

Great Lakes Tunnel Project Information Session

Introduction

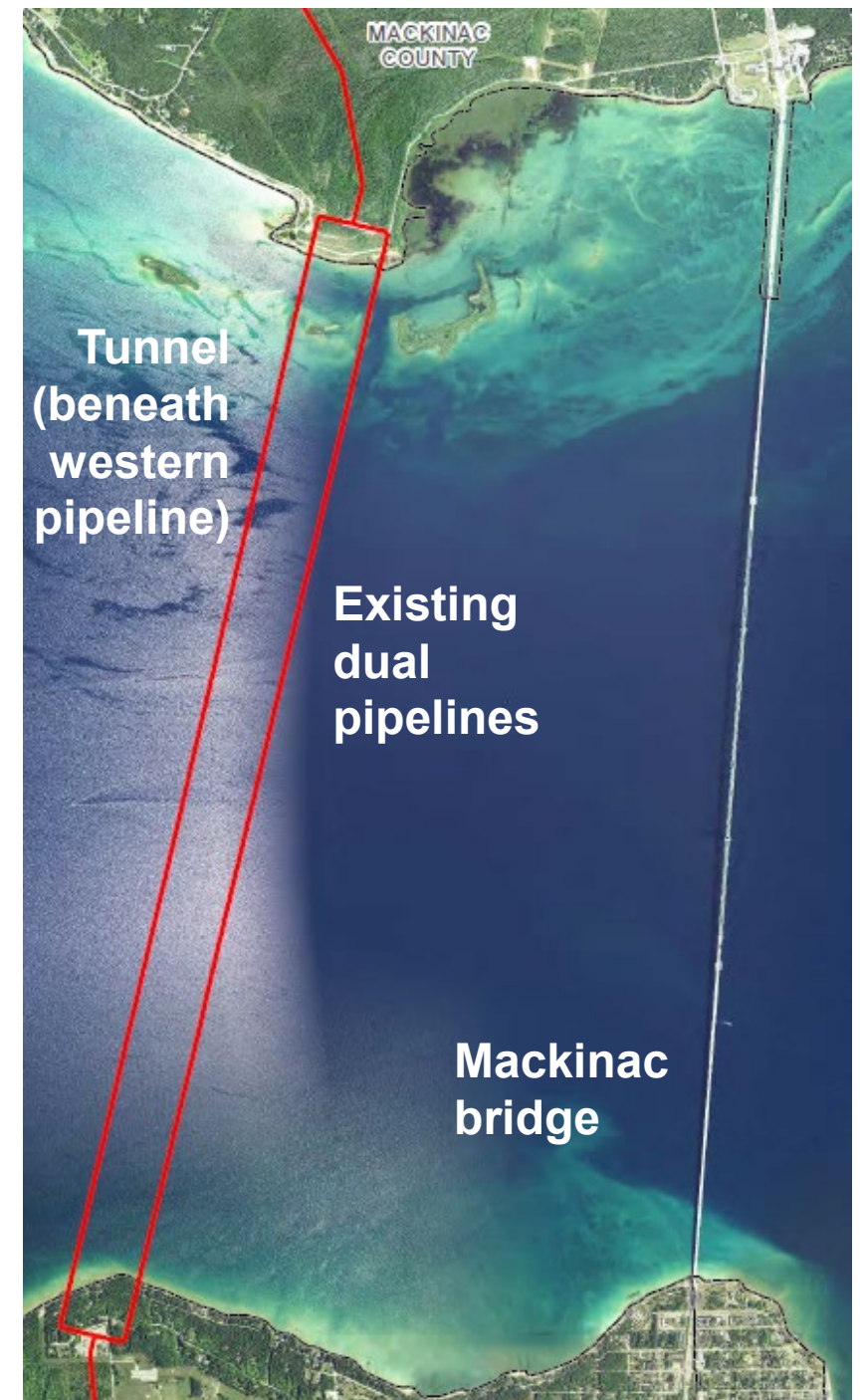
Mike Mooney, PhD PE

Consultant to Mackinac Straits Corridor Authority

Grewcock Chair Professor
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COLORADOSCHOOL OF **MINES**

