MINNEHAHA CREEK
WATERSHED DISTRICT
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Meeting: Board of Managers
Meeting date: 2/24/2022
Agenda Item #: 11.1
Action type: Action

Title:	Approval of 60% Design for 325 Blake Road Restoration and Redevelopment
Resolution number:	22-010
Prepared by:	Gabriel Sherman, Planner-Project Manager (952) 641-4510 gsherman@minnehahacreek.org
Reviewed by:	Michael Hayman, Project Planning Manager
Recommended action:	Board approval of the 60% design submittal, including plans; specifications; opinion of probable cost; Operations, Maintenance, and Monitoring Plan; and design memorandum, with Board feedback to be incorporated at the 90% design phase
Schedule:	March 2022 – Authorization to execute a purchase and sales agreement with Alatus March 2022 – Authorization to submit Point Source Implement Grant application Second Quarter 2022 – Approval of 90% design Summer 2022 - Final design and project bidding
Budget considerations:	N/A

Past Board action:

Res # 20-066	Authorization to Execute a Cooperative Agreement with the City of Hopkins for Coordinated Planning, Improvements and Development for 325 Blake Road
Res # 20-067	Authorization to Release the Request for Proposals for Design Services for 325 Blake Road Stormwater Management and Site Restoration
Res # 20-083	Authorization to Contract for Site Survey for 325 Blake Road Regional Stormwater and Greenway Project
Res # 20-091	Authorization to Contract for Design Services for the 325 Blake Road Regional Stormwater and Greenway Project
Res # 21-063	Acceptance of 30% Design for 325 Blake Road Restoration and Redevelopment
Res # 21-075	Approval of Phase II Design Contract for 325 Blake Road Restoration and Redevelopment

*The Resolutions listed above are specific to the design process and selection of design services. A full history of Board decisions related to the project is available.

Summary:

Background

In December 2020, Minnehaha Creek Watershed District (MCWD) contracted with HDR to provide design and engineering services to advance its stormwater and greenway project at 325 Blake Road and adjacent Cottageville Park properties in Hopkins. The design process has been phased, with the Phase I contract covering project initiation through schematic design and the Phase II contract scoped to bring the project from schematics through final design. Phase I work was completed in September 2021 with Board acceptance of schematic designs, and the Phase II scope of work and contract were authorized in November 2021. At the February 24, 2022 Board meeting, staff will present the draft 60% design submittal for the Board's consideration.

Design Process

Phase I design included significant foundational technical work as well as broad stakeholder engagement, both of which built off prior work undertaken to characterize the site's water resource and societal potential. Listening sessions, surveys, and open houses in early 2021 helped re-establish and refine the specific goals the community, MCWD, and the City of Hopkins (City) held for the site. In July 2021, a design charrette was held in conjunction with MCWD's and the City's selected developer, Alatus, LLC. Findings from the stakeholder engagement process and preliminary stormwater engineering studies were used to sketch MCWD's stormwater and greenway project and demonstrate how Alatus' transit-oriented development could be merged with that design. Representatives from regional agencies with an interest in the project were invited to provide real time input on the emerging designs.

The first Phase II deliverable is 60% design, which incorporates feedback received on the schematic design from the Board and staff, as well as preferences gathered through several community engagement events. MCWD participated in a neighborhood meeting hosted by Alatus in November 2021 to collect ideas on the schematic design and hosted a 60% design virtual community meeting in January 2022. Both events included preference surveys, which were also made available online in English and Somali after the meetings. Two informational sessions and preference surveys were also conducted with students at Hopkins West Junior High to bring youth perspective to the site, a demographic that was under-represented during other community events. The designs have continued to respect the direction set at the July 2021 charrette to allow for seamless integration with the Alatus development, while independently achieving the project goals established by the Board and community.

The Board has maintained active involvement in project design through the selection of the design consultant, participation in the listening sessions and charrette, and providing feedback at Committee and Board design briefings. In between these milestones, Board liaisons appointed to the design process have provided an additional level of review and strategic guidance to project staff through regular design meetings and workshops. A separate Board liaison group has guided the developer selection process.

<u>60% Design</u>

Baseline and Alatus Alternatives

Two alternatives were produced as part of the schematic design: 1) a Baseline Alternative which built out MCWD's stormwater and greenway project and reserved a portion of the site for a future transit-oriented development (TOD), and 2) an Alatus Alternative which merged MCWD's stormwater and greenway project with Alatus' proposed TOD. Throughout late 2021, Alatus rapidly advanced the design of its development to secure land use entitlements by the end of 2021, which allowed MCWD's 60% design to proceed along the Alatus Alternative while maintaining the ability to easily shift to the baseline alternative if necessary.

Project Components

The major components of the project are broken out below to demonstrate that portions of the project could be prioritized or constructed in phases if necessary. Designs for the stormwater pond and associated infrastructure have currently been fast-tracked to meet critical grant deadlines, while the Nature Play Area and Gateway Plaza are proceeding at a more measured pace to allow for future collaboration with Alatus and Hopkins.

Stormwater

At the heart of MCWD's capital project is the regionalization and treatment of 270 acres of stormwater that currently empties untreated into Minnehaha Creek. This stormwater will be brought to the 325 Blake Road site through two diversion pipes (already constructed) and treated in a stormwater pond in the eastern portion of the site. The pond is designed to be functional yet aesthetically pleasing for users of the Minnehaha Creek Greenway trail extension and future residents of the private development. The pond is currently designed to tie into the Alatus development through a pump and cascade system, which offsets the volume of the pond reduced by the development footprint and provides added water quality benefits.

Greenway and Trails

Another core element of the project is the extension of the Minnehaha Creek Greenway, providing a connection through the site between the Cedar Lake LRT Regional Trail and Cottageville Park. The design includes a ten-foot bituminous trail running from the Cedar Lake LRT Regional Trail, along Minnehaha Creek and the stormwater pond, across Minnehaha Creek via a pedestrian bridge, and finally to Lake Street to connect to Cottageville Park. The Greenway will be

bookended with the Trailhead at the Cedar Lake LRT Regional Trail intersection and the Gateway at the Lake Street and Blake Road intersection to welcome and orient users.

Greenway Activity Nodes
In addition to the Gateway and Trailhead, the design includes two distinct activity nodes along the Greenway trail to provide users with connections to the creek and places to gather, while protecting the integrity of the riparian corridor. The Landing is located adjacent to Minnehaha Creek on the 325 Blake Road parcel and will accommodate non-motorized watercraft users, as well as provide picnic areas and more contemplative spaces. The Nature Play Area will be located on the Cottageville parcel immediately downstream of the Lake Street bridge and will be connected to the main 325 Blake Road parcel by a pedestrian bridge across Minnehaha Creek.

60% Submittal
In addition to the drawing set, the 60% design submittal includes draft:

- Specifications: Draft construction specifications based on 60% drawings
- Opinion of Probable Cost: Refined cost estimates based on 60% drawings
- Operations, Maintenance, and Monitoring (OMM) Plan: A draft OMM plan detailing annual and long-term operations and maintenance, including an inspection plan, lifecycle expectations, and maintenance costs
- Design Memorandum: Documents technical data, studies, and community engagement supporting the design.

Each of the above documents will be updated with additional detail as design progresses through 90% and final design.

Next Steps
At the February 24, 2022 Board meeting, staff will present the 325 Blake Road Restoration and Redevelopment draft 60% design and seek Board feedback and acceptance of the proposed plans and supporting documentation. Board feedback will be combined with staff's review and used to refine the 60% design and produce the 90% design submittal.

In March, staff intends to submit plans and specifications for the regional stormwater system to the Minnesota Pollution Control Agency to be certified by June 30, 2022 for the Minnesota Public Facilities Point Source Implementation Grant Program. A purchase and sales agreement with Alatus is nearing completion and is also currently scheduled for Board consideration in March. The purchase and sales agreement will provide the framework for determining if MCWD's project (or a portion of it) could be jointly bid with the larger development to achieve cost efficiencies. In preparation for either jointly or independently bidding MCWD's project, final designs for the main 325 Blake Road parcel are schedule to be completed in Summer 2022. Interpretive and artistic elements may advance on an extended timeline to allow for maximum coordination with project partners. The following is a general timeline of the next steps:

- Authorization to submit PSIG application – March 2022
- Authorization to execute purchase and sales agreement with Alatus – March 2022
- Approval of 90% design – Second Quarter 2022
- Final design and project bidding – Summer 2022

Supporting documents:
The draft 60% design package is comprised of the following documents:

- Design Memorandum (attached)
- Opinion of Probable Cost (attached)
- 60% drawing set (attached)
- Operations, Maintenance, and Monitoring (OMM) Plan (attached)

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RESOLUTION

Resolution number: 22-010

Title: Approval of 60% Design for 325 Blake Road Restoration and Redevelopment

WHEREAS the Minnehaha Creek Watershed District (MCWD) acquired 325 Blake Road, Hopkins, MN in 2011 as a key piece of the Minnehaha Creek Greenway in St. Louis Park and Hopkins;

WHEREAS the MCWD is implementing a regional stormwater project at 325 Blake Road to treat polluted stormwater that flows into the creek from approximately 270 acres of surrounding area and to restore more than 1,000 feet of creek frontage and is planning for this work with three accompanying Cottageville Park parcels bordering the creek, collectively the 325 Blake Road Regional Stormwater and Greenway and Cottageville Park Phase II Riparian Restoration Project. The project is commonly referenced by its shortened title "325 Blake Road Restoration and Redevelopment";

WHEREAS as of March 2020, the construction of both the Powell Road and Lake Street stormwater diversion systems are complete, with the diversion structures remaining bulk-headed until the treatment facility at 325 Blake Road is constructed;

WHEREAS on August 27, 2020, the MCWD Board of Managers authorized the execution of a Cooperative Agreement with the City of Hopkins for Coordinated Planning, Improvements and Development for 325 Blake Road (Res # 20-066);

WHEREAS on August 27, 2020, the MCWD Board of Managers approved the release of a Request for Proposals for Design Services for 325 Blake Road Stormwater Management and Site Restoration (Res # 20-067), which sought landscape architecture and engineering services to complete integrated stormwater management, ecological restoration, and public open space improvements at 325 Blake Road and accompanying parcels;

WHEREAS on December 3, 2020, the MCWD Board of Managers authorized final negotiation and execution of a contract for design and engineering services for the 325 Blake Road Restoration and Redevelopment project with HDR, Inc. (Res # 20-091);

WHEREAS due to project complexity and uncertainty, the MCWD Board of Managers determined it was prudent to contract for a scope of services that included an additional task not solicited in the RFP to further define the public realm and potential redevelopment footprints and re-scope the later stages of the project after a schematic design (30% design) was produced;

WHEREAS the MCWD conducted an extensive stakeholder engagement campaign to establish specific project and design goals, including a series of listening sessions with the community, MCWD Board of Managers, and Hopkins City Council (January – March 2021), community open houses (June – July 2021), preference surveys in English, Spanish, and Somali, and a design charrette with regional agency and development partners (July 13-14, 2021);

WHEREAS the MCWD Board of Managers accepted the 30% design memorandum and schematic design for 325 Blake Road Restoration and Redevelopment on September 23, 2021 (Res # 21-063) upon finding that HDR had satisfactorily completed the tasks and produced the deliverables included in the contract

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authorized by the MCWD Board of Managers on December 3, 2020; and that the schematic design satisfies all major project needs and accurately reflects the project goals defined in the Cooperative Agreement with the City of Hopkins for Coordinated Planning, Improvements and Development for 325 Blake Road;

WHEREAS MCWD staff presented the schematic design to the Hopkins City Council on October 12, 2021 and the Council expressed support for the design and design direction;

WHEREAS the MCWD Board of Managers found that it was prudent to advance all project elements from schematic design through final design and produce a construction phasing plan;

WHEREAS on November 4, 2021, the MCWD Board of Managers authorized execution of a contract for Phase II design and engineering services for the 325 Blake Road Restoration and Redevelopment project with HDR, Inc. (Res # 21-075);

WHEREAS the MCWD conducted further significant community engagement to inform the 60% design process, including participating in a neighborhood meeting hosted by development partner Alatus (November 15, 2021), hosting a virtual community meeting (January 24, 2022), and conducting informational session with students at Hopkins West Junior High (February 11, 2022). Surveys in English and Somali were available during the events and online for participants to express their preference for various project components;

WHEREAS the 60% design meets MCWD's project goals and HDR has satisfied the contractual terms associated with 60% design, including the production of plans; specifications; Operations, Maintenance, and Monitory Plan; design memorandum; and opinion of probable cost;

NOW, THEREFORE, BE IT RESOLVED that the Minnehaha Creek Watershed District Board of Managers approves the 60% design submittal for the 325 Blake Road Restoration and Redevelopment project produced by HDR, Inc., with Board comments on the 60% design to be incorporated at the 90% design phase.

Resolution Number 22- 010 was moved by Manager _____, seconded by Manager _____. Motion to adopt the resolution ___ ayes, ___ nays, ___abstentions. Date: February 24, 2022.

_____ Date: _____
Secretary

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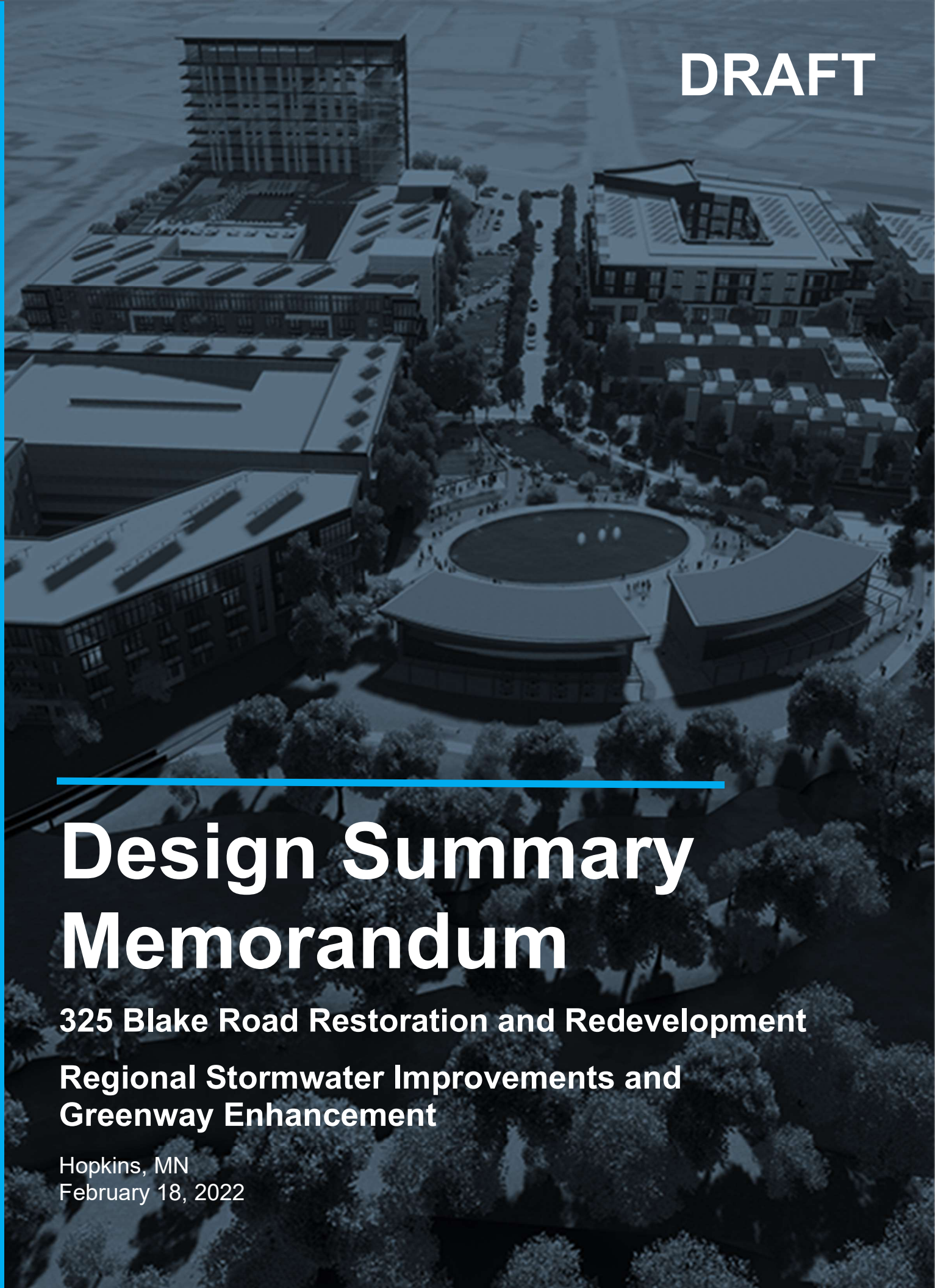

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Design Summary Memorandum

325 Blake Road Restoration and Redevelopment

Regional Stormwater Improvements and Greenway Enhancement

Hopkins, MN
February 18, 2022

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1. Executive Summary

Located adjacent to Minnehaha Creek, the *325 Blake Road Regional Stormwater and Greenway and Cottageville Park Phase II Riparian Restoration Project* is a multi-purpose project being developed to achieve key water quality and recreational goals of Minnehaha Creek Watershed District, along with several other public partners and the greater community. The project features a regional stormwater management facility that treats runoff from several hundred acres of land, the completion of the Minnehaha Creek Greenway, water-centric recreational opportunities, and is co-located with a mixed-use, transit oriented development.

Minnehaha Creek Watershed District has partnered with HDR, Inc., Damon-Farber Landscape Architects, and Inter-Fluve for the detailed design of the public realm development. Design goals include:

- Regionalizing stormwater runoff to improve the water quality of Minnehaha Creek and downstream waterbodies;
- Providing visual and physical access to a previously hidden portion of the creek;
- Increasing recreational opportunities associated with the creek;
- Completing the Minnehaha Creek Greenway by providing improved trail connections for watercraft, pedestrians, and cyclists.

The regional stormwater management facility consists of two stormwater detention ponds separated by a weir wall, located between the Minnehaha Creek Greenway Trail to the east, and a mixed-use private development to the west. The detention ponds are controlled by a multi-stage outlet structure that includes a low-flow orifice and a high-flow weir, with a box culvert located underneath the adjacent trail serving as an auxiliary overflow device. Through coordination with the developer, *Alatus, LLC*, the detention ponds also feature a wet well and pump that discharges stormwater to a cascade on the west side of the mixed-use development. The cascade provides additional stormwater treatment, ultimately discharging back into the detention ponds for recirculation and further water quality enhancement.

Visual and physical access to the creek and recreational opportunities are provided by several aspects of the project design. The Minnehaha Creek Regional Trail is situated between the regional stormwater management ponds and the creek. Key design features include a trailhead and overlook off the Cedar Lake LRT trail, a landing for watercraft using Minnehaha Creek that incorporates picnic areas and hammock poles, a pedestrian bridge to a nature-based play area in the triangular lot north of the creek and adjacent to Lake Street, and a gateway plaza to the Minnehaha Creek Greenway situated at the greenway's hinge point at Blake Road and Lake Street.

2. Project Introduction

Minnehaha Creek Watershed District (MCWD or the District), in partnership with the City of Hopkins (City) and several other public and private partners, is leading an effort to coordinate the planning, design, and redevelopment of the almost 17-acre parcel at 325 Blake Road and three accompanying smaller parcels at 415 Blake Road, 1308 Lake Street, and 1312 Lake Street in Hopkins, Minnesota.

Previously developed as industrial, commercial, or residential properties, these parcels are currently vacant. Adjoining each other, they form a combined site of nearly 18 acres (collectively known as the site). The parcel at 325 Blake Road formerly housed a large cold storage facility with extensive outdoor parking for tractor-trailer trucks. The parcel was purchased by MCWD in 2011 and the cold storage facility and parking lots were demolished in 2018. Situated across the creek from Cottageville Park, the other parcel on Blake Road is wedged between the creek, Blake Road, and Lake Street. It had formerly contained a commercial structure which hindered access and obscured views of the creek as thoroughly as the adjacent cold storage facility. The two parcels on Lake Street are also adjacent to the creek and were occupied by single-family residences before they were purchased and removed by the District. Consequently, access to the creek and public enjoyment of the waterway had been inhibited by their former adjacent land uses. All four parcels have now been cleared with only remnant vegetation remaining, creating the potential for unfettered access to the creek. In addition to these platted parcels, there is also one very small outlot sandwiched between the Lake Street bridge and the former residential properties that is included as part of the site.

Officially known as the *325 Blake Road Regional Stormwater and Greenway and Cottageville Park Phase II Riparian Restoration Project (the project)*, the District's is creating a transformative, water-centric development on this site adjacent to Minnehaha Creek premised on its vision of Balanced Urban Ecology. This process includes:

- Regionalizing stormwater runoff to improve the water quality of Minnehaha Creek and downstream waterbodies;
- Providing visual and physical access to a previously hidden portion of the creek;
- Increasing recreational opportunities associated with the creek;
- Completing the Minnehaha Creek Greenway by providing improved trail connections for watercraft, pedestrians, and cyclists.

Complementing the District's goals were additional goals of the City, including the desire to develop the site as a relatively high-density transit-oriented residential and commercial development.

This report documents the detailed design phase of the project which builds on the schematic design phase completed in 2021. The detailed design involves advancing the "Alatus alternative" from schematic design. This option includes full build out of the development, recreational/preservation features in the riparian corridor and two detention ponds separated by

a weir wall, which receive regional stormwater runoff from the Powell Road and Lake Street subwatersheds adjacent to the site. The project adopted a goal of treating stormwater from the first flush of pollutants, associated with the 1.25-inch storm event. The stormwater ponds were originally designed with sufficient water quality volume available to meet this objective; however the proposed development schematic encroached on the ponds as originally designed. In partnership with the developer, MCWD negotiated an alternative stormwater treatment process, which pumps and treats stormwater from the ponds to a location within the development where further water quality treatment occurs, compensating for pond encroachments.

In addition to the regional stormwater management, the project incorporates several key design elements adding to the recreational opportunities of the site. The design includes a trailhead and overlook off the Cedar Lake LRT, a landing for watercraft using Minnehaha Creek that incorporates picnic areas and hammock poles, a pedestrian bridge to a nature-based play area in the triangular lot north of the creek and adjacent to Lake Street, and a gateway plaza to the Minnehaha Creek Greenway situated at the greenway's hinge point at Blake Road and Lake Street. Elements of project design, construction, long-term operation, maintenance, and monitoring are detailed within this memorandum or the references cited.

Further information related to project planning and early stages of project coordination, outreach, and conceptual design are contained in the *Schematic Design Memorandum,* dated September 3, 2021. Community engagement and outreach has continued to occur throughout detailed design; the process and findings of which is summarized in separate deliverables submitted to MCWD.

3. Site Information

325 Blake Road is located at the southeast quadrant of the Blake Road North (CSAH 20) and Lake Street Northeast intersection; less than ¼-mile from both State Highway 7 to the north and Excelsior Boulevard (CSAH 3) to the south, and within one mile east of State Highway 169. The property is bounded by approximately 1,100-feet of Minnehaha Creek, 1,100-feet of Blake Road, and 1,200-feet of the Cedar Lake LRT Regional Trail and the future Southwest Light Rail Transit (SWLRT) corridor.

The Project is situated in the lower Minnehaha Creek watershed, approximately 7.3 river miles downstream of Grays Bay dam on Lake Minnetonka where the headwaters of Minnehaha Creek are formed, and approximately 11.5 river miles upstream of Lake Hiawatha. Minnehaha Creek's confluence with the Mississippi River is located roughly 13.9 river miles downstream of the project site. Six key influences define the character of the site and its potential for redevelopment. As detailed below, the key influences are: context, parcelization, land use, land cover, transportation, and utilities.

3.1 Context

The factor most influencing the character and development potential of the site is its context as defined by three regional patterns—patterns of nature, mobility, and development. Three corridors generated by these patterns converge on the site, forming the boundaries of the site's triangular shape (see *Figure 3.1: Regional Patterns.)*

Figure 3.1: Regional Patterns. *Three regional patterns exert strong influences on the character of the site and its potential for development.*

The dominant pattern that underlies the other two is the natural pattern created by the topography and hydrography of the Minnehaha Creek Watershed. Minnehaha Creek forms the site's northern and eastern edge, creating a strong, not easily crossed barrier. Only the Lake Street and Blake Road bridges offer access between the site and properties to its north and east. The site sits along a segment of Minnehaha Creek that is being ecologically restored to become a recreational attraction, including conservation efforts as part of this project's design. As the mid-point of the greenway, the site could become an ideal gateway to the greenway and the creek's recreational amenities. As Minnehaha Creek drains the surrounding landscape, it makes the site an ideal location for regional stormwater management.

Regionally, the site is situated in the City of Hopkins, a near western suburb of Minneapolis. The southern edge of the site is mostly impenetrable, defined by the existing Cedar Lake LRT Regional Trail and an existing freight rail line that funnel any crossing to properties south of the site to Blake Road. The new double-track Southwest LRT line will parallel the trail and rail lines, reinforcing the barrier. Despite the barrier, the trail and the LRT facilitate regional mobility. Geographically defined by its location as an attractive midpoint between the residential and commercial opportunities located in the expanding western suburbs and the inviting commercial center of the state, downtown Minneapolis, with its bustling business and vibrant residential districts. Consequently, the LRT station proposed at Blake Road will promote access to the site, creating a destination for residential, commercial, and recreational development.

The site's western edge is formed by Blake Road, a busy four-lane collector with access to the site only at 2nd Street, where it is controlled by a signalized intersection and semaphore, and Lake Street which controls access to Blake Road only with a 2-way stop sign on Lake Street. The site's western edge is semi-permeable, providing access to the larger pattern of urban development that will influence the character of the site's own development.

Since the beginning of the project, it was anticipated that the confluence of the three regional patterns on the site would affect the layout and character of the site's design. As the development process continued, and as the initial phase culminated during the Design Charrette, it became increasingly obvious that the influence of regional natural patterns as represented by Minnehaha Creek would create an edge along the creek that would be dominated by natural features. Similarly, the edge influenced by regional patterns of mobility would create an edge responsive to the Cedar Lake LRT Regional Trail and the Blake Road LRT Station. The edge adjacent to Blake Road would be most influenced by existing and proposed urban development resulting in the concentration of buildings along that western edge of the site. (See *Figure 3.2: Site Influences.)*

Figure 3.2: Site Influences. The layout and character of each edge of the site will be heavily and distinctly influenced by one of the regional patterns.

3.2 Parcelization

The project site is comprised of 4 parcels and one outlot that total 17.81 acres (see *Figure 3.3: Site Parcels*).

- Parcel A: 325 Blake Road N consists of 16.84 acres, including nearly 1.5 acres of riparian woodland buffer along 1,100 feet of Minnehaha Creek.
- Parcel B: 415 Blake Road N consists of approximately 0.48 acres of an open site wedged between the creek, Blake Road, and Lake Street. The parcel slopes to 150 feet of Minnehaha Creek frontage.
- Parcel C: Outlot. A small 0.16-acre outlot, located across Minnehaha Creek from the primary parcel with a narrow riparian woodland buffer has approximately 100 feet of creek frontage.
- Parcel D: 1308 Lake Street NE consists of 0.14 acres, located across Minnehaha Creek from the primary parcel, a mostly open, former residential, parcel with a narrow riparian woodland buffer along 50 feet of Minnehaha Creek.
- Parcel E: 1312 Lake Street NE consists of 0.19 acres, located across Minnehaha Creek from the primary parcel, a mostly open, former residential property with a narrow riparian woodland buffer along 50 feet of Minnehaha Creek.

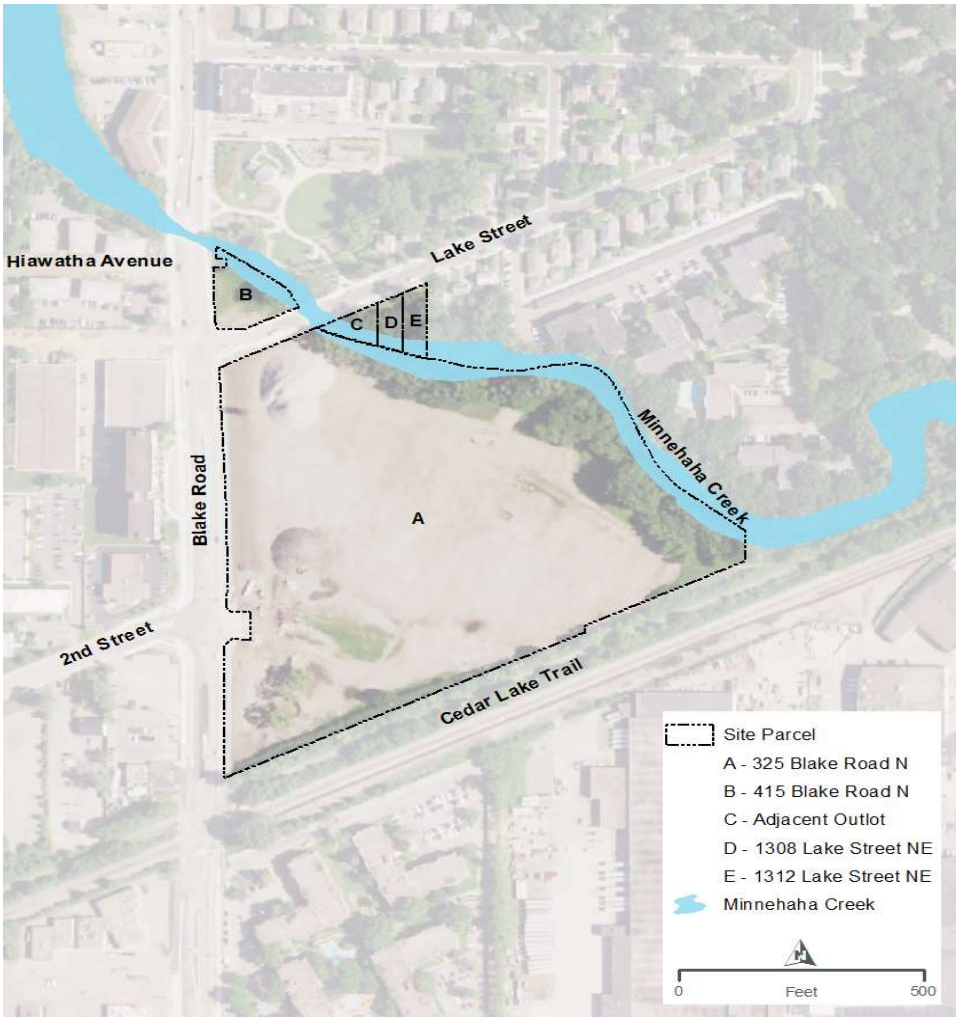


Figure 3.3: Site Parcels. The site is composed of five adjoining, mostly vacant, parcels.

3.3 Land Use

The site is located near the middle of the Minnehaha Creek Greenway; a restored and revitalized ecological and recreational corridor of Minnehaha Creek that meanders through portions of Hopkins and St. Louis Park. Nearby land use includes residential, commercial, industrial, institutional, and transportation infrastructure all of which complement the proposed mixed-use development envisioned by the City. Existing significant landmarks and attractions nearby, including Downtown Hopkins (1.5 miles southwest), Knollwood Mall (0.5 miles north), Cottageville Park (located across the creek from the site), Minnehaha Preserve (0.75 miles east), and Methodist Hospital (1.0 miles east), make the location particularly attractive to commercial and residential development.

3.4 Land Cover

Before the site was cleared for stormwater management and redevelopment, the primary site had been occupied by a cold storage facility. The demolition of that facility in 2018 provided the opportunity to repurpose the parcel in accordance with the vision of MCWD and the City. The cold storage facility consisted of a 6.3-acre building and 5.7 acres of adjacent parking and

driving surfaces, which combined to cover 12 acres of land with impervious surface. The majority of the current site is vacant with aggregate surfacing and sparse vegetation with a wooded riparian buffer covering roughly 1.5 acres along Minnehaha Creek. The district is also storing two large stockpiles of crushed concrete/pavement in the northwest corner of the site. This material will be sold to a local contractor or sourced by the developer's contractor during development. Remaining outlot parcels are also vacant covered with mostly grass and scattered older trees. With the exception of maintaining a vegetative buffer along the creek, the prior impervious landcover will allow redevelopment to proceed with more flexible design and performance criteria to meet regulatory requirements than if the site were previously undeveloped.

3.5 Transportation

Providing transportation access and mobility is key to the successful redevelopment of the site. Two of the site's three sides are flanked by transportation corridors, providing it with excellent access and mobility. To the west is Blake Road. Classified as a Major Collector by the City of Hopkins' 2040 Comprehensive Plan, it has an average annual daily traffic (AADT) of approximately 12,200 vehicles. It operates as a significant north-south corridor for local vehicular traffic and active transportation connecting the site to the metropolitan region and locally to destinations along Blake Road, Excelsior Boulevard to the south, and Minnesota Highway 7 to the north. It supports bus routes and its sidewalks will provide the "last mile" for pedestrians walking between the site and the future Blake Road LRT Station.

The south edge of the site is flanked by a multimodal transportation corridor. The corridor is comprised of three parallel facilities. The closest to the site is Cedar Lake LRT Regional Trail. It is an active transportation facility managed by Three Rivers Park District to promote walking, bicycling, skating, and—as allowed by law—selected forms of electrically powered mobility. It promises to be a significant commuting and recreational connection drawing bicyclists and other active transportation users to and from the site. The trail extends west to downtown Hopkins where it connects to several other trails that serve the western suburbs. Similarly, it extends east into Minneapolis and that city's extensive trail system. Consequently, the Cedar Lake LRT Regional Trail provides a level of service for active transportation users similar to that which Blake Road provides motorists—access to the larger metropolitan region.

Offset south approximately 70 feet and parallel to the trail is an active single track freight railroad. It acts primarily as a barrier, blocking access between the site and locations south of the train tracks and funneling any crossing to Blake Road.

Parallel to the railroad and offset an additional 50 feet south will be the location of the double-track Southwest Light Rail Transit (SWLRT) line. Like the tracks for freight trains, the rails for the SWLRT line will hinder access and mobility, relegating crossings to Blake Road. Currently under construction, the SWLRT will include a transit station in the southwest quadrant of the intersection of the LRT tracks and Blake Road. With the addition of a tunnel under Blake Road and traffic signals at 2nd Street, pedestrian access between the site and the Blake Road Station will be excellent, making the site a prime location for Transit Oriented Development (TOD).

Minnehaha Creek borders the east side of the 325 Blake Road parcel. Although not a traditional transportation corridor, the creek is considered a water trail for recreational watercraft. As a water trail, it provides people with an alternative to safely crossing the bicycle trail, the freight railroad, and LRT tracks that impede travel to destinations south of the site. Between Louisiana Avenue and Blake Road, this creek crossing is the only opportunity to safely cross the transportation facilities that flank the south side of the site.

3.6 Utilities

According to a survey performed in January 2020, utilities associated with the 325 Blake Road parcel include inactive sanitary sewer and natural gas utility lines located near the north edge of the site, which connect to utility mains under Lake Street. Storm sewers from Lake Street and Powell Road are currently bulkheaded, but designed to discharge onto the site from the north and southeast edges of the site, respectively. Two sampling wells are located within the main parcel. Public utilities, including overhead electric lines, underground electric lines, underground communication lines, and similar utilities are located along Blake Road, Lake Street, and near the Cedar Lake LRT Regional Trail. Overhead utilities adjacent to the site currently detract from the site's visual quality. It is anticipated that all overhead utilities will be buried during the site's redevelopment. The survey does not show any utilities within the proposed stormwater management area except the monitoring wells, which will be removed or abandoned during construction.

4. Existing Information

4.1 Prior Studies and Information

Since the Project's initiation in 2013, several studies, models, and reports have been developed that assess and document key findings related to stormwater management at the Project. *Table 4.1* contains a list of major items referenced throughout the project design.

Data Description	Data Source	Date of Record
Assessment of pollutant loading, biology, and habitat	DRAFT Stormwater Management Feasibility Study for 325 Blake Road North, Hopkins, MN	July 2013
Summary of pollutant loading estimates	325 Blake Road Market Analysis Pollutant Loading Study	Nov. 2013
Groundwater and geotechnical parameters	Baseflow Restoration in Minnehaha Creek Watershed with Stormwater Infiltration report	2013
Hopkins Lift Station L27 storm sewer design update memo	Hopkins Lift Station L27 Storm Sewer Design Update Memo	Aug. 2015
Powell Road storm sewer diversion record drawings	Powell Road Storm Sewer Diversion Project Record Plans	Nov. 2015
Runoff volume estimates and groundwater elevations	Storm Water Treatment Concepts at 325 Blake Road Technical Memorandum	Jan. 2016
Regulatory floodplains	Flood Insurance Rate Map (FIRM) Panel 342	Nov. 2016
Soil boring records	DRAFT Phase I Environmental Site Assessment, Appendix H	Aug. 2017
Water quality monitoring results	Powell Rd. and Lake St. Water Quality Analysis Technical Memorandum	Aug. 2018
Prior Utility Demolition	Hopkins Cold Storage Demolition Project	Jul. 2018
Runoff volume estimates and modeled pollutant loading	325 Blake Water Resources Concept Analysis	Oct. 2019
Tree survey	STN Tree Survey	Jan. 2020
Topographic survey	ALTA/NSPS Land Title Survey	Jan. 2020
Lake Street storm sewer diversion record drawings	HIS Contract D – Lift Station L27, Meters M123A & M123B	Mar. 2020
Wetland Delineation	Stantec Consulting Services 325 Blake Road Site Wetland Delineation Report	Nov. 2021
Minnehaha Creek hydrology and hydraulics	Lower Watershed 100-year XP-SWMM Model	--
Powell Road subwatershed hydrologic and hydraulics	Powell Road Diversion HydroCAD Model	--

Table 4.1: Summary of Data Acquired. Studies, models, reports, record plans, models, and other data are critical to project planning and design.

The studies and information included evaluations of regional subwatershed sizes and land covers, surface water and groundwater characteristics, potential for pollutant reduction via regional stormwater management BMPs, potential stormwater BMP schematics, and estimated Project costs. Consideration was given to these studies, and the results leveraged as appropriate in context with current discussion and knowledge of the site.

4.2 Stormwater Drainage

The regional stormwater that will be treated by the project's proposed stormwater management facility is largely driven by two storm sewer diversion structures that direct water towards the Site. The stormwater diversion was first initiated by the District in 2013 and includes the diversion of two regional drainage areas to the Site:

- Powell Road subwatershed, which primarily consists of impervious industrial land use with nearby residential and ball fields. The Powell Road subwatershed drains 226 acres of regional stormwater runoff to the Site.
- Lake Street subwatershed, which primarily consists of impervious transportation land use. The Lake Street subwatershed drains 30.3 acres of regional stormwater runoff to the Site.

The Powell Road and Lake Street diversions are first-flush diversions. As such, they were constructed to divert runoff from smaller storms as well as the first flush from larger storms, which contain the majority of pollutants (see *Figure 4.1: Storm Sewer Diversions*). When the diversions reach capacity, the remaining overflow continues downstream in the mainline storm sewer piping and does not flow to the Site.

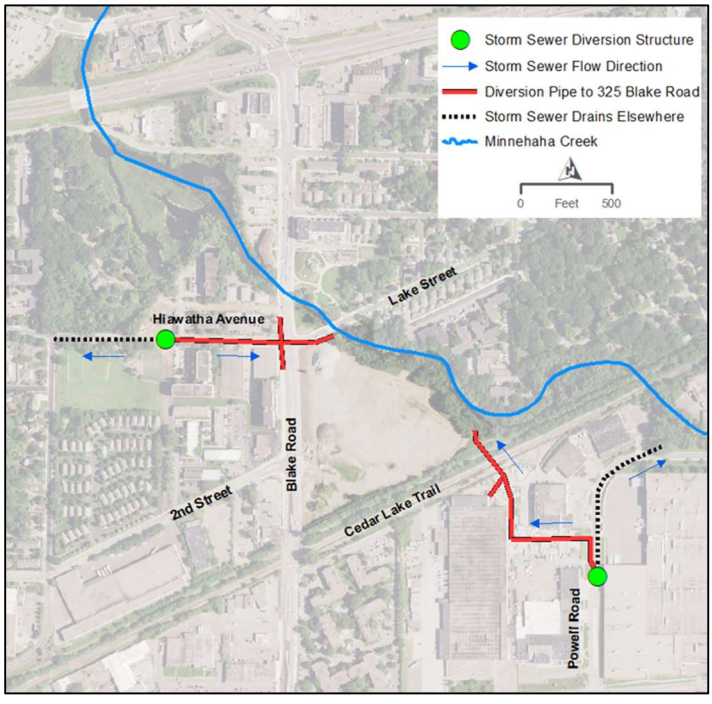


Figure 4.1: Storm Sewer Diversions. Stormwater collected from Powell Road and Lake Street is diverted to the site. When the diversions reach capacity, excess runoff discharges to separate locations.

Site stormwater runoff originates from local high points at the property's border with Lake Street, Blake Road, and the Cedar Lake LRT Regional Trail. These boundaries' conditions range from approximate elevations between 909' to 912' at Lake Street, 912' to 919' along Blake Road, and 911' to 919' along the Cedar Lake LRT Regional Trail. Each site boundary begins with a relatively steep slope down to the property, which transitions to a relatively flat (approximately 1 to 3 percent) grade across the majority of the site, sloping gradually toward Minnehaha Creek.

The importance of stormwater management associated with the Project is emphasized by the regional drainage systems described above, along with the close proximity of the Project to Minnehaha Creek. As an integral part of the regional greenway, the Project offers a unique opportunity to showcase stormwater management, provide visual access to Minnehaha Creek, and develop Balanced Urban Ecology.

4.2.1 POWELL ROAD DIVERSION

According to the District's HydroCAD model and review of record drawings, the Powell Road Diversion consists of a series of storm sewer pipes that drain approximately 226 acres of land. The HydroCAD model was modified by HDR to reflect the diversion condition shown in the Powell Road Diversion construction record drawings (Wenck, 2015). The Powell Road subwatershed is predominantly characterized by developed industrial and residential land use, with minor areas of developed turf grasses (e.g., baseball fields, parks, and landscaped areas).

The Powell Road Diversion structure consists of a 10-ft diameter drainage structure with a 48" reinforced concrete pipe (RCP) inlet. A series of stoplogs function as a weir, diverting stormwater runoff from the inlet pipe toward the Project. The top of the stoplogs is located at elevation 903.5', where water will spill over and travel directly to Minnehaha Creek via the original Powell Road storm pipe. A 6" PVC drain is located at elevation 895.01'. The structure features a sump with an invert elevation 891.96, allowing approximately 3.05' of sediment storage below the PVC drain at full storage capacity. The pipe outlet that diverts water to the Project from the diversion structure is situated at elevation 901.06'. The pipe outlet from the most downstream pipe discharging onto the property is situated at invert elevation 898.40'.

4.2.2 LAKE STREET DIVERSION

The Lake Diversion consists of a series of storm sewer pipes that drain approximately 30.3 acres of land, according to the District's HydroCAD model. The Lake Street subwatershed is predominantly characterized by developed commercial and high-density residential land uses with minimal pervious surfaces.

According to the Lake Street Diversion Record Drawings, the diversion structure consists of an 8-ft diameter drainage structure with a 30" RCP inlet. A concrete weir constructed inside the structure diverts water from the inlet pipe toward the Project (*to be verified by HDR; design will be incorporated into the project plans*). The top of the concrete weir is located at elevation 902.4'. Stormwater would potentially reverse flow over the weir and into the other drainage system at this elevation. The Lake Street Diversion storm sewer drains toward the Site, into a 6-ft diameter manhole with a floor elevation slightly below 897.85 according to the as-built drawings, although the floor elevation is not explicitly recorded. A 12" RC weeper pipe (currently bulkheaded) was constructed from this manhole to allow drainage to daylight onto the Site at

elevation 897.25'. The as-built drawings indicate that the downstream pipes and structures were under water at the time of construction, and standing water was present in the upstream pipes. The storm sewer pipes downstream of the diversion structure feature slopes as low as 0.06% which may result in sedimentation in the pipes regardless of the outlet configuration.

4.3 Minnehaha Creek

The Project is bound to the northeast by a reach of Minnehaha Creek that is relatively stable, featuring a wooded riparian buffer along the creek corridor. This reach of Minnehaha Creek is impaired for Chloride, Fecal Coliform (*E. Coli*), Dissolved Oxygen (DO), Macroinvertebrates Bioassessments, and Fish Bioassessments. A TMDL report is approved for Chlorides and Fecal Coliform, while the remaining impairments have a target TMDL completion year of 2024, according to MPCA's 2020 approved impaired waters list and MPCA's draft 2022 impaired waters list.

Minnehaha Creek originates from Gray's Bay Dam and meanders throughout the watershed to the stream's confluence with the Mississippi River. Flow in Minnehaha Creek is highly variable and subject to rapid fluctuations, which can exacerbate flow-related impairments and stream stability challenges. Stormwater management at the Project considered this variability, assuming that it would not be uncommon for flow rates through this reach to be as low as 10 cubic feet per second (cfs) or to exceed flows up to and above 300 cfs.

Two stream gages were consulted to determine flow characteristics within Minnehaha Creek. One of the stream gages, located upstream of the Project at Gray's Bay Dam, is owned by the United States Geological Survey (USGS) and operated in cooperation with the District. The other stream gage, located downstream of the Project at Hiawatha Avenue, is operated by the USGS. Information obtained from stream gage observations confirmed the assumptions that flows in the creek can range from lower than 10 cfs, to higher than 300 cfs, as demonstrated during the historic flooding that occurred in 2014.

A warm season duration analysis was performed to further evaluate flow rates in Minnehaha Creek. The average daily flows at 50% exceedance during warm seasons range from approximately 34 cfs to 93 cfs. The latter value (93 cfs) provides an estimate for the seasonally high peak flow rate in the creek that is exceeded 50% of the time.

Minnehaha Creek's floodway features regulatory floodplains in the vicinity of the Project. Near the midpoint of the Site, a narrow floodplain exists on the inside of a stream meander. Near the downstream end of the Project, a larger floodplain exists adjacent to the Powell Road diversion's outlet pipe. This floodplain specifically is a critical design and planning feature, located adjacent to a programmed area of the Project. The regulatory flood elevation in this area is estimated to be slightly lower than elevation 899'.

4.4 Geotechnical Investigations

4.4.1 SOIL PROFILE AND GROUNDWATER

According to soil borings obtained in a 1997 soil investigation, soils on the property primarily consist of medium to coarse sand and gravel, with trace amounts of silt and clay. In some

locations, soils near the ground surface are comprised of fill, consisting of topsoil and organic sandy silt. The dominant sand and gravel soil texture is typical to depths of 3 to 6 feet or deeper, which is underlain by 2 to 4 feet of soft clay before transitioning back to sand and gravel at lower depths. This investigation encountered moist soils throughout the boring, except in areas where fill soils were placed. Wet or saturated soils occurred approximately 13 to 14 feet below the ground surface.

Additional soil borings were obtained in May 2013 and May 2014. In May 2013, the groundwater elevation was observed between elevations 889.0 and 891.5 in locations near the proposed stormwater pond. In May 2014, the groundwater elevation was observed at elevation 897.9 near the proposed stormwater pond. The dates of these soil borings were compared to precipitation and stream stage obtained from the stream gages discussed above. The data indicates that groundwater at the site is subject to significant fluctuation in response to precipitation, much like the flow and stage of Minnehaha Creek. Although the soil textures are conducive to infiltration practices, the highly variable depth to groundwater would limit the performance of infiltration BMPs near the elevation of Minnehaha Creek.

A study performed by the University of Minnesota indicates potential for reverse flow from Minnehaha Creek into the riparian groundwater system, although the flow reversals would have minimal impact to the groundwater system. Soil cores indicate that the surficial aquifer in the Project area is overlain by 7 to 12 feet of sandy clay fill material. The aquifer consists of sandy glacial outwash with silt, interspersed with gravel.

4.5 Related Projects

Design of the mixed-use development of the Site is ongoing; performed concurrently with the District's public realm design. This approach allows for collaborative planning, design, construction, and long-term operation and maintenance (O&M).

The design adjacent to the Site's public realm provides for residential and commercial development in response to the construction of the Southwest LRT line and the location of a transit station near the southwest corner of the site. The design currently includes As proposed, the Alatus Alternative included an iconic 10+ story building, several midrise buildings, and townhomes. The taller structures flank Blake Road, with one mid-rise structure extending along the Cedar Lake LRT Regional Trail.

The main roadway through the development forms an arc and coupled with a cascading water feature running from the junction of 2nd Street and Blake Road, it draws people—residents and visitors—to ponds, a skating rink, and restaurants. In addition to the road, there are several pedestrian arteries that open the site up and encourage movement between structures. A boathouse is situated as a terminal view down one of these pedestrian arteries off of Blake Road. Another off of the Cedar Lake LRT Regional Trail turns into a woonerf, or shared street, inviting children to play on its hard surface while pedestrian, bicycles, scooters, and cars all mingle. All of the development's off-street parking is hidden inside occupied buildings. Although parking is extensive, the design intends to minimize the presence of active traffic within the development. Buildings and the open spaces between them will dominate the landscape.

The mixed-use development adjoins the public realm at the restaurants and surrounding areas. The interface between the developments features a vertical wall, maximizing space for both the public realm and the mixed-use development. The restaurant design includes balconies that overlook the ponds, providing another opportunity for water-centric experience. A boat house is proposed near the restaurants, adjacent to the north stormwater pond. The boat house will include a wet well and a stormwater pump, which intakes stormwater from the pond and discharges into the cascading water feature near the west edge of the Site. The pumped stormwater (first treated by the stormwater ponds) would be filtered by natural or cartridge filters to further improve the water quality prior to public exposure. The filtered runoff would then traverse the cascade, ultimately discharging back into the stormwater ponds for additional treatment and recirculation.

5. Design Approach and Analysis

5.1 Stormwater

5.1.1 REGULATORY CRITERIA

Stormwater management and design considerations are governed by various local and state agencies. The primary regulatory criteria influencing design of the Project includes:

- MCWD Rules
- City of Hopkins Code and Ordinances
- Minnesota Pollution Control Agency's National Pollutant Discharge Elimination System (NPDES) Regulations
- Lake Hiawatha Total Maximum Daily Load (TMDL) Report

Regulatory criteria for the developed portion of the Site will be adhered to as part of the Site's development process. For regulatory purposes, the Site is considered redevelopment rather than new development, as the 6.3-acre cold storage facility and 5.3-acre parking area previously occupied the Site.

MCWD's volume control rules vary depending not only on the status of development or redevelopment, but based on the size of the site, the amount of disturbance, and the reduction in impervious surface. Because this project size is greater than 5 acres and disturbs more than 40% of the site, the stormwater management plan must meet the volume control requirements in subsection 3(c) of the volume control rule, requiring abstraction of the first one inch of rainfall from the site's impervious surface.

5.1.2 WATER QUALITY GOALS

In addition to the regulatory design criteria, non-regulatory design goals or objectives to provide regional stormwater treatment have been identified that apply to Project planning, programming, and design. The treatment objectives are based on water quality monitoring results, prior studies, regional plans, and industry best practices.

This reach of Minnehaha Creek is impaired for Chlorides, Fecal Coliform, Dissolved Oxygen (DO), Macroinvertebrates Bioassessments, and Fish Bioassessments. A TMDL report is approved for Chlorides and Fecal Coliform, while the remaining impairments have a target TMDL completion year of 2024, according to MPCA's draft 2020 impaired waters list.

Downstream of the Site is Lake Hiawatha, which has an approved TMDL for nutrients. The Lake Hiawatha TMDL indicates that the average growing season total phosphorus (TP) cumulative watershed load delivered from Minnehaha Creek to Lake Hiawatha is approximately 6,463 pounds. A reduction of 1,907 pounds (29.5% reduction) would be required to achieve the target loading capacity of 4,556 pounds from Minnehaha Creek to Lake Hiawatha.

The 325 Blake Road Restoration and Redevelopment Project has been cited as an opportunity to reduce phosphorus loading to Lake Hiawatha. Estimated pollutant loads to the Site are

summarized in *Table 5.1: Modeled Pollutant Loading* as calculated in the study *Blake Water Resources Concept Analysis (Wenck, 2019)*.

Parameter	Lake Street Diversion	Powell Road Diversion	325 Blake Road North	Total
Total Phosphorus (lbs/yr)	48	151	10	209
Total Suspended Solids (lbs/yr)	8,738	27,618	1,834	38,190

Table 5.1: Pollutant Loading. Of the estimated 209 pounds of TP and 38,190 pounds of TSS delivered to the site, the Powell Road Diversion accounts for approximately 72% of the total pollutant loading.

Prior to this study, the District performed pollutant monitoring in 2016 and 2017, summarized in the *Powell Rd. and Lake St. Water Quality Analysis Technical Memorandum (MCWD, 2018)*. The memorandum describes a TP load of 6.2 lbs/yr from the Lake Street Diversion and 207 lbs/yr from the Powell Road Diversion, although the measured TP loads only occurred between April and October in 2016, potentially underestimating the annual total. The report concludes that particulate phosphorus concentrations are higher than expected from the Powell Road subwatershed, and lower than expected from the Lake Street subwatershed, though the combined annual TP load was greater than expected.

The monitoring results also show that the particulate phosphorus load from the Powell Road subwatershed comprises 90% of the TP on an average annual basis. Stormwater BMPs, including those designed for the project, are typically more effective at removing particulate phosphorus than dissolved phosphorus.

5.1.3 KEY SITE STORMWATER ELEVATIONS

The elevations of Minnehaha Creek, groundwater, and stormwater inflows are key factors in approach to stormwater design. Existing grade for the majority of the site is between elevation 907’ to 910’. Within roughly 100 feet of the creek, the site features a more gentle grade towards the creek which steepens at the creek bank.

The Powell Road diversion storm sewer enters the site at elevation 898.40’ and the Lake Street diversion storm sewer enters the site at elevation 897.25’, roughly 10 feet below the majority of the site’s existing grade. Backflow from these diversion storm sewers into mainline storm sewer systems would occur near elevation 901’. Groundwater elevations have been recorded between elevations 889.0’ to 898.0’. The creek water surface varies along the site but can vary between elevations 893’ to 899’, depending on creek flow (see *Figure 5.1: Key Elevations*).

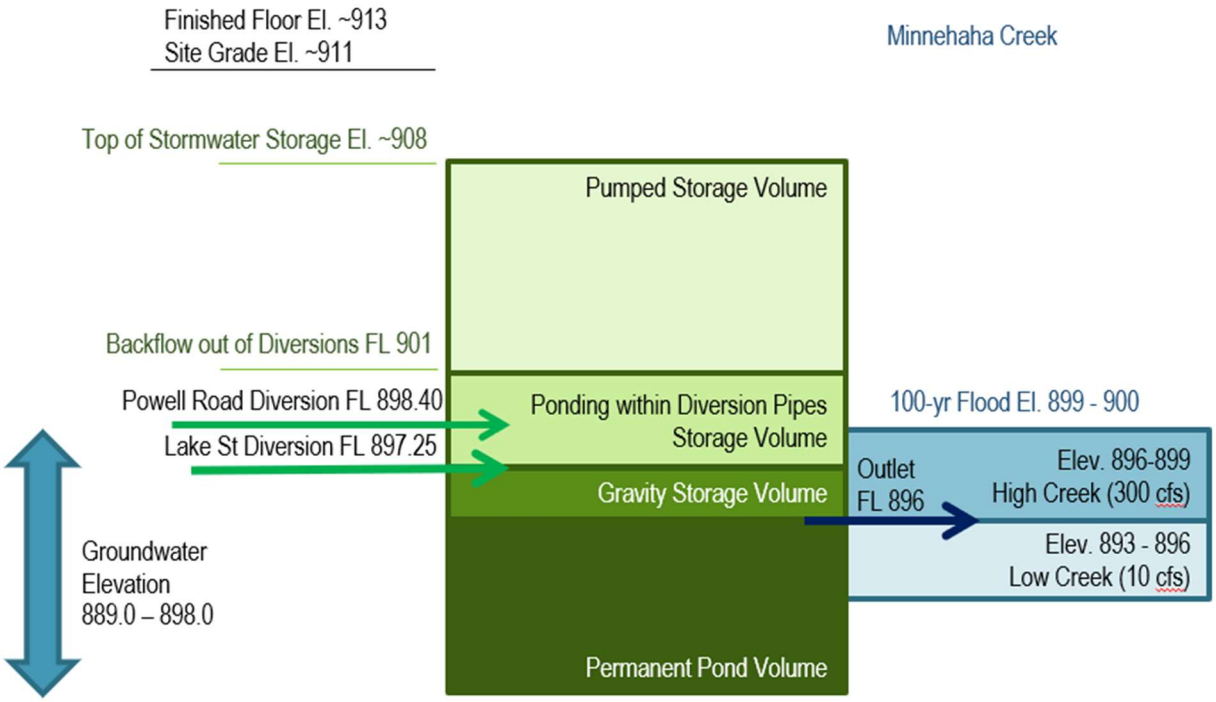


Figure 5.1: Key Elevations. A conceptual sketch of the site elevations demonstrates their significance to stormwater treatment limitations, opportunities, and storage considerations.

Because the storm sewer diversion outfalls are situated in close proximity to groundwater and creek water surface elevations, infiltration as a potential stormwater treatment option was eliminated. The site water elevations are favorable for a stormwater pond, which would have its normal water surface at approximately elevation 896' (north pond) and 897' (south pond), and be partially sustained by groundwater.

5.1.4 STORM SEWER DESIGN

The existing Powell Road Diversion storm sewer drains onto the property through a 36-inch RCP, which enters a manhole and redirects flow toward Minnehaha Creek. The proposed design removes the manhole and extends the 36" RCP, redirecting the pipe away from the creek and toward the south stormwater pond using 36" RCPs to maintain the storm sewer capacity. Prior to discharging runoff into the stormwater pond, the storm sewer drains through a 6' x 12' Nutrient Separating Baffle Box (NSBB) hydrodynamic separator to provide pre-treatment. The NSBB is designed to reduce nitrogen, phosphorus, total suspended solids, and to capture trash and floatables. The storm sewer design flows through the NSBB, discharging into the south stormwater pond at invert elevation 897.0. The outlet consists of a concrete flared end section surrounded by riprap to prevent scour and erosion.

The existing Lake Street Diversion storm sewer drains onto the property through a 42-inch RCP, which drains through a 12" RC weeper pipe which is currently bulkheaded. The proposed design for this project ties into an existing manhole, routing stormwater through a series of 42-inch pipes to maintain drainage capacity. The storm sewer network draining the Lake Street subwatershed directs runoff between the mixed-use development and the proposed trail, draining runoff toward the north pond. Prior to discharging runoff into the stormwater pond, this storm sewer drains through an 8' x 16' NSBB and ultimately discharges into the north pond at invert elevation 896.0. The outlet consists of another concrete flared end section surrounded by riprap to prevent scour and erosion.

5.1.5 STORMWATER POND DESIGN

Prior studies, regulatory requirements, and District goals were considered as factors guiding stormwater management design goals. Best practices published in the Minnesota Stormwater Manual as well as other local regulatory programs were followed and resulted in the preliminary design of a regional stormwater pond. The size of the pond, including surface area, depth, and water quality volume, were optimized to achieve regional water quality goals to the extent practicable. A summary of the design goals used in the layout, sizing and design of a regional stormwater treatment pond with no pumped or upland stormwater treatment is presented below in *Table 5.2: Stormwater Pond Design and Performance Goals.*

Parameter	Design Goal	Status
Location	Avoid wetlands, floodplains, and buffers	✓ Goal Achieved
Permanent Pool	Volume 1,800 cubic feet per acre of drainage area	x Maximum Extent Practicable[1]
	Depth between 3 and 10 feet	✓ Goal Achieved
	Install a liner for contamination, karst, or other flow restriction	x Not Applicable
Water Quality Pool	Volume equal to 1" times impervious surfaces	x Maximum Extent Practicable[2]
Inlets	Provide stabilized inlet areas for high flow conditions	✓ Goal Achieved
Outlets	Discharge < 5.66 cfs per acre of pond surface area	✓ Goal Achieved
	Provide energy dissipation	✓ Goal Achieved
	Provide emergency spillway	✓ Goal Achieved
	Located to prevent short-circuiting	✓ Goal Achieved
	Prevent discharge of floating debris	✓ Goal Achieved
Performance	Maintain or reduce stormwater volume	✓ Goal Achieved
	Maintain or reduce peak flow rates	✓ Goal Achieved
	Reduce TP and TSS loading	✓ Goal Achieved
Maintenance	Provide maintenance access bench	✓ Goal Achieved

Table continued on the next page

Safety	Provide 35’ offset between pond and water supply wells	✓ Goal Achieved
	Incorporate public safety features (e.g., wetland safety bench)	✓ Goal Achieved

Table 5.2: Stormwater Pond Design and Performance Goals. This table will continue to be reviewed as detailed design is developed to meet these design and performance goals.
[1] Permanent pool volume goal is maximized based on the selected development scenario. Achieving the explicit numerical goal would require over 50% of the property be occupied by a single pond.
[2] On-site and regional impervious surfaces are pre-developed. Spatial constraints limit the ability to achieve this explicit numerical goal. The proposed design provides water quality treatment equal to the runoff discharged to the site associated with a the 1.25” rainfall event, which exceeds the water quality (first flush) storm event of 1.1” based on water quality monitoring results.

The project uses two stormwater ponds separated by a sheet pile concrete-capped weir wall with the top of the wall designed at invert elevation 897.0. The weir wall creates two separate cells for the stormwater pond, with the south cell receiving runoff from the Powell Road subwatershed, and the north cell receiving runoff from the Lake Street subwatershed. The south pond is designed with a permanent pool elevation of 897.0, and the north pond is designed with a permanent pool elevation of 896.0. When runoff from Powell Road subwatershed occurs, stormwater will flow through the south pond and drain over the top of the weir wall. As the pond reaches and exceeds elevation 897.0, the water surface elevation will overtop the weir wall and the two ponds will have a combined water surface.

The pond outlet structure adjoins the weir wall and is designed as a 40’ (L) x 10’ (W) concrete structure, allowing for multi-stage (low- and high-flow control) outlets. The objective of the outlet structure is to restrict “first-flush” outflow from the ponds sufficiently to allow settlement of sediments and pollutants and then provide overflow capacity for larger magnitude storm events without engaging the auxiliary overflow culvert. The outlet structure is designed with galvanized steel grating located above the outlets, surrounded by a safety railing. This allows the District to maintain and access the structure but also provides pedestrian access from the trail to the outlet structure where they can safely overlook the stormwater ponds and weir wall.

The outlet structure is designed to intake water from the north pond using a submerged 24-in orifice, located at invert elevation 893.5’. The submerged orifice allows water to enter the structure without being blocked by floating debris at the permanent pool elevation. Inside the structure, a concrete wall with a series of stoplogs is proposed to provide control of the permanent pool elevation. A 4-in diameter orifice is designed in one of the stoplogs, which functions as the low-flow outlet control. As the pond receives runoff and the water surface increases, the 4-in diameter orifice continues to control discharge until the water surface reaches elevation 900.25’. At this elevation, a series of weir openings are designed near the top of the concrete outlet structure. The weir openings are located within both cells of the stormwater pond and each opening is 1.75’ (H) x 10’ (W). Two weir openings are proposed at the outlet structure’s interface with the south pond, and two weir openings are proposed at the outlet structure’s interface with the north pond to provide overflow discharge when the capacity of the 4-in orifice is exceeded. The weir openings provide high-flow outlet control for storm events approaching the 100-year, 24-hour storm. Incorporating several weir openings reduces

the risk of the openings becoming clogged and allows the outlet structure to be supported by concrete walls on the interior to enhance structural integrity. For extreme storm events, an auxiliary overflow culvert is set to the north of the outlet structure to provide additional discharge capacity prior to the pond being overtopped.

A 4’ (H) x 6’ (W) box culvert conveys outflow from the drainage structure and is sized to accommodate potential outflow from the overflow weirs. The design of the outflow channel into the creek continues to be detailed. A riprap apron is proposed at the downstream end of the culvert to dissipate energy and reduce risk of scour. Given the size of the outlet culvert, the design team is reviewing methods to minimize its visual impact. The channel and culvert will be excavated into the bank and potential plantings or boulder installations will be reviewed to further screen the outlet. Safety bars will be installed on the downstream end to prevent access into the culvert from the downstream side.

5.1.6 ALATUS STORMWATER OFFSET

The stormwater ponds interact with the upland mixed-use development via a wet well and pump located in a boat house (designed by Alatus) located adjacent to the north pond. The pumped stormwater design allows for the mixed-use development to occupy sufficient space on site to meet development goals, while compensating for reductions of water quality volume in the stormwater ponds.

The wet well in the boat house is designed to screen and intake stormwater, pumping it through a ductile iron forcemain to the west edge of the property where the developer’s “stormwater cascade” feature begins. The “stormwater cascade” features being designed by the Alatus development will include upland aeration, filtration, and transpiration of stormwater that would not be possible within the stormwater pond. Preliminary filtration concepts include but are not limited to cartridge filters, iron-enhanced sand filters, and similar measures, which are capable of removal up to 85% TSS and 80% TP depending on the design and the pollutant loading parameters. After this additional stormwater treatment is achieved, cleaner stormwater meanders through the cascade, ultimately returning to the south stormwater pond for additional detention and recirculation.

5.2 Stormwater Modeling Results

5.2.1 SITE HYDROLOGY AND HYDRAULICS

The District’s Powell Road Diversion HydroCAD model was modified to account for as-built conditions, and to incorporate the design and construction of the Lake Street Diversion, and the proposed design of the Site. The HydroCAD model determines peak flow rates and stormwater runoff volumes discharged to the Site from regional storm sewer diversion networks, and from the proposed stormwater ponds. Design storm depths used in the model are summarized in *Table 5.3: Modeled Design Storm Depths*. These rainfall depths were used for the site hydrologic and hydraulic modeling described throughout this section.

Design Storm[1]	Modeled Rainfall Depth
1.25-in, 24-hour	1.25”
2-year, 24-hour	2.86”
10-year, 24-hour	4.30”
100-year, 24-hour	5.90”

Table 5.3: Modeled Design Storm Depths. Rainfall depths from the Powell Road Subwatershed model were assumed for this analysis.

Peak flow and runoff volume modeling results are documented for various design storms (see *Table 5.4: Regional Subwatershed HydroCAD Modeling Results)*. The model hydrology (rainfall depths, distributions) and storm sewer diversion hydraulics will continue to be validated during detailed design.

Design Storm	Lake Street Diversion		Powell Road Diversion	
	Runoff Volume (ac-ft)	Peak Flow Rate (cfs)	Runoff Volume (ac-ft)	Peak Flow Rate (cfs)
1.25-in, 24-hour	1.8	23.2	6.2	19.5
2-year, 24-hour	4.7	37.6	13.8	31.5
10-year, 24-hour	7.1	42.0	22.8	35.5
100-year, 24-hour	9.5	43.4	29.3	36.8

Table 5.4: Regional Subwatershed HydroCAD Modeling Results. Peak flow rates and stormwater runoff volumes were modeled for the regional storm sewers draining onto the site.

The existing and proposed conditions summary compares runoff characteristics from the combined regional subwatersheds and the pre-development site were modeled to determine benefits of the project. Peak flow and runoff volume modeling results between existing and proposed conditions are documented for design storms as shown in *Table 5.5: Existing vs. Proposed HydroCAD Modeling Results*. This analysis indicates that stormwater runoff volumes to Minnehaha Creek are generally decreased by 7 to 9%, and peak flow rates are decreased by approximately 49 to 99% based on the design storm event. This analysis does not account for groundwater flow patterns, which can have an influence on site hydrology and hydraulics. Site hydrologic and hydraulic model outputs are contained in *Appendix A*

Design Storm	Existing Conditions[1]		Proposed Conditions	
	Runoff Volume (ac-ft)	Peak Flow Rate (cfs)	Runoff Volume (ac-ft)	Peak Flow Rate (cfs)
1.25-in, 24-hour	8.7	45.3	8.1	3.5
2-year, 24-hour	22.3	123.0	21.4	30.9
10-year, 24-hour	36.3	169.7	31.9	67.3
100-year, 24-hour	48.3	214.1	42.4	109.5

Table 5.5: Existing vs. Proposed HydroCAD Modeling Results. Peak flow rates and stormwater runoff volumes were modeled for the regional storm sewers draining onto the site.

[1] Existing conditions assume that both regional diversions are constructed, operable, and online without any downstream stormwater BMPs.

Peak flow rates and stormwater runoff volumes are significantly reduced by the stormwater BMPs designed for the project. The stormwater pond's water surface elevations associated with the design storms will impact features of the project and the surrounding environment, including regional storm sewers, Minnehaha Creek, building floor and basement elevations, trail grades, etc. Water surface elevations are influenced by inflows to the stormwater ponds and the multi-stage outlet structure. The water surface elevations associated with the modeled design storms are tabulated in *Table 5.6: Stormwater Pond Water Surface Elevations*.

Design Storm	Peak Water Surface Elevation[1]
1.25-in, 24-hour	900.20'
2-year, 24-hour	900.60'
10-year, 24-hour	900.86'
100-year, 24-hour	901.13'

Table 5.6: Stormwater Pond Water Surface Elevations. The pond's water surface elevation ranges from 900.20' (fully controlled by the low-flow orifice) to 901.13'.
[1] Peak elevation assumes all outlets are fully functional without clogs or reduced capacity, and the pump to developer's cascade feature is operating at 1,200 gpm.

5.2.2 MINNEHAHA CREEK HYDROLOGY AND HYDRAULICS

The District's Lower Watershed XP-SWMM model was run to determine water surface elevations (WSEs) corresponding to the Minnehaha Creek flow rates documented above. The WSEs were reviewed near the upstream end of Project, near the Project's midpoint, and near the downstream end of the Project. WSEs reported by the model are tabulated below (see *Table 5.7: Minnehaha Creek Modeled Water Surface Elevations*).

Flow Scenario	Upstream End	Midpoint	Downstream End
Low *(WSE at 10 cfs)*	897.2'	895.5'	893.6'
Average *(WSE at 93 cfs)*	898.0'	896.5'	894.8'
High *(WSE at 300 cfs)*	899.2'	897.6'	896.2'

Table 5.7: Minnehaha Creek Modeled Water Surface Elevations. Variations between low flows, average daily flows, and high flows provide context for the design of recreational opportunities, bridges, and pond outlets.

Inter-Fluve collected survey data of the Minnehaha Creek floodplain, banks, and bed during project design. A preliminary HEC-RAS model was developed to support hydraulic modeling of the creek to evaluate impacts of the design. The results of preliminary modeling are provided in *Appendix B* and will replace XP-SWMM results in final design for establishing the range of potential creek water surface elevations and velocities for flood magnitude events.

