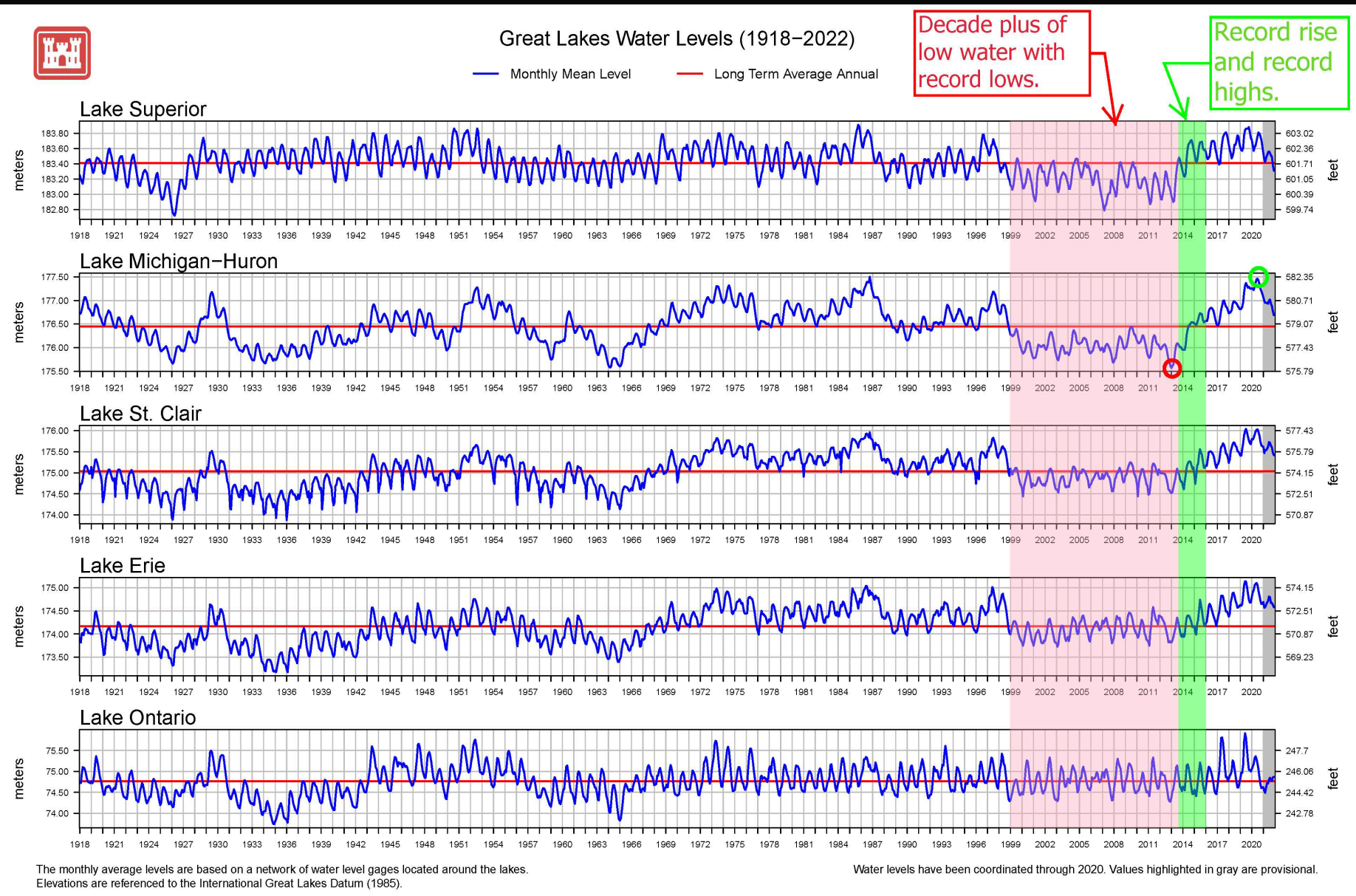
HIGH WATER / EROSION ON COUNTY ROADS

Wayne A. Schoonover, P.E.

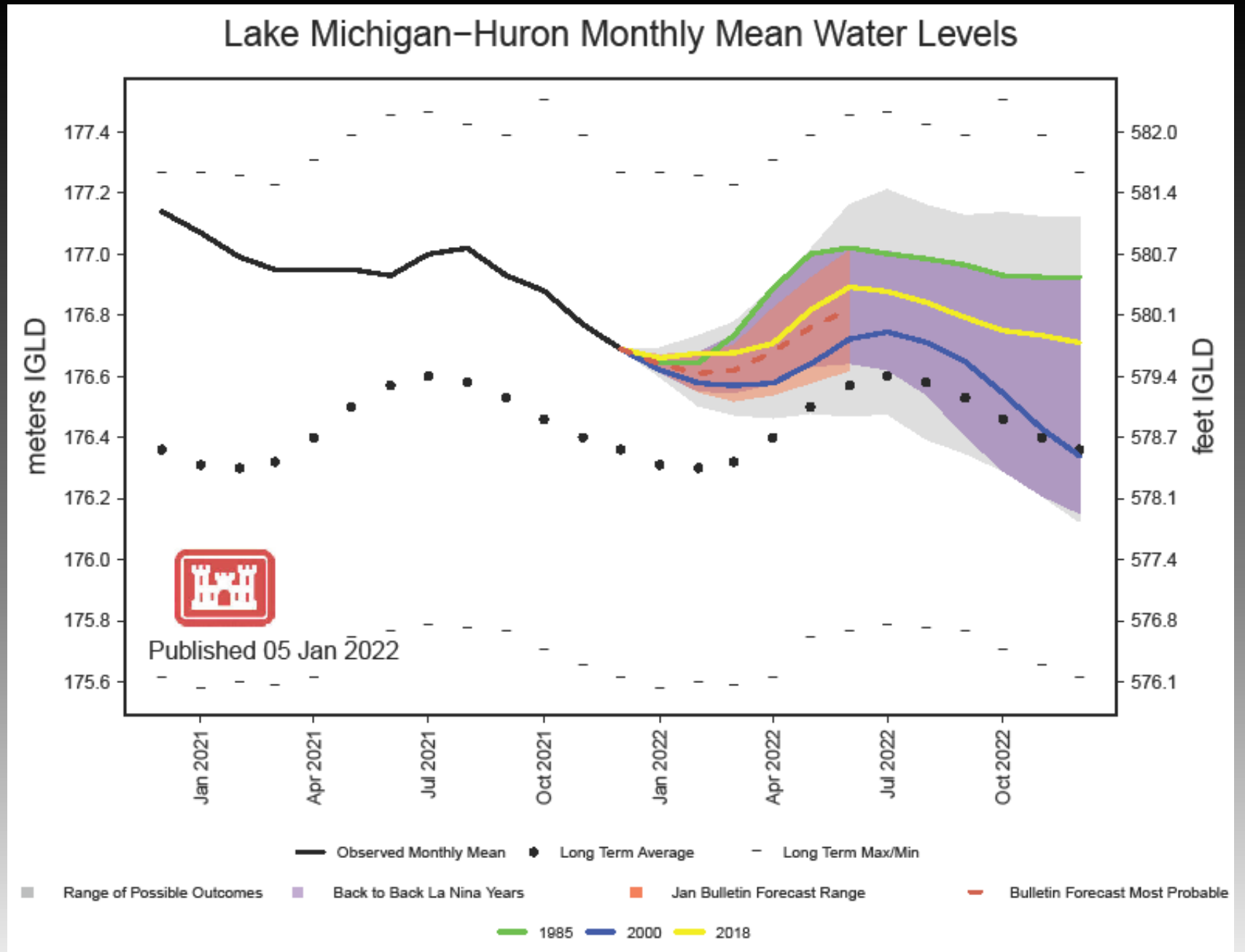
County Highway Engineer / Engineering Manager



In 2019 and 2020, the Great Lakes had experienced the highest water levels since 1986. Water levels on the Great Lakes are cyclical with periods that may last for several years.

Influencing factors include:

- ice cover with less evaporation during the winter
- above-average spring rainfall totals
  - ✓ larger total volume of rainfall
  - ✓ Longer duration of rainfall events
  - ✓ Intense individual rainfall events



Water levels in the Great Lakes are projected to be higher at the start of 2022's boating season than their averages last year, according to the latest six-month forecast by the U.S. Army Corps of Engineers.

The forecast, the first that encompasses June, the start of the boating months, suggests the levels of Lakes Huron, Michigan, Erie and Ontario will be higher than average. Lake Superior appears it will be right around average, with a possibility of being slightly higher or lower in the forecast.

OLD MISSION PENINSULA
GRAND TRAVERSE COUNTY

- 11 different sites of high water wave damage in ‘19 and ’20
- Peninsula Drive – County Primary (6)
- Bluff Rd – County Local (4)
- Forest Ave – Seasonal County Local (1)

WAVE ACTION EROSION AND FIXES – SHALLOW BLUFF

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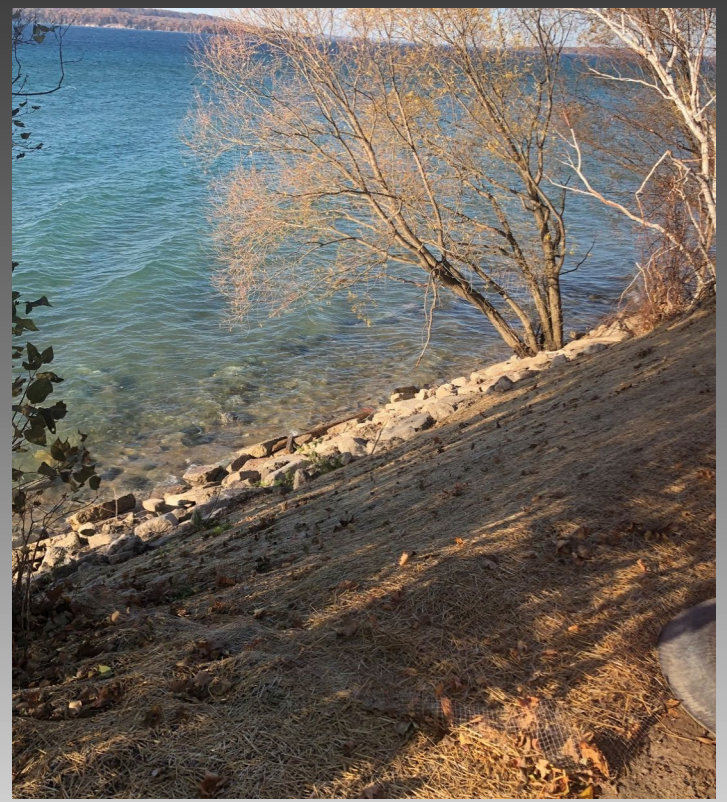
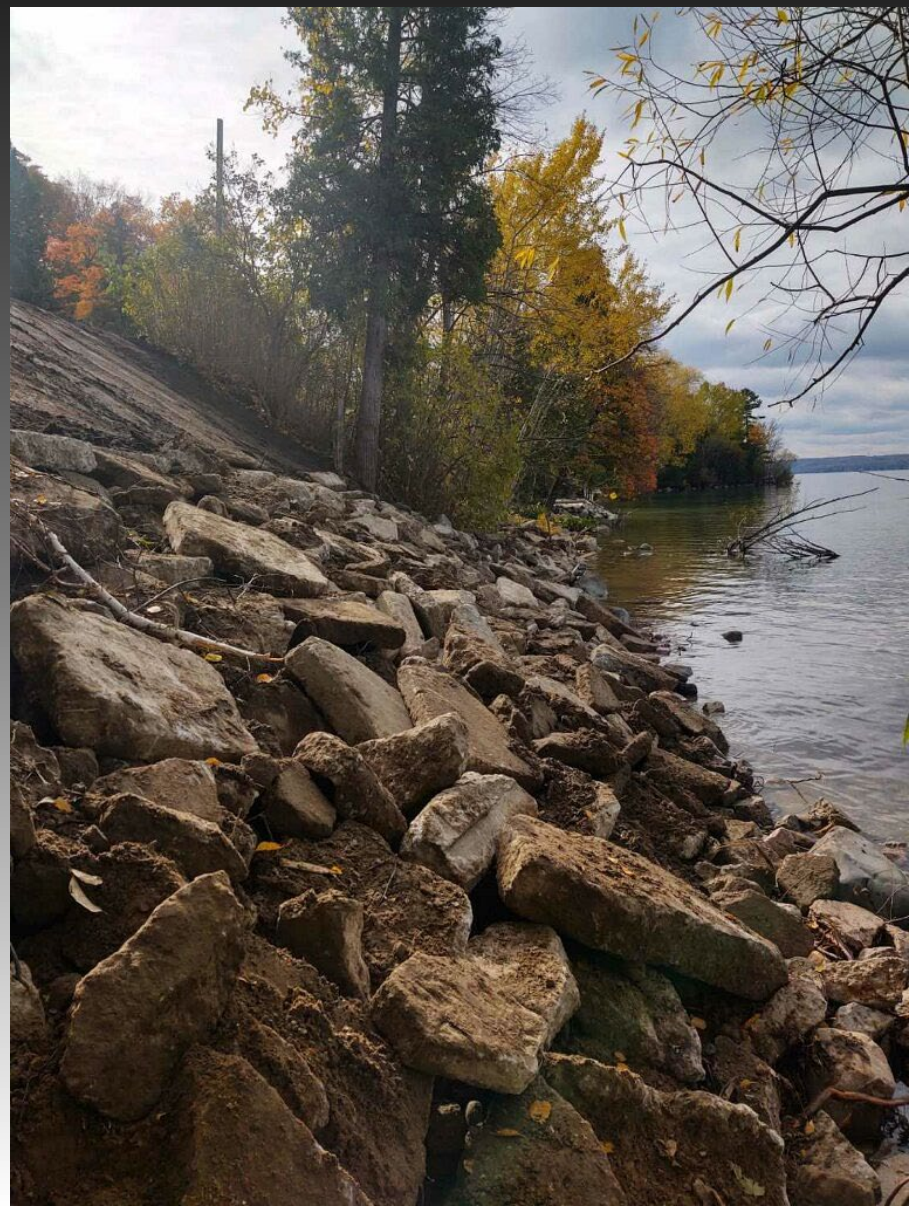




