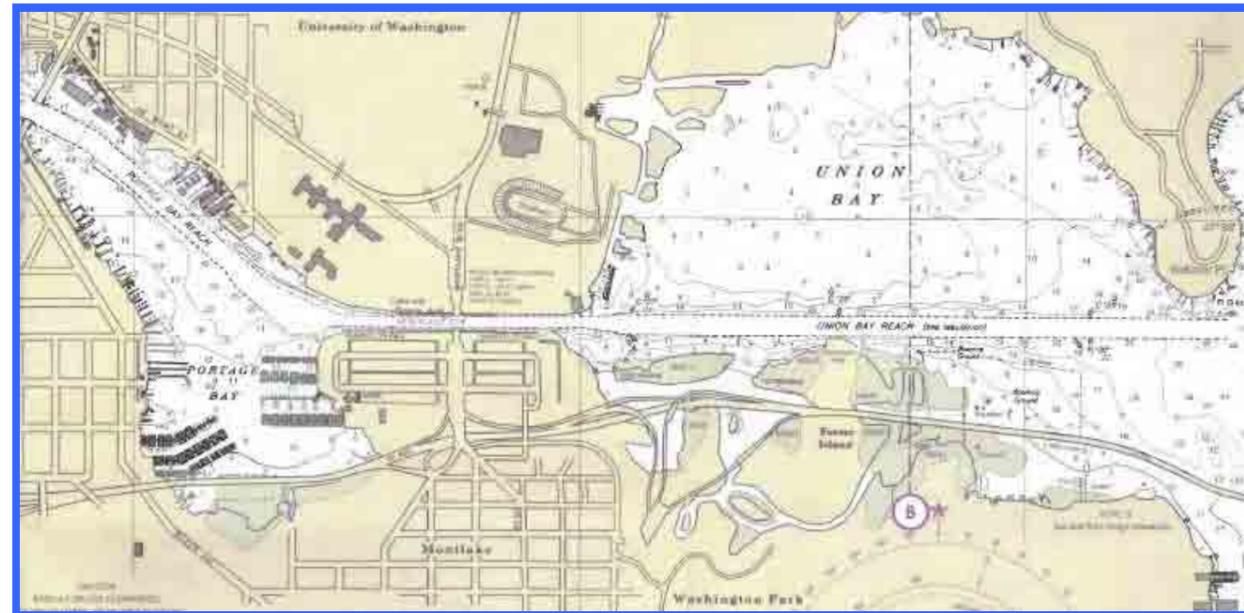


**KEYSTONE CENTER**  
**SEATTLE, SR 520**  
**PROPOSAL K - TUNNELS AT EAST MONTLAKE AND THE ARBORETUM**  
**CONCEPTUAL DESIGN AND COST ESTIMATE**  
**PART 2 - FIGURES**

**MARCH 17, 2008**



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**KEYSTONE CENTER**

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Date of issue 2008-03-17

Prepared CIMA  
Checked CPM  
Approved CPM, STWH

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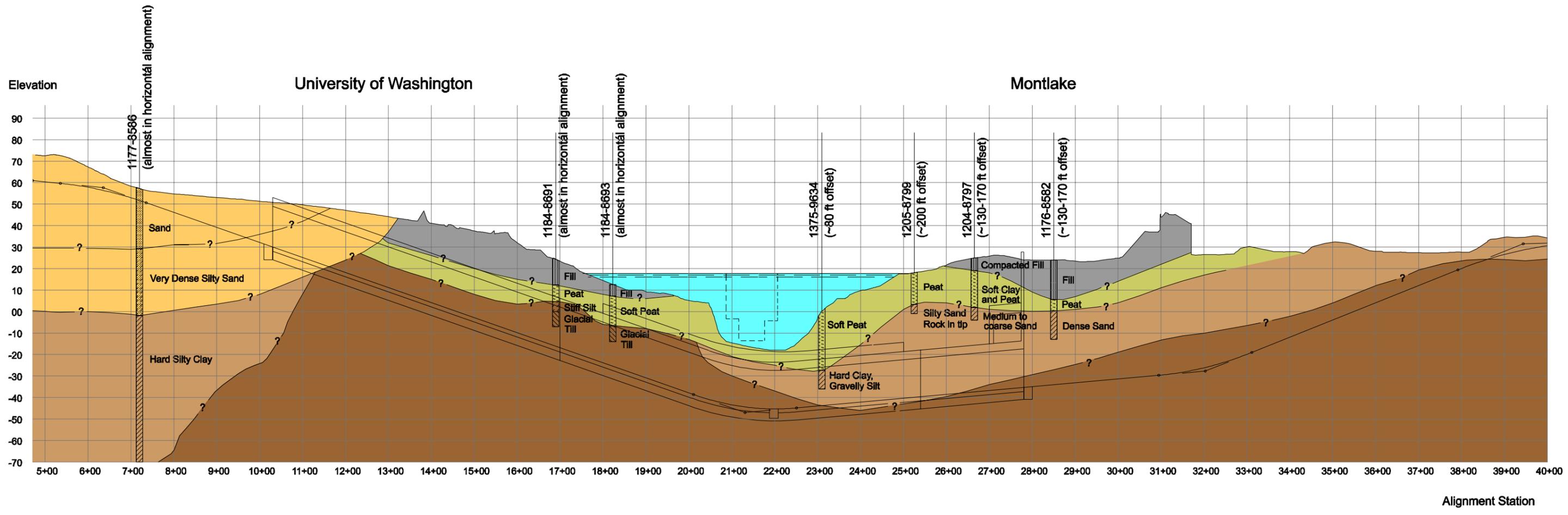
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Proposal K. Tunnel at Montlake. Time Schedule

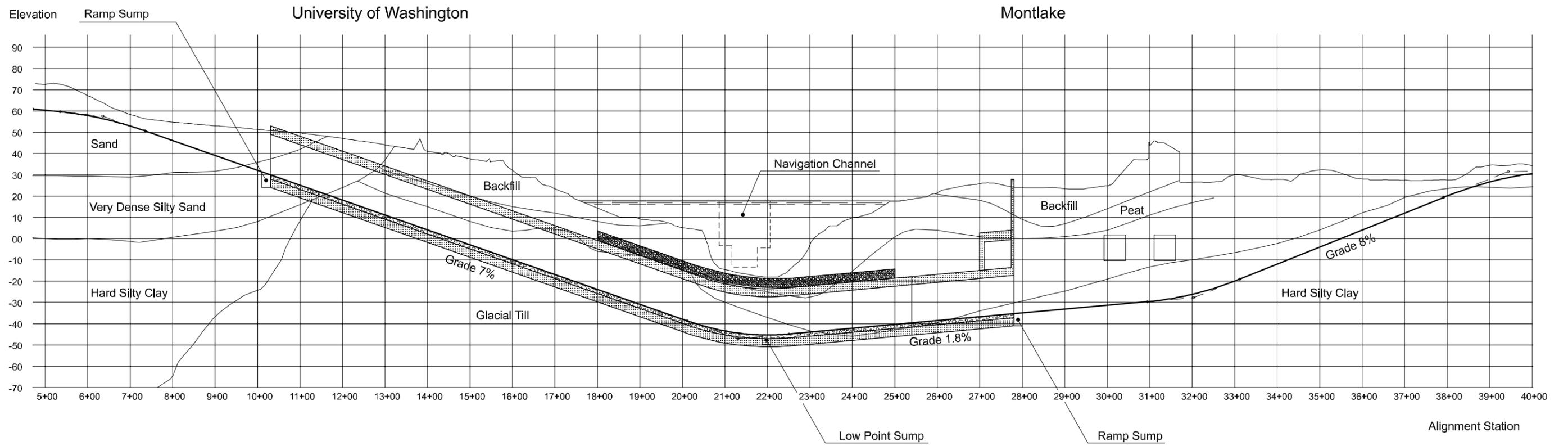


**FIGURE 1**  
**PROPOSAL K TUNNEL AT MONTLAKE AND ARBORETUM**  
**General Lay-Out**  
**12.03.2008**



- Sand
- Fill
- Peat
- Silt / Sand / Clay
- Glacial Till

**FIGURE 2**  
**PROPOSAL K. TUNNEL AT MONTLAKE**  
**Geotechnical Profile**  
**12.03.2008**



-  Structural concrete
-  Ballast concrete
-  Stone protection

FIGURE 3  
 PROPOSAL K. TUNNEL AT MONTLAKE  
 Longitudinal Profile  
 12.03.2008





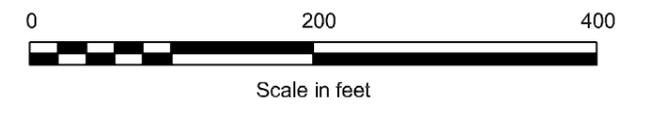
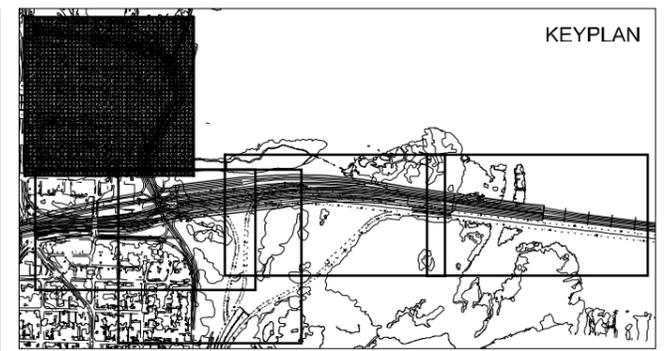
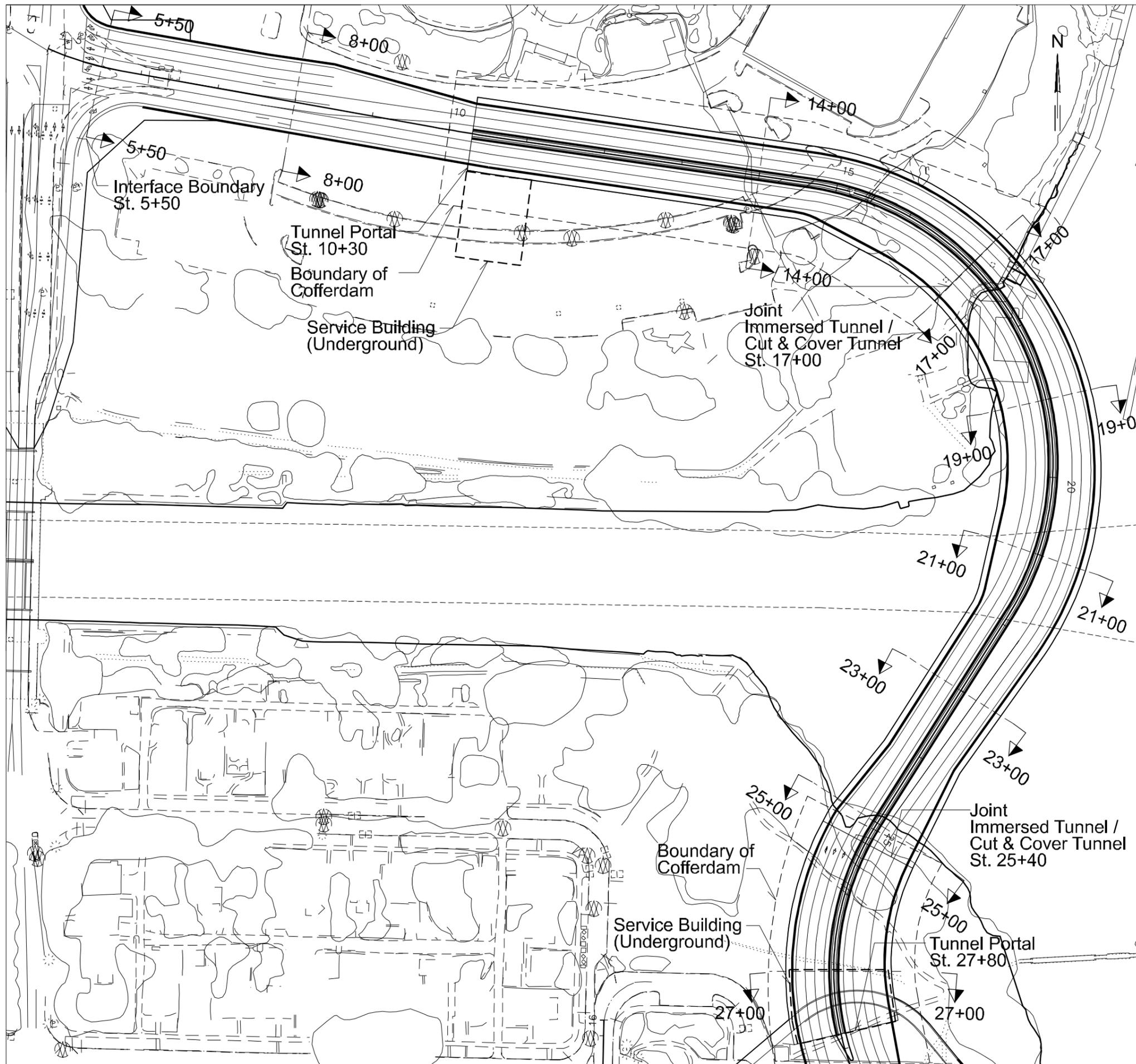


