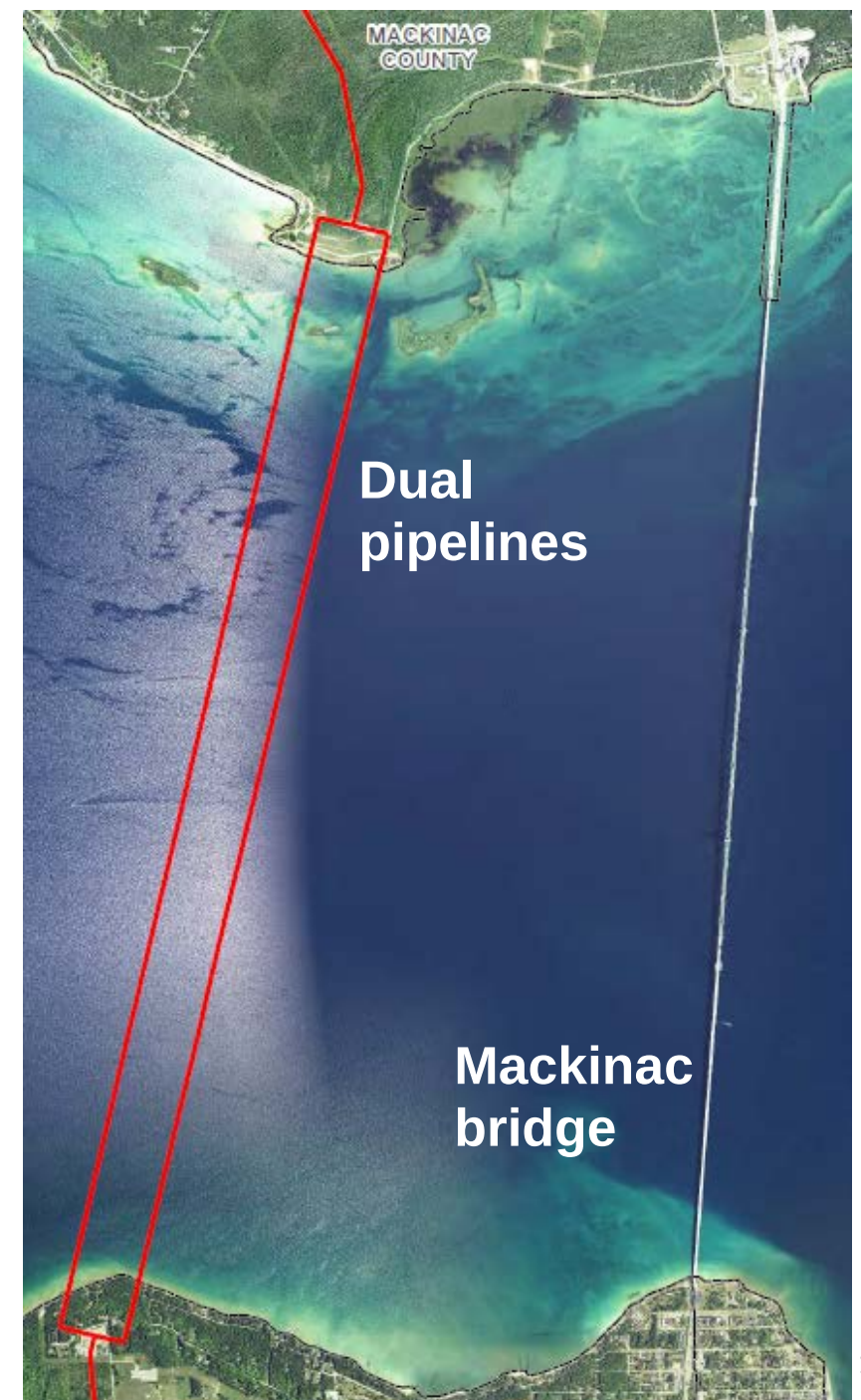


Tunnel Technical Feasibility

- Process
- Finding: Tunnel is Feasible
- Principle characteristics and anticipated conditions are within the realm of previously constructed tunnels

