

GREAT LAKES DREDGING TEAM MEETING

Updating the International Great Lakes
Datum and Low Water Datum

June 3, 2020

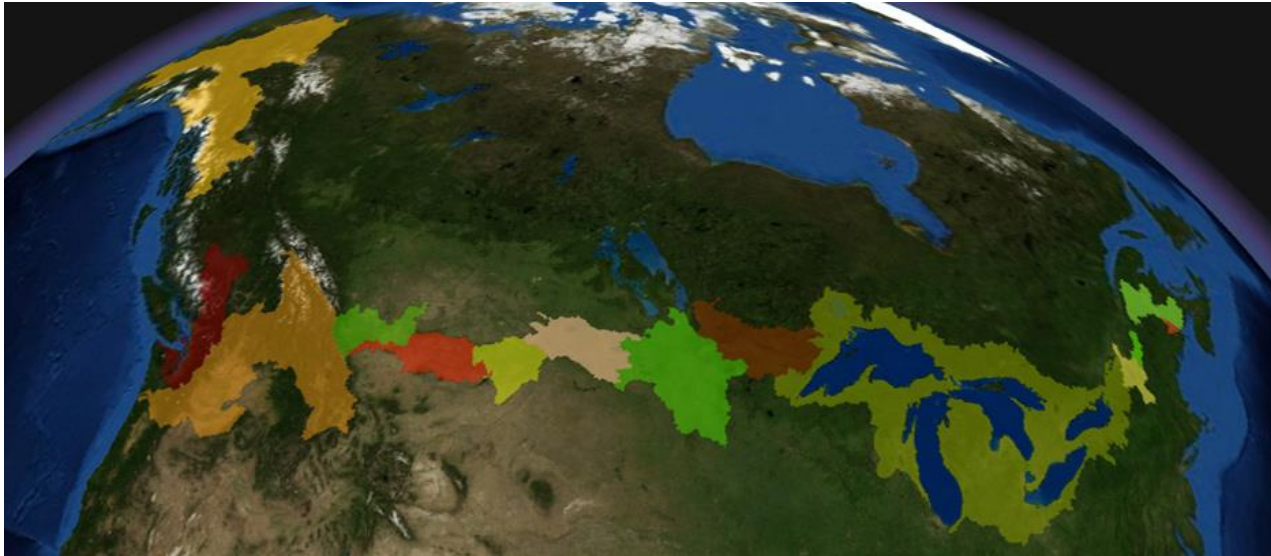


US Army Corps
of Engineers®



DATUMS 101

- What is a vertical datum?
- What is unique about the Great Lakes?
- Why do we need a common datum?



Bi-national water management



Navigation



Hydropower



WHY IS IGLD BEING UPDATED?

- All Great Lakes water levels are referenced to a common vertical datum, IGLD 85
- International Great Lakes Datum (IGLD) of 1955 (IGLD55) was the first common vertical datum on the Great Lakes
- Due to continual rebound of the earth's crust, datum must be updated every 25-30yrs
 - Rates as high as 2inches/10yrs
 - Some areas have rebounded roughly 6" since last datum update
- Now preparing for next update, IGLD2020

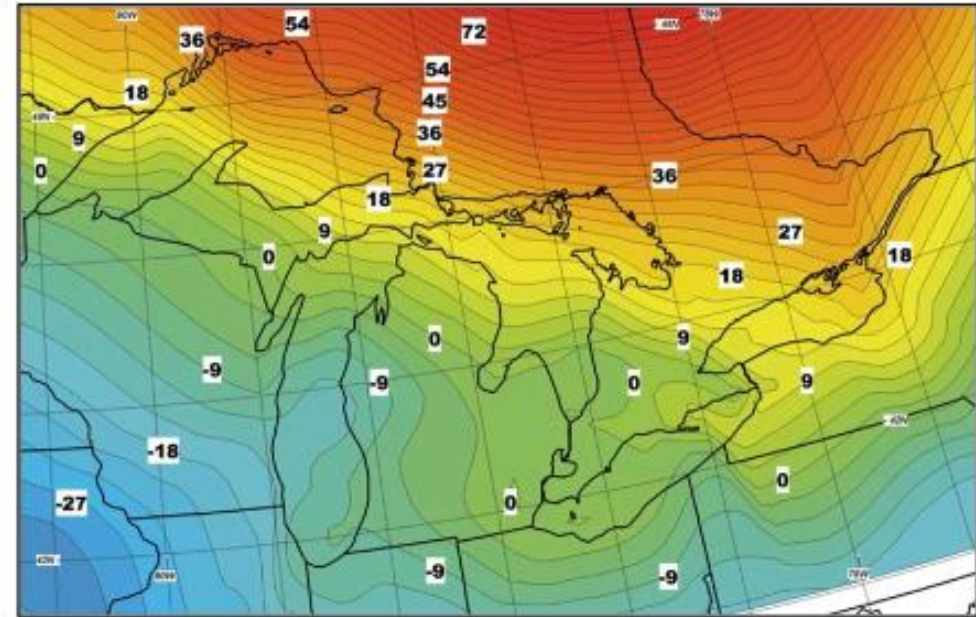


Figure 5. Contour map of crustal movement in cm/century derived from water level gauges. Contour interval: 3 cm/century (0.3 mm/year).



DIFFERENCES WITH IGLD2020

- Based on new joint US and Canadian North American Datum
- New datum 13” higher than previous IGLDs
- No more traditional leveling
- Likely in place by 2025
- Recalculation of Low Water Datum

