



RESPOND. RECLAIM. RENEW.

**HOW DO YOU DROWN A TREE?
AND OTHER UNIQUE AND CHALLENGING CONSTRUCTION ASPECTS**

**PORT LANDS FLOOD PROTECTION
AND ENABLING INFRASTRUCTURE PROJECT**

REMTECH EAST 2023
MAY 31, 2023

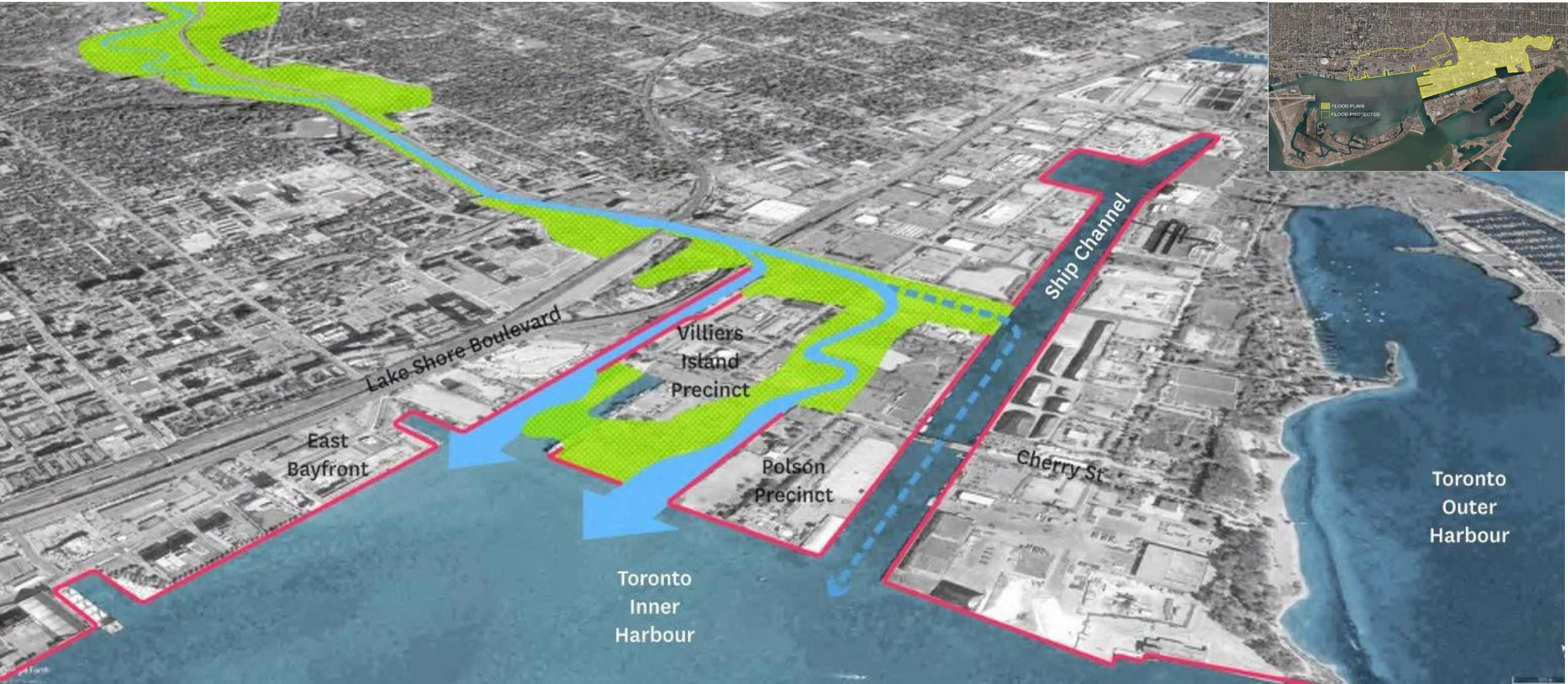
INTRODUCTION



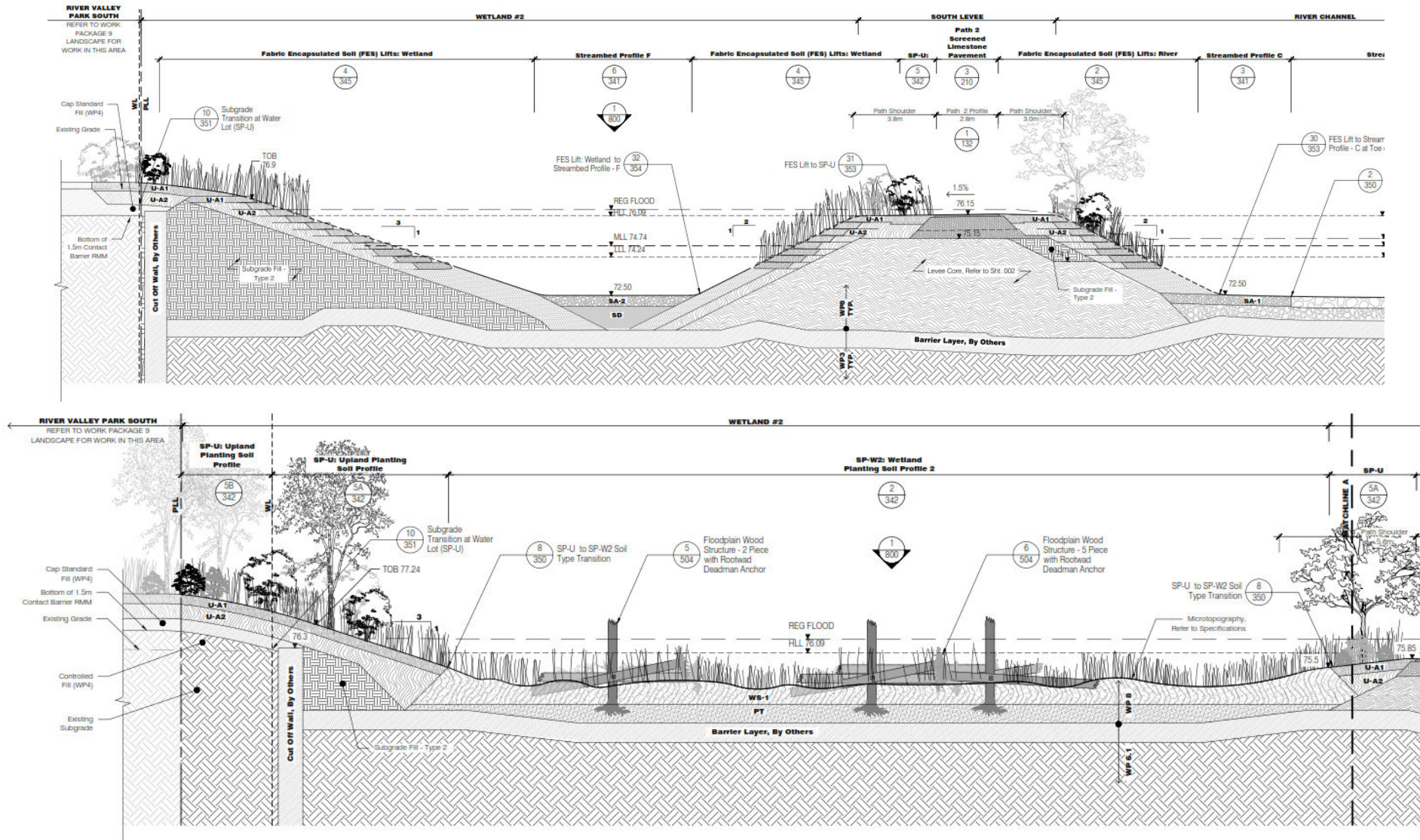
- **Large scale infrastructure projects** are becoming **more complex and frequent**. They are almost all highly **multi-disciplinary** in terms of scope integration and execution.
- Their **frequency** in the future will become greater as the population of earth increases and that population grapples with climate change through **resiliency** infrastructure and the application of **natural based solutions**.
- Construction of these projects is considerably more challenging as their designs become more sophisticated and integrated. Pulling off these projects will **require innovation and creative thinking** from all stakeholders in the face of new, complex, and the logistically impossible.

This presentation intends to give you a contractor's perspective on triumphs and lessons learned on delivering unique and complex elements of a large-scale multidisciplinary climate resiliency waterfront infrastructure project.

