APPENDICES

A) GEOTECHNICAL CONSTRAINTS MEMORANDUM (ENGEO, INC.)

Project No.
5687.100.104

January 16, 2013
Revised January 30, 2013

Mr. Angelo Obertello
Carlson Barbee & Gibson
6111 Bollinger Canyon Road, Suite 150
San Ramon, CA 94583

Subject: Alameda Point – Infrastructure Planning
Alameda, California

GEOTECHNICAL CONSTRAINTS

References:

1. A3GEO, Inc. and Alan Kropp & Associates, Inc.; Data Report, Preliminary Geotechnical and Geologic Studies, Lawrence Berkeley National Laboratory Future Scientific Facility, Alameda Point, Alameda, California; October 28, 2011.

2. ENGEO; Preliminary Geotechnical Exploration, Alameda Point Development, Alameda, California; April 8, 2003; Project No. 5497.100.102.

3. Subsurface Consultants Inc.; Geotechnical Investigation, Oakland Harbor Navigation Improvement (-50 foot) Project, Port of Oakland, Oakland and Alameda, California; February 12, 1999.

4. Carlson, Barbee & Gibson Inc.; Alameda Point, Master Infrastructure Plan, Base Case – Reuse Plan, Land Use and Zoning Districts; October 11, 2012.

Dear Mr. Obertello:

At your request, we prepared the following discussion of the geotechnical constraints that will impact redevelopment of Alameda Point in Alameda, California. We understand that the City of Alameda (City) is advancing site development planning. The purpose of this study is to assist in infrastructure planning at the site. The referenced documents were utilized for this study:

SITE DESCRIPTION AND PROJECT DESCRIPTION

Alameda Point is an area located on the westerly portion of Alameda Island in the City of Alameda, California. Alameda Island lies along the eastern side of the San Francisco Bay, adjacent to the City of Oakland. The site is a portion of the former Naval Air Station Alameda that ceased operations as a military base in 1997. The site is roughly rectangular in shape and is approximately 2 miles long and 1 mile wide. Based on a planning document by Carlson, Barbee & Gibson Inc., (Reference 4), the City is currently interested in developing an infrastructure plan in order to facilitate redevelopment of the site with a mixture of housing, commercial, retail, marine-related facilities, and open spaces.

PREVIOUS GEOTECHNICAL DOCUMENTS

Numerous previous geotechnical explorations have been performed at the site during history. Reports by Subsurface Consultants Incorporated in 1999, ENGEO in 2003, and A3GEO, Inc. and Alan Kropp & Associates, Inc. in 2011, References 1, 2, and 3, are highly relevant to the current study. Numerous borings, Cone Penetration Tests (CPTs) and lab tests were included in these studies. We have compiled and selectively used, as deemed appropriate, the previous field and laboratory data in this current study. The approximate locations of the previous explorations are illustrated on Figure 1 (Site Plan).

SUBSURFACE CONDITIONS

Based on our review of the subsurface information in References 1 through 3, artificial fill of varying thickness was encountered in historic explorations throughout the site. Young Bay Mud was encountered beneath the fill in the portions of the site to the north of the seaplane lagoon with the greatest thickness approximately 130 feet. Merritt Sand and the San Antonio formation sand were found directly beneath the fill in the southeastern portion of the site (approximately 60 to 70 feet in thickness) and dipping beneath the Young Bay Mud to the north and the west. Yerba Buena Mud (also commonly called Old Bay Mud) lies beneath the San Antonio formation.

Due to site elevations and proximity to the San Francisco Bay, the site has relatively shallow groundwater. Based on historic groundwater measurements, we have assumed the groundwater is approximately 4 feet below existing grade in the analyses performed for the site.

Much of the existing fill and some of the Merritt Sand deposits are potentially liquefiable. The Young Bay Mud deposits are highly compressible under loads associated with fill and buildings. The Young Bay Mud is also soft, typically leading to relatively low stability of cuts and slopes as well as low bearing capacity.

GEOTECHNICAL CONSIDERATIONS

Based on the references provided, the main geotechnical concerns for the proposed site development include: (1) stability of the north shoreline, (2) liquefaction, (3) compressible soils and (4) underground utility construction. These concerns are discussed below and should be considered in the initial planning for the project site. A design-level geotechnical analysis should be performed as part of the design process.

North Shoreline Slope Stability

The geotechnical investigation report prepared by Subsurface Consultants Incorporated (SCI) for the Oakland Harbor Navigation Improvement Project at the Port of Oakland (Reference 3) analyzed the proposed deepening and widening of the Inner and Outer Harbor shipping channels and included an evaluation and discussion of that project's impact on adjacent land. The Port's shipping channel deepening project was completed in 2009. A portion of the deepened channel is adjacent to the north shore of the Alameda Point project site.

Reference 3 presents static slope stability analyses performed using limit equilibrium theory to locate the minimum factor of safety and critical slip surface. These analyses were performed using Bishop's Simplified Method and the Spencer Method. Liquefaction analyses were performed using the procedures outlined by Seed, et al. (1984). Lateral spreading was investigated using the Bartlett and Youd method (1995) and seismic slope stability due to inertial forces was analyzed using the method outlined by Makdisi and Seed (1978).

Three levels of seismic design criteria were used in this investigation. Levels 1, 2, and 3 correspond to ground shaking with a 50-, 20-, and 10-percent probability of exceedance in 50 years, and correspond to peak ground accelerations (PGA) of 0.29g, 0.45g, and 0.57g, respectively. A Magnitude 7¼ to 7½ earthquake was assumed for these analyses.

Two cross sections, I-I' and J-J', were analyzed which encroach into a portion of the north shoreline of the proposed Alameda Point project, and the results are presented in Reference 3. The report concluded that the static stability of cross section I-I' was marginal and the seismic performance was poor with very large deformations at all seismic levels. Mitigation in the form of shoreline excavation, ground improvement, rock dikes, and/or bulkheads was recommended. Alternatively, the report suggests moving the channel 25 feet north. The seismic performance of cross section J-J' was concluded to be good at the channel limit but poor at the shoreline. Since the dredging of the channel had a limited effect on the stability of cross section J-J', no mitigation was recommended.

Reference 3 also includes analyses of the northern shoreline stability to the west of the mapped development area. Three additional cross sections, F-F', G-G', and H-H' were evaluated using the methodologies discussed above. The stability was evaluated for both deep failures that would propagate (global failure) on to land as well as localized failures of the cut slope. The previous study indicates that, under static loading, the stability for global failures is relatively high with calculated factors of safety between 1.7 and 2.1, but localized stability of the dredged cut would be slightly above marginal with an approximate factor of safety of 1.3 for all three cross-sections. Under seismic loading, the previous study predicted displacement of the slope (both global and local) for all three cross sections under all three seismic levels. The predicted displacements range from as little as 1 foot to greater than 10 feet of displacement. In all three cross sections, the predicted seismic slope displacements are greater for the localized failure surfaces yet still relatively large for the global failure surfaces.

Based on our understanding of the channel deepening project, no mitigation was performed along the north shore of Alameda Point to improve slope stability.

Limited Slope Stability Analysis

Utilizing information from Reference 3, we analyzed the slope stability of cross sections I-I' and J-J' to verify SCI's results. The locations of these cross sections are shown on Figure 1. We performed the analyses using the computer program SLIDE© (Version 6). SLIDE© is a limit equilibrium program that allows the user various search routines to locate the minimum factor of safety and critical slip surface. We choose the Spencer Method and circular and non-circular searching algorithms for our analysis. We performed seismic deformation analysis on these cross sections, based on the method of Bray and Travasarou (2007) in keeping with the guidelines of the California Geological Survey presented in Special Publication 117A (SP117A). In our analysis, we used the shear strength parameters specified in Reference 3.

Our slope stability calculations indicate that these slopes within the study area are probably marginally stable under current conditions. Any new loads from fill placement or buildings within 50 feet of the northern shoreline would likely have an impact on static slope stability. The calculated seismic slope deformations are in the range (15cm to 100cm) that would be considered potentially seismically "unstable" under SP117A. According to the guidelines, such deformation "may be sufficient to cause serious ground cracking or enough strength loss to result in continuing (post-seismic) failure." Deformations could extend more than 1,000 feet from the shore.

To the west of the study area, the existing slopes appear to be stable under the current conditions but could experience significant deformations (up to 7 feet) under seismic shaking similar to the design earthquake for the site. The distance the deformation could extend is likely smaller than near the development area.

The slope stability results from this study and Reference 3 are included in the Appendix.

Liquefaction

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded fine sands below the groundwater table. Empirical evidence indicates that loose fine-grained soil including low plasticity silt and clay is also potentially liquefiable. When seismic ground shaking occurs, the soil is subjected to cyclic shear stresses that can cause excess hydrostatic pressures to develop and liquefaction of susceptible soil to occur. If liquefaction occurs, and if the soil consolidates following liquefaction, then ground settlement and surface deformation may occur. The previous explorations at the site encountered sand and silty sand deposits that could potentially liquefy under seismic loading.

Shallow liquefiable soil is most likely to vent to the surface in the form of sand boils. Sand boils, if they occur, can result in localized voids in the subsurface and bearing failure of shallow foundations and utilities. Sand boils were observed in portions of the Naval Air Station Alameda in the 1989 Loma Prieta Earthquake.

We performed an evaluation of liquefaction potential on selected existing CPT data with the software program Cliq (version 1.7.1.6) applying the methodologies published by NCEER in 1998 and by Moss in 2006. We also analyzed selected existing boring data with the methodologies published by Youd et al. in 2001, Seed et al. in 2003 and Idriss and Boulanger in 2008. We assumed a groundwater level of 4 feet below existing ground surface, a peak ground acceleration (PGA) of 0.4g, and a moment magnitude (M_w) of 7.3. The PGA value corresponds to the 2010 California Building Code seismic design parameters. We evaluated the liquefaction potential for the soil encountered below the assumed water table. The results indicate that sand and silty sand fill material and native deposits are potentially liquefiable down to 40 feet below existing grades. Our analyses also indicate that the potentially liquefiable soil could settle as much 11 inches. Lateral spreading along the northern shoreline is likely following a design level earthquake. A plan showing the depth of liquefiable soil material is provided as Figure 2.

Liquefaction Mitigation

The amount of potential liquefaction settlement and lateral spreading are greater than typical structures and infrastructure can tolerate without mitigation. Ground improvement techniques will likely be necessary to reduce the liquefaction potential of the sandy deposits at the project site to levels that improvements can be designed to tolerate. Liquefiable soil can be mitigated by either dynamic impact/vibration to densify the soil or mixing with cement to create zones of non-liquefiable soil. The success of dynamic impact methods depends on the fines content of the sand and the depth of the liquefiable material.

- Deep Dynamic Compaction

Deep dynamic compaction (DDC) tends to be the most cost-effective method of liquefaction mitigation, where appropriate. DDC imparts impact energy to the soil by dropping a 10- to 15-ton weight from a height of 16 to 50 feet. Since interlayered clay deposits within the liquefiable soil can absorb the dynamic energy and reduce the effectiveness of the ground improvement, DDC is most effective only to depths as much as 35 feet below grade in sandy soil.

Because the method consists of dropping a significant weight from a significant height, DDC results in significant noise and vibration. Since, the vibration impacts typical of DDC will likely cause damage to adjacent structures and improvements, an appropriate setback should be established. DDC should begin in a portion of the site away from existing structures and improvements and vibrations should be monitored to establish a safe setback. Pre- and post-construction surveys of adjacent improvements conditions should be performed to establish if any damage was caused by DDC. A second ground improvement method may be necessary within any setback area. DDC should not be used over any existing utilities.

- Rapid Impact Compaction

An alternative to DDC is rapid impact compaction (RIC), which is a proprietary densification method where a 7- to 8-ton weight is dropped from 3 to 4 feet high on an approximately 5-foot-diameter hammer head. Because the energy imparted in RIC is significantly less than DDC, it can be used in closer proximity to existing structures and improvements. RIC is most effective in areas were the depth of the liquefiable material is 15 feet or less below the ground surface. Because the treated area is less than with DDC, RIC typically takes longer to treat an area and typically has a higher cost per square foot of area treated.

- Vibratory Replacement

Vibratory replacement methods densify the potentially liquefiable soil by inserting a vibrating probe into the ground and backfilling the shaft created with gravel. This method creates stone columns with densified soil between. The amount of vibration from this method is significantly less than with DDC and the depth of possible treatment is typically at least 35 feet. Unlike DDC and RIC, this method is not performed across the entire project footprint but on a grid of columns with equal spacing across the site. The spacing of the grid would be determined as part of a design-build process.

- Soil/cement Mixing

Soil/cement mixing includes numerous proprietary methods including grouting, grout-mixing, and deep soil mixing. Each of these methods involves mixing the subsurface soil with cement and water to create columns of stiffened soil. The columns can be oriented as individual columns or overlapped to create walls around unimproved soil. The untreated soil is not densified by this technique. This ground improvement method relies on the improved stiffness of the columns to raise the composite stiffness of the site and reduce liquefaction by concentrating the cyclic stresses imparted by the seismic event on the columns and reducing the increase in pore pressure in the soil.

This method of ground improvement results in significantly reduced construction vibrations versus the other alternatives. This method does result in spoils that will be rich in cement; because import is expected at this site, spoils could be mixed with onsite soil to reduce the cement content and used as structural fill once the cement has cured; using spoils as engineered fill will potentially improve performance as a stiffened cap can be constructed to assist in transferring loads to the individual columns. Depending on cement concentration and hydration time, the reaction of cement in the spoils could make conventional soil compaction techniques difficult. If spoils are used as structural fill, we recommend using a method specification to check that appropriate degrees of compaction are achieved.

Compressible Soil

Soft, highly compressible Yong Bay Mud deposits were encountered in the previous explorations at the project site. A plan showing the depth of the base of the Young Bay Mud is provided as Figure 3. The locations and thicknesses of these deposits are variable, ranging from nil to over 130 feet in thickness. The Yong Bay Mud can settle due to loading from any new fill or from new structures constructed at the site. The amount of settlement is a factor of load and thickness of Young Bay Mud. Assuming the Young Bay Mud is normally consolidated, settlement can be as great a ½ foot for each foot of fill placed over the thickest areas of Young Bay Mud. While the majority of settlement from new loads will happen in the first 1 to 2 years after construction, in the areas of the thickest Young Bay Mud, settlement can continue for a period of 50 years or more.

Compressible Soil Mitigation

Depending on the type of buildings planned at the project site, mitigation of the compressible Young Bay Bud deposits may be feasible. One measure that can be used to mitigate the loading from small, relatively lightweight structures is pre-consolidation of compressible material through a surcharge program. Surcharge fill is placed above design grade elevations in areas of the site where pre-consolidation measures are necessary to reduce settlement. The surcharge fill remains in place for a period sufficient to allow the desired degree of consolidation to be achieved, such that the risk of settlement is sufficiently reduced for the planned structure. Surcharging will induce some settlement in adjacent areas; therefore, it may not be feasible to use surcharge as a compressible soil mitigation method in areas near existing structures and utilities. Likewise, surcharging of initial phases of construction should be placed wider than the footprint of the construction area so that subsequent phases of surcharge do not cause settlement of already constructed areas. For planning purposes, we recommend assuming that surcharge areas of initial phases should be overbuilt by at least 20 feet laterally from the improvement area.

The amount of time necessary to effectively mitigate compressible soil through surcharge is directly related to the thickness of the compressible soil deposit. Where the Young Bay Mud is thicker than about 20 feet, it is likely that wick drains may be desired to shorten the drainage path of the compressible deposits and accelerate the surcharge program.

A surcharge program is generally not efficient for structures with bearing pressures over 750 to 1,000 pounds per square foot. In these cases deep foundation systems deriving support from below the Young Bay Mud could be suitable at the project site. Where deep foundations are used, utilities should incorporate flexible connections as the building will not settle with the surrounding soil.

Underground Utilities

Utility Trench Shoring

Due to the soft nature of the Young Bay Mud, excavations that extend into Young Bay Mud deposits may become unstable. Installation of temporary sheetpiles or the use of a shield or continuous hydraulic skeleton shoring should be anticipated for excavations that extend below a depth of about 3 to 5 feet.

Trench Dewatering

Shallow groundwater is expected at the site and trench excavations may encounter perched groundwater. Therefore, utility trench excavations may require temporary dewatering during construction to keep the excavation and working areas reasonably dry. In general, excavations should be dewatered such that water levels are maintained at least 2 feet below the bottom of the excavation prior to and continuously during shoring installation and the backfill process to control the tendency for the bottom of the excavation to heave under hydrostatic pressures and to reduce inflow of soil or water from beneath temporary shoring. We anticipate that dewatering for underground utility construction will be accomplished by pumping from sumps.

Utility trenches adjacent to existing improvements should include a low permeability cutoff to reduce the risk of inadvertent groundwater flow along permeable bedding or backfill. In these areas dewatering may not be an option; therefore, a relatively impervious shoring system of tight interlocking sheet piles, or other impervious wall type, can be utilized to reduce infiltration during construction.

In addition, possibility of encountering contaminated soil and groundwater should be considered during underground construction.

LAND PLANNING ZONES

The limits of the land planning zones discussed below are presented on Figure 4.

North Shore Line

We understand that a significant setback from the north shore is not feasible; therefore, strengthening of the shoreline will be needed to reduce potential lateral displacement. The most cost effective shoreline stabilization measure would likely be performing ground improvement such as soil/cement mixing. Because both the liquefiable fill and Young Bay Mud impact the seismic slope stability, the soil/cement mixing will need to extend about 40 feet below the ground surface to the bottom of the Young Bay Mud layer. Based on similar projects, we estimate that to appropriately improve shoreline stability the soil treatment may need to be performed on 15 to 30 percent of the soil volume over an area between 20 to 30 feet wide. Other shoreline improvement measures, such as a levee and flood protection system could be constructed in conjunction with the improvement area. An alternative to soil/cement mixing would be construction of a structure, such as a bulkhead wall.

We understand that a levee has been proposed as part of the flood protection system on the northern shoreline. The levee embankment should have a crest 12 feet wide with side slopes of approximately 3:1 (horizontal:vertical). We recommend that the material used for embankment construction consist of soil with at least 15 percent passing the No. 200 sieve and no particles greater than 6 inches in maximum dimension.

Adaptive Reuse Area

We understand that some portions of the site are planned for adaptive reuse. In these areas, liquefaction mitigation measures will be constrained by existing structures and utilities. Ground improvement techniques will not be available for existing buildings; therefore, potential liquefaction induced settlement must be mitigated structurally. Where new utilities are to be installed, RIC could be used to densify the top 15 feet of liquefiable material, and the utilities could be designed to withstand settlement up to 8 inches and differential settlement up to 4 inches. Alternatively, vibratory replacement or soil/cement mixing could be used in these areas to reduce settlement of utilities and other improvements; total and differential settlement using these approaches would be less than using RIC. Based on typical construction costs, ground improvement using RIC will likely be the most cost efficient solution though other ground improvement methods would be more effective in decreasing potential settlement where liquefiable soil is deeper than 15 feet. Existing utilities that will remain in place can be supported by grouting underneath the utility.

Liquefaction Hazard Area

This area is not planned for adaptive reuse, so DDC will be the most applicable and cost effective liquefaction mitigation method. DDC results in relatively large noise and vibration impacts, so a buffer zone of up to 100 feet may be necessary from any existing structures to minimize impacts. Inside this buffer zone, other ground improvement methods may be necessary.

Liquefaction and Compressible Soil Hazard Area

DDC will also be the most applicable and cost effective liquefaction mitigation method in this area. DDC results in relatively large noise and vibration impacts, so a buffer zone of up to 100 feet may be necessary from any existing structures to minimize impacts. Inside this buffer zone, other ground improvement methods may be necessary.

Structures constructed in this area that have bearing pressures greater than 750 to 1,000 pounds per square foot will likely need to be supported on deep foundations. A surcharge program could be used to mitigate the consolidation settlement caused by the construction of light buildings.

Outside of the building areas, additional fill from grading to raise the site out of the flood plain will also induce consolidation settlement of the Young Bay Mud, and we anticipate that other measures may be necessary to mitigate potential settlement that could adversely affect site improvements (i.e., streets, parking areas, drainage, underground utilities, concrete flatwork, etc.). The selected mitigation will partly depend on what level of risk is acceptable, and could range from: (1) acceptance of settlement risk and periodic maintenance, (2) implementation of a surcharge program to pre-consolidate the soil and reduce long term settlements, (3) use of lightweight fill as compensation load to reduce settlement or (4) critical utilities could be supported on cement/soil mixed columns.

The comments provided in this letter are professional opinions developed in accordance with current standards of geotechnical engineering practice; no warranty is expressed or implied. If you have any questions regarding our letter, please do not hesitate to contact us.

Sincerely,

ENGEO Incorporated

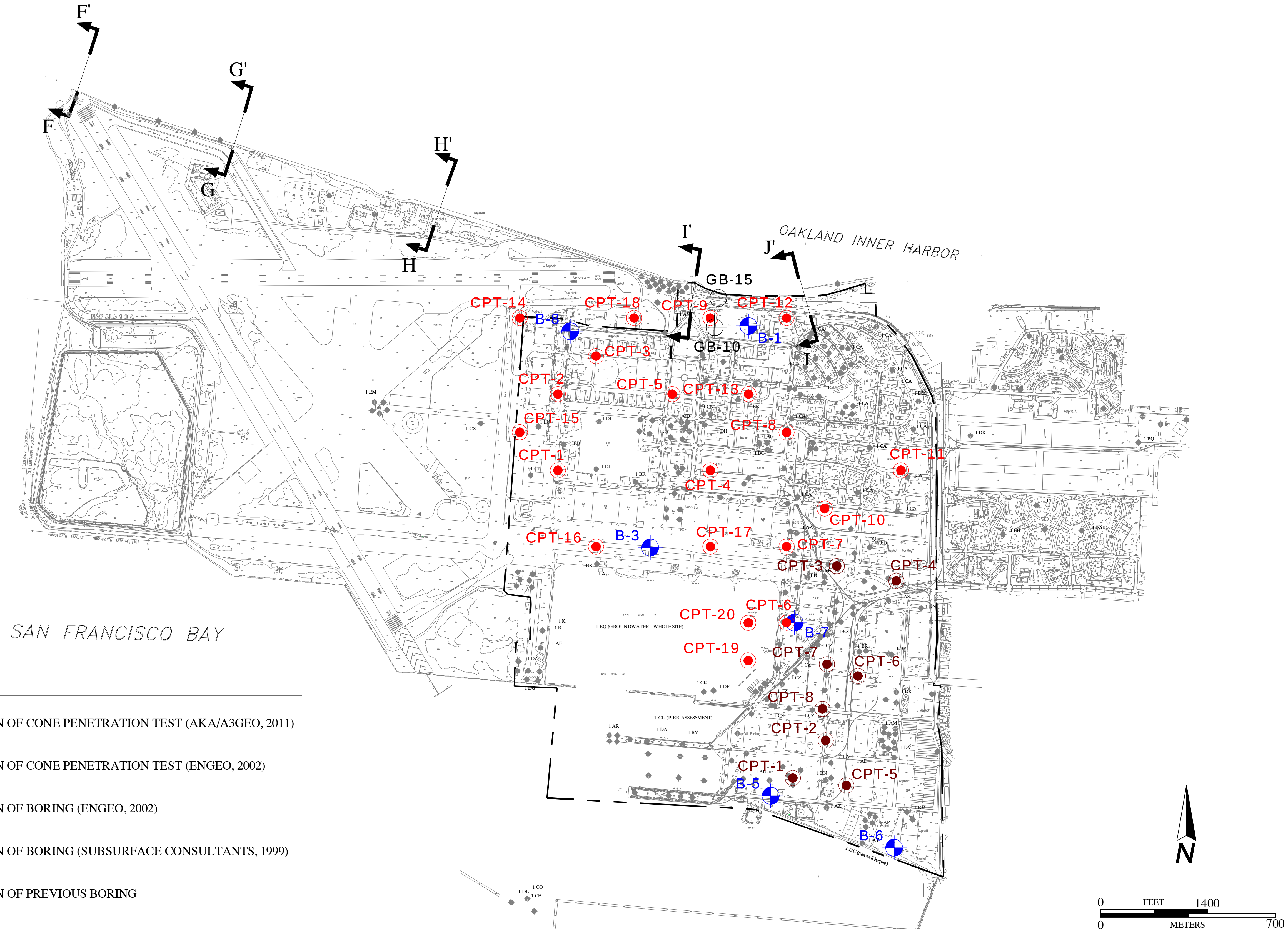
Siobhan O'Reilly-Shah

Jeff Fippin, GE

REGISTERED PROFESSIONAL ENGINEER
JEFFREY A. FIPPIN
No. 2631
Exp. 6/30/2013
GEOTECHNICAL
STATE OF CALIFORNIA

Daniel S. Haynosch, GE
sors/jf/dsh/jf

Attachments: Figure 1 - Site Plan
Figure 2 - Depth of Potentially Liquefiable Soil
Figure 3 - Thickness of Young Bay Mud
Figure 4 – Preliminary Constraints Mapping Based on Land Planning Zones
Appendix – Limited Slope Stability Calculations



EXPLANATION

CPT-8 APPROXIMATE LOCATION OF CONE PENETRATION TEST (AKA/A3GEO, 2011)

CPT-20 APPROXIMATE LOCATION OF CONE PENETRATION TEST (ENGEO, 2002)

B-8 APPROXIMATE LOCATION OF BORING (ENGEO, 2002)

GB-15 APPROXIMATE LOCATION OF BORING (SUBSURFACE CONSULTANTS, 1999)

APPROXIMATE LOCATION OF PREVIOUS BORING

1 AE APPROXIMATE LOCATION OF EXISTING NAVY GEX REPORT

J J' APPROXIMATE LOCATION OF CROSS SECTION EVALUATED BY SUBSURFACE CONSULTANTS

BASE MAP SOURCE: CARLSON, BARBEE & GIBSON

ENGEO Expect Excellence	SITE PLAN ALAMEDA POINT - INFRASTRUCTURE PLANNING ALAMEDA, CALIFORNIA	PROJECT NO.: 5687.100.104 SCALE: AS SHOWN DRAWN BY: SRP CHECKED BY: JF	FIGURE NO 1

