June 27, 2014

Mr. Gene Edwards
Geotechnical Engineering Group
Department of Public Works, City of Los Angeles
1149 S. Broadway, Suite 120
Los Angeles, CA  90015

RE: GROUND ANCHOR LOAD TESTING REPORT FOR
WHITE POINT SLOPE STABILIZATION, PASEO DEL MAR,
SAN PEDRO DISTRICT, LOS ANGELES, CALIFORNIA

Dear Mr. Edwards:

This letter summarizes load testing for the ground anchors constructed for slope stabilization at
the above-referenced site.  This letter refers to our previous conclusions and recommendations
described in the following White Point Landslide correspondence with the City of Los Angeles
Bureau of Engineering:

- Final Addendum Geotechnical Report No. 2, April 17, 2013 (Add-2 Report);
- Ground Anchors Plan prepared by Wagner Engineering & Survey, Inc., dated June 7, 2013 (Project Plans);
- Ground Anchor Performance Test Report, dated December 26, 2013;
- Field Activity Reports (FARs) 11 to 113 (Anchor FARs), November 2013 through June 2014.

Our services have been performed in general accordance with our Add-2 Report and Project
Plans.  We prepared this letter report to summarize our findings for the ground anchor testing.
The contractor, Hayward Baker, Inc. (HBI), installed the ground anchors.

HBI installed 18 ground anchors, in two rows from November 12, 2013 to June 17, 2014.  The
anchors are identified by column with letters A through I and then row placement is denoted by
numbers 1 (upper row) and 2 (lower row).  The locations of the ground anchors are shown on the
Site Plan, Figure 1.  The design load on each anchor is 210 kips.  Each anchor consists of 6
seven-wire strands designed in accordance with ASTM International (ASTM) A416 (Standard
Specification for Steel Strand, Uncoated Seven-Wire, Stress-Relieved Strand for Prestressed Concrete. Each anchor incorporates the PTI Class I double corrosion protection (highest protection). The wedge plates are electro-zinc coated per ASTM B633. The bearing plates, trumpets, and steel end caps are hot dip galvanized per ASTM A153. The diameter of the grout hole is approximately 6 inches. The anchor inclination is approximately 45 degrees from horizontal. The total anchor lengths are approximately 165 and 160 feet, for the upper and lower row anchors, respectively. The bonded length is approximately 35 feet into the Altamira Shale bedrock. Details of the ground anchor construction are provided in the Anchor FARs.

HBI conducted the ground anchor proof testing program between February 24 and 27, 2014 for the upper anchor row and between June 11 and 17, 2014 for the lower anchor row. Testing was performed in accordance with the plans and specifications. Two performance tests for the pre-production anchors were completed at Anchors C-1 and G-1 on December 19, 2013. Test loads were measured with the pressure gauge and a load cell. In addition, Dyna Force sensors were installed in Anchor C-1 and G-1 to monitor the test loads in the anchors. The anchor elongations were measured by dial gauges to the nearest 0.001 inch. The displacements of the reinforced concrete bearing pad were measured by a digital gauge to the nearest 0.001 inch.

A summary of the 18 ground anchor load testing results are presented in Figures 2 through 19. The ground anchors held the required test loads without excessive deformation per the Plans and Specifications. The measured elastic elongations at the maximum test load exceeded 80 percent of the theoretical elastic elongations of the strand unbonded length (lower limit). The measured elastic elongations at maximum test load did not exceed 100 percent of the theoretical elastic elongations of strand unbonded length plus 50 percent of the theoretical elastic elongations of strand bonded length (upper limit). These limits are given in Section 3.04-E of the Plans and Specifications.

The creep movements at the maximum test load were within acceptable tolerance of 0.04 inch in 10-minute holding duration per Section 3.04-E of the Plans and Specifications. A positive value of creep indicated elongation of anchor and the negative value indicated shortening of anchor. A second proof test was performed on Anchor D-1 since the maximum test load was not maintained for the load hold duration of 10 minutes due to equipment malfunction (jack pressure loss). The creep movements at the maximum test load for Anchor D-1 retesting were within acceptable tolerance of 0.04 inch in 10 minutes. Therefore, it is our opinion that the anchors were installed in accordance with the Project Plans and Specifications.
The limitations described in our Add-2 Report above apply to this letter. Please contact me if you have questions regarding this letter.

