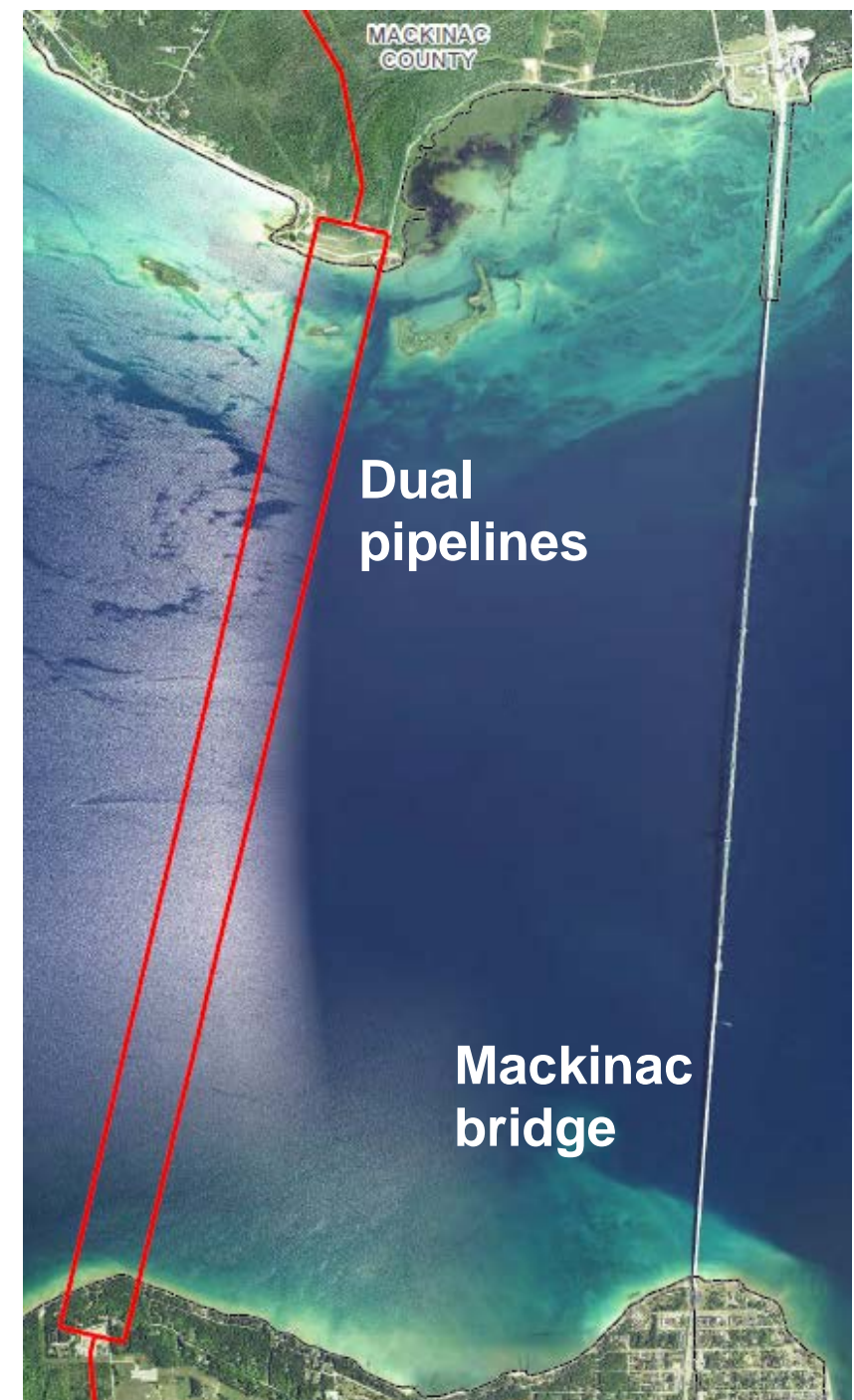


Tunnel Technical Feasibility

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

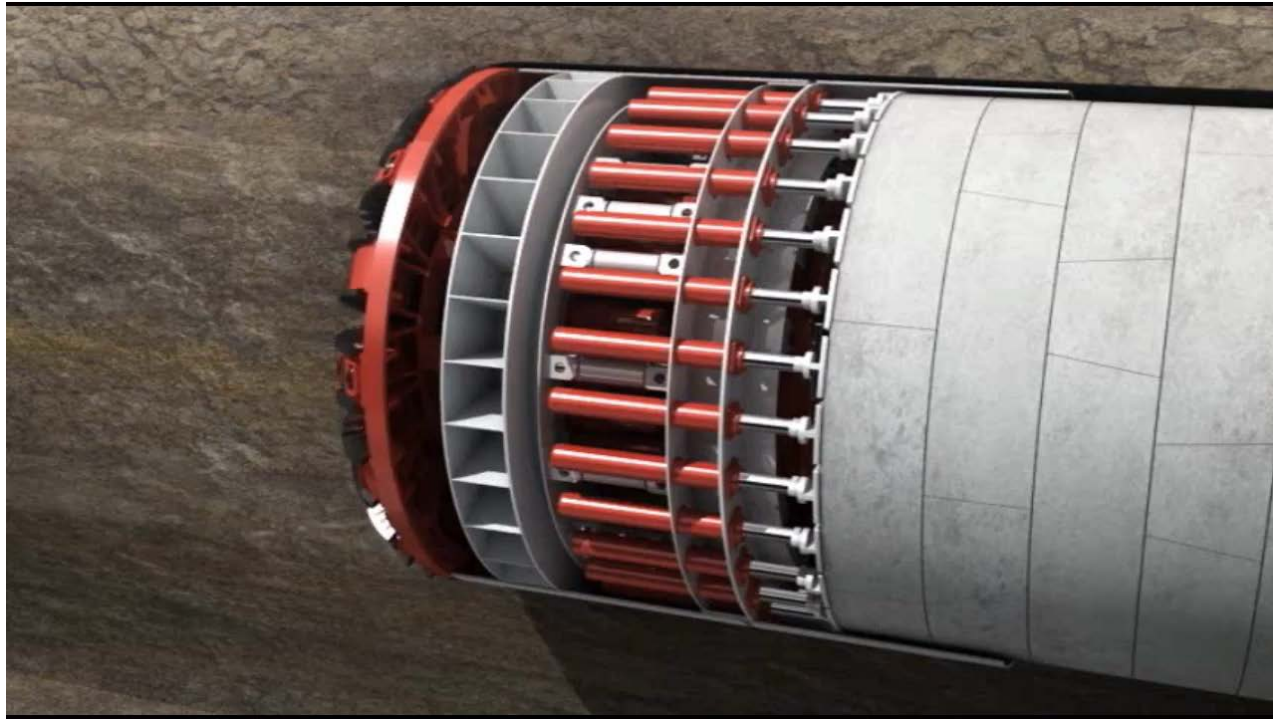


Tunnel Technical Feasibility

