

Appendix A

Restored Lake Edge Construction Options

Figures:

- A-1: Option A1 Lake Edge: Continuous Riprap Plan
- A-2: Option A2 Lake Edge: Intermittent Riprap Plan
- A-3: Options A1 & A2 Lake Edge: Riprap Section
- A-4: Option A3 Lake Edge: Continuous Sheet Pile Plan
- A-5: Option A4 Lake Edge: Intermittent Sheet Pile Plan
- A-6: Option A3 & A4 Lake Edge: Sheet Pile Section
- A-7: Option A5 Lake edge: Continuous Toe-Wood Plan
- A-8: Option A6 Lake Edge: Intermittent Toe-Wood Plan
- A-9: Options A5 & A6 Lake Edge: Toe-Wood Section

Appendix A: Restored Lake Edge Construction Options

Option A1 Lake Edge – continuous riprap plan. Under this plan, riprap would be placed continuously along the shoreline to create a linear ridge 2' below the OHWL (Figures A-1 and A-3). Lake bottom sediment (fill) would be placed on the land side of the riprap, creating an aquatic shelf for establishment of aquatic and emergent shoreline marsh vegetation. Please note, for illustration purposes only, the diagram presented as Figure A-3 shows a single support for the Lake Walk. However, as will be discussed below, several options are being considered for the Lake Walk support. The riprap and fill would be placed along 1,637 lf of the lake shore, at a width of approximately 14.31'.

Option A2 Lake Edge – intermittent riprap plan. Similar to Option A1, however under this plan, the riprap would be placed in four discrete areas along the lake edge, rather than continuously as discussed in Option A1 (Figures A-2 and A-3). This would create smaller areas of discrete shoreline marsh.

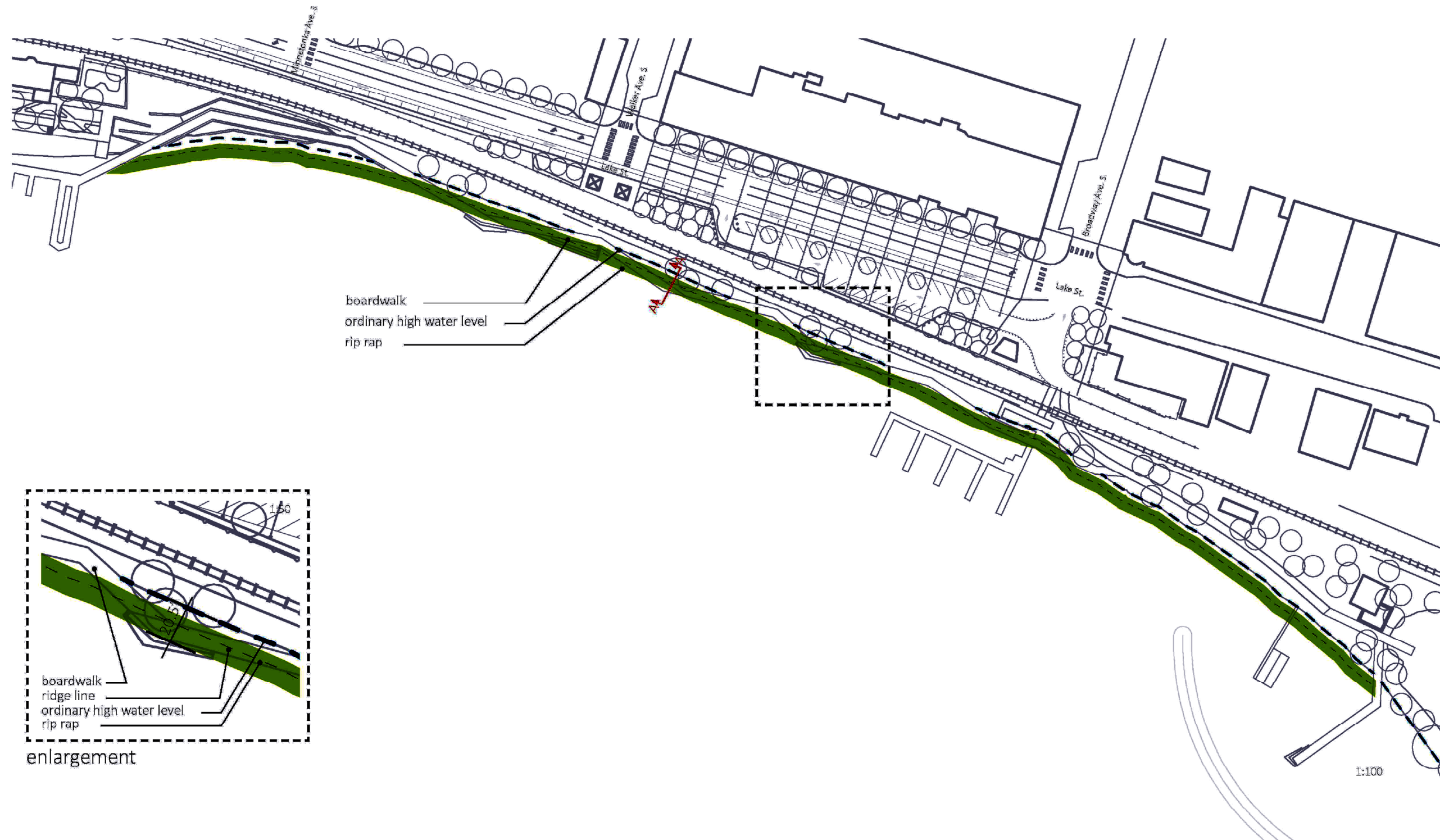
Option A3 Lake Edge – continuous sheet pile plan. Under this plan, 1,637 lf of sheet pile would be placed along the lake shore approximately 11' from the shoreline (Figure A-4). The top of the sheet pile would be at a depth of 2' below the OHWL. Fill would be placed on the land side of the sheet pile for a width of approximately 5' (Figure A-6), creating an aquatic shelf for establishment of aquatic and emergent shoreline marsh vegetation.