Sincerely,

SHANNON & WILSON, INC.

R. Travis Deane, P.E., G.E.
Senior Associate

MAM:NXN:RTD:TMG/nxn

Enc:  Figure 1 – Site Plan
      Figure 2 – Proof Testing Anchor A-1
      Figure 3 – Proof Testing Anchor B-1
      Figure 4 – Performance Testing Anchor C-1
      Figure 5 – Proof Testing Anchor D-1
      Figure 6 – Proof Testing Anchor E-1
      Figure 7 – Proof Testing Anchor F-1
      Figure 8 – Performance Testing Anchor G-1
      Figure 9 – Proof Testing Anchor H-1
      Figure 10 – Proof Testing Anchor I-1
      Figure 11 – Proof Testing Anchor A-2
      Figure 12 – Proof Testing Anchor B-2
      Figure 13 – Proof Testing Anchor C-2
      Figure 14 – Proof Testing Anchor D-2
      Figure 15 – Proof Testing Anchor E-2
      Figure 16 – Proof Testing Anchor G-2
      Figure 17 – Proof Testing Anchor F-2
      Figure 18 – Proof Testing Anchor H-2
      Figure 19 – Proof Testing Anchor I-2
1. Map adapted from drawing titled Ground Anchors Plan, Sheet C-4.0, by Wagner Engineering & Surveying, Inc. Dated 05-01-2013.

2. Extensometer EX-1 was replaced by EX-3 in January 2014 due to interference with the drilling equipment.

3. FAR = Field Activity Report

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51-1-10079-033

FIG. 1
Testing was conducted in accordance with the project plans and specifications, and Section 8.0 of "Recommendations for Prestressing Rock and Soil Anchors" by the Post-Tensioning Institute (PTI, 2004).

NOTE

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PROOF TESTING ANCHOR A-1
June 2014
51-1-10079-033

FIG. 2
Testing was conducted in accordance with the project plans and specifications, and Section 8.0 of "Recommendations for Prestressing Rock and Soil Anchors" by the Post-Tensioning Institute (PTI, 2004).

NOTE

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PROOF TESTING ANCHOR B-1
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FIG. 3
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### Relationship between Loads vs. Elastic Elongations

- **Field Data (Pressure Gauge)**
- **80% of Free Stressing Length (PTI)**
- **100% Free Length + 50% Bonded Length (PTI)**

### Relationship between Creep Movement vs. Time

- **Field Data (Pressure Gauge)**
- **0.04 inch per 10 minutes (PTI)**
Testing was conducted in accordance with the project plans and specifications, and Section 8.0 of "Recommendations for Prestressing Rock and Soil Anchors" by the Post-Tensioning Institute (PTI, 2004).

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NOTE

Load (kips)

Elastic Elongation (in)

Creep Movement (in)

Elapsed Time (mins)

Field Data (Pressure Gauge)

80% of Free Stressing Length (PTI)

100% Free Length + 50% Bonded Length (PTI)

0.04 inch per 10 minutes (PTI)
Testing was conducted in accordance with the project plans and specifications, and Section 8.0 of "Recommendations for Prestressing Rock and Soil Anchors" by the Post-Tensioning Institute (PTI, 2004).

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NOTE

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PROOF TESTING ANCHOR E-2
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FIG. 15
Testing was conducted in accordance with the project plans and specifications, and Section 8.0 of "Recommendations for Prestressing Rock and Soil Anchors" by the Post-Tensioning Institute (PTI, 2004).
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PROOF TESTING ANCHOR H-2
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FIG. 18
Testing was conducted in accordance with the project plans and specifications, and Section 8.0 of "Recommendations for Prestressing Rock and Soil Anchors" by the Post-Tensioning Institute (PTI, 2004).