

## Memorandum

**To:** Bassett Creek Watershed Management Commission  
**From:** Barr Engineering Co.  
**Subject:** Item 5C. Consider Approval of 90% Plans for Northwood Lake Improvement Project (NL-1), New Hope  
BCWMC November 18, 2015 Meeting Agenda  
**Date:** November 11, 2015  
**Project:** 23270051 2015 633

### 5C. Consider Approval of 90% Plans for Northwood Lake Improvement Project (NL-1), New Hope

#### Summary:

**Proposed Work:** Northwood Lake Improvement Project

**Basis for Commission Review:** 90% Design Review

**Change in Impervious Surface:** N.A

#### **Recommendations:**

- 1) Conditional approval of 90% drawings

The 2016 Northwood Lake Improvement project (NL-1) will be funded by the BCWMC's ad valorem levy (via Hennepin County). The City of New Hope provided the 90% design plans to the BCWMC for review and comment, as set forth in the BCWMC CIP project flow chart.

#### **50% Design Review Summary**

The BCWMC approved the 50% design plans for the Northwood Lake improvement project at the September 17, 2015 Commission meeting. The 50% design plans included the designs for Concept A (storm sewer diversion, subsurface stormwater reuse system, and rain gardens in Northwood Park) and Concept C (wet detention basin along Jordan Avenue) from the feasibility study.

Concept A includes the diversion of storm sewer along Boone Avenue, south toward Northwood Park and the subsurface storage for the stormwater reuse system. Prior to discharging into the subsurface storage system, the storm sewer diversion will pass through a treatment manhole (e.g. Stormceptor) to provide sediment removal prior to discharging into the subsurface treatment system. The subsurface storage tank will include pumps and a force main that will connect with the existing irrigation system for the ball fields in Northwood Park, east of Boone Avenue. Overflows from the underground storage system will be directed to a series of rain gardens along Ensign Avenue to provide additional treatment before

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discharging to Northwood Lake. Concept C includes the diversion of storm sewer along Jordan Avenue into a new wet detention pond located west of Jordan Avenue, prior to discharging into Northwood Lake.

## 90% Design Review Summary

Many of the recommendations provided in the 50% review were addressed as part of the 90% design submittal. The table below compares the water quality treatment volumes to be provided by the project, as presented in the feasibility study, in the 50% design plans, and in the current 90% design plans. Additional discussion of the proposed design is discussed below.

	<b>Underground Storage Volume (for Stormwater Reuse)</b>	<b>Rain Garden Volume</b>	<b>Jordan Avenue Retention Pond Dead Storage Volume</b>
Feasibility Study (November 2014)	0.5 acre-ft (160,000 gallons)	0.37 acre-ft	0.7 acre-ft
50% Design Plans	0.24 acre-ft	0.34 acre-ft	1.55 acre-ft
90% Design Plans	0.491 acre-ft (159,982 gallons)	0.258 acre-ft	1.32 acre-ft

According to the information provided by the city's consultant (using the MIDS calculator), the project is anticipated to achieve the following annual total phosphorus (TP) and total suspended solids (TSS) reductions:

<b>Concept</b>	<b>Average Annual Volume Reduction (ac-ft/yr (%))</b>	<b>Average Annual TP Removal (lbs/yr (%))</b>	<b>Average Annual TSS Removal (lbs/yr (%))</b>
Concept A – Stormwater reuse for irrigation in Northwood Park	8.0 acre-ft (11%)	4.62 lbs/yr (11%)	519 lbs/yr (11%)
Concept A – Rainwater Gardens (3) along Ensign Avenue	0.89 acre-ft (1.3%)	20.19 lbs/yr (52.0%)	4,151 lbs/yr (92.7%)
Concept C – Jordan Avenue water quality treatment pond	0.0 acre-ft (0%)	5.67 lbs/yr (34%)	1,813 lbs/yr (60%)
<b>Project Total</b>	<b>8.89 acre-ft</b>	<b>30.48 lbs/yr</b>	<b>6,483 lbs/yr</b>

The November 2014 feasibility study estimated the average total phosphorus removal to be 22.0 pounds/year for the combination of Concepts A and C; the city's consultant used the MIDS calculator to arrive at this estimate.

