

Washington County Water Consortium

February 7, 2024

2 to 3:45 pm

Remote meeting - Zoom

(If you are not on the Consortium listserv, please email

Smita.Rakshit@co.washington.mn.us for the Zoom link and access code)

Agenda

2:00 – 2:05

Welcome

Introductions, Announcements

2:05 – 2:30

St. Croix River – Riverbank Stabilization & Riverwalk Project

Topic: Project background, critical elements, successes, and lessons learned.

Presenter: Zac Morris, PE, AMI Consulting Engineers, PA

2:30 – 3:30

Low Salt Design

Topic: New infrastructure design considerations that can increase winter safety and drive down the need for salt. Introducing low salt design and examples, pilot cities, upcoming guidance, and opportunities in 2024.

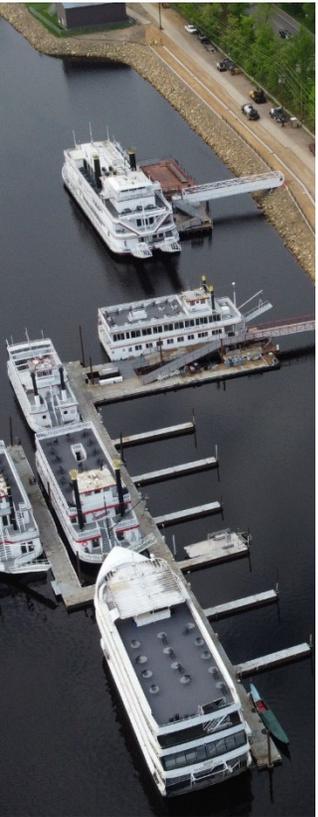
Presenter: Connie Fortin, Low Salt Strategist, Bolton & Menk Inc.

3:30 – 3:45

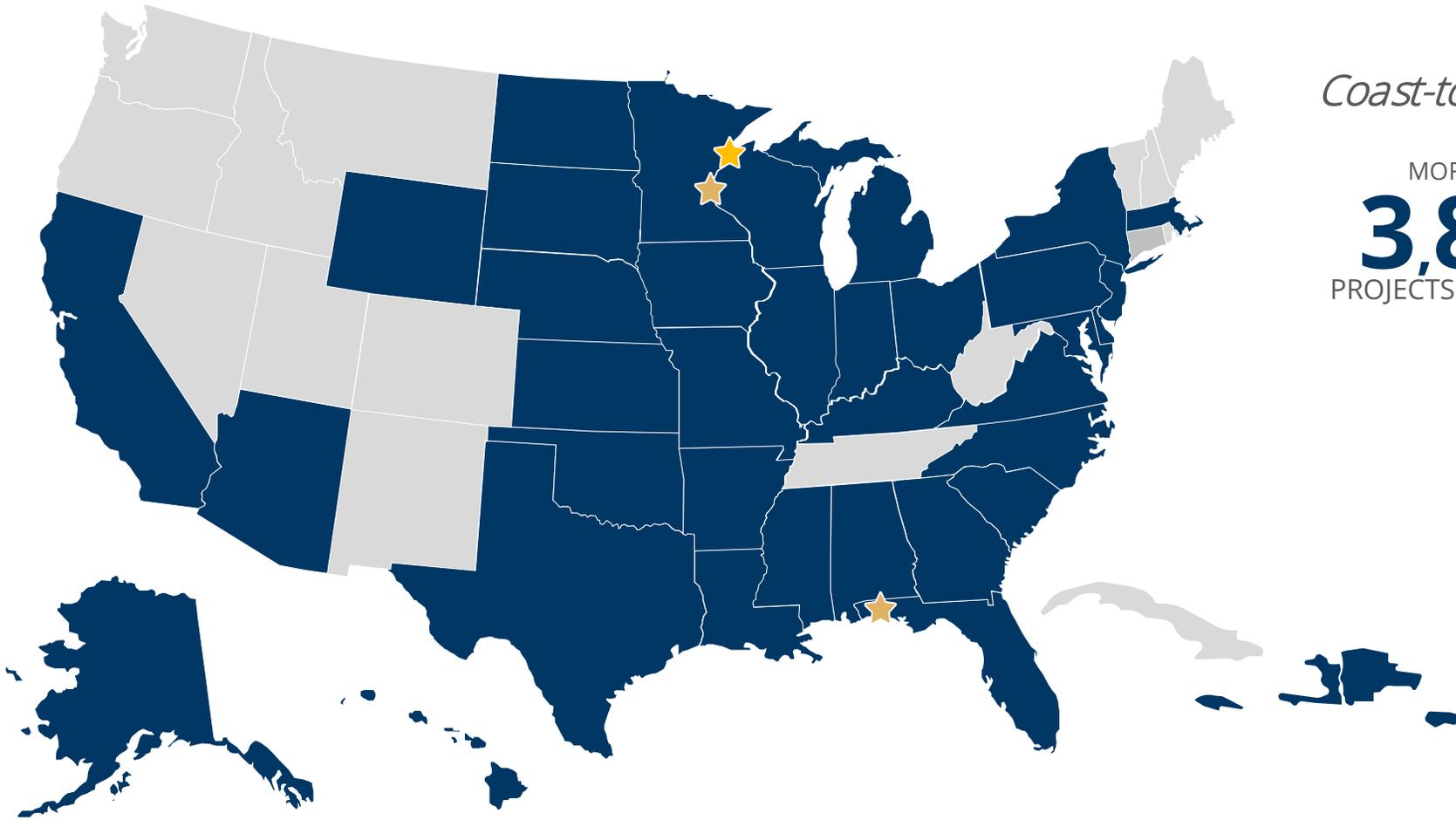
Questions/Adjourn

St. Croix River – Riverbank Stabilization & Riverwalk Project.

Background, Critical Elements,
Successes, and Lessons
Learned.



WHO WE ARE
ABOUT AMI



Coast-to-coast we are providing solutions.

MORE THAN
3,800 **98%**
PROJECTS NATIONWIDE REPEAT CUSTOMERS



Ports & Harbors
Docks, seawalls, terminals



Coastal & Riverine
Shorelines, riverfronts, estuaries



Waterfronts & Marinas
Piers, boardwalks, trails

ST. CROIX RIVER RIVERBANK STABILIZATION & RIVERWALK



- Traditional & Bioengineering Methods

Project Scope

- Stabilization of 3,700 LF of eroded banks along the Western shore of the river
- Construction of riverwalk
- Improvements to existing trails & connections
- Construction of 3 river overlook structures



Need & Purpose

- Shoreline stabilization
- Permanent erosion control & scour protection
- Public safety improvements
- Improving the multimodal (pedestrian, bicycle, etc.) access to the St. Croix trail system
- Restore the functionality of existing infrastructure
- Restore shoreline lost by erosion



REGULATORY COMPLIANCE & ENVIRONMENTAL REVIEW - FEDERAL

U.S. National Park Service

- National Wild & Scenic Rivers Act
- Lower St. Croix River Act
- Minnesota's Wild & Scenic Rivers Act

U.S. Fish and Wildlife Service

- Endangered Species Act
- Bald and Golden Eagle Protection Act
- Migratory Bird Treaty Act

U.S. Army Corps of Engineers

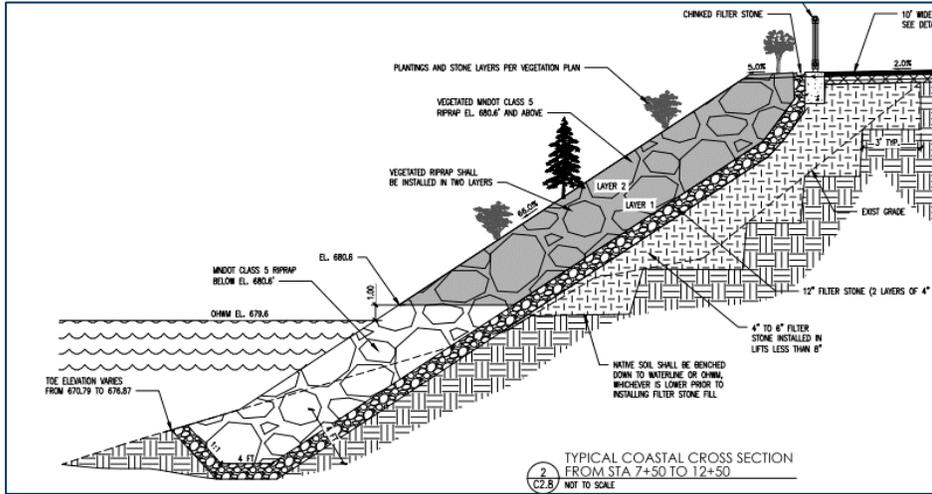
Permit Required:

Nationwide Permit- Bank Stabilization

Transportation Regional General Permit



REGULATORY COMPLIANCE & ENVIRONMENTAL REVIEW - STATE OF MINNESOTA



Minnesota Department of Natural Resources (Grant)

- Endangered Species Act & Natural Heritage Information System (NHIS)
- Public Waters Work Permit

State Historical Preservation Office

National Historic Preservation Act

- Stillwater Cultural Landscape Historic District
- Stillwater South Main Street Archeological District
- Heritage Preservation Commission
- Stillwater Planning Commission

Minnesota Pollution Control Agency

- Section 401 Clean Water Act

Middle St Croix Watershed Management Organization

- Stormwater Management Plan
- Stormwater Pollution Prevention Plan



SPECIES OF CONCERN

Biological Assessment

Bald Eagle (Probability of presence based on breeding season)

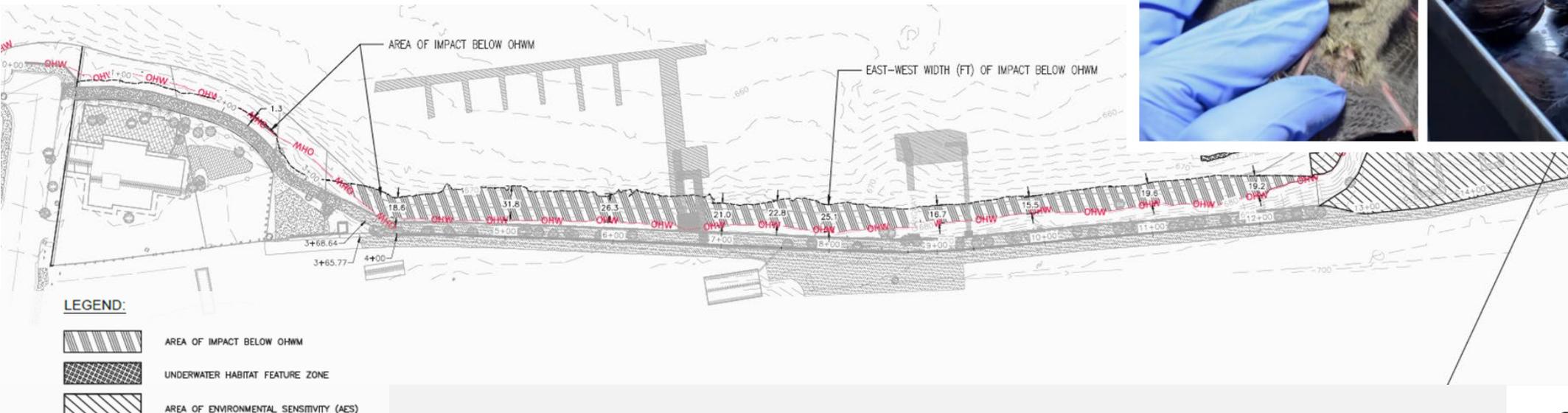
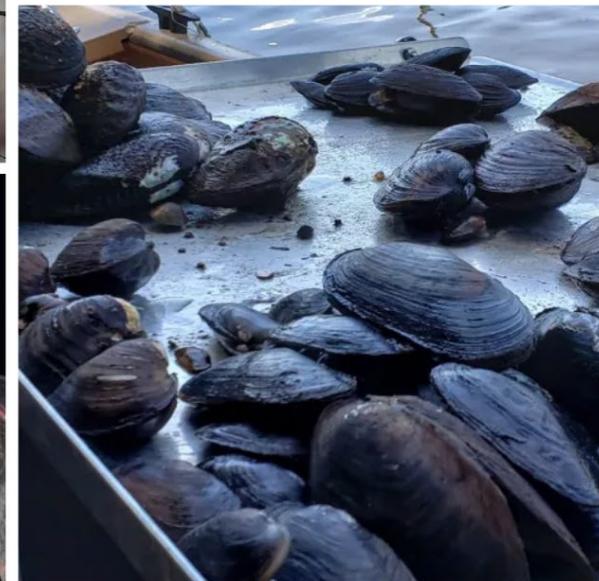
Rusty Patched Bumble Bee **Endangered**