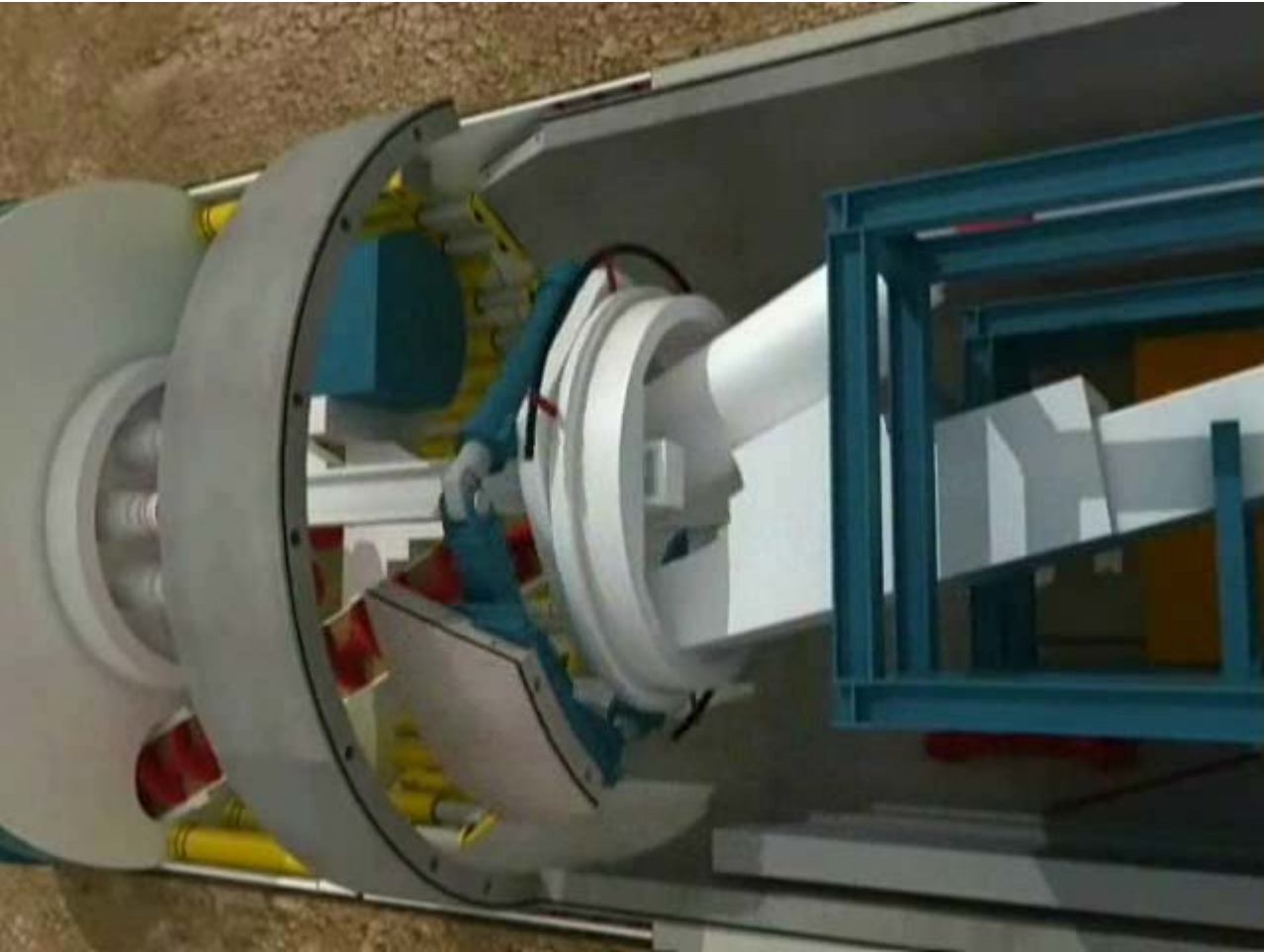
- Process
- Finding: Tunnel is Feasible
- Principle characteristics and anticipated conditions are within the realm of previously constructed tunnels

