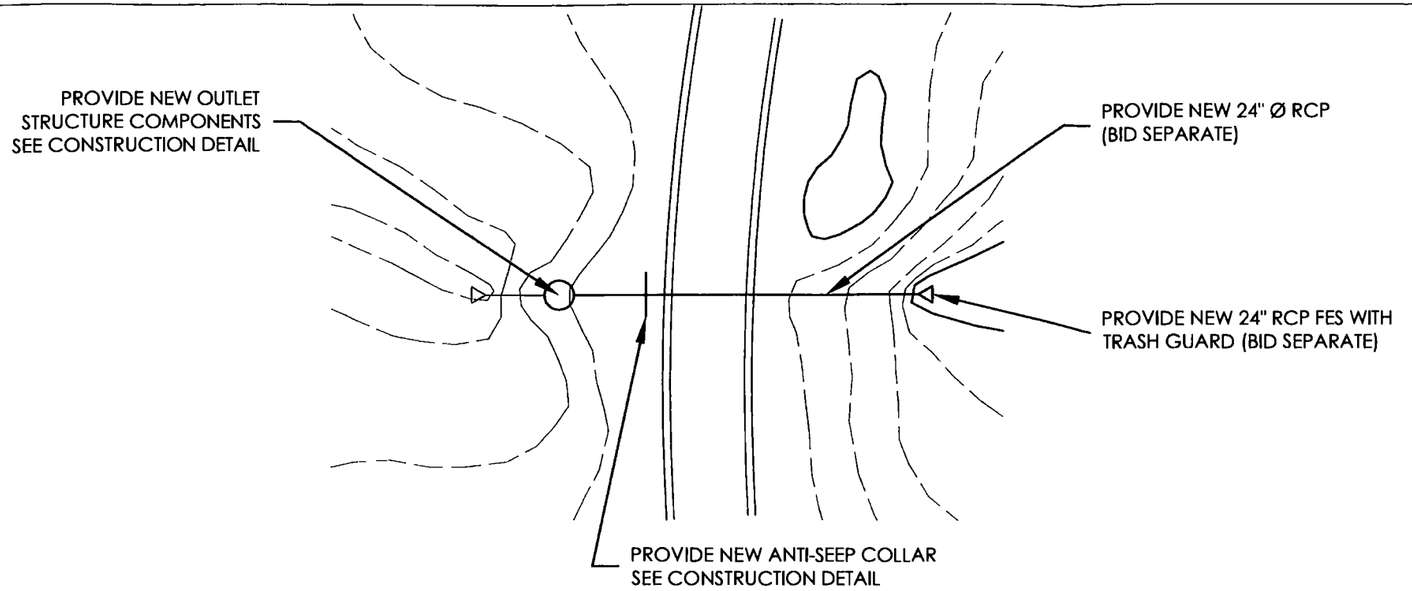
Sunny Lake Trail
Carver Park Reserve

Proj. No.	CAR 0801
Issue Date	MAR 2009
Designed By	BPC
Drawn By	BPC
Checked By	ALG

