APPENDIX H

CIVIL FEASIBILITY REVIEW LETTER

WAGNER ENGINEERING & SURVEY, INC.
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CONSTRUCTABILITY REPORT

WHITE POINT LANDSLIDE

SAN PEDRO DISTRICT
CALIFORNIA 90732

August 15, 2012

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1 INTRODUCTION

This report presents the constructability analysis for immediate repairs and five conceptual long-term repair options for White Point Landslide in the San Pedro District of Los Angeles. Wagner Engineering & Survey, Inc. (WES) performed an analysis based on Shannon & Wilson, Inc. (SW) preliminary geotechnical report. In this report, SW recommends cleaning and shaping, dewatering and ground anchors along with five alternatives on how to repair Paseo Del Mar's damaged roadway.

Paseo Del Mar is defined as a Secondary Scenic Highway that extends east-west along the top of the 120-foot-high, south-facing sea bluff overlooking the Pacific Ocean. Paseo Del Mar's roadway had the major damage from the White Point Landslide (November 2011).

In this review, WES will provide engineering suggestions, rough order of magnitude cost estimates, rough earthwork quantities and highlight possible construction restrictions.

2 CONCEPTUAL LONG TERM REPAIR OPTIONS

One option for immediate repairs and five options for long term repairs are recommended by the Geotechnical Report for a conceptual long-term repair, with different grading alternatives and reroutes. WES will describe the options and provide constructability review and rough order of magnitude cost for each option and assist the City to make a repair decision. The cost estimates provided do not include property acquisitions, environmental review, other related improvements and any other incurring costs. After reviewing the options, we have found no issues with ADA compliance. The sidewalks will be at a maximum 2% cross slope with a maximum longitudinal slope of 5%.

IMMEDIATE REPAIRS

This option has been presented as an immediate action to perform repairs, which includes cleaning and shaping as necessary to provide adequate surface drainage in rainy season to convey water away from the impacted areas while minimizing erosion and to flatten existing steep slopes. Earthwork will be performed to smooth the topography of the jagged landslide surface to eliminate depressions and irregularities caused by the landslide, while maintaining balanced onsite cut and fill conditions to eliminate import/export of soil materials.

Dewatering will be necessary and is considered in this option as recommended in the Geotechnical Report, as the water level factor affects the stability of the slope.

We recommend providing end-of-road barricades, 170 feet away from the landslide limits, as defined in section 9.3.1 and Figure 9 of the Geotechnical Report. As the road designation is Scenic Secondary Highway, its width of 70 feet is adequate to provide U-turn radius. Proper signage for speed reduction (50mph actual) and to warn of approaching Dead End will be needed. Substantial bollards are recommended at the Dead End.

In this option, the areas adjacent to the steep headscarp on the perimeter of the landslide on the north side of the mass "island" be cleaned and shaped to smooth the surfaces and fill the depressions in the graben of the landslide to reduce surface infiltration. The rough earthwork quantities for this option are:

CUT: 17,168 cubic yards

FILL: 17,170 cubic yards

Immediate measures are necessary to prevent sloughing in the steep headscarp; anchored whales are proposed in order to minimize ground movement east of the 2011 landslide.

OPTION 1 - RESTORE ROADWAY TO PREVIOUS LOCATION WITHOUT RETAINING WALL

This Option restores the road grade to its previous elevation, filling in the void with reinforced soil slope (RSS) consisting of free-draining granular fill and geosynthetic reinforcement layers to sustain the tensile stress. This Option will require massive earth work. New paving and sidewalks will be constructed to have the road in its original location and elevation.

Grading

This option recommends fill with RSS to be made below the slide plane. The rough earth work quantities for this option are: CUT: 280,750 cubic yards and FILL: 299,150 cubic yards with RSS.

OPTION 2 - RESTORE ROADWAY TO PREVIOUS LOCATION WITH RETAINING WALL

This option considers also restoring the road to its previous condition with the design of a retaining wall with soldier piles and tie back anchors, thus reducing the earthwork quantities of Option 2. New paving and sidewalks will be constructed to have the road in its original location and elevation.