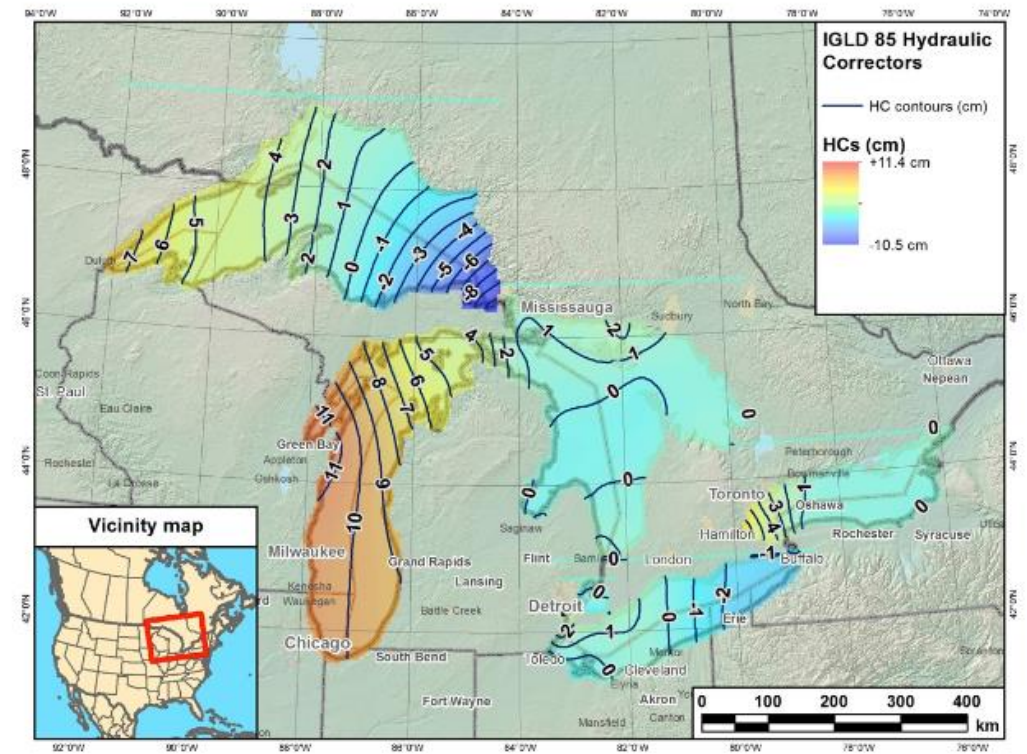
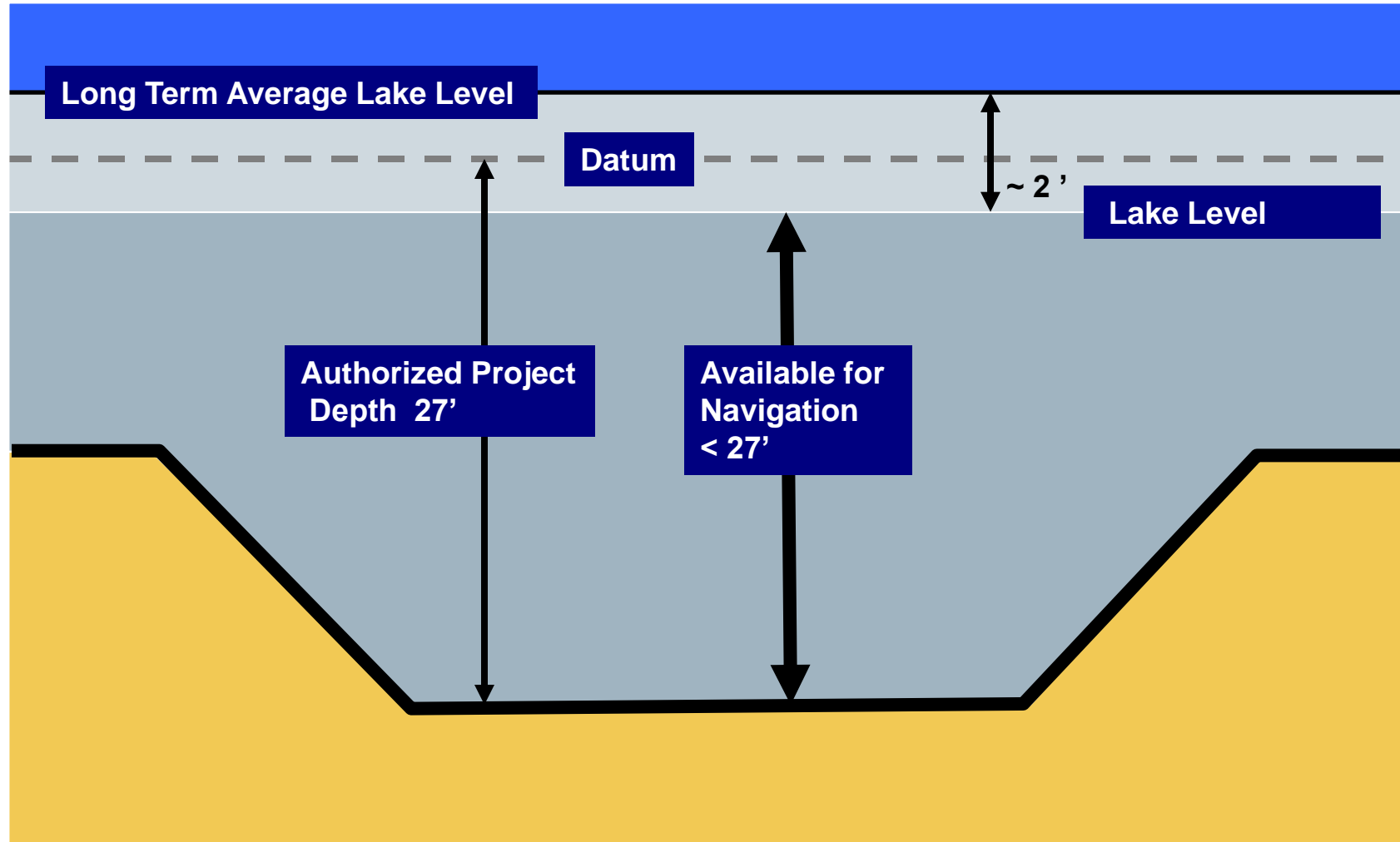


Figure 4. IGLD (1985) hydraulic corrector model developed and implemented in the VDatum transformation tool.



LOW WATER DATUM ILLUSTRATION

Channel depths are designated by Congressional Authorization, through Rivers and Harbors Acts. The Acts specify the depth of the channel relative to the established datum.