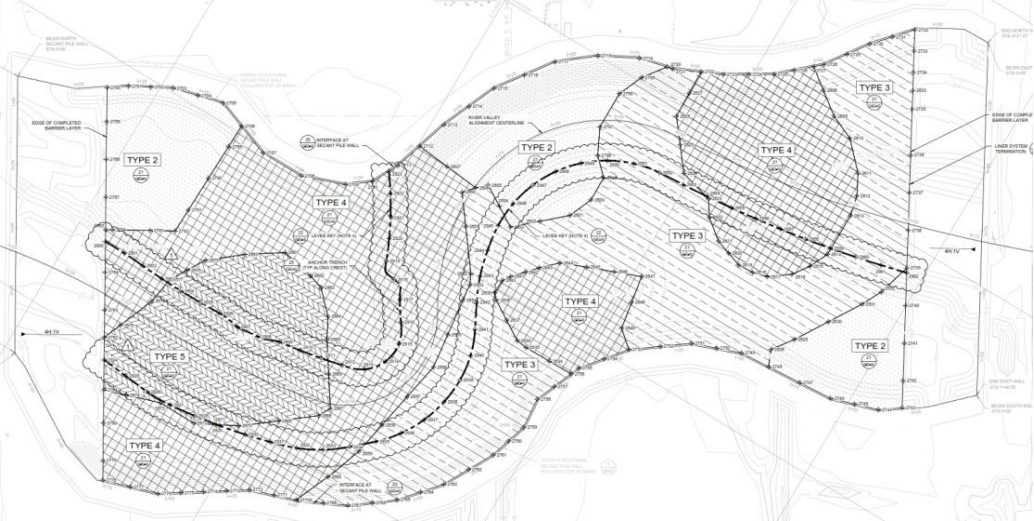
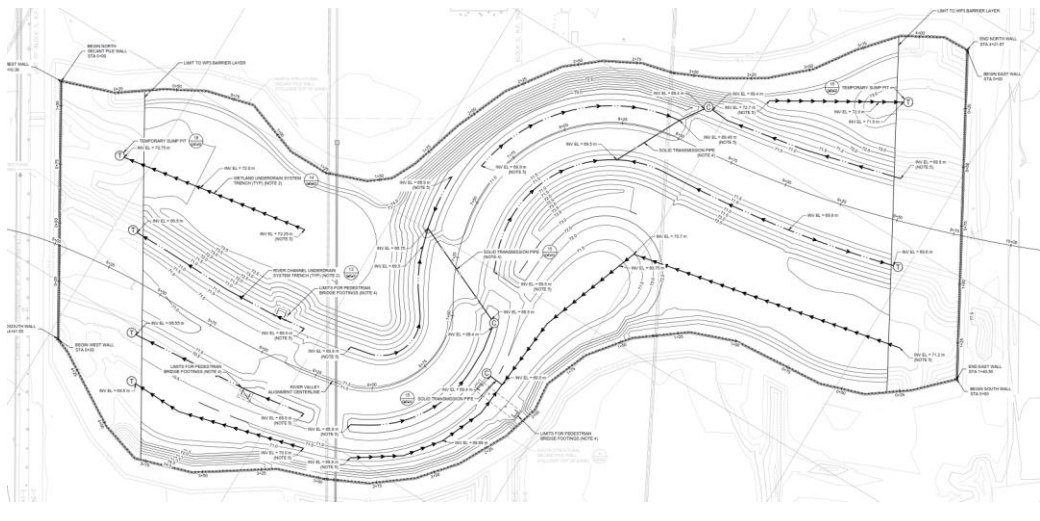
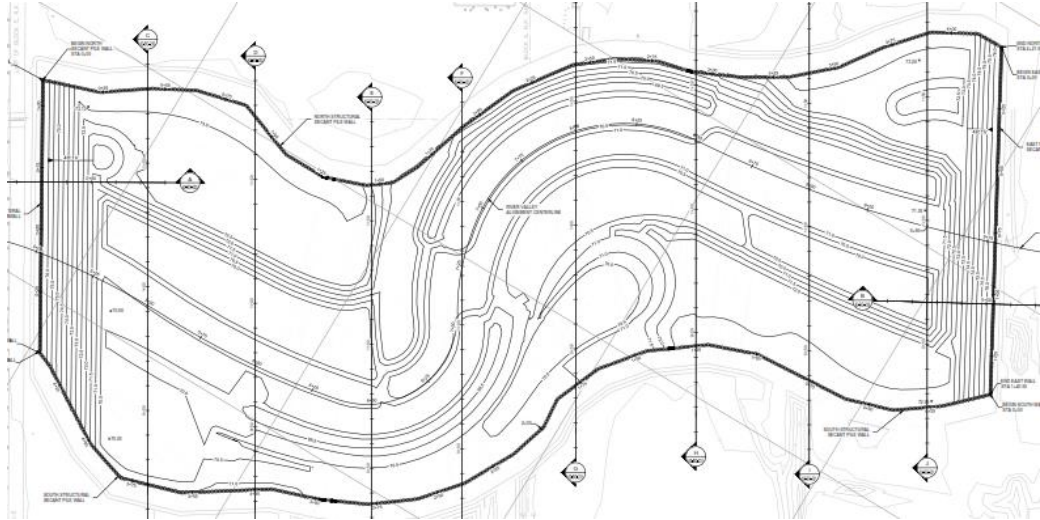
PROJECT OBJECTIVES



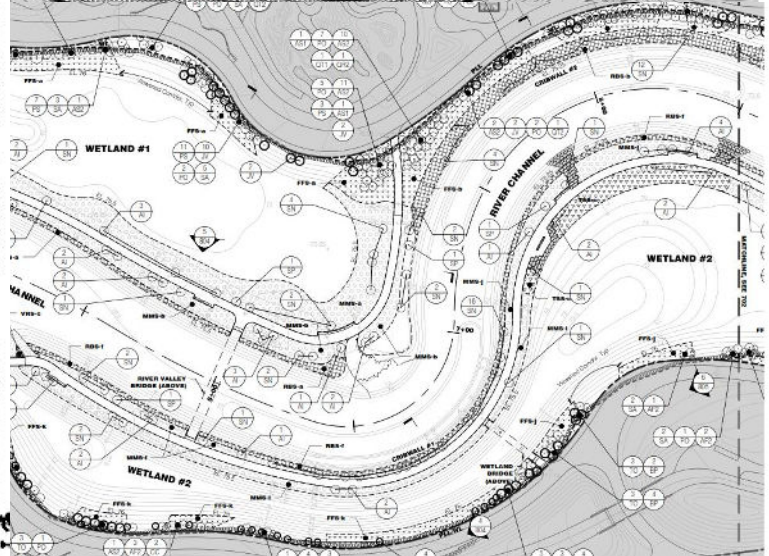
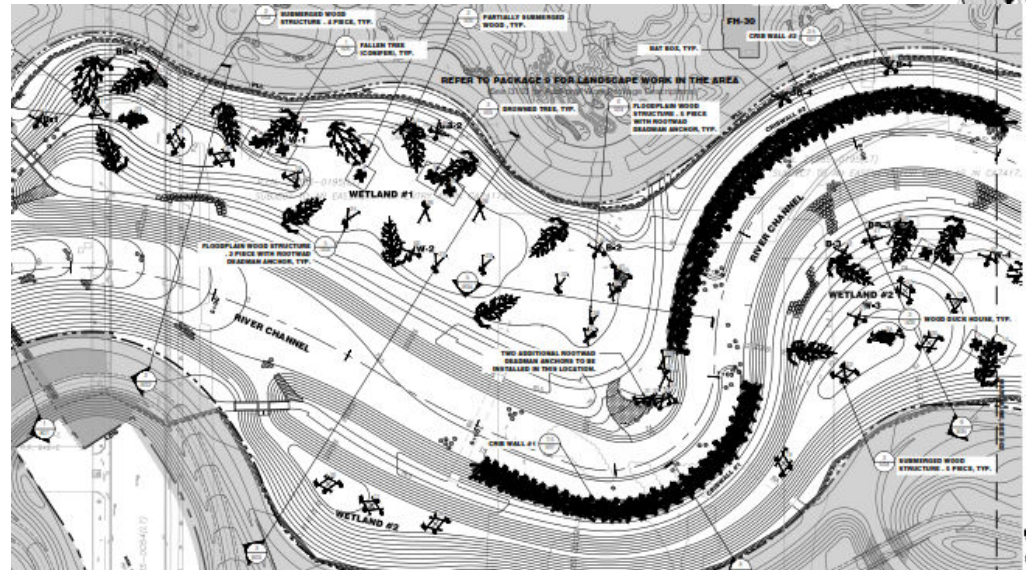
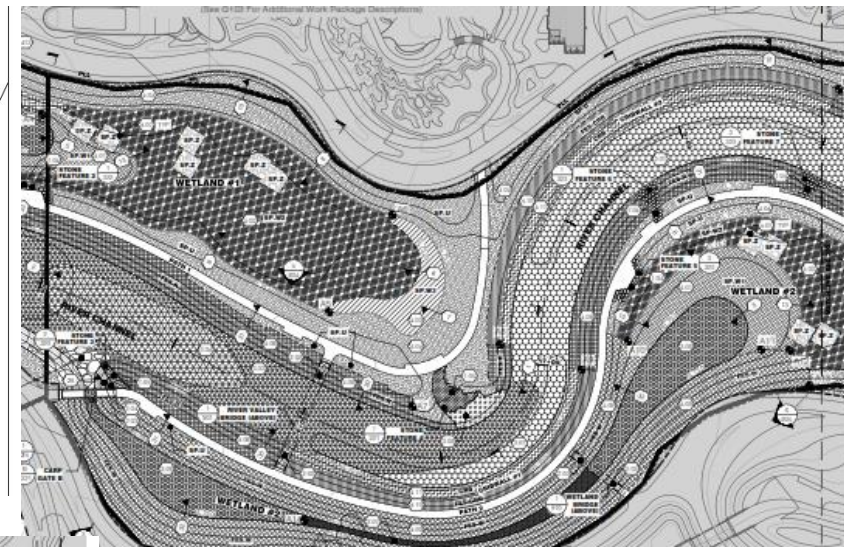
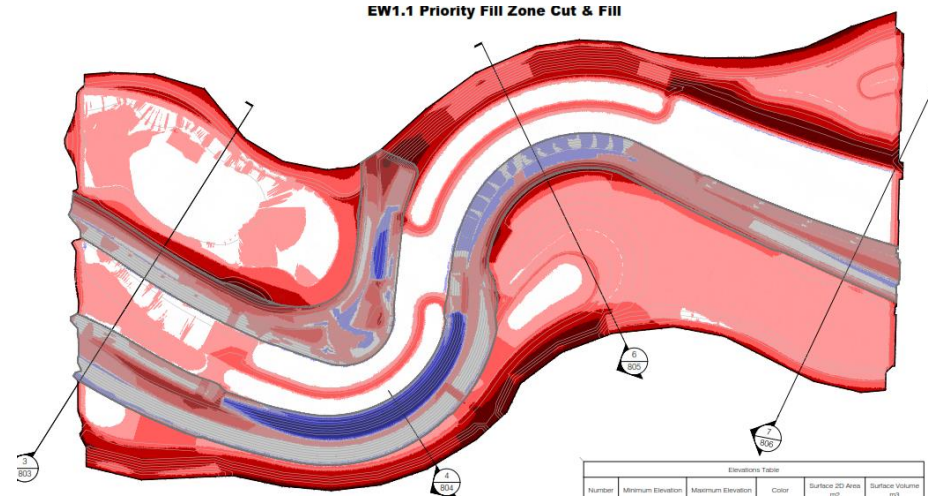
CROSS SECTION OF DESIGN