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The BCWMC Engineer also reviewed the Minnesota Department of Natural Resources (MnDNR) surface water appropriations permit application (as provided by the city's consultant). In the appropriations permit application, the city requested an appropriation of 1.5 million gallons per year from Northwood Lake. However, according to the information provided in the MIDS calculator, the estimated average annual volume to be used for irrigation is 2.6 million gallons per year (8.1 acre-ft per year). The city should revise its permit application accordingly to adequately cover the expected pumping amount.

The city's consultant also provided a memo (dated November 5, 2015) and follow-up correspondence summarizing the results of the water level analysis performed for Northwood Lake. The city's consultant used the existing BCWMC P8 model to help understand the relative impacts of the proposed diversion of water away from Northwood Lake (used for irrigation in Northwood Park, downstream of Northwood Lake) on the resulting lake levels based on two scenarios. The first scenario reflects the existing watershed conditions. The second scenario assumes that the area tributary to the subsurface storage/irrigation system would be diverted entirely away from Northwood Lake, because the proposed irrigation area is downstream of Northwood Lake. This is a conservative (worst-case) scenario, as not all of the runoff from that watershed is diverted away from the lake. The current design directs runoff volumes greater than the subsurface storage volume to a series of rainwater gardens in Northwood Park that ultimately discharge to Northwood Lake. Per the MIDS evaluation, only 11% of the average annual runoff volume from the tributary watershed will be used for irrigation (i.e., diverted away from Northwood Lake), while the remaining volume will continue to discharge to Northwood Lake.

The following table summarizes the existing and proposed Northwood Lake levels as predicted by the P8 model for the two scenarios above:

<b>Scenario</b>	<b>Minimum Lake Level (ft)</b>	<b>Average Lake Level (ft)</b>	<b>Maximum Lake Level (ft)</b>
Existing Conditions	5.4	7.9	9.5
Proposed Conditions	5.4	7.2	9.1

The table above shows a 0.7-foot estimated reduction in the average lake level from existing to proposed conditions. However, as noted earlier, this estimate is based on diverting the entire area tributary to subsurface storage/irrigation system away from the lake, but only 11% of the average annual runoff volume is predicted to be diverted away from Northwood Lake for irrigation. As a result, a more likely impact on the average lake level would be 11% of 0.7 feet, or 0.08 feet (1 inch), a minimal impact. During flood events, an even smaller percentage of the runoff from the watershed would be diverted from the lake.

The BCWMC's review comments/recommendations regarding the 50% plans included comments regarding the level of stormwater treatment to be provided prior to the use of the stormwater for

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irrigation. Based on information provided in the construction plans (Sheet P3.01) and in a November 2, 2015 letter from the city's consultant, the proposed system will use an online filter (200 micron), which is sufficient for the existing irrigation heads. The BCWMC's comments also included recommendations to incorporate an online UV treatment system and to consider other methods (i.e., timing of irrigation and signage) to limit the public's contact with the stormwater. The city decided not to use a UV treatment system, but the city's intent is to irrigate the fields at night to minimize public contact with the irrigation water and they also intend to install signs in the park regarding the use of non-potable water for irrigation. The 90% design plans do not include details on the signage; these details should be included with the final plan submittal.