Option A4 Lake Edge – intermittent sheet pile. Under this plan, 585 lf of sheet pile would be placed in four areas along the lake shore, just inside the land edge of the Lake Walk (Figure A-5). The top of the sheet pile would be at a depth of 2' below the OHWL. Fill would be placed on the land side of the sheet pile (Figure A-6). This would result in discrete areas of shoreline marsh.

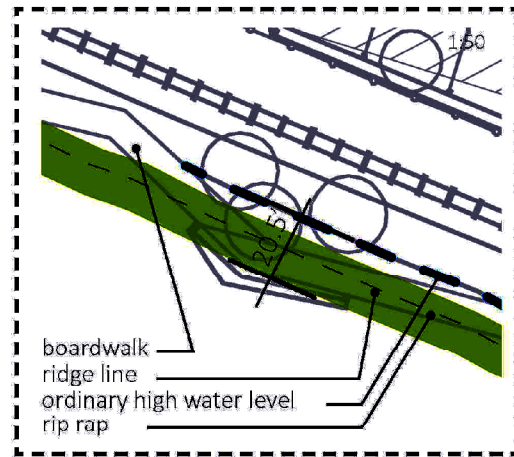
Option A5 Lake Edge – continuous toe-wood plan. Under this plan, 1,637 lf of toe-wood would be placed along the lake shore approximately 11' from the shoreline (Figure A-7). The toe-wood create a ridge approximately 2' in height and fill would be placed on the landward side of the toe-wood (Figure A-9). The fill would create an aquatic shelf for establishment of aquatic and emergent shoreline marsh vegetation.

Option A6 Lake Edge – intermittent toe-wood plan. Under this plan, the toe-wood would be placed at four discrete locations (Figure A-8). The placement of the toe-wood and fill would be similar to Option A4 (Figure A-9), and would result in discrete areas of shoreline marsh.

Option A7 Lake Edge – floating islands. Under this plan, a synthetic mesh or other similar floating substrate would be installed along the lake edge. Living wetland plants are installed on the mesh, creating a floating structure that rises and falls with fluctuating water levels. Floating islands would not disturb lake bottom or displace lake volume, but would need to be removed each fall and reinstalled each spring due to the destructive forces of ice on Lake Minnetonka.



boardwalk
ordinary high water level
rip rap



enlargement

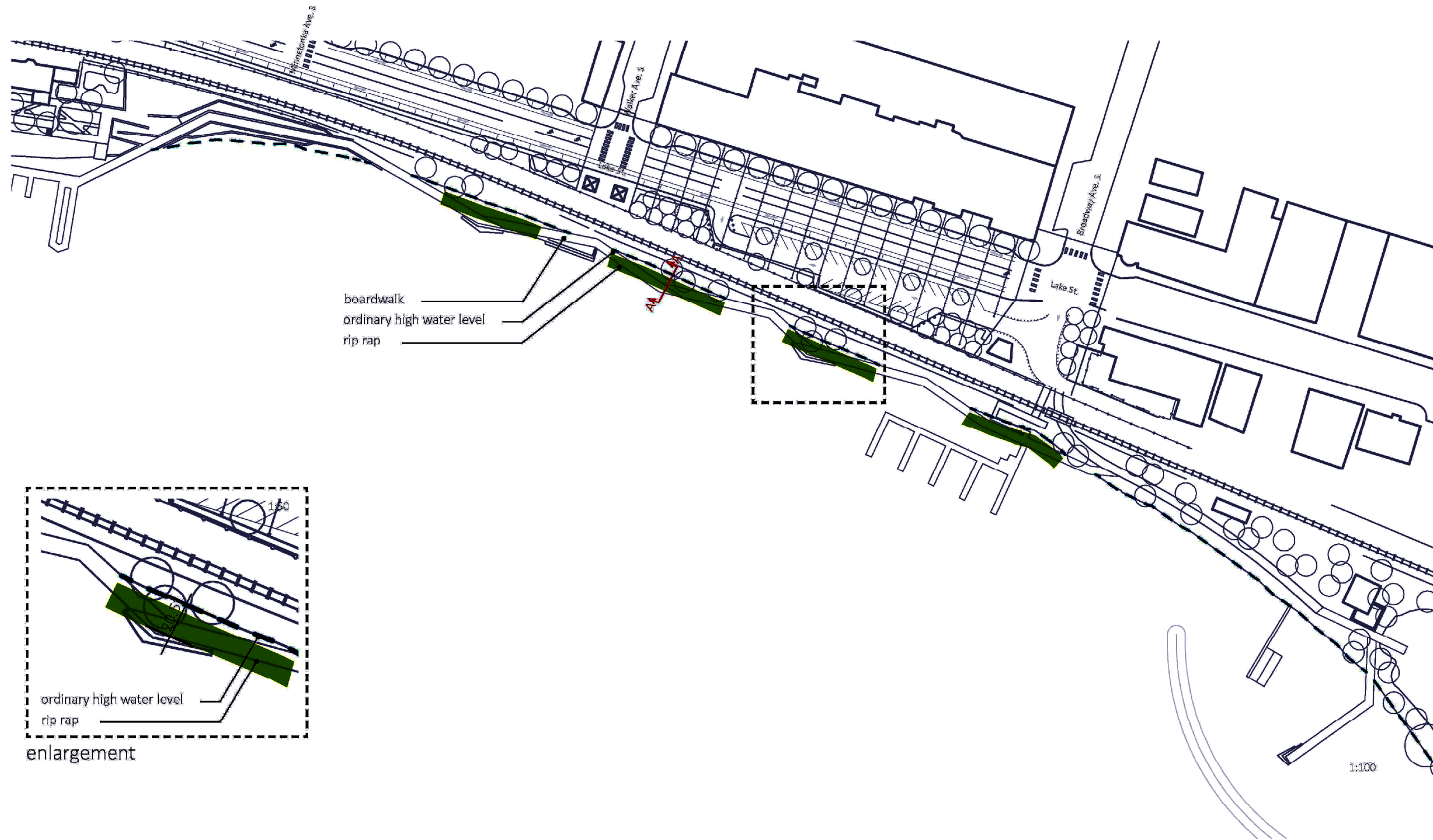
WAYZATA LAKE EFFECT
Lake Edge Diagrams : Continuous Riprap Plan Diagram

