

March 24, 2021

# Port Lands Flood Protection Project

## How We're Building a New River

Waterfront Toronto

# Transforming the Port Lands



# 5 Key Design Details in Port Lands Flood Protection

1. Cut Off Walls
2. Water Management
3. Horizontal RMM
4. Soil Remediation
5. Ground Improvement

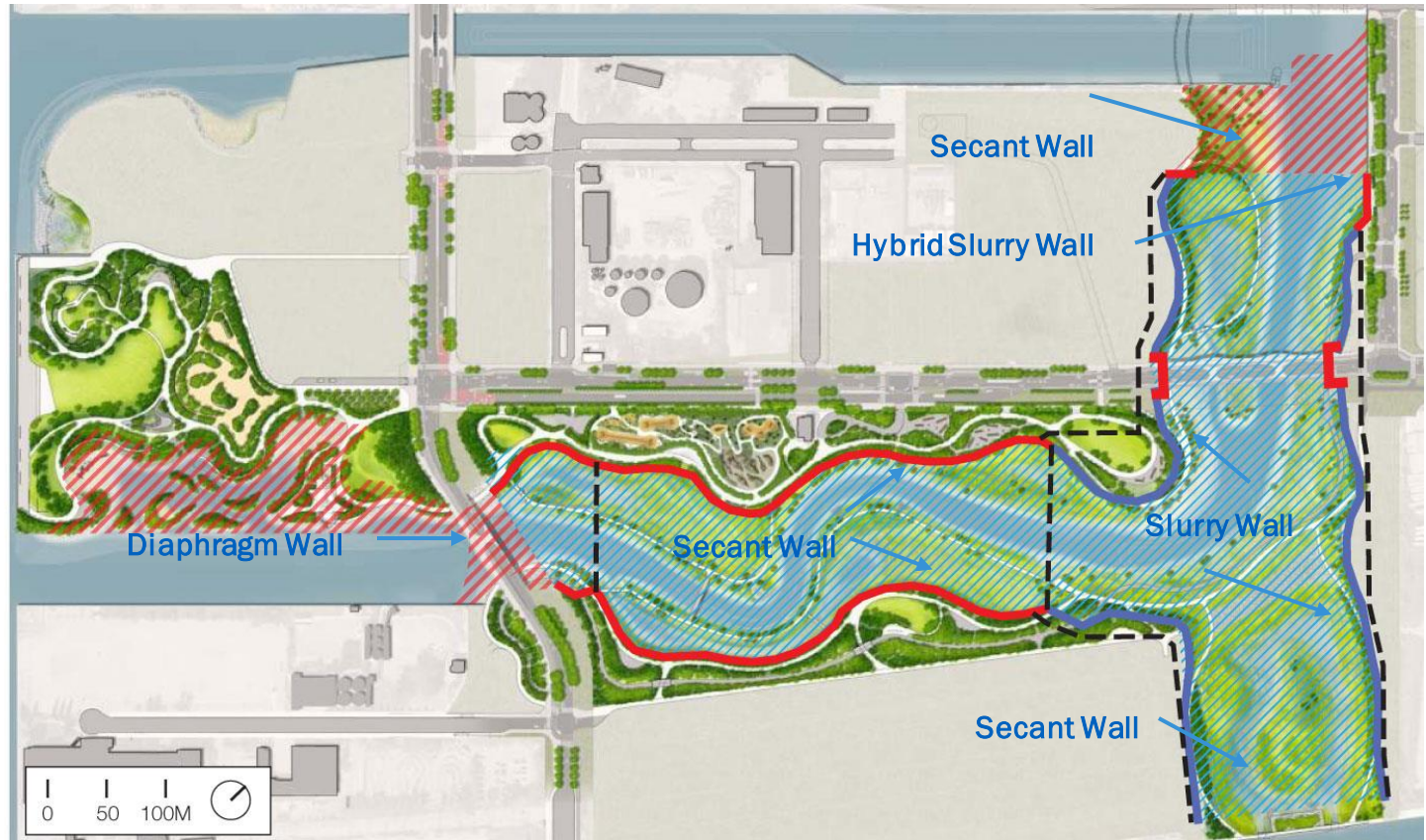


# Cut Off Walls

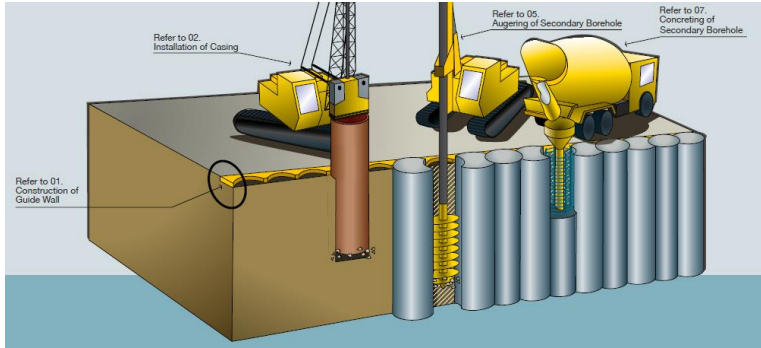
- Design Solutions
  - Secant Pile Walls
  - Slurry Walls
  - Hybrid Walls
  - Diaphragm Walls
  - Clay Plug Vertical RMM



- █ Structural Cut Off Wall/  
Vertical Barrier
- █ Clay Plug Wall  
Vertical Barrier
- Non-Structural  
Cut-Off Wall
- Subaqueous Horizontal  
Barrier
- Geosynthetic Clay Liner  
Horizontal Barrier



