

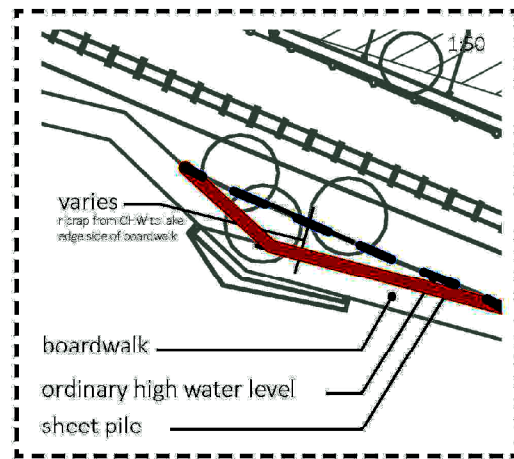
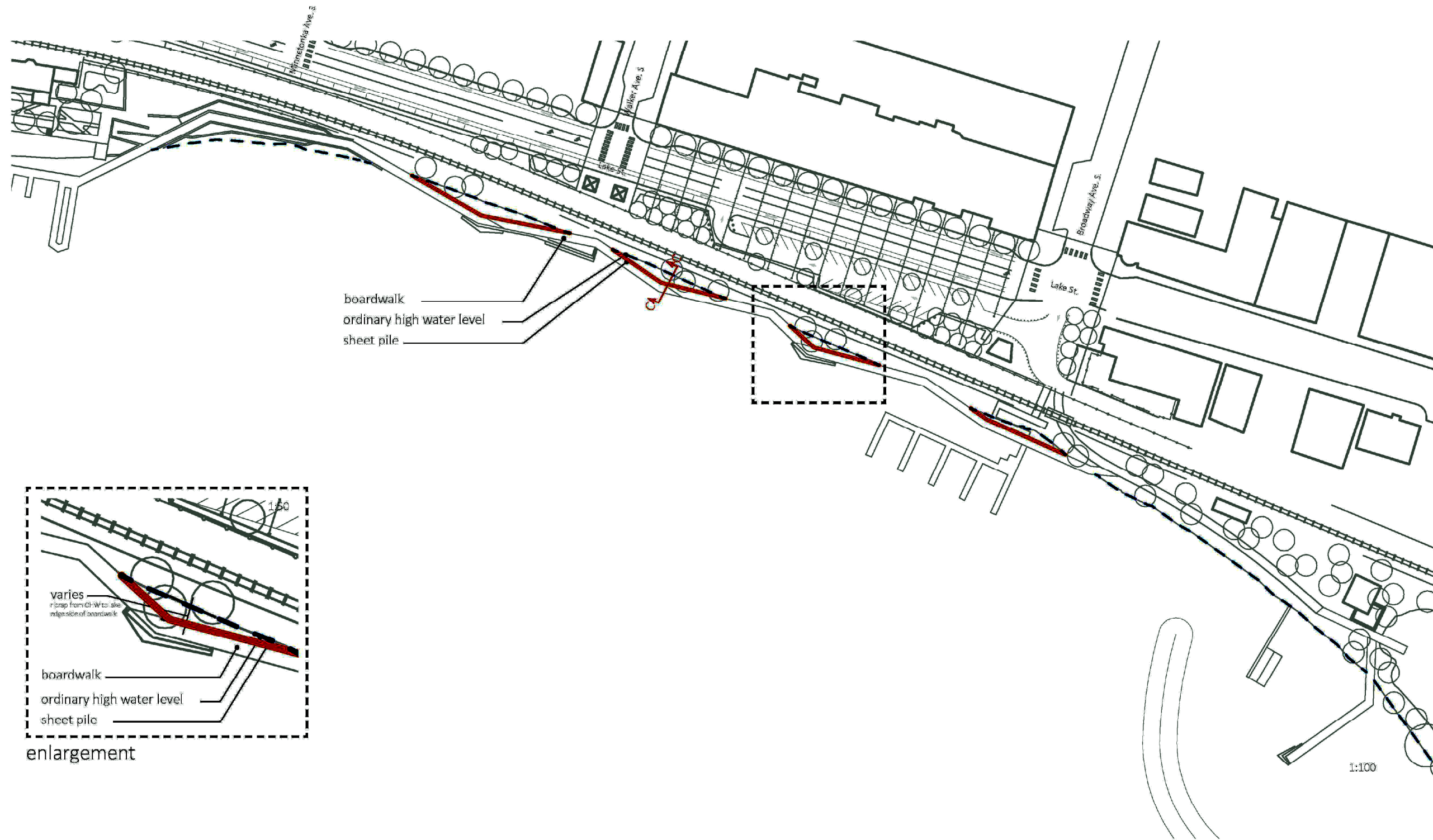
OPTION A3 LAKE EDGE: CONTINUOUS SHEET PILE PLAN  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Continuous Sheet Pile Plan Diagram



Project No:	B1607634
Drawing No.	B1607634_FigA4
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig.	A-4

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enlargement

**WAYZATA LAKE EFFECT**

Lake Edge Diagrams : Intermittent Sheet Pile Plan Diagram

**CIVITAS**

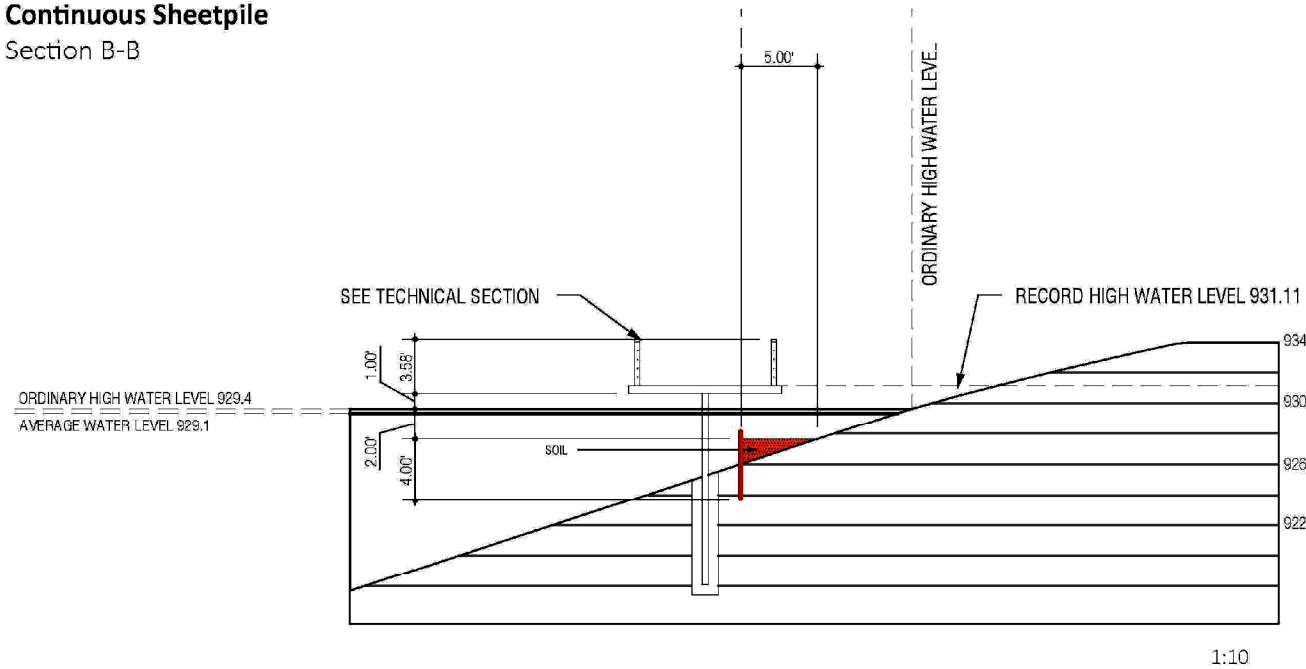
5

OPTION A4 LAKE EDGE: INTERMITTENT SHEET PILE PLAN  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

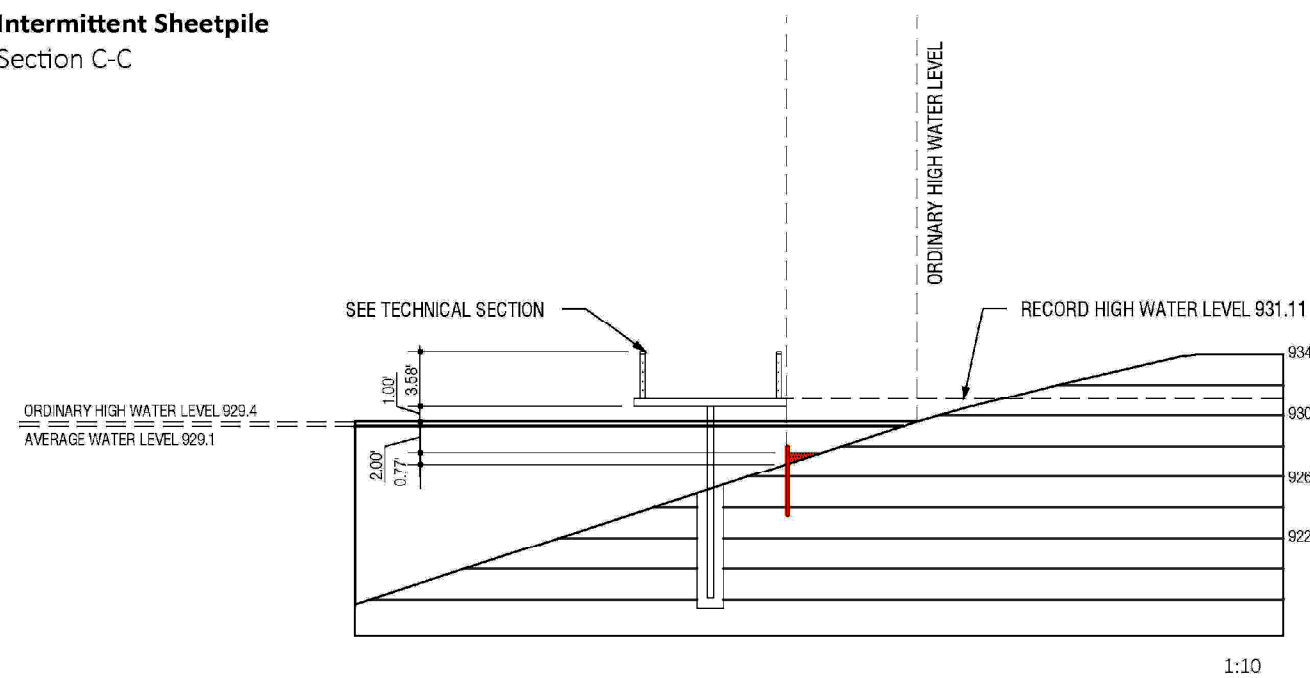
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Drawing No.		B1607634_FigA5
Drawn By:	CMF	
Date Drawn:	01/20/2017	
Checked By:	JBW	
Last Modified:	2/9/17	
Sheet:	Fig.	
1 of 1	A-5	



**Continuous Sheetpile**  
Section B-B



**Intermittent Sheetpile**  
Section C-C



**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Sheet Pile Section

**VOLUME CALCULATIONS**

**1. Continuous Sheetpile with fill**

Sheet Pile  
length = 1,637 lf  
sheetpile area = .125 sf (.03125' x 4')  
volume = 205 cf

Lake Bottom Disturbance  
8,185 s.f

Fill  
fill area = 4.1 sf  
length = 1,637 lf  
volume = 6,712 cf

**Total Volume = 6,917 cf**

**2. Intermittent Sheetpile**

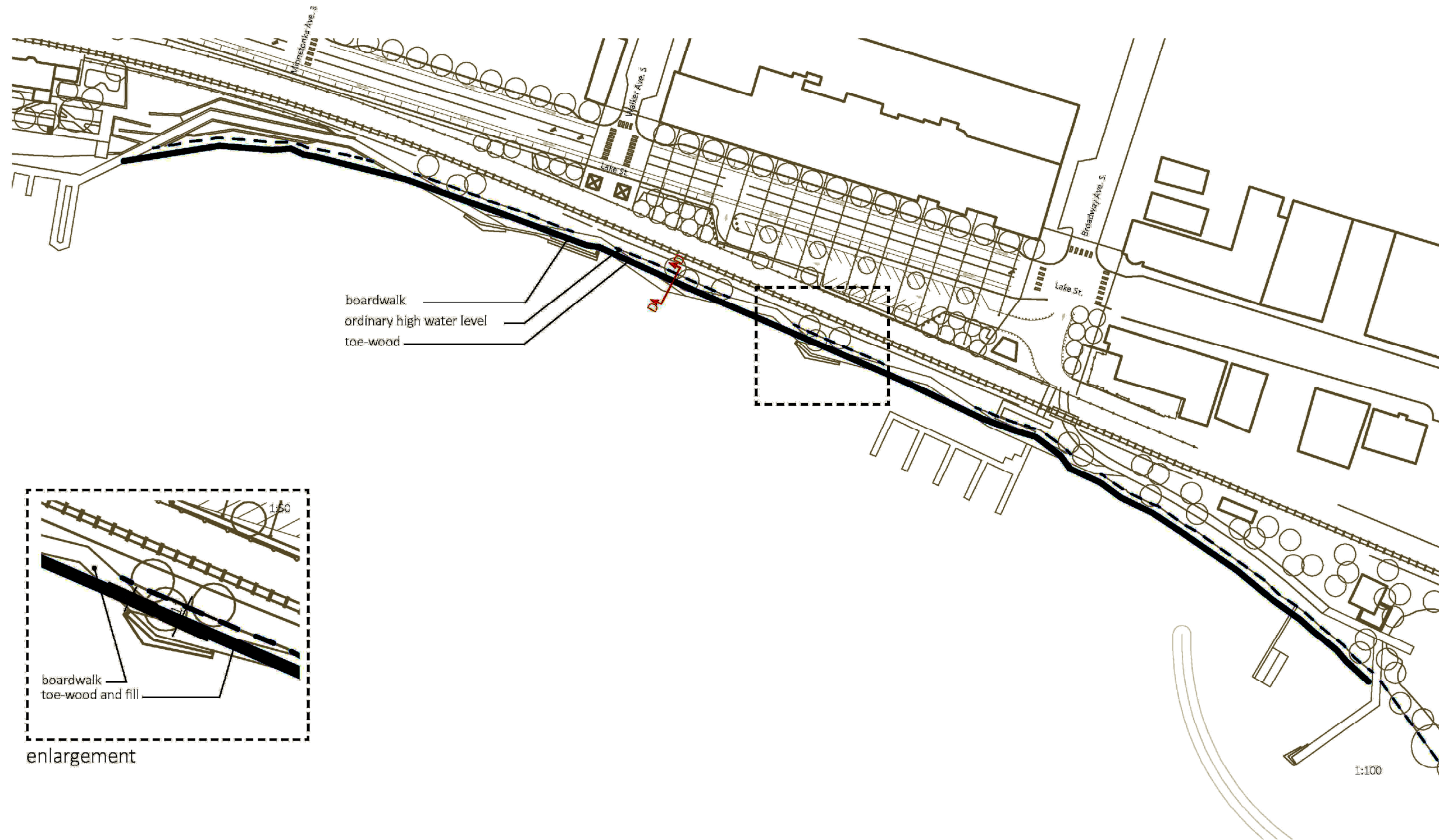
Sheet Pile  
length = 585 lf  
sheetpile area = .125 sf (.03125' x 4')  
volume = 73 cf