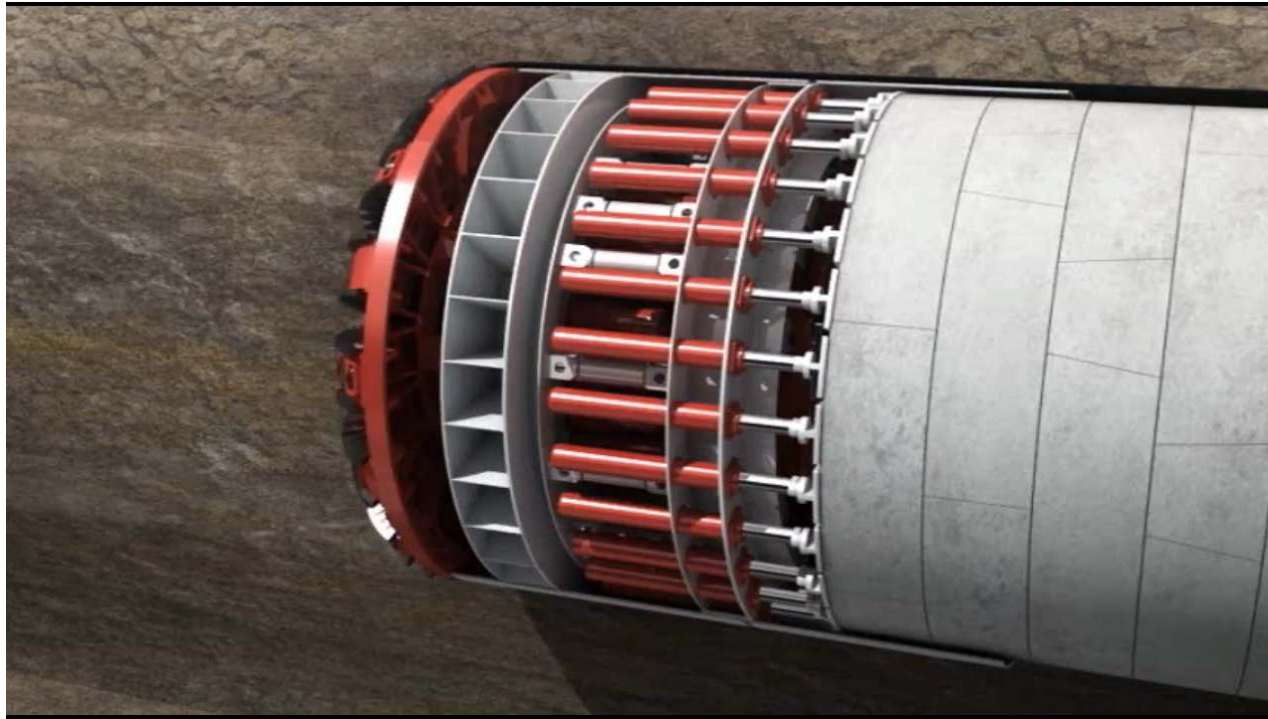


Tunnel Technical Feasibility

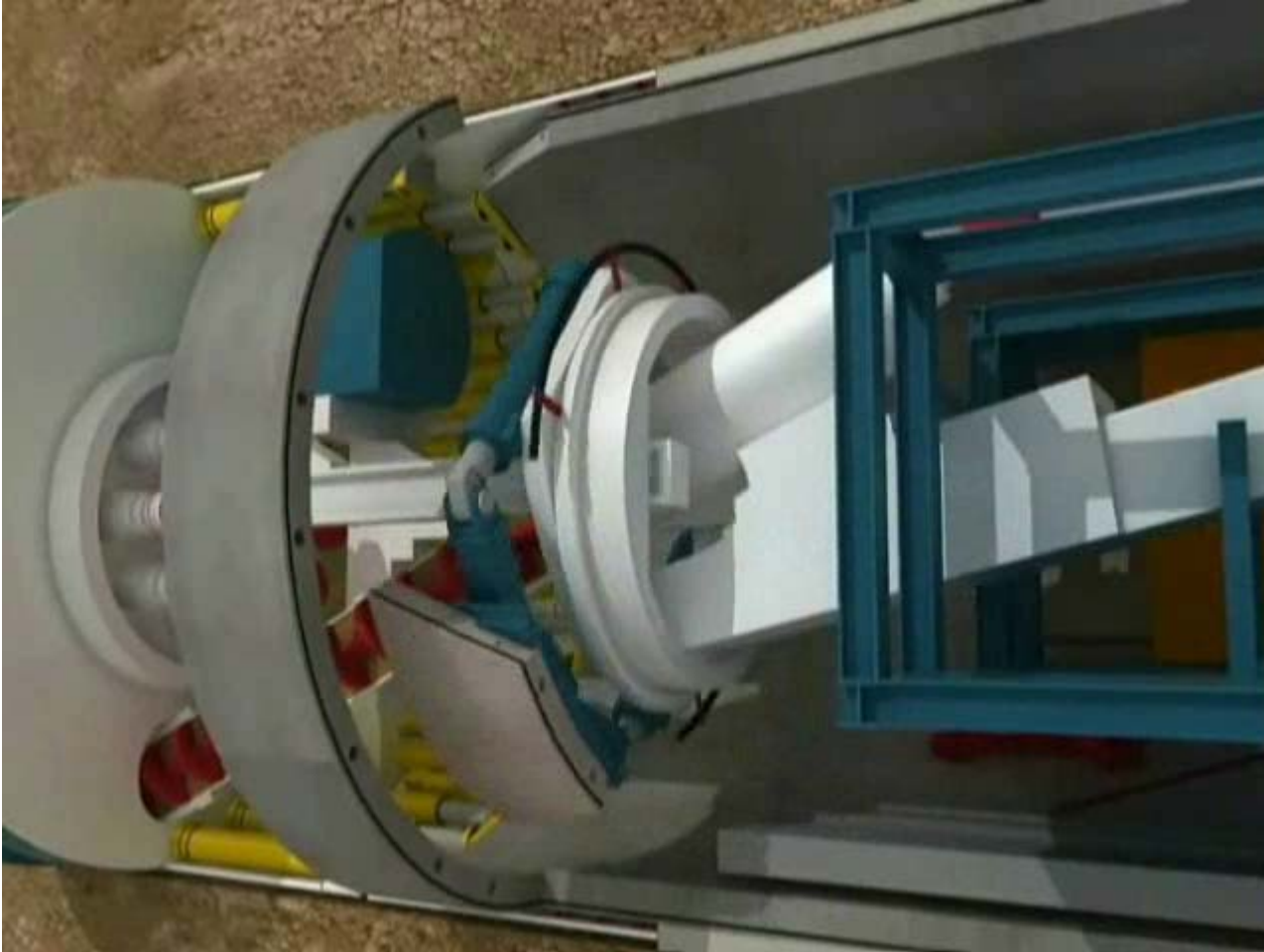
- Process
- Finding: Tunnel is Feasible
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Attribute	Straits Tunnel	State of Practice
Excavated Diameter	12 ft	20-25 ft common; largest is 58 ft
Length	4 miles	Many tunnels 10 miles and longer
Water pressure (depth)	10-11 bar	14 bar (18-20 bar anticipated in NY tunnel)
Geology	Limestone Dolomite Shale	Many tunnels in these and stronger rock types