Northern Long-eared Bat **Threatened**

Freshwater Mussels (4 State / 2 Federal) **Endangered**

Significant Mussel Assemblage (20 species overall)
-Spectaclecase (federally endangered. Not to be relocated)

Directly related to WATER QUALITY



MUSSELS

<u>Common Name</u>	<u>Scientific Name</u>	August Relocation Dives		September Relocation Dives		<u>Total</u>
		<u>Stations</u> 12+00 to 13+00*	<u>Stations</u> 0+00 to 2+00	<u>Stations</u> 12+00 to 13+00	<u>Stations</u> 0+00 to 12+00	
Three Ridge	<i>Amblema plicata</i>	84	174	264	2042	2564
Rock Pocketbook	<i>Arcidens confragosus</i> **	0	0	1	1	2
Spectaclecase*	<i>Cumberlandia monodonta</i> +	2	0	S	0	2
Wabash Pigtoe	<i>Fusconaia flava</i>	0	7	2	13	22
Plain Pocketbook	<i>Lampsilis cardium</i>	1	1	2	8	12
Fatmucket	<i>Lampsilis siloquoidea</i>	0	0	2	11	13
White Heelsplitter	<i>Lasmigona complanata</i>	0	0	0	4	4
Fragile Papershell	<i>Leptodea fragilis</i>	31	1	32	10	74
Black Sandshell	<i>Ligumia recta</i>	0	0	0	1	1
Threehorn	<i>Obliquaria reflexa</i>	4	S	2	3	9
Pink Heelsplitter	<i>Potamilus alatus</i>	56	11	66	215	348
Giant Floater	<i>Pyganodon grandis</i>	44	2	94	204	344
Pimpleback	<i>Quadrula pustulosa</i>	0	3	0	2	5
Maple Leaf	<i>Quadrula quadrula</i>	5	6	4	24	39
Salamander Mussel	<i>Simpsonaias ambigua</i> **	3	0	94	0	97
Creeper	<i>Strophotius undulatus</i>	0	0	0	0	0
Pistolgrip	<i>Tritogonia verrucosa</i> **	0	0	0	S	S
Lilliput	<i>Toxolasma parvum</i>	0	0	0	1	1
Deertoe	<i>Truncilla truncata</i>	0	2	0	0	2
Pond Papershell	<i>Utterbackia imbecillis</i>	0	S	0	7	7
Total Live		230	207	563	2546	3546
Effort		7.50	0.67	12.33	19.50	40.00
CPUE		30.7	309.0	45.7	130.6	88.7
Richness Live		9	9	11	15	18
Total Richness (Live+Shell)		9	11	12	16	19

* some efforts were in the area of 13+00 to 16+00

** state-listed species

+ Federally endangered species were not relocated



Consulting Engineers P.A.



MUSSEL RELOCATION

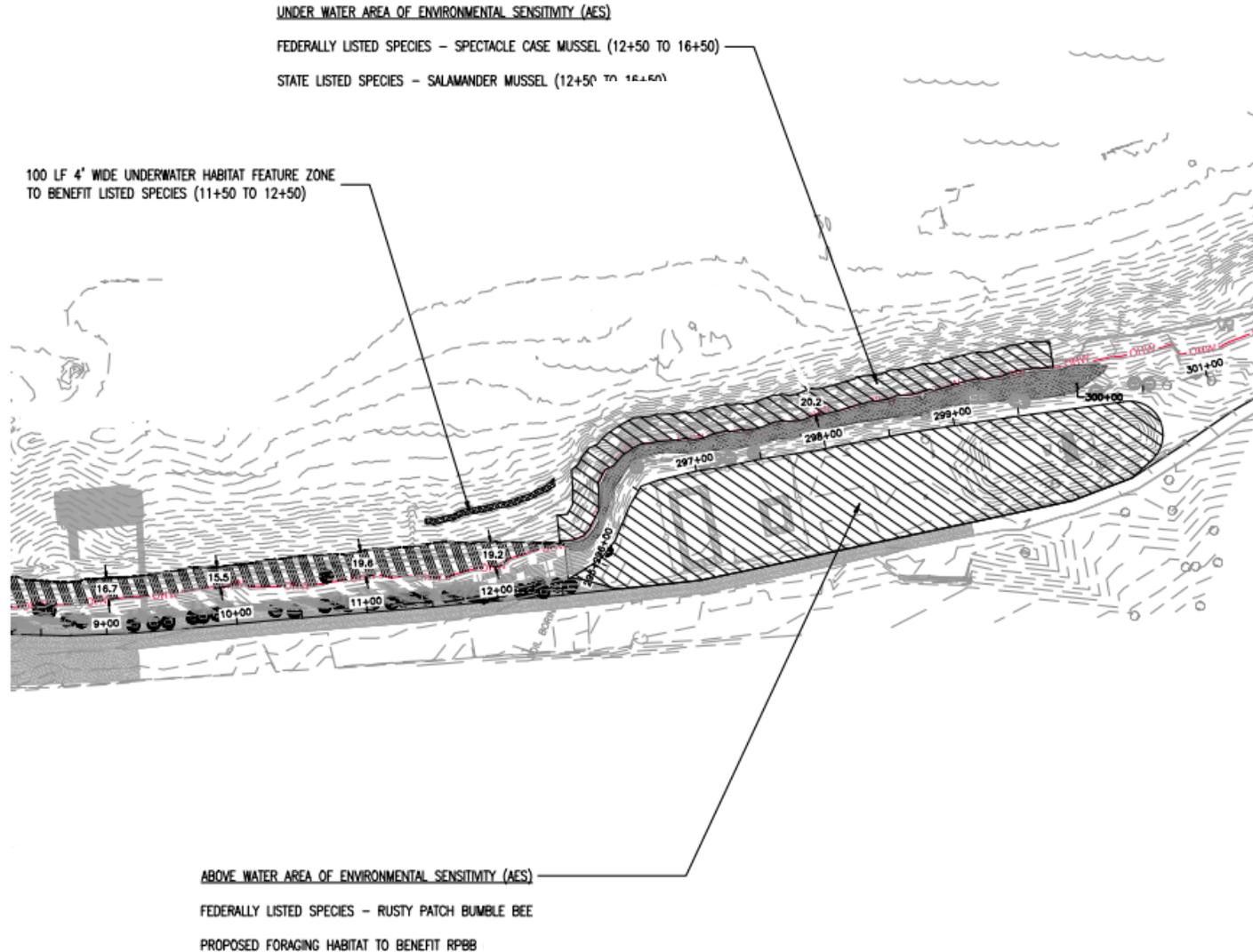
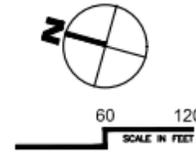


Spectaclecase Mussel



Salamander Mussel

AREAS OF ENVIRONMENTAL SENSITIVITY



- Endangered Species (Federal & State)
- Plans designed to avoid impact to the species of concern
- Special Provisions, BMP's implementation
- Water Quality
- Habitat Conservation
- Historical Resources Protection

CONSTRUCTION

Performed by Sunram Construction.
Construction progressed in a timely fashion.
Substantial completion in Fall 2022.

SUCCESS! MUSSEL HABITAT



Creation of new Mussel Habitat.





SUCCESS!

Tree Preservation

Limited removal of large trees

CONSTRUCTION

SCENIC
OVERLOOKS
& TIGHT
WORKING
CONDITIONS



CONSTRUCTION



SUCCESS!

Reclaimed
land lost
from erosion



SUCCESS

BEFORE



AFTER



ONE YEAR



SUCCESS

BEFORE



AFTER



ONE YEAR



SUCCESS

BEFORE



AFTER



ONE YEAR



SUCCESS

BEFORE



AFTER



ONE YEAR



SUCCESS

BEFORE



AFTER



ONE YEAR



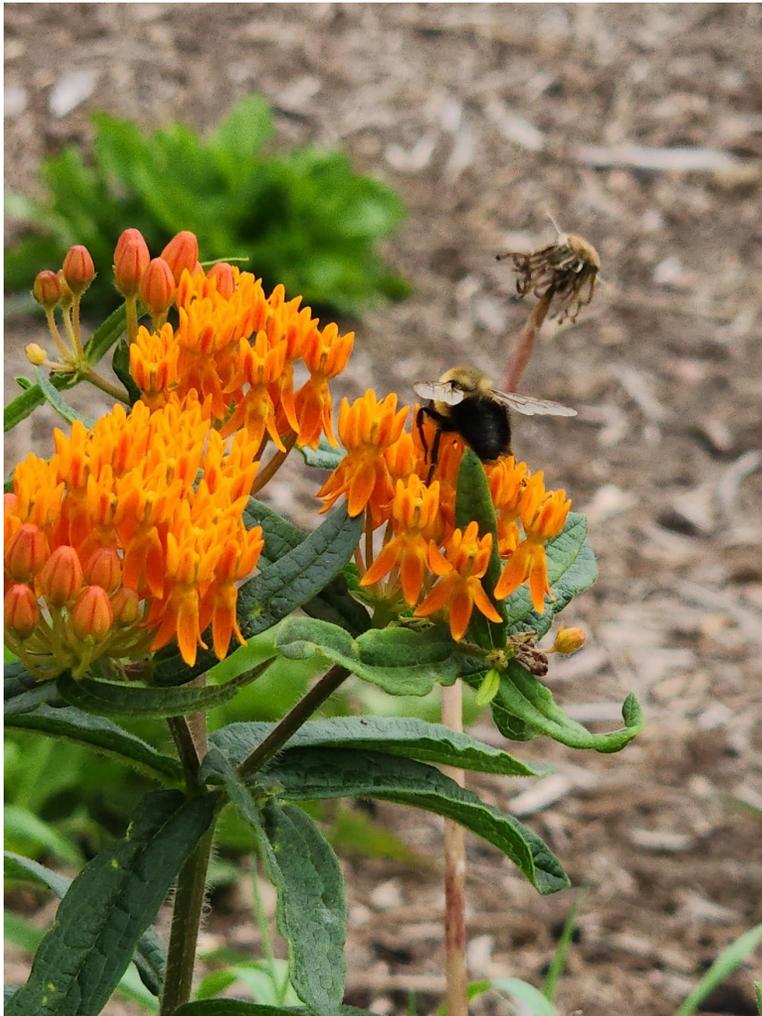
SUCCESS!

BEFORE



AFTER





SUCCESS!

- Vegetated Shoreline
- 30,000 SF Native Vegetation
- 20,000 SF Pollinator Gardens

SUCCESS!