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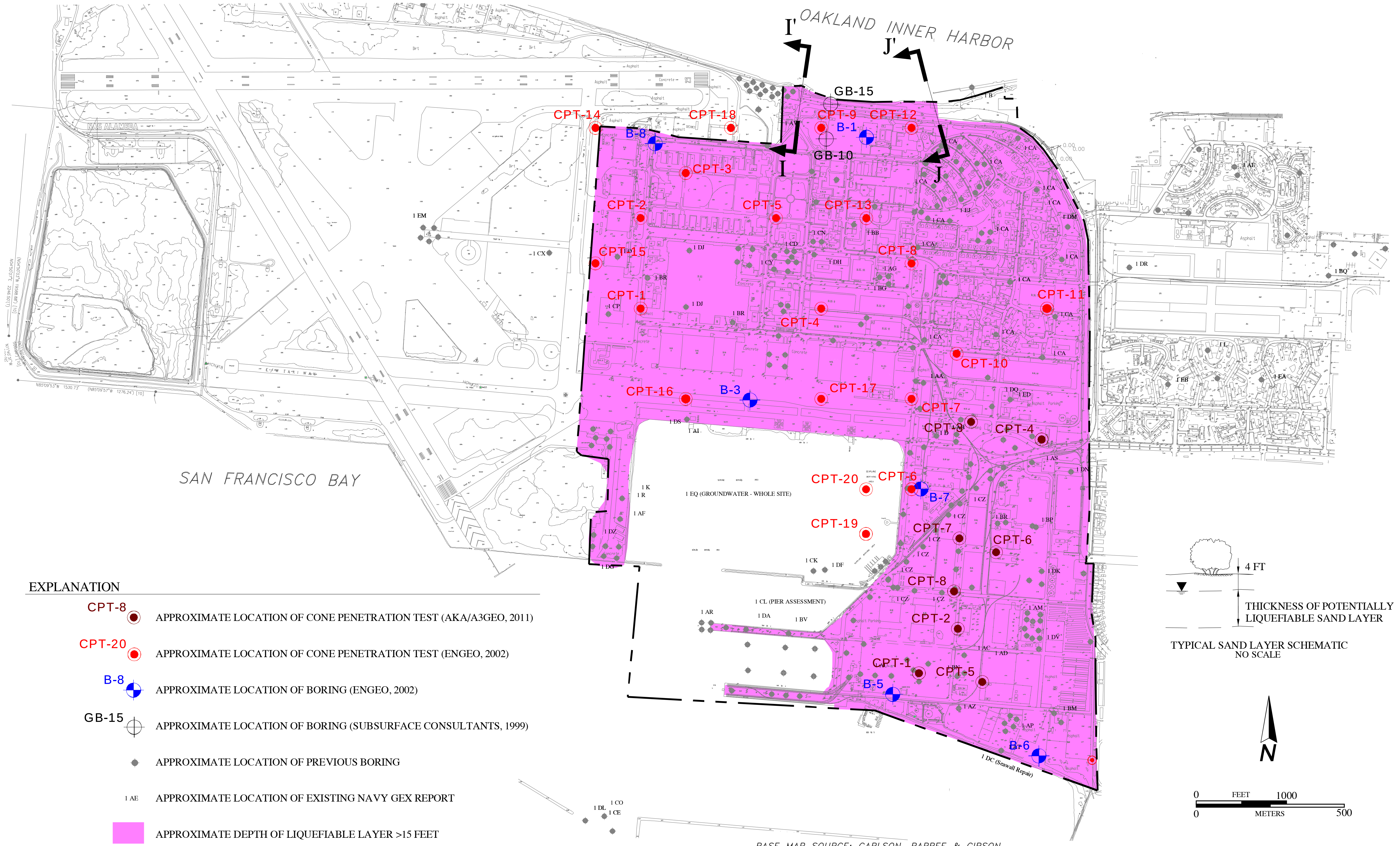
ORIGINAL FIGURE PRINTED IN COLOR



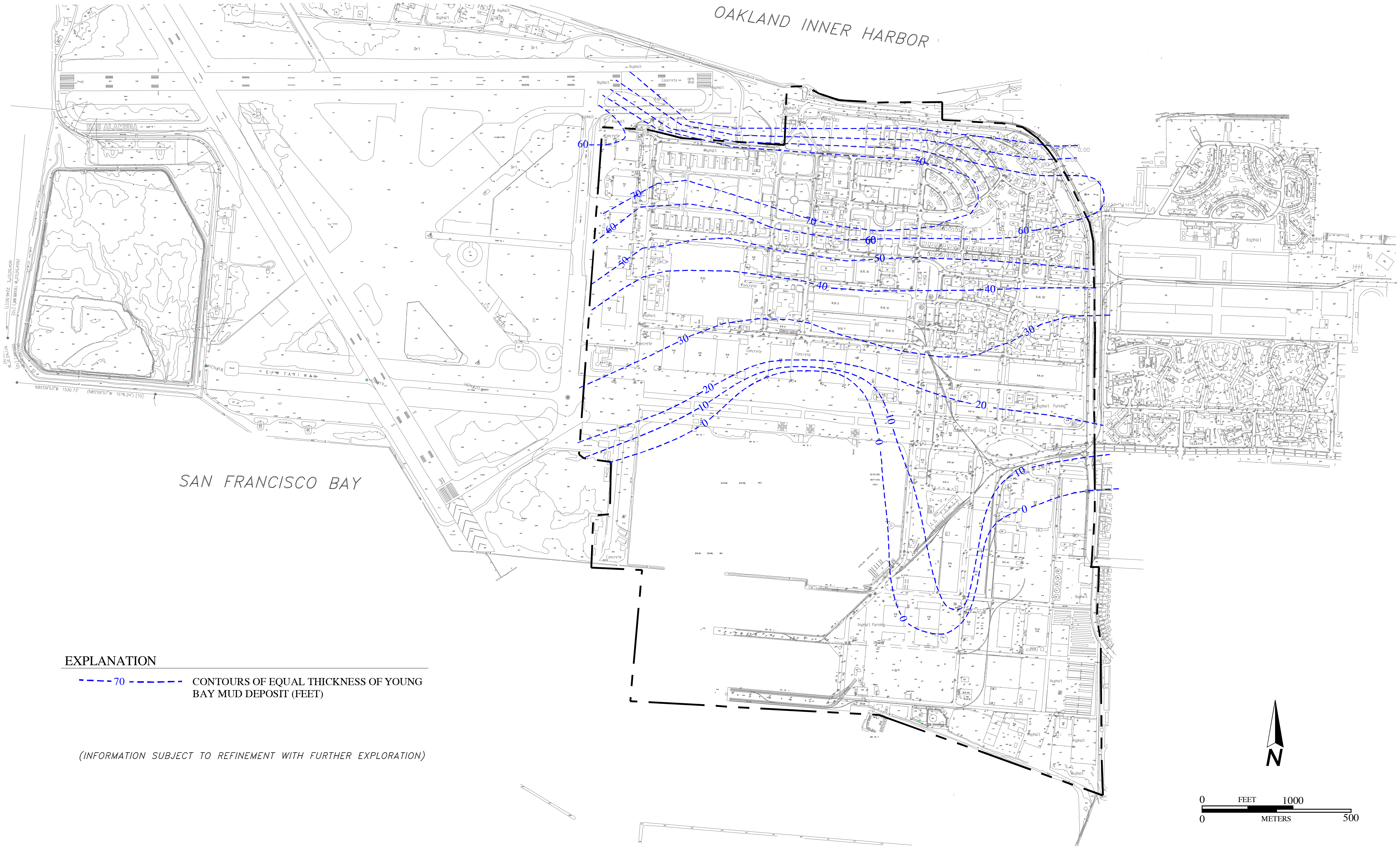
ENGEO
Expect Excellence

DEPTH OF POTENTIALLY LIQUEFIABLE SOIL
ALAMEDA POINT - INFRASTRUCTURE PLANNING
ALAMEDA, CALIFORNIA

PROJECT NO.: 5687.100.104
SCALE: AS SHOWN
DRAWN BY: SRP | CHECKED BY: JF

FIGURE NO. 2

G:\Drafting\DRAFTING2_Dwg\5687\100\2013\5687100104-2-ThicknessOfLiquifiableSand-0113.dwg Plot Date: 1-15-13 SPATTERS
ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

- - -70- - - - - CONTOURS OF EQUAL THICKNESS OF YOUNG BAY MUD DEPOSIT (FEET)

(INFORMATION SUBJECT TO REFINEMENT WITH FURTHER EXPLORATION)

BASE MAP SOURCE: CARLSON, BARBEE & GIBSON

ENGEO Expect Excellence

THICKNESS OF YOUNG BAY MUD

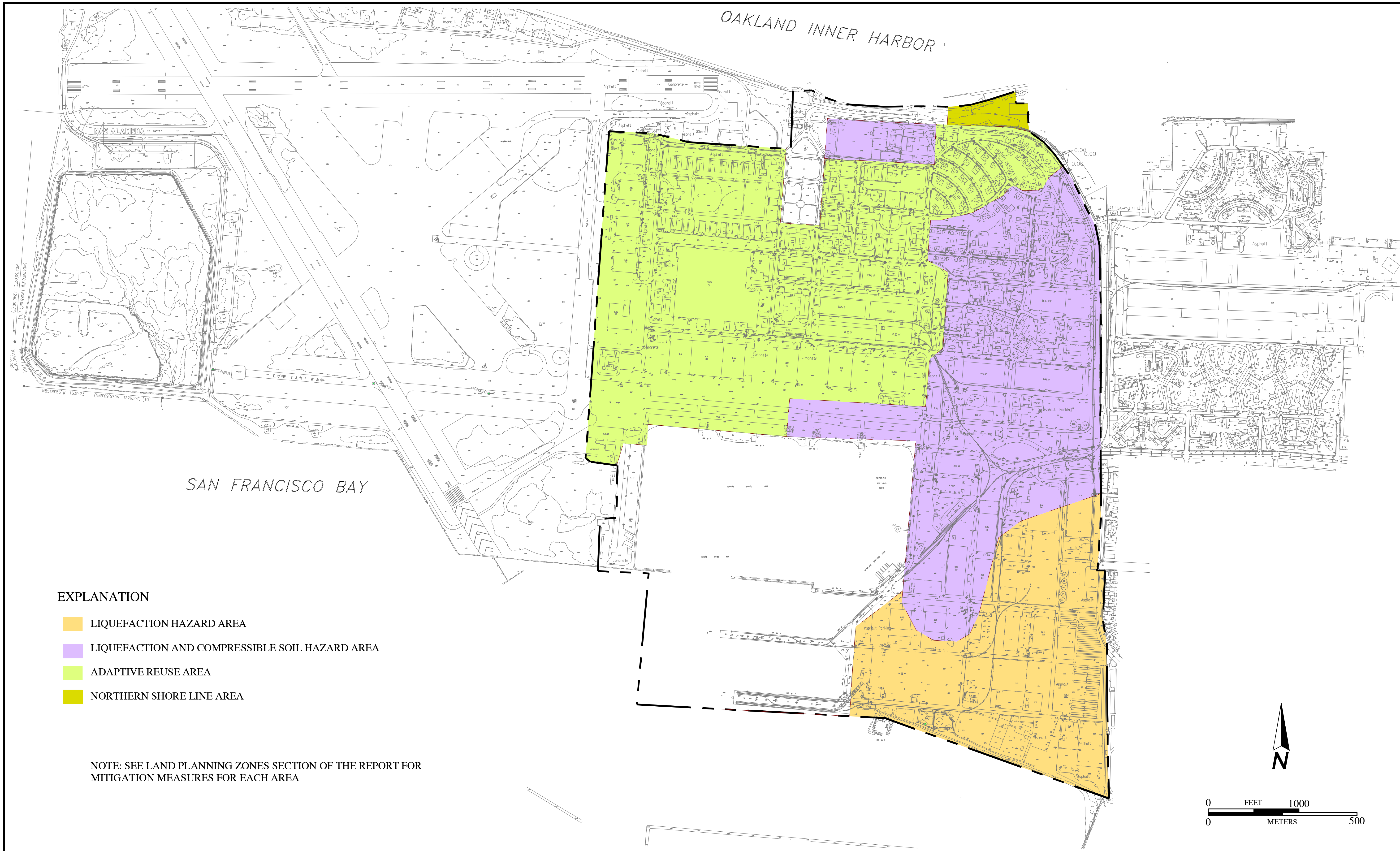
ALAMEDA POINT - INFRASTRUCTURE PLANNING

ALAMEDA, CALIFORNIA

PROJECT NO.: 5687.100.104	FIGURE NO. 3
SCALE: AS SHOWN	
DRAWN BY: SRP	CHECKED BY: JF

G:\Drafting\DRAFTING2_Dwg\5687\100\2013\5687100104-3-YoungBayMud-0113.dwg Plot Date: 1-15-13 SPATTERS

ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

- LIQUEFACTION HAZARD AREA
- LIQUEFACTION AND COMPRESSIBLE SOIL HAZARD AREA
- ADAPTIVE REUSE AREA
- NORTHERN SHORE LINE AREA

NOTE: SEE LAND PLANNING ZONES SECTION OF THE REPORT FOR MITIGATION MEASURES FOR EACH AREA

BASE MAP SOURCE: CARLSON, BARBEE & GIBSON

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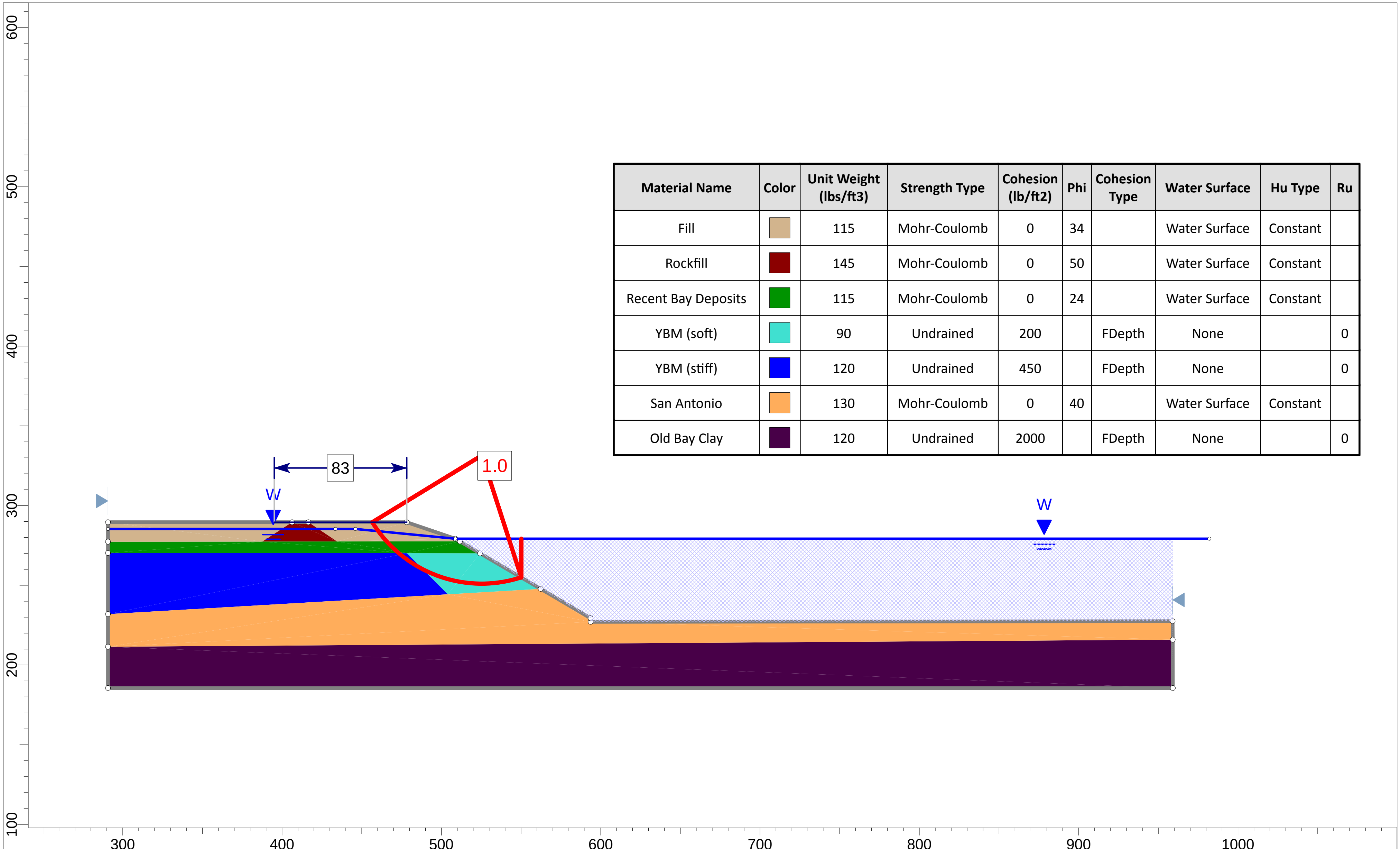
PRELIMINARY CONSTRAINTS MAPPING
BASED ON LAND PLANNING ZONES
ALAMEDA POINT - INFRASTRUCTURE PLANNING
ALAMEDA, CALIFORNIA

PROJECT NO.: 5687.100.104		FIGURE NO. 4
SCALE: AS SHOWN		
DRAWN BY: SRP	CHECKED BY: JF	

APPENDIX

Limited Slope Stability Calculations

5687.100.104
January 16, 2013
Revised January 30, 2013

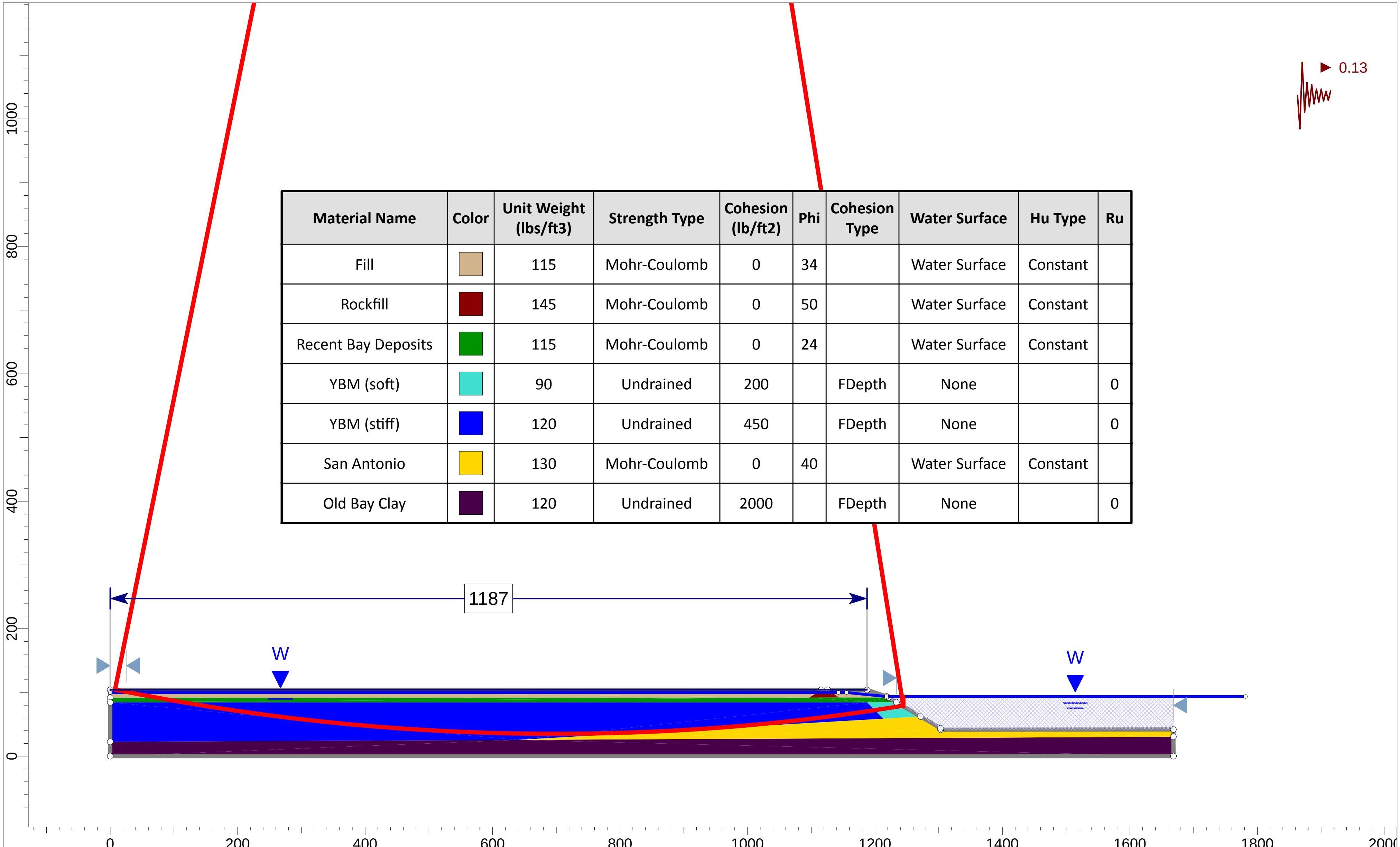


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi	Cohesion Type	Water Surface	Hu Type	Ru
Fill		115	Mohr-Coulomb	0	34		Water Surface	Constant	
Rockfill		145	Mohr-Coulomb	0	50		Water Surface	Constant	
Recent Bay Deposits		115	Mohr-Coulomb	0	24		Water Surface	Constant	
YBM (soft)		90	Undrained	200		FDepth	None		0
YBM (stiff)		120	Undrained	450		FDepth	None		0
San Antonio		130	Mohr-Coulomb	0	40		Water Surface	Constant	
Old Bay Clay		120	Undrained	2000		FDepth	None		0

ENGEO Expect Excellence 40 years

SLIDEINTERPRET 6.014

Project	Alameda Point		
Analysis Description	Spencer		
Drawn By Siobhan O'Reilly-Shah	*Scale* 1:1000	*Company*	ENGEO
Date	12/12/2012, 10:36:05 AM	*File Name*	Static Slope Stability - xsec I-I'.slim



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Old Bay Clay		120	Undrained	2000		FDepth	None		0

ENGEO Expect Excellence 40 years

SLIDEINTERPRET 6.014

Project	Alameda Point
Analysis Description	Spencer
Drawn By	Siobhan O'Reilly-Shah
Scale	1:2500
Company	ENGEO
Date	12/12/2012, 10:36:05 AM
File Name	Pseudo-Static Slope Stability - xsec I-I'.slim

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi	Cohesion Type	Water Surface	Hu Type	Ru
Fill		115	Mohr-Coulomb	0	34		Water Surface	Constant	
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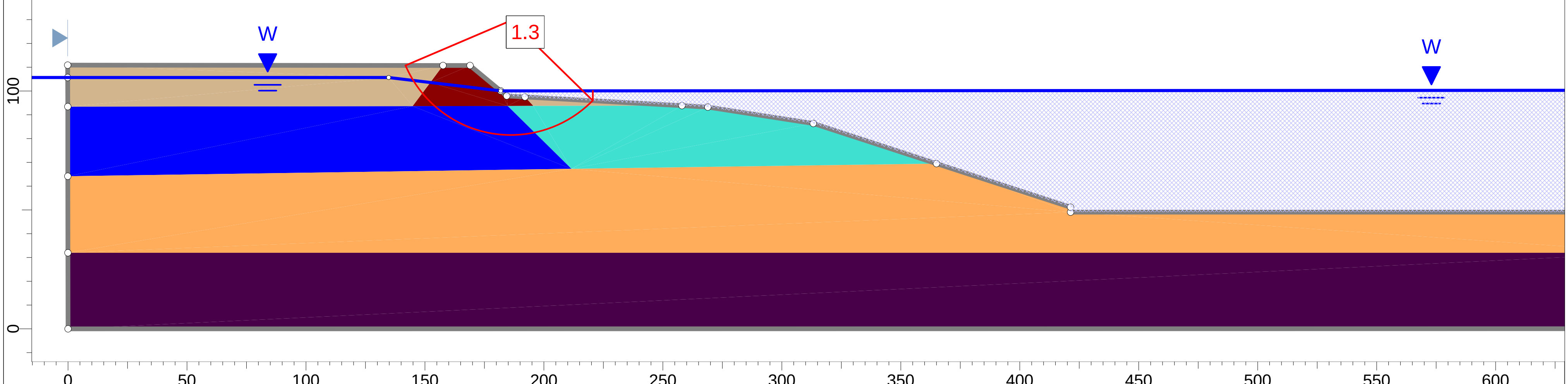
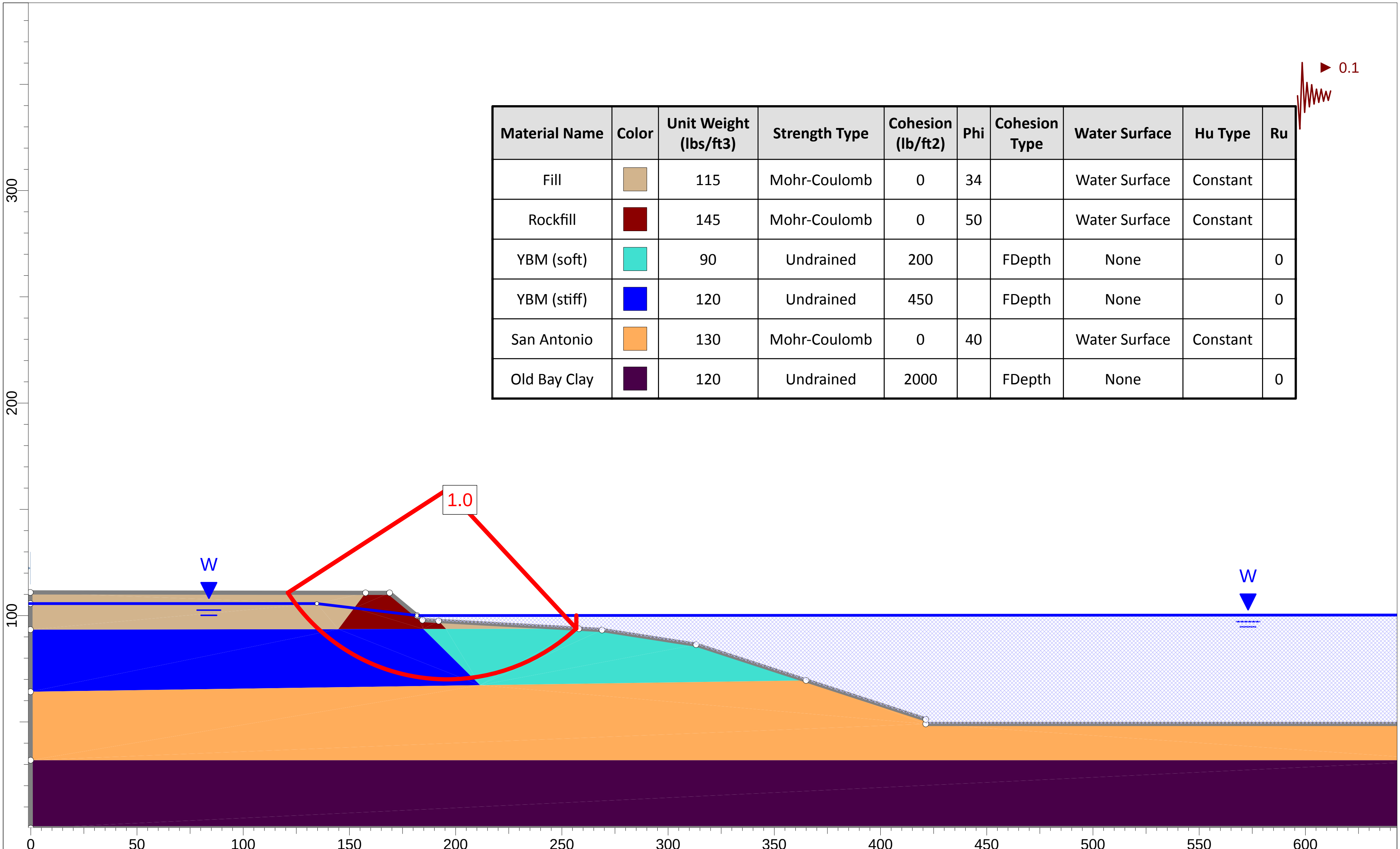