CIVITAS

1

OPTION A1 LAKE EDGE: CONTINUOUS RIPRAP PLAN
WAYZATA LAKE EFFECT
WAYZATA, MINNESOTA

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Drawing No.		B1607634_FigA1
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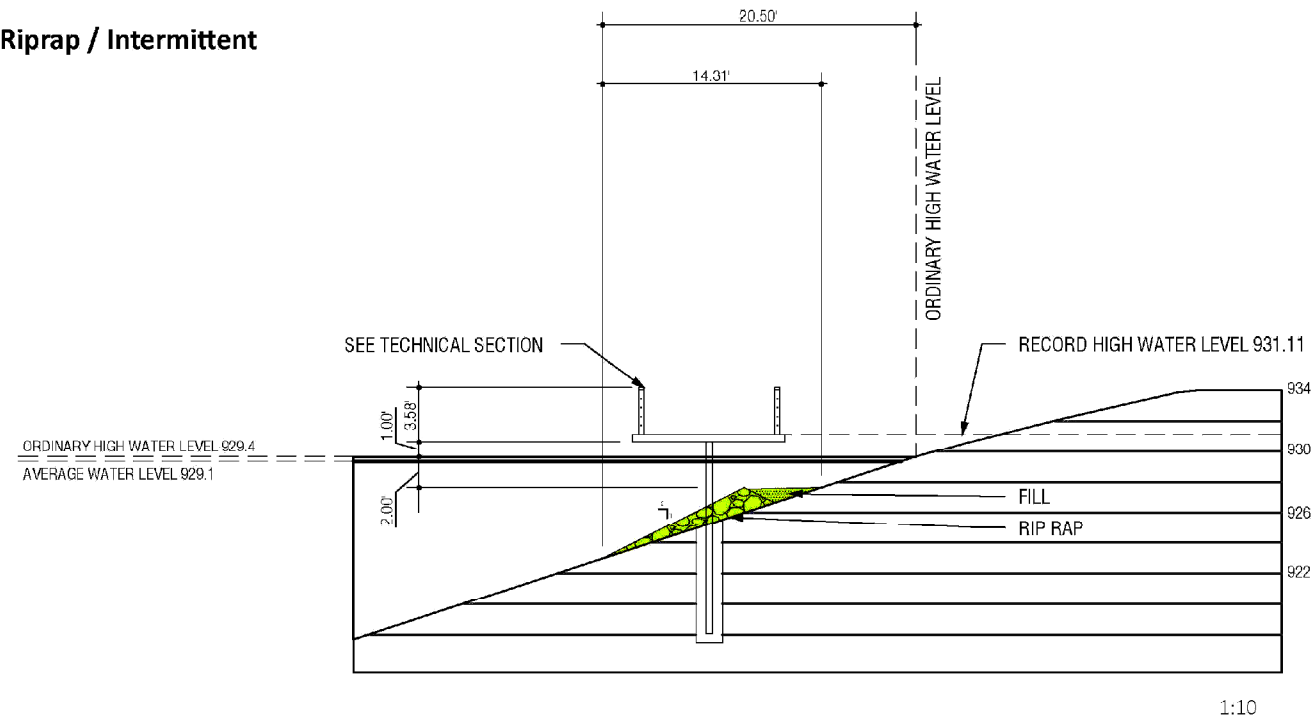
OPTION A2 LAKE EDGE: INTERMITTENT RIPRAP
WAYZATA LAKE EFFECT
WAYZATA, MINNESOTA

WAYZATA LAKE EFFECT
Lake Edge Diagrams : Intermittent Riprap Plan Diagram

CIVITAS
2

Project No:		B1607634
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Continuous Riprap / Intermittent
Section A-A