Grading

A granular material fill is proposed between the retaining wall and a stepped slope. An area adjacent to the south side of the wall will be excavated and filled with granular material. The rough quantities for this option are:

CUT: 99,240 cubic yards (export)

FILL: 116,270 cubic yards with granular material (import)

OPTION 3 - RESTORE ROADWAY TO PREVIOUS LOCATION WITH BRIDGE

This option considers restoring the road to its previous location and elevation with a bridge constructed across the landslide area to support the road in its original location and elevation with intermediate piers in the landslide zone. The Geotechnical Report refers to an example bridge constructed at the Pitkins Curve Landslide on Highway 1 along the Big Sur Coast in Monterey California, comprised of a cantilevered, post-tensioned-concrete box-girder bridge that was constructed to span approximately 310 feet across the active landslide at a cost of $25 million.

Grading

This option will require grading the steep headscarp on the perimeter of the landslide area to reduce the occurrence of future landslide and to fill the depressions in the graben of the landslide to reduce surface infiltration and to protect the footings. The quantities for this option are:

CUT: 25,250 cubic yards (export)

FILL: 24,360 cubic yards with granular fill (import)

OPTION 4 - REGRADE ROADWAY

This considers regrading the original alignment to accommodate the post landslide topography over a 1,100 foot distance. Three vertical curves may have to be designed: two crest curves with 180 foot length and radius of 3,500 feet and 5,000 feet; one sag curve with 660 foot length and a radius of 3,530 feet with 5 % transitions designed between curves. For this option, the speed must be reduced to 40 mph to be consistent with the codes and designed with proper traffic warning signage.

Grading

Following recommendations for this option, the rough earthwork quantities for this are:

CUT: 28,330 cubic yards (export)

FILL: 46,240 cubic yards (import)

OPTION 5 - REROUTE ROADWAY

The rerouting is proposed around the landslide zone 170 feet away from the original landslide headscarp boundary. No significant vertical curves will be needed in this design; however the actual conditions for this option only allow connecting the road to existing Weymouth Avenue in a location 280 feet distant northeasterly from its intersection with Paseo del Mar with horizontal curves of approximate 780 feet radii. For this option, parcels totaling approximately of 151,600 square feet will need to be acquired. As these areas are publically owned, the City may be able to facilitate the acquisition. Properties Assessor's Parcel Numbers are 7563-001-900 and 7563-002-0913.

This option will include gates at each end of the road that will allow the White Point Nature Preserve to close the road at night.

Grading

This option requires two separate areas for grading: for proposed roadway and for the landslide area.

Roadway earthwork quantities:

CUT: 6,570 cubic yards

FILL: 4,620 cubic yards

Landslide area earthwork quantities:

CUT: 30,250 cubic yards (export)

FILL: 29,360 cubic yards with RSS

3 ROUGH ORDER OF MAGNITUDE COST ESTIMATE

Preliminary rough order of magnitude costs were prepared for the immediate repairs and each of the five options; results show that the most expensive options are restoring the road with a bridge and restoring the road without retaining wall. The least expensive options will be to abandon the roadway and to reroute it.

4 ENVIRONMENTAL

Per government and local agencies all the options may be subject to environmental review.

This is an Engineer's estimate. It is not intended for bidding, construction or budgeting purposes

White Point Landslide - San Pedro
Preliminary Cost for
ROUGH ORDER OF MAGNITUDE COST ESTIMATE

SUMMARY

	DESCRIPTION	COST	RANGE IN COST
1	IMMEDIATE REPAIRS	**$ 6,889,699**	**$5M - $8M**
2	OPTION 1 - RESTORE ROADWAY TO PREVIOUS LOCATION WITHOUT RETAINING WALL	**$ 48,687,550**	**$42M - $50M**
3	OPTION 2 - RESTORE ROADWAY TO PREVIOUS LOCATION WITH RETAINING WALL	**$ 26,523,010**	**$22M - $27M**
4	OPTION 3 - RESTORE ROADWAY TO PREVIOUS LOCATION WITH BRIDGE	**$ 59,927,290**	**$57M - $62M**
5	OPTION 4 - REGRADE ROADWAY	**$ 7,455,820**	**$4M - $8M**
6	OPTION 5 - REROUTE ROADWAY	**$ 7,424,506**	**$4M - $8M**

Note: Values are rounded up to hundred thousands.