5.2.3 SITE WATER QUALITY MODELING

The Project has a water quality volume design goal of treating 8.0 ac-ft of stormwater runoff from regional storm sewer diversions in accordance with planning and schematic design objectives. *Table 5.8: Water Quality Volume Tracker* on the following page shows stormwater runoff parameters from the development, the compensatory runoff volume required for encroachment on the stormwater ponds, and the water quality provided by the cascade used to compensate for decreased storage in the stormwater ponds. The table summarizes volumetric water quality assessments but does not include results of detailed water quality modeling.

DEVELOPMENT RUNOFF ANALYSIS	Impervious Surface		Required Stormwater Abstraction Volume[1]		Provided Stormwater Abstraction Volume[2]		Compensatory Volume Managed by Cascade[3]	
	sf	ac	cf	ac-ft	cf	ac-ft	cf	ac-ft
	398,574	9.15	33,215	0.76	35,763	0.82	-2,548	-0.06

1 *Equals 1 inch times the impervious surface created by the project*

2 *Refer to MCWD Stormwater Management Rule, Appendix A, for credit calculation*

3 *Compensatory Volume = Volume Required - Volume Provided. Negative value indicates the required abstraction value has been met.*

POND WATER QUALITY ANALYSIS	Design Volume Goal[1]		Baseline Alternative		Design Volume Provided		Compensatory Pond Volume Required[2]	
	cf	ac-ft	cf	ac-ft	cf	ac-ft	cf	ac-ft
	348,480	8.00	368,193	8.45	248,081	5.70	100,399	2.30

1 *Based on the Lake Street and Powell Road subwatershed runoff volumes, associated with the 1.25" storm event*

2 *Compensatory Volume = Volume Goal - Volume Provided*

POND/CASCADE WATER QUALITY SUMMARY	Total Design BMP Volume Required[1]		Pond Treatment Volume Provided		Cascade Treatment Volume[2]		Treatment Volume Check[3]	
	cf	ac-ft	cf	ac-ft	cf	ac-ft	cf	ac-ft
	345,932	7.94	248,081	5.70	287,932	6.61	190,081	4.36

1 *Total Volume = Pond Design Volume Goal + Compensatory Volume Managed by Cascade*

2 *Cascade Volume provided by HydroCAD model during the 1.25" storm event, assuming 1,200 gpm pump rate. Pump design in progress by Alatus.*

3 *Treatment Volume Check = Pond and Cascade Volume Provided - Design BMP Volume Required. Positive value indicates the goal has been achieved.*

Table 5.8: Water Quality Volume Tracker. The pond's water surface elevation ranges from 900.20'

Water quality modeling is currently underway using P8 water quality modeling software, assuming the 60% design moves forward without significant changes to the project concept. The water quality modeling and associated results are moderately dependent upon developer features, as a significant amount of stormwater runoff will be pumped from the ponds filtration BMPs for additional water quality treatment and recirculation. As such, water quality models will be finalized and preliminary results documented when developer BMPs are selected.

Several stormwater management practices selected for the project have published pollutant removal efficiencies that can be considered for preliminary water quality planning, as shown in *Table 5.9: Preliminary Water Quality Estimates*. Site water quality model is underway; model outputs will be contained in *Appendix C* when available.

Stormwater BMP	TSS Removal (%)	TP Removal (%)	TN Removal (%)	Metals Removal (%)	Bacteria Removal (%)
Nutrient Separating Baffle Box[1]	90	19	20	--[4]	--[4]
Constructed Pond[2]	60	34	30	70	60
Hydrodynamic Separator[3]	80	75	--[4]	--[4]	--[4]

Table 5.9: Preliminary Water Quality Estimates. Water quality will be improved by several BMPs that receive flow from the regional storm sewer diversions. The BMPs listed in this table are presented in order of their treatment train location; a Nutrient Separating Baffle Box drains into a constructed pond, which is pumped to the top of the Site's cascade feature before discharging filtered water back into the constructed pond.

[1] Nutrient Separating Baffle Boxes are located between each regional storm sewer diversion and the constructed ponds, providing pre-treatment before runoff enters each pond. The pollutant removal efficiencies listed are according to Oldcastle Infrastructure's publicly available data.

[2] Constructed pond removal efficiencies are listed in accordance with Minnesota Stormwater Manual's estimates for Design Level 1. These values do not account for recirculated runoff that is pumped from and returned to the ponds.

[3] The selection and design of a hydrodynamic separator, cartridge filter, sand filter, or other BMP at the top of the Cascade is in progress by the Developer's engineering team. This assessment assumes that a Contech Jellyfish Filter (cartridge filter) or equivalent is used for treatment of pumped stormwater.

[4] Values not published.

5.3 Geotechnical Analysis

A geotechnical analysis was performed to evaluate the slope stability and seepage gradients of the pond embankment and foundation soils. The analysis also included evaluation of the foundation conditions at the pedestrian bridge, weir wall, and outlet structure. To support the geotechnical analysis, a subsurface investigation was completed to gather site-specific geotechnical data. This investigation was completed in January 2022 and results from this investigation were not available at the time of the report. To complete preliminary design, the geotechnical analysis reviewed subsurface stratigraphy and soil parameters of the Site based on available regional data and soil descriptions from the following reports:

- Surficial Geology of Minnesota
- Wenck 2017 Borehole Logs
- Wenck 2017 Monitoring Well Logs

- Piezometer information from *Baseflow Restoration in Minnehaha Creek Watershed with Stormwater Infiltration* report (University of Minnesota, 2013)

Preliminary findings of the geotechnical analysis are summarized in a technical memorandum in *Appendix D*.

5.3.1 GEOTECHNICAL SITE INVESTIGATION

A geotechnical site investigation was completed in American Engineering Testing in early 2022. Preliminary results from the investigation are available, however, lab and in-situ test results are pending.

The objectives of this investigation were to:

- Determine soil and rock stratigraphy across the project site as well as the characteristics of the typical soils encountered.
- Determine a better knowledge of groundwater conditions.
- Determine soil material parameters based on field and laboratory testing for use in final design.
- Assess the degree of variability of the encountered soils based on field and laboratory testing.

The scope of the geotechnical investigation included:

- One standard penetration test (SPT) boring drilled to a depth of 35 feet below ground surface (BGS)
    - Installation of a two-inch diameter PVC cased well with 5-foot screen, located at the depth interval from 30 to 35 feet BGS
    - Development of the well
    - Slug test completed within the well
- Two SPT borings at the proposed edge of the ponds drilled to 50 feet BGS.
- Two SPT borings drilled to bedrock (assumed to be 80 feet) near the proposed bridge abutments.
- Perform laboratory testing on representative soil samples collected from the investigation.

5.4 Structural Analysis and Design

Structural analysis and design is being completed for the:

- Weir Wall
- Outlet Structure
- Pedestrian Bridge Foundation

5.4.1 CODES AND STANDARDS

The following codes and standards were used in the structural analysis and design:

- International Building Code 2018

- Minnesota Building Code 2020
- Reinforced Concrete ACI318-14 & ACI350-06
- Minimum Design Loads for Buildings and Other Structures ASCE7-16
- American Institute of Steel Construction AISC
    - Manual of Steel Construction, 14th Ed.
- American Welding Society D1.4

5.4.2 MATERIAL STRENGTH

The following material strengths are used in the structural design:

- Structural steel: 50 ksi
- Reinforcing steel: 60 ksi
- Concrete: 4,000 psi at 28 days
- Steel sheet pile (pz-22): 50 ksi
- Steel h-piles: 50 ksi

5.5 Trailhead and Overlook

To pull regional trail users into the site, to explore it and its recreational opportunities, Cottageville Park, and the City of Hopkins, an inviting trailhead and overlook is designed as a transition from the Cedar Lake LRT Regional Trail. The trailhead design includes raised planters, block seating, a drinking fountain, bicycle storage and repair areas, and an interpretive kiosk. The trailhead is finished with permeable pavers to differentiate it from the rest of the trail and, and is set among trees to provide shade and wind protection.

5.6 Trail Design

A bituminous trail is designed between Minnehaha Creek and the proposed stormwater ponds, providing a connections between the Cedar Lake LRT Regional Trail, the Minnehaha Creek Greenway, Cottageville Park, and recreational features of the project. The trail consists of a 10-foot wide bituminous surface with 2 feet of aggregate shoulder on each side. The cross slope of the trail is 1.5%, with maximum slopes of 3:1 (H:V) outside of the 2-foot shoulders. The trail alignment is designed to fit the existing topography and conserve the creek's riparian corridor, including mature trees, to the extent practical.

The trail features a graded path that transitions to a constructed ramp over the east slope of the north pond, connecting to the traversable outlet structure overlooking the stormwater ponds. As discussed above. Near the north edge of the property, the trail includes a pedestrian bridge over Minnehaha Creek, connecting the trail to a nature-based play area across the creek and offering pedestrians a place to spend time overlooking the creek. The pedestrian bridge with a steel frame and wood planks, restricting access to pedestrians and light vehicles.

5.7 The Landing

The Landing is designed as a stop for people venturing along the creek and the greenway trails, located along a south bank of Minnehaha Creek. Finished with beach surfacing, this area can

serve as a transfer location between land and water recreation. The Landing includes a picnic area, canoe storage, informal seating, and creek access.

5.8 Nature-Based Play Area

A project outlot is designed as a nature-based play area, which provides a connection between the regional trail and Cottageville Park. This location effectively ties the development with the larger community, and the community with the development. The play area features log stacks, play boulders, precast concrete acorns, benches, tables, and seating areas. Wood fiber surfacing gives the ground a soft finish, while short trails of crushed stone offer access to seating areas closer to the creek.

5.9 Gateway to Greenway

A gateway plaza to the Minnehaha Creek Greenway is designed on a parcel located at the greenway's hinge point at Blake Road and Lake Street. The gateway design includes a sheltering plaza to obscure the sound of traffic, surrounded by a pergola. A water feature is proposed in the center of the plaza, with seating areas located nearby. The plaza is finished with decorative concrete paving, and non-decorative concrete paving allows controlled pedestrian access down to benches in close proximity to the creek.

6. Opinion of Probable Cost

The design elements from the proposed design were tabulated into distinct construction elements and quantities for preliminary construction costing. The AutoCAD-based linework, grading and surfacing models, and pipe network models were used to estimate quantities for most major construction features within the main site parcel (pond, trailhead, landing). The Nature Play Area and Gateway to Greenway areas continued to be a lump sum estimate due to the preliminary nature of some of the design elements

Costs were estimated using several sources, including recent MnDOT average bid prices, RSMeans cost heavy construction cost reference (localized for the metro area), vendor pricing, and prior design/construction experience/references.

The estimate continues to carry two cost contingencies. The design contingency was reduced from 25% to 20%. The 10% construction contingency continues to be included to account for the non-standard construction elements, as well as work near the creek and groundwater table which can increase contractor pricing for construction risk.

A cost summary based on major construction features is provided on the following page (see *Table 6.1: Opinion of Probable Costs*). A more detailed cost estimate table is provided as *Appendix E*.

Construction Item	Cost
Mobilization	$171,244
Erosion and Sediment Control	$102,747
Site Preparation	$95,372
Demolition	$33,868
Earthwork	$748,306
Stormwater Piping/Structures	$257,795
Outlet Structure	$169,510
Weir Wall	$288,320
Pedestrian Bridge (over creek)	$235,500
Pond Site Finishing/Surfacing	$110,213
Signage/Wayfinding/Interpretation	$100,000
Site Lighting	$80,000
Trailhead	$199,436
The Landing	$48,390
Picnic Areas	$58,180
Nature Play Area	$300,000
Greenway/Gateway Plaza	$700,000
Contractor Administration/Incidentals	$369,888
Design Contingency (20%)	$813,754
Construction Contingency (10%)	$488,252
Total Construction Estimate	**$5,370,774**

Table 6.1: Opinion of Probable Costs. Construction items and associated costs associated with the Baseline Alternative.

The schematic design cost estimate was $5.48M compared to the current estimate of $5.37 for detailed design/60%. Several addition features were further detailed such as the outlet structure, weir wall, stormwater system, and the trailhead, landing, and picnic areas. No major design changes were involved in 60%, just additional detailing and with the design advanced, the project construction cost has stayed at a similar level.

Additional cost considerations for project construction are summarized as follows:

- The costs are reflective of the construction areas shown within the work limits on the project drawings (attached separately).

- It is assumed the stockpiles of crushed concrete/pavement will be sold by the District or sourced by the development contractor – no costs were included for handling that material.
- The pedestrian bridge would be a steel frame with wood planks – pedestrian and light vehicle access only.
- Pond/stormwater costs versus public realm costs were approximately 50%/50%. This breakdown is provided in the detailed cost estimate in Appendix F.
- Construction costs are fluctuating significantly due to several factors including labor shortages, supply chain issues, COVID-19, etc. These factors could impact the cost of this project, so the use of bid options is recommended to allow the District the ability to stay within construction budget under these conditions.
- The entire western pond edge is comprised of walls, which are assumed to be solely an Alatus cost.
- Construction of the stormwater pond and the Alatus walls/buildings on the west side of the pond at different times or by different contractors simultaneously would be complex and could increase costs. The District should continue discussion with Alatus on shared construction of at least the pond excavation with the Alatus walls/buildings.

Appendix A

Site Hydrology and Hydraulics Model Outputs

(H&H model outputs available separately; to be included with final report)

Appendix B

Existing Conditions Hydraulic Model Technical Memorandum

TECHNICAL MEMORANDUM

To: Andrew Judd, PE (HDR)

From: Briana Drake, PE; Nick Jordan, PE; and Maren Hancock, PE (Inter-Fluve)

Date: February 14, 2022 **Project:** 325 Blake Road Stormwater and Greenway

Re: Existing Conditions Hydraulic Modeling of Minnehaha Creek adjacent to 325 Blake Road

This memorandum summarizes Inter-Fluve's data collection and hydraulic modeling of Minnehaha Creek in the vicinity of 325 Blake Road in Hopkins, Minnesota. The ultimate purpose of the hydraulic model is to evaluate the impacts of HDR's proposed design within the Minnehaha Creek corridor for the 325 Blake Road project. To date, Inter-Fluve has collected survey data and prepared an existing conditions hydraulic model for the project. This memo provides background on the hydrology used, and documentation of model construction.

SURVEY

Inter-Fluve collected survey data of the Minnehaha Creek floodplain, banks, and bed on December 8 and 15, 2021. Data was collected using RTK-GPS equipment. Survey data was collected at bridge crossings, the channel bed, banks, and floodplain surfaces. Large obstructions in the floodplain such as downed trees were also surveyed. Survey data was collected in the State Plane Minnesota South coordinate system referenced to the NAD83 datum. Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

HYDRAULIC MODEL CONSTRUCTION

Hydrology

Flows in Minnehaha Creek are controlled by releases at Gray's Bay Dam at the outlet of Lake Minnetonka, impacting creek hydrology. For the purposes of this modeling effort, flow data was reviewed from the following sources and is shown in Table 1 below.

- Peak flow data from the USGS StreamStats application
- Flood flow data from the FEMA Flood Insurance Study flood flows
- Output from the Minnehaha Creek Watershed District's XP-SWMM model

Table 1. Comparison of Reviewed Hydrology Data

Annual Exceedance Probability	Average Recurrence Interval (years)	USGS StreamStats Flow (cfs)	XP-SWMM Flow (cfs)	FEMA Flow (cfs)
67%	1.5	111	233	
50%	2	144	273	
20%	5	244	393	
10%	10	329	469	544
4%	25	454	512	
2%	50	560	546	543
1%	100	683	684	641
0.2%	500	1,000		949

Based on the comparison of available data, in the model we included the series of XP-SWMM flows, the 100-year FEMA flow, and a series of low flows (30 cfs and 60 cfs) presumed to be frequent flows within the regulated creek system.

Model Development

A one-dimensional steady state hydraulic model was created in the U.S. Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) software version 6.1.0. The existing conditions model geometry was developed using survey data merged with LiDAR digital terrain models in AutoCAD Civil 3D to create a combined topographic and bathymetric surface. The model extends from approximately 150 feet upstream of Blake Road to downstream of Meadowbrook Road.

All cross-section overbanks were cut from the LiDAR surface. Where model cross sections closely aligned with survey data, the surveyed points were used to create the cross-section geometry. Where the survey data was further away from the cross sections, the channel geometry was cut from the combined surface which created an interpolated geometry between bounding surveyed cross sections. Bridge data was manually added into the model based on Inter-Fluve's survey data and as-built drawings received from Minnehaha Creek Watershed District. Bridges were included for the crossings at Blake Road, Lake Street North East, the water main crossing, and Meadowbrook Road. The bridge decks for the Cedar Lake Trail and SWLRT bridge crossings were not included in the model geometry at this time because no survey data was collected due to the southern side of the crossing was under construction during the survey. Flood flows do not exceed the elevations of the low chord of the bridges based on reviewed bridge design drawings. Cross sections were included to represent the retaining walls and overbank characteristics in this section.

Computational Parameters

Manning's "n" values were assigned based on observed channel substrate and floodplain vegetation conditions. Table summarizes the Manning's "n" values used along the reach.

Table 2. Manning's "n" values used in the hydraulic model.

Location	Manning's "n"	Typical Descriptions	Notes
Channel	0.035	Channel with sand/gravel substrates and little woody debris.	Used throughout the reach
Channel	0.050	Channel with gravel/cobble substrate and some woody debris.	Used for areas with log jams or significant woody debris
Overbank	0.050	Turf, scattered brush and heavy weeds	Lawn type overbank.
Overbank	0.080	Medium to dense brush, in winter (i.e., without foliage)	Shrub type overbank.
Overbank	0.100	Dense brush	Forest type overbank.

A normal depth boundary condition was applied to the upstream and downstream model boundaries. The average bed slope in these locations was used to estimate normal depth conditions. The boundaries were located sufficiently far from the area of interest such that the selection of boundary condition does not influence hydraulic model results near the area of interest.

Appendix C

Site Water Quality Model Outputs

(Water quality modeling underway; to be included with final report)

Appendix D

Geotechnical Findings Technical Memorandum

Technical Memorandum

Date:	Friday, February 18, 2022
Project:	325 Blake Road Regional Stormwater and Greenway/Cottageville Park Phase II Riparian Restoration Project, Hopkins, MN Project No. 10268112
To:	File
From:	Kerrie Berg, PE, HDR Engineering Inc. Greta Backman, PE, HDR Engineering Inc. Erica Bley, EIT, HDR Engineering Inc.
Subject:	Geotechnical Findings

Introduction

This technical memorandum presents the results of the geotechnical analyses and engineering evaluation of the proposed regional stormwater treatment pond to be located at 325 Blake Road in Hopkins, Minnesota. This parcel was purchased by Minnehaha Creek Watershed District (MCWD) in 2011 with the intent to create a transformative, water-centric development on this site adjacent to Minnehaha Creek premised on its vision of Balanced Urban Ecology (MCWD 2021).

This memorandum presents findings, conclusions, and recommendations regarding:

- Evaluation of pond embankment exit gradients
- Evaluation of the slope stability of the pond embankment and foundation soils
- Evaluation of the foundation conditions at the pedestrian bridge, weir wall, and outlet structure.

Project Description

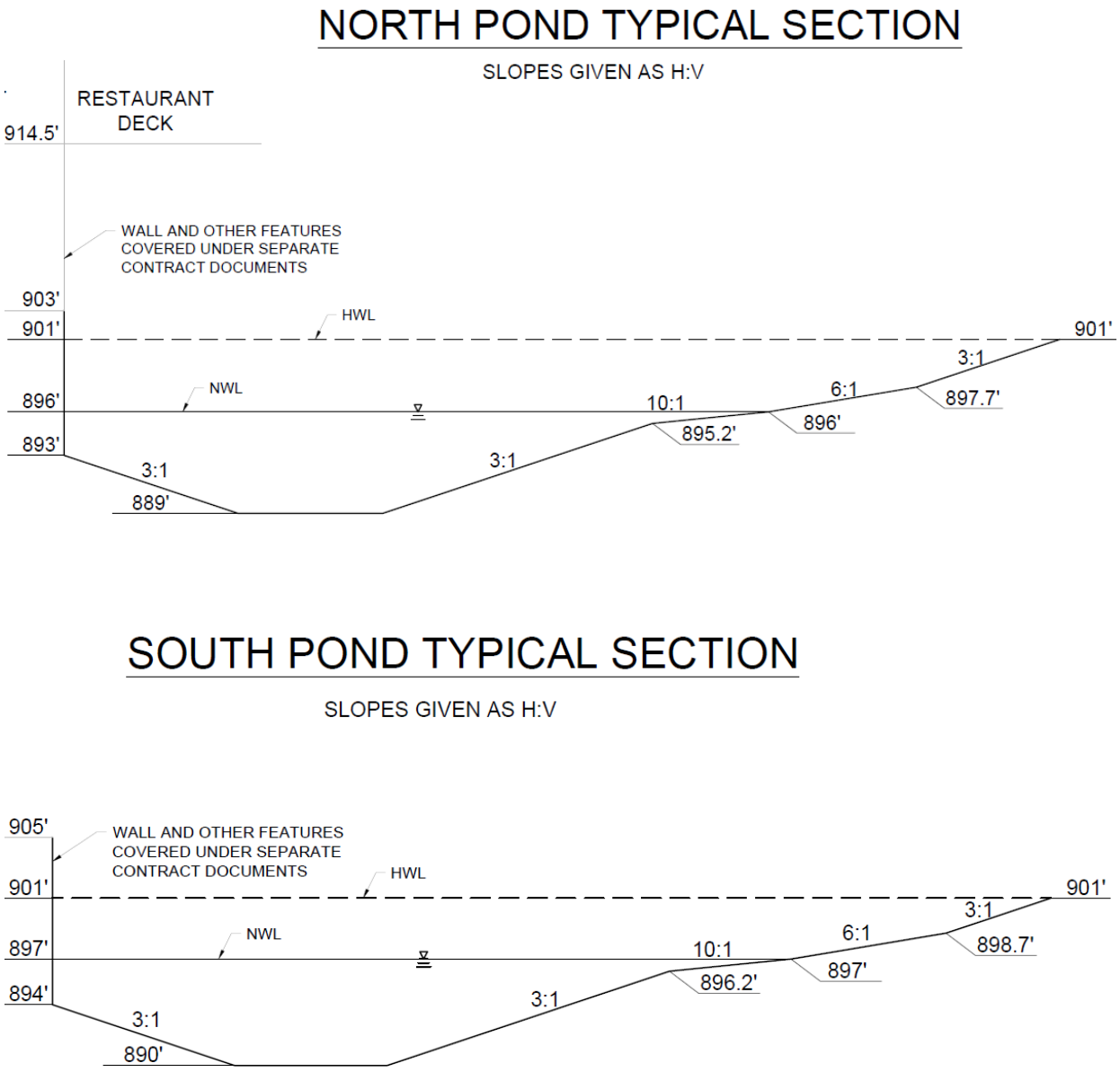
Figure 1 shows the location of the proposed two-pond concept stormwater design, which is located to the west of Minnehaha Creek. The proposed normal water surface of the north pond is elevation 896 feet, and the south pond is elevation 897 feet. The proposed overflow elevation is 901 feet. The pond will be excavated into existing ground.

The proposed footprint is approximately 1.7 acres. There is approximately 8 acre-feet of storage at the ponds normal water surface elevations. The top of the pond embankment would be at an elevation of 901 feet, or higher depending on surrounding ground surface elevations. The bottom elevation of the south pond will be excavated to an elevation of 890 feet and the north pond to 889 feet. This results in a maximum pond slope height of approximately 20 feet based on the maximum ground elevation at the pond footprint of approximately 910 feet.

Sections SL-2 (STA 103+50, typical cross section of the north pond) and SL-3 (STA 105+00, typical cross section of the south pond) from Figure 1 are shown in Figure 2. These embankment cross sections have interior side slopes ranging from 3H:1V to 10H:1V.

Figure 1. Plan View, Proposed Stormwater Basin

Figure 2. Typical North and South Pond Cross Sections (Sections SL-2 and SL-3 respectively, shown in Figure 1)



Geotechnical Site Investigation

In January 2022, a geotechnical site investigation was completed by American Engineering Testing located in Saint Paul, MN. Preliminary results from the investigation are available, however, lab and in-situ test results were not available at the time of this report, so the findings from the investigation are not included report but will be incorporated into future reports.

The objectives of this investigation were to:

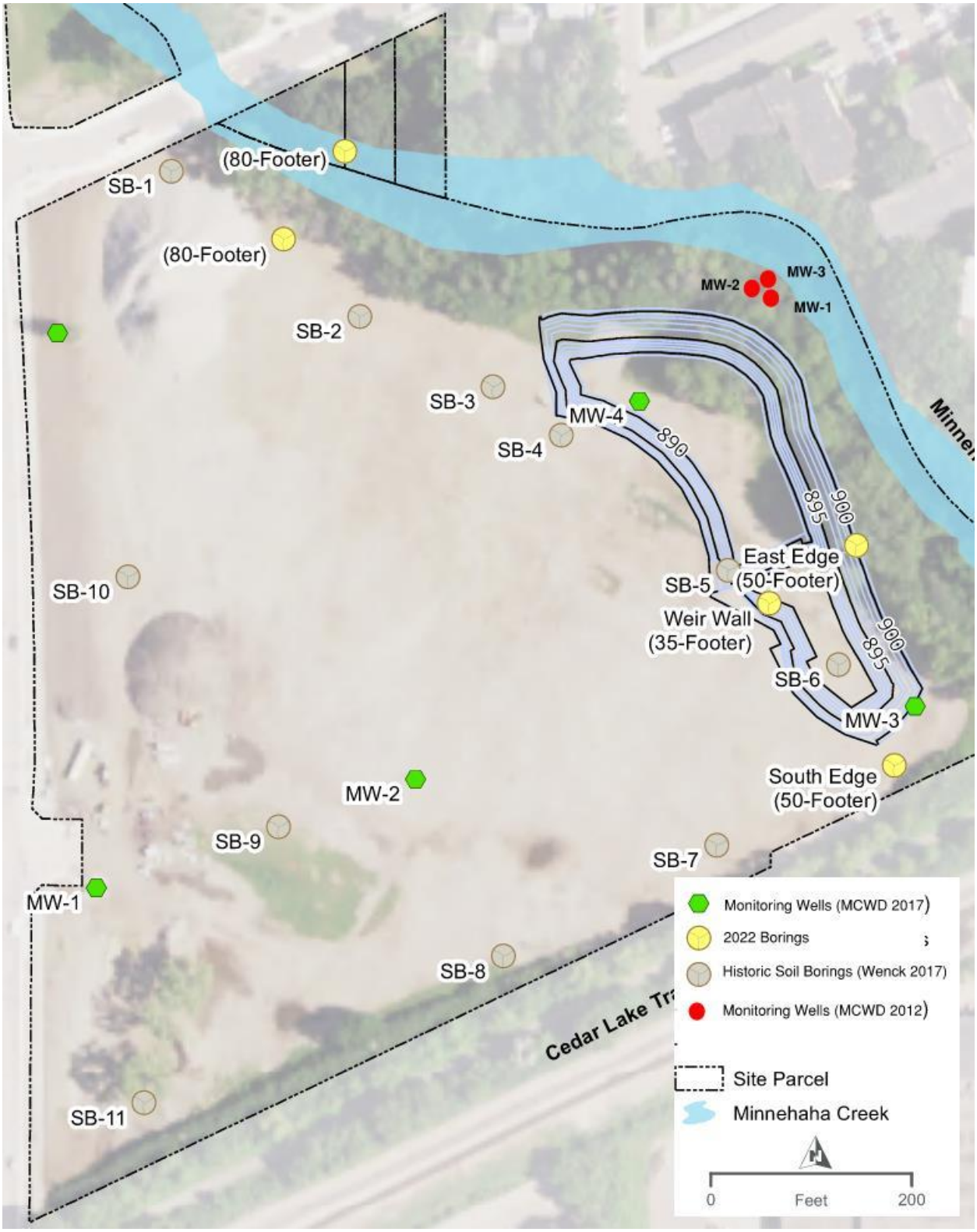
- Determine soil and rock stratigraphy across the project site as well as the characteristics of the typical soils encountered.
- Determine a better knowledge of groundwater conditions.
- Determine soil material parameters based on field and laboratory testing for use in final design.
- Assess the degree of variability of the encountered soils based on field and laboratory testing.

The scope of the geotechnical investigation included:

- One standard penetration test (SPT) boring drilled to a depth of 35 feet below ground surface (BGS)
    - Installation of a two-inch diameter PVC cased well with 5-foot screen, located at the depth interval from 30 to 35 feet BGS
    - Development of the well
    - Slug test completed within the well
- Two SPT borings at the proposed edge of the ponds drilled to 50 feet BGS.
- Two SPT borings drilled to bedrock (assumed to be 80 feet) near the proposed bridge abutments.
- Perform laboratory testing on representative soil samples collected from the investigation.

The SPT sampling will provide an insight of the in-situ ground conditions, specifically the relative strength of the soil. The piezometer installed will be used to measure groundwater at the pond location and test the in-situ permeability of the subsurface materials at that location. The rock core will be used to determine the relative quality of the rock. Finally, lab testing will be used to characterize encountered soils and help determine the soil parameters for final design. Figure 3 shows the location of historic borings and wells and the 2022 borings mentioned above.

Figure 3. Borehole Location Map



Subsurface Stratigraphy and Soil Parameters

Subsurface stratigraphy at the site was determined based on the available regional geological data and soil descriptions from historic geologic reports for the site:

- Surficial Geology of Minnesota [1]
- Wenck 2017 Borehole Logs [2]
- Wenck 2017 Monitoring Well Logs [2]
- Piezometer information from *Baseflow Restoration in Minnehaha Creek Watershed with Stormwater Infiltration* report (University of Minnesota 2013) [3]

Based on the available data, the following soils are found at the site, listed from the ground surface downward:

- Fill (SM/SC) – Previous boring and well logs describe a fill material typically 2 to 5 ft thick overlying native sand deposits. The fill is classified as a gravelly, silty to clayey sand (SM/SC).
- Glacial Outwash (SP)-The native sand deposit located below the fill are described a as gravelly to silty sand based on previous boring and well logs. The fill is classified as a gravelly sand (SP). Regional geological maps show that the predominant native surficial material at the site is a glacial outwash deposit. This material is described as gravelly sand Outwash.

Preliminary results from the 2022 investigation confirm the general stratigraphy trends described above.

Soil Strength Design Parameters

Analyses were performed to assess the factor of safety for slope stability at critical cross-sections through the ponds. Pond slope stability modeling requires strength parameter inputs. The strength parameters selected for the materials encountered within the pond slopes are presented in Table 1. These parameters include the material unit weight and the drained shear strength for the soil. Soil strength parameters were selected based on values presented in literature [4,5,6]. Strength material properties will be refined based on the field and laboratory test results from the 2022 Geotechnical Investigation.

Seepage Parameters

The primary input parameter in seepage analyses is hydraulic conductivity (or “permeability”) of the materials at the site. The permeability, as well as the other hydraulic input parameters, were selected based on values published from literature [7,8,9,10]. Hydraulic material properties will be refined based on field and laboratory test results from the 2022 Geotechnical Investigation.

Table 1. Soil Parameters

Soil Type	Moist Unit Weight γ (lbs/ft³)	Shear Strength Parameters		Horizontal Saturated Permeability, [k_h] (1)	Anisotropy k_v/k_h (1)	Coefficient of Volume Compressibility (M_v) /psf (2)	Saturated Volumetric Water Content, Θs (ft^3/ft^3) (3)	Residual Volumetric Water Content, Θr (4)	GeoStudio SWCC Function
		Effective Stress Envelope (Drained Strength)							
		c' (psf)	ϕ'						
Fill (gravelly, silty to clayey sand)	125	0	30	1.64E-05	0.5	5.00E-06	0.32	0.032	**Silty Clay**
Sand (gravelly sand with varying amounts of silt)	123	0	30	1.64E-04	0.5	2.00E-06	0.33	0.033	**Silty Sand**
Sheetpile	N/A	N/A	N/A	3.28E-08	1	N/A	N/A	N/A	**N/A**

Notes:

(1) USBR (United States Bureau of Reclamation) DS13-8 Seepage 2014
(2) Calculated from Young's modulus values from AASHTO 2014.
(3) Calculated from void ratio estimate from Fredlund and Rahardjo 1993.
(4) Leij et al, 1996.

Seepage Analysis and Slope Stability

Seepage analysis and slope stability were evaluated using SEEP/W and SLOPE/W in GeoStudio 2021 R2 software [11]. SEEP/W uses the finite-element analysis technique to model water movement and porewater pressure distribution within porous materials, such as soil and rock. This program can analyze both simple and highly complex seepage problems, including saturated and unsaturated flow, steady-state and transient conditions, and various boundary conditions.

SLOPE/W module uses limit equilibrium theory to compute the factor of safety of earth and rock slopes. Like SEEP/W, SLOPE/W has an established track record for analyzing critical infrastructure within the geotechnical profession. In the limit equilibrium approach, the geologic material is assumed to be at the state of limiting equilibrium and a factor of safety is computed. SLOPE/W can use a variety of methods to compute the factor of safety of a slope while analyzing complex geometry, stratigraphy, and loading conditions.

The loading cases modeled in the seepage analyses were also analyzed for slope stability. GeoStudio allows for integration of SEEP/W and SLOPE/W, such that the porewater pressures and phreatic surface computed in SEEP/W can be automatically imported and used in the SLOPE/W analysis. This allows for a more realistic stability analysis than can be obtained by drawing in a phreatic surface. For any node on the ground surface line where the pore water pressure is positive (i.e., surface ponding condition), SLOPE/W automatically computes the equivalent weight of the water above the ground surface. A minimum slip surface depth of 3 feet was set. Slip surfaces less than 3 feet were assumed to be considered a maintenance issue.

Cross Section Geometry and Subsurface Stratigraphy

Two critical embankment cross sections were selected to evaluate seepage and stability for the proposed stormwater pond embankment based on preliminary embankment geometry and the encountered subsurface conditions at the site. Existing survey data, the Minnesota Department of Natural Resources MNTOPO website [12], existing piezometer data, and the Schematic Design

Memorandum [13] were used to determine the ground surface topography beyond the proposed pond dimensions and to estimate the bathymetry of the Minnehaha Creek. Locations of the two cross sections (labeled North-South and East-West) are shown in Figure 4 and were deemed critical based on ground surface elevations and proximity to Minnehaha Creek. Figure 5 shows the East-West cross section and slope stability results for the High Pond, Low Creek case modeled in SLOPE/W. Figure 6 shows the North-South cross section and seepage output for the Empty Pond, High Creek case modeled.

Figure 4. Location of modeled cross sections

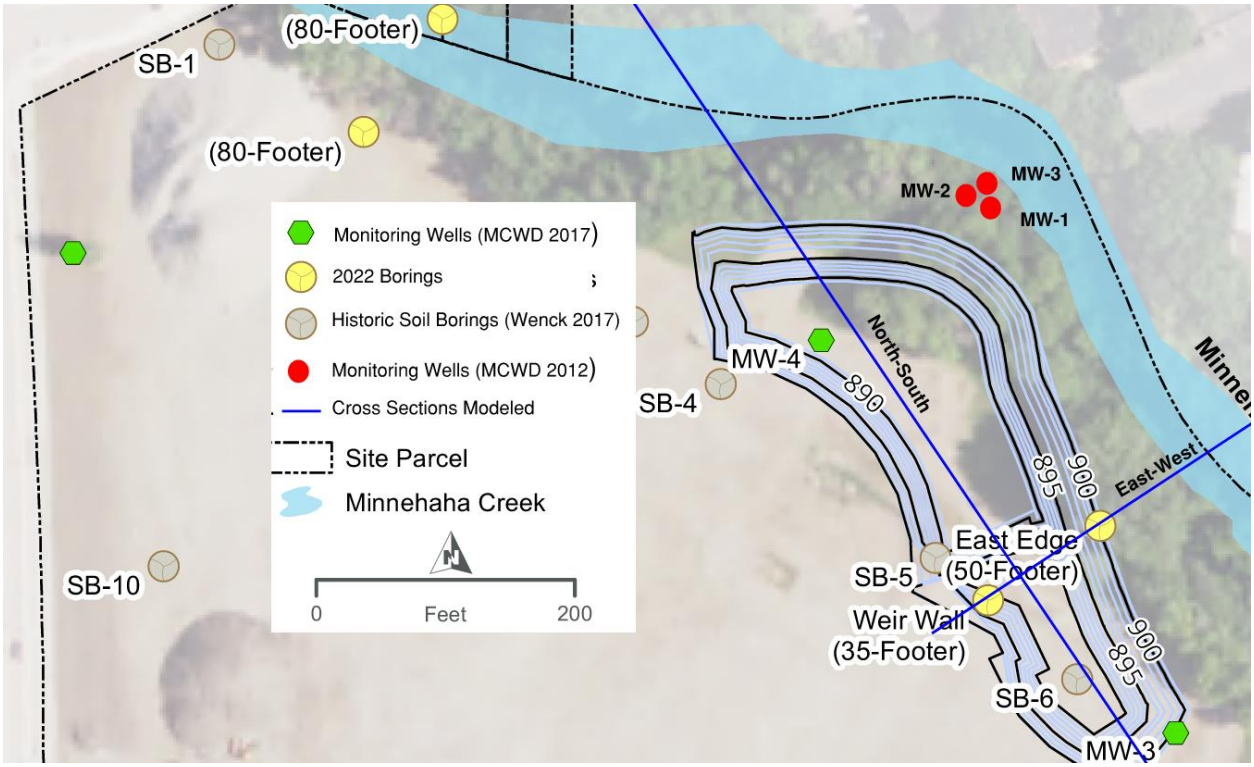


Figure 5. East-West cross section showing slope stability results for the High Pond, Low Creek case modeled

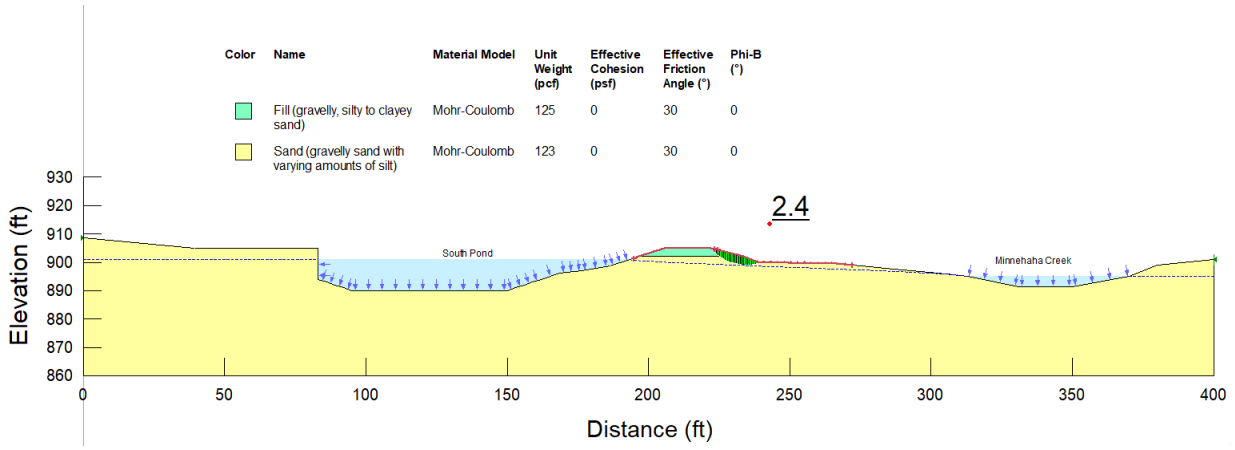
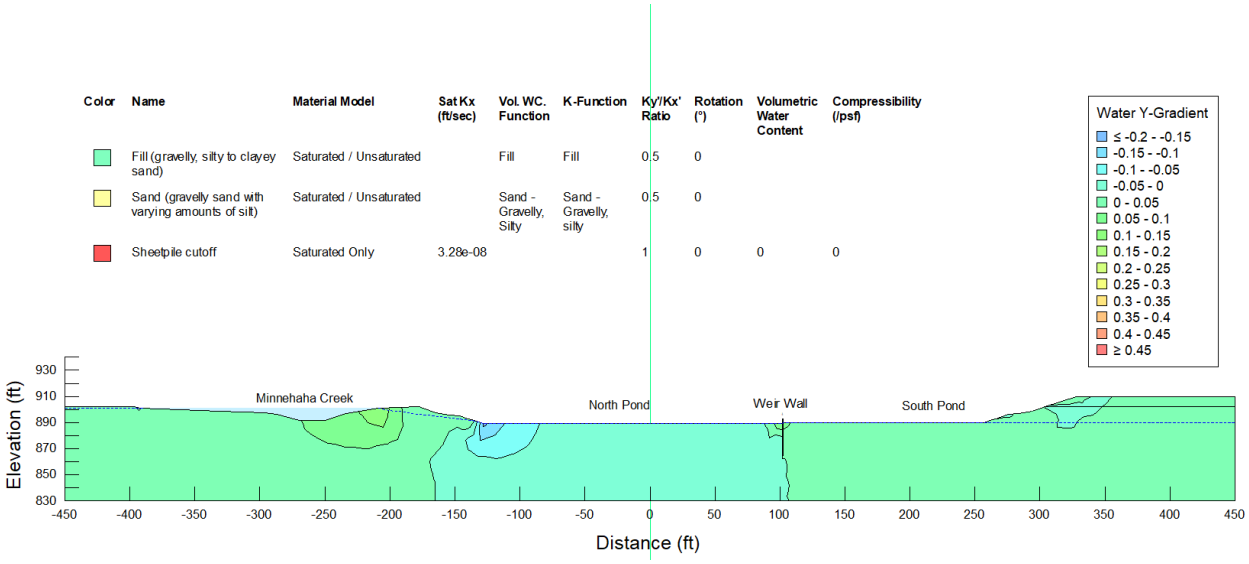


Figure 6. North-South cross section showing seepage output for the Empty Pond, High Creek case modeled



Loading Conditions

The hydraulic boundary conditions for the seepage models are provided in Table 2.

Table 2. Hydraulic Boundary Conditions for Loading Cases

Cross Section	Loading Case	Analysis Type	Slope analyzed	Pond Water Elevation [feet]	Far field Creek Conditions
East-West	Case 1: Empty Pond, High Creek	Steady-State	Interior Slope	890	Minnehaha Creek Elev. 901 feet
	Case 1a: 894-foot Elev. Pond, High Creek	Steady-State	Interior Slope	894	Minnehaha Creek Elev. 901 feet
	Case 2: High Pond, Low Creek	Steady-State	Exterior Slope	901	Minnehaha Creek Elev. 895 feet
North-South	Case 1: Empty Pond, High Creek	Steady-State	Interior Slope – North Pond	890	Minnehaha Creek Elev. 901 feet
	Case 1a: 894-foot Elev. Pond, High Creek	Steady-State	Interior Slope - North Pond	894	Minnehaha Creek Elev. 901 feet
	Case 2: High Pond, Low Creek	Steady-State	Exterior Slope – North Pond	901	Minnehaha Creek Elev. 895 feet
	Case 1: Empty Pond, High Creek	Steady-State	Interior Slope – South Pond	890	Minnehaha Creek Elev. 901 feet

Currently, there is limited surface water elevation data of the Minnehaha Creek at the Blake Road site. In addition, well data at the site is limited. Groundwater monitoring from the Wenck 2017 report [2] (included in Attachment A) provides a limited history for the groundwater conditions. The lowest reading from Monitoring Wells 3 and 4 (the Wenck 2017 wells that are closest to the proposed stormwater basin, see Figure 1) is 896.73 feet. Unfortunately, readings from the three monitoring wells described in the University of Minnesota 2013 report [3] are based on a local benchmark that was assigned an elevation of 100 feet and the readings are not useable at this time. Considering the limited data available, conservative water elevations were selected and are described below:

- The maximum creek elevation is based on the Wenck 2017 Monitoring Well 3 water level reading at time of install (rounded to the nearest foot to obtain an elevation of 901 feet, which coincides with the high-water level of the pond; see Attachment A).
- The low creek elevation was selected as 895 feet based on information from the Wenck 2016 technical memo [14] (included in Attachment A), which stated an assumed groundwater level under the pond of 895 feet. This was selected as it was lower than the 896.73 feet elevation (the lowest reading from Monitoring Wells 3 and 4) from the Wenck 2017 report [2]. Because of the permeable granular soils at the sight, it is assumed the groundwater level readings at the wells match up well with the Creek water level.
- The high-water level elevation of the pond is 901 feet elevation. This is the overflow elevation of the pond (see Figure 2).

No additional external loading was applied to the models, such as surcharge loads associated with vehicle traffic or stockpiles. Using the seepage conditions modeled based on the hydraulic loading conditions in Table 2, the slope stability modeling cases were analyzed for the interior and exterior pond slopes. For this analysis, only steady-state seepage conditions were analyzed, and only drained strengths were applied for the soil strength parameters.

Seepage and Stability Results

Seepage Analysis Results

The pond cross sections for the proposed stormwater pond were evaluated with respect to excessive exit gradients. Guidance for *High Exit Gradients in a Cohesionless Soil* from USBR Design Standards No.13 Chapter 8: Seepage (2014) was used to evaluate seepage concerns [7].

Excessive exit gradients in cohesionless soil can lead to a “quick” ground condition at the location of seepage, which could lead to the presence of sand boils [7] and could possibly develop into progressive backward erosion and pond breach. To evaluate for the potential of excessive gradient (aka heave) in the seepage model, the vertical exit gradient (I_e) in the native Sand where the piezometric line exited the slope (the area of maximum vertical gradient) was evaluated with respect to the critical gradient, I_c, of the Sand. The I_c is defined as the ratio of the soils’ buoyant unit weight to the unit weight of water. The FOS with respect to the vertical exit gradient is the ratio of the critical gradient to the exit gradient. For new dams, USBR recommends a FOS (factor of safety) of 4.0 to evaluate heave. The seepage results for all cross sections demonstrate a FOS greater than 4.0.

In addition, seepage analysis was evaluated per USACE EM 1110-2-1913, “Design and Construction of Levees” manual guidelines [16], which states that the exit hydraulic gradient does not exceed 0.5 at the toe of the pond embankment. Seepage results for all cross sections

demonstrate the exit gradient is less than the maximum allowable value of 0.5 at the toe of the pond embankment for both interior and exterior slopes, indicating seepage design requirements are satisfied.

Table 3 shows the seepage analysis results. See Attachment B for figures of the SEEP/W seepage analysis results.

Table 3. Seepage Analysis Results

Cross Section	Piezometric Conditions	Slope analyzed	Exit Gradient – USACE[1] Recommended < 0.5	Factor of Safety-Heave Recommended USBR[2] Minimum- 4.0
East-West	Case 1: Empty Pond, High Creek	Interior Slope, South Pond	0.30	4.2
	Case 1b: 894-foot Elev. Pond, High Creek	Interior Slope, South Pond	0.15	8.4
	Case 2: High Pond, Low Creek	Exterior Slope, South Pond	0.10	12.6
North-South	Case 1: Empty Pond, High Creek,	Interior Slope, North Pond	0.30	4.2
	Case 1b: 894-foot Elev. Pond, High Creek	Interior Slope, North Pond	0.15	8.4
	Case 2: High Pond, Low Creek	Exterior Slope, North Pond	0.15	8.4
	Case 1: Empty Pond, High Creek	Interior Slope, South Pond	0.00	>>4.0

[1] USACE = United States Army Corps of Engineers
[2] USBR = United States Bureau of Reclamation

Slope Stability Analysis Results

Slope stability criteria and guidance as defined in EM 1110-2-1913 and EM 1110-2-1902 [15,16], was used to evaluate the stormwater pond embankment stability. This was deemed the most appropriate guidance for this project.

Long Term - Steady State Seepage

For the steady state condition, the water surfaces as described in Table 2 were first used to estimate the pore water pressures in the embankment based on a seepage analysis. The pore water pressures from the seepage analysis were used in the stability analysis. Drained soil strengths are used for this analysis.

Results

The cross sections were evaluated using established FOS typically used by USACE as defined in EM 1110-2-1913 and EM 1110-2-1902 [15,16]. For the long-term stability condition, a factor of safety of 1.4 was selected. The minimum factors of safety calculated for each section under the various loading conditions are shown in Table 4. All factors of safety determined for the embankment were above minimum requirements except for the East-West (south pond) and North-South (north pond) cross sections under the empty pond, high creek condition. By increasing the pond water level to an elevation of 894 feet, a factor of safety of 1.4 is achieved. Attachment C includes figures of the SLOPE/W slope stability analysis results.

Table 4. Slope Stability Results

Case		Slope Analyzed	USACE Recommended Minimum Factor of Safety (EM 1110-2-1913)	East-West Cross Section (South Pond)	North-South Cross Section (North Pond)	North-South Cross Section (South Pond)
Steady State Seepage-Drained (Long-term) Loading	**Case 1: Empty Pond, High Creek**	Interior Slope	1.4	1.3	1.1	1.9
	Case 1b: 894' Elev. Pond, High Creek	Interior Slope		1.4	1.5	N/A
	Case 2: High Pond, Low Creek	Exterior Slope		2.4	1.4	N/A

Slope Stability and Seepage Findings

Preliminary engineering evaluations demonstrate that design requirements are satisfied for the proposed Blake Road Stormwater Pond except for Case 1 of the East-West (south pond) and North-South (north pond) cross sections (under the empty pond, high creek condition). While these two cases are below the recommended FOS values, they do still have a FOS greater than 1.0. All analysis were completed under steady state seepage conditions, which is conservative. If the pond is raised to elevation 894' FOS requirements are met.

In addition, the case of an empty pond and a high river is not likely. However, the pond may be emptied for maintenance purposes if it's drawn down for weir wall or outlet structure maintenance. These slope stability results can be used to inform maintenance recommendations (e.g., avoid draining the pond when the creek is high).

Final analysis can be completed upon soil testing to refine parameters, groundwater information, and information on the Minnehaha Creek water elevations.

Pedestrian Bridge, Outlet Structure, and Weir Wall Evaluation

Pedestrian Bridge

The 2022 subsurface investigation included two SPT borings drilled to bedrock (encountered at approximately 70 to 73 feet below ground surface) near the proposed bridge abutments (the two 2022 borings labeled ’80-footer’ on Figure 3). Preliminary results indicate pile foundation with refusal at approximately elevation 832 feet (to bedrock). The analysis will be finalized once soil laboratory results and field tests are completed.

Outlet Structure

The 2022 subsurface investigation included one SPT boring drilled to 50 feet below ground surface near the proposed weir wall (the 2022 borings labeled ‘East Edge (50-footer)’ on Figure 3). Preliminary results indicate a pile foundation will not be required but helical anchors may be considered to mitigate uplift from groundwater. The analysis will be finalized once soil laboratory results and field tests are completed.

Weir Wall

The 2022 subsurface investigation included one SPT boring drilled to 35 feet below ground surface near the proposed weir wall (the 2022 borings labeled ’Weir Wall (35-footer)’ on Figure 3). The weir wall will consist of concrete capped sheetpile extended to a depth of 20 feet below the bottom of the pond. The weir wall design will be finalized once soil laboratory results and field tests are completed.

Abbreviations

AASHTO LRFD. American Association of State Highway and Transportation Officials Load-and-Resistance Factor Design.

EM. Engineering Manual.

FOS. Factor of Safety.

Ft. Feet.

I_c. Critical Gradient.

I_e. Exit Gradient.

MCWD. Minnehaha Creek Watershed District.

NAVFAC. Naval Facilities Engineering Command.

SWCC. Soil-Water Characteristic Curve.

USACE. United States Army Corps of Engineers.

USBR. United State Bureau of Reclamation.

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16. United States Army Corps of Engineers. EM 1110-2-192 Slope Stability, October 2003.

Attachments

Attachment A – Borehole Logs

Attachment B – SEEP/W Seepage Analysis Results

Attachment C – SLOPE/W Slope Stability Analysis Results

Attachment A

- Existing Monitoring Well Logs
- Peizometer Data from the University of Minnesota 2013 Report
- Wenck 2017 Groundwater Monitoring Report
- Wenck 2016 Technical Memo

Protect it. Pass it on.

MISSISSIPPI WATERSHED MANAGEMENT ORGANIZATION

MINNEHAHA CREEK WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE

Baseflow Restoration in Minnehaha Creek Watershed with Stormwater Infiltration

MWMO Watershed Bulletin: 2014-3

Prepared for the MWMO by:
University of Minnesota

Appendix IV. Piezometer Installation Details

Shallow monitoring wells were installed at 4 sites along the creek as described in Section 3.3. At each site, three to four 2-in diameter, PVC wells were installed in the riparian zone approximately perpendicular to flow in the creek. A plan view of piezometer locations is provided in Figure 12. The following sections provide greater detail as to piezometer installations and observed stratigraphy for each of the sites.

Jidana Wetland

All wells at the Jidana wetland site were hand-augered to a depth ranging from 3 to 5.5 ft below the surface. Vegetation at the site transitioned from cattails (edge of the channel to piezometer 2 as labled in Figure A.5.), to *Phragmites* (piezometer 1), to trees (piezometer A). All piezometers were screened in the sandy aquifer underlying up to 4 feet of organic material at the site. Piezometers were screened across the bottom-most 10-inches of the PVC pipe. The aquifer was comprised predominantly of coarse sand interspersed with gravel and small rocks (up to 3-inches in diameter). With the exception of piezometer 1, which was dry from August 2012 to March 2013, the water table remained above screened sections.

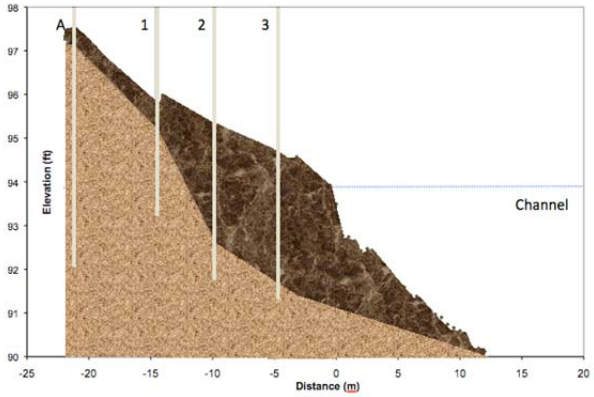

Figure A.5. Cross-section of wells installed at the Jidana wetland. The cross section is comprised of a layer of organic material (dark brown shading) up to 4-ft thick near the stream underlain by a layer of coarse sand and gravel/cobble (light brown shading) to which the 10-in screened interval at the bottom of all wells is open.

Lahti Wetland

Two sets of piezometers were installed at the Lahti wetland (Figure 12). Piezometers at the upstream end of the site were installed during the spring of 2013. Piezometers 1 and 3 were installed by hand while a drill rig was used to install piezometers 2s and 2d. Cattails were the dominant vegetation type from the channel to piezometer 1. A layer of organic material with a relatively uniform thickness of 4 to 5 ft was encountered at this site. Although at different depths (Figure A.6.), all piezometers were open to the same sand and gravel aquifer underlying the layer of organic material. An additional bore hole was augered near the location of piezometers 2s and 2d to discern the presence of any low permeability layers within the aquifer. Such a layer, consisting of silty-clay till, was encountered at a depth of 45 ft. The water table remained perched above the ground surface at all piezometers from June to early August, 2013.

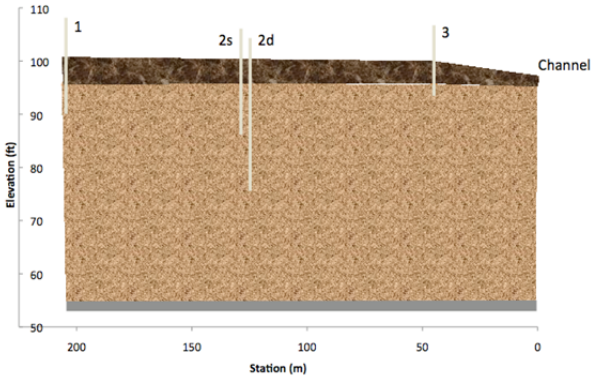

Figure A.6. Cross-section of wells installed on the upstream end of the Lahti wetland site. A relatively uniform, 4-ft thick organic layer (brown shading), overlays the sandy aquifer (light brown shading). The 10-in screened interval of all piezometers is open to the sandy aquifer. A confining sandy clay layer (dark gray shading) was encountered at a depth of about 45 ft in a boring conducted near piezometers 2s and 2d. Note that the extension of this layer across the rest of the site is assumed.

The second set of piezometers was installed approximately 1000 ft downstream (Figure A.7.) Grasses, namely *Phragmites,* were the dominant vegetation type across this site. A relatively thick (about 6 ft) organic layer was encountered immediately below the ground surface. A 10-inch screened section at the bottom of all piezometers was open to the sand and gravel aquifer underlying this organic layer. A thin clay layer was encountered between the organic and sandy aquifer at piezometers 1 and 2.

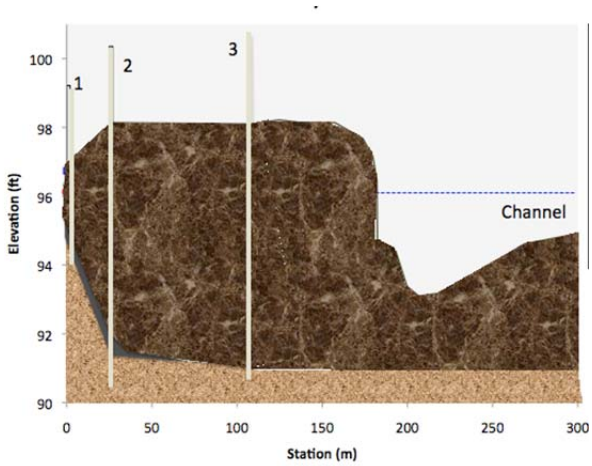

Figure A.7. Cross-section of wells installed on the downstream end of the Lahti wetland site. A thick layer (up to 6 ft) of organic soil (brown shading) overlays a layer of gleyed, silty sand (light brown shading) to which the 10-in screened interval of all piezometers is open. A thin clay layer (solid gray shading) capping the sand layer was observed at Piezometers 1 and 2. The piezometric head in piezometer 3 was greater than the ground surface throughout monitoring in 2013.

Blake Cold Storage Site

Soil characteristics within the riparian area immediately adjacent to the site were examined with a hand auger (Figure A.8.). Piezometer installation was also completed with a hand auger in July 2012. A silt layer ranging in thickness from 1 to 3 feet overlays a relatively compacted till layer (Figure A.9.) Compared to the other sites, this gravely sand layer was more difficult to penetrate with the hand auger. Additional soil explorations of the lawn area between the wooded riparian area and parking lot of the Cold Storage plant were conducted by a drill rig (Figure A.8.). Borings in the lawn area indicated the presence of a 7 to 12 ft layer of silty- to clayey- sand fill material overlying a silty-sand aquifer.

Figure A.8. Approximate locations of piezometer installations (solid red circles) within wooded riparian area of creek and soil borings completed with a drill rig (black and white circles) in the upslope lawn area.

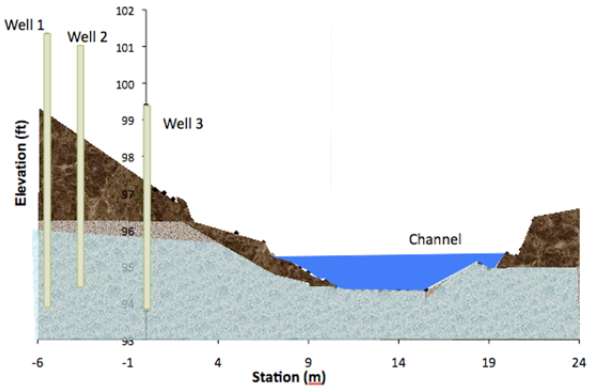

Figure A.9. Cross-section of wells installed at the Cold Storage site on Blake Road. Underlying a 1-2 foot layer of silt (dark brown shading) is a thick layer of compacted loamy sand till with large gravel and stones embedded throughout. The 10-in screened interval of all wells is open to this layer.

Utley Park

Soil stratigraphy was initially explored by hand auger during 2012 in the lawn area immediately adjacent the stream. In general, the site is overlain by about 0.5 ft of top soil, underlain by about 2 ft of compacted clay. A graveley sand layer was encountered below the clay layer; however, the diameter of gravel in this layer was too large to permit penetration with the hand auger. Due to interest in this site as a location in which groundwater may be perched, subsequent borings and piezometer installations were conducted during the spring of 2013. Figure A.10. illustrates the location and depth of piezometers relative to the stream channel. A relatively low conductivity till layer was encountered at a depth of 50 ft.

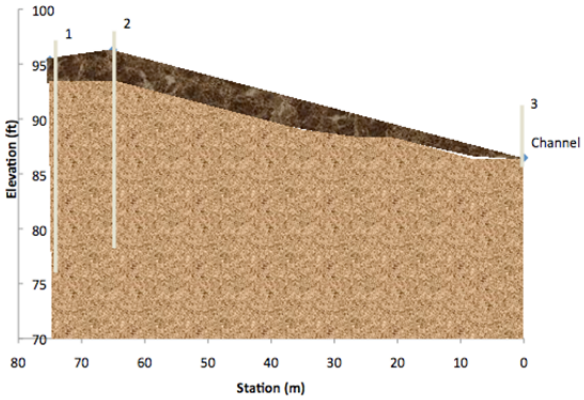

Figure A.10. Cross-section of wells installed at the Utley Park site in Edina. Underlying a 1-2 foot layer of silty-clay fill material (dark brown shading) is a thick layer of compacted loamy sand till with large gravel and stones embedded throughout. The 10-in screened interval of all wells is open to this layer.

WENCK File #B0185-0069
October 31, 2017

Phase II Environmental Site Assessment Addendum: Groundwater Monitoring Report

Hopkins Cold Storage
325 Blake Road North
Hopkins, MN

Prepared for:

Minnehaha Creek Watershed District and Hennepin County

15320 Minnetonka Blvd.
Minnetonka, MN 55345

WENCK
Responsive partner.
Exceptional outcomes.

Prepared by:

WENCK Associates, Inc.
1802 Wooddale Drive
Woodbury, MN 55125-2937
Phone: 651-294-4580
Fax: 651-228-1969

Table 1
Summary of Historical Groundwater Elevation Data
Hopkins Cold Storage
325 North Blake Road, Hopkins, Minnesota
Wenck Project No. B0185-0069
October 2017

Well ID No.	**MW-1**	**MW-2**	**MW-3**	**MW-4**	**MW-5**
Northing*	150415.50	150517.00	150584.90	150923.70	151019.30
Easting*	499515.50	499862.80	500400.80	500049.10	499471.00
TOC Elevation (ft above MSL)	909.13	907.19	911.27	907.59	913.49
Ground Elevation (ft above MSL)	907.0	907.0	909.1	905.5	910.8
Top of Screen Elevation (ft above MSL)	899.2	897.8	899.8	897.5	901.8
Bottom of Screen Elevation (ft above MSL)	889.2	887.8	889.8	887.5	891.8

Date of Measurement	**MW-1**	**MW-2**	**MW-3**	**MW-4**	**MW-5**
08/22/17	898.24	897.79	897.05	897.50	898.37
09/19/17	897.57	897.23	896.73	897.26	896.77

Notes: Horizontal coordinates values shown are the North American Datum of 1988, Hennepin County coordinate system

MCWD	WENCK Responsive partner. Exceptional outcomes.	AUG 2017
Boring Locations Map		Figure 3

Appendix A

Soil Boring Logs

WENCK

Responsive partner. Exceptional outcomes.

LOG OF BORING SB-1

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/16/17	Operator	: Todd
Date Completed	: 8/16/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 2.5'

Depth in Feet	Surf. Elev. 913	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	913	Bit Fill		Bituminous surface			
				Gravel base			
		Fill		SAND, well graded, some silt, slight clay, gravel and organics, dark brown/black, slightly moist (Fill)		0.5-2.5'	0.1
				GRAVELLY SAND, medium to coarse grained, some cobbles, light brown, dry to slightly moist (Outwash)			0.4
5	908	GW/SP				5-7.5'	0.8
							0.6
10	903			No Recovery @ 10-15' rock in shoe			
15	898	GW/SP		GRAVELLY SAND, medium to coarse grained, some cobbles, light brown, wet (Outwash)	▼		1.3
							1.0
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-24-2017 C:\Users\andcj0675\Desktop\Cold Storage Boring Logs\SB-1.bor

WENCK

Responsive partner. Exceptional outcomes.

LOG OF BORING SB-2

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/16/17	Operator	: Todd
Date Completed	: 8/16/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 9'

Depth in Feet	Surf. Elev. 912	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	912	Bit Fill		Bituminous surface Gravel base			
		Fill		SILT, slight clay, sand, gravel and organics, black, slightly moist (Fill)		0.5-2.5'	1.0
		Fill		GRAVELLY SAND, well graded, brown, slightly moist, some lenses of black organic silt in part (Fill)			0.6
5	907	Fill		SANDY GRAVEL, very fine to coarse, brown, slightly moist, some brown and black silt in part (Fill)			0.8
							0.4
10	902	GW/SP		GRAVELLY SAND, medium to coarse grained, some cobbles, light brown, moist (Outwash) Becoming wet @ 10'	▼	10-12.5'	0.5
							0.6
15	897			Becoming coarse grained @ 15'			0.3
							0.4
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-24-2017 C:\Users\andcj0675\Desktop\Cold Storage Boring Logs\SB-2.bor

WENCK

Responsive partner. Exceptional outcomes.

LOG OF BORING SB-3

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/16/17	Operator	: Todd
Date Completed	: 8/16/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 5'

Depth in Feet	Surf. Elev. 912	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	912	Bit Fill		Bituminous surface			
				Gravel base			
		Fill		SILTY CLAY, some organics, slight sand and cobbles, soft, black, slightly moist (Fill)		0.5-2.5'	1.9
		Fill		GRAVELLY SAND, well graded, loose, brown, slightly moist, (Fill)			
		Fill		CLAYEY SILT, soft, brown, moist (Fill)			0.9
		Fill		SANDY GRAVEL, very fine to coarse, some cobbles, brown, slightly moist, (Fill)			
5	907	SP		SAND, fine to medium grained, moderately dense, light brown, moist (Outwash)			1.0
							1.3
10	902					10-12.5'	2.9
		SP		SAND, coarse grained, slight gravel and cobbles, light brown, very moist (Outwash)	▼		2.7
				Becoming wet @ 14'			
15	897			No Recovery @ 15-20' rock in shoe			
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-24-2017 C:\Users\andcj0675\Desktop\Cold Storage Boring Logs\SB-3.bor

WENCK

Responsive partner. Exceptional outcomes.

LOG OF BORING SB-4

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/16/17	Operator	: Todd
Date Completed	: 8/16/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 10'

Depth in Feet	Surf. Elev. 912	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	912	Bit		Bituminous surface			
		Fill		GRAVELLY SAND, fine to coarse grained, brown, dry (Fill)			1.6
		Fill		SANDY CLAY, some silt, slight organics, dark brown, moist, (Fill)			2.5
5	907	Fill		GRAVELLY SAND, fine to coarse grained, brown, slightly moist (Fill)			
		Fill		SANDY CLAY, some silt, slight organics, dark brown, moist (Fill)		5-7.5'	2.6
		Fill		GRAVELLY SAND, fine to coarse grained, some silt in part, slight to moderate petroleum odor, brown, moist (Fill)			140.5
10	902	GW/SP		GRAVELLY SAND, coarse grained, some cobbles, light brown, wet (Outwash) Moderate to strong petroleum odor from 10-13'	▼	10-12.5'	216.8
							2.7
15	897	SP		SAND, fine to medium grained, light brown, wet (Outwash)		15-17.5'	0.9
							0.7
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-24-2017 C:\Users\andcj0675\Desktop\Cold Storage Boring Logs\SB-4.bor

WENCK

Responsive partner. Exceptional outcomes.

LOG OF BORING SB-5

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/16/17	Operator	: Todd
Date Completed	: 8/16/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 6.5'

Depth in Feet	Surf. Elev. 911	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	911	Fill		GRAVEL, some sand and silt, brown, dry (Fill)			
		Fill		CLAYEY SAND, some silt and organics, black, moist (Fill)			0.6
		Fill		GRAVELLY SAND, fine to coarse grained, brown, slightly moist, some black organic silt in part (Fill)		2.5-5'	0.8
5	906	Fill		GRAVELLY SAND, medium grained, brown, dry (Fill)			0.8
		OL		ORGANIC SILT, slight sand and clay, soft, black, moist (Swamp Deposit)			
		GW/SP		SANDY GRAVEL, coarse grained, some cobbles, light brown, slightly moist (Outwash)		7.5-10'	1.2
10	901			Becoming wet @ 10'	▼		1.4
							0.7
15	896						0.9
							0.9
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-30-2017 T:\0185\0069 325 Blake Investigation Proposal and Grant\Phase II Investigation\Phase II Field Work\Cold Storage Quicklog\SB-5.bor

WENCK

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LOG OF BORING SB-6

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/16/17	Operator	: Todd
Date Completed	: 8/16/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 10'

Depth in Feet	Surf. Elev. 912	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	912	Fill		GRAVEL, some sand and silt, brown, dry (Fill)			
		Fill		CLAYEY SAND, some silt and organics, dark brown/black, moist (Fill)			1.2
		Fill		SILT, slight sand and clay, soft, brown, moist (Fill)			1.2
		Fill		GRAVELLY SAND, fine to coarse grained, brown, slightly moist (Fill)			
5	907	Fill		GRAVELLY SAND, fine to coarse grained, brown, slightly moist, some black silt with sand and clay in part (Fill)		5-7.5'	1.5
		Fill		SILT, some sand, clay and organics, dark brown/black, moist, some brown gravelly sand in part (Fill)			1.3
10	902	GW/SP		SANDY GRAVEL, coarse grained, some cobbles, light brown, wet (Outwash)	▼	10-12.5'	2.1
							1.8
15	897	GW/SP		GRAVELLY SAND, fine to coarse grained, slight cobbles, light brown, wet (Outwash)			1.0
		GW		GRAVEL, some sand and cobbles, light brown, wet (Outwash)			1.1
20				End of boring @ 20'			

Elevation estimated from Google Earth.