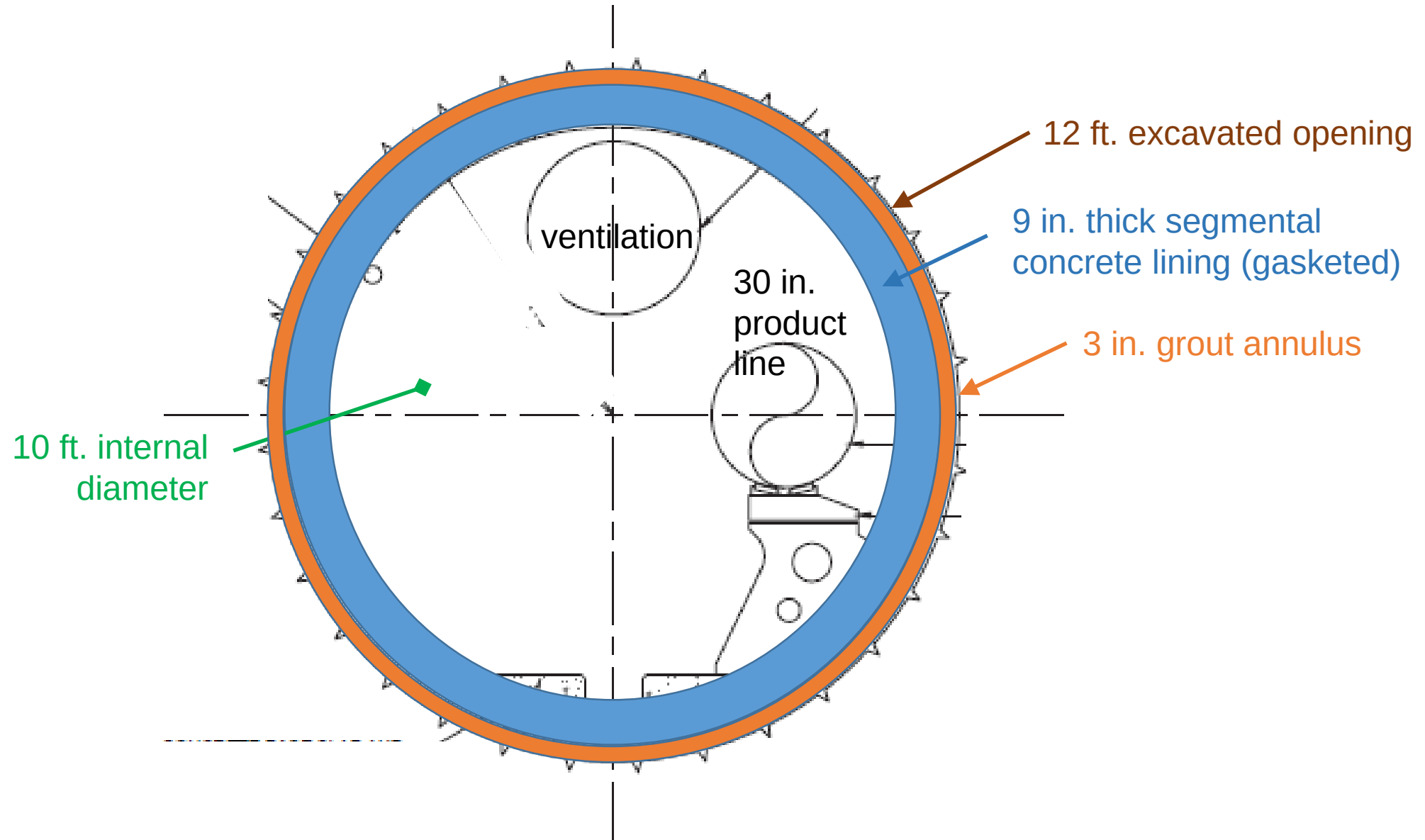
Tunnel Construction



Tunnel Grouting



Feasible Tunnel Cross-Section

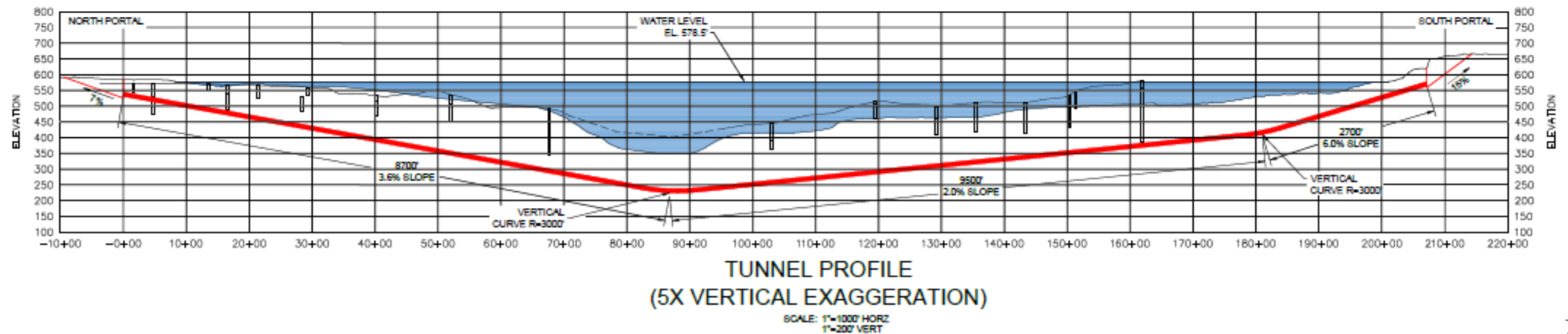
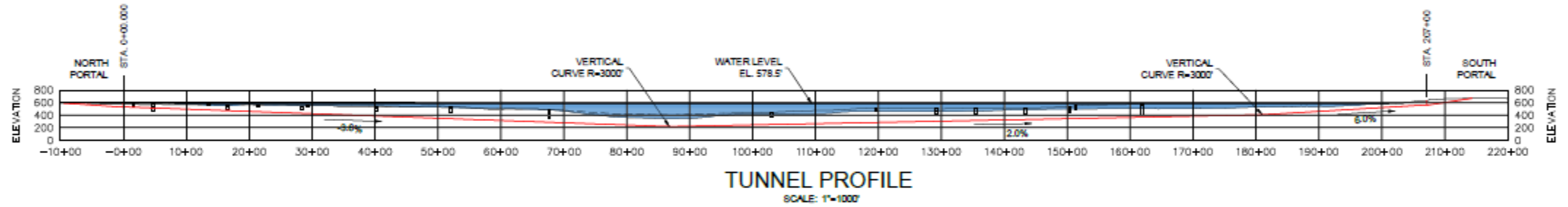
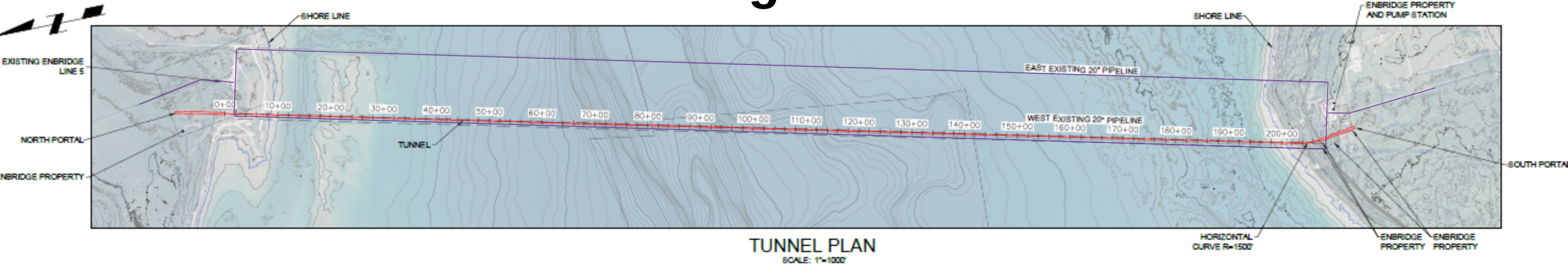