SHEET TITLE
Demo Plan and Detail

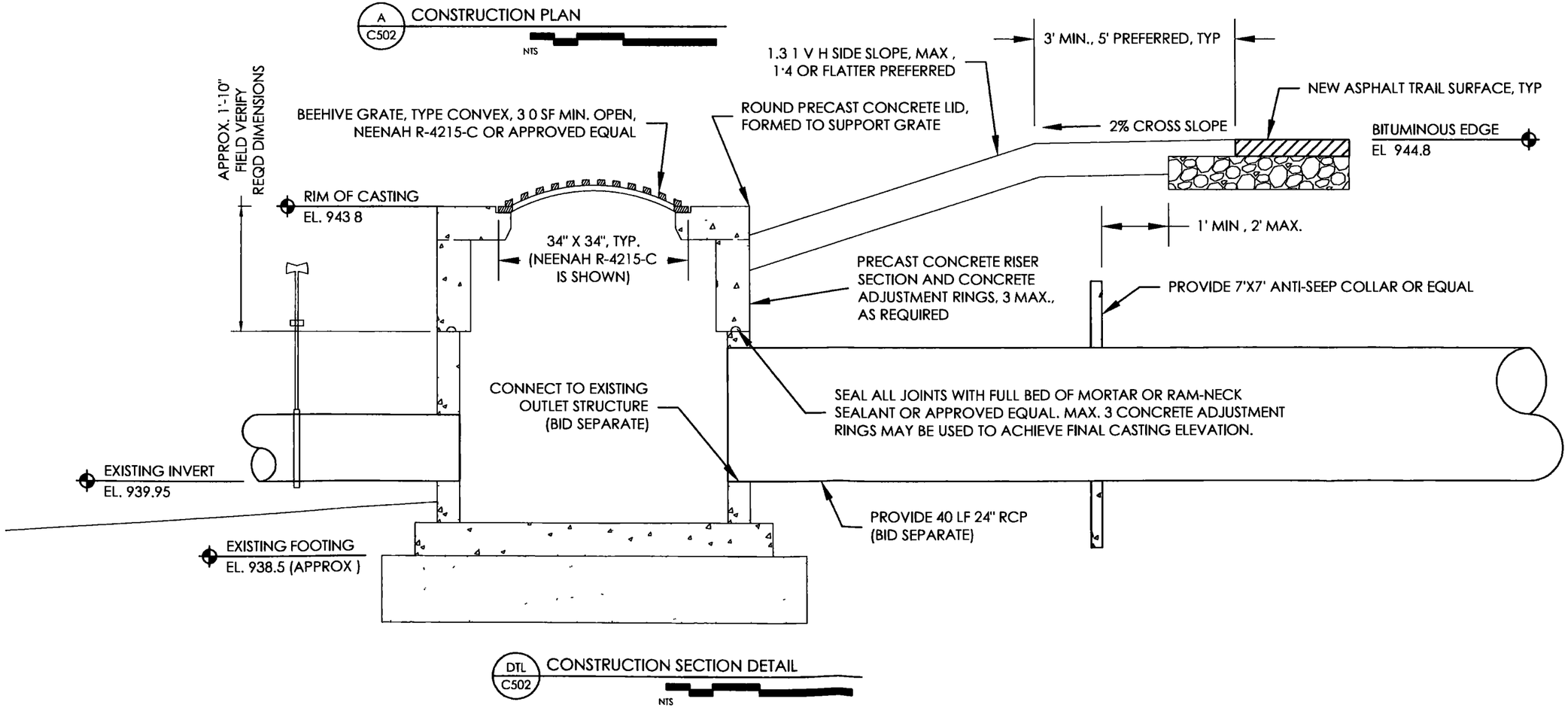
C501

Sheet 1 of



A / C502 CONSTRUCTION PLAN

NTS



DTL / C502 CONSTRUCTION SECTION DETAIL

NTS

REVISIONS

Mark	Date	Description

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL xxxx UNDER THE LAWS OF THE STATE OF MINNESOTA

NAME
DATE
REG. NO

ThreeRivers PARK DISTRICT
DEPARTMENT OF PLANNING AND DEVELOPMENT
3000 Xenium Lane North Ph 763-559-9000
Plymouth, Minnesota 55441 Fax 763-557-5248

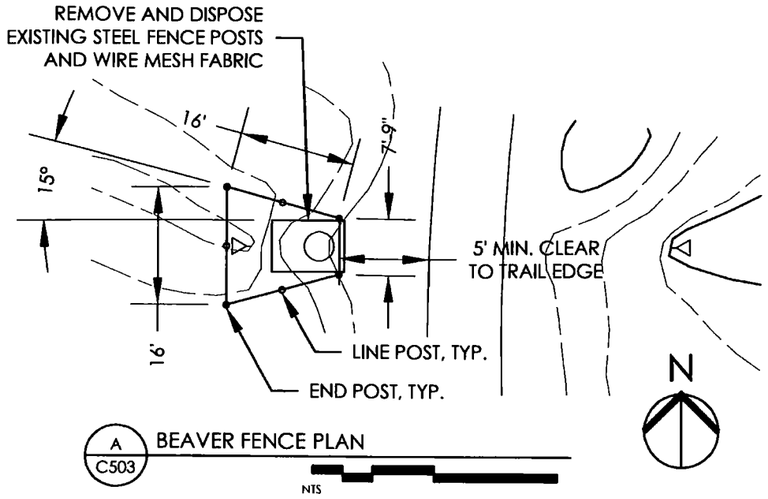
Sunny Lake Trail
Carver Park Reserve

Proj. No.	CAR 0801
Issue Date	MAR 2009
Designed By	BPC
Drawn By	BPC
Checked By	ALG