FIGURE 6  
PROPOSAL K. TUNNEL AT MONTLAKE  
Pacific Street Interchange  
Plan Northern Part  
12.03.2008

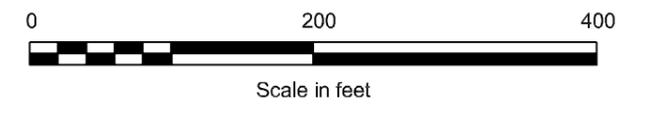
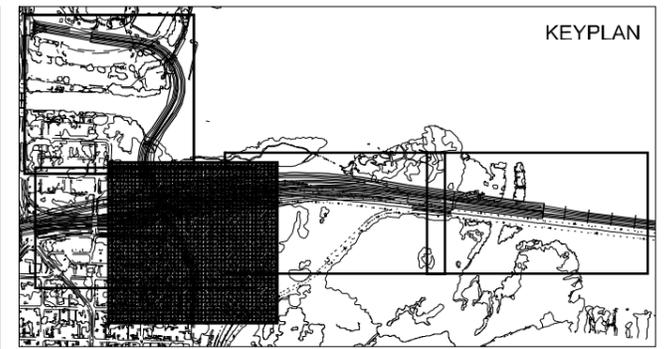
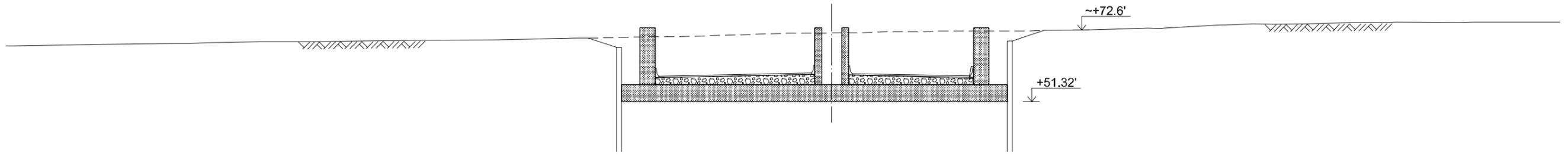
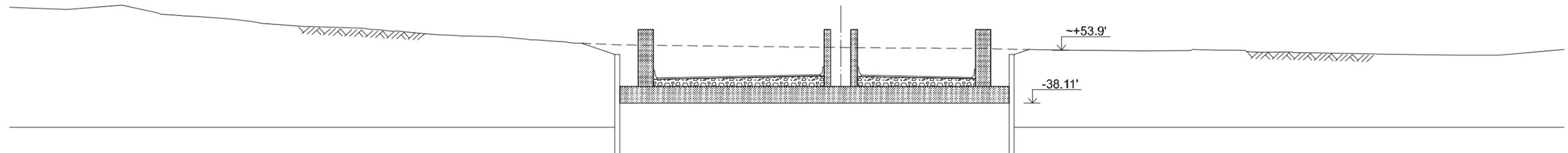


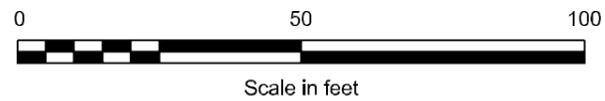
FIGURE 7  
PROPOSAL K. TUNNEL AT MONTLAKE  
Pacific Street Interchange  
Plan Southern Part  
12.03.2008



Cross Section 5+50

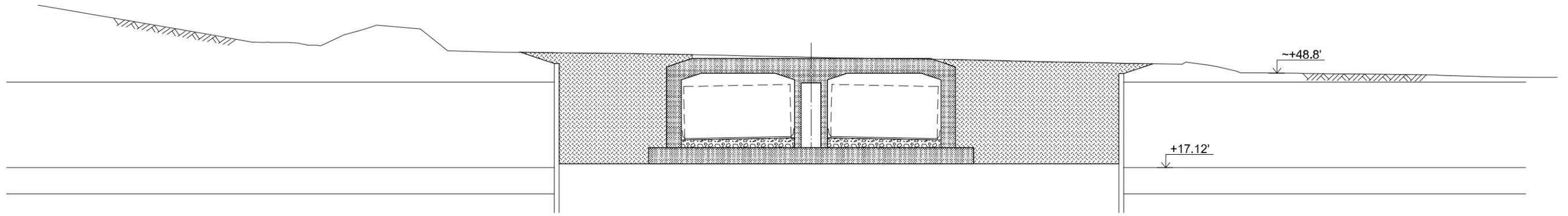


Cross Section 8+00

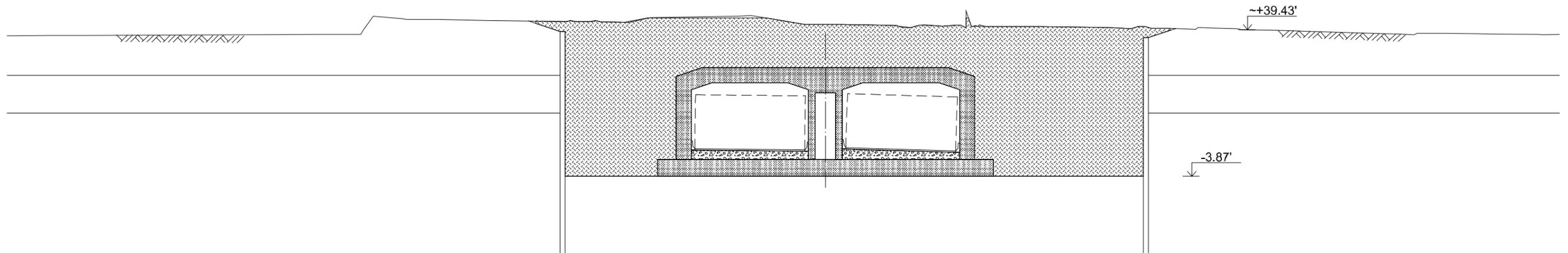


-  Structural concrete
-  Ballast concrete

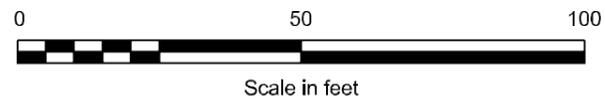
FIGURE 8  
PROPOSAL K. TUNNEL AT MONTLAKE  
Pacific Street Interchange  
Cross Section St. 5+50 and 8+00  
12.03.2008



Cross Section 11+00

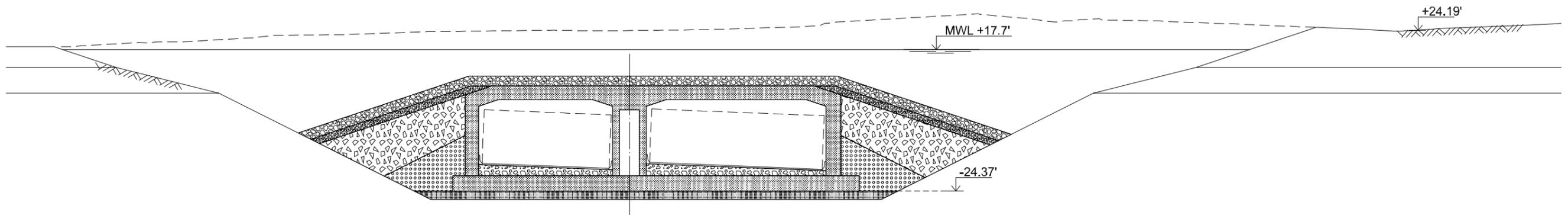


Cross Section 14+00

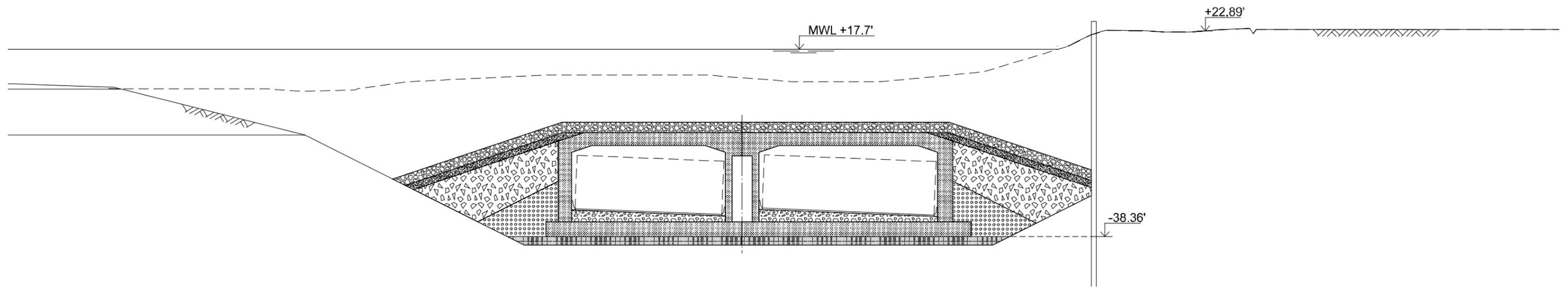


-  Back fill
-  Structural concrete
-  Ballast concrete

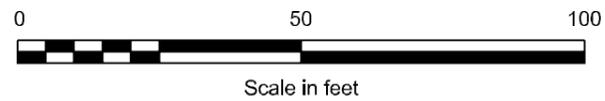
FIGURE 9  
PROPOSAL K. TUNNEL AT MONTLAKE  
Pacific Street Interchange  
Cross Section St. 11+00 and 14+00  
12.03.2008