Lake Bottom Disturbance  
2,925 s.f

Fill  
average fill area = 4.1 sf  
length = 585 lf  
volume = 2,399 cf

**Total Volume = 2,472 cf**

**OPTIONS A3 AND A4 LAKE EDGE: SHEET PILE SECTION**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA



OPTION A5 LAKE EDGE: CONTINUOUS TOE-WOOD PLAN  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

**WAYZATA LAKE EFFECT**

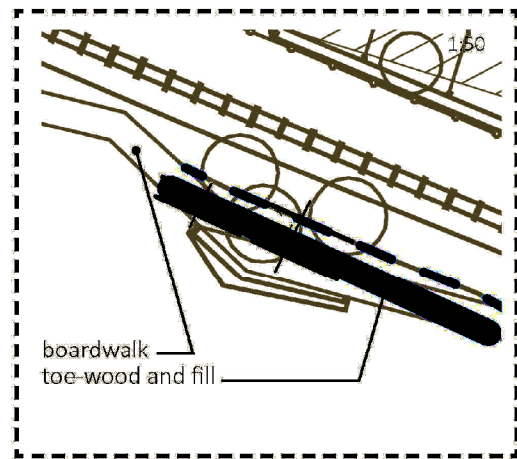
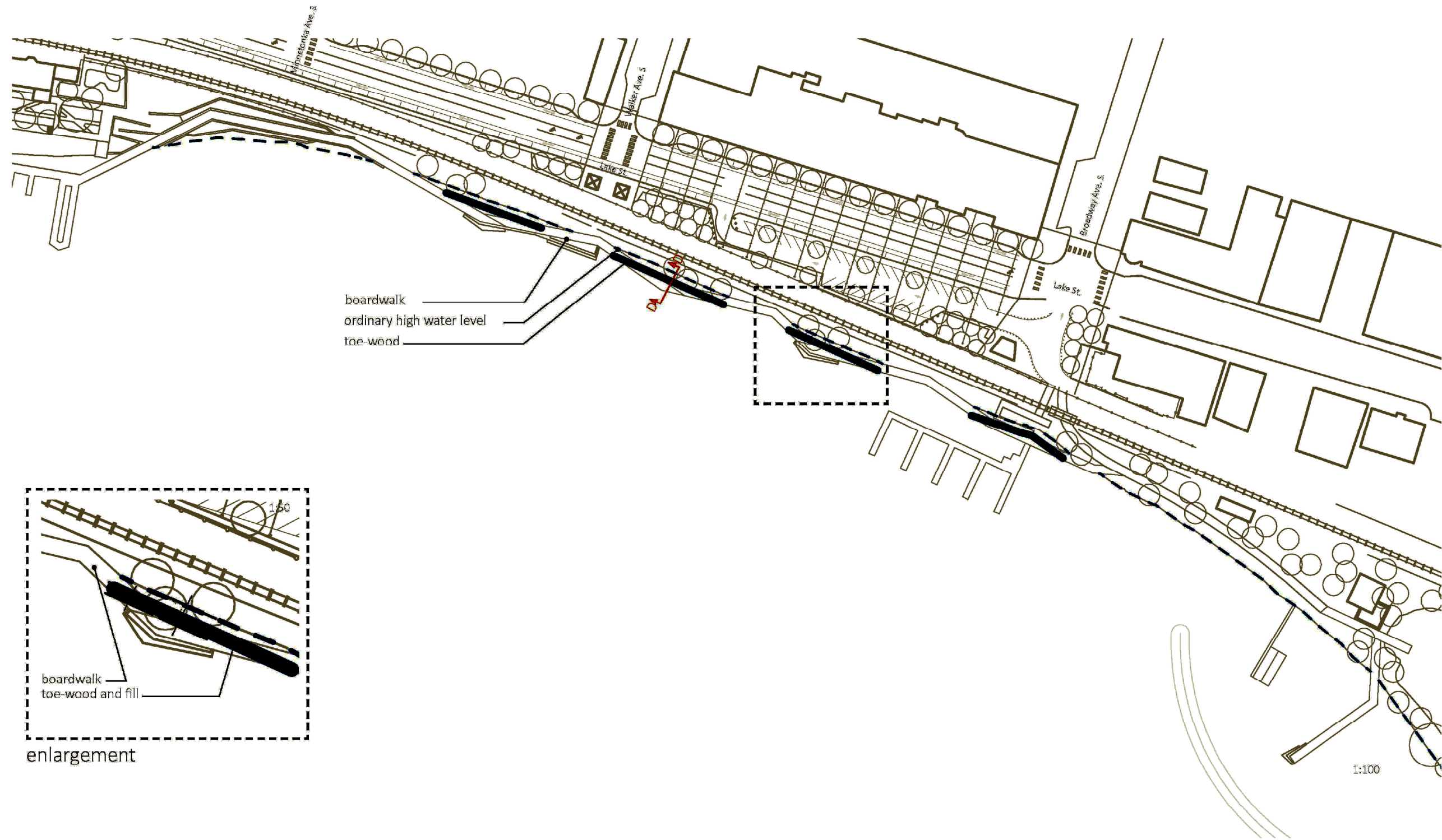
Lake Edge Diagrams : Continuous Toe-Wood Plan Diagram

**CIVITAS**

7

Project No:	B1607634
Drawing No:	B1607634_FigA7
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig:	A-7



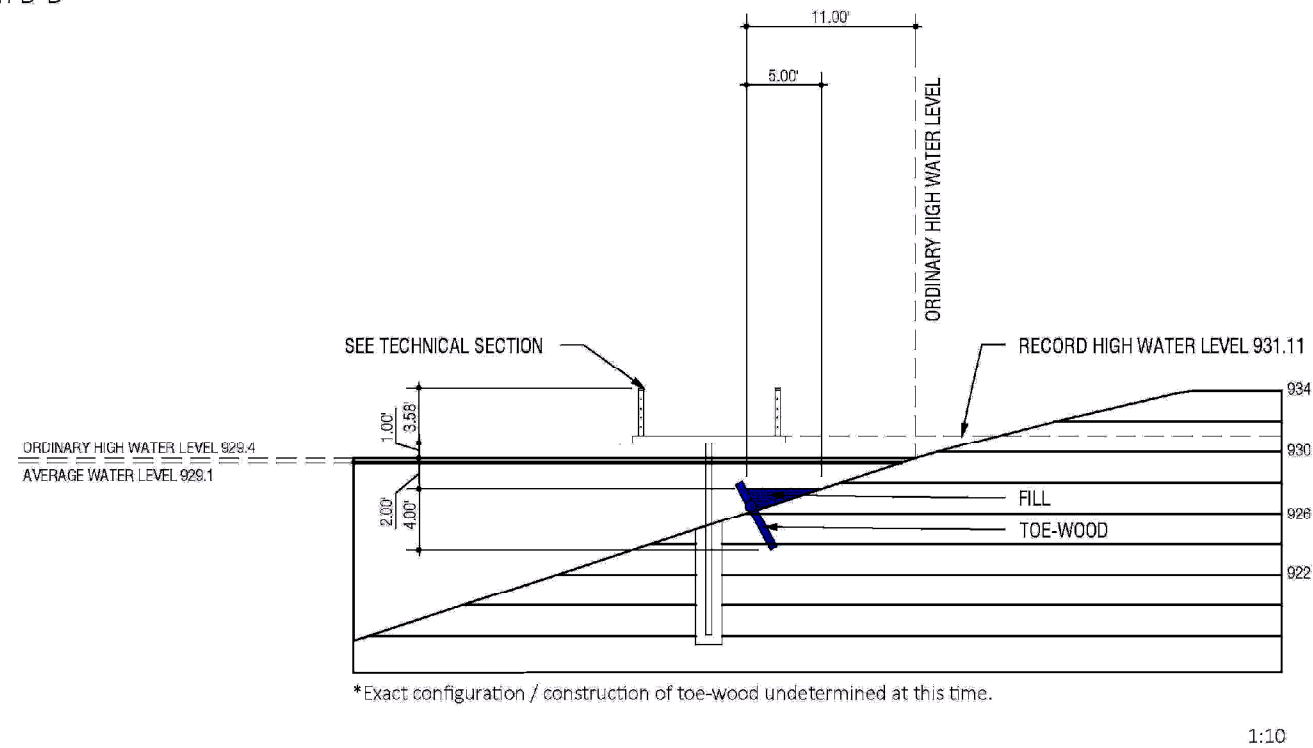


enlargement

**WAYZATA LAKE EFFECT**  
 Lake Edge Diagrams : Intermittent Toe-Wood Plan Diagram

Project No:		B1607634
Drawing No.		B1607634_FigA8
Drawn By:		CMF
Date Drawn:		01/20/2017
Checked By:		JBW
Last Modified:		2/9/17
Sheet:	Fig.	
1 of 1	A-8	

**Toe-Wood Section**  
Section D-D



**VOLUME CALCULATIONS**

**1. Continuous Toe-Wood**

<b>Toe-Wood</b>	<b>Lake Bottom Disturbance</b>
length of lake edge = 1,637 lf	8,185 s.f
Toe-wood volume = 1 cf (.2 x 3.84)	
Volume = 1,637 cf	

**Fill**  
length of lake edge = 1,637 lf  
Area = 3.3 s f  
Volume = 5,402 cf

**Total Volume = 7,039 cf**

**2. Intermittent Toe-Wood**

<b>Toe-Wood</b>	<b>Lake Bottom Disturbance</b>
length of lake edge = 585 lf	2,925 s.f
Toe-wood volume = 1 cf (.2 x 3.84)	
Volume = 585 cf	

**Fill**  
length = 585 lf  
Area = 3.3 s f  
Volume = 1,930 cf

**Total Volume = 2,515 cf**

**OPTIONS A5 AND A6 LAKE EDGE: TOE-WOOD SECTION**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA

**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams :

**CIVITAS**  
9

Project No: B1607634	
Drawing No. B1607634_FigA9	
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet: 1 of 1	Fig. A-9



## **Appendix B**

### **Lake Walk/Boardwalk Construction Options**

#### **Figures**

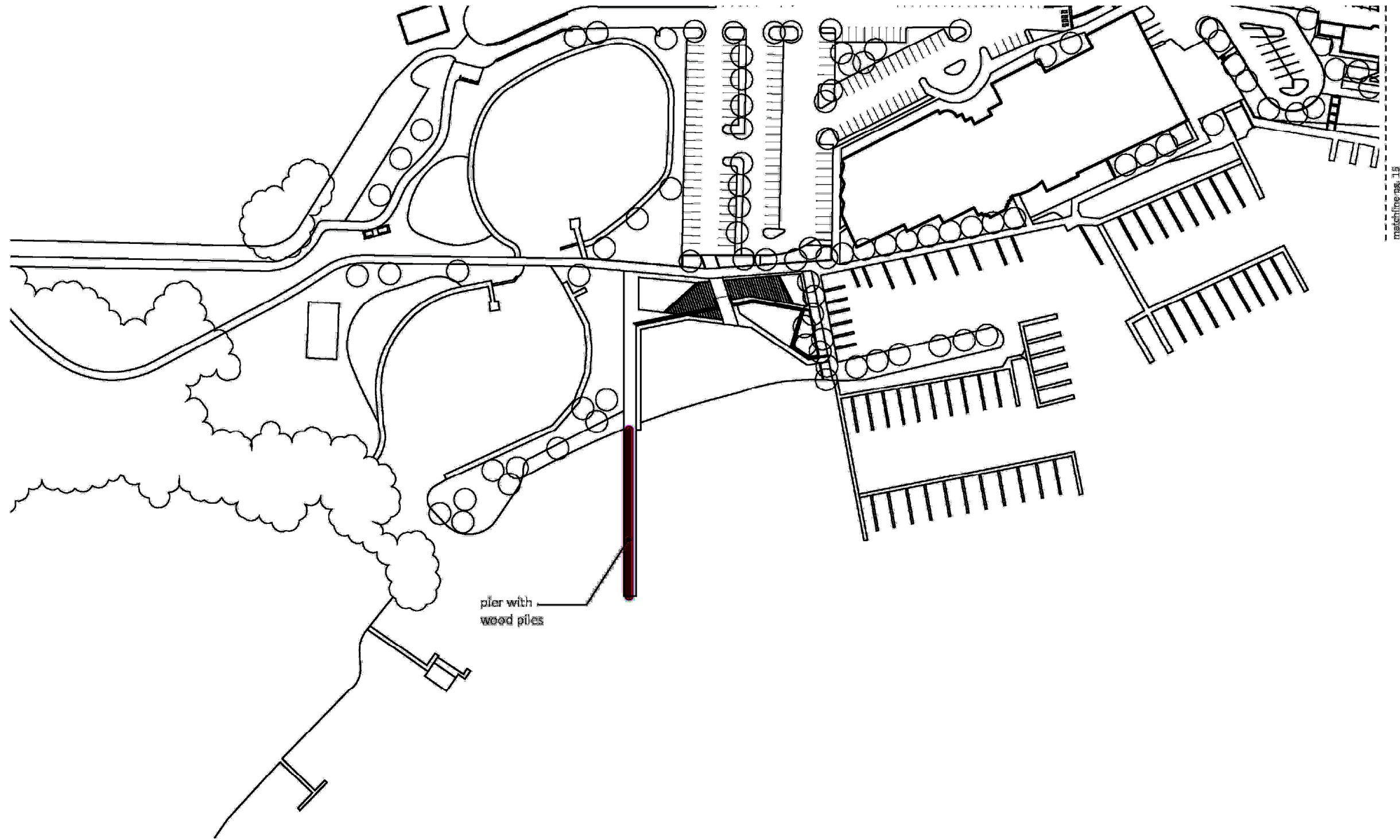
- B-1: Option B1 Boardwalk Wood Pile Plan – Beach Area
- B-2: Option B1 Boardwalk Wood Pile Plan – Lake Walk
- B-3: Option B1 Boardwalk Wood Pile Section
- B-4: Option B2 Boardwalk Concrete Pile Plan – Beach Area
- B-5: Option B2 Boardwalk Concrete Pile Plan – Lake Walk
- B-6: Option B2 Boardwalk Concrete Pile Section

## Appendix B Lake Walk/Boardwalk Construction Options

Option B1. Boardwalk support – wood piles. Under this scenario, 8' wood piles would be placed along the outside edges of the boardwalks, spaced 5.5' apart, for the entire 2,217 lf, for a total of 512 wood piles (Figures B-1 and B-2). These piles would be driven into the lake bottom (Figure B-3).