VOLUME CALCULATIONS

1. Continuous Riprap

Rip Rap
length = 1,637 lf
Area = 9 sf
Volume = 14,733 cf

Lake Bottom Disturbance
23,426 s.f

Fill
length = 1,637 lf
Area = 2.4 sf
Volume = 3,929 cf

Total Volume = 18,662 cf

2. Intermittent Riprap

Rip Rap
length = 585 lf
Area = 9 sf
Volume = 5,265 cf

Lake Bottom Disturbance
8,371 s.f

Fill
length = 585 lf
Area = 2.4 sf
Volume = 1,404 cf

Total Volume = 6,669 cf

OPTIONS A1 AND A2 LAKE EDGE: RIPRAP SECTION
WAYZATA LAKE EFFECT
WAYZATA, MINNESOTA

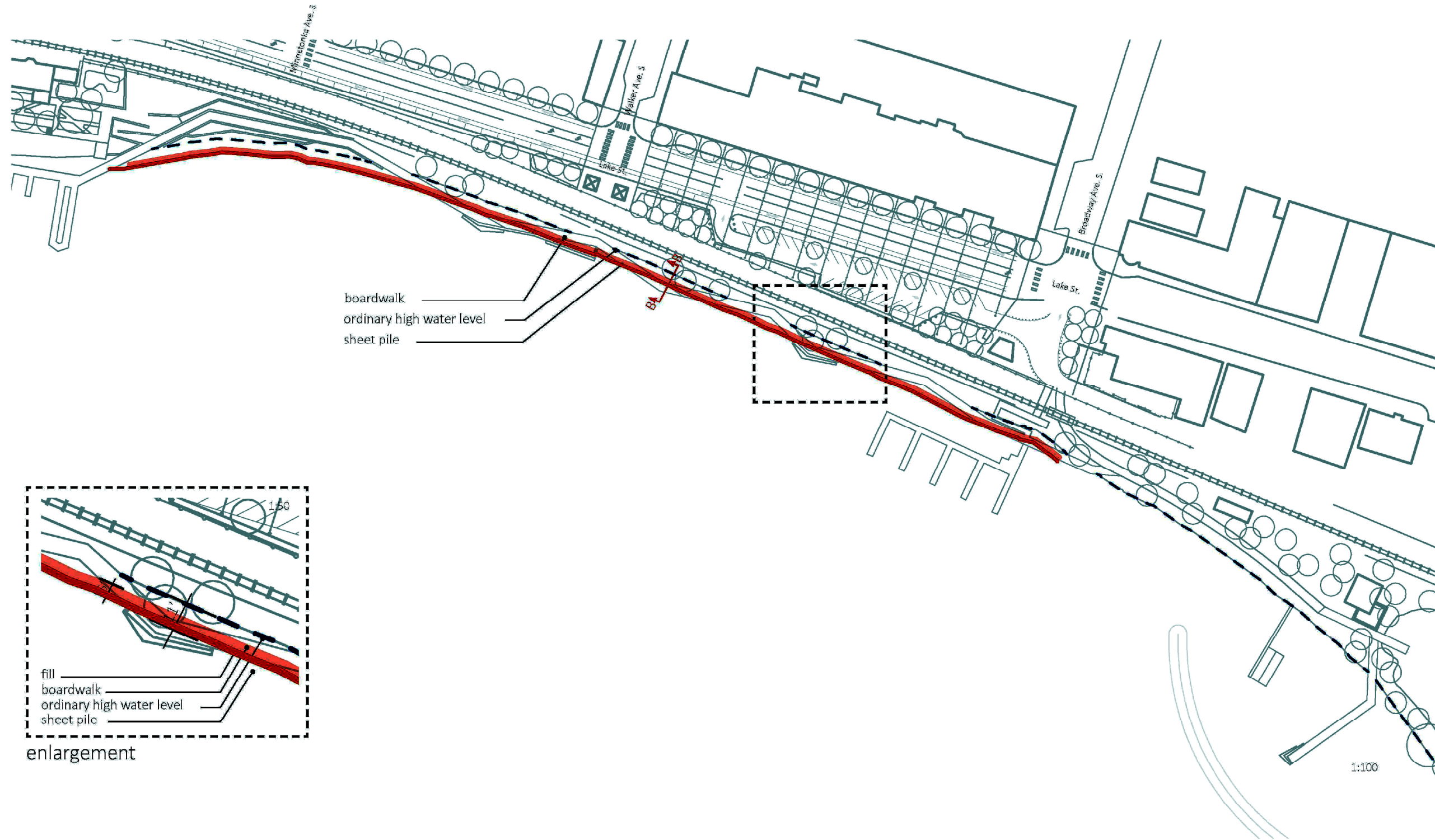
WAYZATA LAKE EFFECT
Lake Edge Diagrams : Riprap Section