Cross Section 17+00

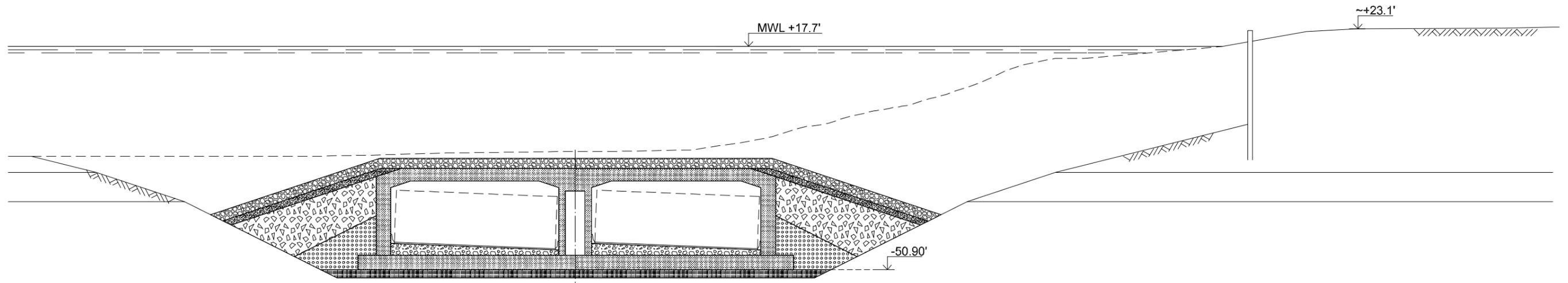


Cross Section 19+00

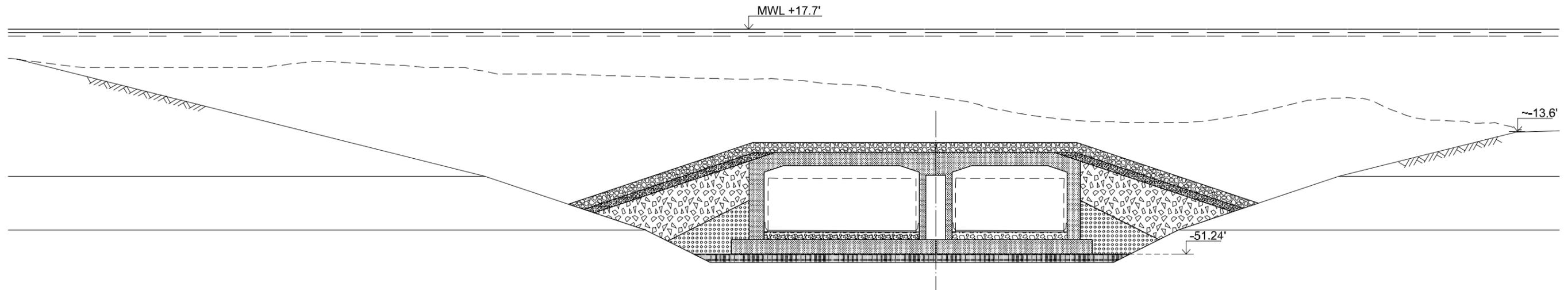


- |  |                     |  |                  |
|--|---------------------|--|------------------|
|  | Ordinary fill       |  | Sand foundation  |
|  | Locking fill        |  | Filter layer     |
|  | Structural concrete |  | Stone protection |
|  | Ballast concrete    |  |                  |

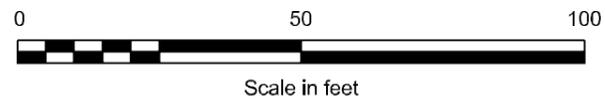
FIGURE 10  
PROPOSAL K. TUNNEL AT MONTLAKE  
Pacific Street Interchange  
Cross Section St. 17+00 and 19+00  
12.03.2008



Cross Section 21+00

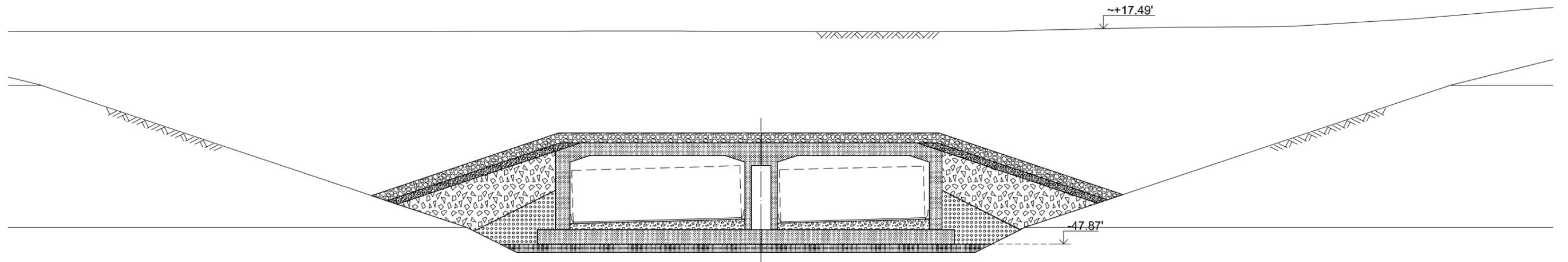


Cross Section 23+00

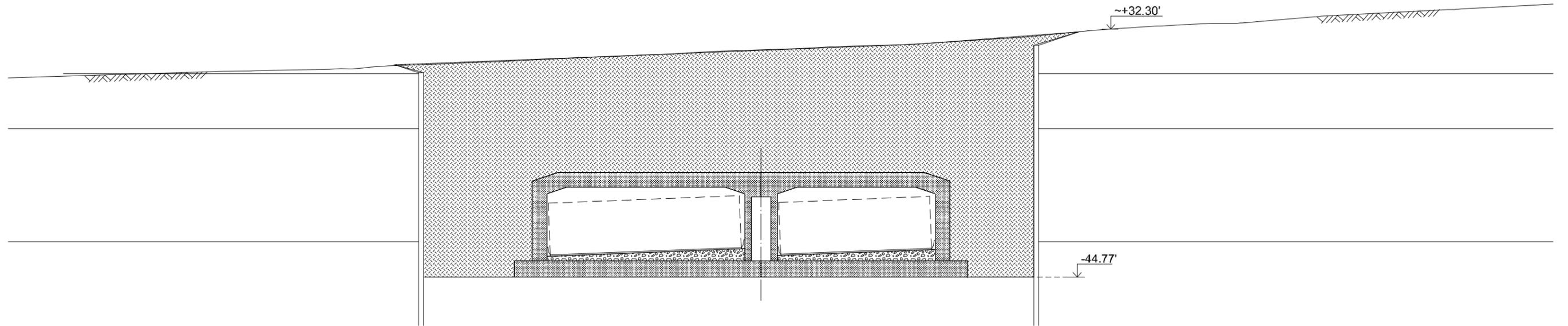


- |  |                     |   |                  |
|--|---------------------|---|------------------|
|  | Ordinary fill       |  | Sand foundation  |
|  | Locking fill        |  | Filter layer     |
|  | Structural concrete |  | Stone protection |
|  | Ballast concrete    |   |                  |

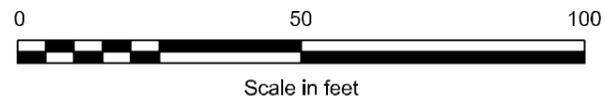
FIGURE 11  
 PROPOSAL K. TUNNEL AT MONTLAKE  
 Pacific Street Interchange  
 Cross Section St. 21+00 and 23+00  
 12.03.2008



Cross Section 25+00

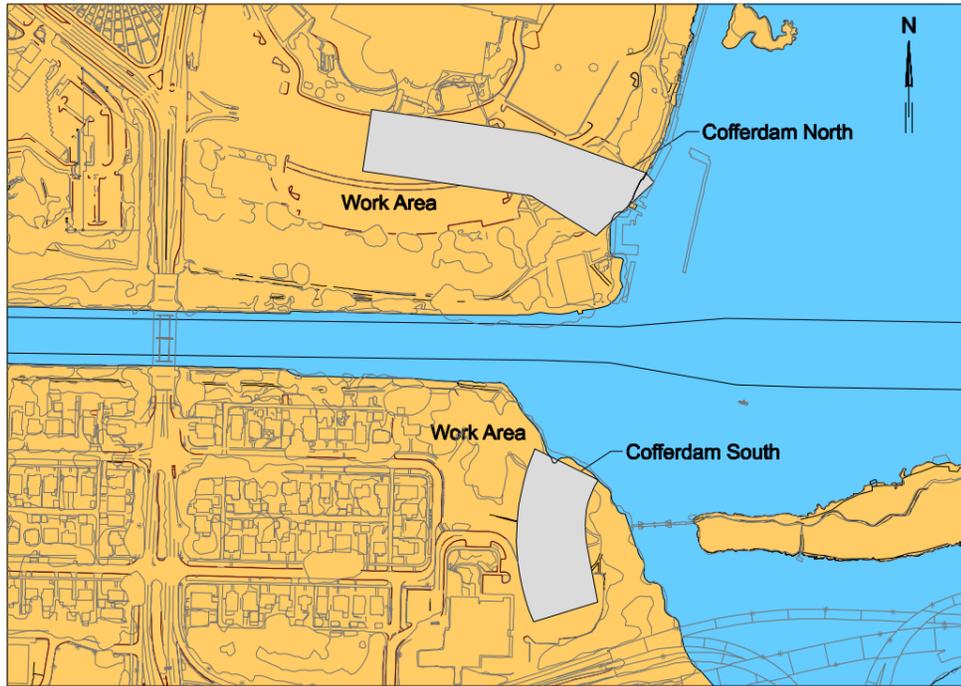


Cross Section 27+00



- |  |                     |   |                  |
|--|---------------------|---|------------------|
|  | Ordinary fill       |  | Sand foundation  |
|  | Locking fill        |  | Filter layer     |
|  | Structural concrete |  | Stone protection |
|  | Ballast concrete    |   |                  |

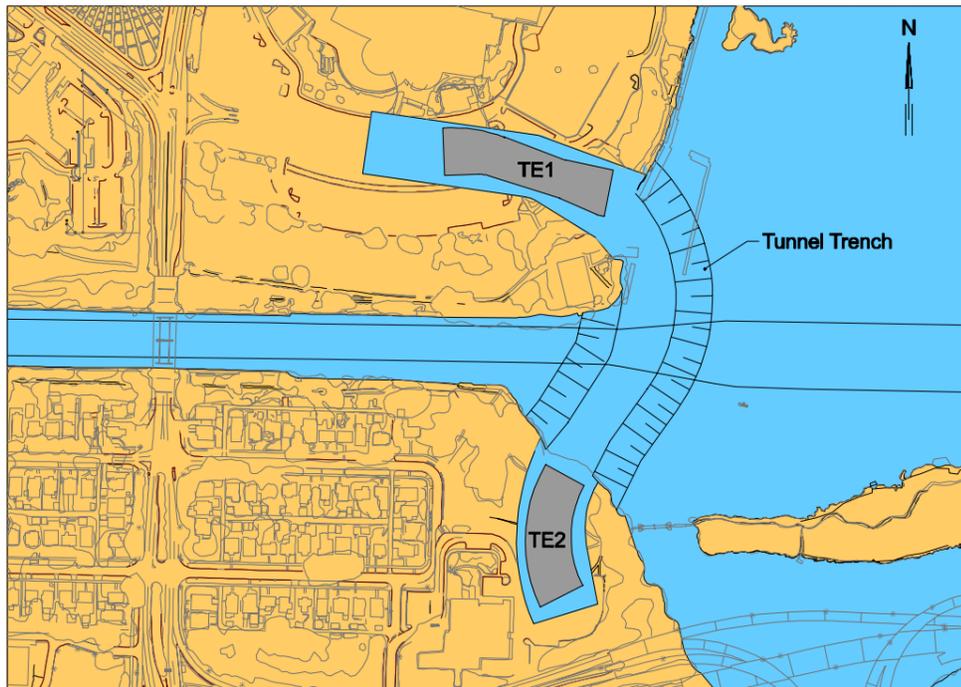
FIGURE 12  
PROPOSAL K. TUNNEL AT MONTLAKE  
Pacific Street Interchange  
Cross Section St. 25+00 and 27+00  
12.03.2008



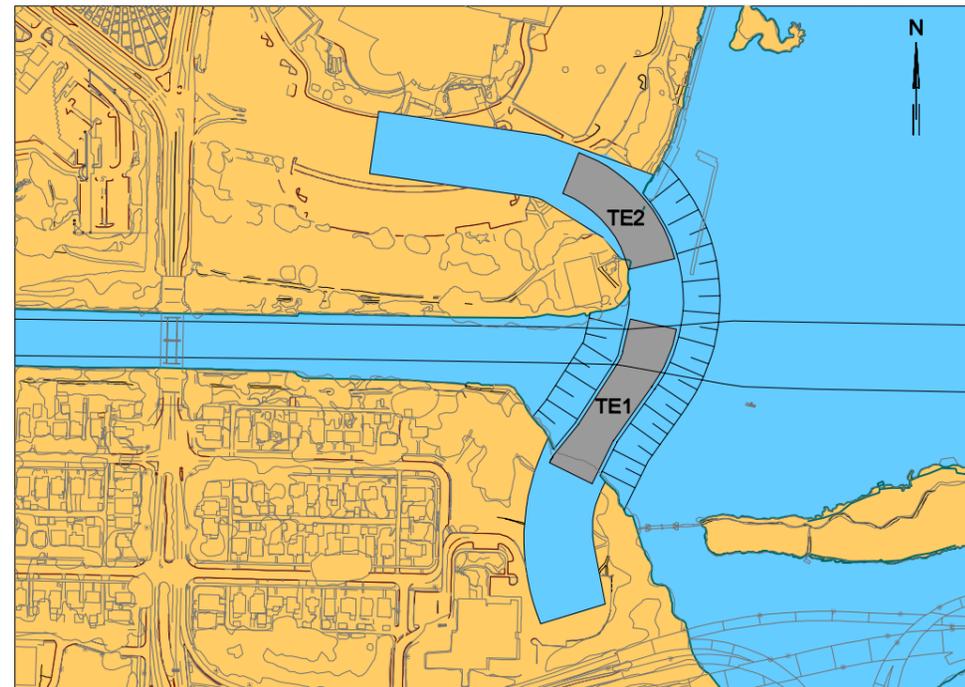
- STAGE 1**
- Mobilisation
  - Establishing of Work Areas
  - Sheetpiling, Excavation and Dewatering for Cofferdams for Tunnels