WAVE ACTION EROSION AND FIXES – TALL BLUFF

WAVE ACTION EROSION AND FIXES – TALL BLUFF

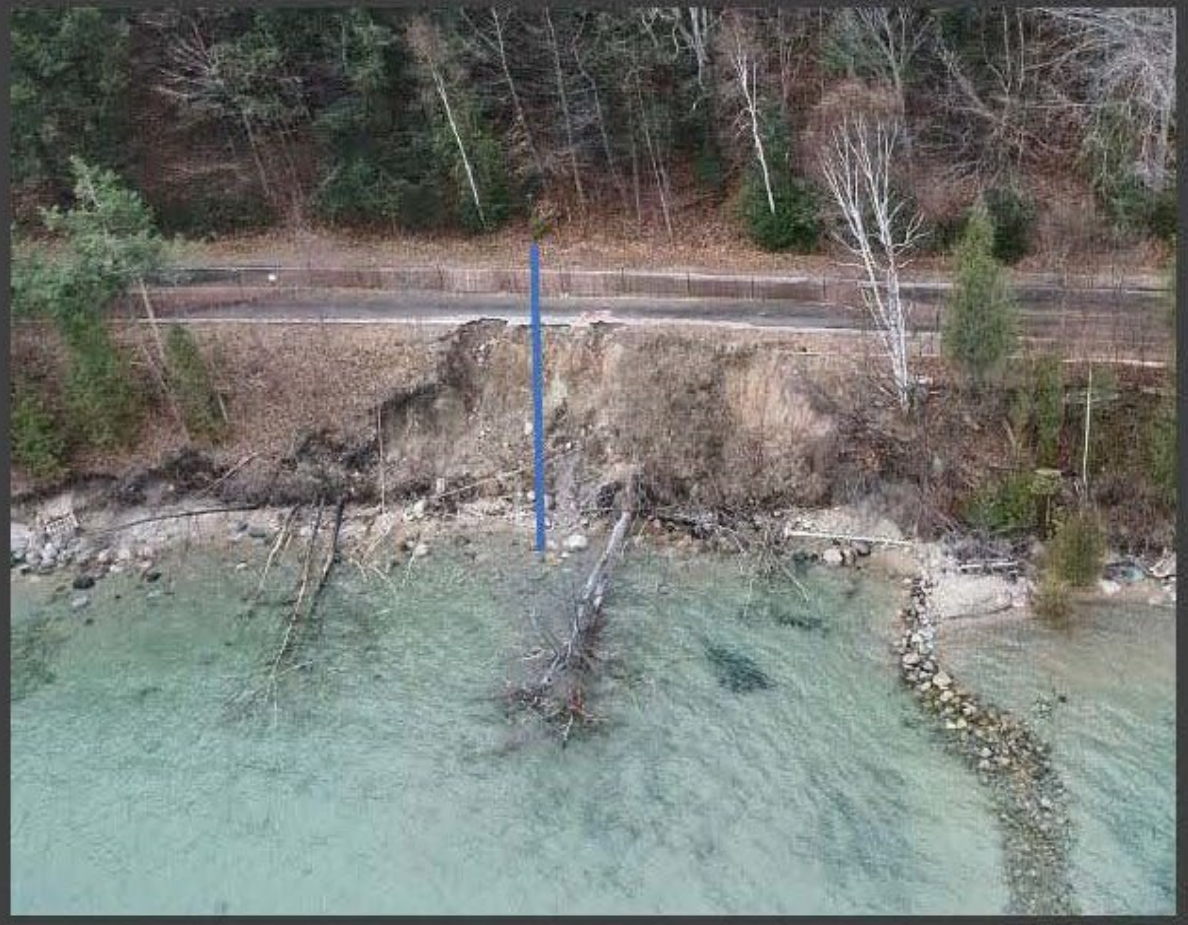
WAVE ACTION EROSION AND FIXES – TALL BLUFF

WAVE ACTION / SLOPE FAILURE – TALL BLUFF

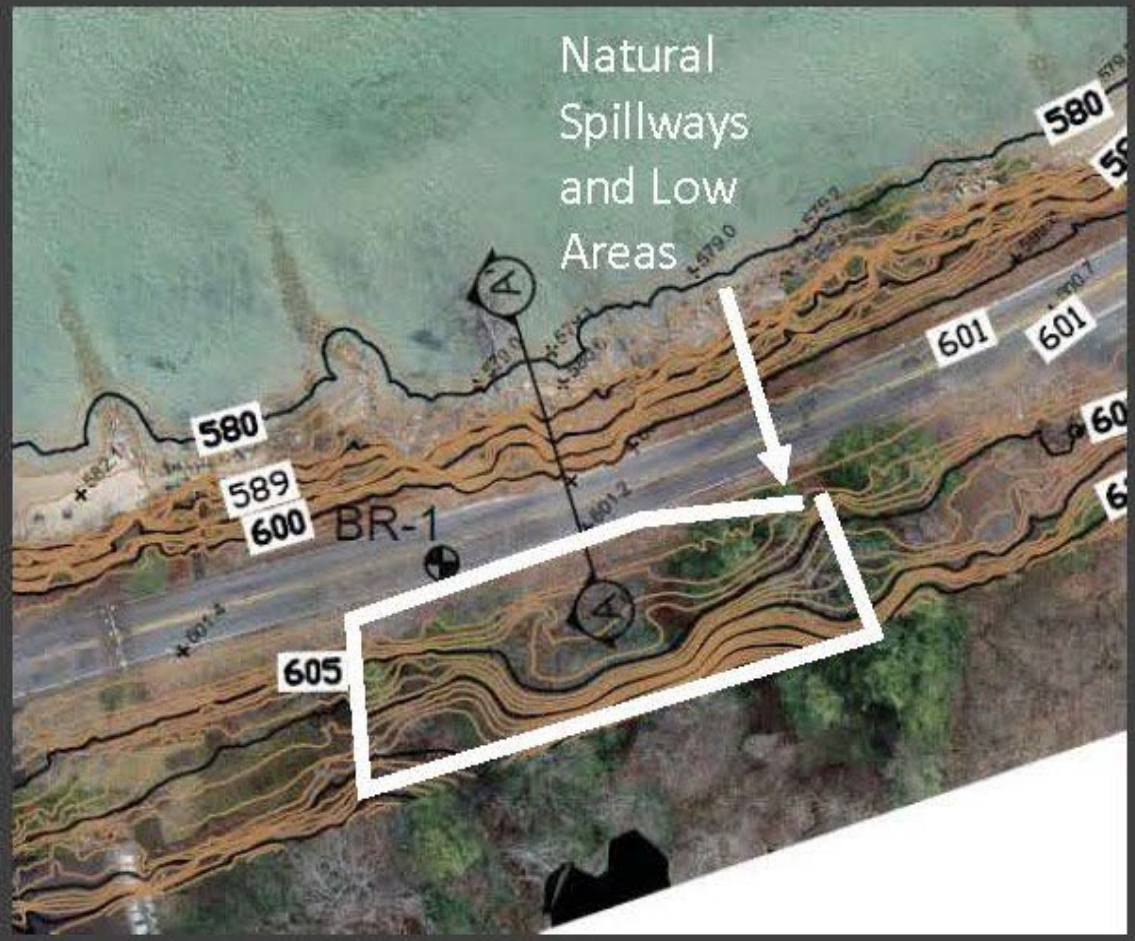
WAVE ACTION / SLOPE FAILURE – TALL BLUFF

WAVE ACTION / SLOPE FAILURE – TALL BLUFF

Bluff Rd at A-A’



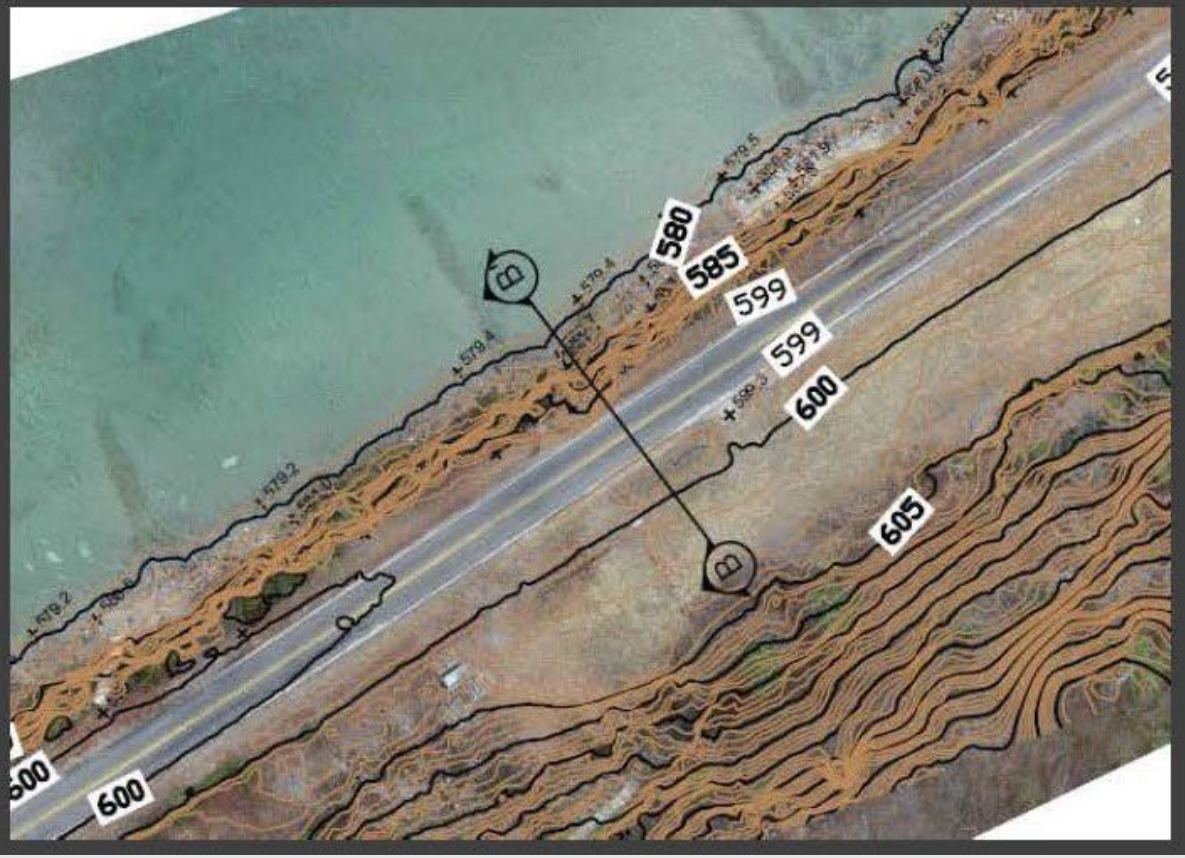
Contours at A-A’



WAVE ACTION / SLOPE FAILURE – TALL BLUFF

Bluff Rd at B-B’

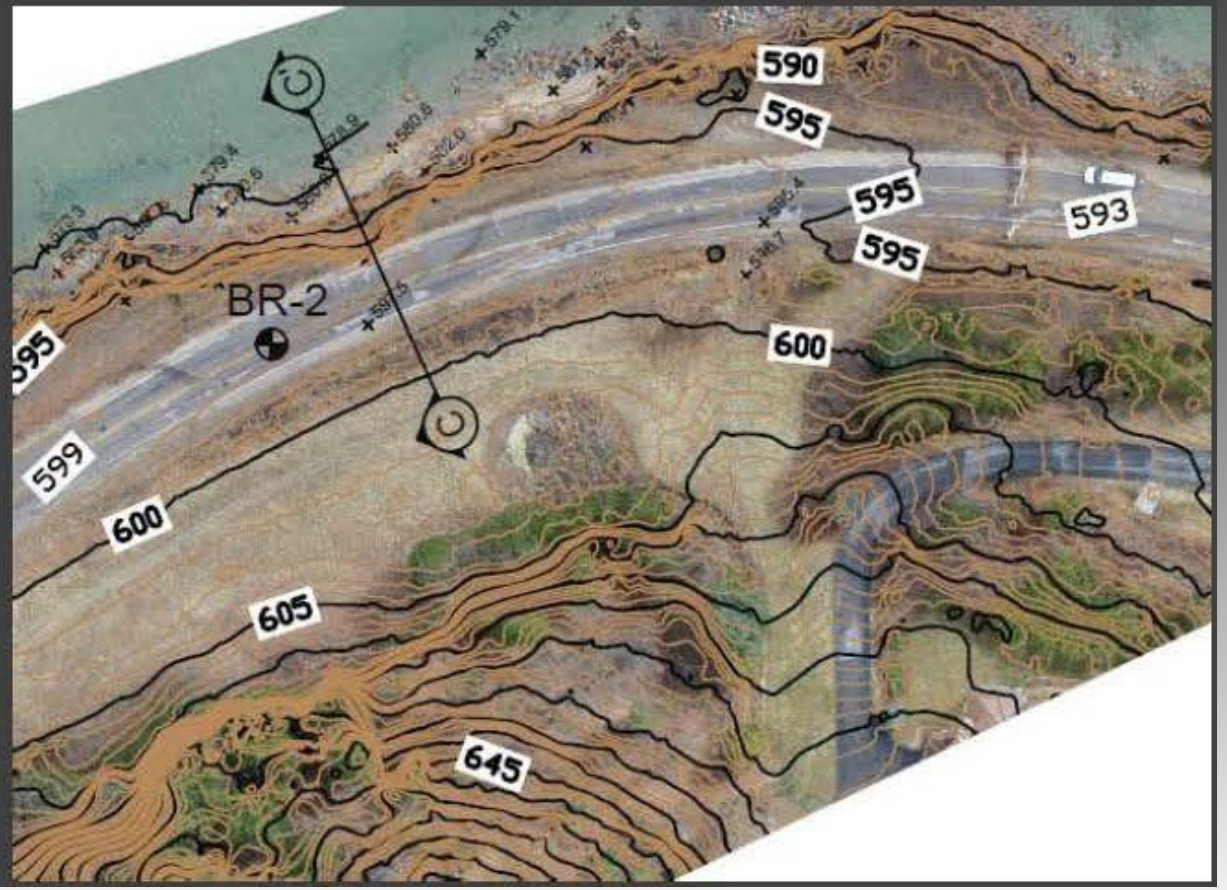
Contours at B-B’