Option B2. Boardwalk support – concrete pile. Under this scenario, concrete piers would be placed periodically along the boardwalk (Figures B-4 and B-5), for total of 19 piers. Each concrete pier would span the width of the boardwalk and extend into the lake bottom (Figure B-6).





pier with  
wood piles

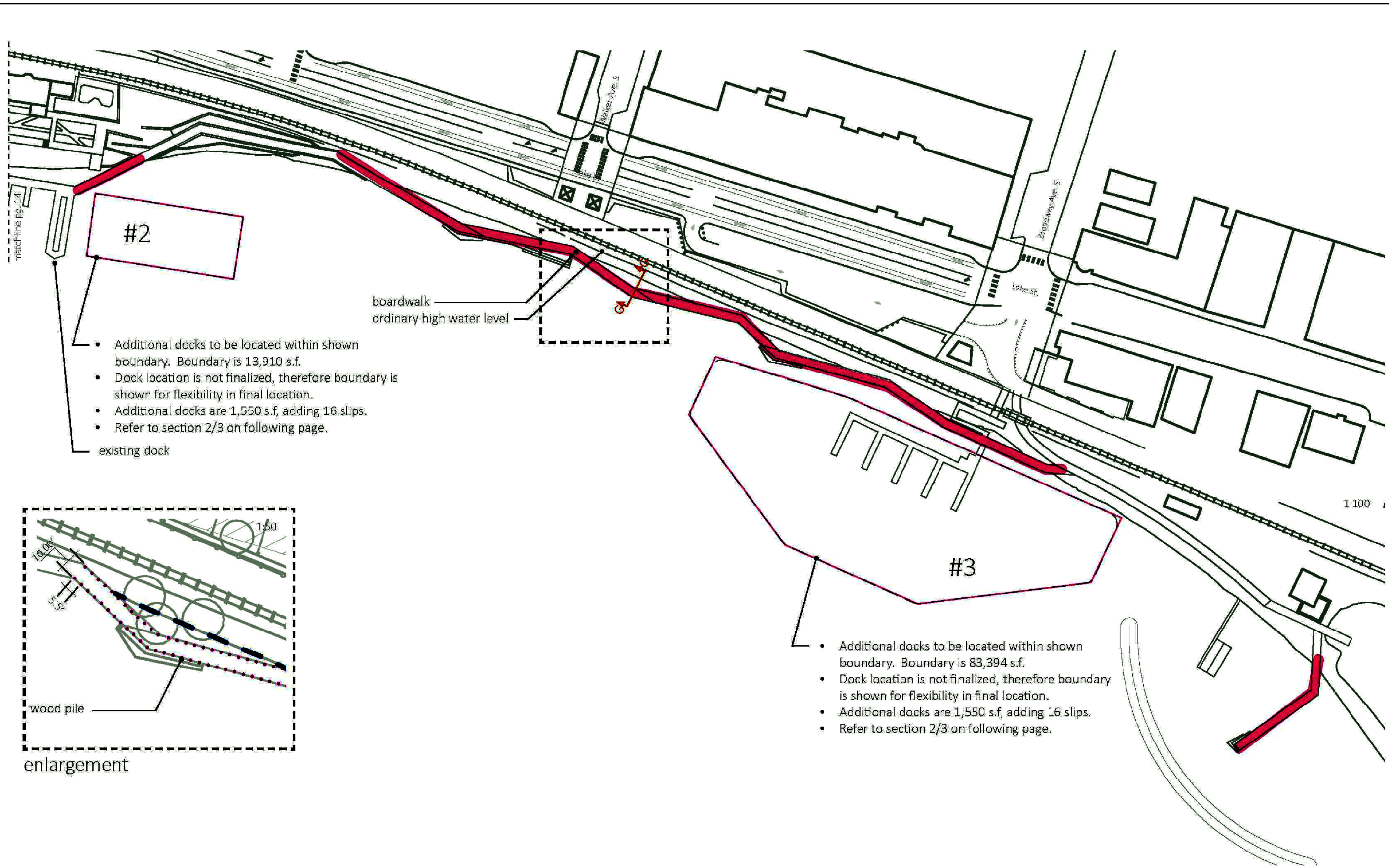
matchline pg. 15

**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Boardwalk Wood Pile Plan Diagram

**OPTION B1 BOARDWALK WOOD PILE PLAN**  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

Project No:	
B1607634	
Drawing No.	
B1607634_FigB1	
Drawn By:	
CMF	
Date Drawn:	
01/20/2017	
Checked By:	
JBW	
Last Modified:	
2/9/17	
Sheet:	Fig.
1 of 1	B-1

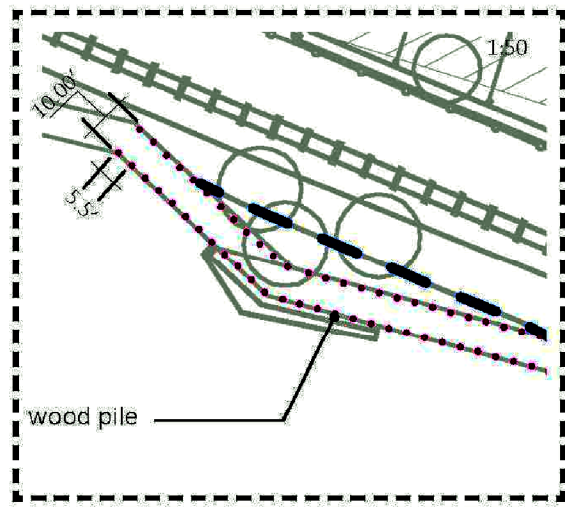
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- Additional docks to be located within shown boundary. Boundary is 13,910 s.f.
- Dock location is not finalized, therefore boundary is shown for flexibility in final location.
- Additional docks are 1,550 s.f, adding 16 slips.
- Refer to section 2/3 on following page.

existing dock

- Additional docks to be located within shown boundary. Boundary is 83,394 s.f.
- Dock location is not finalized, therefore boundary is shown for flexibility in final location.
- Additional docks are 1,550 s.f, adding 16 slips.
- Refer to section 2/3 on following page.



enlargement

**WAYZATA LAKE EFFECT**  
 Lake Edge Diagrams : Boardwalk Wood Pile Plan Diagram

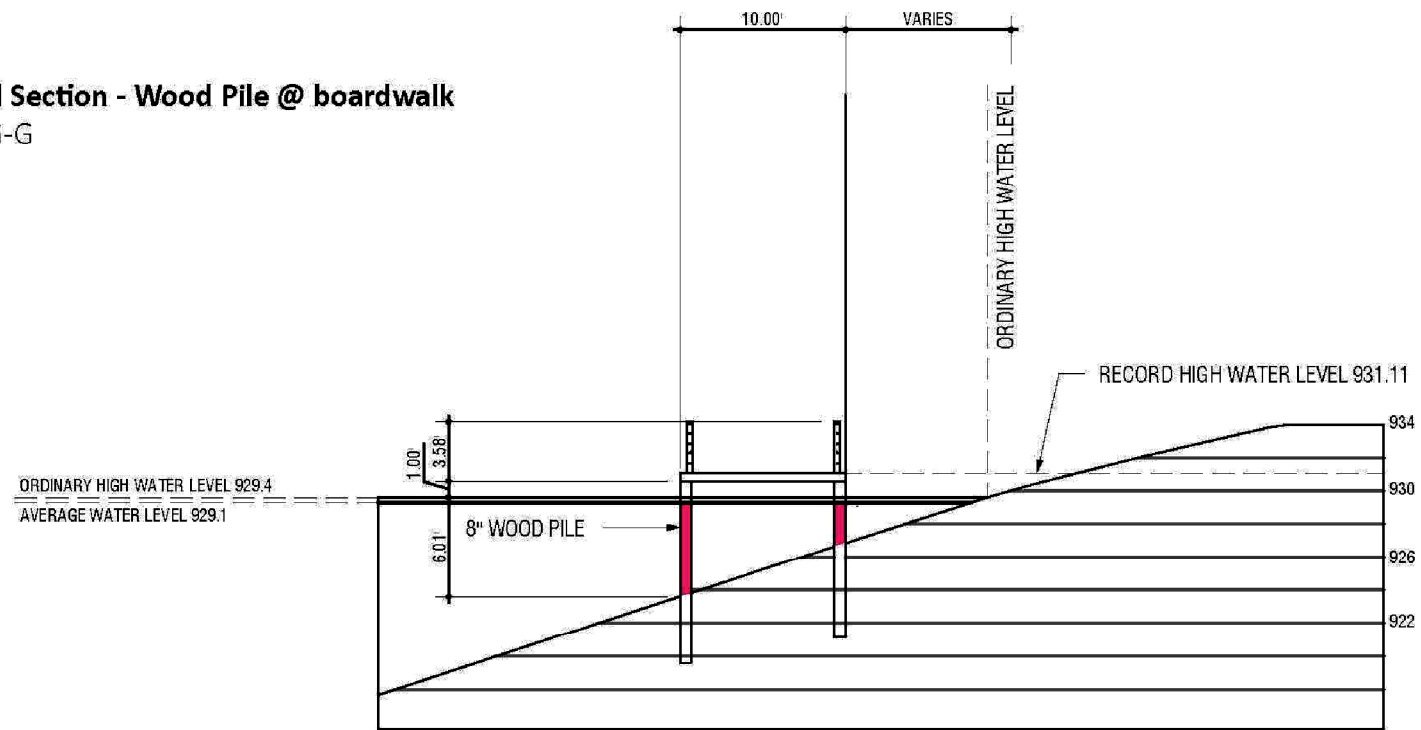


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Drawing No:	B1607634_FigB2
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	1/24/18
Sheet:	1 of 1
Fig:	B-2

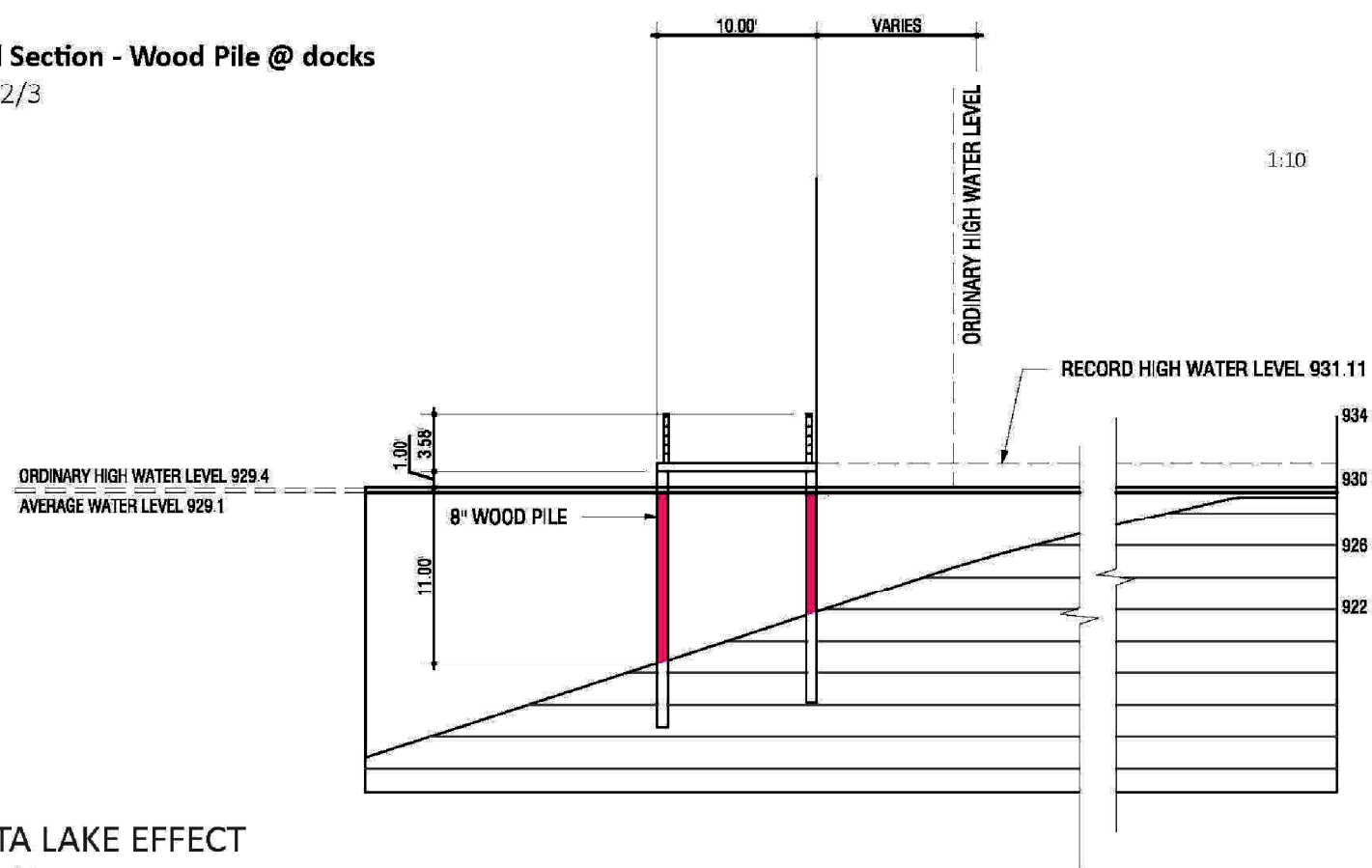
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**Technical Section - Wood Pile @ boardwalk**  
 Section G-G