## Recommendations

A. Conditional approval of 90% drawings based on the following comments,:

- 1) The City should revise its MnDNR appropriations permit application so that it adequately covers the expected pumping amount.
- 2) Sheets P3.01 and P4.01 of the plans include details of the forcemain and the connection to the existing irrigation system.
  - a. The existing irrigation box includes a backflow preventor. Verify that the backflow preventor meets the city/plumbing code requirements to prevent cross contamination of the potable water supply.
  - b. Section A on Sheet \_P3.01 indicates that there is a level transducer in the pump vault and Sheet E1.01 indicates there is a control panel, suggesting automated operation of the pumping system and control of the system valves. Additionally, Sheet P4.01 indicates there is an isolation valve and box along the potable water irrigation line downstream of the existing irrigation box. Section B on Sheet 3.01 indicates there is a check valve in the utility structure along the 4-inch stormwater forcemain that would prevent backflow into the filter and subsurface system. Verify that the function of the isolation valve and pumping system is automated and coordinated (based on the water level in the underground storage tank).
- 3) Details regarding signage in the park that address the use of non-potable water for irrigation need to be included with the final plan submittal.
- 4) Sheet C3.03 of the plans show a proposed filter media depth of 18 inches. The BCWMC Requirements document (current and previous version) and the Minnesota Stormwater Manual recommend a filter media depth of 30 inches (2.5 feet) or more to allow adequate filtration processes to occur. The final plan submittal should include a revised design that

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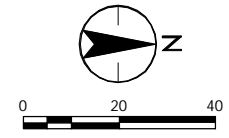
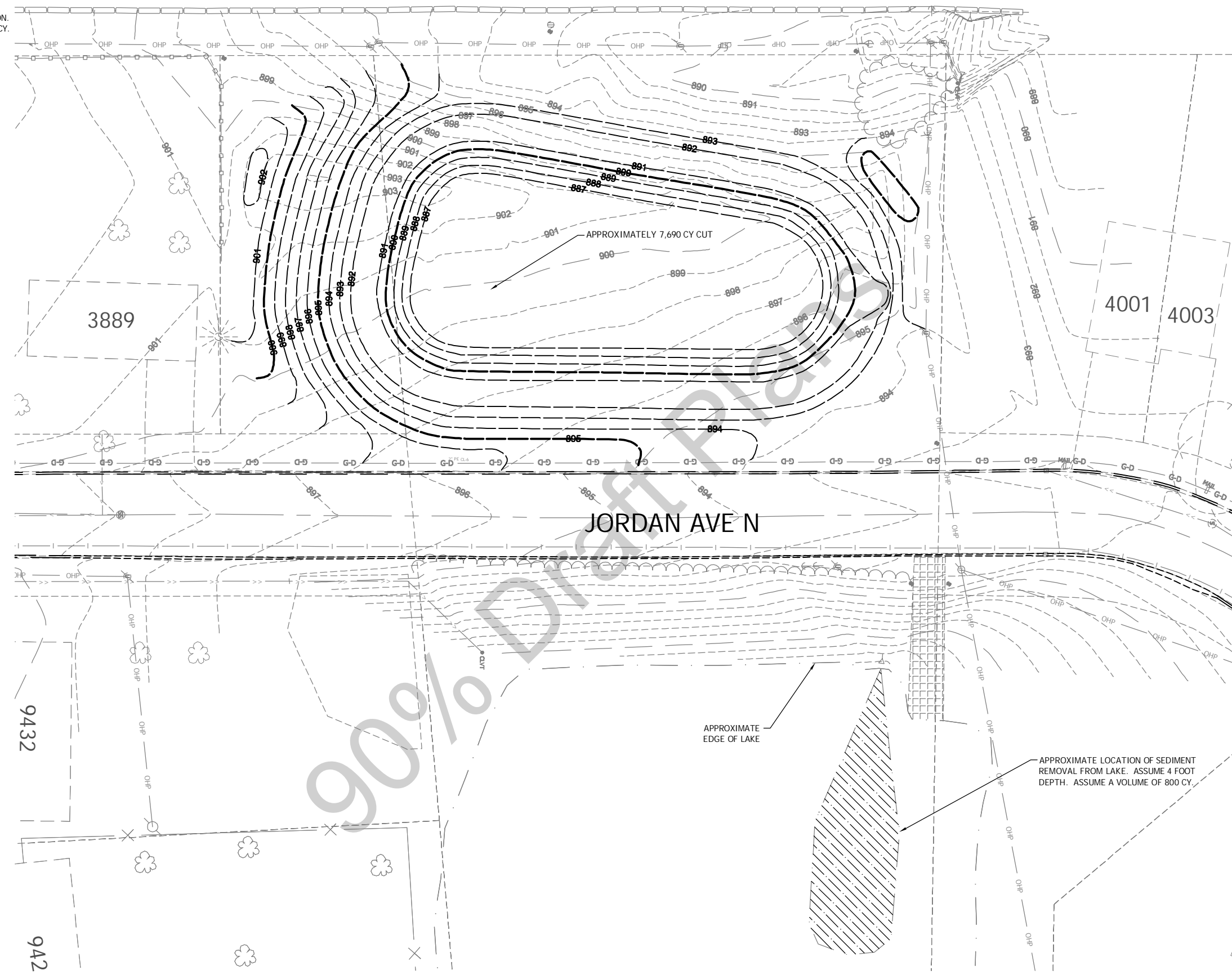
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meets the recommended filter media depth or an explanation should be provided as to why the filter media depth needs to be shallower (e.g., depth to groundwater).