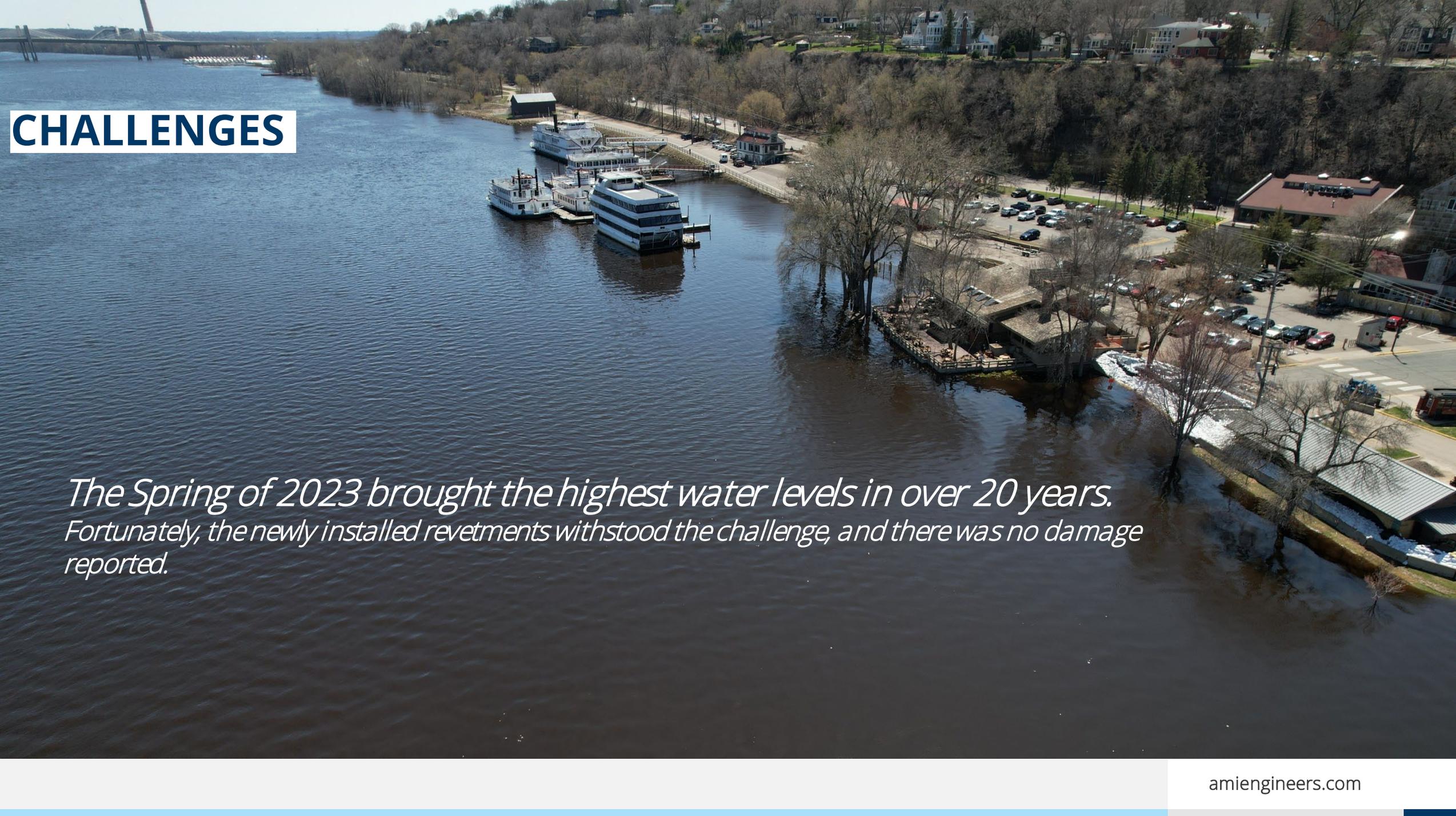


STABILIZATION



OVERLOOKS

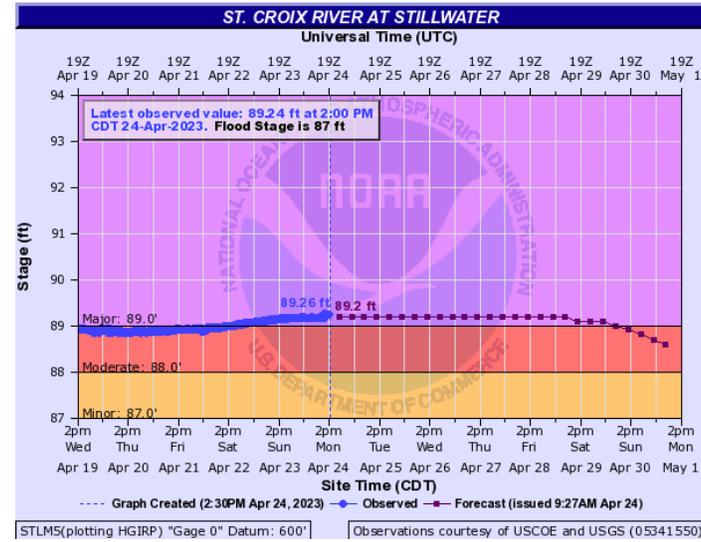
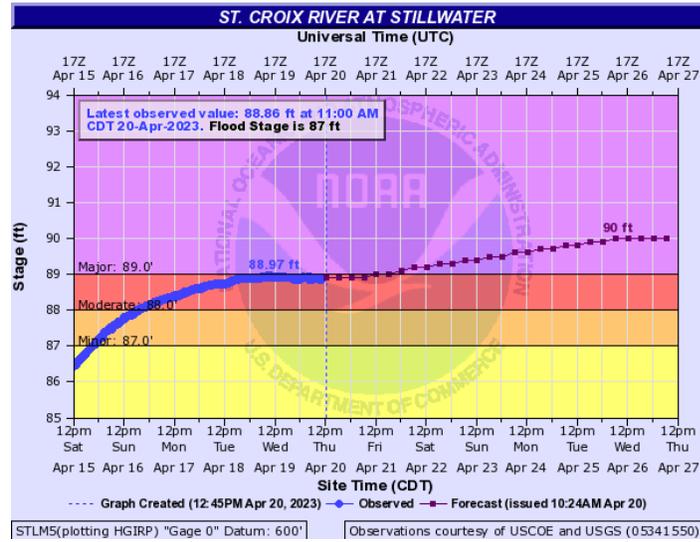
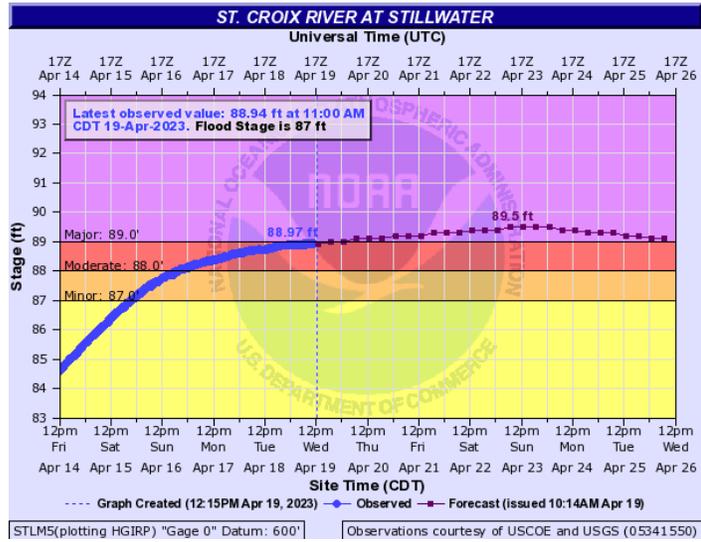
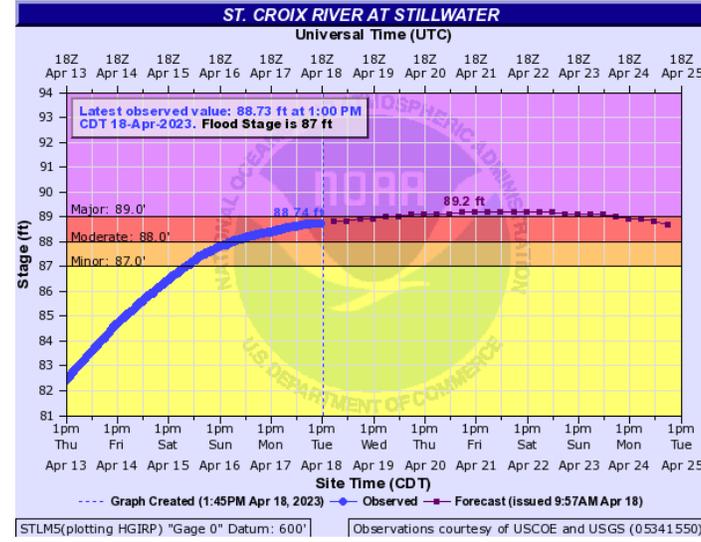
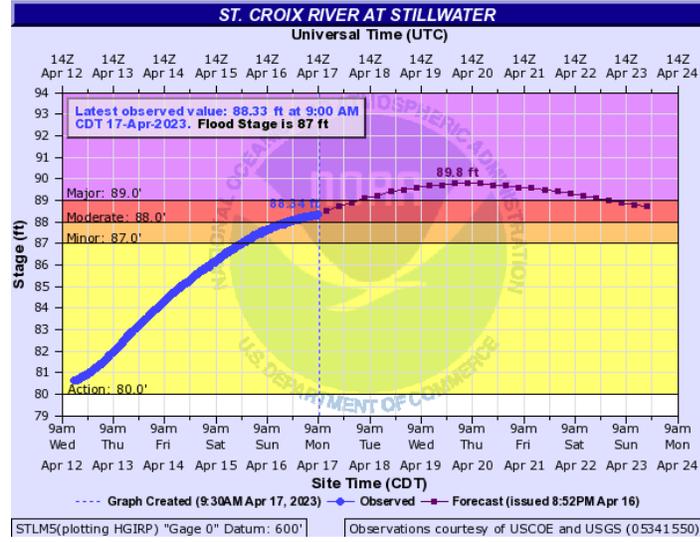
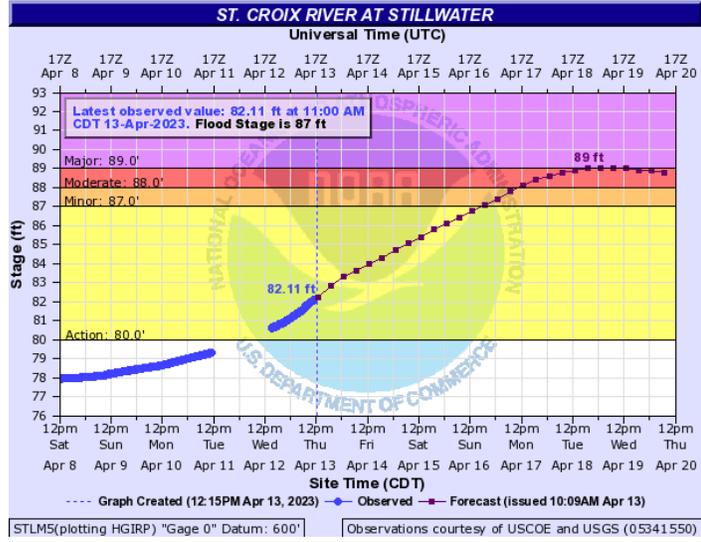


An aerial photograph of a wide river with high water levels. Several large white boats are docked at a pier on the left. On the right bank, there are buildings, a parking lot with many cars, and trees. The water is dark and reflects the sky. In the background, a bridge is visible on the left, and residential houses are on a hillside on the right.

CHALLENGES

The Spring of 2023 brought the highest water levels in over 20 years. Fortunately, the newly installed revetments withstood the challenge, and there was no damage reported.