**Technical Section - Wood Pile @ docks**  
 Section #2/3



WAYZATA LAKE EFFECT  
 Lake Edge Diagrams : Technical Sections

**VOLUME CALCULATIONS**

**1. Wood Pile @ boardwalk**

length of boardwalk = 1,405 lf  
 wood pile radius = .34 ft  
 average area = .35 sf  
 average length = 3'  
 volume = 1.05 (.35 x 3')

Lake Bottom Disturbance  
 180 sf

1,405 (length of boardwalk) ÷ 5.5' (pile spacing) = 256 wood piles  
 2 piles every 5.5' = 256x2 = 512

**Volume = 538 cf (512x 1.05)**

**2. Wood Pile @ proposed docks**

length of dock = 406 lf  
 wood pile radius = .34 ft  
 average area = .35 sf  
 average length = 19' (includes both piles)  
 volume = 6.65cf (.35 x 19')

406 (length of dock) ÷ 5.5' (pile spacing) = 74 wood piles

Volume = 493 cf (6.65x 74)

**3. Wood Pile @ proposed docks**

length of dock = 406 lf  
 wood pile radius = .34 ft  
 average area = .35 sf  
 average length = 19' (includes both piles)  
 volume = 6.65cf (.35 x 19')

406 (length of dock) ÷ 5.5' (pile spacing) = 74 wood piles

Volume = 493 cf (6.65x 74)

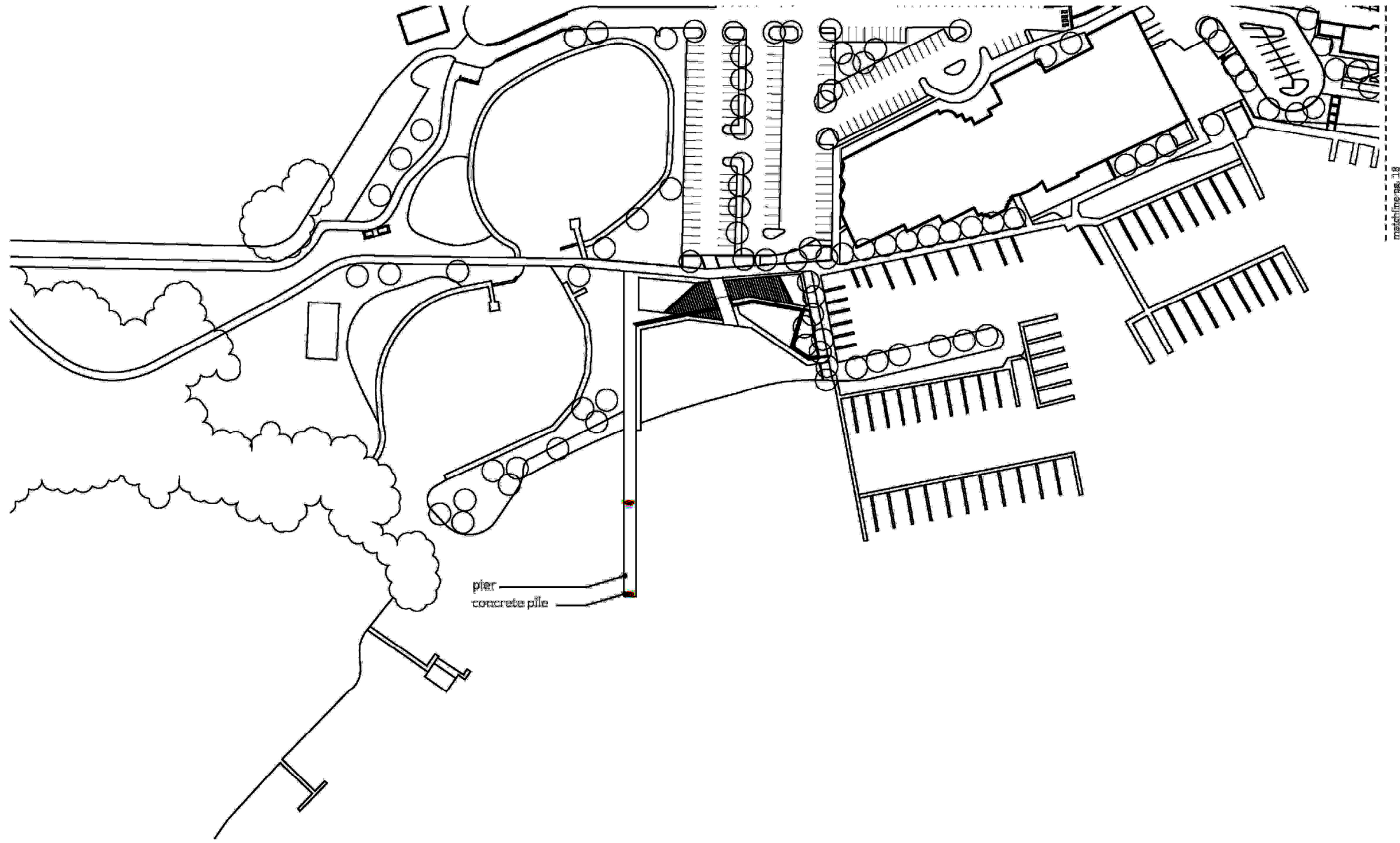
**Volume (2/3 combined) = 986 cf**

**OPTION B1 BOARDWALK WOOD PILE SECTION**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA

Project No:	B1607634
Drawing No:	B1607634_FigB3
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	1/24/18
Sheet:	1 of 1
Fig:	B-3

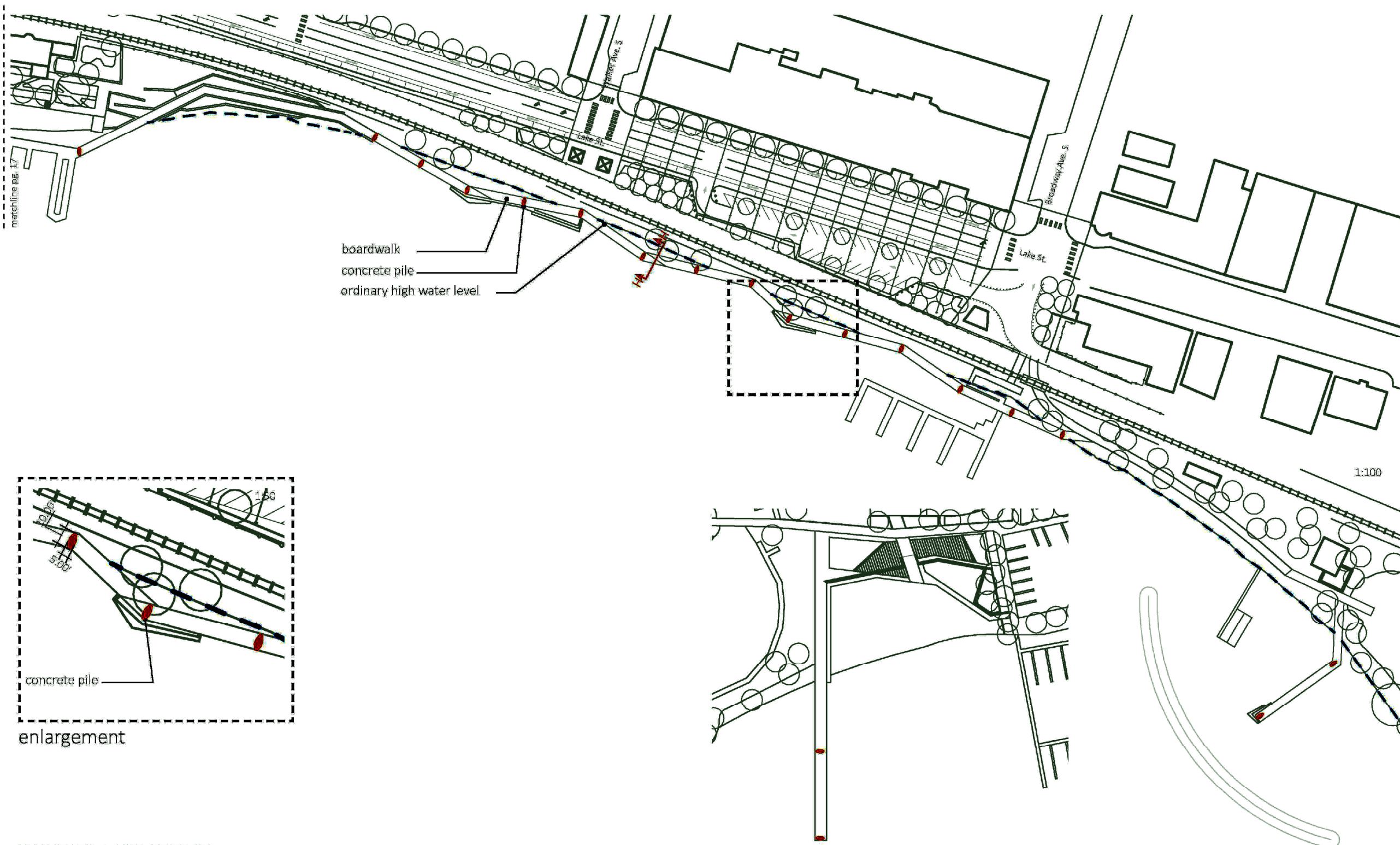
OPTION B2 BOARDWALK CONCRETE PILE PLAN  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

Project No:	B1607634
Drawing No:	B1607634_FigB4
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig:	B-4

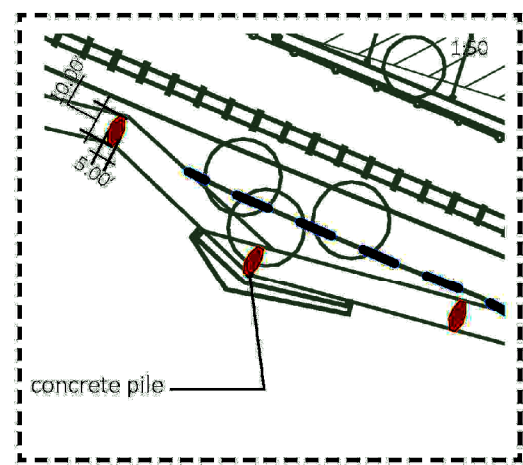


**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Boardwalk Wood Pile Plan Diagram

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boardwalk  
concrete pile  
ordinary high water level



enlargement

**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Boardwalk Concrete Pile Plan Diagram

**CIVITAS**

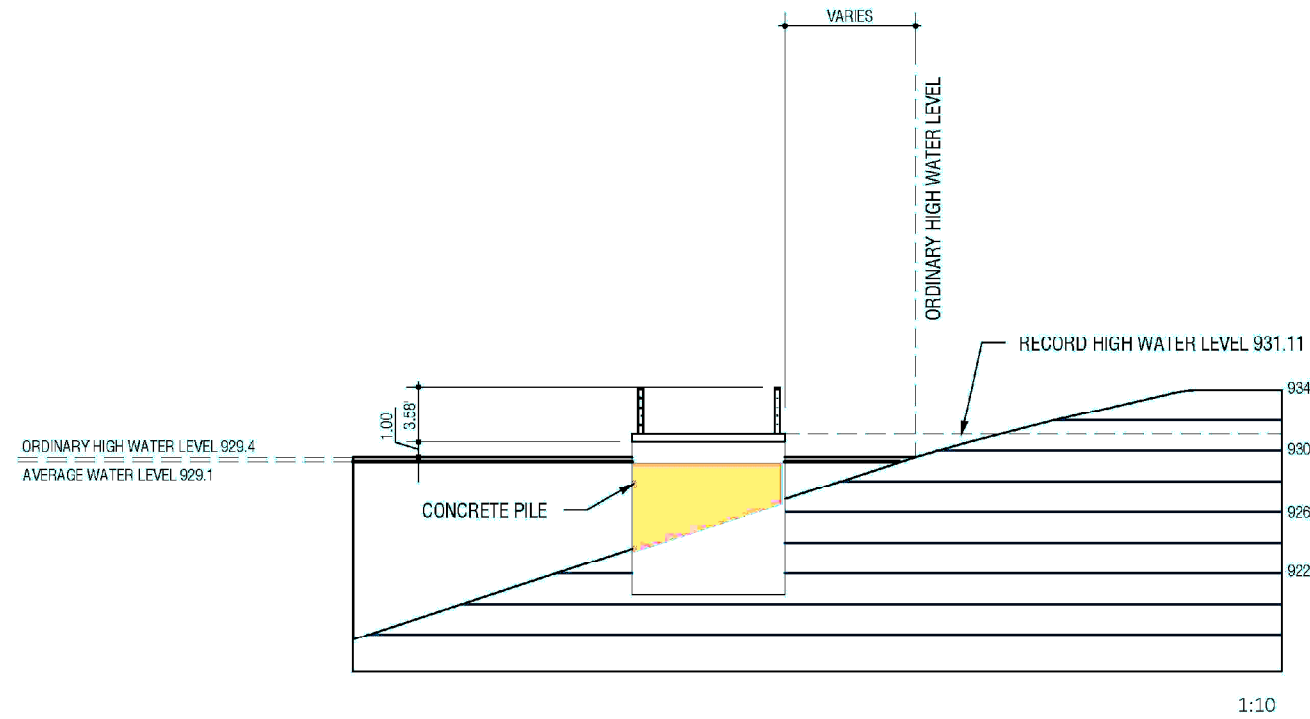
18

OPTION B2 BOARDWALK CONCRETE PILE PLAN  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