September 20, 2021

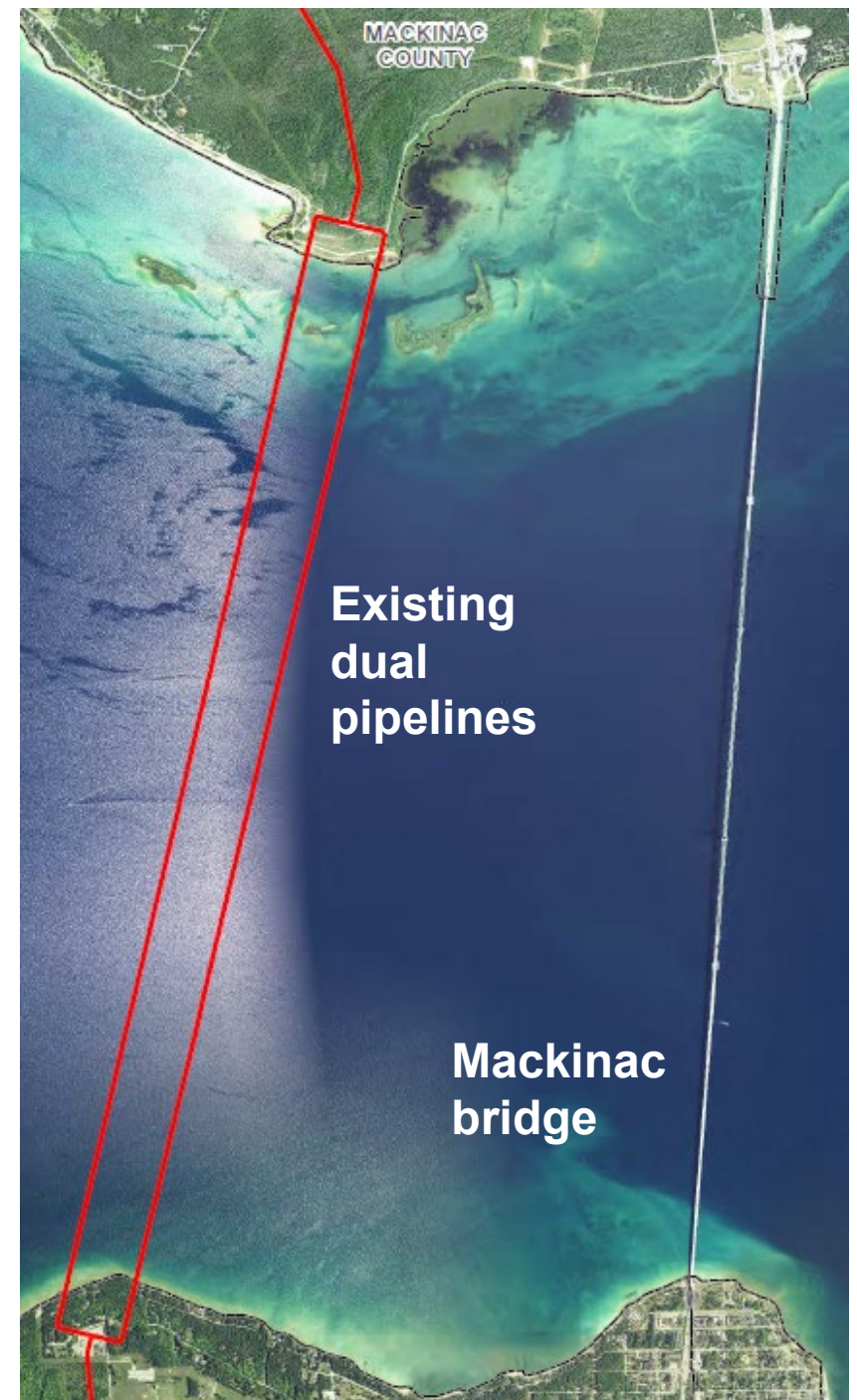


Objectives of the Info Session

- Presentation and discussion of the key design, construction and operational aspects of the Great Lakes Tunnel Project (GLTP) with emphasis on risk assessment and mitigation.
- Provide a forum for Mackinac Straits Corridor Authority (MSCA) Board Member Q&A with GLTP personnel.
- A word on Risk
 - 1. Risk exists everywhere.
 - 2. Discussing risk is not a cause for alarm; risk discussion and risk management is central to engineering practice.
 - 3. Risk assessment and management is used to reduce risk to acceptable levels.