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CIVITAS

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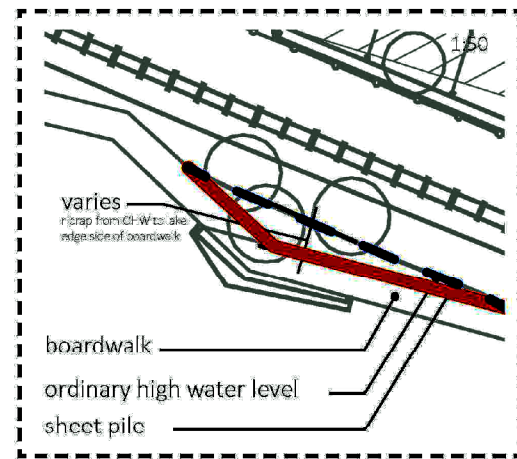
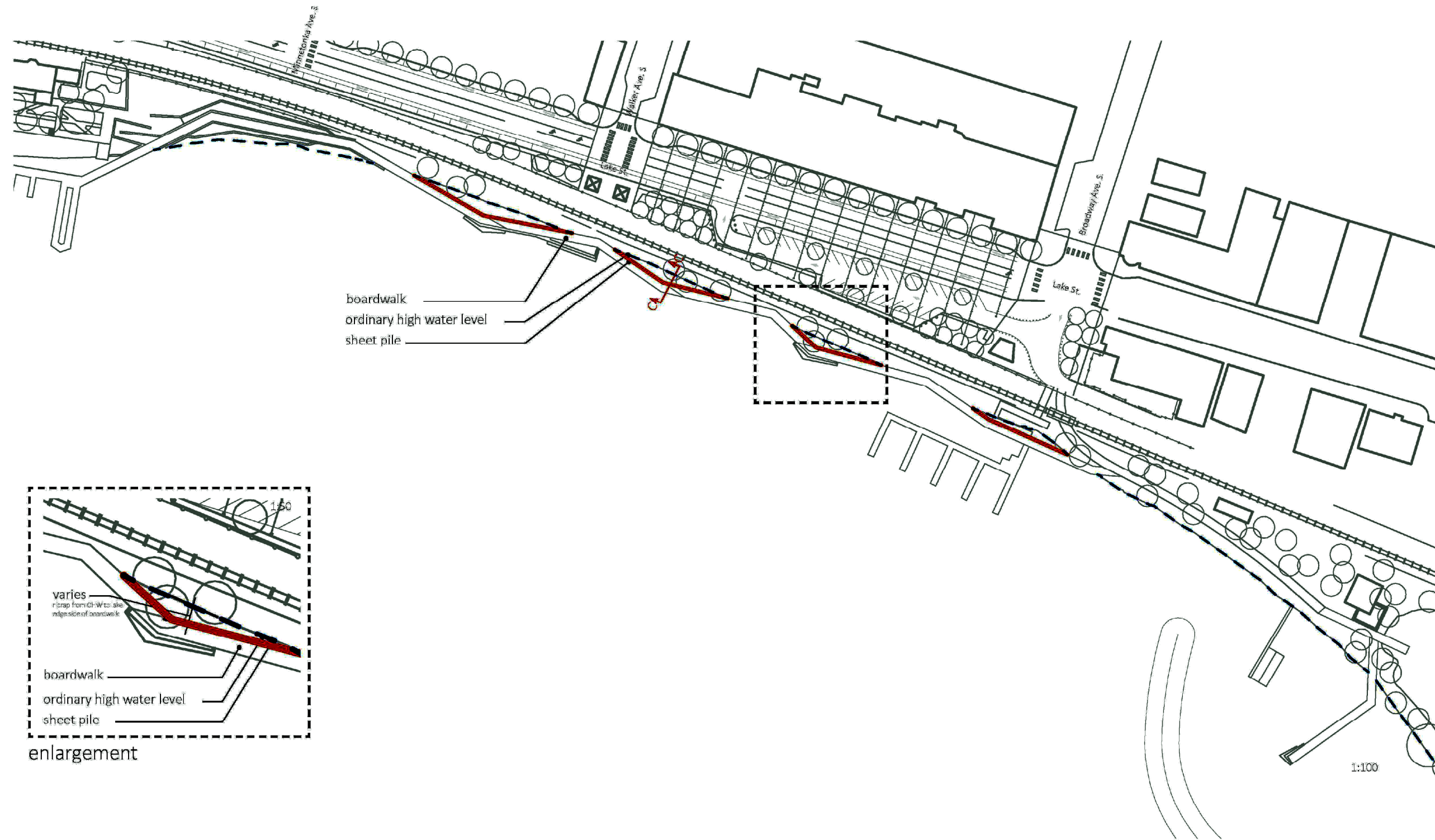