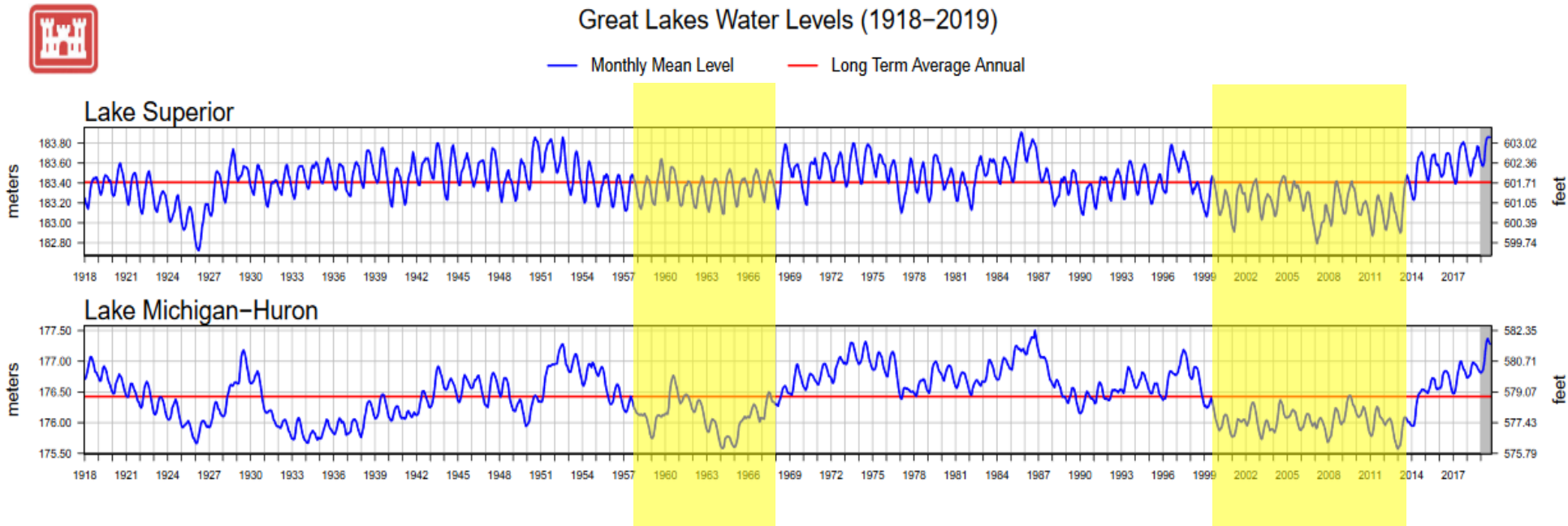




UPDATING LOW WATER DATUM

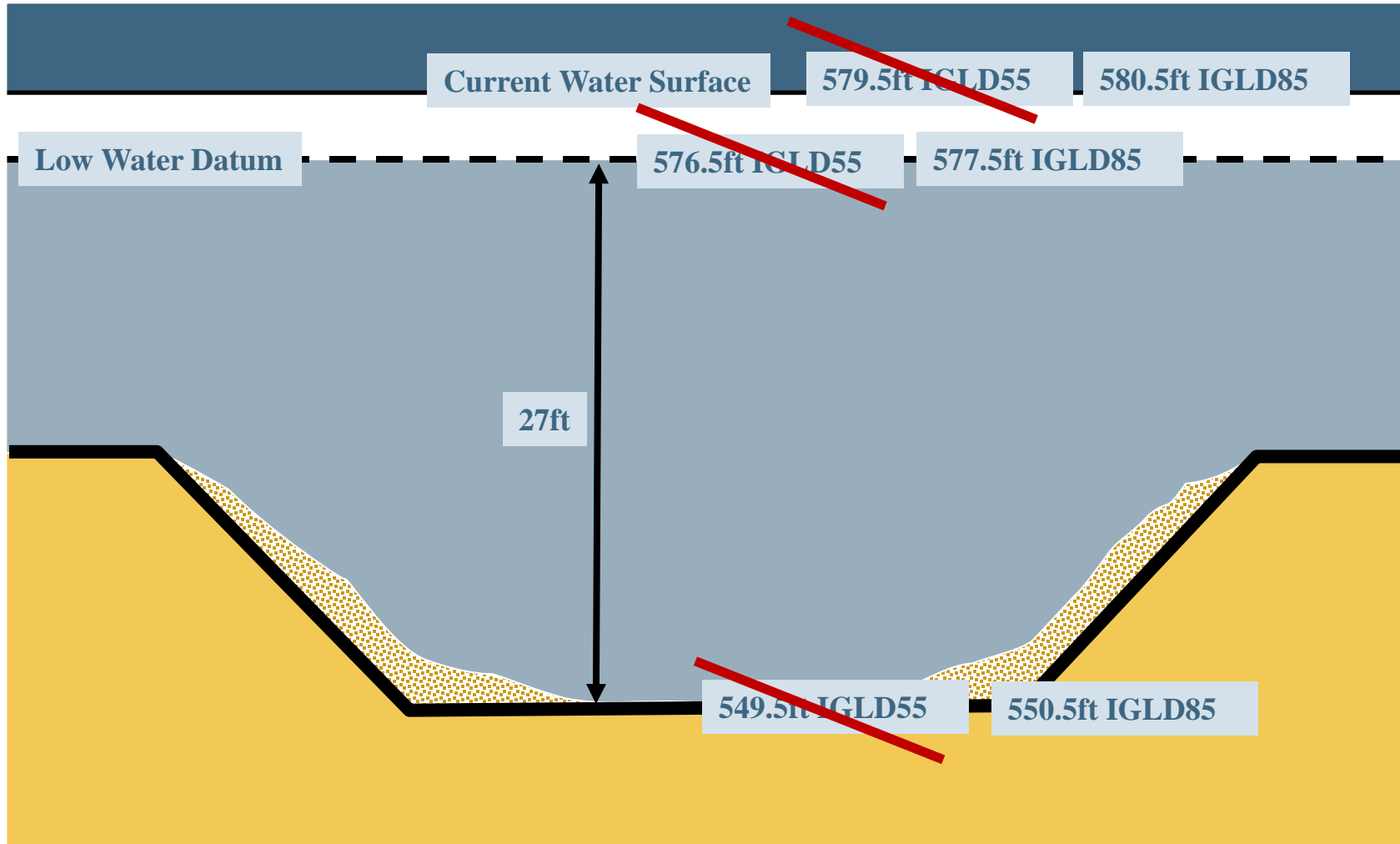


- Previous updates have just been a conversion, no updated methodology
 - Essentially the LWD didn't change in relationship to the water level gages
 - Just given a new elevation
- Current LWD based on levels prior to 1930
- LWD intended to be a level so low that water levels “seldom” fall below