# Cut Off Walls – Secant Pile Walls



# Cut Off Walls – Secant Pile Walls

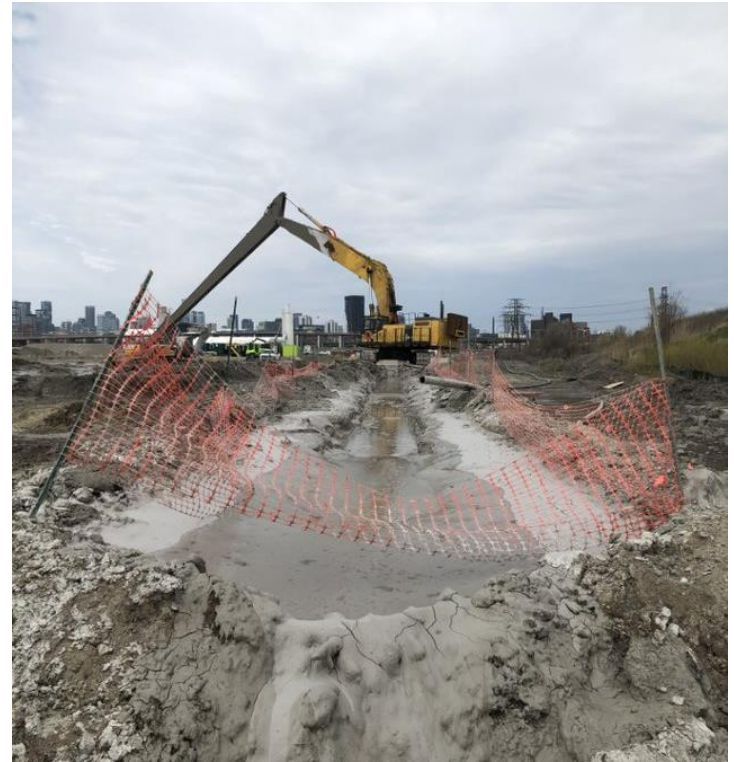
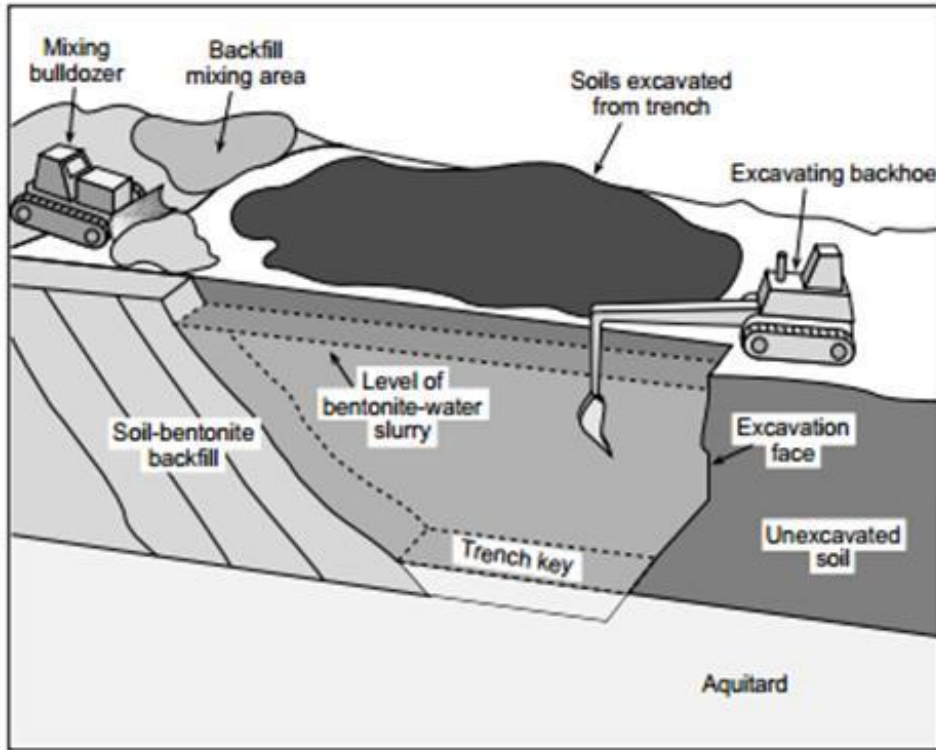