OPTION A3 LAKE EDGE: CONTINUOUS SHEET PILE PLAN
WAYZATA LAKE EFFECT
WAYZATA, MINNESOTA

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

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enlargement

WAYZATA LAKE EFFECT

Lake Edge Diagrams : Intermittent Sheet Pile Plan Diagram

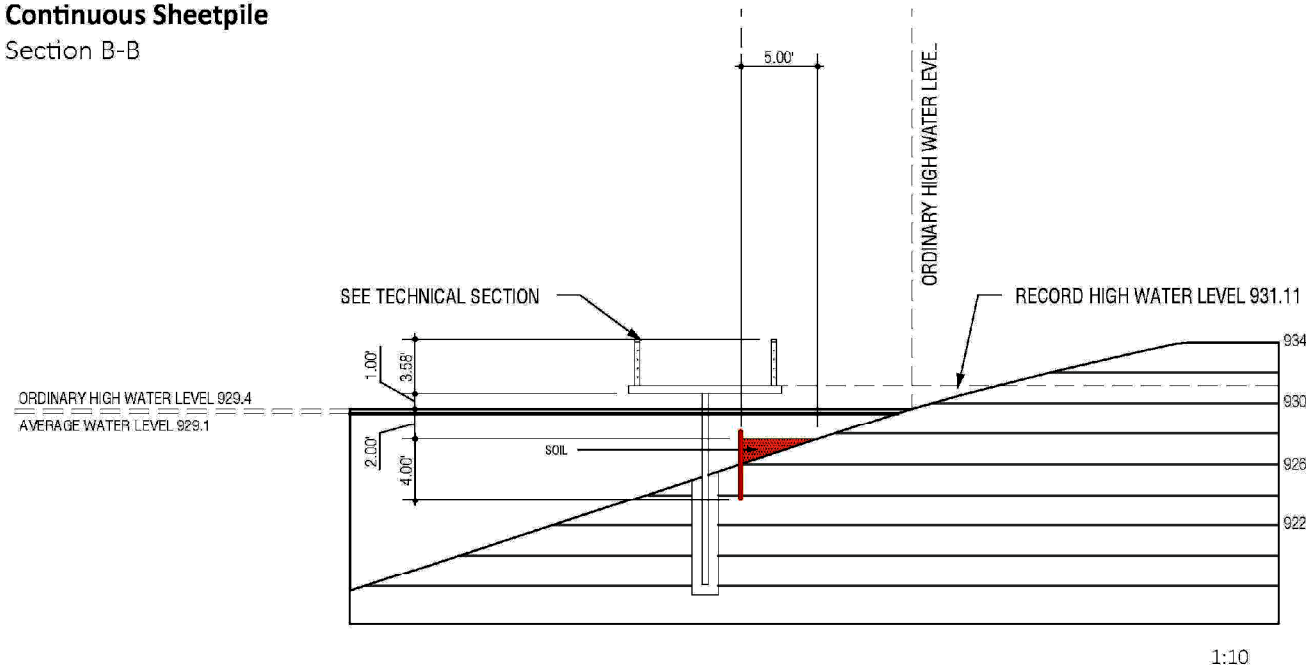
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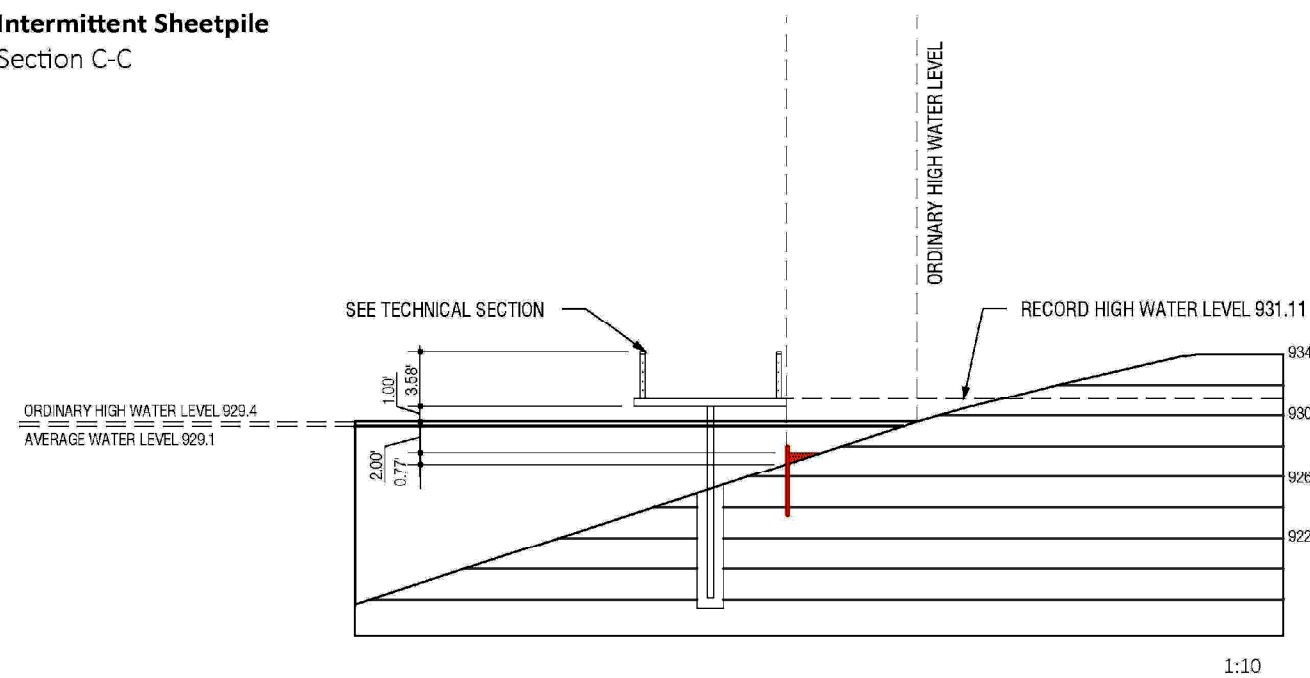
OPTION A4 LAKE EDGE: INTERMITTENT SHEET PILE PLAN
WAYZATA LAKE EFFECT
WAYZATA, MINNESOTA

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Last Modified:	2/9/17
Sheet:	1 of 1
Fig:	A-5