WAVE ACTION / SLOPE FAILURE – TALL BLUFF

Bluff Rd at C-C’

Contours at C-C’



WAVE ACTION / SLOPE FAILURE – TALL BLUFF

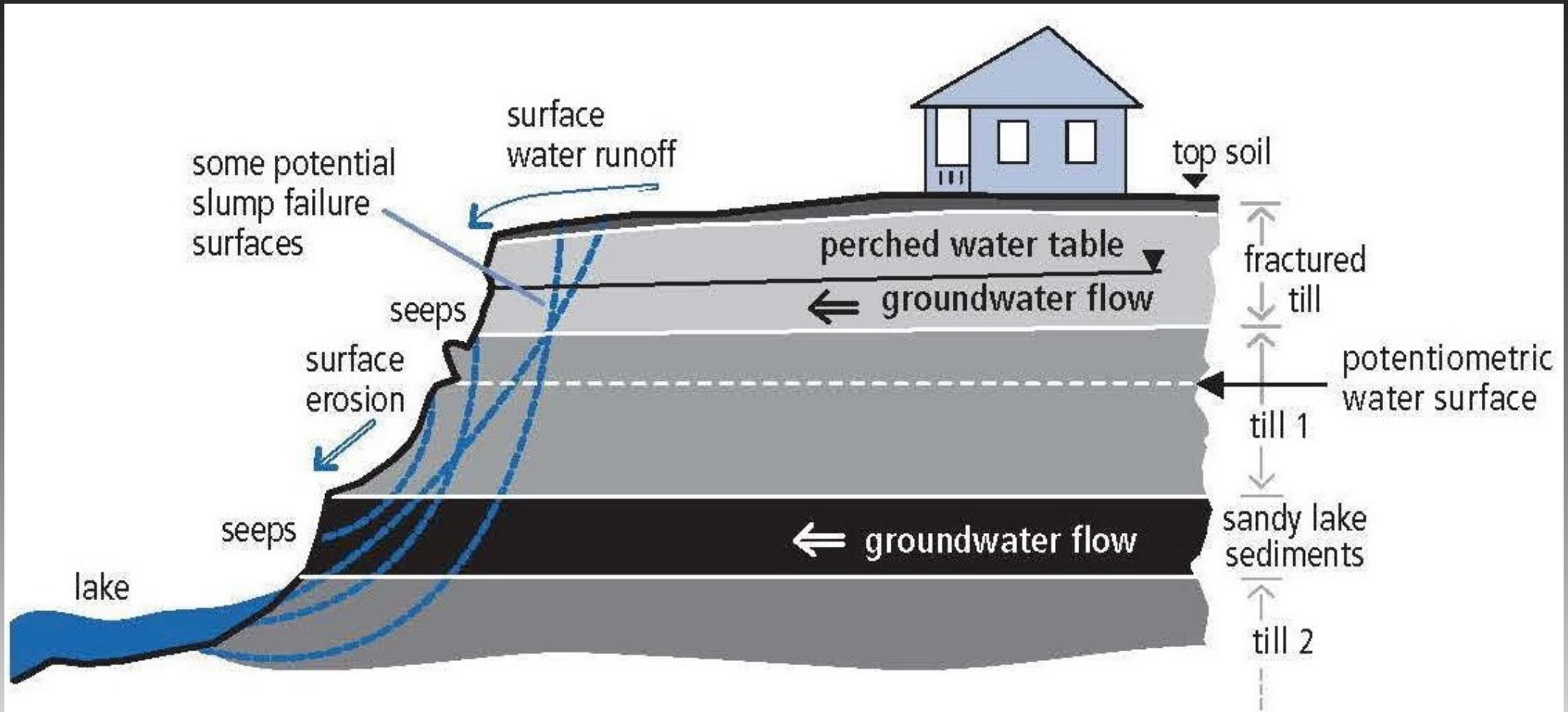
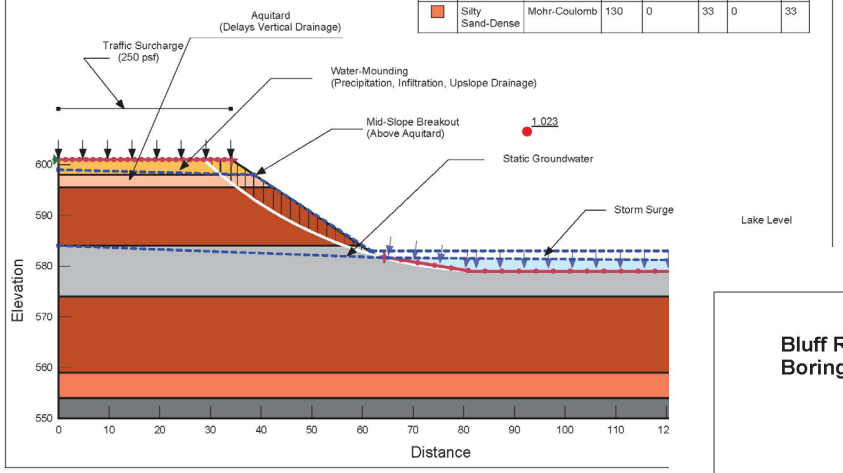


Illustration – Geologic Cross Section, Instability, Runoff and Erosion

WAVE ACTION / SLOPE FAILURE – TALL BLUFF

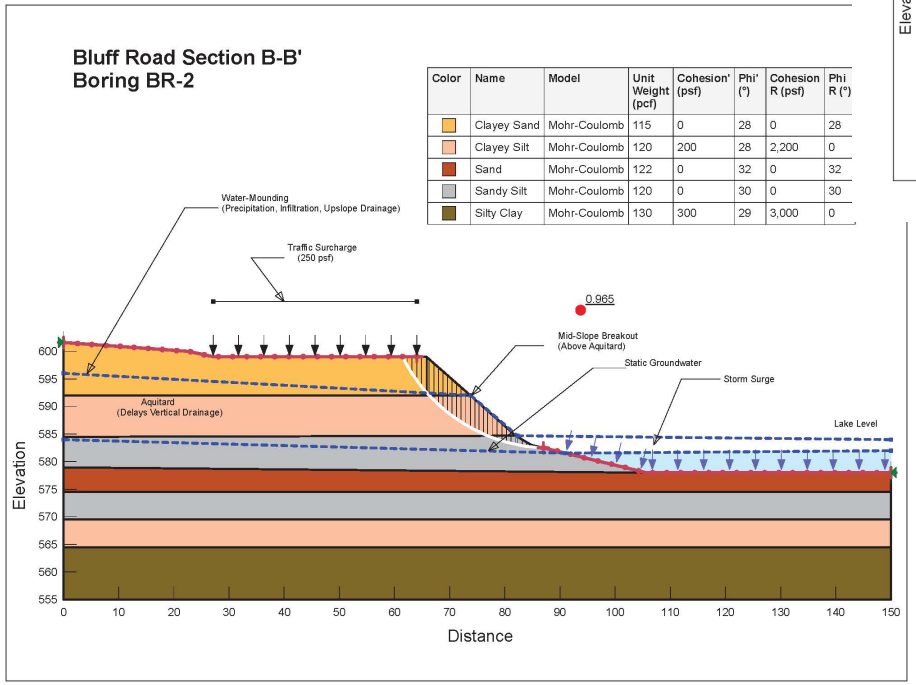
Bluff Road Section A-A'
Boring BR-1

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Cohesion R (psf)	Phi R (°)
	Clayey Silt	Mohr-Coulomb	120	200	28	2,000	0
	Sand-Loose	Mohr-Coulomb	115	0	29	0	29
	Sand-MD	Mohr-Coulomb	122	0	30	0	30
	Sandy Silt	Mohr-Coulomb	120	0	32	0	32
	Silty Clay	Mohr-Coulomb	120	300	29	4,500	0
	Silty Sand-Dense	Mohr-Coulomb	130	0	33	0	33



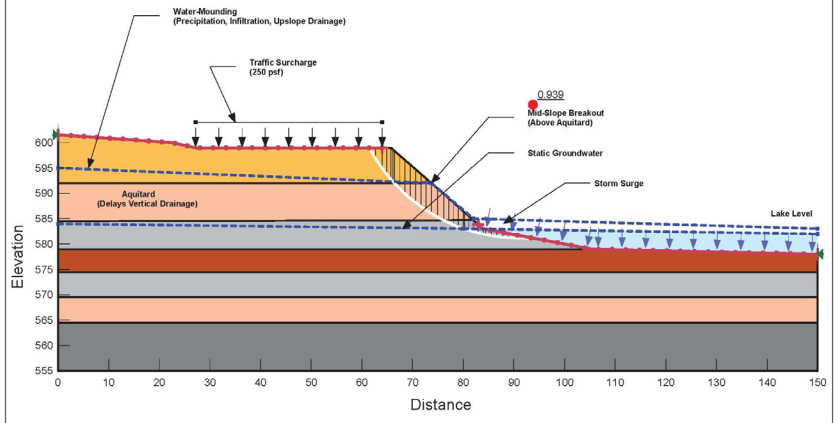
Bluff Road Section B-B'
Boring BR-2

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Cohesion R (psf)	Phi R (°)
	Clayey Sand	Mohr-Coulomb	115	0	28	0	28
	Clayey Silt	Mohr-Coulomb	120	200	28	2,200	0
	Sand	Mohr-Coulomb	122	0	32	0	32
	Sandy Silt	Mohr-Coulomb	120	0	30	0	30
	Silty Clay	Mohr-Coulomb	130	300	29	3,000	0



Bluff Road Section C-C'
Boring BR-2

Color	Name	Model	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Cohesion R (psf)	Phi R (°)
	Clayey Sand	Mohr-Coulomb	115	0	28	0	28
	Clayey Silt	Mohr-Coulomb	120	200	28	2,200	0
	Sand	Mohr-Coulomb	122	0	32	0	32
	Sandy Silt	Mohr-Coulomb	120	0	30	0	30
	Silty Clay	Mohr-Coulomb	130	300	29	3,000	0



CONTRIBUTING FACTORS – TALL BLUFF

- HIGH PRECIPITATION
- PERCHED GROUNDWATER
- HIGH WATER TABLE
- AQUITARD / SILT-CLAY LAYER
- SURFACE EROSION – HARD SURFACE RUN-OFF, STAIRWAYS
- SLOPE SLUMPING
- WAVE EROSION
- GROINS

HIGH WATER / EROSION ON COUNTY ROADS

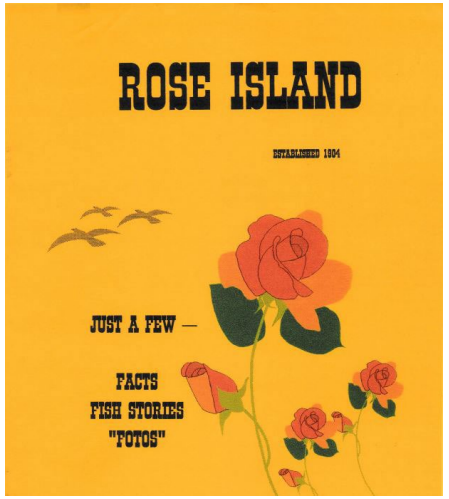
Questions?