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LOG OF BORING SB-7

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/16/17	Operator	: Todd
Date Completed	: 8/16/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 0.5'

Depth in Feet	Surf. Elev. 912	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	912	Bit		Bituminous surface			
		Fill		Gravel base			0.7
		OL		ORGANIC SILT, some clay, soft, black, moist (Swamp Deposit)			
		ML		CLAYEY SILT, soft, brown, moist (Outwash)		2.5-5'	1.5
5	907	SP		SAND, fine to medium grained, coarsening downward, moderately dense, light brown, moist (Outwash)			1.4
		GW/SP		GRAVELLY SAND, fine to coarse grained, slight cobbles, light brown, slightly to very moist (Outwash)			2.1
10	902			Becoming wet @ 12'	▼	10-12.5'	3.0
							2.7
15	897	SP		SAND, fine to very fine grained, light brown, wet (Outwash)			1.2
							1.4
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-30-2017 T:\0185\0069 325 Blake Investigation Proposal and Grant\Phase II Investigation\Phase II Field Work\Cold Storage Quicklog\SB-7.bor

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LOG OF BORING SB-8

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/16/17	Operator	: Todd
Date Completed	: 8/16/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 2'

Depth in Feet	Surf. Elev. 914	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	914	Bit		Bituminous surface			
		Fill		Gravel base			
		Fill		SANDY CLAY, some organics, black, moist (Fill)		1-2'	0.5
		OL		ORGANIC SILT, some clay, soft, black, moist (Swamp Deposit)			0.9
		SM		SILTY SAND, some clay, soft, brown, moist (Outwash)			
5	909	GW		GRAVEL, some sand, slight cobbles, light brown, dry to slightly moist (Outwash)			0.5
							0.5
10	904						1.6
		GW/SP		GRAVELLY SAND, medium grained, slight cobbles, light brown, moist (Outwash)			
				Becoming wet @ 13'	▼		0.6
15	899						0.8
							0.9
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-30-2017 T:\0185\0069 325 Blake Investigation Proposal and Grant\Phase II Investigation\Phase II Field Work\Cold Storage Quicklog\SB-8.bor

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LOG OF BORING SB-9

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/17/17	Operator	: Dave
Date Completed	: 8/17/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: No Fill Observed

Depth in Feet	Surf. Elev. 912	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	912	ML		SILT, some organics, trace very fine sand and clay, dark brown/black, slightly moist (Topsoil)		0-2.5'	0.0
		SP		SAND, medium grained, light brown, dry (Outwash)			
				GRAVELLY SAND, medium to coarse grained, some cobbles, light brown, dry to moist (Outwash)			0.0
5	907						0.0
							0.0
10	902	GW/SP		Becoming wet @ 10'	▼		0.1
							0.3
15	897						0.4
							0.4
20		SC		CLAYEY SAND, stiff, light brown, wet (Outwash)			
				End of boring @ 20'			

Elevation estimated from Google Earth.

08-24-2017 C:\Users\landcj0675\Desktop\Cold Storage Boring Logs\SB-9.bor

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LOG OF BORING SB-10

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/17/17	Operator	: Dave
Date Completed	: 8/17/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: 0.5'

Depth in Feet	Surf. Elev. 912	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	912	Bit		Bituminous surface			
		Fill		Gravel base		0.5-2.5'	0.4
		GW/SP		GRAVELLY SAND, medium to coarse grained, some cobbles, light brown, dry (Outwash)			0.5
5	907	SP		SAND, fine to medium grained, slight gravel, moderately dense, light brown, moist (Outwash)			1.5
							1.1
10	902	GW/SP		GRAVELLY SAND, fine to coarse grained, some cobbles, light brown, moist (Outwash)			1.6
				Becoming wet @ 12'	▼		0.8
15	897						1.0
							0.6
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-24-2017 C:\Users\andcj0675\Desktop\Cold Storage Boring Logs\SB-10.bor

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LOG OF BORING SB-11

Cold Storage
325 Blake Rd N
Hopkins, MN

Phase II Investigation

Project # B0185-0077

Date Started	: 8/17/17	Operator	: Dave
Date Completed	: 8/17/17	Logged By	: CJA
Contractor	: Range Environmental	Checked By	: MLH
Drilling Method	: Push Probe		
Sampling Method	: Macro Core		

Water Levels
▼ Water Level

Boring Depth: 20'
Estimated Depth of Fill: ~1'

Depth in Feet	Surf. Elev. 912	USCS	GRAPHIC	DESCRIPTION	Water Level	Soil Sample Interval	PID Result (PPM)
0	912	Fill		SAND, well graded very fine to coarse grained, slight silt and clay, brown, moist (Possible Fill)			
		GW/SP		GRAVELLY SAND, very fine to medium grained, some cobbles, light brown, dry to slightly moist (Outwash)		1-2'	0.2
							0.5
5	907						1.5
							0.8
10	902						1.2
					▼		0.9
15	897	GW		SANDY GRAVEL, coarse grained, slight cobbles, light brown, wet (Outwash)			1.6
							1.1
20				End of boring @ 20'			

Elevation estimated from Google Earth.

08-24-2017 C:\Users\andcj0675\Desktop\Cold Storage Boring Logs\SB-11.bor

WENCK

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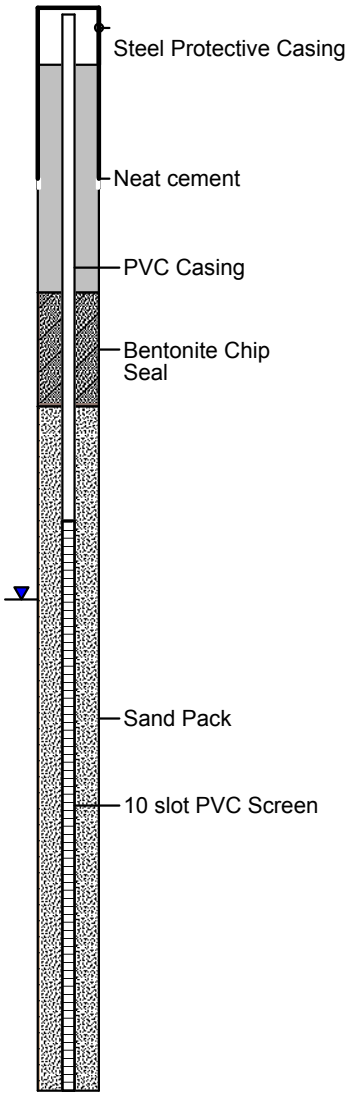
LOG OF BORING MW-1

Cold Storage
325 Blake Rd N
Hopkins, MN
Phase II Investigation
Project # B0185-0077

Date Started	: 8/15/17	Drilling Contractor	: Range Environmental
Date Completed	: 8/15/17	Driller	: Todd
Hole Diameter	: 5.75	Drilling Assistant	: N/A
Drilling Method	: Push Probe	Logged By	: CJA
Sampling Method	: Macro Core		

Location: SW portion of property near Blake Rd N

Depth in Feet	Surf Elev 912	USCS	GRAPHIC	DESCRIPTION	PID (PPM)	Soil Analytical Collected
0	912	Fill		SILT, some sand, some roots, loose, dark brown, moist (Fill)	0.1	
		GW/SP		GRAVELLY SAND, fine to coarse grained, slight cobbles, moderately dense, light brown, moist (Outwash)	0.1	
5	907				0.3	
					0.2	
10	902			Becoming wet @ 10'	0.7	
		GW		GRAVEL, some sand and cobbles, strong petroleum odor, dark grey, wet (Outwash)	655.5	12.5-15
15	897	GW		SANDY GRAVEL, some cobbles, strong petroleum odor, dark grey, wet (Outwash)	408.1	
		GW		SANDY GRAVEL, some cobbles, brown, wet (Outwash)	2.1	
20				End of boring @ 20'		



Monitoring well installed using hollow stem auger after sampling soil using push probe.
Surface elevation approximated from google earth.
Water level measured at 11.28' below top of casing on 8/16/17.
Well casing stickup ~1.9' above ground surface.

08-24-2017 C:\Users\landcj0675\Desktop\Cold Storage Boring Logs\MW-1.bor

WENCK

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LOG OF BORING MW-2

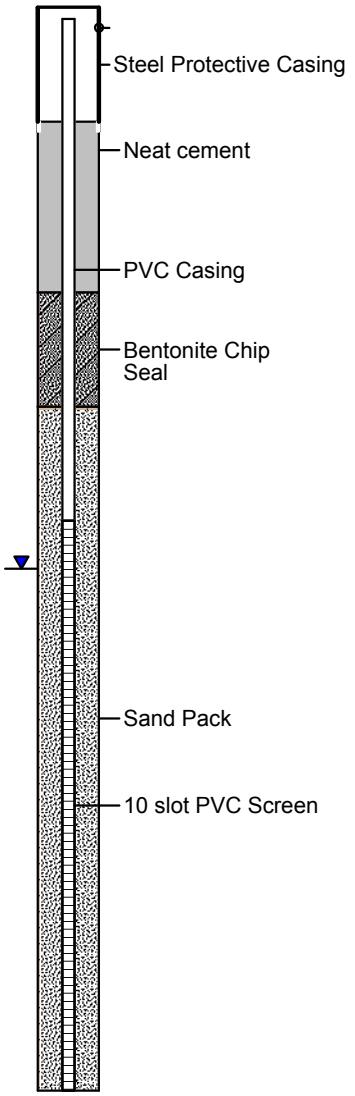
Cold Storage
325 Blake Rd N
Hopkins, MN
Phase II Investigation
Project # B0185-0077

Date Started	: 8/15/17	Drilling Contractor	: Range Environmental
Date Completed	: 8/15/17	Driller	: Todd
Hole Diameter	: 5.75	Drilling Assistant	: N/A
Drilling Method	: Push Probe	Logged By	: CJA
Sampling Method	: Macro Core		

Location: South loading dock finished at grade.

Depth in Feet	Surf Elev 912	USCS	GRAPHIC	DESCRIPTION	PID (PPM)	Soil Analytical Collected
0	912	Bit		Bituminous surface.		0.5-1'
		Fill		Gravel base.		
		Fill		SAND, fine to medium grained, slight gravel, brown, dry (Fill)	0.5	
				GRAVELLY SAND, fine to coarse grained, some gravel, slightly dense, light brown, dry (Outwash)	0.6	
5	907			Becoming with some cobbles @ 5'	0.7	
		GW/SP			0.6	
10	902			Becoming moist @ 10'	0.8	
				Becoming wet @ 13'	1.0	
15	897				0.7	
		SP		SAND, fine to medium grained, dense, light brown, wet (Outwash)	0.7	
20				End of boring @ 20'		

Well: MW-2
TOC Elev.: TBD



Monitoring well installed using hollow stem auger after sampling soil using push probe.
Surface elevation approximated from google earth.
Water level measured at 9.64' below top of casing on 8/17/17.
Well finished at grade, casing ~2" below ground surface.

08-24-2017 C:\Users\landcj0675\Desktop\Cold Storage Boring Logs\MW-2.bor

WENCK

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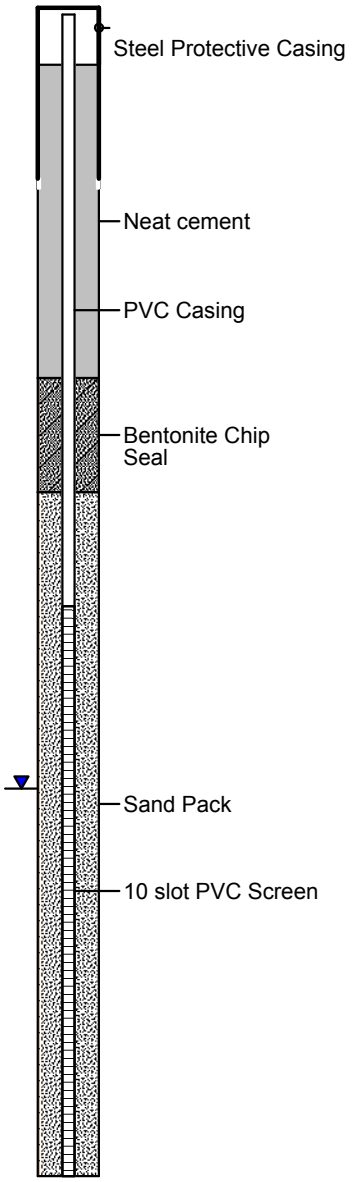
LOG OF BORING MW-3

Cold Storage
325 Blake Rd N
Hopkins, MN
Phase II Investigation
Project # B0185-0077

Date Started	: 8/15/17	Drilling Contractor	: Range Environmental
Date Completed	: 8/15/17	Driller	: Todd
Hole Diameter	: 5.75	Drilling Assistant	: N/A
Drilling Method	: Push Probe	Logged By	: CJA
Sampling Method	: Macro Core		

Location: Northeast portion of property

Depth in Feet	Surf Elev 914	USCS	GRAPHIC	DESCRIPTION	PID (PPM)	Soil Analytical Collected
0	914	Fill		SILT, some sand, some roots, loose, dark brown/black, moist (Fill)	0.1	0-2'
		GW/SP		GRAVELLY SAND, fine to coarse grained, some gravel, loose to slightly dense, light brown, dry to moist (Outwash)	0.0	
5	909				0.0	
					0.1	
10	904				1.3	10-12.5'
		GW		GRAVEL, some sand, slight cobbles, light brown, wet (Outwash)	0.8	
15	899	GW		SANDY GRAVEL, coarse, slight cobbles, light brown, wet (Outwash)	1.0	
					0.7	
20				End of boring @ 20'		



Monitoring well installed using hollow stem auger after sampling soil using push probe.
Surface elevation approximated from google earth.
Water level measured at 14.60' below top of casing on 8/16/17.
Well casing stickup ~2' above ground surface.

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WENCK

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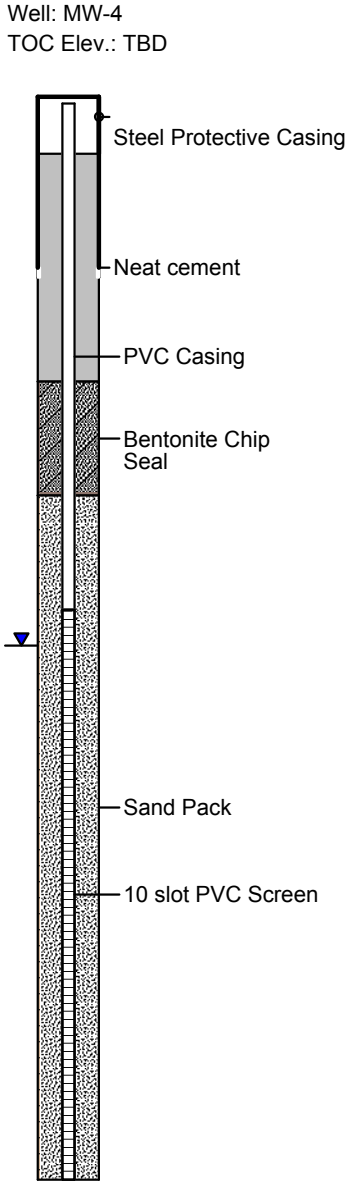
LOG OF BORING MW-4

Cold Storage
325 Blake Rd N
Hopkins, MN
Phase II Investigation
Project # B0185-0077

Date Started	: 8/16/17	Drilling Contractor	: Range Environmental
Date Completed	: 8/16/17	Driller	: Todd
Hole Diameter	: 5.75	Drilling Assistant	: N/A
Drilling Method	: Push Probe	Logged By	: CJA
Sampling Method	: Macro Core		

Location: North portion of property behind building

Depth in Feet	Surf Elev 910	USCS	GRAPHIC	DESCRIPTION	PID (PPM)	Soil Analytical Collected
0	910	Fill		SAND, well graded, very fine to coarse, some silt, brown, moist (Fill)	0.2	1-2'
				Gravel base (Fill)		
		Fill		SILTY CLAY, slight sand, gravel and organics, slightly stiff, dark brown/black, moist (Fill)	0.4	
5	905	SP		SAND, medium to coarse grained, slight to some gravel, slight cobbles, slightly dense, light brown, slightly moist (Outwash)	0.6	
					1.2	7.5-10'
10	900	GW/SP		GRAVELLY SAND, fine to coarse grained, slight cobbles, slightly dense, moist (Outwash) Becoming wet @ 11'	1.1	
					1.0	
15	895	GW		SANDY GRAVEL, coarse, some cobbles, light brown, wet (Outwash)	1.1	
					1.3	
20				End of boring @ 20'		



Monitoring well installed using hollow stem auger after sampling soil using push probe.
Surface elevation approximated from google earth.
Water level measured at 10.53' below top of casing on 8/16/17.
Well casing stickup ~2' above ground surface.

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WENCK

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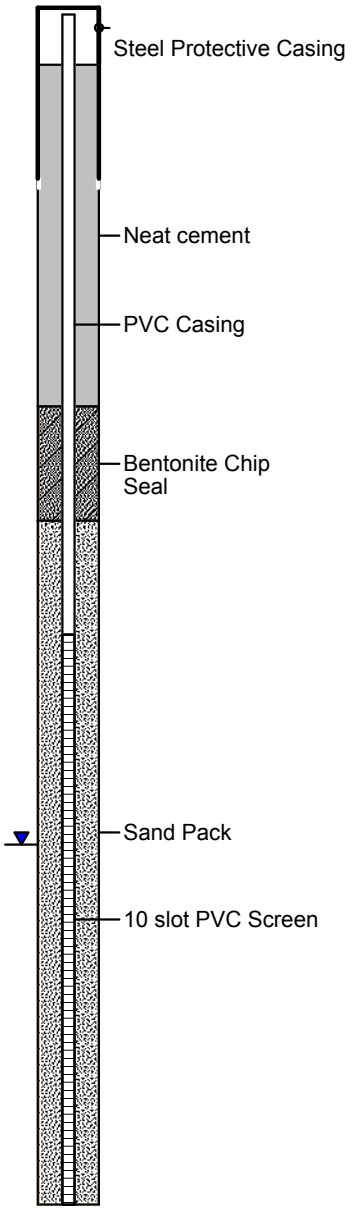
LOG OF BORING MW-5

Cold Storage
325 Blake Rd N
Hopkins, MN
Phase II Investigation
Project # B0185-0077

Date Started	: 8/16/17	Drilling Contractor	: Range Environmental
Date Completed	: 8/16/17	Driller	: Todd
Hole Diameter	: 5.75	Drilling Assistant	: N/A
Drilling Method	: Push Probe	Logged By	: CJA
Sampling Method	: Macro Core		

Location: NW portion of propery near Blake Rd N

Depth in Feet	Surf Elev 916	USCS	GRAPHIC	DESCRIPTION	PID (PPM)	Soil Analytical Collected
0	916	Fill		SILT, some roots/organics, slight sand and clay, loose, dark brown/black, moist (Fill)	0.0	0-2.5'
		GW/SP		GRAVELLY SAND, meduim to coarse grained,slight cobbles, slightly dense, light brown, slightly moist (Outwash)	0.0	
5	911			becoming with some cobbles @ 5'	0.5	5-7.5'
					1.1	
10	906				1.2	
		SP		SAND, fine grained, slight silt, light brown, moist (Outwash)		
		GW/SP		GRAVELLY SAND, coarse grained, some cobbles, light brown, very moist (Outwash) Becoming wet @ 14'	0.9	
15	901				1.0	
		GW		GRAVEL, slight sand and silt, light brown, wet (Outwash)	0.9	
20				End of boring @ 20'		



Monitoring well installed using hollow stem auger after sampling soil using push probe.
Surface elevation approximated from google earth.
Water level measured at 15.58' below top of casing on 8/16/17.
Well casing stickup ~1.7' above ground surface.

08-24-2017 C:\Users\andcj0675\Desktop\Cold Storage Boring Logs\MW-5.bor

Technical Memo

WENCK ASSOCIATES

Responsive partner.
Exceptional outcomes.

To: Michael Hayman, Project Manager, Minnehaha Creek Watershed District

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

Date: January 7, 2016

Subject: Storm Water Treatment Concepts at 325 Blake Road

Minnehaha Creek Watershed District (MCWD) is currently working with a development team to evaluate options for site development at 325 Blake Road in Hopkins, MN. Wenck was tasked to have a better understanding of how much, where and to what extents the storm water will be routed to the site.

Verify Storm Water Volumes

The two major diversion inflows planned for the 325 Blake parcel were the Lake Street Diversion Project –(MCES) and the Powell Road Diversion Project (MCWD). The Powell Road Diversion Project has since been constructed and the Lake Street Diversion is entering final design. As these projects progressed design modifications were required which resulted in a change to the stormwater volumes which would be diverted to 325 Blake. As a result there was a need to determine the current volumes and the necessary footprint for a stormwater BMP on the site.

A HydroCAD model was developed with the updated attributes of the each of the projects to determine the runoff volume that can be directed to the 325 Blake Road stormwater BMP (Table 1). The volumes calculated in the analysis were based on the 1.0 and 1.25-inch 24-hour rainfall events. These two events represent water quality depths used for stormwater BMP sizing.

Table 1 – Runoff Volumes and BMP Footprint Size

Storm Event	**Runoff Volume (ac-ft)**			**BMP Footprint (ac)***
	From Powell	*From Lake St.*	*Total*	
1.0-inch	3.93	1.92	5.85	1.95
1.25-inch	6.23	2.73	8.96	2.99

*****The BMP footprint is based on an assumed depth of 3 ft.*

Site Design Refinement

Based on the two rainfall events mentioned above, the footprint of the filtration basins were calculated and placed graphically in Figure 1. The footprints shown in Figure 1 are the overall impact area of each infiltration basin based on side slopes of 4 horizontal to 1 vertical and tie into the existing surface. The BMP depth was assumed as 3 feet from elevation 898.0 to 901.0. These elevations were determined by understanding the approximate groundwater depth (bottom of basin) and the two diversion structure inverts (overflow elevation). The existing site is generally flat with the exception of the

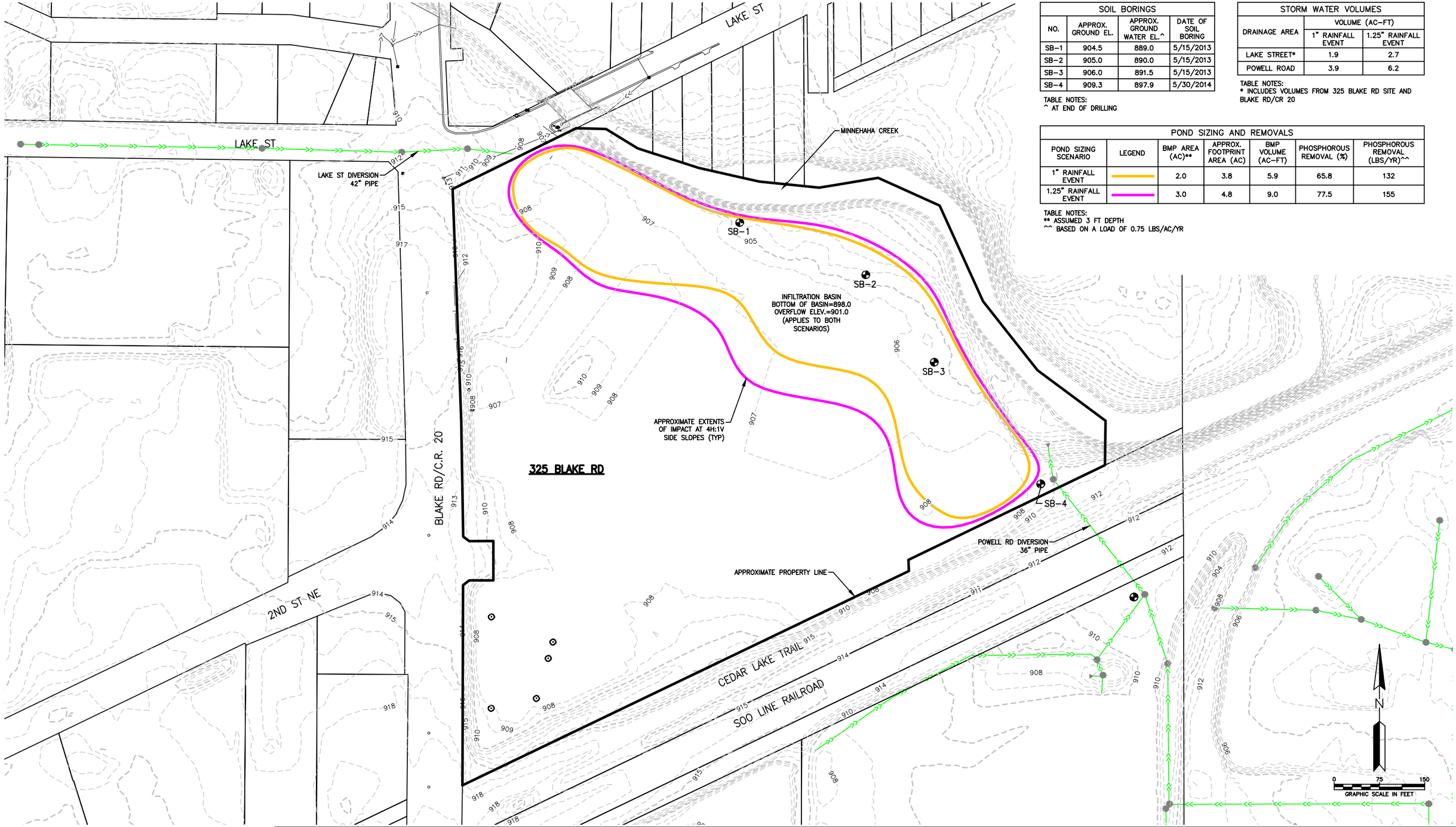
northeastern edge of the site going down to the creek, indicating the exact shape and location of the proposed filtration basin will have minimal effect on the earthwork for the site.

Soil borings from both May of 2013 and May 2014 were reviewed to understand the existing groundwater in the area and to determine the filtration basin bottom elevation. A basin bottom elevation of 898.0 was determined based on three feet of separation from the assumed ground water level. The basin overflow elevation is based on the Lake Street and Powell Road Diversions. Lake Street has an overflow elevation of 902.31 at the diversion structure before water would backup into the system. Powell Road has an overflow elevation of 901.06 at the diversion structure before backing up into the system and thus dictates the overflow elevation for the proposed basin.

Construction Cost Estimate

Both an overall component cost estimate and detailed cost estimate for the storm water treatment concepts were developed. The component cost used a combination of the 2013 Feasibility Study estimates and the 2015 325 Blake Demolition report. Assumptions for the estimates are included in each document. The storm water treatment concept is estimated in the range of $1,865,550 to $2,238,660. These costs are higher than the original 2013 feasibility study estimate largely due to the assumed common excavation quantity. The original estimate assumed a common excavation quantity of 34,000 cubic yards based on calculated storm water volumes at the time. The current common excavation quantity is estimated at 62,500 cubic yards and is based on the removing soil material between the bottom of the proposed basin and the existing surface. The common excavation unit cost currently assumes all material will be hauled off site; however, this unit cost could be reduced if some soil material remains on site.

Plot Date & Time: 7 January 2016 4:56 PM



SOIL BORINGS			
NO.	APPROX. GROUND EL.	APPROX. GROUND WATER EL.^	DATE OF SOIL BORING
SB-1	904.5	889.0	5/15/2013
SB-2	905.0	890.0	5/15/2013
SB-3	906.0	891.5	5/15/2013
SB-4	909.3	897.9	5/30/2014

TABLE NOTES:
^ AT END OF DRILLING

STORM WATER VOLUMES		
DRAINAGE AREA	VOLUME (AC-FT)	
	1" RAINFALL EVENT	1.25" RAINFALL EVENT
LAKE STREET*	1.9	2.7
POWELL ROAD	3.9	6.2

TABLE NOTES:
* INCLUDES VOLUMES FROM 325 BLAKE RD SITE AND BLAKE RD/CR 20

POND SIZING AND REMOVALS						
POND SIZING SCENARIO	LEGEND	BMP AREA (AC)**	APPROX. FOOTPRINT AREA (AC)	BMP VOLUME (AC-FT)	PHOSPHOROUS REMOVAL (%)	PHOSPHOROUS REMOVAL (LBS/YR)^^
1" RAINFALL EVENT		2.0	3.8	5.9	65.8	132
1.25" RAINFALL EVENT		3.0	4.8	9.0	77.5	155

TABLE NOTES:
** ASSUMED 3 FT DEPTH
^^ BASED ON A LOAD OF 0.75 LBS/AC/YR

REV	REVISION DESCRIPTION	DWN	APP	REV DATE

SEAL

NOT FOR CONSTRUCTION

SUB CONSULTANT

PRIME CONSULTANT

WENCK ASSOCIATES

Responsive partner. Exceptional outcomes.

PROJECT TITLE
STORM WATER TREATMENT CONCEPTS AT 325 BLAKE ROAD

MINNEHAHA CREEK WATERSHED DISTRICT
QUALITY OF WATER, QUALITY OF LIFE

SHEET TITLE
POND SIZING CONFIGURATION

DWN BY	CHK'D	APP'D	DWG DATE	JAN 2016
MJS			SCALE	AS SHOWN

PROJECT NO.	SHEET NO.	REV NO.
0185-0028	FIGURE 1	

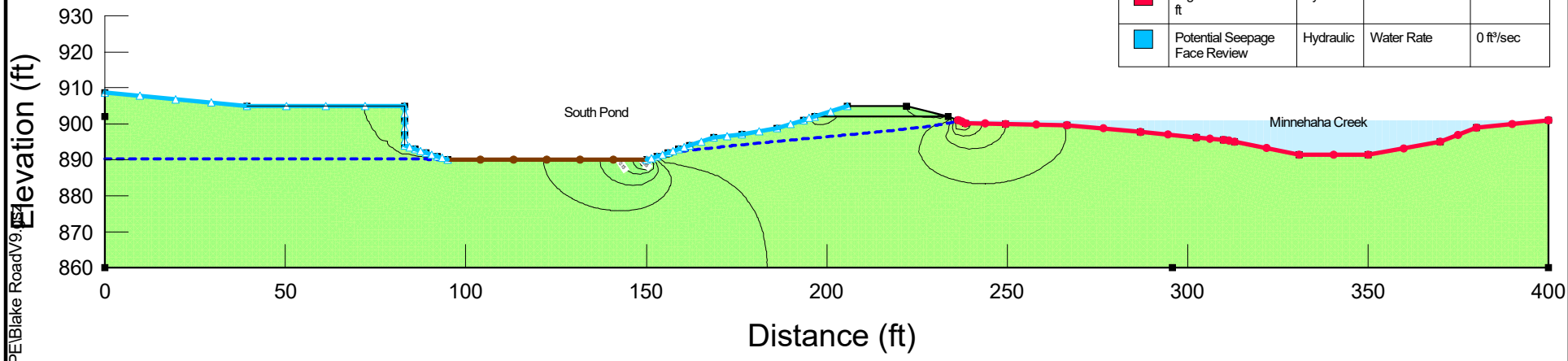
V:\Drafting\0185 MCWD\0028\CAD\DWG\Figure 1.dwg

Attachment B

SEEP/W Seepage Analysis Results

Color	Name	Material Model	Vol. WC. Function	K-Function	Ky'/Kx' Ratio	Rotation (°)
	Fill (gravelly, silty to clayey sand)	Saturated / Unsaturated	Fill	Fill	0.5	0
	Sand (gravelly sand with varying amounts of silt)	Saturated / Unsaturated	Sand - Gravelly, Silty	Sand - Gravelly, silty	0.5	0

Color	Name	Category	Kind	Parameters
	Empty Pond 890 ft	Hydraulic	Water Total Head	890 ft
	High Creek Elev 901 ft	Hydraulic	Water Total Head	901 ft
	Potential Seepage Face Review	Hydraulic	Water Rate	0 ft³/sec



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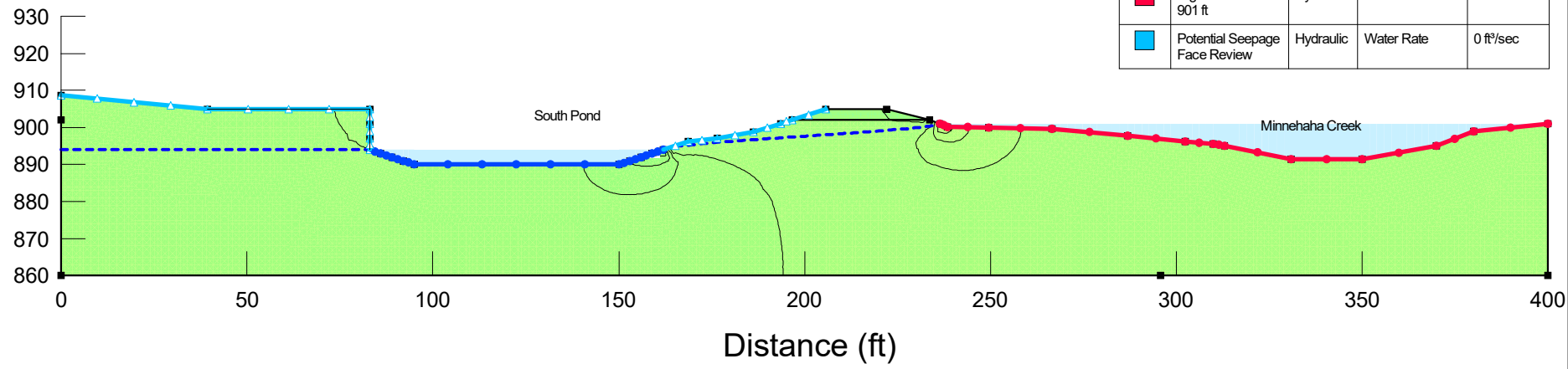
Blake Road Regional Stormwater Pond		Computed: KB	Date:02/18/2022
East - West Cross Section		Checked: GB	Date:02/14/2022
Steady-State Seepage - Case 1: Empty Pond, High Creek			
SEEP/W 11.1.2.22321		Scale: 1:520	

Color	Name	Material Model	Vol. WC. Function	K-Function	Ky'/Kx' Ratio	Rotation (°)
	Fill (gravelly, silty to clayey sand)	Saturated / Unsaturated	Fill	Fill	0.5	0
	Sand (gravelly sand with varying amounts of silt)	Saturated / Unsaturated	Sand - Gravelly, Silty	Sand - Gravelly, silty	0.5	0

Color	Name	Category	Kind	Parameters
	Pond 894 ft	Hydraulic	Water Total Head	894 ft
	High Creek Elev 901 ft	Hydraulic	Water Total Head	901 ft
	Potential Seepage Face Review	Hydraulic	Water Rate	0 ft³/sec



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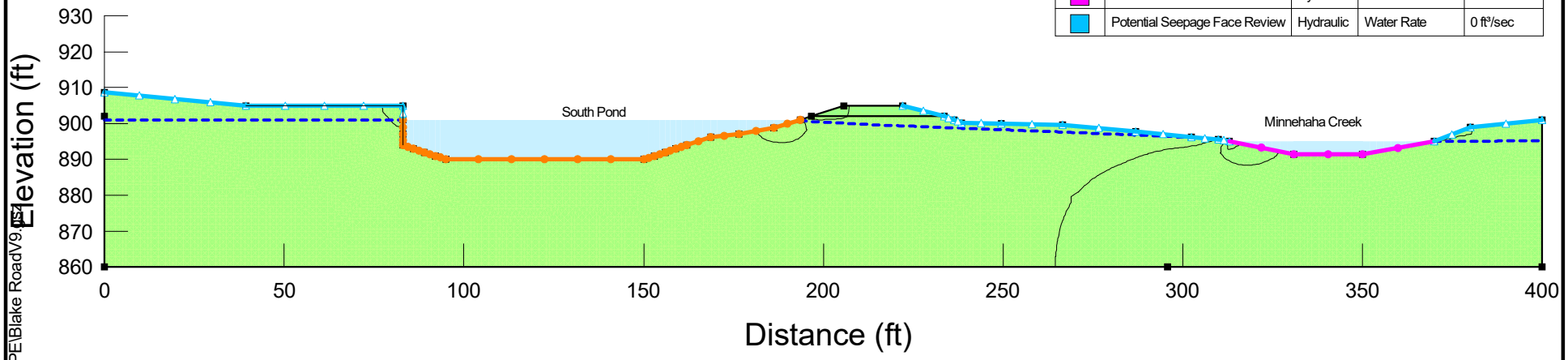
Blake Road Regional Stormwater Pond		Computed: KB	Date:02/18/2022
East - West Cross Section		Checked: GB	Date:02/14/2022
Steady-State Seepage - Case 1a: 894' Pond, High Creek			
SEEP/W 11.1.2.22321		Scale: 1:520	

Color	Name	Material Model	Vol. WC. Function	K-Function	Ky'/Kx' Ratio	Rotation (°)
	Fill (gravelly, silty to clayey sand)	Saturated / Unsaturated	Fill	Fill	0.5	0
	Sand (gravelly sand with varying amounts of silt)	Saturated / Unsaturated	Sand - Gravelly, Silty	Sand - Gravelly, silty	0.5	0

Color	Name	Category	Kind	Parameters
	High Pond Elevation 901	Hydraulic	Water Total Head	901 ft
	Low Creek Elev 895 ft	Hydraulic	Water Total Head	895 ft
	Potential Seepage Face Review	Hydraulic	Water Rate	0 ft³/sec



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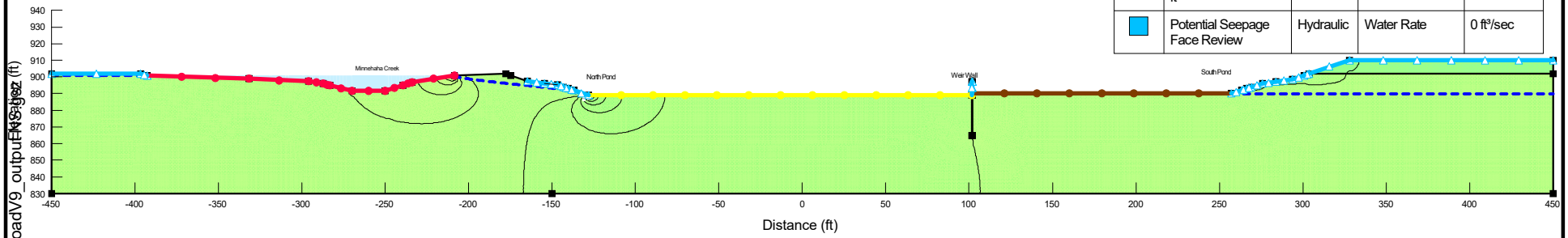
Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
East - West Cross Section	Checked: GB	Date:02/14/2022
Steady-State Seepage - Case 2: High Pond, Low Creek		
SEEP/W 11.1.2.22321	Scale: 1:520	

Color	Name	Material Model	Sat Kx (ft/sec)	Vol. WC. Function	K-Function	Ky'/Kx' Ratio	Rotation (°)	Volumetric Water Content	Compressibility (/psf)
	Fill (gravelly, silty to clayey sand)	Saturated / Unsaturated		Fill	Fill	0.5	0		
	Sand (gravelly sand with varying amounts of silt)	Saturated / Unsaturated		Sand - Gravelly, Silty	Sand - Gravelly, silty	0.5	0		
	Sheetpile cutoff	Saturated Only	3.28e-08			1	0	0	0

Color	Name	Category	Kind	Parameters
	Empty Pond 889	Hydraulic	Water Total Head	889 ft
	Empty Pond 890 ft	Hydraulic	Water Total Head	890 ft
	High Creek Elev 901 ft	Hydraulic	Water Total Head	901 ft
	Potential Seepage Face Review	Hydraulic	Water Rate	0 ft²/sec



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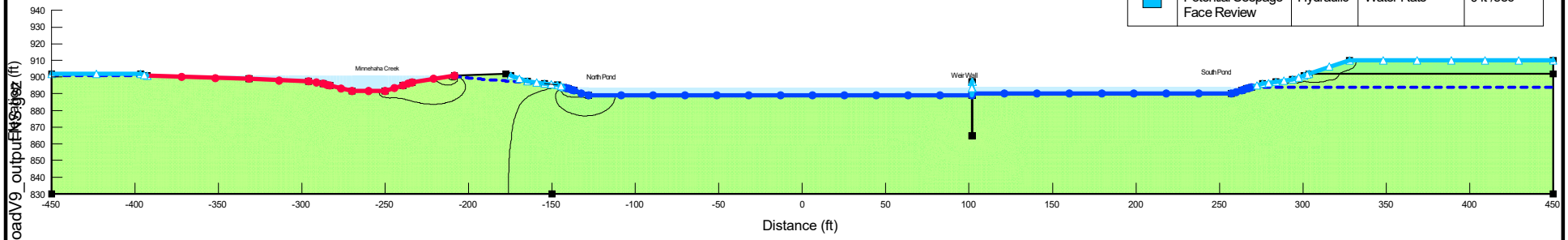
	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	North - South Cross Section	Checked: GB	Date:02/14/2022
	Steady-State Seepage - Case 1: Empty Pond, High Creek, North Pond		
	SEEP/W 11.1.2.22321	Scale: 1:1,120	

Color	Name	Material Model	Sat Kx (ft/sec)	Vol. WC. Function	K-Function	Ky'/Kx' Ratio	Rotation (°)	Volumetric Water Content	Compressibility (/psf)
	Fill (gravelly, silty to clayey sand)	Saturated / Unsaturated		Fill	Fill	0.5	0		
	Sand (gravelly sand with varying amounts of silt)	Saturated / Unsaturated		Sand - Gravelly, Silty	Sand - Gravelly, silty	0.5	0		
	Sheetpile cutoff	Saturated Only	3.28e-08			1	0	0	0

Color	Name	Category	Kind	Parameters
	Pond 894 ft	Hydraulic	Water Total Head	894 ft
	High Creek Elev 901 ft	Hydraulic	Water Total Head	901 ft
	Potential Seepage Face Review	Hydraulic	Water Rate	0 ft³/sec



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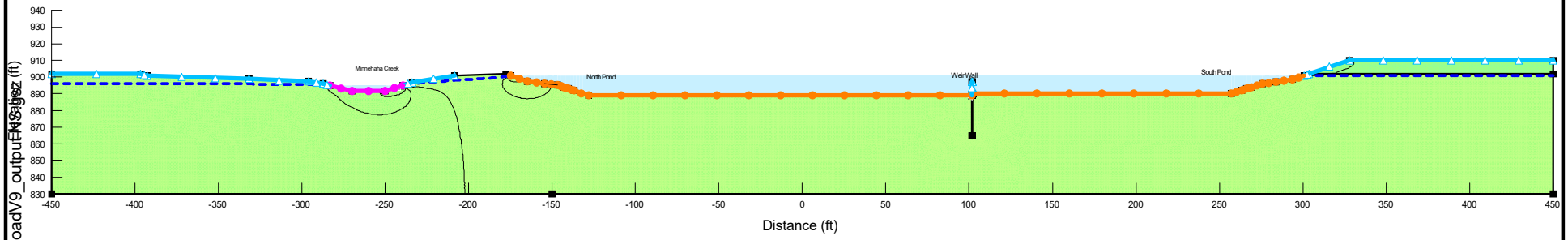
	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	North - South Cross Section	Checked: GB	Date:02/14/2022
	Steady-State Seepage - Case 1a: 894' Pond, High Creek, North Pond (2)		
	SEEP/W 11.1.2.22321	Scale: 1:1,120	

Color	Name	Material Model	Sat Kx (ft/sec)	Vol. WC. Function	K-Function	Ky'/Kx' Ratio	Rotation (°)	Volumetric Water Content	Compressibility (/psf)
	Fill (gravelly, silty to clayey sand)	Saturated / Unsaturated		Fill	Fill	0.5	0		
	Sand (gravelly sand with varying amounts of silt)	Saturated / Unsaturated		Sand - Gravelly, Silty	Sand - Gravelly, silty	0.5	0		
	Sheetpile cutoff	Saturated Only	3.28e-08			1	0	0	0

Color	Name	Category	Kind	Parameters
	High Pond Elevation 901	Hydraulic	Water Total Head	901 ft
	Low Creek Elev 895 ft	Hydraulic	Water Total Head	895 ft
	Potential Seepage Face Review	Hydraulic	Water Rate	0 ft³/sec



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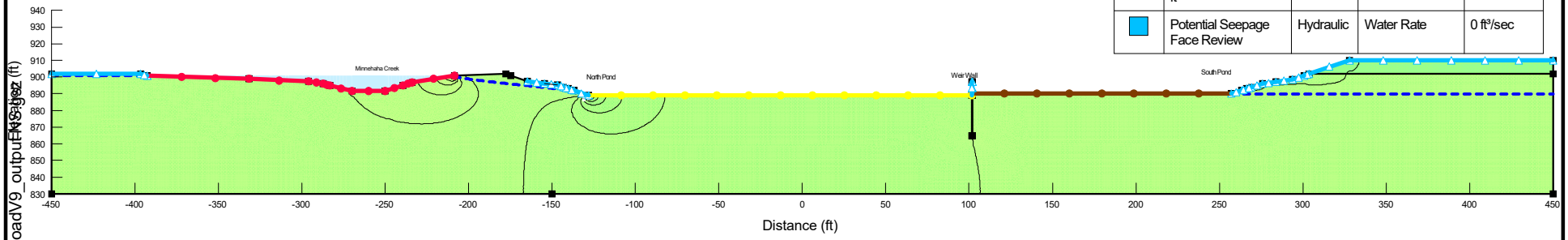
	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	North - South Cross Section	Checked: GB	Date:02/14/2022
	Steady-State Seepage - Case 2: High Pond, Low Creek, North Pond		
	SEEP/W 11.1.2.22321	Scale: 1:1,120	

Color	Name	Material Model	Sat Kx (ft/sec)	Vol. WC. Function	K-Function	Ky'/Kx' Ratio	Rotation (°)	Volumetric Water Content	Compressibility (/psf)
	Fill (gravelly, silty to clayey sand)	Saturated / Unsaturated		Fill	Fill	0.5	0		
	Sand (gravelly sand with varying amounts of silt)	Saturated / Unsaturated		Sand - Gravelly, Silty	Sand - Gravelly, silty	0.5	0		
	Sheetpile cutoff	Saturated Only	3.28e-08			1	0	0	0

Color	Name	Category	Kind	Parameters
	Empty Pond 889	Hydraulic	Water Total Head	889 ft
	Empty Pond 890 ft	Hydraulic	Water Total Head	890 ft
	High Creek Elev 901 ft	Hydraulic	Water Total Head	901 ft
	Potential Seepage Face Review	Hydraulic	Water Rate	0 ft²/sec



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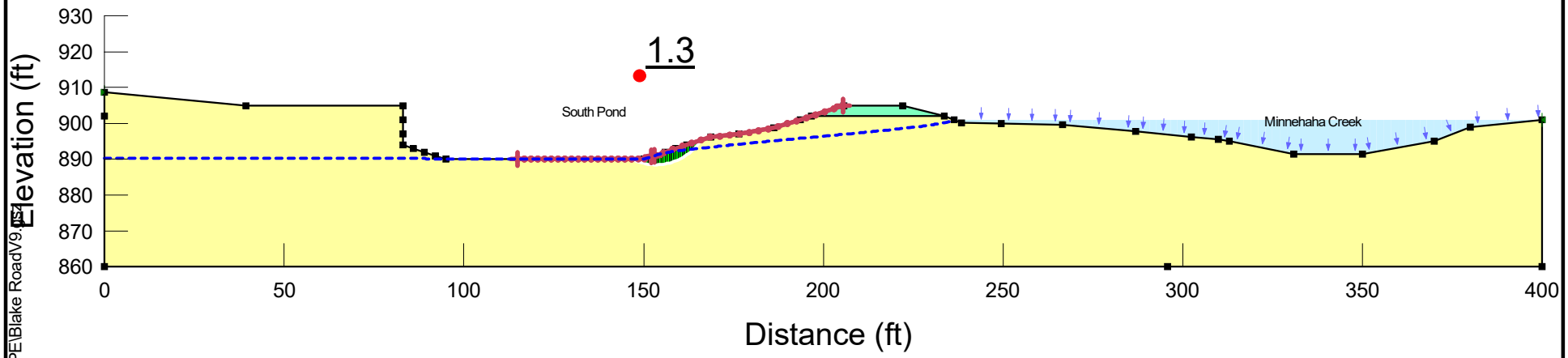
	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	North - South Cross Section	Checked: GB	Date:02/14/2022
	Steady-State Seepage - Case 1: Empty Pond, High Creek, South Pond		
	SEEP/W 11.1.2.22321	Scale: 1:1,120	

Attachment C

SLOPE/W Slope Stability Analysis Results

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Fill (gravelly, silty to clayey sand)	Mohr-Coulomb	125	0	30
	Sand (gravelly sand with varying amounts of silt)	Mohr-Coulomb	123	0	30



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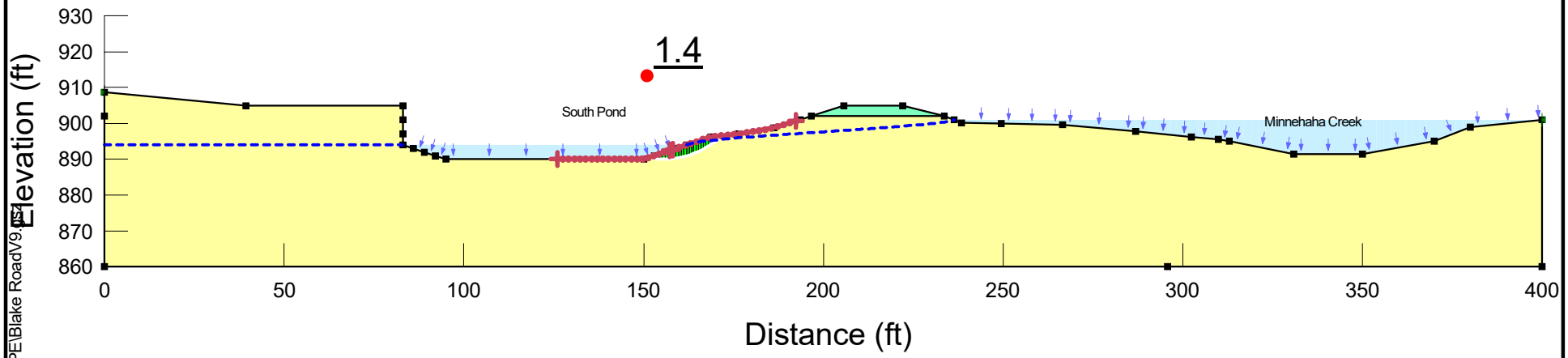
	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	East - West Cross Section	Checked: GB	Date:02/14/2022
	Case 1: Slope Stability		
	SLOPE/W 11.1.2.22321	Scale: 1:520	

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Fill (gravelly, silty to clayey sand)	Mohr-Coulomb	125	0	30
	Sand (gravelly sand with varying amounts of silt)	Mohr-Coulomb	123	0	30



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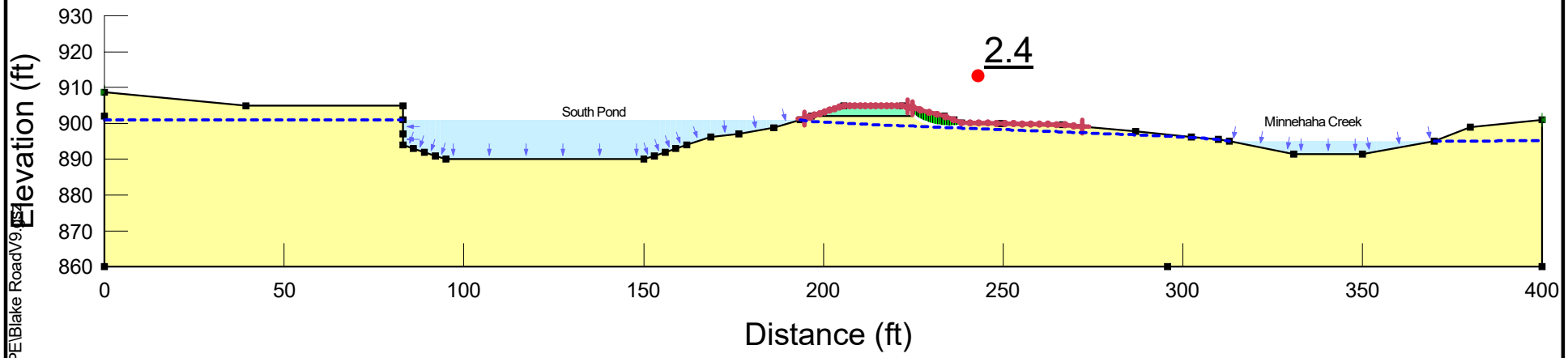
Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
East - West Cross Section	Checked: GB	Date:02/14/2022
Case1a: Slope Stability		
SLOPE/W 11.1.2.22321	Scale: 1:520	

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Fill (gravelly, silty to clayey sand)	Mohr-Coulomb	125	0	30
	Sand (gravelly sand with varying amounts of silt)	Mohr-Coulomb	123	0	30



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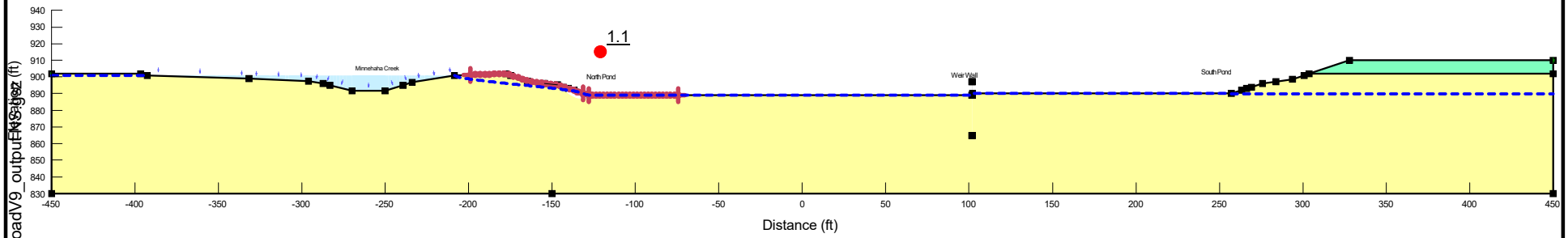
Blake Road Regional Stormwater Pond		Computed: KB	Date:02/18/2022
East - West Cross Section		Checked: GB	Date:02/14/2022
Case 2: Slope Stability			
SLOPE/W 11.1.2.22321		Scale: 1:520	

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Fill (gravelly, silty to clayey sand)	Mohr-Coulomb	125	0	30
	Sand (gravelly sand with varying amounts of silt)	Mohr-Coulomb	123	0	30
	Sheetpile cutoff	(None)			



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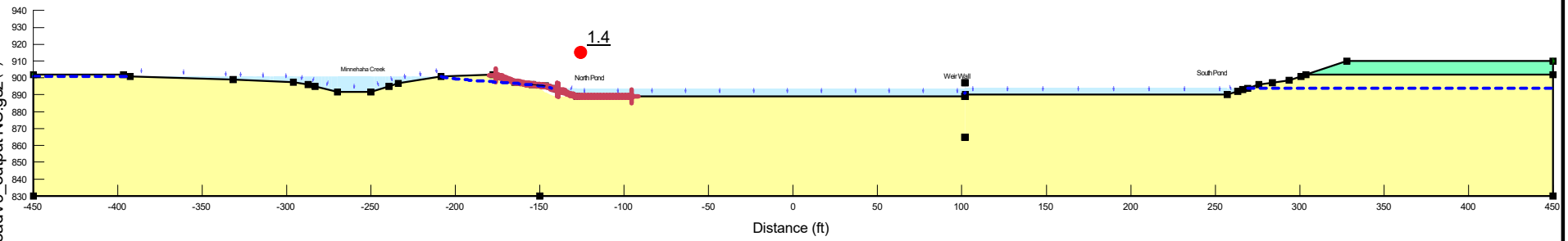
	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	North - South Cross Section	Checked: GB	Date:02/14/2022
	Case 1: Slope Stability North Pond		
	SLOPE/W 11.1.2.22321	Scale: 1:1,120	

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Fill (gravelly, silty to clayey sand)	Mohr-Coulomb	125	0	30
	Sand (gravelly sand with varying amounts of silt)	Mohr-Coulomb	123	0	30
	Sheetpile cutoff	(None)			



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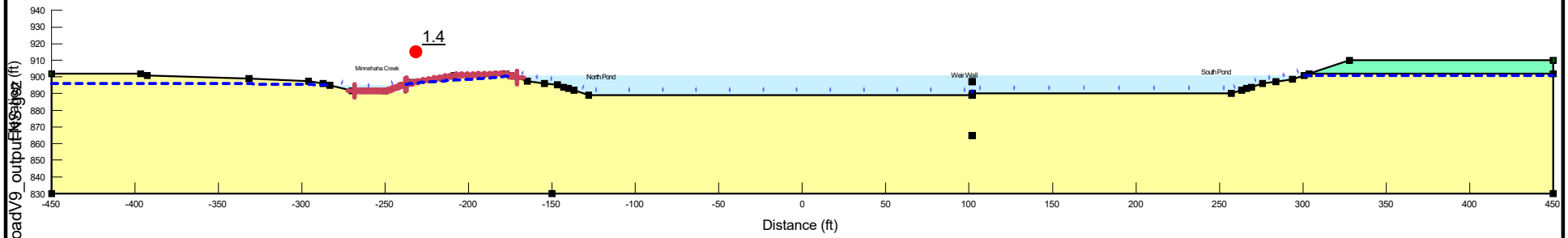
	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	North - South Cross Section	Checked: GB	Date:02/14/2022
	Case 1a: Slope Stability North Pond		
	SLOPE/W 11.1.2.22321	Scale: 1:1,120	

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Fill (gravelly, silty to clayey sand)	Mohr-Coulomb	125	0	30
	Sand (gravelly sand with varying amounts of silt)	Mohr-Coulomb	123	0	30
	Sheetpile cutoff	(None)			



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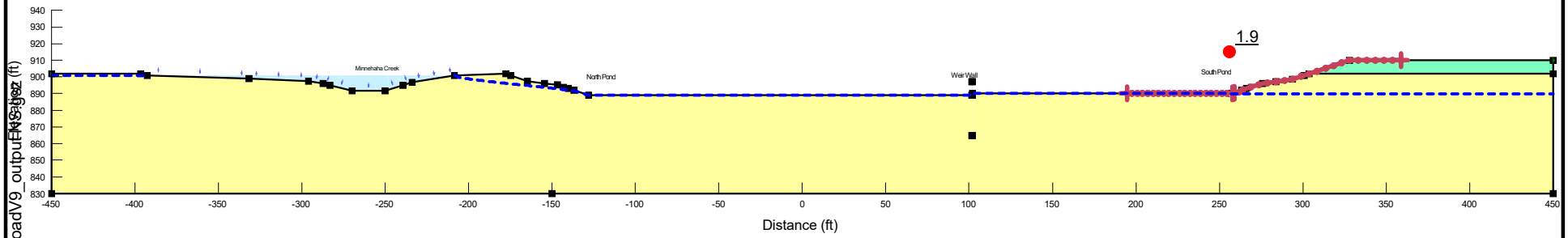
	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	North - South Cross Section	Checked: GB	Date:02/14/2022
	Case 2: Slope Stability North Pond		
	SLOPE/W 11.1.2.22321	Scale: 1:1,120	

Color	Name	Material Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Fill (gravelly, silty to clayey sand)	Mohr-Coulomb	125	0	30
	Sand (gravelly sand with varying amounts of silt)	Mohr-Coulomb	123	0	30
	Sheetpile cutoff	(None)			



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	Blake Road Regional Stormwater Pond	Computed: KB	Date:02/18/2022
	North - South Cross Section	Checked: GB	Date:02/14/2022
	Case1: Slope Stability South Pond		
	SLOPE/W 11.1.2.22321	Scale: 1:1,120	

Appendix E

Cost Estimate

Minnehaha Creek Watershed District
Blake Road Development — Public Realm
Opinion of Probable Costs — Stormwater
18-Feb-22

BLAKE ROAD REDEVELOPMENT PROJECT
OPINION OF PROBABLE CONSTRUCTION COSTS (OPCC) - DETAILED/60% DESIGN PHASE

				BASELINE OPTION			
					DIRECT COST		
AREA	ITEM	SUB-ITEM	UNITS	QUANTITY	UNIT PRICE	COST	COMMENTS
OVERALL	General Conditions	Mobilization	%	5%	of construction	$ 171,244.46	
		Erosion/Sediment Control	%	3%	of construction	$ 102,746.68	
	Site Preparation	Clearing and Grubbing	AC	1.2	$10,663.95	$ 12,797	Vegetated areas only
		Dewatering	LS	1	$80,000.00	$ 80,000	Pond excavated in the wet, dewatering for outlet structure
		Scarify site for seeding/planting	MSF	348	$7.40	$ 2,575	
	Demolition/Removals	Remove SD MH	EA	2	$870.00	$ 1,740	
		Remove SD Pipe	LF	115	$18.50	$ 2,128	
		Abandon and Grout SD Pipe	LS	2	$9,000.00	$ 18,000	Includes removal of headwall and restoration of bank
		Remove Trees	EA	20	$600.00	$ 12,000	12"+ caliper, smaller trees removed via clearing/grubbing
MAIN PARCEL	Earthwork	Pond Excavation	CY	37,000	$12.55	$ 464,350	
		Haul and dispose	CY	44,400	$ 6.29	$ 279,276	Assumes 20% bulking, 10 mile hauling no disposal fee
		Finish Grading	SY	18,000	$ 0.26	$ 4,680	
	Stormwater	Pipe Connections	EA	2	$ 1,800.00	$ 3,600	Connect to Powell and Lake Diversions
		Baffle Inlets	EA	2	$ 30,000.00	$ 60,000	Costs from Technical report estimates
		36" RCP	LF	105	$ 140.26	$ 14,727	Powell Diversion - Includes Excavation
		42" RCP	LF	532	$ 143.57	$ 76,379	Lake Diversion - includes Excavation
		1.5'Hx4'W RCB	LF	30	$ 300.00	$ 9,000	Includes excavation and backfill
		4'Hx6'W RCB	LF	40	$ 600.00	$ 24,000	Includes excavation and backfill
		Manhole	EA	6	$ 7,262.00	$ 43,572	
		Pipe End Section	EA	2	$ 2,200.00	$ 4,400	
		RCB Culvert End Section	EA	3	$ 4,000.00	$ 12,000	
		HPTRM	SY	53	$ 45.00	$ 2,400	60'x8'
		Riprap	CY	103	$ 75.00	$ 7,717	Filter material incidental
	Outlet Structure	Structural Excavation	CY	120	$ 11.50	$ 1,380	
		Reinforced Concrete	CY	100	$ 1,000.00	$ 100,000	
		Grating	SF	80	$ 140.00	$ 11,200	
		Miscellaneous Structures	LS	1	$ 6,000.00	$ 6,000	Hinging, handles, locks ,etc
		Stoplogs	LS	1	$ 12,000.00	$ 12,000	with lifter
		Guardrail	LF	94	$ 120.00	$ 11,280	
		H-Piles	LF	570	$ 45.00	$ 25,650	W10x49
		Interpretive Signage	EA	1	$ 2,000.00	$ 2,000	
	Weir Wall	Sheetpile	SF	3,840	$ 48.00	$ 184,320	Conservative estimate, PZ-22 assumed, 160'x24' (8' exposed)
		Concrete Cap	CY	120	$ 800.00	$ 96,000	Cap along 120 LF of wall
		Connections to Outlet and Cascade Weir	EA	2	$ 4,000.00	$ 8,000	
	Pedestrian Bridge	Wood Pedestrian Bridge	SF	1,200	$ 170.00	$ 204,000	Spans creek to connect to nature play
		Concrete Base Slab	CY	30	$ 600.00	$ 18,000	15 CY each side
		H-Piles	LF	300	$ 45.00	$ 13,500	W10x49
	Site Finishing/Surfacing	Pond Seeding	AC	0.5	$ 2,126.09	$ 1,063	Hydroseeding with mulch and fertilizer
		Non-Pond Seeding	AC	4	$ 1,287.39	$ 5,150	Hydroseeding with mulch and fertilizer
		Tree Planting	EA	40	$ 500.00	$ 20,000	
		Paved Trails	LF	1,200	$ 70.00	$ 84,000	Assume 10' wide
		Signage/Wayfinding/Interp	LS	1	$ 100,000.00	$ 100,000	
		Site Lighting	LS	1	$ 80,000.00	$ 80,000	
	Trailhead	Permeable Pavers	SF	1,502	$ 25.00	$ 37,550	
		Flush Curb	LF	250	$ 40.00	$ 10,000	
		Planter Seatwall	LF	137	$ 250.00	$ 34,250	
		Limestone Seatwall (Straight Segments)	LF	110	$ 350.00	$ 38,500	
		Bench	EA	3	$ 2,500.00	$ 7,500	
		Trailhead Kiosk	EA	2	$ 18,000.00	$ 36,000	
		Bike Rack	EA	3	$ 650.00	$ 1,950	
		Trash Receptable	EA	2	$ 500.00	$ 1,000	
		Drinking Fountain (with utilities)	EA	1	$ 10,000.00	$ 10,000	
		Interpretive Signage	LS	1	$ 8,000.00	$ 8,000	
		Planting Soils (18" depth)	CY	41	$ 40.00	$ 1,640	
		Trees	EA	6	$ 600.00	$ 3,600	
		Irrigation	LS	1	$ 5,000.00	$ 5,000	
		Shrubs	SF	741	$ 6.00	$ 4,446	
	The Landing	Bunker Sand	CY	288	$ 40.00	$ 11,520	
		Glacial Boulders	EA	13	$ 1,000.00	$ 13,000	
		Crushed Limestone (4" depth)	SF	185	$ 4.00	$ 740	
		Stone Edger	LF	54	$ 20.00	$ 1,080	
		Hammock Poles	EA	4	$ 500.00	$ 2,000	
		Glacial Boulders	EA	13	$ 650.00	$ 8,450	
		Canoe Rack	EA	1	$ 10,000.00	$ 10,000	
		Log Seating	EA	2	$ 800.00	$ 1,600	
	Upstream Picnic Area	Crushed Limestone (4" depth)	SF	550	$ 4.00	$ 2,200	
		Stone Edger	LF	110	$ 20.00	$ 2,200	
		Limestone Seatwall (Curved Segments)	LF	36	$ 420.00	$ 15,120	
		Glacial Boulders	EA	13	$ 650.00	$ 8,450	
		Picnic table	EA	1	$ 4,000.00	$ 4,000	
		Bike Rack	EA	1	$ 1,200.00	$ 1,200	
		Interpretive Signage	EA	1	$ 2,000.00	$ 2,000	
	Downstream Picnic Area	Crushed Limestone (4" depth)	SF	550	$ 4.00	$ 2,200	
		Stone Edger	LF	80	$ 20.00	$ 1,600	
		Limestone Seatwall (Curved Segments)	LF	18	$ 420.00	$ 7,560	
		Glacial Boulders	EA	13	$ 650.00	$ 8,450	
		Bike Rack	EA	1	$ 1,200.00	$ 1,200	
		Interpretive Signage	EA	1	$ 2,000.00	$ 2,000	
NATURE PLAY	Nature Play Area	play equipments/seating/creek access	LS	1	$ 300,000.00	$ 300,000	
G2G PLAZA	Blake and Lake	Greenway/Gateway Plaza	LS	1	$ 700,000.00	$ 700,000	
		Stormwater Construction Subtotal				$ 1,594,234	47%
		Public Realm Construction Subtotal				$ 1,830,656	53%
							check
		Total Construction Subtotal				$ 3,424,889	$ 3,424,889
		Mob/SWPPP				$ 273,991	
		Subtotal				$ 3,698,880	
		Contractor Incidentals		10%		$ 369,888.04	
		Subtotal				$ 4,068,768	
		Design Contingency		20%		$ 813,753.69	Will reduce as design progresses
		Subtotal				$ 4,882,522	
		Construction Contingency		10%		$ 488,252.21	Stays to account for work near water, unique structures, etc.
		Total				$ 5,370,774	
		Stormwater				$ 2,500,014	
		Public Realm				$ 2,870,761	

MINNEHAHA CREEK
WATERSHED DISTRICT

Contract Drawings For

325 BLAKE RD

RESTORATION & REDEVELOPMENT PROJECT

HDR Project No.
10268112

HOPKINS, MINNESOTA
JUNE, 2022

HDR

DF/
DAMON FARBER
LANDSCAPE ARCHITECTS

310 South 4th Avenue, Suite 7050
Minneapolis, MN 55415
p: 612.332.7522

INDEX OF DRAWINGS

GENERAL CONSTRUCTION NOTES

1. LOCATE AND PROTECT ALL UTILITIES WHETHER OR NOT THEY ARE SHOWN IN THE PLANS. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING GOPHER ONE CALL FOR A UTILITY LOCATE AT LEAST 72 HOURS PRIOR TO COMMENCEMENT OF WORK.
2. THE CONTRACTOR IS RESPONSIBLE FOR APPLYING FOR THE MINNESOTA NPDES/SDS CONSTRUCTION STORMWATER PERMIT (SWPPP) AND MEETING ALL REQUIREMENTS OF THE PERMIT.
3. STAKE LIMITS OF CONSTRUCTION FOR OWNER'S REPRESENTATIVE TO REVIEW PRIOR TO STARTING CONSTRUCTION.
4. USE CAUTION WHEN WORKING AROUND ANY EXISTING STRUCTURE AND MINNEHAHA CREEK. ANY DAMAGE INCURRED IS THE RESPONSIBILITY OF THE CONTRACTOR.
5. ALL PRE-PROJECT DRAINAGE PATTERNS WILL BE MAINTAINED UNLESS OTHERWISE SHOWN ON THE CONSTRUCTION DRAWINGS.
6. RESTORE AREAS DISTURBED DURING CONSTRUCTION TO PRE-CONSTRUCTION CONDITIONS, UNLESS OTHERWISE NOTED.
7. DO NOT INTERRUPT OR BLOCK PUBLIC ROAD TRAFFIC.
8. ALLOW ACCESS TO OTHER AREAS OF CONSTRUCTION WITHIN THE PROPERTY BY OTHER CONTRACTORS. PROVIDE ACCESS FOR EMERGENCY PERSONNEL TO THE SITE FROM PUBLIC ROADS AND THE SWLRT TRAIL.