ENGEO Expect Excellence 40 years

SLIDEINTERPRET 6.014

Project	Alameda Point
Analysis Description	Spencer
Drawn By	Siobhan O'Reilly-Shah
Scale	1:750
Company	ENGEO
Date	12/12/2012, 10:36:05 AM
File Name	Static Slope Stability - xsec J-J'.slim



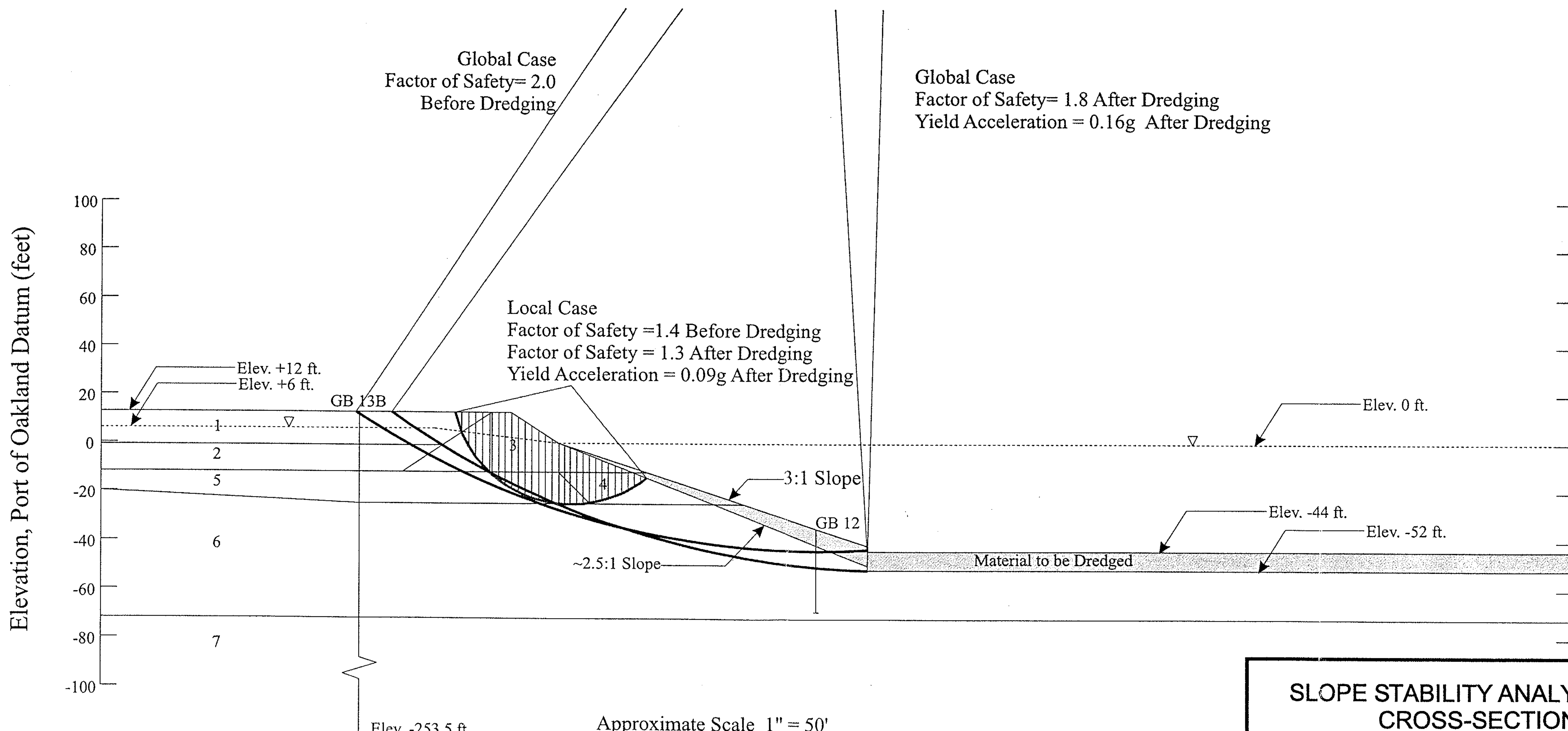
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (lb/ft2)	Phi	Cohesion Type	Water Surface	Hu Type	Ru
Fill		115	Mohr-Coulomb	0	34		Water Surface	Constant	
Rockfill		145	Mohr-Coulomb	0	50		Water Surface	Constant	
YBM (soft)		90	Undrained	200		FDepth	None		0
YBM (stiff)		120	Undrained	450		FDepth	None		0
San Antonio		130	Mohr-Coulomb	0	40		Water Surface	Constant	
Old Bay Clay		120	Undrained	2000		FDepth	None		0

ENGEO Expect Excellence 40 years

SLIDEINTERPRET 6.014

Project	Alameda Point
Analysis Description	Spencer
Drawn By	Siobhan O'Reilly-Shah
Scale	1:750
Company	ENGEO
Date	12/12/2012, 10:36:05 AM
File Name	Pseudo-Static Slope Stability - xsecJ-J''.slim

Layer No.	Soil Classification (Lithologic Unit)	Unit Weight (pcf)	Effective Friction Angle (degrees)	Effective Cohesion Intercept (psf)	Undrained Shear Strength (psf)
1	Loose Sand (Fill)	115	30	0	-
2	Soft to Medium Stiff Clay (Fill)	100	-	-	400 at top of layer, increasing 9 psf/ft.
3	Rockfill (Old Training Wall)	145	50	0	-
4	Soft Clay (Young Bay Mud)	95	-	-	250 at El. -12 ft., increasing 11 psf/ft
5	Medium Stiff Clay (Young Bay Mud)	100	-	-	500 at top of layer, increasing 11 psf/ft.
6	Very Dense Sand (San Antonio Formation)	130	40	0	-
7	Very Stiff Clay (Old Bay Mud)	120	-	-	2000 at top of layer, increasing 30 psf/ft



Approximate Scale 1" = 50'

0 50 100

Notes:
1. Yield Acceleration was determined using a post-liquefaction residual strength of 300 psf for the submerged part of layer #1
2. If the new channel limit is moved 25 feet north, the -42 foot channel slope can be extended at a 3:1 slope so that the local stability case is not impacted by the proposed dredging.

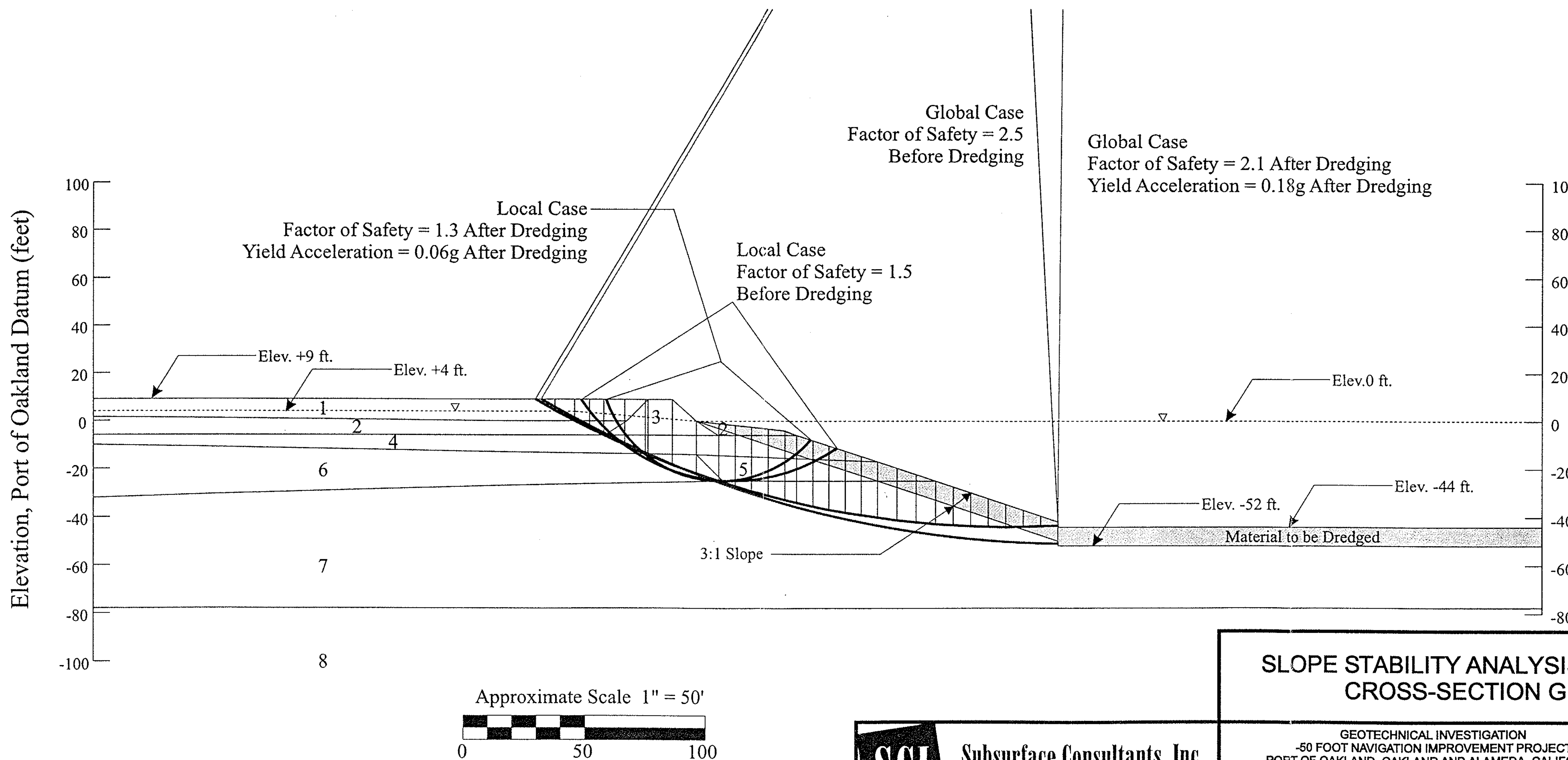
SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

SLOPE STABILITY ANALYSIS RESULTS
CROSS-SECTION F - F'

GEOTECHNICAL INVESTIGATION
-50 FOOT NAVIGATION IMPROVEMENT PROJECT
PORT OF OAKLAND, OAKLAND AND ALAMEDA, CALIFORNIA

JOB NUMBER	DATE	APPROVED	PLATE
133.007	12/97	[signature]	37

Layer No.	Soil Classification (Lithologic Unit)	Unit Weight (pcf)	Effective Friction Angle (degrees)	Effective Cohesion Intercept (psf)	Undrained Shear Strength (psf)
1	Loose Sand (Fill)	115	30	0	-
2	Loose Sand (Fill)	115	30	0	-
3	Rockfill (Old Training Wall)	145	50	0	-
4	Interbedded Loose Sand and Soft Clay (Recent Bay Deposits)	115	30	0	-
5	Soft Clay (Young Bay Mud)	95	-	-	250 at El. -14 ft., increasing 11 psf/ft
6	Medium Stiff Clay (Young Bay Mud)	100	-	-	500 at top of layer, increasing 11 psf/ft.
7	Very Dense Sand (San Antonio Formation)	130	40	0	-
8	Very Stiff Clay (Old Bay Mud)	120	-	-	2000 at top of layer, increasing 30 psf/ft



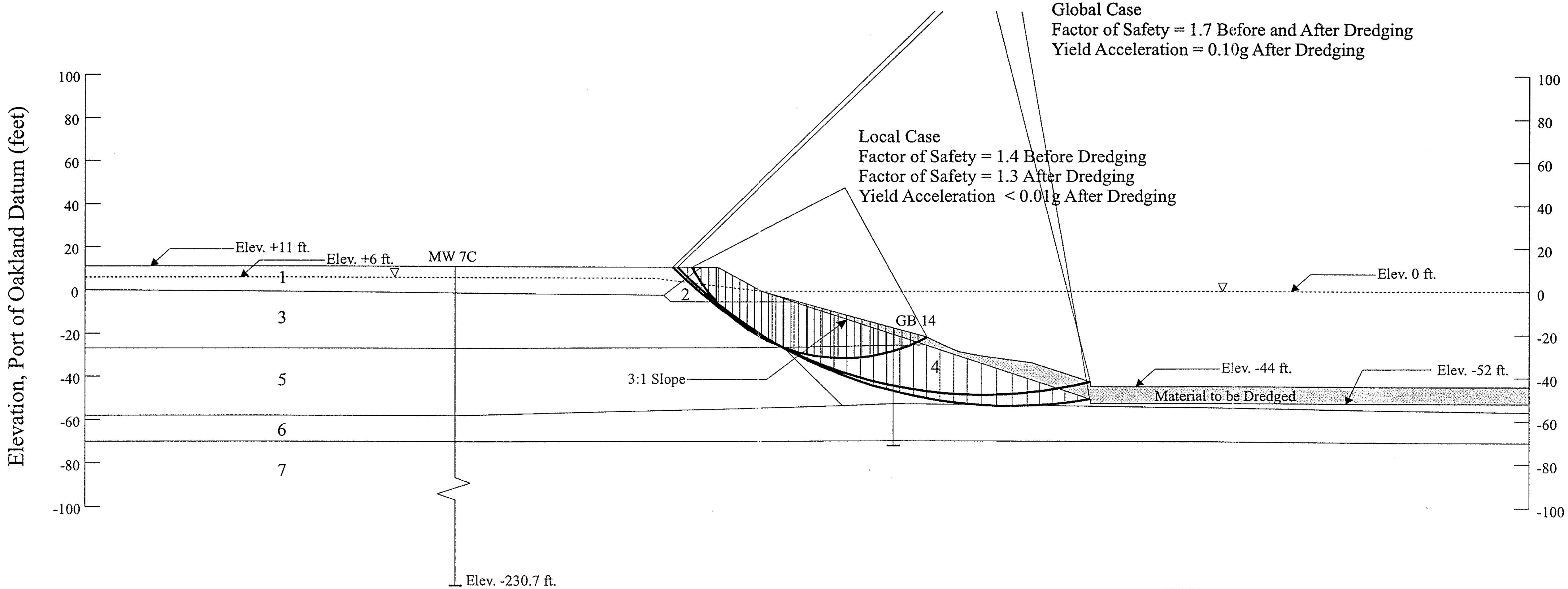
SLOPE STABILITY ANALYSIS RESULTS
CROSS-SECTION G - G'

SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

GEOTECHNICAL INVESTIGATION
-50 FOOT NAVIGATION IMPROVEMENT PROJECT
PORT OF OAKLAND, OAKLAND AND ALAMEDA, CALIFORNIA

JOB NUMBER	DATE	APPROVED	PLATE
133.007	12/97	[signature]	38

Layer No.	Soil Classification (Lithologic Unit)	Unit Weight (pcf)	Effective Friction Angle (degrees)	Effective Cohesion Intercept (degrees)	Undrained Shear Strength (psf)
1	Loose Sand (Fill)	115	30	0	-
2	Rockfill (Old Training Wall)	145	50	0	-
3	Interbedded Loose Sand and Soft Clay (Recent Bay Deposits)	115	30	0	-
4	Soft Clay (Young Bay Mud)	100	-	-	300 at El. -27 ft., increasing 11 psf/ft.
5	Interbedded Medium Stiff Clay and Medium Dense Clayey Sand (Young Bay Mud and San Antonio Formations)	105	-	-	500 at El. -27 ft., increasing 11 psf/ft.
6	Very Dense Sand (San Antonio Formation)	130	40	0	
7	Very Stiff Clay (Old Bay Clay)	120	-	-	2000 at top of layer, increasing 30 psf/ft.



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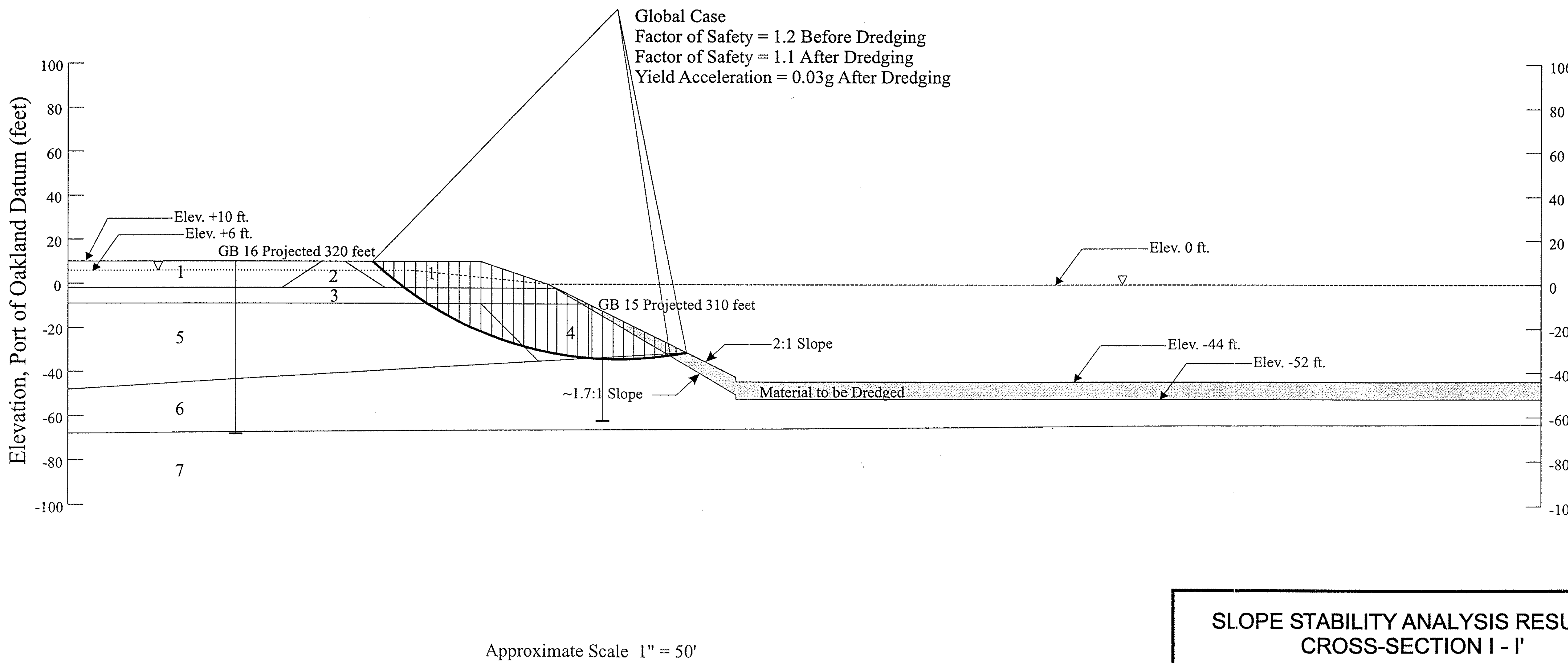
SLOPE STABILITY ANALYSIS RESULTS
CROSS-SECTION H - H'

GEOTECHNICAL INVESTIGATION
-50 FOOT NAVIGATION IMPROVEMENT PROJECT
PORT OF OAKLAND, OAKLAND AND ALAMEDA, CALIFORNIA

JOB NUMBER	DATE	APPROVED	PLATE
133.007	12/97	[signature]	39

Layer No.	Soil Classification (Lithologic Unit)	Unit Weight (pcf)	Effective Friction Angle (degrees)	Effective Cohesion Intercept (degrees)	Undrained Shear Strength (psf)
1	Medium Dense to Dense Sand (Fill)	115	34	0	-
2	Rockfill (Old Training Wall)	145	50	0	-
3	Medium Dense to Dense Sand (Recent Bay Deposits)	115	34	0	-
4	Soft Clay (Young Bay Mud)	90	-		200 at El. -27 ft., increasing 11 psf/ft.
5	Medium Stiff Clay (Young Bay Mud)	95	-	-	450 at El. -27 ft., increasing 11 psf/ft.
6	Very Dense Sand (San Antonio Formation)	130	40	0	-
7	Very Stiff Clay (Old Bay Clay)	120	-	-	2000 at top of layer, increasing 30 psf/ft.



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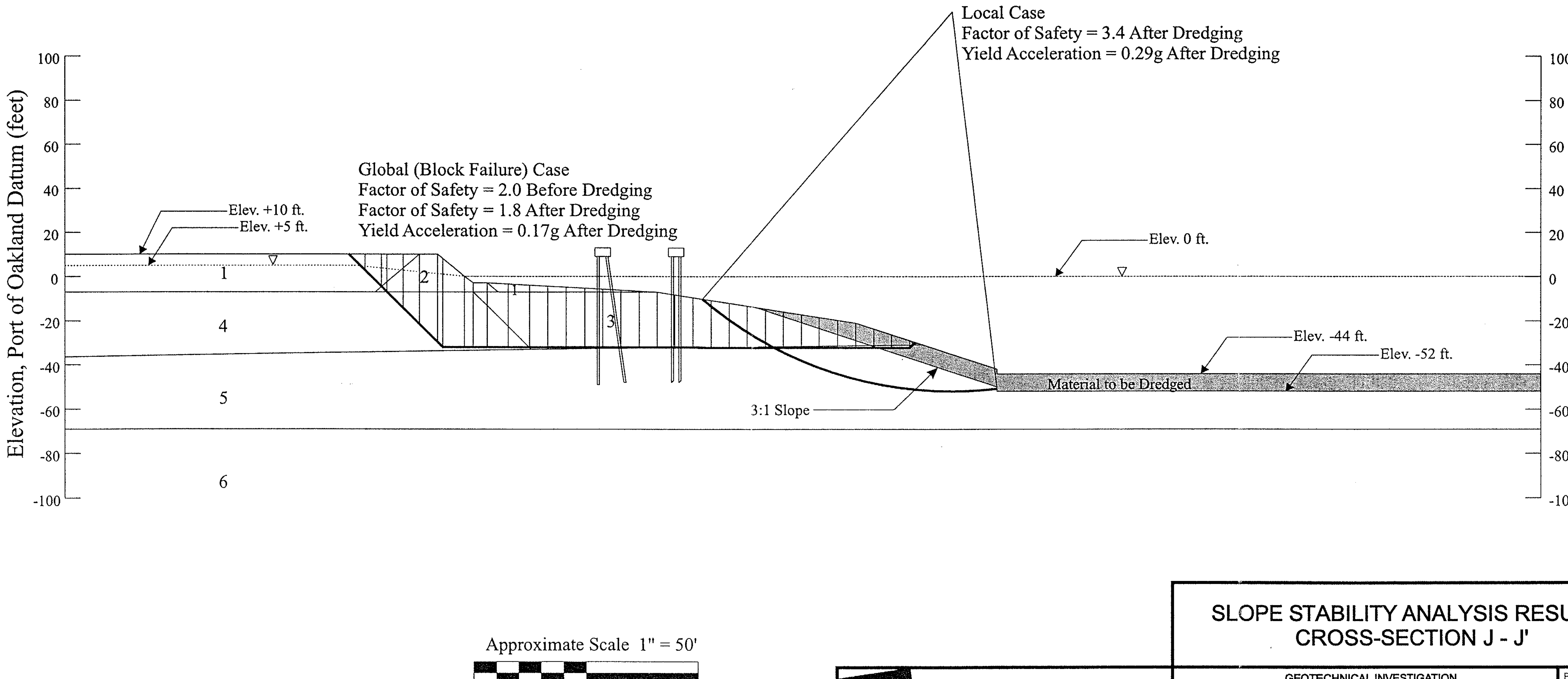
Geotechnical & Environmental Engineers

SLOPE STABILITY ANALYSIS RESULTS CROSS-SECTION I - I'

GEOTECHNICAL INVESTIGATION
-50 FOOT NAVIGATION IMPROVEMENT PROJECT
PORT OF OAKLAND, OAKLAND AND ALAMEDA, CALIFORNIA

JOB NUMBER	DATE	APPROVED	PLATE
133.007	12/97	[signature]	40

Layer No.	Soil Classification (Lithologic Unit)	Unit Weight (pcf)	Effective Friction Angle (degrees)	Effective Cohesion Intercept (degrees)	Undrained Shear Strength (psf)
1	Loose to Medium Dense Sand (Fill)	115	30	0	-
2	Rockfill (Old Training Wall)	145	50	0	-
3	Soft Clay (Young Bay Mud)	90	-		170 at El. -7 ft., increasing 11 psf/ft.
4	Medium Stiff Clay (Young Bay Mud)	95	-	-	350 at El. -7 ft., increasing 11 psf/ft.
5	Very Dense Sand (San Antonio Formation)	130	40	0	-
6	Very Stiff Clay (Old Bay Clay)	120	-	-	2000 at top of layer, increasing 30 psf/ft.