Tunnel Cross-Section

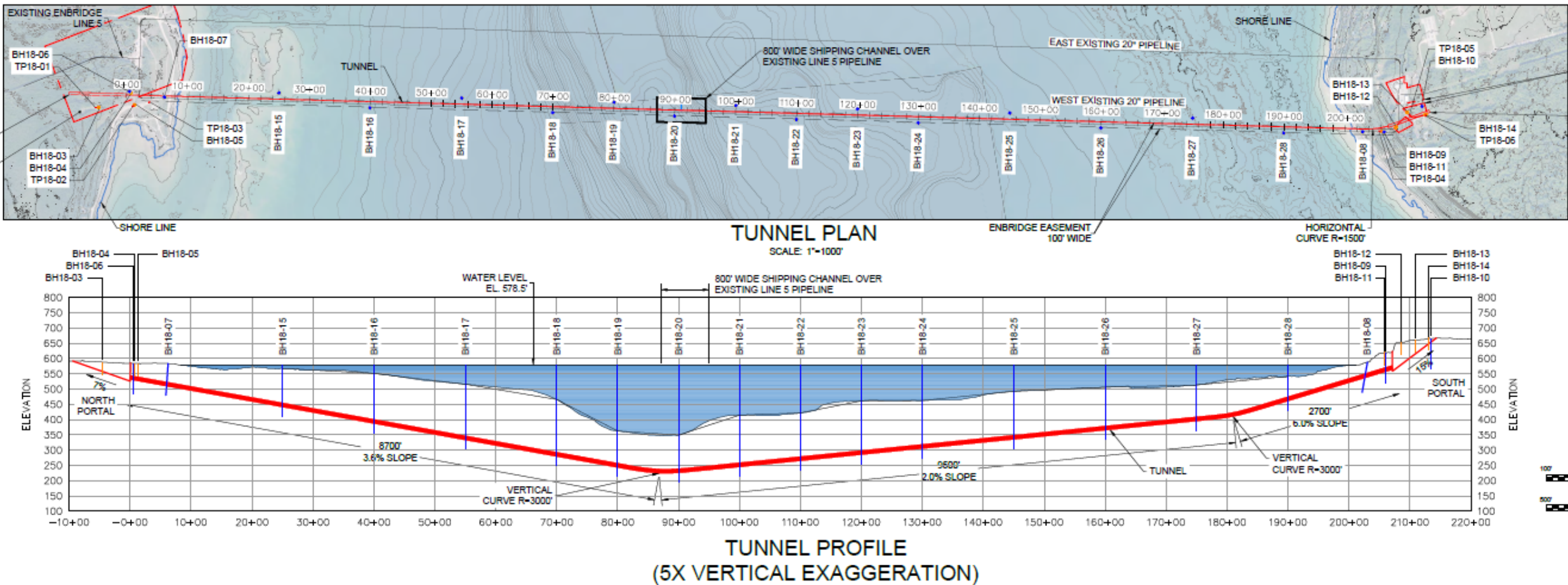


Gastau tunnel (17.5 ft internal diameter)

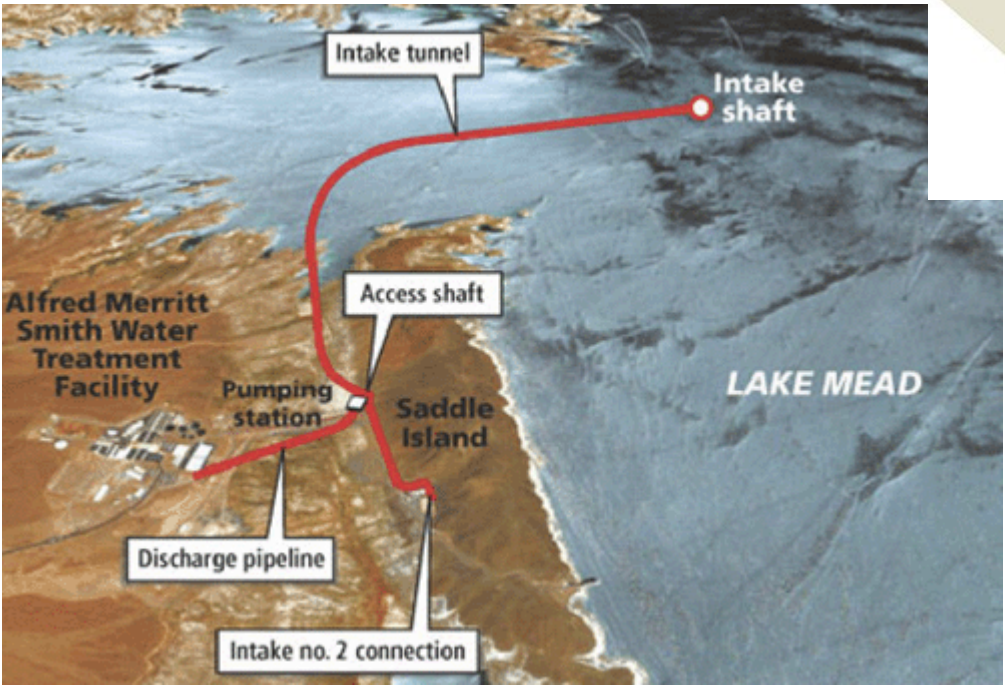
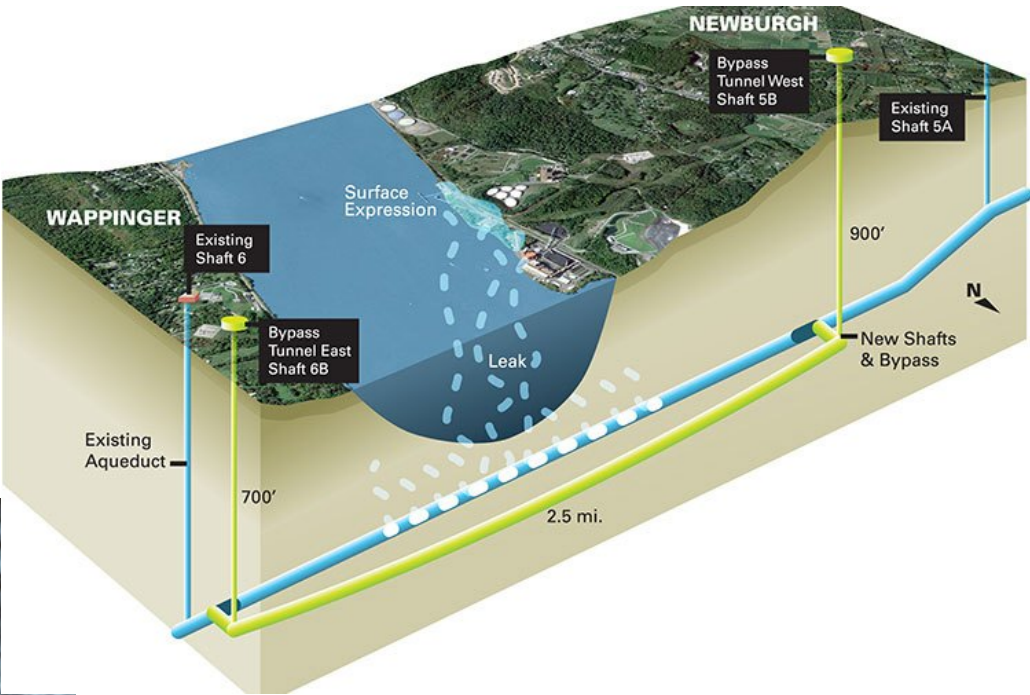
Tunnel Alignment