FLOOD 2023



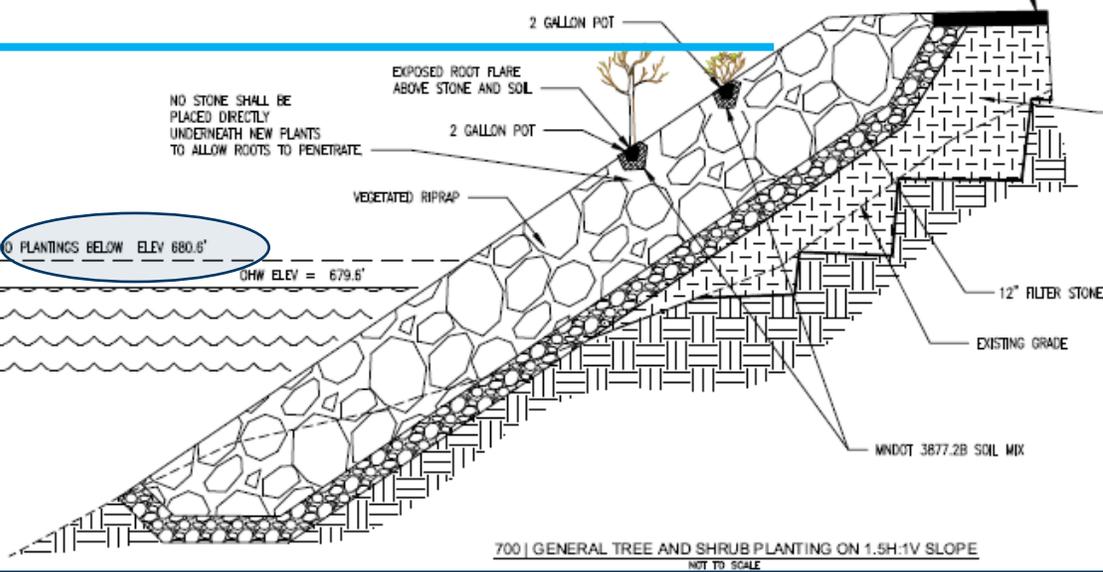
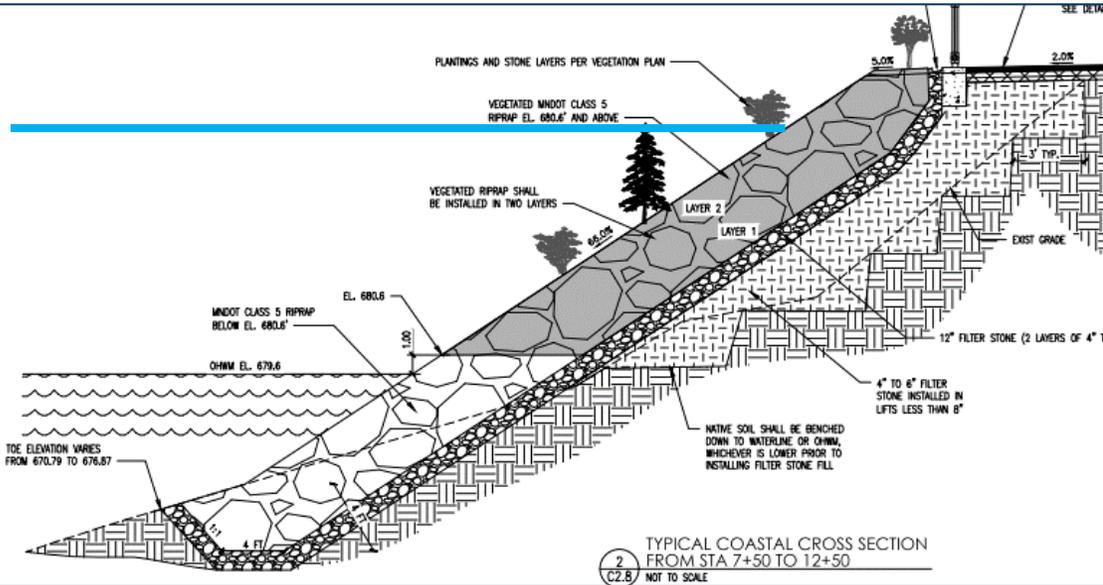
Flood Categories (in feet)

Major Flood Stage:	89
Moderate Flood Stage:	88
Flood Stage:	87
Action Stage:	80

Historic Crests

- 94.10 ft on 04/18/1965
- 92.30 ft on 04/27/2001
- 92.20 ft on 04/16/1969
- 91.10 ft on 04/16/2001
- 90.45 ft on 04/12/1997
- 89.70 ft on 04/14/1952
- 89.21 ft on 04/24/2023 (P)
- 88.48 ft on 03/31/2019
- 87.90 ft on 06/28/1993
- 87.63 ft on 06/27/2014

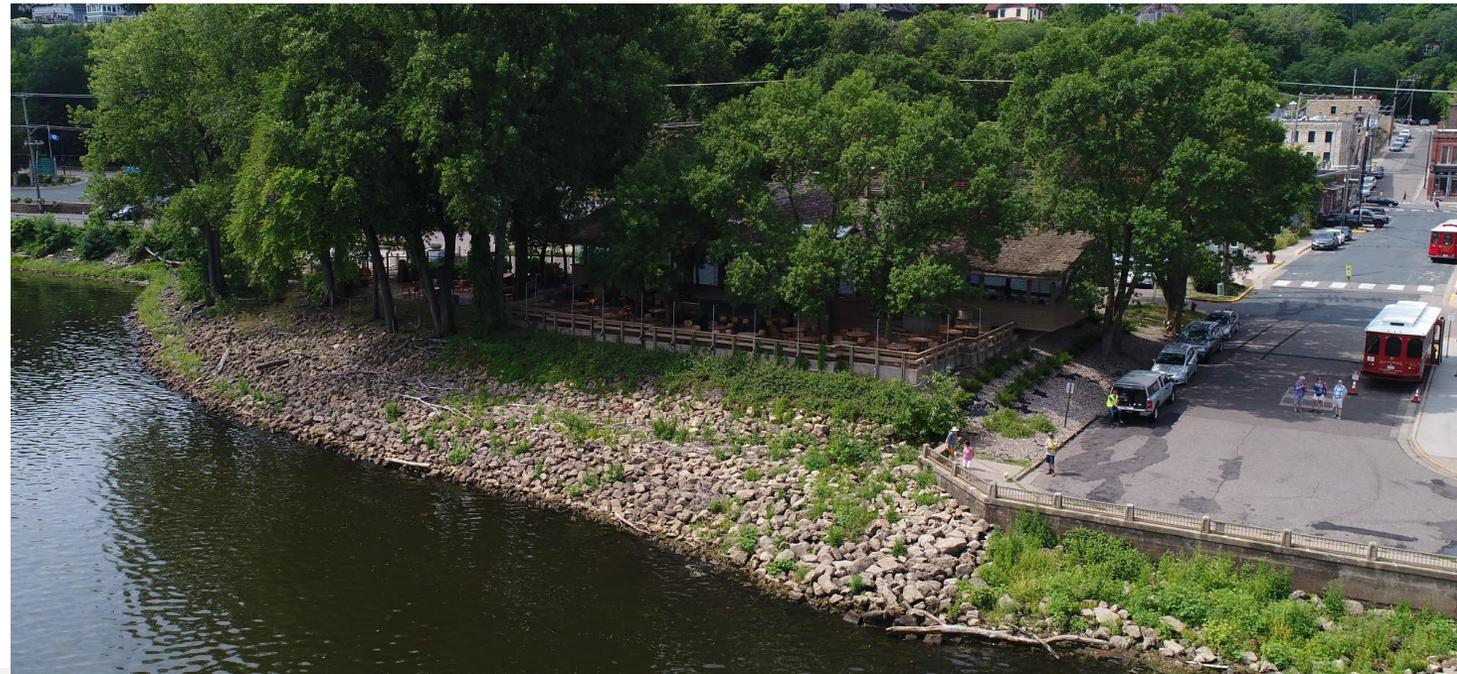
CHALLENGES & LESSONS LEARNED



Historic Crests	
(1)	94.10 ft on 04/18/1965
(2)	92.30 ft on 04/27/2001
(3)	92.20 ft on 04/16/1969
(4)	91.10 ft on 04/16/2001
(5)	90.45 ft on 04/12/1997
(6)	89.70 ft on 04/14/1952
(7)	89.21 ft on 04/24/2023 (P)
(8)	88.48 ft on 03/31/2019
(9)	87.90 ft on 06/28/1993
(10)	87.63 ft on 06/27/2014

CHALLENGES & LESSONS LEARNED

- Have pre-permitting kickoff meetings before starting the permitting process
- Be very clear to the regulatory agencies
- Know your easements and property constraints
- Be careful with 408 – ask if it is truly needed to accomplish the project objective?
- Dig into the details and over-communicate (especially on the St. Croix)
- Plan for flooding contingency
- Mussel relocations windows
- Tree clearing windows
- Permitting timelines with respect to special species



THANK YOU

Zac Morris, PE

zac.morris@amiengineers.com

Ben Harker

ben.harker@amiengineers.com

Low Salt Design



Connie Fortin
Low Salt Strategist



**BOLTON
& MENK**



Minnesota Statewide Chloride Management Plan

m MINNESOTA POLLUTION
CONTROL AGENCY



Chloride is a TOP pollutant of
concern in Minnesota

2021

- MN first state to have a comprehensive chloride management plan



Chloride Problems



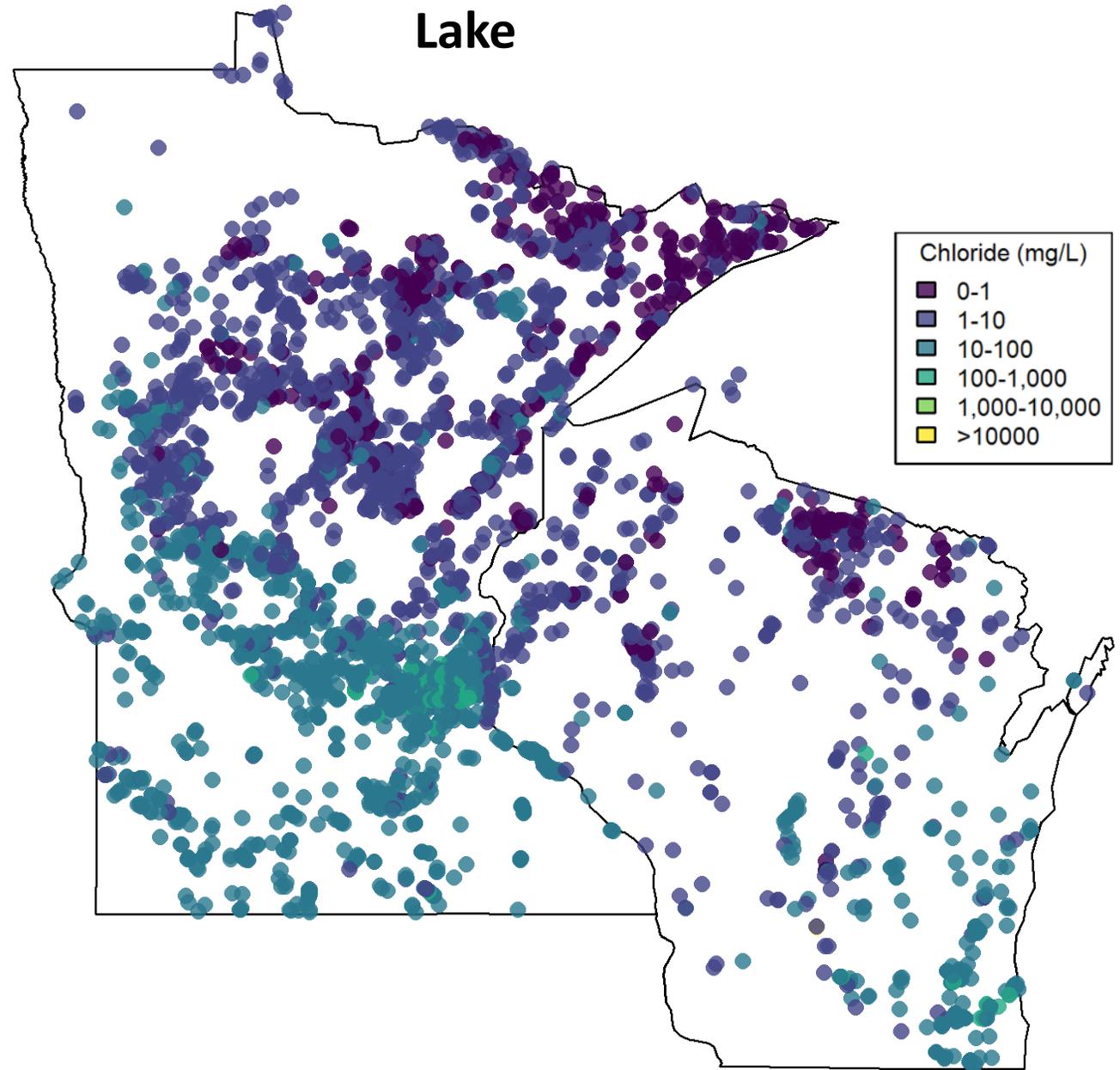
Forever Pollutant

- EPA standard for aquatic life **230 mg/L**
- Drinking water standard **250 mg/L**
- Damages infrastructure, soil, water, vegetation, and wildlife