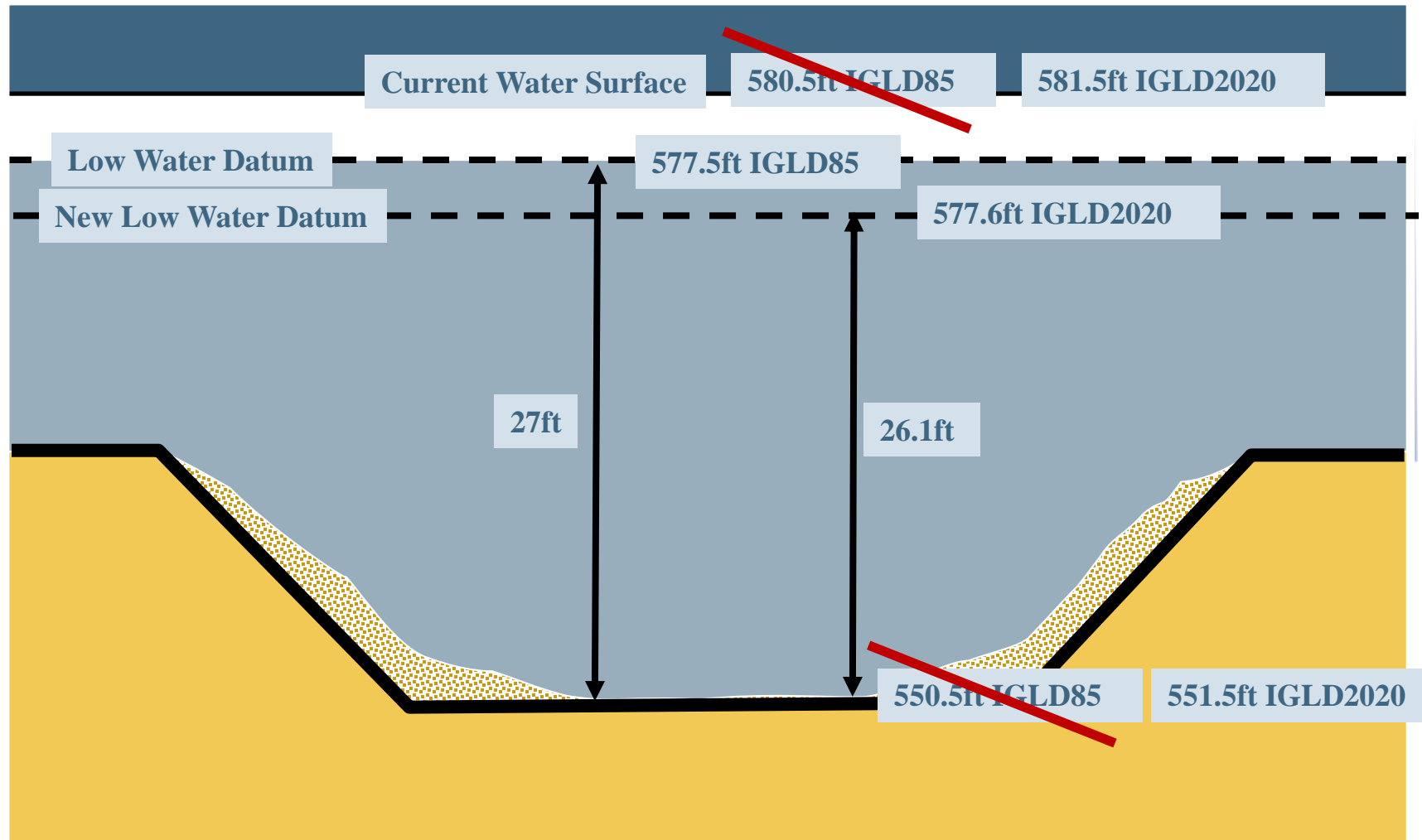


EXAMPLE – TRANSITION FROM IGLD55 TO IGLD85





EXAMPLE – TRANSITION FROM IGLD85 TO IGLD2020





POTENTIAL MAGNITUDE OF LWD CHANGE

Change from old LWD to new LWD

	Change - 90%		Change - 95%		Change - 99%	
	Recorded	Simulated	Recorded	Simulated	Recorded	Simulated
Superior	-2.4	-4.0	-5.1	-7.0	-11.8	-11.0
M-H	-3.5	-7.0	-8.3	-11.0	-13.8	-19.0
Erie	7.1	11.0	2.0	7.0	-6.3	-1.0
Ontario	5.5	TBD	0.4	TBD	-12.6	TBD
					(values in inches)	

- Preliminary results
- Likely lowering on upper lakes, raising on lower lakes
- Could require additional channel maintenance



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PATH FORWARD

- 2021 – Propose numbers, solicit feedback
- 2022 – Finalize values, allow time for agency budget development
- 2025 – Implement change.