## Cut Off Walls – Secant Pile Walls





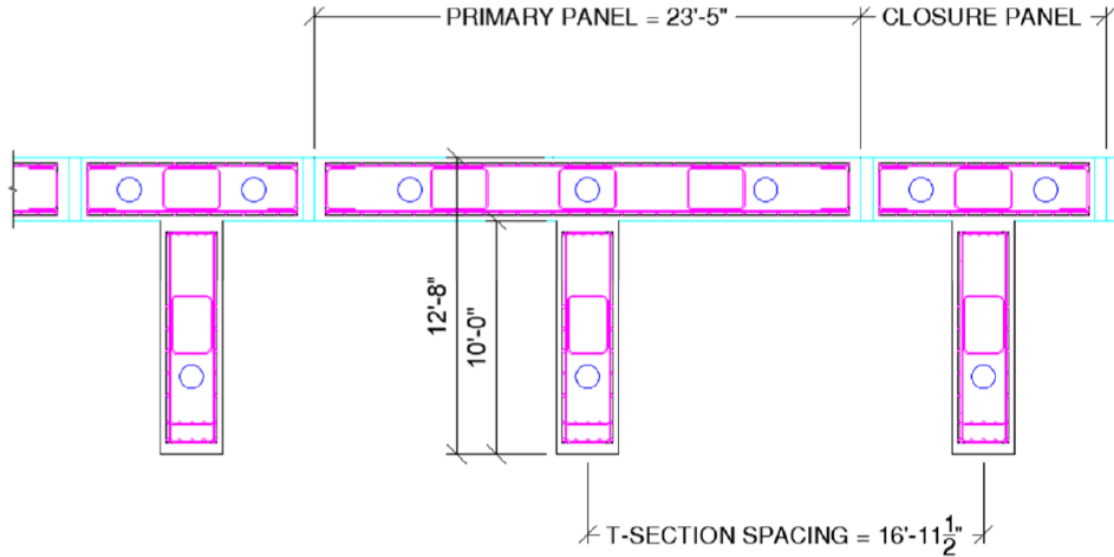
# Cut Off Walls – Slurry Walls



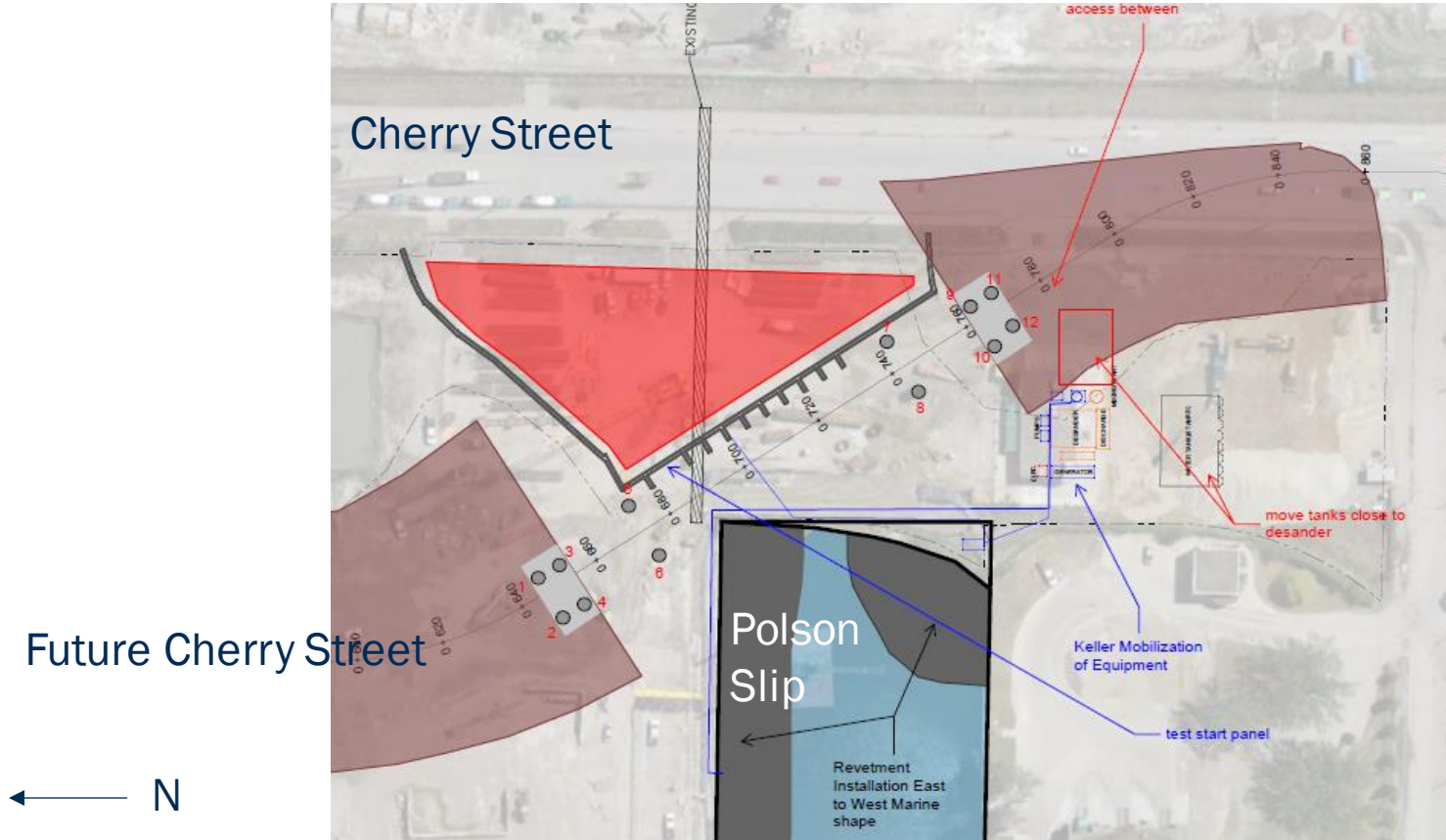
# Cut Off Walls – Hybrid Slurry Walls



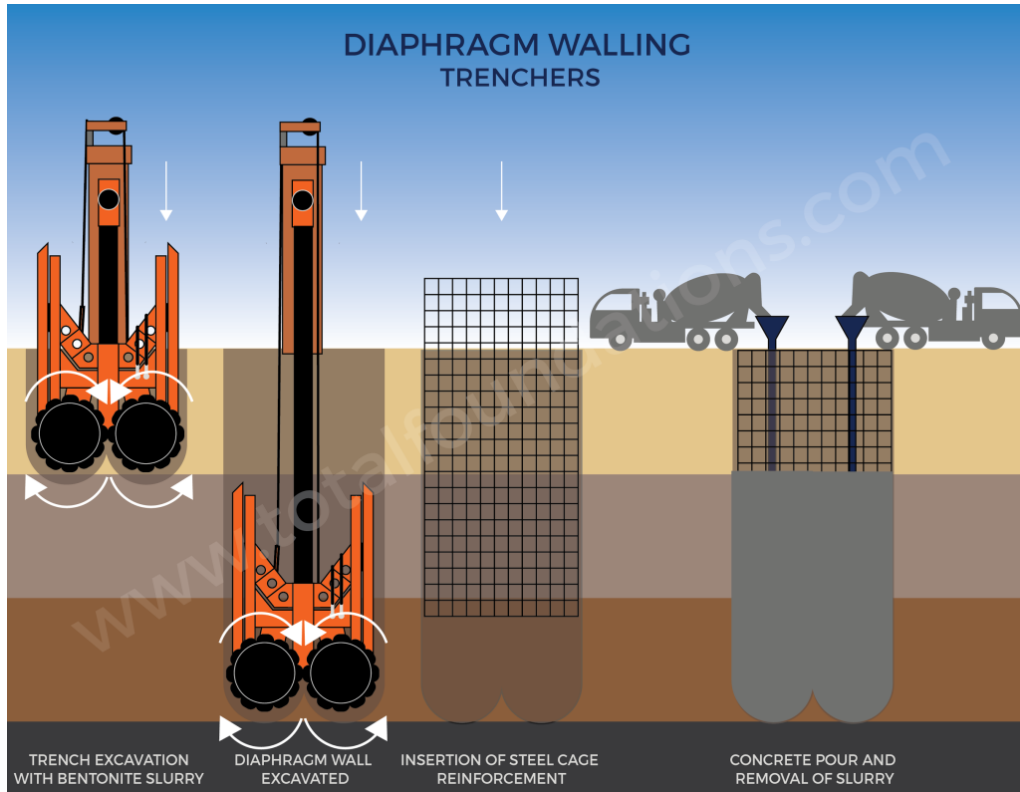