LAYERS OF THE CAKE

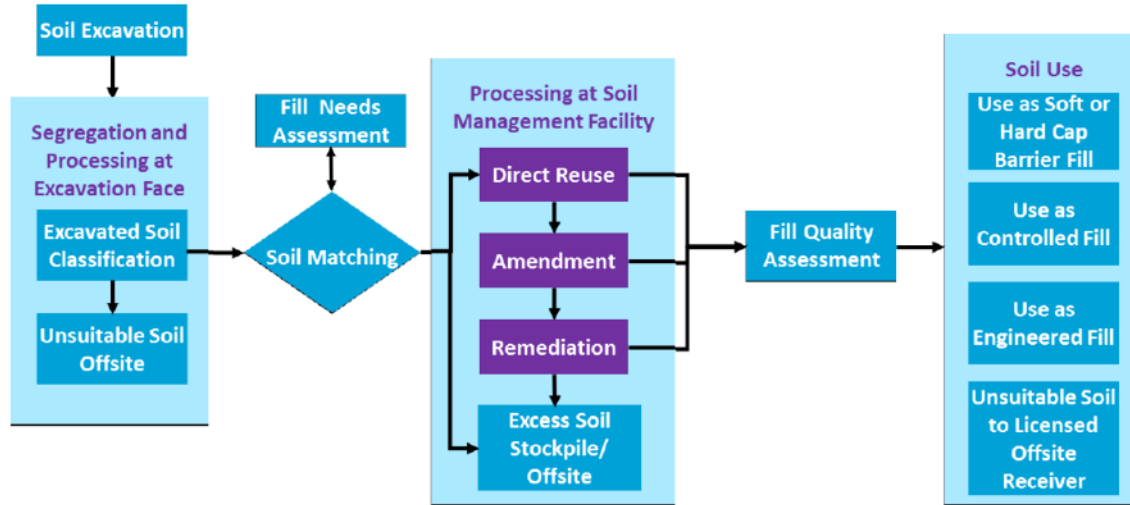


LAYERS OF THE CAKE



Confidential

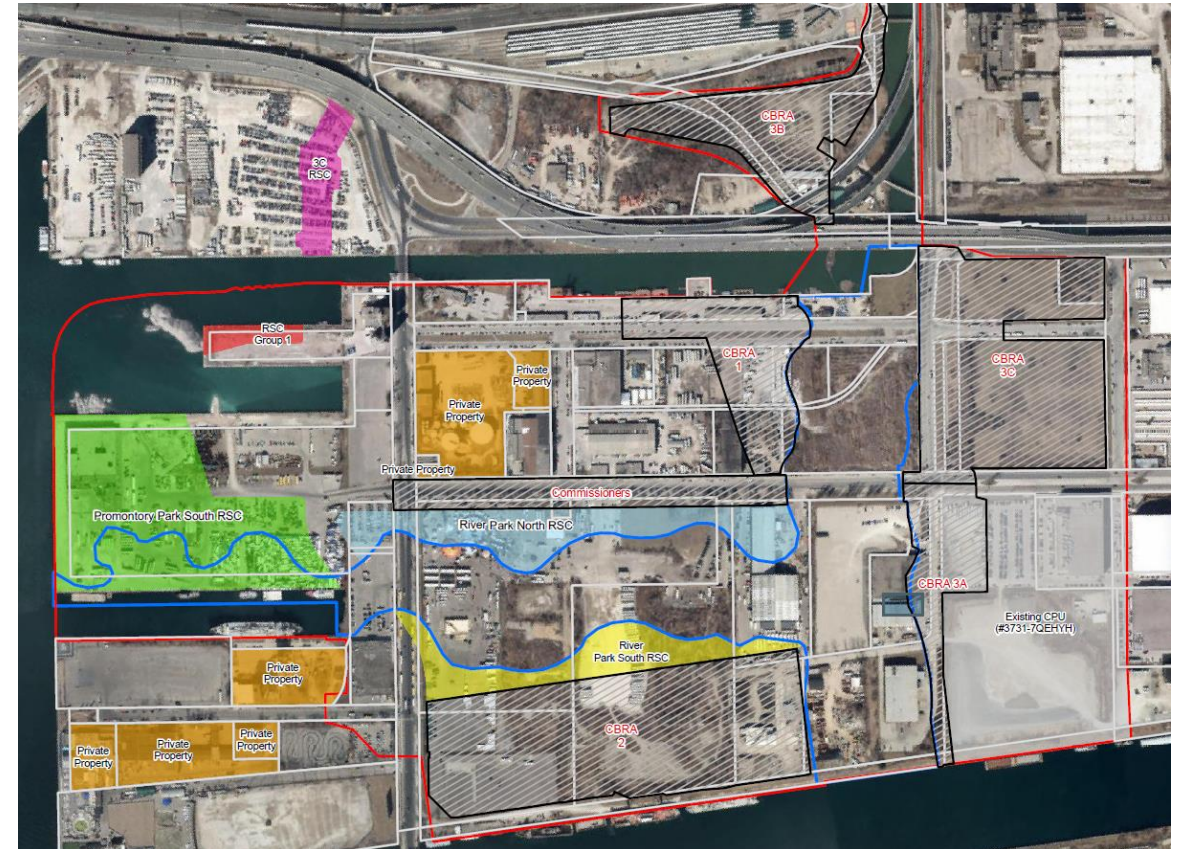
SOIL REUSE CRITERIA & CBRAS



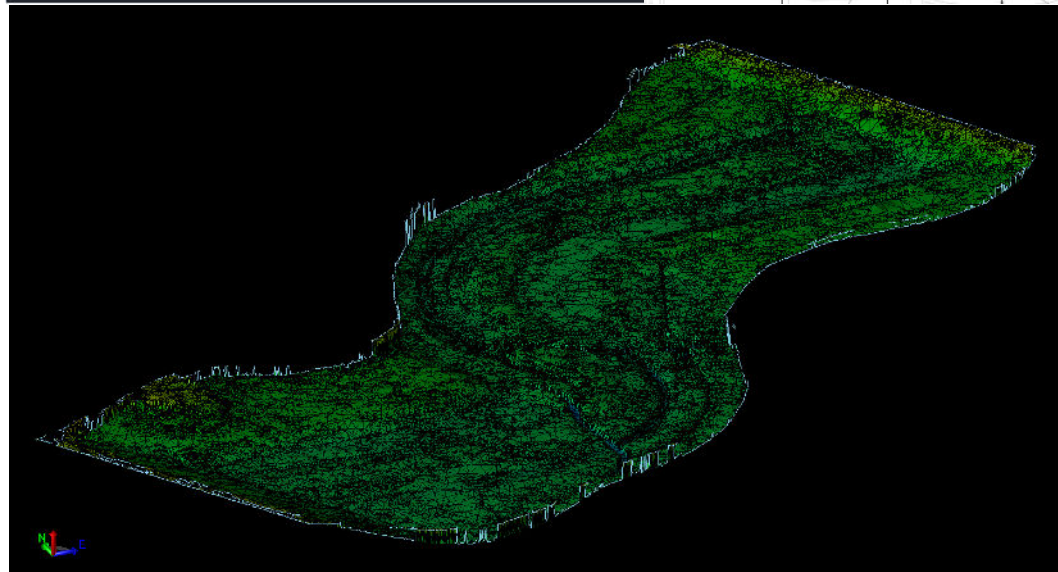
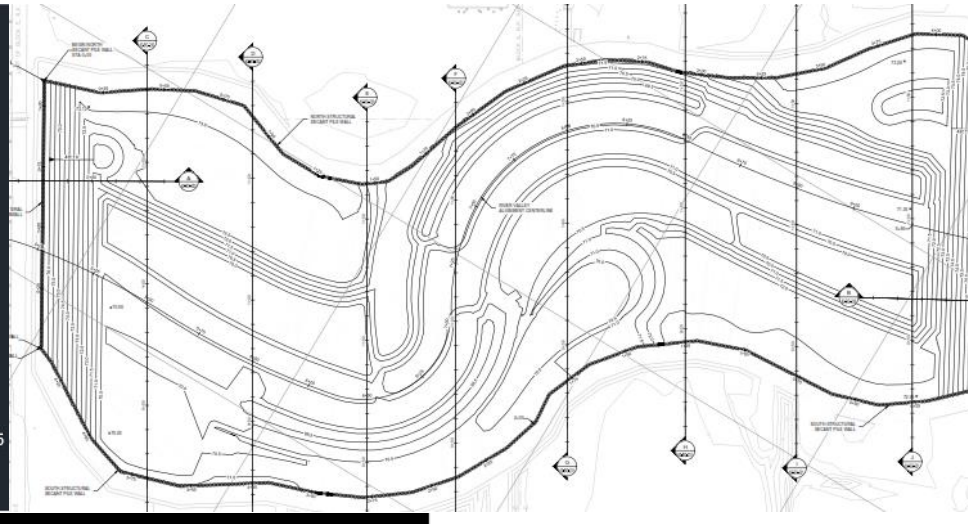
PLFPEI Soil Management Plan, Jacobs (2019)

.2 Digital tracking will include, at a minimum, the following time-stamped criteria for each truck used to move soil or debris material from or within the excavation area shown in the drawings or otherwise identified, commencing with the excavation of source material from the excavation area, and/or the placement of material in a temporary stockpile:

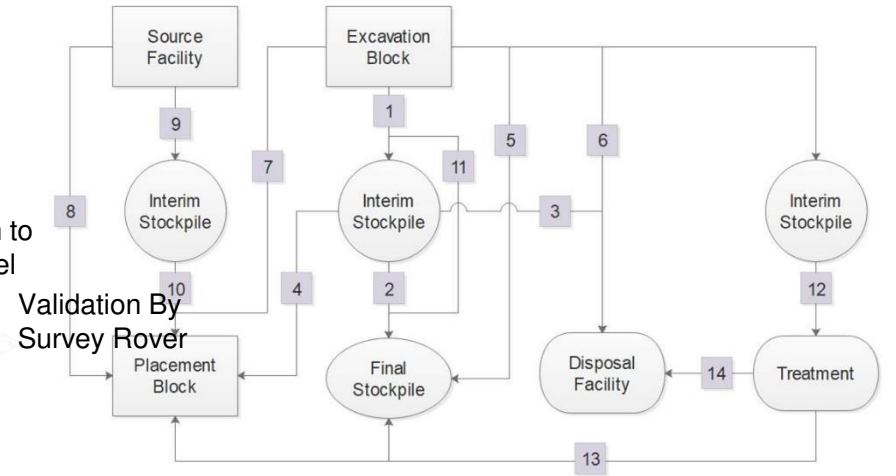
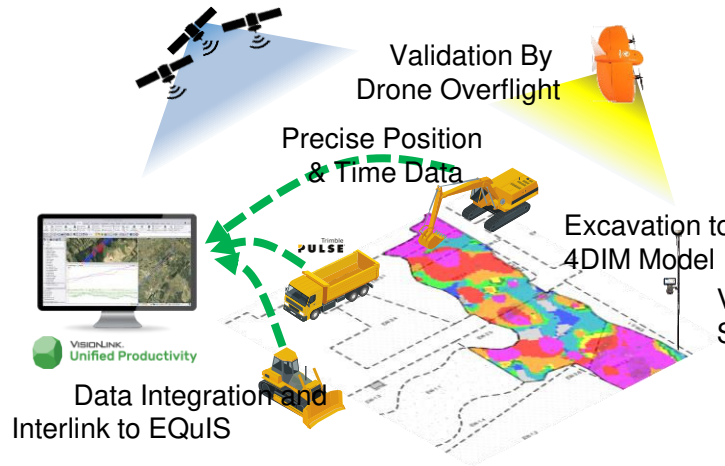
- .1 Unique haul truck identification such as license plate number, registration number or Ministry approval number.
- .2 Load source location (GPS with submeter accuracy coordinates or origin identification), including depth and/or elevation range.
- .3 Load volume.
- .4 Qualitative assessment by Subcontractor of the moisture content (e.g., wet, dry, moist, etc.)
- .5 Load soil type (e.g., sand, fill, silt, etc.)