Operations Response to High Water

Huron County
Road Commission

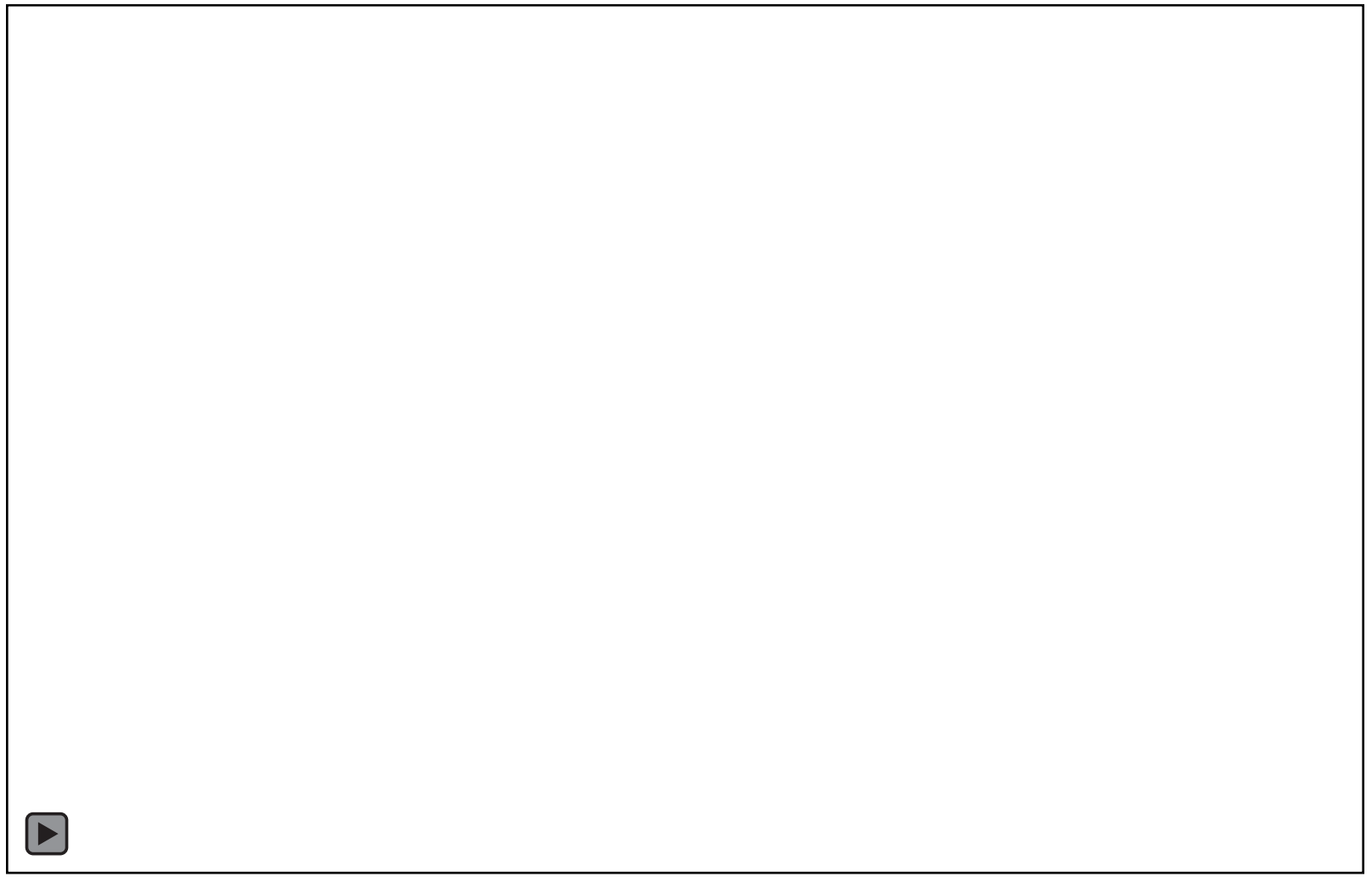
Rose Island

Fairhaven Township, MI



Rose Island

Fairhaven Township, MI



Rose Island Road

High Water

Flooding issues continue

Erosion taking toll along county shoreline

| NOVEMBER 07, 2019

BY SETH STAPLETON
EDITOR • SSTAPLETON@MIHOMEPAPER.COM

Water levels are quite high on this stretch of Rose Island Road, north of Sebewaing, in Fairhaven Township. Photo by Seth Stapleton

HURON COUNTY – Historic lake leve
have caused continual problems along H
this year.

According to both state and local official
going away anytime soon.

Rose Island Road

Type of Roadway Dictates Response:

- Low Speed
- Low Volume
- Residential

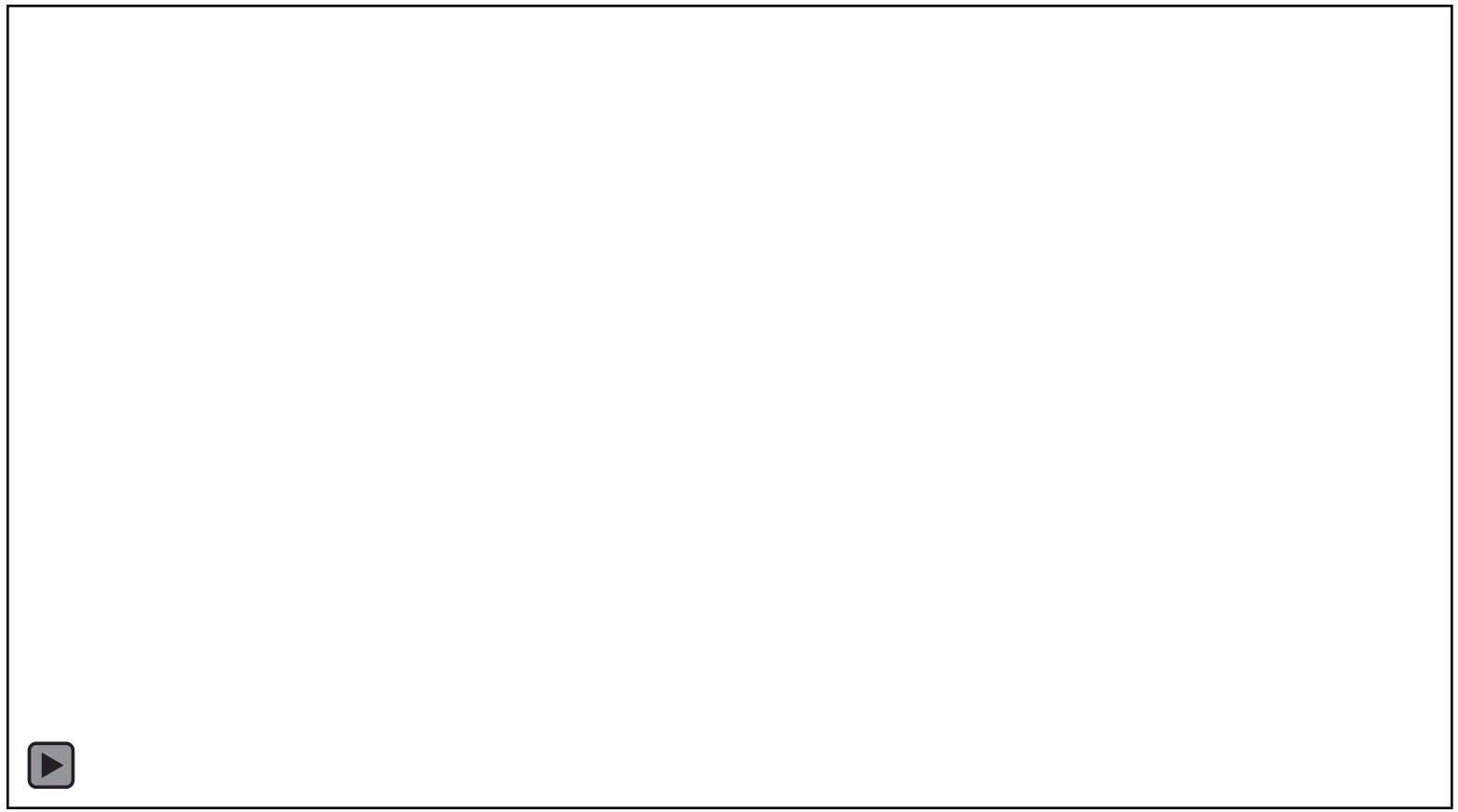
Rose Island Road

Signing Response

Rose Island Road

Thumb Area High Water Issues

Thumb Area High Water Issues



Thank You!