MINNEHAHA CREEK
WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
0	2/18/2022	60% DRAFT FOR CLIENT REVIEW

PROJECT MANAGER ANDREW F. JUDD
PROJECT NUMBER 10268112

60% DRAFT
SUBMITTAL FOR
CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

GENERAL NOTES

0 1" 2"

FILENAME GC102.DWG
SCALE NA

SHEET
GC102

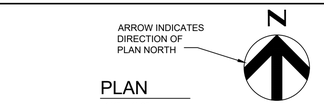
CIVIL MAPPING SYMBOLOGY

- EMBANKMENT SLOPE (CUT)
- EMBANKMENT SLOPE (FILL)
- H:V — EMBANKMENT SLOPE RIGHT ARROW RIGHT
- H:V — EMBANKMENT SLOPE LEFT ARROW LEFT
- 123 — SPOT ELEVATION/POINT #
- SURVEY BENCHMARK
- CP-X — SURVEY CONTROL POINT
- HORIZONTAL CONTROL POINT
- VERTICAL CONTROL POINT
- TEST PIT
- SOIL BORING
- FLOW ARROW
- WATER LEVEL IN SECTION/PROFILE
- DOWNGUY
- J — EXTERIOR UTILITY JUNCTION BOX
- XXX — INTERSTATE HIGHWAY SYMBOL
- XXX — US HIGHWAY SYMBOL
- XXX — STATE HIGHWAY SYMBOL
- XXX — COUNTY ROAD SYMBOL
- HAY BALE SILT CHECK
- TEMPORARY SEDIMENT TRAP
- PIEZOMETER
- RAIL SIGNAL
- FIRE HYDRANT
- MW — MONITORING WELL
- S — SANITARY MANHOLE
- MH — PROVIDE SANITARY MANHOLE
- CB — STORM SQUARE CATCH BASIN
- CB — STORM ROUND CATCH BASIN
- D — STORM DRAINAGE MANHOLE
- DOMESTIC WATER VALVE
- PD — PEDESTAL
- POWER BOX
- POLE
- TARGET ELEVATION

UTILITY/CIVIL LINE SYMBOLOGY

- UTILITY BENEATH STRUCTURE
- RAILROAD
- EASEMENT
- LIMITS OF CONSTRUCTION
- ROW
- EXISTING CONTOUR (MINOR)
- 25 — EXISTING CONTOUR W/ELEVATION (MAJOR)
- SURVEYED EDGE OF WATER
- NEW CONTOUR (MINOR)
- 25 — NEW CONTOUR (MAJOR)
- BR-BR-BR — SEDIMENT CONTROL LOG, TYPE WOOD CHIP
- HI-HI-HI — SILT FENCE, TYPE HI
- F — FIBER OPTIC
- NATURAL GAS
- SANITARY SEWER
- FM — SANITARY FORCE MAIN
- STORM SEWER
- WATERMAIN
- OHE — OVERHEAD ELECTRICAL
- STREET LIGHTS
- UNDERGROUND ELECTRICAL
- CABLE — CABLE
- UGT — UNDERGROUND TELEPHONE
- TEL — TELEPHONE
- PSS — PSS — PROVIDE SANITARY SEWER
- **PW** — **PW** — PROVIDE DOMESTIC WATER
- WETLAND
- SEDIMENT CONTROL LOG, TYPE ROCK

GENERAL SYMBOLOGY



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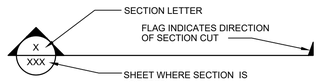

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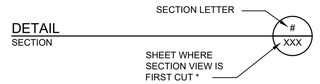

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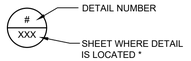
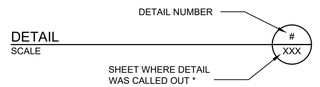


DETAIL MARKER

FOR REFERENCING DETAILS INCLUDED IN DRAWING SET.

DETAIL MARKER

FOR REFERENCING DETAILS BOUND IN SPECIFICATIONS OR SEPARATE VOLUME.



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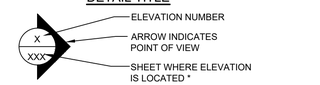
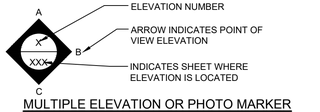
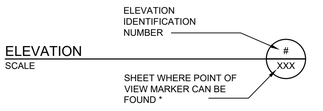


SINGLE ELEVATION OR PHOTO MARKER



MULTIPLE ELEVATION OR PHOTO MARKER



ELEVATION TITLE

* EXCEPTIONS WHERE THE SHEET NUMBER IS REPLACED BY A DASH (-).
1) FOR COMMON DETAILS, SECTIONS, ELEVATIONS OR DETAILS THAT ARE CUT OR CALLED OUT ON MULTIPLE SHEETS.
2) SECTIONS, ELEVATIONS OR DETAILS THAT ARE LOCATED ON THE SAME SHEET THEY ARE CUT OR CALLED OUT ON.

SHEET NAMING CONVENTION

DISCIPLINE DESIGNATOR & DISCIPLINE ORDER

G	GENERAL
V	SURVEYING / MAPPING
X	DEMOLITION
C	CIVIL
L	LANDSCAPING
U	MULTI-DISCIPLINE
S	STRUCTURAL
A	ARCHITECTURAL
D	PROCESS
M	MECHANICAL (HVAC)
P	PLUMBING
F	FIRE PROTECTION
E	ELECTRICAL
Y	INSTRUMENTATION

DRAWING TYPE DESIGNATOR

0	GENERAL (SCHEDULES, SYMBOLS, LEGENDS)
1	PLANS
2	PROFILES / ELEVATIONS
3	SECTIONS
4	LARGE SCALE VIEWS
5	DETAILS
6	DIAGRAMS
7	3D REPRESENTATIONS

EXAMPLE

PLAN AND PROFILE, SHEET 1

C			

DISCIPLINE DESIGNATOR

	2		

DRAWING TYPE DESIGNATOR

		0	1

SHEET NUMBER

C	2	0	1

SAMPLE SHEET NUMBER

GENERAL NOTES:

1. THIS IS A STANDARD CIVIL SYMBOLOGY SHEET. ALL SYMBOLS ARE NOT NECESSARILY USED ON THIS PROJECT.

2. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH SHEET FOR USAGE.

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

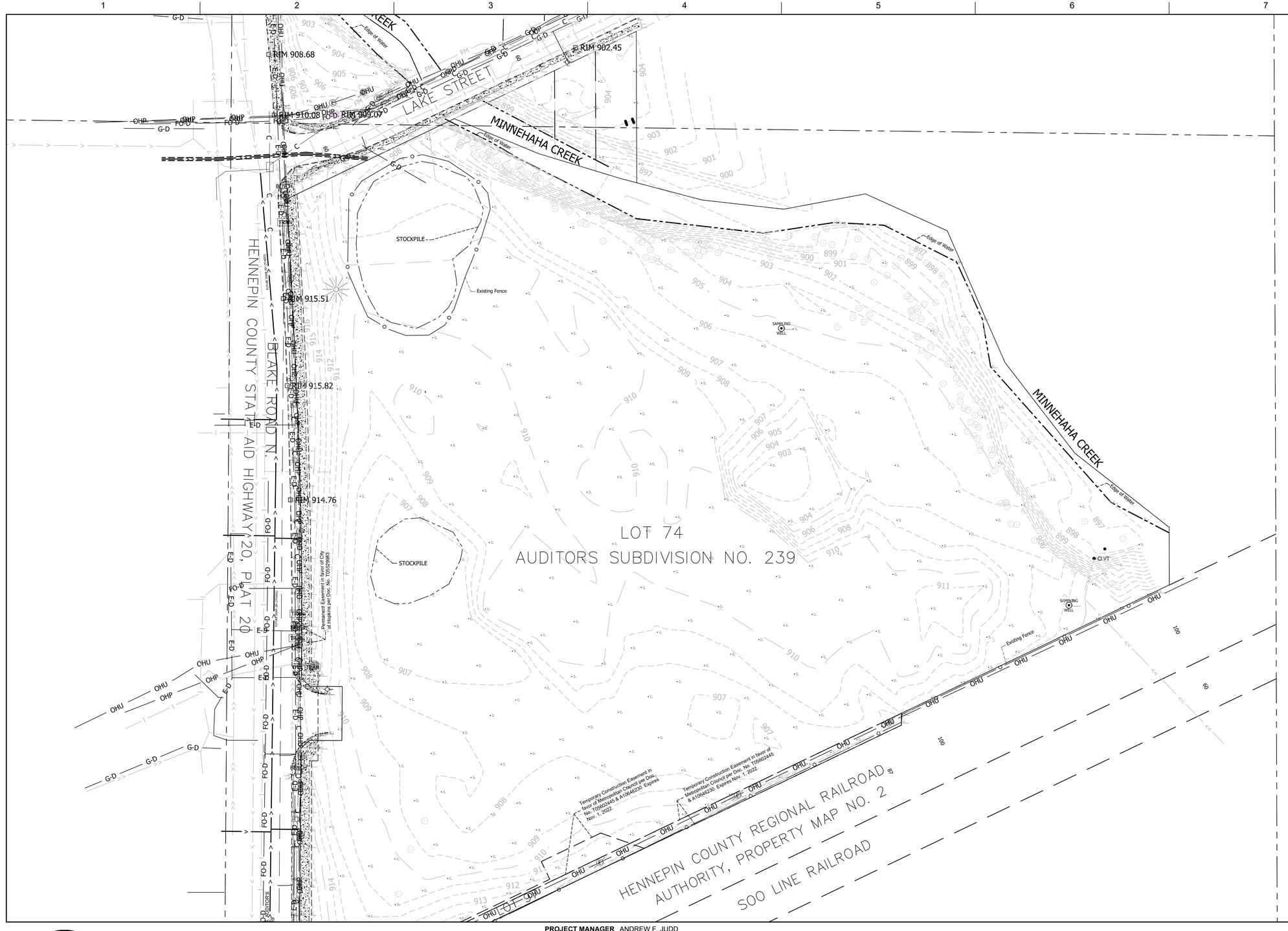
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

PROJECT SYMBOLOGY

0 1" 2"

FILENAME GC103.DWG
SCALE NA

SHEET GC103



N

HORIZONTAL DATA
HENNEPIN COUNTY COORDINATE SYSTEM, NAD83, 2011 ADJUSTMENT, U.S. SURVEY FOOT

VERTICAL DATA
NAVD88
MNDOT MONUMENT SONYA
GSID STATION #95216
ELEVATION = 902.019'

SURVEY NOTES

1. SURVEY WAS COMPLETED JANUARY 2020 BY STANTEC
2. VISIBLE FEATURES WERE SURVEYED. DUE TO SNOW COVER ON THE SITE, SOME FEATURES MAY NOT HAVE BEEN VISIBLE AT THE TIME OF SURVEY.
3. THE UTILITIES SHOWN ON THE SURVEY BASEFILE HAVE BEEN LOCATED FROM ABOVE GROUND VISIBLE EVIDENCE AND UNDERGROUND UTILITY MARKINGS AT THE TIME OF SURVEY.
4. PRIOR TO ANY SITE DISTURBANCE OR CONSTRUCTION CALL GOPHER STATE ONE-CALL 1-800-252-1166 AND VERIFY ALL UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO STARTING WORK.

MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD
PROJECT NUMBER 10268112

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

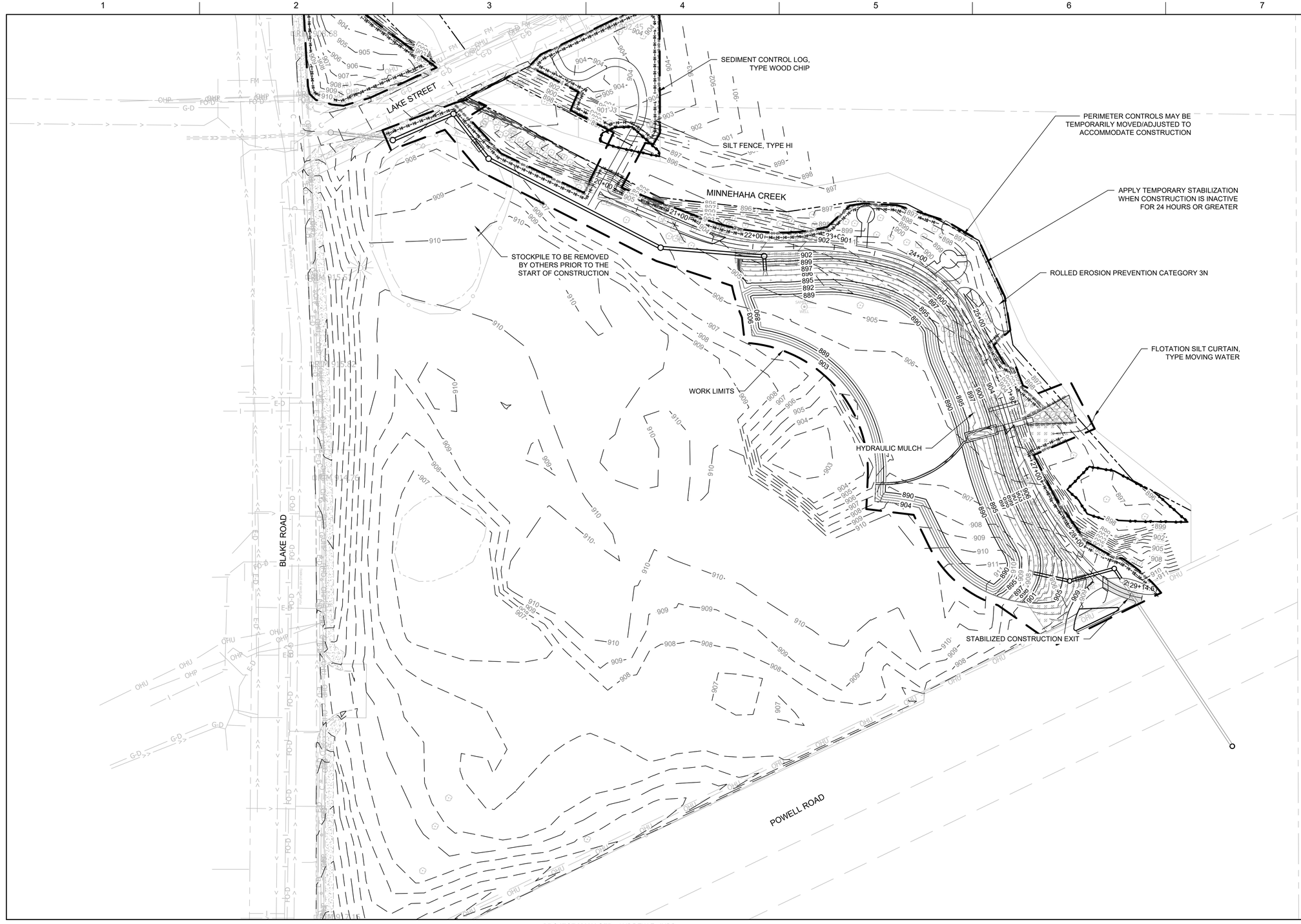
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

SURVEY AND CONTROL

0 1" 2"

FILENAME GC104.DWG
SCALE 1" = 60'

SHEET
GC104



GENERAL NOTES

1. PROVIDE INLET PROTECTION FOR EXISTING INLETS TO BE REPLACED IF EARTH WORK ACTIVITIES ARE BEING COMPLETED PRIOR TO REPLACEMENT.
2. PROVIDE INLET PROTECTION FOR ALL NEW AND REPLACED INLETS IF EARTH WORK ACTIVITIES ARE OCCURRING UPSTREAM OF INLETS.

EROSION CONTROL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF ALL EROSION & SEDIMENT CONTROL MEASURES AND PRACTICES THROUGHOUT THE PROJECT INCLUDING ANY AND ALL FINES ASSOCIATED WITH EROSION CONTROL VIOLATIONS .
2. EROSION CONTROL IS THE CONTRACTOR'S RESPONSIBILITY. THIS PLAN SHOULD BE USED AS A GUIDE AND REPRESENTS THE MINIMUM EROSION CONTROL DEVICES REQUIRED.
3. EROSION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED IF DEEMED NECESSARY BASED ON SITE CONDITIONS OR THE RESULTS OF SITE INSPECTIONS.
4. THE CONTRACTOR IS RESPONSIBLE FOR INSPECTING AND REPAIRING ALL EROSION AND SEDIMENT CONTROL DEVICES AFTER EACH RAINFALL EVENT. REPAIRS MUST BE PERFORMED WHEN DEVICES ARE RIPPED, TORN, FLATTED, OR OTHERWISE NON-FUNCTIONAL.
5. THE CONTRACTOR SHALL PROVIDE ANY FURTHER EROSION CONTROL MEASURES NECESSARY IN ADDITION TO THOSE LISTED TO ENSURE THAT SILT WILL NOT LEAVE THE PROJECT LIMITS.
6. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND WHEN ALL UPSLOPE AREAS HAVE ACHIEVED PERMANENT STABILIZATION WITH 70% OR GREATER UNIFORM PERENNIAL VEGETATIVE COVER.
7. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SILT FROM THE SITE IF NOT REUSABLE ON SITE AND ASSURING PLAN ALIGNMENT AND GRADE IN ALL CONVEYANCES AND DRAINAGEWAYS AT COMPLETION OF CONSTRUCTION.
8. ENSURE THAT ALL DRAINAGE STRUCTURES, FLUMES, PIPES, ETC. ARE CLEANED OUT AND WORKING PROPERLY AT TIME OF ACCEPTANCE.
9. PROVIDE A TEMPORARY CONSTRUCTION ENTRANCE/EXIT FOR VEHICULAR TRAFFIC AT LOCATION SHOWN.
10. SILT FENCE SHOWN AT UPSLOPE PERIMETERS OF THE SITE MAY BE SUBSTITUTED FOR CONSTRUCTION FENCE, AND IS NOT REQUIRED WHERE ACCESS IS PROVIDED TO ALLOW FOR VEHICLE ENTRANCE AND EXIT.
11. REFERENCE EROSION CONTROL DETAILS SHEET FOR TYPICAL EROSION CONTROL DEVICE INSTALLATION.
12. INSPECT PUBLIC ROADS ADJACENT TO THE PROJECT AT THE END OF EACH WORK DAY. CLEAN THE STREETS OF DEPOSITED SEDIMENT AS FREQUENTLY AS NEEDED AS DETERMINED BY THE CITY OR ENGINEER TO KEEP THEM SAFE FOR PUBLIC USE AND TO CONTROL DUST.
13. PRIOR TO GRADING ACTIVITIES, CONTRACTOR MUST HAVE TEMPORARY BMP'S IN THE PUBLIC ROW INSPECTED BY THE CITY. ALL DOWNSLOPE PERIMETER CONTROLS MUST BE INSTALLED PRIOR TO THE START OF UPSLOPE EARTH WORK.
14. TEMPORARILY SEED AND STABILIZE AREAS STRIPPED OF VEGETATION THAT WILL BE EXPOSED FOR MORE THAN 14 DAYS TO PREVENT EROSION. IF MULCHED, CRIMP THE MULCH INTO THE EXPOSED GROUND.
17. ALL DISTURBED AREAS WITHIN 200 FEET OF THE EDGE OF WATER, THAT ACTIVELY DRAIN TO THE WATERBODY, MUST BE TEMPORARILY OR PERMANENTLY STABILIZED WITHIN 24 HOURS OF CONSTRUCTION ENDING IN THOSE AREAS FOR A PERIOD OF 24 HOURS OR LONGER.
18. USE PERMANENT SEEDING IN ALL DISTURBED AREAS NOT RECEIVING PERMANENT STABILIZATION, SUCH AS PAVEMENT, ROOFS, SOD, ETC. PERMANENT VEGETATION MUST BE ESTABLISHED BEFORE TEMPORARY SEDIMENT CONTROLS CAN BE REMOVED AND PRIOR TO FINAL APPROVAL.
19. CONCRETE WASHOUT SHALL BE COMPLETED OFF-SITE OR IN SELF-CONTAINED TRUCKS. CONCRETE MAY NOT BE DISPOSED OF ON THE GROUND OR IN SURFACE WATERS.

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

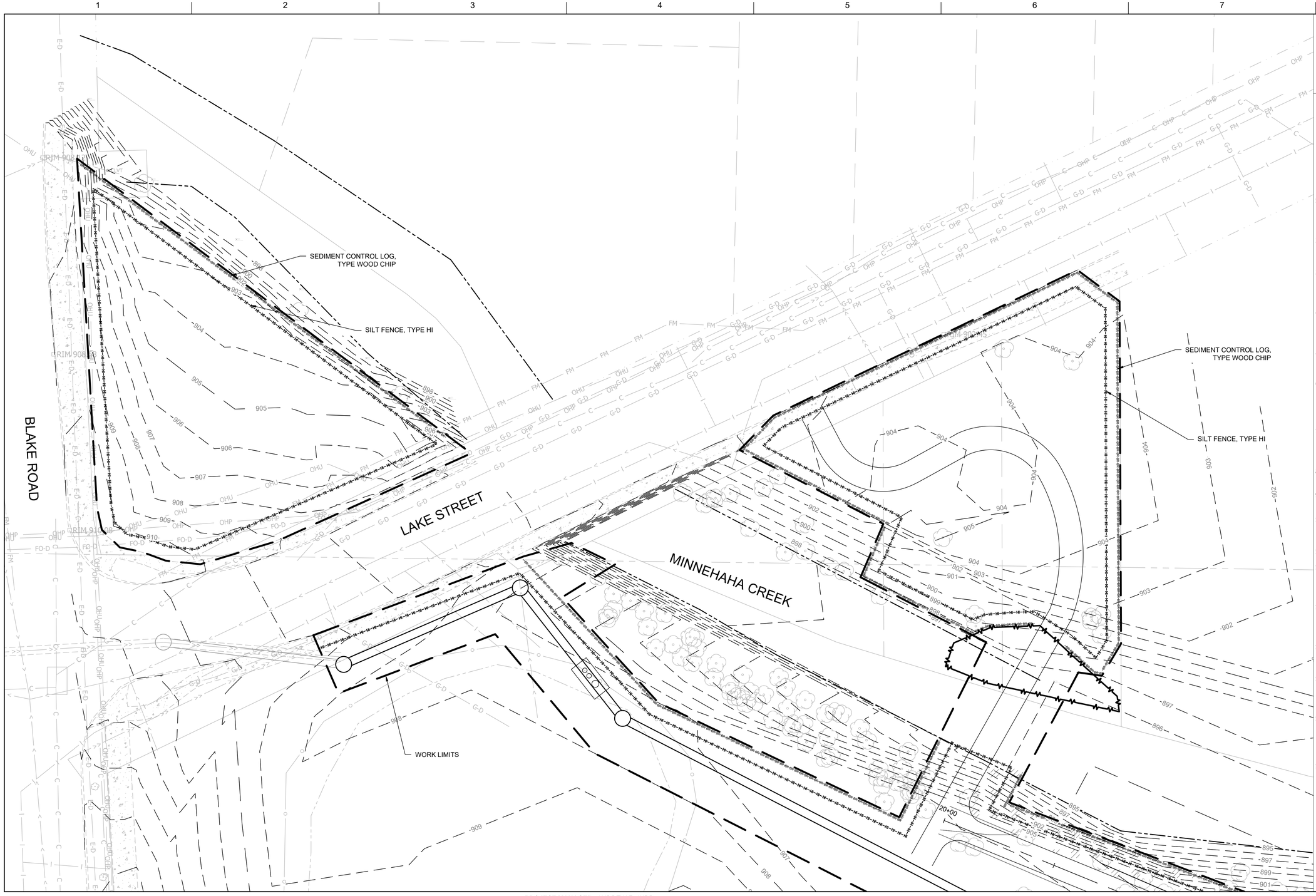
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

EROSION CONTROL PLAN

0 1" 2"

FILENAME EC101-103.DWG
SCALE 1" = 60'

SHEET EC101



GENERAL NOTES

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MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

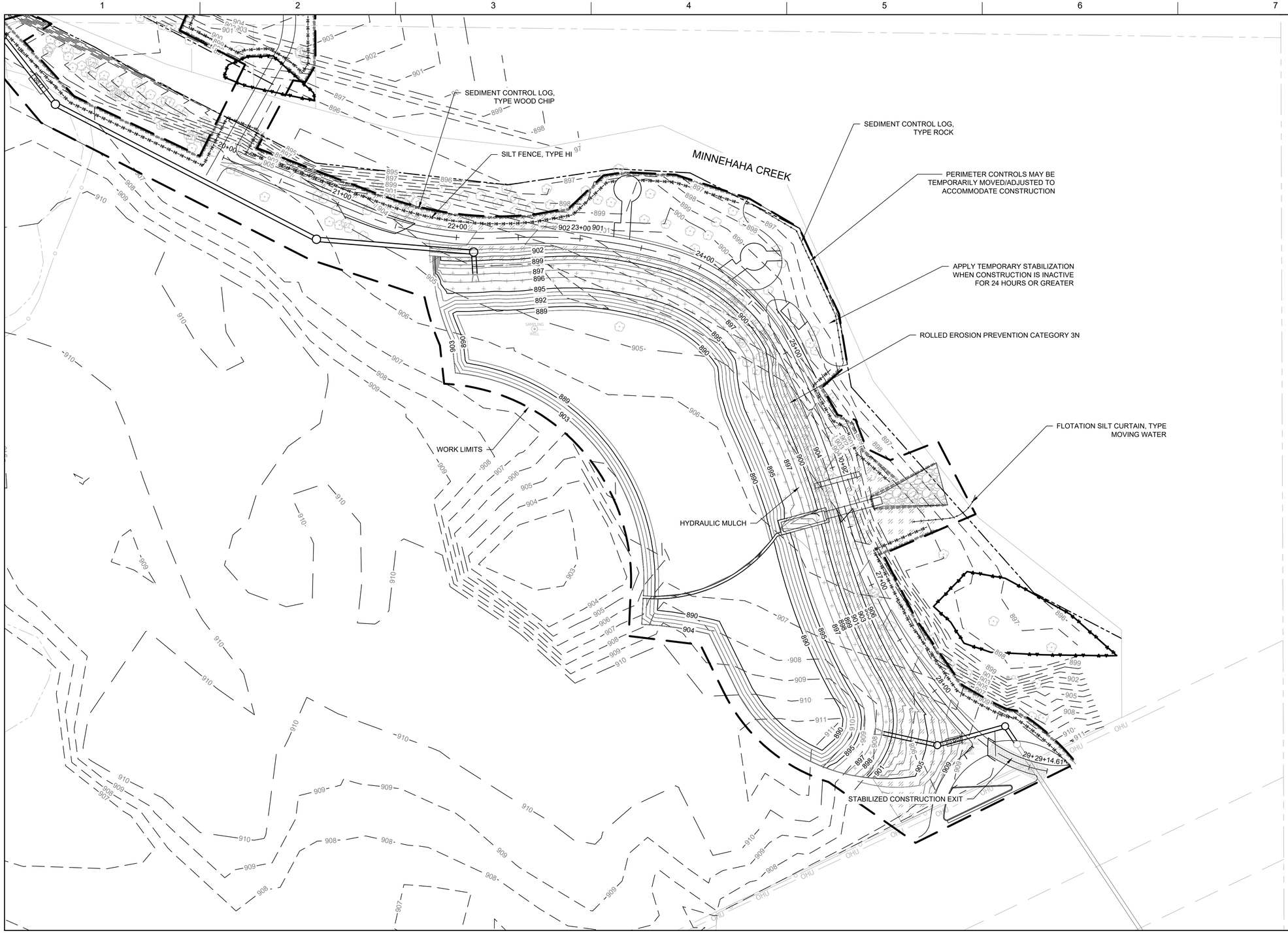
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

EROSION CONTROL PLAN

0 1" 2"

FILENAME EC101-103.DWG
SCALE 1" = 20'

SHEET EC102



N

GENERAL NOTES

1. PROVIDE INLET PROTECTION FOR EXISTING INLETS TO BE REPLACED IF EARTH WORK ACTIVITIES ARE BEING COMPLETED PRIOR TO REPLACEMENT.
2. PROVIDE INLET PROTECTION FOR ALL NEW AND REPLACED INLETS IF EARTH WORK ACTIVITIES ARE OCCURRING UPSTREAM OF INLETS.

EROSION CONTROL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF ALL EROSION & SEDIMENT CONTROL MEASURES AND PRACTICES THROUGHOUT THE PROJECT INCLUDING ANY AND ALL FINES ASSOCIATED WITH EROSION CONTROL VIOLATIONS .
2. EROSION CONTROL IS THE CONTRACTOR'S RESPONSIBILITY. THIS PLAN SHOULD BE USED AS A GUIDE AND REPRESENTS THE MINIMUM EROSION CONTROL DEVICES REQUIRED.
3. EROSION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES WILL BE INSTALLED IF DEEMED NECESSARY BASED ON SITE CONDITIONS OR THE RESULTS OF SITE INSPECTIONS.
4. THE CONTRACTOR IS RESPONSIBLE FOR INSPECTING AND REPAIRING ALL EROSION AND SEDIMENT CONTROL DEVICES AFTER EACH RAINFALL EVENT. REPAIRS MUST BE PERFORMED WHEN DEVICES ARE RIPPED, TORN, FLATTED, OR OTHERWISE NON-FUNCTIONAL.
5. THE CONTRACTOR SHALL PROVIDE ANY FURTHER EROSION CONTROL MEASURES NECESSARY IN ADDITION TO THOSE LISTED TO ENSURE THAT SILT WILL NOT LEAVE THE PROJECT LIMITS.
6. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING TEMPORARY EROSION AND SEDIMENT CONTROL DEVICES AFTER COMPLETION OF CONSTRUCTION AND WHEN ALL UPSLOPE AREAS HAVE ACHIEVED PERMANENT STABILIZATION WITH 70% OR GREATER UNIFORM PERENNIAL VEGETATIVE COVER.
7. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING SILT FROM THE SITE IF NOT REUSABLE ON SITE AND ASSURING PLAN ALIGNMENT AND GRADE IN ALL CONVEYANCES AND DRAINAGEWAYS AT COMPLETION OF CONSTRUCTION.
8. ENSURE THAT ALL DRAINAGE STRUCTURES, FLUMES, PIPES, ETC. ARE CLEANED OUT AND WORKING PROPERLY AT TIME OF ACCEPTANCE.
9. PROVIDE A TEMPORARY CONSTRUCTION ENTRANCE/EXIT FOR VEHICULAR TRAFFIC AT LOCATION SHOWN.
10. SILT FENCE SHOWN AT UPSLOPE PERIMETERS OF THE SITE MAY BE SUBSTITUTED FOR CONSTRUCTION FENCE, AND IS NOT REQUIRED WHERE ACCESS IS PROVIDED TO ALLOW FOR VEHICLE ENTRANCE AND EXIT.
11. REFERENCE EROSION CONTROL DETAILS SHEET FOR TYPICAL EROSION CONTROL DEVICE INSTALLATION.
12. INSPECT PUBLIC ROADS ADJACENT TO THE PROJECT AT THE END OF EACH WORK DAY. CLEAN THE STREETS OF DEPOSITED SEDIMENT AS FREQUENTLY AS NEEDED AS DETERMINED BY THE CITY OR ENGINEER TO KEEP THEM SAFE FOR PUBLIC USE AND TO CONTROL DUST.
13. PRIOR TO GRADING ACTIVITIES, CONTRACTOR MUST HAVE TEMPORARY BMP'S IN THE PUBLIC ROW INSPECTED BY THE CITY. ALL DOWNSLOPE PERIMETER CONTROLS MUST BE INSTALLED PRIOR TO THE START OF UPSLOPE EARTH WORK.
14. TEMPORARILY SEED AND STABILIZE AREAS STRIPPED OF VEGETATION THAT WILL BE EXPOSED FOR MORE THAN 14 DAYS TO PREVENT EROSION. IF MULCHED, CRIMP THE MULCH INTO THE EXPOSED GROUND.
17. ALL DISTURBED AREAS WITHIN 200 FEET OF THE EDGE OF WATER, THAT ACTIVELY DRAIN TO THE WATERBODY, MUST BE TEMPORARILY OR PERMANENTLY STABILIZED WITHIN 24 HOURS OF CONSTRUCTION ENDING IN THOSE AREAS FOR A PERIOD OF 24 HOURS OR LONGER.
18. USE PERMANENT SEEDING IN ALL DISTURBED AREAS NOT RECEIVING PERMANENT STABILIZATION, SUCH AS PAVEMENT, ROOFS, SOD, ETC. PERMANENT VEGETATION MUST BE ESTABLISHED BEFORE TEMPORARY SEDIMENT CONTROLS CAN BE REMOVED AND PRIOR TO FINAL APPROVAL.
19. CONCRETE WASHOUT SHALL BE COMPLETED OFF-SITE OR IN SELF-CONTAINED TRUCKS. CONCRETE MAY NOT BE DISPOSED OF ON THE GROUND OR IN SURFACE WATERS.

MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

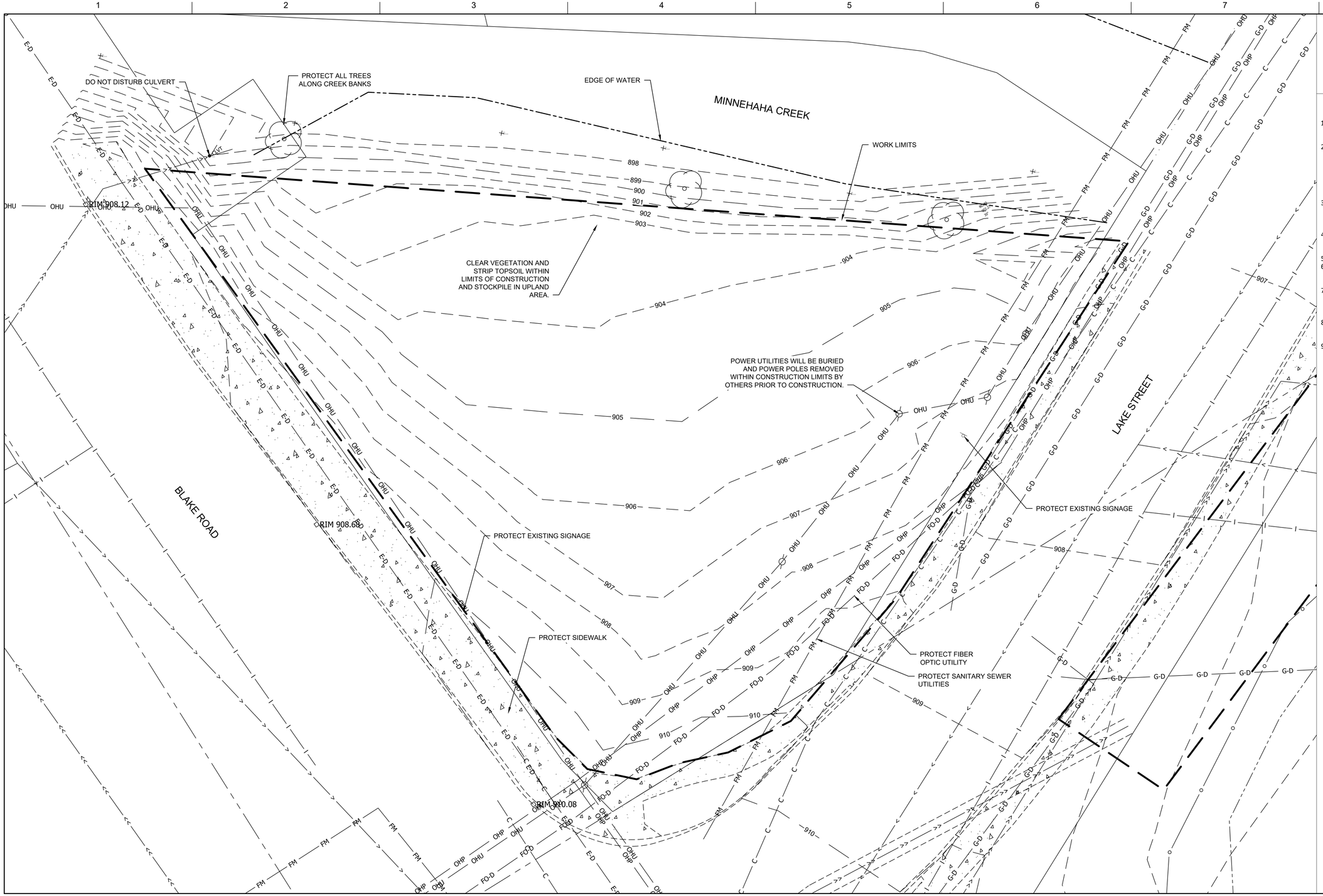
EROSION CONTROL PLAN

0 1" 2"

FILENAME EC101-103.DWG

SCALE 1" = 40'

SHEET EC103



GENERAL NOTES

1. FIELD VERIFY LOCATION OF ALL ELEMENTS SHOWN FOR DEMOLITION PRIOR TO BEGINNING DEMOLITION ACTIVITIES.
2. THE LIMITS, EXTENT, AND ITEMS TO BE DEMOLISHED ARE PROVIDED AS A GUIDE. ADDITIONAL DEMOLITION WITHIN THE LIMITS OF CONSTRUCTION MAY BE REQUIRED. NOTIFY THE OWNER'S REPRESENTATIVE OF ANY APPARENT CONFLICTS BETWEEN ITEMS NOT IDENTIFIED FOR DEMOLITION AND PROPOSED PROJECT FEATURES.
3. SOME UTILITY REMOVALS AND RELOCATIONS WILL BE COMPLETED BY OTHERS PRIOR TO OR DURING THIS CONTRACT. COORDINATE LOCATION AND SCHEDULE WITH OWNERS REPRESENTATIVE.
4. CALL GOPHER STATE ONE CALL 1-800-252-1166 AND VERIFY ALL UTILITIES WITHIN THE LIMITS OF CONSTRUCTION PRIOR TO STARTING WORK.
5. DO NOT BURY, DUMP, OR DISCHARGE DEBRIS ON SITE.
6. STAY WITHIN LIMITS OF CONSTRUCTION AND DO NOT DISTURB CREEK BANK VEGETATION UNLESS REQUIRED FOR PROPOSED CONSTRUCTION.
7. ALL TREES IDENTIFIED FOR REMOVAL ARE IDENTIFIED ON THE CD DRAWINGS. VERIFY ALL TREE REMOVALS WITH OWNERS REPRESENTATIVE PRIOR TO BEGINNING TREE REMOVAL.
8. SEE DETAILS ON SHEET XXX FOR TREE PROTECTION REQUIREMENTS FOR TREES IDENTIFIED TO REMAIN WITHIN LIMITS OF CONSTRUCTION.
9. AT ALL LOCATIONS WHERE PROPOSED PAVEMENT TIES INTO EXISTING, SAW CUT AND REMOVE EXISTING PAVEMENT TO PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING AND NEW PAVEMENT.

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

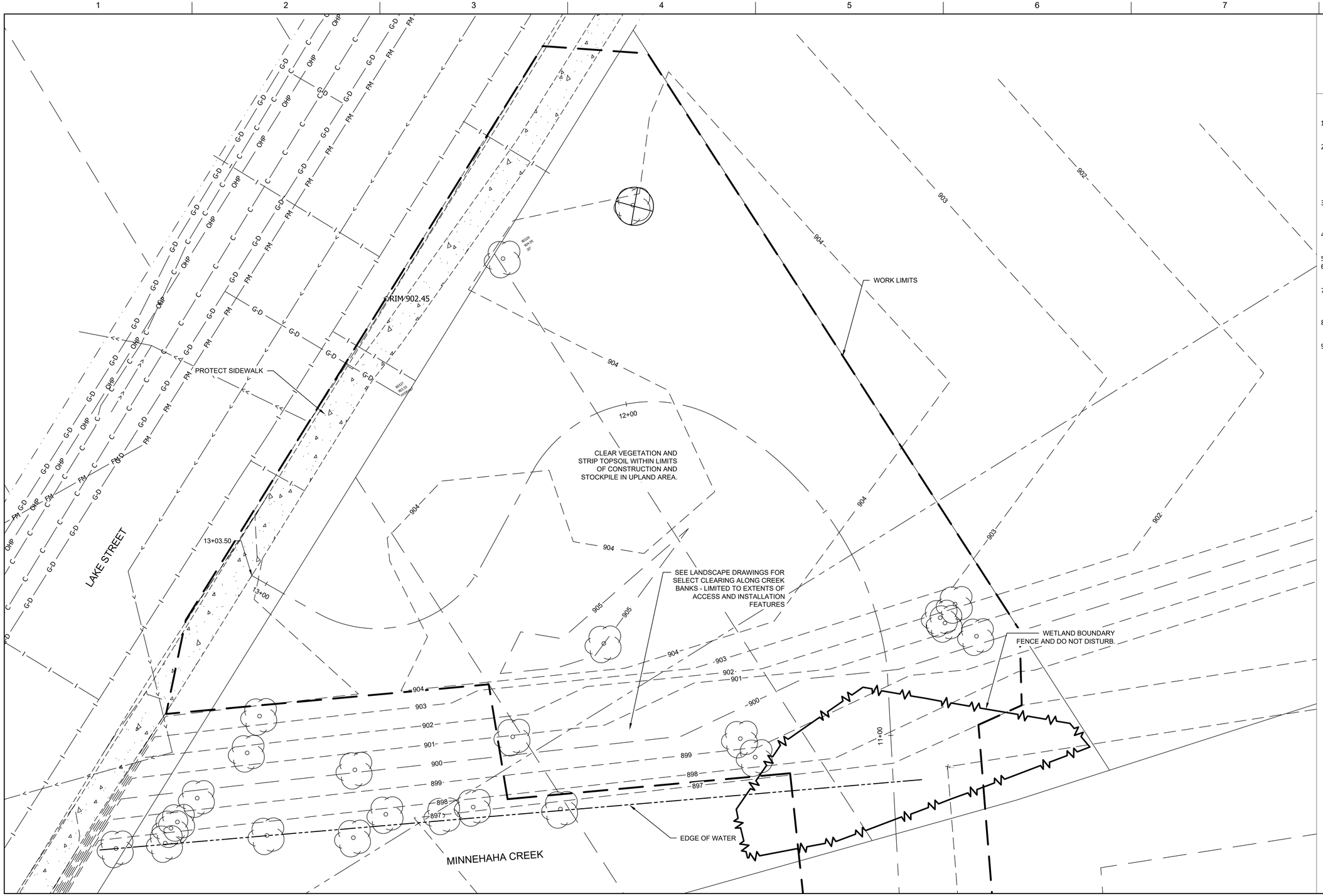
DEMOLITION & PRESERVATION PLAN

0 1" 2"

FILENAME CD101-103.DWG

SCALE 1" = 10'

SHEET CD101



N

GENERAL NOTES

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MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

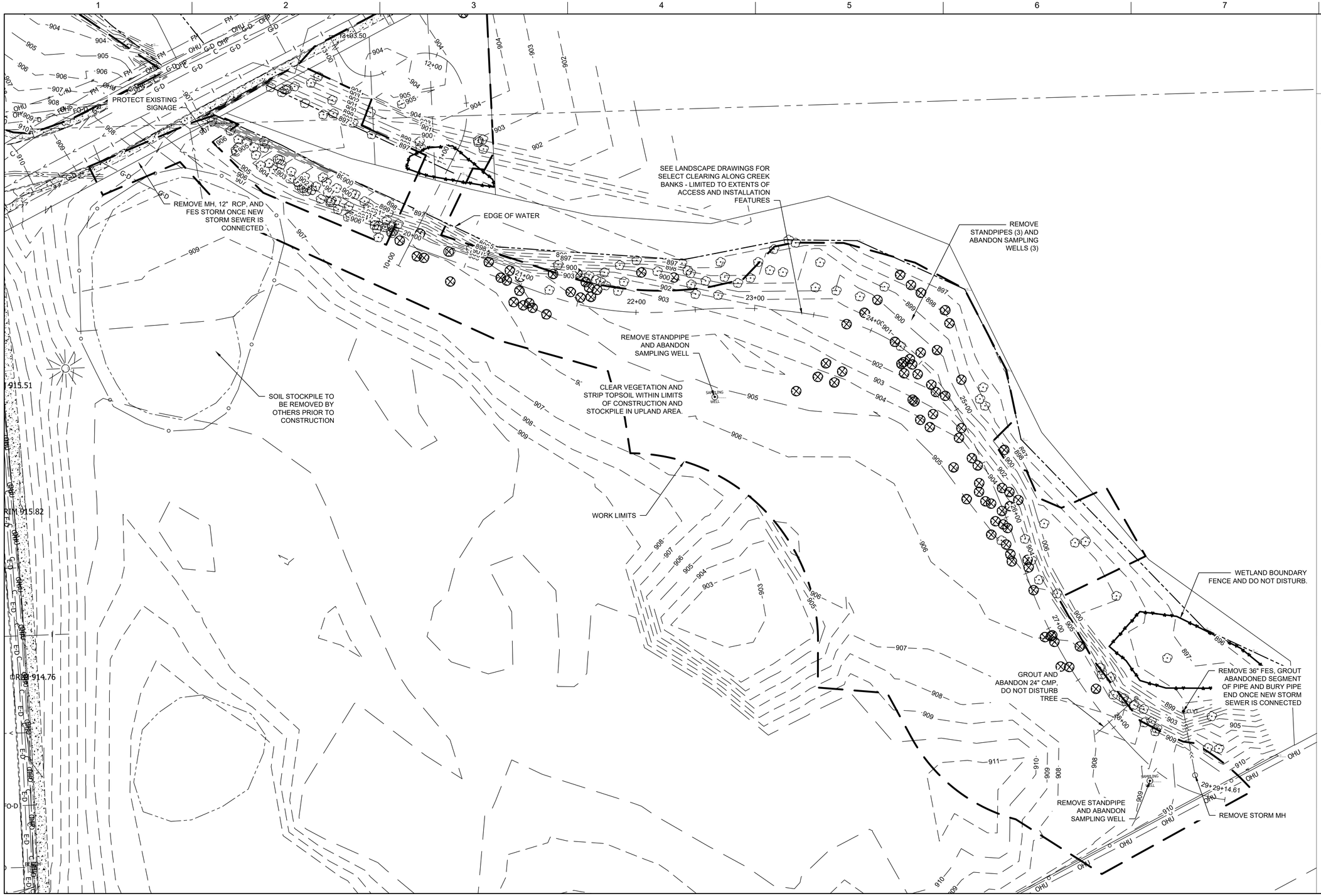
DEMOLITION & PRESERVATION PLAN

0 1" 2"

FILENAME CD101-103.DWG

SCALE 1" = 10'

SHEET CD102



GENERAL NOTES

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MINNEHAHA CREEK WATERSHED DISTRICT

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

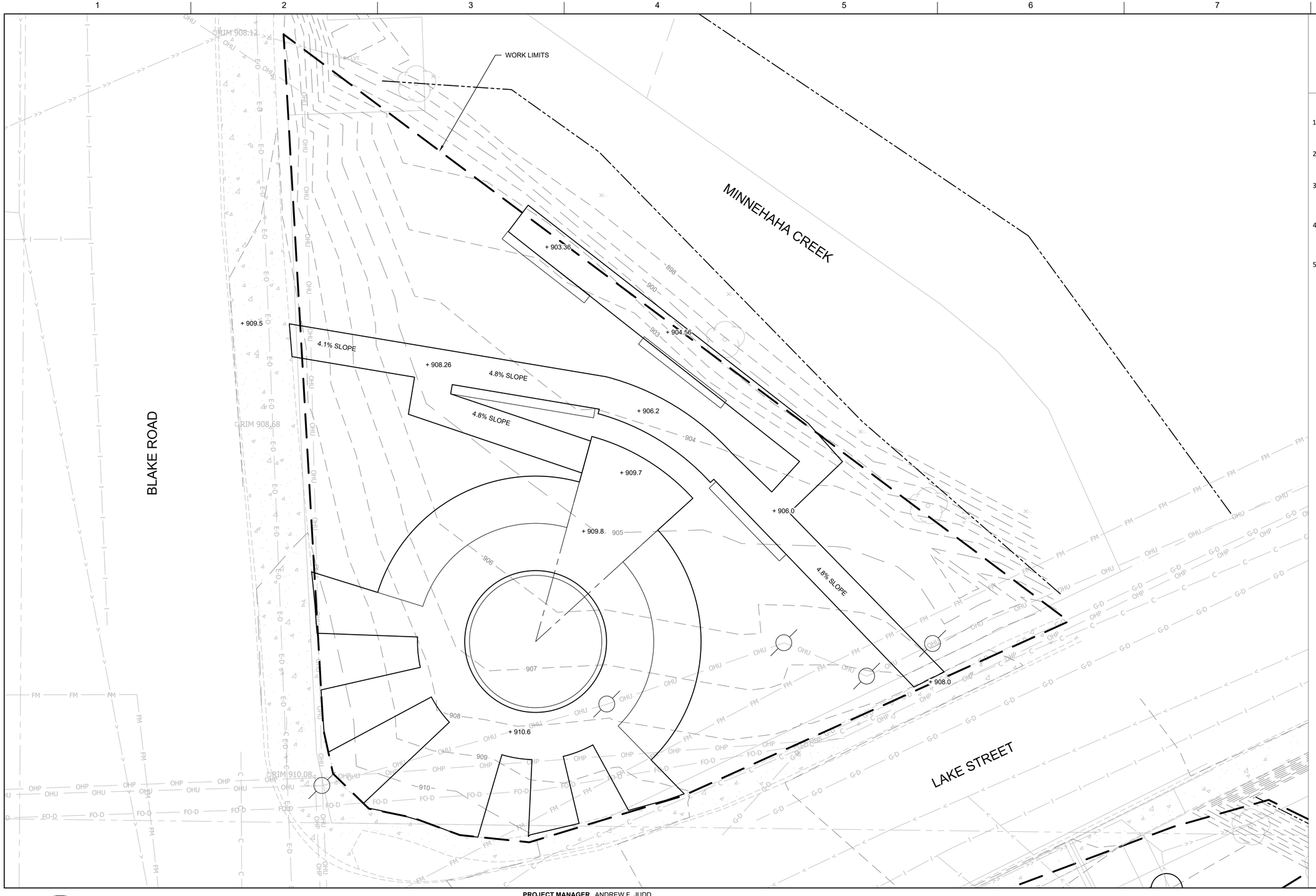
DEMOLITION & PRESERVATION PLAN

0 1" 2"

FILENAME CD101-103.DWG

SCALE 1" = 30'

SHEET CD103



N

GENERAL NOTES

1. LAYOUT AND ALIGNMENT OF TRAILS, EMBANKMENTS, AND WALLS TO BE FIELD STAKED AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
2. MAXIMUM LONGITUDINAL AND CROSS SLOPES TO BE AS INDICATED. NOTIFY OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY CONFLICTS.
3. PROVIDE SMOOTH SLOPE TRANSITIONS IN PAVED AND VEGETATED AREAS THAT MINIMIZE IMPACTED AREA. NOTIFY OWNER'S REPRESENTATIVE OF ANY CONFLICTS IMMEDIATELY.
4. SEE CT SHEETS FOR TRAIL AND PEDESTRIAN BRIDGE PLAN AND PROFILE AND CP SHEETS FOR STORM SEWER, WEIR WALL, AUXILIARY OVERFLOW, AND OUTLET STRUCTURE.
5. SEE L SHEETS FOR SURFACING AND SITE FURNISHINGS.

MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

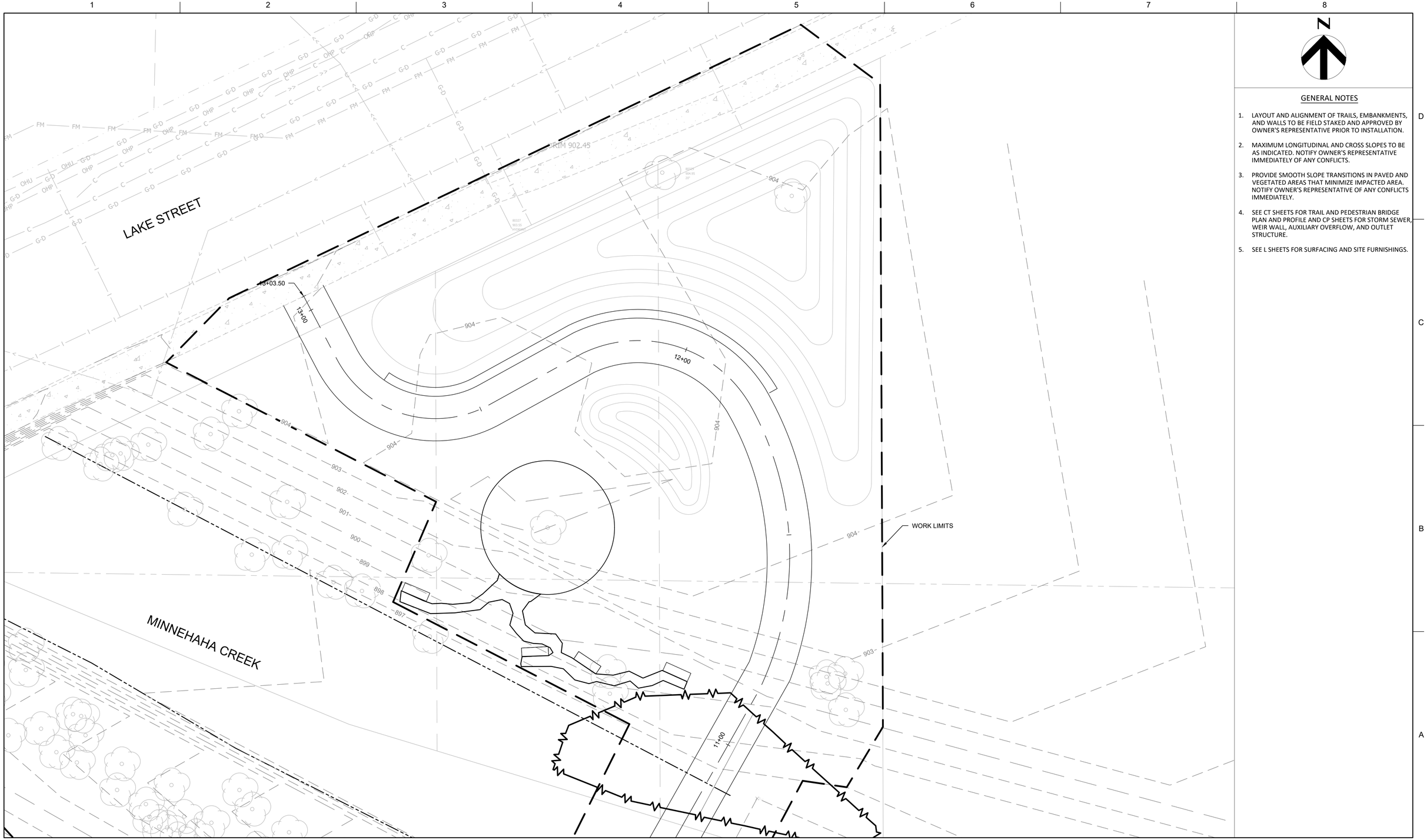
SITE GRADING PLAN GREENWAY TO GATEWAY

0 1" 2"

FILENAME CG101-105.DWG

SCALE 1" = 10'

SHEET CG101



N

GENERAL NOTES

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5. SEE L SHEETS FOR SURFACING AND SITE FURNISHINGS.

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

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CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

SITE GRADING PLAN
NATURE-BASED PLAY AREA

0 1" 2"

FILENAME CG101-105.DWG

SCALE 1" = 10'

SHEET
CG102

N

GENERAL NOTES

1. LAYOUT AND ALIGNMENT OF TRAILS, EMBANKMENTS, AND WALLS TO BE FIELD STAKED AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
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4. SEE CT SHEETS FOR TRAIL AND PEDESTRIAN BRIDGE PLAN AND PROFILE AND CP SHEETS FOR STORM SEWER, WEIR WALL, AUXILIARY OVERFLOW, AND OUTLET STRUCTURE.
5. SEE L SHEETS FOR SURFACING AND SITE FURNISHINGS.
6. SEE CG201 FOR POND TYPICAL SECTIONS FOR SLOPES AND GRADE BREAK ELEVATIONS.

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER	ANDREW F. JUDD
PROJECT NUMBER	10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

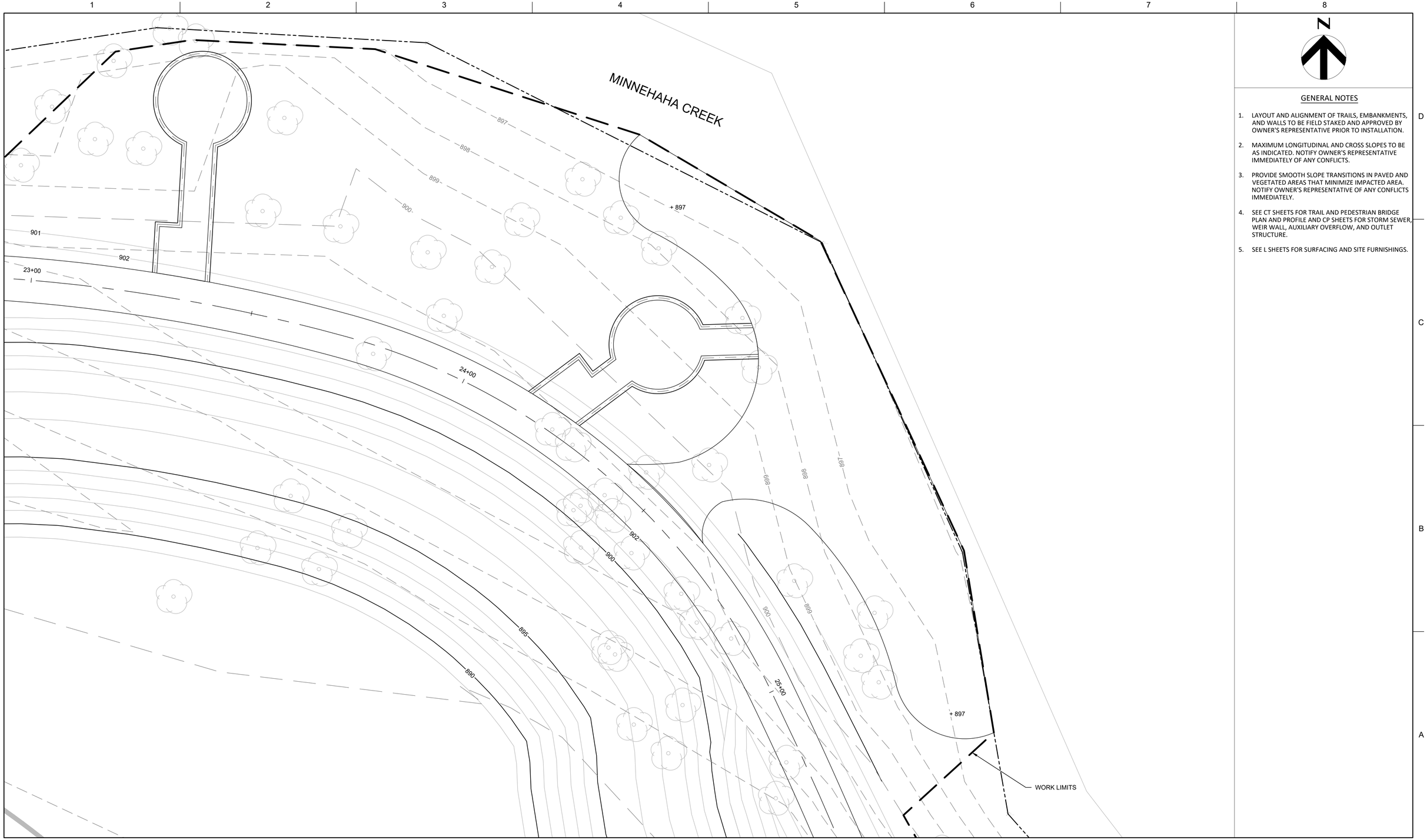
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

SITE GRADING PLAN STORMWATER POND

0 1" 2"

FILENAME	CG103.DWG
SCALE	1" = 30'

SHEET
CG103



N

GENERAL NOTES

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5. SEE L SHEETS FOR SURFACING AND SITE FURNISHINGS.

MINNEHAHA CREEK
WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER	ANDREW F. JUDD
PROJECT NUMBER	10268112

60% DRAFT
SUBMITTAL FOR
CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

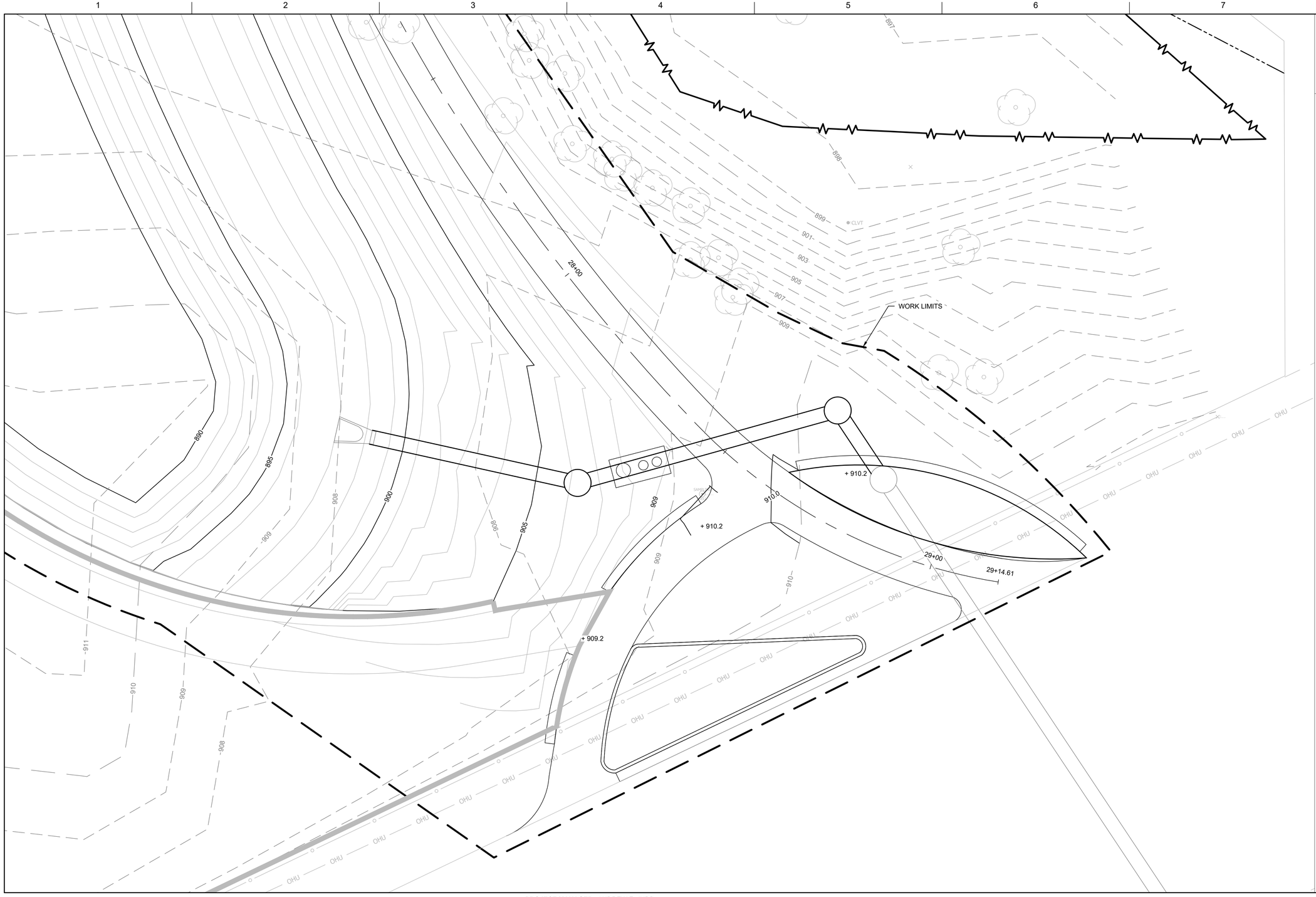
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

SITE GRADING PLAN LANDING AREA

0 1" 2"

FILENAME	CG101-105.DWG
SCALE	1" = 10'

SHEET
CG104



MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

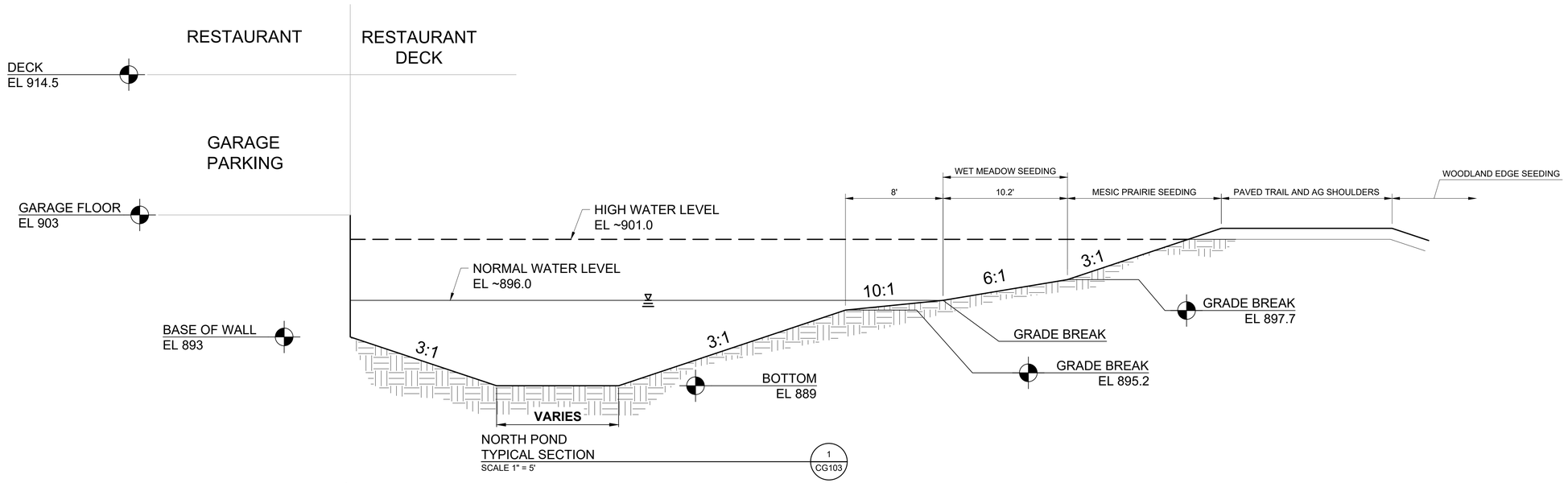
SITE GRADING PLAN TRAILHEAD

0 1" 2"

FILENAME CG101-105.DWG

SCALE 1" = 10'

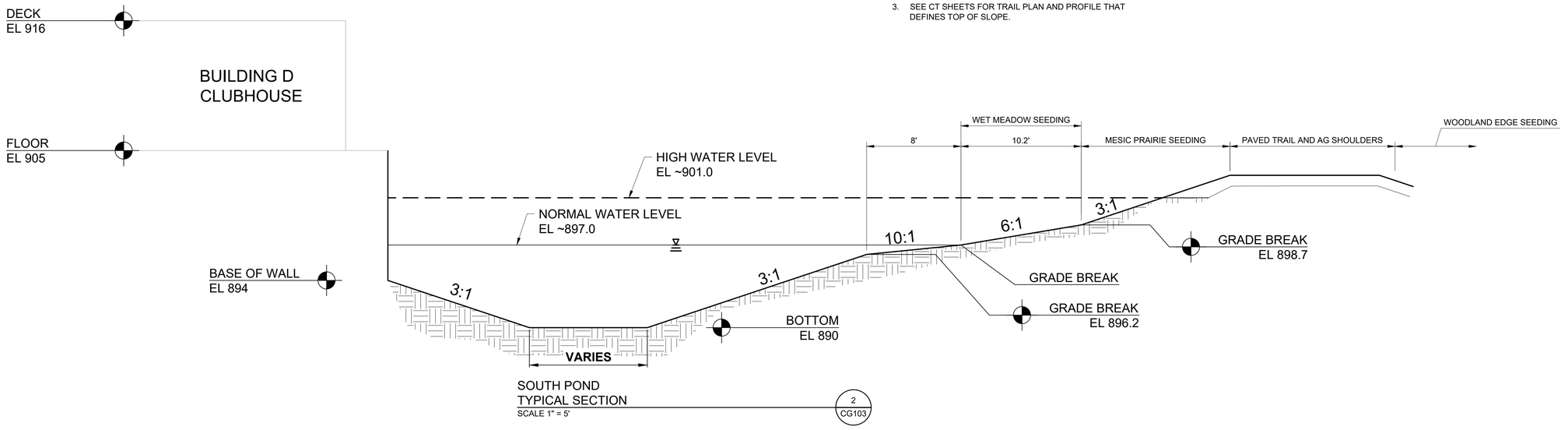
SHEET **CG105**



WALL AND OTHER FEATURES BY OTHERS

NOTES:

1. SEE L SHEETS FOR DETAILED SEEDING PLAN.
2. GROUNDWATER HAS BEEN ENCOUNTERED NEAR EL ~896' DURING SOIL BORINGS. WET SOIL CONDITIONS SHOULD BE ANTICIPATED DURING POND EXCAVATION.
3. SEE CT SHEETS FOR TRAIL PLAN AND PROFILE THAT DEFINES TOP OF SLOPE.



MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
0	2/18/2022	60% DRAFT FOR CLIENT REVIEW

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

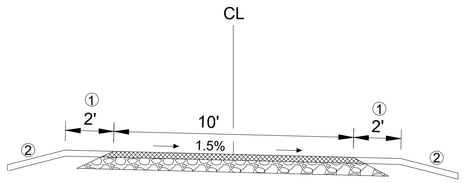
TYPICAL SECTIONS POND

0 1" 2"

FILENAME CG201.DWG

SCALE 1" = 5'

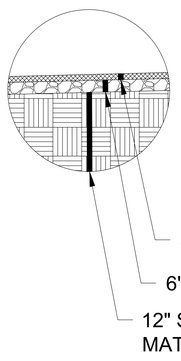
SHEET CG201



NOTES:

1. 2' WIDE AGGREGATE SHOULDER
2. 3:1 MAXIMUM SLOPE (H:V) OUTSIDE OF 2' SHOULDER.

INSET A



NOTES:

1. BITUMINOUS SHALL BE PLACED IN ONE LIFT.
2. CLASS 5 AGGREGATE BASE SHALL CONFORM TO MNDOT SPEC 3138.
3. SUBGRADE SHALL BE TEST ROLLED PRIOR TO AGGREGATE BASE INSTALLATION AND CONFORM TO MNDOT SPEC 2111.
4. SEE CT SHEETS FOR TRAIL PLAN AND PROFILE.