Continuous Sheetpile
Section B-B



Intermittent Sheetpile
Section C-C



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

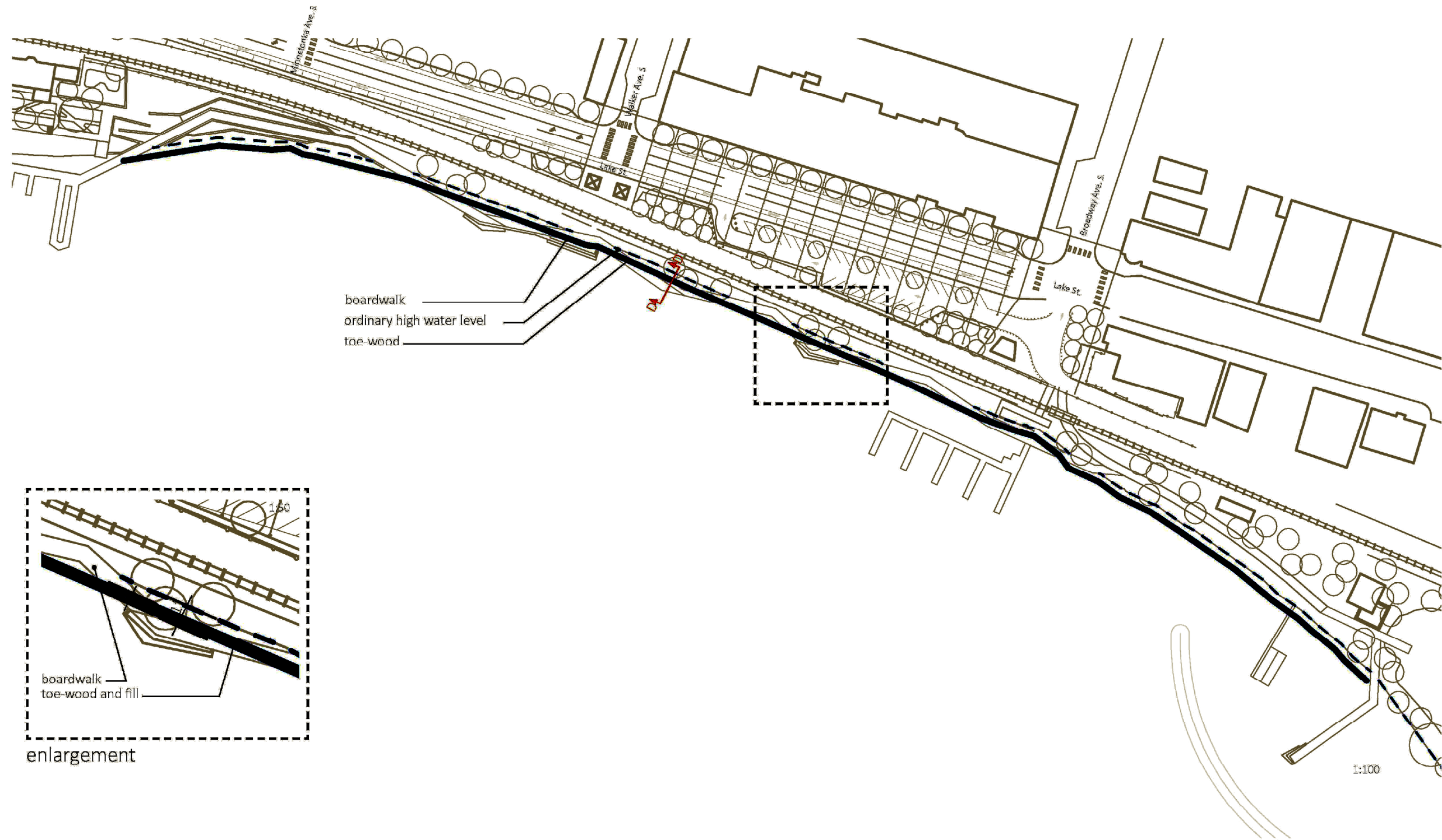
Total Volume = 2,472 cf

WAYZATA LAKE EFFECT
Lake Edge Diagrams : Sheet Pile Section

CIVITAS
6

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

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Fig.	A-6

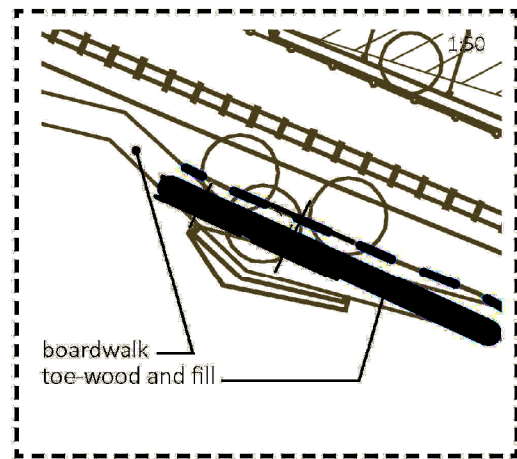
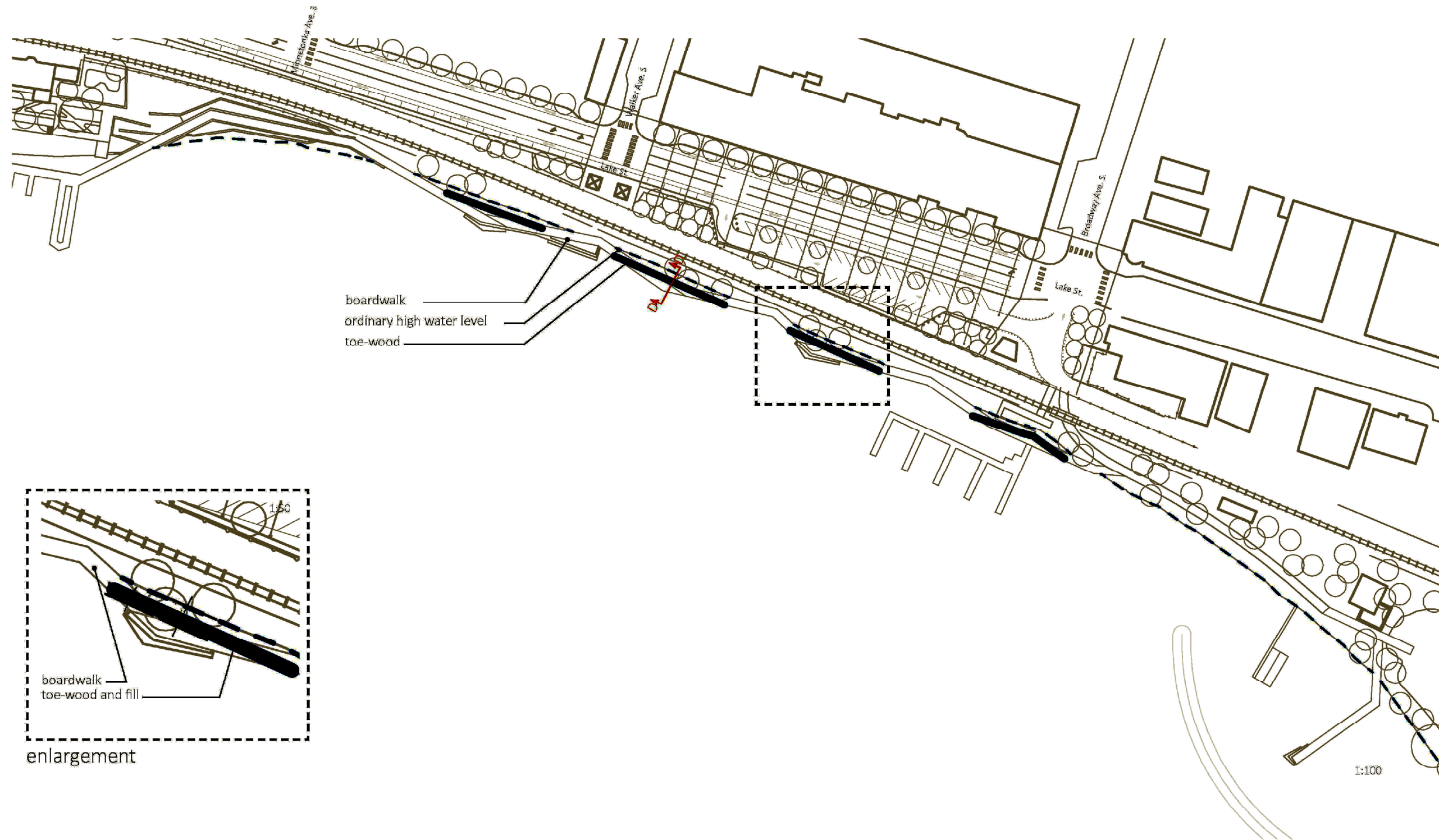