Erik A. Tamlyn, P.E.
Huron County Road
Commision Engineer

etamlyn@hcroads.com

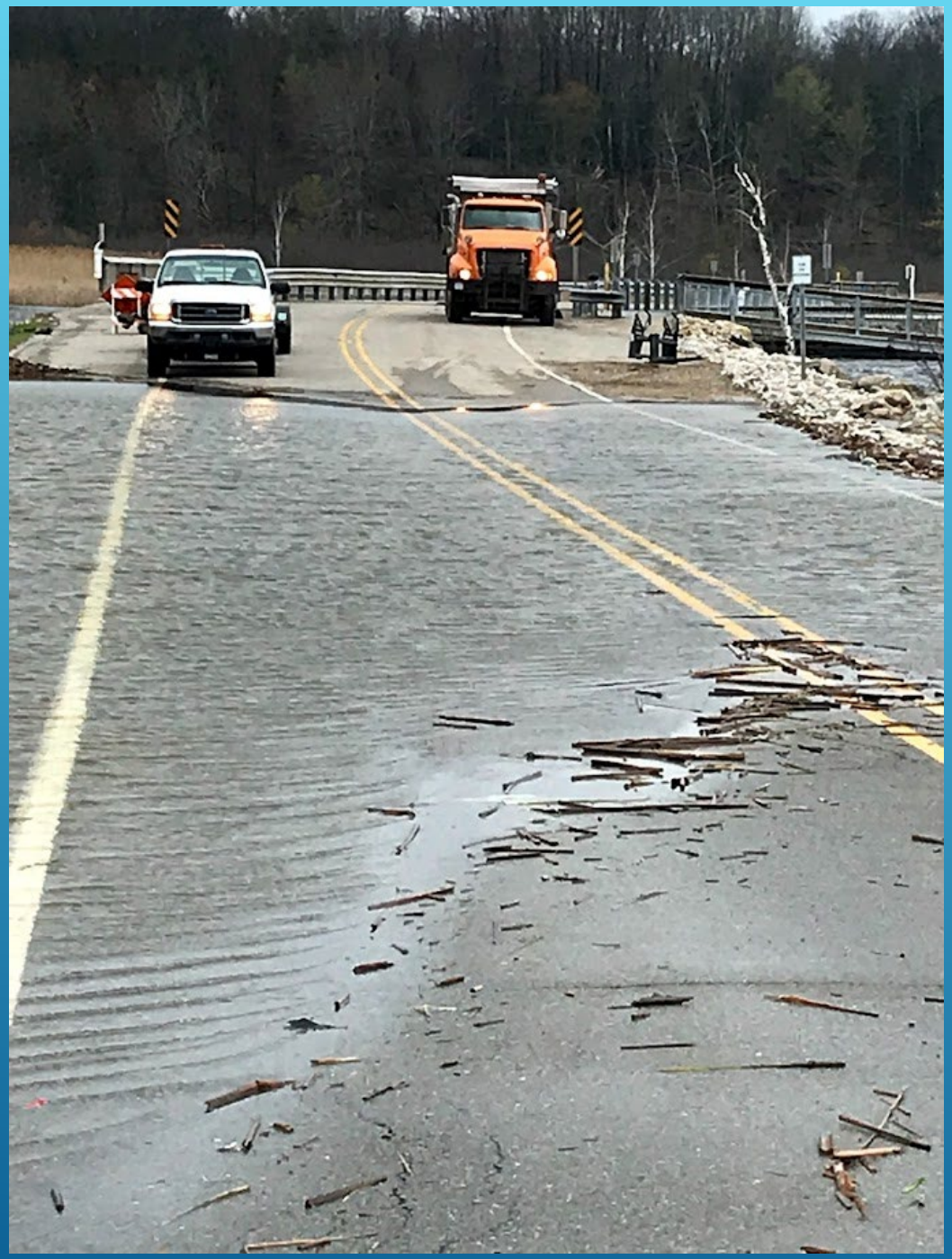
HIGH WATER/EROSION ON COUNTY ROADS

Lifting Longbridge &

Erosion Control on Scenic Drive at Stony Lake

INITIAL FLOODING

WATER OVER THE ROAD



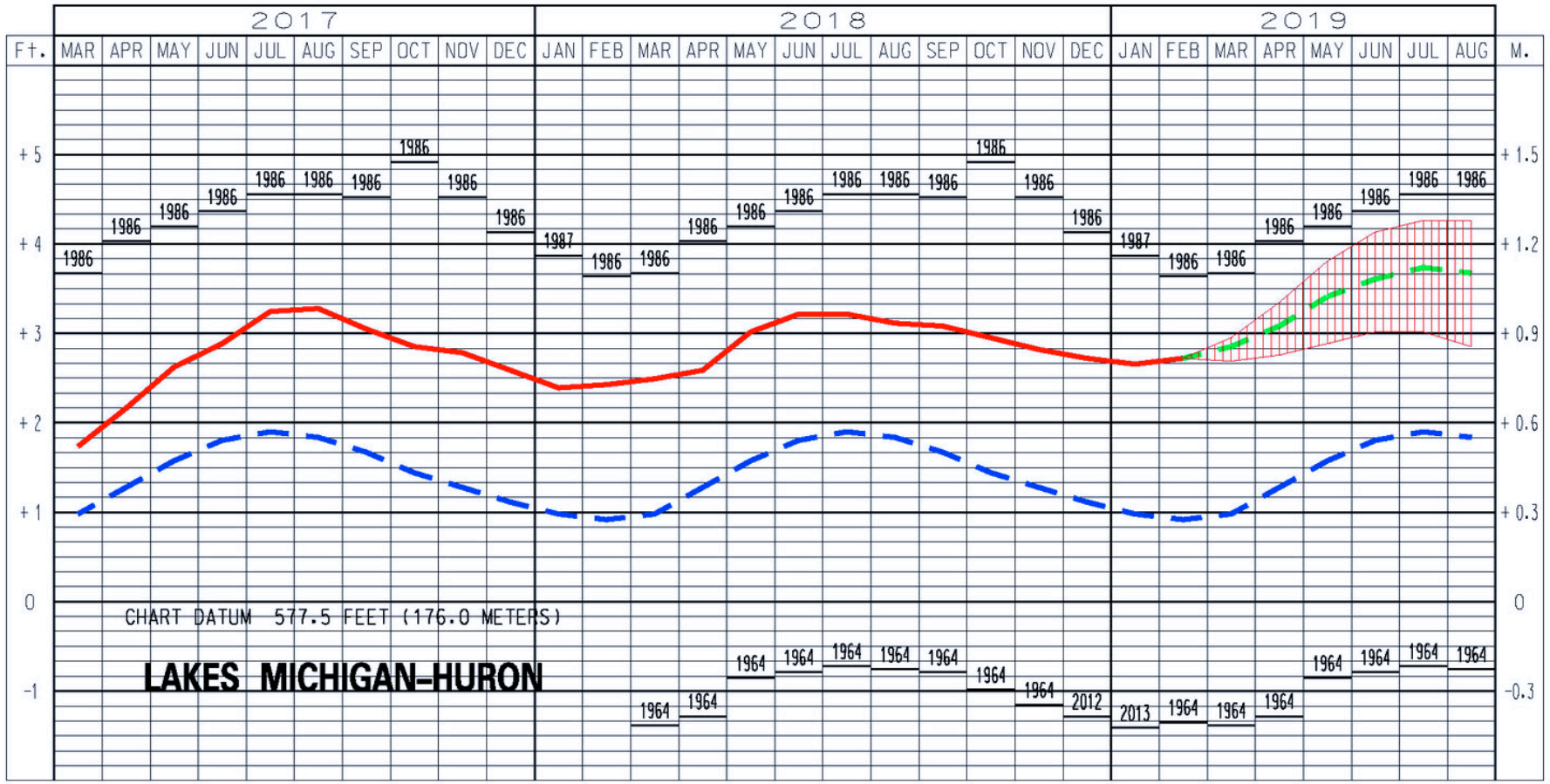
Longbridge Road

LIMIT
5
TONS
SPEED
LIMIT
35
WATER
OVER
ROAD

WATER LEVEL RECEDED SLIGHTLY

Then continued to rise…

LAKES MICHIGAN–HURON WATER LEVELS – MARCH 2019



LEGEND

LAKE LEVELS

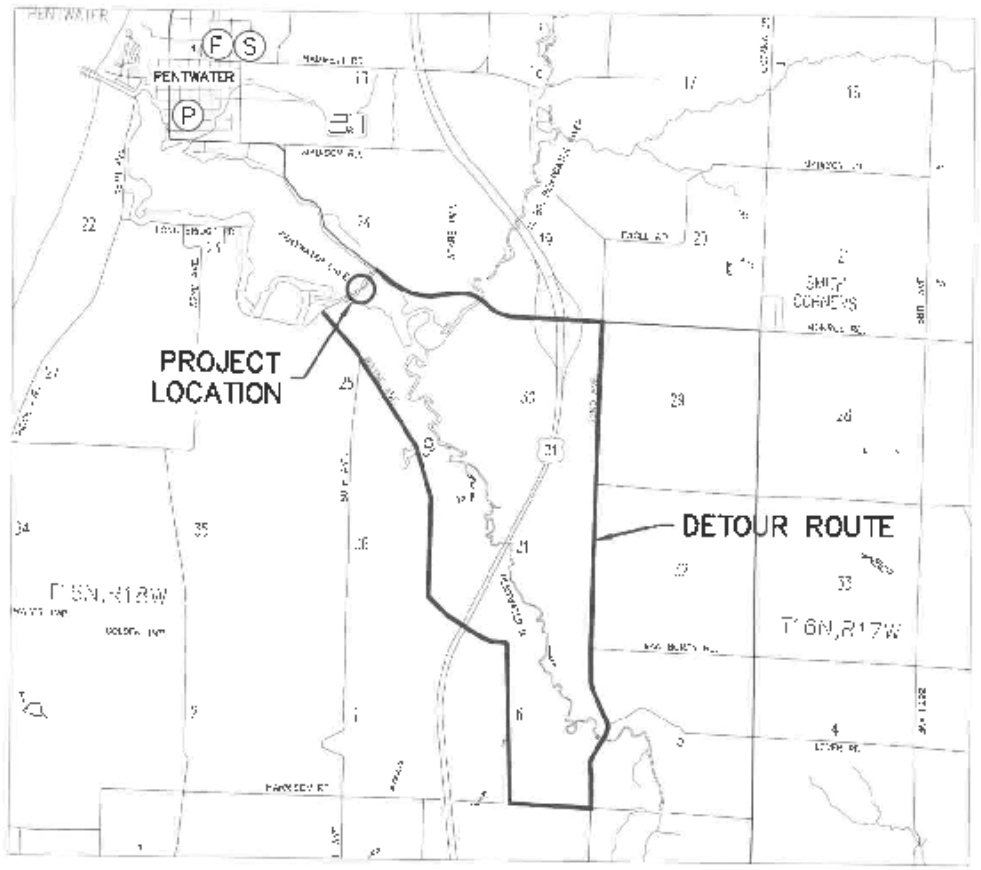
RECORDED

PROJECTED

AVERAGE **				
MAXIMUM **	1985	1985	1973	1973
MINIMUM **	1936	1934	1926	1934

** Average, Maximum and Minimum for period 1918-2018

Closure and 13 Mile Detour for a normal half mile drive



LOCATION MAP
LONGBRIDGE ROAD OVER PENTWATER RIVER
PENTWATER TOWNSHIP (T16N, R18W) SECTION 24
OCEANA COUNTY

LEGEND: (F) FIRE STATION
(P) POLICE
(S) SCHOOL

DETOUR
ROAD
CLOSED
WEIGHT LIMIT 5 TONS
SPEED LIMIT 35
B 15
SOUTH

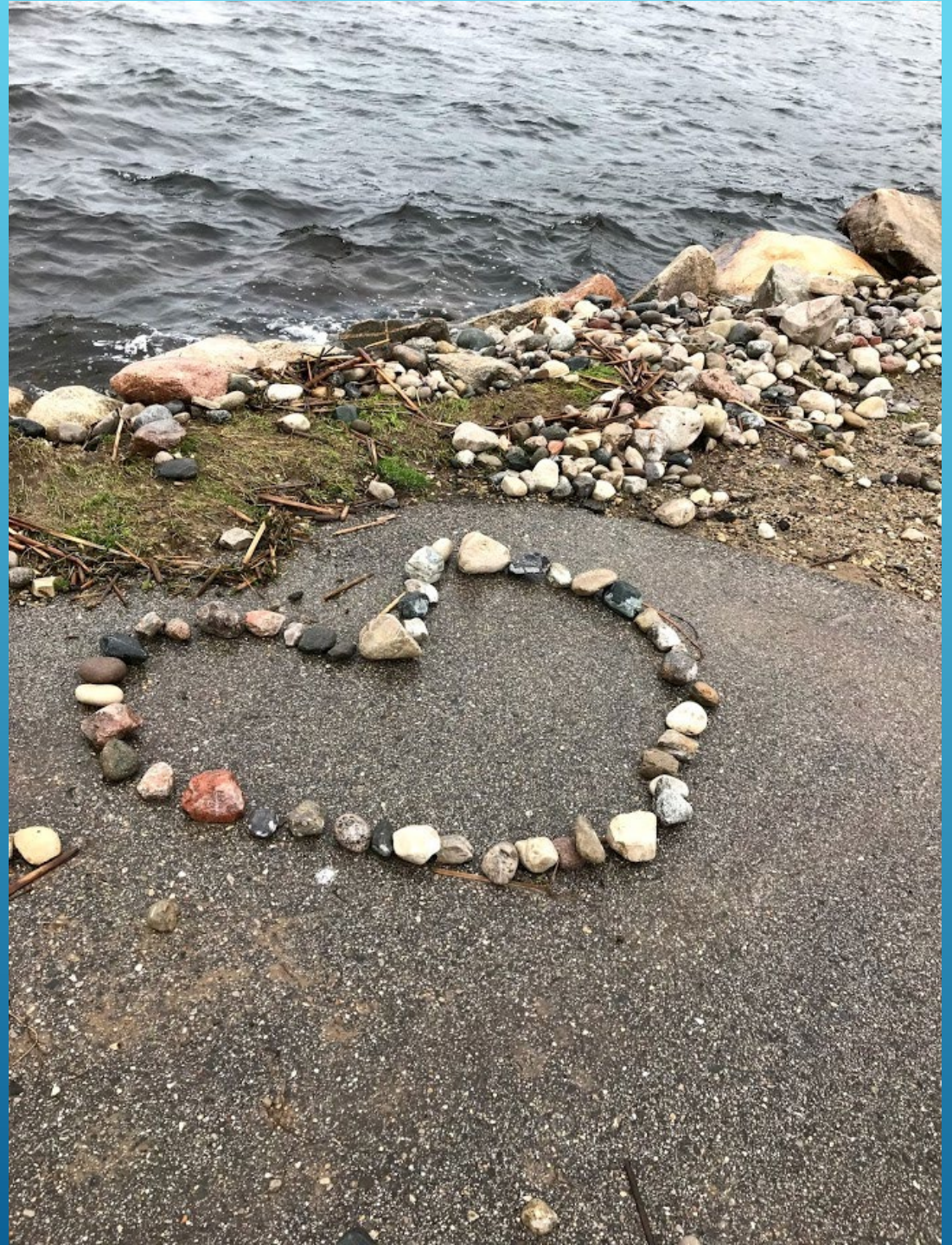
View from Northeast side of Longbridge

Concrete barrier blocks were placed as residents continued to pull barricades and snow fence aside and drive over road

WALKING ACROSS ROAD NOW REQUIRED WADERS

THE ONLY HAPPY RESIDENTS

SOMEONE STILL HAD HOPE…



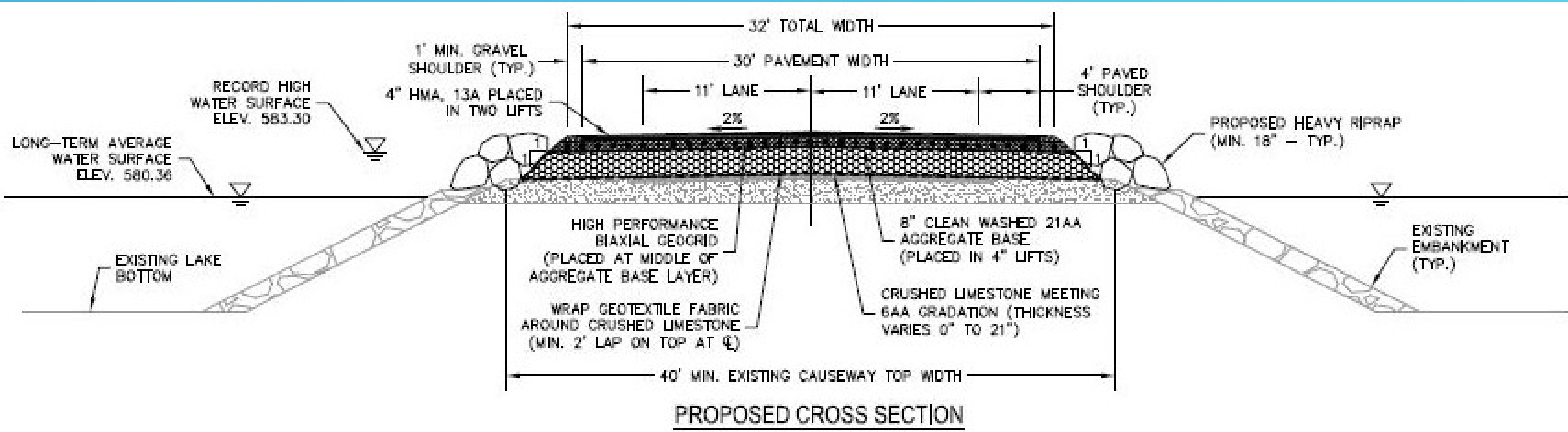
SOIL BORINGS DETERMINED 85’ OF PEAT

SURVEYING LAKE AND RIVER BY STATIONS, USING GRABBER CONE AND KAYAK

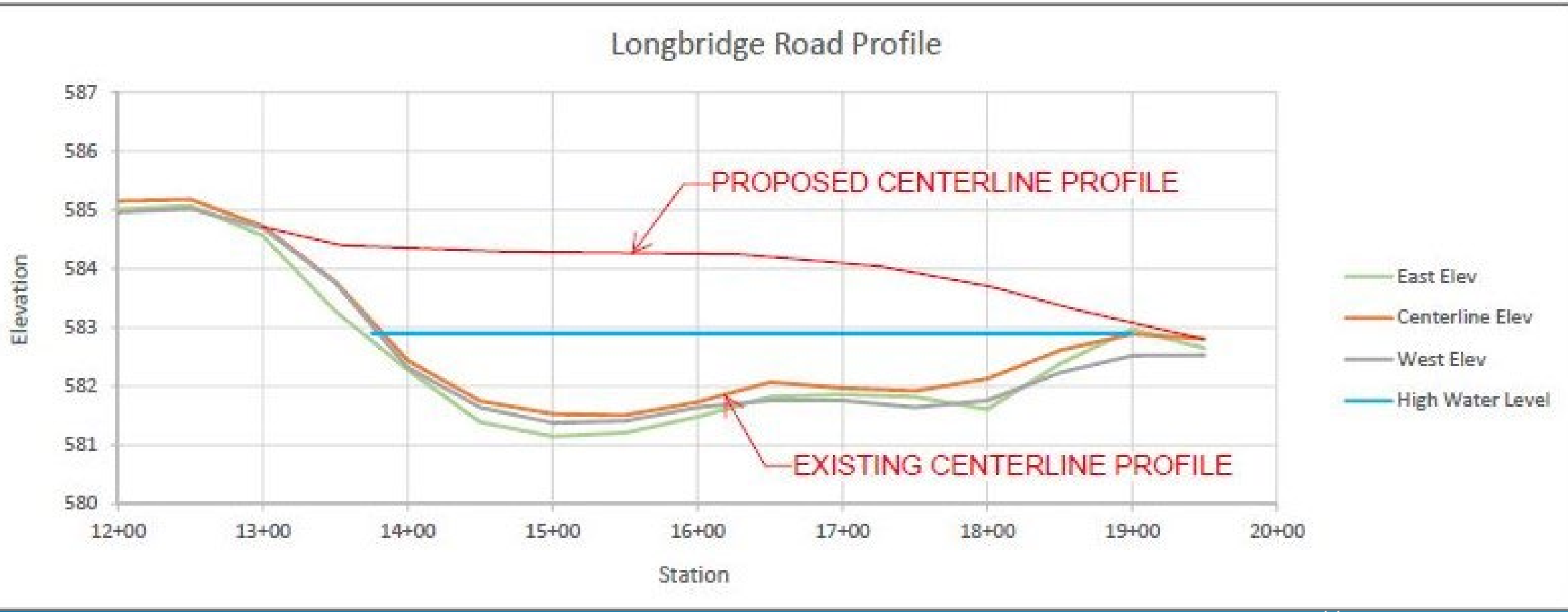
Project Location
650 feet from US 31 BR to North Side of Bridge