- .6 Load source soil excavation category as defined on Drawing 4-E-1
- .7 Drop location (spatial coordinates of fill placement) and approximate lift thickness and elevation.



1. A "MODEL" EXCAVATION



2. TRACKING – FACE TO PLACE



VISIONLINK 3D Productivity Manager

Current Week (06/28/21 - 06/30/21)

Hide Quality Metrics

Cut/Fill

Recalculate Volumes

This is how much work was completed.

From: <Current Filler> 06/28/21 12:00 AM
To: <Current Filler> 06/30/21 07:36 AM

GOLDER PLFP Soil Tracking

Reference Links

Stockpile Summary

| STOCKPILE ID | GENW APPROVALS | LEADW APPROVALS | GENEWH APPROVALS | TREATMENT APPROVALS | |
|----------------------|----------------|-----------------|------------------|---------------------|---------|
| EW1_1_A001_3T002_B01 | X | X | X | X | Samples |
| EW1_1_A001_3T001_B00 | X | X | X | X | Samples |
| EW1_1_A001_3T007_B06 | X | X | X | X | Samples |
| EW1_1_A001_3T003_B05 | X | X | X | X | Samples |
| EW1_1_A001_3T003_B16 | X | X | X | X | Samples |
| EW1_1_A001_3T003_B17 | X | X | X | X | Samples |
| EW1_1_A001_3T003_B17 | X | X | X | X | Samples |
| EW1_1_A001_3T004_B06 | X | X | X | X | Samples |