Project No:	B1607634
Drawing No.	B1607634_FigB5
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig.	B-5



**Technical Section - Concrete Pile**  
Section H-H



**VOLUME CALCULATIONS**

**1. Concrete Pile**

number of piers = 19  
area of pier = 40 sf  
average depth = 4.42'  
volume = 177 cf

Lake Bottom Disturbance  
760 sf

**Volume = 3,363 cf (19 x 177)**

**OPTION B2 BOARDWALK CONCRETE PILE SECTION**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA

**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Technical Sections

**CIVITAS**  
19

Project No:	
B1607634	
Drawing No.	
B1607634_FigB6	
Drawn By:	
CMF	
Date Drawn:	
01/20/2017	
Checked By:	
JBW	
Last Modified:	
2/9/17	
Sheet:	Fig.
1 of 1	B-6



## **Appendix C**

### **Linear Reef and Shoreline Marsh Construction Options**

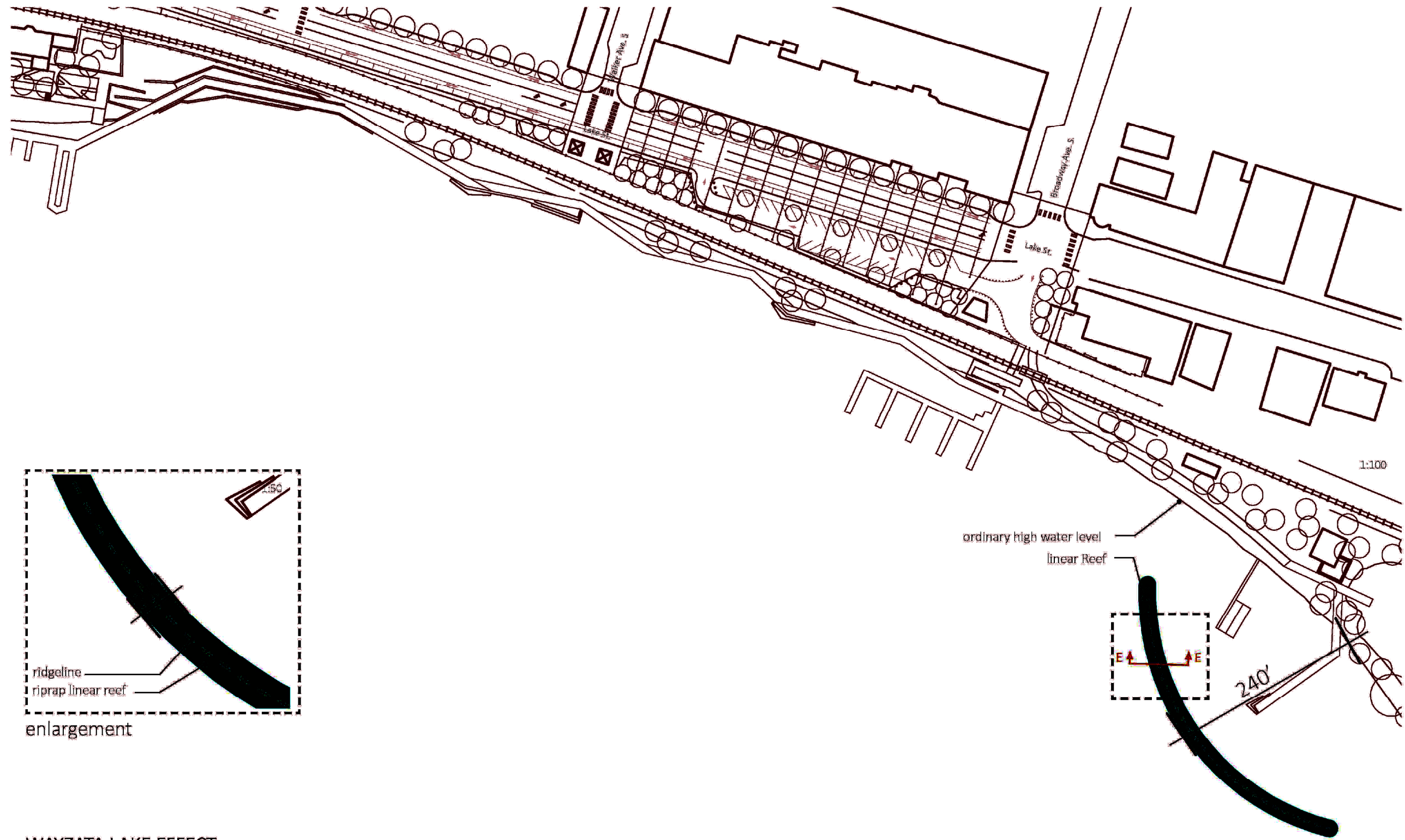
**Figures:**

- C-1: Option C1 Linear Reef Riprap Plan
- C-2: Option C1 Linear Reef Riprap Section
- C-3: Option C2 Linear Reef Sheet Pile Plan
- C-4: Option C2 Linear Reef Sheet Pile Section

## Appendix C Linear Reef and Shoreline Marsh Construction Options

Option C1      Linear Reef – riprap plan. Under this plan, a 394 lf arc of riprap would be placed to depth of approximately 2' below the OHWL (Figure C-1). The riprap would be placed at a width of 21' and to a maximum height of 3.5' (Figure C-2).

Option C2      Linear Reef – sheet pile plan. Under this plan, 394 lf of sheet pile would be placed in an arc to a depth of approximately 2' below the OHWL (Figure C-3). The maximum height of the sheet pile would be approximately 3.5' (Figure C-4).



OPTION C1 LINEAR REEF RIPRAP PLAN  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Linear Reef- Rip Rap Plan Diagram

**CIVITAS**

10

Project No:	B1607634
Drawing No:	B1607634_FigC1
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig:	C-1



**Linear Reef - Rip Rap**  
 Section E-E

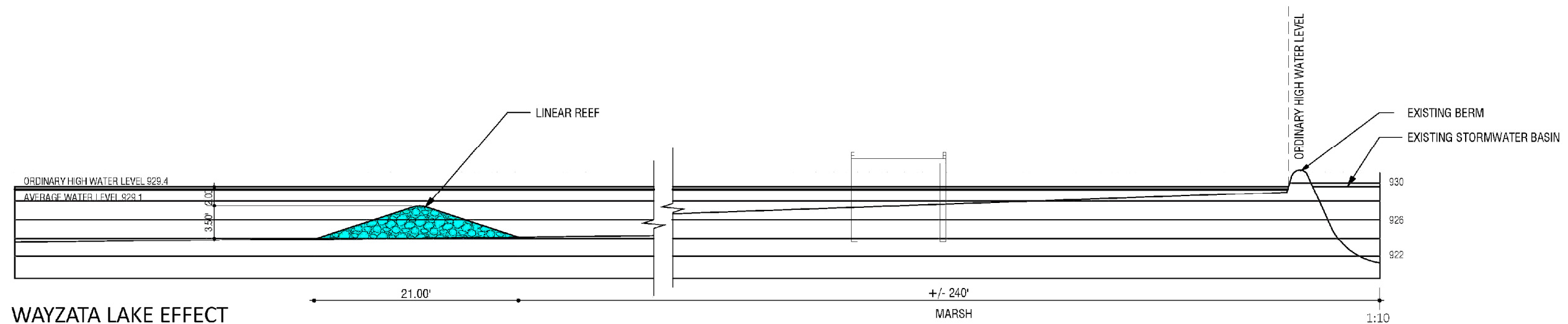
**VOLUME CALCULATIONS**

Linear Reef - Rip Rap

length of linear reef = 395 lf  
 Area of section = 39 sf

Lake Bottom Disturbance  
 8,608 s.f

Volume = 15,405 cf



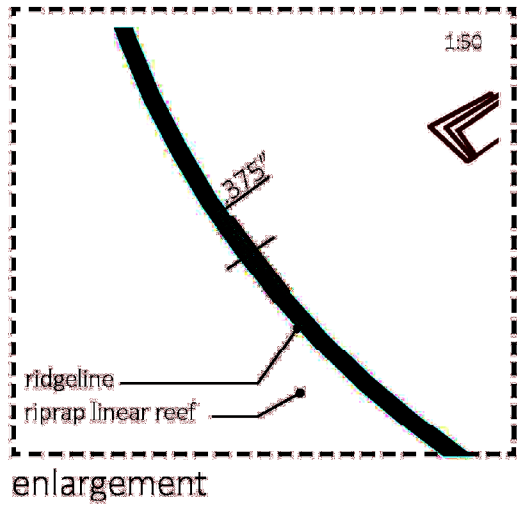
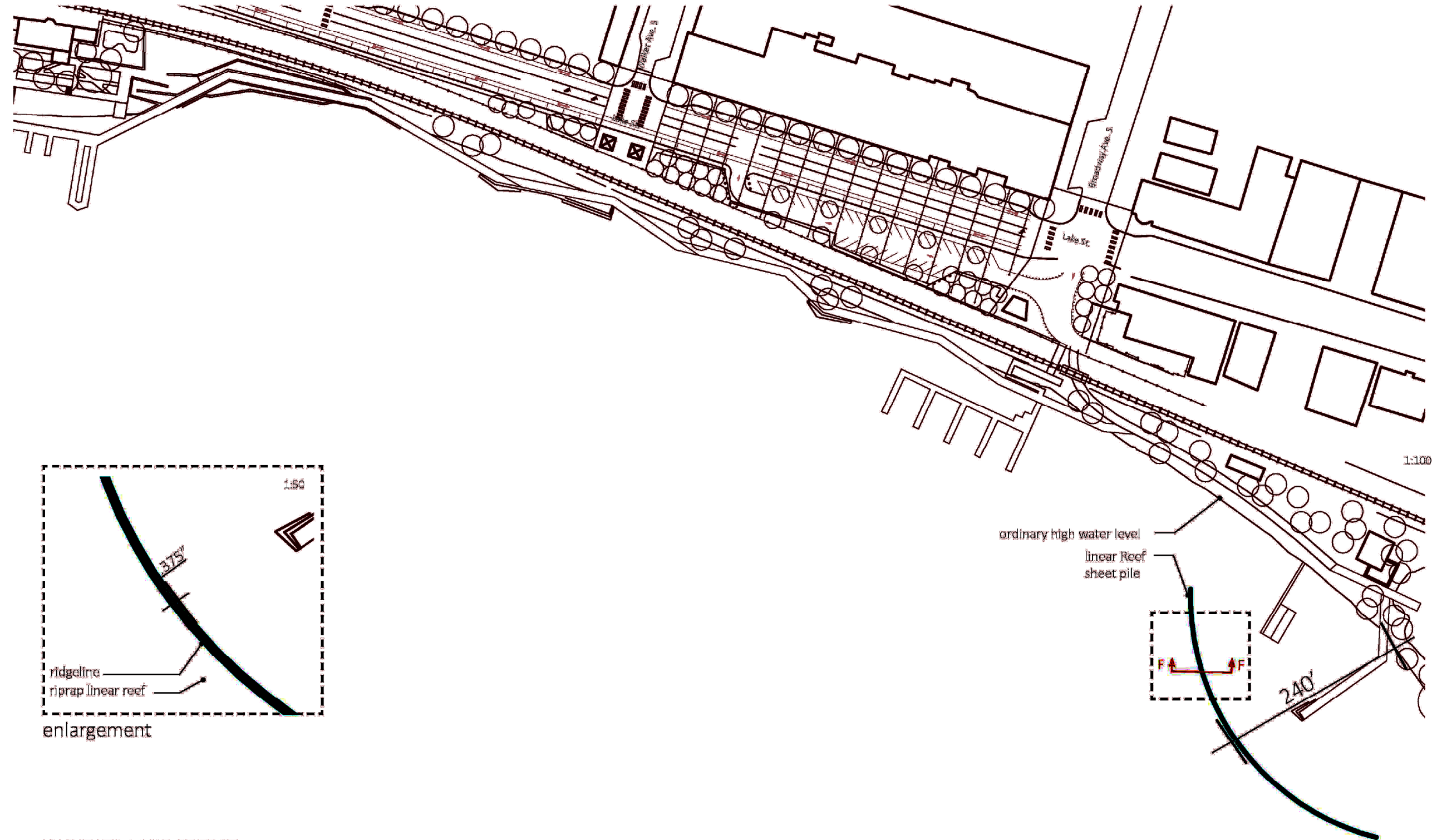
**WAYZATA LAKE EFFECT**  
 Lake Edge Diagrams : Linear Reef Section

**OPTION C1 LINEAR REEF RIPRAP SECTION**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA

**CIVITAS**

11

Project No:	B1607634
Drawing No.	B1607634_FigC2
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig.	C-2



**WAYZATA LAKE EFFECT**  
 Lake Edge Diagrams : Linear Reef- Sheet Pile Plan Diagram

**OPTION C2 LINEAR REEF SHEET PILE PLAN**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA

Project No:		B1607634
Drawing No.		B1607634_FigC3
Drawn By:		CMF
Date Drawn:		01/20/2017
Checked By:		JBW
Last Modified:		2/9/17
Sheet:	Fig.	
1 of 1	C-3	

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**Linear Reef - Sheet Pile**  
Section Γ-Γ