SHEET TITLE
Construction Plan and Detail

C502

Sheet 2

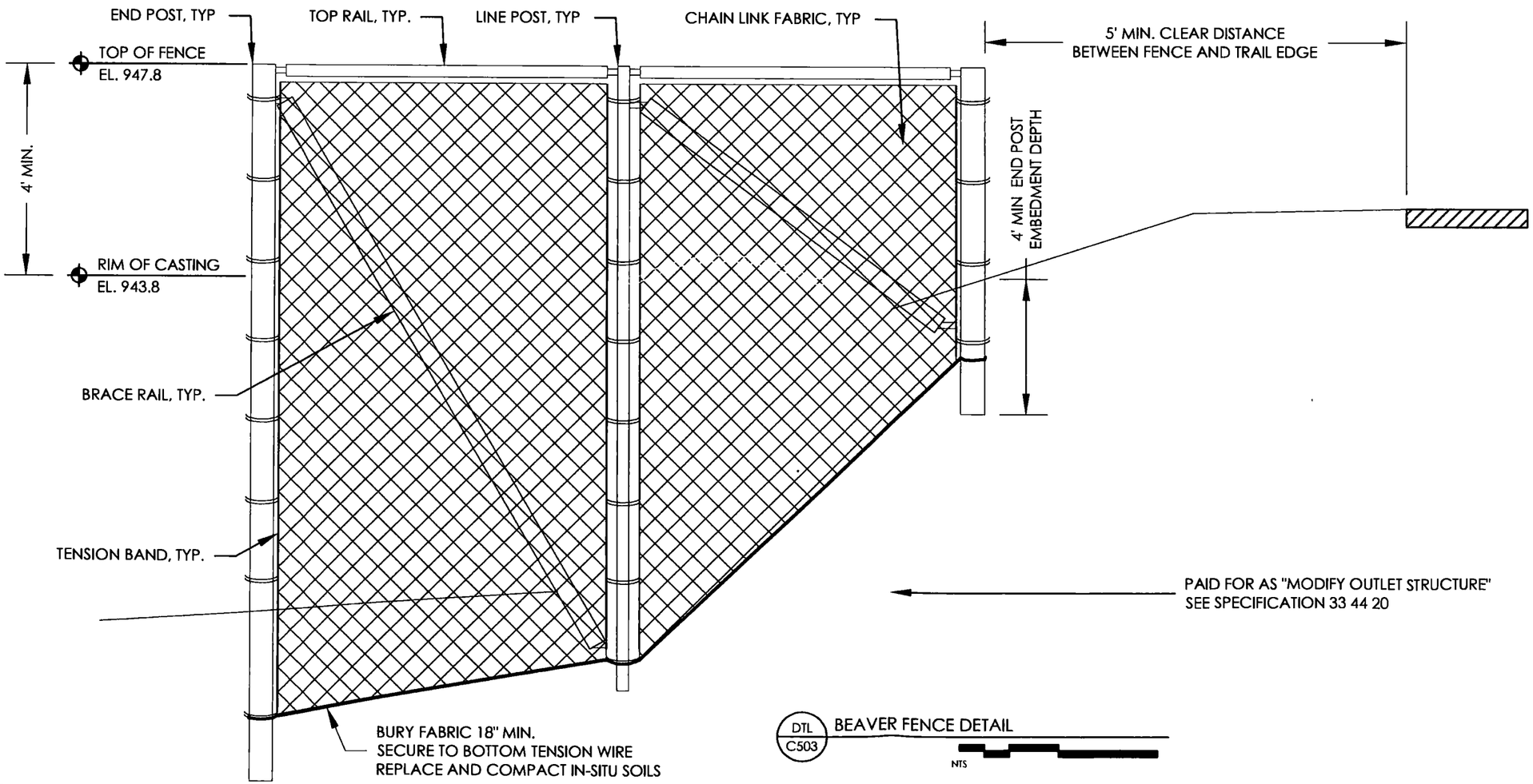


A C503 BEAVER FENCE PLAN

NTS

NOTES·

1. CONFORM TO MNDOT SPEC 2557 AND THE FOLLOWING SPECIFICATIONS UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. CHAIN LINK FABRIC SHALL BE TYPE IV, VINYL COATED, BLACK, 8 GAUGE (FINISH), WITH 2" MESH SIZE AND FOLLOWING MIN. SPECIFICATIONS. 11 GAUGE CORE WIRE, .30 GALVANIZED , 22 MILS PVC COATING.
3. END POSTS SHALL BE VINYL COATED, BLACK, GALVANIZED, 3" O.D.
4. LINE POSTS SHALL BE VINYL COATED, BLACK, GALVANIZED, 2-1/2" O.D
5. TOP AND BRACE RAIL SHALL BE VINYL COATED, BLACK, GALVANIZED, 1-5/8" O.D.
6 BOTTOM TENSION WIRE SHALL BE 7 GAUGE GALVANIZED
7. ALL FITTINGS, TIES, BANDS, LOOP CAPS, AND COMPONENT PARTS SHALL BE VINYL COATED, BLACK, GALVANIZED.
8 CHAIN LINK FABRIC SHALL BE TIED BELOW TOP RAIL EVERY 1' WITH 9 GAUGE GALVANIZED TIES, AND ABOVE BOTTOM TENSION WIRE EVERY 3' WITH 11 GAUGE GALVANIZED TIES.
9 FENCE SHALL BE GROUNDED.



DTL C503 BEAVER FENCE DETAIL

NTS

REVISIONS

Mark	Date	Description

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL XXXX UNDER THE LAWS OF THE STATE OF MINNESOTA

NAME REG. NO

DATE

ThreeRivers PARK DISTRICT
DEPARTMENT OF PLANNING AND DEVELOPMENT
3000 Xenium Lane North Ph 763-559-9000
Plymouth, Minnesota 55441 Fax 763-557-5248

Sunny Lake Trail
Carver Park Reserve

Proj. No.	CAR 0801
Issue Date	MAR 2009
Designed By	BPC
Drawn By	BPC
Checked By	ALG

SHEET TITLE
Fence Plan and Detail

C503
Sheet 3 of 3

RECEIVED
MAR 2 6 2009

Plotted 3/20/2009 8:16 AM

J:\PROJECTS\Carver Park Reserve\CAR0801 Sunny Lake Refuge Trail Development\A-E\CAR0801 Maple Marsh Outlet.dwg

ATTACHMENT 3

TRPD Inventory of Water Control Structures, 2009

Three Rivers Park District
Inventory of Water Control Structures

DATE OF SURVEY: 6/30/2009

Location: Carver Park Reserve Maple Marsh

Park and number on attached map: CV 12 GPS coordinates: 446552/4969764

Description of type: Overflow drop pipe

Description of materials: Concrete with steel grate

Condition of water control structure: Failed, water leaking through below concrete overflow lid. Structure to be replaced in 2009 as part of constructing the new bike trail.

Height of high riser: Drop pipe height 6′

Diameter of high riser: 60″ with 3′ steel grate in the middle of the concrete circle

Diameter of discharge pipe: 4′ approximate

Poisonous gas reading for all structures deeper than six feet: N/A

Type of lid: N/A

Condition of lid: N/A

Size of body of water created by structure in acres: 23.0

PWI #: 10-56 P

Year installed: Originally installed in 1980 and redone in 2009 when the bike trail was redone. Was originally a concrete overflow drop pipe similarly to how it operates now.

Picture(s) of Water Control Structure:

Comments: This structure was being replaced and modified as part of the bike trail project in 2009. This photo is of the old structure.

Attachment E:
Public Comments and Request for Board Consideration

Outlook

Culvert replacement between Sunny and Zumbra

From Craig and Amy Pabich <craigandamy21@hotmail.com>
Date Sun 7/6/2025 8:41 AM
To Abigail Couture <ACouture@minnehahacreek.org>

Abigail,

My family lives on Lake Zumbra. Are you able to provide any asditional information regarding the culvert replacement project, specifically:

1. Will replacing this help prevent large swings in water levels on Zumbra? We tend to get large water level increases after storms.
2. How long is the material supposed to last on this new replaced culvert?
3. Was there any review done by the DNR, county or any other entity regard how large/small of a culvert should be in place? Or any other review discussion about the size? Just looking for any other details around that topic.

Thanks for your time, looking forward to your response.

Outlook

Fwd: Permit #25-262

From dickhawley <dickhawley@aol.com>
Date Tue 7/15/2025 11:31 AM
To Abigail Couture <ACouture@minnehahacreek.org>

Begin forwarded message:

From: Dick Hawley <dickhawley@aol.com>
Date: Jul 14, 2025 at 7:09 PM
To: acouture@mpnnehahacreek.org <acouture@mpnnehahacreek.org>
Subject: Permit #25-262

This permit should not be approved. Cross water body lake structures are illegal according to the DNR.. Also, this causeway is not dividing two different lakes. Lake Zumbra-Sunny is officially a single lake and is listed officially by the DNR as a single lake in their finder as "Zumbra-Sunny". The culvert interferes with fish passage and adversely impacts its natural ecology.