PLAN VIEW

SCALE:
HORIZONTAL
0'
50'
100'
N
MONROE RD. (US-31BR)
PENTWATER
LAKE
650'
PROJECT
LENGTH
40' MIN.
EXISTING
CAUSEWAY
WIDTH
1' PROP. GRAVEL SHOULDER
(TYP. EACH SIDE)
30' PROP.
PAVEMENT
WIDTH
PROPOSED FLOODPLAIN FILL
AREA – 2400 SYD
VOLUME – 800 CYD
℄ LONGBRIDGE RD.
FLOW
PENTWATER
RIVER
EXISTING BRIDGE OVER
PENTWATER RIVER



CROSS SECTION



PROFILE VIEW

RESIDENTS KAYAKING ACROSS ROAD

DETOUR
ROAD
CLOSED

SIGNED PERMIT NOVEMBER 4, 2019

EGLE

NOTICE OF AUTHORIZATION

Permit Number: WRP019314 v. 1 **Date Issued: November 4, 2019**
Site Name: 64 - Longbridge Road, Pentwater River **Expiration Date: November 4, 2024**

The Michigan Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division, P.O. Box 30458, Lansing, Michigan 48909-7958, under provisions of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended; specifically:

- ☒ Part 31, Floodplain Regulatory Authority of the Water Resources Protection.
- ☒ Part 301, Inland Lakes and Streams.
- ☐ Part 303, Wetlands Protection.
- ☐ Part 315, Dam Safety.
- ☐ Part 323, Shorelands Protection and Management.
- ☐ Part 325, Great Lakes Submerged Lands.
- ☐ Part 353, Sand Dunes Protection and Management.

Authorized activity:

Place 800 cubic yards of clean washed material to facilitate raising the submerged Longbridge Road crossing of Pentwater River and associated floodplain to restore emergency access to services. No work is authorized beyond the existing footprint of the road.

To be conducted at property located in: Oceana County, Waterbody: Pentwater River
Section 24, Town 16N, Range 18W, Village of Pentwater

Permittee:
Mark Timmer
Oceana County Road Commission
3501 West Polk Road
P.O. Box 112
Hart, Michigan 49420

Issued By:
Holly Vickers
Transportation Review Unit
Water Resources Division
616-295-2787

This notice must be displayed at the site of work.
Laminating this notice or utilizing sheet protectors is recommended.
Please refer to the above permit number with any questions or concerns.