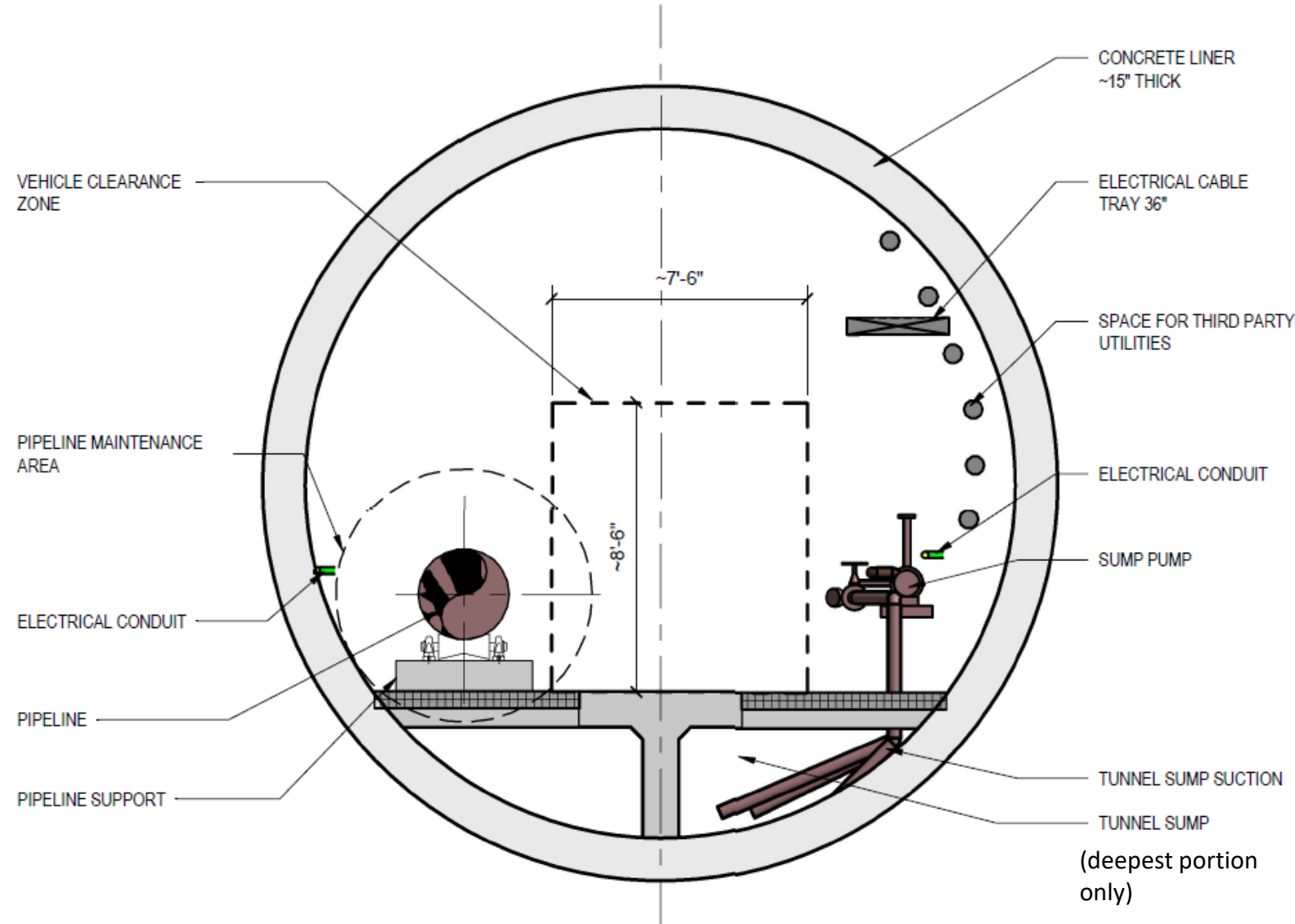
Reason for the Project

- Objective is to reduce/eliminate the risk of a pipeline leak impacting the Great Lakes.
- The Alternatives Study (2018) concluded that a bored tunnel provides the best approach to accomplish this.
- December 2018 formation of the Mackinac Straits Corridor Authority (MSCA) and the Tunnel Agreement between the MSCA and Enbridge.