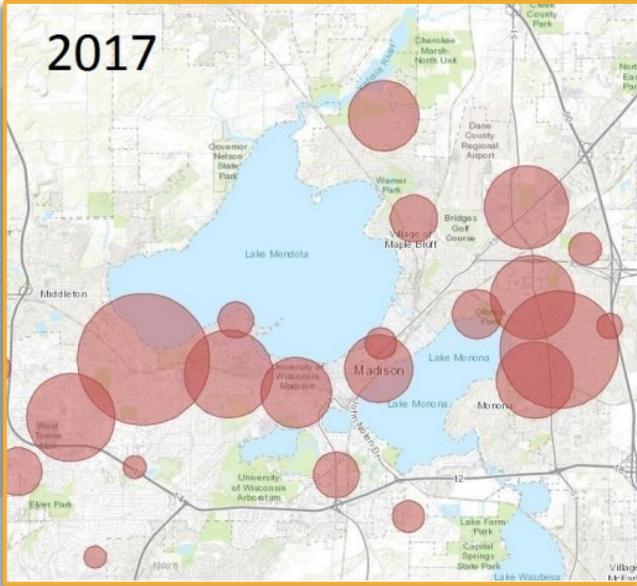
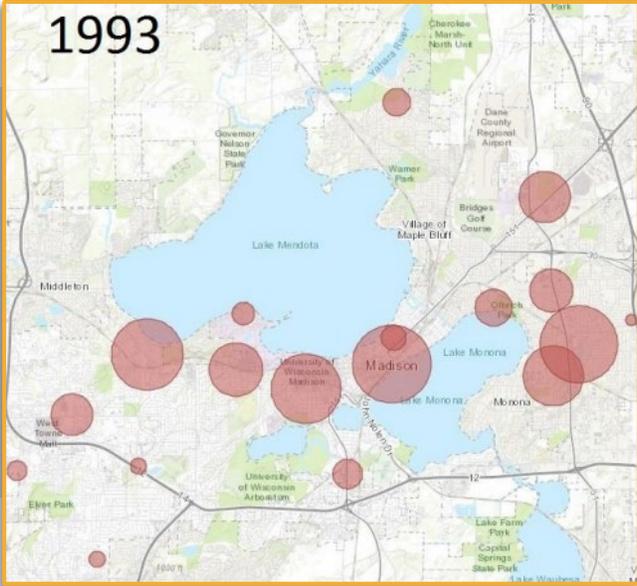
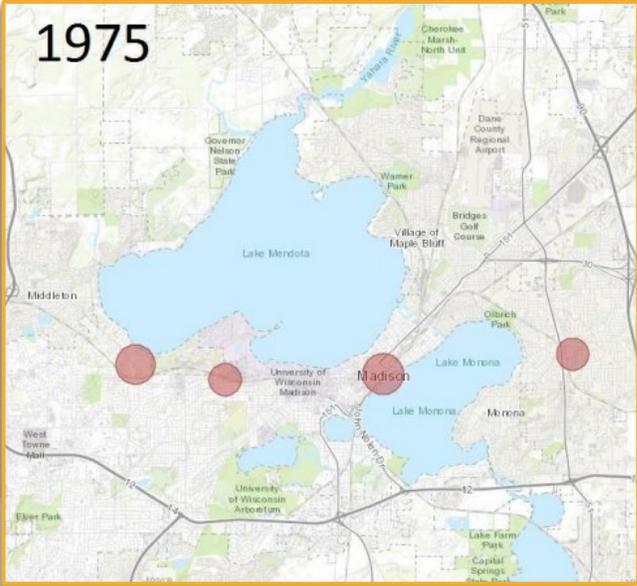


Chloride in MN Lakes

Dr. Hilary Dugan – 2018



Drinking Water in Madison



The larger the dot, the more chloride in wells

Source: Phil Gaebler, City of Madison Wisconsin





Infrastructure Damage Estimate

1 ton of salt → \$1,700 - \$17,000
(2023 costs)

** MPCA Smart Salting for Roads manual*



Salt Sterilizes Soils & Damages Vegetation

- Changes soil structure
- Strips soil of several macronutrient or micronutrient cations required for plant growth



- Erosion Control problems
- Vegetation establishment
- Vegetation survival

Overall loss of soil structure

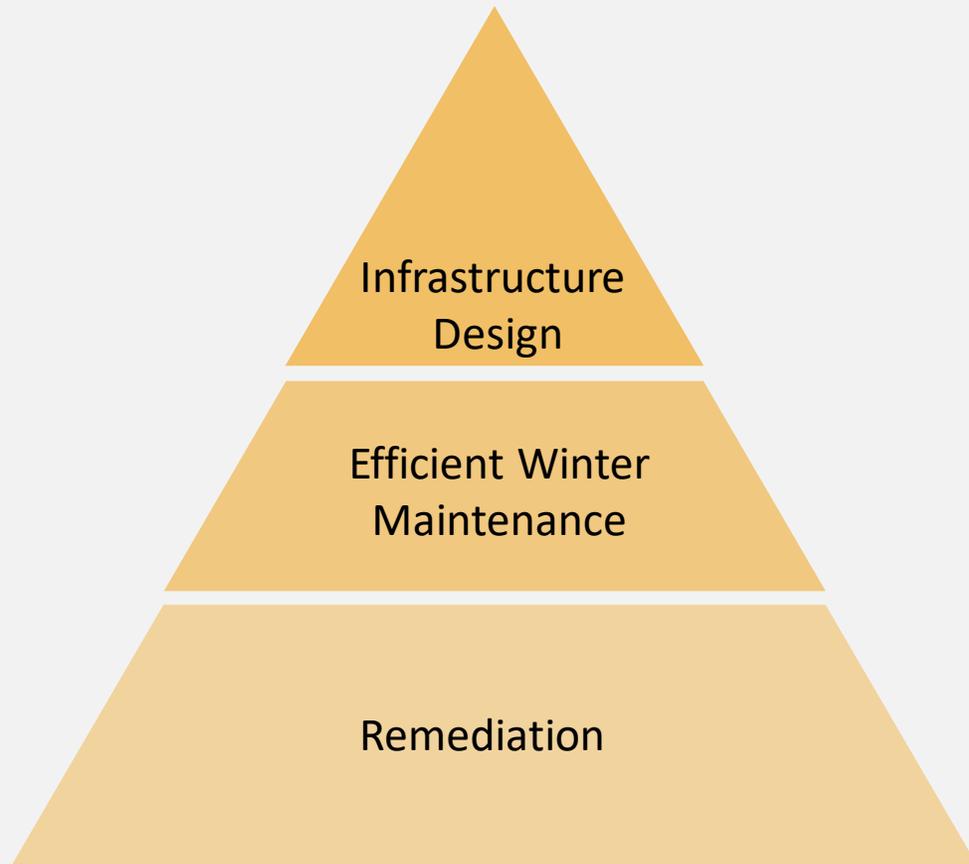




Opportunity to Redirect Spending

- ~\$100,000,000 annually for road salt purchased on State of WI or MN bid

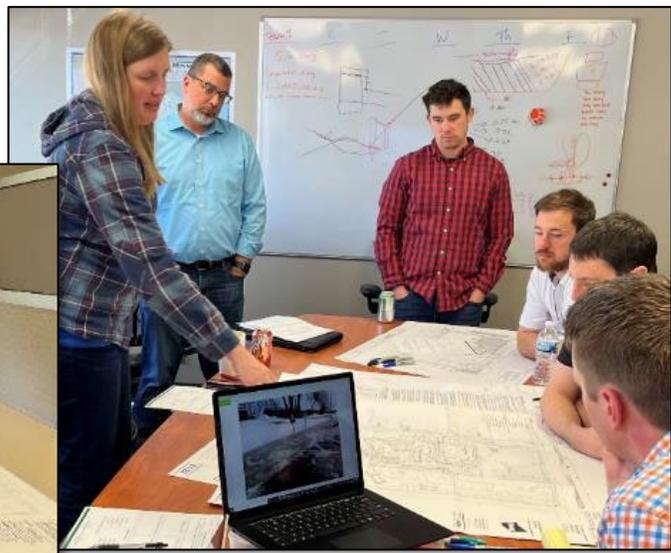
Cost to Control Chlorides



Controlling Chlorides

The best way to get on top of the chloride problem is to reduce the need for it!





Low Salt Design

Low Salt Design is the first component in a series of Low Salt Solutions



Low Salt Solutions



Bolton & Menk will be the first company in the world to integrate Low Salt Design into all cold climate design projects.

Vision

Protecting our beautiful communities from the damage caused by salt and giving our clients:

- Safer winter surfaces for pedestrian and vehicle travel
- Cost savings by reduced winter maintenance effort
- Longer life and lower repairs with less salted infrastructure
- Reduced chloride loading to their surface and groundwater
- Less salt toxicity to soils, vegetation and wildlife