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White Point Landslide - San Pedro
Preliminary Cost for
ROUGH ORDER OF MAGNITUDE COST ESTIMATE

IMMEDIATE REPAIRS

No.	DESCRIPTION	UNIT	UNIT COST	Q-TY	COST
1.00	EARTH WORK				
1.01	CUT	CY	$ 21.85	17,168	$ 375,121
1.02	FILL WITH ONSITE MATERIAL	CY	$ 34.00	17,170	$ 583,780
2.00	DEWATERING	LS	$ 1,500,000	1	$ 1,500,000
3.00	SLOPE ANCHOR SYSTEM	LS	$ 1,725,000	1	$ 1,725,000
4.00	SIGNAGE AND BARRICADES	LS	$ 69,000	1	$ 69,000
	TOTAL DIRECT COST				**$ 4,252,901**
	Design, Inspection, Survey, Geotechnical, Project Management, Construction Management, Environmental				$ 1,488,515
	TOTAL INCL.MARK-UP				**$ 5,741,416**
	Contingency				$ 1,148,283
	TOTAL				**$ 6,889,699**

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White Point Landslide - San Pedro
Preliminary Cost for
ROUGH ORDER OF MAGNITUDE COST ESTIMATE

OPTION 1 - RESTORE ROADWAY TO PREVIOUS LOCATION WITHOUT RETAINING WALL

No.	DESCRIPTION	UNIT	UNIT COST	Q-TY	COST
1.00	EARTH WORK				
1.01	CUT	CY	$ 21.85	280,750	$ 6,134,388
1.02	FILL WITH REINFORCED SOIL SLOPE	CY	$ 55.20	299,150	$ 16,513,080
1.03	HAUL AWAY	CY	$ 25.30	280,750	$ 7,102,975
2.00	ASPHALT CONCRETE PAVEMENT	SF	$ 5.75	28,000	$ 161,000
3.00	CONCRETE SIDEWALK	SF	$ 9.20	8,000	$ 73,600
4.00	SIGNAGE	LS	$ 69,000	1	$ 69,000
	TOTAL DIRECT COST				**$ 30,054,043**
	Design, Inspection, Survey, Geotechnical, Project Management, Construction Management, Environmental				$ 10,518,915
	TOTAL INCL.MARK-UP				**$ 40,572,958**
	Contingency				$ 8,114,592
	TOTAL				**$ 48,687,550**

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White Point Landslide - San Pedro
Preliminary Cost for
ROUGH ORDER OF MAGNITUDE COST ESTIMATE

OPTION 2 - RESTORE ROADWAY TO PREVIOUS LOCATION WITH RETAINING WALL

No.	DESCRIPTION	UNIT	UNIT COST	Q-TY	COST
1.00	EARTH WORK				
1.01	CUT	CY	$ 21.85	99,240	$ 2,168,394
1.02	FILL WITH GRANULAR MATERIAL	CY	$ 50.60	116,270	$ 5,883,262
1.03	HAUL AWAY	CY	$ 25.30	99,240	$ 2,510,772
2.00	ASPHALT CONCRETE PAVEMENT	SF	$ 5.75	28,000	$ 161,000
3.00	CONCRETE SIDEWALK	SF	$ 9	8,000	$ 73,600
4.00	RETAINING WALL AND ANCHORS	SF	$ 242	22,800	$ 5,506,200
5.00	SIGNAGE	LS	$ 69,000	1	$ 69,000
	TOTAL DIRECT COST				**$ 16,372,228**
	Design, Inspection, Survey, Geotechnical, Project Management, Construction Management, Environmental				$ 5,730,280
	TOTAL INCL.MARK-UP				**$ 22,102,508**
	Contingency				$ 4,420,502
	TOTAL				**$ 26,523,010**