MINNEHAHA CREEK GREENWAY TRAIL TYPICAL SECTION

SCALE 1" = 5'

3
CT103

MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
0	2/18/2022	60% DRAFT FOR CLIENT REVIEW

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PROJECT NUMBER 10268112

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

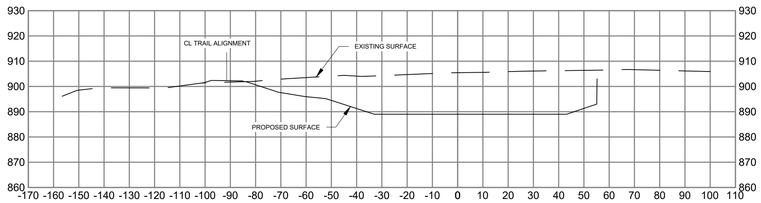
TYPICAL SECTIONS TRAIL

0 1" 2"

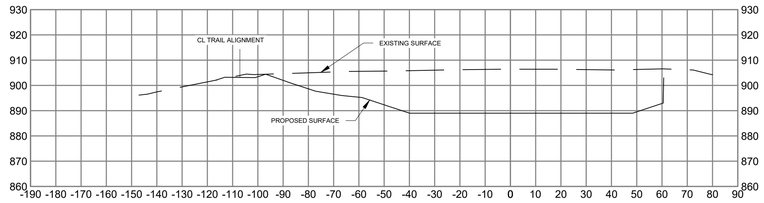
FILENAME CG202.DWG

SCALE 1" = NA'

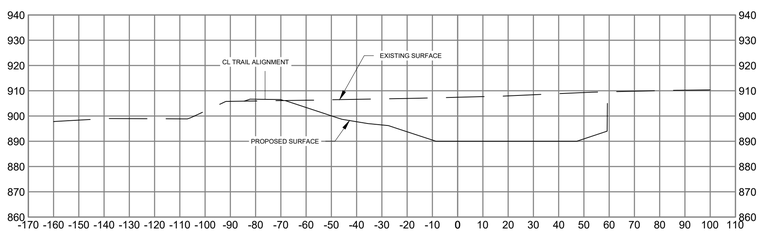
SHEET **CG202**



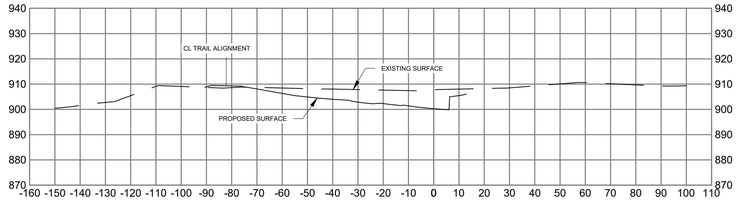
SECTION 1
POND ALIGNMENT - STA 102+00 (SL-1 / CG301)
1" = 30'



SECTION 2
POND ALIGNMENT - STA 103+50 (SL-2 / CG301)
1" = 30'



SECTION 3
POND ALIGNMENT - STA 105+00 (SL-3 / CG301)
1" = 30'



SECTION 4
POND ALIGNMENT - STA 106+20 (SL-4 / CG301)
1" = 30'

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

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PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

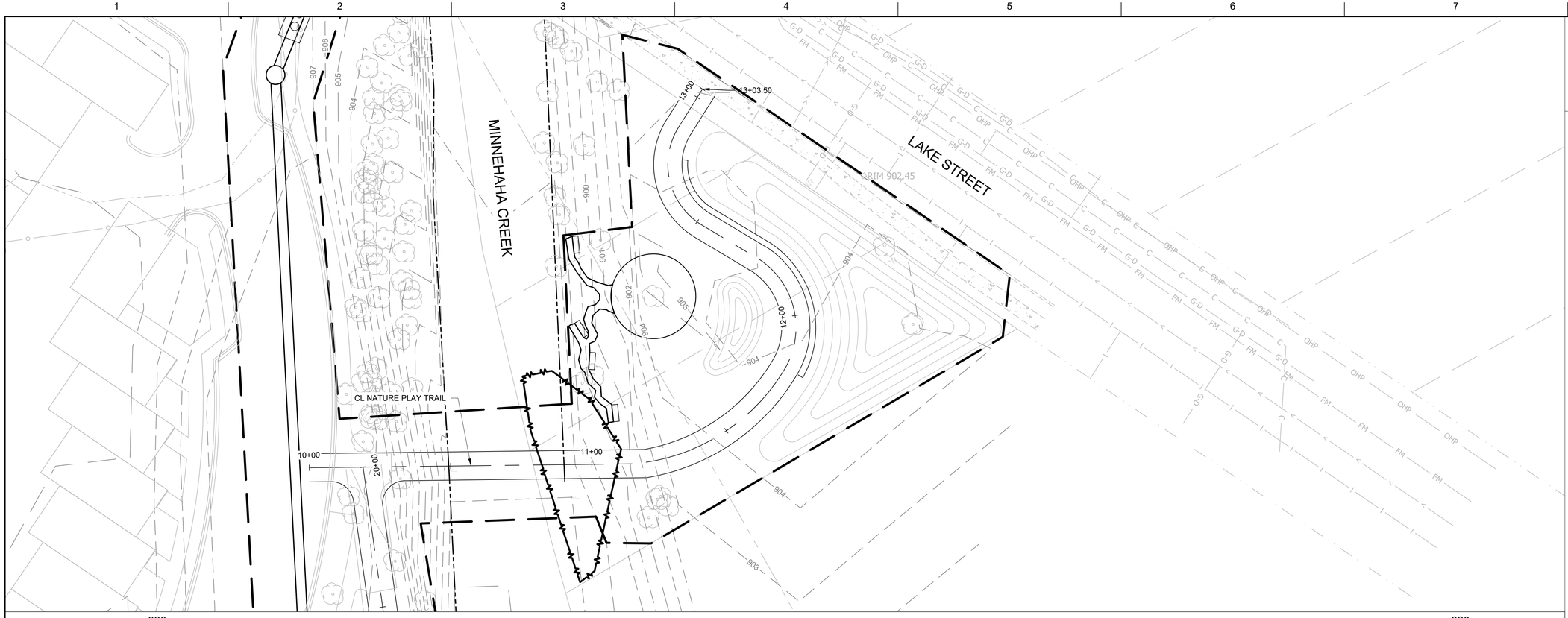
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

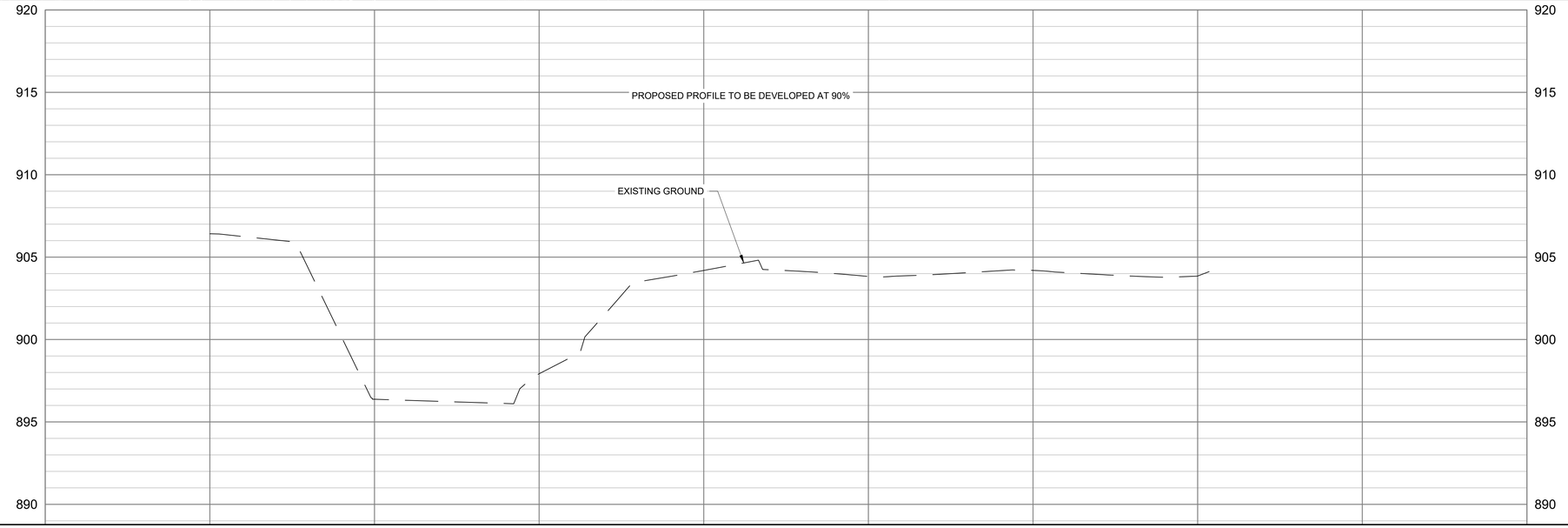
CROSS SECTIONS

0 1" 2"

FILENAME CG103.DWG
SCALE 1" = 30'

SHEET CG301





VERTICAL SCALE : 1" = 4'

0 1" 2"

MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

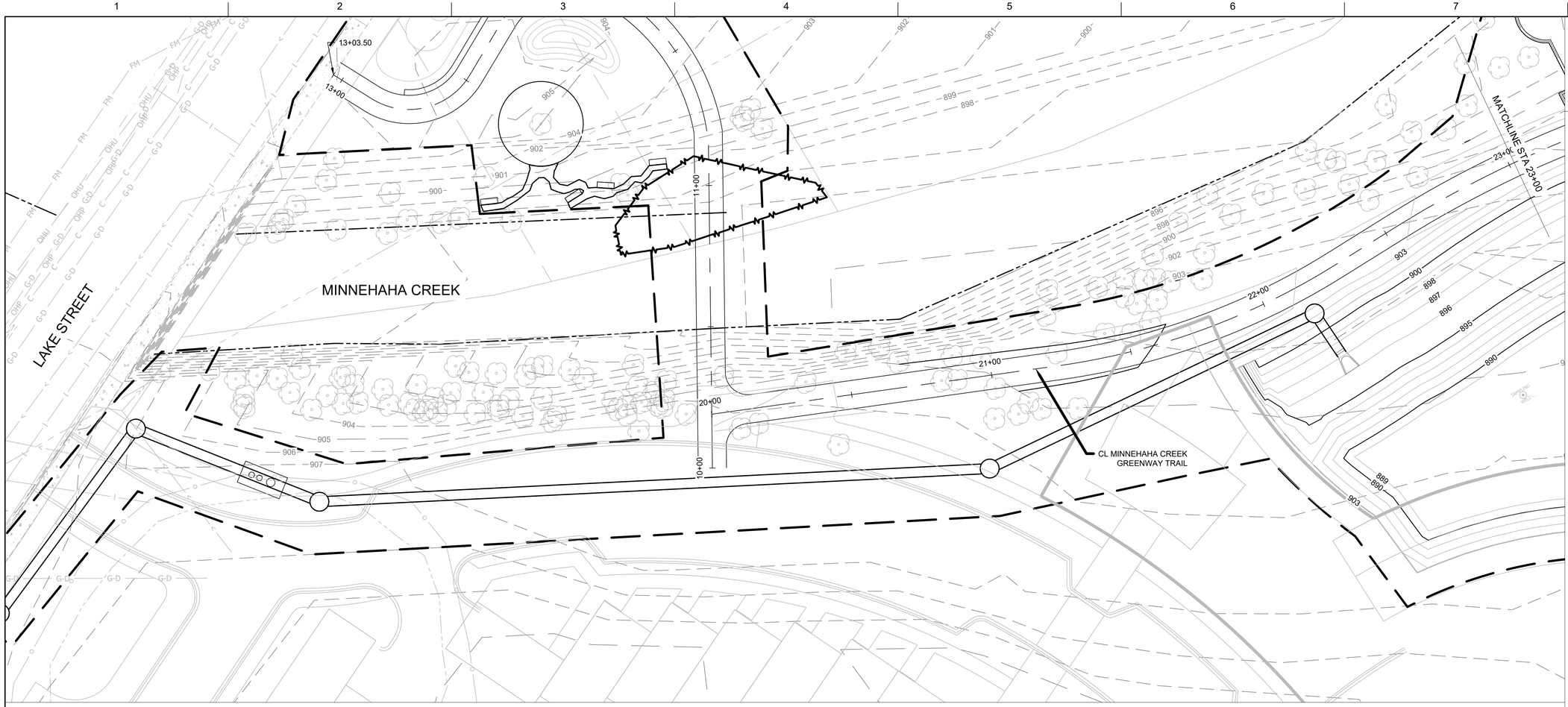
TRAIL PLAN & PROFILE

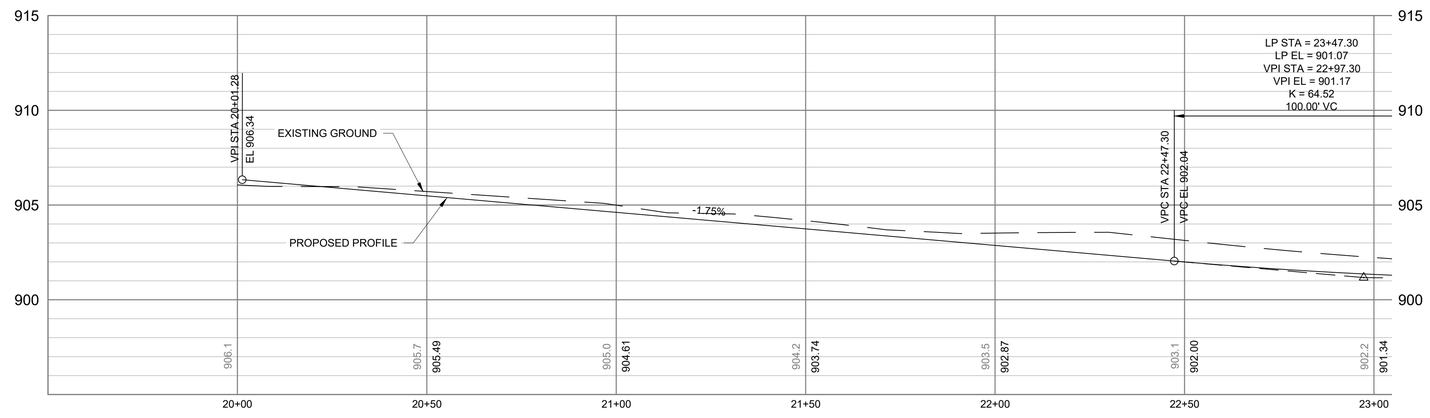
0 1" 2"

FILENAME CT101-104.DWG

SCALE 1" = 20'

SHEET CT101





VERTICAL SCALE : 1" = 4'

0 1" 2"

MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

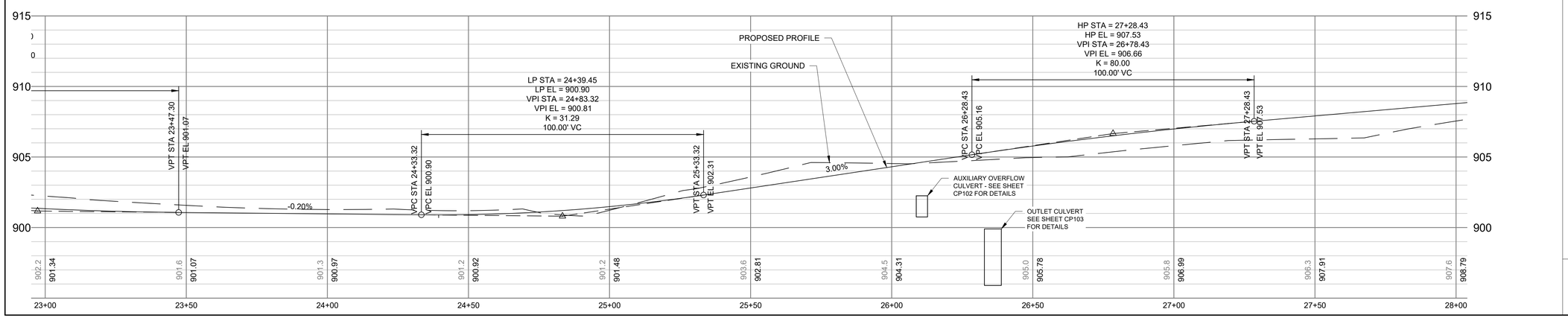
TRAIL PLAN & PROFILE

0 1" 2"

FILENAME CT101-104.DWG

SCALE 1" = 20'

SHEET CT102



VERTICAL SCALE : 1" = 4'

0 1" 2"

MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

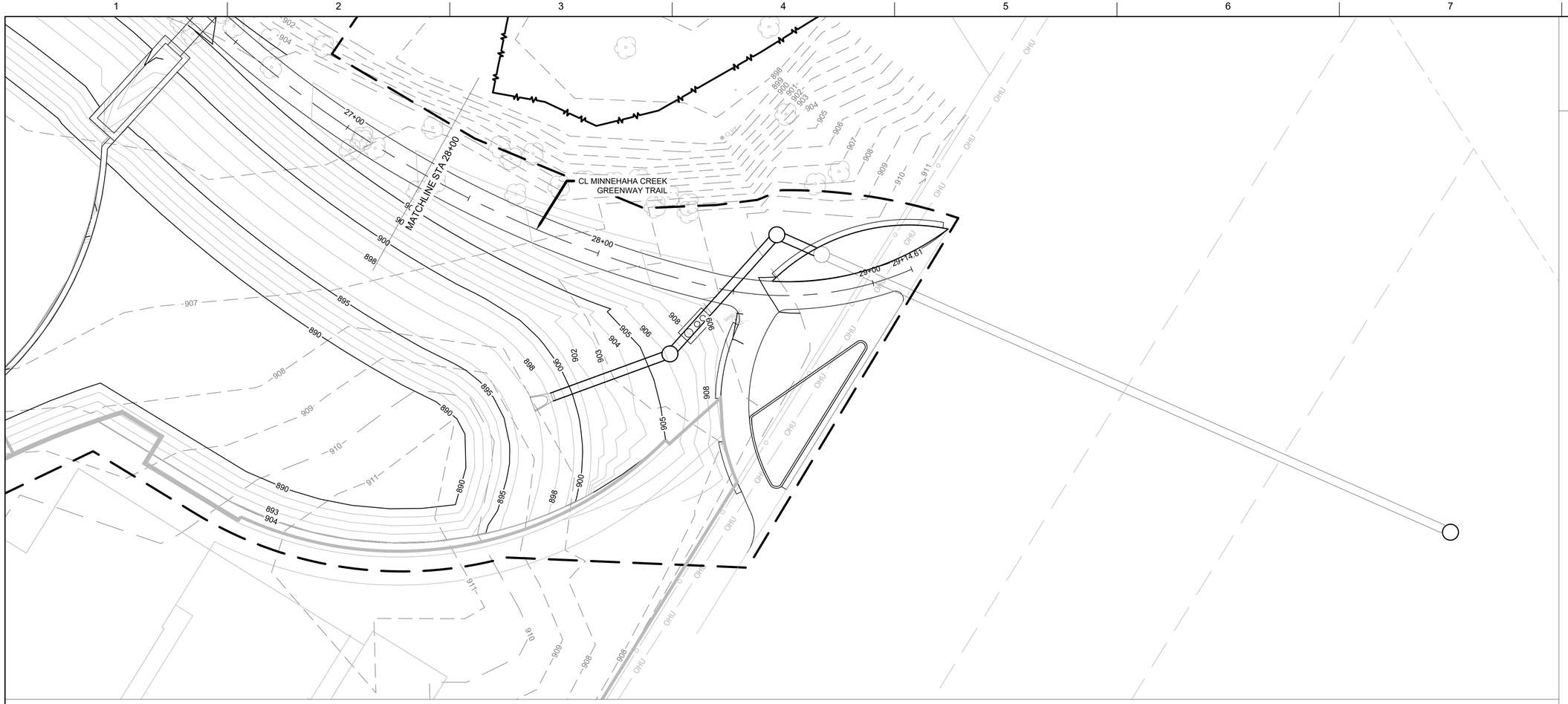
TRAIL PLAN & PROFILE

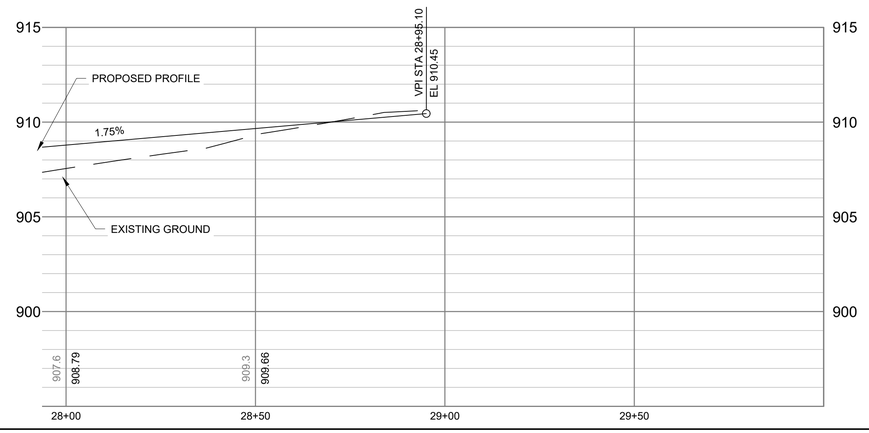
0 1" 2"

FILENAME CT101-104.DWG

SCALE 1" = 20'

SHEET CT103





VERTICAL SCALE : 1" = 4'

0 1" 2"

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER	ANDREW F. JUDD
PROJECT NUMBER	10268112

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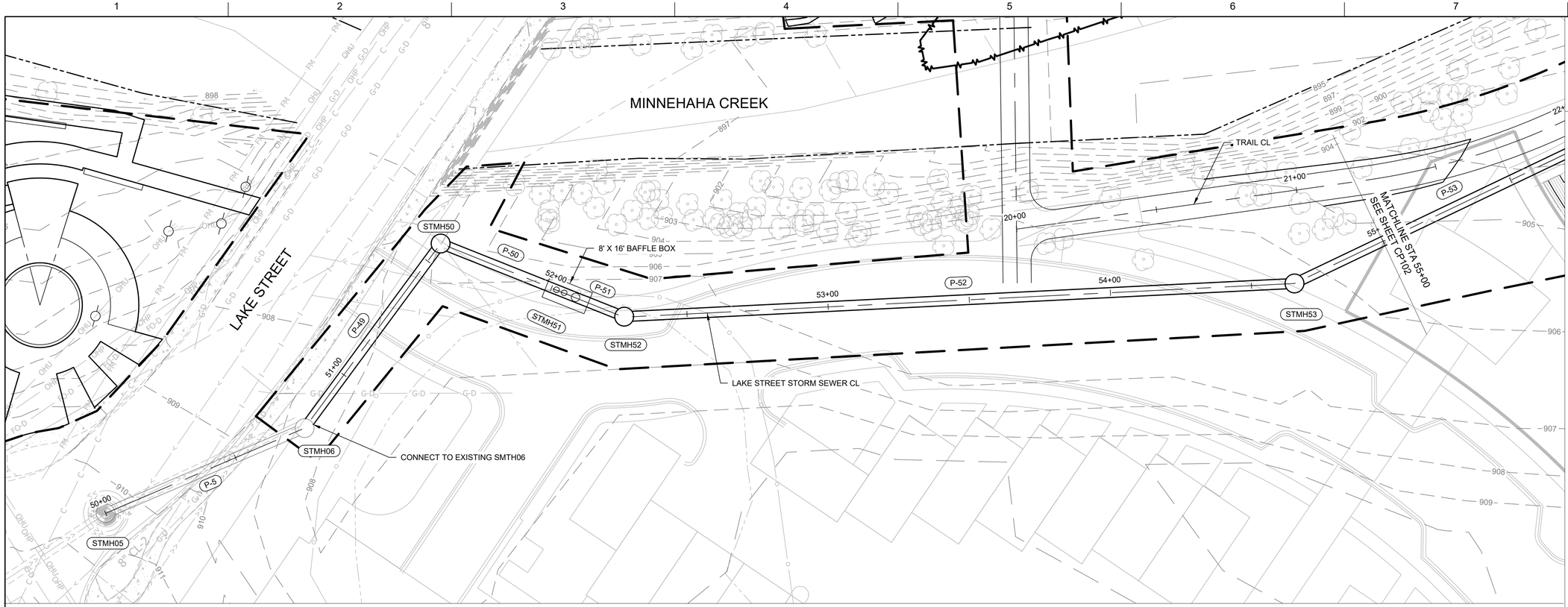
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

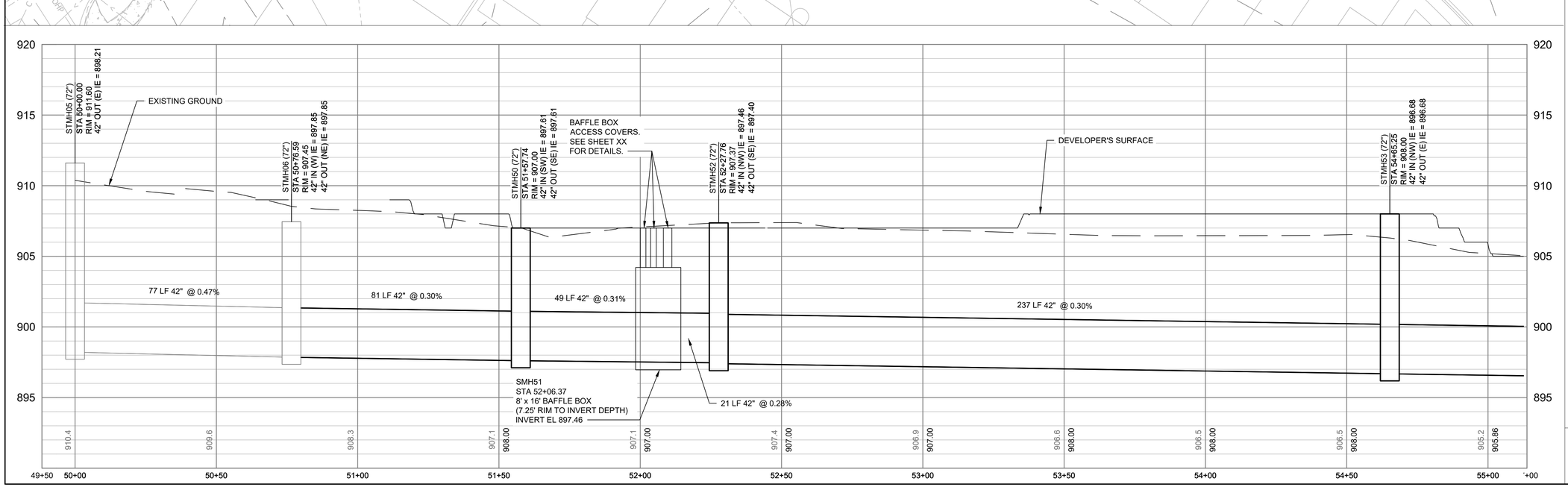
TRAIL PLAN & PROFILE

0 1" 2"

FILENAME CT101-104.DWG
SCALE 1" = XX'

SHEET
CT104





VERTICAL SCALE : 1" = 4'

0 1" 2"

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

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SUBMITTAL FOR
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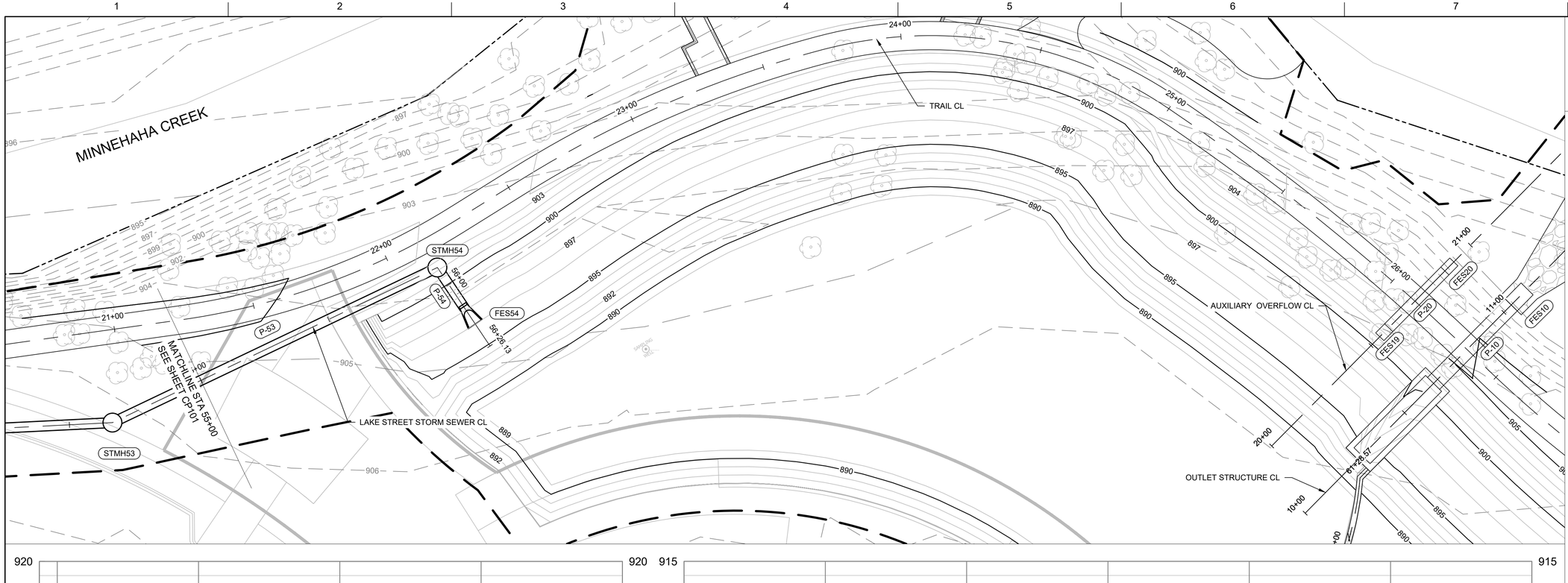
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

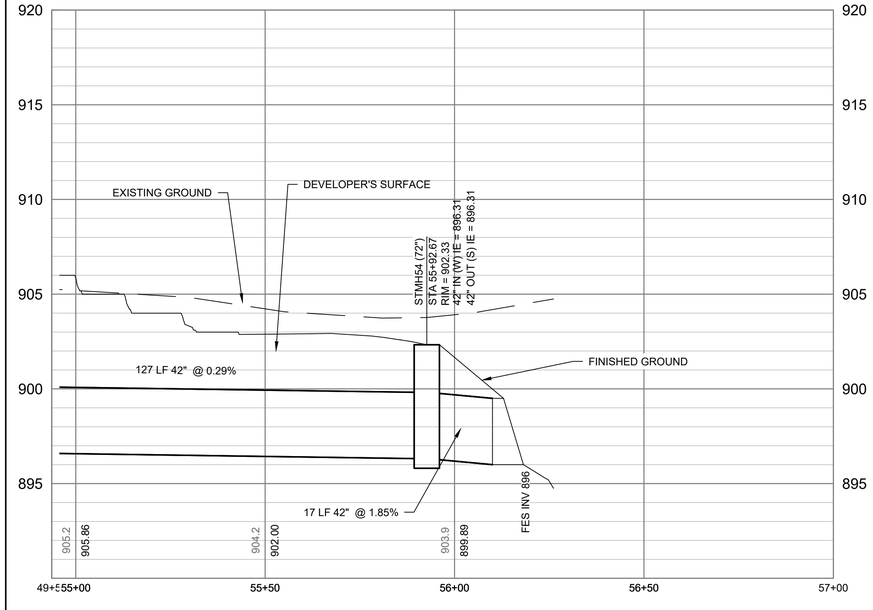
STORMWATER PLAN & PROFILE

0 1" 2"

FILENAME CP101-104.DWG
SCALE 1" = 20'

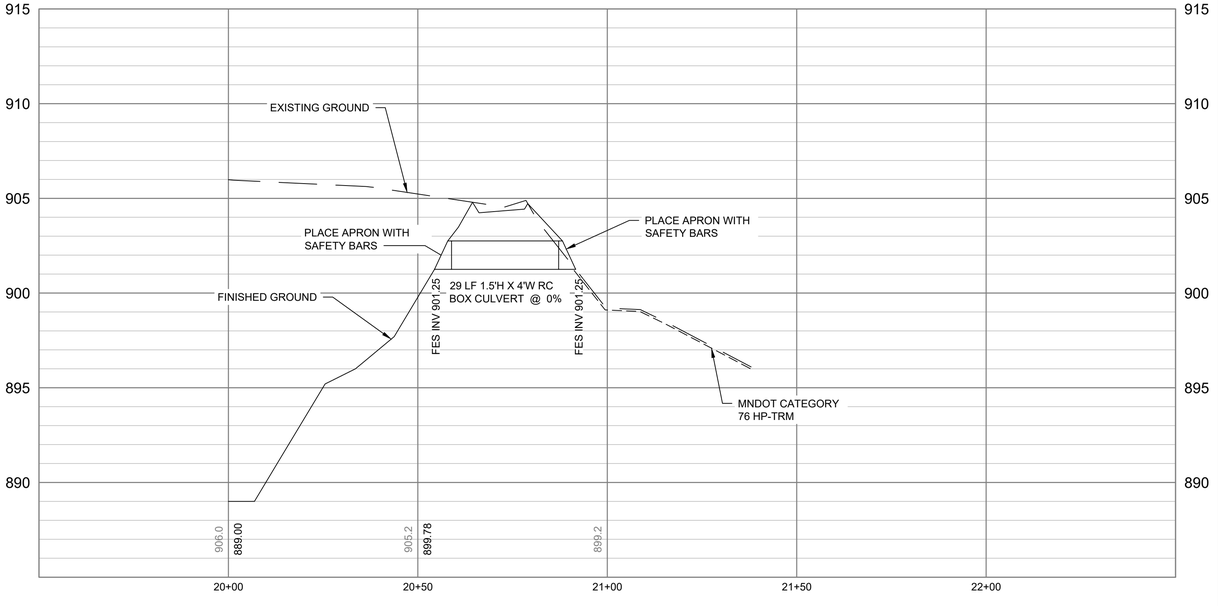
SHEET
CP101





LAKE STREET STORM SEWER PROFILE

H: 1"=20', V: 1"=4'



AUXILIARY OVERFLOW PROFILE

H: 1"=20', V: 1"=4'

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

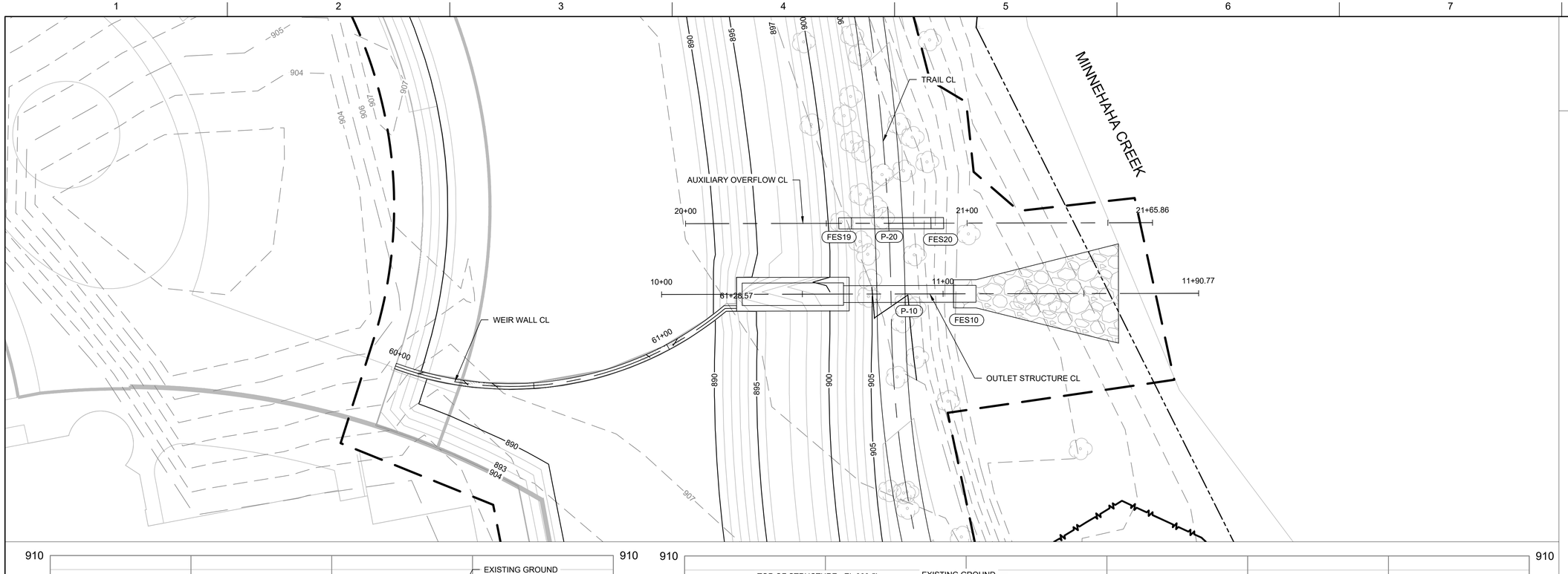
STORMWATER PLAN & PROFILE

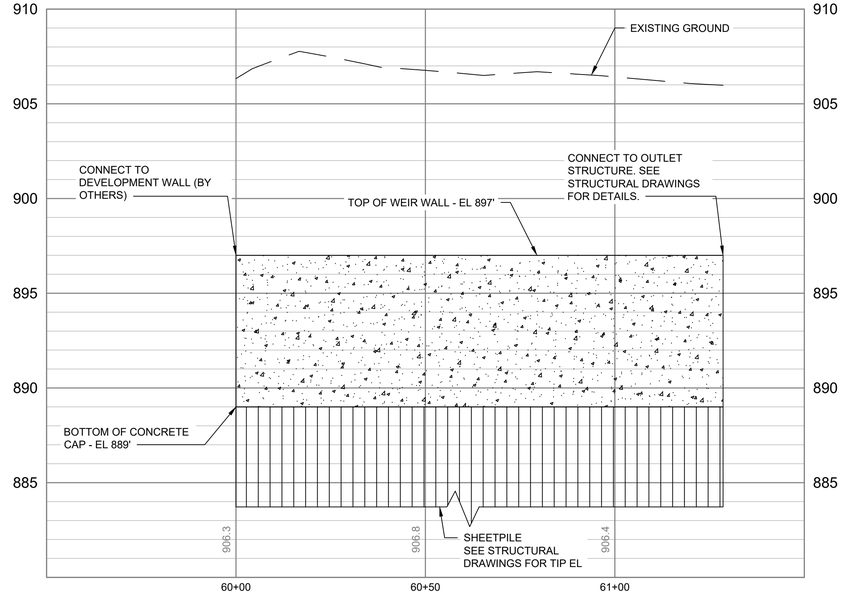
0 1" 2"

FILENAME CP101-104.DWG

SCALE 1" = 20'

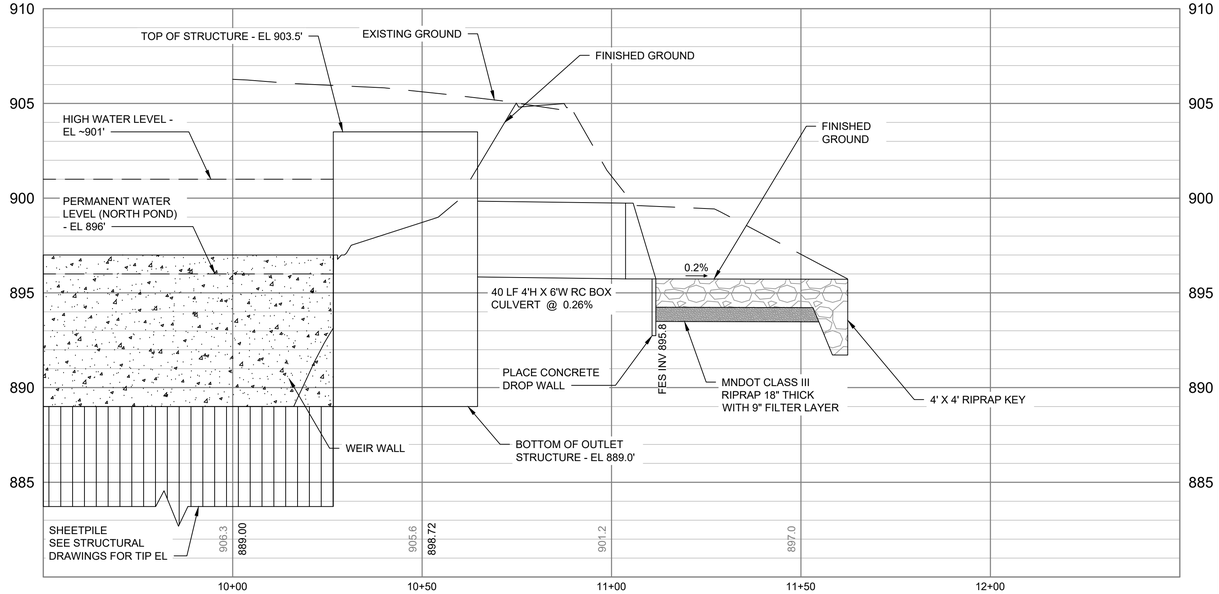
SHEET CP102





WEIR WALL PROFILE

H: 1"=20', V: 1"=4'



OUTLET STRUCTURE PROFILE

H: 1"=20', V: 1"=4'

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

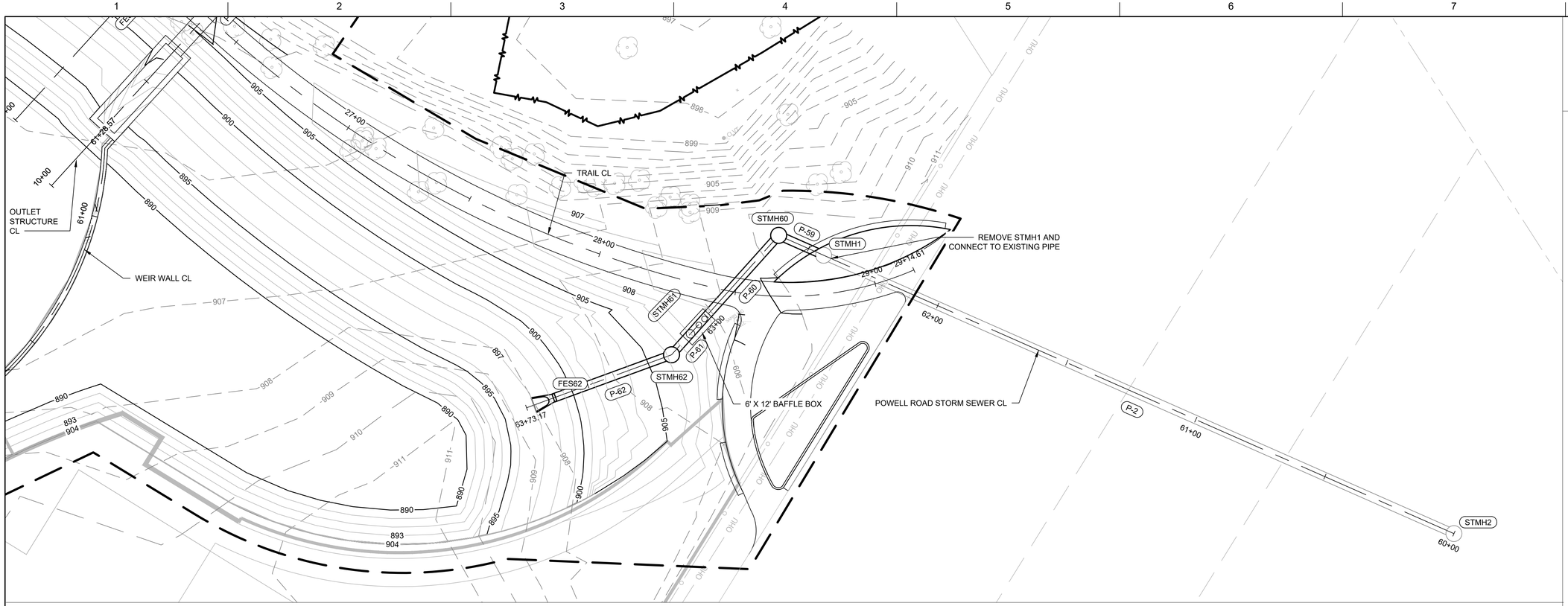
STORMWATER PLAN & PROFILE

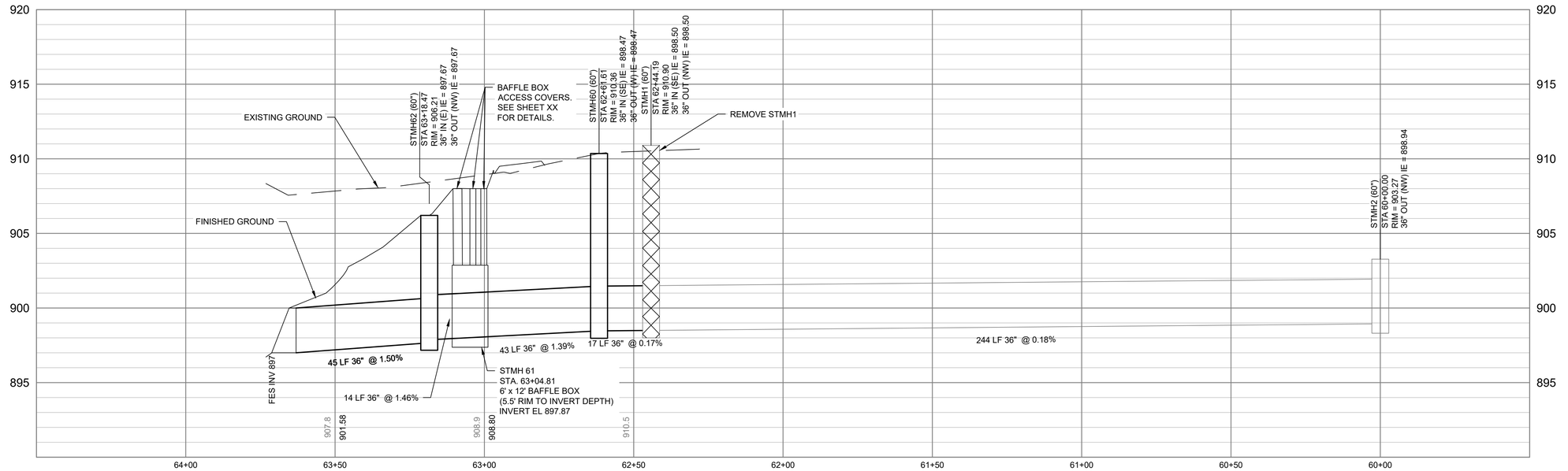
0 1" 2"

FILENAME CP101-104.DWG

SCALE 1" = 20'

SHEET CP103





VERTICAL SCALE : 1" = 4'

0 1" 2"

MINNEHAHA CREEK WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

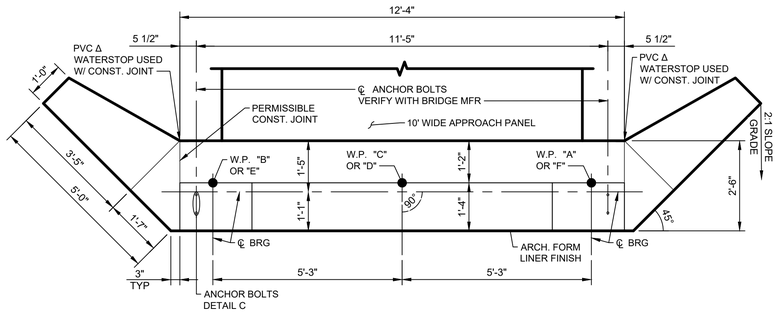
STORMWATER PLAN & PROFILE

0 1" 2"

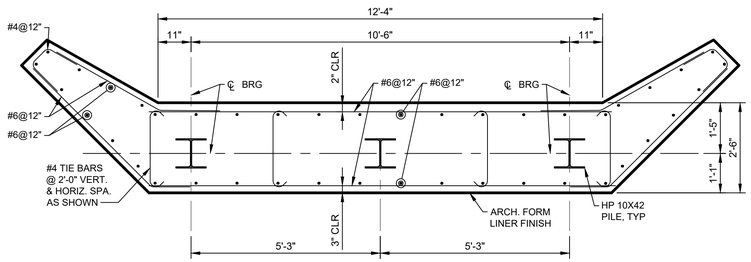
FILENAME CP101-104.DWG

SCALE 1" = XX'

SHEET CP104



PLAN
1" = 1'-0" 1



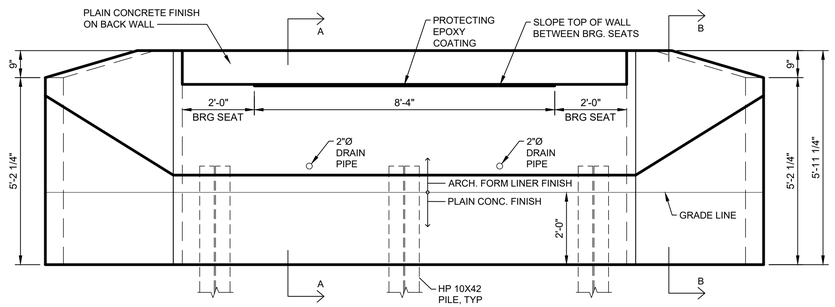
SECTIONAL PLAN
1" = 1'-0" 2

CONSTRUCTION NOTES:

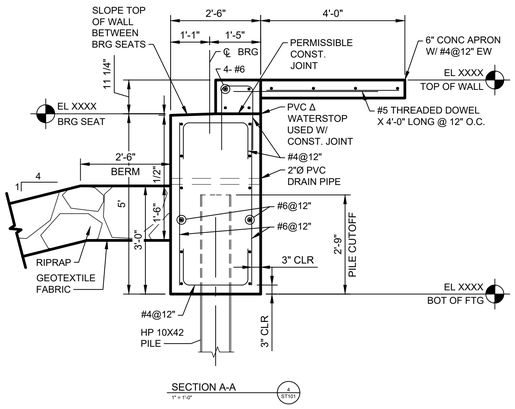
1. CONCRETE
   A. LAP SPLICES AND 90° HOOKS SHALL BE AS SHOWN BELOW UNLESS NOTED OTHERWISE.

REINF. BAR SIZE	LAP SPLICE (IN)	90° END HOOK (IN)
#4	24	8
#5	31	10
#6	37	12
#7	43	14
#8	51	16

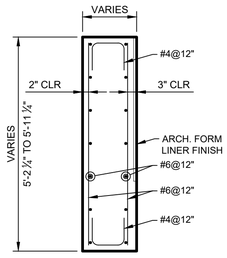
   B. REINFORCING BARS SHALL HAVE THE FOLLOWING CONCRETE COVER UNLESS NOTED OTHERWISE:
      1. CONCRETE CAST AGAINST EARTH 3"
      2. CONCRETE CAST W/ FORM LINER 3"
      3. ALL OTHER CONCRETE 2"
   C. CONCRETE SHALL BE PLACED WITHOUT CONSTRUCTION JOINTS EXCEPT WHERE SPECIFICALLY SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER.
   D. BEVEL ALL EXPOSED CORNERS OF CONCRETE 3/4" X 3/4".
   Δ POLYVINYL CHLORIDE WATERSTOP TO EXTEND FULL WIDTH OF ABUTMENT SEAT & VERT. FROM SEAT TO TOP OF WINGWALL. P.C.W. SHALL BE BUTT-SPLICED AT ALL INTERSECTIONS BY USING A HEATED SPLICING IRON. HOLD FLUSH TO CONCRETE.



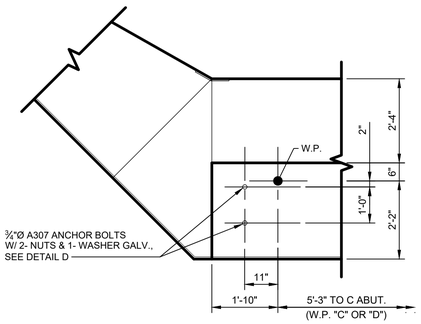
ELEVATION
1" = 1'-0" 3



SECTION A-A
1" = 1'-0" 4 ST101

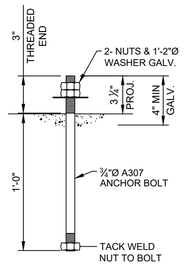


SECTION B-B
1" = 1'-0" 5 ST101



NOTE:
1. VERIFY ANCHOR BOLT LOCATION W/ BRIDGE MFR PRIOR TO ABUTMENT CONSTRUCTION.

DETAIL
NOT TO SCALE 6



DETAIL
1" = 1'-0" 7

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

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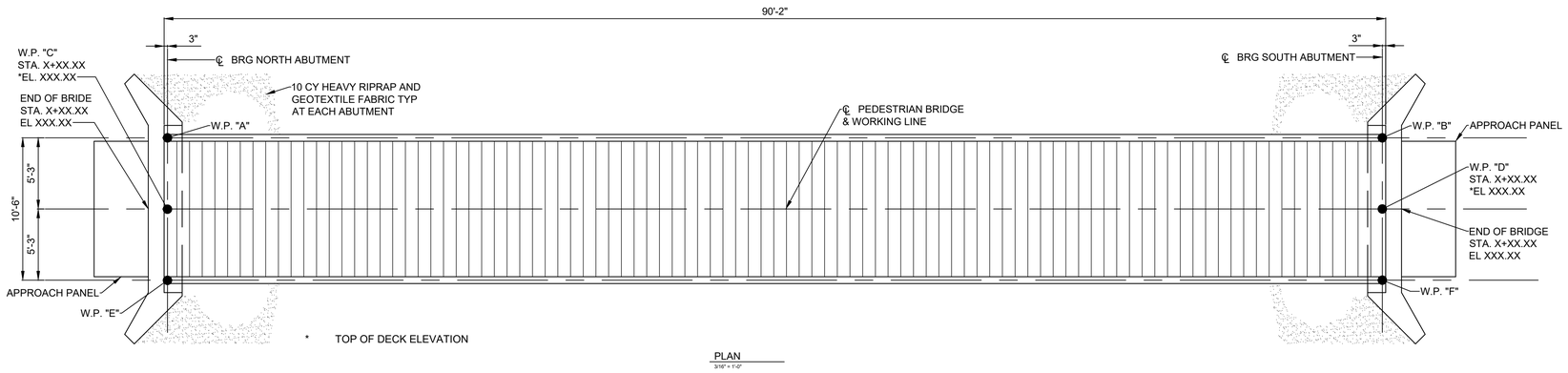
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

STRUCTURAL DETAILS PEDESTRIAN BRIDGE

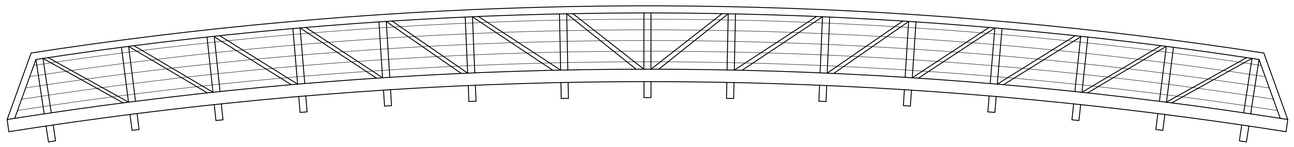
0 1" 2"

FILENAME ST103.DWG
SCALE NA

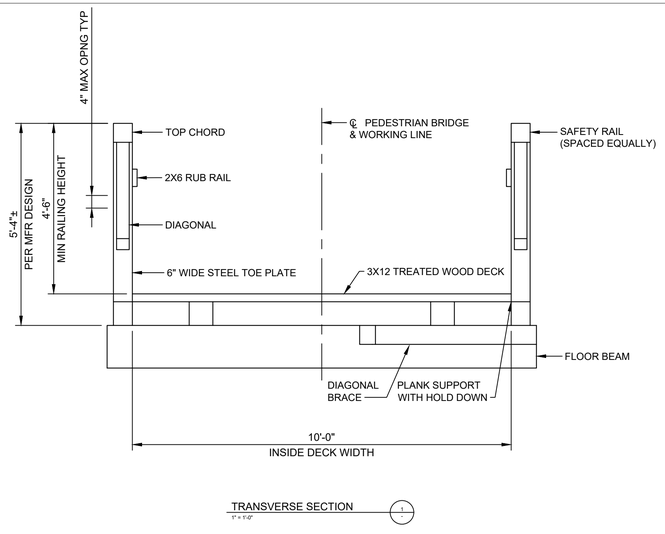
SHEET ST101



PLAN
3/16" = 1'-0"



ELEVATION



TRANSVERSE SECTION
1" = 1'-0"

MINNEHAHA CREEK
WATERSHED DISTRICT

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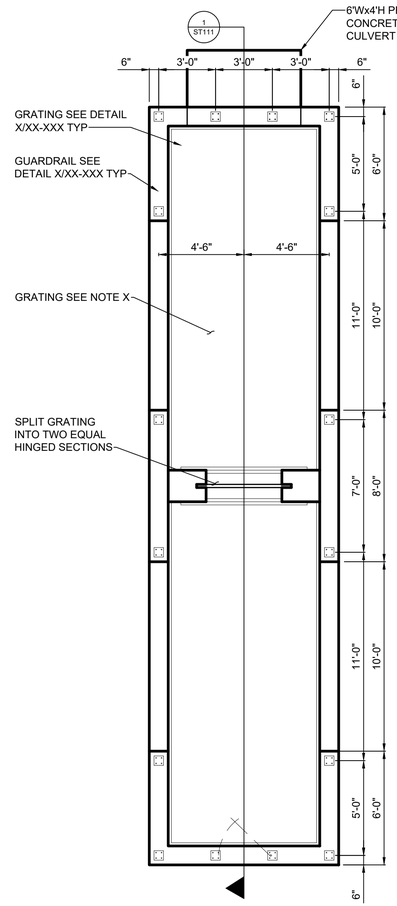
325 BLAKE RD
HOPKINS, MN 55343

STRUCTURAL DETAILS PEDESTRIAN BRIDGE

0 1" 2"

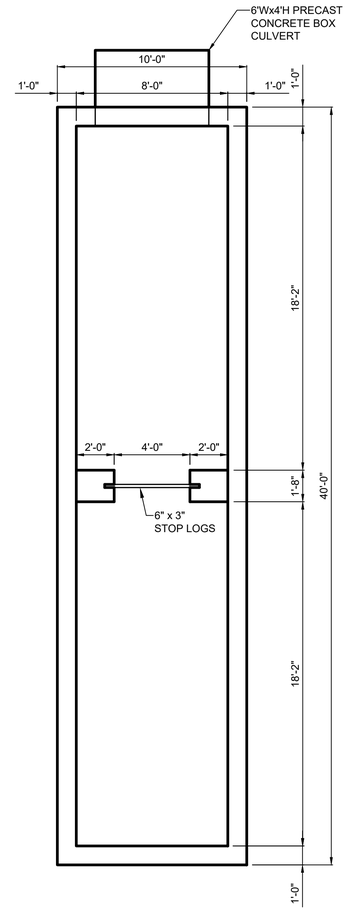
FILENAME ST104.DWG
SCALE NA

SHEET
ST102



PLAN

1/4" = 1'-0"



SECTIONAL PLAN @ EL 900'-0"

1/4" = 1'-0"

MINNEHAHA CREEK
WATERSHED DISTRICT

HDR

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PROJECT MANAGER	ANDREW F. JUDD
PROJECT NUMBER	10268112

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CLIENT REVIEW

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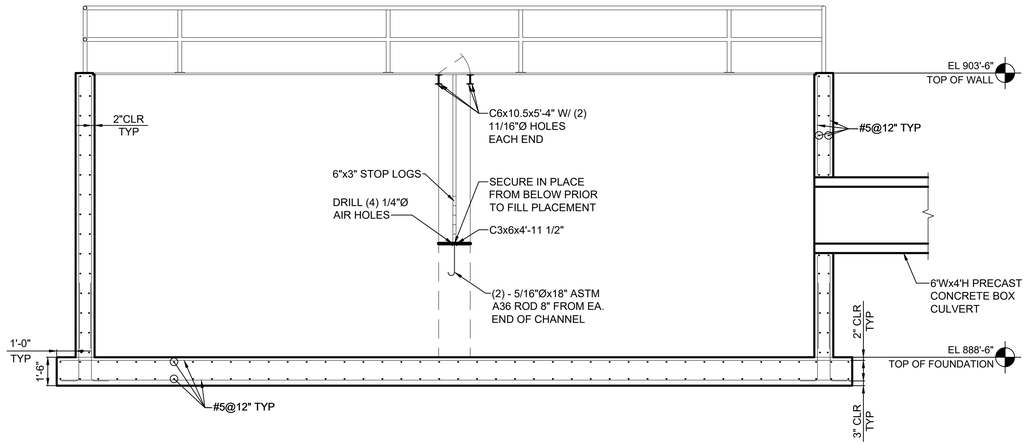
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

STRUCTURAL DETAILS
POND OUTLET

0 1" 2"

FILENAME ST110.DWG
SCALE NA

SHEET
ST110



SECTIONAL PLAN @ EL 900'-0"
1/4" = 1'-0"
1 / ST110

MINNEHAHA CREEK
WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

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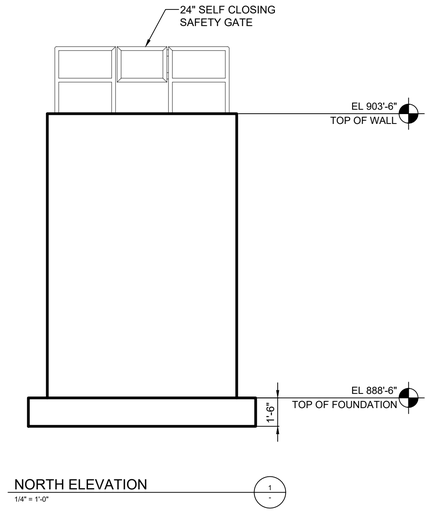
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

STRUCTURAL DETAILS POND OUTLET

0 1" 2"

FILENAME ST111.DWG
SCALE NA

SHEET ST111



NORTH ELEVATION
1/4" = 1'-0"

MINNEHAHA CREEK
WATERSHED DISTRICT

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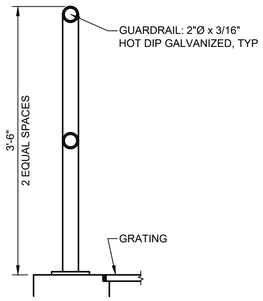
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

STRUCTURAL DETAILS
POND OUTLET

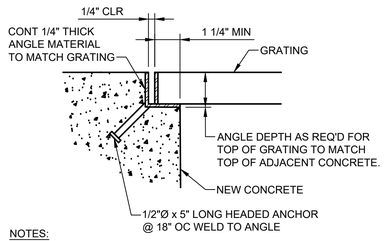
0 1" 2"

FILENAME ST112.DWG
SCALE NA

SHEET
ST112



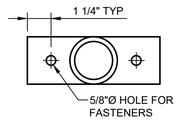
GUARD RAIL DETAIL (1)
NOT TO SCALE



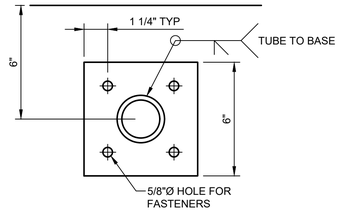
NOTES:

1. GRATING 1 1/2" x 3/16" SERRATED. ANCHORS SHALL BE TYPE 316 SST.
2. ALL ENDS AND OPENINGS SHALL BE BANDED.
3. ATTACH GRATING TO ALL SUPPORT ANGLES WITH BOLTED CLIPS, SPACED AT 2'-0" MAX CENTERS.

GRATING AND SUPPORT DETAIL (2)
NOT TO SCALE

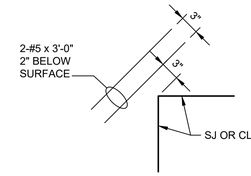


BASE PLATE FOR MOUNTING TO METAL STRUCTURE

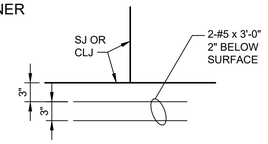


BASE PLATE FOR MOUNTING TO CONCRETE

STEEL POST BASE PLATE DETAIL (3)
NOT TO SCALE



RE-ENTRANT CORNER



DISCONTINUOUS JOINT INTERSECTION

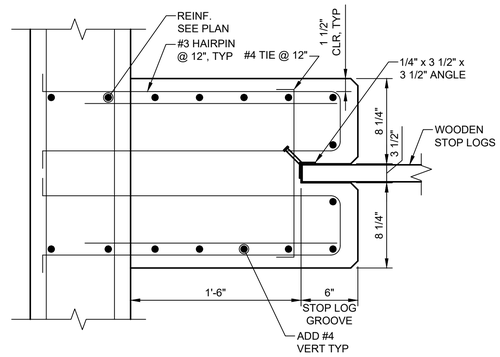
TYPICAL ADDITIONAL SLAB REINFORCING DETAIL (4)
NOT TO SCALE

LAP SPLICE AND EMBEDMENT LENGTHS f'c = 4.0 ksi or 4.5 ksi fy = 60 ksi		
BAR	BARS SPACED GREATER THAN 4"	BARS SPACED LESS THAN OR EQUAL TO 4"
#3	14"	20"
#4	19"	32"
#5	29"	46"
#6	39"	62"
#7	55"	87"
#8	69"	107"
#9	76"	116"
#10	97"	140"
#11	120"	146"

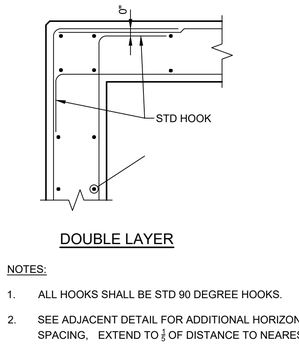
NOTES:

1. PROVIDE MINIMUM LAP SPLICE LENGTHS AND EMBEDMENTS PER TABLE UNLESS NOTED OTHERWISE. EMBEDMENT LENGTH EQUALS THE LAP SPLICE LENGTH UNLESS OTHERWISE NOTED.
2. BAR SPACING AT LAP SPLICE IS THE MINIMUM CLEAR DISTANCE BETWEEN LAPPED BARS PLUS ONE BAR DIAMETER.
3. ALL SPLICES TO BE CONTACT SPLICES AND WIRED TOGETHER UNLESS OTHERWISE APPROVED BY ENGINEER.

REINFORCING LAP AND EMBEDMENT SCHEDULE (5)
NOT TO SCALE



STOP LOG DETAIL (6)
NOT TO SCALE

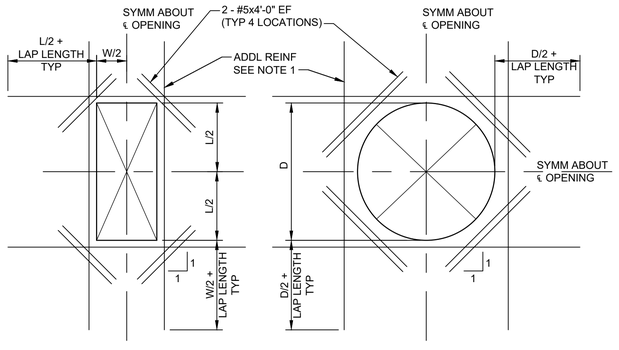


DOUBLE LAYER SINGLE LAYER

NOTES:

1. ALL HOOKS SHALL BE STD 90 DEGREE HOOKS.
2. SEE ADJACENT DETAIL FOR ADDITIONAL HORIZONTAL BARS. STAGGER BETWEEN TYPICAL REINF SPACING, EXTEND TO $\frac{1}{8}$ OF DISTANCE TO NEAREST ADJACENT WALL IN EACH DIRECTION, UNO.
3. OPTIONAL LAP LOCATION. APPLIES TO BOTH DOUBLE AND SINGLE LAYER CONDITIONS TYP.

WALL REINFORCEMENT AT CORNERS (7)
NOT TO SCALE

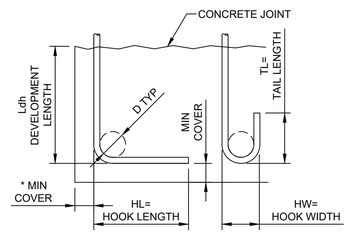


RECTANGULAR OPENING DETAIL CIRCULAR OPENING DETAIL

NOTES:

1. PROVIDE ADDITIONAL REINFORCING THE SAME SIZE AS DISCONTINUOUS REINFORCEMENT AT OPENING. QUANTITY OF REINFORCING IN EACH DIRECTION SHALL BE EQUAL TO OR ONE GREATER THAN THE NUMBER OF DISCONTINUOUS BARS. PLACE 1/2 OF ADDITIONAL REINFORCING BARS EACH SIDE OF OPENING. PLACE ADDITIONAL REINFORCEMENT AT 3" OC (TYPICAL BOTH DIRECTIONS AND ALL LAYERS OF REINFORCEMENT). START FIRST BAR 2" CLEAR TO OPENING. PLACE ADDITIONAL REINFORCING IN SAME PLANES AS INTERRUPTED TYPICAL REINFORCING.
2. EXTEND ADDITIONAL REINFORCING BEYOND EDGE OF OPENING AS SHOWN ABOVE. ADDITIONAL BARS MAY TERMINATE AT THE END OF THE WALL WITH A STANDARD HOOK WHERE THE LENGTH OF THE WALL WILL NOT PERMIT BARS TO EXTEND AS SHOWN ABOVE.
3. TYPICAL WALL OR SLAB REINFORCING NOT SHOWN FOR CLARITY. TERMINATE TYPICAL REINFORCING 2" CLEAR TO OPENING.

EXTRA REINFORCING AROUND OPENINGS (8)
NOT TO SCALE



90 DEG STD HOOK 180 DEG STD HOOK

BAR SIZE GRADE 60	HL	HW	TL	D**	Ldh*
#3	6"	3"	3"	2 1/4"	6"
#4	8"	4"	4 1/2"	3"	7"
#5	10"	5"	5"	3 3/4"	9"
#6	1'-0"	6"	6"	4 1/2"	10"
#7	1'-2"	7"	7"	5 1/4"	12"
#8	1'-4"	8"	8"	6"	14"
#9	1'-7"	11 3/4"	10 1/2"	9 1/2"	15"
#10	1'-10"	1'-1 1/4"	11 1/2"	10 3/4"	17"
#11	2'-0"	1'-2 3/4"	1'-1"	12"	19"

* COMPLYING WITH MINIMUM COVER REQUIREMENTS OF ACI 318, 12.5.3 OTHERWISE Ldh MUST BE RE-CALCULATED.