Geotechnical Site Investigation



Contemporary Comparison

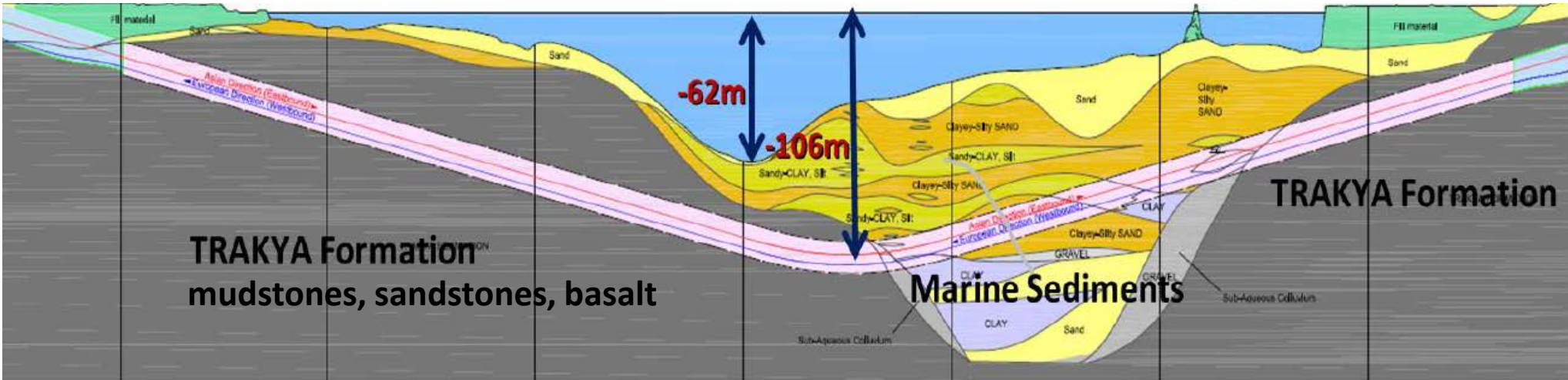


Eurasia Tunnel

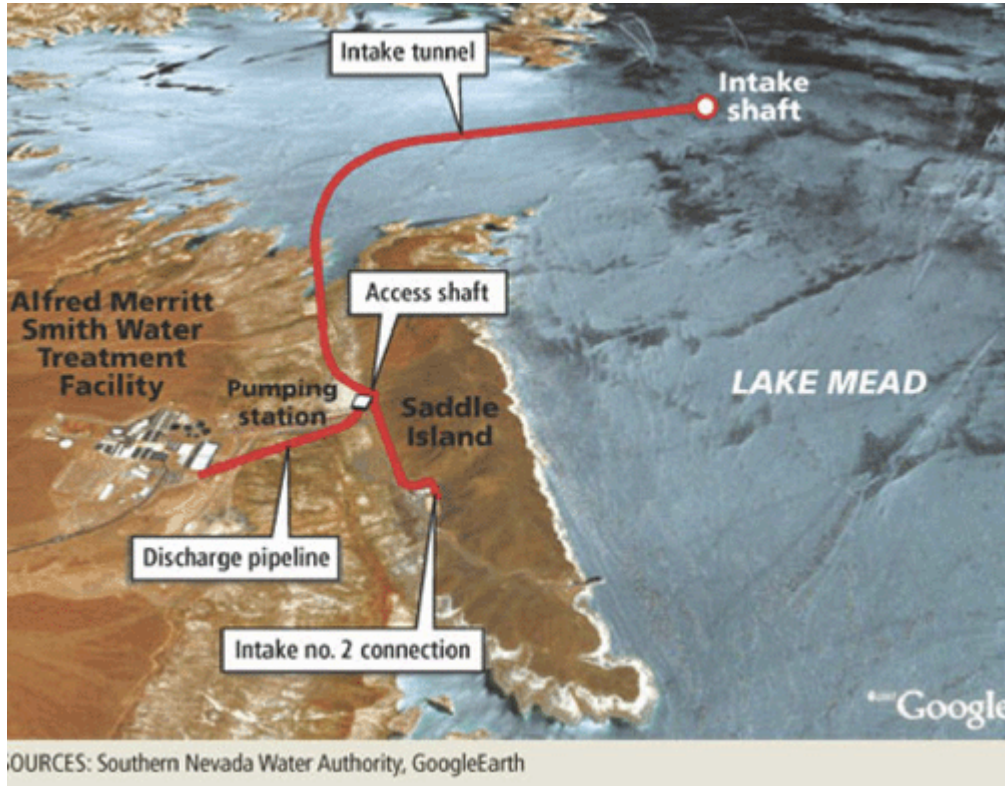


- 45 ft excavated diameter
- 430 ft below water
- Experienced 12-14 bar water pressure