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White Point Landslide - San Pedro
Preliminary Cost for
ROUGH ORDER OF MAGNITUDE COST ESTIMATE

OPTION 3 - RESTORE ROADWAY TO PREVIOUS LOCATION WITH BRIDGE

No.	DESCRIPTION	UNIT	UNIT COST	Q-TY	COST
1.00	EARTH WORK				
1.01	CUT	CY	$ 21.85	25,250	$ 551,713
1.02	FILL WITH GRANULAR MATERIAL	CY	$ 50.60	24,360	$ 1,232,616
1.03	HAUL AWAY	CY	$ 25.30	25,250	$ 638,825
2.00	BRIDGE	LS	$ 34,500,000	1	$ 34,500,000
3.00	SIGNAGE	LS	$ 69,000	1	$ 69,000
	TOTAL DIRECT COST				**$ 36,992,154**
	Design, Inspection, Survey, Geotechnical, Project Management, Construction Management, Environmental				$ 12,947,254
	TOTAL INCL.MARK-UP				**$ 49,939,408**
	Contingency				$ 9,987,882
	TOTAL				**$ 59,927,290**

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White Point Landslide - San Pedro
Preliminary Cost for
ROUGH ORDER OF MAGNITUDE COST ESTIMATE

OPTION 4 - REGRADE ROADWAY

No.	DESCRIPTION	UNIT	UNIT COST	Q-TY	COST
1.00	EARTH WORK				
1.01	CUT	CY	$ 21.85	28,330	$ 619,011
1.02	FILL WITH GRANULAR MATERIAL	CY	$ 55.20	46,240	$ 2,552,448
1.03	HAUL AWAY	CY	$ 25.30	28,330	$ 716,749
2.00	ASPHALT CONCRETE PAVEMENT	SF	$ 5.75	77,000	$ 442,750
3.00	CONCRETE SIDEWALK	SF	$ 9.20	22,000	$ 202,400
4.00	SIGNAGE	LS	$ 69,000	1	$ 69,000
	TOTAL DIRECT COST				**$ 4,602,358**
	Design, Inspection, Survey, Geotechnical, Project Management, Construction Management, Environmental				$ 1,610,825
	TOTAL INCL.MARK-UP				**$ 6,213,183**
	Contingency				$ 1,242,637
	TOTAL				**$ 7,455,820**

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White Point Landslide - San Pedro
Preliminary Cost for
ROUGH ORDER OF MAGNITUDE COST ESTIMATE

OPTION 5 - REROUTE ROADWAY

No.	DESCRIPTION	UNIT	UNIT COST	Q-TY	COST
1.00	EARTH WORK				
1.01	CUT	CY	$ 21.85	36,820	$ 804,517
1.02	FILL WITH GRANULAR MATERIAL	CY	$ 55.20	33,980	$ 1,875,696
1.03	HAUL AWAY	CY	$ 25.30	36,820	$ 931,546
2.00	ASPHALT CONCRETE PAVEMENT	SF	$ 5.75	105,420	$ 606,165
3.00	CONCRETE SIDEWALK	SF	$ 9.20	30,120	$ 277,104
4.00	SIGNAGE	LS	$ 69,000	1	$ 69,000
4.00	GATES AT END OF ROADS	EACH	$ 9,500	2	$ 19,000
	TOTAL DIRECT COST				**$ 4,583,028**
	Design, Inspection, Survey, Geotechnical, Project Management, Construction Management, Environmental				$ 1,604,060
	TOTAL INCL.MARK-UP				**$ 6,187,088**
	Contingency				$ 1,237,418
	TOTAL				**$ 7,424,506**