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

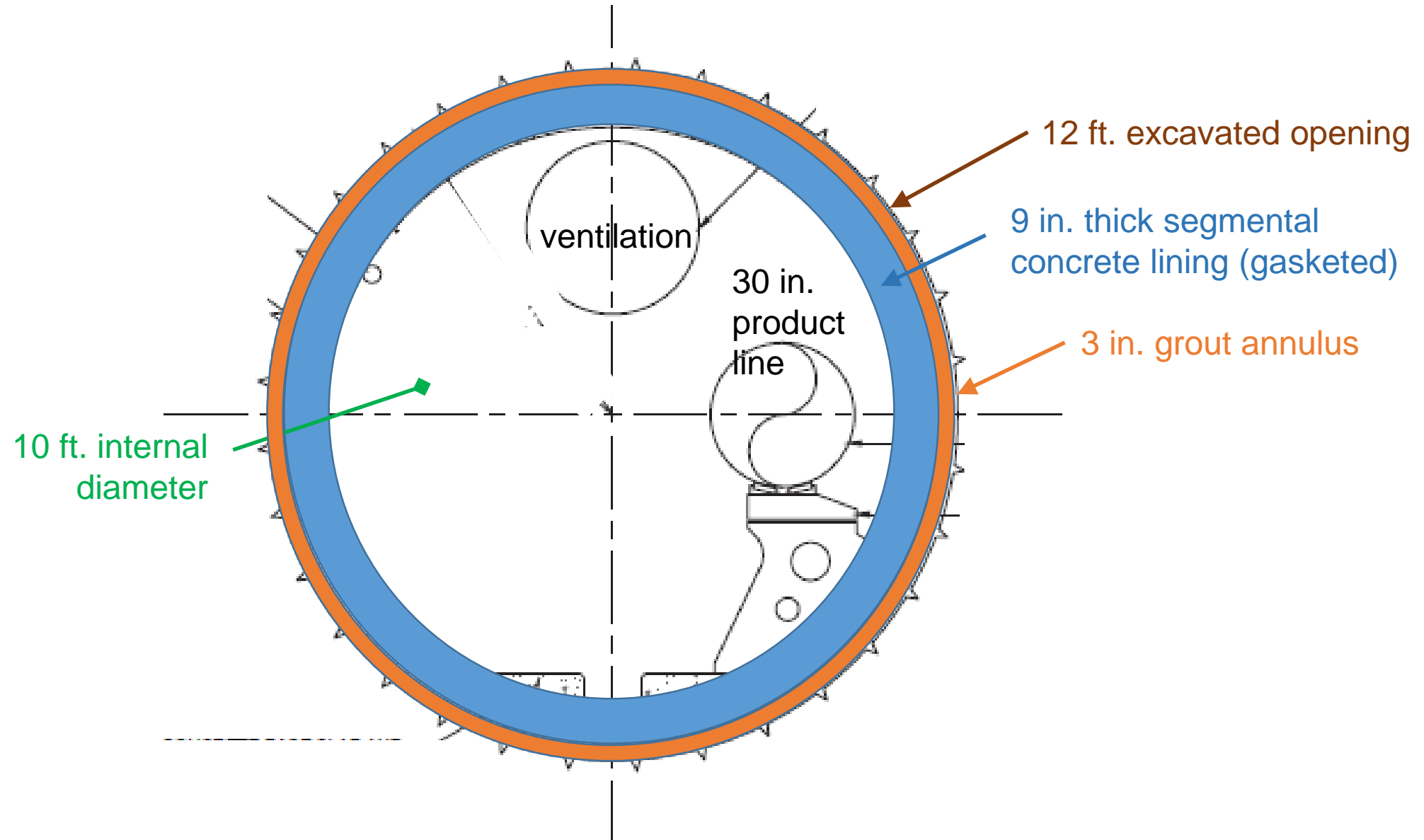
Tunnel Construction



Tunnel Grouting



Feasible Tunnel Cross-Section

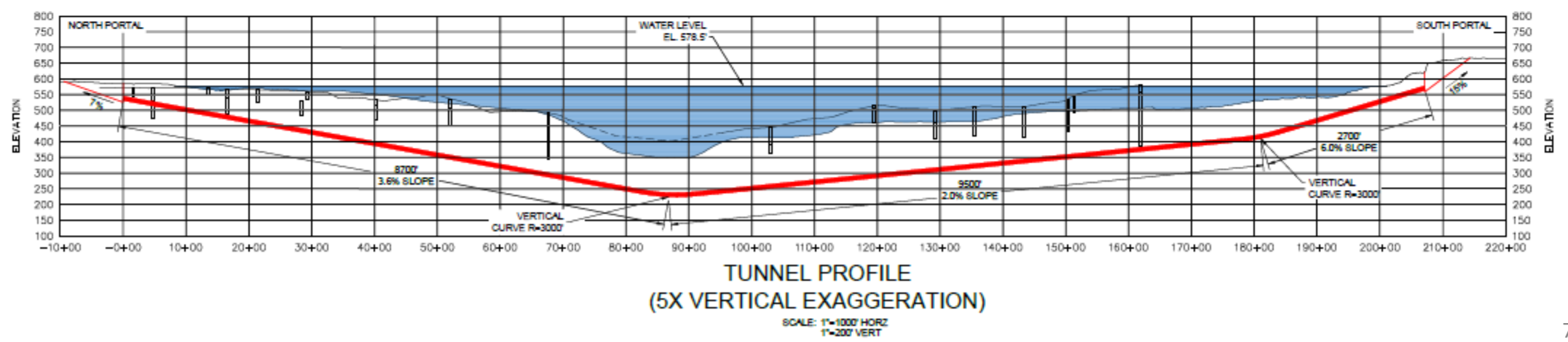
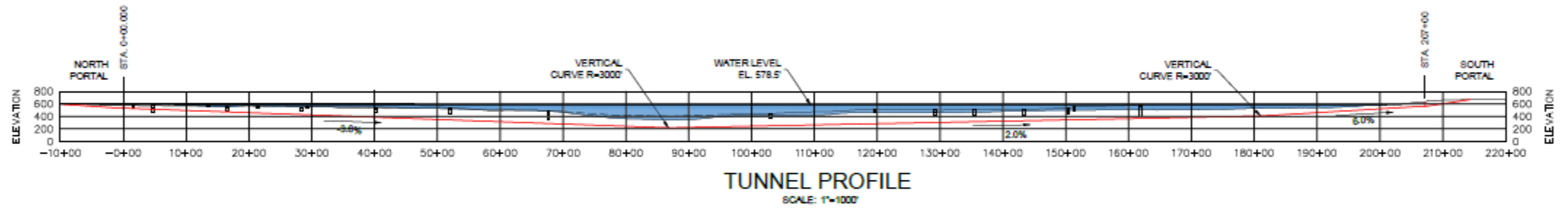
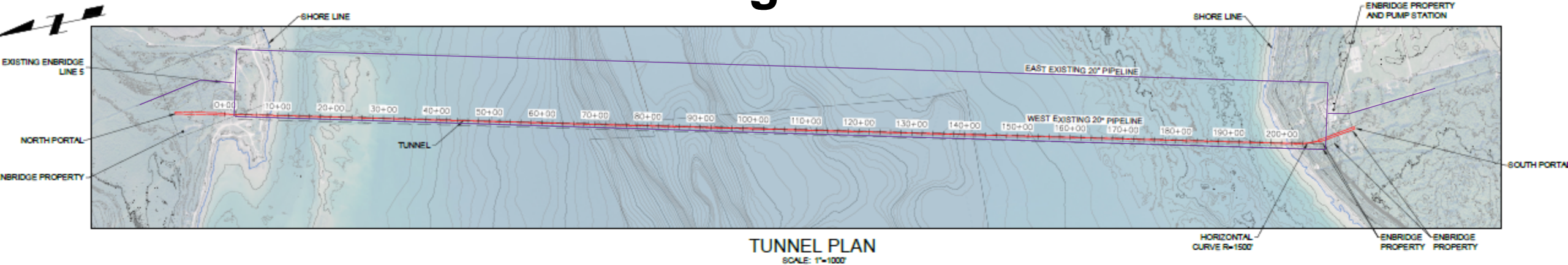


Tunnel Cross-Section



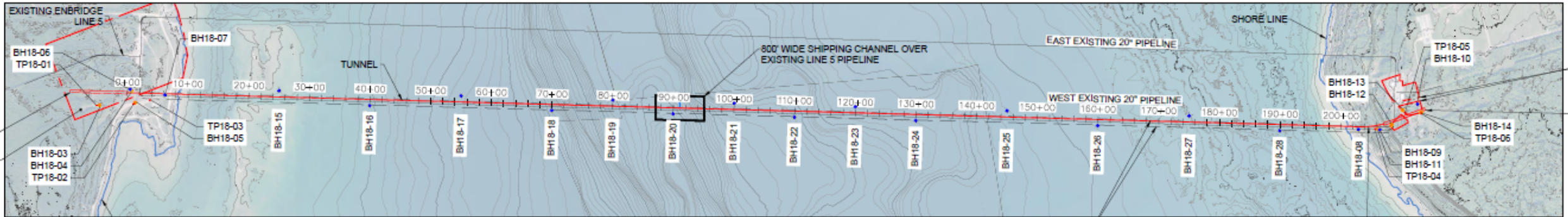
Gastau tunnel (17.5 ft internal diameter)