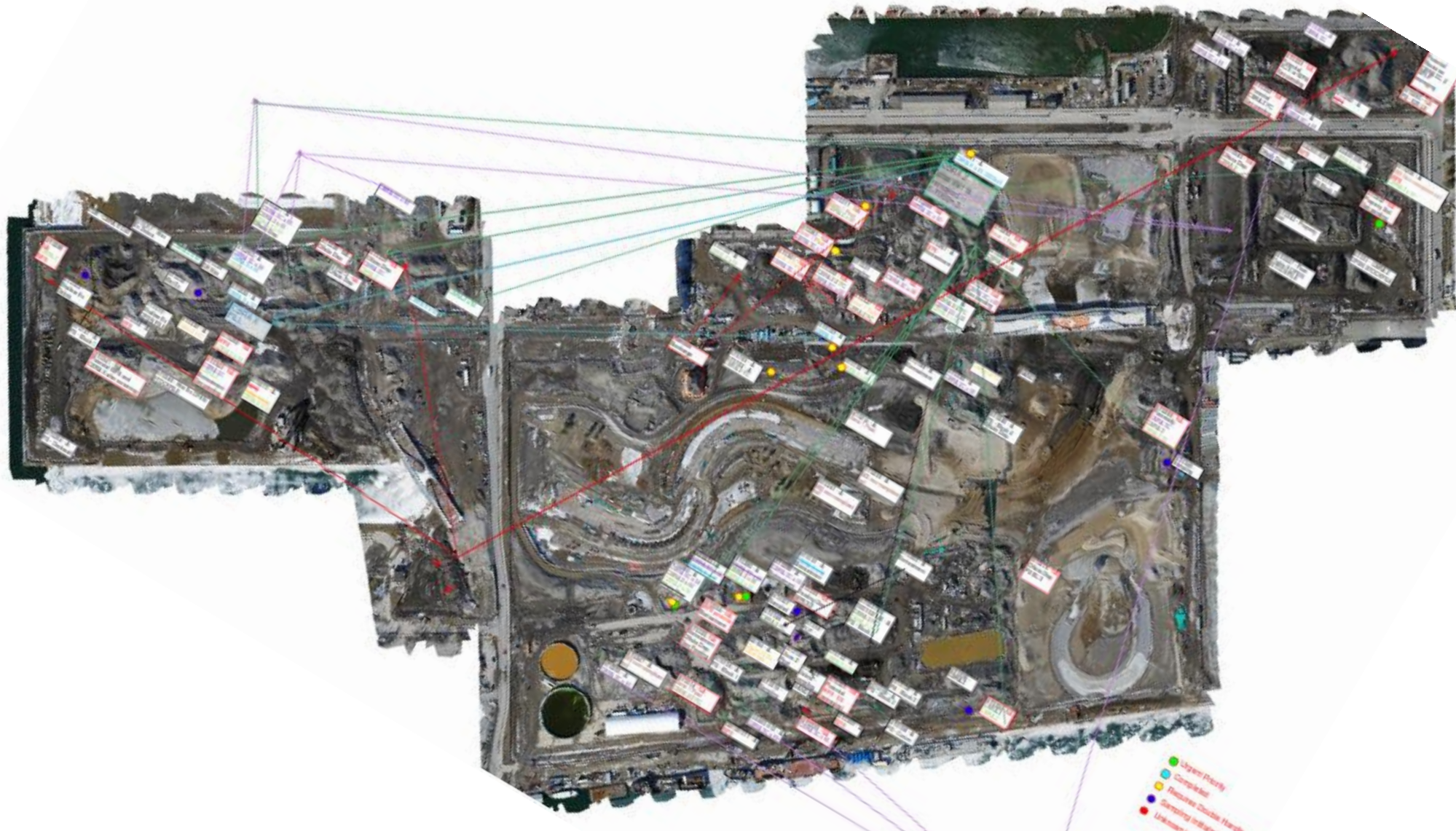
SYSTEM ACTIVITY REPORTING

| Block/Location | Earthwork Area | Municipal Address | Line Item | Empty State/Time | Reason | Block ID | Earthwork Area | Ticket Number | Ticket Sub | Ticket Weight (Metric Tons) |
|----------------|----------------|-----------------------|-----------|---------------------|-------------------------|----------|----------------|---------------|------------|-----------------------------|
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 09:31:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 09:22:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 10:03:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 10:14:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 10:29:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 10:37:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 11:01:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 11:47:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 12:00:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 12:16:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 12:32:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| WA 2-C | EW 2.4 | 7500 Commissioners St | 851 | 2021-06-07 12:46:00 | Excavation to Stockpile | PO042 | EW 2.4 | | | |
| placement-01 | EW 1.4 | 100 Commissioners St | 410 | 2021-06-07 13:07:00 | Excavation to Stockpile | T0049 | EW 1.2 | | | |
| placement-01 | EW 1.2 | 100 Commissioners St | 410 | 2021-06-07 13:16:00 | Excavation to Stockpile | T0049 | EW 1.2 | | | |
| placement-01 | EW 1.0 | 100 Commissioners St | 410 | 2021-06-07 13:30:00 | Excavation to Stockpile | T0049 | EW 1.0 | | | |
| placement-01 | EW 1.4 | 100 Commissioners St | 410 | 2021-06-07 13:38:00 | Excavation to Stockpile | T0049 | EW 1.2 | | | |

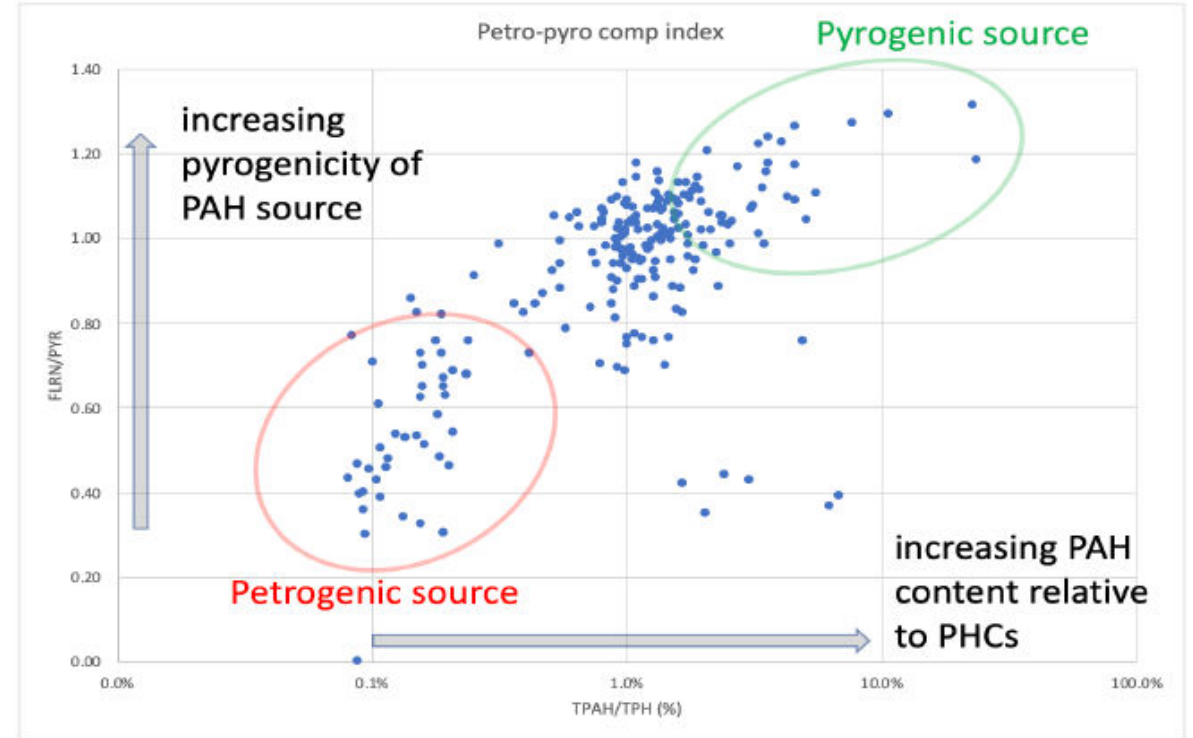
3. PREVENTING GCL HYDRATION



5. SEQUENCING PUZZLE



6. PAH VARIABILITY SLOT MACHINE



7. BALANCING THE MASS

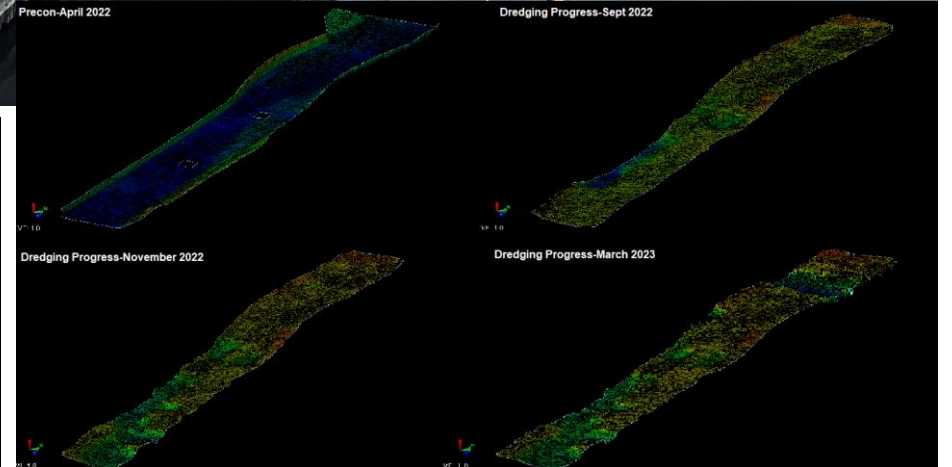
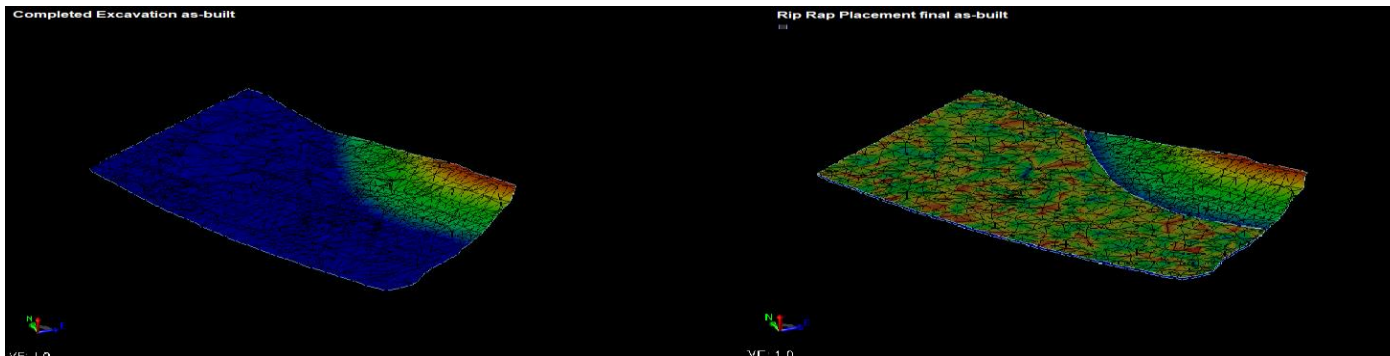


