RFI #00265

SKANSKA

Skanska USA Civil
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Riverside, California 92509

Project: 90009590 - I-405 - Brickyard to SR527
Bothell, Washington 98011

BY-CRE-01613_009727_RFI_00265_16.03.02_MSE Wall 23.80R Settlement and Plumbness

TO:	Rachel Gehrlein **(Washington State Department of Transportation)** Ron Haukom **(Washington State Department of Transportation)** Nancy Alpuche **(Washington State Department of Transportation)** Sokha Men **(Washington State Department of Transportation)**	**FROM:**	Samuel Will **(Skanska USA Civil West)**
DATE INITIATED:	11/07/2024	**STATUS:**	Open
LOCATION:		**DUE DATE:**	12/13/2024
COST CODE:		**REFERENCE:**	
COST IMPACT:		**SCHEDULE IMPACT:**	
DRAWING NUMBER:		**SPEC SECTION:**	
PRIORITY:			
LINKED DRAWINGS:			
RECEIVED FROM:	Samuel Will **(Skanska USA Civil West)**		

COPIES TO:
Ryan Abraham **(AECOM)**, I405 AECOM **(AECOM)**, Nancy Alpuche **(Washington State Department of Transpor)**, Nick Beatty **(Skanska USA Civil West)**, Sonia Berriz **(Washington State Department of Transpor)**, Kristal Buster **(AECOM)**, Marisa Chong **(Washington State Department of Transpor)**, Kim Christian **(Skanska USA Civil West)**, Document Control - Skanska **(Skanska USA Civil West)**, Erin Gaffney **(Skanska USA Civil West)**, Rachel Gehrlein **(Washington State Department of Transpor)**, Jon Guerrero **(AECOM)**, Ron Haukom **(Washington State Department of Transpor)**, Janka Lovering **(Washington State Department of Transpor)**, Michelle McDowell **(AECOM)**, Sokha Men **(Washington State Department of Transpor)**, Kai Ortega **(Skanska USA Civil West)**, Michelle Petterson **(Skanska USA Civil West)**, Jacob Schmidt **(Atlas)**, Kyle Sharrer **(Skanska USA Civil West)**, Danny Snyder **(Skanska USA Civil West)**, Sharath Kumar Somalraju **(AECOM)**, Scott Turner **(Skanska USA Civil West)**, Alan Villavicencio **(Skanska USA Civil West)**

ADDITIONAL FIELDS

RFI Response Date

Estimated Hours

RFI Priority

RFI CUSTOM FIELDS FOR PORT AUTHORITY PROJECTS

Contract Number

Port Authority Priority

Question Date

Attachments

Question from Samuel Will (Skanska USA Civil West) at 02:42 PM on 11/07/2024

The Segment 2 Package 1B Geotech RFC:

- Table 6.34 provides the settlement Summary Table for Wall 23.80R with the following values:
  - Estimated Total Settlement Range (Inch) = 0.1 to 1.1 for unimproved soil conditions, the actual performance of the walls will be better than reported due to proposed stone column ground improvement.
  - Estimated Max Differential Settlement Over 100 Feet (Inch) = 0.4
  - Allowable Settlement (Inch) = 4
- Section 6.4.4.2 - Load Transfer Pad Design Summary states: "Wall 23.72R and Wall 23.80R (all stone column zones) are designed by SSL and require a LTP below the wall facing with a minimum unreinforced LTP thickness of 2 feet with a minimum width of 5 feet (centered on the wall facing). Alternatively, the structural engineer can design a reinforced concrete leveling pad below the wall facing."

WSDOT Standard Specification M41-10 Section 6-13.3(1) Structural Earth Walls - Quality Assurance limits the deviation from the overall design batter of the wall per 10 feet of wall height for precast concrete panel faced structural earth walls to 1/2 inch.

Drawing W22-6 Detail 2 provides a reinforced concrete leveling pad for Wall 23.80R.

In accordance with Drawing W22-6 and Segment 2 Package 1B Geotech RFC Section 6.4.4.2, Skanska constructed a reinforced concrete leveling pad for Wall 23.80R without a load transfer pad above the stone columns. Skanska then began setting MSE panels and backfill.