SLOPE STABILITY ANALYSIS RESULTS
CROSS-SECTION J - J'

SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

GEOTECHNICAL INVESTIGATION
-50 FOOT NAVIGATION IMPROVEMENT PROJECT
PORT OF OAKLAND, OAKLAND AND ALAMEDA, CALIFORNIA

JOB NUMBER	DATE	APPROVED	PLATE
133.007	12/97	[signature]	41

APPENDICES

B) DETAILED UTILITY SCHEMATIC PLAN

DRAFT

ALAMEDA POINT
MASTER INFRASTRUCTURE PLAN
CONCEPTUAL UTILITY STUDY
BASE CASE - REUSE PLAN

CITY OF ALAMEDA   ALAMEDA COUNTY   CALIFORNIA

cbg
Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS
6111 BOLLINGER CANYON ROAD, SUITE 150
SAN RAMON, CALIFORNIA 94583
(925) 866-0322
FAX (925) 866-8575
SAN RAMON • LATHROP

0' 200' 600' 800'

SCALE: 1" = 200'

DATE: JULY, 2013

APPENDICES

C) WASTEWATER FLOW CALCULATIONS

DRAFT

ENGINEER'S PRELIMINARY CALCULATIONS
SEWAGE FLOW
BASE CASE - REUSE PLAN
ALAMEDA POINT
ALAMEDA, CALIFORNIA

July 31, 2013
Job No.: 1087-010

Total Unit Count: 1,425
Total Acres: 766.1
Total SF: 5,500,000

Sanitary Sewage Design Quantities based on **New** City of Alameda Standards:

Type of	Zoning	Base Usage	PF	Peak Usage		Usage		DU/acre Range
Residential Reuse	RE	240	2.0	480	gpd/unit	0.0007	cfs/unit	-
Very Low Density	R1	240	2.0	480	gpd/unit	0.0007	cfs/unit	< 8.7
Single Family	R2	240	2.0	480	gpd/unit	0.0007	cfs/unit	8.7 - 21.8
Office	O	0.1	2.0	0.20	gpd/sf	0.00000031	cfs/sf	-
Manufacturing/WH	M	0.02	2.0	0.04	gpd/sf	0.00000006	cfs/sf	-
Retail	R	0.1	2.0	0.20	gpd/sf	0.00000031	cfs/sf	-
Service	S	0.5	2.0	1.00	gpd/sf	0.00000155	cfs/sf	-
GWI and I/I	I	-	-	1,300	gpd/net acre	0.0020	cfs/net acre	-
Park	P	-	-	3,231	gpd/net acre	0.0050	cfs/net acre	-
VA	-	-	-	20,000	gpd	0.0310	cfs	-

From Node	Rim	Invert Out	Cover (Ft)	To Node	Rim	Invert In	Pipe Diameter (Inches)	Pipe Length (Feet)	Pipe Slope (Ft / Ft)	Peak Flow (cfs)	Velocity (fps)	Percent Capacity	**Area Number**	**Product Type**	**Unit Count**	**Acreage**	**SF**	**Zoning**	**Usage based on Zoning**	**Peak Sewage Flow by**	**Peak Sewage Flow by area(cfs)**
1	7.7	-0.15	7.2	**4**	8.0	-4.90	8 inch	1,355	0.0035	0.03	1.0 fps	14%	C-8	Park	-	6.6	-	P	3,231	0.0050	0.03
2	7.5	1.40	5.4	**4**	8.0	-4.90	8 inch	1,740	0.0035	0.24	1.8 fps	40%	C-4 (~50%)	Manufacturing/WH	-	11.9	205,000	M	0.04	0.00000006	0.01
													C-7	Office	-	14.6	300,000	O	0.20	0.00000031	0.09
													C-8	Park	-	17.0	-	P	3,231	0.0050	0.09
													GWI & I/I	GWI and I/I	-	26.5	-	I	1,300	0.0020	0.05
																					0.24
3	8.0	-1.60	8.9	**4**	8.0	-4.90	8 inch	915	0.0035	0.07	1.3 fps	21%	C-6	Office	-	10.1	175,000	O	0.20	0.00000031	0.05
													GWI & I/I	GWI and I/I	-	10.1	-	I	1,300	0.0020	0.02
																					0.07
4	8.0	-5.00	12.3	**LS 1**	8.0	-5.40	8 inch	80	0.0035	0.35	2.0 fps	49%	Node 1	-	-	-	-	-	-	-	0.03
													Node 2	-	-	-	-	-	-	-	0.24
													Node 3	-	-	-	-	-	-	-	0.07
																					0.35
LS 1	8.0	1.30	6.0	**6**	7.0	-2.50	8 inch	1,055	0.0035	0.35	2.0 fps	49%	LS 1	-	-	-	-	-	-	-	0.35
5	6.6	-2.10	8.0	**6**	7.0	-3.85	8 inch	505	0.0035	0.10	1.4 fps	25%	C-2	Manufacturing/WH	-	12.5	50,000	M	0.04	0.00000006	0.00
													C-2	Retail	-	-	100,000	R	0.20	0.00000031	0.03
													C-4 (~50%)	Manufacturing/WH	-	11.9	205,000	M	0.04	0.00000006	0.01
													GWI & I/I	GWI and I/I	-	24.4	-	I	1,300	0.0020	0.05
																					0.10
6	7.0	-3.30	9.6	**7**	6.6	-4.85	8 inch	435	0.0035	0.45	2.2 fps	57%	LS 1	-	-	-	-	-	-	-	0.35
													Node 5	-	-	-	-	-	-	-	0.10
																					0.45
7	6.6	-4.95	10.6	**9**	6.1	-5.90	12 inch	465	0.0020	0.67	1.9 fps	45%	C-1	Office	-	11.1	250,000	O	0.20	0.00000031	0.08
													C-3	Office	-	19.1	250,000	O	0.20	0.00000031	0.08
													C-3	Manufacturing/WH	-	-	100,000	M	0.04	0.00000006	0.01
													Node 6	-	-	-	-	-	-	-	0.45
													GWI & I/I	GWI and I/I	-	30.2	-	I	1,300	0.0020	0.06
																					0.67

From Node	Rim	Invert Out	Cover (Ft)	To Node	Rim	Invert In	Pipe Diameter (Inches)	Pipe Length (Feet)	Pipe Slope (Ft / Ft)	Peak Flow (cfs)	Velocity (fps)	Percent Capacity	Area Number	Product Type	Unit Count	Acreage	SF	Zoning	Usage based on Zoning	Peak Sewage Flow by	Peak Sewage Flow by area(cfs)
8	6.7	-3.90	9.9	**9**	6.1	-5.90	8 inch	575	0.0035	0.13	1.6 fps	29%	C-5	Manufacturing/WH	-	10.0	435,000	M	0.04	0.00000006	0.03
													C-5	Park	-	15.7	-	P	3,231	0.0050	0.08
													GWI & I/I	GWI and I/I	-	10.0	-	I	1,300	0.0020	0.02
																					0.13
9	6.1	-6.00	11.1	**LS 2**	6.1	-5.90	12 inch	935	0.0020	0.81	2.0 fps	50%	B-3 (~50%)	Retail	-	0.3	12,500	R	0.20	0.00000031	0.00
													B-3 (~50%)	Park	-	2.8	-	P	3,231	0.0050	0.01
													Node 7	-	-	-	-	-	-	-	0.67
													Node 8	-	-	-	-	-	-	-	0.13
													GWI & I/I	GWI and I/I	-	0.3	-	I	1,300	0.0020	0.00
																					0.81
LS 2	6.1	0.00	5.1	**10**	6.1	-1.45	12 inch	665	0.0020	0.81	2.0 fps	50%	Node 9	-	-	-	-	-	-	-	0.81
																					0.81
10	6.1	-1.45	6.6	**18**	7.0	-2.85	12 inch	690	0.0020	0.92	2.1 fps	54%	B-2 (~50%)	Retail	-	1.625	37,500	R	0.20	0.00000031	0.01
													B-2 (~50%)	Service	-	1.625	60,000	S	1.00	0.00000155	0.09
													Node 10	-	-	-	-	-	-	-	0.81
													GWI & I/I	GWI and I/I	-	3.25	-	I	1,300	0.0020	0.01
																					0.92
11	6.5	-2.55	8.4	**14**	6.0	-4.15	8 inch	450	0.0035	0.09	1.4 fps	24%	B-4	Single Family	100	5.6	-	R2	480	0.0007 /Unit	0.07
													B-4	Retail	-	-	25,000	R	0.20	0.00000031	0.01
													GWI & I/I	GWI and I/I	-	5.6	-	I	1,300	0.0020	0.01
																					0.09
12	6.3	-2.75	8.4	**14**	6.0	-4.25	8 inch	430	0.0035	0.41	2.1 fps	54%	B-6	Single Family	100	11.2	-	R2	480	0.0007 /Unit	0.07
													B-6	Office	-	-	100,000	O	0.20	0.00000031	0.03
													B-6	Retail	-	-	25,000	R	0.20	0.00000031	0.01
													B-6	Service	-	-	90,000	S	1.00	0.00000155	0.14
													B-7	Single Family	100	11.2	-	R2	480	0.0007 /Unit	0.07
													B-7	Office	-	-	100,000	O	0.20	0.00000031	0.03
													B-7	Retail	-	-	25,000	R	0.20	0.00000031	0.01
													GWI & I/I	GWI and I/I	-	22.4	-	I	1,300	0.0020	0.05
																					0.41
13	5.6	-2.70	7.6	**14**	6.0	-4.15	8 inch	405	0.0035	0.09	1.4 fps	24%	B-5	Single Family	100	5.6	-	R2	480	0.0007 /Unit	0.07
													B-5	Retail	-	-	25,000	R	0.20	0.00000031	0.01
													GWI & I/I	GWI and I/I	-	5.6	-	I	1,300	0.0020	0.01
																					0.09
14	6.0	-4.25	9.3	**16**	6.0	-6.15	12 inch	935	0.0020	0.60	1.9 fps	42%	Node 11	-	-	-	-	-	-	-	0.09
													Node 12	-	-	-	-	-	-	-	0.41
													Node 13	-	-	-	-	-	-	-	0.09
																					0.60

From Node	Rim	Invert Out	Cover (Ft)	To Node	Rim	Invert In	Pipe Diameter (Inches)	Pipe Length (Feet)	Pipe Slope (Ft / Ft)	Peak Flow (cfs)	Velocity (fps)	Percent Capacity	Area Number	Product Type	Unit Count	Acreage	SF	Zoning	Usage based on Zoning	Peak Sewage Flow by	Peak Sewage Flow by area(cfs)
15	5.5	-3.25	8.1	**16**	6.0	-4.70	8 inch	405	0.0035	0.13	1.6 fps	29%	A-7 (~50%)	Very Low Density	48	6.5	-	R1	480	0.0007 /Unit	0.04
													A-9	Very Low Density	75	10.5	-	R1	480	0.0007 /Unit	0.06
													GWI & I/I	GWI and I/I	-	17.0	-	I	1,300	0.0020	0.03
																					0.13
16	6.0	-6.25	11.3	**LS 3**	6.0	-6.50	12 inch	80	0.0020	0.72	2.0 fps	47%	Node 14	-	-	-	-	-	-	-	0.60
													Node 15	-	-	-	-	-	-	-	0.13
																					0.72
LS 3	6.0	-1.00	6.0	**17**	6.5	-2.25	12 inch	560	0.0020	0.72	2.0 fps	47%	Node 16	-	-	-	-	-	-	-	0.72
17	6.5	-2.25	7.8	**18**	7.0	-3.35	12 inch	555	0.0020	0.87	2.1 fps	53%	LS 3	-	-	-	-	-	-	-	0.72
													A-6 (~50%)	Very Low Density	55	10.1	-	R1	480	0.0007 /Unit	0.04
													A-8	Very Low Density	80	12.7	-	R1	480	0.0007 /Unit	0.06
													GWI & I/I	GWI and I/I	-	22.8	-	I	1,300	0.0020	0.05
																					0.87
18	7.0	-3.45	9.0	**LS 4**	5.6	-4.50	18 inch	950	0.0010	1.80	1.9 fps	53%	Node 10	-	-	-	-	-	-	-	0.92
													Node 17	-	-	-	-	-	-	-	0.87
													D-13	Manufacturing/WH	-	2.3	21,500	M	0.04	0.00000006	0.00
													GWI & I/I	GWI and I/I	-	2.3	-	I	1,300	0.0020	0.00
																					1.80
19	5.5	-2.00	6.8	**20**	5.9	-3.40	8 inch	400	0.0035	0.05	1.2 fps	18%	A-7 (~50%)	Very Low Density	47	6.5	-	R1	480	0.0007 /Unit	0.03
													GWI & I/I	GWI and I/I	-	6.5	-	I	1,300	0.0020	0.01
																					0.05
20	5.9	-4.50	9.7	**21**	6.1	-6.50	8 inch	600	0.0035	0.24	1.8 fps	40%	Node 19	-	-	-	-	-	-	-	0.05
													A-5	Single Family	200	13.8	-	R2	480	0.0007 /Unit	0.15
													A-5	Park	-	3.0	-	P	3,231	0.0050	0.02
													GWI & I/I	GWI and I/I	-	13.8	-	I	1,300	0.0020	0.03
																					0.24
21	6.1	-6.60	12.0	**LS 4**	5.0	-8.90	8 inch	660	0.0035	0.44	2.2 fps	56%	Node 20	-	-	-	-	-	-	-	0.24
													A-4	Very Low Density	135	18.8	-	R1	480	0.0007 /Unit	0.10
													A-6 (~50%)	Very Low Density	55	10.1	-	R1	480	0.0007 /Unit	0.04
													GWI & I/I	GWI and I/I	-	28.9	-	I	1,300	0.0020	0.06
																					0.44
LS 4	5.0	-2.00	5.0	**23**	6.5	-3.25	24 inch	1150	0.0010	2.32	2.0 fps	39%	Node 18	-	-	-	-	-	-	-	1.80
													Node 21	-	-	-	-	-	-	-	0.44
													D-9 (~50%)	Residential Reuse	38	5.7	-	RE	480	0.0007 /Unit	0.03
													D-9 (~50%)	Office	-	-	15,000	O	0.20	0.00000031	0.00
													D-9 (~50%)	Service	-	-	17,500	S	1.00	0.00000155	0.03
													D-13	Manufacturing/WH	-	3.7	36,000	M	0.04	0.00000006	0.00
													GWI & I/I	GWI and I/I	-	9.4	-	I	1,300	0.0020	0.02
																					2.32
22	5.5	-0.80	5.6	**23**	6.5	-3.15	8 inch	665	0.0035	0.04	1.1 fps	16%	D-12 (~25%)	Manufacturing/WH	-	1.8	10,000	M	0.04	0.00000006	0.00
													D-13	Manufacturing/WH	-	13.0	173,000	M	0.04	0.00000006	0.01
													GWI & I/I	GWI and I/I	-	14.8	-	I	1,300	0.0020	0.03
																					0.04

From Node	Rim	Invert Out	Cover (Ft)	To Node	Rim	Invert In	Pipe Diameter (Inches)	Pipe Length (Feet)	Pipe Slope (Ft / Ft)	Peak Flow (cfs)	Velocity (fps)	Percent Capacity	Area Number	Product Type	Unit Count	Acreage	SF	Zoning	Usage based on Zoning	Peak Sewage Flow by	Peak Sewage Flow by area(cfs)
23	6.5	-3.25	7.8	**35**	6.5	-7.80	24 inch	420	0.0108	2.38	4.8 fps	22%	LS 4	-	-	-	-	-	-	-	2.32
													Node 22	-	-	-	-	-	-	-	0.04
													D-7	Office	-	1.8	49,000	O	0.20	0.00000031	0.02
													D-12 (~25%)	Manufacturing/WH	-	1.8	10,000	M	0.04	0.00000006	0.00
													GWI & I/I	GWI and I/I	-	3.6	-	I	1,300	0.0020	0.01
																					2.38
24	6.1	0.05	5.4	**26**	3.2	-5.15	8 inch	1480	0.0035	0.13	1.6 fps	29%	D-17	Manufacturing/WH	-	10.5	100,000	M	0.04	0.00000006	0.01
													D-20	Park	-	4.2	-	P	3,231	0.0050	0.02
													D-20	Office	-	1.1	50,000	O	0.20	0.00000031	0.02
													D-21	Park	-	8.6	-	P	3,231	0.0050	0.04
													D-21	Office	-	1.1	50,000	O	0.20	0.00000031	0.02
													GWI & I/I	GWI and I/I	-	12.7	-	I	1,300	0.0020	0.03
																					0.13
25	3.7	-4.60	7.6	**26**	3.2	-5.15	8 inch	150	0.0035	0.02	0.9 fps	12%	D-14	Office	-	7.0	18,500	O	0.20	0.00000031	0.01
													GWI & I/I	GWI and I/I	-	7.0	-	I	1,300	0.0020	0.01
																					0.02
26	3.2	-5.25	7.8	**29**	4.0	-9.80	8 inch	1305	0.0035	0.20	1.8 fps	36%	Node 24	-	-	-	-	-	-	-	0.13
													Node 25	-	-	-	-	-	-	-	0.02
													D-15 (~50%)	Manufacturing/WH	-	8.25	112,500	M	0.04	0.00000006	0.01
													D-18	Office	-	5.8	58,000	O	0.20	0.00000031	0.02
													GWI & I/I	GWI and I/I	-	14.1	-	I	1,300	0.0020	0.03
																					0.20
27	5.4	-1.30	6.0	**28**	4.0	-4.90	8 inch	1000	0.0035	0.11	1.5 fps	26%	B-1	Residential Reuse	90	15.5	-	RE	480	0.0007 /Unit	0.07
													D-13	Manufacturing/WH	-	4.3	39,500	M	0.04	0.00000006	0.00
													GWI & I/I	GWI and I/I	-	19.8	-	I	1,300	0.0020	0.04
																					0.11
28	4.0	-5.00	8.3	**29**	4.0	-6.75	8 inch	490	0.0035	0.27	1.9 fps	43%	Node 27	-	-	-	-	-	-	-	0.11
													B-2 (~50%)	Retail	-	1.625	37,500	R	0.20	0.00000031	0.01
													B-2 (~50%)	Service	-	1.625	60,000	S	1.00	0.00000155	0.09
													B-3 (~50%)	Retail	-	0.3	12,500	R	0.20	0.00000031	0.00
													B-3 (~50%)	Park	-	2.8	-	P	3,231	0.0050	0.01
													D-16 (~50%)	Manufacturing/WH	-	2.25	53,000	M	0.04	0.00000006	0.00
													D-19	Park	-	1.6	-	P	3,231	0.0050	0.01
													D-21	Park	-	4.0	-	P	3,231	0.0050	0.02
													GWI & I/I	GWI and I/I	-	5.8	-	I	1,300	0.0020	0.01
																					0.27
29	4.0	-9.80	13.1	**LS 5**	4.0	-10.00	8 inch	30	0.0035	0.47	2.2 fps	59%	Node 26	-	-	-	-	-	-	-	0.20
													Node 28	-	-	-	-	-	-	-	0.27
																					0.47
LS 5	4.0	-2.00	5.3	**31**	5.2	-4.20	8 inch	605	0.0035	0.48	2.2 fps	60%	Node 29	-	-	-	-	-	-	-	0.47
													D-16 (~50%)	Manufacturing/WH	-	2.25	53,000	M	0.04	0.00000006	0.00
													GWI & I/I	GWI and I/I	-	2.25	-	I	1,300	0.0020	0.00
																					0.48

From Node	Rim	Invert Out	Cover (Ft)	To Node	Rim	Invert In	Pipe Diameter (Inches)	Pipe Length (Feet)	Pipe Slope (Ft / Ft)	Peak Flow (cfs)	Velocity (fps)	Percent Capacity	Area Number	Product Type	Unit Count	Acreage	SF	Zoning	Usage based on Zoning	Peak Sewage Flow by	Peak Sewage Flow by area(cfs)
30	5.0	-1.00	5.3	**31**	5.2	-4.20	8 inch	910	0.0035	0.05	1.2 fps	18%	D-11 (~20%)	Office	-	5.4	6,000	O	0.20	0.00000031	0.00
													D-11 (~20%)	Manufacturing/WH	-	-	174,000	M	0.04	0.00000006	0.01
													D-15 (~50%)	Manufacturing/WH	-	8.25	112,500	M	0.04	0.00000006	0.01
													GWI & I/I	GWI and I/I	-	13.65	-	I	1,300	0.0020	0.03
																					0.05
31	5.2	-4.30	8.5	**35**	6.3	-6.25	12 inch	980	0.0020	0.56	1.8 fps	41%	LS 5	-	-	-	-	-	-	-	0.48
													Node 30	-	-	-	-	-	-	-	0.05
													D-11 (~20%)	Office	-	5.4	6,000	O	0.20	0.00000031	0.00
													D-11 (~20%)	Manufacturing/WH	-	-	174,000	M	0.04	0.00000006	0.01
													D-12 (~50%)	Manufacturing/WH	-	3.7	19,500	M	0.04	0.00000006	0.00
													GWI & I/I	GWI and I/I	-	9.10	-	I	1,300	0.0020	0.02
																					0.56
32	5.0	-0.30	4.6	**33**	7.0	-2.40	8 inch	600	0.0035	0.10	1.4 fps	25%	D-2	Manufacturing/WH	-	23.1	260,000	M	0.04	0.00000006	0.02
													D-10	Manufacturing/WH	-	7.1	70,000	M	0.04	0.00000006	0.00
													D-11 (~20%)	Office	-	5.4	6,000	O	0.20	0.00000031	0.00
													D-11 (~20%)	Manufacturing/WH	-	-	174,000	M	0.04	0.00000006	0.01
													GWI & I/I	GWI and I/I	-	35.6	-	I	1,300	0.0020	0.07
																					0.10
33	7.0	-2.40	8.7	**36**	6.0	-6.15	8 inch	1065	0.0035	0.19	1.7 fps	35%	Node 32	-	-	-	-	-	-	-	0.10
													D-3 (~20%)	Residential Reuse	20	4.4	-	RE	480	0.0007 /Unit	0.01
													D-3 (~20%)	Office	-	-	18,400	O	0.20	0.00000031	0.01
													D-3 (~20%)	Manufacturing/WH	-	-	25,000	M	0.04	0.00000006	0.00
													D-3 (~20%)	Service	-	-	18,400	S	1.00	0.00000155	0.03
													D-11 (~20%)	Office	-	5.4	6,000	O	0.20	0.00000031	0.00
													D-11 (~20%)	Manufacturing/WH	-	-	174,000	M	0.04	0.00000006	0.01
													GWI & I/I	GWI and I/I	-	9.8	-	I	1,300	0.0020	0.02
																					0.19
34	2.5	-4.60	6.1	**35**	2.0	-5.80	12 inch	600	0.0020	0.03	0.8 fps	10%	VA	-	-	-	-	-	-	-	0.03
													E-1	Park	-	158.5	-	P	3,231	0.0050	Not Included
																					0.03
35	2.0	-5.80	6.8	**36**	2.5	-6.15	12 inch	170	0.0020	0.31	1.6 fps	30%	Node 34	-	-	-	-	-	-	-	0.03
													E-2	Park	-	55.5	-	P	3,231	0.0050	0.28
																					0.31
36	2.5	-6.25	7.8	**44**	1.7	-9.00	12 inch	1380	0.0020	0.61	1.9 fps	43%	Node 33	-	-	-	-	-	-	-	0.19
													Node 35	-	-	-	-	-	-	-	0.31
													D-3 (~40%)	Residential Reuse	40	8.7	-	RE	480	0.0007 /Unit	0.03
													D-3 (~40%)	Office	-	-	36,800	O	0.20	0.00000031	0.01
													D-3 (~40%)	Manufacturing/WH	-	-	50,000	M	0.04	0.00000006	0.00
													D-3 (~40%)	Service	-	-	36,800	S	1.00	0.00000155	0.06
													GWI & I/I	GWI and I/I	-	8.7	-	I	1,300	0.0020	0.02
																					0.61

From Node	Rim	Invert Out	Cover (Ft)	To Node	Rim	Invert In	Pipe Diameter (Inches)	Pipe Length (Feet)	Pipe Slope (Ft / Ft)	Peak Flow (cfs)	Velocity (fps)	Percent Capacity	**Area Number**	**Product Type**	**Unit Count**	**Acreage**	**SF**	**Zoning**	**Usage based on Zoning**	**Peak Sewage Flow by**	**Peak Sewage Flow by area(cfs)**
35	6.0	-7.90	11.9	**44**	1.7	-9.00	24 inch	1065	0.0010	3.09	2.2 fps	46%	Node 23	-	-	-	-	-	-	-	2.38
													Node 31	-	-	-	-	-	-	-	0.56
													D-4	Park	-	8.0	-	P	3,231	0.0050	Not Included
													D-5	Park	-	1.8	-	P	3,231	0.0050	Not Included
													D-6	Park	-	3.6	-	P	3,231	0.0050	Not Included
													D-3 (~40%)	Residential Reuse	40	8.7	-	RE	480	0.0007 /Unit	0.03
													D-3 (~40%)	Office	-	-	36,800	O	0.20	0.00000031	0.01
													D-3 (~40%)	Manufacturing/WH	-	-	50,000	M	0.04	0.00000006	0.00
													D-3 (~40%)	Service	-	-	36,800	S	1.00	0.00000155	0.06
													D-11 (~20%)	Office	-	5.5	6,000	O	0.20	0.00000031	0.00
													D-11 (~20%)	Manufacturing/WH	-	-	174,000	M	0.04	0.00000006	0.01
													GWI & I/I	GWI and I/I	-	14.2	-	I	1,300	0.0020	0.03
																					3.09
38	3.5	-1.65	4.5	**40**	1.0	-6.45	8 inch	1345	0.0035	0.04	1.1 fps	16%	A-3	Residential Reuse	12	14.2	-	RE	480	0.0007 /Unit	0.01
													GWI & I/I	GWI and I/I	-	14.2	-	I	1,300	0.0020	0.03
																					0.04
39	2.6	-2.80	4.7	**40**	1.0	-6.35	8 inch	985	0.0035	0.04	1.1 fps	16%	A-3	Residential Reuse	11	6.0	-	RE	480	0.0007 /Unit	0.01
													D-8 (~10%)	Office	-	3.8	7,500	O	0.20	0.00000031	0.00
													D-8 (~10%)	Service	-	-	7,500	S	1.00	0.00000155	0.01
													GWI & I/I	GWI and I/I	-	9.8	-	I	1,300	0.0020	0.02
																					0.04
40	1.0	-6.45	6.8	**LS 6**	2.0	-6.60	8 inch	35	0.0035	0.08	1.4 fps	22%	Node 38	-	-	-	-	-	-	-	0.04
													Node 39	-	-	-	-	-	-	-	0.04
																					0.08
LS 6	2.0	-3.40	4.7	**41**	2.3	-6.15	8 inch	760	0.0035	0.24	1.8 fps	40%	Node 40	-	-	-	-	-	-	-	0.08
													A-2	Service	-	3.1	100,000	S	1.00	0.00000155	0.15
													GWI & I/I	GWI and I/I	-	3.1	-	I	1,300	0.0020	0.01
																					0.24
41	2.3	-6.15	7.8	**43**	2.1	-7.55	8 inch	400	0.0035	0.36	2.1 fps	50%	LS 6	-	-	-	-	-	-	-	0.24
													A-1	Very Low Density	42	7.3	-	R1	480	0.0007 /Unit	0.03
													D-8 (~45%)	Office	-	3.7	33,750	O	0.20	0.00000031	0.01
													D-8 (~45%)	Service	-	-	33,750	S	1.00	0.00000155	0.05
													GWI & I/I	GWI and I/I	-	11.0	-	I	1,300	0.0020	0.02
																					0.36