I am prepared to legally oppose the proposal and insist that the existing causeway is eliminated. An appropriate bridge that enables open passage by Lake users between the two bays would be supported. This has been an open past discussion with the ParK and should not be a surprise to MCWD.

Sincerely,

Dick Hawley.

Outlook

Re: Request for Flap Gate Installation and Permit Access – Permit #25-262 (Lake Zumbra/Sunny Lake Culvert Project)

From kristian dolan <kristian_dolan@hotmail.com>
Date Fri 7/11/2025 2:03 AM
To Abigail Couture <ACouture@minnehahacreek.org>
Cc Kevin Lohmann <kevin.lohmann@gmail.com>; James Wisker <JWisker@minnehahacreek.org>; Vlach, Brian <Brian.Vlach@threeriversparks.org>

Hi Abigail,
Thank you for your response and for the helpful background information regarding the culvert replacement project.
I've had a chance to speak directly with Brian Vlach from Three Rivers Park District, who explained the Park's position and indicated that our primary avenue for addressing the issue of backflow into Lake Zumbra would be through the Minnehaha Creek Watershed District. Based on that guidance, I'd like to formally request that the Watershed District review the potential inclusion of a flap gate as part of the permitting process for Permit #25-262, and that this matter be brought before the MCWD Board of Managers for consideration.
As a representative of Ridge Lands Inc., the HOA for the Zumbra Ridge neighborhood, I want to underscore how critical this issue is to our community. The replacement of this culvert represents a rare and important opportunity to address a problem that has been affecting Lake Zumbra residents for decades.
Key Reasons a Flap Gate Should Be Reconsidered:

1. Backflow from Sunny Lake is Documented and Ongoing
   According to the May 2025 Technical Memo by Moore Engineering, Sunny Lake has nearly three times the drainage area of Zumbra (1,446 vs. 524 acres), and backflow from Sunny into Zumbra has been observed and modeled—with a one-foot elevation difference noted during survey.
   (Source: *"20250520 lake zumbra outlet tech memo," pages 2–3*)

2. MCWD's Own Flood Studies Point to a Flap Gate as the Best Solution
   In both the 2015 and 2017 flood evaluations, the scenario that most effectively reduced water levels in Zumbra was the installation of a one-way flow valve (flap gate). This solution lowered the 100-year high water level by 0.7 feet—more than any other approach modeled.
   (Source: *"MCWD-FloodStudy-FullPackage," Floodplain Evaluation Memo, page 6*)

3. No Significant Impact to Downstream Water Bodies
   Those same studies show that installing a flap gate does not significantly raise water levels in Lake Auburn or other downstream locations, countering the concern that such a measure would simply shift the problem.
   (Source: *Flood Study, page 6*)

4. Ongoing Damage to Shorelines and Infrastructure
   The elevated water levels in Zumbra are not theoretical—they have resulted in tangible

erosion and property damage, including documented issues along Highway 7 and several private properties.
(Source: *Flood Study, pages 2–3*)

5. This Has Been an Identified Issue for Over 50 Years
   Historical analyses dating back to the 1970s reference culvert issues and elevated water levels in Zumbra. A flap gate has repeatedly surfaced as a practical and impactful fix, yet has not been implemented.
   (Source: *Flood Study Historical Analysis, pages 2 and 7*)

Given these findings and the long history of concern, we believe it is essential for MCWD to take a leadership role in ensuring that this culvert replacement doesn't just maintain the status quo but meaningfully improves water level management for both public and private stakeholders.
We respectfully request that the MCWD Board of Managers formally review and evaluate the feasibility of a flap gate or similar one-way flow mechanism before finalizing this permit.
Thank you again for your time and for your continued work on behalf of the watershed.
Best regards,
Kristian Dolan
Zumbra Ridge Neighborhood Representative
612-483-1210
kristian_dolan@hotmail.com

From: Abigail Couture <ACouture@minnehahacreek.org>
Date: Thursday, July 10, 2025 at 11:09 PM
To: kristian dolan <kristian_dolan@hotmail.com>
Cc: Kevin Lohmann <kevin.lohmann@gmail.com>, James Wisker <JWisker@minnehahacreek.org>, Vlach, Brian <Brian.Vlach@threeriversparks.org>
Subject: Re: Request for Flap Gate Installation and Permit Access – Permit #25-262 (Lake Zumbra/Sunny Lake Culvert Project)

Hello Kristian,

Thank you for your email.

Please find this link to the study you referenced, as well as the proposed plans. You can also access the project plans on our public notice webpage, which was listed on the postcard.

Regarding your request that a flap gate be considered as part of the design, MCWD understands that you have also directed this request to Three Rivers Park District, which owns the infrastructure. Since you've already shared this request with Three Rivers Park District, and given MCWD's role as a permitting authority, it would be best to continue coordinating with them directly regarding any design considerations.

Best regards,
Abigail

Abigail Couture || **Permitting Technician** || www.minnehahacreek.org
15320 Minnetonka Blvd. Minnetonka, MN 55345 • 952.641.4587

MINNEHAHA CREEK
WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE

From: kristian dolan <kristian_dolan@hotmail.com>
Sent: Wednesday, July 9, 2025 2:01 AM
To: Abigail Couture <ACouture@minnehahacreek.org>
Cc: Kevin Lohmann <kevin.lohmann@gmail.com>
Subject: Re: Request for Flap Gate Installation and Permit Access – Permit #25-262 (Lake Zumbra/Sunny Lake Culvert Project)

You don't often get email from kristian_dolan@hotmail.com. Learn why this is important

Good morning Abigail.

I hope you had a good time off. Wanted to follow-up on the email below. It looks like you've been CC'd on the email from Brian (3 rivers) as well. Could you please follow-up on the requested items below so we have time to assess our options?