# Cut Off Walls – Diaphragm Walls



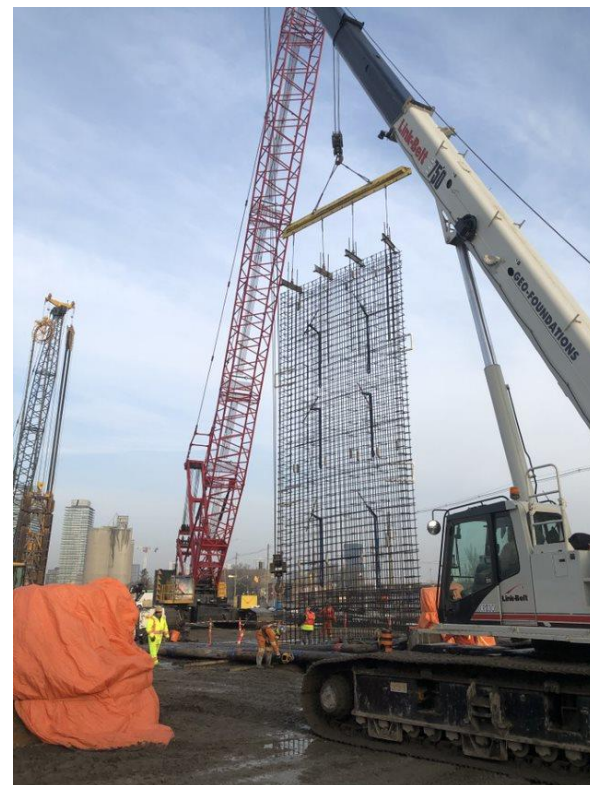
# Cut Off Walls – Diaphragm Walls



# Cut Off Walls – Diaphragm Walls



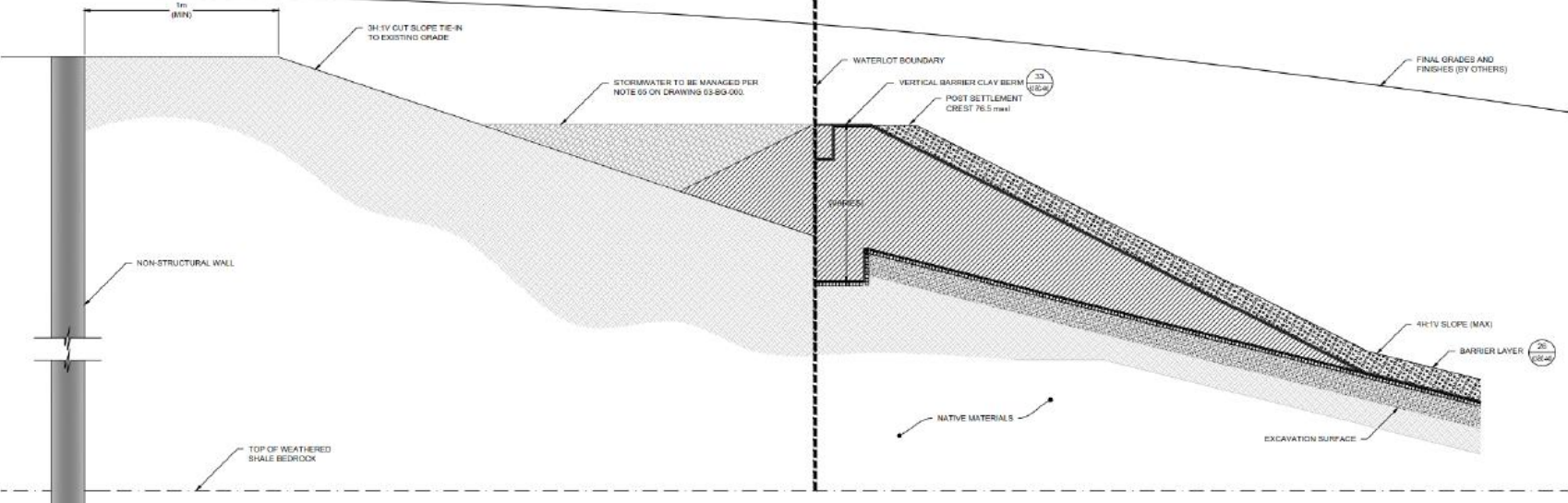
# Cut Off Walls – Diaphragm Walls



# Cut Off Walls – Diaphragm Walls



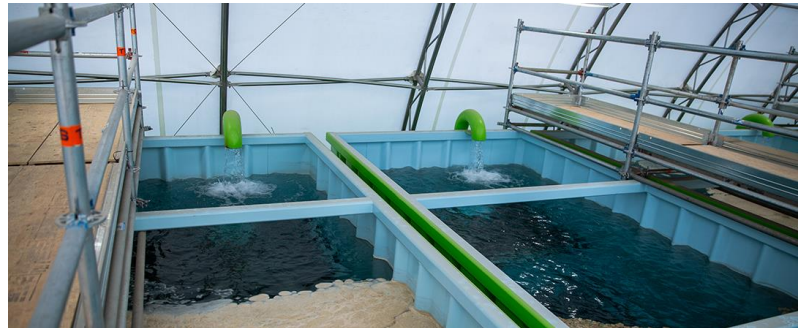