Using the Sun



Outsmart the Wind



Horizontal Drainage



Vertical Drainage



Snow Storage



Salt Storage



Pavement Alternatives



Vegetation



Snow Removal Made Easy



Minimize Footprint of Salted Surfaces



General Tools



Pavement Considerations



Drainage



Plow Access



Salt Storage



Snow Storage



Use the Sun



Vegetation

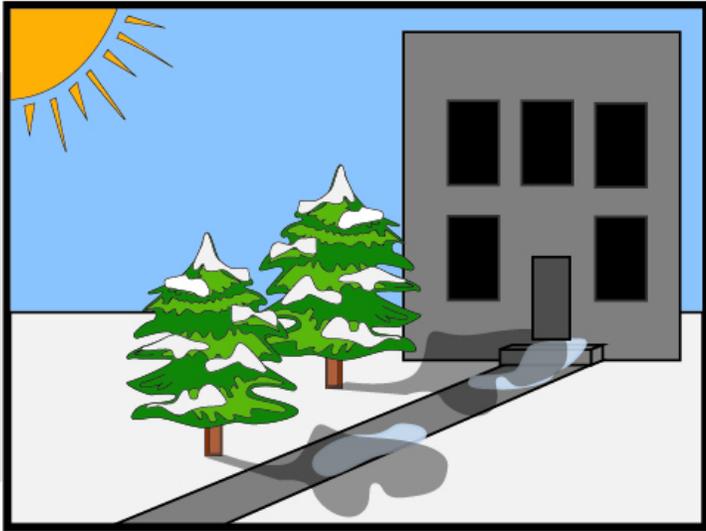


Outsmart the Wind

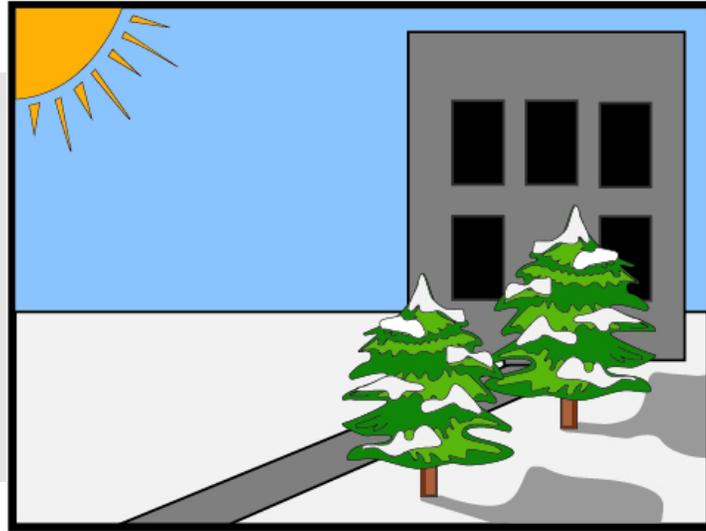
Use the Sun



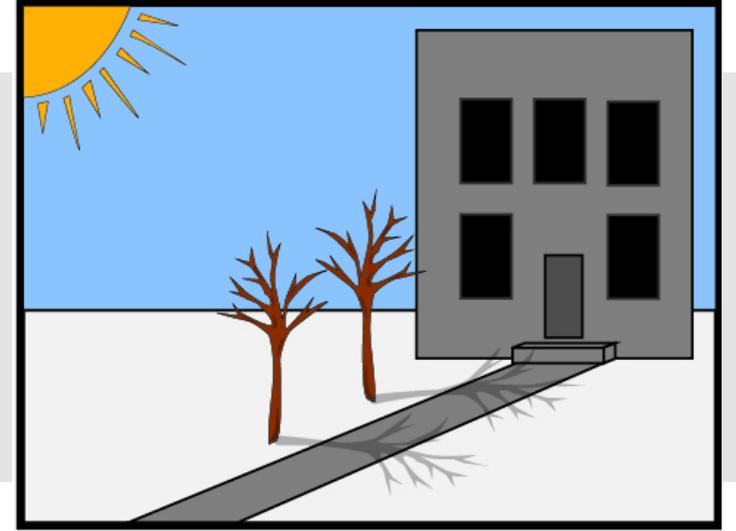
Use the Sun



HIGH SALT



LOW SALT



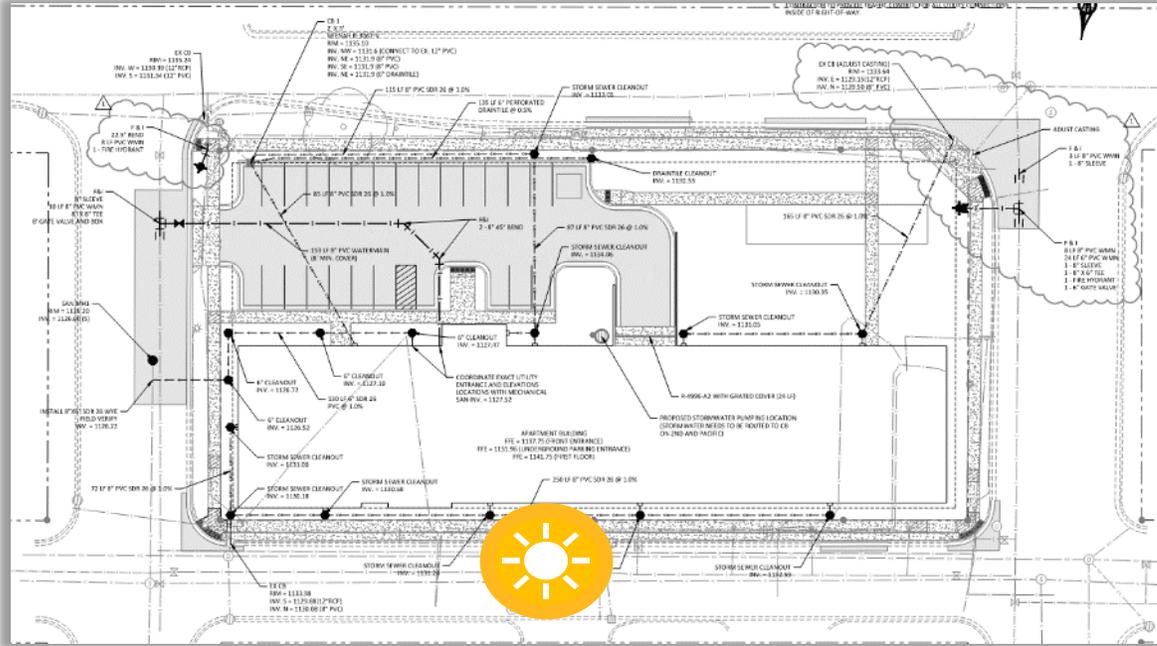
LOW SALT



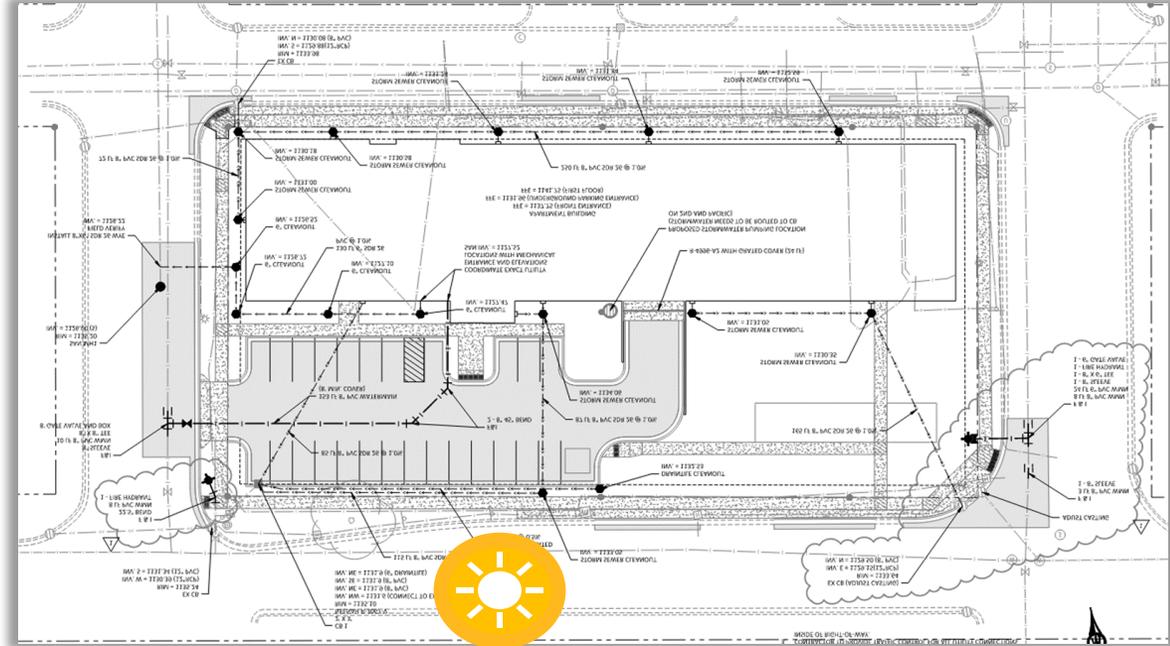
Winter Shade = More Salt



Parking in the Shade



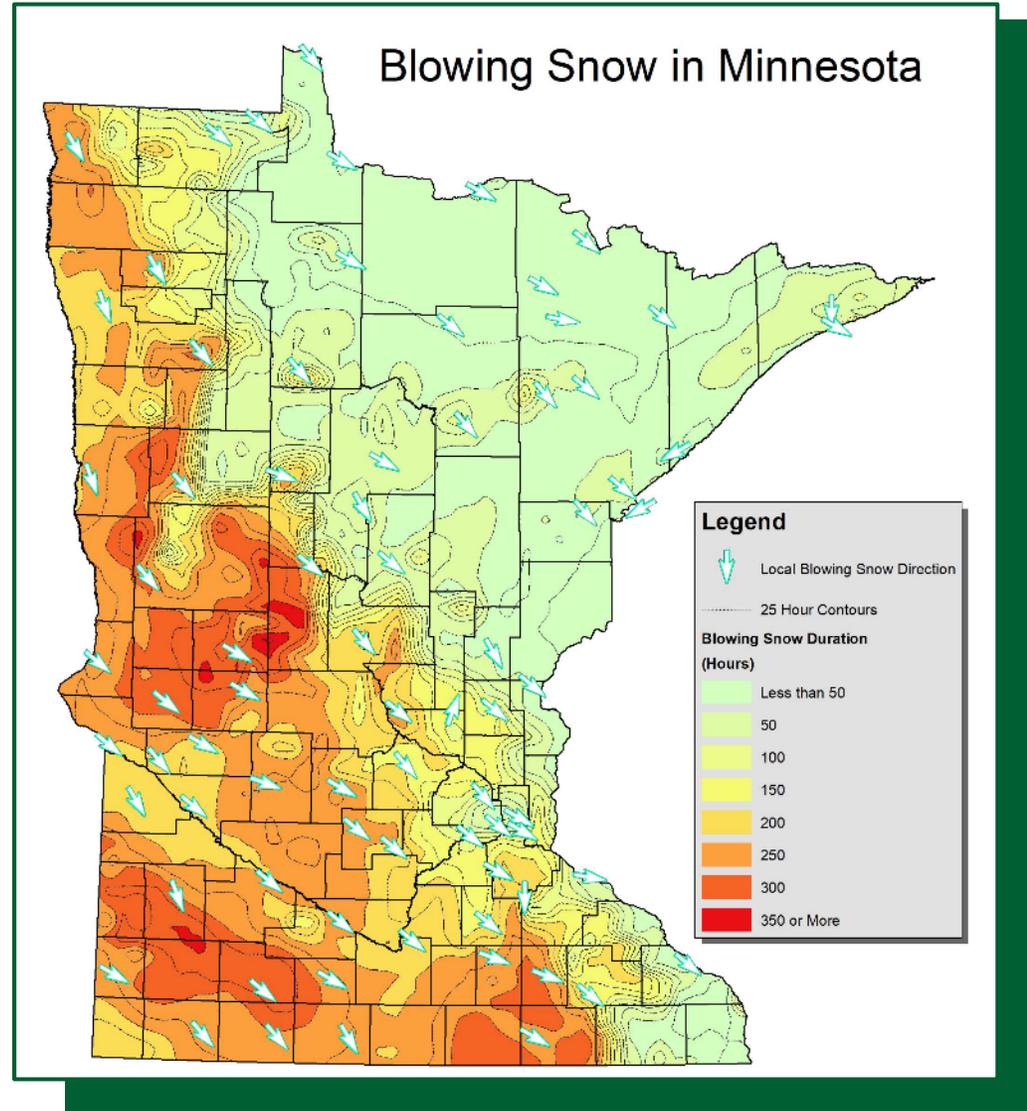
Parking in the Sun



Outsmart the Wind



Outsmart the
Wind





Understand the Direction of Snow Transport

Outsmart the Wind

If the fetch is > 1000 feet, take action!

		Direction	Hours	
C	D	E	F	G
State	Concat	Blowing Snow From Direction (Deg from North)	Blowing Snow Duration (hours above 15mph during winter)	Thaw-Freeze Transitions (Count)
ND	Stevens, ND	335.6	271.9	46.2
MN	Stewart, MN	308.3	257.0	49.0
ND	Stewart, ND	321.7	304.9	49.1
MN	Stewartville, MN	309.1	204.2	50.5
MN	Stillwater, MN	308.8	77.6	45.9
ND	Stillwater, ND	293.9	244.2	74.2
ND	Stirton, ND	329.7	327.4	49.6
IA	STOCKHOLM, IA	320.8	200.0	63.7
MN	Stockholm, MN	309.5	248.1	47.1
IA	STOCKPORT, IA	302.4	57.4	68.2