| QP Classification | Earthwork Area | Placed Survey Volume (m3) - Characterized Soil + Property Soil | Stockpiled in Placement EW To Be Placed (m3) | Characterized Used as Surcharge (m3) | Characterized - Awaiting Placement Volume (m3) | Waiting Approval Volume (m3) | Total Estimated Volume | Design Volume | Estimated Quantity Remaining/Needed |
|---|-----------------------|---|---|---|---|-------------------------------------|-------------------------------|----------------------|--|
| Package 8 Confined Fill | 1.1/2.1/2.2/2.4 | 80,733 | | - | 12,276 | - | 93,009 | 99,723 | 6,714 |
| Package 8 Confined Fill | 1.1 | 21,980 | - | - | - | - | 21,980 | 26,736 | 4,756 |
| Package 8 Confined Fill | 2.1 | 27,700 | - | - | - | - | 27,700 | 28,352 | 652 |
| Package 8 Confined Fill | 2.2 | 10,818 | - | - | - | - | 10,818 | 11,052 | 234 |
| Package 8 Confined Fill | 2.4 | 20,235 | - | - | - | - | 20,235 | 21,583 | 1,348 |
| Package 8 Confined Fill (Plugs) | 6.1 | - | - | - | 11,649 | - | 11,649 | 12,000 | 351 |
| CBRA X | 1.7/1.9 | 32,197 | 300 | 9,681 | 5,738 | - | 47,916 | 41,759 | (6,157) |
| CBRA X | 1.7 | 25,085 | - | - | - | - | 25,085 | 32,014 | 6,929 |
| CBRA X | 1.9 | 7,112 | 300 | - | - | - | 7,412 | 9,745 | 2,333 |
| CBRA 3C | 5.3/5.4 | 37,643 | 21,393 | 2,942 | 8,651 | - | 70,629 | 113,092 | 42,463 |
| CBRA 3C + Property Block 625 | 5.3 | 22,019 | 400 | - | - | - | 22,419 | 28,217 | 5,798 |
| CBRA 3C + Property Block 185 | 5.4 | 15,624 | 20,993 | - | - | - | 36,617 | 84,875 | 48,258 |
| CBRA 2 | 1.2 | 47,111 | | 11,559 | 11,262 | 305.00 | 70,237 | 193,150 | 122,913 |
| CBRA Z | 3.1/3.4 | 125,133 | 32,000 | 7,114 | 5,335 | - | 169,582 | 170,907 | 1,325 |
| CBRA Z | 3.1 | 56,574 | 32,000 | - | - | - | 88,574 | 88,183 | (391) |
| CBRA Z | 3.4 | 68,152 | 706 | - | - | - | 68,858 | 82,724 | 13,866 |
| Volume of Property Soil Excavated and Stockpiled - Characterized (Dispositioned and Directly Reused) | Earthwork Area | Placed Survey Volume (m3) - Characterized Soil + Property Soil | Stockpiled in Placement EW To Be Placed (m3) | Characterized Used as Surcharge (m3) | Characterized - Awaiting Placement Volume (m3) | Waiting Approval Volume (m3) | Total Estimated Volume | Design Volume | Estimated Quantity Remaining/Needed |
| Property Soil Block 2 | 1.5 | 51,491.00 | 3,900 | - | - | - | 55,391 | 67,534 | 12,143 |
| Property Soil Block 3 | 2.2/5.1 | 21,778.00 | - | 5,296 | 3,557 | - | 30,631 | N/A | |
| Property Soil Block 4 | 2.1/2.5 | 6,326.60 | - | - | 1,400 | - | 7,727 | N/A | |
| Property Soil Block 1 | 1.3/1.4 | 60,750.00 | - | 76,894 | - | - | 137,644 | N/A | |
| Commissioners Property Soil | Commissioners St | - | - | - | - | - | 0 | N/A | |
| SDMA Property | SDMA | 200.00 | 500 | - | - | - | 700 | N/A | |
| Commissioners CFTC | Commissioners St | 25,750.01 | - | - | - | - | 25,750 | N/A | |
| Comm St IV SC | Commissioners St | 4,983.10 | - | - | - | - | 4,983 | N/A | |
| Volume of Peat Excavated and Stockpiled - Characterized (Dispositioned and Directly Reused) | Earthwork Area | Placed Survey Volume (m3) - Characterized Soil + Property Soil | Stockpiled in Placement EW To Be Placed (m3) | Characterized Used as Surcharge (m3) | Characterized - Awaiting Placement Volume (m3) | Waiting Approval Volume (m3) | Total Estimated Volume | Design Volume | Estimated Quantity Remaining/Needed |
| Zone 1 | 1.1 | 14,992.19 | - | - | - | - | 14,992.19 | N/A | |
| Zone 2 | 1.1 | - | - | - | - | - | - | N/A | |
| Zone 1 Peat | 1.1/2.1/2.4 | 12,729.00 | | | 8,354 | | 21,083.00 | N/A | |
| CBRA X FC | 1.7/1.9 | - | - | 15,151 | - | - | 15,151.45 | N/A | |
| CBRA 3C FC | 5.3 | - | - | - | 18,410 | - | 18,410.00 | N/A | |
| CBRA 2 FC | 1.2 | - | - | - | 14,404 | - | 14,404.47 | N/A | |
| CBRA Z FC | 3.1/3.4 | - | - | - | 13,777 | - | 13,777.47 | N/A | |

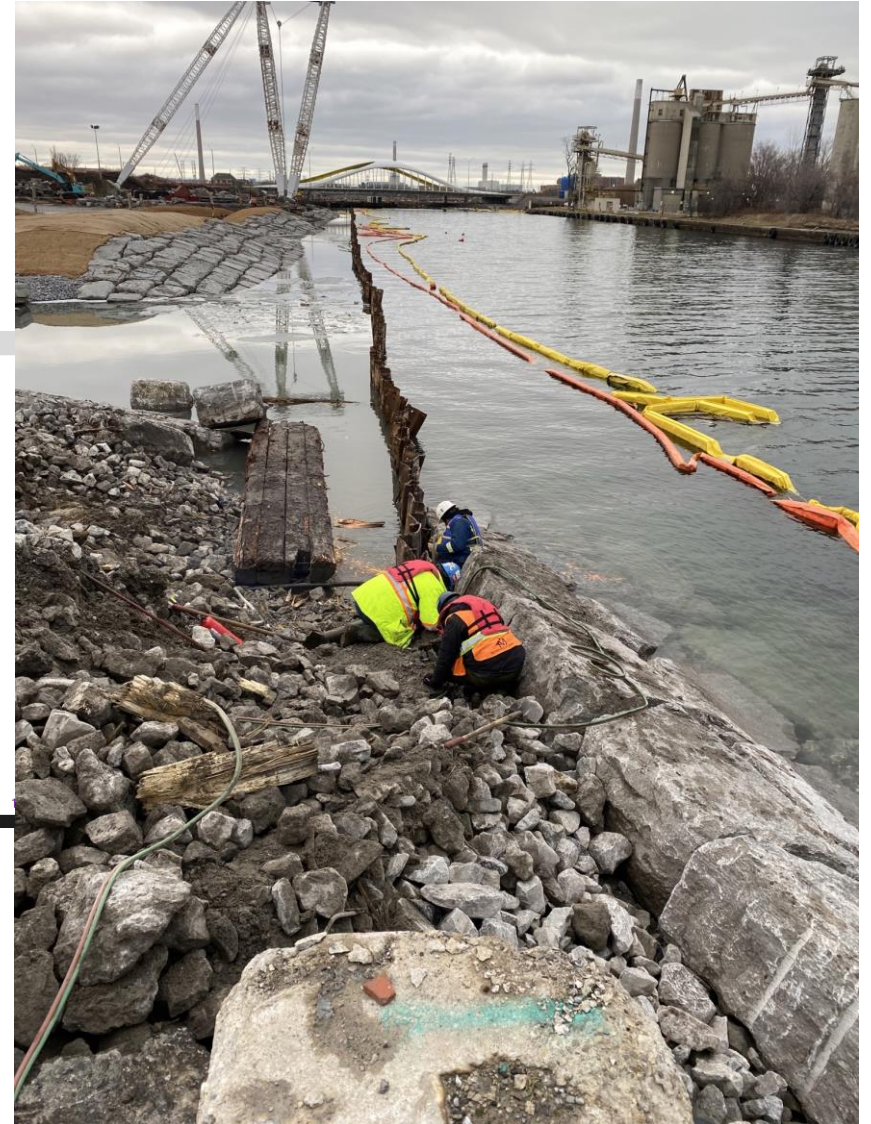
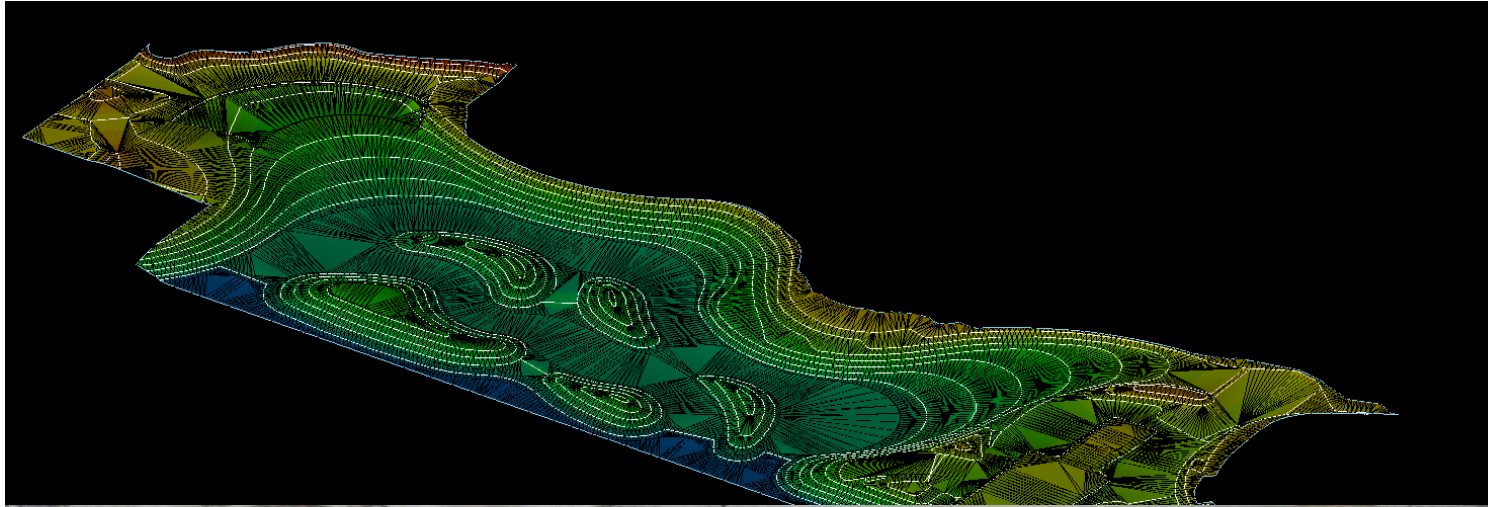
8. OBSTRUCTIONS