From Node	Rim	Invert Out	Cover (Ft)	To Node	Rim	Invert In	Pipe Diameter (Inches)	Pipe Length (Feet)	Pipe Slope (Ft / Ft)	Peak Flow (cfs)	Velocity (fps)	Percent Capacity	Area Number	Product Type	Unit Count	Acreage	SF	Zoning	Usage based on Zoning	Peak Sewage Flow by	Peak Sewage Flow by area(cfs)
42	2.5	-5.40	7.2	**43**	2.1	-7.45	8 inch	580	0.0035	0.14	1.6 fps	30%	D-8 (~45%)	Office	-	3.7	33,750	O	0.20	0.00000031	0.01
													D-8 (~45%)	Service	-	-	33,750	S	1.00	0.00000155	0.05
													D-9 (~50%)	Residential Reuse	37	5.6	-	RE	480	0.0007 /Unit	0.03
													D-9 (~50%)	Office	-	-	15,000	O	0.20	0.00000031	0.00
													D-9 (~50%)	Service	-	-	17,500	S	1.00	0.00000155	0.03
													GWI & I/I	GWI and I/I	-	9.3	-	I	1,300	0.0020	0.02
																					0.14
43	2.1	-7.45	8.9	**44**	1.7	-9.00	8 inch	415	0.0035	0.50	2.2 fps	62%	Node 41	-	-	-	-	-	-	-	0.36
													Node 42	-	-	-	-	-	-	-	0.14
													D-1	Park	-	14.9	-	P	3,231	0.0050	Not Included
																					0.50
44	1.7	-9.10	8.8	**PS 1**	3.6	-9.50	24 inch	365	0.0010	4.20	2.4 fps	55%	Node 35	-	-	-	-	-	-	-	3.09
													Node 36	-	-	-	-	-	-	-	0.61
													Node 43	-	-	-	-	-	-	-	0.50
																					4.20

APPENDICES

D) SANITARY SEWER FLOW ESTIMATES AND MODELING (RMC)

Technical Memorandum - DRAFT

Subject: **Alameda Point Sanitary Sewer Flow Estimates and Modeling**

Prepared for: Barbara Hawkins and Jennifer Ott, City of Alameda

Prepared by: Gisa Ju

Date: June 28, 2013

This Technical Memorandum (TM) summarizes the results of hydraulic modeling of the proposed Alameda Point sewer system as developed for the Draft Alameda Pont Master Infrastructure Plan (MIP) prepared by Carlson, Barbee & Gibson (CBG) for the City of Alameda. The modeling was conducted pursuant to an agreement between RMC and the City of Alameda dated April 3, 2013. The purpose of the modeling work is to confirm the design wastewater flow projections for the proposed Alameda Point redevelopment and estimate the flows at interim stages of development. The information in this TM will also provide information for the assessment of downstream flow impacts to be addressed in the Alameda Point Draft Environmental Impact Report.

1 Model Network

The model of the proposed Alameda Point sewer system was developed in InfoWorks™ CS, the same hydraulic modeling software used for the City's system-wide Sanitary Sewer System Hydraulic Analysis (May 2010) previously prepared by RMC. The configuration and alignment of the proposed Alameda Point sewer system and the proposed land uses and their associated "load points" to the sewer network were provided by CBG in the form of an AutoCAD map showing the proposed sewer network, and an Excel spreadsheet listing the sewer network data (pipe diameters, lengths, slopes, rim and invert elevations) and associated loading (land uses) to each manhole in the network. The model only includes the "trunk system" network, i.e., smaller diameter pipes and manholes that were not indicated as loading nodes on the CBG map were not included in the model. CBG also provided information (approximate pumping capacities and wet well dimensions) as needed for modeling of the six proposed lift stations in the system.

The CBG map divides the system into "blocks" with associated land uses and acreages. Since some of these blocks load to more than one model node, those blocks were further subdivided as necessary to create individual "subcatchments" for model loading.

Figure 1 depicts the modeled sewer network. Note that all flow in both the existing and proposed Alameda Point sewer system is conveyed to the pump station owned and operated by the East Bay Municipal Utility District (EMBUD) on the north side of the site, from where the flow is pumped through a 20-inch force main to the inlet structure of EBMUD's Alameda siphons. The siphons, which convey all flow from the City of Alameda, cross the Oakland Estuary and connect to EBMUD's South Interceptor, which conveys flow to EBMUD's Main Wastewater Treatment Plant located near the eastern terminus of the San Francisco-Oakland Bay Bridge. Note that EBMUD's Alameda Point pump station, known as Pump Station R, is called Pump Station 1 in the MIP. See Figure 30 of the Draft MIP for a depiction of the off-site EBMUD wastewater conveyance facilities.

Figure 1: Alameda Point Proposed Sewer System - Modeled Network

J:\Projects\0232-009 Alameda Point Sewer Evaluation\G. GIS_MXD\AlamedaPoint_Overview.mxd

2 Model Scenarios

The development of Alameda Point is expected to take place in stages, with the portion identified as the "Development Area", largely located on the eastern side of the site, being developed first with all new sewer infrastructure (see Draft MIP Figure 31). Development of the remainder of the site, called the "Reuse Area," would proceed incrementally over time, initially making use of the existing infrastructure with some rehabilitation to address existing deficiencies and reduce infiltration/inflow (I/I) (see Draft MIP Figure 32). Ultimately, new sewer infrastructure would also be constructed in the Reuse Areas as well (Draft MIP Figure 33).

Accordingly, three modeling scenarios were analyzed for this TM:

- **Scenario A –** Full development in the Development Area with new sewer infrastructure conveying flow to Pump Station 1; existing uses in the Reuse Area utilizing existing sewer infrastructure but tying into major trunks constructed as part of the Development Area to convey flow to Pump Station 1.
- **Scenario B –** Scenario A plus additional development in the Reuse Area, but still utilizing existing sewer infrastructure with some rehabilitation to address deficiencies and reduce I/I.
- **Scenario C -** Full development and all new sewer infrastructure in both the Development and Reuse Areas.

Note that although there is existing mapping for the existing Alameda Point sewer system, there is not sufficient sewer attribute information (e.g., rim and invert elevations, etc.) to hydraulically model the system. Therefore, for Scenarios A and B, the Reuse Area model subcatchments were loaded at the nodes on the Scenario A new trunk system to which the flows from those subcatchments would ultimately be conveyed. This was considered a reasonable approximation for purposes of estimating the total flow in the system conveyed to Pump Station 1 under each scenario.

3 Model Loads

Flow inputs to the model are represented in terms of average base wastewater flow (BWF) for residential and non-residential land uses, groundwater infiltration rates, and rainfall-dependent I/I hydrograph parameters for each loading area, called " subcatchments" in the model.

3.1 Base Wastewater Flow

Using the spreadsheet provided by CBG, the land uses loading to each subcatchment were quantified and converted to average BWF for residential and non-residential land uses. The unit flow rates as applied to the land use information were the same as those used for the City's 2010 Hydraulic Analysis, except some flow was also allocated to parks. The average BWF unit factors are shown in **Table 1**.

In addition to the land use-based loads, the model also includes the proposed load from the proposed Veterans Affairs (VA) facility on the western end of the site (flows from the VA facility would be pumped east to the Alameda Point sewer system). CBG estimated the peak flow for the VA facility at 20,000 gallons per day (gpd). For purposes of the model, this was converted to an average BWF non-residential load of 12,000 gpd and was included in all three model scenarios.

Table 1: Average Base Wastewater Flow Unit Factors

Land Use	Zoning Designation	Unit	Average BWF Factor (gpd/unit)
Residential Reuse	RE	Dwelling unit	240
Very Low Density	R2	Dwelling unit	240
Single Family	R2	Dwelling unit	240
Office	O	Building square feet	0.1
Manufacturing/Warehouse	M	Building square feet	0.02
Retail	R	Building square feet	0.1
Service	S	Building square feet	0.5
Park	P	Each	3,000
Park w/Sports Complex	P	Each	45,000
VA Facility	VA	Each	12,000

The model computes the diurnal BWF for each subcatchment by applying diurnal profiles for residential and non residential uses, as shown in **Figure 2**. The non-residential diurnal profile was applied for parks and for the VA facility

3.2 Infiltration/Inflow

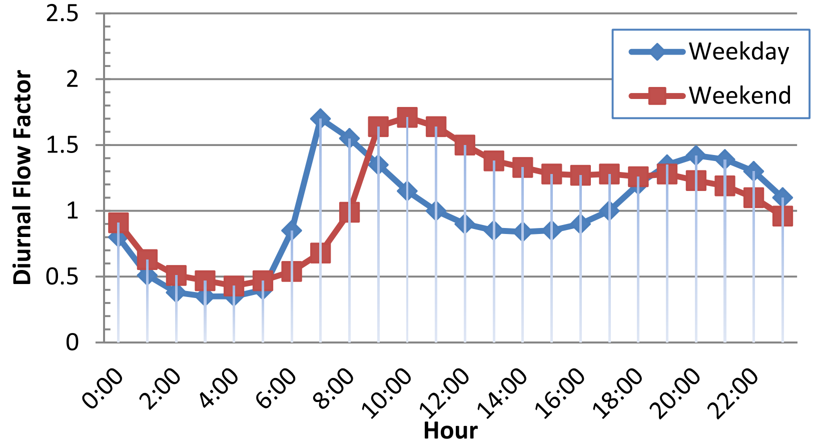
I/I flows include groundwater infiltration (GWI) and rainfall-dependent I/I (RDI/I). GWI is groundwater that enters the system from the ground through defects in sewer pipelines, manholes, and building laterals. GWI is typically greatest during the winter and early spring, and is represented as a constant flow during both non-rainfall and rainfall periods. RDI/I is stormwater that enters the sewer system through direct inflow connections (e.g., roof downspouts or area drains directly connected to the sanitary sewer system) or through infiltration through the soil to pipe and manhole defects. RDI/I is represented as a hydrograph that follows the pattern of rainfall, typically producing a peak flow response directly related to the rainfall intensity. For purposes of the analysis in this TM, I/I was quantified for a "design" condition assumed to represent maximum GWI and RDI/I for a 5-year design storm event falling under saturated soil conditions. The 5-year event is the specific storm event developed for EBMUD and its Satellite systems as part of studies conducted during the 1980s and known as the "EBMUD Design Storm" event.

Assumed I/I rates were based on the factors used for the City's Hydraulic Analysis as well as existing flows developed by EBMUD as part of its Flow Modeling and Limits Report (FMLR) prepared in compliance with its Stipulated Order for Preliminary Relief with the U.S. EPA. The FMLR analyses were based on flow monitoring conducted by EBMUD during the 2009/10 and 2010/11 wet weather seasons in order to quantify flows from each area discharging to its interceptor system (called Interceptor Tributary Areas, or ITAs). The monitoring included a meter located on the influent pipe to Pump Station R (Pump Station 1), representing the existing flow from the Alameda Point area (identified by EBMUD as ITA 90-2). EBMUD also utilized winter water use data to help quantify base wastewater flows for the ITAs. Based on the FMLR analyses, the existing flows from ITA 90-2 were quantified as follows:

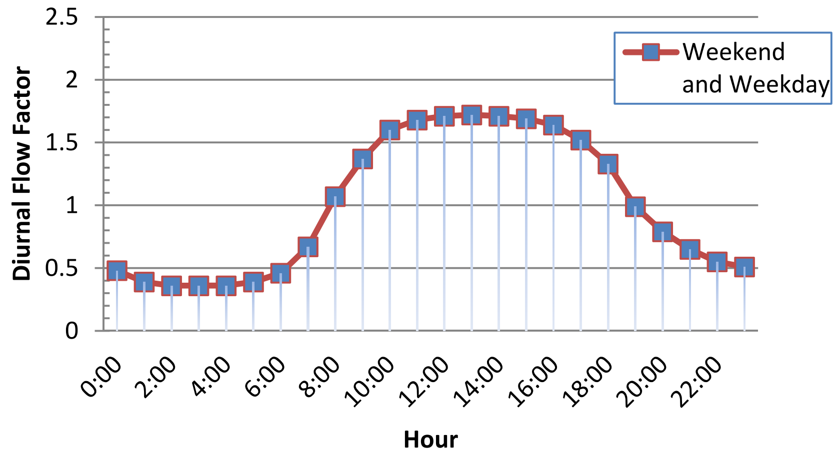
- Average BWF 0.20 mgd (~500 gpd/acre)
- Maximum GWI 0.27 mgd (~600 gpd/acre)
- Peak RDI/I (5-year design event) 1.32 mgd (~3,000 gpd/acre)

For purposes of modeling the flow contribution from the Reuse Area prior to redevelopment and construction of new sewer infrastructure, the existing BWF, GWI, and peak RDI/I flows were converted to unit flow rates (gpd/acre) based on the total Alameda Point non-park development acreage estimated by CBG (approximately 450 acres). The calculated unit flow rates (rounded up) are also shown above.

Figure 2: Base Wastewater Flow Diurnal Profiles



Residential BWF Profile



Non-Residential BWF Profile

Construction of new sewer infrastructure is expected to reduce I/I flows in the future. Under Scenario C, an assumed GWI rate of 300 pgd/acre was used, based on the value assumed for new development for the City's 2010 Hydraulic Analysis. For RDI/I, the rate documented in EBMUD's FMLR for a nearby, relatively newer area of the Alameda (ITA 90-3, which comprises the Marina Village area), was used. The 5-year design event peak RDI/I for this area was calculated to be approximately 1,000 gpd/acre.

For the Reuse Area under Scenario B, the following assumptions were made to reflect interim development and partial rehabilitation of the existing sewer infrastructure:

- BWF equivalent to 50 percent of buildout development
- GWI of 450 gpd/acre
- Peak RDI/I of approximately 2,000 gpd/acre

Note that for all scenarios, hydrograph parameters to represent the volume and rate of flow response to rainfall were developed for the model based roughly on those developed for the EBMUD FMLR. The parameters were set so as to generate the expected peak RDI/I rates noted above. Furthermore, as in the City's Hydraulic Analysis, the timing of the design storm was set to produce a peak RDI/I flow roughly coincident with the peak diurnal BWF.

4 Model Results

Table 2 summarizes the resultant flows to Pump Station 1 for each of the scenarios and for existing conditions. As indicated in the table, redevelopment of Alameda Point and construction of new sewer infrastructure is projected to result in a net 12 percent (0.23 mgd) increase in the design storm PWWF.

Table 2: Summary of Alameda Point Flows

Scenario	Alameda Point Flow to PS 1 (mgd)				
	Avg. BWF	Max. GWI	PDWF	Peak RDI/I	PWWF
Existing*	0.20	0.27	0.61	1.32	1.93
Scenario A	0.60	0.21	1.20	0.91	2.10
Scenario B	0.76	0.17	1.42	0.68	2.11
Scenario C	0.95	0.14	1.71	0.46	2.16
Overall change (mgd)	0.75	-0.13	1.10	-0.86	0.23
Overall change (%)	373%	-49%	180%	-65%	12%

* ABWF, Max. GWI, and Peak RDI/I from EBMUD FMLR for ITA 90-2
PDWF = Peak BWF + Max. GWI
PWWF = PDWF + Peak RDI/I

APPENDICES

E) STORMWATER PROTOTYPICAL WATERSHED MODEL

Memo

To: Angeleo Obertello, P.E. (Carlson, Barbee & Gibson)

From: Edward Ballman, P.E. CFM

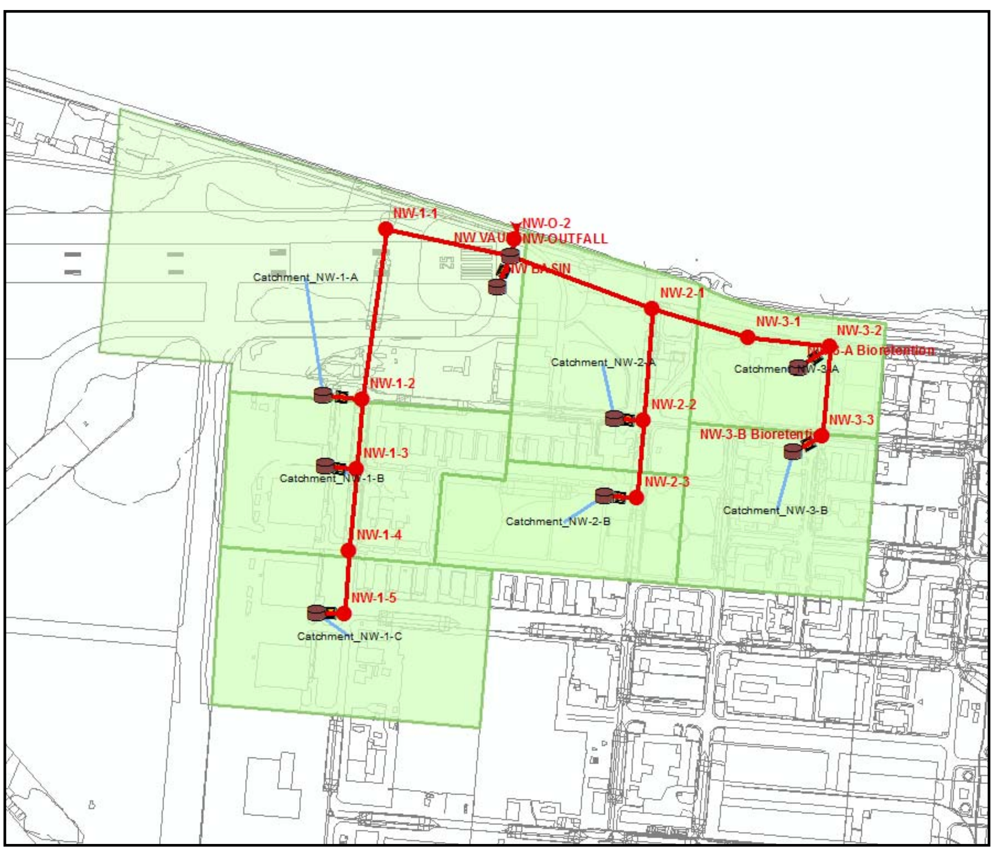
Date: June 13, 2013

Subject: Mike URBAN Modeling Output for the Northwest Drainage Area, Alameda Point, City of Alameda

Attached are output summaries from the Mike URBAN modeling of a prototypical storm drain, basin, and pump configuration for the low-lying northwest portion of the Alameda Point site.

All modeling was done using protocols established in the City's storm drain master planning project. Attachment A presents output for the present case (e.g. no sea level rise). Attachment B presents output for future conditions with 4.6 feet (55 inches) of sea level rise. Both output files include references to the southeast basin as well, which were originally included in the model domain, but were not optimized when it became clear that higher elevations in that drainage area were far less constraining and that the prototypical approaches framed in the northwest area could readily be adapted to other locations at the site. The catchments include small storage elements that represent the stormwater detention volume that will be provided by LID infrastructure in the final configuration of the drainage network.

The modeling domain is illustrated below:



Attachment A

MOUSE HD Computation Engine x64 v2012 Release Version (13.0.0.6270)

MOUSE Pipe Flow Simulation --- Status Report ---Dynamic Wave

Index of summary

File Overview

Working dir :	P:\2012\212082 CBG Alameda Point\212082 Modeling\URBAN Modeling Current\	-
Sewer network data (UND) :	25-yr Design StormBase.mex	1/2/2013 8:20:56 AM
Hydrological data (HGF) :	25-yr Design StormBase.mex	1/2/2013 8:20:56 AM
Additional parameters file (ADP) :	-	-
Dry weather flow data (DWF) :	25-yr Design StormBase.mex	1/2/2013 8:20:56 AM
Repetitive profile data (RPF) :	-	-
Runoff Hydrographs (CRF) :	25-yr Design StormBase.CRF	1/1/2013 12:47:12 PM
Hotstart file (PRF) :	-	-
Result File (PRF) :	25-yr Design StormBase.PRF	1/2/2013 8:21:04 AM
Reduced result file (PRF) :	-	-

Time Overview

Simulation start date :	2050-01-01 00:00:00	Calculation started :	2013-01-02 08:20:59
Simulation end date :	2050-01-01 23:50:00	Calculation ended :	2013-01-02 08:21:30
Save time step [hh:mm:ss] :	0:02:00	Calculation time [hh:mm:ss] :	0:00:31
Maximum time step [sec] :	1	Hotstart start date :	-
Minimum time step [sec] :	1		

Input Summary

Number of Manholes:	27
Number of Basins:	17
Number of Outlets:	2
Number of Storage Nodes:	0
Number of Circular Pipes:	48
Number of Rectangular pipes:	5
Number of CRS defined pipes:	0
Number of Pumps:	1
Number of Controlled Pumps:	0
Number of Weirs/Orifices:	15
Number of Controlled Weirs/Gates:	0
Number of Valves:	0
Number of Controlled Valves:	0

Nodes

Min Invert Level	NW-O-2	-8.00 ft
Max Invert Level	SE-1-A Bioret	2.50 ft
Min Ground Level	NW-3-1	1.90 ft
Max Ground Level	SE-2-2	7.80 ft
Min X Coordinate	NW-1-C Bioret	6.039E06 ft
Max X Coordinate	SE-1-6	6.0441E06 ft
Min Y Coordinate	SE-1-2	2.1081E06 ft

Max Y Coordinate	NW-1-1	2.1156E06 ft
Total Manhole Volume		9541.2 ft3
Total Basin Volume		1557066.6 ft3

Links

Total Circular Volume	174941.2 ft3
Total CRS Volume	30045.0 ft3
Total Length	18529.00 ft

Simulation Result Summary

Continuity Balance

1 :	**Start volume in Pipes, Manholes and Structures**			**98538.4 ft3**
2 :	**End volume in Pipes, Manholes and Structures**			**422305.5 ft3**
3 :	**Total inflow volume**			
	Specified inflows			
	Runoff :	3084599.2 ft3		
	Non-specified inflows			
	Outlets (inflow) :	13566.4 ft3		
		3098165.6 ft3	**-->**	**3098165.6 ft3**
4 :	**Total diverted volume**			
	Operational, non-specified outflows			
	Outlets :	2263159.6 ft3		
	Pumps :	489385.9 ft3		
		2752545.5 ft3	**-->**	**2752545.5 ft3**
5 :	**Water generated in empty parts of the system :**			**2122.8 ft3**
6 :	**Continuity Balance = (2-1) - (3-4+5) :**			**-23975.7 ft3**
	Continuity Balance max value :		0.0 ft3	
	Continuity Balance min value :		-25077.4 ft3	

Boundary Connections

Outlet levels

Boundary Condition ID	Location	Temporal variation	Value/TS name	Validity	Minimum Value	Maximum Value
					ft	ft
NW 25-yr Tide	NW-OUTFALL	Time Series	\\192.168.1.152\pacific\2012\212082 CBG Alameda Point\212082 Modeling\URBAN Modeling Current\25-yr Coincident Tide.dfs0	Unlimited	-3.84	1.71

Nodes - Water level

G : Max level exceeds ground level

W : Max level exceeds weir crest level

C : Max level exceeds critical level

	Minimum	Maximum	Ground Level	Ground Level - Maximum	Time - Minimum	Time - Maximum	Note
	[ft]	[ft]	[ft]	[ft]			
NW-OUTFALL	-8.00	1.71	2.40	0.69	2050-01-01 00:00:00	2050-01-01 00:00:00	
NW-O-2	-8.00	0.50	2.40	1.90	2050-01-01 00:00:00	2050-01-01 13:10:00	
NW VAULT	-6.00	1.64	3.00	1.36	2050-01-01 00:00:00	2050-01-01 13:00:00	W
NW-2-1	-8.00	1.75	2.00	0.25	2050-01-01 00:00:00	2050-01-01 13:00:00	
NW-1-1	-6.00	1.93	2.40	0.47	2050-01-01 00:00:00	2050-01-01 13:02:00	
NW BASIN	-2.00	1.62	3.00	1.38	2050-01-01 00:00:00	2050-01-01 13:00:00	
NW-2-2	-6.00	1.77	2.00	0.23	2050-01-01 00:00:00	2050-01-01 13:00:00	
NW-3-1	-6.00	1.76	1.90	0.14	2050-01-01 00:00:00	2050-01-01 13:00:00	
NW-1-2	-5.00	2.31	2.50	0.19	2050-01-01 00:00:00	2050-01-01 13:04:00	
NW-2-3	-6.00	2.03	2.20	0.17	2050-01-01 00:00:00	2050-01-01 12:38:00	
NW-2-A Bioret	-1.50	2.14	2.50	0.36	2050-01-01 00:00:00	2050-01-01 12:34:00	W

NW-3-2	**-6.00**	**1.88**	**2.50**	**0.62**	**2050-01-01 00:00:00**	**2050-01-01 12:38:00**	
NW-1-3	**-5.00**	**2.39**	**2.50**	**0.11**	**2050-01-01 00:00:00**	**2050-01-01 13:06:00**	
NW-1-A Bioret	**-1.50**	**2.36**	**2.50**	**0.14**	**2050-01-01 00:00:00**	**2050-01-01 13:04:00**	**W**
NW-2-B Bioret	**-1.50**	**2.12**	**2.50**	**0.38**	**2050-01-01 00:00:00**	**2050-01-01 12:38:00**	**W**
NW-3-3	**-6.00**	**2.30**	**2.70**	**0.40**	**2050-01-01 00:00:00**	**2050-01-01 12:42:00**	
NW-3-A Bioret	**-0.50**	**3.10**	**3.50**	**0.40**	**2050-01-01 00:00:00**	**2050-01-01 12:34:00**	**W**
NW-1-B Bioret	**-1.50**	**2.41**	**2.50**	**0.09**	**2050-01-01 00:00:00**	**2050-01-01 13:06:00**	**W**
NW-1-4	**-4.00**	**2.40**	**4.20**	**1.80**	**2050-01-01 00:00:00**	**2050-01-01 13:06:00**	
NW-3-B Bioret	**-0.50**	**2.32**	**3.50**	**1.18**	**2050-01-01 00:00:00**	**2050-01-01 12:42:00**	**W**
NW-1-5	**-4.00**	**2.52**	**7.00**	**4.48**	**2050-01-01 00:00:00**	**2050-01-01 13:08:00**	
NW-1-C Bioret	**-1.50**	**2.54**	**2.50**	**-0.04**	**2050-01-01 00:00:00**	**2050-01-01 13:08:00**	**G W**

Number of Critical level exceedings : 0

Number of Ground level exceedings : 1

Number of Weir Crest level exceedings : 8

Nodes - Volume spilled

No Spilling Nodes were found in the network

Weir/Orifice-Gate/Valve Discharge

	Minimum	**Maximum**	**Flow - Accumulated**	**Time - Minimum**	**Time - Maximum**
	[cfs]	**[cfs]**	**[ft3]**		
NW VAULT+BASIN	**-43.306**	**47.295**	**7237.0**	**2050-01-01 13:04:00**	**2050-01-01 13:02:00**
NW-1-A Overflow	**0.000**	**52.657**	**308463.3**	**2050-01-01 00:00:00**	**2050-01-01 13:06:00**
NW-1-B Overflow	**0.000**	**27.374**	**61820.3**	**2050-01-01 00:00:00**	**2050-01-01 13:08:00**
NW-1-C Overflow	**0.000**	**26.231**	**66073.9**	**2050-01-01 00:00:00**	**2050-01-01 13:26:00**
NW-2-A Overflow	**0.000**	**28.739**	**102237.9**	**2050-01-01 00:00:00**	**2050-01-01 12:34:00**

NW-2-B Overflow	0.000	19.570	80375.9	2050-01-01 00:00:00	2050-01-01 12:34:00
NW-3-A Overflow	0.000	17.322	44889.9	2050-01-01 00:00:00	2050-01-01 12:34:00
NW-3-B Overflow	0.000	21.531	71842.3	2050-01-01 00:00:00	2050-01-01 12:52:00

Pumps - Discharge

	Minimum	Maximum	Flow - Accumulated	Time - Minimum	Time - Maximum	Pump starts	Dry stops (1)	Speed	Operation total
	[cfs]	[cfs]	[ft3]			[Count]	[Count]		[Hr:Min:Sec]
NW PUMP	0.000	44.595	489385.9	2050-01-01 00:00:00	2050-01-01 12:08:00	2	0	Constant	3:02:54

(1) : Pump stops due to dry pump well.