Tunnel Alignment

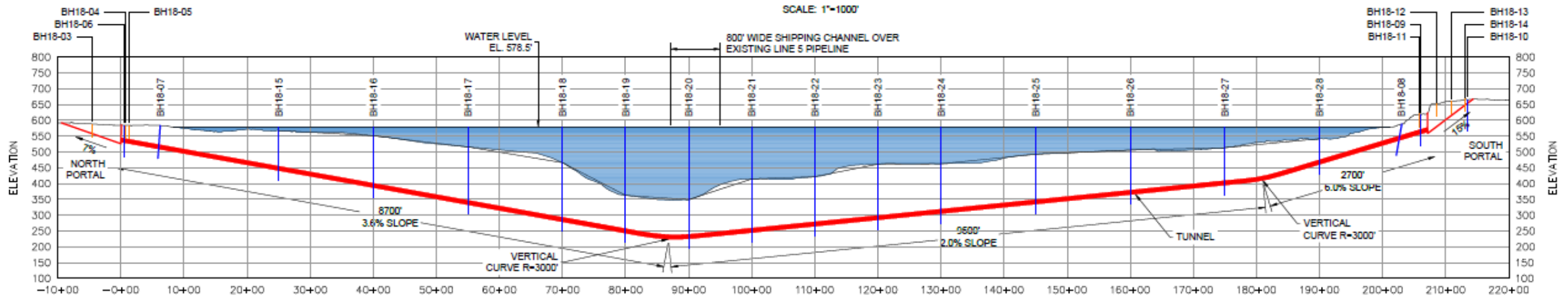


NOTES:

Geotechnical Site Investigation

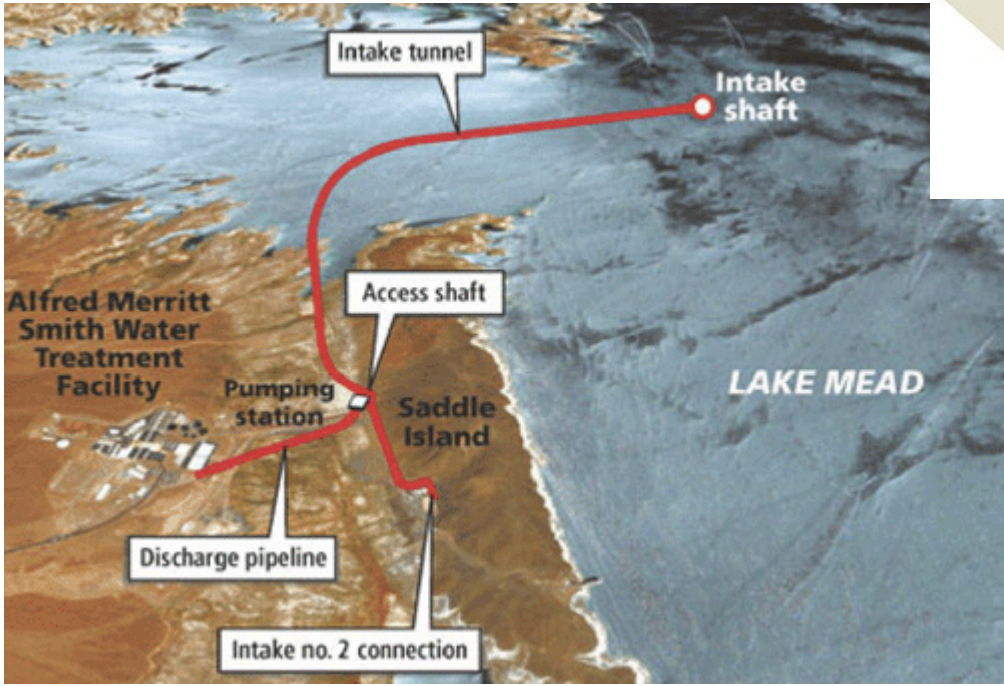
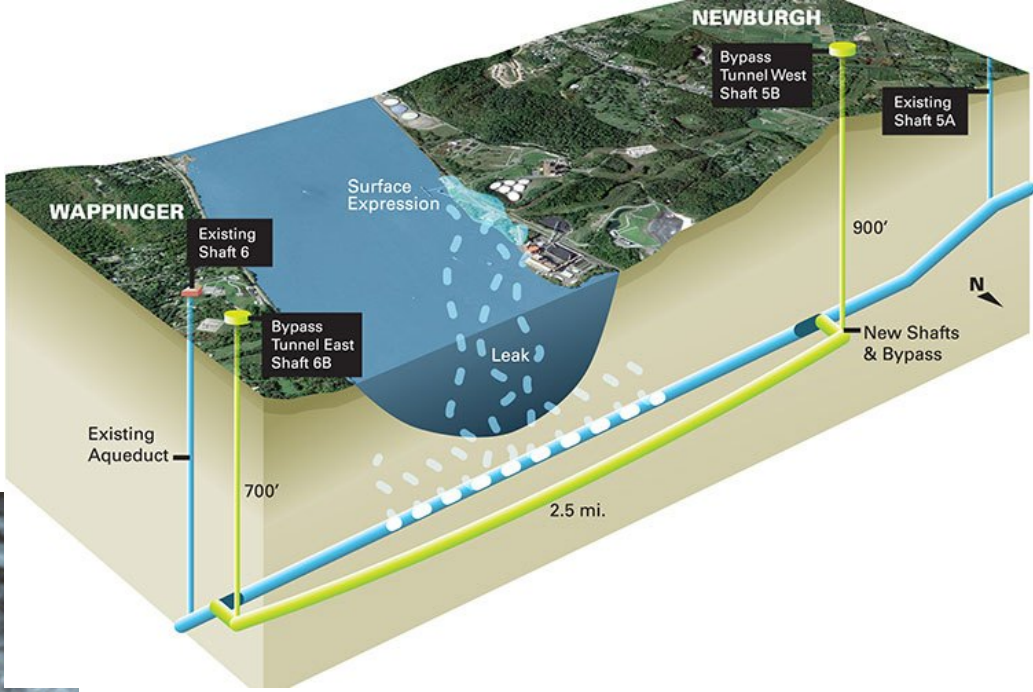


TUNNEL PLAN
SCALE: 1"=1000'



TUNNEL PROFILE
(5X VERTICAL EXAGGERATION)