9. BLIND UNDER WATER



10. AQUATIC CURVES & TRANSITIONS



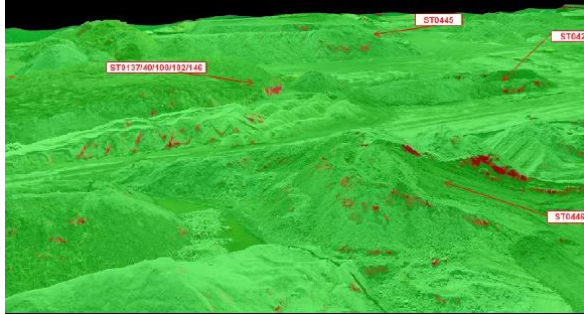
11. DROWNING TREES (UNKNOWN EFFORTS)



12. QUALITY STONE WORK



13. BIRDS, WEEDS, SLOPES, AND EROSION



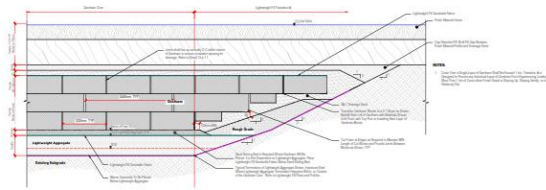
14. WINTER HAD COME (A FEW TIMES)



15. SCULPTING WITH FOAM

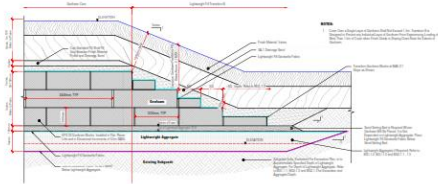


RESPOND. RECLAIM. RENEW.

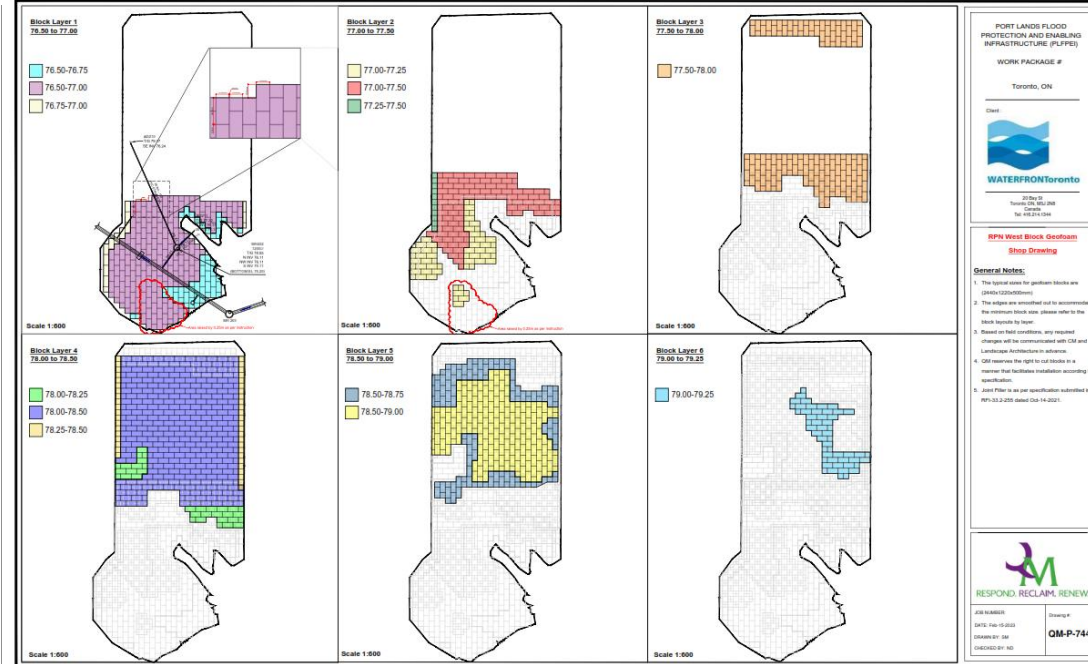
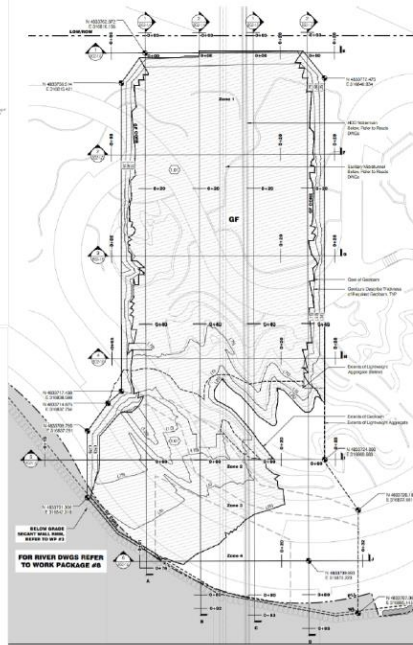


Typical: Lightweight Fill - Transition A
1:7.5

Note: Transition A and B are typical transitions. The Block Layer Surfaces should be reviewed for actual transition details.



Typical: Lightweight Fill - Transition B
1:7.5



PORT LANDS FLOOD PROTECTION AND BRANDING INFRASTRUCTURE (PLFPI)

WORK PACKAGE #

Toronto, ON

Client

Waterfront Toronto

Project #

Toronto, ON G5M 0B6

Contract #

142-214-0244

RPM West Block Geotam

Shop Drawing

General Notes:

- The typical sizes for geotam blocks are provided in the schedule.
- The edges are provided cut to accommodate the maximum block size, please refer to the block schedule for more.
- Based on field conditions, any required changes will be communicated with CM and Landscape Architect in advance.
- CM reserves the right to cut blocks in a manner that maintains installation accessibility to specification.
- Joint Foam is an open specification submitted to RPM/PLFPI and shall meet the criteria.

RESPOND. RECLAIM. RENEW.