Links - Result summary

LinkID	From Node	To Node	Qf	Hmax	Qmax	Hmax /D	Qmax/ Qf	Flow - Accumulated	Time - Hmax	Time - Qmax
			[cfs]	[ft]	[cfs]			[ft3]		
NW-1-1+V (1)	NW-1-1	NW VAULT	50.225	1.79	38.891	1.909	0.774	362221.6	2050-01-01 13:02:00	2050-01-01 13:08:00
NW-1-1+V (2)	NW-1-1	NW VAULT	50.225	1.79	38.891	1.909	0.774	362221.6	2050-01-01 13:02:00	2050-01-01 13:08:00
NW-1-2+1 (1)	NW-1-2	NW-1-1	50.002	2.20	38.868	1.829	0.777	370094.3	2050-01-01 13:02:00	2050-01-01 13:08:00
NW-1-2+1 (2)	NW-1-2	NW-1-1	50.002	2.20	38.868	1.829	0.777	370094.3	2050-01-01 13:02:00	2050-01-01 13:08:00
NW-1-3+2	NW-1-3	NW-1-2	50.071	2.34	40.251	1.703	0.804	415719.3	2050-01-01 13:04:00	2050-01-01 13:14:00
NW-1-4+3	NW-1-4	NW-1-3	50.082	2.39	26.438	1.638	0.528	223640.6	2050-01-01 13:06:00	2050-01-01 13:26:00
NW-1-5+4	NW-1-5	NW-1-4	23.395	2.45	26.565	2.054	1.136	226418.1	2050-01-01 13:08:00	2050-01-01 13:26:00
NW-1-A+2	NW-1-A Bioret	NW-1-2	0.692	2.36	0.850	14.194	1.228	34124.7	2050-01-01 13:04:00	2050-01-01 22:46:00
NW-1-B+3	NW-1-B Bioret	NW-1-3	2.391	2.40	2.881	8.736	1.205	133550.0	2050-01-01 13:06:00	2050-01-01 14:46:00

NW-1-C+5	NW-1-C Bioret	NW-1-5	2.664	2.53	3.555	7.376	1.334	161729.7	2050-01-01 13:08:00	2050-01-01 14:48:00
NW-2-1+V (1)	NW-2-1	NW VAULT	50.210	1.68	42.094	1.909	0.838	236461.0	2050-01-01 13:00:00	2050-01-01 12:34:00
NW-2-1+V (2)	NW-2-1	NW VAULT	50.210	1.68	42.094	1.909	0.838	236461.0	2050-01-01 13:00:00	2050-01-01 12:34:00
NW-2-2+1 (1)	NW-2-2	NW-2-1	50.144	1.75	24.432	1.746	0.487	120268.0	2050-01-01 13:00:00	2050-01-01 12:34:00
NW-2-2+1 (2)	NW-2-2	NW-2-1	50.144	1.75	24.432	1.746	0.487	120268.0	2050-01-01 13:00:00	2050-01-01 12:34:00
NW-2-3+2	NW-2-3	NW-2-2	23.343	1.80	19.653	2.153	0.842	99955.4	2050-01-01 12:38:00	2050-01-01 12:34:00
NW-2-A+2	NW-2-A Bioret	NW-2-2	0.992	2.05	1.142	13.453	1.152	49339.6	2050-01-01 12:38:00	2050-01-01 14:46:00
NW-2-B+3	NW-2-B Bioret	NW-2-3	0.388	2.11	0.504	17.595	1.300	21608.5	2050-01-01 12:38:00	2050-01-01 14:46:00
NW-3-1+2-1 (1)	NW-3-1	NW-2-1	49.834	1.75	17.927	1.746	0.360	127132.3	2050-01-01 13:00:00	2050-01-01 12:30:00
NW-3-1+2-1 (2)	NW-3-1	NW-2-1	49.834	1.75	17.927	1.746	0.360	127132.3	2050-01-01 13:00:00	2050-01-01 12:30:00
NW-3-2+1	NW-3-2	NW-3-1	50.397	1.79	35.897	1.629	0.712	263581.9	2050-01-01 13:00:00	2050-01-01 12:30:00
NW-3-3+2	NW-3-3	NW-3-2	23.147	2.13	21.752	2.080	0.940	163562.1	2050-01-01 12:40:00	2050-01-01 12:52:00
NW-3-A+2	NW-3-A Bioret	NW-3-2	1.091	2.91	1.241	12.998	1.138	58896.7	2050-01-01 12:38:00	2050-01-01 14:46:00
NW-3-B+3	NW-3-B Bioret	NW-3-3	1.948	2.31	2.078	10.206	1.067	93840.6	2050-01-01 12:42:00	2050-01-01 14:48:00
NW-B-V	NW BASIN	NW VAULT	158.570	1.64	11.851	1.034	0.075	7542.0	2050-01-01 13:00:00	2050-01-01 13:34:00
NW-O-2+OUT	NW-O-2	NW-OUTFALL	261.394	1.71	103.068	1.382	0.394	680727.7	2050-01-01 00:00:00	2050-01-01 12:40:00
NW-O-V+2 (1)	NW VAULT	NW-O-2	111.465	1.40	51.544	1.475	0.462	348366.4	2050-01-01 13:00:00	2050-01-01 12:40:00
NW-O-V+2 (2)	NW VAULT	NW-O-2	111.465	1.40	51.544	1.475	0.462	348366.4	2050-01-01 13:00:00	2050-01-01 12:40:00

Links - Data

LinkID	From Node	To Node	Up - Invert Level	Down - Invert Level	Length	Dimension (Max Height)	Slope	Qf

			[ft]	[ft]	[ft]	[ft]	[‰]	[]
NW-1-1+V (1)	NW-1-1	NW VAULT	-5.38	-6.00	618.00	4.00	1.003	50.225
NW-1-1+V (2)	NW-1-1	NW VAULT	-5.38	-6.00	618.00	4.00	1.003	50.225
NW-1-2+1 (1)	NW-1-2	NW-1-1	-4.50	-5.38	885.00	4.00	0.994	50.002
NW-1-2+1 (2)	NW-1-2	NW-1-1	-4.50	-5.38	885.00	4.00	0.994	50.002
NW-1-3+2	NW-1-3	NW-1-2	-4.16	-4.50	341.00	4.00	0.997	50.071
NW-1-4+3	NW-1-4	NW-1-3	-3.76	-4.16	401.00	4.00	0.998	50.082
NW-1-5+4	NW-1-5	NW-1-4	-3.45	-3.76	307.00	3.00	1.010	23.395
NW-1-A+2	NW-1-A Bioret	NW-1-2	-1.50	-4.50	193.00	0.48	15.544	0.692
NW-1-B+3	NW-1-B Bioret	NW-1-3	-1.50	-4.16	155.00	0.75	17.161	2.391
NW-1-C+5	NW-1-C Bioret	NW-1-5	-1.50	-3.45	138.00	0.81	14.130	2.664
NW-2-1+V (1)	NW-2-1	NW VAULT	-5.24	-6.00	758.00	4.00	1.003	50.210
NW-2-1+V (2)	NW-2-1	NW VAULT	-5.24	-6.00	758.00	4.00	1.003	50.210
NW-2-2+1 (1)	NW-2-2	NW-2-1	-4.69	-5.24	550.00	4.00	1.000	50.144
NW-2-2+1 (2)	NW-2-2	NW-2-1	-4.69	-5.24	550.00	4.00	1.000	50.144
NW-2-3+2	NW-2-3	NW-2-2	-4.31	-4.69	378.00	3.00	1.005	23.343
NW-2-A+2	NW-2-A Bioret	NW-2-2	-1.50	-4.69	100.00	0.48	31.900	0.992
NW-2-B+3	NW-2-B Bioret	NW-2-3	-1.50	-4.13	100.00	0.35	26.300	0.388
NW-3-1+2-1 (1)	NW-3-1	NW-2-1	-4.76	-5.24	486.00	4.00	0.988	49.834
NW-3-1+2-1 (2)	NW-3-1	NW-2-1	-4.76	-5.24	486.00	4.00	0.988	49.834
NW-3-2+1	NW-3-2	NW-3-1	-4.36	-4.76	396.00	4.00	1.010	50.397
NW-3-3+2	NW-3-3	NW-3-2	-3.93	-4.36	435.00	3.00	0.989	23.147
NW-3-A+2	NW-3-A Bioret	NW-3-2	-0.50	-4.36	100.00	0.48	38.600	1.091
NW-3-B+3	NW-3-B Bioret	NW-3-3	-0.50	-3.93	100.00	0.61	34.300	1.948
NW-B-V	NW BASIN	NW VAULT	-2.00	-2.50	50.00	4.00	10.000	158.570
NW-O-2+OUT	NW-O-2	NW-OUTFALL	-4.92	-5.20	55.00	5.00	5.091	261.394
NW-O-V+2 (1)	NW VAULT	NW-O-2	-4.50	-4.92	85.00	4.00	4.941	111.465
NW-O-V+2 (2)	NW VAULT	NW-O-2	-4.50	-4.92	85.00	4.00	4.941	111.465

Attachment B

MOUSE HD Computation Engine x64 v2012 Release Version (13.0.0.6270)

MOUSE Pipe Flow Simulation --- Status Report ---Dynamic Wave

Index of summary

File Overview

Working dir :	P:\2012\212082 CBG Alameda Point\212082 Modeling\URBAN Modeling Current\	-
Sewer network data (UND) :	25-yr Design StormBase.mex	1/1/2013 6:01:06 PM
Hydrological data (HGF) :	25-yr Design StormBase.mex	1/1/2013 6:01:06 PM
Additional parameters file (ADP) :	-	-
Dry weather flow data (DWF) :	25-yr Design StormBase.mex	1/1/2013 6:01:06 PM
Repetitive profile data (RPF) :	-	-
Runoff Hydrographs (CRF) :	25-yr Design StormBase.CRF	1/1/2013 12:47:12 PM
Hotstart file (PRF) :	-	-
Result File (PRF) :	25-yr Design StormBase.PRF	1/1/2013 6:01:14 PM
Reduced result file (PRF) :	-	-

Time Overview

Simulation start date :	2050-01-01 00:00:00	Calculation started :	2013-01-01 18:01:09
Simulation end date :	2050-01-01 23:50:00	Calculation ended :	2013-01-01 18:01:43
Save time step [hh:mm:ss] :	0:02:00	Calculation time [hh:mm:ss] :	0:00:33
Maximum time step [sec] :	1	Hotstart start date :	-
Minimum time step [sec] :	1		

Input Summary

Number of Manholes:	27
Number of Basins:	17
Number of Outlets:	2
Number of Storage Nodes:	0
Number of Circular Pipes:	48
Number of Rectangular pipes:	5
Number of CRS defined pipes:	0
Number of Pumps:	1
Number of Controlled Pumps:	0
Number of Weirs/Orifices:	15
Number of Controlled Weirs/Gates:	0
Number of Valves:	0
Number of Controlled Valves:	0

Nodes

Min Invert Level	NW-O-2	-8.00 ft
Max Invert Level	SE-1-A Bioret	2.50 ft
Min Ground Level	NW-3-1	1.90 ft
Max Ground Level	SE-2-2	7.80 ft
Min X Coordinate	NW-1-C Bioret	6.039E06 ft
Max X Coordinate	SE-1-6	6.0441E06 ft
Min Y Coordinate	SE-1-2	2.1081E06 ft

Max Y Coordinate	NW-1-1	2.1156E06 ft
Total Manhole Volume		9541.2 ft3
Total Basin Volume		1930225.0 ft3

Links

Total Circular Volume	174941.2 ft3
Total CRS Volume	30045.0 ft3
Total Length	18529.00 ft

Simulation Result Summary

Continuity Balance

1 :	**Start volume in Pipes, Manholes and Structures**			**26565625.0 ft3**
2 :	**End volume in Pipes, Manholes and Structures**			**17610862.1 ft3**
3 :	**Total inflow volume**			
	Specified inflows			
	Runoff :	3084599.2 ft3		
	Non-specified inflows			
	Outlets (inflow) :	3480.3 ft3		
		3088079.5 ft3	**-->**	**3088079.5 ft3**
4 :	**Total diverted volume**			
	Operational, non-specified outflows			
	Outlets :	10937389.2 ft3		
	Pumps :	1175279.8 ft3		
		12112669.0 ft3	**-->**	**12112669.0 ft3**
5 :	**Water generated in empty parts of the system :**			**833.2 ft3**
6 :	**Continuity Balance = (2-1) - (3-4+5) :**			**68993.5 ft3**
	Continuity Balance max value :		69993.0 ft3	
	Continuity Balance min value :		0.0 ft3	

Boundary Connections

Outlet levels

Boundary Condition ID	Location	Temporal variation	Value/TS name	Validity	Minimum Value	Maximum Value
					ft	ft
NW 25-yr Tide	NW-OUTFALL	Time Series	\\192.168.1.152\pacific\2012\212082 CBG Alameda Point\212082 Modeling\URBAN Modeling Current\25-yr Coincident Tide SLR=4.6.dfs0	Unlimited	0.76	6.31

Nodes - Water level

G : Max level exceeds ground level

W : Max level exceeds weir crest level

C : Max level exceeds critical level

	Minimum	Maximum	Ground Level	Ground Level - Maximum	Time - Minimum	Time - Maximum	Note
	[ft]	[ft]	[ft]	[ft]			
NW-OUTFALL	-8.00	6.31	2.40	-3.91	2050-01-01 00:00:00	2050-01-01 00:00:00	G
NW-O-2	-8.00	1.88	2.40	0.52	2050-01-01 00:00:00	2050-01-01 14:06:00	
NW VAULT	-6.00	1.88	3.00	1.12	2050-01-01 00:00:00	2050-01-01 13:52:00	W
NW-2-1	-8.00	1.89	2.00	0.11	2050-01-01 00:00:00	2050-01-01 13:50:00	
NW-1-1	-6.00	2.00	2.40	0.40	2050-01-01 00:00:00	2050-01-01 13:40:00	
NW BASIN	-2.00	1.88	3.00	1.12	2050-01-01 00:00:00	2050-01-01 13:52:00	
NW-2-2	-6.00	1.89	2.00	0.11	2050-01-01 00:00:00	2050-01-01 13:50:00	
NW-3-1	-6.00	1.89	1.90	0.01	2050-01-01 00:00:00	2050-01-01 13:50:00	
NW-1-2	-5.00	2.22	2.50	0.28	2050-01-01 00:00:00	2050-01-01 13:18:00	
NW-2-3	-6.00	2.09	2.20	0.11	2050-01-01 00:00:00	2050-01-01 12:36:00	
NW-2-A Bioret	-1.50	2.14	2.50	0.36	2050-01-01 00:00:00	2050-01-01 12:34:00	W
NW-3-2	-6.00	1.90	2.50	0.60	2050-01-01 00:00:00	2050-01-01 13:50:00	

NW-1-3	-5.00	2.34	2.50	0.16	2050-01-01 00:00:00	2050-01-01 13:06:00	
NW-1-A Bioret	-1.50	2.27	2.50	0.23	2050-01-01 00:00:00	2050-01-01 13:06:00	W
NW-2-B Bioret	-1.50	2.15	2.50	0.35	2050-01-01 00:00:00	2050-01-01 12:36:00	W
NW-3-3	-6.00	2.34	2.70	0.36	2050-01-01 00:00:00	2050-01-01 12:42:00	
NW-3-A Bioret	-0.50	3.10	3.50	0.40	2050-01-01 00:00:00	2050-01-01 12:34:00	W
NW-1-B Bioret	-1.50	2.36	2.50	0.14	2050-01-01 00:00:00	2050-01-01 13:06:00	W
NW-1-4	-4.00	2.37	4.20	1.83	2050-01-01 00:00:00	2050-01-01 13:06:00	
NW-3-B Bioret	-0.50	2.36	3.50	1.14	2050-01-01 00:00:00	2050-01-01 12:42:00	W
NW-1-5	-4.00	2.52	7.00	4.48	2050-01-01 00:00:00	2050-01-01 13:08:00	
NW-1-C Bioret	-1.50	2.53	2.50	-0.03	2050-01-01 00:00:00	2050-01-01 13:08:00	G W

Number of Critical level exceedings : 0

Number of Ground level exceedings : 2

Number of Weir Crest level exceedings : 8

Nodes - Volume spilled

No Spilling Nodes were found in the network

Weir/Orifice-Gate/Valve Discharge

	Minimum	Maximum	Flow - Accumulated	Time - Minimum	Time - Maximum
	[cfs]	[cfs]	[ft3]		
NW VAULT+BASIN	-16.453	106.318	160280.5	2050-01-01 15:48:00	2050-01-01 12:40:00
NW-1-A Overflow	0.000	47.887	312129.3	2050-01-01 00:00:00	2050-01-01 12:46:00
NW-1-B Overflow	0.000	20.644	75158.2	2050-01-01 00:00:00	2050-01-01 12:38:00
NW-1-C Overflow	0.000	12.193	81817.2	2050-01-01 00:00:00	2050-01-01 12:50:00
NW-2-A Overflow	0.000	28.781	107383.9	2050-01-01 00:00:00	2050-01-01 12:34:00
NW-2-B Overflow	0.000	19.101	82680.7	2050-01-01 00:00:00	2050-01-01 12:38:00

NW-3-A Overflow	0.000	17.347	48534.7	2050-01-01 00:00:00	2050-01-01 12:34:00
NW-3-B Overflow	0.000	21.244	81157.5	2050-01-01 00:00:00	2050-01-01 12:46:00

Pumps - Discharge

	Minimum	Maximum	Flow - Accumulated	Time - Minimum	Time - Maximum	Pump starts	Dry stops (1)	Speed	Operation total
	[cfs]	[cfs]	[ft3]			[Count]	[Count]		[Hr:Min:Sec]
NW PUMP	0.000	44.595	1175279.8	2050-01-01 00:00:00	2050-01-01 11:08:00	6	0	Constant	7:19:20

(1) : Pump stops due to dry pump well.

Links - Result summary

LinkID	From Node	To Node	Qf	Hmax	Qmax	Hmax/D	Qmax/Qf	Flow - Accumulated	Time - Hmax	Time - Qmax
			[cfs]	[ft]	[cfs]			[ft3]		
NW-1-1+V (1)	NW-1-1	NW VAULT	50.225	1.94	37.495	1.969	0.747	360803.4	2050-01-01 13:44:00	2050-01-01 12:46:00
NW-1-1+V (2)	NW-1-1	NW VAULT	50.225	1.94	37.495	1.969	0.747	360803.4	2050-01-01 13:44:00	2050-01-01 12:46:00
NW-1-2+1 (1)	NW-1-2	NW-1-1	50.002	2.14	37.510	1.846	0.750	368740.9	2050-01-01 13:26:00	2050-01-01 12:46:00
NW-1-2+1 (2)	NW-1-2	NW-1-1	50.002	2.14	37.510	1.846	0.750	368740.9	2050-01-01 13:26:00	2050-01-01 12:46:00
NW-1-3+2	NW-1-3	NW-1-2	50.071	2.27	27.862	1.680	0.556	414200.8	2050-01-01 13:10:00	2050-01-01 12:40:00
NW-1-4+3	NW-1-4	NW-1-3	50.082	2.36	12.377	1.626	0.247	222614.1	2050-01-01 13:06:00	2050-01-01 12:50:00
NW-1-5+4	NW-1-5	NW-1-4	23.395	2.44	12.382	2.045	0.529	225801.6	2050-01-01 13:08:00	2050-01-01 12:50:00
NW-1-A+2	NW-1-A Bioret	NW-1-2	0.692	2.27	0.851	14.001	1.230	30178.8	2050-01-01 13:08:00	2050-01-01 20:30:00
NW-1-B+3	NW-1-B Bioret	NW-1-3	2.391	2.36	2.883	8.671	1.206	120081.3	2050-01-01 13:06:00	2050-01-01 17:24:00
NW-1-C+5	NW-1-C	NW-1-5	2.664	2.53	3.535	7.372	1.327	145586.0	2050-01-01	2050-01-01

	Bioret								13:08:00	17:26:00
NW-2-1+V (1)	NW-2-1	NW VAULT	50.210	1.88	40.915	1.969	0.815	235563.2	2050-01-01 13:50:00	2050-01-01 12:36:00
NW-2-1+V (2)	NW-2-1	NW VAULT	50.210	1.88	40.915	1.969	0.815	235563.2	2050-01-01 13:50:00	2050-01-01 12:36:00
NW-2-2+1 (1)	NW-2-2	NW-2-1	50.144	1.89	23.947	1.782	0.478	120056.8	2050-01-01 13:50:00	2050-01-01 12:34:00
NW-2-2+1 (2)	NW-2-2	NW-2-1	50.144	1.89	23.947	1.782	0.478	120056.8	2050-01-01 13:50:00	2050-01-01 12:34:00
NW-2-3+2	NW-2-3	NW-2-2	23.343	1.89	19.181	2.193	0.822	99950.3	2050-01-01 13:50:00	2050-01-01 12:40:00
NW-2-A+2	NW-2-A Bioret	NW-2-2	0.992	2.06	1.143	13.705	1.153	44294.6	2050-01-01 12:36:00	2050-01-01 18:50:00
NW-2-B+3	NW-2-B Bioret	NW-2-3	0.388	2.14	0.506	17.766	1.305	19349.8	2050-01-01 12:36:00	2050-01-01 18:50:00
NW-3-1+2-1 (1)	NW-3-1	NW-2-1	49.834	1.89	17.530	1.782	0.352	126613.8	2050-01-01 13:50:00	2050-01-01 12:42:00
NW-3-1+2-1 (2)	NW-3-1	NW-2-1	49.834	1.89	17.530	1.782	0.352	126613.8	2050-01-01 13:50:00	2050-01-01 12:42:00
NW-3-2+1	NW-3-2	NW-3-1	50.397	1.89	35.136	1.662	0.697	263038.8	2050-01-01 13:50:00	2050-01-01 12:42:00
NW-3-3+2	NW-3-3	NW-3-2	23.147	2.17	21.411	2.087	0.925	163342.8	2050-01-01 12:40:00	2050-01-01 12:46:00
NW-3-A+2	NW-3-A Bioret	NW-3-2	1.091	2.92	1.240	13.041	1.137	55235.7	2050-01-01 12:36:00	2050-01-01 17:24:00
NW-3-B+3	NW-3-B Bioret	NW-3-3	1.948	2.36	2.074	10.280	1.065	84509.7	2050-01-01 12:42:00	2050-01-01 17:26:00
NW-B-V	NW BASIN	NW VAULT	158.570	1.88	27.397	1.094	0.173	156262.7	2050-01-01 13:52:00	2050-01-01 16:08:00
NW-O-2+OUT	NW-O-2	NW-OUTFALL	261.394	6.31	-0.327	2.302	-0.001	-0.3	2050-01-01 00:00:00	2050-01-01 00:18:00
NW-O-V+2 (1)	NW VAULT	NW-O-2	111.465	1.88	0.112	1.700	0.001	929.7	2050-01-01 14:06:00	2050-01-01 07:18:00
NW-O-V+2 (2)	NW VAULT	NW-O-2	111.465	1.88	0.112	1.700	0.001	929.7	2050-01-01 14:06:00	2050-01-01 07:18:00