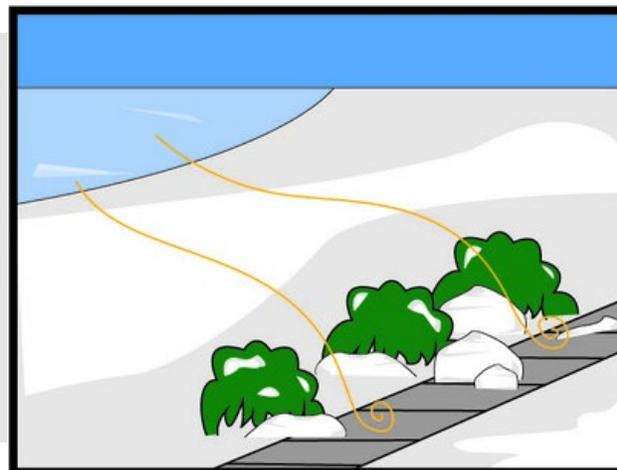


Outsmart the
Wind

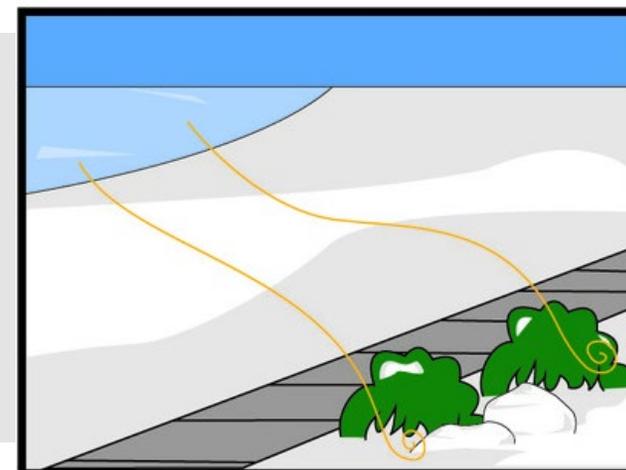
Intentional Snow Fence



Unintentional Snow Fence



HIGH SALT



LOW SALT



Horizontal Drainage

*Reduce meltwater
footprint*



Drainage



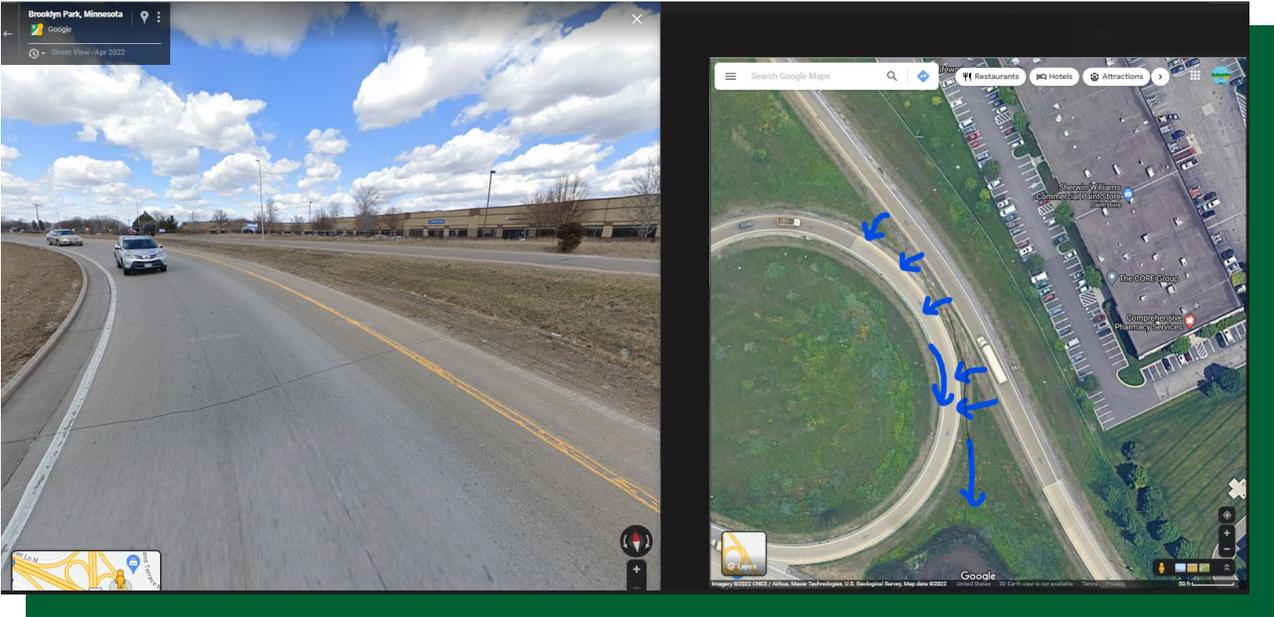
Meltwater Sprawl

- Overlooked in Design



Stillwater has roughly **46 Freeze/Thaw cycles a year.**
All are potential salting events!

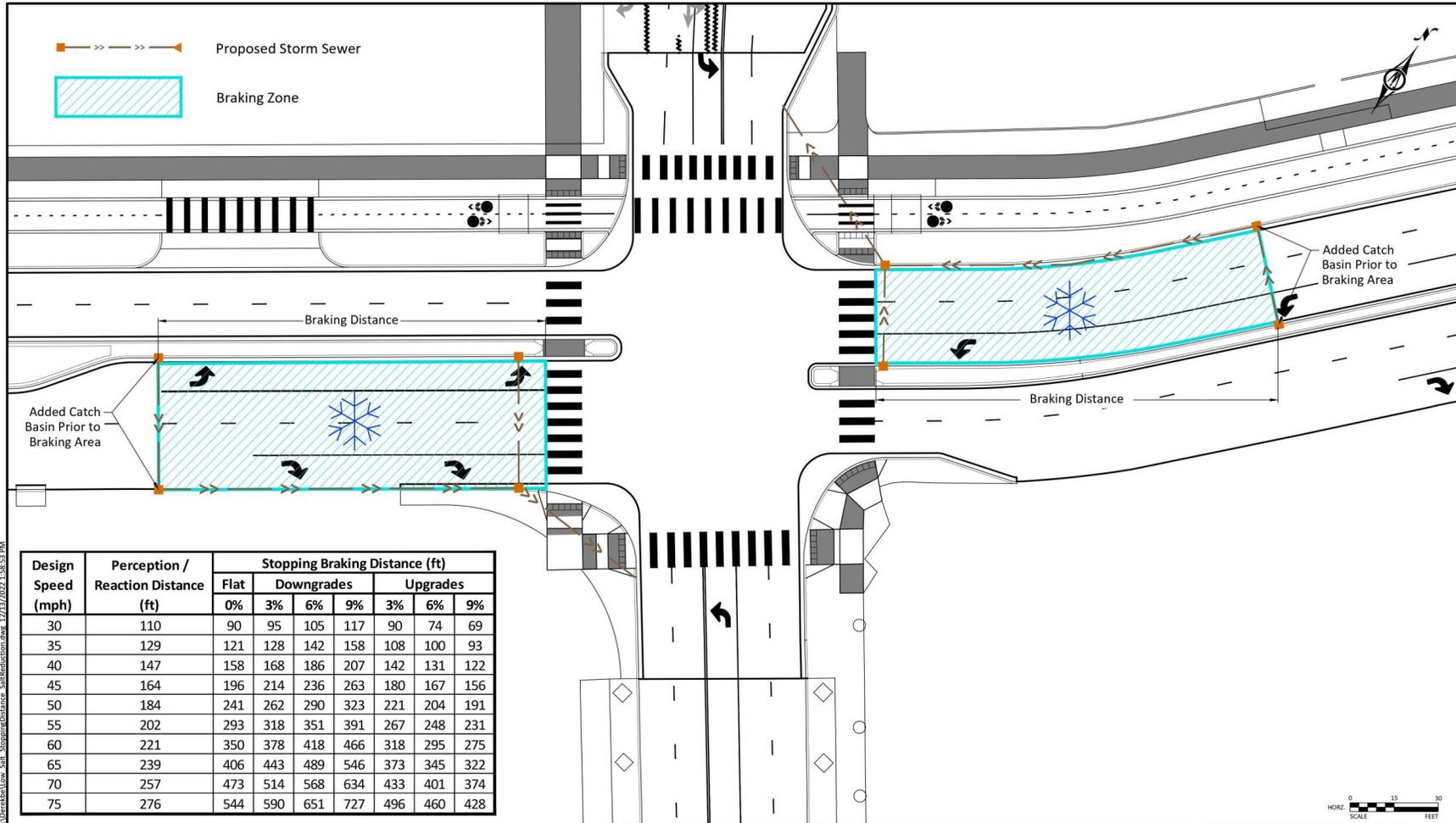
Pay Attention to Super Elevated Surfaces



Direct Meltwater Away from Braking Zone

Low Salt Design
BMI

Figure 1: Braking Zone Salt Reduction
December 2022



K:\Drexel\Low Salt StoppingDistance_SaltReduction.dwg 12/13/2022 1:58:53 PM

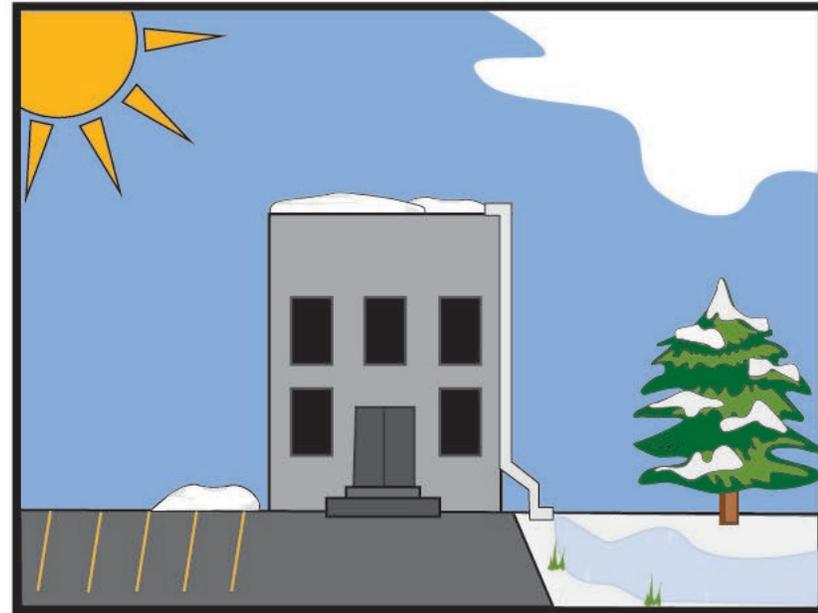


Vertical Drainage

Direct meltwater away from salted surfaces

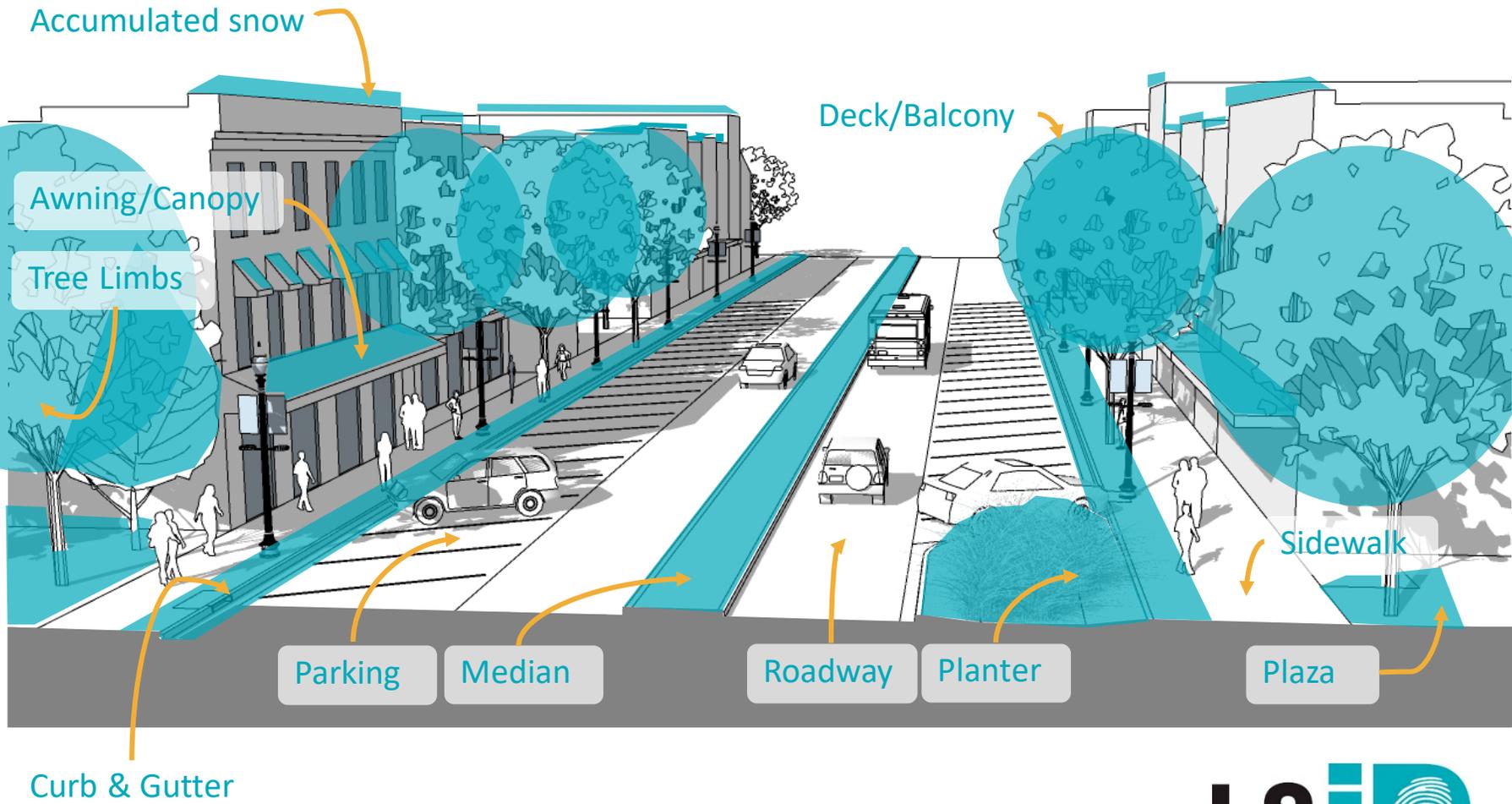


HIGH SALT



LOW SALT

Don't Forget to Look Up!



To reduce salt, address piled snow:

- Planters
- Medians
- Plazas
- Evergreen Plants
- Awnings
- Anything that collects snow!

All need meltwater management!