- 5) The Minnesota Stormwater Manual requires a separation distance of 3 feet between the bottom of the bioretention (rainwater garden) practice and the elevation of the seasonally high water table. Based on the cross sections provided on Sheet C3.03 and the information provided in the soil boring logs dated October 13, 2015, soil boring 12 must be at least 0.6 feet deeper (11.6 feet in depth) to confirm that there is adequate separation to groundwater. This needs to be addressed in the final plan submittal.
  - 6) Perimeter control should be added for the removals on Jordan Avenue (removals shown on Sheet C0.01). The November 2, 2015 letter from the city's consultant indicates perimeter control was added, but it does not appear to be shown on the plans in areas downgradient of the pavement and curb removal on Jordan Avenue. Perimeter controls and contours with labels should be added to Sheet C2.01 as part of the final plan submittal (the contours will facilitate review of the erosion control placement).
- B. Authorize the City of New Hope to proceed with final plans; note that the parts of the project outside the scope of the BCWMC CIP will require separate review as part of the BCWMC project review program.
- C. The final plans must be submitted to the BCWMC Engineer for administrative review and approval after modifications have been completed.

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- NOTES:  
1. SEE SHEET C3.01 FOR TYPICAL GRADING SECTION.  
2. DEAD STORAGE VOLUME APPROXIMATELY 1509 CY.



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User: 193802816\_BORDER\_193802816\_XSI\_193802816\_XSI

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PRINT NAME: \_\_\_\_\_  
SIGNATURE: \_\_\_\_\_  
DATE: \_\_\_\_\_ LIC. NO. \_\_\_\_\_