Contemporary Comparison

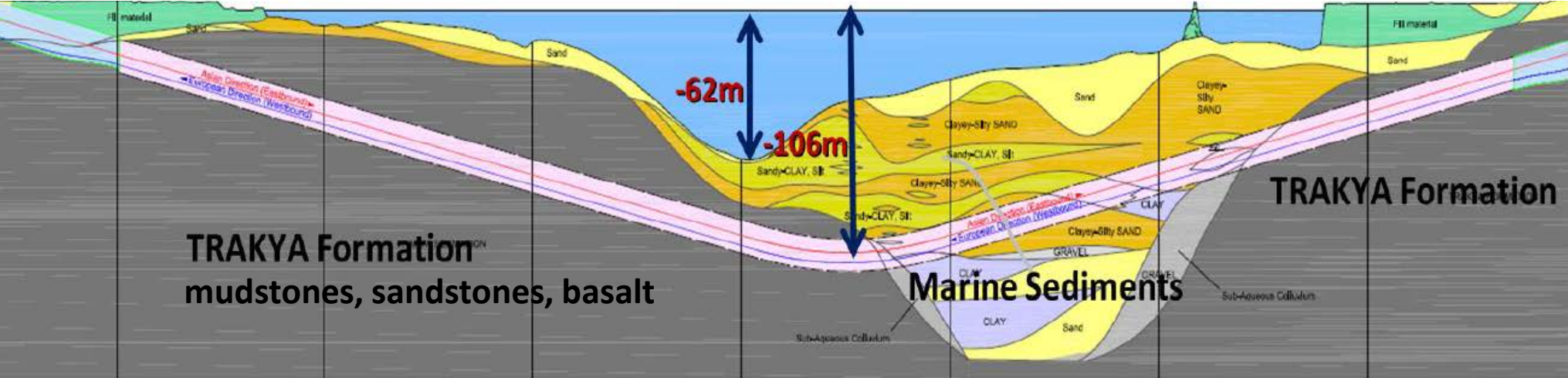


Eurasia Tunnel

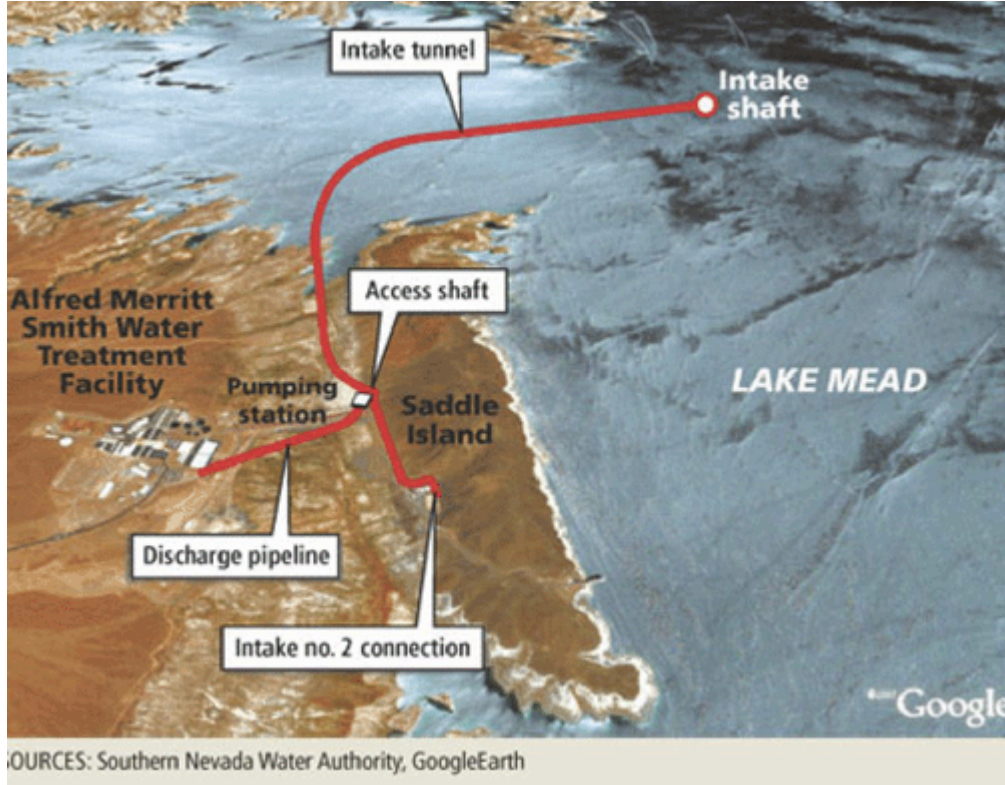


- 45 ft excavated diameter
- 430 ft below water
- Experienced 12-14 bar water pressure