** ALL REINFORCING BENDS ON THE PROJECT EXCEPT STIRRUPS AND TIES SHALL USE THESE BEND DIAMETERS.

REINFORCING HOOK SCHEDULE (9)
NOT TO SCALE

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

STRUCTURAL DETAILS POND OUTLET

0 1" 2"

FILENAME ST113.DWG

SCALE NA

SHEET **ST113**

GENERAL STRUCTURAL NOTES:

G1. SCOPE

THE NOTES ON THIS SHEET AND THE STANDARD STRUCTURAL DETAILS ARE GENERAL AND APPLY TO THE ENTIRE PROJECT WHETHER SPECIFICALLY CALLED OUT OR NOT, EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY ON STRUCTURAL SHEETS. IF THERE ARE QUESTIONS, THEY SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER AND ANSWERED IN WRITING PRIOR TO CONSTRUCTION.

G2. APPLICABLE SPECIFICATIONS AND CODES

A. 2015 MINNESOTA STATE BUILDING CODE WITH APPLICABLE EDITIONS OF THE CODE REFERENCED STANDARDS.
B. ACI 318

G3. DESIGN CRITERIA

APPLIES TO ALL STRUCTURES (UNLESS NOTED OTHERWISE)

A.	DEAD LOAD:	
A.1.	ACTUAL TRIBUTARY STRUCTURE WEIGHT	
B.	LIVE LOAD:	
B.1.	WALKWAYS, STAIRS, GRATING:	60 PSF
C.	WIND:	
C.1.	BASIC WIND SPEED (ULTIMATE):	105 MPH
C.2.	EXPOSURE:	C
C.3.	RISK CATEGORY:	III

G4. THE FOLLOWING NON-CONTRACTUAL GEOTECHNICAL INVESTIGATION REPORT WAS DEVELOPED FOR THIS PROJECT AND IS THE BASIS OF THIS STRUCTURAL DESIGN:
GEOTECHNICAL FIRM NAME:
ADDRESS:

REPORT DATE:
REPORT NUMBER:

G5. SAFETY

SAFETY AND STRUCTURE STABILITY DURING CONSTRUCTION ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. STRUCTURES HAVE BEEN DESIGNED TO RESIST THE DESIGN LIVE LOADS ONLY AS A COMPLETED STRUCTURE.

G6. OPENINGS

OPENINGS FOR PIPES, DUCTS, CONDUITS, ETC. ARE NOT ALL SHOWN ON THE STRUCTURAL DRAWINGS. COORDINATE AND PROVIDE OPENINGS AS REQUIRED TO ACCOMMODATE ALL WORK SHOWN OR SPECIFIED IN THE CONTRACT DOCUMENTS AND OTHERWISE REQUIRED FOR THE FURNISHING OF A FUNCTIONALLY COMPLETE PROJECT. REINFORCE AROUND OPENINGS PER STANDARD STRUCTURAL DETAILS UNLESS OTHERWISE SHOWN.

G7. SPECIAL INSPECTIONS

SPECIAL INSPECTIONS ARE REQUIRED IN ACCORDANCE WITH CHAPTER 1 AND CHAPTER 17 OF THE IBC. PAYMENT FOR THESE INSPECTIONS IS NOT THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE FOR FULL ACCESS TO THE WORK BY THE SPECIAL INSPECTOR AND SHALL PROVIDE FOR THESE INSPECTIONS IN HIS CONSTRUCTION SCHEDULE IN ACCORDANCE WITH THE SPECIFICATIONS.

G8. ALL ELEVATIONS REFER TO NAVD88.

G9. STANDARD DETAILS

THE STANDARD DETAILS DEPICT TYPICAL DETAILING TO BE USED ON THIS PROJECT. IF CONDITIONS ARE NOT EXPLICITLY SHOWN ON THE DRAWINGS THEY SHALL BE MADE SIMILAR TO THE STANDARD DETAILS. OBTAIN APPROVAL OF ENGINEER IN WRITING FOR SIMILAR CONDITIONS PRIOR TO CONSTRUCTION.

GENERAL STRUCTURAL NOTES (CONTINUED)

G10. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS OF EXISTING CONSTRUCTION AS REQUIRED TO COORDINATE NEW CONSTRUCTION. SUBMIT REQUIRED CHANGES FOR APPROVAL.

G11. CONTRACTOR TO SUBMIT FOR REVIEW ALL EQUIPMENT SIZES, OPERATING WEIGHTS, VIBRATION FORCES, SUPPORT LOCATIONS, ALONG WITH ANY FLOOR OPENINGS, NOTCHES, AND RECESSES REQUIRED BY SUCH EQUIPMENT. CONCRETE SUPPORT PADS AND/OR FRAMING REQUIRED TO SUPPORT SAID EQUIPMENT SHALL NOT BE FABRICATED AND PLACED UNTIL THE CONCRETE SUPPORT PADS AND/OR FRAMING IS APPROVED TO SUPPORT THE EQUIPMENT.

G12. GRANULAR BEDDING UNDER OUTLET PIPE SHALL BE FIRMLY COMPACTED FINE FILTER AGGREGATE GRADED IN ACCORDANCE WITH MNDOT SPEC 3149.2J.

G13. COMPACT EMBANKMENT MATERIALS USING THE SPECIFIED DENSITY METHOD TO 100% STANDARD PROCTOR MAXIMUM DRY DENSITY (ASTM D698) AROUND STRUCTURE. COMMON BORROW - EMBANKMENT SHALL HAVE MOISTURE CONTENT BETWEEN 1% BELOW OPTIMUM AND 3% ABOVE OPTIMUM MOISTURE CONTENT. THE CONTRACTOR IS FULLY RESPONSIBLE FOR PROVIDING THE WORK AND MEETING MOISTURE CONTENT AND DENSITY REQUIREMENTS.

CONCRETE

C1. DESIGN STRENGTHS:

CONCRETE (28-DAY COMPRESSIVE STRENGTH)	
GENERAL USE STRUCTURAL CONCRETE:	f'c = 4,500 PSI
REINFORCING:	fy = 60,000 PSI
LOW STRENGTH CONCRETE FILL:	f'c = 3,000 PSI
MN/DOT MIX DESIGN:	3B44
AIR ENTRAINMENT:	6.5% +/- 1.5%
NOMINAL MAXIMUM AGGREGATE SIZE:	1 1/2"
SLUMP RANGE:	2" - 4"

C2. CONCRETE COVER

UNLESS OTHERWISE NOTED, PROVIDE CONCRETE COVER FOR REINFORCING AS FOLLOWS:

CONCRETE DEPOSITED AGAINST EARTH:	3"
ALL OTHER:	2"
SEE DRAWINGS FOR EXCEPTIONS	

C3. SEE SPECIFICATIONS FOR REINFORCING PLACEMENT REQUIREMENTS.

C4. REFER TO OTHER DISCIPLINE DRAWINGS PRIOR TO CONSTRUCTION FOR EMBEDDED ITEMS AND PENETRATIONS NOT SHOWN ON STRUCTURAL DRAWINGS. AS REQUIRED TO ACCOMMODATE ALL WORK SHOWN OR SPECIFIED IN THE CONTRACT DOCUMENTS AND OTHERWISE REQUIRED FOR THE FURNISHING OF A FUNCTIONALLY COMPLETE PROJECT. REINFORCE AROUND OPENINGS PER STANDARD STRUCTURAL DETAILS UNLESS OTHERWISE SHOWN.

C5. PROVIDE 3/4" CHAMFERS AT ALL EXPOSED EDGES UNLESS NOTED OTHERWISE. NOT ALL CHAMFERS ARE SHOWN ON DRAWINGS.

C6. FIELD ADJUST REINFORCING AT OPENINGS AND EMBEDDED ITEMS AS INDICATED.

C7. ANCHOR BOLTS NOT SPECIFIED ON THE DRAWINGS SHALL BE DESIGNED AND CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER, RETAINED BY THE CONTRACTOR, IN ACCORDANCE WITH APPLICABLE PROJECT AND CODE REQUIREMENTS. SUBMIT AS A SHOP DRAWING FOR REVIEW AND APPROVAL BY THE CONTRACTING OFFICER. COORDINATE LOCATION, SIZE AND EMBEDMENT PRIOR TO CASTING CONCRETE.

C8. ABSOLUTELY NO WELDING OF REINFORCING BARS OR TORCHING TO BEND REINFORCING BARS SHALL BE ALLOWED WITHOUT SPECIFIC APPROVAL FROM THE STRUCTURAL ENGINEER.

C9. ALL POST-INSTALLED ADHESIVE ANCHORS INDICATED IN THE STRUCTURAL DOCUMENTS SHALL COMPLY WITH APPENDIX D OF ACI 318 AND CHAPTER 19 OF THE IBC. ALL ADHESIVE ANCHORS SHALL HAVE THE ICC REPORT SHOWING EQUIVALENT LOAD CAPACITY. SUBMIT AND INSTALL PER THE ICC EVALUATION REPORT.

STEEL

S1. DESIGN STRENGTHS:

STAINLESS STEEL:	Fy=33 KSI
WIDE FLANGE AND TEES:	Fy=50 KSI
PIPES:	Fy=35 KSI
HSS:	Fy=46 KSI
ALL OTHER PLATES AND SHAPES:	Fy=36 KSI

S2. DIMENSIONS:
TO CENTERLINES OF COLUMNS AND BEAMS, TOP SURFACES OF BEAMS AND TUBES AND BACKS OF CHANNELS AND ANGLES UNO.

S3. ELEVATIONS:
TOP OF STEEL REFERS TO TOP SURFACE OF MEMBER OR FLANGE UNO.

S4. WHEN FILLET WELD SIZE IS NOT INDICATED, PROVIDE MAXIMUM WELD SIZE BASED ON MATERIAL THICKNESS IN ACCORDANCE WITH AISC SPECIFICATIONS.

S5. ALL BOLTED STRUCTURAL CONNECTIONS ARE BEARING TYPE CONNECTIONS UNLESS OTHERWISE SPECIFIED TO BE SLIP-CRITICAL. PROVIDE LOAD INDICATING WASHERS AT SLIP-CRITICAL CONNECTIONS.

S6. CONFORM TO AISC 360, STEEL CONSTRUCTION MANUAL.

GRATING

G1. FABRICATE GRATING IN ACCORDANCE WITH NAAMM MBG 531.

G2. BEARING BARS:
A. RECTANGULAR 1-1/4 X 3/16 IN UNLESS SHOWN OTHERWISE ON DRAWINGS.
B. MAXIMUM 1-3/16 IN OC SPACING.

G3. CROSS BARS:
A. WELDED, SWAGED OR PRESSURE LOCKED TO BEARING BARS.
B. MAXIMUM 4 IN OC SPACING.

G4. TOP EDGES OF BARS: SERRATED OR GROOVED.

G5. HINGED GRATING SECTIONS: NOT WIDER THAN 2 FT AND NOT MORE THAN 35 LBS EACH.

G6. FINISH:
A. HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM A123.
B. CLIPS AND BOLTS: STAINLESS STEEL OR GALVANIZED.
C. SEAT ANGLES: GALVANIZED STEEL.

G7. ENDS AND PERIMETER EDGES: BANDED.

G8. PROVIDE JOINTS AT OPENINGS BETWEEN INDIVIDUAL GRATING SECTIONS.

G9. FABRICATE GRATING SO THAT BEARING BARS AND CROSS BARS IN ADJACENT SECTIONS ARE ALIGNED.

G10. ANCHOR GRATING WITH SADDLE CLIPS AND 1/4" SELF-TAPPING BOLTS
A. MAXIMUM SPACING OF 2'-0" WITH MINIMUM OF (2) PER SIDE.

GUARD RAILING

GR1. CUSTOM FABRICATE PIPE RAILINGS TO DIMENSIONS AND PROFILES SHOWN ON DRAWINGS.

GR2. GUARD RAILS:
A. TOP RAILS AND INTERMEDIATE RAILS: SCHEDULE 40, 2" IN NOMINAL DIAMETER PIPE.
B. VERTICAL POSTS: SCHEDULE 80, 2" IN NOMINAL DIAMETER PIPE.

GR3. SPACE VERTICAL POSTS AS REQUIRED BY LOADING REQUIREMENTS BUT NOT MORE THAN 4 FT OC. AVOID LOCATING VERTICAL POSTS AT CHANGES IN DIRECTION OF RAILING.
A. HOLD VERTICAL POST BACK FROM CORNER AND PROVIDE RADIUSED CORNERS.

GR4. BASE PLATE FOR VERTICAL GUARDRAIL POSTS MOUNTED TO TOP OF CONCRETE SURFACE:
A. 3/8 X 6 X 6 IN SQUARE PLATE WELDED TO THE VERTICAL POST.
B. PREDRILLED TO ACCEPT FOUR (4) ANCHORS.

GR5. PROVIDE 1/4 X 4 IN HIGH TOE BOARDS AT ELEVATED WALKWAYS.
A. CLEARANCE BETWEEN BOTTOM OF TOE BOARD AND WALKING SURFACE SHALL NOT EXCEED 1/4 IN.

GR6. WELDED RAILING FABRICATION:
A. ALL WELDING TO BE CONTINUOUS IN ACCORDANCE WITH AWS D1.1.
1. ALL WELDED RAILING JOINTS SHALL HAVE FULL PENETRATION WELDS.
B. ALL EXPOSED WELDS TO BE GROUND AND BUFFED SMOOTH AND FLUSH TO MATCH AND BLEND WITH ADJOINING SURFACES.

GR7. FIT EXPOSED ENDS OF GUARDRAILS AND HANDRAILS WITH SOLID TERMINATIONS.

GR8. INSTALL WEEPS TO DRAIN MOISTURE FROM HOLLOW SECTIONS OF RAILING.
A. DRILL 1/4 IN WEEP HOLE IN RAILINGS CLOSED AT BOTTOM:
1. 1 IN ABOVE WALKWAY SURFACE AT BOTTOM OF POSTS.
2. DRILL HOLE PRIOR TO GALVANIZING.
3. DO NOT DRILL WEEP HOLES IN BOTTOM OF BASE PLATE.

GR9. FINISH: GALVANIZED AFTER FABRICATION.

GR10. GUARD RAILING BASE PLATES SHALL BE ANCHORED WITH 1/2 IN DIAMETER HILTI HIT-HY 200 + HIT-Z-R ADHESIVE ANCHORS WITH 4 IN EMBEDMENT.

MINNEHAHA CREEK WATERSHED DISTRICT

HDR

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER ANDREW F. JUDD
PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

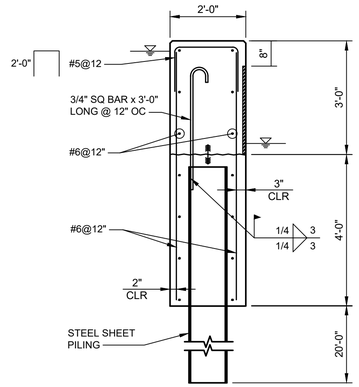
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

STRUCTURAL GENERAL NOTES

0 1" 2"

FILENAME ST114.DWG
SCALE NA

SHEET
ST114



WEIR WALL DETAIL
1" = 1'-0"

MINNEHAHA CREEK
WATERSHED DISTRICT

ISSUE	DATE	DESCRIPTION
-	-	-

PROJECT MANAGER	ANDREW F. JUDD
PROJECT NUMBER	10268112

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SUBMITTAL FOR
CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

STRUCTURAL DETAILS
WEIR WALL

0 1" 2"

FILENAME	ST120.DWG
SCALE	NA

SHEET
ST120

SITE AND LANDSCAPE NOTES

SITE PREPARATION NOTES

1. CONTRACTOR SHALL INSPECT THE SITE AND BECOME FAMILIAR WITH EXISTING CONDITIONS RELATING TO THE NATURE AND SCOPE OF WORK.
2. CONTRACTOR SHALL VERIFY PLAN LAYOUT AND BRING TO THE ATTENTION OF THE LANDSCAPE ARCHITECT DISCREPANCIES WHICH MAY COMPROMISE THE DESIGN OR INTENT OF THE LAYOUT.
3. CONTRACTOR SHALL ASSURE COMPLIANCE WITH APPLICABLE CODES AND REGULATIONS GOVERNING THE WORK AND MATERIALS SUPPLIED.
4. CONTRACTOR SHALL PROTECT EXISTING ROADS, CURBS/GUTTERS, TRAILS, TREES, LAWNS AND SITE ELEMENTS DURING CONSTRUCTION OPERATIONS. DAMAGE TO SAME SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER.
5. CONTRACTOR SHALL VERIFY ALIGNMENT AND LOCATION OF UNDERGROUND AND ABOVE GRADE UTILITIES AND PROVIDE THE NECESSARY PROTECTION FOR SAME BEFORE CONSTRUCTION BEGINS (MINIMUM 10' CLEARANCE).
6. CONTRACTOR SHALL COORDINATE THE PHASES OF CONSTRUCTION AND PLANTING INSTALLATION WITH OTHER CONTRACTORS WORKING ON SITE.
7. UNDERGROUND UTILITIES SHALL BE INSTALLED SO THAT TRENCHES DO NOT CUT THROUGH ROOT SYSTEMS OF EXISTING TREES TO REMAIN.
8. EXISTING CONTOURS, TRAILS, VEGETATION, CURB/GUTTER AND OTHER ELEMENTS ARE BASED UPON INFORMATION SUPPLIED TO THE LANDSCAPE ARCHITECT BY OTHERS. CONTRACTOR SHALL VERIFY DISCREPANCIES PRIOR TO CONSTRUCTION AND NOTIFY LANDSCAPE ARCHITECT OF SAME.
9. HORIZONTAL AND VERTICAL ALIGNMENT OF PROPOSED WALKS, TRAILS OR ROADWAYS ARE SUBJECT TO FIELD ADJUSTMENT REQUIRED TO CONFORM TO LOCALIZED TOPOGRAPHIC CONDITIONS AND TO MINIMIZE TREE REMOVAL AND GRADING. CHANGES IN ALIGNMENT AND GRADES MUST BE APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO IMPLEMENTATION.
10. CONTRACTOR SHALL REVIEW THE SITE FOR DEFICIENCIES IN SITE CONDITIONS WHICH MIGHT NEGATIVELY AFFECT PLANT ESTABLISHMENT, SURVIVAL OR WARRANTY. UNDESIRABLE SITE CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT OF WORK.
11. CONTRACTOR IS RESPONSIBLE FOR ONGOING MAINTENANCE OF NEWLY INSTALLED MATERIALS UNTIL TIME OF SUBSTANTIAL COMPLETION. REPAIR OF ACTS OF VANDALISM OR DAMAGE WHICH MAY OCCUR PRIOR TO SUBSTANTIAL COMPLETION SHALL BE THE RESPONSIBILITY OF THE LANDSCAPE CONTRACTOR.
12. EXISTING TREES OR SIGNIFICANT SHRUB MASSINGS FOUND ON SITE SHALL BE PROTECTED AND SAVED UNLESS NOTED TO BE REMOVED OR ARE LOCATED IN AN AREA TO BE GRADED. QUESTIONS REGARDING EXISTING PLANT MATERIAL SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT PRIOR TO REMOVAL.
13. EXISTING TREES TO REMAIN, UPON DIRECTION OF LANDSCAPE ARCHITECT, SHALL BE FERTILIZED AND PRUNED TO REMOVE DEAD WOOD, DAMAGED AND RUBBING BRANCHES.
14. CONTRACTOR SHALL PREPARE AND SUBMIT A WRITTEN REQUEST FOR THE SUBSTANTIAL COMPLETION INSPECTION OF LANDSCAPE AND SITE IMPROVEMENTS PRIOR TO SUBMITTING FINAL PAY REQUEST.
15. CONTRACTOR SHALL PREPARE AND SUBMIT REPRODUCIBLE AS-BUILT DRAWING(S) OF LANDSCAPE INSTALLATION, IRRIGATION AND SITE IMPROVEMENTS UPON COMPLETION OF CONSTRUCTION INSTALLATION AND PRIOR TO SUBSTANTIAL COMPLETION.
16. SYMBOLS ON PLAN DRAWING TAKE PRECEDENCE OVER SCHEDULES IF DISCREPANCIES IN QUANTITIES EXIST. SPECIFICATIONS AND DETAILS TAKE PRECEDENCE OVER NOTES.

SOIL TESTING

1. CONTRACTOR SHALL OBTAIN A SOIL SAMPLE(S) FROM PROJECT SITE AND/OR SALVAGED TOPSOIL STOCKPILE AND SUBMIT TO INDEPENDENT TESTING AGENCY. ANALYSIS AND RECOMMENDATIONS FOR (INCLUDING BUT NOT LIMITED TO) MACRONUTRIENTS, MICRONUTRIENTS, COMPOSITION AND SOLUBLE SALTS SHALL BE PROVIDED.
2. CONTRACTOR SHALL PROVIDE TWO SERIES OF TESTS: FIRST, PRIOR TO CONSTRUCTION; SECOND, AFTER SOIL IS AMENDED, PRIOR TO PLANTING.
3. CONTRACTOR SHALL PROVIDE ANALYSIS RESULTS AND RECOMMENDATIONS TO THE LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO SOIL AMENDMENT AND PRIOR TO PLANTING.

GRADING

1. ROUGH GRADING AND FINISHED GRADING TO BE DONE BY OTHERS EXCEPT WHERE NOTED.
2. GRADING LIMITS ARE DEFINED AS THE JUNCTURE OF PROPOSED GRADE WITH EXISTING GRADE UNLESS NOTED OTHERWISE.
3. GRADING LIMITS AND LIMITS OF WORK SHOWN ON PLAN ARE ONLY APPROXIMATE AND MAY BE ADJUSTED IN FIELD BY LANDSCAPE ARCHITECT. WORK OUTSIDE OF THESE LIMITS WILL BE DONE AT LANDSCAPE CONTRACTORS EXPENSE UNLESS DIRECTED BY LANDSCAPE ARCHITECT OR OWNER IN WRITING.
4. FILL/CUT AS NECESSARY TO PROVIDE A 1% MINIMUM GRADE AWAY FROM BUILDINGS WITHIN LIMITS OF CONSTRUCTION.
5. SALVAGE TOPSOIL FROM THE EARTHWORK AREAS AS APPROPRIATE OR AS INDICATED ON PLANS AND STOCKPILE FOR REUSE.
6. MAINTAIN A UNIFORM GRADE BETWEEN CONTOURS IN AREAS TO BE GRADED UNLESS NOTED OTHERWISE.
7. ELEVATIONS, IF SHOWN ARE FINISHED ELEVATIONS. SPOT ELEVATIONS TAKE PRECEDENCE OVER CONTOURS.
8. ADD EROSION CONTROL MEASURES IF GRADES GREATER THAN 3:1 OR IF CONDITIONS WARRANT. REFER TO MNDOT SPECIFICATIONS FOR EROSION CONTROL.
9. CONTRACTOR SHALL CONTACT PUBLIC UTILITIES FOR LOCATION OF UNDERGROUND WIRES, CABLES, CONDUITS, PIPES, MANHOLES, VALVES OR OTHER BURIED STRUCTURES BEFORE DIGGING. LANDSCAPE CONTRACTOR SHALL REPAIR OR REPLACE THE ABOVE IF DAMAGED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.
10. CONTRACTOR SHALL PROVIDE PROPER EROSION CONTROL MEASURES AS REQUIRED TO ENSURE THAT EROSION IS KEPT TO AN ABSOLUTE MINIMUM.
11. PROVIDE TEMPORARY COVERING FOR CATCH BASINS AND MAN HOLES UNTIL FINISHED GRADING IS COMPLETE.
12. CONTRACTOR SHALL CONSTRUCT DRAINAGE BASINS AS NEEDED.
13. PERIMETER SILT FENCE AND ROCK CONSTRUCTION ENTRANCES SHALL BE INSTALLED PRIOR TO CONSTRUCTION. REFER TO STATE SPECIFICATIONS FOR AGGREGATE BASE AND SILT FENCE.
14. CONTRACTOR SHALL INSTALL CATCH BASIN EROSION CONTROL MEASURES PER LOCAL POLLUTION CONTROL AGENCY AND SPECIFICATIONS.
15. WITHIN TWO WEEKS OF FINISHED SITE GRADING, DISTURBED AREAS SHALL BE STABILIZED WITH SEED, SOD, MULCH OR ROCK BASE.
16. CONTRACTOR SHALL MAINTAIN EROSION CONTROL MEASURES, INCLUDING THE REMOVAL OF ACCUMULATED SILT IN FRONT OF SILT FENCES AND EXCESS SEDIMENT IN PROPOSED CATCH BASINS, FOR THE DURATION OF CONSTRUCTION.
17. CONTRACTOR SHALL REMOVE EROSION CONTROL MEASURES AFTER VEGETATION IS ESTABLISHED AND DISPOSE OF OFF SITE.
18. CONTRACTOR SHALL ENSURE THAT SOIL CONDITIONS AND COMPACTION ARE ADEQUATE TO ALLOW FOR PROPER DRAINAGE AROUND THE CONSTRUCTION SITE. UNDESIRABLE CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT PRIOR TO BEGINNING OF WORK. IT SHALL BE THE LANDSCAPE CONTRACTOR'S RESPONSIBILITY TO ENSURE PROPER SURFACE AND SUBSURFACE DRAINAGE IN PLANTING AREAS.

PLANTING

1. SPRING PLANT MATERIAL INSTALLATION IS FROM APRIL 15 TO JUNE 15.
2. FALL CONIFEROUS PLANTING IS ACCEPTABLE FROM AUGUST 21 TO SEPTEMBER 30.
3. FALL DECIDUOUS PLANTING IS ACCEPTABLE FROM AUGUST 15 UNTIL NOVEMBER 15.
4. ADJUSTMENTS TO PLANTING DATES MUST BE APPROVED IN WRITING BY THE LANDSCAPE ARCHITECT.
5. STAKE PROPOSED PLANTING LOCATIONS PER PLAN FOR REVIEW AND APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO INSTALL.
6. PLANT MATERIAL SHALL COMPLY WITH THE CURRENT EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK, ANSI Z60.1. UNLESS NOTED OTHERWISE, DECIDUOUS SHRUBS SHALL HAVE AT LEAST 5 CANES AT THE SPECIFIED HEIGHT. ORNAMENTAL TREES SHALL HAVE NO 'V' CROTCHES AND SHALL BEGIN BRANCHING NO LOWER THAN 3' FEET ABOVE THE ROOT BALL. STREET AND BOULEVARD TREES SHALL BEGIN BRANCHING NO LOWER THAN 6' ABOVE PAVED SURFACE.
7. INSTALL PLANT MATERIAL AFTER FINAL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA.
8. INSTALL PLANT MATERIALS PER PLANTING DETAILS.
9. SUBSTITUTION REQUESTS FOR PLANT MATERIAL TYPE & SIZE SHALL BE SUBMITTED TO THE LANDSCAPE ARCHITECT FOR CONSIDERATION PRIOR TO BIDDING. SUBSTITUTIONS AFTER BIDDING MUST BE APPROVED BY LANDSCAPE ARCHITECT AND ARE SUBJECT TO CONTRACT ADJUSTMENTS.
10. ADJUSTMENTS IN LOCATION OF PROPOSED PLANT MATERIALS MAY BE NEEDED IN FIELD. LANDSCAPE ARCHITECT MUST BE NOTIFIED PRIOR TO ADJUSTMENT OF PLANTS.
11. FERTILIZE PLANT MATERIALS IN ACCORDANCE WITH SOIL TEST RECOMMENDATIONS. [FERTILIZE PLANT MATERIAL UPON INSTALLATION WITH DRIED BONE MEAL AND OTHER APPROVED FERTILIZER MIXED IN WITH THE PLANTING SOIL (PER THE MANUFACTURER'S INSTRUCTIONS) OR TREAT FOR SUMMER AND FALL INSTALLATION WITH AN APPLICATION OF GRANULAR 10-0-5 OF 12 OZ. PER 2.5" CALIPER TREE AND 6 OZ. PER SHRUB WITH AN ADDITIONAL APPLICATION OF 10-0-10 THE FOLLOWING SPRING IN THE TREE SAUCER.]
12. INSTALL 18" DEPTH OF PLANTING SOIL IN AREAS RECEIVING GROUND COVER, PERENNIALS, AND ANNUALS. PLANTING SOIL SHALL CONSIST OF MnDOT 3877-B MODIFIED TO CONTAIN A MAXIMUM OF 30% SAND, A PH OF 7.1 MAX, OR AS OTHERWISE SPECIFIED IN THE PROJECT SPECIFICATIONS MANUAL.
13. [TREE WRAPPING MATERIAL SHALL BE PAPER APPLIED FROM TRUNK FLARE TO FIRST BRANCH. WRAP SMOOTH-BARKED DECIDUOUS TREES PLANTED IN THE FALL PRIOR TO DECEMBER 1 AND REMOVE WRAPPING AFTER MAY 1.] [DO NOT WRAP TREES.]
14. APPLY PRE-EMERGENT HERBICIDE (PREEN OR APPROVED EQUAL) IN ANNUAL, PERENNIAL, AND SHRUB BEDS FOLLOWED BY SHREDDED HARDWOOD MULCH. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION REGARDING USE OF HERBICIDES.

MULCHING

1. INSTALL [4" DEEP FINELY SHREDDED HARDWOOD MULCH] RINGS AT CONIFEROUS & DECIDUOUS TREES WITH NO MULCH IN DIRECT CONTACT WITH TREE TRUNK.
2. INSTALL [3" DEEP FINELY SHREDDED HARDWOOD MULCH] RINGS AT SHRUB PLANTING AREAS WITH NO MULCH IN DIRECT CONTACT WITH SHRUB STEMS.
3. INSTALL [3" DEEP FINELY SHREDDED MULCH] IN PERENNIAL PLANTING BEDS. REMOVE ALL MULCH FROM STEMS OF PERENNIALS; PLANT STEMS SHOULD NOT BE IN DIRECT CONTACT WITH MULCH.

WATERING

1. PLANTED MATERIALS SHALL BE WATERED BY TEMPORARY MEANS UNTIL PLANTS ARE ESTABLISHED.
2. TEMPORARY WATERING MEANS, METHODS, AND SCHEDULING SHALL BE THE CONTRACTOR'S RESPONSIBILITY. REMOVE TEMPORARY WATERING EQUIPMENT UPON PLANT ESTABLISHMENT.

WARRANTY

1. WARRANTY NEW PLANT MATERIAL THROUGH ONE CALENDAR YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION. NO PARTIAL ACCEPTANCE WILL BE CONSIDERED.

IRRIGATION NOTES

1. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AN IRRIGATION LAYOUT PLAN AND SPECIFICATION THAT MEETS THE REQUIREMENTS OF THE PROVIDED PERFORMANCE SPECIFICATION AS PART OF THE SCOPE OF WORK. SUBMIT LAYOUT PLAN AND SPECIFICATIONS FOR APPROVAL BY THE LANDSCAPE ARCHITECT PRIOR TO ORDER AND/OR CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT SODDED/SEEDED AND PLANTED AREAS ARE IRRIGATED PROPERLY, INCLUDING THOSE AREAS DIRECTLY AROUND AND ABUTTING BUILDING FOUNDATION.
2. CONTRACTOR SHALL FIELD VERIFY WATER SUPPLY, VOLUME, PRESSURE AND LOCATION FOR SYSTEM TAP PRIOR TO SYSTEM DESIGN.
3. [CONTRACTOR SHALL FIELD VERIFY AND INSPECT EXISTING IRRIGATION SYSTEM LAYOUT, EQUIPMENT, CONDITION AND OPERABILITY PRIOR TO SYSTEM DESIGN.]
4. CONTRACTOR SHALL CONFIRM COMPLETE LIMITS OF IRRIGATION WITH LANDSCAPE ARCHITECT PRIOR TO SUPPLYING SHOP DRAWINGS.
5. CONTRACTOR SHALL CONTACT LANDSCAPE ARCHITECT FOR INSPECTION AND APPROVAL OF AREAS RECEIVING DRIP IRRIGATION PRIOR TO INSTALLATION OF MULCH.
6. CONTRACTOR SHALL PROVIDE THE OWNER AND LANDSCAPE ARCHITECT WITH AS-BUILT DRAWINGS, DETAILED SYSTEM OPERATION INSTRUCTIONS AND AN IRRIGATION SCHEDULE APPROPRIATE TO THE PROJECT SITE CONDITIONS AND PLANTED MATERIAL GROWTH REQUIREMENTS.

MINNEHAHA CREEK WATERSHED DISTRICT

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60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

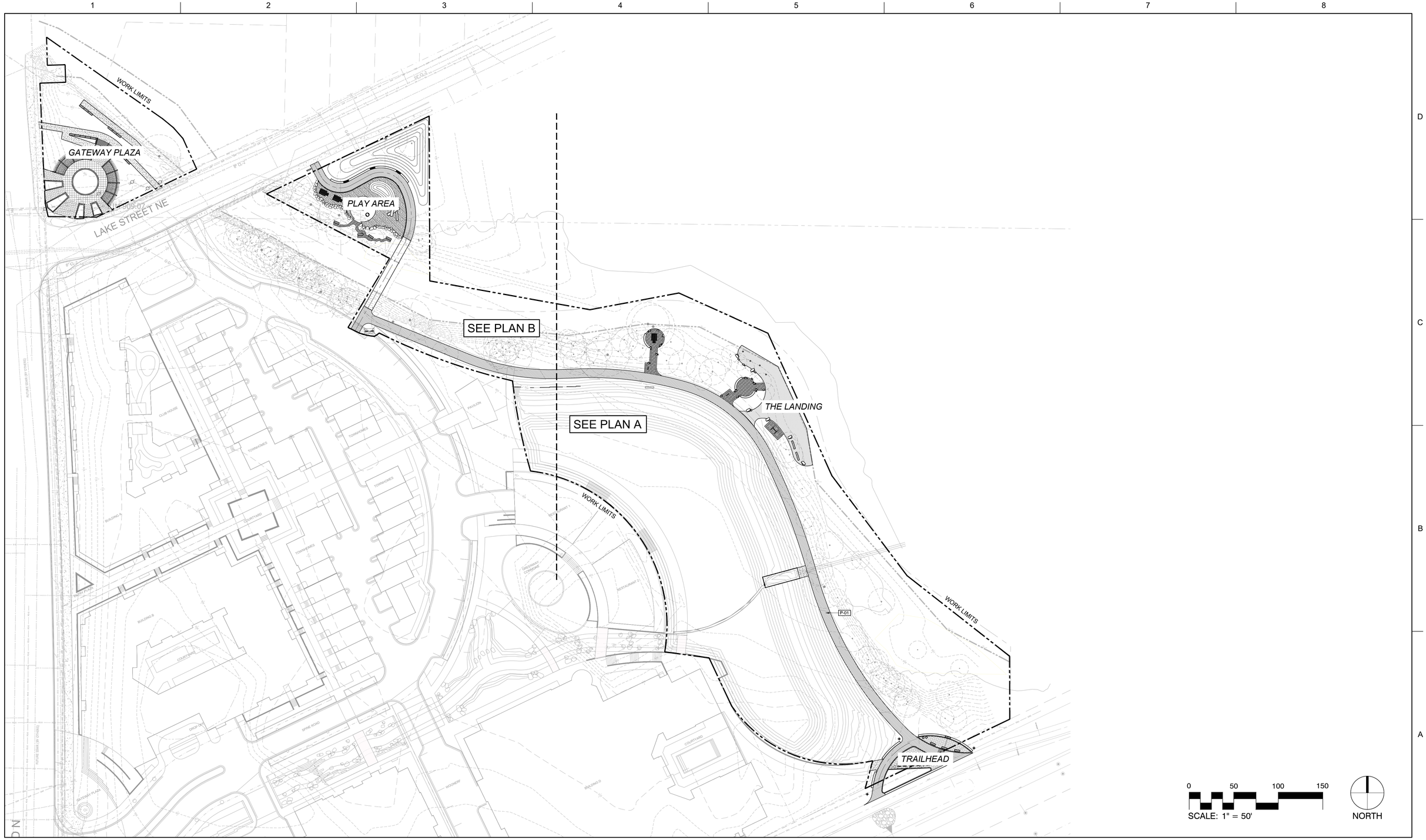
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

LANDSCAPE GENERAL NOTES

0 1" 2"

FILENAME
SCALE

SHEET
L001



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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

SITE ORIENTATION PLAN

0 1" 2"

FILENAME
SCALE

SHEET
L002

MATERIALS SCHEDULE

	AMENITY					
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	MANUFACTURER	COLOR/FINISH
AM-01	AMENITY TYPE 01 - TRAIL KIOSK	2	1/L580	THREE RIVERS PARK DISTRICT TRAIL KIOSK		
AM-02	AMENITY TYPE 02 - SYSTEM KIOSK	1	1/L581	THREE RIVERS PARK DISTRICT SYSTEM KIOSKI		
AM-03A	AMENITY TYPE 03A - INTERPRETIVE FEATURE	1		TBD		
AM-03B	AMENITY TYPE 03B - INTERPRETIVE FEATURE	2		TBD		
AM-05	AMENITY TYPE 05 - PERGOLA	2		HSS FRAME WITH WOOD PERLINS OVER CONCRETE FOOTINGS	CUSTOM	
AM-06	AMENITY TYPE 06 - CANOE RACK	1	1/L584	GALVANIZED STEEL STRUCTURE OVER CONCRETE FOOTINGS	CUSTOM	
AM-08	AMENITY TYPE 08 - DRINKING FOUNTAIN	1	2/L583			
AM-09	AMENITY TYPE 09 - BIKE FIX-IT STATION	1	3/L583	FIX IT STATION WITH AIR KIT 2, SURFACE MOUNT TO CONC. BELOW	DERO	TBD

	CURB				
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	
CB-01	CURB TYPE 01 - CIP CONCRETE PLANTER CURB	229 LF	1/L520	8" W X 6" H REINFORCED CONCRETE CURB, OVER COMPACTED AGGREGATE, COMPACTED SUBGRADE	
CB-02	CURB TYPE 02 - CIP CONCRETE RIBBON CURB	296 LF	2/L520	8" WIDTH AT GRADE REINFORCED CONCRETE CURB OVER COMPACTED AGGREGATE BASE	
CB-03	CURB TYPE 03 - CIP CONCRETE PLAY AREA CURB	163 LF	3/L520	6" WIDTH AT GRADE REINFORCED CONCRETE CURB OVER COMPACTED AGGREGATE BASE	

	EDGING				
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	COLOR/FINISH
ED-01	EDGING TYPE 01 - STONE EDGING	261 LF	1/L530	LIMESTONE EDGING, 4" WIDTH X 8" LENGTHS, OVER COMPACTED AGGRETATE BASE	TBD
ED-02	EDGING TYPE 02 - PAVER RESTRAINT	25 LF	3/L530	1/8" X 3" X 3" ANGLE IRON EDGE RESTRAINT W/ 12" STAKE	

	FENCE & GUARDRAIL					
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	MANUFACTURER	COLOR/FINISH
FE-01	GUARDRAIL TYPE 01 - OUTLET STRUCTURE GUARDRAIL	104 LF	1/L551	42" HEIGHT GALVANIZED STEEL	CUSTOM	HOT-DIPPED GALVANIZED

	HANDRAIL				
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	MANUFACTURER
HR-01	HANDRAIL TYPE 01 - STAIR HANDRAIL	31 LF	1/L550	1 1/2" DIA. GALV STEEL RAIL	CUSTOM

	LIGHTING					
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	MANUFACTURER	COMMENTS
LT-01	LIGHT TYPE 01 - PEDESTRIAN SCALE POLE LIGHT	3	3/L572	PEDESTRIAN SCALE POLE LIGHT	TBD	SEE ELECTRICAL PLANS

	PAVING							
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	MANUFACTURER	PRODUCT/MODEL	COLOR/FINISH	COMMENTS
P-01	PAVING TYPE 01 - BITUMINOUS PAVING	12,162 SF		SEE CIVIL				
P-02	PAVING TYPE 02 - PERMEABLE CONCRETE UNIT PAVERS	5,878 SF	1/L510	3" THK, 6" X 12" OVER COMPACTED AGGREGATE BASE, COMPACTED SUBGRADE	WAUSAU TILE / TECTURA DESIGNS	ECOPREMIER	HEP-60	
P-03	PAVING TYPE 03 - CONCRETE PAVING	2,604 SF	2/L510	SEE CIVIL			GRAY, MEDIUM BROOM FINISH	REFER TO LA DETAIL FOR TYP JOINTING, SEE CIVIL FOR DEPTH / BASE MATERIALS
P-04	PAVING TYPE 04 - CRUSHED STONE SURFACING	18.56 CY	3/L510	3/8" AGGREGATE, 4" DEPTH				
P-05	PAVING TYPE 05 - BEACH SURFACING	3,945 SF		4" DEPTH SAND SALVAGED FROM CONSTRUCTION				
P-07	PAVING TYPE 07 - DECORATIVE CONCRETE PAVING	1,256 SF		4" REINFORCED CONCRETE PAVING			SANDBLAST WITH PATTERN, PATTERN TBD	

	PLAY EQUIPMENT				
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	MANUFACTURER
PE-01	PLAY EQUIPMENT TYPE 01 - WOOD FIBER SURFACING (EWF)	2,484 SF		ENGINEERED WOOD FIBER, DEPTH PER ASTM STND. WITH SUBSURFACE DRAINGE SYSTEM	
PE-03	PLAY EQUIPMENT TYPE 03 - LOG STACK	1		LOG STACK ANCHORED IN PLACE OVER CONCRETE FOOTINGS	TBD
PE-06	PLAY EQUIPMENT TYPE 05 - PRECAST CONCRETE ACORNS	3		PRECAST CONCRETE ACORNS OVER AGGREGATE BASE	CUSTOM

	ROCK			
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY
RO-01	ROCK TYPE 01 - LANDSCAPE BOULDER	38	4/L510	DOLOMITIC LIMESTONE OUTCROPPING, 12"-48" SIZES

	SITE FURNITURE							
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	MANUFACTURER	PRODUCT/MODEL	COLOR/FINISH	COMMENTS
SF-01	SITE FURNITURE TYPE 01 - LINEAR BENCH	21	1/L570	2' X 6' LINEAR BENCH	ANOVA	INF24L6T	THERMORY SLAT	SURFACE MOUNT
SF-02	SITE FURNITURE TYPE 02 - HAMMOCK POLE	4	2/L570	10" DIA. 5'-6' HEIGHT WOODEN POST, EMBEDDED IN WASHED AGGREGATE	SALVAGE FROM SITE			
SF-03	SITE FURNITURE TYPE 03 - BIKE RACK	3	3/L570	BIKE RACK EMBEDDED IN CIP CONCRETE FOOTING	DERO	ROLLING RACK	GALVANIZED STEEL	
SF-04	SITE FURNITURE TYPE 04 - LOG BENCH	2	4/L570	6' LONG WOODEN BENCH WITH FLAT TOP OVER COMPACTED AGGREGATE BASE	SALVAGE FROM SITE			
SF-05	SITE FURNITURE TYPE 05 - PICNIC TABLE	3	1/L571	ACCESSIBLE PICNIC TABLE WITH SEATS	COLUMBIA CASCADE COMPANY	2165-6	GALVANIZED STEEL FRAME	
SF-06	SITE FURNITURE TYPE 07 - WASTE RECEPTACLE	2	1/L572	TBD				

	STAIRS			
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY
ST-01	STAIR TYPE 01 - RADIAL STAIR @ GATEWAY	6 LF	1/L540	CIP CONCRETE STAIR

	WALL					
CODE	DESCRIPTION	QTY	DETAIL	MATERIAL PROFILE/ASSEMBLY	PRODUCT/MODEL	COLOR/FINISH
WL-01	WALL TYPE 01 - LIMESTONE SEATWALL @ TRAILHEAD	111 LF	1/L560	2' WIDTH X 1.5' HEIGHT X 4' LENGTHS, RADIAL LAYOUT PER PLAN	DOLOMITIC LIMESTONE	CUT TOP AND BUTT ENDS, SPLIT FACES
WL-02	WALL TYPE 02 - LIMESTONE SEATWALL @ PLAY AREA	117 LF	2/L560	1.5' HEIGHT X RANDOM WIDTHS & LENGTHS LIMESTONE OUTCROPPINGS OVER AGGREGATE BASE	DOLOMITIC LIMESTONE	NATURAL TOP AND FACES
WL-03	WALL TYPE 03 - LIMESTONE SEATWALL @ PICNIC AREA	52 LF	1/L561	1.5' HEIGHT X RANDOM WIDTHS & LENGTHS LIMESTONE OUTCROPPINGS OVER AGGREGATE BASE	DOLOMITIC LIMESTONE	SAWN TOP & ENDS, AND FRONT FACES
WL-04	WALL TYPE 04 - CIP CONCRETE WALL	107 LF	2/L562	8" WIDTH CIP CONCRETE WALL		
WL-05	WALL TYPE 05 - CIP CONCRETE SEATWALL @ PLAY AREA	98 LF	2/L561	2' WIDTH, 1.5' HEIGHT CIP CONC WALL W INTEGRAL WOOD SEATING		
WL-06	WALL TYPE 06 - CIP CONCRETE PITCHED SEATWALL @ GATEWAY	218 LF	1/L562	VARIED WIDTH AND HEIGHT CIP CONC WALL W INTEGRAL WOOD SEATING		
WL-07	WALL TYPE 07 - CIP CONCRETE CHEEK WALL	14 LF	2/L540	1' HEIGHT CIP WALL W/ REINFORCEMENT OVER COMPACTED AGGREGATE BASE		STANDARD GRAY CONC/ SMOOTH FINISH

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

SITE MATERIALS SCHEDULE

0 1" 2"

FILENAME

SCALE

SHEET
L010

CONCEPT PLANT SCHEDULE

	CONIFEROUS TREE PICEA GLAUCA `DENSATA` / BLACK HILLS SPRUCE	6
	DECIDUOUS CANOPY TREE BETULA PAPYRIFERA `VAREN` TM / PRAIRIE DREAM BIRCH CARPINUS CAROLINIANA / AMERICAN HORNBEAM CELTIS OCCIDENTALIS / COMMON HACKBERRY OSTRYA VIRGINIANA / AMERICAN HOPHORNBEAM QUERCUS BICOLOR / SWAMP WHITE OAK QUERCUS MACROCARPA / BUR OAK QUERCUS X `HERITAGE` / HERITAGE ENGLISH OAK ULMUS AMERICANA `ST. CROIX` / ST. CROIX AMERICAN ELM	44
	ORNAMENTAL TREE AMELANCHIER X GRANDIFLORA / APPLE SERVICEBERRY BETULA NIGRA `CULLY` TM / HERITAGE RIVER BIRCH BETULA PAPYRIFERA `RENCI` TM / RENAISSANCE REFLECTION PAPER BIRCH BETULA PAPYRIFERA `VAREN` TM / PRAIRIE DREAM BIRCH CARPINUS CAROLINIANA / AMERICAN HORNBEAM	13
	DECIDUOUS COLUMNAR TREE POPULUS TREMULOIDES `NE ARB` / PRAIRIE GOLD ASPEN	6
	DECIDUOUS SHRUB -	2,048 SF
	SEED MIX - TURF TBD LOW MOW TURF MIX -	695 SF
	SEED MIX - WET MEADOW BSWR - 34-271 WET MEADOW SOUTH & WEST -	5,770 SF
	SEED MIX - WOODLAND EDGE BWSR MIX 36-211 WOODLAND EDGE SOUTH & WEST -	11,938 SF
	SEED MIX - MESIC PRAIRIE BWSR PILOT MIXES: "LITTLE BLUESTEM URBAN PRAIRIE" -	32,253 SF

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

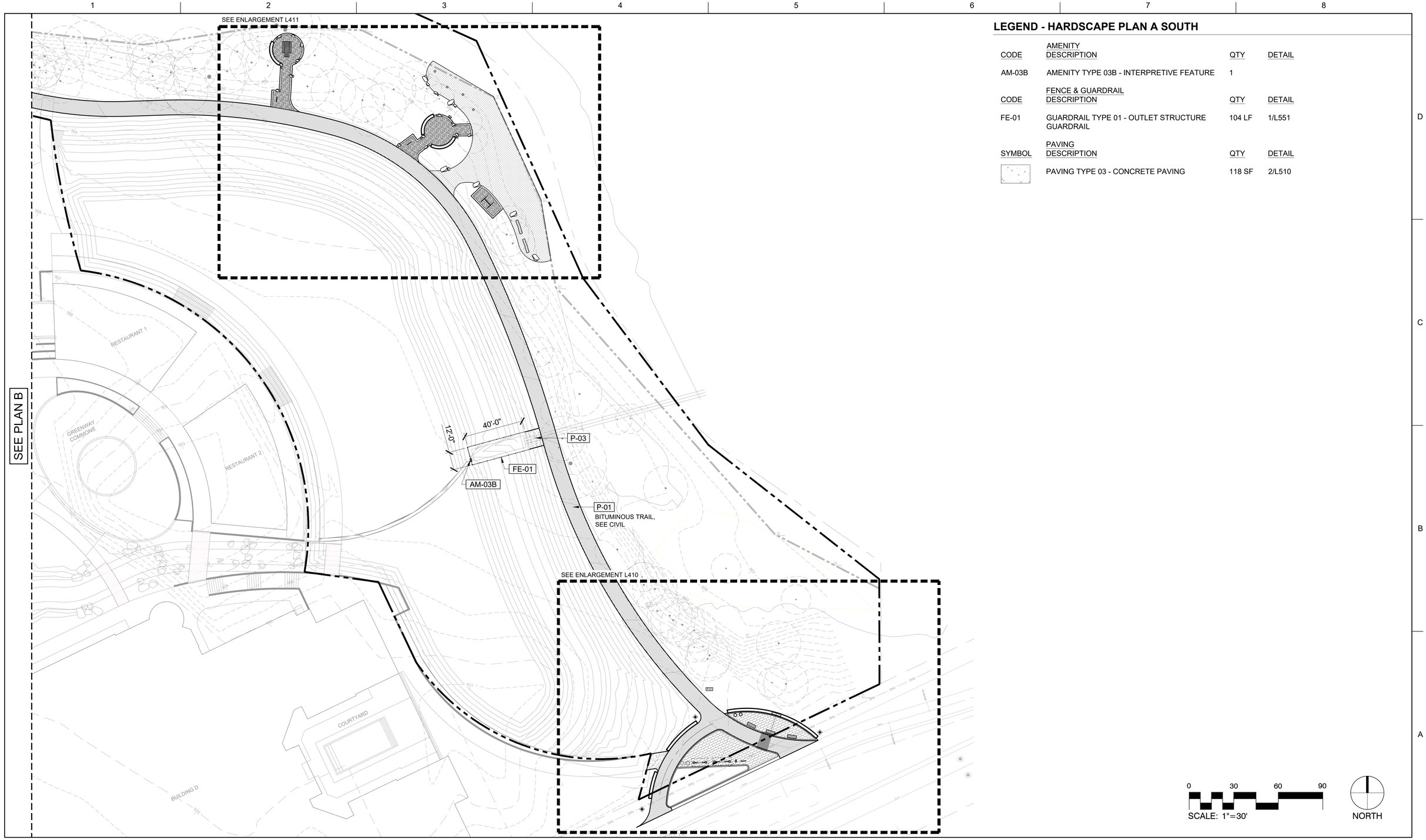
LANDSCAPE SCHEDULE

0 1" 2"

FILENAME

SCALE

SHEET
L030



LEGEND - HARDSCAPE PLAN A SOUTH

CODE	AMENITY DESCRIPTION	QTY	DETAIL
AM-03B	AMENITY TYPE 03B - INTERPRETIVE FEATURE	1	

CODE	FENCE & GUARDRAIL DESCRIPTION	QTY	DETAIL
FE-01	GUARDRAIL TYPE 01 - OUTLET STRUCTURE GUARDRAIL	104 LF	1/L551

SYMBOL	PAVING DESCRIPTION	QTY	DETAIL
	PAVING TYPE 03 - CONCRETE PAVING	118 SF	2/L510

SCALE: 1"=30'

NORTH

MINNEHAHA CREEK WATERSHED DISTRICT

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

HARDSCAPE PLAN A - SOUTH

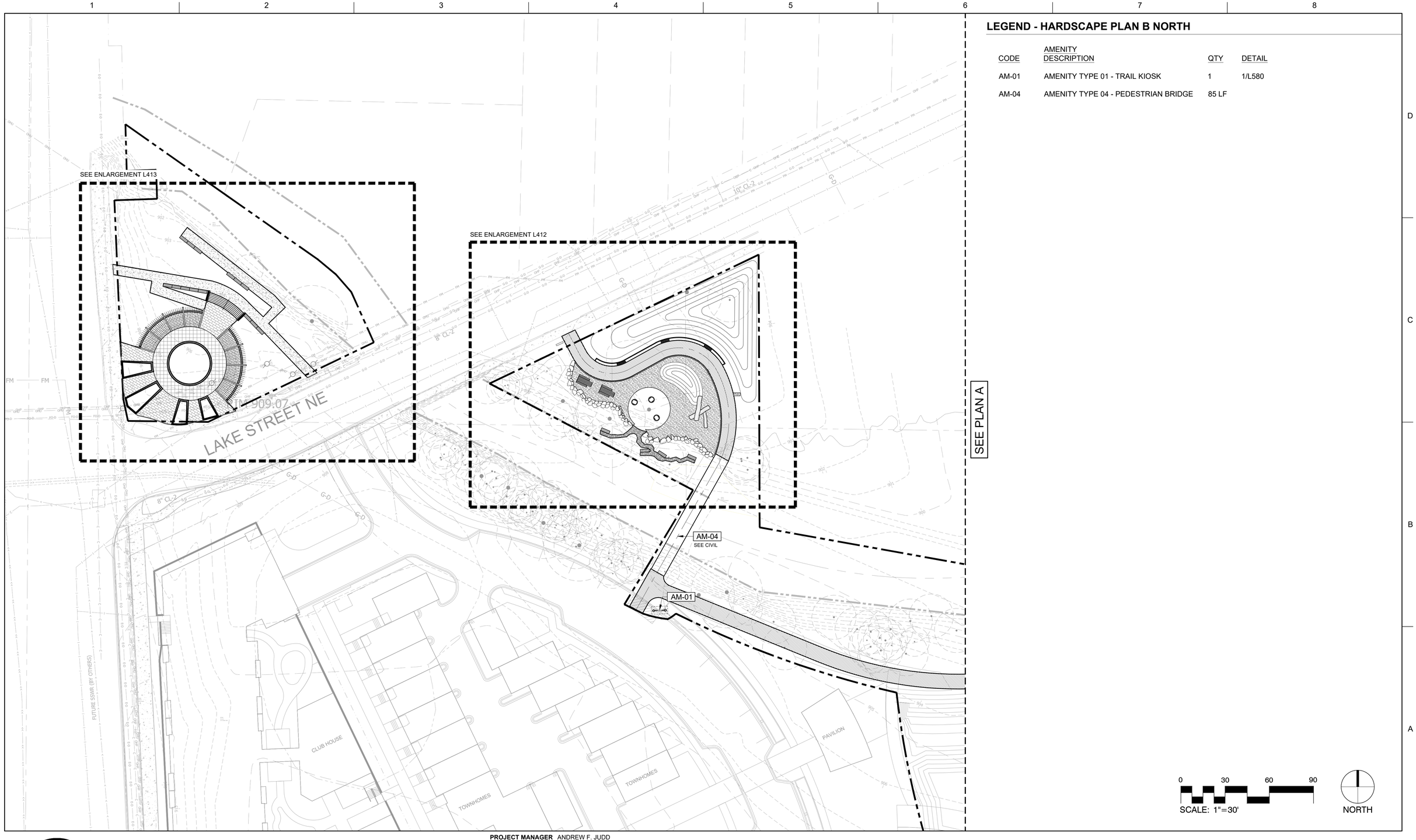
FILENAME

SCALE

SHEET L110

LEGEND - HARDSCAPE PLAN B NORTH

CODE	AMENITY DESCRIPTION	QTY	DETAIL
AM-01	AMENITY TYPE 01 - TRAIL KIOSK	1	1/L580
AM-04	AMENITY TYPE 04 - PEDESTRIAN BRIDGE	85 LF	



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325 BLAKE RD
HOPKINS, MN 55343

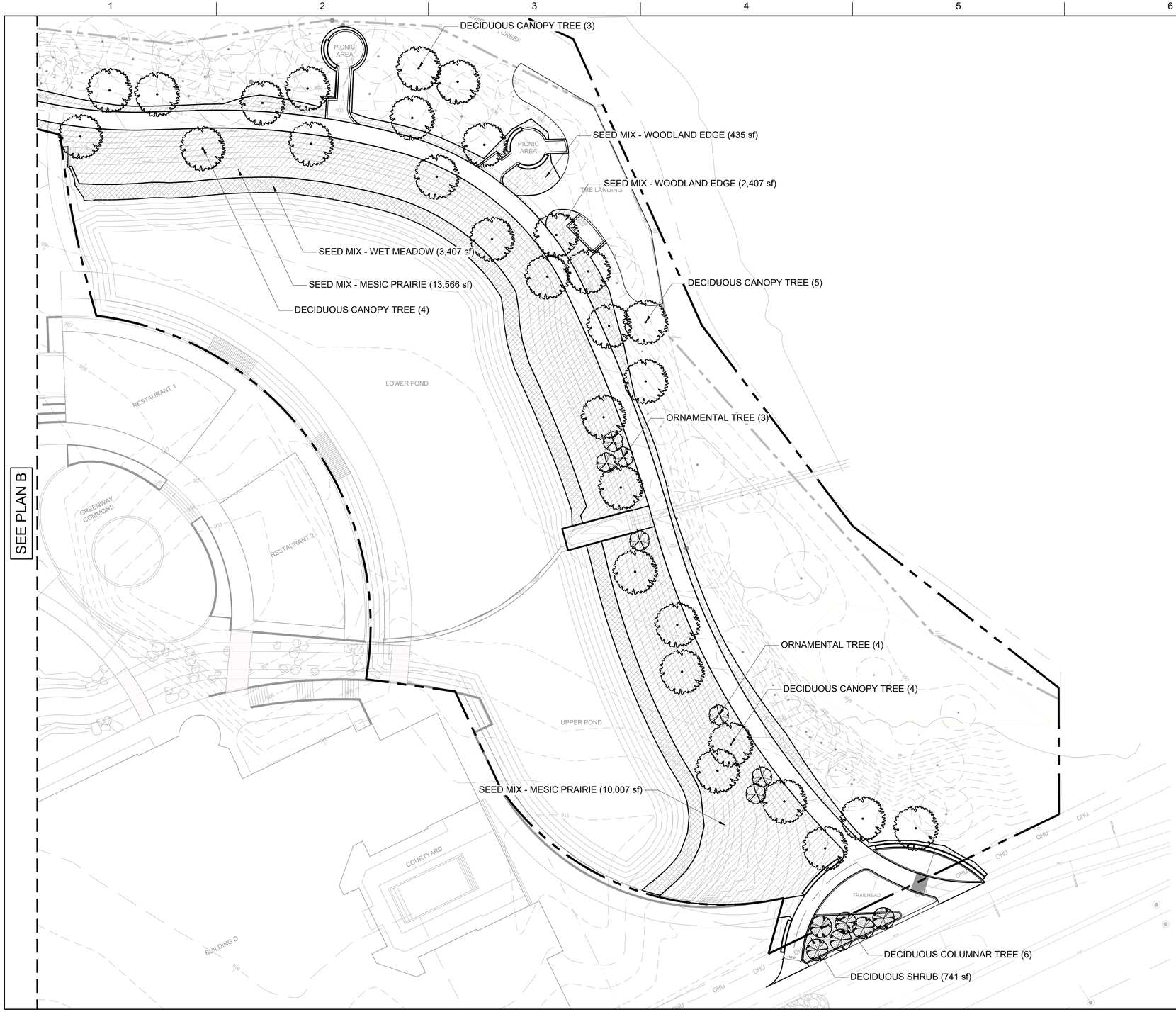
HARDSCAPE PLAN B - NORTH

0 1" 2"

FILENAME

SCALE

SHEET
L111



LEGEND - PLANTING PLAN A

	DECIDUOUS CANOPY TREE BETULA PAPYRIFERA `VAREN` TM / PRAIRIE DREAM BIRCH CARPINUS CAROLINIANA / AMERICAN HORNBEAM CELTIS OCCIDENTALIS / COMMON HACKBERRY OSTRYA VIRGINIANA / AMERICAN HOPHORNBEAM QUERCUS BICOLOR / SWAMP WHITE OAK QUERCUS MACROCARPA / BUR OAK QUERCUS X `HERITAGE` / HERITAGE ENGLISH OAK ULMUS AMERICANA `ST. CROIX` / ST. CROIX AMERICAN ELM	30
	ORNAMENTAL TREE AMELANCHIER X GRANDIFLORA / APPLE SERVICEBERRY BETULA NIGRA `CULLY` TM / HERITAGE RIVER BIRCH BETULA PAPYRIFERA `RENCI` TM / RENAISSANCE REFLECTION PAPER BIRCH BETULA PAPYRIFERA `VAREN` TM / PRAIRIE DREAM BIRCH CARPINUS CAROLINIANA / AMERICAN HORNBEAM	7
	DECIDUOUS COLUMNAR TREE POPULUS TREMULOIDES `NE ARB` / PRAIRIE GOLD ASPEN	6
	DECIDUOUS SHRUB -	741 SF
	SEED MIX - WET MEADOW BSWR - 34-271 WET MEADOW SOUTH & WEST -	5,260 SF
	SEED MIX - WOODLAND EDGE BWSR MIX 36-211 WOODLAND EDGE SOUTH & WEST -	5,075 SF
	SEED MIX - MESIC PRAIRIE BWSR PILOT MIXES: “LITTLE BLUESTEM URBAN PRAIRIE” -	23,573 SF

SCALE: 1"=30'

NORTH

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325 BLAKE RD
HOPKINS, MN 55343

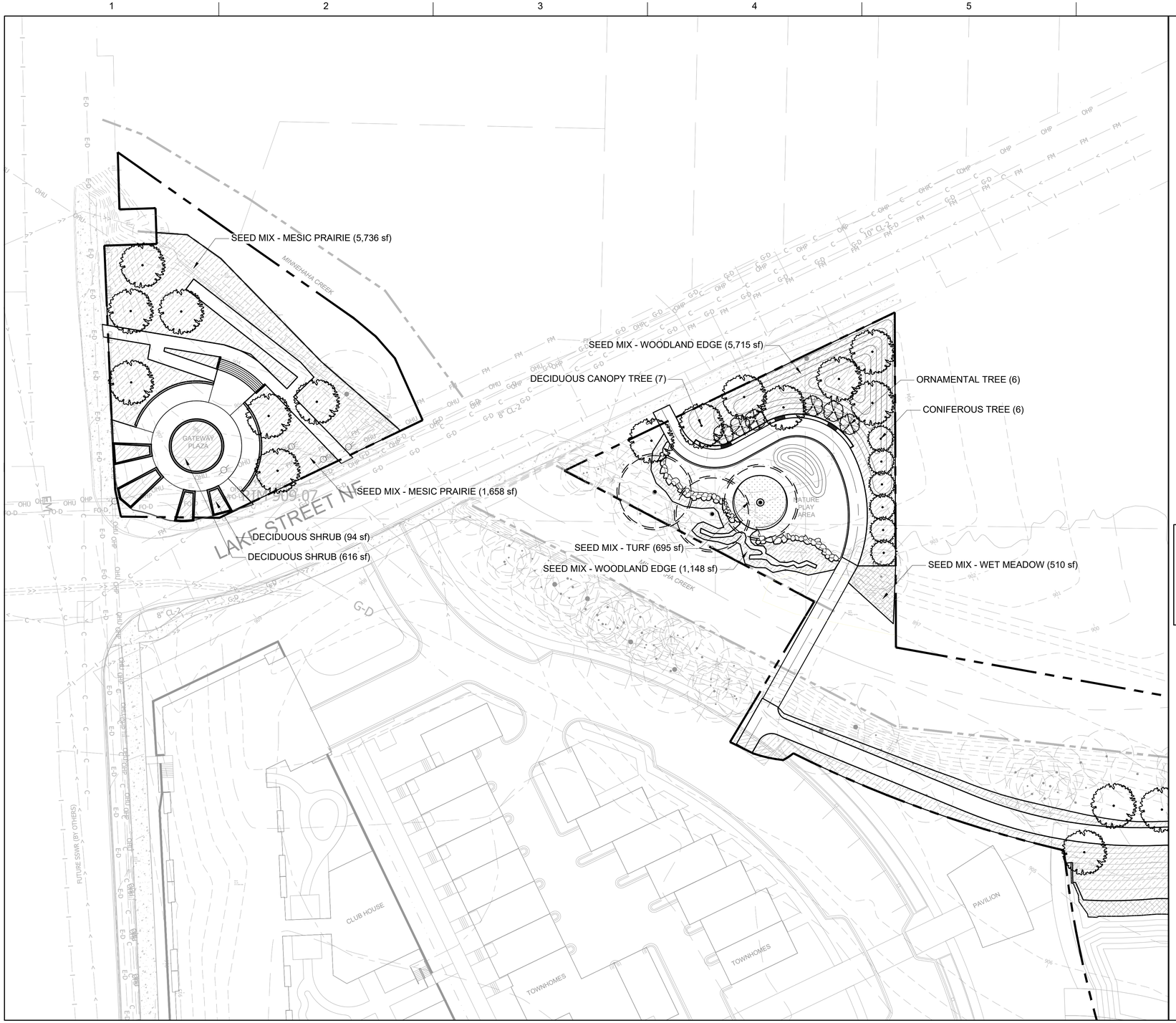
PLANTING PLAN A

0 1" 2"

FILENAME PLANTING PLAN A

SCALE

SHEET L160



LEGEND - PLANTING PLAN A

	CONIFEROUS TREE PICEA GLAUCA `DENSATA` / BLACK HILLS SPRUCE	6
	DECIDUOUS CANOPY TREE BETULA PAPYRIFERA `VAREN` TM / PRAIRIE DREAM BIRCH CARPINUS CAROLINIANA / AMERICAN HORNBEAM CELTIS OCCIDENTALIS / COMMON HACKBERRY OSTRYA VIRGINIANA / AMERICAN HOPHORNBEAM QUERCUS BICOLOR / SWAMP WHITE OAK QUERCUS MACROCARPA / BUR OAK QUERCUS X `HERITAGE` / HERITAGE ENGLISH OAK ULMUS AMERICANA `ST. CROIX` / ST. CROIX AMERICAN ELM	14
	ORNAMENTAL TREE AMELANCHIER X GRANDIFLORA / APPLE SERVICEBERRY BETULA NIGRA `CULLY` TM / HERITAGE RIVER BIRCH BETULA PAPYRIFERA `RENCI` TM / RENAISSANCE REFLECTION PAPER BIRCH BETULA PAPYRIFERA `VAREN` TM / PRAIRIE DREAM BIRCH CARPINUS CAROLINIANA / AMERICAN HORNBEAM	6
	DECIDUOUS SHRUB -	1,307 SF
	SEED MIX - TURF TBD LOW MOW TURF MIX -	695 SF
	SEED MIX - WET MEADOW BSWR - 34-271 WET MEADOW SOUTH & WEST -	510 SF
	SEED MIX - WOODLAND EDGE BWSR MIX 36-211 WOODLAND EDGE SOUTH & WEST -	6,863 SF
	SEED MIX - MESIC PRAIRIE BWSR PILOT MIXES: “LITTLE BLUESTEM URBAN PRAIRIE” -	8,680 SF

SEE PLANTING PLAN A

0 30 60 90
SCALE: 1"=30'

NORTH

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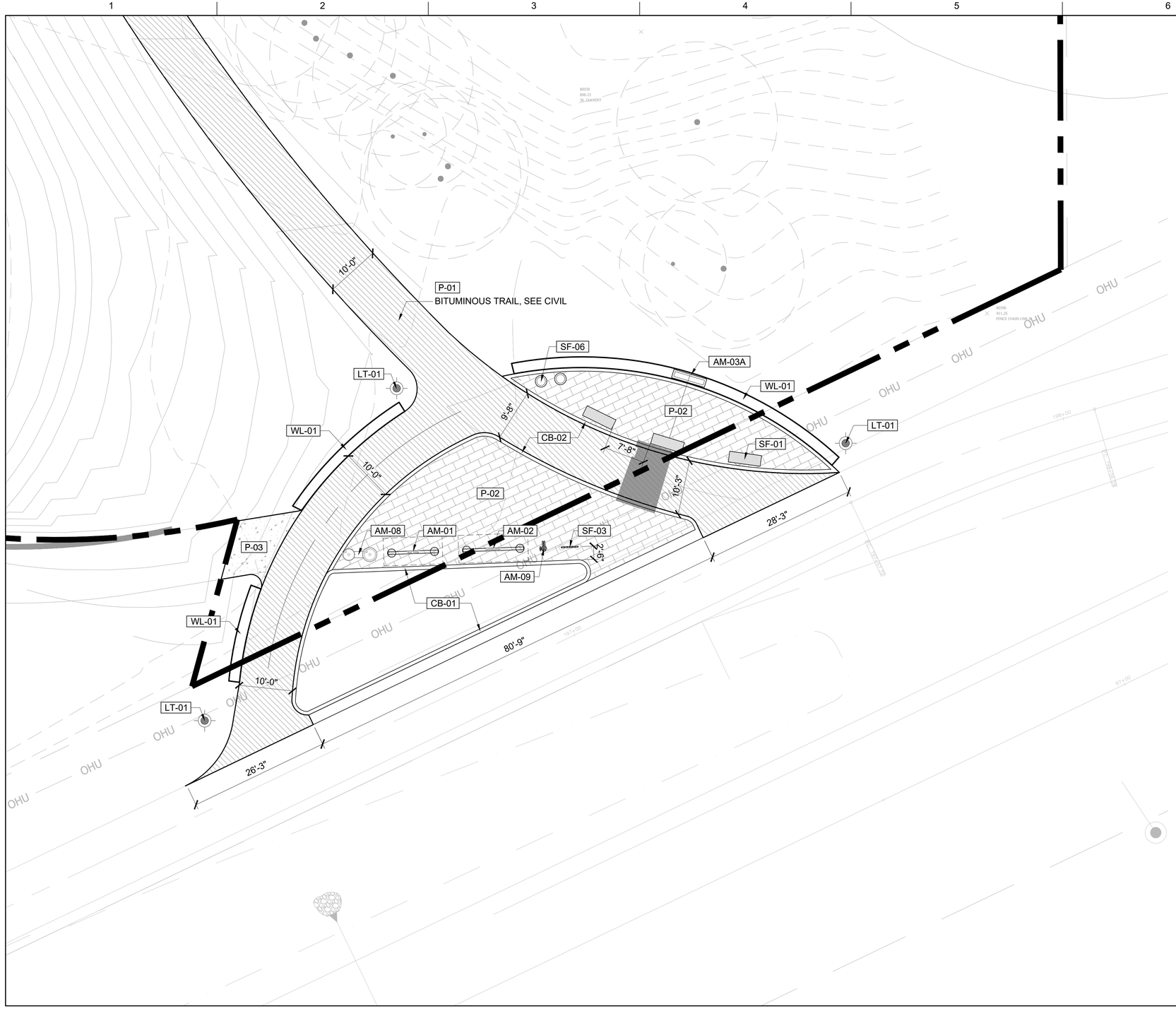
HOPKINS, MN 55343