# Cut Off Walls – Clay Plug Vertical RMM



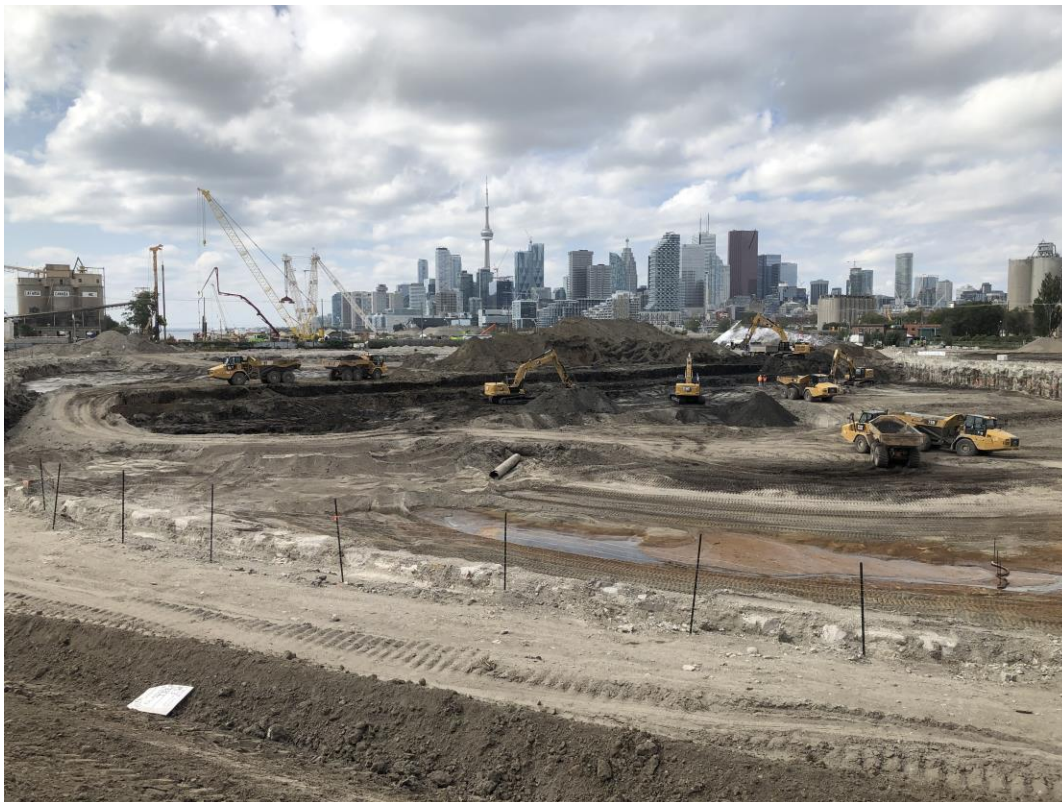


# Water Management

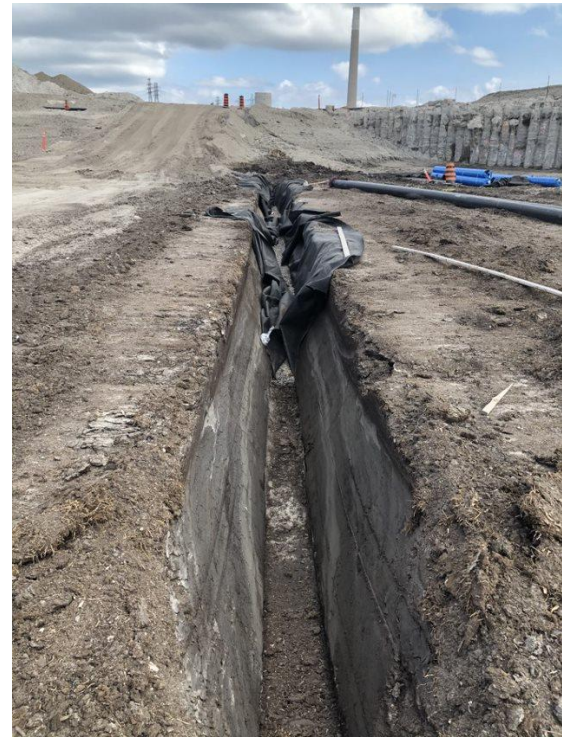
- Design Solution
  - Excavation Dewatering Sumps
  - Underdrain System
  - On-Site Water Treatment System
  - Sequenced Flooding