2.1 mile long, 45 ft diameter

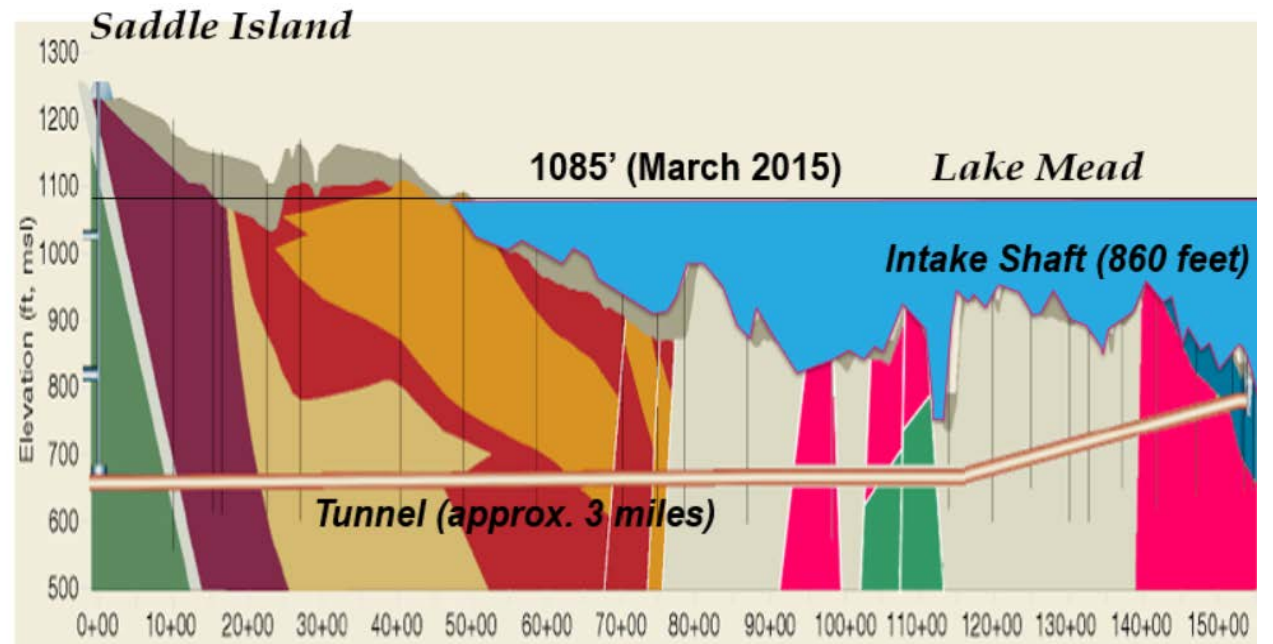


Lake Mead Intake 3 Tunnel

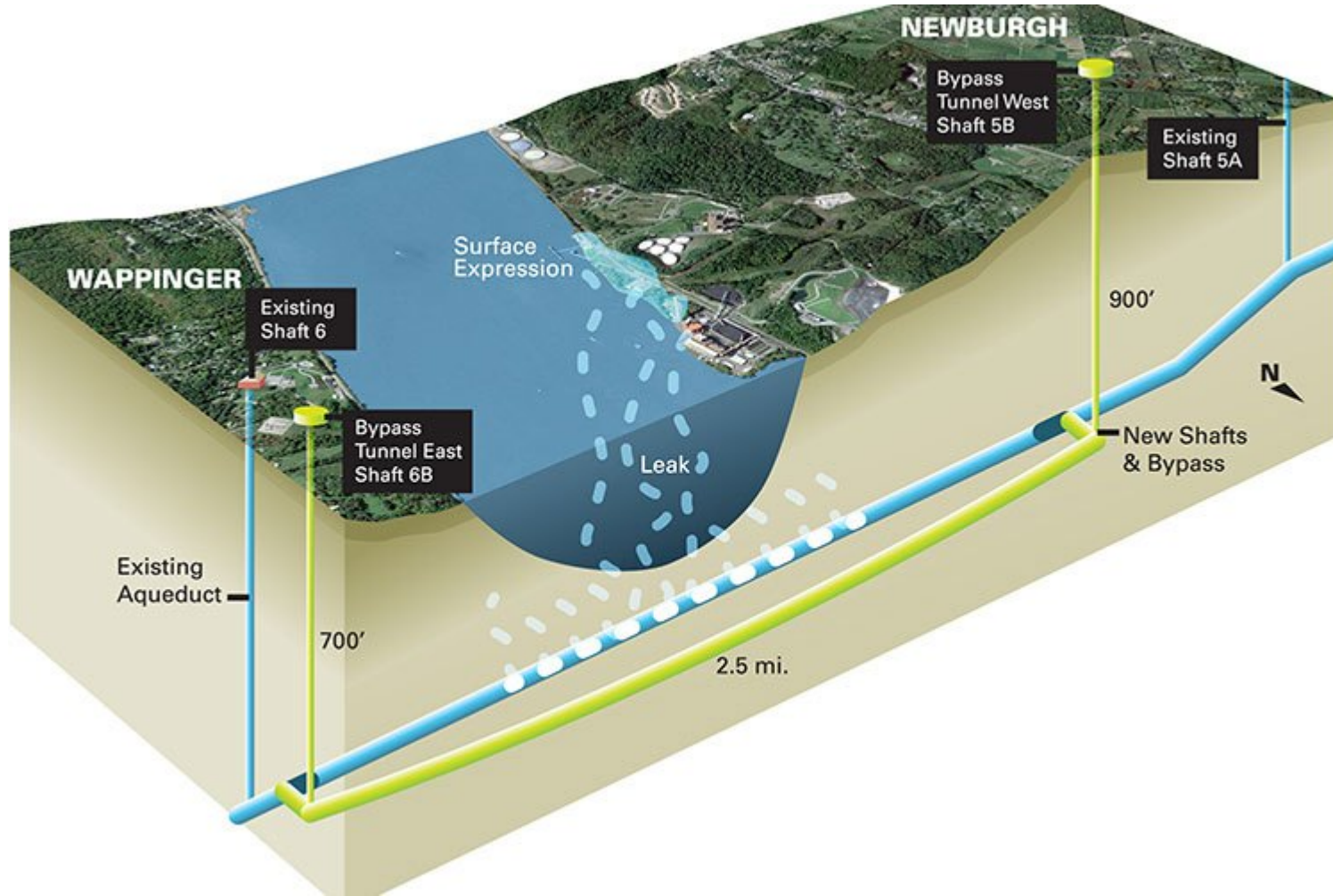


- 20 ft excavated diameter
- 450+ ft below water
- Up to 14 bar water pressure

Alignment Profile