- STAGE 2**
- Construction of Tunnel Elements TE1 and TE2 within the Cofferdams, functioning as Dry Docks

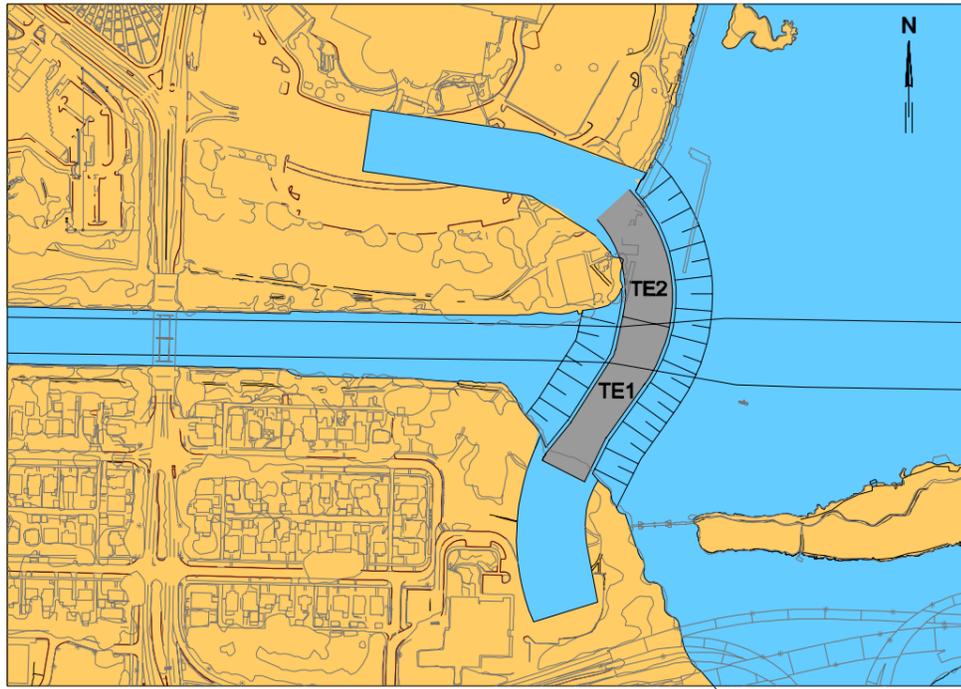


- STAGE 3**
- Dredging of Tunnel Trench
  - Preparing of Tunnel Elements for Immersion
  - Flooding and Opening of Cofferdams



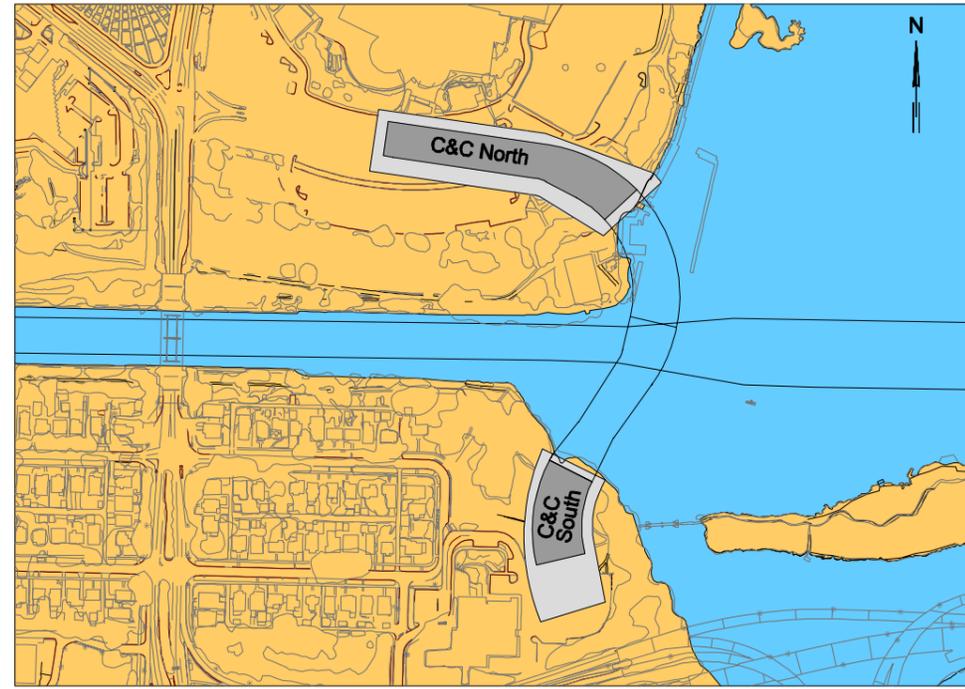
- STAGE 4**
- Towing out of the two Tunnel Elements
  - Immersion of Tunnel Element 1
  - Temporary Mooring of Tunnel Element 2

**FIGURE 13**  
**PROPOSAL K. TUNNEL AT MONTLAKE**  
 General Construction - Sequence - Stage 1-4  
 12.03.2008



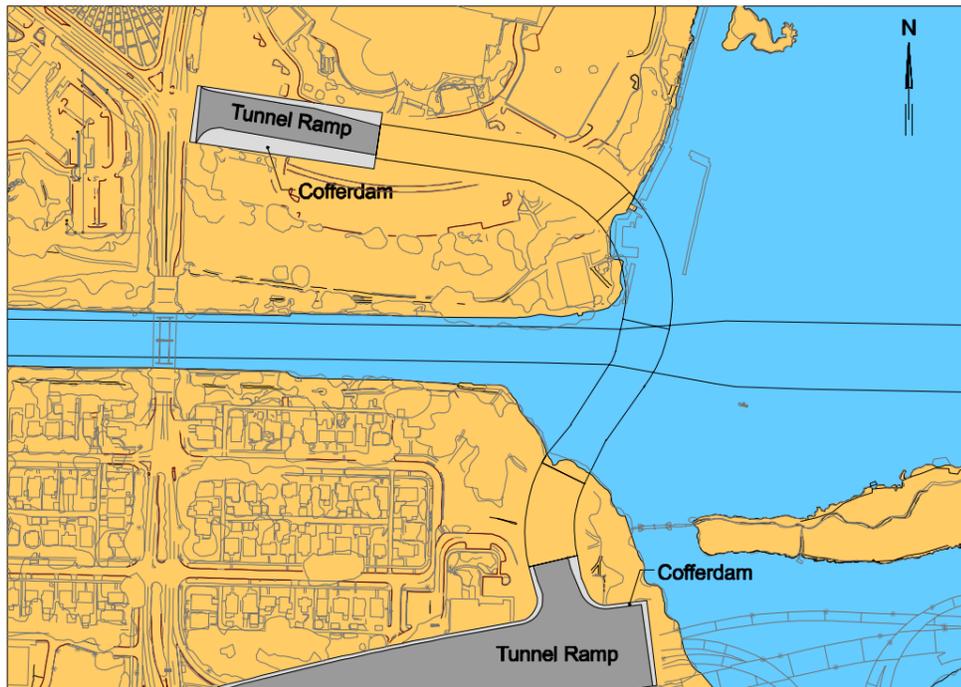
**STAGE 5**

- Immersion of TE2
- Joining of Tunnel Elements
- Foundation of Tunnel Elements



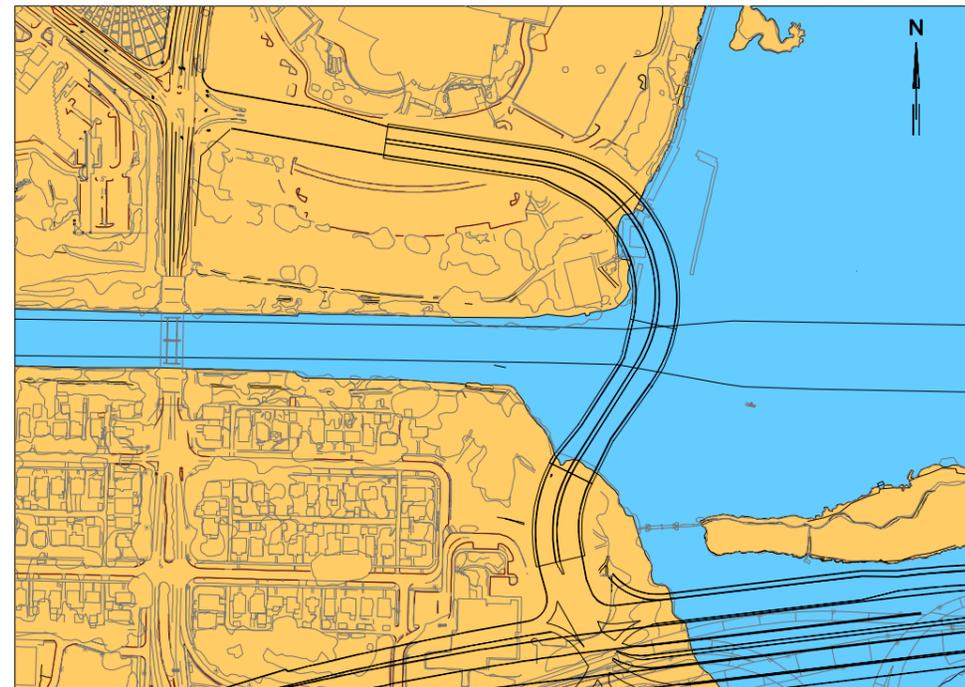
**STAGE 6**

- Sand Backfilling and placing of Stone Protection for Immersed Tunnel
- Closing and Dewatering of Cofferdams
- Construction of Cut & Cover Tunnels



**STAGE 7**

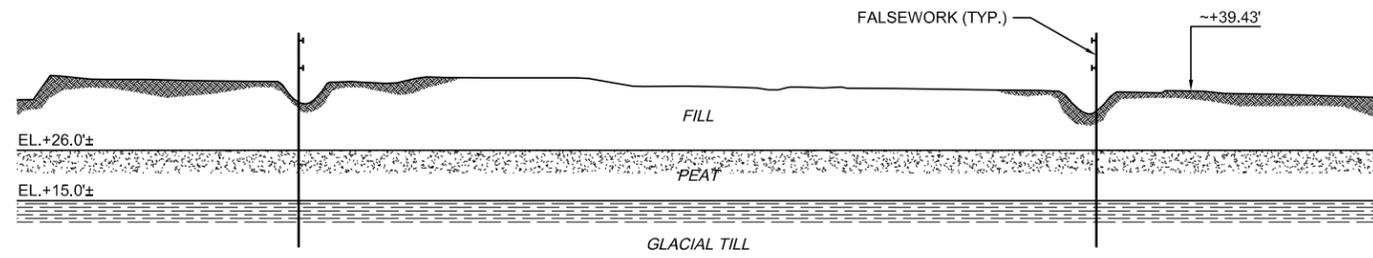
- Sheet Piling and Excavation for Cofferdams for Tunnel Ramps
- Construction of Tunnel Ramps