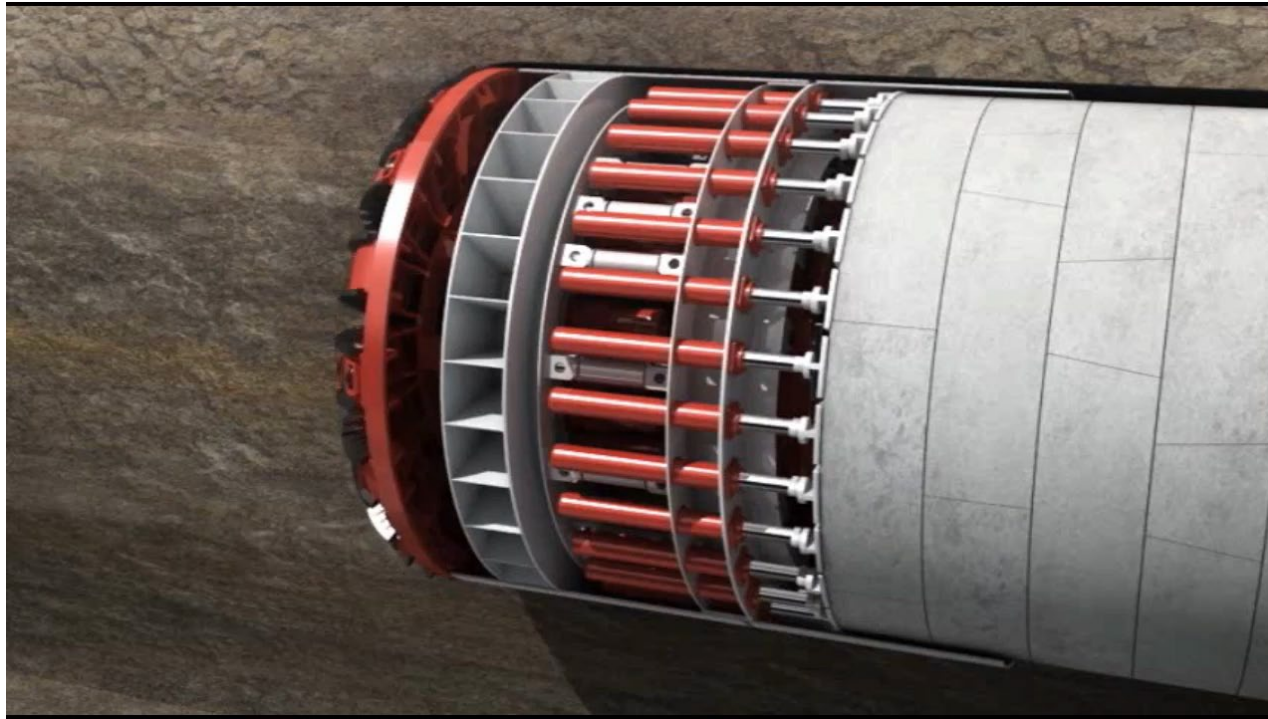


Project Overview

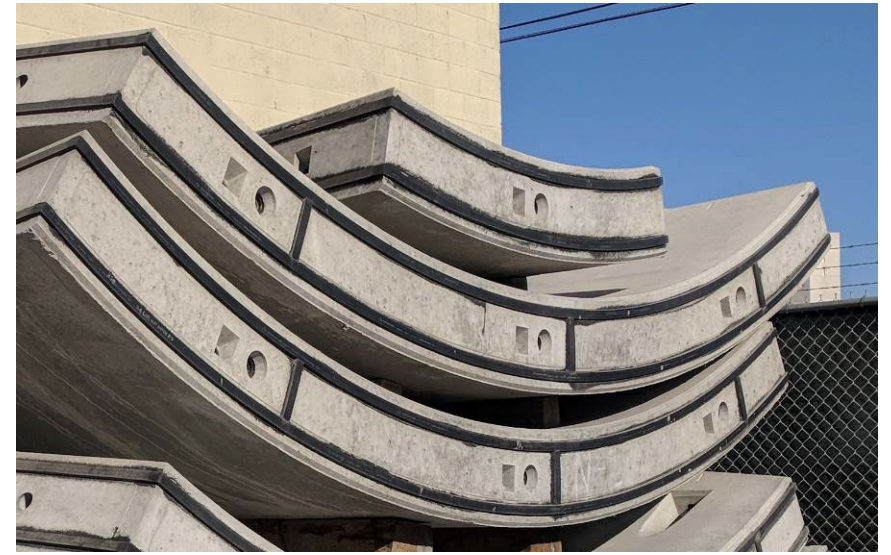
- 4 mile long, 21 ft internal diameter (nominal), concrete-lined tunnel.
- Shaft/portal structures at north and south shores.
- 99 year design service life.
- Provide access to third-party utilities.
- Design-build-finance by Enbridge.
- Tunnel ownership acceptance by MSCA with lease agreement with Enbridge.
- Maintenance and operations performed by Enbridge.



Tunnel Construction



Source: Terratec (extracted from <https://www.youtube.com/watch?v=1XVkmbeB958> to show ring building. Note that type of TBM and cutterhead layout not representative of GLTP TBM type)



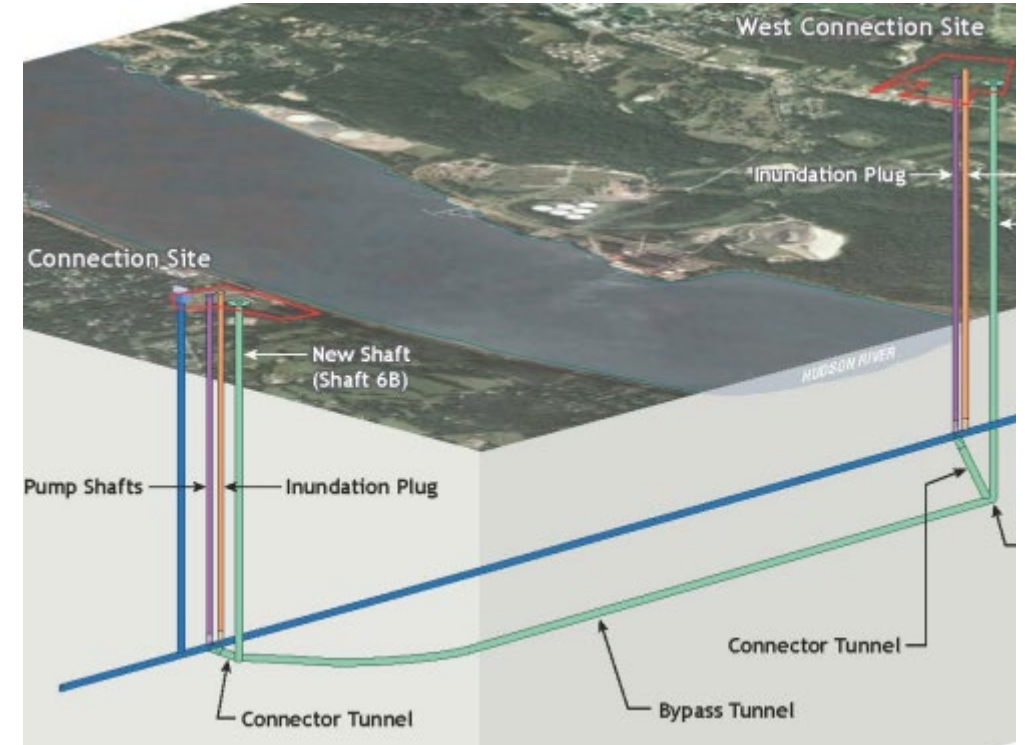
(double gasketed concrete segments; from regional connector tunnel project, LA)