EGLE-WRD
WRP019314 v1.0
Approved
Issued On:11/04/2019
Expires On:11/04/2024

BEGAN WORK NOVEMBER 5, 2019

CAT

CAT

GEOTECH FABRIC INSTALLED DIRECTLY ON ROAD BED

6AA LIMESTONE PLACED ON GEOTECH FABRIC

TOUGH WORKING CONDITIONS

FABRIC OVERLAPPED ~ 1 FOOT

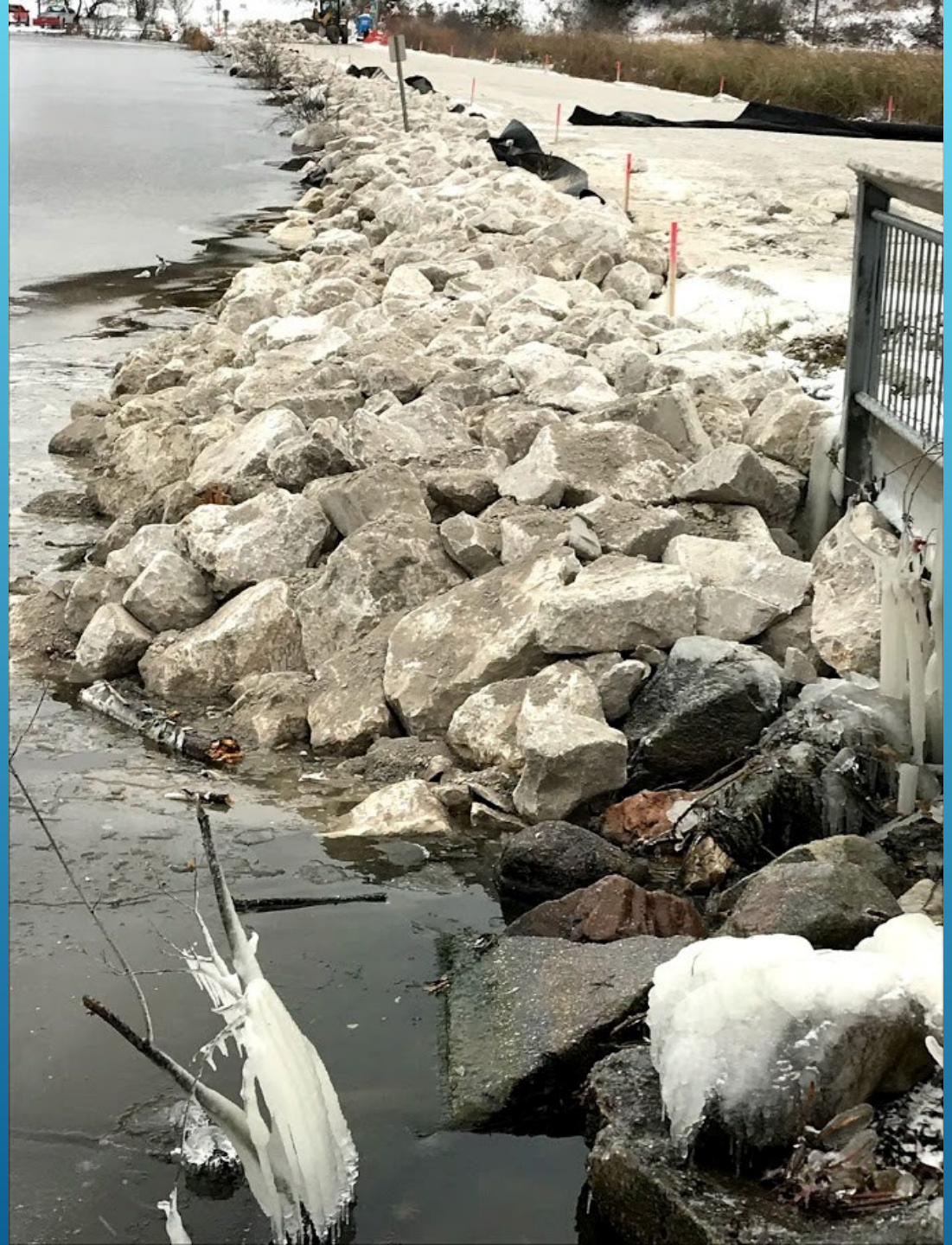
T3T

BRINE TRUCK TO KEEP AGGREGATE FROM FREEZING

GEO GRID INSTALLED HALF WAY IN LIFT OF 6AA LIMESTONE

PLACING FINAL LIFT

HEAVY RIP RAP

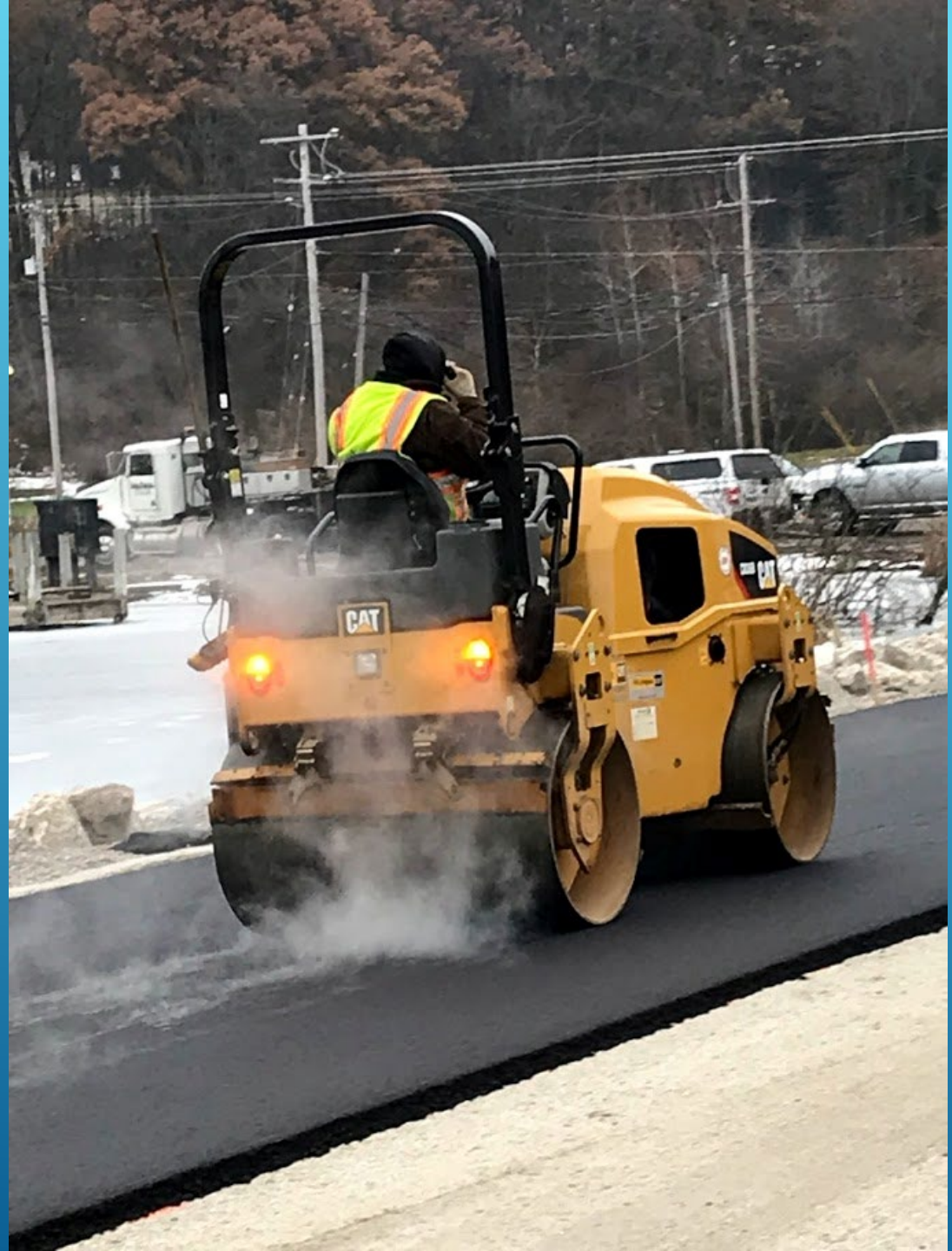


18”- 24” RIP RAP

ROAD LIFTED AN AVERAGE OF 1.5 FEET

PAVING
TWO LIFTS
2” EACH
13A

TOTAL OF
4”
ASPHALT


CAT

WEATHER COOPERATED FOR PAVING

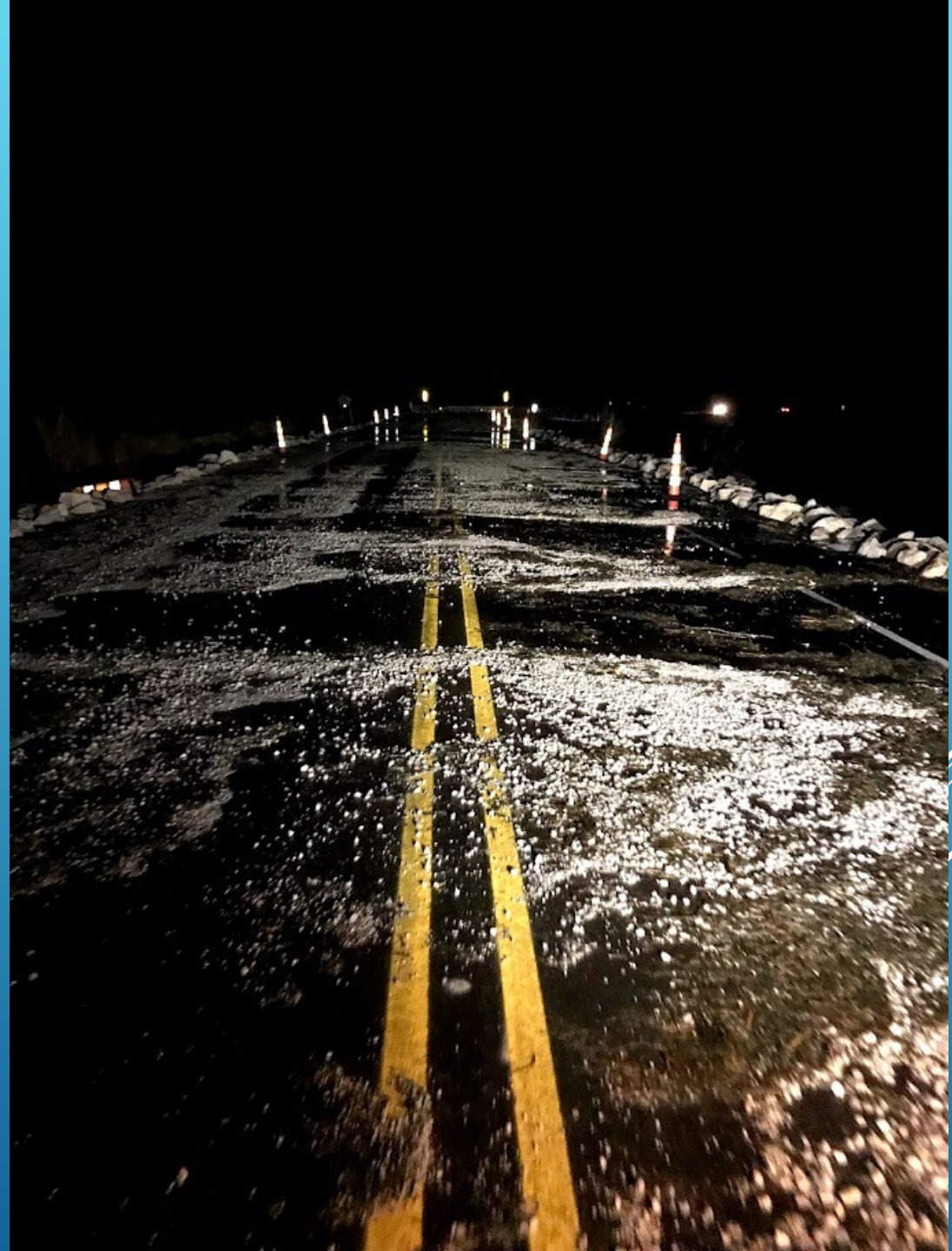
PAINT STRIPING PAINTED ON WARM PAVEMENT

PAVED, STRIPED AND OPEN FOR TRAFFIC NOVEMBER 20, 2019

Project took two weeks to build by Hallack Contracting

14’ WAVES FROM WEST ON PENTWATER LAKE

WASHED OUT 21AA LIMESTONE FROM SHOULDERS



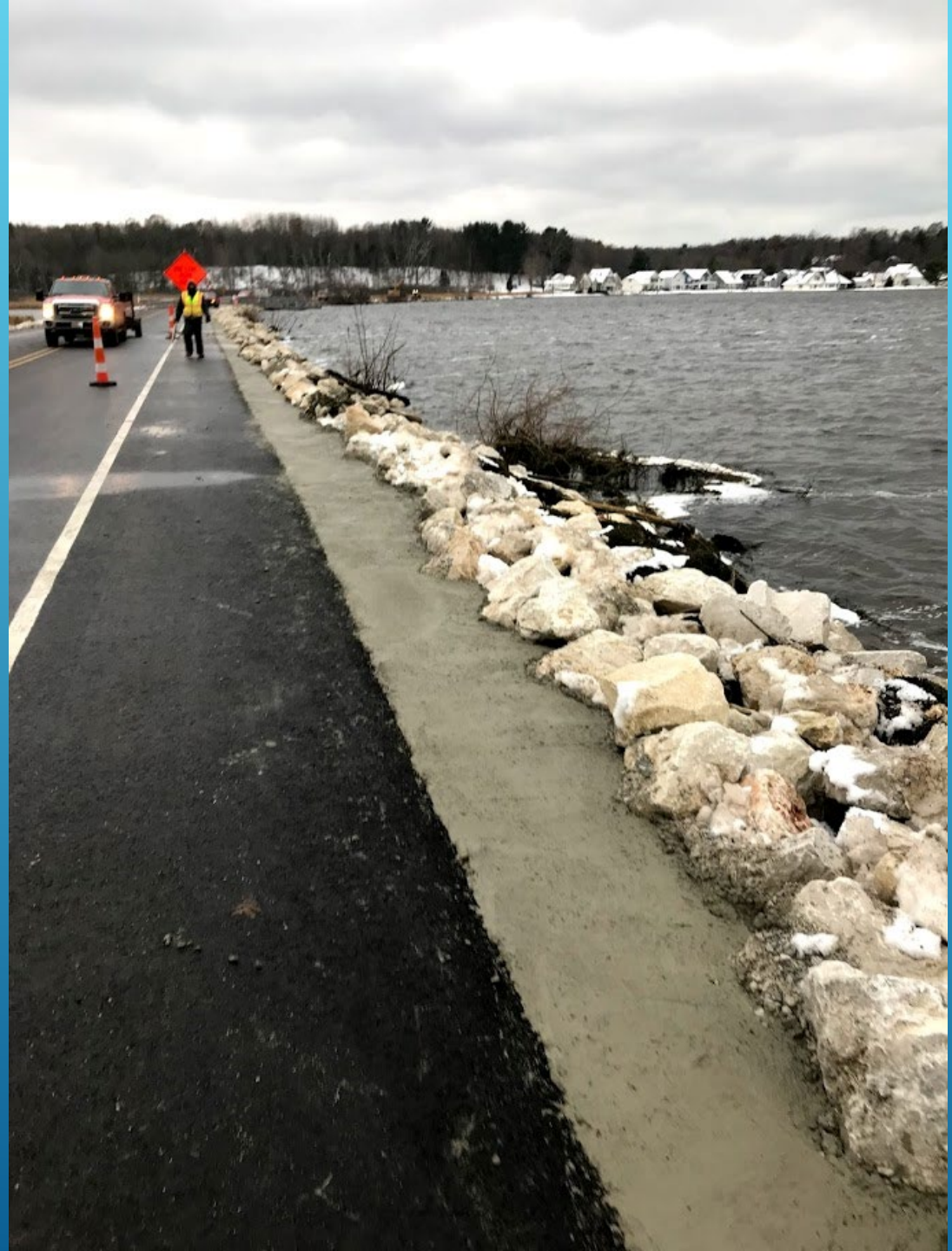
AFTERMATH OF STORM

ORIGNIALLY WE PLACED 21AA LIMESTONE ON SHOULDERS BUT WAVE ACTION WASHED IT OUT

We then used vac truck to remove remaining limestone

SPEED
LIMIT
35

WE THEN POURED CONCRETE BETWEEN ASPHALT SHOULDER AND RIP RAP



FINISHED ROAD WITH CONCRETE APRON

Road surface is now over 1 foot above high water mark

CARRYING THE BANNER WITH A CITIZEN

GRAND OPENING SPEECH

Ribbon Cutting Ceremony

RESIDENTS AND ROAD COMMISSION CELEBRATE IN VICTORY!