 **Coordinating Committee on Great Lakes
Basic Hydraulic & Hydrologic Data** 

**Updating the
International Great Lakes Datum (IGLD)**
Executive Summary



Map: See also: CIGLCC, NOAA NGS, and other contributors

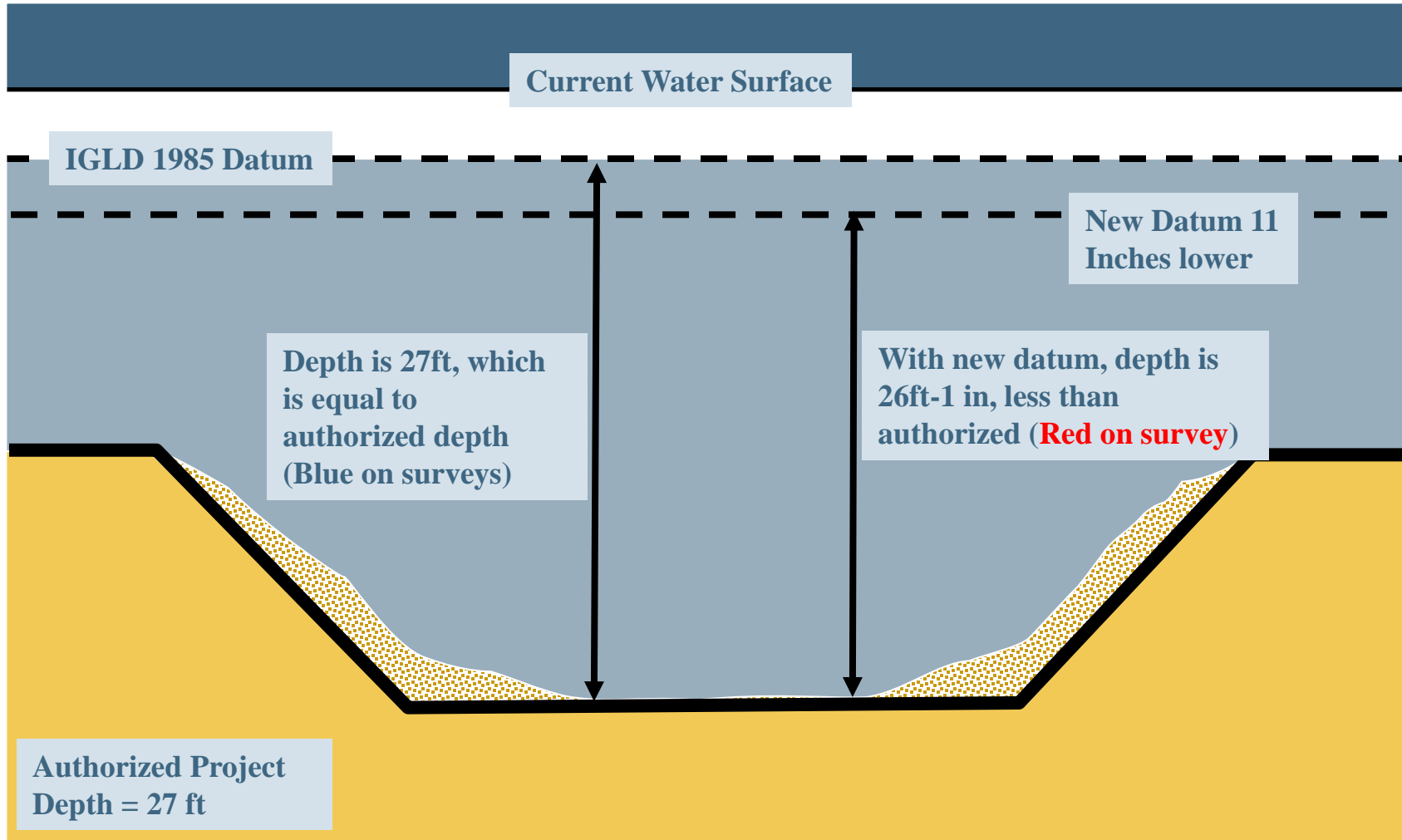


IMPACT ON OPERATIONS





IMPLICATIONS OF CHANGE TO LOW WATER DATUM





IMPLICATIONS OF CHANGE TO LOW WATER DATUM ON NAVIGATION SYSTEM

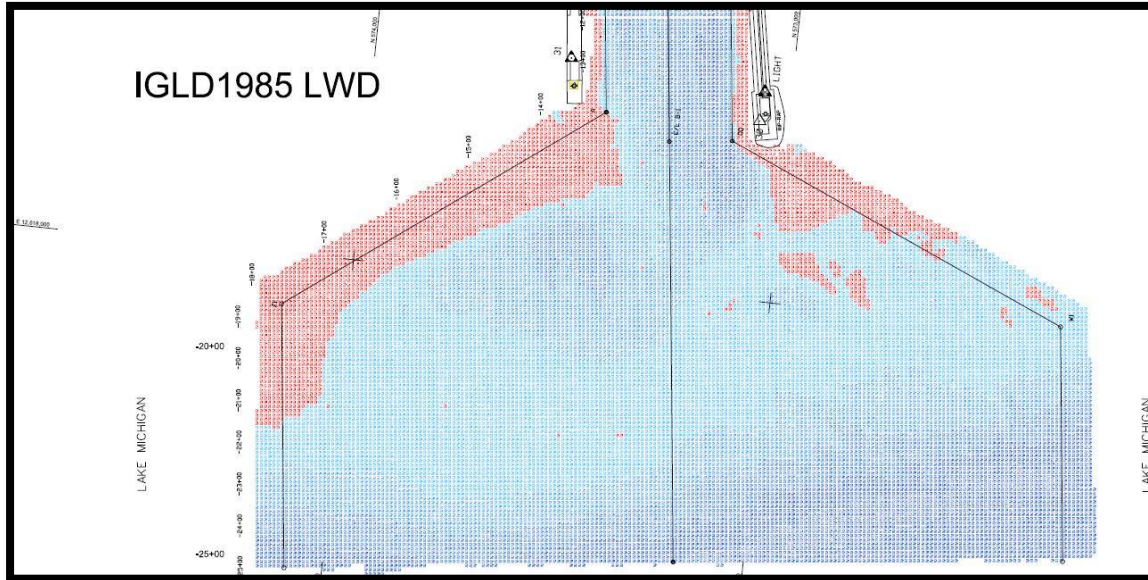


For harbors/channels where LWD will be lower:

- Increased dredging quantity for a one-time lowering of channel bottom to maintain authorized depth
- Potential increase in top elevation of navigation structures
- Potential need to increase top elevation of CDF dikes that are built in the water or adjacent to the lake
- Locks – lock chambers will have less available depth over the sill