Rondout Bypass Tunnel



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

Feasible Approach

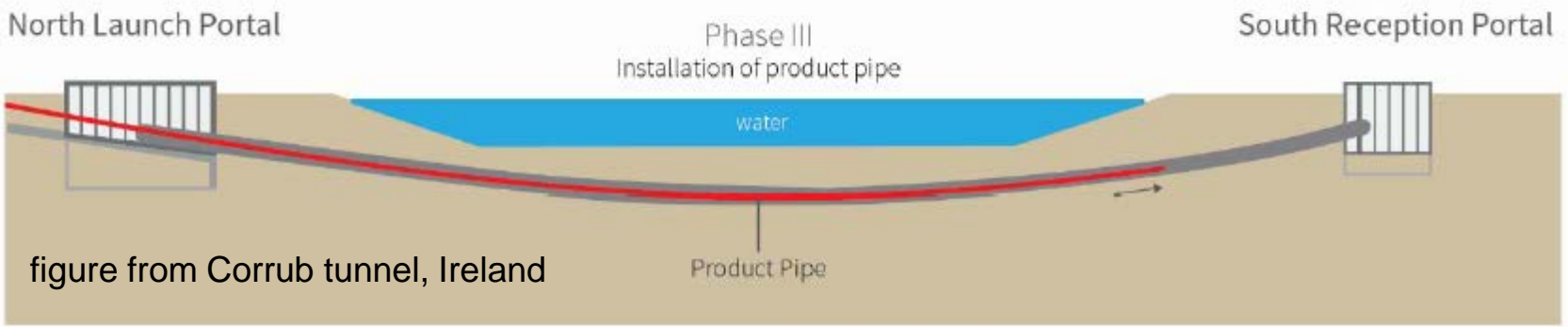
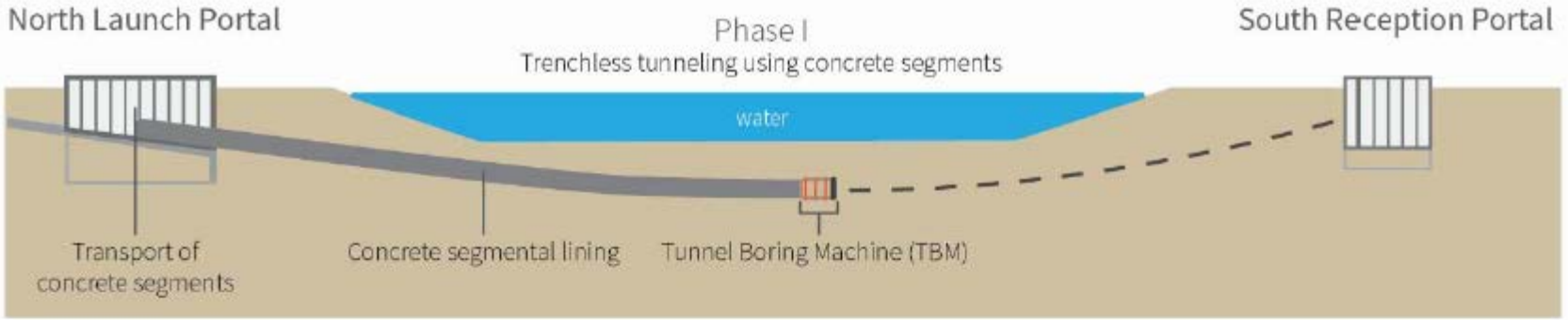
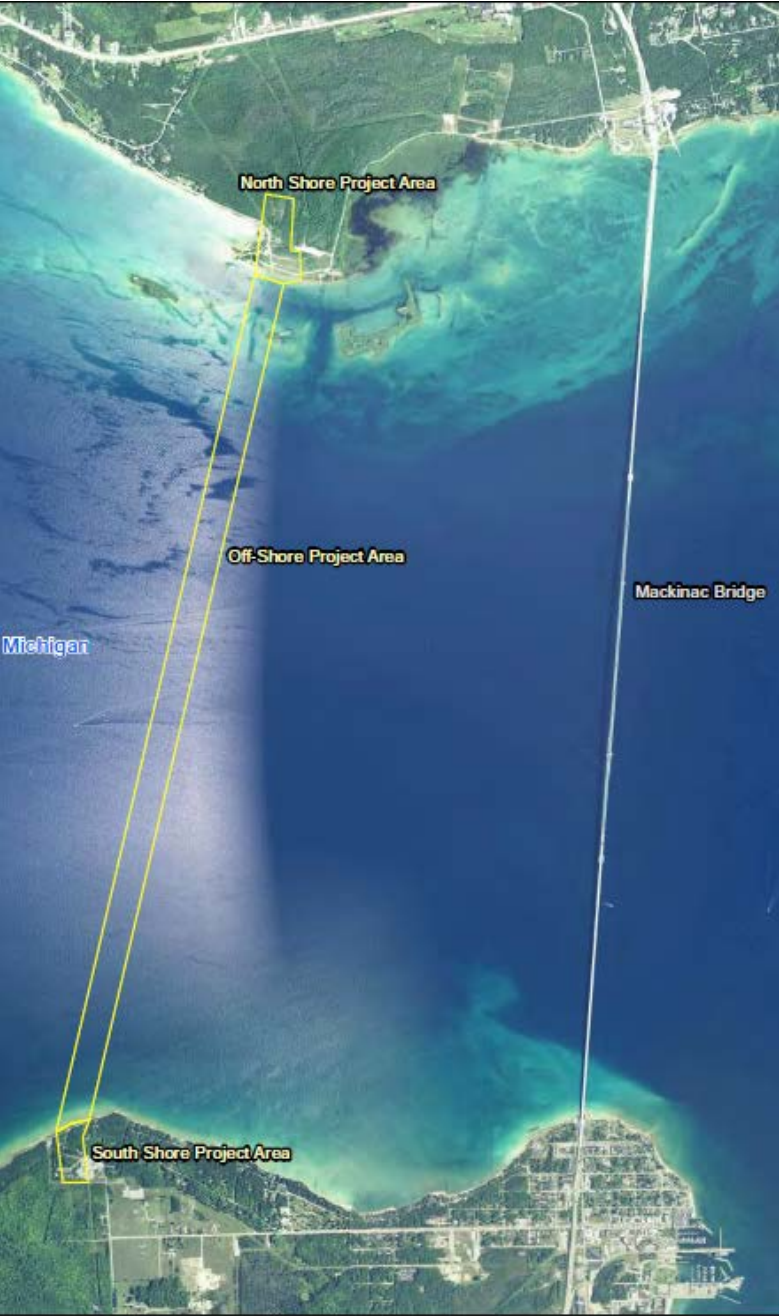
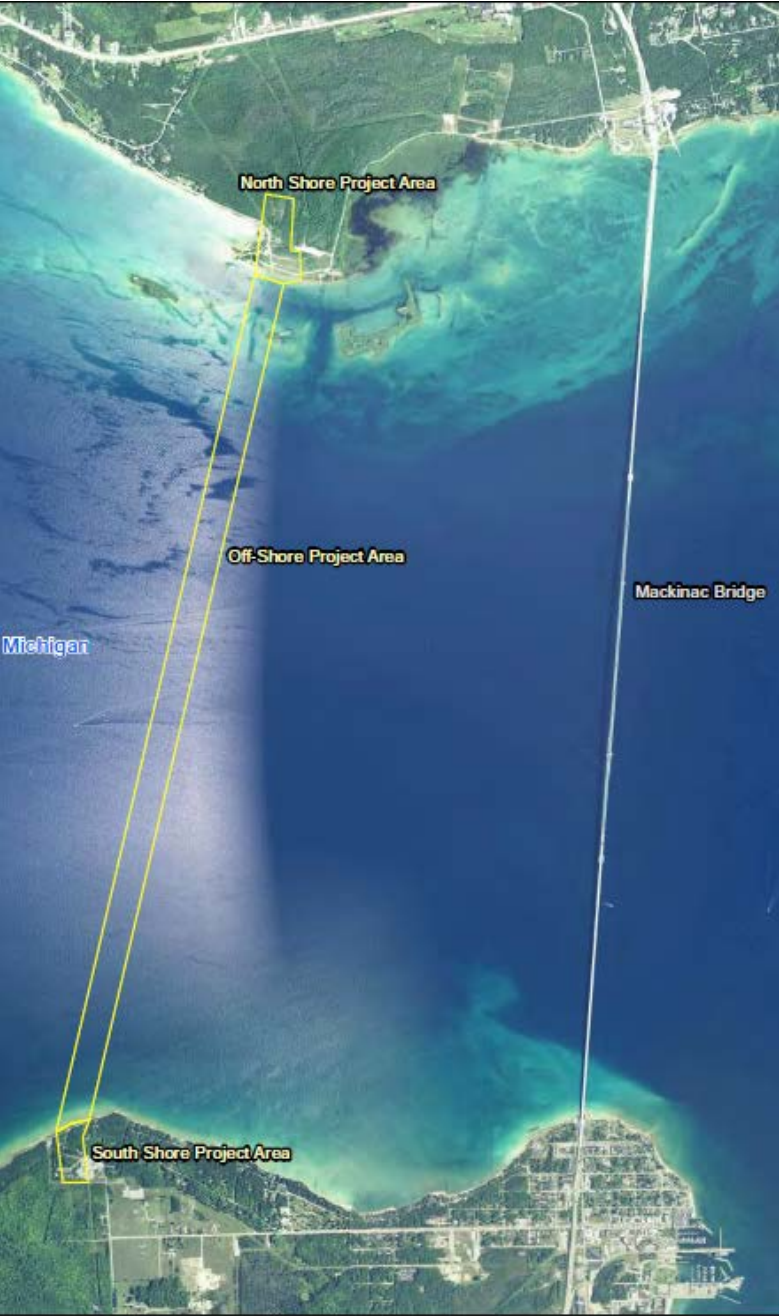