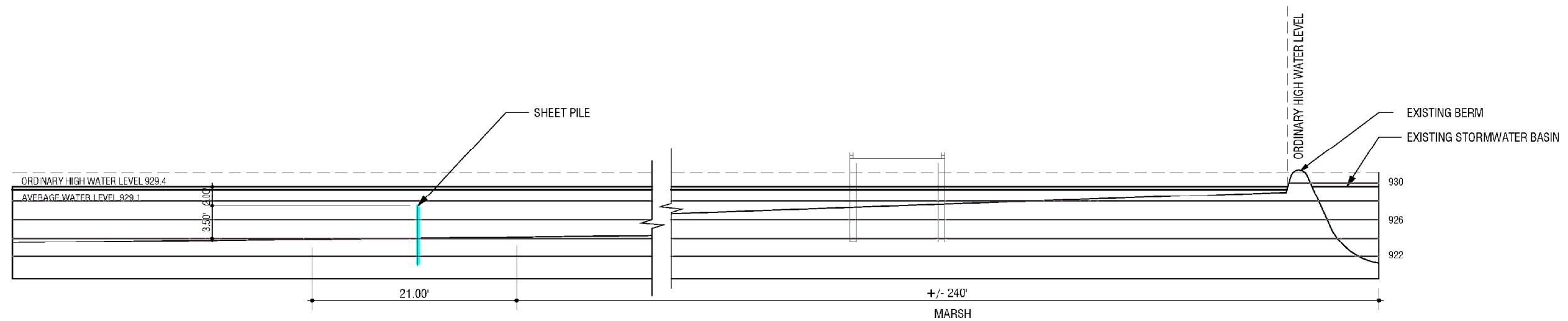
**VOLUME CALCULATIONS**

Linear Reef - Sheet Pile

length of linear reef = 394 lf  
Area of section = .11 sf  
(width of sheet pile .03125' x 3.5' = .11)

Lake Bottom Disturbance  
13 s.f

Volume = 43 cf



**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Linear Reef Section

1:10

**CIVITAS**

13

**OPTION C2 LINEAR REEF SHEET PILE SECTION**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA

Project No:	B1607634
Drawing No.	B1607634_FigC4
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig.	C-4



## **Appendix D**

### **Mitigation Options**

**Figures:**

- D-1: Depot Park Terrace Section
- D-2: Beach Section
- D-3: Boatworks Marina
- D-4: East Pond
- D-5: Bushaway Road Mitigation

## Appendix D Mitigation Options

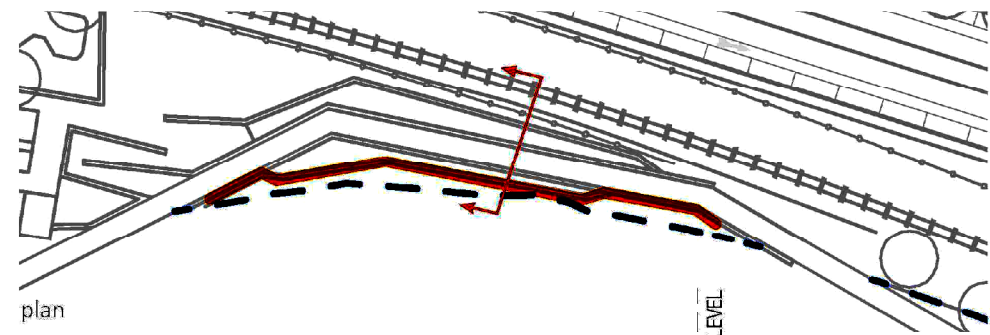
Option M1 – Depot Park Terrace - At the eastern side of the Depot, between the Lake Walk and the shoreline, the area would be landscaped to provide terraces for people to gather. Presently, the area is protected behind a wrought iron fence and gently slopes to the water. The area on the lake side of the fence would be shaped into four terraces, one of which would continue to the Lake Walk. As part of this terrace, and as a mitigation measure for lake bottom and volume displaced by the proposed project, the lake bottom at or just below the OHWL would be expanded by excavation (Figure D-1).

Option M2 – Beach Edge – A beach area is currently present on the west side of the proposed project, to the west of the Boatworks building. As a mitigation measure for lake bottom and volume displaced by the proposed project, the existing beach edge would be excavated, moving the shoreline approximately 14' inland (Figure D-2).

Options M3 and M4 - Boatworks Marina Dredging – currently there are two inland bays in the western portion of the project used as the Boatworks Marina. As a mitigation measure for lake volume displaced by the proposed project, the marina would be dredged either one foot or two feet (Figure D-3).

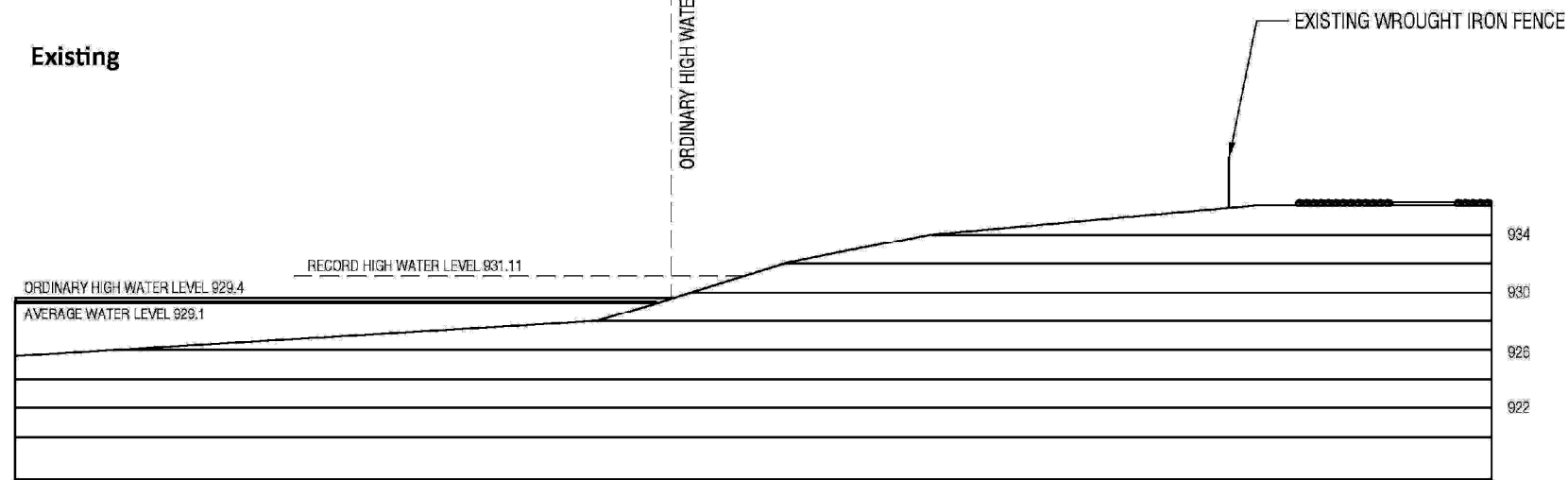
Options M5 and M6 – East Pond Dredging – currently there is a man-made stormwater basin on the east end of the proposed project, near the Section Forman House. As a mitigation measure for lake volume displaced by the proposed project, the basin would be dredged either one foot or two feet (Figure D-4).

Option M7 – Bushaway Road Parcel – this is a separate parcel of land owned by the City of Wayzata, on the east side of Bushaway Road. The parcel is located adjacent to a previously excavated backwater lagoon of the Lower Lake of Lake Minnetonka. As a mitigation measure for lake bottom and volume displaced by the proposed project, an area of this parcel that is currently dominated by volunteer herbaceous plants, would be excavated an average depth of 3.4' to expand the adjacent lagoon (Figure D-5).

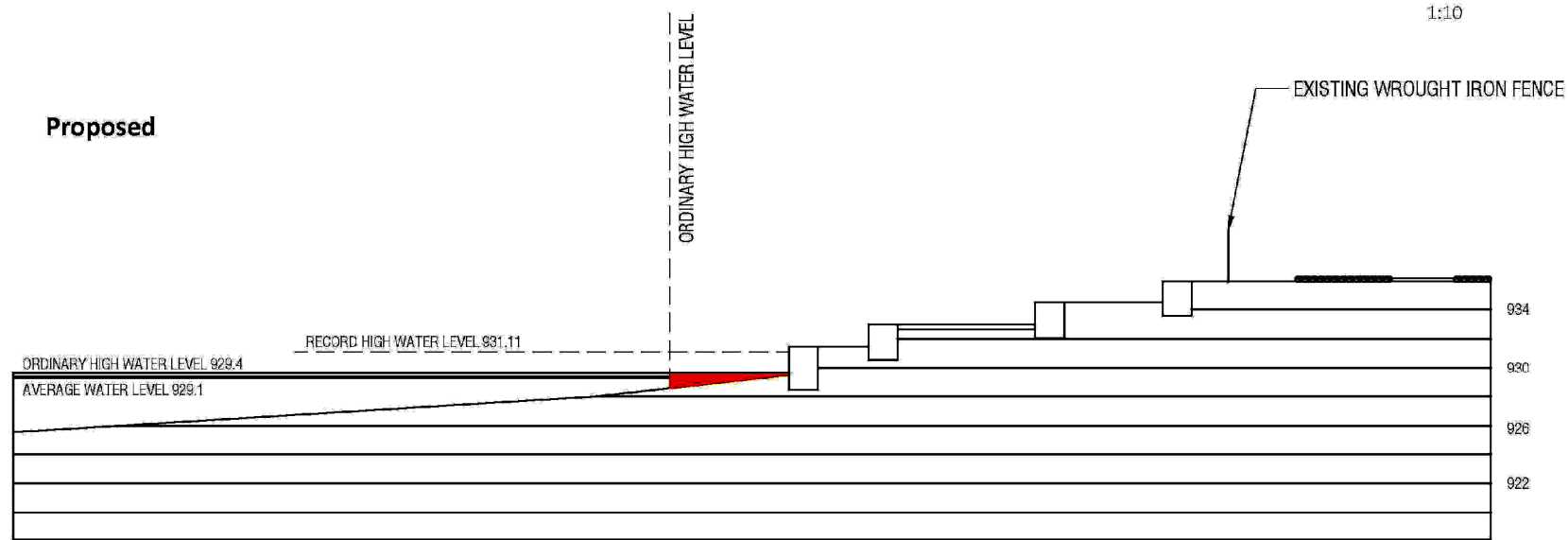


plan

**Existing**



**Proposed**



**WAYZATA LAKE EFFECT**

Lake Edge Diagrams : Depot Park Terrace Section

**VOLUME CALCULATIONS**

length of terrace = 285 lf  
Area of section = 4.72 sf

Lake Bottom Disturbance  
2,346 sf

Volume = 1,345 cf

**Approximate Volume Gain = 1,345 cf**

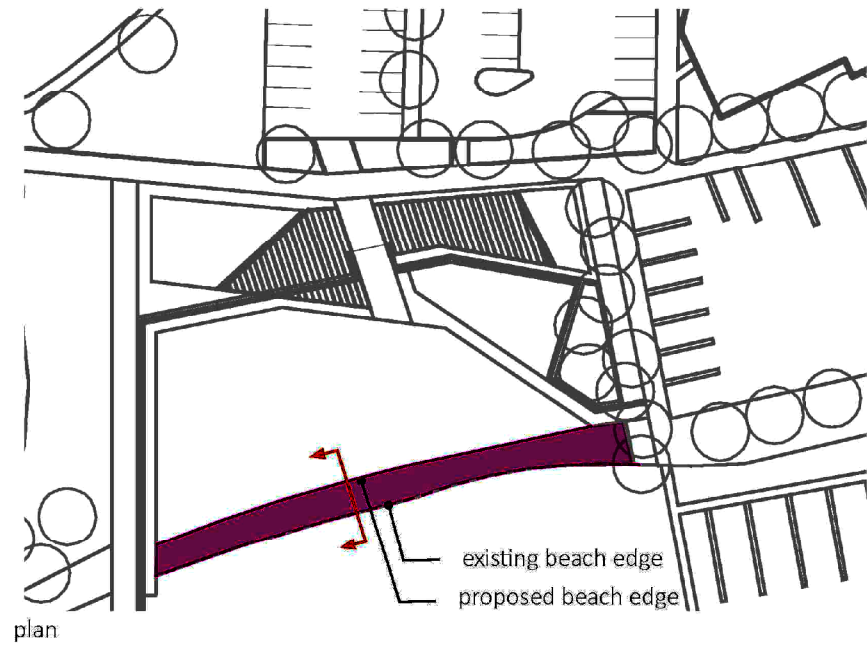
**DEPOT PARK TERRACE SECTION**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA

**CIVITAS**

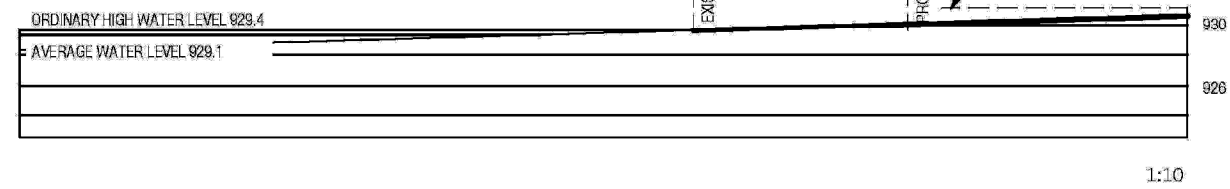
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Drawing No.	B1607634_FigD1
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig.	D-1

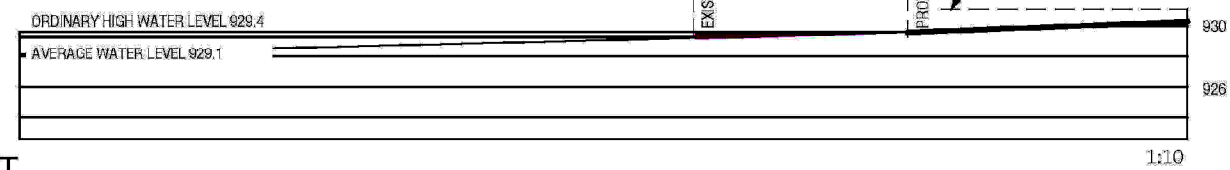




**Existing**



**Proposed**



**VOLUME CALCULATIONS**

Proposed

length = 215 lf  
Area = 1.5 sf  
Volume = 322 cf

Lake Bottom Disturbance  
2,934 sf

**Approximate Volume Gain = 322 cf**

**WAYZATA LAKE EFFECT**  
Lake Edge Diagrams : Beach Section

**BEACH SECTION**  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

Project No:	B1607634
Drawing No.	B1607634_FigD2
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig.	D-2





	Cut (CF)
Boatworks Marina - Dredging 1 FT (925-926)	76887
Boatworks Marina - Dredging an Additional 1 FT (924-925)	53262
<b>TOTAL</b>	<b>130149</b>

IMAGE FOR REFERENCE. NOT TO SCALE OR EXACT PLACEMENT.