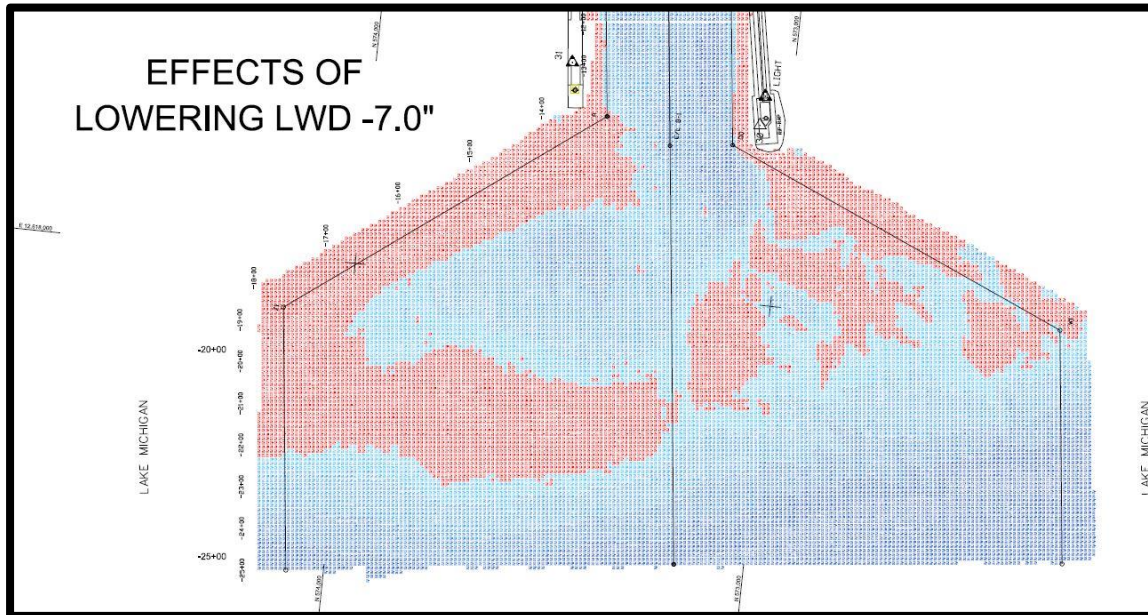


Grand Haven, MI - Outer Harbor



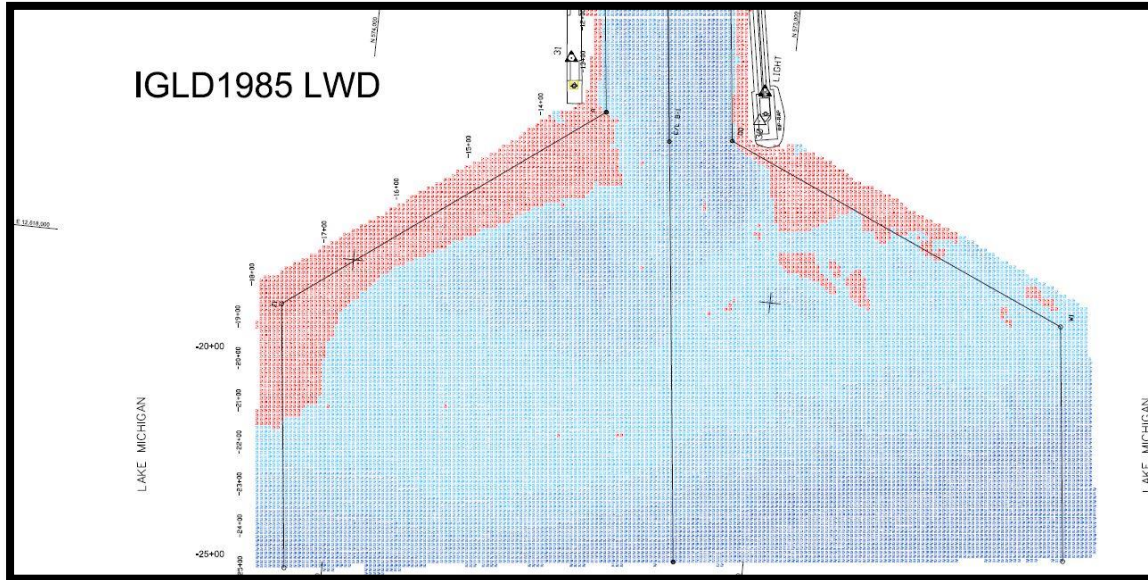
Current Outer Harbor Condition Survey

Red = soundings less than authorized project depth when referenced to LWD



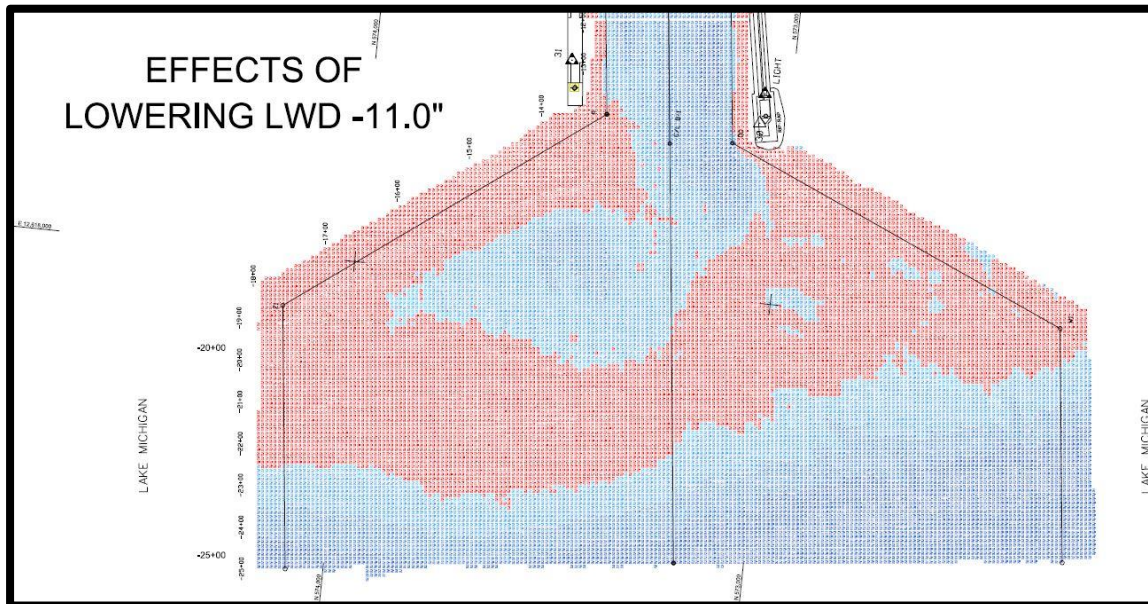


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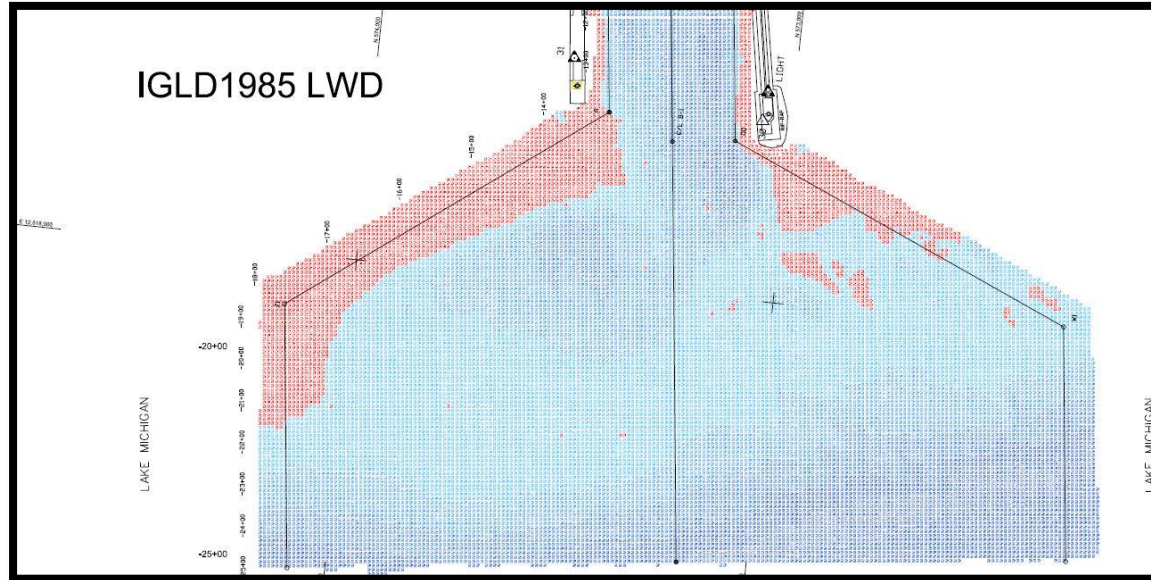
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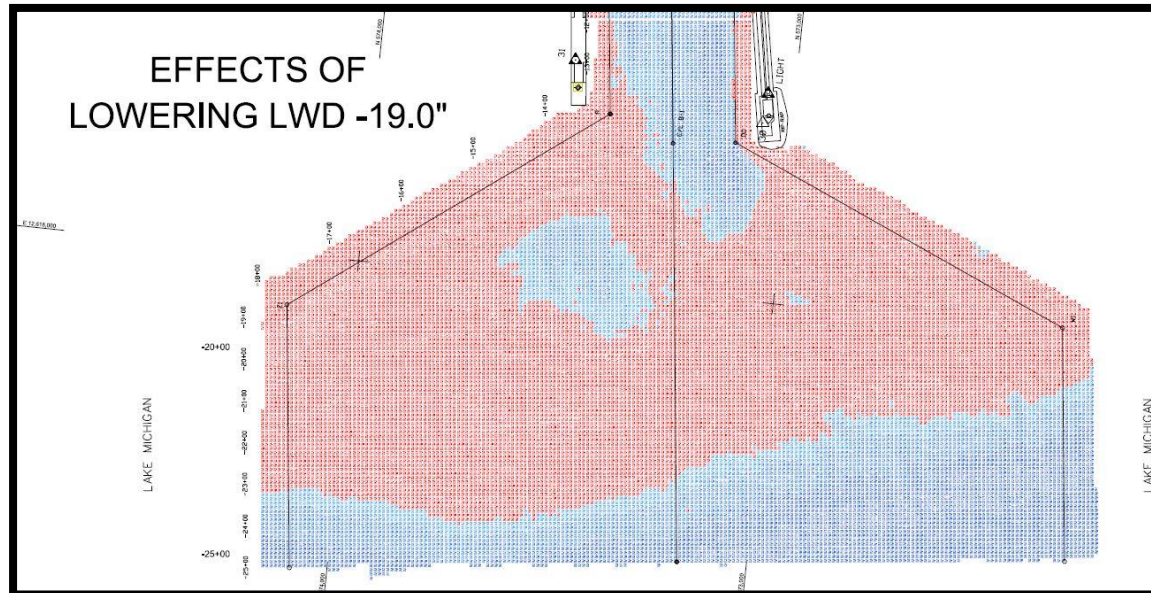