2.1 mile long, 45 ft diameter

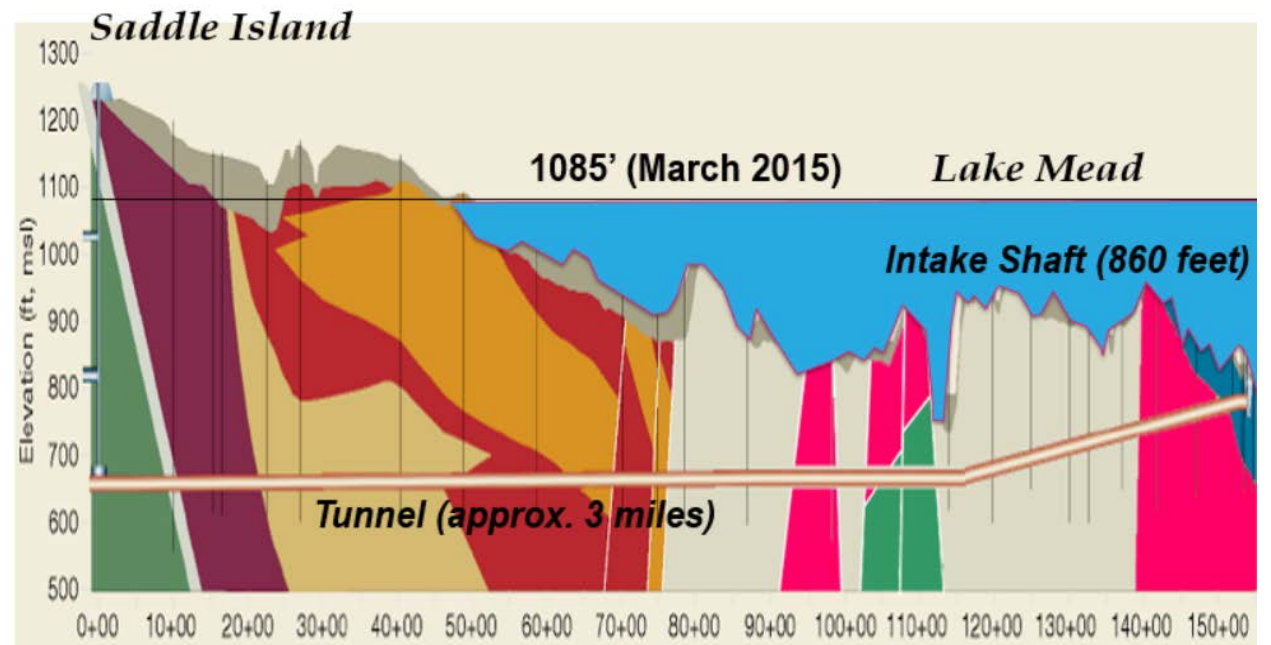


Lake Mead Intake 3 Tunnel

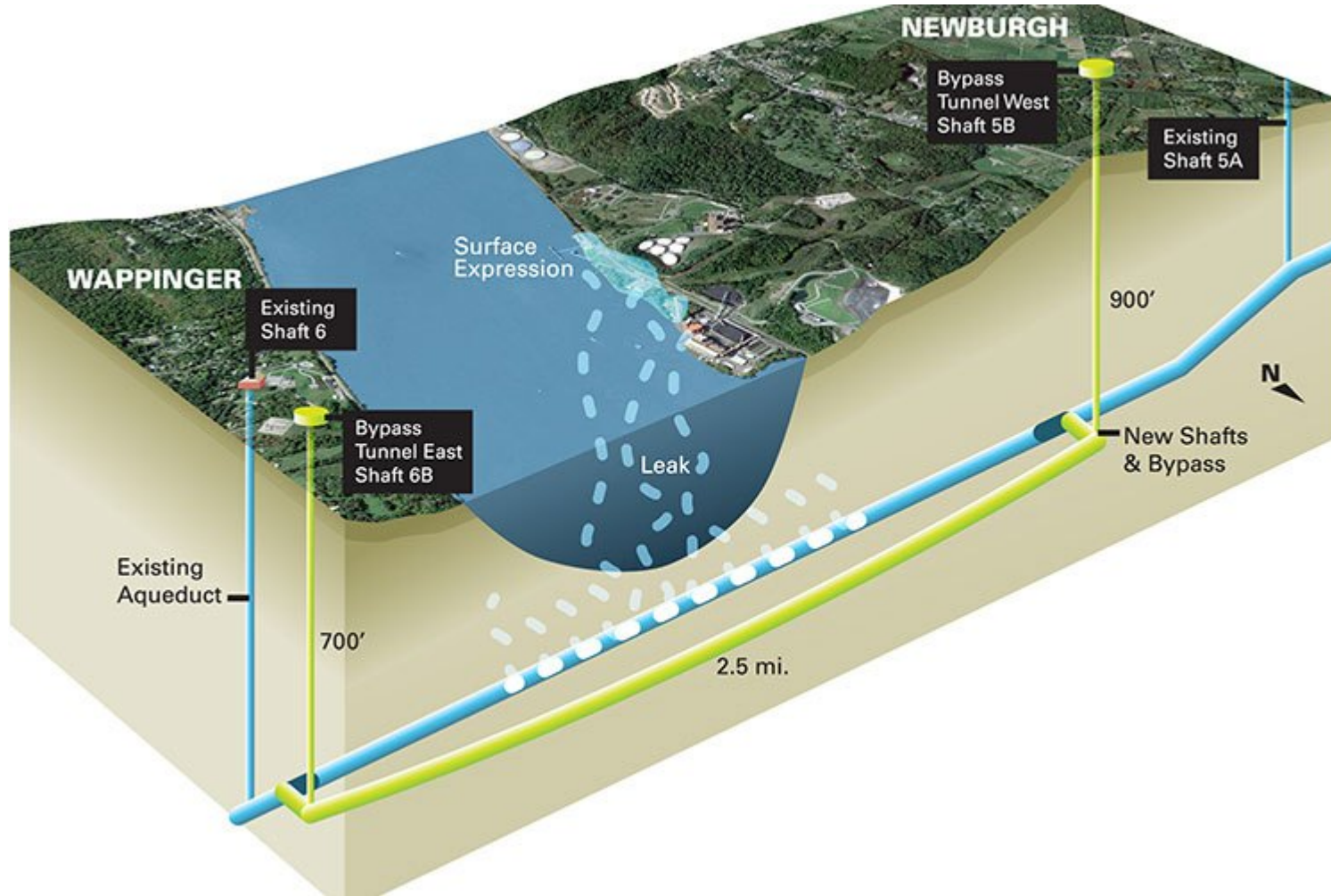


- 20 ft excavated diameter
- 450+ ft below water
- Up to 14 bar water pressure