# Water Management – Underdrain System



# Water Management – Underdrain System

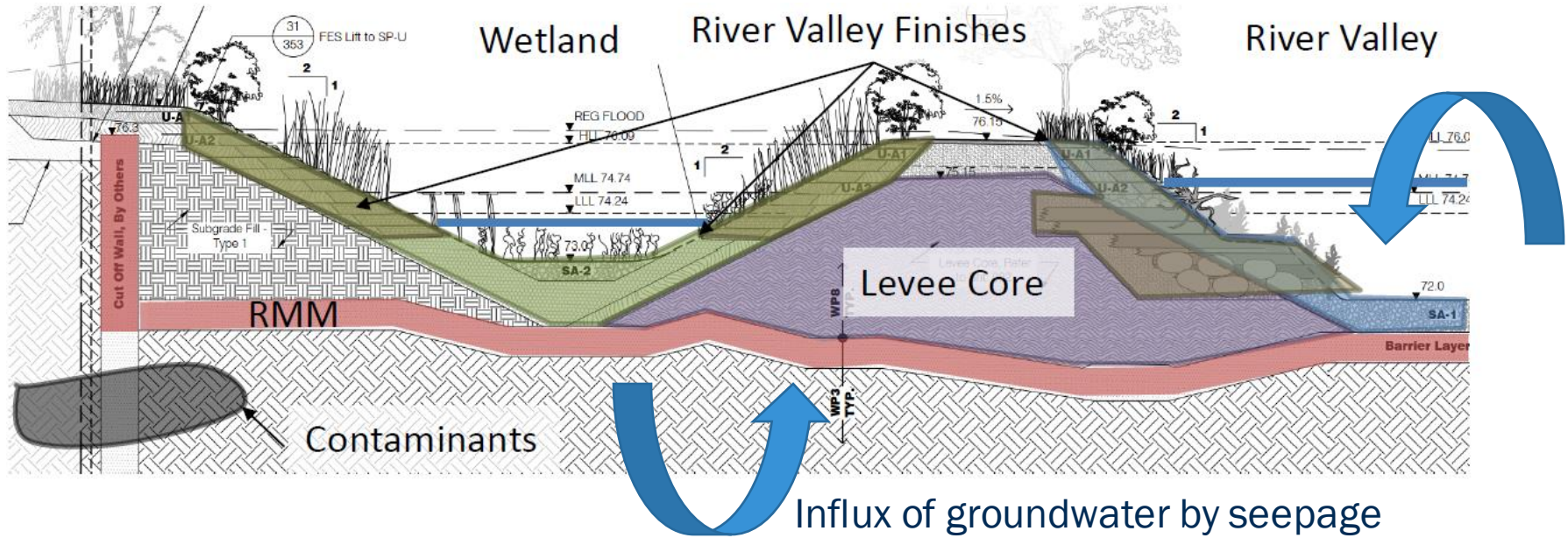


# Water Management – Water Treatment System

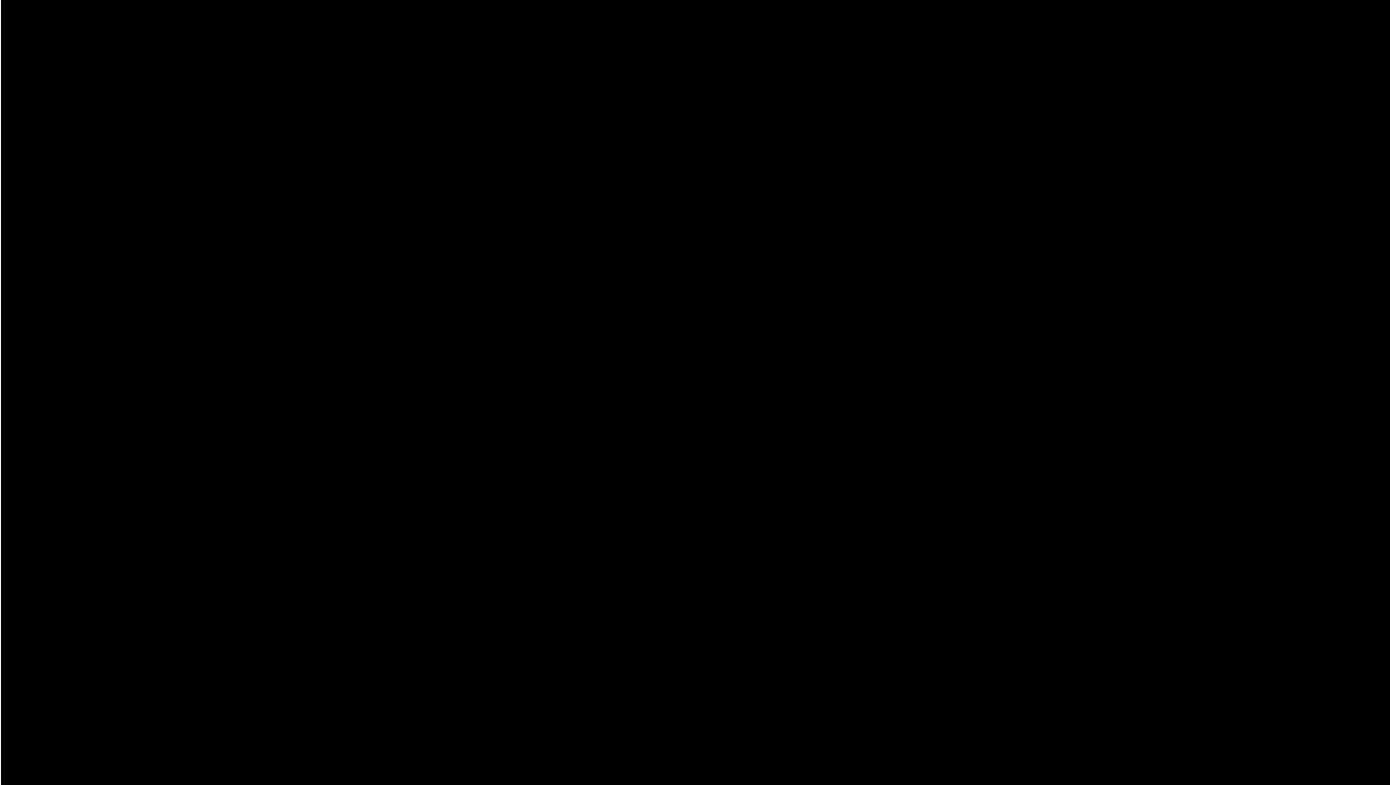


# Water Management – Sequenced Flooding

Filling of river valley with lake water