Thanks,

Kristian Dolan

612 483 1210

From: kristian dolan <kristian_dolan@hotmail.com>
Date: Tuesday, July 8, 2025 at 6:52 AM
To: acouture@minnehahacreek.org <acouture@minnehahacreek.org>
Cc: Kevin Lohmann <kevin.lohmann@gmail.com>
Subject: Request for Flap Gate Installation and Permit Access – Permit #25-262 (Lake Zumbra/Sunny Lake Culvert Project)

Hi Abigail,

My name is Kristian Dolan, and I'm reaching out on behalf of the Zumbra Ridge neighborhood regarding the proposed culvert replacement project between Lake Zumbra and Sunny Lake (Permit #25-262), led by Three Rivers Park District.

Our community has been experiencing increased flooding due to water flowing from Sunny Lake into Lake Zumbra, which is accelerating shoreline erosion and causing property damage. We would like to formally request that a **flap gate solution** be considered as part of this project, one that allows water to flow from Lake Zumbra to Sunny Lake, but not in the reverse direction. We believe this could significantly reduce downstream flooding impact on our shoreline.

Additionally, we understand the Minnehaha Creek Watershed District conducted a study in 2014 related to this issue. Would you be able to share a copy of that report with us?

Lastly, the notice mentions a QR code for accessing the permit and site plans, but the QR code doesn't appear on the notice we received. I also visited the MCWD permits page and was unable to locate Permit #25-262. Could you please provide instructions or a direct link to access the relevant permit documents?

Thank you in advance for your time and assistance. I can be reached at 612-483-1210 or kristian_dolan@hotmail.com if further discussion is needed.

Best regards,

Kristian Dolan

Zumbra Ridge Neighborhood Representative

612-483-1210

kristian_dolan@hotmail.com

Outlook

Lake Zumbra and Sunny Lake (Permit #25-262)

From kristian dolan <kristian_dolan@hotmail.com>
Date Mon 7/7/2025 11:56 PM
To Permitting <permitting@minnehahacreek.org>
Cc Kevin Lohmann <kevin.lohmann@gmail.com>; Abigail Couture <ACouture@minnehahacreek.org>

Dear Permitting Team,

I'm writing to request a copy of the materials associated with **Permit #25-262**, regarding the proposed culvert replacement between Lake Zumbra and Sunny Lake in Victoria.

Could you please provide the permit documentation and any related site plans or supporting materials? Or how I can access this online?

Thank you for your assistance.

Best regards,
Kristian Dolan
612-483-1210
kristian_dolan@hotmail.com

Outlook

Re: Sunny culvert proposal

From Michelle Haroldson <michelleessene@yahoo.com>
Date Sat 7/19/2025 11:09 PM
To Abigail Couture <ACouture@minnehahacreek.org>
Cc Brian Vlach <brian.vlach@threeriversparks.org>; James Wisker <JWisker@minnehahacreek.org>; Kristian Dolan <kdolan@northteq.com>

Hi,
Thank you for your reply.

Whatever study was done in 2016 is now almost 10 years old. And who ever was representing our neighborhood at that time I believe was hoping for a larger solution than the one offered. Doing nothing about the culvert has not been acceptable, and given the work now being done we deserve reconsideration rather than only pointing to discussions from almost a decade ago.

As the climate changes and storms become more severe, we deserve more than a rubber stamp - I believe that is what your postcard was asking for - some feedback or ability to raise concerns? The concerns were primarily previously addressed by addressing beaver dams if I recall? Not the culvert as a whole.

Yes, many agencies are involved which means we effectively have no way to demand change or hold anyone accountable to the many things that affect lake levels and allow the system to back up to us with nowhere to go. Since 2016 we've also had the development of a massive neighborhood just in 1 mile away across hiway 7 with a crazy amount of impermeable surfaces that replaced farmland, the gutters & drains put into hiway 7 as it borders our lake that seem to route run off our way, the destruction of trees for an underground internet project on hiway 7 and more.

I believe in fact you DO make decisions all the time about land you do not own in regulating the level of lake minnetonka, which affects every bit of land above and below that lake.

I sincerely hope your request via postcard signals some interest in our concerns on lake Zumbra for the one spot we could protect ourselves from the entire watershed dumping into us.

~Michelle Essene Haroldson

> On Jul 10, 2025, at 4:12 PM, Abigail Couture <ACouture@minnehahacreek.org> wrote:
>
> Hello Michelle,

Thank you for your email.

The Three Rivers Park District submitted a permit application to the Minnehaha Creek Watershed District (MCWD) for our review of their project's compliance with our rules.

The MCWD has taken steps to address resident concerns with water levels. In 2016, MCWD convened the City of Victoria as a local land use authority, Carver County as an owner of infrastructure, Three Rivers Park District as an owner of land and infrastructure, and the Department of Natural Resources which oversees the regulation of water levels. This team participated in a study to analyze both the issues and a range of potential solutions, the results of which were shared through numerous points of engagement with the Zumbra Ridge residents.

This work identified prospective roles for the agencies, which identifies MCWD as providing permitting direction, recognizing that any project to change system hydraulics affects infrastructure and land not owned by MCWD.

Best regards,
Abigail

Abigail Couture || **Permitting Technician** || www.minnehahacreek.org

15320 Minnetonka Blvd. Minnetonka, MN 55345 • 952.641.4587

MINNEHAHA CREEK
WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE

From: Michelle Haroldson <michelleessene@yahoo.com>
Sent: Saturday, July 5, 2025 9:42 AM
To: Abigail Couture <ACouture@minnehahacreek.org>
Subject: Sunny culvert proposal

[You don't often get email from michelleessene@yahoo.com. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

Hello,
Who submitted the permit to leave the culvert size and elevation unchanged between zumbra and sunny?
Our lake Zumbra neighborhood ends up having high water and flooding in our neighborhood regularly- and that culvert was an unnatural choke point when it was first installed over an existing wetland.
Why isn't the watershed taking the opportunity to fix what has been an ongoing issue ever since it was installed?
When the watershed gets full, you are aware we are the end of the line and become a holding tank for the whole watershed system effectively as seen on your map if you reverse

the arrows.