Alignment Profile

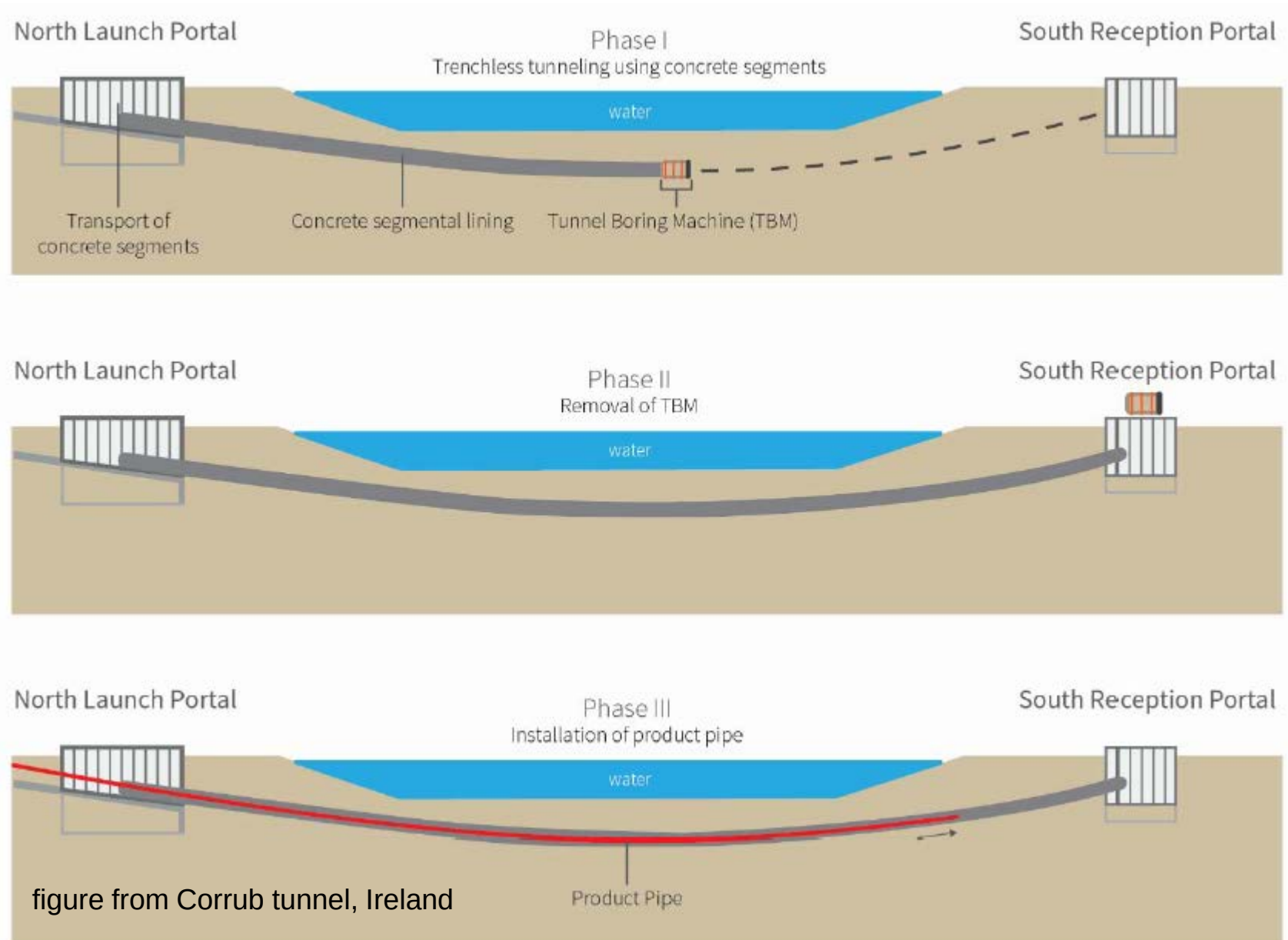


Rondout Bypass Tunnel

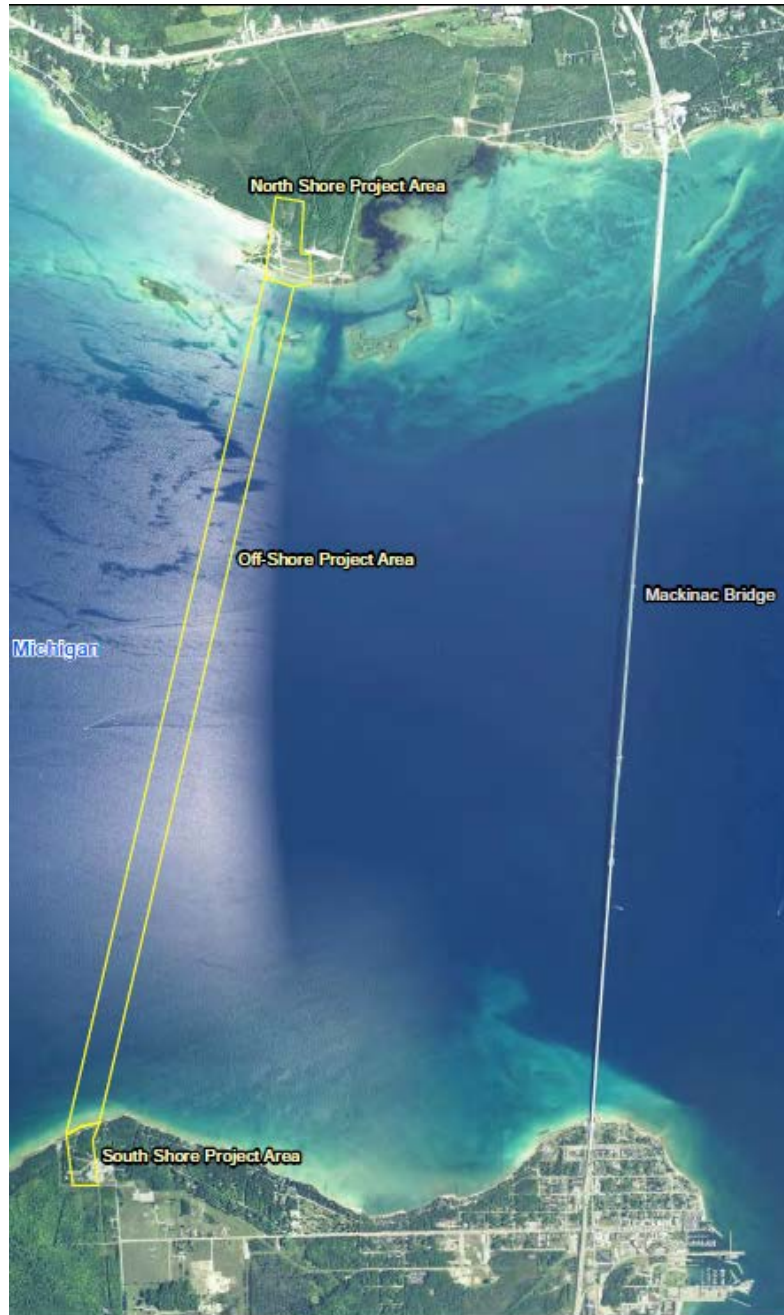


- 22 ft excavated diameter
- 900 ft deep
- Potential 20 bar water pressure
- Under construction now