NEW HOPE, MINNESOTA  
2016 NORTHWOOD LAKE IMPROVEMENTS  
CITY PROJECT NO. 938  
GRADING PLAN

NO.	REVISION	DATE

SURVEY	
DRAWN	BJH
DESIGNED	CWL
CHECKED	CWL
APPROVED	CWL
PROJ. NO.	193802816
SHEET NUMBER	C3.01

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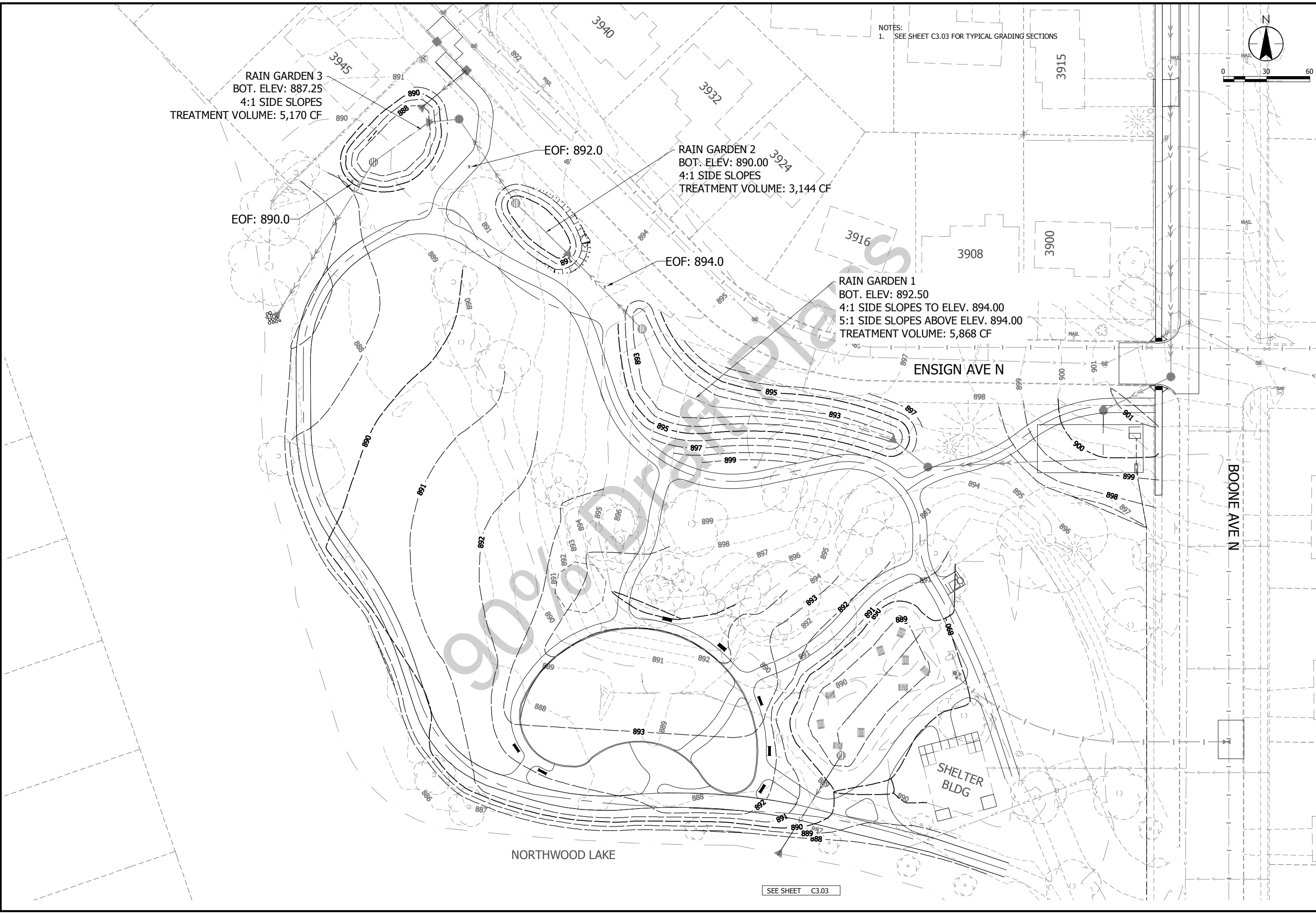
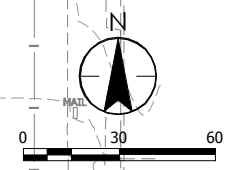
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RAIN GARDEN 3  
BOT. ELEV: 887.25  
4:1 SIDE SLOPES  
TREATMENT VOLUME: 5,170 CF

RAIN GARDEN 2  
BOT. ELEV: 890.00  
4:1 SIDE SLOPES  
TREATMENT VOLUME: 3,144 CF

RAIN GARDEN 1  
BOT. ELEV: 892.50  
4:1 SIDE SLOPES TO ELEV. 894.00  
5:1 SIDE SLOPES ABOVE ELEV. 894.00  
TREATMENT VOLUME: 5,868 CF

NOTES:  
1. SEE SHEET C3.03 FOR TYPICAL GRADING SECTIONS



SEE SHEET C3.03

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NEW HOPE, MINNESOTA  
2016 NORTHWOOD LAKE IMPROVEMENTS  
CITY PROJECT NO. 938  
GRADING PLAN

NO	REVISION	DATE

SURVEY  
DRAWN: ACD  
DESIGNED: CWL  
CHECKED: CWL  
APPROVED: CWL  
PROJ. NO.: 193802816  
SHEET NUMBER  
**C3.02**