REVISIONS BY

NO.	DATE	BY	DESCRIPTION

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

CIVIL ENGINEER \_\_\_\_\_ REG. NO. \_\_\_\_\_  
 DATE: \_\_\_\_\_

**Solution Blue**  
 WATER TREATMENTS  
 218 Oakdale Street  
 Saint Paul, MN 55105  
 612.294.2018  
 www.solutionblue.com

**BOATWORKS**  
 WAYZATA LAKE EFFECT  
 CIVITAS  
 WAYZATA, MN

DRAWN BY: NW  
 CHECKED BY: MJC  
 DATE: 11-29-16  
 JOB NO.: 151002  
 SHEET: EX-1

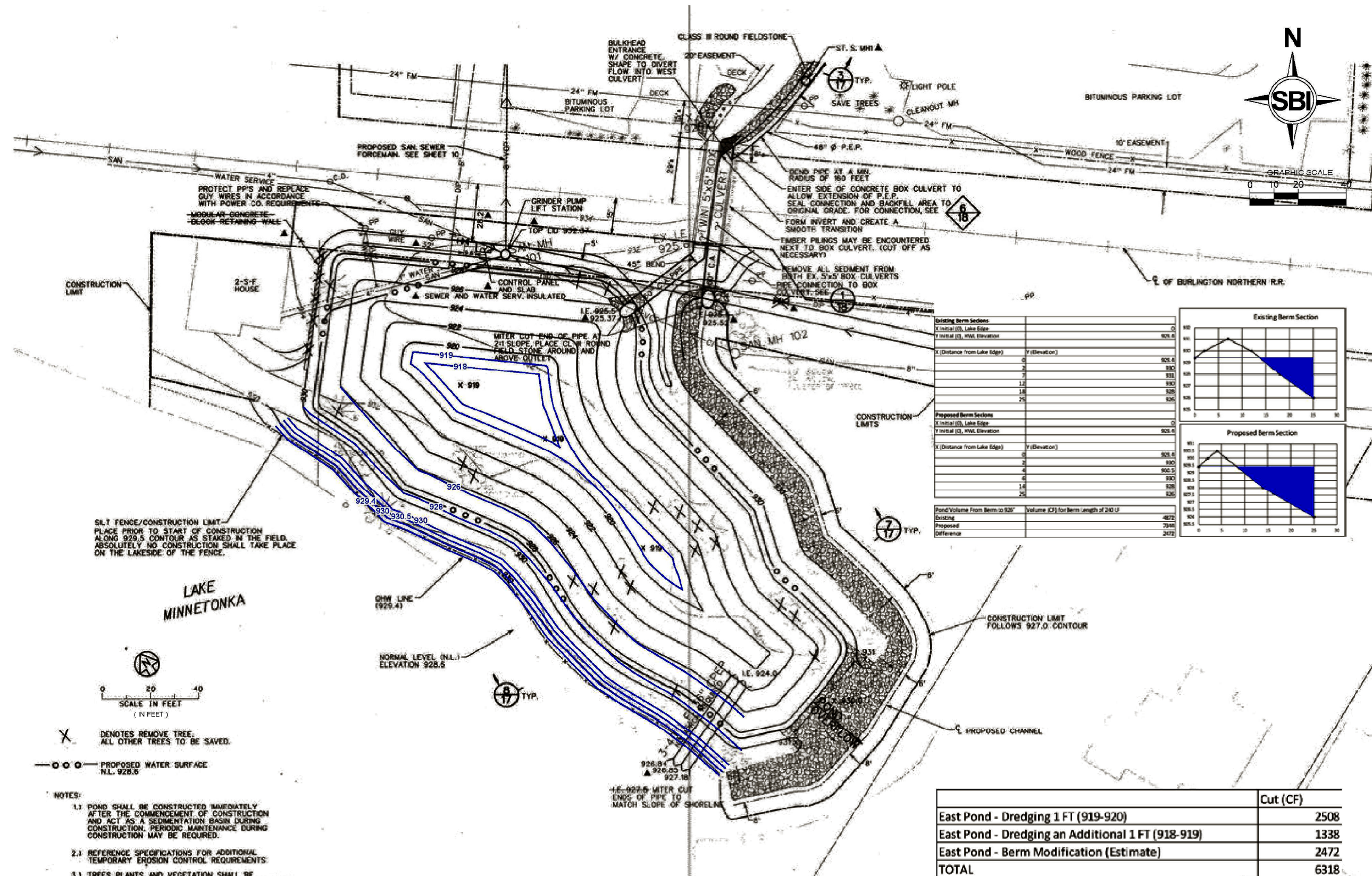
**BRAUN INTERTEC**  
 11001 Hampshire Avenue S  
 Minneapolis, MN 55438  
 PH. (952) 995-2000  
 FAX (952) 995-2020

**BOATWORKS MARINA**  
 WAYZATA LAKE EFFECT  
 WAYZATA, MINNESOTA

Project No: B1607634  
 Drawing No: B1607634\_FigD3  
 Drawn By: CMF  
 Date Drawn: 01/20/2017  
 Checked By: JBW  
 Last Modified: 2/9/17  
 Sheet: 1 of 1 | Fig: D-3

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Existing Berm Section	
X Initial (0, Lake Edge)	0
Y Initial (0, MWL Elevation)	925.4
X (Distance from Lake Edge)	Y (Elevation)
0	925.4
2	930
7	931
12	930
18	928
25	926

Proposed Berm Section	
X Initial (0, Lake Edge)	0
Y Initial (0, MWL Elevation)	925.4
X (Distance from Lake Edge)	Y (Elevation)
0	925.4
2	930
4	930.5
6	930
14	928
25	926

Pond Volume from Berm to 927'		Volume (CF) for Berm Length of 240 LF	
Existing		4872	
Proposed		2944	
Difference		2472	

X DENOTES REMOVE TREE. ALL OTHER TREES TO BE SAVED.

○ ○ ○ PROPOSED WATER SURFACE N.L. 928.6

- NOTES:
1. POND SHALL BE CONSTRUCTED IMMEDIATELY AFTER THE COMMENCEMENT OF CONSTRUCTION AND ACT AS A SEDIMENTATION BASIN DURING CONSTRUCTION. PERIODIC MAINTENANCE DURING CONSTRUCTION MAY BE REQUIRED.
  2. REFERENCE SPECIFICATIONS FOR ADDITIONAL TEMPORARY EROSION CONTROL REQUIREMENTS.
  3. TREES, PLANTS, AND VEGETATION SHALL BE PROTECTED AGAINST DAMAGE DURING CONSTRUCTION OPERATIONS BY INSTALLING TEMPORARY FENCING TO THE SATISFACTION OF THE ENGINEER.

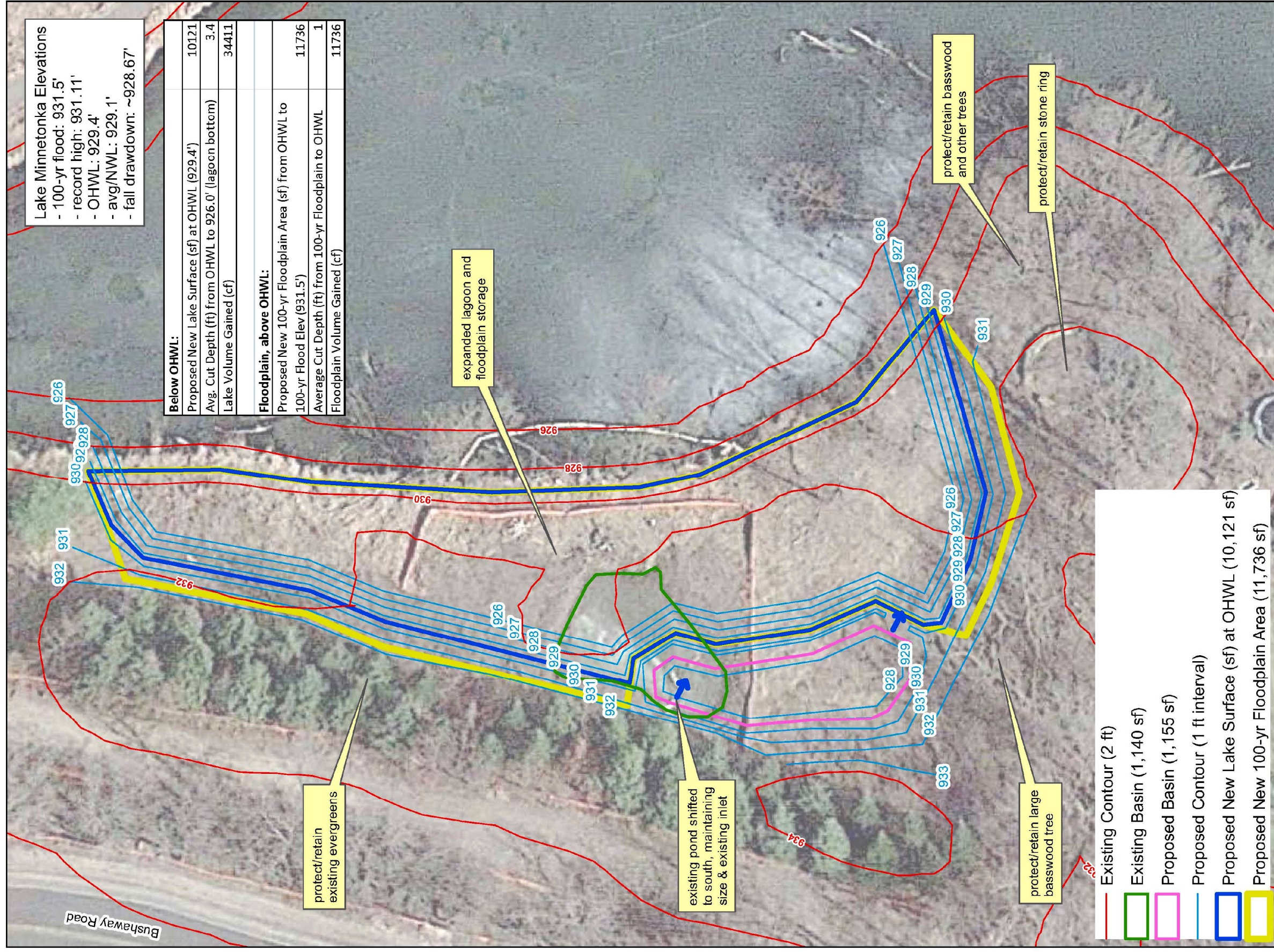
	Cut (CF)
East Pond - Dredging 1 FT (919-920)	2508
East Pond - Dredging an Additional 1 FT (918-919)	1338
East Pond - Berm Modification (Estimate)	2472
<b>TOTAL</b>	<b>6318</b>

Lake Bottom Disturbance  
18,746 sf

EAST POND  
WAYZATA LAKE EFFECT  
WAYZATA, MINNESOTA

Project No: B1607634  
Drawing No: B1607634\_FigD4  
Drawn By: CMF  
Date Drawn: 01/20/2017  
Checked By: JBW  
Last Modified: 2/9/17  
Sheet: 1 of 1 Fig. D-4





**Lake Minnetonka Elevations**  
 - 100-yr flood: 931.5'  
 - record high: 931.11'  
 - OHWL: 929.4'  
 - avg/NWL: 929.1'  
 - fall drawdown: ~928.67'

Below OHWL:	
Proposed New Lake Surface (sf) at OHWL (929.4')	10121
Avg. Cut Depth (ft) from OHWL to 926.0' (lagoon bottom)	3.4
Lake Volume Gained (cf)	34411

Floodplain, above OHWL:	
Proposed New 100-yr Floodplain Area (sf) from OHWL to 100-yr Flood Elev (931.5')	11736
Average Cut Depth (ft) from 100-yr Floodplain to OHWL	1
Floodplain Volume Gained (cf)	11736

- Existing Contour (2 ft)
- Existing Basin (1,140 sf)
- Proposed Basin (1,155 sf)
- Proposed Contour (1 ft interval)
- Proposed New Lake Surface (sf) at OHWL (10,121 sf)
- Proposed New 100-yr Floodplain Area (11,736 sf)

## Wayzata Lake Effect EAW

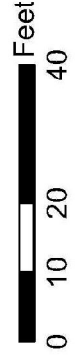
### Bushaway Road Floodplain Mitigation Concept

Data Sources:  
 - MNDNR (Contours)  
 - GoogleEarth image (3/11/2016)

AES Project Number: 16-0549  
 Date: 11/17/16  
 File Name: Wayzata EAW\_BushawayRd\_2016-11-17



Applied Ecological Services, Inc.  
 21938 Mushtown Road  
 Prior Lake, MN 55372  
 952-447-1919  
 www.appliedeco.com