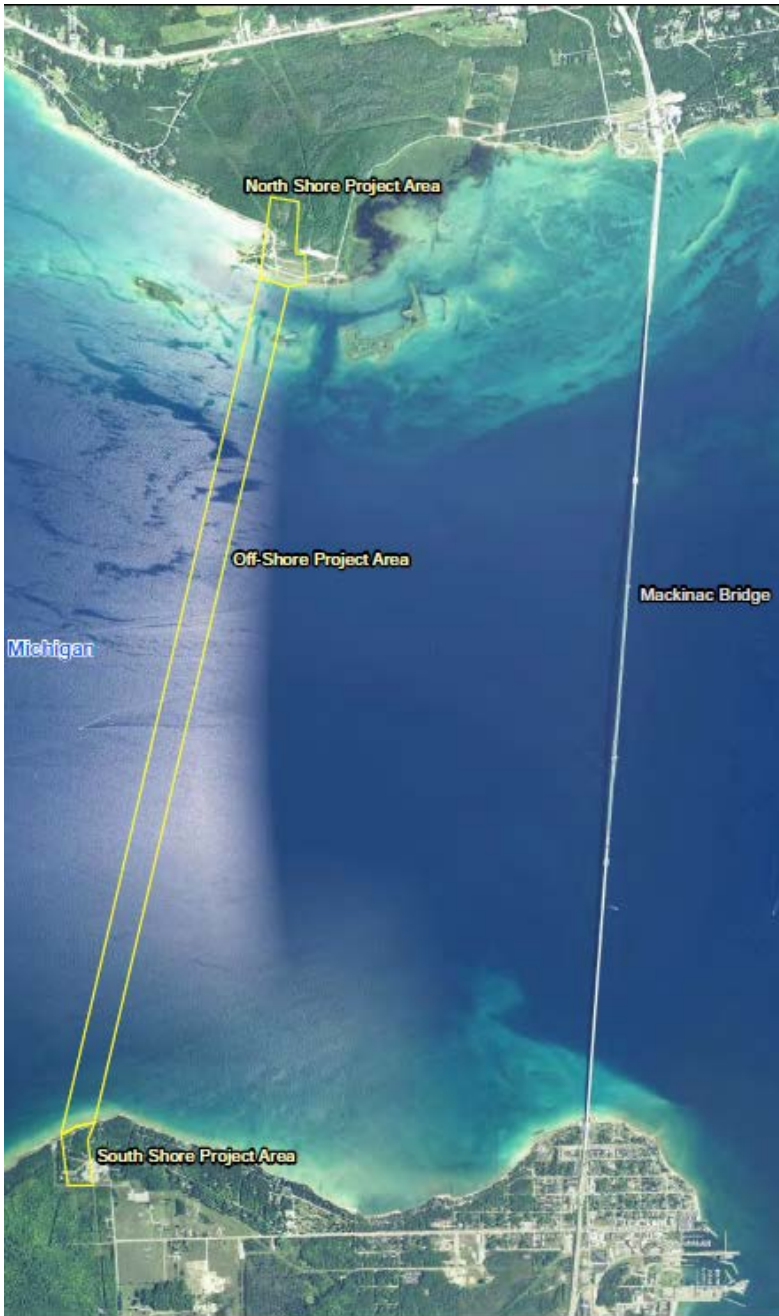
Feasible Approach



North Shore Portal

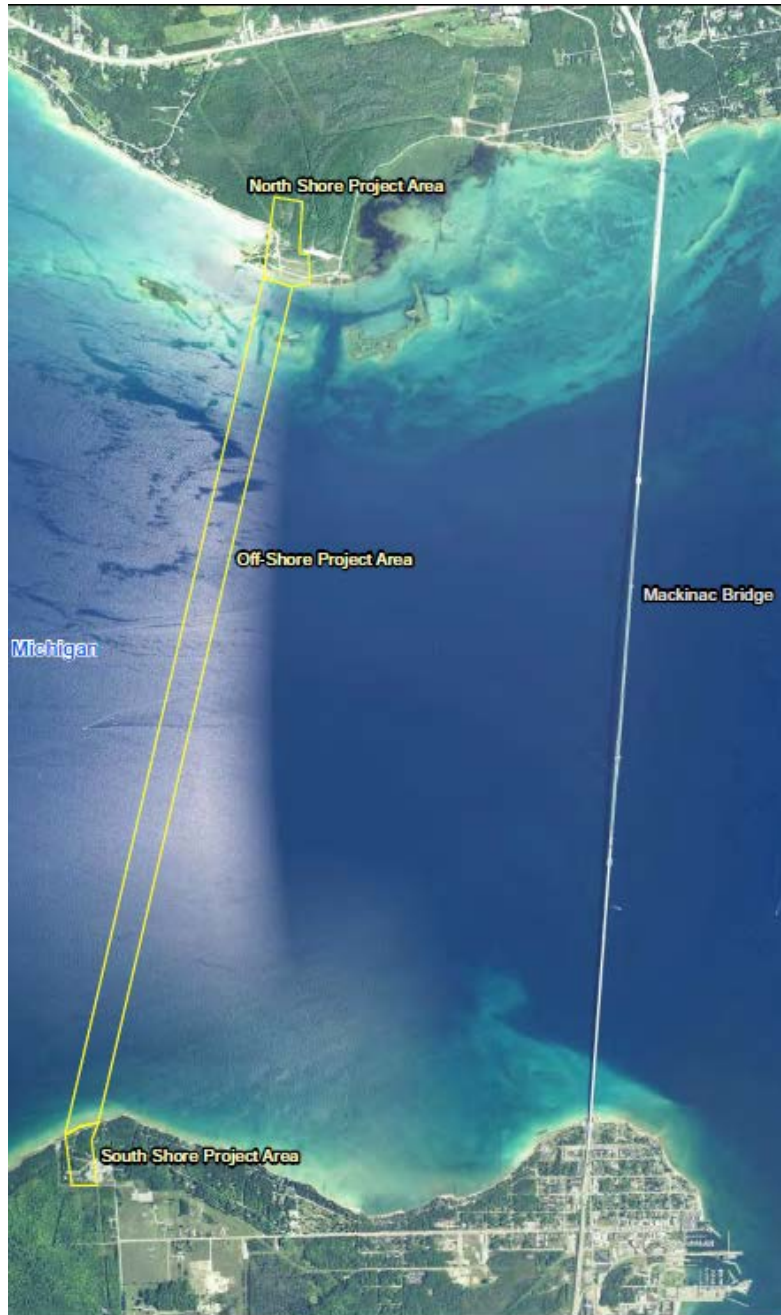


North Shore Portal

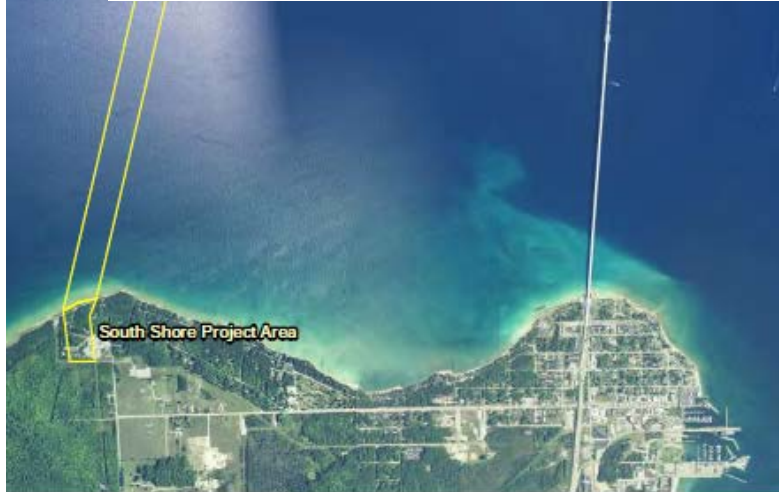
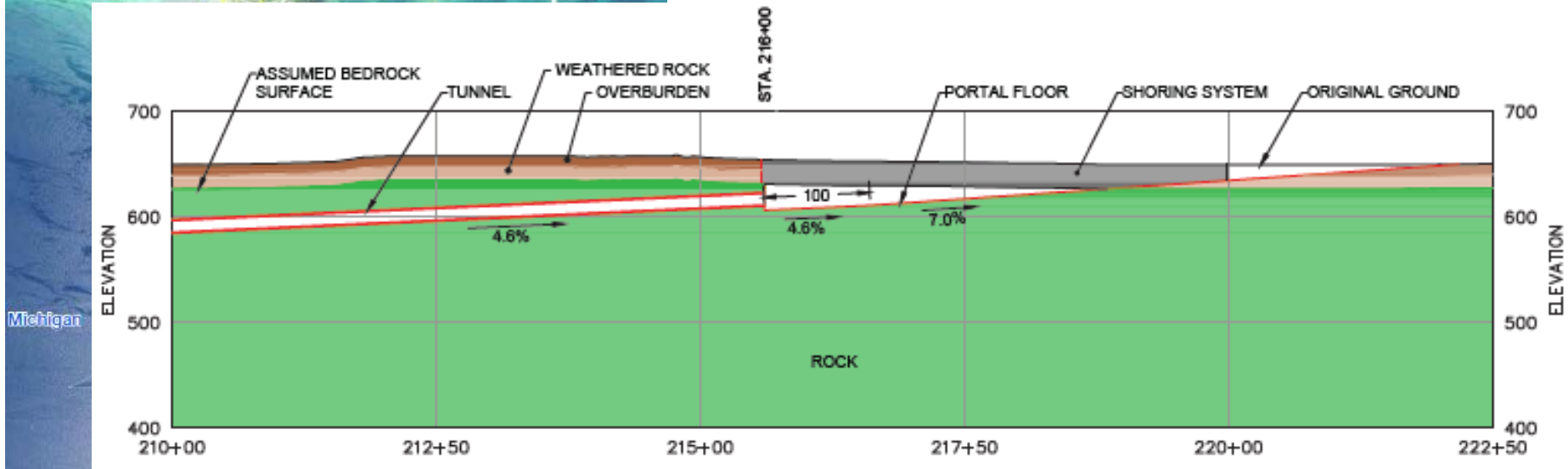


Niagara tunnel portal
(45 ft diam. TBM)

South Shore Portal



South Shore Portal



Tunnel Technical Feasibility

- Process
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