SCOTT CIVIL ENGINEERING-DESIGN & PERMITS

FLEIS & VANDENBRINK-CONSTRUCTION ENG

HALLACK CONTRACTING-CONCEPT/CONSTRUCTION

ASPHALT PAVING

MICHIGAN PAVEMENT MARKING-STRIPING

Critical Dunes On South Side

SCENIC DR AT SOUTH END OF STONY LAKE

MAY 2020 EROSION DUE TO HIGH LAKE MICHIGAN WATER LEVEL

EROSION MODERATE AT FIRST

STORM FROM EAST CAUSED EROSION THAT THREATENED TO WASH OUT ROAD

NUMEROUS ERODED LOCATIONS

EROSION PAST GUARDRAIL

CHANNEL BETWEEN STONY LAKE AND LAKE MICHIGAN

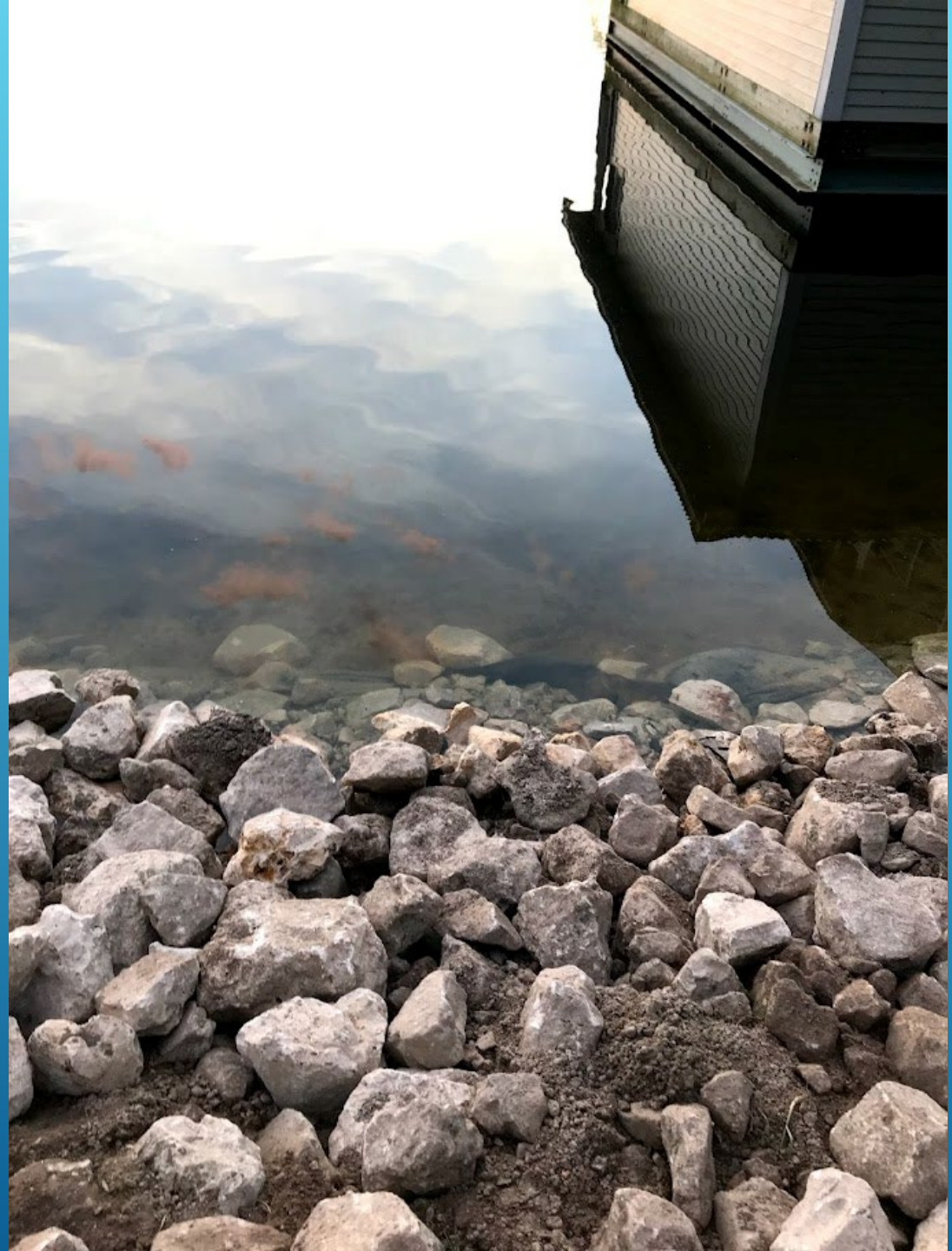
OCRC INSTALLED GEO TECH FABRIC AND 21AA LIMESTONE AS TEMPORARY MEASURE

HALLACK CONTRACTING INSTALLED GEO TECH FABRIC & RIP RAP

MINIMAL BRUSH REMOVAL

RIP RAP PLACED WITH EXCAVATOR

CAT

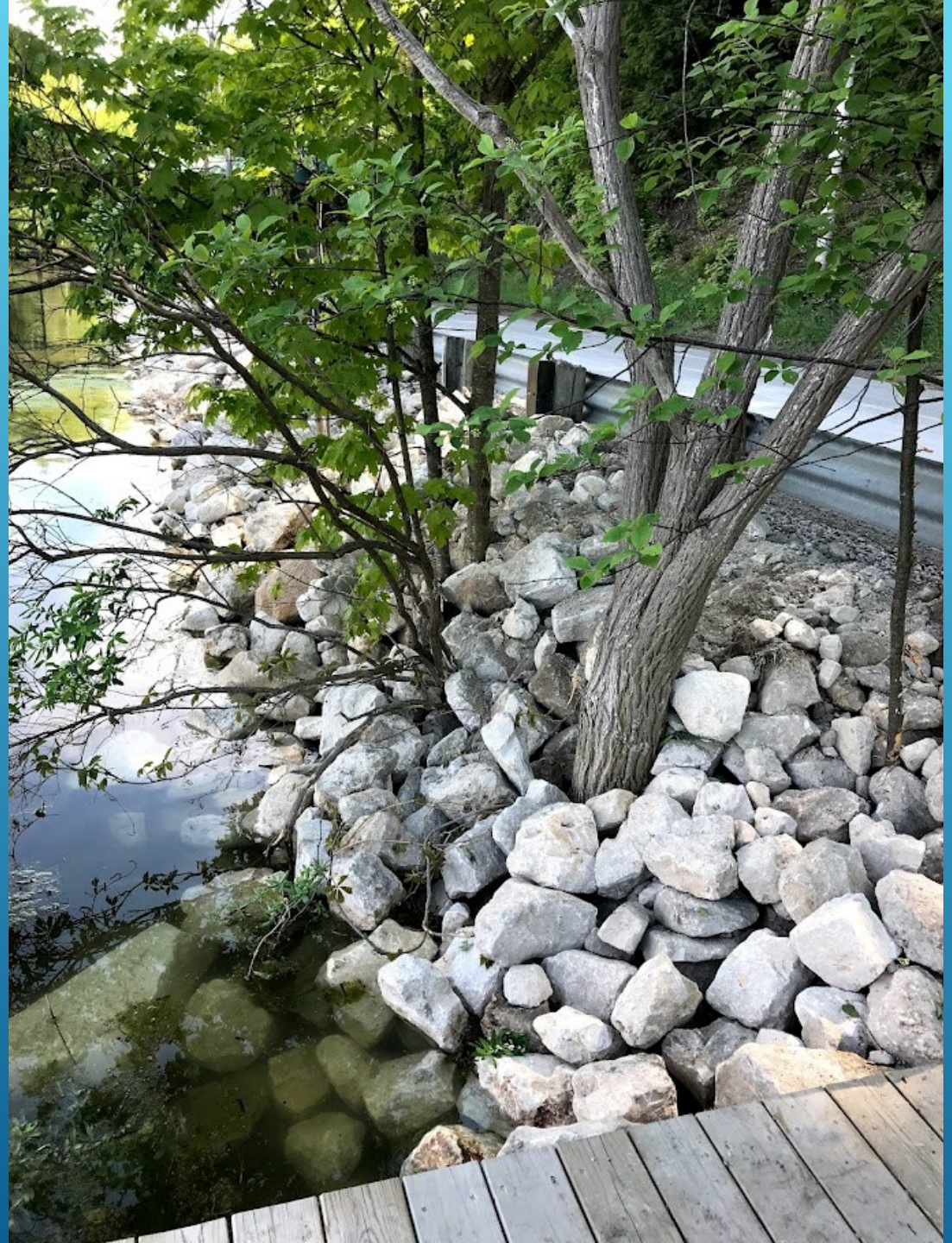


GUARDRAIL LEFT IN PLACE

CAT

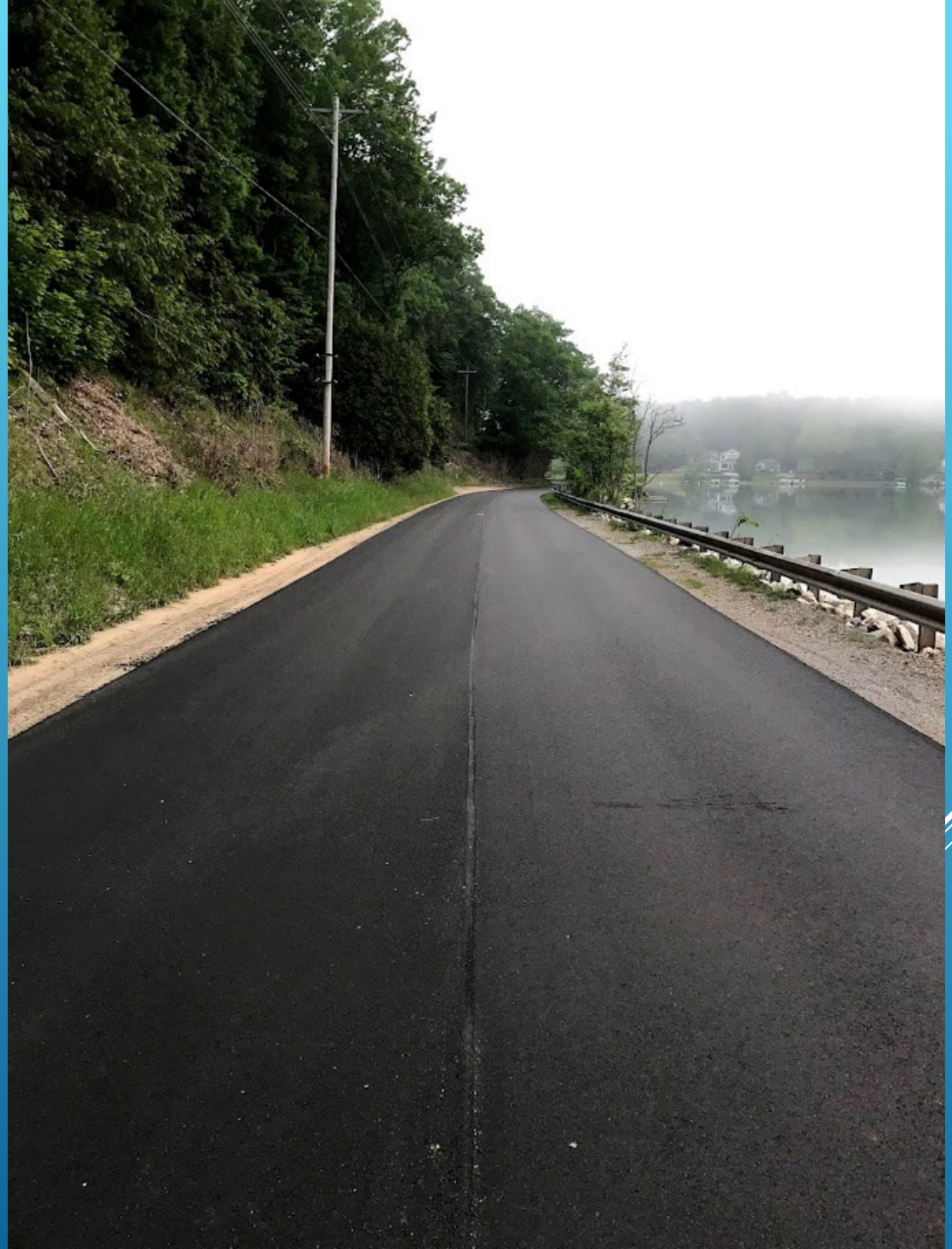
DEER WERE INSPECTING JOB SITE…

GREAT EROSION CONTROL AND NICE AESTHETICS



SEAWALL HAD BEEN PREVIOUSLY INSTALLED BY CAMP

PAVED THE FOLLOWING YEAR JUNE 2020

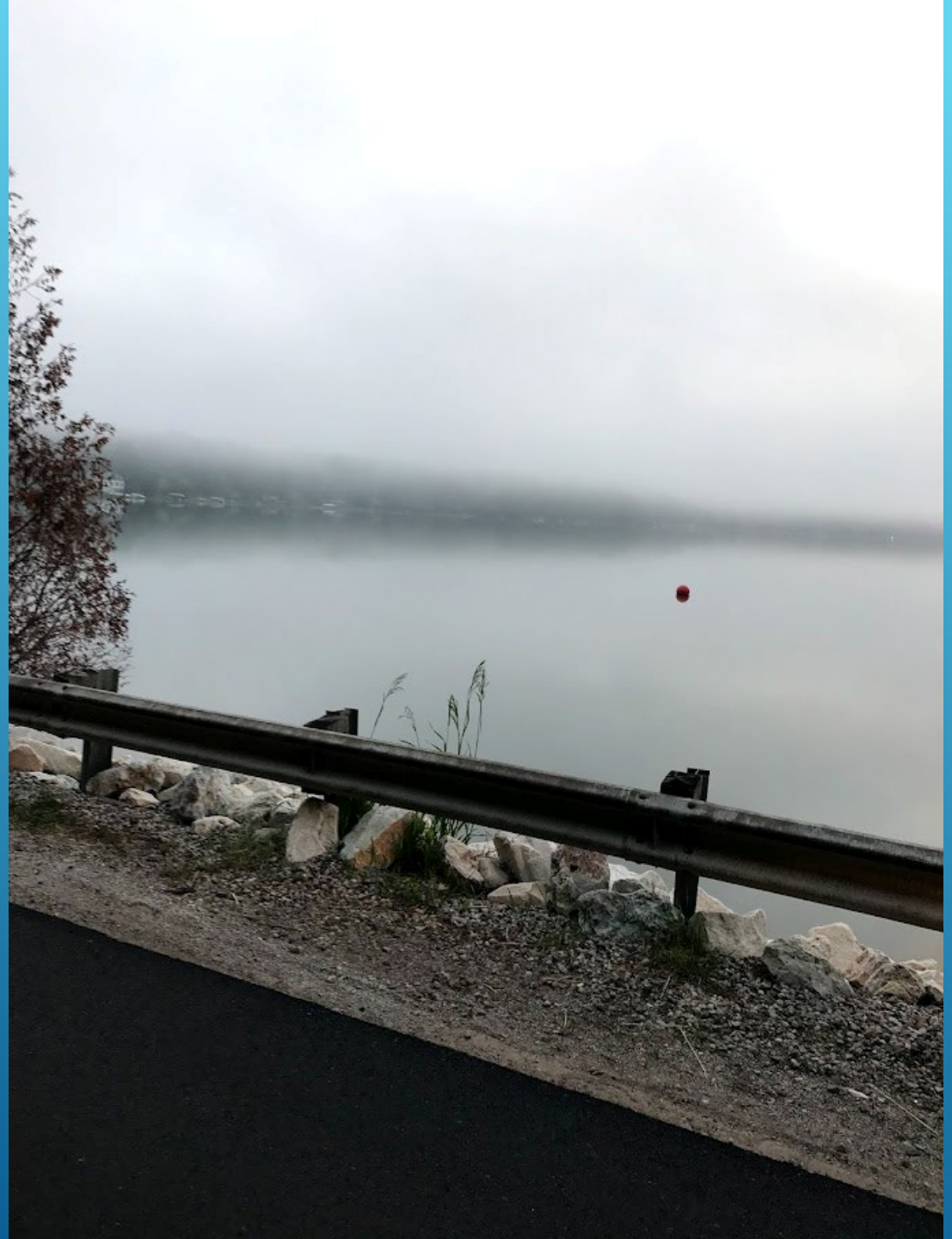


OVERLAY OVER EXISTING PAVING

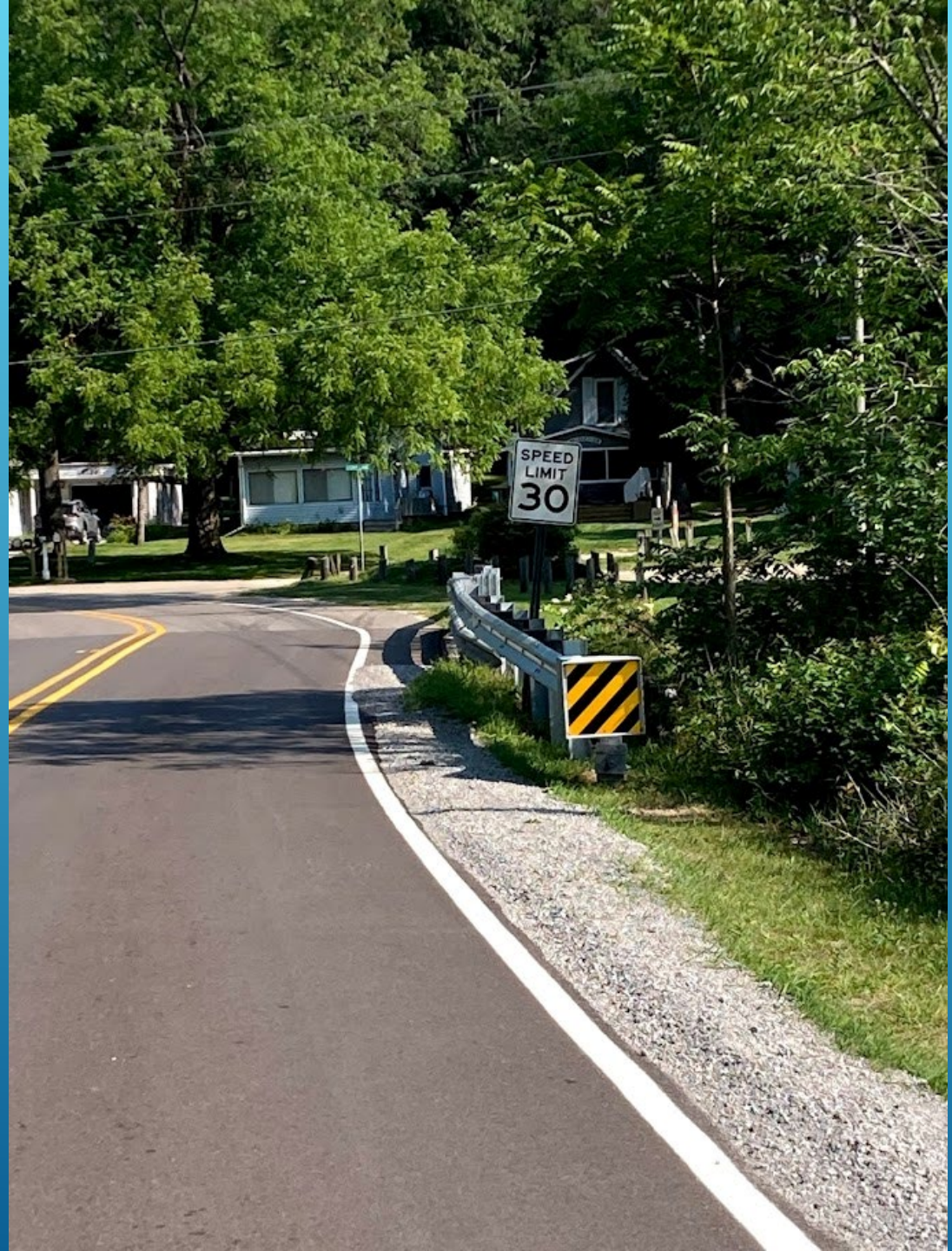
SCRATCH COURSE
~90#/YARD

TOP COURSE
~165#/YARD
13A

STONY LAKE



PAVEMENT WAS MILLED FROM BRIDGE DECK PRIOR TO RESURFACING


SPEED
LIMIT
30

GUARDRAIL UPGRADE AFTER PAVING WAS COMPLETE

NORTH END OF PAVING

CHANNEL FEEDS LAKE MICHIGAN

Hallack Contracting

Asphalt Paving

OCEANA COUNTY ROAD COMMISSION

Mark Timmer

Managing Director

3501 W. Polk Road
P.O. Box 112
Hart, MI 49420
Phone: 231-873-4226
M-20 Phone: 231-861-8222
Fax: 231-873-7123
Shop: 231-873-3717
e-mail: mtimmer@oceanacrc.org

www.oceanacrc.org

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