On 10/31/24, Skanska observed that the MSE wall facing panels installed on Wall 23.80R from approximately STA 12+00 to 15+00 had positive batter in excess of 5 inches at the top of panels. On 11/6/24, Skanska began removing backfill and MSE panels for reinstallation to achieve the required plumbness and wall line. On 11/7/24, one day after resetting a portion of the MSE panels and beginning the backfill operation in accordance with the wall designer's installation manual, Skanska observed panels that had been reset had gained 1"-2" of positive batter overnight.

Upon further investigation, Skanska confirmed that the leveling pad at wall STA 12+00, STA 12+50 and STA 13+00 has settled 0.01 feet, 0.13 feet, and 0.25 feet respectively. The observed settlement exceeds the estimated settlement listed within the geotech report Table 6.34; however, is within the allowable settlement.

Based on the observed movement of the subgrade and Wall 23.80R, Skanska is concerned that the stability of the ground conditions is impacting the plumbness of Wall 23.80R. Skanska requests the design team consider the observed movements and provide details to limit movement within allowable tolerances during construction.

Attachments:
23.80 Stone Column and Leveling Pad Overlay with RFI 00119.pdf 23.80 SETTLEMENT EXHIBIT.pdf BY-CRE-01613_009727_RFI_00265_16.03.02_MSE Wall 23.80R Settlement and Plumbness_W23.80 Level Pad Measurements.xlsx BY-CRE-01613_009727_RFI_00265_16.03.02_MSE Wall 23.80R Settlement and Plumbness.pdf

Official Response: **Kim Christian (Skanska USA Civil West)** *responded on Thursday, January 9th, 2025 at 12:14PM PST*

Please see attached updated response from Ben Upsall.

Attachments:
Updated Response Addition to RFI 0265.pdf

Official Response: **Rachel Gehrlein (Washington State Department of Transportation)** *responded on Friday, December 13th, 2024 at 2:30PM PST*

Please confirm the load transfer pad is sized to span multiple stone columns such that the load is appropriately distributed. The use of CDF would be considered an NDC as the use of CDF as a load transfer platform was not included in the original report and would be subject to review of an updated settlement model.

Attachments:

Official Response: **Ben Upsall (GeoEngineers)** *responded on Tuesday, December 10th, 2024 at 5:55PM PST*

Based on survey results provided by Skanska, it appears that the reinforced concrete leveling pad is settling more of less vertically (with minimal rotation of the leveling pad). Those areas appear to line up fairly well with zones where the leveling pad spans across from one row of stone columns to another (i.e. the layout of the stone columns was on a square grid and did not follow the path of the wall's leveling pad). The soil beneath the existing leveling pad may be soft enough to be settling beneath the load of the MSE wall panels. The issue appears to be concentrated underneath the deepest portion of the leveling pad from Wall Station 11+95.007 to 13+90.007 where the top of the 12" thick leveling pad is called out at elevation +22.40'.

We recommend removing the existing wall and leveling pad within the station range noted above plus a short zone to the north of station 13+90.007 and a short zone to the south of station 11+95.007 as described in greater detail below. We recommend that an over excavation and replacement of the unsuitable subgrade be performed to a depth of 3 feet below the bottom of the proposed new concrete leveling pad. We recommend that this over excavation (at 3' below the bottom of the proposed new concrete leveling pad) should extend at that elevation at least between wall station 11+92.007 and 13+93.007. We recommend that the ends of the over excavated trench can then be sloped up from there to existing wall footing grade at a slope no steeper than 1H:1V to help ease the transition between the deepest portion of the leveling pad (i.e. top of leveling pad elevation +22.40') and the portions to the south and north of it where the leveling pad is planned at a higher elevation. We recommend that the over excavated trench below the leveling pad be a minimum of 6' wide and extend horizontally at least 2' from the planned wall panel face toward the east (i.e. toward the existing creek) and extend horizontally at least 4' from the planned wall panel face toward the west (i.e. toward the reinforced backfill zone under the roadway).

We recommend that one of two options (or a combination of both) be utilized to backfill the over excavated area.