## Soil Model – Contamination of Excavated Soil






# Horizontal Risk Management Measures



# Horizontal Risk Management Measures

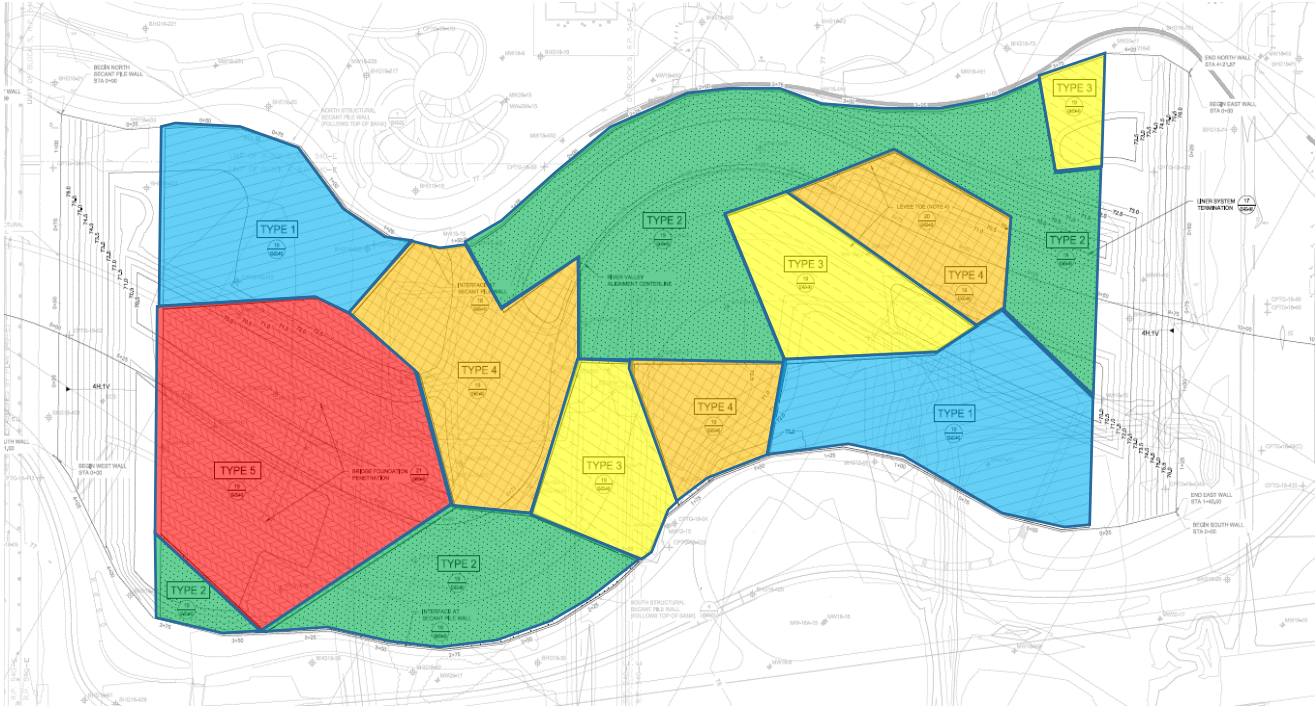
## Horizontal RMM Configurations

-  Sand Cap
-  Sand + Activated Carbon
-  GCL/Geomembrane + Activated Carbon (various dosages)
-  Geomembrane
-  Reactive Core mat (Oleophilic Clay Geocomposite)
-  Sand Cap (RSC)