~Michelle Essene Haroldson

Attachment F:
TRPD 100-Year Floodplain Modeling Analysis

moore engineering, inc.

Two Carlson Parkway, Ste 110, Plymouth, MN 55447
P: 612.355.7726

Memorandum

Date: May 20th, 2025

Prepared By: Dan Elemes, PE
Quentin Scott, PE
Jeff Madejczyk

Project: Zumbra Lake Outlet, Three Rivers Park District
Subject: Design Summary Memo

Narrative:

Three Rivers Park District (Park District) hired Moore Engineering, Inc. (Moore) to evaluate a lake outlet in Victoria, MN. The outlet is located between Lake Zumbra (Zumbra) and Lake Sunny (Sunny) and is currently a 24-inch culvert. Figure 1 shows the culvert location. The culvert is at the end of its serviceable life. Additionally, due to local concerns regarding Zumbra water levels, the Park District desires to determine whether outlet modifications could reduce high water levels on Zumbra, while addressing maintenance concerns with the existing culvert including vegetation clogging and beaver activity. This memorandum describes Moore's evaluation of potential outlet improvements and what effect these improvements have on water levels in the combined Zumbra and Sunny basins.

Figure 1: Project Location

Existing Conditions

There is currently a paved asphalt trail that separates Zumbra and Sunny with a 24-inch corrugated steel pipe connecting the two lakes. Historically the Sunny-Zumbra complex was a single basin, as shown in Figure 2. The existing culvert has historically been prone to clogging due to vegetation and beaver activity near the crossing location which necessitates frequent maintenance from Park District staff. The culvert is aging and shows signs of rust and cracking and could fail causing the trail overtop of the culvert to also fail. The local perception is that the culvert is undersized, causing too high of water levels on Zumbra during storm events.

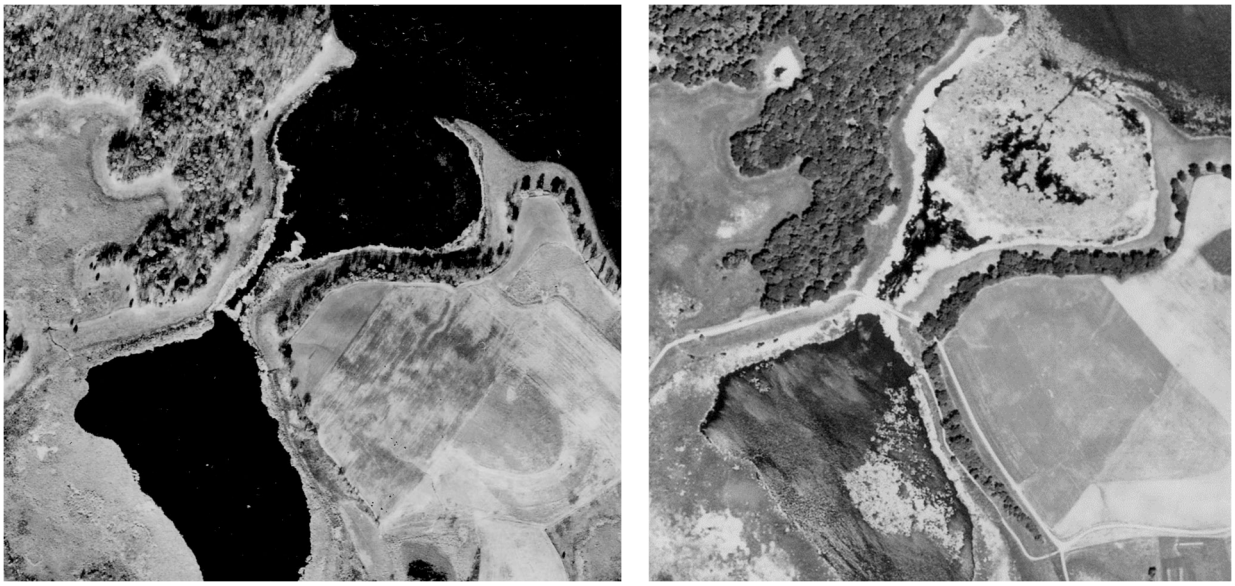


Figure 2: Open Channel in 1957 Aerial Image (left) and Berm with Trail in 1963 Aerial Image (right)

The Sunny-Zumbra complex flows north to south. After water flows from Zumbra into Sunny through the 24-inch culvert, water drains through Sunny through a 36-inch culvert. The 36-inch culvert is at a higher elevation than the 24-inch culvert beneath the trail. Table 1 summarizes the elevation of relevant features in the Sunny-Zumbra complex, which is a MnDNR public water. Due to its historic connectivity, the Sunny-Zumbra complex is considered a single basin, with a constant ordinary high-water level (OHW) and single public water number (100041-00) for both basins. The outlet in the southeast corner of Sunny controls the permanent pool depth for both basins, and presumably is the MnDNR-regulated "water controlling structure" for both the Sunny and Zumbra lobes of the complex.

Table 1: Existing Sunny-Zumbra Elevation Summary

Feature	Elevation (NAVD88)
Sunny-Zumbra Equalization Culvert	940.1
Sunny Outlet Culvert	941.2
Zumbra Water Level at Survey	941.3
Sunny Water Level at Survey	942.2
Ordinary High Water Level	943.2

Proposed Conditions Considered

Moore considered four potential improvements to the existing connection between the two basins under the trail to address water level and maintenance objectives: a.) Replace in kind, with a 24-inch metal pipe, b.) a larger metal pipe, c.) a box culvert, or d.) an open span pedestrian bridge. The

pedestrian bridge was identified as a review of historic aerial imagery shows Sunny and Zumbra used to be connected by an open channel.