(completed segmental lining tunnel)

Contemporary Comparison

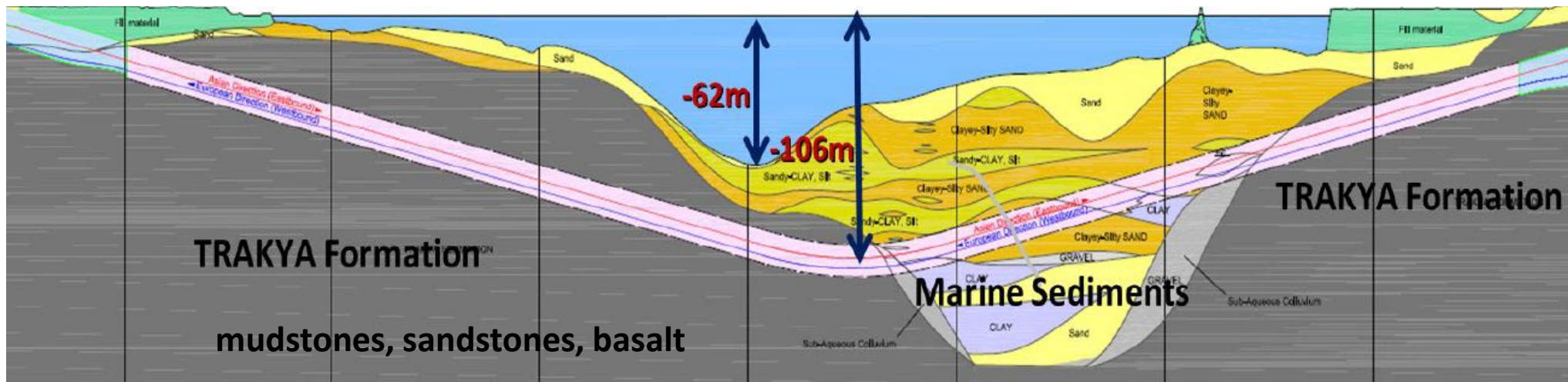
Three “peer” projects recently constructed in rock under high water pressure.