Links - Data

LinkID	From Node	To Node	Up - Invert Level	Down - Invert Level	Length	Dimension (Max Height)	Slope	Qf

			[ft]	[ft]	[ft]	[ft]	[‰]	[]
NW-1-1+V (1)	NW-1-1	NW VAULT	-5.38	-6.00	618.00	4.00	1.003	50.225
NW-1-1+V (2)	NW-1-1	NW VAULT	-5.38	-6.00	618.00	4.00	1.003	50.225
NW-1-2+1 (1)	NW-1-2	NW-1-1	-4.50	-5.38	885.00	4.00	0.994	50.002
NW-1-2+1 (2)	NW-1-2	NW-1-1	-4.50	-5.38	885.00	4.00	0.994	50.002
NW-1-3+2	NW-1-3	NW-1-2	-4.16	-4.50	341.00	4.00	0.997	50.071
NW-1-4+3	NW-1-4	NW-1-3	-3.76	-4.16	401.00	4.00	0.998	50.082
NW-1-5+4	NW-1-5	NW-1-4	-3.45	-3.76	307.00	3.00	1.010	23.395
NW-1-A+2	NW-1-A Bioret	NW-1-2	-1.50	-4.50	193.00	0.48	15.544	0.692
NW-1-B+3	NW-1-B Bioret	NW-1-3	-1.50	-4.16	155.00	0.75	17.161	2.391
NW-1-C+5	NW-1-C Bioret	NW-1-5	-1.50	-3.45	138.00	0.81	14.130	2.664
NW-2-1+V (1)	NW-2-1	NW VAULT	-5.24	-6.00	758.00	4.00	1.003	50.210
NW-2-1+V (2)	NW-2-1	NW VAULT	-5.24	-6.00	758.00	4.00	1.003	50.210
NW-2-2+1 (1)	NW-2-2	NW-2-1	-4.69	-5.24	550.00	4.00	1.000	50.144
NW-2-2+1 (2)	NW-2-2	NW-2-1	-4.69	-5.24	550.00	4.00	1.000	50.144
NW-2-3+2	NW-2-3	NW-2-2	-4.31	-4.69	378.00	3.00	1.005	23.343
NW-2-A+2	NW-2-A Bioret	NW-2-2	-1.50	-4.69	100.00	0.48	31.900	0.992
NW-2-B+3	NW-2-B Bioret	NW-2-3	-1.50	-4.13	100.00	0.35	26.300	0.388
NW-3-1+2-1 (1)	NW-3-1	NW-2-1	-4.76	-5.24	486.00	4.00	0.988	49.834
NW-3-1+2-1 (2)	NW-3-1	NW-2-1	-4.76	-5.24	486.00	4.00	0.988	49.834
NW-3-2+1	NW-3-2	NW-3-1	-4.36	-4.76	396.00	4.00	1.010	50.397
NW-3-3+2	NW-3-3	NW-3-2	-3.93	-4.36	435.00	3.00	0.989	23.147
NW-3-A+2	NW-3-A Bioret	NW-3-2	-0.50	-4.36	100.00	0.48	38.600	1.091
NW-3-B+3	NW-3-B Bioret	NW-3-3	-0.50	-3.93	100.00	0.61	34.300	1.948
NW-B-V	NW BASIN	NW VAULT	-2.00	-2.50	50.00	4.00	10.000	158.570
NW-O-2+OUT	NW-O-2	NW-OUTFALL	-4.92	-5.20	55.00	5.00	5.091	261.394
NW-O-V+2 (1)	NW VAULT	NW-O-2	-4.50	-4.92	85.00	4.00	4.941	111.465
NW-O-V+2 (2)	NW VAULT	NW-O-2	-4.50	-4.92	85.00	4.00	4.941	111.465

APPENDICES

F) POTABLE WATER SYSTEM MODEL (FILES INCLUDED ON SEPARATE CD)

APPENDICES

G) DETAILED BACKBONE INFRASTRUCTURE CONSTRUCTION COST ESTIMATE SUMMARY

DRAFT
Backbone Infrastructure Engineer's Preliminary Construction Cost Estimate Summary

Alameda Point
ALAMEDA, CALIFORNIA

August 8, 2013

Prepared For:

Prepared By:

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

2633 CAMINO RAMON, SUITE 350 • SAN RAMON, CALIFORNIA 94583 • (925) 866-0322 • www.cbandg.com

Assumptions / Exclusions

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
KEY ASSUMPTIONS & EXCLUSIONS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description
	GENERAL
1	This estimate is based on information available at this time. Carlson, Barbee & Gibson, Inc. (CBG) assumes no liability for changes in prices, fees or costs due to unforeseen conditions or changes required by Governing Agencies, Market Conditions, or other issues beyond the control of this office.
2	This estimate is based upon the Draft Master Infrastructure Plan, dated July 31, 2013. This estimate is also being prepared concurrently with the Alameda Point Planning Guide, Draft Environmental Impact Report, Zoning Amendment, Town Center & Waterfront Master Plan and Regional Transit Access Study (RTAS). This estimate is intended to be updated through the community review process of the documents listed above.
3	This estimate includes the construction costs of the backbone infrastructure described in the Draft MIP. All in-tract or on-site improvements interior to the development blocks are assumed to be future development costs and are excluded from this estimate.
4	This estimate excludes costs associated with Environmental Remediation. This estimate assumes that all environmental remediation will be completed by the Navy prior to transfer of the property to the City.
5	This estimate excludes the costs associated with the extension of infrastructure to the VA Project west of Monarch Street.
6	This estimate excludes improvements to the existing piers and wharfs in the southeast portion of the site, such as utility replacements, seismic retrofits, etc.
7	This estimate applies and includes a 25% contingency to all backbone infrastructure construction costs. The contingency is not applied to the soft costs.
8	This estimate includes Construction Administration (4%), Professional Services (15%) and Plan Check & Inspection Fees (4%). The soft costs are applied to the backbone infrastructure hard costs without contingency excluding the Regional Transit Costs which are assumed to already include soft costs.
9	This estimate excludes all costs associated with the maintenance and operations of the backbone infrastructure.
	DEMOLITION
10	This estimate includes the costs associated with the Demolition and Abatement of the existing buildings within the Development Areas. The following typical unit costs for demolition and abatement are assumed in this estimate: • Single Family Residential Structures = $50,000 per structure • Multi-Family Residential Structures = $100,000 per structure • Industrial / Warehouse Structures *(north of W. Atlantic Ave)* = $7.50 per square foot • Industrial / Warehouse Structures *(south of W. Atlantic Ave)* = $15 per square foot
11	This estimate assumes the existing utilities within the public right of ways will be removed. The existing utilities within the Development Parcels are assumed to be 50% slurry filled and 50% removed.
12	This estimate assumes the existing on-site concrete and pavement materials will be processed and reused on-site for future street base rock, utility trench backfill and other uses as approved by the City and project geotechnical engineers.

Item	Description
13	This estimate assumes a budget of $15M to relocate supportive housing (Alameda Point Collaborative, Building Futures for Women and Children, and Operation Dignity) to the northeast corner of the project site. This cost is included in Phase 2.

GRADING

14 This estimate assumes the Flood and Sea Level Rise Protection will be provided by the following improvements: *(Please see the enclosed exhibit depicting the Flood Protection Concept for Alameda Point)*

- Development Areas = The elevation of the development pads and streets will be elevated to be above the required elevation for flood and sea level rise protection.
- Reuse Areas = A system of perimeter flood and sea level protection measures will be constructed including elevated sea walls, berms and revetments.

15 This estimate assumes the Northern Shoreline will be stabilized. The Northern Shoreline will be stabilized for all areas where Flood Protection measures are proposed within 200' of the shoreline.

16 This estimate includes costs for liquefaction remediation for Development Areas, roadway and utility corridors and areas within Flood Protection measures.

17 This estimate includes costs for importing material ($25/CY) for the following areas:

- Flood Protection Berms & Revetments
- Replacement of pavement and concrete within Residential Development Areas
- Raise Development Areas that are below the Flooding Criteria *(northeast corner of site)*
- Anticipated settlement associated with liquefaction remediation
- Anticipated settlement associated with new structural loads within areas that previously had no structures

18 This estimate includes a budget to accelerate the settlement within areas where differential settlement are anticipated. This is intended to include a surcharge program and/or wick drains.

DEWATERING

19 This estimate includes costs for a dewatering operation during utility construction.

20 This estimate includes a budget to address contaminated groundwater that maybe encountered during construction dewatering. The budget included assumes only minor occurrences of groundwater contaminates will be encountered.

UTILITIES

21 This estimate assumes that all existing utilities within the project site will be replaced with new systems that are consistent with current codes and regulations. This includes utility replacements within the backbone streets within the Reuse Areas.

22 This estimate excludes the costs associated with interim rehabilitation improvements to the existing utility systems within the Reuse Areas. These interim improvements are anticipated to be completed by proposed development projects that utilize the existing utilities prior to their replacement.

23 This estimate assumes that utilidors will be constructed for all utilities within 50% of W. Atlantic Ave. and within the roadways south and east of Building 5.

24 This estimate includes budgets within each phase to maintain utility services to existing buildings and future phases throughout construction.

25 This estimate assumes that initial sub-phases within Phases 1 and 2 will initially connect to the existing sanitary sewer system between each phase and Pump Station 1. This estimate includes costs associated with rehabilitation improvements to this portion of the existing system, such as pipe lining. The ultimate sanitary sewer system connecting to Pump Station 1 is assumed to be constructed with subsequent phases.

Item	Description
26	Sanitary sewer system must be a grid system of collection pipelines that connect the upstream pipe ends of separate sewer zones.
27	This estimate includes costs for point of source water quality facilities, such as roadside vegetated swales, to provide water quality treatment for the proposed streets only. All other on-site water quality solutions for the Development Areas are excluded and assumed to be on-site / in-tract costs.
28	This estimate assumes that the existing 115 kV poles adjacent to Main Street will remain in their existing locations.
29	This estimate excludes costs associated with upgrading the existing Cartwright Substation.
	ON-SITE STREET WORK
30	This estimate assumes the street cross sections of the backbone roadway framework are consistent with those depicted in the Draft MIP.
31	This estimate includes budgets within each phase to maintain access to existing buildings and future phases throughout construction.
	TRANSPORTATION
32	This estimate includes costs for the following off-site street and intersection improvements outlined in the DEIR Mitigation Measures.
33	This estimate excludes the costs associated with completing the Stargell Ave Widening to 4 Lanes *(from Main St to 5th St)* and the extension of Mitchell Ave *(from Main St to the western boundary of Alameda Landing)*
34	This estimate includes an assumed budget of $1.75M for Off-Island Mitigations.
35	This estimate includes costs for the following transit costs: • Bus Rapid Transit - Option W-2-B from the RTAS *(Assumed to be constructed in Phase 2) This estimate assumes a 25% project share of the estimate from the RTAS of $20M.* • Shuttle Service *(Assumed to be implemented in Phase 1) This estimate utilizes the initial start-up estimate cost from the RTAS of $1M.* • Ferry Terminal Parking Lot Expansion @ Ex Terminal *(Assumed to be constructed in Phase 1)* • Ferry Terminal New @ Seaplane Lagoon (Assumed to be constructed in Phase 2) This estimate assumes a budget of $10M. • Transit Center (Assumed to be constructed in Phases 1 and 2) This estimate assumes a budget of $1.5M. • Broadway / Jackson Project Share (Assumed to be spread across Phases 1 and 2) This estimate utilizes a previous estimate by others of $4.5M. • TDM Costs (Assumed to be spread across the Phases 1 and 2) This estimate utilizes a previous estimate by others of $4.2M. • Cross Alameda Trail (Assumed to be constructed in Phase 2) This estimate utilizes a previous estimate by others of $1.9M.
	LANDSCAPING
36	This estimate includes the costs associated with constructing the backbone park and open space system as outlined in the Draft MIP, unless otherwise noted below.
37	This estimate includes a budget of $20M for the construction of the Sports Complex. This cost is assumed to be spread across Phases 1 and 2.
38	This estimate includes costs associated with improvement to approximately half of Enterprise Park. The remainder is assumed to be maintained in its existing condition or improved by others.
39	This estimate includes costs for constructing the Bay Trail adjacent to the project site frontages to the Sea Plane Lagoon, San Francisco Bay and Oakland Inner Harbor.

Item	Description
	PUBLIC BENEFITS
40	This estimate includes costs for the following public benefit costs: • Fire Station (Assumed to be constructed in Phase 2) *This estimate assumes a budget of $4.5M.* • Bay Trail NW Territories & VA Property *(Assumed to be constructed in Phase 2)* • Pro-Rata Share of Satellite Corporation Yard *(Assumed to be constructed in Phase 2) This estimate assumes a budget of $1M.*
41	This estimate excludes costs associated with other Public Benefits, such as Enhanced Sports Complex, NW Territories Open Space, Wetland Creation / Restoration, Marina, Library, School, Sustainability Programs, etc. These Public Benefit costs are assumed to be provided by others.

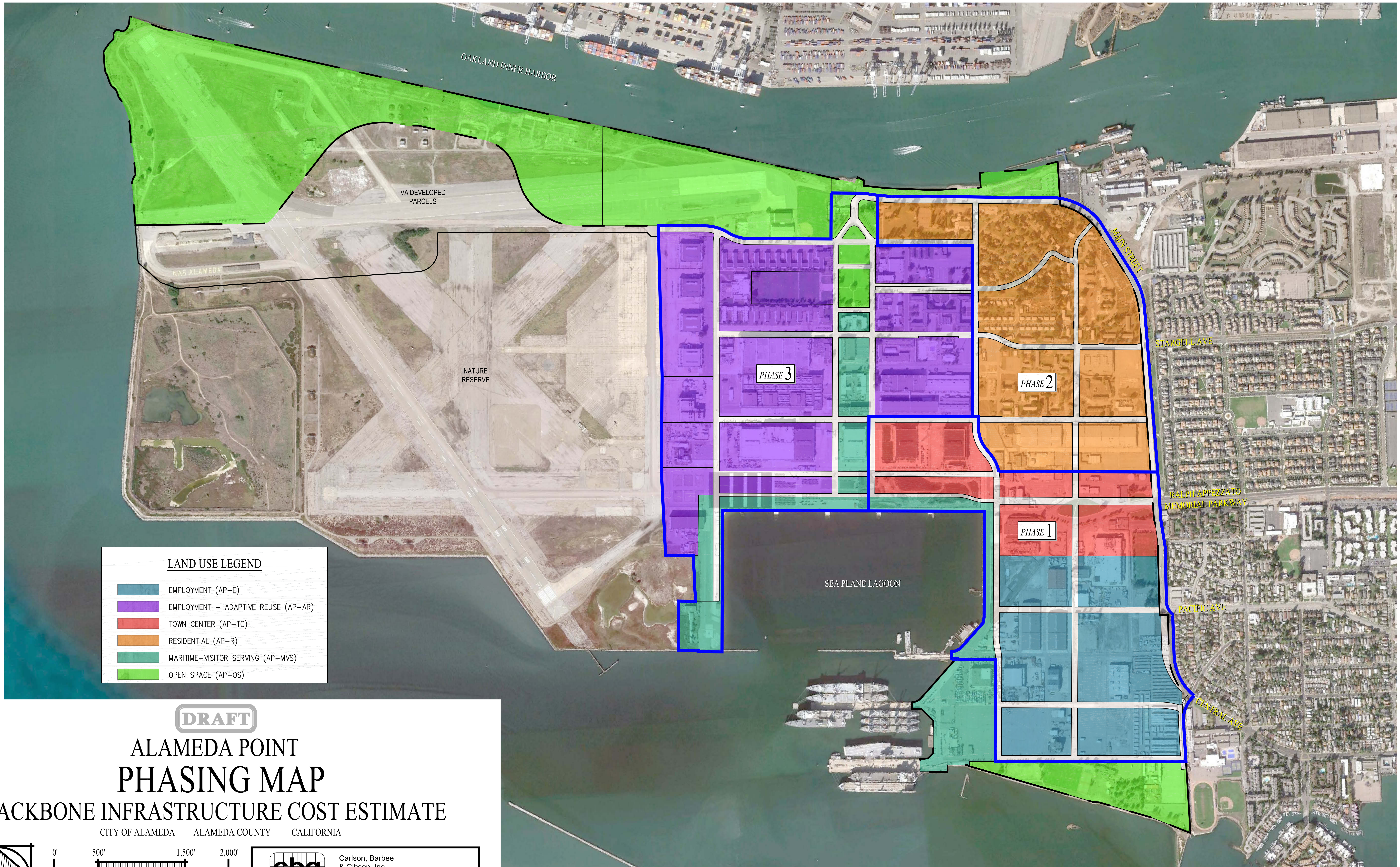
Overall Summary

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
COST ESTIMATE SUMMARY - OVERALL
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

	Description	PHASE 1	PHASE 2	PHASE 3	TOTAL
	BACKBONE INFRASTRUCTURE				
1	DEMOLITION / SITE PREPARATION	$ 33,919,000	$ 42,064,000	$ 2,630,000	$ 78,613,000
2	ENVIRONMENTAL REMEDIATION	BY OTHERS	BY OTHERS	BY OTHERS	BY OTHERS
3	FLOOD PROTECTION AND SITE GRADING	$ 41,483,000	$ 40,343,000	$ 27,754,000	$ 109,580,000
4	DEWATERING	$ 3,981,000	$ 2,960,000	$ 3,281,000	$ 10,222,000
5	SANITARY SEWER	$ 12,657,000	$ 3,255,000	$ 4,605,000	$ 20,517,000
6	STORM DRAIN	$ 13,519,000	$ 8,411,000	$ 10,916,000	$ 32,846,000
7	POTABLE WATER	$ 5,314,000	$ 4,405,000	$ 6,238,000	$ 15,957,000
8	RECYCLED WATER	$ 1,470,000	$ 506,250	$ 876,000	$ 2,852,250
9	DRY UTILITIES	$ 7,221,000	$ 5,919,000	$ 6,621,000	$ 19,761,000
10	ON-SITE STREET WORK	$ 23,305,000	$ 18,023,000	$ 13,933,000	$ 55,261,000
11	TRANSPORTATION	$ 10,400,000	$ 34,206,000	$ -	$ 44,606,000
12	PARKS AND OPEN SPACE	$ 28,990,000	$ 15,898,000	$ 20,030,000	$ 64,918,000
13	PUBLIC BENEFITS	$ 1,250,000	$ 16,038,000	$ -	$ 17,288,000
	SUBTOTAL BACKBONE INFRASTRUCTURE CONSTRUCTION COST ***(to nearest $10,000)***	**$ 183,510,000**	**$ 192,030,000**	**$ 96,880,000**	**$ 472,420,000**
	SOFT COSTS				
14	CONSTRUCTION ADMIN	$ 5,872,000	$ 6,145,000	$ 3,100,000	$ 15,117,000
15	PROFESSIONAL SERVICES	$ 22,021,000	$ 23,044,000	$ 11,626,000	$ 56,691,000
16	FEES	$ 7,730,000	$ 7,717,000	$ 5,016,000	$ 20,463,000
17	IMPROVEMENT ACCEPTANCE	$ 734,000	$ 768,000	$ 388,000	$ 1,890,000
	SUBTOTAL SOFT COST ***(to nearest $10,000)***	**$ 36,360,000**	**$ 37,670,000**	**$ 20,130,000**	**$ 94,160,000**
	TOTAL BACKBONE INFRASTRUCTURE COST ***(to nearest $10,000)***	**$ 219,870,000**	**$ 229,700,000**	**$ 117,010,000**	**$ 566,580,000**

Exhibits



DRAFT

ALAMEDA POINT
PHASING MAP
BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA   ALAMEDA COUNTY   CALIFORNIA

0' 500' 1,500' 2,000'

SCALE: 1" = 500'

DATE: JULY, 2013

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SAN RAMON, CALIFORNIA 94583
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SAN RAMON • LATHROP

NOTE:
ROADWAY FRAMEWORK IS BASED UPON THE PRELIMINARY DEVELOPMENT CONCEPT (PDC)

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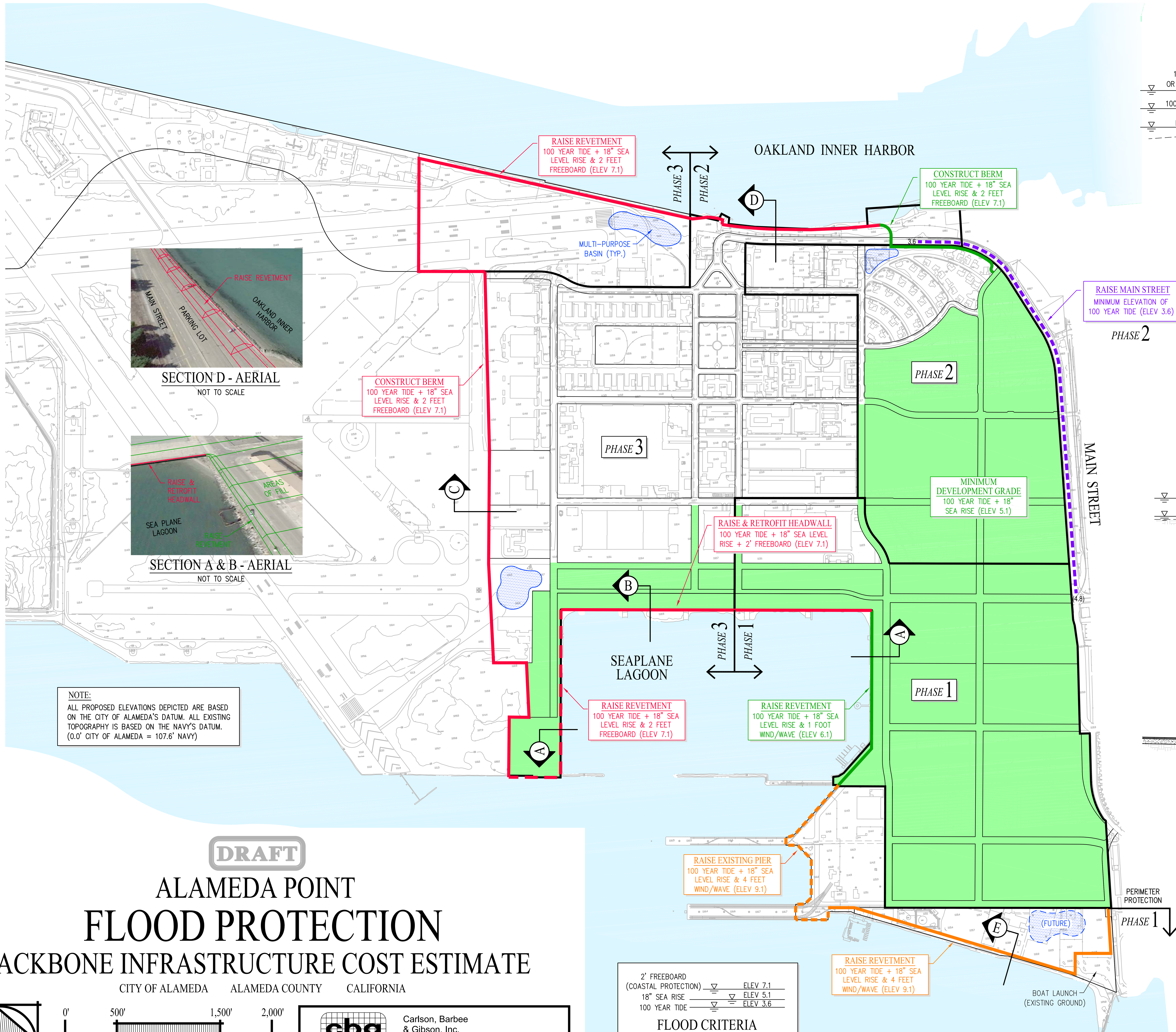

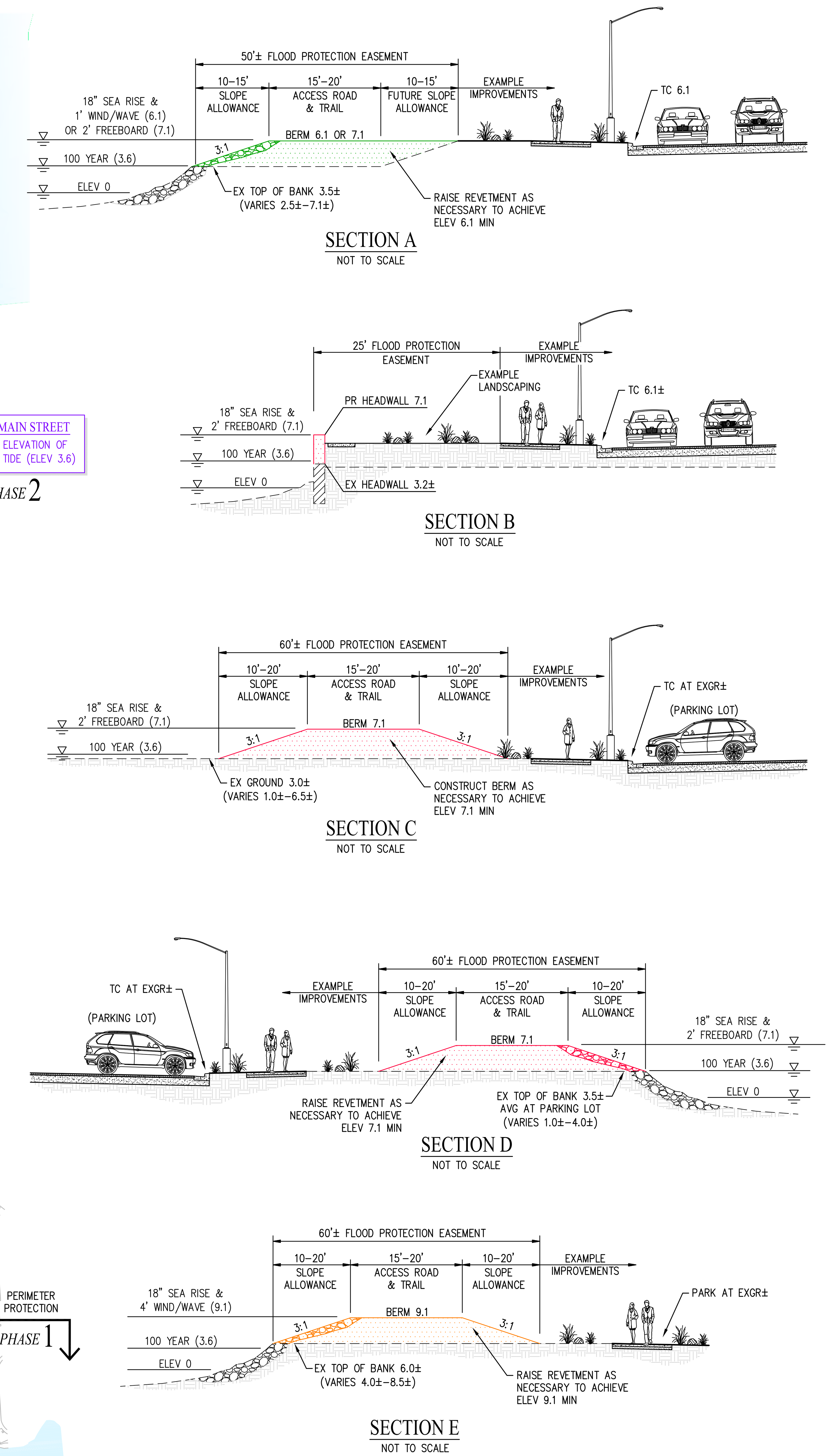

NOTE:
ALL PROPOSED ELEVATIONS DEPICTED ARE BASED ON THE CITY OF ALAMEDA'S DATUM. ALL EXISTING TOPOGRAPHY IS BASED ON THE NAVY'S DATUM. (0.0' CITY OF ALAMEDA = 107.6' NAVY)