Option 1: Place a layer of Mirafi 160N geotextile separation fabric (or equivalent) down in the over excavated trench and backfill over the top of it with 12" of compacted Gravel Borrow (9-03.14(1)) or Gravel Borrow for Structural Earth Wall (9-03.14(4)) compacted in accordance with WSDOT Standard Specifications 2-03.3(14)C - Method B. Place a layer of Tensar BX1500 geogrid on top of the first 12" thick compacted layer of gravel and place a second 12" thick layer of compacted Gravel Borrow (9-03.14(1)) or Gravel Borrow for Structural Earth Wall (9-03.14(4)) compacted in accordance with WSDOT Standard Specifications 2-03.3(14)C - Method B. Place a second layer of Tensar BX1500 geogrid on top of the second 12" thick compacted layer of gravel and then place a third and final 12" thick layer of compacted Gravel Borrow (9-03.14(1)) or Gravel Borrow for Structural Earth Wall (9-03.14(4)) compacted in accordance with WSDOT Standard Specifications 2-03.3(14)C - Method B. Either a reinforced concrete leveling pad (in accordance with the existing wall plans) or an unreinforced concrete leveling pad (in accordance with the pre-approved plans for SSL walls described in the WSDOT GDM Chapter 15, Appendix 15-N), can be constructed on top of the backfill section described above.

Option 2: Backfill the trench with unreinforced controlled density fill (cdf). Either a reinforced concrete leveling pad (in accordance with the existing wall plans) or an unreinforced concrete leveling pad (in accordance with the pre-approved plans for SSL walls described in the WSDOT GDM Chapter 15, Appendix 15-N), can be constructed on top of the backfill section described above.

We recommend that either backfill option described above can be used, or a combination of both where conditions and space are best suited to either method. If both methods are used along the length of the trench, the swap from one to another can occur at a vertical plane or at a sloping transition with either method on the top or bottom of the slope.

As the Geotechnical Special Inspector (GSI) and in accordance with RFP Section 2.6.8.2.1, a representative from GeoEngineers should be called out to the site to perform geotechnical special inspections in the field for all segments of the over excavated trench before backfilling activities begin to occur in that given segment. GeoEngineers should also be called out to the site to perform geotechnical special inspections in the field for all segments of the backfilled trench once backfilling activities in that given segment are complete and before the new concrete leveling pad is poured.

Attachments:

Official Response: **Ben Upsall (GeoEngineers)** *responded on Wednesday, November 27th, 2024 at 4:21PM PST*

As a result of the issue clarification meeting on 11/20/2024, we had requested some additional survey on the western edge of the leveling pad footing. That survey (attached) was provided on 11/26/2024 by Sam Will via email. The design team will evaluate the situation in light of this newly provided information.

Attachments:
20241122 Leveling Pad Survey.xlsx

All Replies:

Response from Sokha Men (Washington State Department of Transpor) at 04:34 PM on 01/10/2025

WSDOT takes no exception to the size and location of the load transfer pad.

Attachments:

Response from Kim Christian (Skanska USA Civil West) at 12:14 PM on 01/09/2025

Please see attached updated response from Ben Upsall.

Attachments:
Updated Response Addition to RFI 0265.pdf

Response from Kim Christian (Skanska USA Civil West) at 02:33 PM on 12/13/2024

Assigned BY-REC-01350

Attachments:

Response from Rachel Gehrlein (Washington State Department of Transpor) at 02:30 PM on 12/13/2024

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Attachments:

Response from Kim Christian (Skanska USA Civil West) at 08:10 AM on 12/11/2024

DRFI to RFI

Attachments:

Response from Kim Christian (Skanska USA Civil West) at 07:52 AM on 12/11/2024

Assigned BY-RDC-00718

Attachments:

Response from Ben Upsall (GeoEngineers) at 05:55 PM on 12/10/2024

Based on survey results provided by Skanska, it appears that the reinforced concrete leveling pad is settling more of less vertically (with minimal rotation of the leveling pad). Those areas appear to line up fairly well with zones where the leveling pad spans across from one row of stone columns to another (i.e. the layout of the stone columns was on a square grid and did not follow the path of the wall's leveling pad). The soil beneath the existing leveling pad may be soft enough to be settling beneath the load of the MSE wall panels. The issue appears to be concentrated underneath the deepest portion of the leveling pad from Wall Station 11+95.007 to 13+90.007 where the top of the 12" thick leveling pad is called out at elevation +22.40'.

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Response from Lucas Del Rosario (Atlas) at 03:23 PM on 11/08/2024
ok for EOR
Attachments:

Response from Erin Gaffney (Skanska USA Civil West) at 11:44 AM on 11/08/2024
Okay for structures/geotech review.
Attachments:

BY **DATE** **COPIES TO**