Vertical Drainage



Snow Removal Made Easy



Plow Access

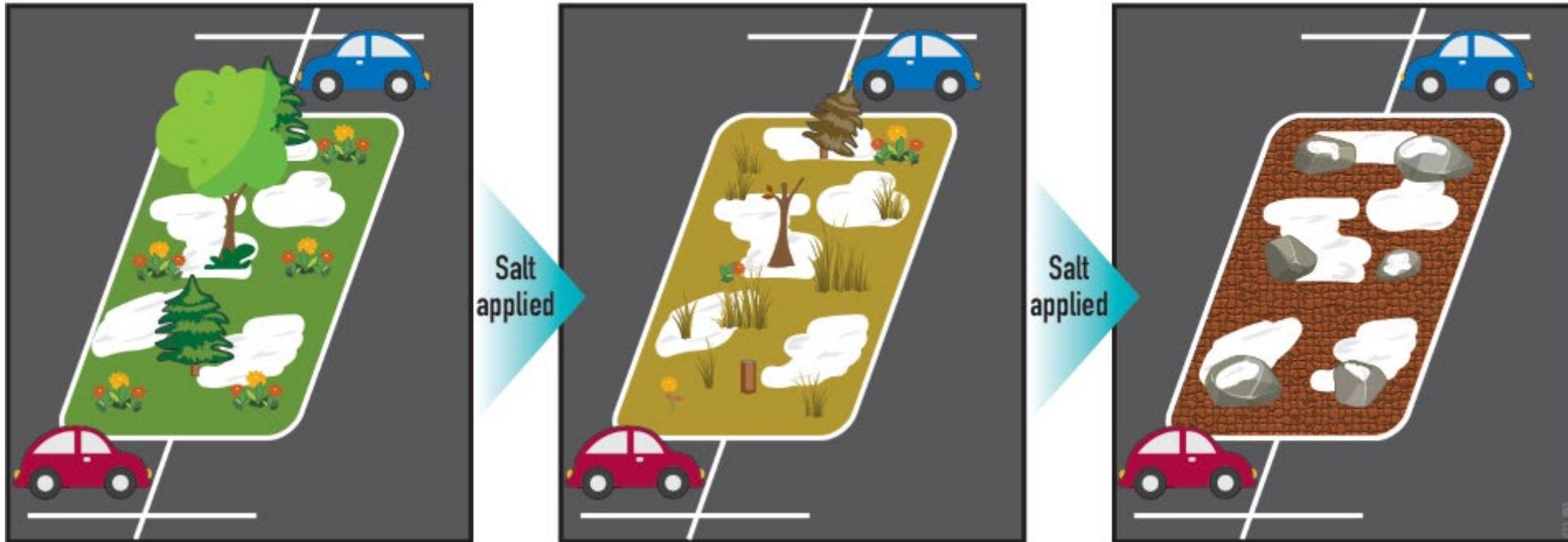


Good Intentions But...



Snow Storage

EVOLUTION OF PARKING LOT ISLANDS

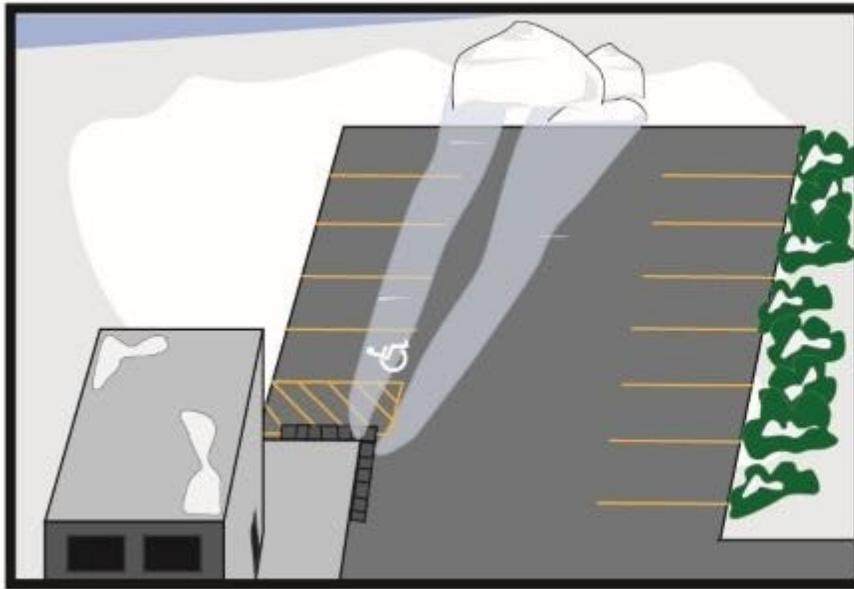


Snow Storage

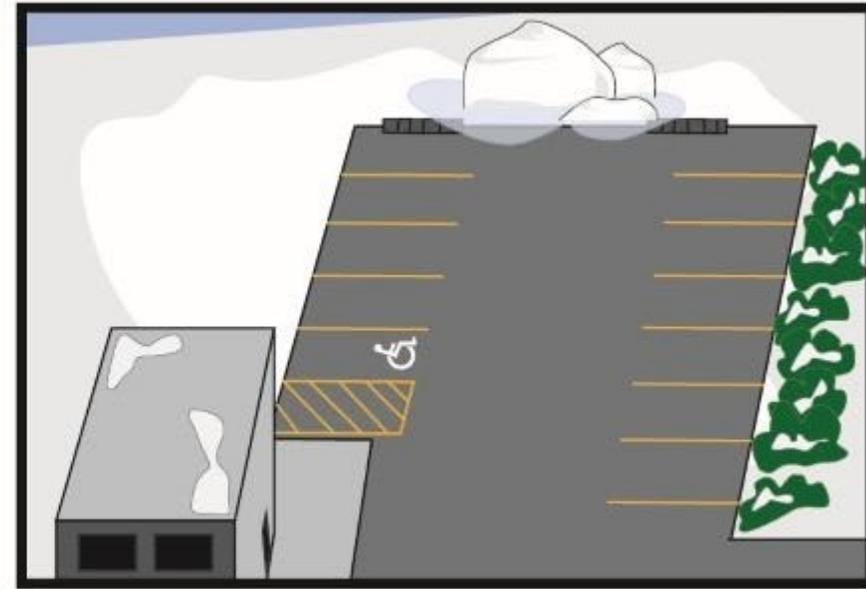


Snow Storage

Store snow on low side to reduce meltwater footprint



HIGH SALT



LOW SALT





Snow Storage



Sight Lines

Stop sign

Sight Lines

High risk, high salt zone

Meltwater Sprawl & Refreeze



Snow Garden Guide



Snow Storage



Project No. 19-00000
 Date: 12/20/23
 Scale: As Shown
 Drawing No. 19-00000-01

ICS
 ICS CONSULTANTS, INC.
 1000 W. WISCONSIN ST., SUITE 200
 ROCKFORD, WI 53085

Prepared by: Bolton & Menk, Inc.
 Checked by: Bolton & Menk, Inc.
 Date of this drawing: 12/20/23
 Name of the Project: ROCKFORD SCHOOL'S SITE IMPROVEMENTS
 Name of the Client: ROCKFORD SCHOOL DISTRICT
 Name of the Engineer: Bolton & Menk, Inc.
 Name of the Designer: Bolton & Menk, Inc.
 Name of the Checker: Bolton & Menk, Inc.
 Name of the Drafter: Bolton & Menk, Inc.
 Name of the Plotter: Bolton & Menk, Inc.

BOLTON & MENK
 1975 GOLDEN VALLEY ROAD, SUITE 200
 MANAPOWIS, WI 53407

ROCKFORD SCHOOL'S SITE IMPROVEMENTS
 ROCKFORD SCHOOL, 4001 43RD STREET, ROCKFORD, WI 53085
 ROCKFORD HIGH SCHOOL, 1700 COUNTY ROAD 96, ROCKFORD, WI 53083
 ROCKFORD PUBLIC SCHOOLS
 1000 W. WISCONSIN STREET, ROCKFORD, WI 53085

GRADING & DRAINAGE PLAN ES-HS SOUTH

Sheet **C1.31**

Snow Garden Guide

Bolton & Menk, Inc
 December 2023

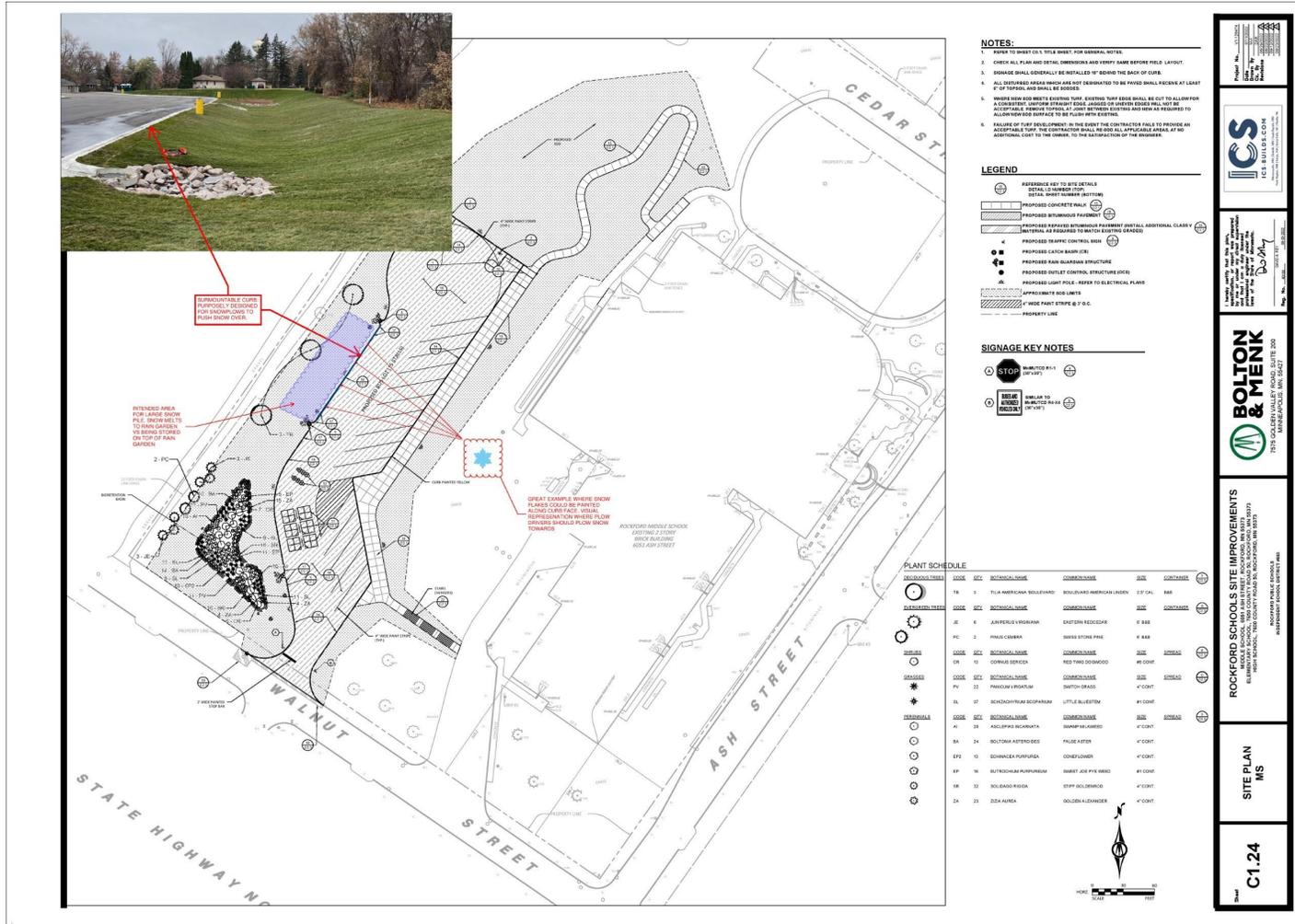
Draft

Coming soon

LSiD
 Low Salt Solutions



Low Salt Design Primer



Low Salt Design Primer

Bolton & Menk, Inc
 Month Day, Year

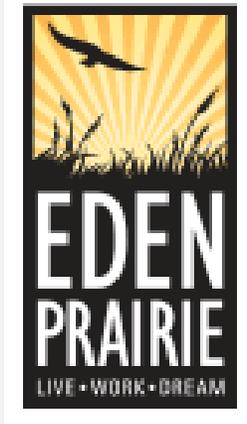
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Coming soon

LSiD
 Low Salt Solutions
BOLTON & MENK
 Real People. Real Solutions.



Low Salt Design Pilot Cities



Coming soon





**BOLTON
& MENK**

Real People. Real Solutions.

Thank You!



Connie Fortin

Low Salt Strategist

Connie.Fortin@bolton-menk.com

(612) 220-5999

"We can outwit winter!"

Bolton-Menk.com

Next Steps...
‘We can
outwit winter’



Real People. Real Solutions.