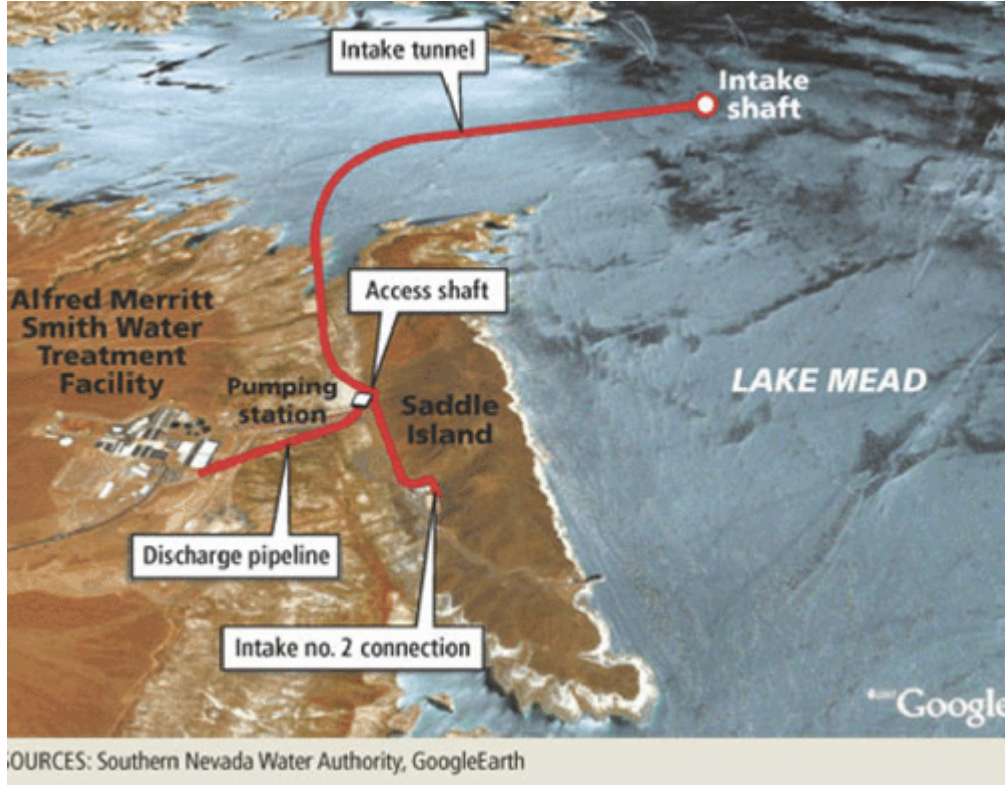
Eurasia Tunnel



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

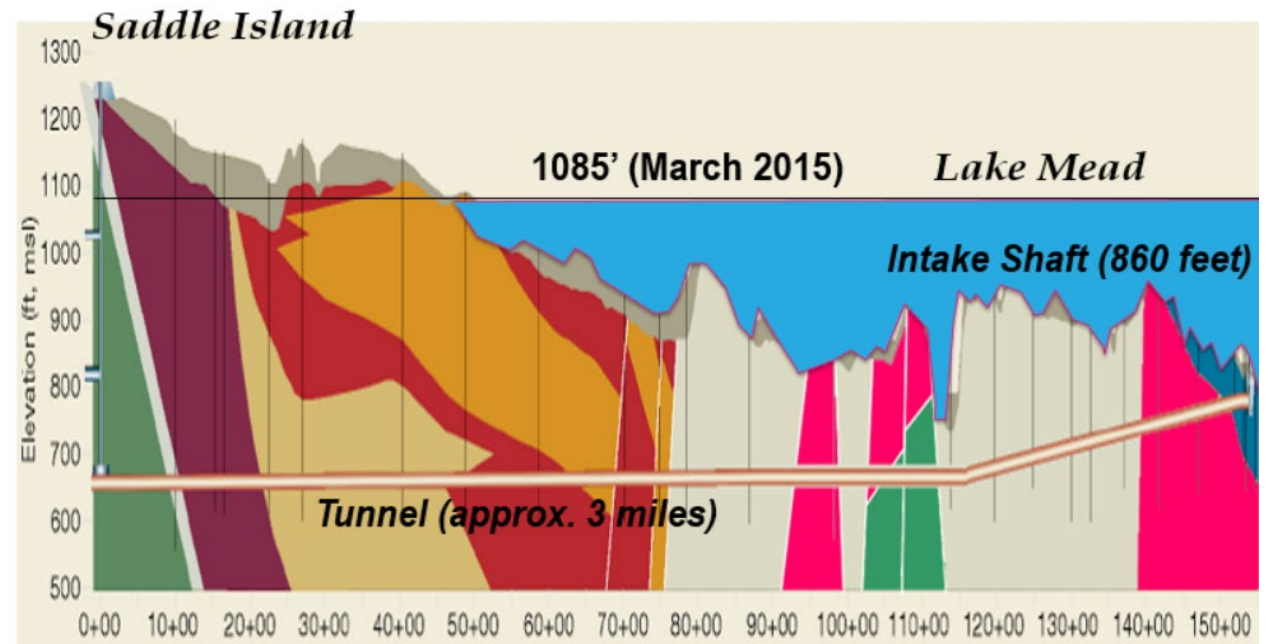


Lake Mead Intake No. 3 Tunnel

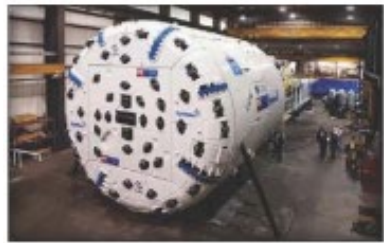


- 3 miles long
- 20 ft excavated diameter
- 450+ ft below water
- Up to 14 bar water pressure