**STAGE 8**

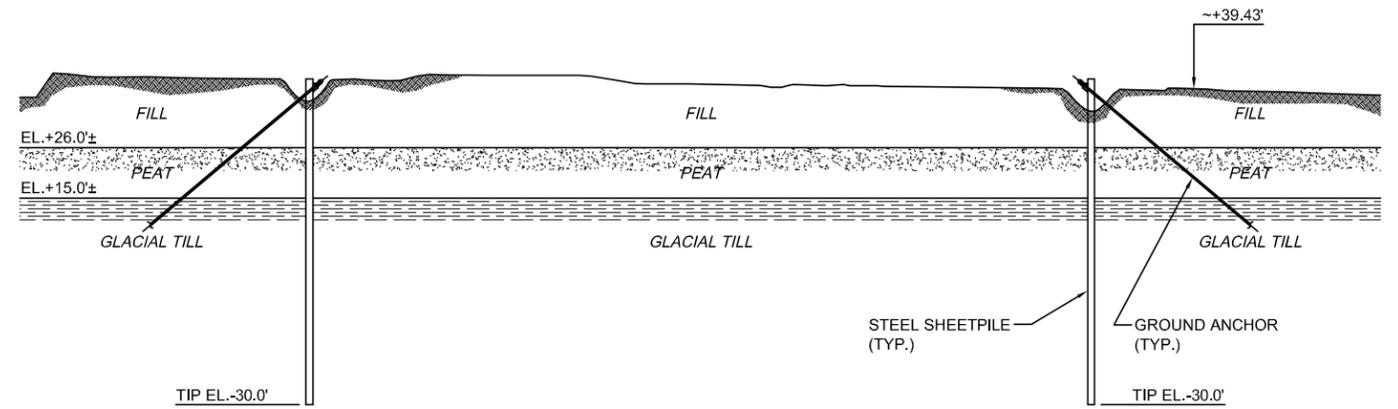
- Installation of M & E Equipment.
- Site Testing and Commissioning
- Completion of Works

**FIGURE 14**  
**PROPOSAL K. TUNNEL AT MONTLAKE**  
 General Construction - Sequence - Stage 5-8  
 12.03.2008



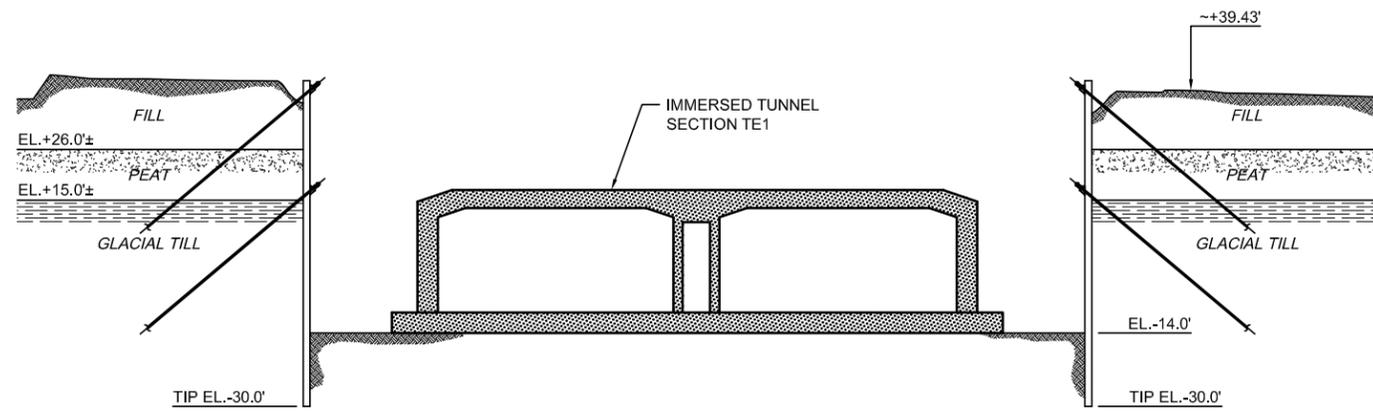
**STAGE 1A**

EXCAVATE TRENCH LINE  
INSTALL FALSEWORK FOR SHEET PILES



**STAGE 1B**

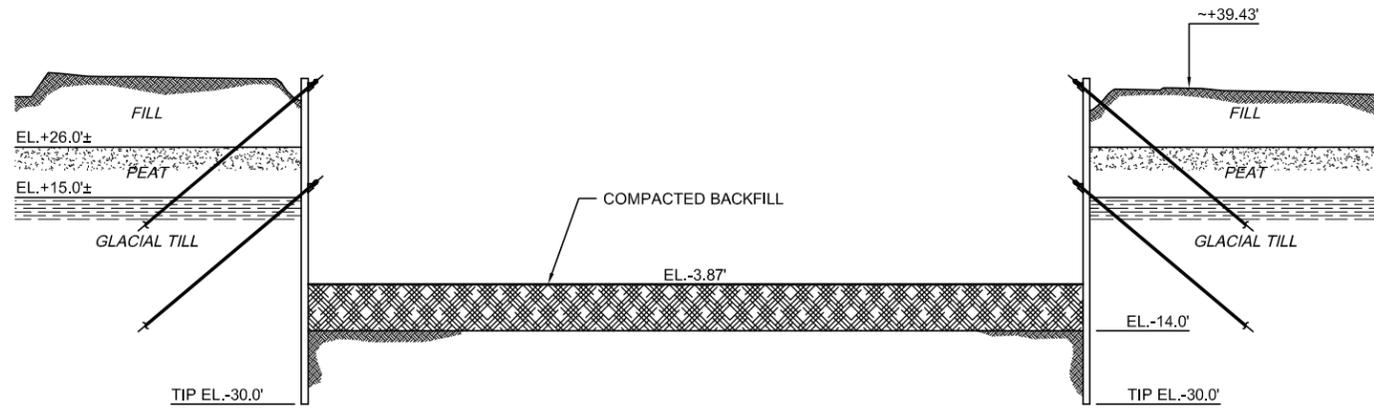
INSTALL SHEET PILES  
REMOVE FALSEWORK  
INSTALL GROUND ANCHORS



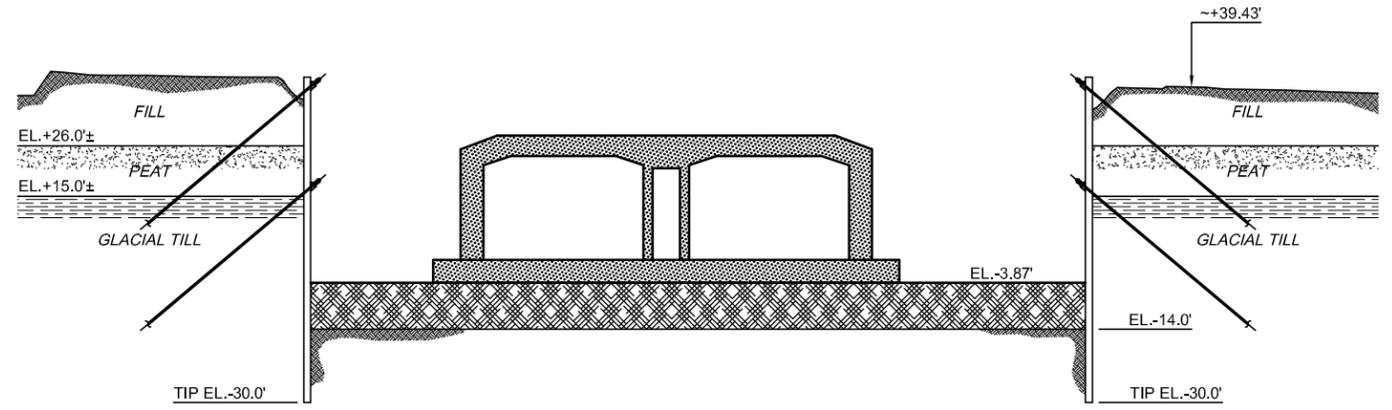
**STAGE 2**

EXCAVATE TO ELEVATION -14.0'  
INSTALL 2nd ELEVATION OF GROUND ANCHORS  
CONSTRUCT IMMERSSED TUNNEL SECTION

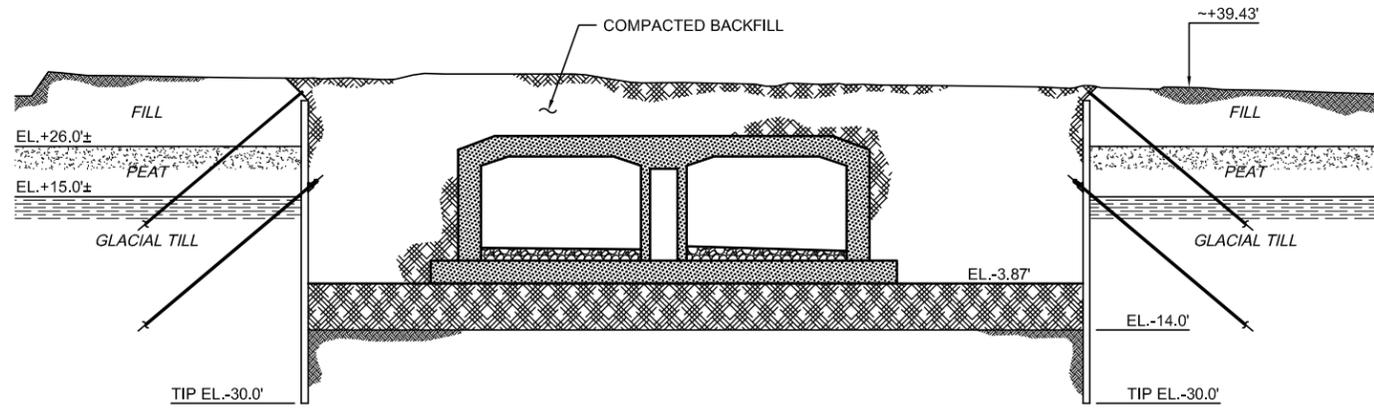
FIGURE 15  
PROPOSAL K. TUNNEL AT MONTLAKE  
Construction Sequence Landbased Works (Stat. 14+00)  
Part 1  
12.03.2008



**STAGE 4**  
 LAUNCH IMMERSED TUNNEL SECTION  
 BACKFILL FOR CUT AND COVER TUNNEL

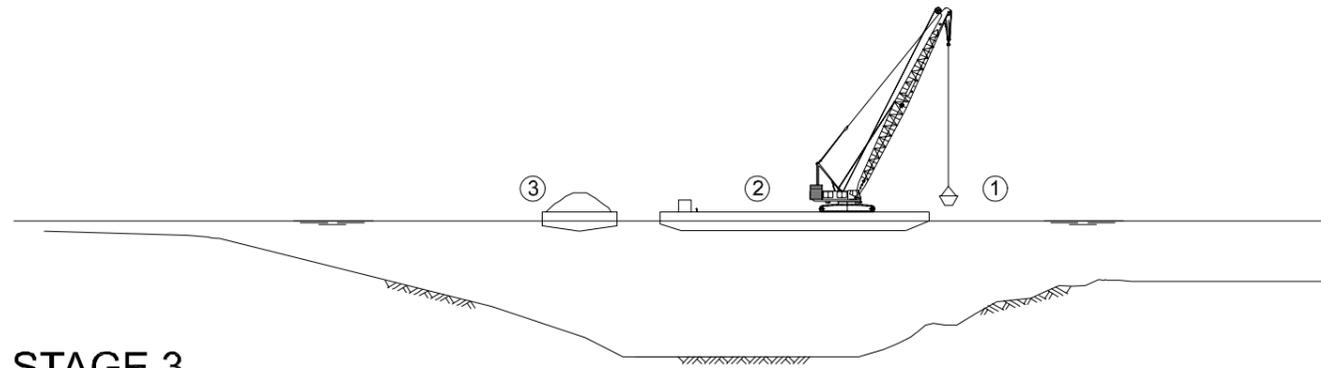


**STAGE 6**  
 CONSTRUCT CUT AND COVER TUNNEL SECTION



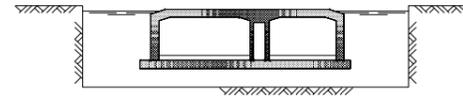
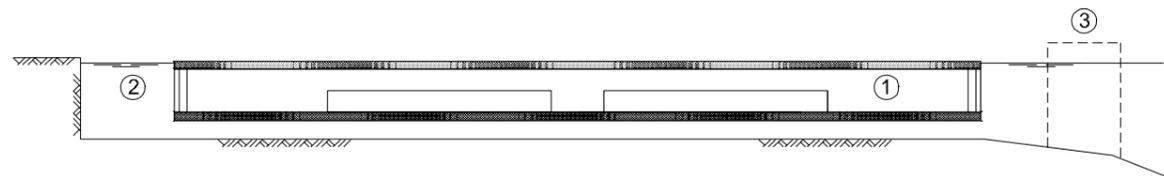
**STAGE 7**  
 BACKFILL  
 TRIM SHEET PILES AND TOP GROUND ANCHOR