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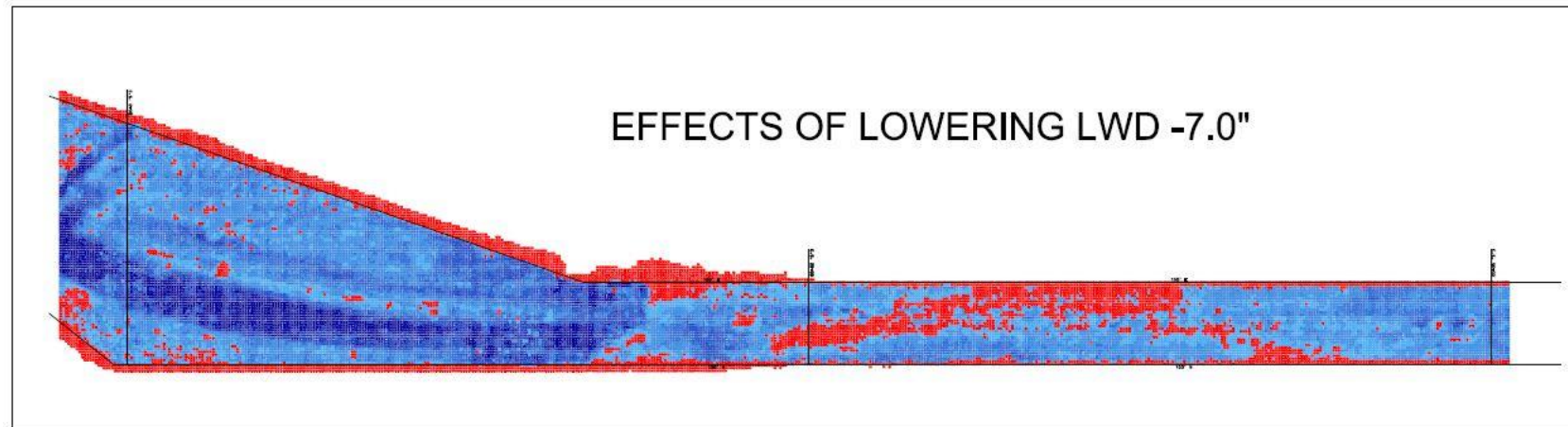
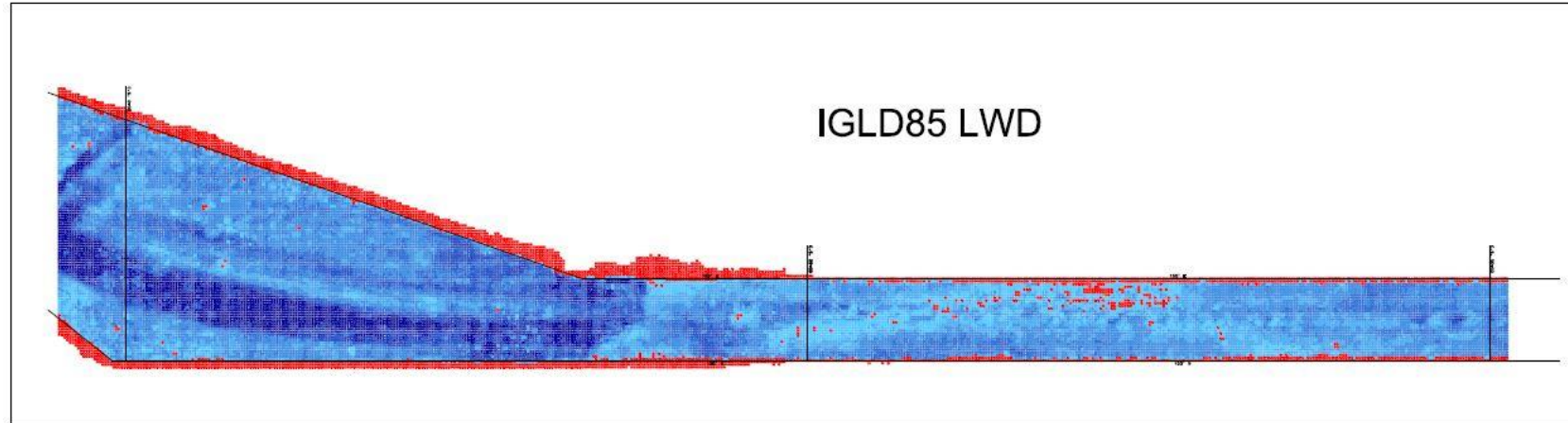
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St. Marys River, MI – Course 6 West Neebish Channel

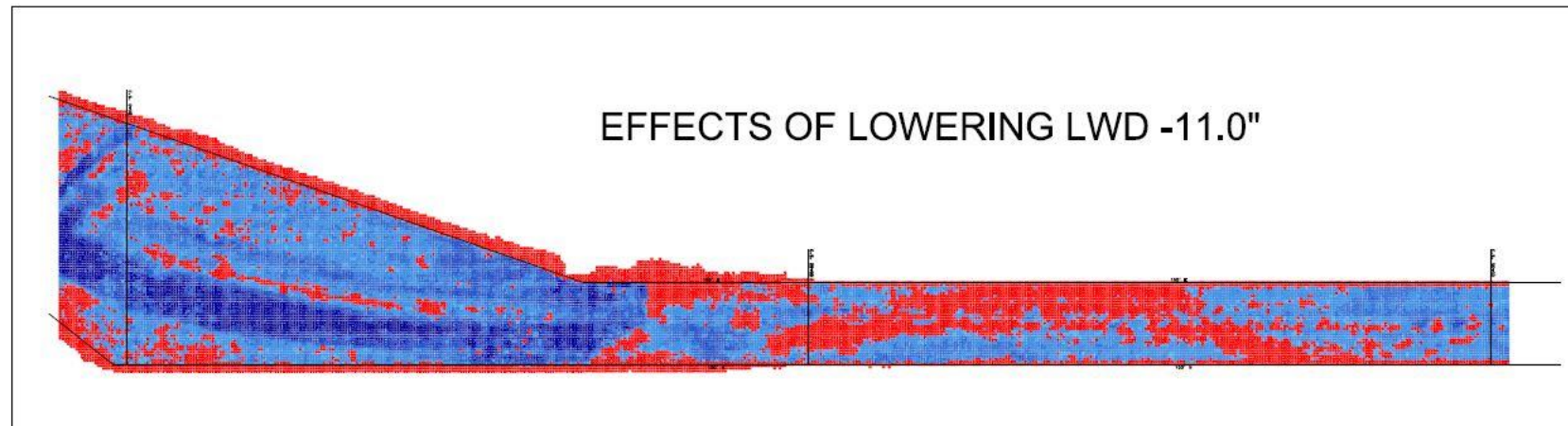
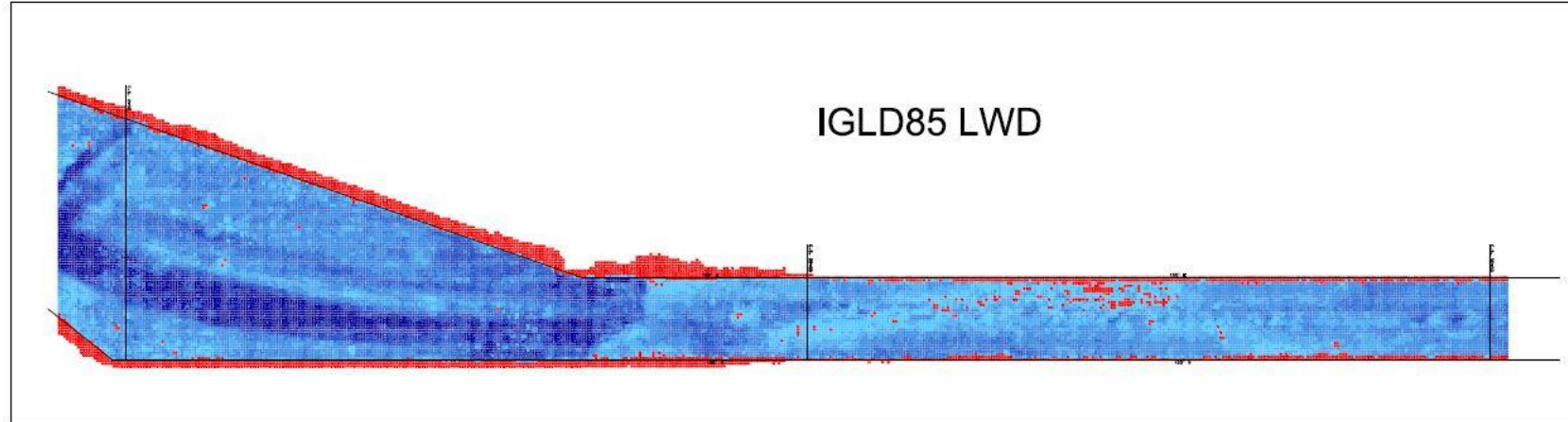