figure from Corrub tunnel, Ireland

North Shore Portal

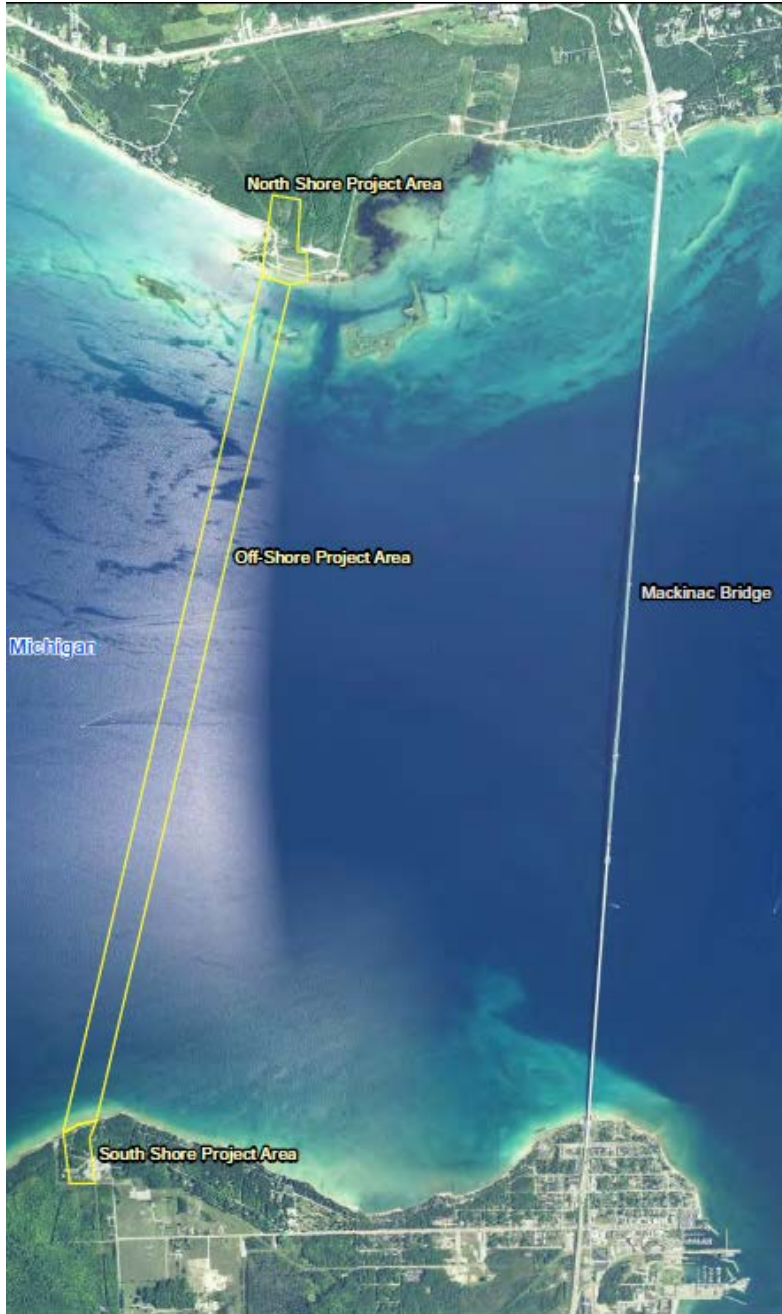


North Shore Portal

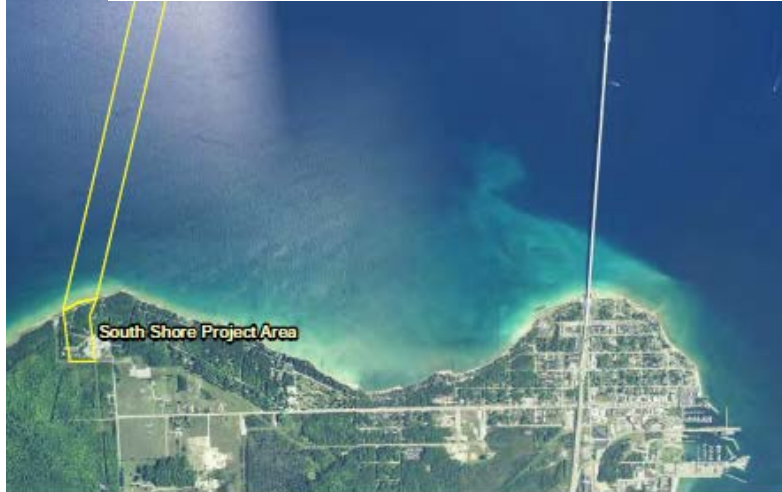
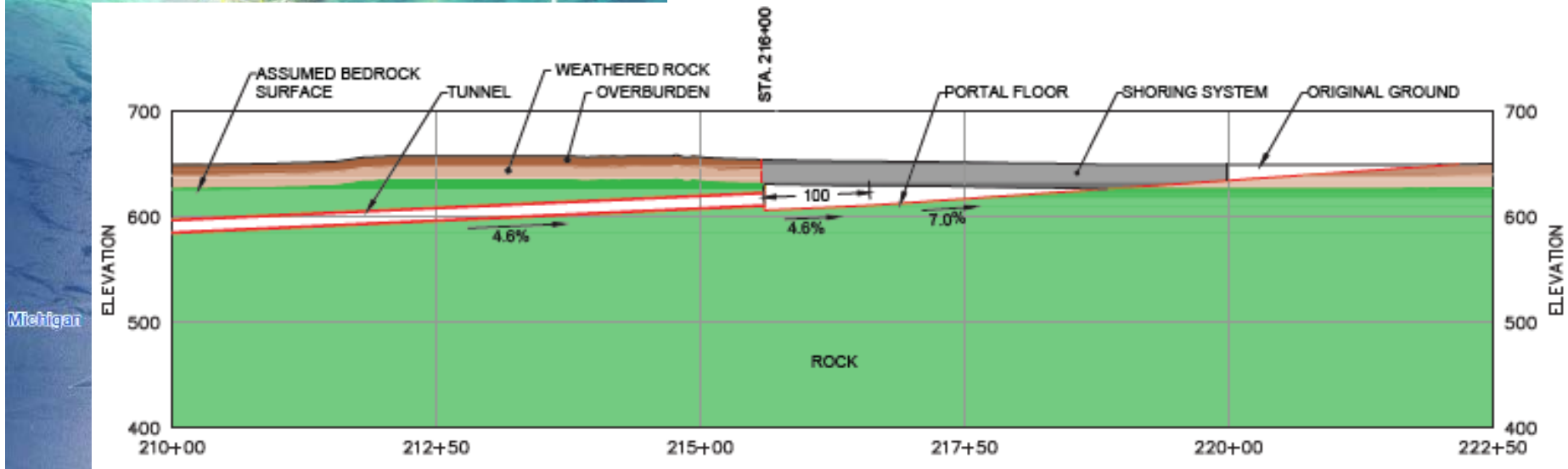


Niagara tunnel portal
(45 ft diam. TBM)

South Shore Portal



South Shore Portal



Tunnel Technical Feasibility

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

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)	10-12 bar	14 bar (18-20 bar anticipated in NY tunnel)
Geology	Limestone Dolomite Shale	Many tunnels in these and stronger rock types