Alignment Profile



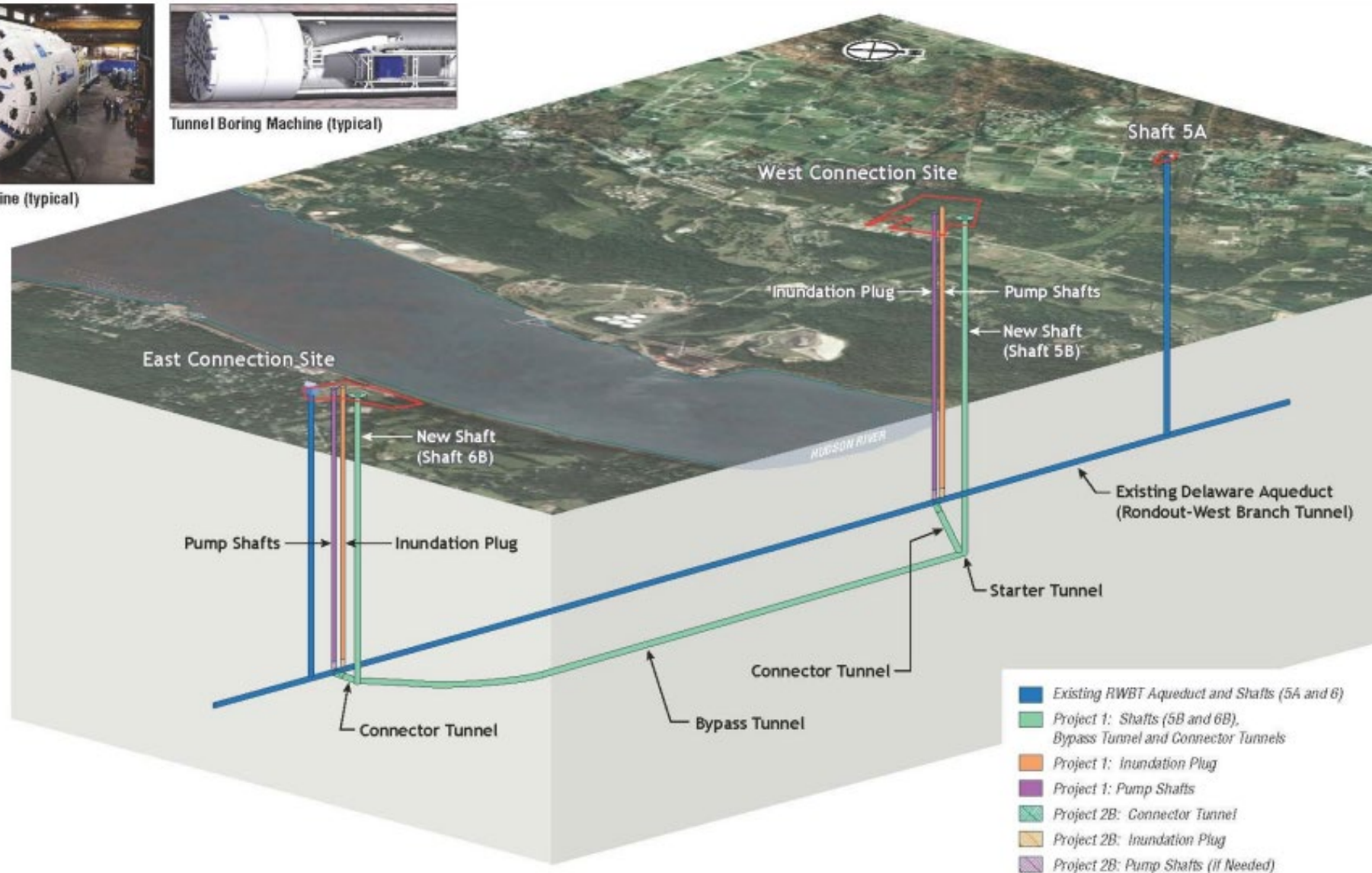
Rondout Bypass Tunnel



Tunnel Boring Machine (typical)



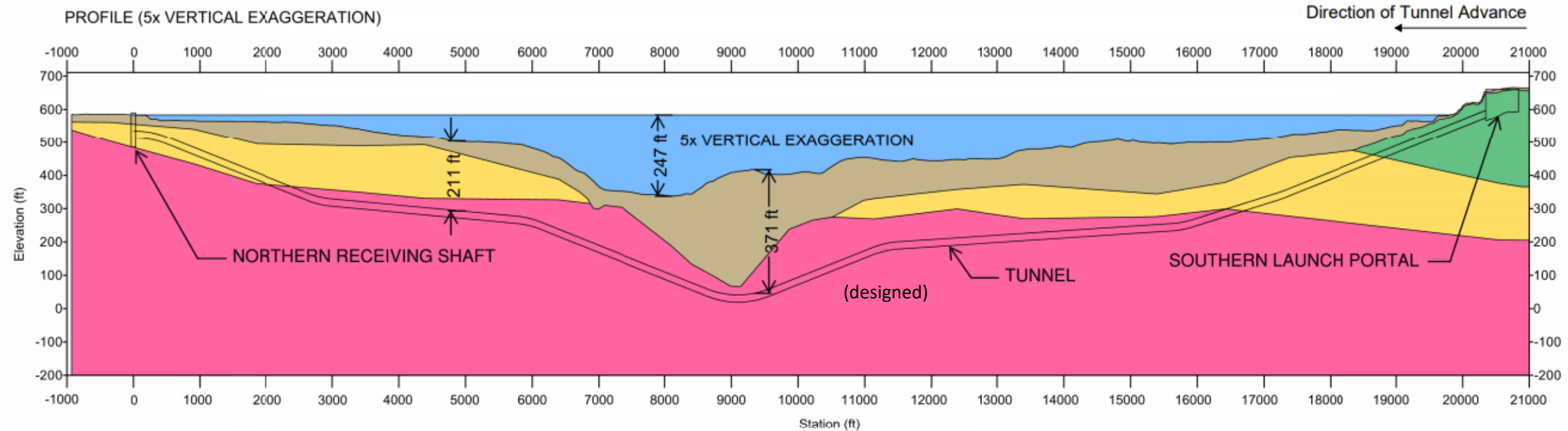
Tunnel Boring Machine (typical)