PLANTING PLAN B

0 1" 2"

FILENAME
SCALE

SHEET
L161



LEGEND - HARDSCAPE ENLARGEMENT PLAN TRAILHEAD

CODE	AMENITY DESCRIPTION	QTY	DETAIL
AM-01	AMENITY TYPE 01 - TRAIL KIOSK	1	1/L580
AM-02	AMENITY TYPE 02 - SYSTEM KIOSK	1	1/L581
AM-03A	AMENITY TYPE 03A - INTERPRETIVE FEATURE	1	
AM-08	AMENITY TYPE 08 - DRINKING FOUNTAIN	1	2/L583
AM-09	AMENITY TYPE 09 - BIKE FIX-IT STATION	1	3/L583

CODE	CURB DESCRIPTION	QTY	DETAIL
CB-01	CURB TYPE 01 - CIP CONCRETE PLANTER CURB	138 LF	1/L520
CB-02	CURB TYPE 02 - CIP CONCRETE RIBBON CURB	296 LF	2/L520

CODE	LIGHTING DESCRIPTION	QTY	DETAIL
LT-01	LIGHT TYPE 01 - PEDESTRIAN SCALE POLE LIGHT	3	3/L572

CODE	SITE FURNITURE DESCRIPTION	QTY	DETAIL
SF-01	SITE FURNITURE TYPE 01 - LINEAR BENCH	3	1/L570
SF-03	SITE FURNITURE TYPE 03 - BIKE RACK	1	3/L570
SF-06	SITE FURNITURE TYPE 07 - WASTE RECEPTACLE	2	1/L572

CODE	WALL DESCRIPTION	QTY	DETAIL
WL-01	WALL TYPE 01 - LIMESTONE SEATWALL @ TRAILHEAD	111 LF	1/L560

SYMBOL	PAVING DESCRIPTION	QTY	DETAIL
	PAVING TYPE 02 - PERMEABLE CONCRETE UNIT PAVERS	1,500 SF	1/L510
	PAVING TYPE 03 - CONCRETE PAVING	414 SF	2/L510

0 10 20 30
SCALE: 1"=10'

NORTH

MINNEHAHA CREEK WATERSHED DISTRICT

DF/ DAMON FARBER LANDSCAPE ARCHITECTS
401 North 2nd Avenue, Suite 410
Minneapolis, MN 55401 p: 612.332.7522

ISSUE	DATE	DESCRIPTION
0	02-18-2022	60% DRAFT FOR CLIENT REVIEW

PROJECT MANAGER ANDREW F. JUDD
PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

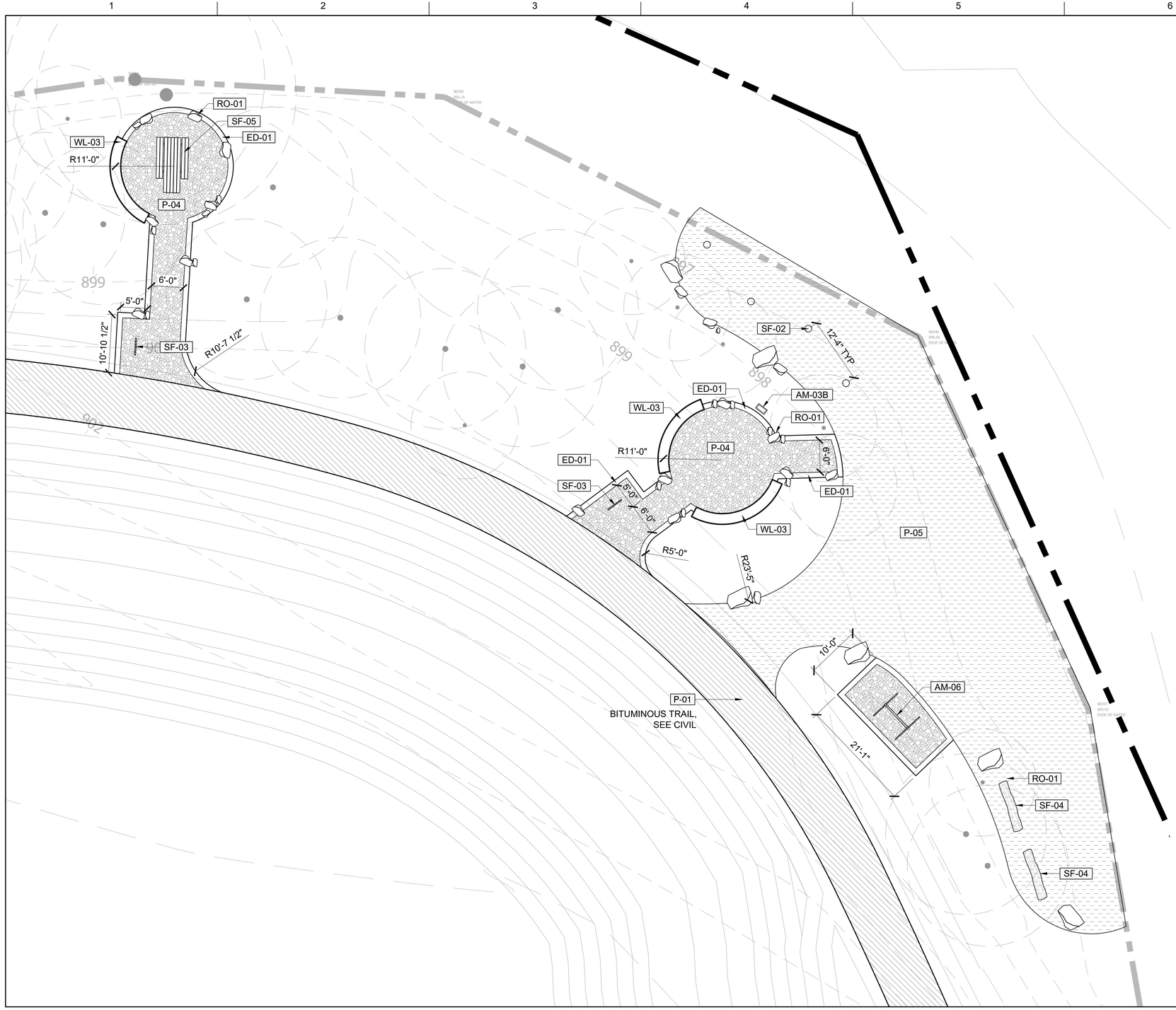
HARDSCAPE ENLARGEMENT PLAN TRAILHEAD

0 1" 2"

FILENAME

SCALE

SHEET
L410



LEGEND - HARDSCAPE ENLARGEMENT PLAN LANDING

CODE	AMENITY DESCRIPTION	QTY	DETAIL
AM-03B	AMENITY TYPE 03B - INTERPRETIVE FEATURE	1	
AM-06	AMENITY TYPE 06 - CANOE RACK	1	1/L584

CODE	EDGING DESCRIPTION	QTY	DETAIL
ED-01	EDGING TYPE 01 - STONE EDGING	261 LF	1/L530

CODE	ROCK DESCRIPTION	QTY	DETAIL
RO-01	ROCK TYPE 01 - LANDSCAPE BOULDER	38	4/L510

CODE	SITE FURNITURE DESCRIPTION	QTY	DETAIL
SF-02	SITE FURNITURE TYPE 02 - HAMMOCK POLE	4	2/L570
SF-03	SITE FURNITURE TYPE 03 - BIKE RACK	2	3/L570
SF-04	SITE FURNITURE TYPE 04 - LOG BENCH	2	4/L570
SF-05	SITE FURNITURE TYPE 05 - PICNIC TABLE	1	1/L571

CODE	WALL DESCRIPTION	QTY	DETAIL
WL-03	WALL TYPE 03 - LIMESTONE SEATWALL @ PICNIC AREA	52 LF	1/L561

SYMBOL	PAVING DESCRIPTION	QTY	DETAIL
	PAVING TYPE 05 - BEACH SURFACING	3,945 SF	

SYMBOL	PAVING DESCRIPTION	QTY	DETAIL
	PAVING TYPE 04 - CRUSHED STONE SURFACING	15.75 CY	3/L510

SCALE: 1"=10'

NORTH

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

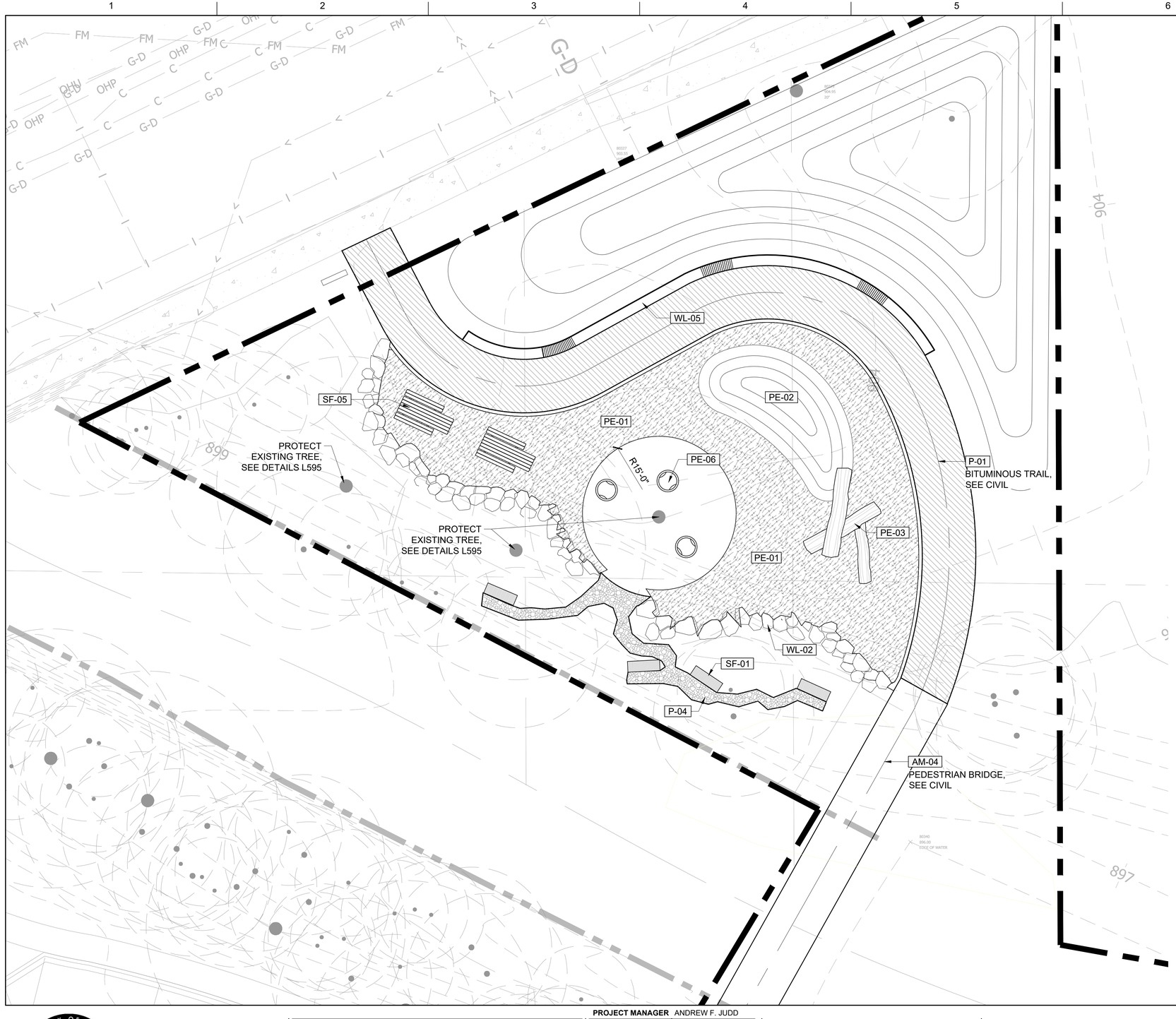
HARDSCAPE ENLARGEMENT PLAN LANDING

0 1" 2"

FILENAME

SCALE

SHEET L411



LEGEND - HARDSCAPE ENLARGEMENT PLAN NATURE PLAY

CODE	CURB DESCRIPTION	QTY	DETAIL
CB-03	CURB TYPE 03 - CIP CONCRETE PLAY AREA CURB	163 LF	3/L520

CODE	PLAY EQUIPMENT DESCRIPTION	QTY	DETAIL
PE-03	PLAY EQUIPMENT TYPE 03 - LOG STACK	1	
PE-06	PLAY EQUIPMENT TYPE 05 - PRECAST CONCRETE ACORNS	3	

CODE	SITE FURNITURE DESCRIPTION	QTY	DETAIL
SF-01	SITE FURNITURE TYPE 01 - LINEAR BENCH	4	1/L570
SF-05	SITE FURNITURE TYPE 05 - PICNIC TABLE	2	1/L571

CODE	WALL DESCRIPTION	QTY	DETAIL
WL-02	WALL TYPE 02 - LIMESTONE SEATWALL @ PLAY AREA	117 LF	2/L560
WL-05	WALL TYPE 05 - CIP CONCRETE SEATWALL @ PLAY AREA	98 LF	2/L561

SYMBOL	PAVING DESCRIPTION	QTY	DETAIL
	PAVING TYPE 01 - BITUMINOUS PAVING	1,854 SF	

SYMBOL	PLAY EQUIPMENT DESCRIPTION	QTY	DETAIL
	PLAY EQUIPMENT TYPE 01 - WOOD FIBER SURFACING (EWF)	2,484 SF	

SYMBOL	PAVING DESCRIPTION	QTY	DETAIL
	PAVING TYPE 04 - CRUSHED STONE SURFACING	2.81 CY	3/L510

0 10 20 30
SCALE: 1"=10'

NORTH

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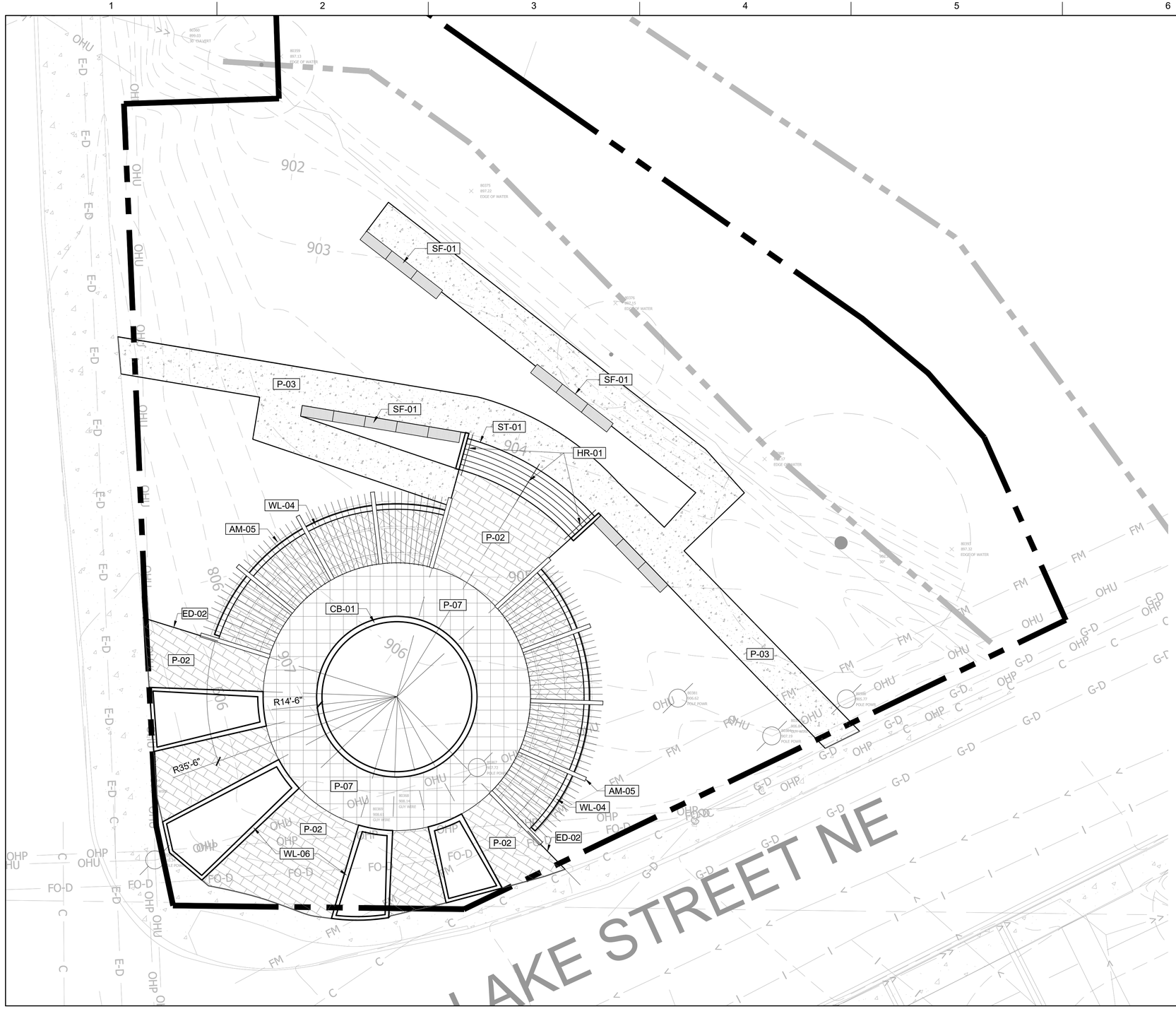
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

HARDSCAPE ENLARGEMENT PLAN NATURE PLAY

0 1" 2"

FILENAME
SCALE

SHEET
L412



LEGEND - HARDSCAPE ENLARGEMENT PLAN GATEWAY PLAZA

CODE	AMENITY DESCRIPTION	QTY	DETAIL
AM-05	AMENITY TYPE 05 - PERGOLA	2	

CODE	CURB DESCRIPTION	QTY	DETAIL
CB-01	CURB TYPE 01 - CIP CONCRETE PLANTER CURB	91 LF	1/L520

CODE	EDGING DESCRIPTION	QTY	DETAIL
ED-02	EDGING TYPE 02 - PAVER RESTRAINT	25 LF	3/L530

CODE	HANDRAIL DESCRIPTION	QTY	DETAIL
HR-01	HANDRAIL TYPE 01 - STAIR HANDRAIL	24 LF	1/L550

CODE	SITE FURNITURE DESCRIPTION	QTY	DETAIL
SF-01	SITE FURNITURE TYPE 01 - LINEAR BENCH	14	1/L570

CODE	STAIRS DESCRIPTION	QTY	DETAIL
ST-01	STAIR TYPE 01 - RADIAL STAIR @ GATEWAY	6 LF	1/L540

CODE	WALL DESCRIPTION	QTY	DETAIL
WL-04	WALL TYPE 04 - CIP CONCRETE WALL	107 LF	2/L562
WL-06	WALL TYPE 06 - CIP CONCRETE PITCHED SEATWALL @ GATEWAY	218 LF	1/L562
WL-07	WALL TYPE 07 - CIP CONCRETE CHEEK WALL	14 LF	2/L540

SYMBOL	PAVING DESCRIPTION	QTY	DETAIL
	PAVING TYPE 02 - PERMEABLE CONCRETE UNIT PAVERS	4,378 SF	1/L510
	PAVING TYPE 03 - CONCRETE PAVING	2,071 SF	2/L510
	PAVING TYPE 07 - DECORATIVE CONCRETE PAVING	1,256 SF	

SCALE: 1"=10'

NORTH

MINNEHAHA CREEK WATERSHED DISTRICT

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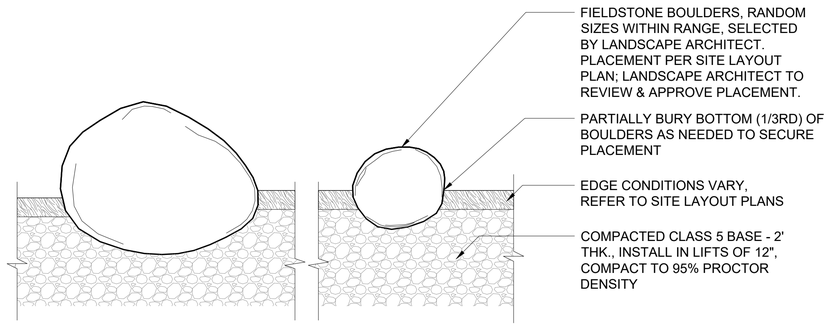
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

HARDSCAPE ENLARGEMENT PLAN GATEWAY PLAZA

FILENAME

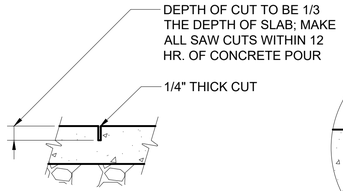
SCALE

SHEET L413



4 DETAIL - RO-01 LANDSCAPE BOULDER

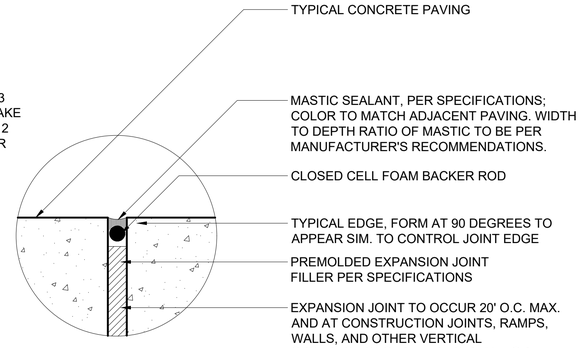
NTS P-20.199-38



TYPICAL SAWCUT CONTROL JOINT

CONCRETE FINISH TO BE XXX

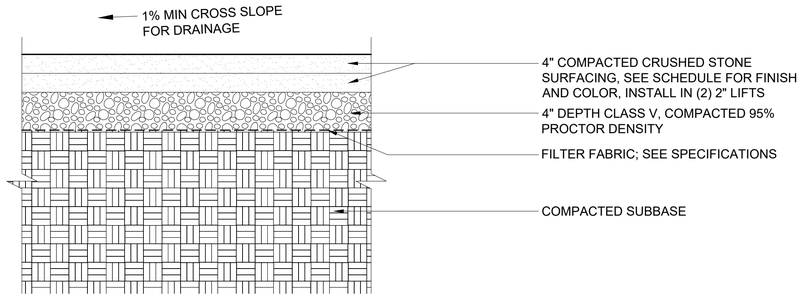
SEE CIVIL DETAILS FOR TYPICAL CONCRETE AND BASE MATERIAL PROFILES



TYPICAL EXPANSION JOINT - ENLARGED

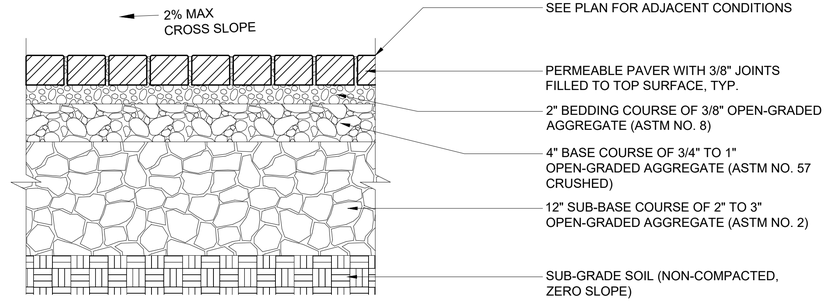
2 DETAIL - P-03 CONCRETE PAVING TYPICAL JOINTING

NTS P-20.199-106



3 DETAIL - P-04 CRUSHED STONE SURFACING

1 1/2" = 1'-0" P-20.199-127



1 DETAIL - P-02 PERMEABLE CONCRETE UNIT PAVERS

1 1/2" = 1'-0" P-20.199-126

MINNEHAHA CREEK WATERSHED DISTRICT

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

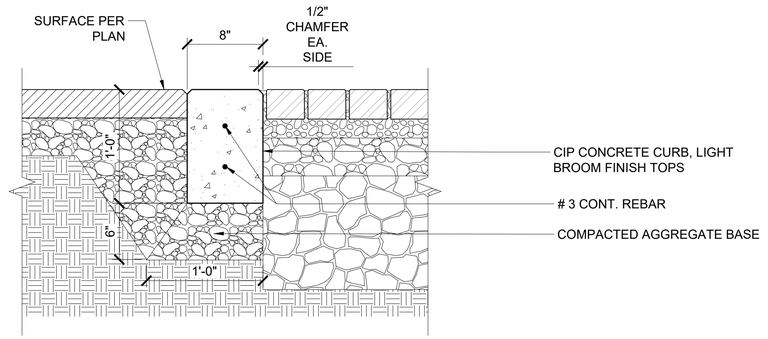
LANDSCAPE DETAILS PAVING

0 1" 2"

FILENAME

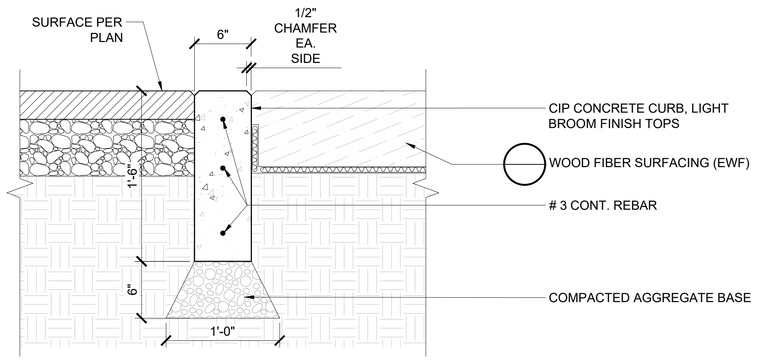
SCALE

SHEET
L510



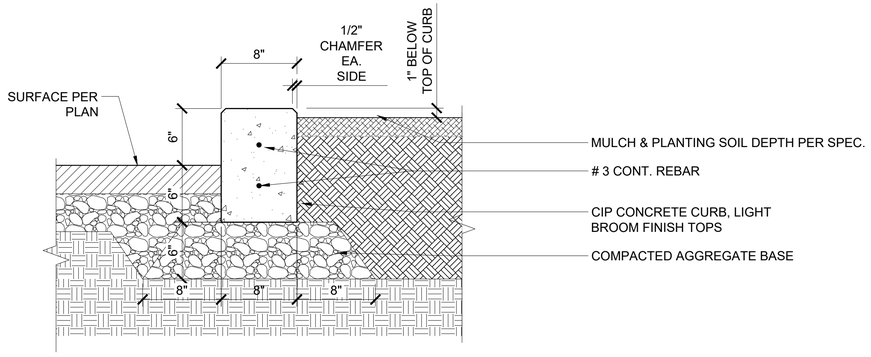
2 DETAIL - CB-02 CIP CONCRETE RIBBON CURB

1 1/2" = 1'-0" P-20.199-111



3 DETAIL - CB-03 CIP CONCRETE PLAY AREA CURB

1 1/2" = 1'-0" P-20.199-113



1 DETAIL - CB-01 CIP CONCRETE PLANTER CURB

1 1/2" = 1'-0" P-20.199-110

MINNEHAHA CREEK WATERSHED DISTRICT

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

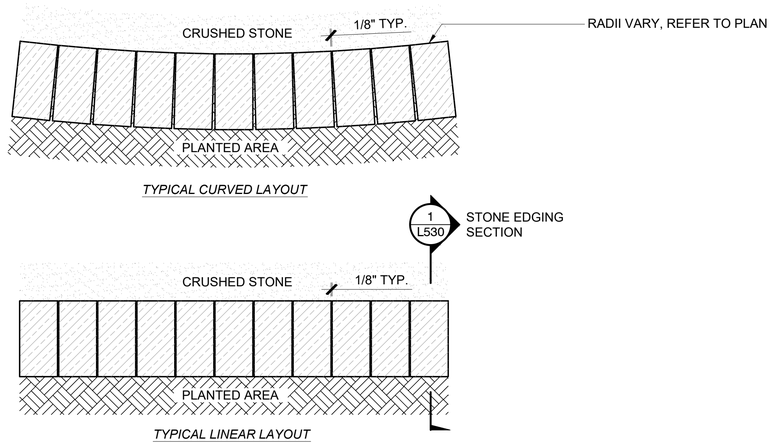
LANDSCAPE DETAILS CURB

0 1" 2"

FILENAME

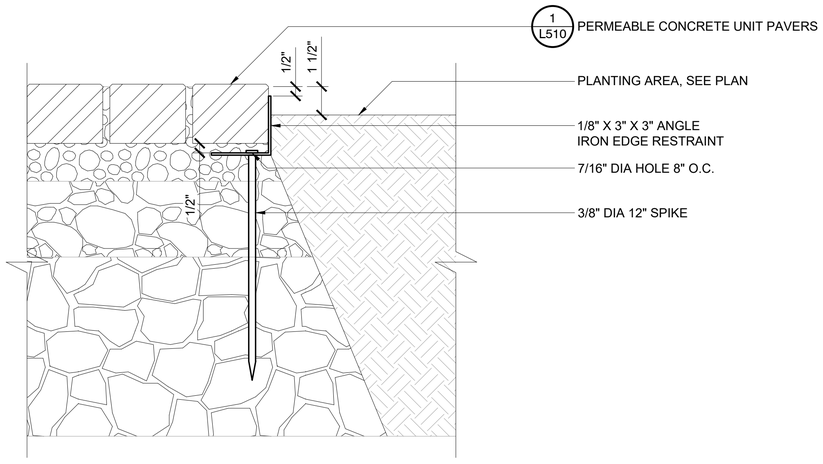
SCALE

SHEET **L520**



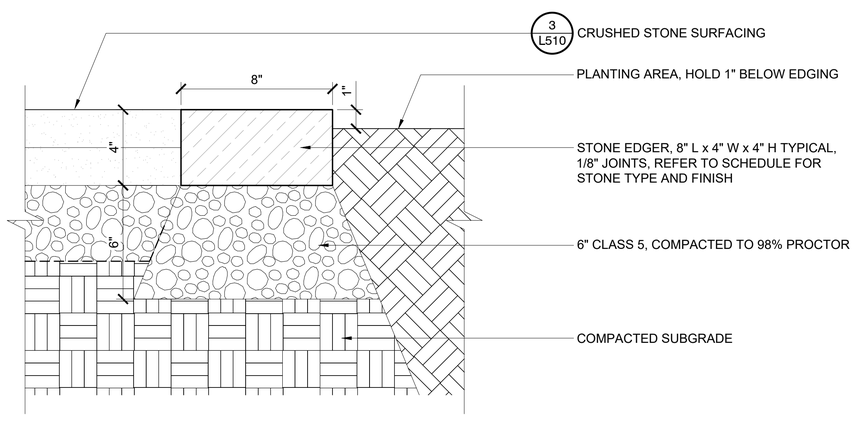
2 DETAIL - ED-01 STONE EDGING TYPICAL LAYOUTS

1 1/2" = 1'-0" P-20.199-131



3 DETAIL - ED-02 PAVER RESTRAINT

3" = 1'-0" P-20.199-128



1 DETAIL - ED-01 STONE EDGING

3" = 1'-0" P-20.199-130

MINNEHAHA CREEK WATERSHED DISTRICT

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

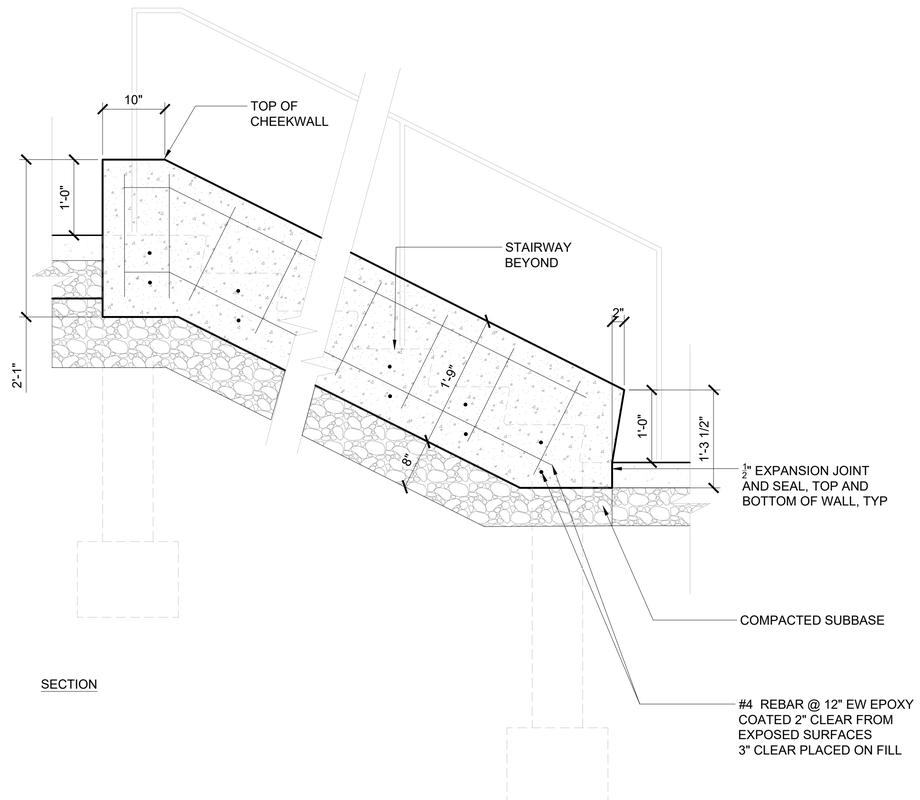
LANDSCAPE DETAILS EDGING

0 1" 2"
FILENAME
SCALE

SHEET
L530

GENERAL NOTES:

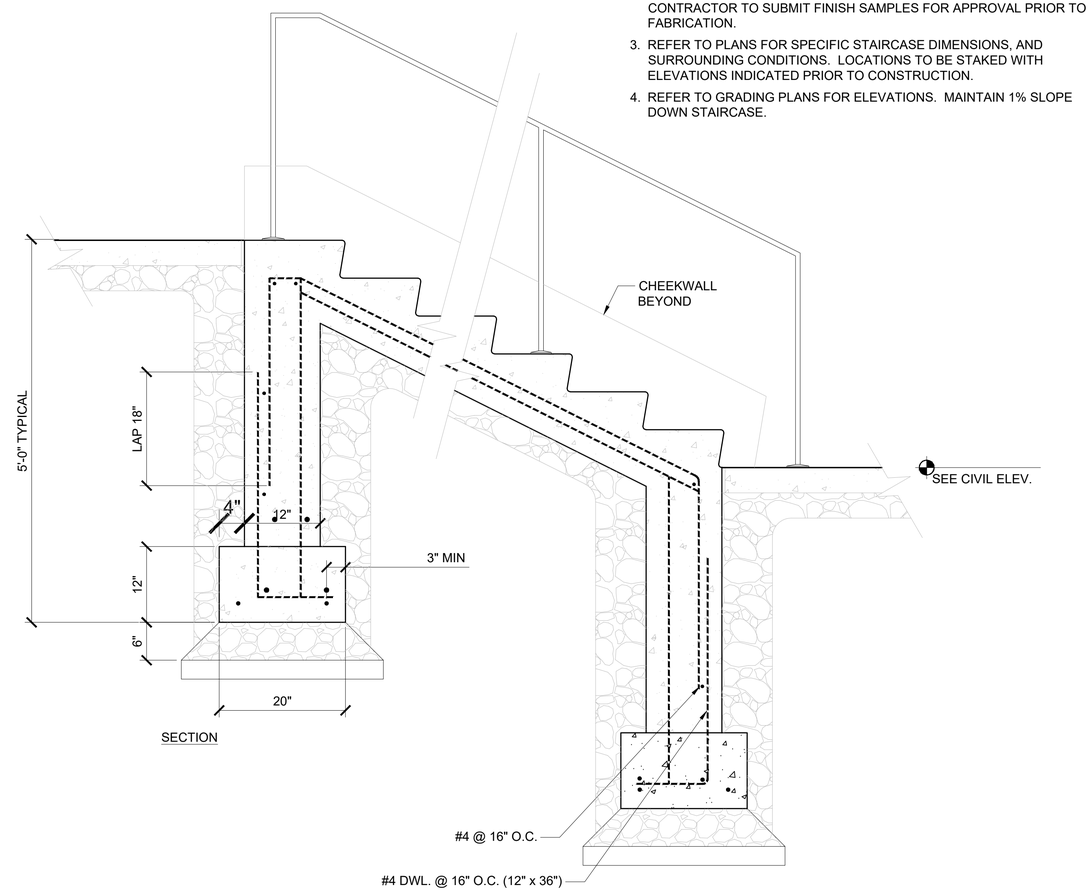
1. ALL REBAR TO BE COVERED BY 2" OF CONCRETE MIN. CONCRETE SURFACING TO BE MEDIUM BROOM FINISH PERPENDICULAR TO PEDESTRIAN CIRCULATION.
2. REFER TO HANDRAIL ENLARGEMENT FOR TUBING PROFILES. CONTRACTOR TO SUBMIT FINISH SAMPLES FOR APPROVAL PRIOR TO FABRICATION.
3. REFER TO PLANS FOR SPECIFIC STAIRCASE DIMENSIONS, AND SURROUNDING CONDITIONS. LOCATIONS TO BE STAKED WITH ELEVATIONS INDICATED PRIOR TO CONSTRUCTION.
4. REFER TO GRADING PLANS FOR ELEVATIONS. MAINTAIN 1% SLOPE DOWN STAIRCASE.



SECTION

2 DETAIL - WL-07 CIP CONCRETE CHEEK WALL

1" = 1'-0" P-20.199-104



SECTION

1 DETAIL - ST-01 RADIAL STAIR @ GATEWAY

1" = 1'-0" P-20.199-10

MINNEHAHA CREEK WATERSHED DISTRICT

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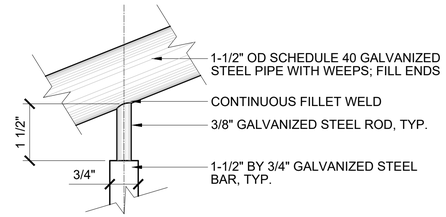
325 BLAKE RD
HOPKINS, MN 55343

LANDSCAPE DETAILS STAIR

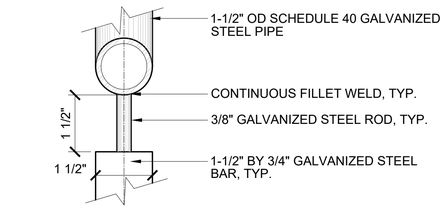
0 1" 2"

FILENAME
SCALE

SHEET
L540



ELEVATION - SIDE OF INTERMEDIATE POST



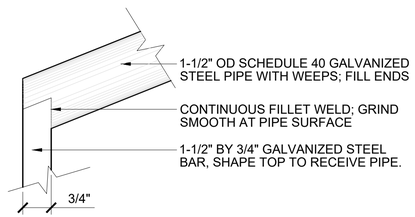
SECTION - INTERMEDIATE POST

3 DETAIL - HANDRAIL INTERMEDIATE POST ENLARGEMENT

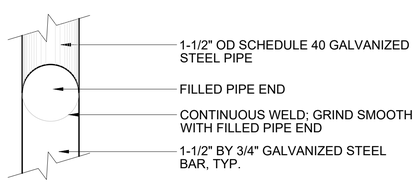
6" = 1'-0" P-20.199-80

NOTES:

1. ALL STEEL RAILING COMPONENTS TO BE GALVANIZED STEEL.
2. SUBMIT SHOP DRAWINGS FOR EACH RAILING. ENGINEERED SHOP DRAWINGS TO INCLUDE RAILING LENGTH, HEIGHT, FOOTING SIZE, & FINISH FOR APPROVAL PRIOR TO FABRICATION. DIMENSIONS TO BE FIELD VERIFIED PRIOR TO MANUFACTURING.



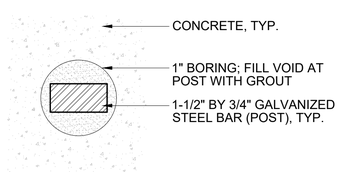
ELEVATION - SIDE OF END POST



ELEVATION - FACE OF END POST

NOTES:

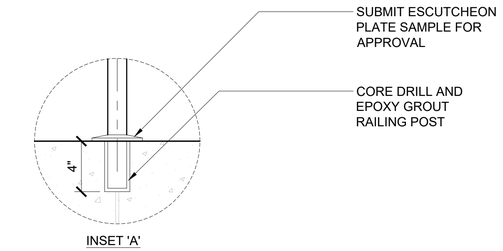
1. ALL STEEL RAILING COMPONENTS TO BE GALVANIZED STEEL.
2. SUBMIT SHOP DRAWINGS FOR EACH RAILING. ENGINEERED SHOP DRAWINGS TO INCLUDE RAILING LENGTH, HEIGHT, FOOTING SIZE, & FINISH FOR APPROVAL PRIOR TO FABRICATION. DIMENSIONS TO BE FIELD VERIFIED PRIOR TO MANUFACTURING.



PLAN - POST AT CONCRETE

2 DETAIL - HANDRAIL END POST ENLARGEMENT

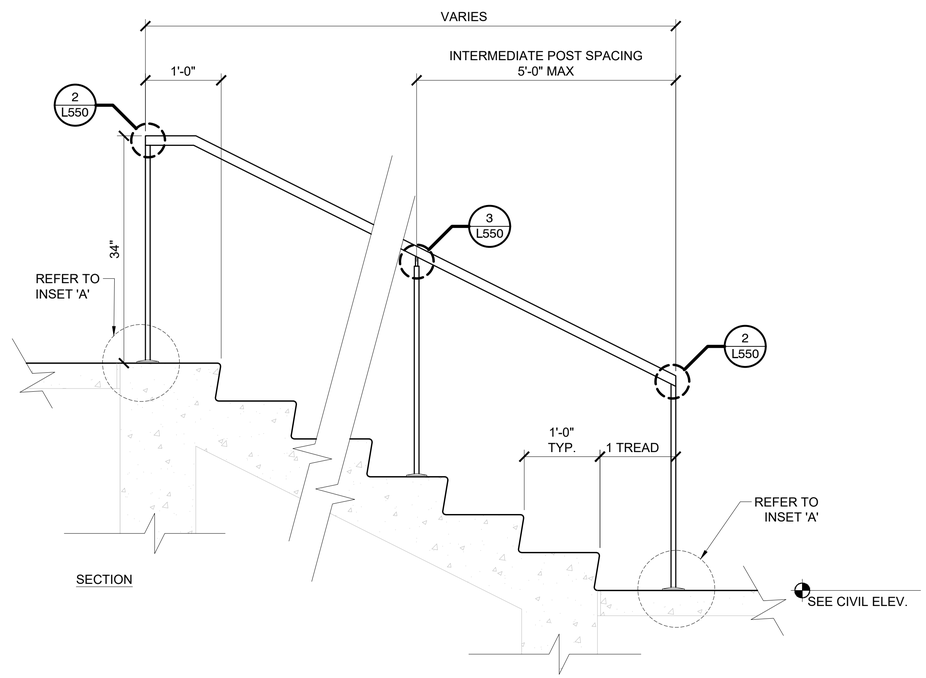
6" = 1'-0" P-20.199-81



INSET 'A'

GENERAL NOTES:

1. REFER TO HANDRAIL ENLARGEMENT FOR TUBING PROFILES. CONTRACTOR TO SUBMIT FINISH SAMPLES FOR APPROVAL PRIOR TO FABRICATION.
2. REFER TO PLANS FOR SPECIFIC STAIRCASE DIMENSIONS, AND SURROUNDING CONDITIONS.
3. REFER TO GRADING PLANS FOR ELEVATIONS.



SECTION

1 DETAIL - HR-01 STAIR HANDRAIL

1" = 1'-0" P-20.199-82

MINNEHAHA CREEK WATERSHED DISTRICT

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

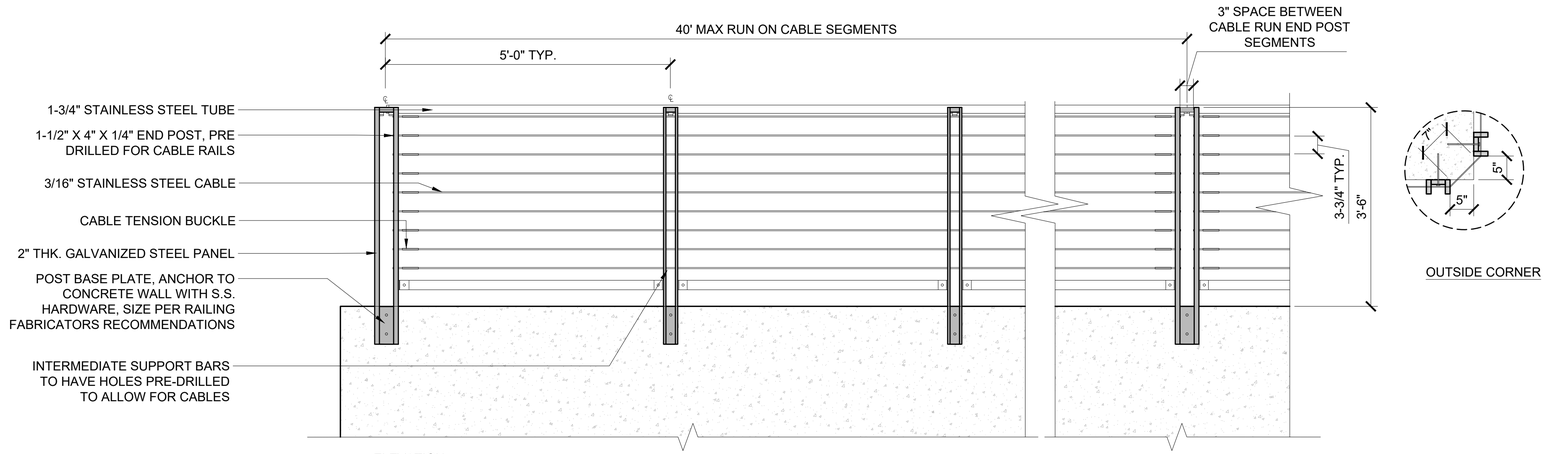
LANDSCAPE DETAILS HANDRAIL & GUARDRAIL

0 1" 2"

FILENAME

SCALE

SHEET L550



ELEVATION

OUTSIDE CORNER

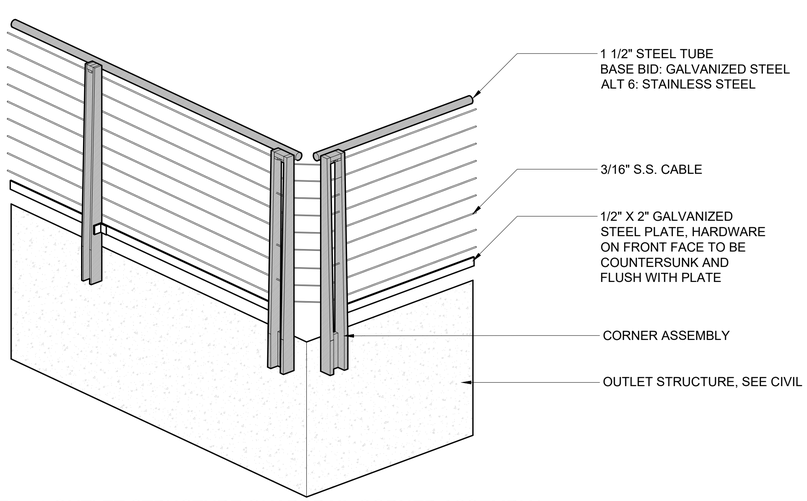
NOTE:

1. ALL METAL BARS & TUBES ARE TO BE GALVANIZED, WELDED PRIOR TO GALVINIZATION. SUBMIT SAMPLES FOR APPROVAL.
2. JOINTS TO BE WELDED BETWEEN BARS & TUBES, CUSTOM CUT ANGLE OF POST TO TOP RAIL CONNECTIONS ON SLOPED WALLS.
3. ALL POSTS TO BE SET PLUMB, WELDED TO BASE PLATE AND ANCHORED TO CONCRETE WALLS WITH FABRICATOR RECOMMENDED FASTENERS.
4. CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO APPROVING FABRICATION OF ANY GUARDRAIL COMPONENTS.
5. TENSION & ANCHOR HARDWARE TO BE STAINLESS STEEL, SIZE PER FABRICATORS RECOMMENDATIONS.

2 DETAIL - FE-01 OUTLET STRUCTURE GUARDRAIL CORNER ELEVATION

3/4" = 1'-0"

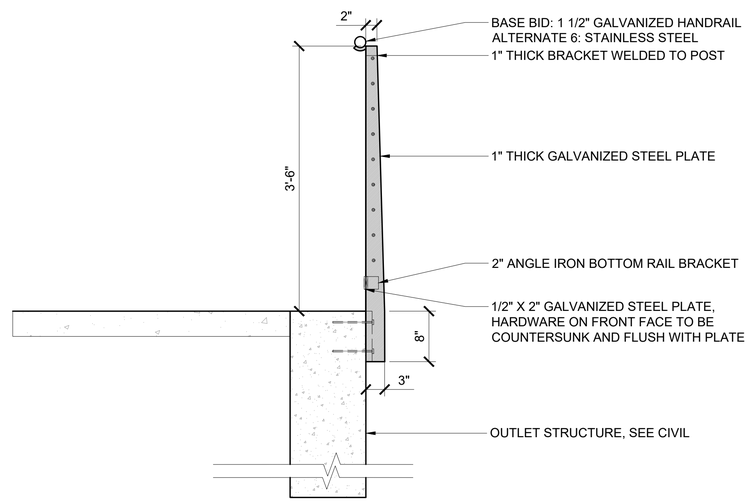
P-20.199-33



3 DETAIL - FE-01 OUTLET STRUCTURE GUARDRAIL CORNER ASSEMBLY

3/4" = 1'-0"

P-20.199-72



1 DETAIL - FE-01 OUTLET STRUCTURE GUARDRAIL SECTION

1" = 1'-0"

P-20.199-34

MINNEHAHA CREEK WATERSHED DISTRICT

DF/ DAMON FARBER LANDSCAPE ARCHITECTS
401 North 2nd Avenue, Suite 410
Minneapolis, MN 55401 p: 612.332.7522

ISSUE	DATE	DESCRIPTION
0	02-18-2022	60% DRAFT FOR CLIENT REVIEW

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

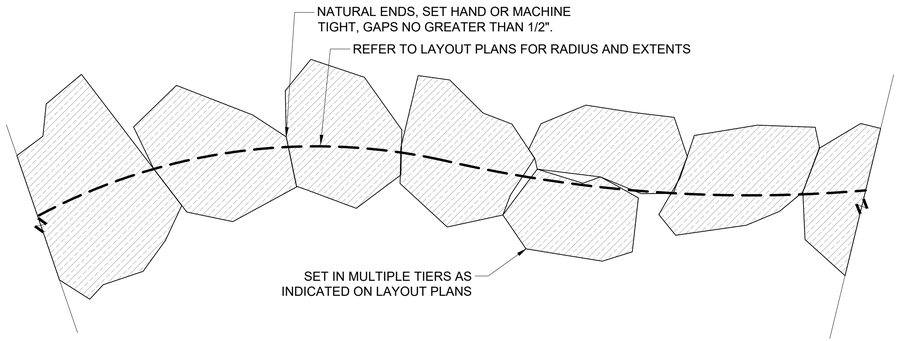
LANDSCAPE DETAILS HANDRAIL & GUARDRAIL

0 1" 2"

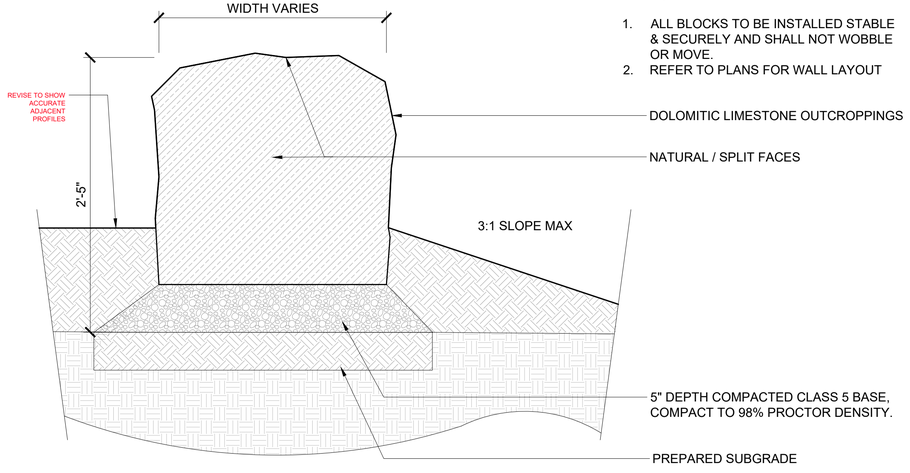
FILENAME

SCALE

SHEET
L551



PLAN



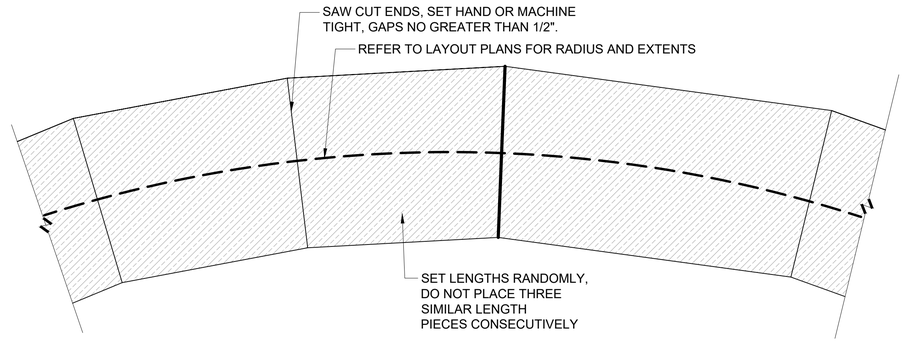
NOTES:

1. ALL BLOCKS TO BE INSTALLED STABLE & SECURELY AND SHALL NOT WOBBLE OR MOVE.
2. REFER TO PLANS FOR WALL LAYOUT

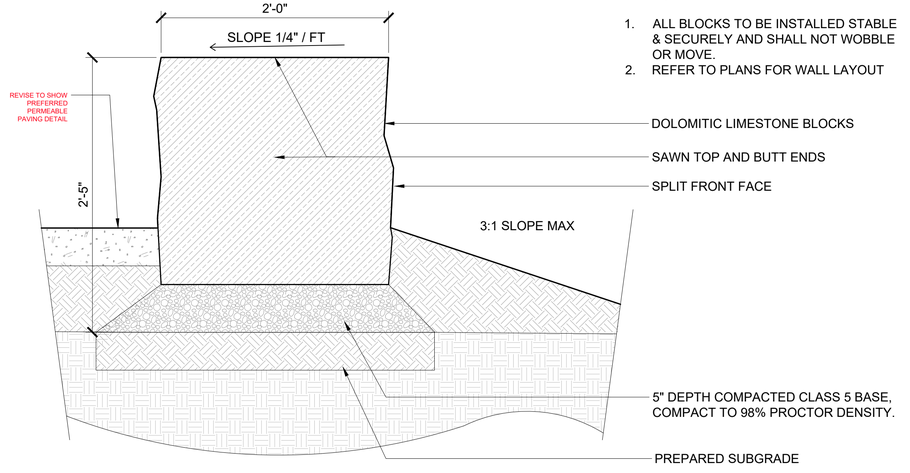
2 DETAIL - WL-02 LIMESTONE SEATWALL @ PLAY AREA

1 1/2" = 1'-0"

P-20.199-107



PLAN



NOTES:

1. ALL BLOCKS TO BE INSTALLED STABLE & SECURELY AND SHALL NOT WOBBLE OR MOVE.
2. REFER TO PLANS FOR WALL LAYOUT

1 DETAIL - WL-01 LIMESTONE SEATWALL @ TRAILHEAD

1 1/2" = 1'-0"

P-20.199-21

MINNEHAHA CREEK WATERSHED DISTRICT

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

LANDSCAPE DETAILS WALL

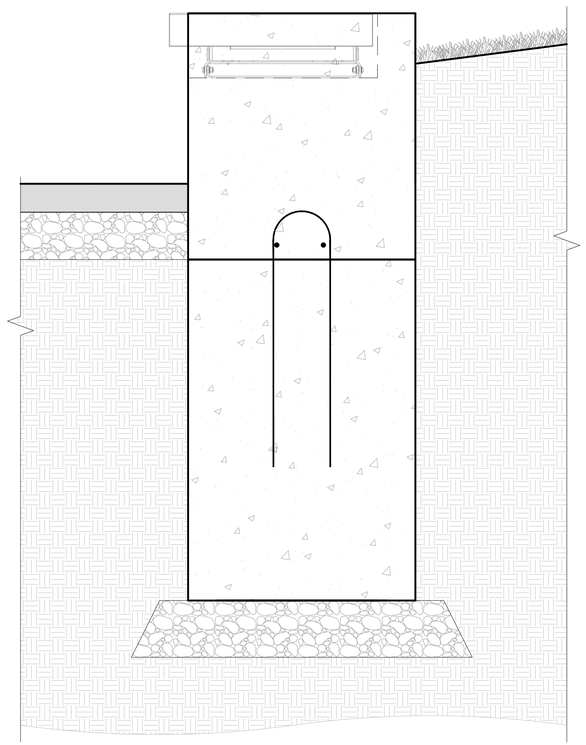
0 1" 2"

FILENAME

SCALE

SHEET

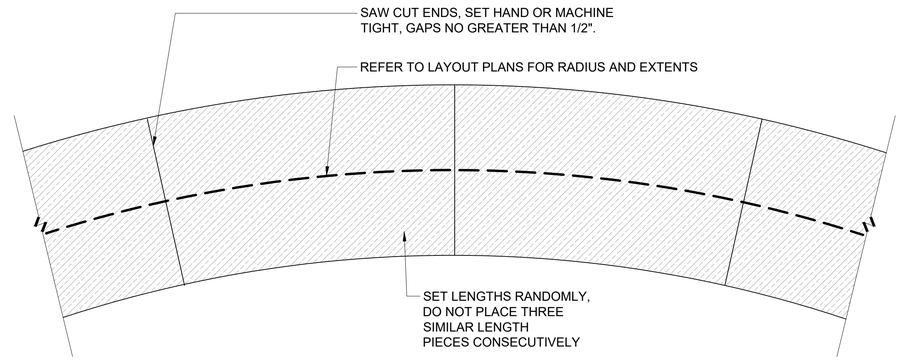
L560



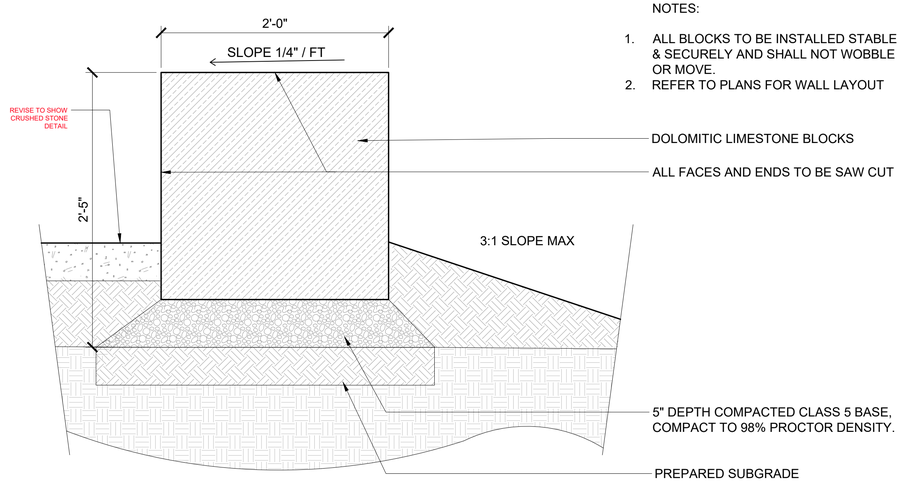
2 DETAIL - WL-04 CIP CONCRETE SEATWALL @ PLAY AREA

1 1/2" = 1'-0"

P-20.199-108



PLAN



NOTES:

1. ALL BLOCKS TO BE INSTALLED STABLE & SECURELY AND SHALL NOT WOBBLE OR MOVE.
2. REFER TO PLANS FOR WALL LAYOUT

1 DETAIL - WL-03 LIMESTONE SEATWALL @ PICNIC AREA

1 1/2" = 1'-0"

P-20.199-133

MINNEHAHA CREEK WATERSHED DISTRICT

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Minneapolis, MN 55401 p: 612.332.7522

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PROJECT NUMBER 10268112

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

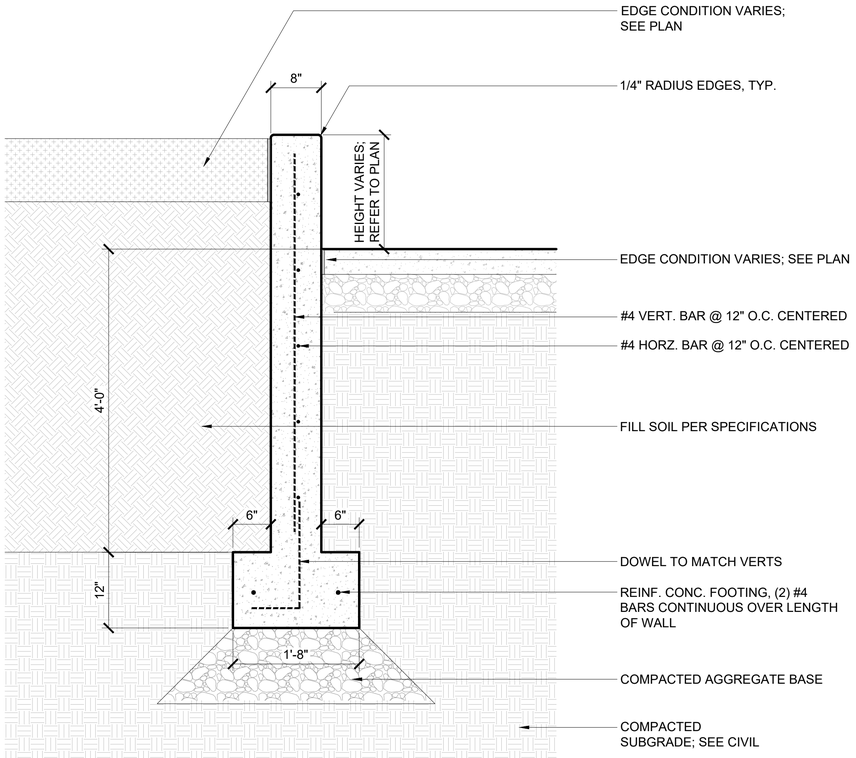
LANDSCAPE DETAILS WALL

0 1" 2"

FILENAME

SCALE

SHEET L561

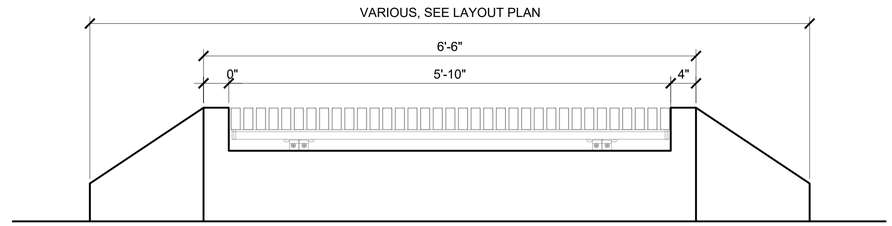


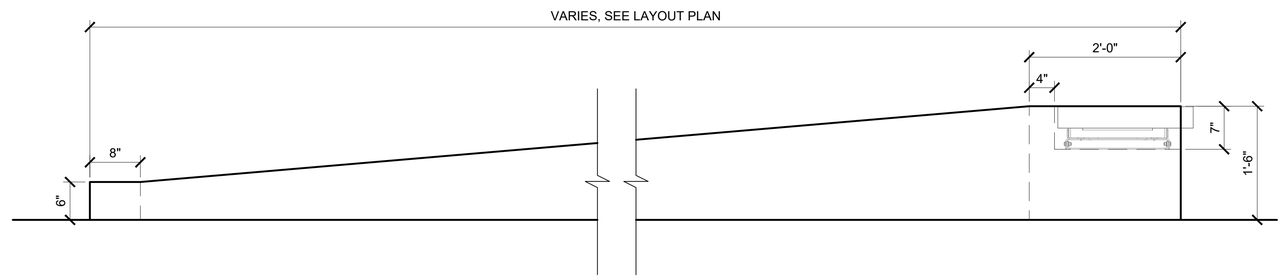
NOTES:
1. EPOXY REBAR TO BE SET 3" MIN. CLEAR FROM FACE OF CIP CONCRETE
2. SEE PLAN FOR SURFACE FINISH

2 DETAIL - WL-03 CIP CONCRETE WALL

1" = 1'-0"

P-20.199-15





1 DETAIL - WL-05 CIP CONCRETE PITCHED SEATWALL @ GATEWAY

1" = 1'-0"

P-20.199-109

MINNEHAHA CREEK WATERSHED DISTRICT

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PROJECT NUMBER 10268112

60% DRAFT
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CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

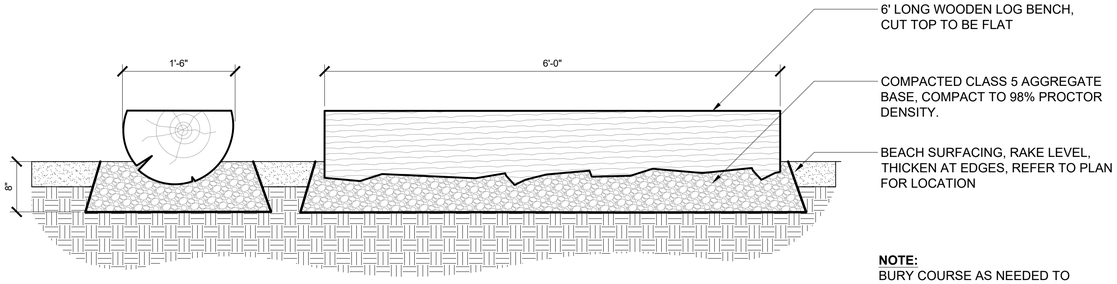
LANDSCAPE DETAILS WALL

0 1" 2"

FILENAME

SCALE

SHEET
L562

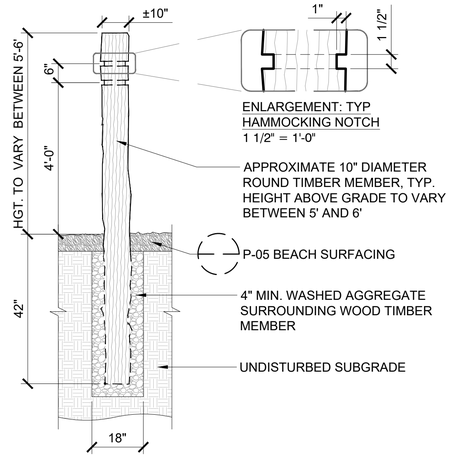


NOTE:
BURY COURSE AS NEEDED TO MEET PROPOSED GRADES. KEEP TOP OF BENCH RELATIVELY LEVEL.

4 DETAIL - SF-04 LOG BENCH

1" = 1'-0"

P-20.199-47



NOTES:

1. ROUND TIMBER MEMBERS TO BE DE-BARKED, SEASONED OR KILN DRIED, BLACK LOCUST SPECIES TREATED WITH INSECTICIDE AND SEALER. WOOD SURFACE TO BE SANDED SMOOTH WITH MINIMUM 80 GRIT. WOOD FORM TO BE SELECTED FOR INTENDED PLAY FEATURE PURPOSE. BRANCHES SMALLER THAN 3" DIA. TO BE REMOVED AND SANDED SMOOTH TO MAIN TRUNK. BRANCHES LARGER THAN 3" DIA. TO REMAIN AS "CHARACTER" AS SHOWN WITH VARIATIONS. CUT ENDS OF BRANCHES SO THAT THEY SHED WATER AND HAVE 1/2" CHAMFER AT THE END CUT. REFER TO SPECIFICATIONS.

2. PROVIDE ENGINEER STAMPED SHOP DRAWINGS. FEATURE TO BE DESIGNED TO WITHSTAND LOADS APPLIED, FOLLOWING ASTM F 1487, SECTION 12.6. LOADS SHALL BE CALCULATED USING SECTIONS 12.3.1 TO 12.5.2 AS APPROPRIATE.

3. FEATURE SHALL BE REVIEWED FOR SHARP POINTS, PROTRUSIONS AND ENTRAPMENT AREAS.

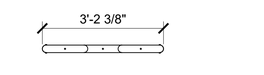
4. CONTRACTOR TO PROVIDE SHOP DRAWINGS OF PLAY FEATURE TO OWNER / LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.