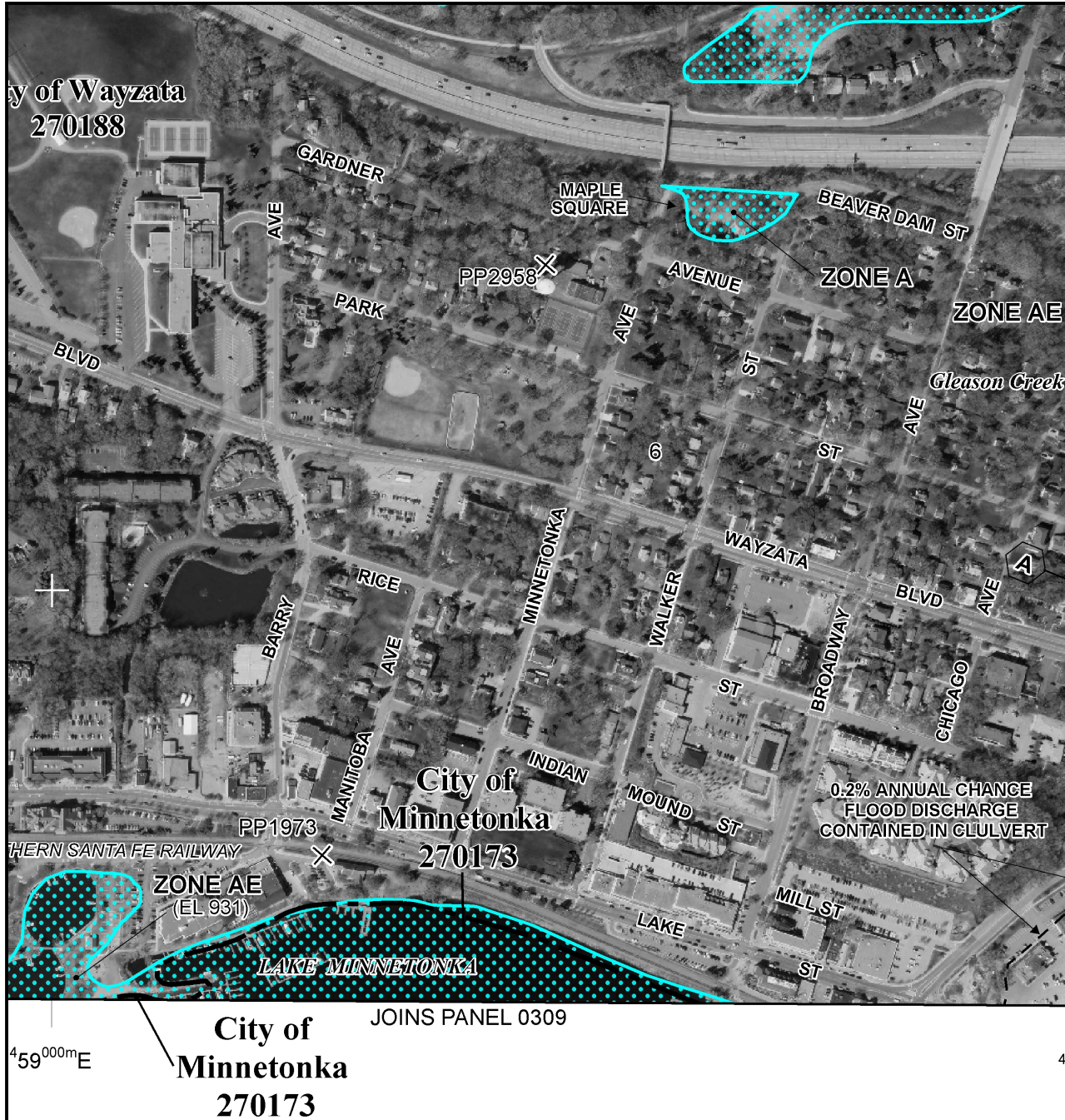


Project No:	B1607634
Drawing No:	B1607634_FigD5
Drawn By:	CMF
Date Drawn:	01/20/2017
Checked By:	JBW
Last Modified:	2/9/17
Sheet:	1 of 1
Fig:	D-5

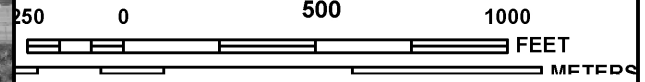


## **Appendix E**

### **FEMA Map**



MAP SCALE 1" = 500'



PANEL 0307F

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**HENNEPIN COUNTY,**  
**MINNESOTA**  
**(ALL JURISDICTIONS)**

**PANEL 307 OF 500**  
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MEDINA, CITY OF	270171	0307	F
MINNETONKA, CITY OF	270173	0307	F
ORONO, CITY OF	270178	0307	F
PLYMOUTH, CITY OF	270179	0307	F
WAYZATA, CITY OF	270188	0307	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



**MAP NUMBER**  
**27053C0307F**  
**MAP REVISED**  
**NOVEMBER 4, 2016**

Federal Emergency Management Agency

NFIP  
 NATIONAL FLOOD INSURANCE PROGRAM

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)

## **Appendix F**

### **Well Logs**





**249098**County Hennepin  
Quad Hopkins  
Quad ID 104BMINNESOTA DEPARTMENT OF HEALTH  
**WELL AND BORING REPORT**  
Minnesota Statutes Chapter 1031Entry Date 10/26/2006  
Update Date 07/29/2015  
Received Date

<b>Well Name</b> LOCUST HILL	<b>Township</b> 117	<b>Range</b> 22	<b>Dir Section</b> W 8	<b>Subsection</b> BACDDC	<b>Well Depth</b> 486 ft.	<b>Depth Completed</b> 486 ft.	<b>Date Well Completed</b>
<b>Elevation</b> 955 ft.	<b>Elev. Method</b> 7.5 minute topographic map (+/- 5 feet)				<b>Drill Method</b> Cable Tool	<b>Drill Fluid</b>	
<b>Address</b> C/W 500 BUSHAWAY RD WAYZATA MN 55391					<b>Use</b> domestic	<b>Status</b> Inactive	
<b>Stratigraphy Information</b>					<b>Well Hydrofractured?</b> Yes <input type="checkbox"/> No <input type="checkbox"/>	<b>From</b>	<b>To</b>
<b>Geological Material</b>	<b>From</b>	<b>To (ft.)</b>	<b>Color</b>	<b>Hardness</b>	<b>Casing Type</b> Single casing	<b>Joint</b>	
GLACIAL DRIFT	0	110			<b>Drive Shoe?</b> Yes <input type="checkbox"/> No <input type="checkbox"/>	<b>Above/Below</b>	
GLENWOOD SHALE	110	116			<b>Casing Diameter</b> 8 in.	<b>Weight</b> 245 ft. lbs./ft.	<b>Hole Diameter</b> 8 in. To 486 ft.
ST. PETER	116	225			<b>Open Hole</b> From 245 ft. To 486 ft.		
ST. PETER	225	278			<b>Screen?</b> <input type="checkbox"/>	<b>Type</b>	<b>Make</b>
PRAIRIE DU CHIEN	278	411			<b>Static Water Level</b> 115 ft. land surface Measure 10/26/2006		
JORDAN SANDSTONE	411	486			<b>Pumping Level (below land surface)</b>		
					<b>Wellhead Completion</b> Pitless adapter manufacturer Model <input type="checkbox"/> Casing Protection <input type="checkbox"/> 12 in. above grade <input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)		
					<b>Grouting Information</b> Well Grouted? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Specified		
					<b>Nearest Known Source of Contamination</b> feet Direction Type Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No		
					<b>Pump</b> <input type="checkbox"/> Not Installed Date Installed Manufacturer's name Model Number HP Volt Length of drop pipe ft Capacity g.p. Typ		
					<b>Abandoned</b> Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No		
					<b>Variance</b> Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No		
					<b>Miscellaneous</b> First Bedrock Glenwood Formation Aquifer St.Peter-Jordan Last Strat Jordan Sandstone Depth to Bedrock 110 ft Located by Minnesota Geological Survey Locate Method Digitization (Screen) - Map (1:24,000) System UTM - Mad83, Zone 15, Meters X 460966 Y 4978644 Unique Number Verification Information from Input Date		
<b>Remarks</b> CALIPER, MULTI TOOL, & GAMMA LOGGED 10-26-2006. LOGGED FOR MDH.					<b>Angled Drill Hole</b>		
					<b>Well Contractor</b> Minnesota Geological Survey MGS Licensee Business Lic. or Reg. No. Name of Driller		

**251285**County Hennepin  
Quad Excelsior  
Quad ID 105AMINNESOTA DEPARTMENT OF HEALTH  
**WELL AND BORING REPORT**  
Minnesota Statutes Chapter 1031Entry Date 04/30/1997  
Update Date 07/29/2015  
Received Date

<b>Well Name</b>	<b>Township</b>	<b>Range</b>	<b>Dir Section</b>	<b>Subsection</b>	<b>Well Depth</b>	<b>Depth Completed</b>	<b>Date Well Completed</b>		
	117	22	W 8	CBBABC	318 ft.	318 ft.			
<b>Elevation</b>	965 ft.	<b>Elev. Method</b>	7.5 minute topographic map (+/- 5 feet)						
<b>Address</b>					<b>Drill Method</b>	<b>Drill Fluid</b>			
C/W 655 BUSHAWAY RD WAYZATA MN					Use domestic	Status Unknow			
<b>Stratigraphy Information</b>					<b>Well Hydrofractured?</b>	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
Geological Material	From	To (ft.)	Color	Hardness	<b>Casing Type</b>	Single casing <input type="checkbox"/> Joint <input type="checkbox"/>			
GLACIAL DRIFT	0	134			<b>Drive Shoe?</b>	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
ST. PETER	134	287			<b>Casing Diameter</b>	Weight			
PRAIRIE DU CHIEN	287	318			6 in. To	308 ft.	lbs./ft.		
					<b>Open Hole</b>	From 308 ft.	To 318 ft.		
					<b>Screen?</b>	<input type="checkbox"/>	<b>Type</b>	<b>Make</b>	
					<b>Static Water Level</b>				
					46 ft.	land surface	Measure 04/28/1997		
					<b>Pumping Level (below land surface)</b>				
					<b>Wellhead Completion</b>				
					Pitless adapter manufacturer	Model			
					<input type="checkbox"/> Casing Protection	<input type="checkbox"/> 12 in. above grade			
					<input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)				
					<b>Grouting Information</b>	Well Grouted?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Specified <input type="checkbox"/>
					<b>Nearest Known Source of Contamination</b>				
					feet	Direction	Type		
					Well disinfected upon completion?	Yes <input type="checkbox"/>	No <input type="checkbox"/>		
					<b>Pump</b>	<input type="checkbox"/> Not Installed	Date Installed		
					Manufacturer's name				
					Model Number	HP	Q	Volt	
					Length of drop pipe	ft	Capacity	g.p. Typ	
					<b>Abandoned</b>				
					Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No				
					<b>Variance</b>				
					Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input type="checkbox"/> No				
					<b>Miscellaneous</b>				
					First Bedrock	St.Peter Sandstone	Aquifer	Prairie Du Chien	
					Last Strat	Prairie Du Chien Group	Depth to Bedrock	134 ft	
					Located by Minnesota Geological Survey				
					Locate Method Digitization (Screen) - Map (1:24,000)				
					System	UTM - Mad83, Zone 15, Meters	X 460538	Y 4978186	
					Unique Number Verification	Information from	Input Date	06/02/2000	
					<b>Angled Drill Hole</b>				
					<b>Well Contractor</b>				
					Minnesota Geological Survey	MGS			
					Lic. or Reg. No.	Name of Driller			
<b>Remarks</b>									
GAMMA LOGGED 4-28-1997.									
<b>Minnesota Well Index Report</b>					<b>251285</b>				
					Printed on 01/04/2017 HE-01205-15				

**793702**

County Hennepin  
 Quad Excelsior  
 Quad ID 105A

MINNESOTA DEPARTMENT OF HEALTH  
**WELL AND BORING REPORT**  
 Minnesota Statutes Chapter 1031

Entry Date 12/17/2012  
 Update Date 07/27/2015  
 Received Date 11/09/2012

<b>Well Name</b> SENIOR	<b>Township</b> 117	<b>Range</b> 22	<b>Dir Section</b> W 6	<b>Subsection</b> DBDABB	<b>Well Depth</b> 60 ft.	<b>Depth Completed</b> 60 ft.	<b>Date Well Completed</b> 08/28/2012
<b>Elevation</b> 935 ft.	<b>Elev. Method</b> 7.5 minute topographic map (+/- 5 feet)				<b>Drill Method</b> Auger (non-specified)	<b>Drill Fluid</b>	
<b>Address</b>					<b>Use</b> elevator	<b>Status</b> Active	
Well 831 LAKE ST E WAYZATA MN 55391					<b>Well Hydrofractured?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <b>From</b> <b>To</b>		
<b>Stratigraphy Information</b>					<b>Casing Type</b> Step down <b>Joint</b> Welded		
Geological Material From To (ft.) Color Hardness					<b>Drive Shoe?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <b>Above/Below</b>		
SILTY CLAY 0 10 GRAY SOFT					<b>Casing Diameter</b> <b>Weight</b> <b>Hole Diameter</b>		
SAND & GRAVEL 10 30 BROWN MEDIUM					18 in. To 60 ft. 70.5 lbs./ft. 24 in. To 60 ft.		
HARDPAN 30 40 GRAY MEDIUM					24 in. To 57 ft. 63.4 lbs./ft.		
SAND & GRAVEL 40 60 BROWN MEDIUM					<b>Open Hole</b> From ft. To ft.		
					<b>Screen?</b> <input type="checkbox"/> <b>Type</b> <b>Make</b>		
					<b>Static Water Level</b>		
					2 ft. land surface Measure 08/28/2012		
					<b>Pumping Level (below land surface)</b>		
					<b>Wellhead Completion</b>		
					Pitless adapter manufacturer Model		
					<input type="checkbox"/> Casing Protection <input type="checkbox"/> 12 in. above grade		
					<input type="checkbox"/> At-grade (Environmental Wells and Borings ONLY)		
					<b>Grouting Information</b> Well Grouted? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Specified		
					Material Amount From To		
					neat cement 3 Cubic yards ft. 60 ft.		
					<b>Nearest Known Source of Contamination</b>		
					feet Direction Type		
					Well disinfected upon completion? <input type="checkbox"/> Yes <input type="checkbox"/> No		
					<b>Pump</b> <input type="checkbox"/> Not Installed Date Installed		
					Manufacturer's name		
					Model Number HP Volt		
					Length of drop pipe ft Capacity g.p. Typ		
					<b>Abandoned</b>		
					Does property have any not in use and not sealed well(s)? <input type="checkbox"/> Yes <input type="checkbox"/> No		
					<b>Variance</b>		
					Was a variance granted from the MDH for this well? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
					<b>Miscellaneous</b>		
					First Bedrock Aquifer		
					Last Strat sand +larger-brown Depth to Bedrock ft		
					Located by Minnesota Department of Health		
					Locate Method GPS SA Off (averaged)		
					System UTM - Mad83, Zone 15, Meters X 459928 Y 4979632		
					Unique Number Verification Info/GPS from data Inpute Date 02/12/2014		
					<b>Angled Drill Hole</b>		
					<b>Well Contractor</b>		
					United Drilling, Inc. 1832 LANGSDORF, A.		
					Licensee Business Lic. or Reg. No. Name of Driller		

**Remarks**  
 STATIC WATER LEVEL MEASURED FROM PIT FLOOR.