Drawn by

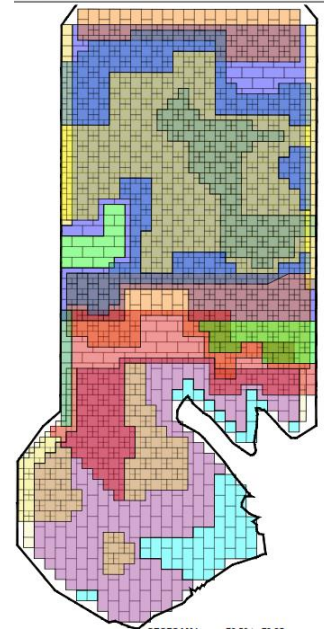
Checked by

DATE: 14-10-2024

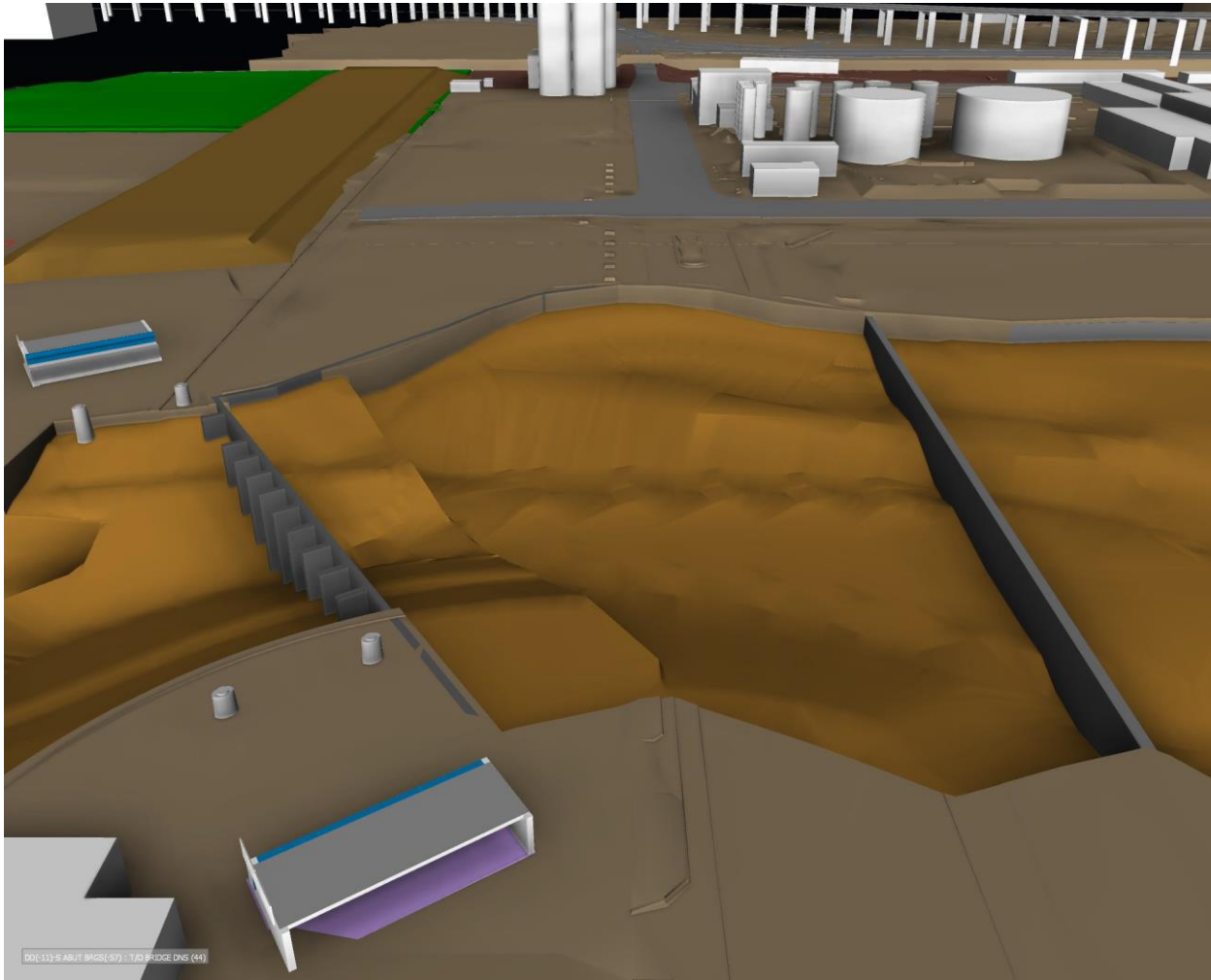
DESIGNED BY: JM

QM-P-744

DESIGNED BY: ND



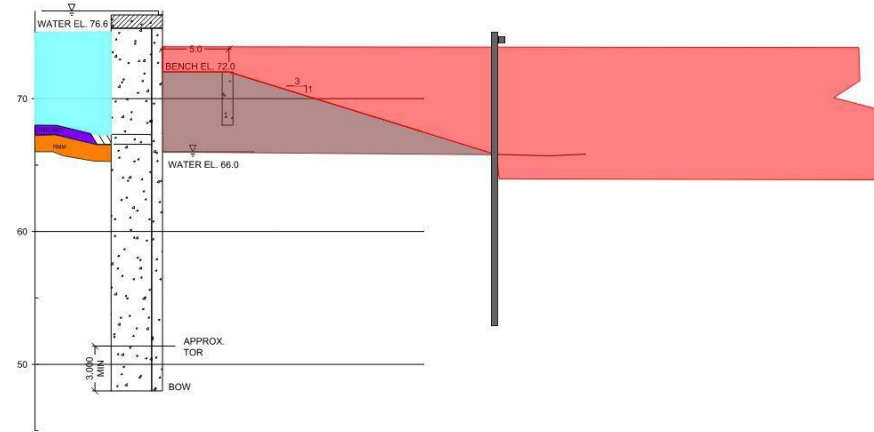
WHAT'S NEXT? WEST PLUG SEQUENCE & DEMO



DD-11-5 ABUT BRGS (97) / TAD BRIDGE DNS (44)

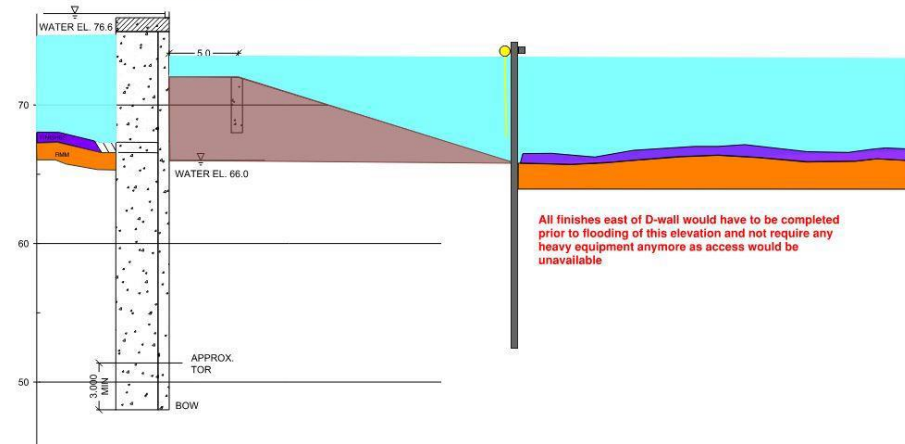
Stage 2
Excavate Red area to achieve underdrain elevations and subgrade levels while maintaining brown area soil berm and install SSP and water

**PORT LANDS FLOOD PROTECTION
SLURRY WALL**

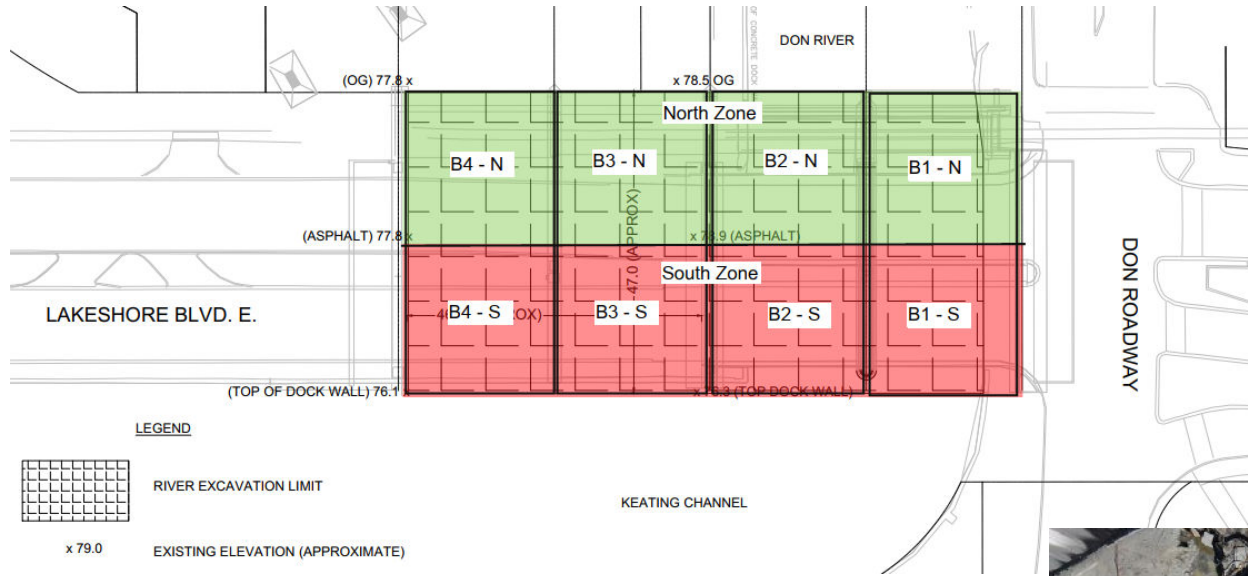


Stage 5
Install Turbidity Barrier and Flood River Valley to elevation of +73.5m for stabilization of berm removal.

**PORT LANDS FLOOD PROTECTION
SLURRY WALL**



WHAT'S NEXT? LSBE SEQUENCE



QUESTIONS?



Acknowledgements



WATERFRONToronto



Geosyntec[®]
consultants



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