5. FEATURE LOCATION TO BE STAKED FOR REVIEW AND APPROVAL BY OWNER / LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

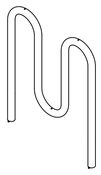
2 DETAIL - SF-02 HAMMOCK POLE

1/2" = 1'-0"

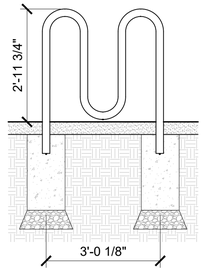
P-20.199-105



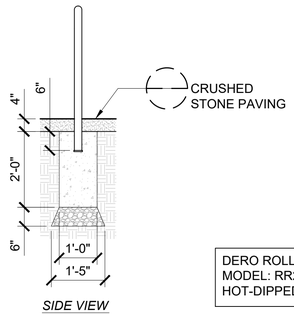
TOP VIEW



AXON VIEW



FRONT VIEW



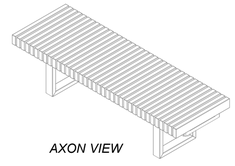
SIDE VIEW

DERO ROLLING BIKE RACK
MODEL: RR2H
HOT-DIPPED GALVANIZED FINISH

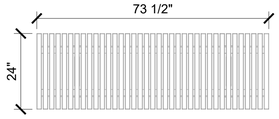
3 DETAIL - SF-03 BIKE RACK

1/2" = 1'-0"

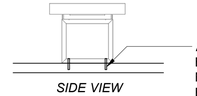
P-20.199-125



AXON VIEW



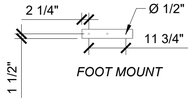
TOP VIEW



SIDE VIEW

ANCHOR TO PAVING BELOW, HARDWARE NOT INCLUDED WITH BENCH

FRONT VIEW



FOOT MOUNT

INF24L6T - ANOVA INFINITY BENCH, REFER TO MANUFACTURER FOR ASSEMBLY INSTRUCTIONS

1 DETAIL - SF-01 LINEAR BENCH

1/2" = 1'-0"

P-20.199-99

MINNEHAHA CREEK WATERSHED DISTRICT

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

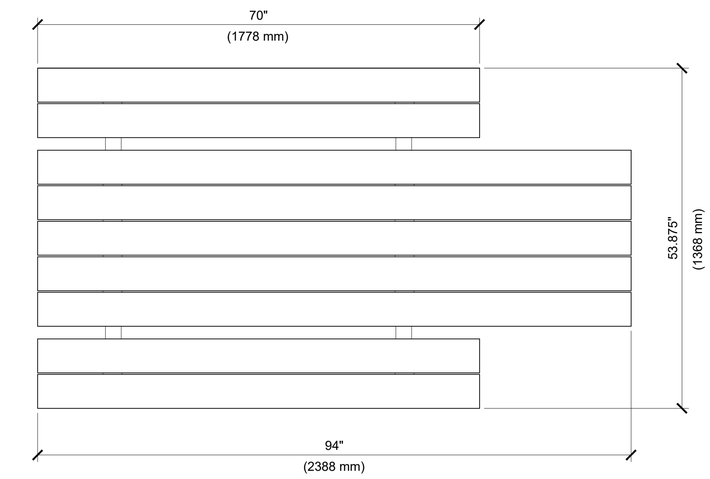
LANDSCAPE DETAILS SITE FURNISHING

0 1" 2"

FILENAME

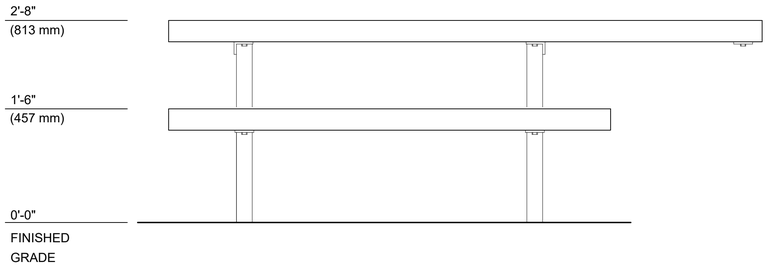
SCALE

SHEET
L570

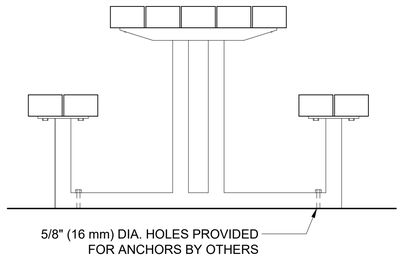


TOP VIEW

COLUMBIA CASCADE COMPANY
TIMBERFORM GREENWAY TABLES
MODEL NO. 2165-6
ACCESSIBLE PICNIC TABLE WITH SEATS



FRONT VIEW



END VIEW

1 DETAIL - SF-05 PICNIC TABLE

1" = 1'-0"

P-20.199-124

MINNEHAHA CREEK
WATERSHED DISTRICT

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

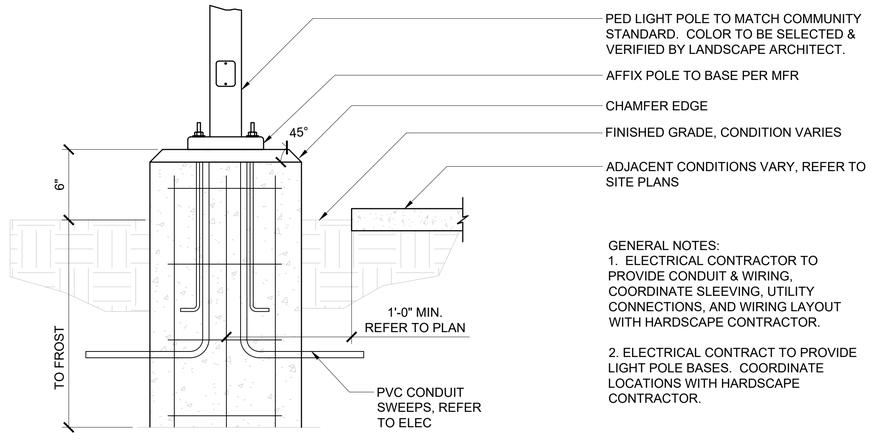
LANDSCAPE DETAILS
SITE FURNISHING

0 1" 2"

FILENAME

SCALE

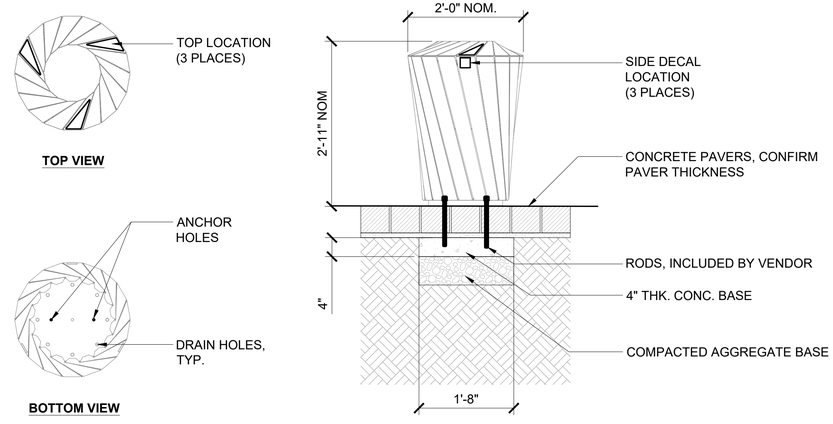
SHEET
L571



GENERAL NOTES:
1. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT & WIRING, COORDINATE SLEEVING, UTILITY CONNECTIONS, AND WIRING LAYOUT WITH HARDSCAPE CONTRACTOR.

2. ELECTRICAL CONTRACT TO PROVIDE LIGHT POLE BASES. COORDINATE LOCATIONS WITH HARDSCAPE CONTRACTOR.

3 DETAIL - LT-01 PEDESTRIAN SCALE POLE LIGHT
1" = 1'-0"
P-20.199-95



1 DETAIL - SF-06 WASTE RECEPTACLE
3/4" = 1'-0"
P-20.199-79

MINNEHAHA CREEK WATERSHED DISTRICT

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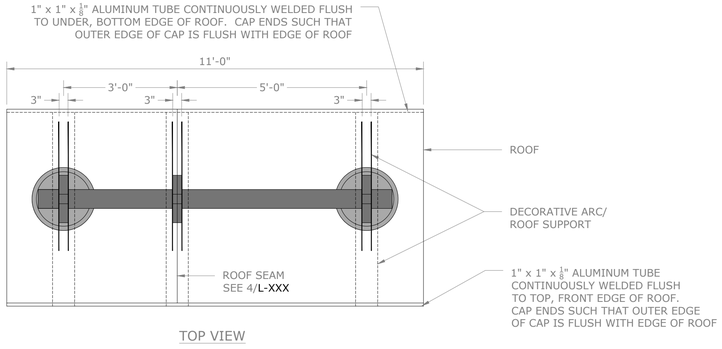
MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

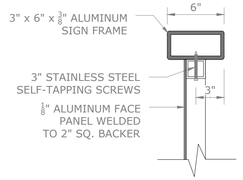
LANDSCAPE DETAILS SITE FURNISHING

0 1" 2"
FILENAME
SCALE

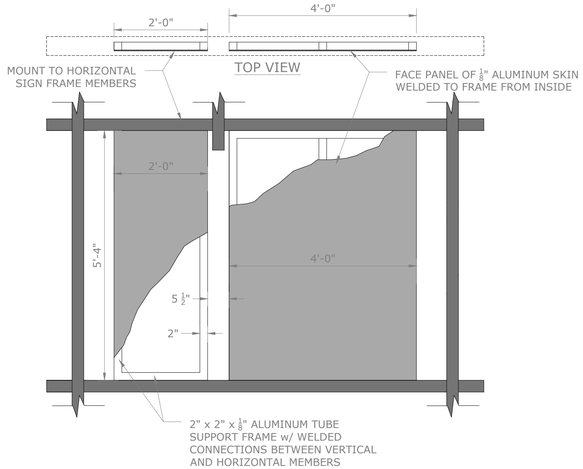
SHEET
L572



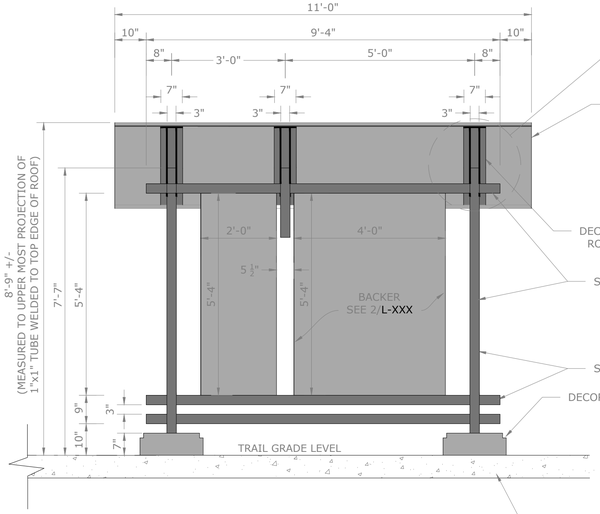
TOP VIEW



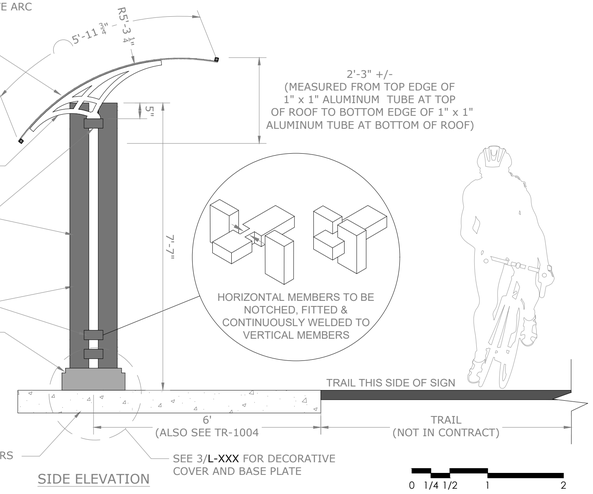
MOUNTING TO SIGN FRAME



ELEVATION
NO SCALE



FRONT ELEVATION



SIDE ELEVATION

0 1/4 1/2 1 2

GENERAL NOTES

SIGNS SHALL HAVE NON-CORROSIVE, CONCEALED FASTENERS, CONCEALED CONTINUOUS WELDS WHERE PRACTICAL, GROUND SMOOTH, FILLED, PRIMED & FINISH PAINTED TO MATCH. NO VISIBLE ATTACHMENT METHODS UNLESS OTHERWISE NOTED.

SIGN TO MEET ALL LOCAL, STATE & NATIONAL CODES.

SIGN FABRICATOR TO PROVIDE SHOP DRAWINGS FOR REVIEW BY OWNER PRIOR TO FABRICATION. SIGN FABRICATOR TO ALLOW OWNER TO REVIEW ASSEMBLED KIOSK PRIOR TO PAINTING.

SIGN FABRICATOR TO PROVIDE COLOR SAMPLES TO OWNER FOR APPROVAL PRIOR TO FABRICATION.

ALL METAL FINISHES TO ACCEPT SPECIFIED FINISHES.

SEE STANDARD PLAN TR-1004 (SHEET **L-XXX**) FOR PLACEMENT OF STRUCTURES.

SIGN COMPONENTS

SIGN FRAME: 3" x 6" ALUMINUM TUBE CONSTRUCTION. ⅜" WALL, SOFTENED SQUARE CORNERS WITH ¼" OUTSIDE RADIUS CORNERS, CONTINUOUS WELD ALL SEAMS, CAPPED ENDS, SEAMLESS, SMOOTH AND DEFECT FREE. HORIZONTAL MEMBERS TO BE NOTCHED, FITTED AND WELDED TO VERTICAL MEMBERS, CONTINUOUS WELD ALL MEMBERS, SEAMLESS, SMOOTH AND DEFECT FREE. FINISH ALL SURFACES WITH **FINISH "A"**.

DECORATIVE ARC/ROOF SUPPORT: ¼" PLATE ALUMINUM, CUT WITH WATER JET - EDGES TO BE SMOOTH AND DEFECT FREE. FASTEN DECORATIVE ARC TO VERTICAL FRAME MEMBERS WITH TAMPER PROOF FLUSH/COUNTERSUNK BOLTS. MECHANICAL ATTACHMENT TO ROOF, ¼" x 7" ALUMINUM PLATE WITH PRE-PUNCHED HOLES TO ATTACH ROOF, CONTINUOUS WELDED TO BASE. FINISH ALL SURFACES WITH **FINISH "A"**.

ROOF: ¼" SHEET ALUMINUM, CURVE ROLL FORMED TO MATCH DECORATIVE ARC/ROOF SUPPORT. 1" x 1" X ⅛" ALUMINUM TUBE TO BE FASTENED FLUSH TO FRONT & REAR EDGES WITH FLATHEAD/FLUSH NUT BOLTS. FINISH ALL SURFACES WITH **FINISH "B"**.

BACKER: 2" x 2" ALUMINUM TUBE CONSTRUCTION WITH ⅛" ALUMINUM SKIN FACE PANEL, SEAMLESS, SMOOTH AND DEFECT FREE. FINISH ALL SURFACES WITH **FINISH "A"**.

DECORATIVE COVER: ¼" ALUMINUM, WELDS CONTINUOUS & SMOOTH, GROUND SMOOTH. PROVIDE FASTENING TABS AND STAINLESS STEEL TAMPER PROOF FASTENER ASSEMBLY. FINISH ALL SURFACES WITH **FINISH "A"**.

FINISH SCHEDULE

FINISH "A": DIRECT-TO-METAL (DTM) URETHANE MASTIC (PPG DURETHANE OR APPROVED EQUAL) TO MATCH PANTONE 7546C (DEEP GREY).

FINISH "B": DIRECT-TO-METAL (DTM) URETHANE MASTIC (PPG DURETHANE OR APPROVED EQUAL) TO MATCH MATTHEWS MP13362 (TO MATCH THE LOOK OF COR-TEN STEEL).

1 DETAIL - AM-01 TRAIL KIOSK

P-20.199-119

MINNEHAHA CREEK WATERSHED DISTRICT

DF/ DAMON FARBER LANDSCAPE ARCHITECTS
401 North 2nd Avenue, Suite 410
Minneapolis, MN 55401 p: 612.332.7522

ISSUE	DATE	DESCRIPTION
0	02-18-2022	60% DRAFT FOR CLIENT REVIEW

PROJECT MANAGER ANDREW F. JUDD

PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

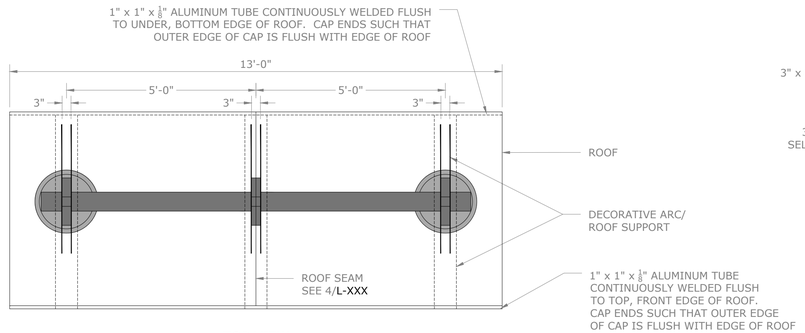
LANDSCAPE DETAILS AMENITY

0 1" 2"

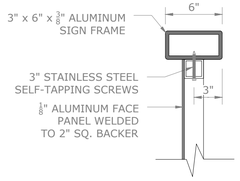
FILENAME

SCALE

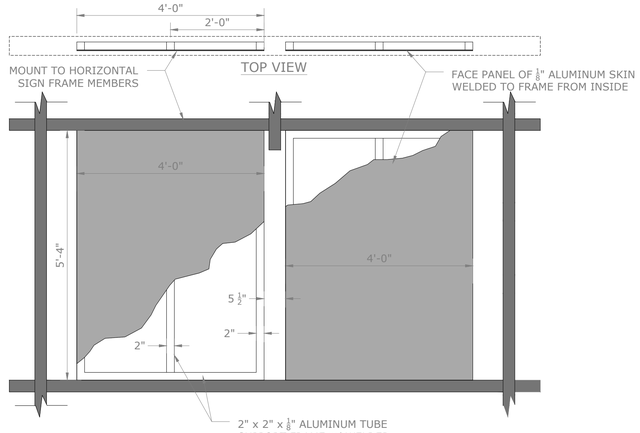
SHEET
L580



TOP VIEW

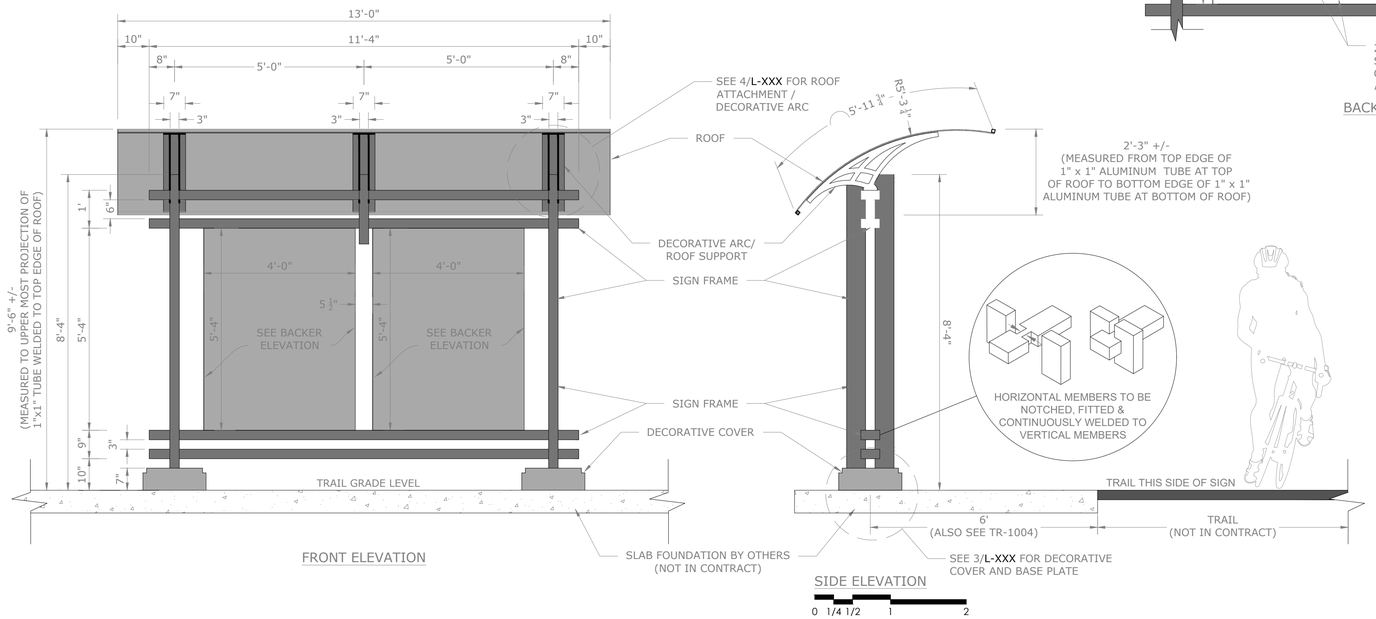


MOUNTING TO SIGN FRAME



BACKER ELEVATION

NO SCALE



FRONT ELEVATION

SIDE ELEVATION

0 1/4 1/2 1 2

GENERAL NOTES

SIGNS SHALL HAVE NON-CORROSIVE, CONCEALED FASTENERS, CONCEALED CONTINUOUS WELDS WHERE PRACTICAL, GROUND SMOOTH, FILLED, PRIMED & FINISH PAINTED TO MATCH. NO VISIBLE ATTACHMENT METHODS UNLESS OTHERWISE NOTED.

SIGN TO MEET ALL LOCAL, STATE & NATIONAL CODES.

SIGN FABRICATOR TO PROVIDE SHOP DRAWINGS FOR REVIEW BY OWNER PRIOR TO FABRICATION. SIGN FABRICATOR TO ALLOW OWNER TO REVIEW ASSEMBLED KIOSK PRIOR TO PAINTING.

SIGN FABRICATOR TO PROVIDE COLOR SAMPLES TO OWNER FOR APPROVAL PRIOR TO FABRICATION.

ALL METAL FINISHES TO ACCEPT SPECIFIED FINISHES.

SEE STANDARD PLAN TR-1004 (SHEET **L-XXX**) FOR PLACEMENT OF STRUCTURES.

SIGN COMPONENTS

SIGN FRAME: 3" x 6" ALUMINUM TUBE CONSTRUCTION. ⅜" WALL, SOFTENED SQUARE CORNERS WITH ¼" OUTSIDE RADIUS CORNERS, CONTINUOUS WELD ALL SEAMS, CAPPED ENDS, SEAMLESS, SMOOTH AND DEFECT FREE. HORIZONTAL MEMBERS TO BE NOTCHED, FITTED AND WELDED TO VERTICAL MEMBERS, CONTINUOUS WELD ALL MEMBERS, SEAMLESS, SMOOTH AND DEFECT FREE. FINISH ALL SURFACES WITH **FINISH "A"**.

DECORATIVE ARC/ROOF SUPPORT: ¼" PLATE ALUMINUM, CUT WITH WATER JET - EDGES TO BE SMOOTH AND DEFECT FREE. FASTEN DECORATIVE ARC TO VERTICAL FRAME MEMBERS WITH TAMPER PROOF FLUSH/COUNTERSUNK BOLTS. MECHANICAL ATTACHMENT TO ROOF, ¼" x 7" ALUMINUM PLATE WITH PRE-PUNCHED HOLES TO ATTACH ROOF, CONTINUOUS WELDED TO BASE. FINISH ALL SURFACES WITH **FINISH "A"**.

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1 DETAIL - AM-02 SYSTEM KIOSK

P-20.199-122

MINNEHAHA CREEK WATERSHED DISTRICT

DF/ DAMON FARBER LANDSCAPE ARCHITECTS
401 North 2nd Avenue, Suite 410
Minneapolis, MN 55401 p: 612.332.7522

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PROJECT NUMBER 10268112

60% DRAFT SUBMITTAL FOR CLIENT REVIEW

325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

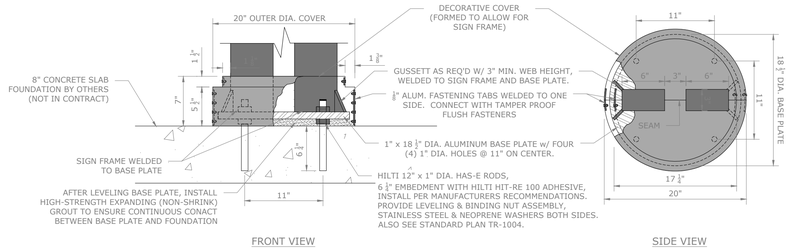
LANDSCAPE DETAILS AMENITY

0 1" 2"

FILENAME

SCALE

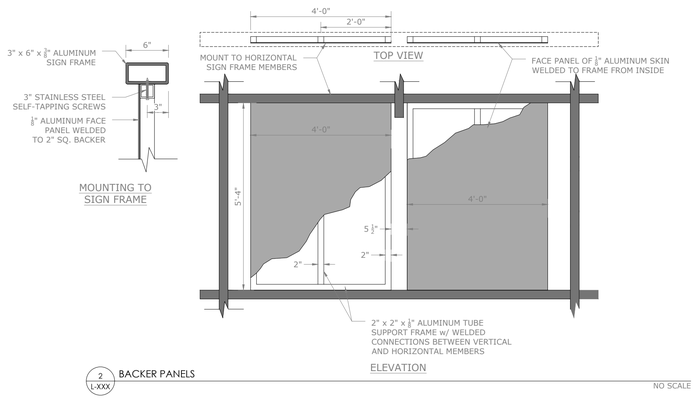
SHEET **L581**



3 DETAIL - AM-01 & AM-02 KIOSK DECORATIVE COVER AND BASE PLATE

NTS

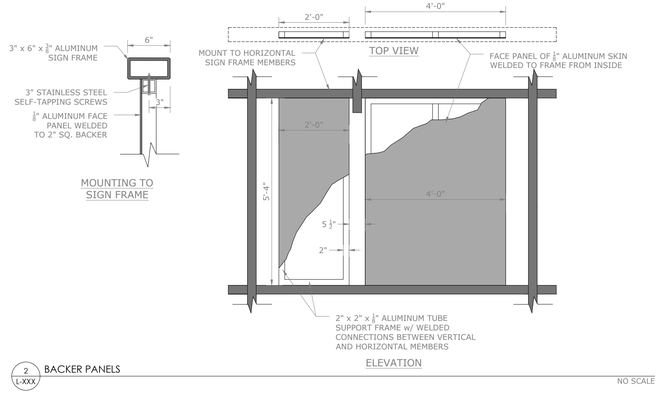
P-20.199-117



2 DETAIL - AM-02 SYSTEM KIOSK, BACKER PLANELS

3/8" = 1'-0"

P-20.199-120



1 DETAIL - AM-01 TRAIL KIOSK, BACKER PLANELS

3/8" = 1'-0"

P-20.199-121

MINNEHAHA CREEK WATERSHED DISTRICT

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PROJECT NUMBER 10268112

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MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

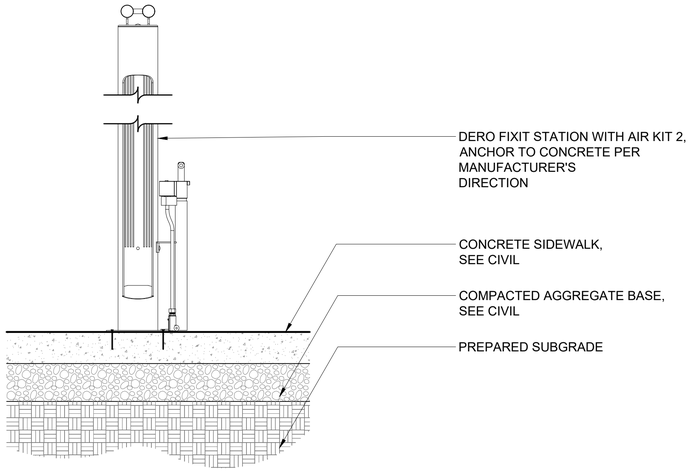
LANDSCAPE DETAILS AMENITY

0 1" 2"

FILENAME

SCALE

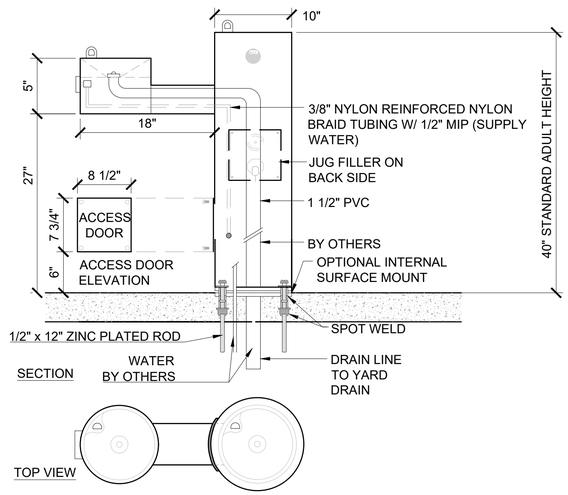
SHEET
L582



3 DETAIL - AM-09 BIKE FIX-IT STATION

1" = 1'-0"

P-20.199-58



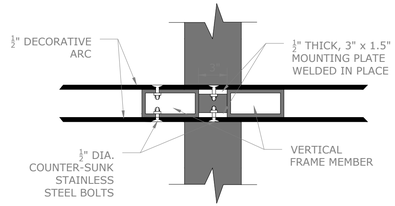
NOTES:

1. MEETS ADA REGULATIONS.
2. OPTIONAL STAINLESS STEEL SURFACE CARRIER RECOMMENDED.
3. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
4. DO NOT SCALE DRAWING.
5. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY. THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION.
6. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.

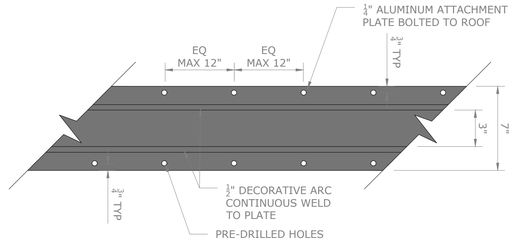
2 DETAIL - AM-08 DRINKING FOUNTAIN

1" = 1'-0"

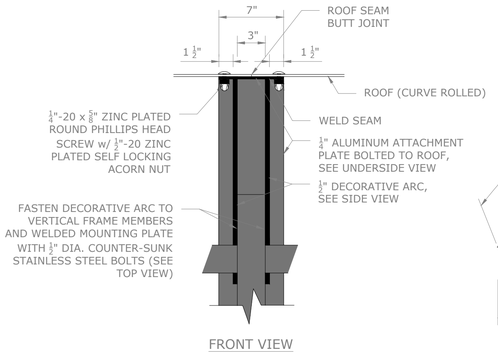
P-20.199-115



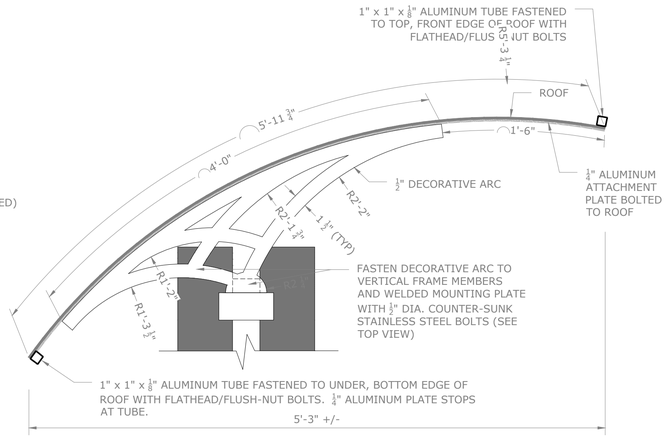
TOP VIEW - DECORATIVE ARC ATTACHMENT TO VERTICAL FRAME



UNDERSIDE VIEW - ATTACHMENT PLATE



FRONT VIEW



SIDE VIEW - DECORATIVE ARC

1 DETAIL - AM-01 & AM-02 KIOSK ROOF ATTACHMENT / DECORATIVE ARC

NTS

P-20.199-123

MINNEHAHA CREEK WATERSHED DISTRICT

DF/ DAMON FARBER LANDSCAPE ARCHITECTS
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Minneapolis, MN 55401 p: 612.332.7522

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PROJECT NUMBER 10268112

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

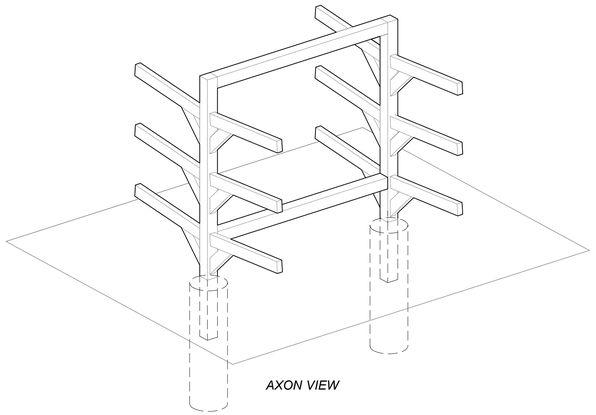
LANDSCAPE DETAILS AMENITY

0 1" 2"

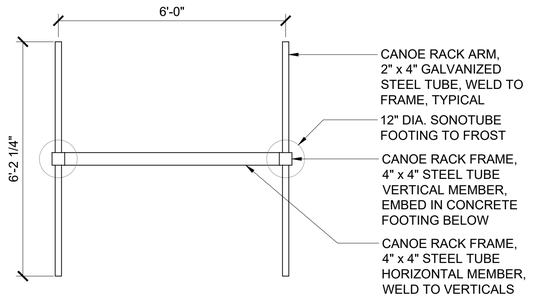
FILENAME

SCALE

SHEET
L583

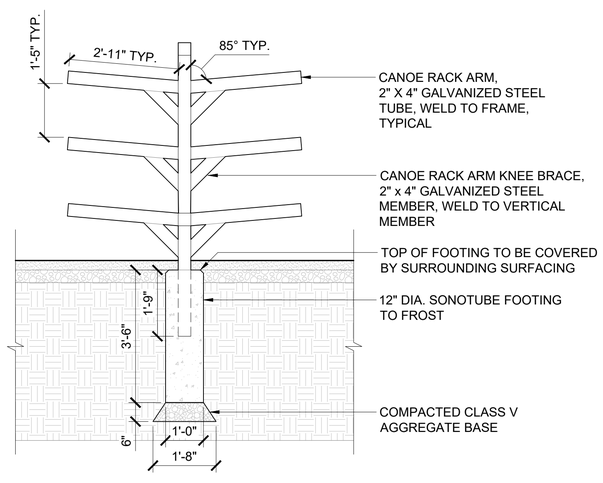


AXON VIEW

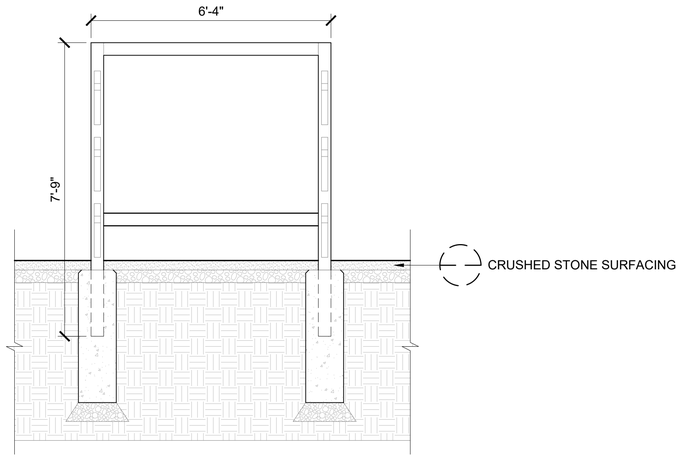


TOP VIEW

CUSTOM STEEL CANOE RACK, PROVIDE SHOP DRAWINGSS FOR APPROVAL BY LANDSCAPE ARCHITECT



SIDE VIEW



FRONT VIEW

1 DETAIL - AM-06 CANOE RACK

1/2" = 1'-0"

P-20.199-116

MINNEHAHA CREEK WATERSHED DISTRICT

DF/ DAMON FARBER LANDSCAPE ARCHITECTS
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Minneapolis, MN 55401 p: 612.332.7522

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

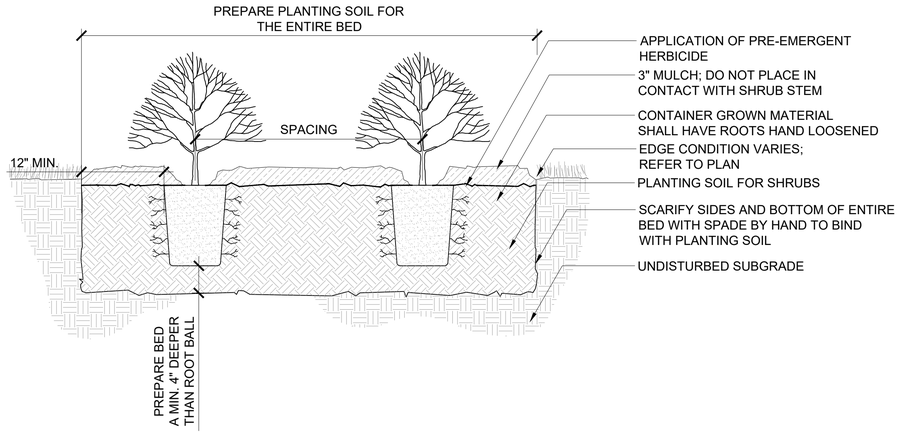
LANDSCAPE DETAILS AMENITY

0 1" 2"

FILENAME

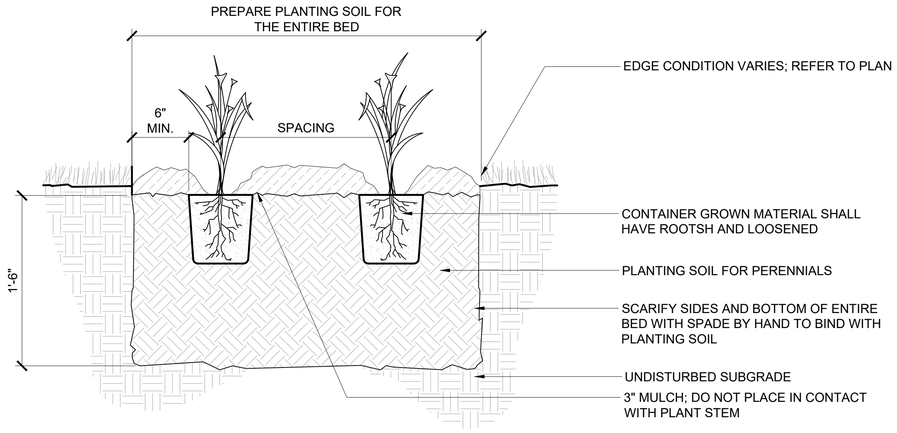
SCALE

SHEET L584



3 DETAIL - SHRUB PLANTING

1" = 1'-0" P-20.199-08

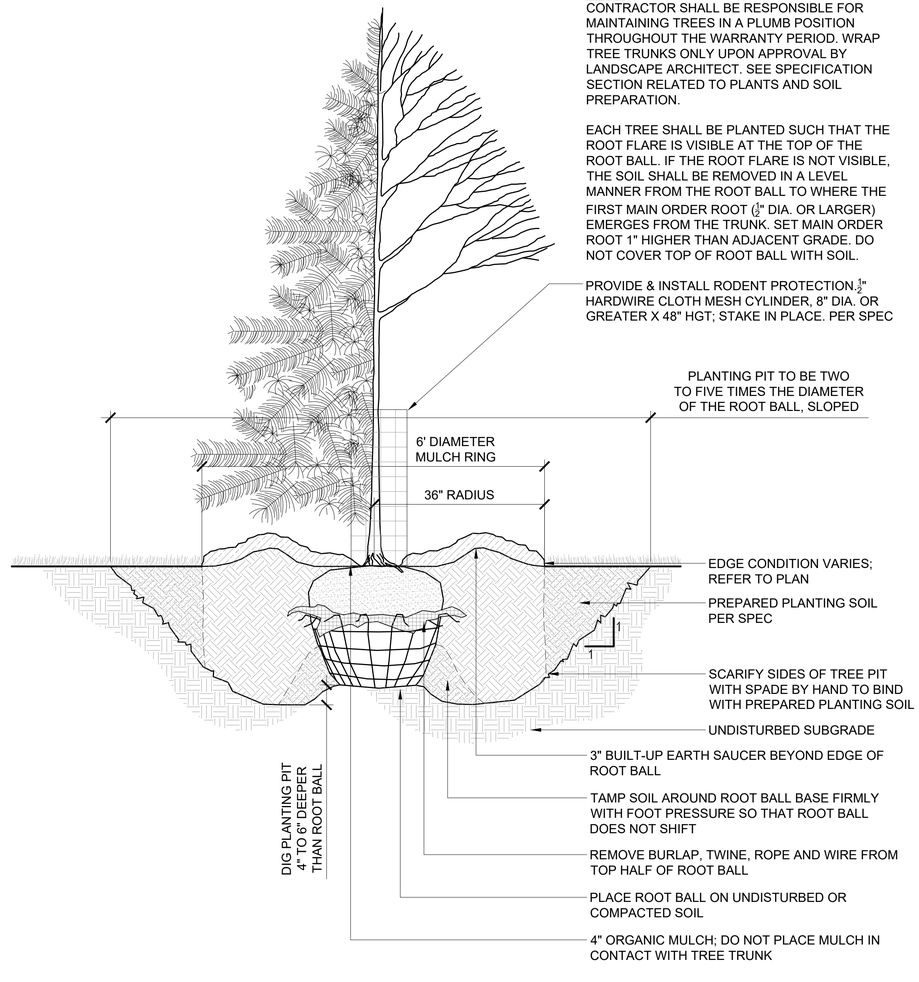


2 DETAIL - PERENNIAL PLANTING

1 1/2" = 1'-0" P-20.199-06

NOTE:
CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING TREES IN A PLUMB POSITION THROUGHOUT THE WARRANTY PERIOD. WRAP TREE TRUNKS ONLY UPON APPROVAL BY LANDSCAPE ARCHITECT. SEE SPECIFICATION SECTION RELATED TO PLANTS AND SOIL PREPARATION.

EACH TREE SHALL BE PLANTED SUCH THAT THE ROOT FLARE IS VISIBLE AT THE TOP OF THE ROOT BALL. IF THE ROOT FLARE IS NOT VISIBLE, THE SOIL SHALL BE REMOVED IN A LEVEL MANNER FROM THE ROOT BALL TO WHERE THE FIRST MAIN ORDER ROOT ($\frac{1}{2}$" DIA. OR LARGER) EMERGES FROM THE TRUNK. SET MAIN ORDER ROOT 1" HIGHER THAN ADJACENT GRADE. DO NOT COVER TOP OF ROOT BALL WITH SOIL.



1 DETAIL - TREE PLANTING

3/4" = 1'-0" P-20.199-05

MINNEHAHA CREEK WATERSHED DISTRICT

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

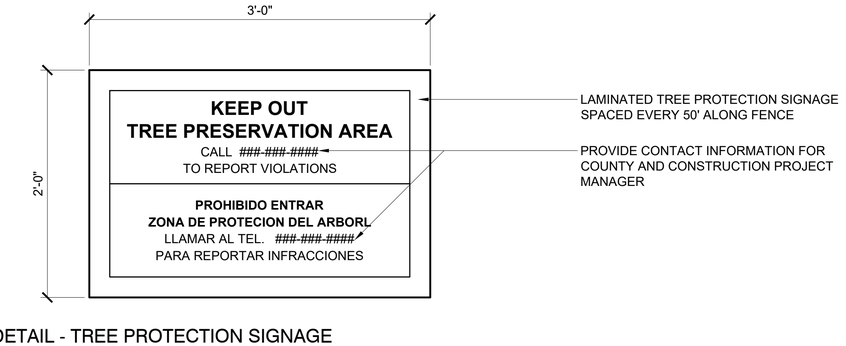
LANDSCAPE DETAILS PLANTING

0 1" 2"

FILENAME

SCALE

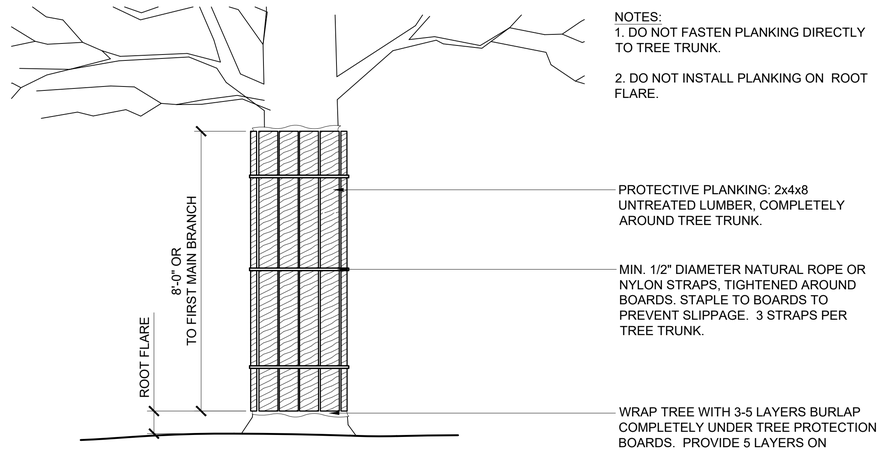
SHEET
L590



3 DETAIL - TREE PROTECTION SIGNAGE

1 1/2" = 1'-0"

P-20.199-69



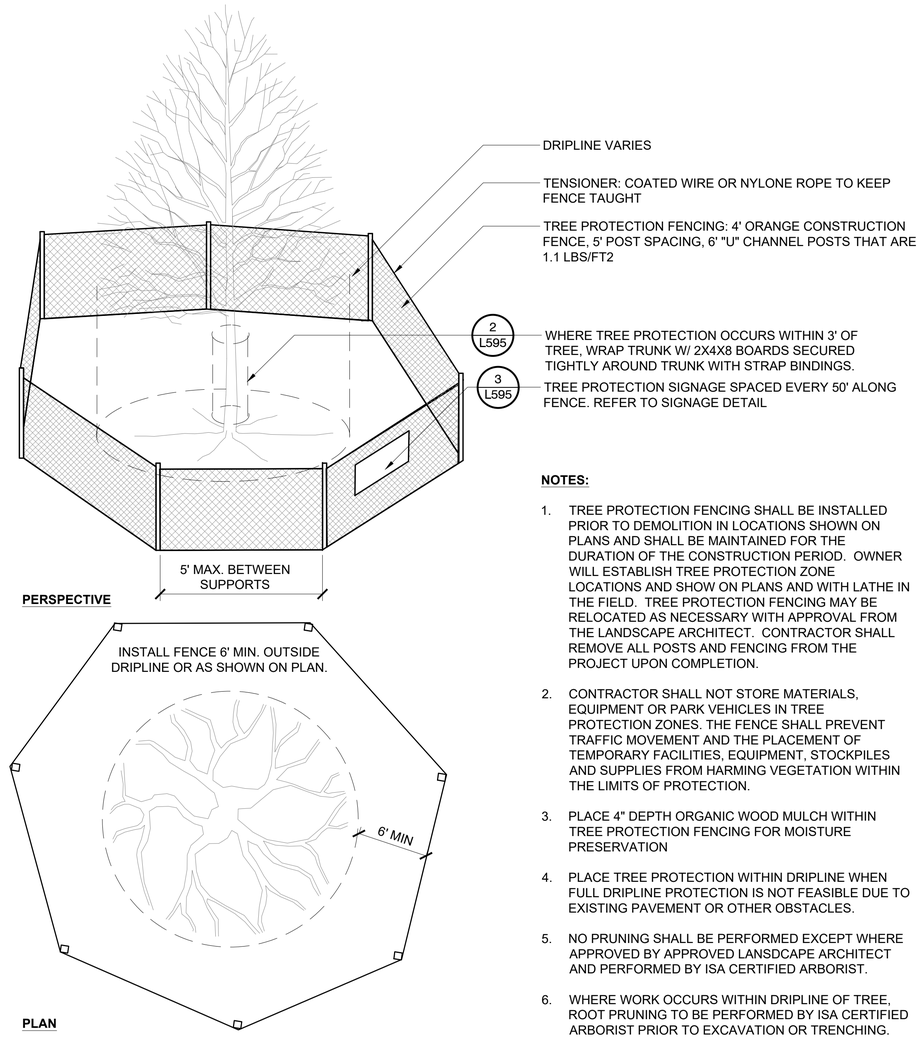
NOTES:
1. DO NOT FASTEN PLANKING DIRECTLY TO TREE TRUNK.

2. DO NOT INSTALL PLANKING ON ROOT FLARE.

2 DETAIL - TRUNK PROTECTION

1" = 1'-0"

P-20.199-71



NOTES:

1. TREE PROTECTION FENCING SHALL BE INSTALLED PRIOR TO DEMOLITION IN LOCATIONS SHOWN ON PLANS AND SHALL BE MAINTAINED FOR THE DURATION OF THE CONSTRUCTION PERIOD. OWNER WILL ESTABLISH TREE PROTECTION ZONE LOCATIONS AND SHOW ON PLANS AND WITH LATHE IN THE FIELD. TREE PROTECTION FENCING MAY BE RELOCATED AS NECESSARY WITH APPROVAL FROM THE LANDSCAPE ARCHITECT. CONTRACTOR SHALL REMOVE ALL POSTS AND FENCING FROM THE PROJECT UPON COMPLETION.

2. CONTRACTOR SHALL NOT STORE MATERIALS, EQUIPMENT OR PARK VEHICLES IN TREE PROTECTION ZONES. THE FENCE SHALL PREVENT TRAFFIC MOVEMENT AND THE PLACEMENT OF TEMPORARY FACILITIES, EQUIPMENT, STOCKPILES AND SUPPLIES FROM HARMING VEGETATION WITHIN THE LIMITS OF PROTECTION.

3. PLACE 4" DEPTH ORGANIC WOOD MULCH WITHIN TREE PROTECTION FENCING FOR MOISTURE PRESERVATION

4. PLACE TREE PROTECTION WITHIN DRIPLINE WHEN FULL DRIPLINE PROTECTION IS NOT FEASIBLE DUE TO EXISTING PAVEMENT OR OTHER OBSTACLES.

5. NO PRUNING SHALL BE PERFORMED EXCEPT WHERE APPROVED BY APPROVED LANSDCAPE ARCHITECT AND PERFORMED BY ISA CERTIFIED ARBORIST.

6. WHERE WORK OCCURS WITHIN DRIPLINE OF TREE, ROOT PRUNING TO BE PERFORMED BY ISA CERTIFIED ARBORIST PRIOR TO EXCAVATION OR TRENCHING.

1 DETAIL - TREE PROTECTION FENCE

1 1/2" = 1'-0"

P-20.199-28

MINNEHAHA CREEK WATERSHED DISTRICT

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325 BLAKE RD REGIONAL STORMWATER AND GREENWAY

MINNEHAHA CREEK WATERSHED DISTRICT
325 BLAKE RD
HOPKINS, MN 55343

LANDSCAPE DETAILS TREE PROTECTION

0 1" 2"

FILENAME

SCALE

SHEET
L595

Draft Operation, Maintenance, and Monitoring Plan

325 Blake Road Restoration and Redevelopment

Regional Stormwater Improvements and Greenway Enhancement

Minnehaha Creek Watershed District
February 2022

Table of Contents

Figures

Tables

Appendices

DRAFT

1. Introduction

The *325 Blake Road Regional Stormwater and Greenway Project (the project)* consists of the restoration and water-centric redevelopment of a site located adjacent to Minnehaha Creek, premised on a vision of Balanced Urban Ecology. The site is comprised of 4 parcels and one outlot that total 17.81 acres (see *Figure 1.1: Site Parcels)*, with the primary parcel (A) being subdivided between the Developer (Alatus) and Minnehaha Creek Watershed District (*the District*). The project is situated in the lower Minnehaha Creek watershed, approximately 7.3 river miles downstream of Grays Bay dam on Lake Minnetonka where the headwaters of Minnehaha Creek are formed, and approximately 11.5 river miles upstream of Lake Hiawatha. Minnehaha Creek's confluence with the Mississippi River is located roughly 13.9 river miles downstream of the project site.

The project includes stormwater management BMPs and recreational facilities situated along Minnehaha Creek and the Cedar Lake LRT Regional Trail, within the Minnehaha Creek Greenway. Stormwater runoff from the Powell Road subwatershed (226 acres) and Lake Street subwatershed (30.3 acres) drains into the project through diversions of the mainline storm sewers. The diversions will fully divert small storms and the first flush of larger storms into the regional stormwater pond. When the diversions reach capacity, the remaining overflow discharges to existing offsite storm sewer outfalls.

This Operations, Maintenance, and Monitoring (OMM) plan outlines specific tasks recommended to maintain the District's regional stormwater treatment system and associated project features .

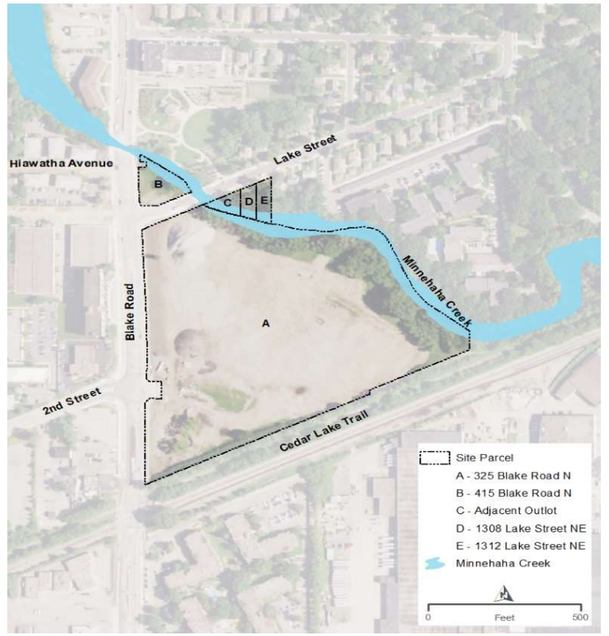

Figure 1.1: Site Parcels.

Cooperative Agreement and Associated Responsibilities

Project development was performed in partnership with Alatus, the developer of the non-District portions of the site. The District and Alatus have entered into a cooperative agreement for long-term operation and maintenance of various project features, including contractually defined responsibilities for various project infrastructure. The primary project parcel at 325 Blake Road North has defined ownership and development boundaries, with MCWD overseeing the public realm (Trailhead and Overlook, Stormwater Ponds, The Landing, Nature-Based Play Area, and the Gateway to Greenway) and Alatus overseeing the mixed-use development located adjacent to the public realm components of the site. Project components and parties responsible for operation, maintenance, and monitoring of said components, are summarized in Section 2. Note that the maintenance responsibilities outlined below may not strictly follow the extents of the site development and subdivision. These cases will be specifically noted in Section 2.

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2. Project Components

The project features several stormwater components that require routine operation, maintenance, and monitoring to achieve the goals set forth by the District. Other site amenities and infrastructure will require ongoing operation and maintenance; however this plan focuses solely on the maintenance of stormwater management components. Refer to Project Drawings for construction information and the Project Design Memo for narrative descriptions of project components. Table 2.1 displays a matrix of the stormwater project components of the overall site relative to required maintenance activities and their frequency.

Table 2.1: Project Components

Project Component	Responsible Party – update per agreement	Maintenance Activities*																
		Weekly	Monthly		Monthly - Growing Season		Annually - Late Fall				As Needed Based on Inspection							
		Litter Removal	Drainage Structure Clearing	Flow Path Clearing	Mowing	Weed Control	Maintenance & Monitoring Structure Clearing	Vegetation Harvesting	Pruning	Winterization	Pump Maintenance	Nutrient Separating Baffle Box Maintenance	Drainage Structure Maintenance	Pipe Maintenance	Dredging*	Graffitti Removal	Minor Concrete/ Masonry Repair	Planting	Erosion Repair
Powell Road and Lake Street Diversion Storm Sewers	MCWD	✓	✓	✓			✓			✓			✓	✓		✓	✓		
Nutrient Separating Baffle Boxes (NSBBs)	MCWD	✓	✓							✓		✓				✓	✓		
North Pond	MCWD	✓	✓	✓	✓	✓		✓	✓				✓		✓	✓	✓	✓	✓
South Pond	MCWD	✓	✓	✓	✓	✓		✓	✓				✓		✓	✓	✓	✓	✓
Weir Wall	MCWD	✓														✓	✓		
Outlet Structure	MCWD	✓	✓				✓						✓			✓	✓		✓
Private Development BMPs	Alatus	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓		✓	✓	✓	✓
Private Development Storm Sewer	Alatus	✓	✓	✓			✓			✓			✓	✓		✓	✓		
Cascade and Associated BMPs	Alatus	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓		✓	✓	✓	✓
Boathouse, Pumps, and Associated Piping	Alatus	✓					✓			✓	✓			✓		✓	✓		

*See Table 4.1 for detailed description and recommended frequency of routine maintenance activities.

3. Site Safety and Contacts

Safety precautions should be observed while performing any maintenance, inspection, or monitoring activities associated with the site's stormwater management systems. When potentially hazardous conditions arise, O&M personnel should remove themselves from the situation and secure the site to the maximum extent possible. Any safety concerns that may continue to be present beyond the maintenance, inspection, or monitoring event or potentially impact the safety of the public or other site personnel.

Potential hazards for O&M personnel include but are not limited to:

- Extremely hot or cold weather.
- Heavy equipment and machinery.
- Sloped surfaces
- Confined space
- Insects and wildlife
- Deep water

Onsite safety meetings to discuss potential safety concerns, shall be performed prior to conducting any O&M activities. All maintenance activities must be performed according to Federal, State, and Local regulations. Entry into confined spaces should only be performed by certified professionals.

To the maximum extent possible vehicle use should be limited to designated path areas. Partial closure of paths, or drive aisles may be required for certain maintenance tasks, specifically those requiring specialized equipment such as vacuum trucks. Use of the pond's maintenance bench should be limited to light-weight vehicles with tight turning radii, such as mowers.

The operation, maintenance, and monitoring of the Blake Road project will include coordination between multiple parties. The following list provides a primary list of points of contact for the project.

Contacts – to be filled in as responsibilities are defined

- Minnehaha Watershed District Site Contact –
- Alatus Site Contact –
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4. Operation and Maintenance

Table 4.1 provides a reference for anticipated maintenance activities and the recommended frequency at which this maintenance should be performed. This table intends to cover the majority of anticipated maintenance tasks, however additional maintenance needs beyond those outlined in the table, such as full replacement of site features, may be necessary. Should this situation occur, maintenance responsibility will be incurred by the party responsible for the site component as defined in Table 2.1.

All maintenance activities should be performed in a manner that reasonably limits impacts to the surrounding natural environment and other site features. Each party is responsible for the in-kind replacement of facilities impacted by maintenance and other activities that they perform.

Each maintenance activity includes an anticipated expense/effort per maintenance event. The following numbers are only estimates, and may vary based on several factors, such as extent of maintenance required and the ability to combine multiple maintenance tasks into a single maintenance event:

- Low – Maintenance personnel require minimal specialized training and equipment, expense expected to be less than $2,000 per event
- Moderate – Maintenance personnel require some specialized training and equipment, expense expected to be between $2,000 and $10,000 per event
- High - Maintenance personnel require significantly specialized training and equipment, expense expected to be between more than $10,000 per event.

Table 4.1 Routine Maintenance

Maintenance Activity	Description	Frequency	Expense/Effort
Litter Removal	Removal of trash, debris, and litter from site areas and accessible structures, and accessible pond areas.	Weekly	Low
Drainage Structure Clearing	Clear structures and grates to facilitate proper function of drainage structures.	Monthly	Low
Flow Path Clearing	Remove obstructions and debris to promote proper overland flow.	Monthly	Low
Mowing	Mow lawns, 3-foot wide strip along pedestrian areas, and pond maintenance bench. String trimming permitted in difficult to reach areas.	Monthly during growing season	Low
Weed Control	Remove and/or control of noxious or invasive weeds.	Monthly during growing season	Low
Maintenance & Monitoring Structure Clearing	Locate and clear access promote ease of inspection and monitoring. Remove excessive vegetation and debris.	Annually in late Fall	Low
Vegetation Harvesting	Trim back wetland vegetation to a height of 8 inches.	Annually in late Fall	Low
Pruning	Prune woody vegetation within 5 feet of pedestrian areas for proper structure, removal of dead limbs, and 14-foot vertical clearance.	Annually in late Fall	Moderate
Winterization	Turn off pumps, drain hoses. Spray rusted or likely to freeze appurtenances with lubricant.	Annually in late Fall	Low
Pump Maintenance	Perform routine service to promote proper function.	As needed based on inspection	Moderate
Nutrient Separating Baffle Box Maintenance	Jet/Vac Baffle Box per maintenance requirements to remove sediment and debris.	As needed based on inspection	High
Drainage Structure Maintenance	Jet/Vac sumped Drainage Structures to remove sediment and debris. Dewatering may be necessary.	As needed based on inspection	High
Pipe Maintenance	Jet pipes.	As needed based on inspection	Moderate
Dredging*	Remove submerged sediment and debris from pond bottom to restore original design elevations.	As needed based on inspection	High

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Maintenance Activity	Description	Frequency	Expense/Effort
Graffiti Removal	Remove graffiti, repaint surfaces.	As needed based on inspection	Low
Minor Concrete/ Masonry Repair	Repair spalling, cracking, or displaced/loose concrete or masonry site components.	As needed based on inspection	Moderate
Planting	Replant bare areas greater than 1,000 square feet with native plantings based on the original planting plan.	As needed based on inspection	Moderate
Erosion Repair	Remove debris and restore surface flow paths, access paths, and sideslopes to design elevations. Restore undermined structures.	As needed based on inspection	Low

*See Dredging Sub-section below

In addition to routine maintenance tasks, corrective maintenance may be needed as site conditions require. Corrective maintenance requests may result from a formal site inspection, or a simple observation from a site owner, staff, or member of the community. When corrective maintenance is required, it is critical that maintenance personnel be provided with a list of maintenance tasks to be completed from the site owner or inspector prior to performing maintenance. Additional details of inspection requirements are included below.

Dredging

Based on existing knowledge of site groundwater and geotechnical conditions, draining and dewatering of the ponds may be complex and cost-intensive. As such, it is recommended that when the pond(s) require dredging, a “wet dredging” approach is considered.

Wet Dredging may be conducted through a combination of shoreline truck, barge, or the use of geotextile tubes. Because the basin bottom will be submerged during wet dredging, it is critical that rod-measurement of removed sediment be conducted prior to, during, and following the dredging event to understand accurate quantities of sediment removed. Dredged material should be tested for potential contamination prior to removal from the site. Contaminated materials may be subject to special requirements for re-use, disposal, or land application.

The need for dredging will be established through inspection and/or monitoring. Sediment depths should be estimated by a using a measuring rod at several points within the pond to providing an approximate measurement of sediment depth. A Minnesota company called BioBase provides sonar equipment and analysis for a sonar approach as an alternative to rod measurement, but sonar should not be used for measuring dredge quantities during construction.

When the average sediment depth is approaching 3 feet, the District should begin planning for a near-term dredge project. Additionally, if pond outlet monitoring indicates a consistent degradation in water quality, it may be due to sediment resuspending within the pond and the need for dredging should be evaluated.

Records should be kept of any dredging project that is planned, designed, and performed.

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5. Inspection & Monitoring Program

Inspection

Inspection of all site components shall be performed regularly to reduce the risk of hazards and future maintenance costs. Inspections shall follow the same responsible party breakdown as maintenance activities, as indicated in Table 2.1. An inspection report (Appendix B) should be completed during each inspection. This inspection report should be used my maintenance crews to describe corrective maintenance requirements. Documentation, including inspection reports and records of resulting corrective maintenance, will be shared between the District and Alatus, and kept on file for the life of the project.

In addition to inspections occurring at regular time intervals, inspections will also be performed following major storm events. A major storm event is defined as a rainfall event in excess of 1.5 inches in 24 hours, or an event in which intense rainfall, winds, freezing rain, or other natural phenomena could reasonably affect site function.

Inspection activities, recommended frequencies, and suggested corrective maintenance activities to remediate deficiencies are provided in the following tables. Inspections are divided into categories based on similarities in scope and frequency. If inspectors are qualified to perform multiple inspections, they could be conducted simultaneously.

Inspection Activities

Routine inspections shall occur, at minimum, annually, after major storm events, and at the discretion of the owner based on community input or site needs.

Table 5.1 Routine Inspection Activities

Inspection Item	Corrective Maintenance Trigger	Typical Corrective Maintenance Action
Algae	Algae present in more than 25% of pond surface area.	Manage algae via physical removal, or the addition of additives and chemicals as needed.
Animal Burrows	Animal burrows or signs of burrowing present onsite.	Fill animal burrows with acceptable media.
Basin Bottom Depth	Basin bottom level exceeds 50% of the design depth measured from the design basin bottom to the permanent pool outlet elevation (Basin bottom elevation +889 for North Pond, basin bottom elevation +890 for South Pond).	Dredge bottom of affected basin areas.
Concrete	Minor concrete or masonry damage such as spalling, cracking, or displaced/loose concrete or masonry site components is present.	Repair damage with parging, patching, or replacement of missing components.
Erosion	Erosion that exceeds 20 square feet observed along basin slopes, access paths, maintenance bench, or near drainage or operations & maintenance structures.	Repair erosion using acceptable media, erosion control fabric, and/or additional planting.
Organic Debris	Excessive organic debris is present within the pond, or near drainage structures, pumps, etc. that may impact site function.	Remove and dispose of organic debris.
Graffiti	Graffiti is present.	Remove graffiti and repaint surfaces as necessary.
Woody Debris	Woody debris is accumulated in an area that inhibits site function or poses an aesthetic or safety issue.	Remove and dispose of woody debris.

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Vegetation inspections shall occur, at minimum, annually during the growing season, and at the discretion of the owner based on community input or site needs.

Table 5.2 Vegetation Inspection Activities

Inspection Item	Corrective Maintenance Trigger	Typical Corrective Maintenance Action
Bare Areas	Vegetation is missing from an area of approximately 1,000 square feet.	Replant bare areas with native plantings based on the original planting plan.
Invasive Weeds	Weeds categorized as noxious or invasive are present in planted areas.	Remove noxious or invasive weeds.
Organic Debris	Excessive organic debris present in vegetated areas that may impede the proper growth of desirable vegetation	Remove and dispose of or relocate organic debris.

Drainage structure inspections shall occur, at minimum, every other year, after major storm events, and at the discretion of the owner based on community input or site needs. **Additional inspections may be required for the outlet structure**, especially following storm events that result in discharge through the outlet structure's overflow weir. Should the baffle box, manholes, or other sumped structures, require more frequent maintenance, additional inspections of those structures may be required.

Table 5.3 Drainage Structure Inspection Activities

Inspection Item	Corrective Maintenance Trigger	Typical Corrective Maintenance Action
Nutrient Separating Baffle Box	CCTV Camera or visual inspection reveals baffle box sump is greater than 50% filled with sediment or debris. Or structure inflows/outflows are blocked.	Vacuuming or mechanical removal of sediment and debris.
Concrete	Minor concrete or masonry damage such as spalling, cracking, or displaced/loose concrete or masonry site components is present.	Repair damage with parging, patching, or replacement of missing components.
Fasteners	Structure fasteners are rusted or stuck.	Lubricate or replace fasteners to provide access to structures.
Other Drainage Structures	CCTV Camera or visual inspection reveals structure sumps are greater than 50% filled with sediment or debris. Or structure inflows/outflows are blocked.	Vacuuming or mechanical removal of sediment and debris.
Pipes	CCTV Camera or visual inspection reveals that pipe cross sectional area is more than 30% obstructed by sediment or debris.	Jetting or clearing of pipes.
Railing	Railing atop overflow structure is loose or damaged.	Repair, replace, or tighten railing.

Maintenance and monitoring structure inspections shall occur, at minimum, every other year, and at the discretion of the owner/responsible party.

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Table 5.4 Maintenance and Monitoring Structure Inspection Activities

Inspection Item	Corrective Maintenance Trigger	Typical Corrective Maintenance Action
Conduit	Electrical conduit is exposed to the surface.	Bury conduit to provide protection from mowing and other activities.
Maintenance Structures	Maintenance structure inaccessible or unable to be located.	Trim vegetation, remove debris, or remove soil to provide access to the structures.
Monitoring Structures	Maintenance structure inaccessible or unable to be located.	Trim vegetation, remove debris, or remove soil to provide access to the structures.
Fasteners	Structure fasteners are rusted or stuck.	Lubricate or replace fasteners to provide access to structures.

Weir inspections shall occur, at minimum, every five years, after major storm events, and at the discretion of the owner based on community input or site needs. Weir inspections may require the use of a diver in order to properly understand structural deficiencies of submerged features.

Table 5.5 Weir Inspection Activities

Inspection Item	Corrective Maintenance Trigger	Typical Corrective Maintenance Action
Graffiti	Graffiti is present.	Remove graffiti and repaint surfaces as necessary.
Concrete	Minor concrete or masonry damage such as spalling, cracking, or displaced/loose concrete or masonry site components is present.	Repair damage with parging, patching, or replacement of missing components.
Scuppers	Scuppers are damaged or obstructed.	Repair/replace scuppers or clear flow paths, clean scuppers if necessary.
Structural	Signs of structural damage to weir.	Conduct a professional structural analysis of the weir. Depending on extent of damage observed it may be necessary to dewater the pond.

Pump inspections shall occur, at minimum, every other year, and at the discretion of the owner based on community input or site needs.

Table 5.6 Pump Inspection Activities

Inspection Item	Corrective Maintenance Trigger	Typical Corrective Maintenance Action

Corrosion	Rusting, cracking or discoloration of pump or associated pipework.	Turn off pump, clean or replace corroded components.
Improper Function	Noise, vibrations, or decreased flow rate observed.	Turn off pump, conduct a professional analysis of the pump.
Intake/Outlet	Intake or outlet area are full of debris, sediment, or trash.	Turn off pump, clear intake and outlet.

Monitoring

Permanent monitoring equipment has been installed at various on-site locations. This monitoring equipment shall be used to better understand the efficacy of the stormwater management installation both from a perspective of both quality and quantity. The following monitoring equipment is installed onsite:

- XXXEquipment Name ISCO Sampler – measures water quality information such as total nitrogen, total phosphorous, and total suspended solids.
- XXXEquipment Name Flow Rate – measures flow rate and velocity of stormwater entering and exiting the site.

All monitoring equipment is installed in a permanent lockable structure. These structures have been designed to be low profile as to not distract from the overall site aesthetic. Electricity is provided to sensors via buried conduit. Approximate locations of all maintenance and monitoring equipment can be found on the map in Appendix A and is summarized below:

- Inflow of each NSBB – XXXEquipment Name
- Pond Outlet – XXXEquipment Name
- Boat House – XXXEquipment Name

Frequent access to these structures will be required for the collection of monitoring data. All structures are accessible from the surface and therefore do not require confined space entry.

Monitoring structures should be inspected whenever accessed (refer to the *Inspection* section above). Should the results of the inspection require corrective maintenance, it should be communicated to the site owner.

The results of monitoring may also indicate the need for maintenance. If observed key site metrics in water quality or quantity are insufficient, corrective maintenance may be required. Specifically, monitoring results should be considered when determining the need for pond dredging. Monitoring results that would trigger the need for corrective maintenance include:

- A 20% decrease in water quality for a duration exceeding 5 days.
- A 50% decrease in water quality in a single event.
- An unexpected increase or decrease of 20% of outflow quantity for a period exceeding 24 hours.

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Appendix A

Placeholder – Inspection Report

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Appendix B

Oldcastle Infrastructure NSBB Operation and Maintenance Manual

OperationManual_NSBB_WM.pdf (oldcastleinfrastructure.com)

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