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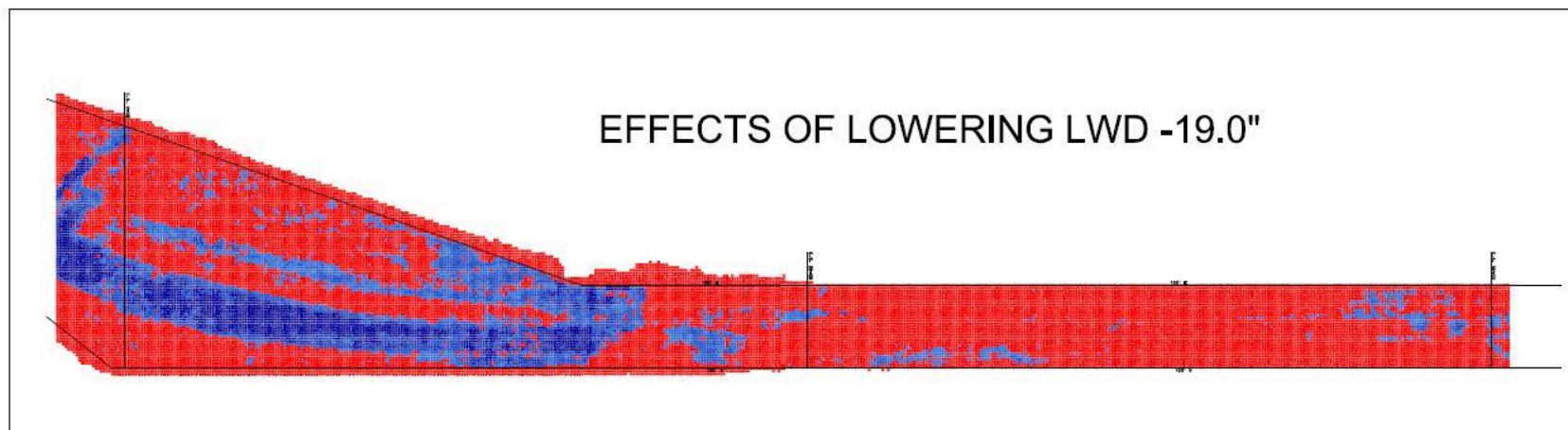
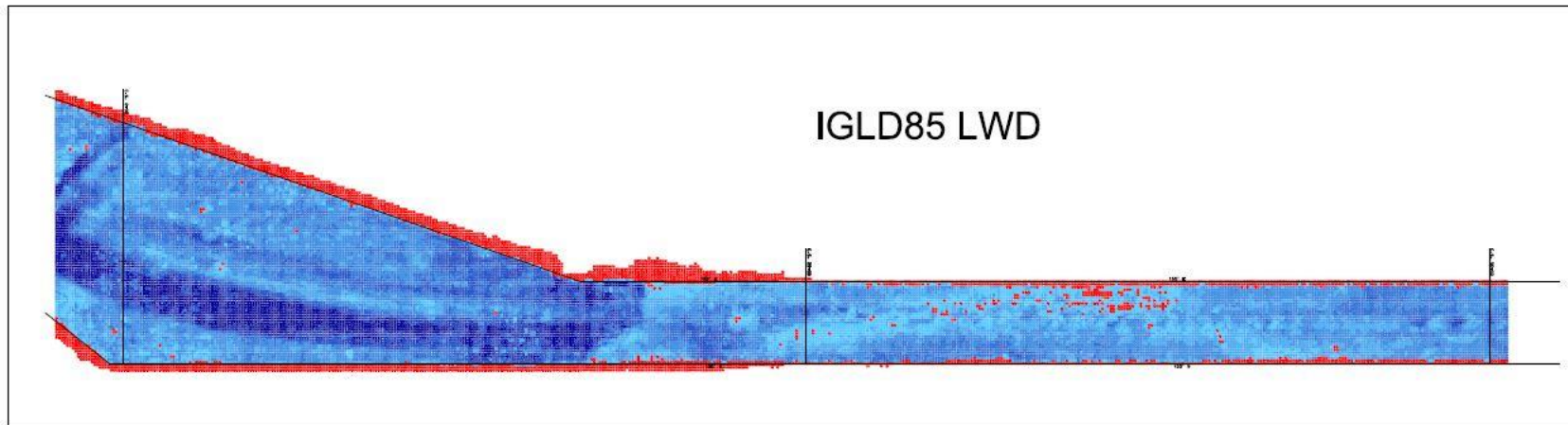


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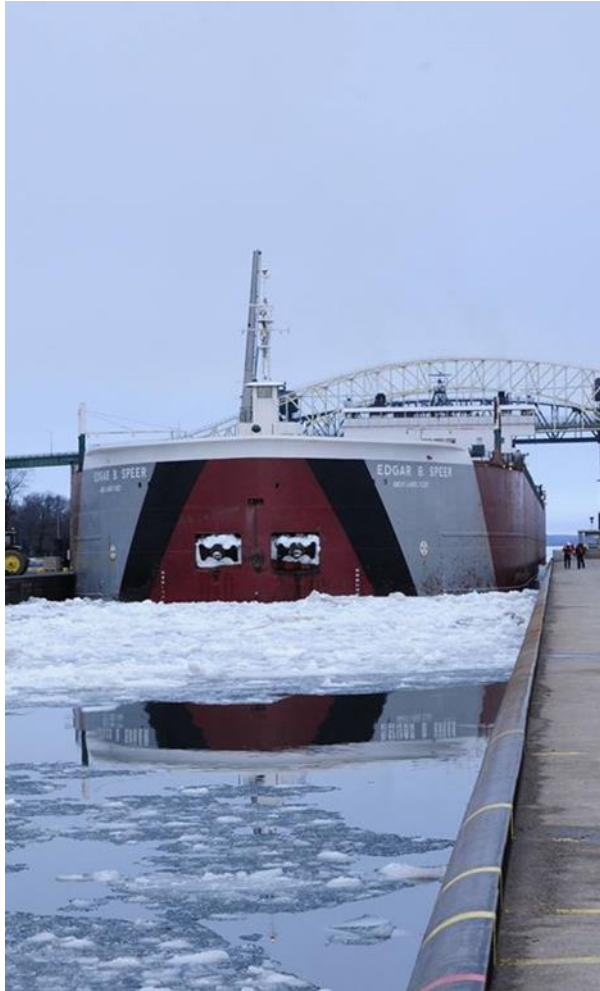


IMPACT OF CHANGE TO LOW WATER DATUM

Project	Decrease in LWD (Inches)	Rough Cost to Clear to Authorized Depth (\$M)
Grand Haven Harbor, MI (based on Lake Michigan datum change)	7	\$5.2
	11	\$7.8
	19	\$9.6
St. Marys River Above Locks (based on Lake Superior datum change)	4	\$10.6
	7	\$18.5
	11	\$29.5
St. Marys River Below Locks (Lakes Mich-Huron govern)	7	\$39.2
	11	\$62.5
	19	\$106.6



COMMENTS/FEEDBACK/QUESTIONS



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