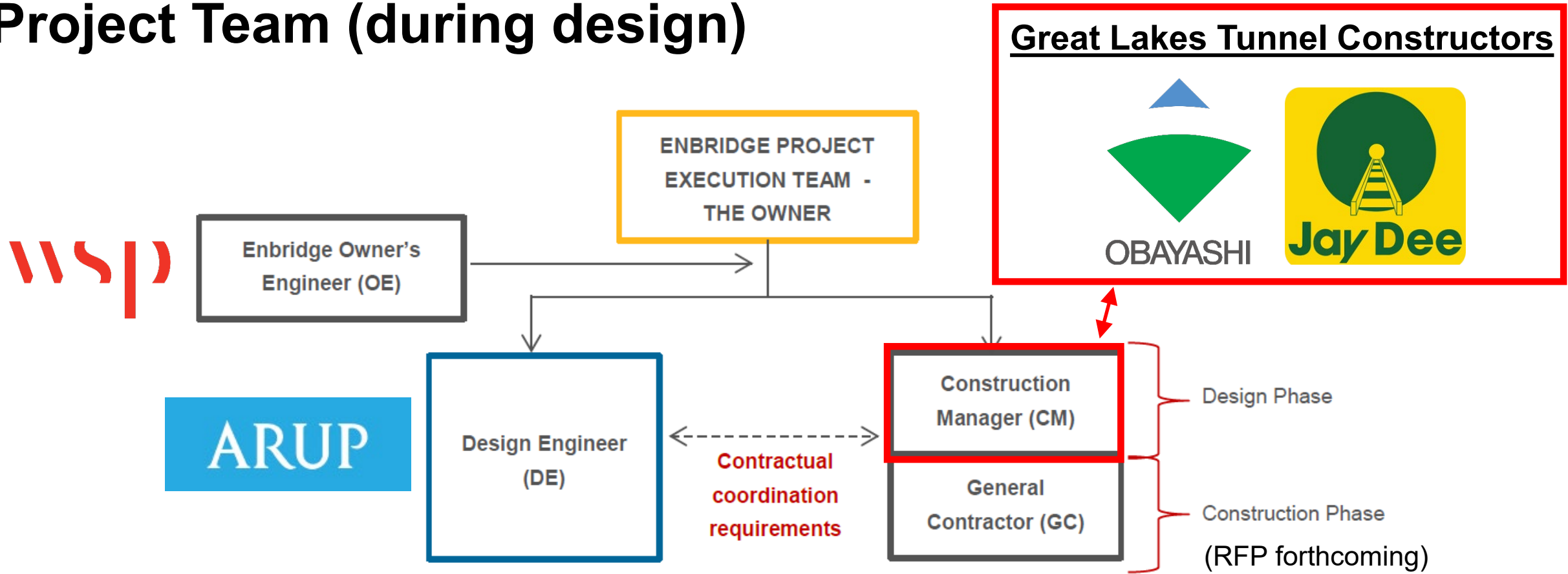
- 22 ft excavated diameter
- 900 ft deep
- Potential 20 bar water pressure

Great Lakes Tunnel Project

- 4 miles long
- ~ 24 ft excavated diameter
- 560 ft deep below water level
- Potential 17 bar water pressure



Project Team (during design)



MSCA / MDOT

- Joint specification development
- Independent quality assurance
- Ownership after tunnel acceptance

Agenda

Time	Topic	Presenter	Board Q&A Time
9:00 - 9:15	Info Session Introduction	Mooney	5 min
9:20 - 9:25	Project Team Introduction	Enbridge	-
9:25 - 9:40	Ground Conditions	WSP	10 min
9:50 - 10:10	Overall Design	Arup	10 min
10:20 - 10:30	Tunnel Lining Design, Construction, Service Life Performance	Arup	10 min
10:40 - 10:50	Break		
10:50 - 11:10	Tunnel Construction	Arup	10 min
11:20 - 11:30	Tunnel Operations	Enbridge	10 min
11:40 - 11:50	RFP and Upcoming Schedule	Enbridge	10 min
12:00	Public Comment		