Methodology

Moore received an existing XPSWMM model from Minnehaha Creek Watershed District (MCWD). The model was developed and maintained by MCWD and includes the entire Minnehaha Creek Watershed. Moore truncated the model to focus on the Six-Mile Creek (SMC) Subwatershed, which included the project area, see attached Exhibit 1 for modeled watersheds. Three alternative scenarios were modeled to replace the existing culvert: installing a new larger circular culvert, installing a new box culvert, and installing a new pedestrian bridge. Resulting highwater levels (HWL) are summarized in Figure 2 below for the 100-yr storm.

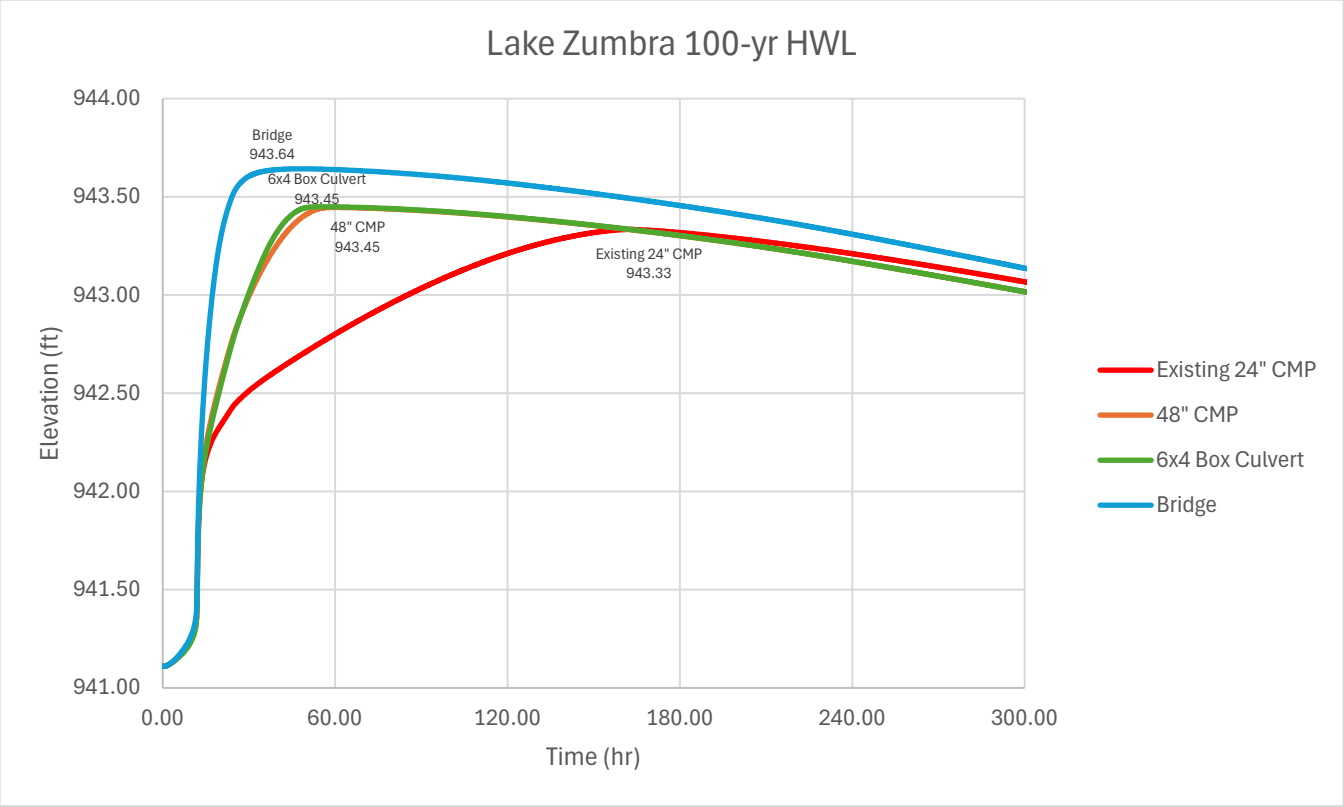


Figure 3: Lake Zumbra 100-yr HWL

These initial findings may seem somewhat counterintuitive, as increasing the size of the pipe had the opposite effect as anticipated, increasing high water levels on Zumbra. Upon further analysis, Moore determined the drainage area to Zumbra is 524 acres, whereas the drainage area to Sunny is nearly three times larger, at 1,446 acres (2,851 acres if Zumbra's watershed is included). This upstream drainage area is shown in the attached Exhibit 1. With Sunny receiving the much larger area, the culvert connecting Sunny and Zumbra backflows from Sunny into Zumbra. This was shown in the model and is consistent with Park staff observations. Additionally, when Moore staff collected survey data, the water level on Sunny was approximately one foot higher than the water level on Zumbra, and backflow was observable through the culvert; in the week prior to Moore survey staff mobilizing to the site the Sunny-Zumbra watershed received approximately 1.7-inches of precipitation. As a result of the backflowing, increasing the size of the connection between the lakes would allow for a larger volume of water to enter Zumbra, increasing the HWLs within the lake, as shown in Figure 2.

Moore did consider a variety of scenarios of altering the culvert's invert elevations, specifically for the box culvert alternative, to see if there was a combination of size and elevation that would: a.) provide a more easily maintained crossing, b.) maintain no-rise conditions (±0.00-feet for the 100-year high water level), and c.) still be lower than Sunny's outlet, which is at a higher elevation than the culvert that connects Zumbra to Sunny. This combination of objectives proved to be infeasible; the closest iteration still showed one tenth of rise in Zumbra.

During the design phase of this project a different project was being designed that would affect a culvert downstream of Zumbra. The project was along CSAH 11/Victoria Drive and replaced the culvert that outlets watershed SMC-25 in MCWD's XPSWMM model which is the next downstream watershed of Lake Sunny. Moore received an updated MCWD model with the proposed changes to ensure the two projects were incorporated into a cohesive model. The updated model did not affect the decision to replace the Zumbra-Sunny culvert in kind.