**FIGURE 16**  
**PROPOSAL K. TUNNEL AT MONTLAKE**  
 Construction Sequence Landbased Works (Stat. 14+00)  
 Part 2  
 12.03.2008



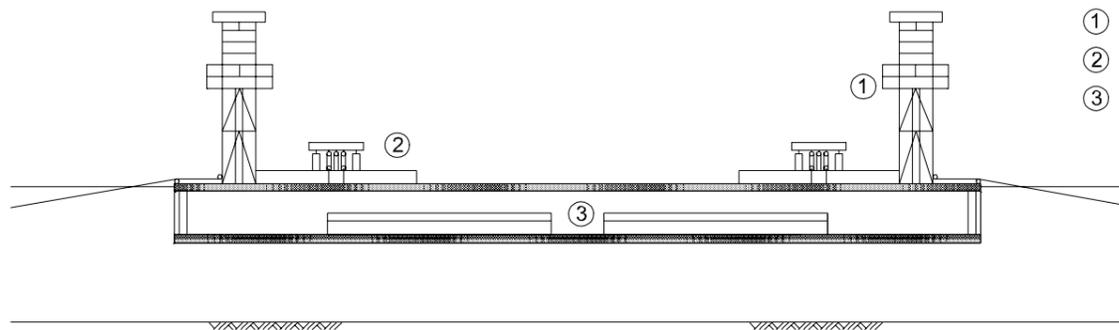
- ① Barge mounted Crane
- ② Clamshell type Bucket
- ③ Barge with dredged Spoil

**STAGE 3**  
DREDGING OF TUNNEL TRENCH

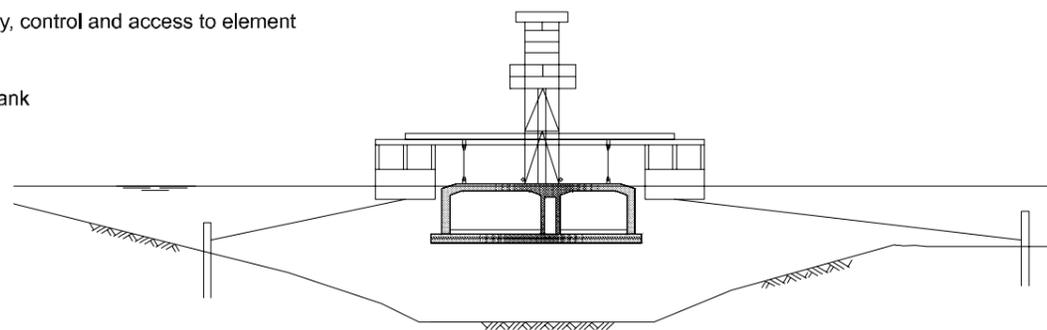


- ① Floating Tunnel Element closed with Bulkhead
- ② Flooded Cofferdam
- ③ Separation wall to the Bay removed

**STAGE 3**  
FLOODING AND OPENING OF COFFERDAMS



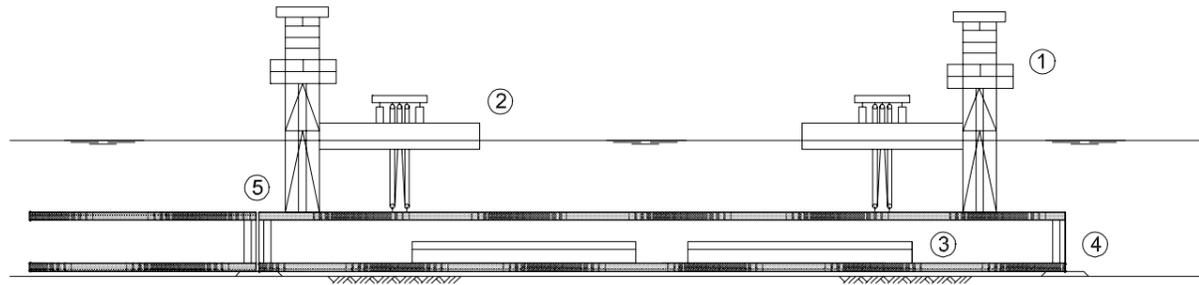
- ① Tower for survey, control and access to element
- ② Pontoon
- ③ Water Ballast Tank



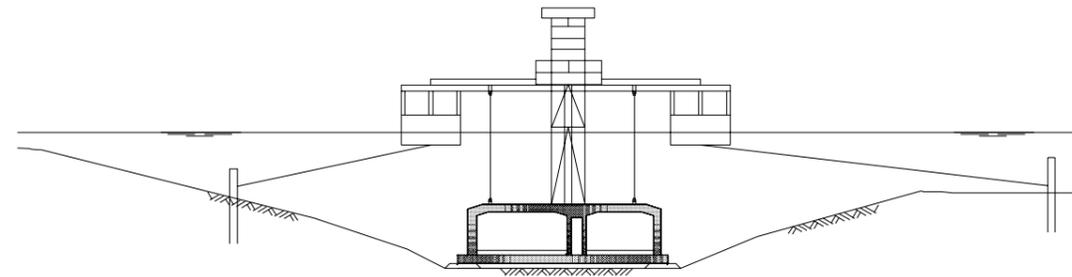
**STAGE 4**  
TOWING OUT OF TUNNEL ELEMENT

**FIGURE 17**  
**PROPOSAL K. TUNNEL AT MONTLAKE**  
Construction Sequence Marine Works, Part 1  
12.03.2008

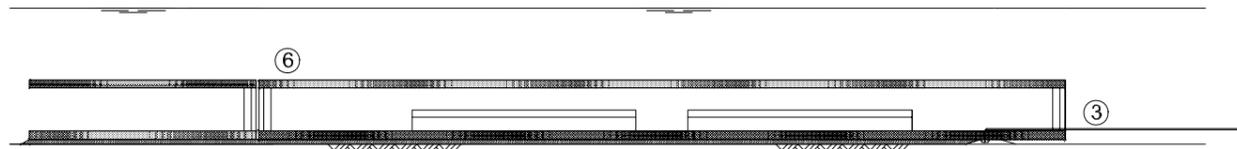
NOTE:  
Stages refer to Figures 13 & 14



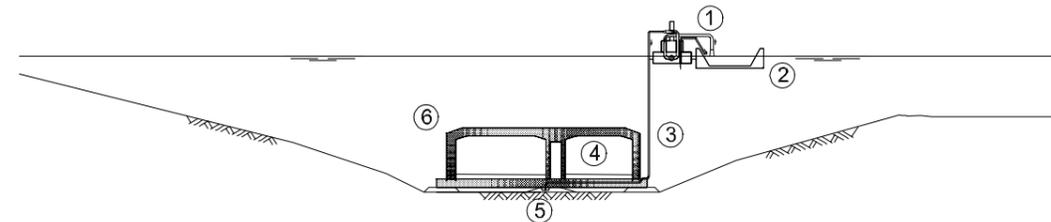
**STAGE 4 & 5**  
IMMERSION AND JOINING OF TUNNEL ELEMENT



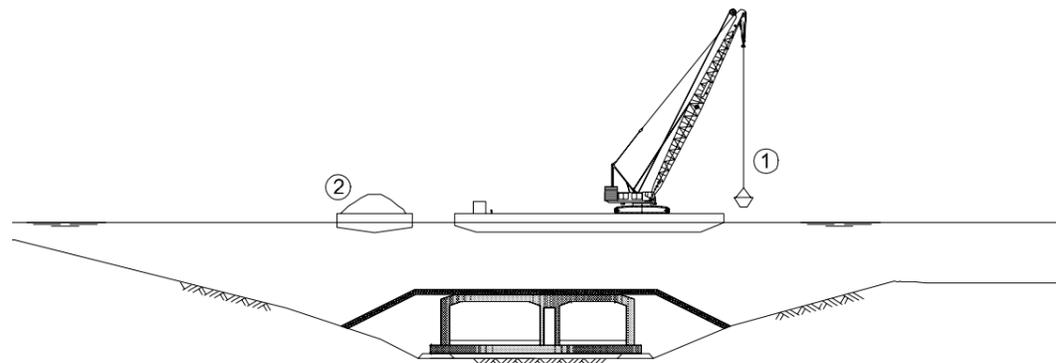
- ① Tower for Survey, Control and Access to Element
- ② Ponton
- ③ Water Ballast Tank
- ④ Temporary Foundation Pads
- ⑤ Immersion Joint



**STAGE 5**  
FOUNDATION OF TUNNEL ELEMENT



- ① Sand Pumping device (may be remote from the tunnel)
- ② Sand Supply Barge
- ③ Pipeline
- ④ Cast-in Sand Supply Pipe
- ⑤ Sand Setting on outer Slope
- ⑥ Element placed on Temporary Foundation Pads