OPTION A5 LAKE EDGE: CONTINUOUS TOE-WOOD PLAN
WAYZATA LAKE EFFECT
WAYZATA, MINNESOTA

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



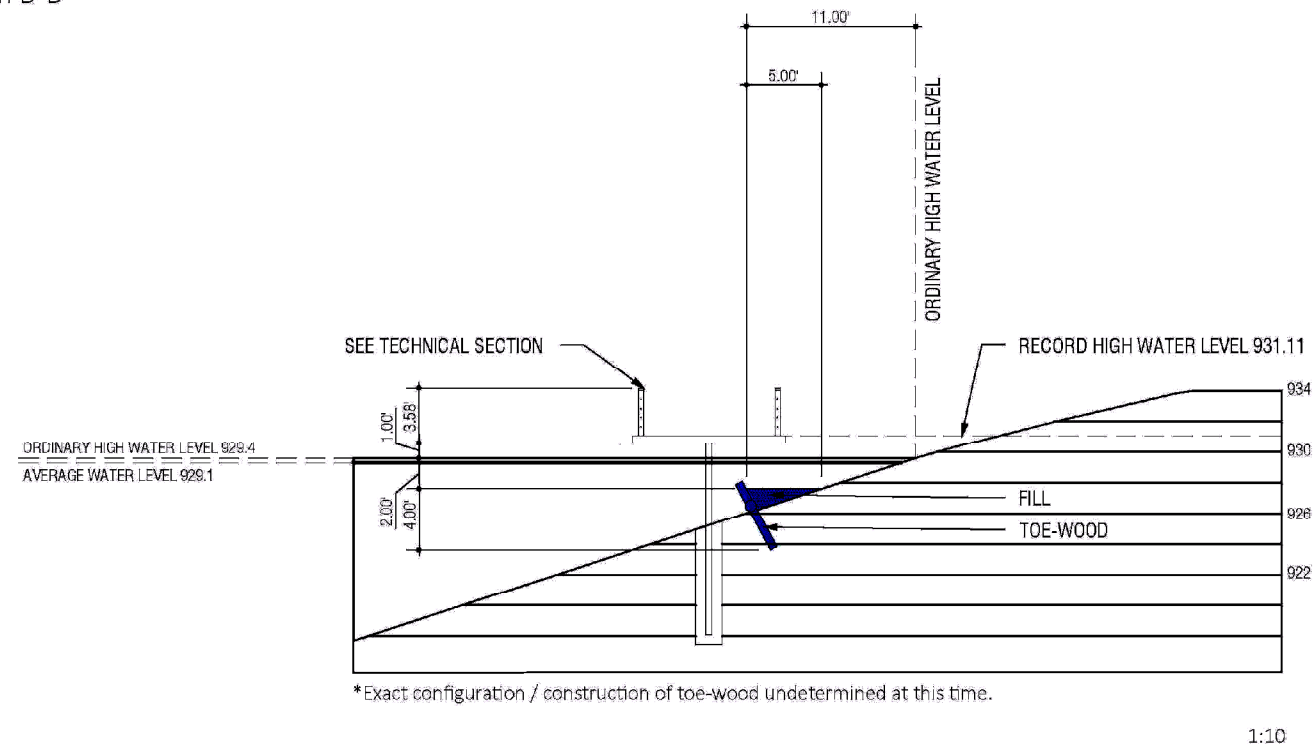
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enlargement

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

Toe-Wood Section
Section D-D



VOLUME CALCULATIONS

1. Continuous Toe-Wood

Toe-Wood	Lake Bottom Disturbance
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

Toe-Wood	Lake Bottom Disturbance
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	
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