Based on the initial findings, and the sensitivity of managing high water levels on Zumbra, it was determined that the culvert would be replaced in kind to ensure the project does not result in an increase of water levels on private property. It was decided that the culvert would be centered on the trail between the lakes. Changing the location did not affect the high water levels as the inverts, material, and length were kept the same but this new location has less vegetation and will help with the clogging issues the current culvert faces.

Conclusion

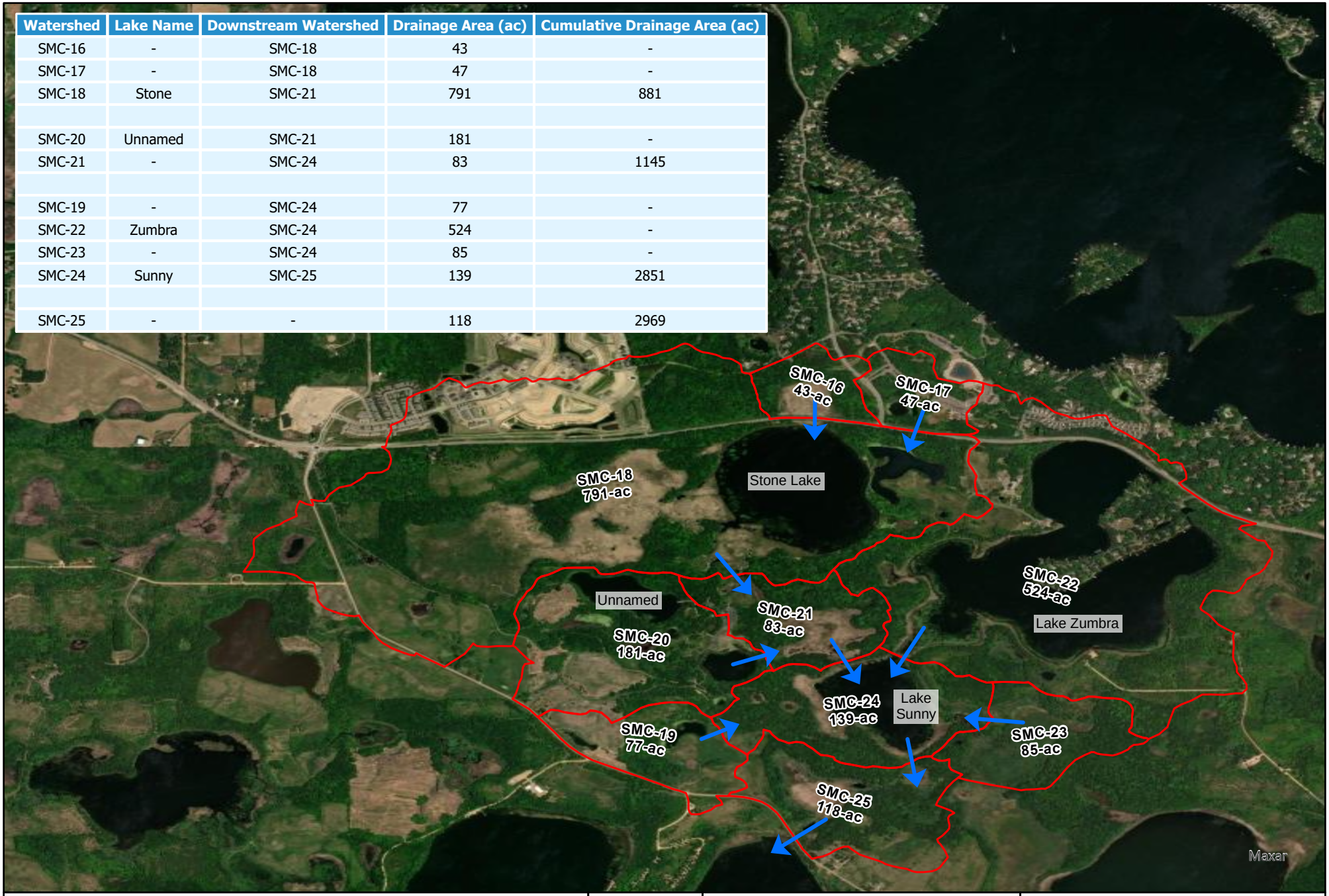
Park District staff identified an aging culvert for replacement that connects Zumbra and Sunny Lakes. The culvert is at the end of its serviceable life and requires frequent maintenance. The purpose of this evaluation was to explore options to replace the culver that would reduce maintenance efforts and address private landowner concerns regarding water level management within the basins. However, based on XPSWMM model results and observed onsite conditions, replacing the culvert with a larger pipe or structure will raise the water levels within Zumbra. Therefore, it was determined that the culvert should be replaced with a pipe with equivalent capacity.

Attachments

1. Watershed Map for Zumbra-Sunny Complex

Attachment 1

Watershed	Lake Name	Downstream Watershed	Drainage Area (ac)	Cumulative Drainage Area (ac)
SMC-16	-	SMC-18	43	-
SMC-17	-	SMC-18	47	-
SMC-18	Stone	SMC-21	791	881
SMC-20	Unnamed	SMC-21	181	-
SMC-21	-	SMC-24	83	1145
SMC-19	-	SMC-24	77	-
SMC-22	Zumbra	SMC-24	524	-
SMC-23	-	SMC-24	85	-
SMC-24	Sunny	SMC-25	139	2851
SMC-25	-	-	118	2969



WATERSHED DRAINAGE FLOWPATHS
LAKE ZUMBRA OUTLET

Created By: GIS Date Created: XX/XX/20 Date Saved: 05/22/24 Date Plotted: N/A Date Exported: 06/05/24
Plotted By: Parcel Date: XX/XX/20 Aerial Image: 2019 County NAIP SIDS Elevation Data: Lidar
Horizontal Datum: GCS WGS 1984 Vertical Datum: NAVD1988
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moore engineering, inc.