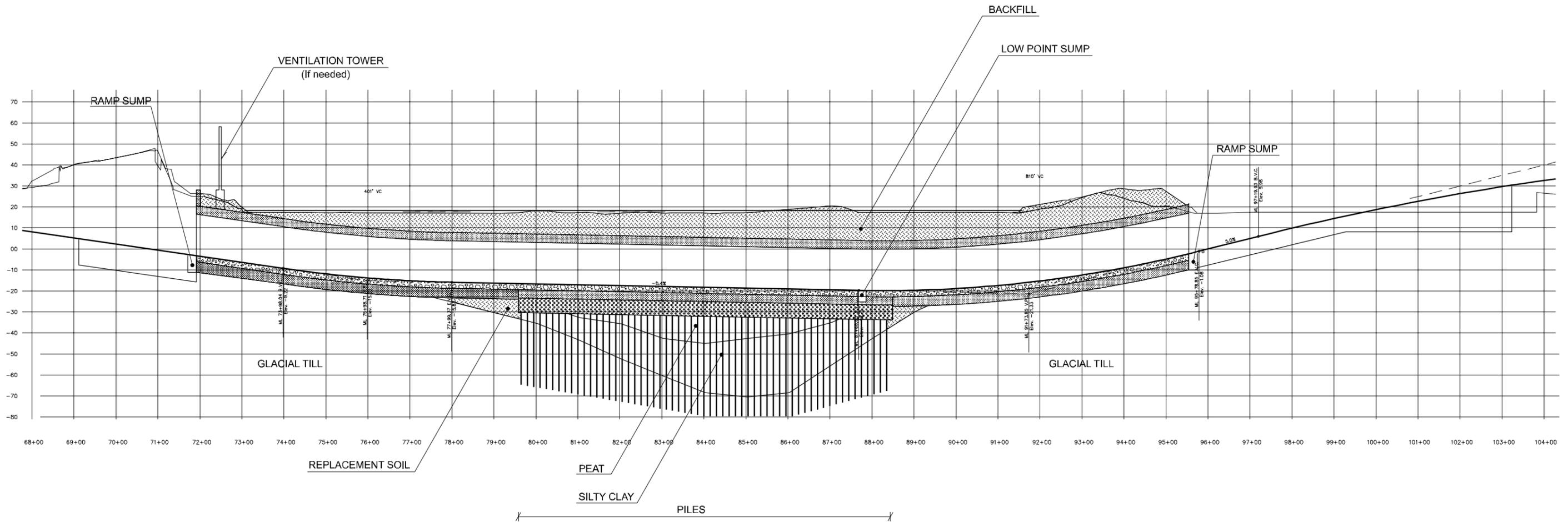


**STAGE 6**  
SAND BACKFILLING AND PLACING OF  
STONE PROTECTION FOR IMMERSSED TUNNEL

- ① Barge Mounted Crane
- ② Stone Supply Barge

NOTE:  
Stages refer to Figures 13 & 14

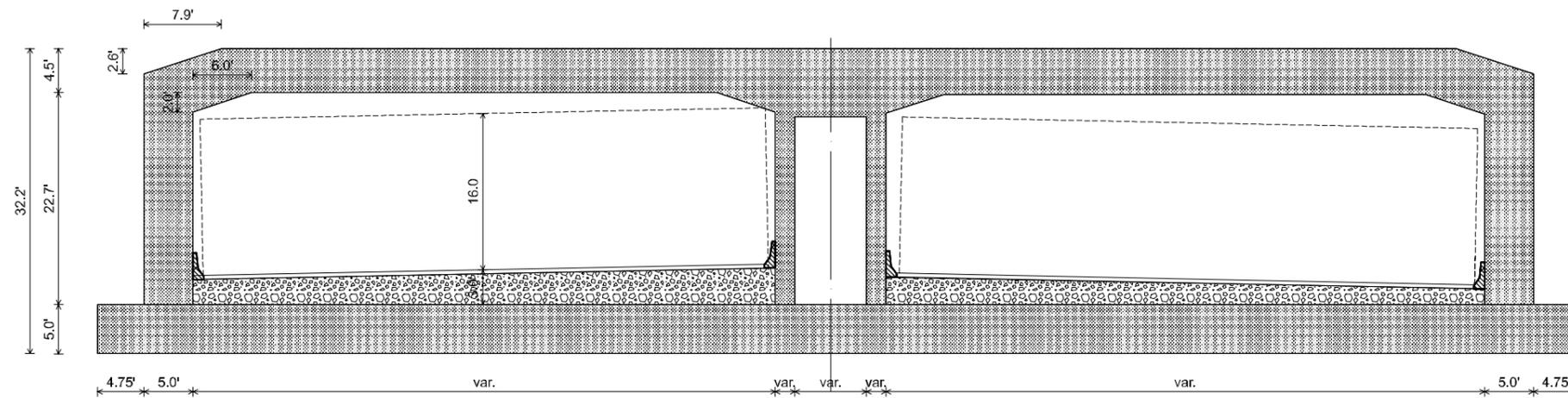
**FIGURE 18**  
**PROPOSAL K. TUNNEL AT MONTLAKE**  
Construction Sequence Marine Works, Part 2  
12.03.2008



-  Under water concrete
-  Structural concrete
-  Ballast concrete

FIGURE 19  
 PROPOSAL K. TUNNEL AT ARBORETUM  
 Longitudinal Profile  
 12.03.2008





-  Structural concrete
-  Ballast concrete or gravel

FIGURE 21  
 PROPOSAL K. TUNNEL AT ARBORETUM  
 Cut & Cover Tunnel Structure (Eastern Part)  
 Typical Cross Section  
 12.03.2008

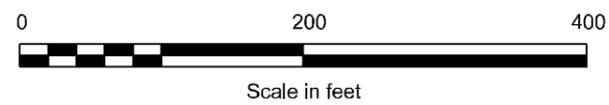
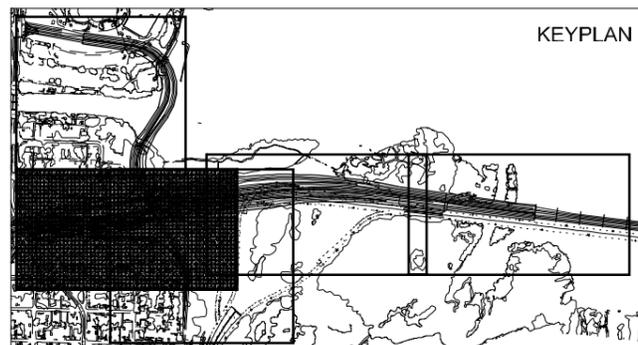
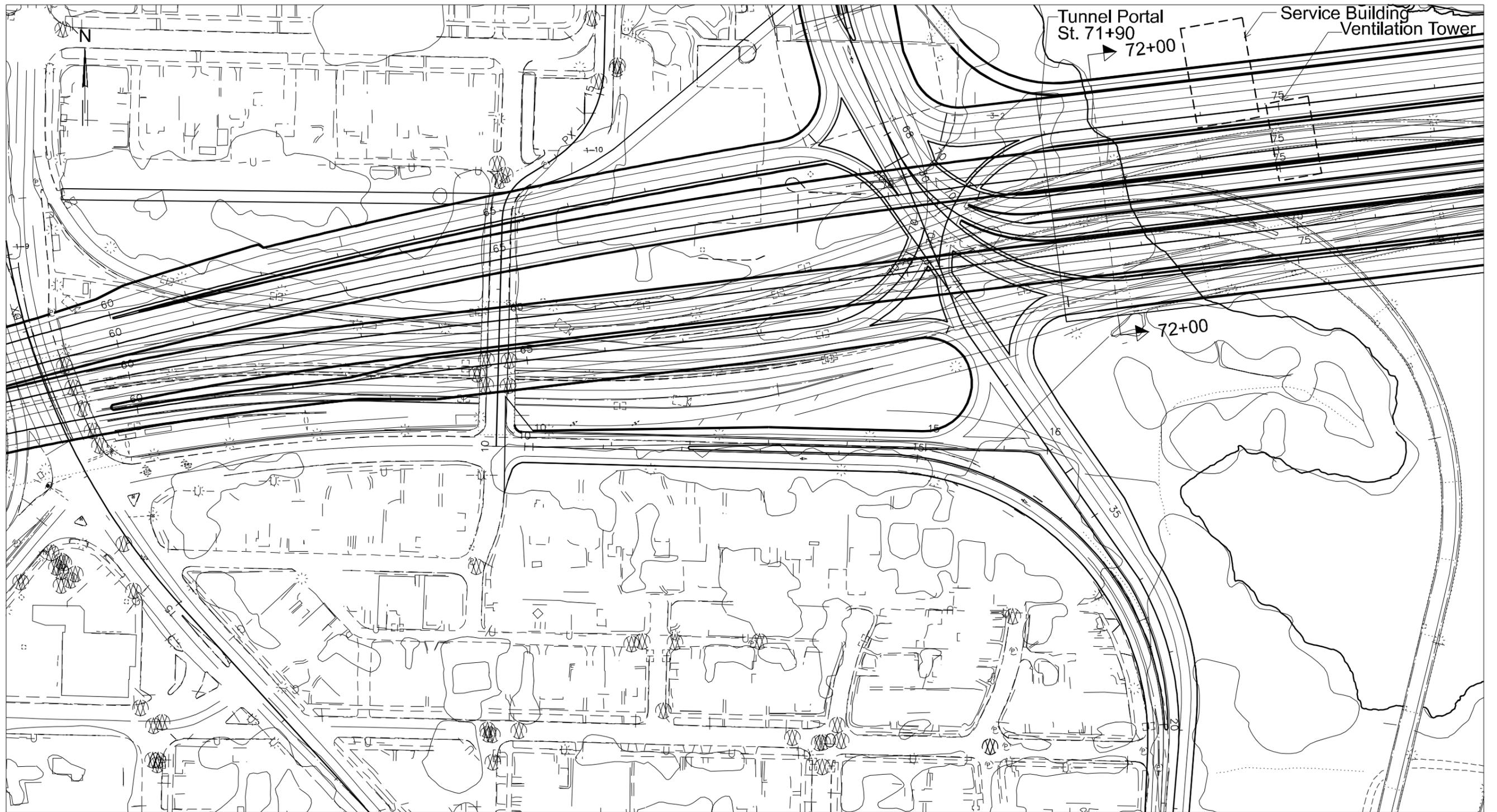


FIGURE 22  
PROPOSAL K. TUNNEL AT ARBORETUM  
Main Road  
Plan Western Part  
12.03.2008

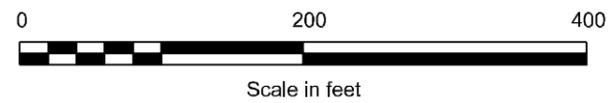
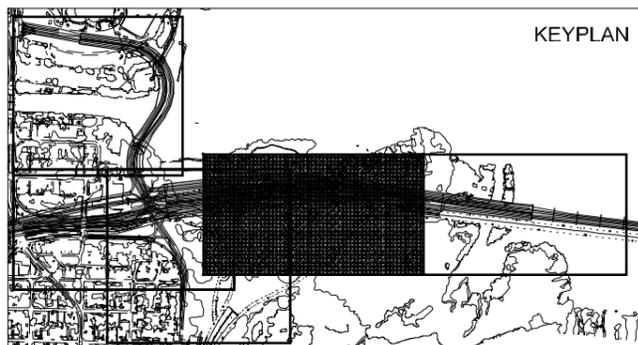
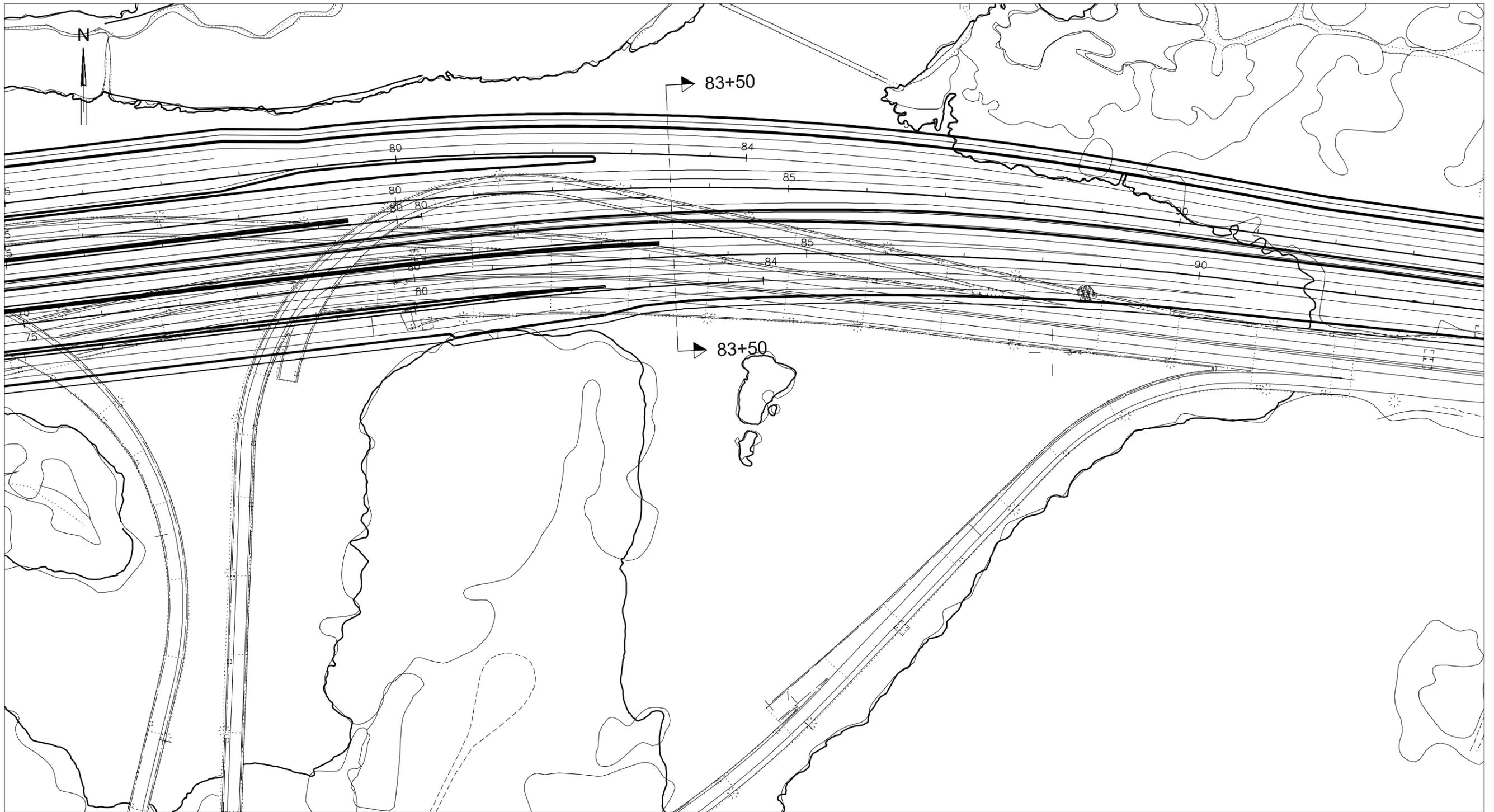