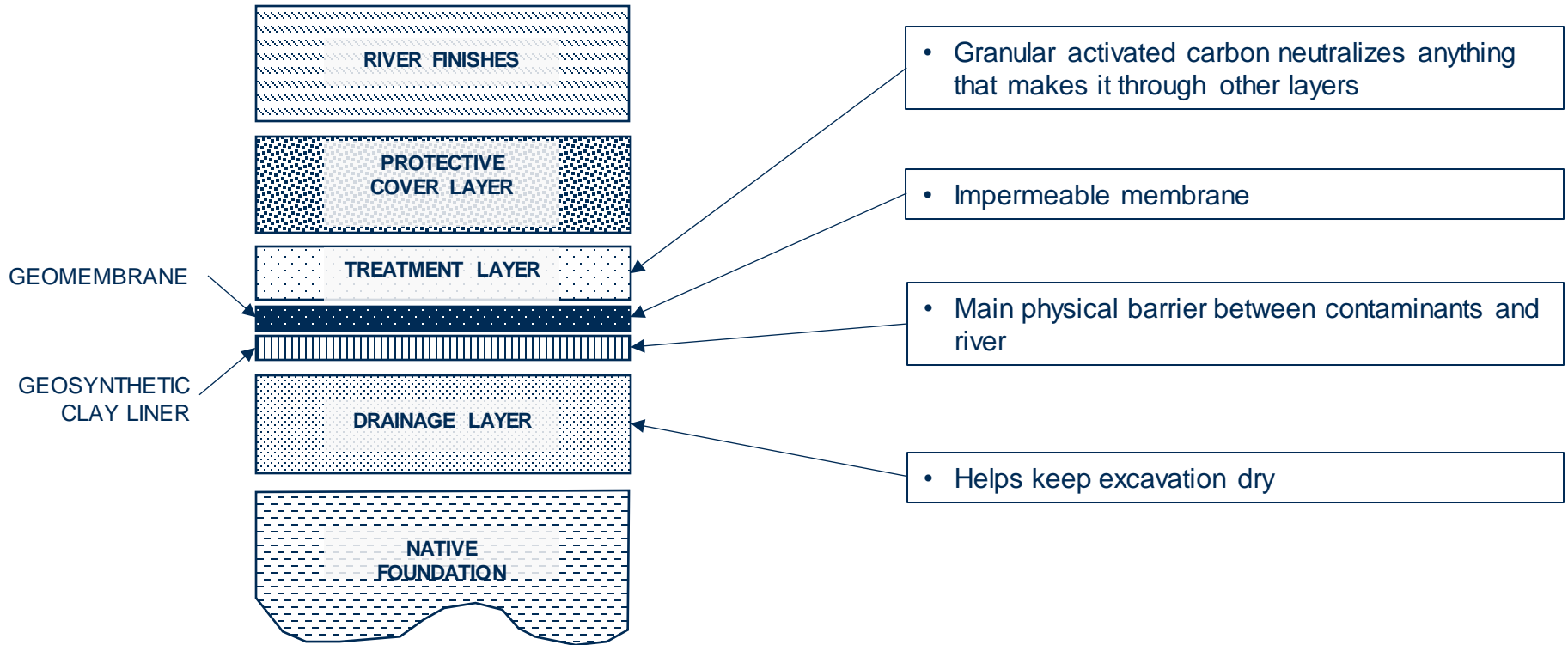




# Horizontal RMM – RTL Dosage Refinement



# Horizontal RMM – Layer Configuration



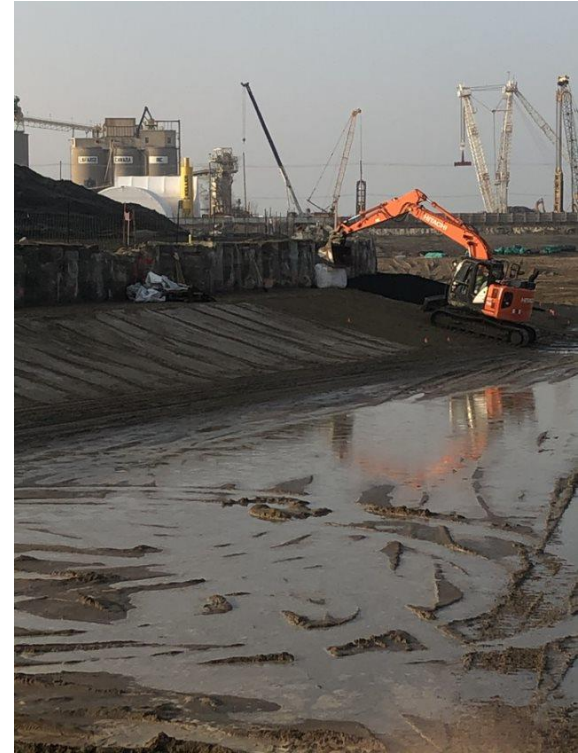
# Horizontal RMM – Implementation



## Horizontal RMM – Implementation



# Horizontal RMM - Implementation



# Horizontal RMM - Implementation



# Soil Remediation

- Design Solution
  - Bioremediation
    - Targeted for use on 210,000 m<sup>3</sup>
  - Star X
    - Targeted for use on 75,000 m<sup>3</sup>
  - Direct Reuse
    - Approximately 800,000 m<sup>3</sup>
  - Off-Site Disposal
    - As little as possible!



# Soil Remediation - Bioremediation





# Soil Stockpiling



## Soil Remediation – STARx



# Ground Improvement

- Design Solutions
  - Surcharging
  - Rigid Inclusions
  - Lightweight Fill
  - Geogrid



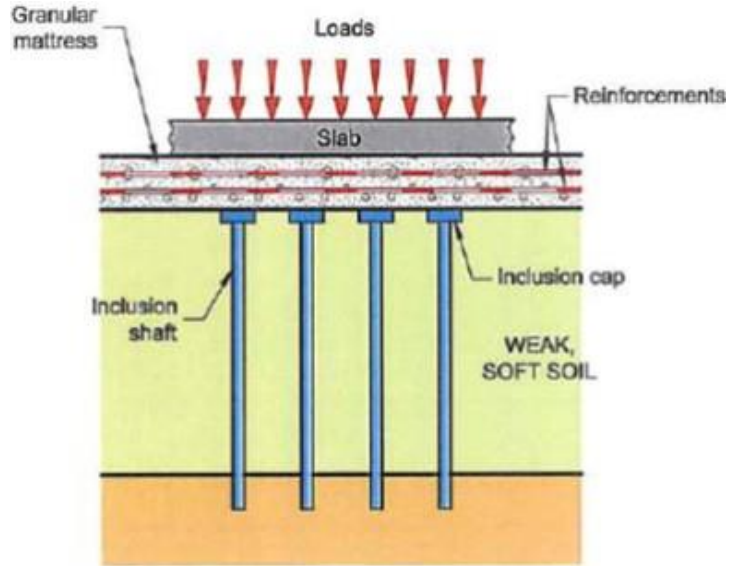
# Ground Improvements - Surcharging



# Ground Improvement - Surcharging



# Ground Improvement – Rigid Inclusions



# Ground Improvement – Lightweight Fill & Geogrid



- Geofabric
- Cellular Concrete





# Thank you.

[info@waterfrontoronto.ca](mailto:info@waterfrontoronto.ca)

Waterfront Toronto  
20 Bay Street, Suite 1310  
Toronto, ON M5J 2N8  
[www.waterfrontoronto.ca](http://www.waterfrontoronto.ca)

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