FIGURE 23  
 PROPOSAL K. TUNNEL AT ARBORETUM  
 Main Road  
 Plan Central Part  
 12.03.2008

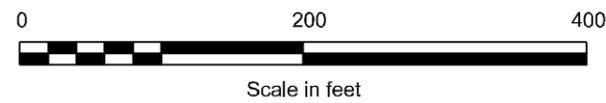
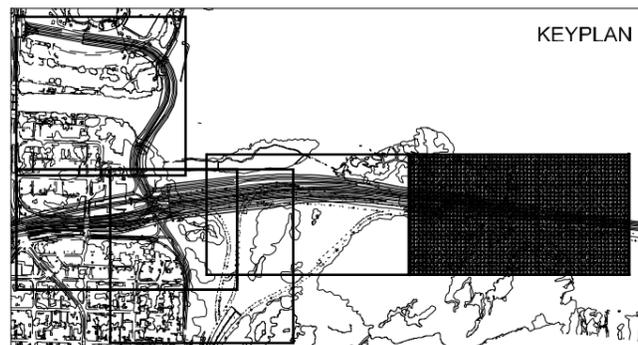
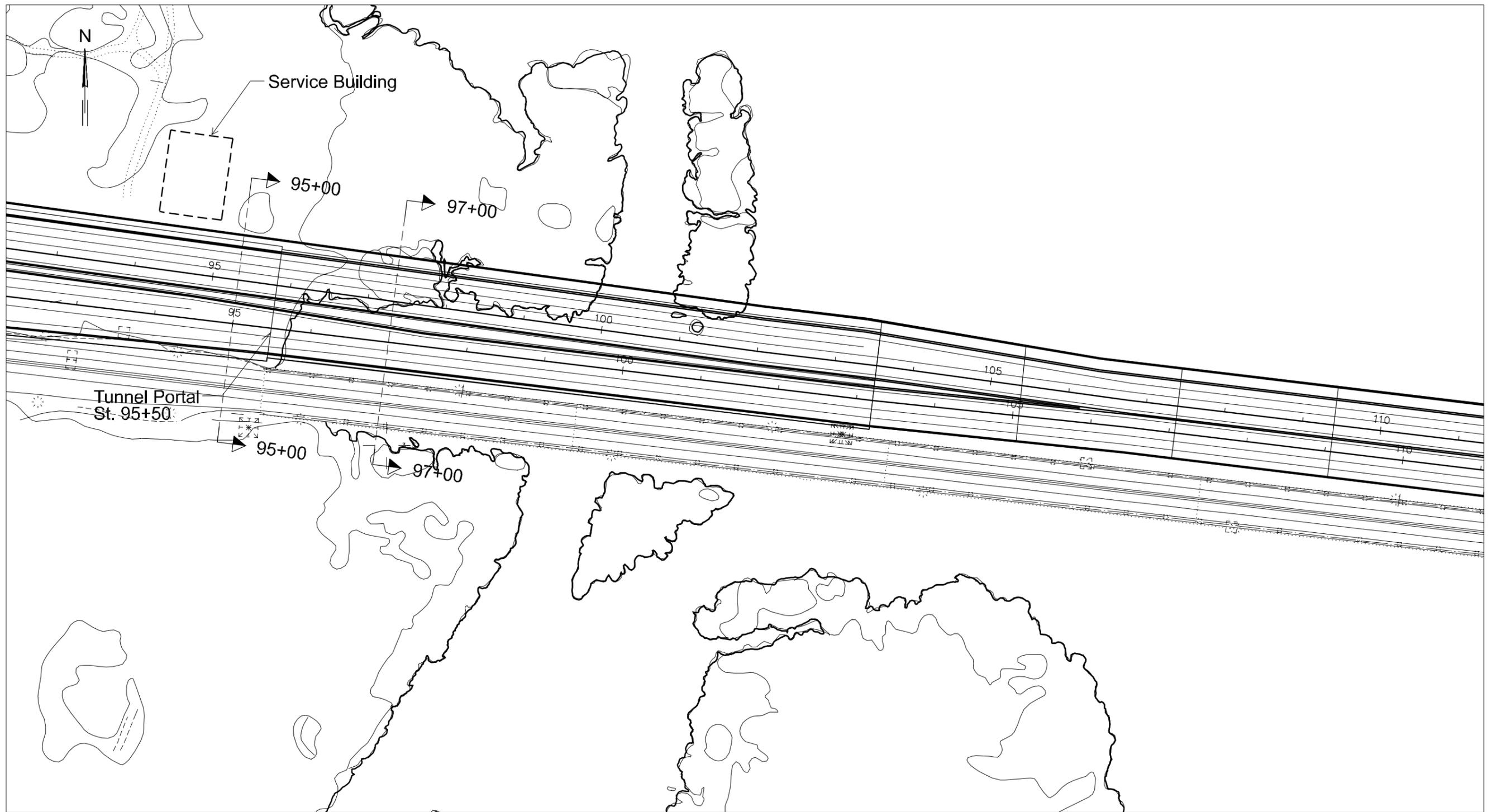
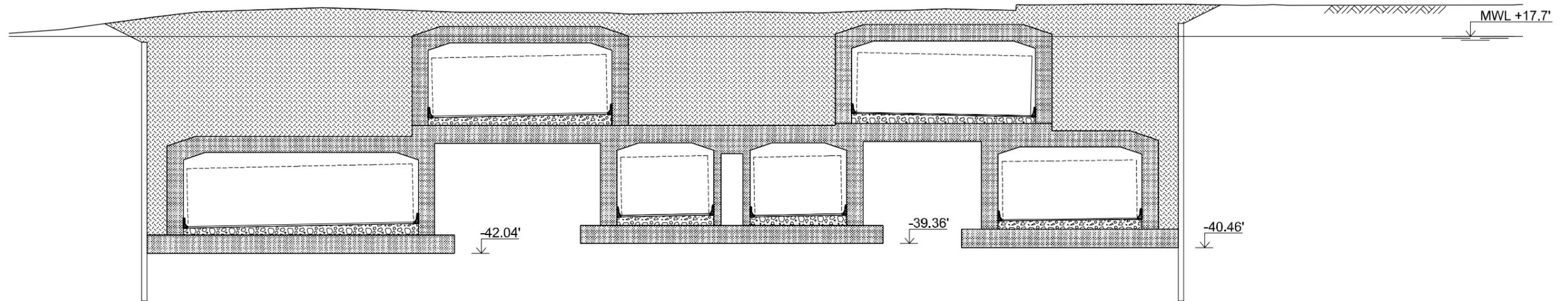
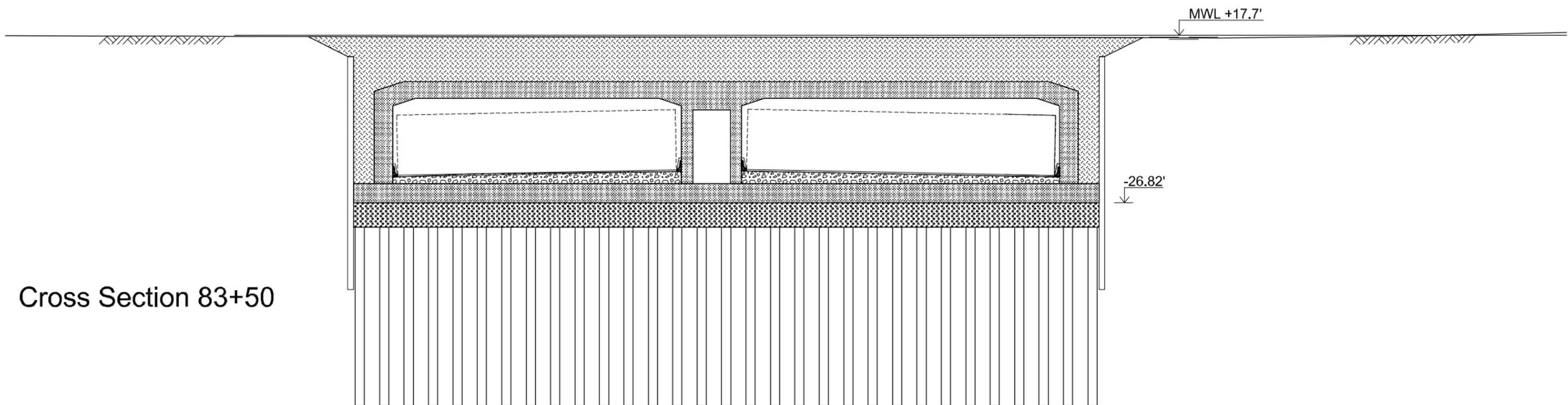


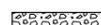
FIGURE 24  
 PROPOSAL K. TUNNEL AT ARBORETUM  
 Main Road  
 Plan Eastern Part  
 12.03.2008



Cross Section 72+00



Cross Section 83+50

-  Back fill
-  Structural concrete
-  Ballast concrete

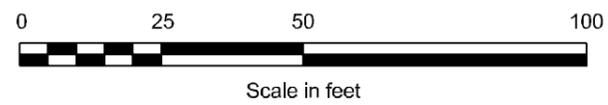
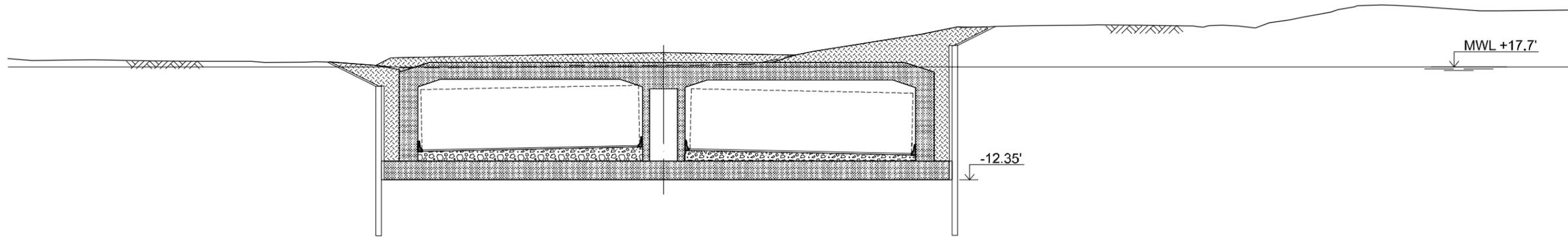
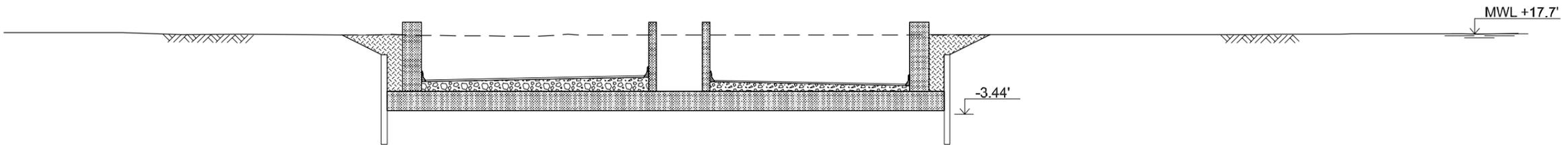


FIGURE 25  
PROPOSAL K. TUNNEL AT ARBORETUM  
Main Road Cross Section St. 72+00 and 83+50  
12.03.2008



Cross Section 95+00



Cross Section 97+00

-  Back fill
-  Structural concrete
-  Ballast concrete

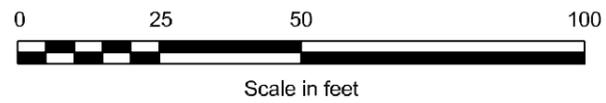


FIGURE 26  
PROPOSAL K. TUNNEL AT ARBORETUM  
Main Road Cross Section St. 95+00 and 97+00  
12.03.2008

**PROPOSAL K. TUNNEL AT MONTLAKE  
TIME SCHEDULE**