DRAFT

ALAMEDA POINT
FLOOD PROTECTION
BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA   ALAMEDA COUNTY   CALIFORNIA

2' FREEBOARD (COASTAL PROTECTION)	ELEV 7.1
18" SEA RISE	ELEV 5.1
100 YEAR TIDE	ELEV 3.6

FLOOD CRITERIA
CITY OF ALAMEDA DATUM

0' 500' 1,500' 2,000'
SCALE: 1" = 500'   DATE: JULY, 2013

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ALAMEDA POINT
GEOTECHNICAL REMEDIATION
BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA ALAMEDA COUNTY CALIFORNIA

0' 500' 1,500' 2,000'

SCALE: 1" = 500'

DATE: JULY, 2013

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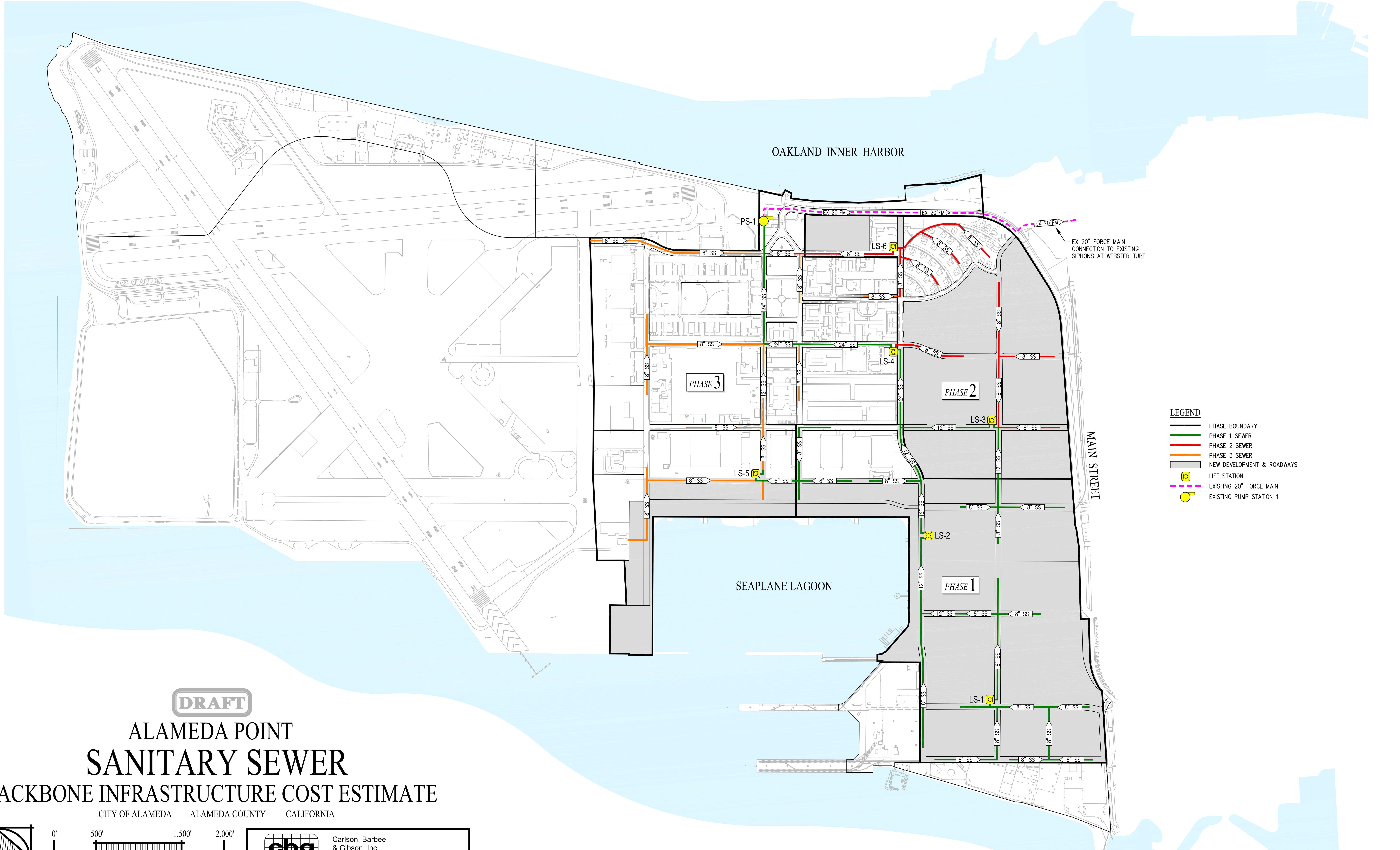

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ALAMEDA POINT

SANITARY SEWER

BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA ALAMEDA COUNTY CALIFORNIA

0' 500' 1,500' 2,000'

SCALE: 1" = 500'

DATE: JULY, 2013

cbg

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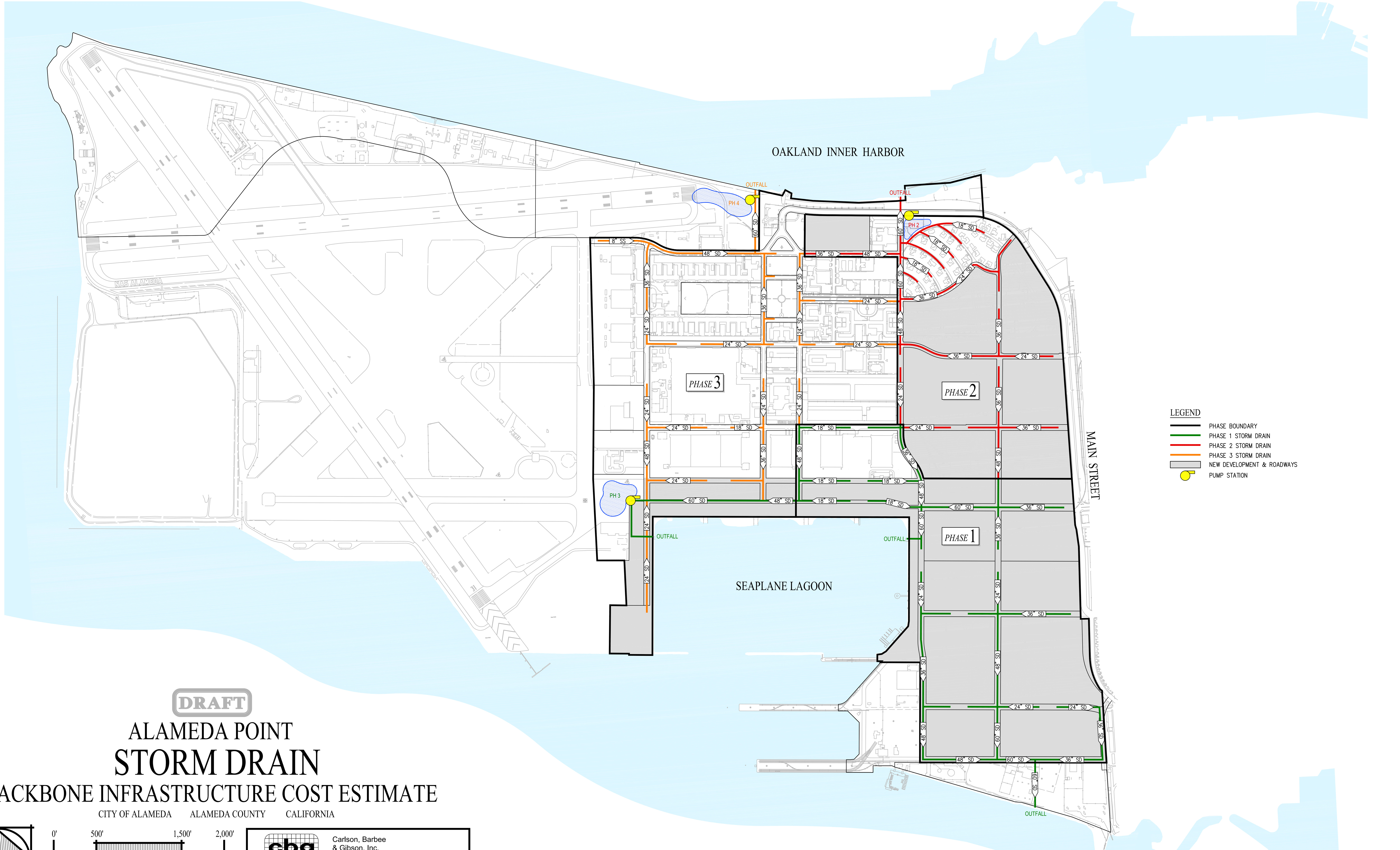

DRAFT

ALAMEDA POINT
STORM DRAIN
BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA ALAMEDA COUNTY CALIFORNIA

0' 500' 1,500' 2,000'

SCALE: 1" = 500'

DATE: JULY, 2013

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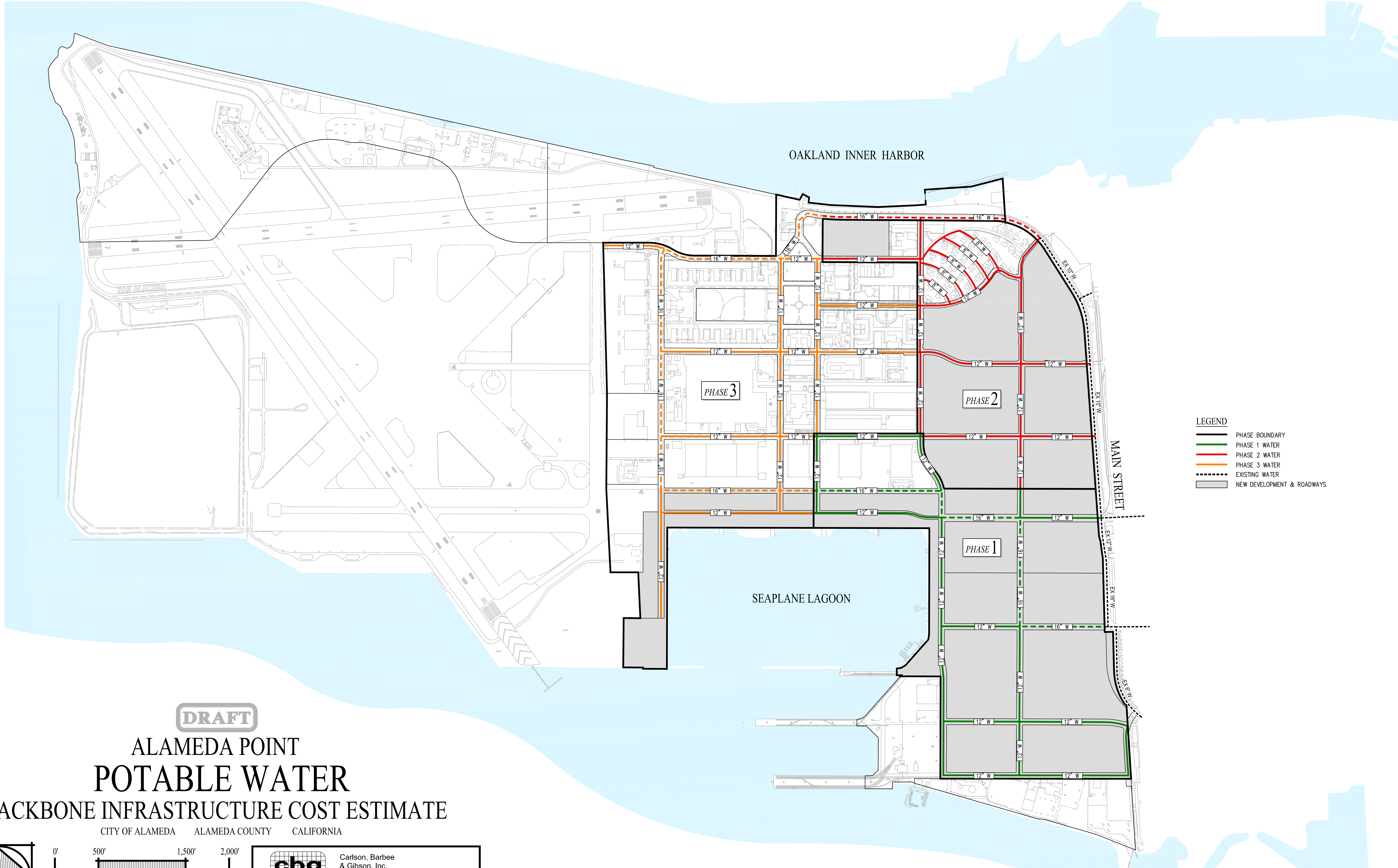

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ALAMEDA POINT

POTABLE WATER

BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA   ALAMEDA COUNTY   CALIFORNIA

0' 500' 1,500' 2,000'

SCALE: 1" = 500'   DATE: JULY, 2013

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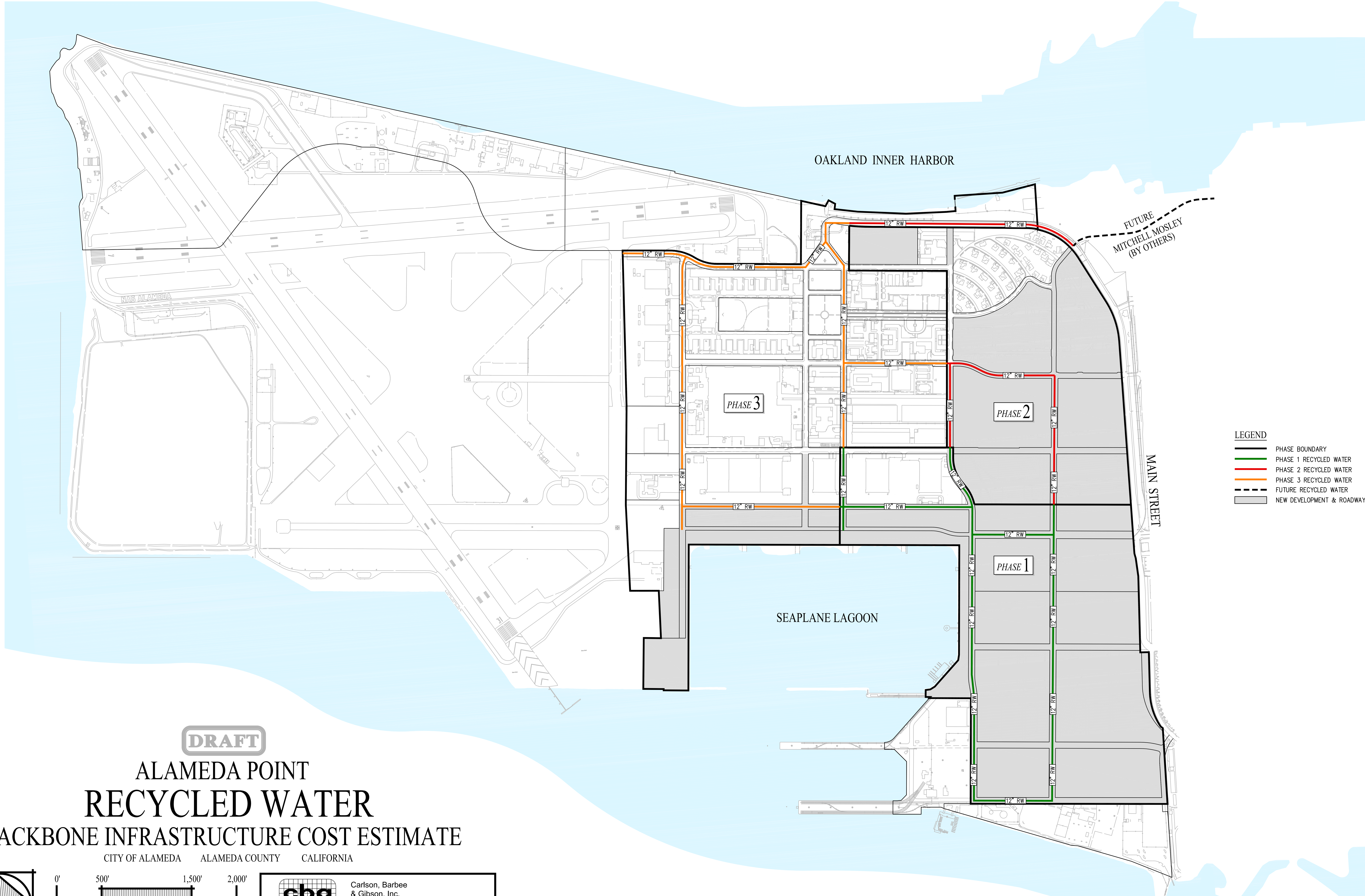

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ALAMEDA POINT
RECYCLED WATER
BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA ALAMEDA COUNTY CALIFORNIA

0' 500' 1,500' 2,000'

SCALE: 1" = 500' DATE: JULY, 2013

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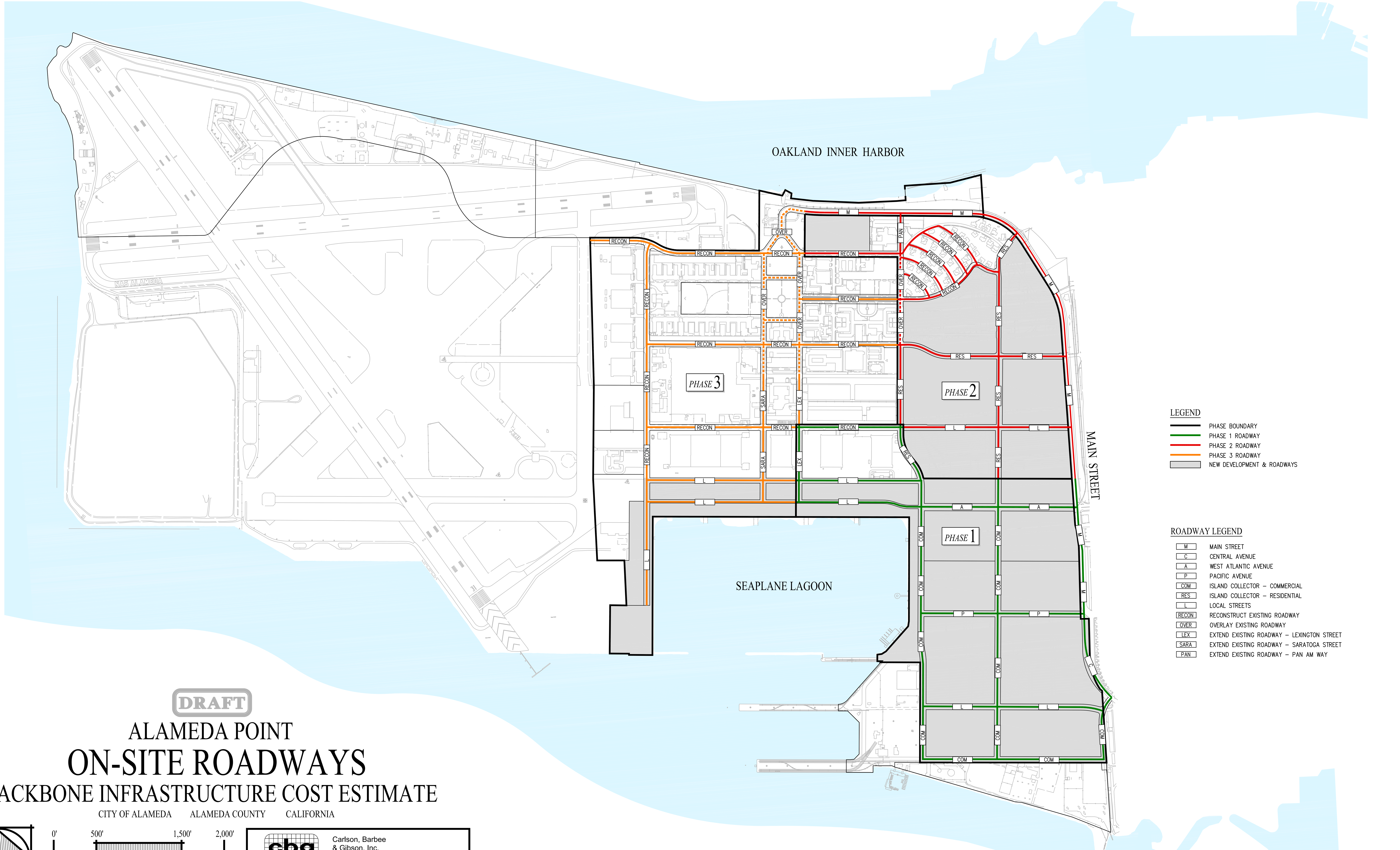

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ALAMEDA POINT

ON-SITE ROADWAYS

BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA ALAMEDA COUNTY CALIFORNIA

0' 500' 1,500' 2,000'

SCALE: 1" = 500'

DATE: JULY, 2013

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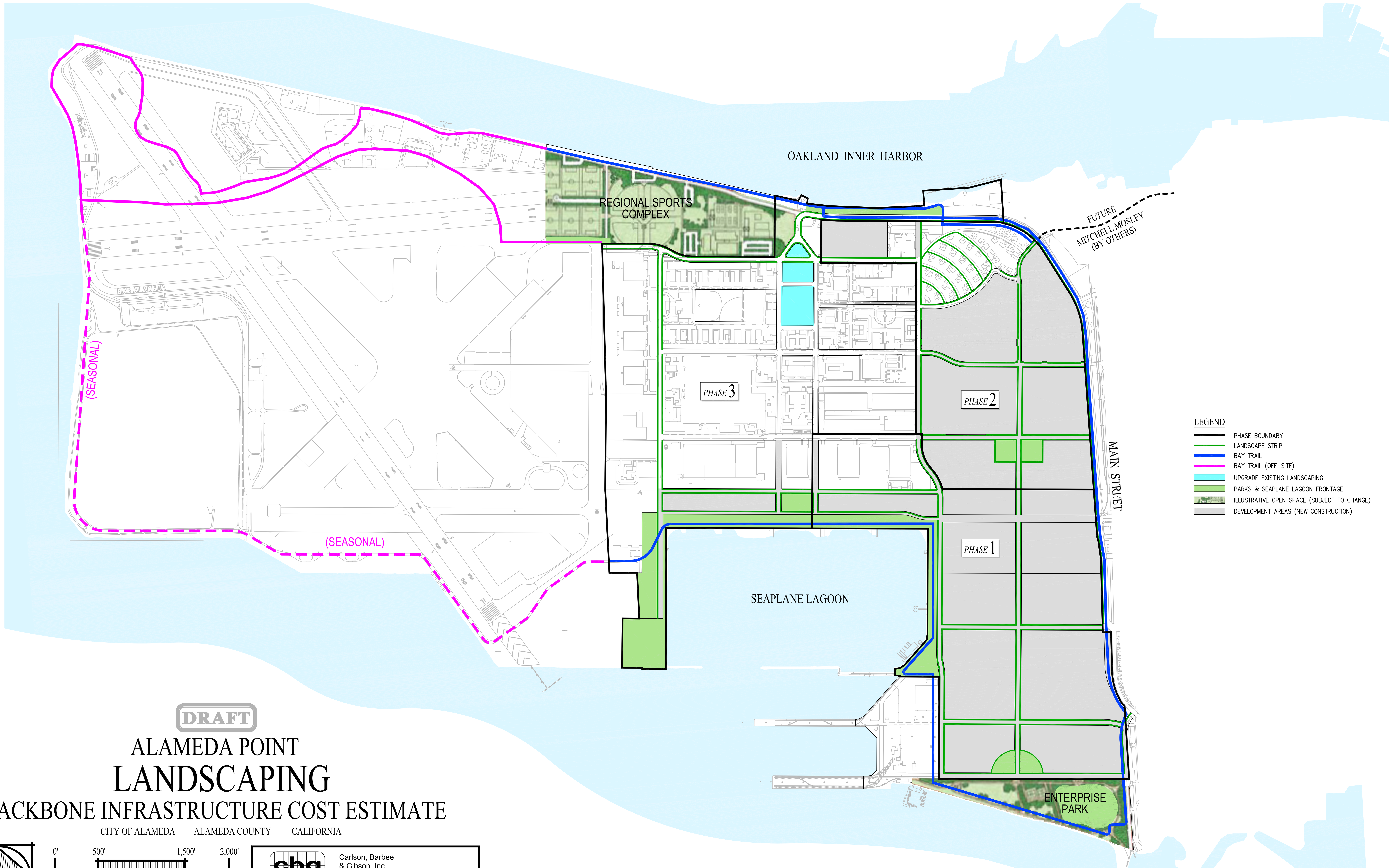

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ALAMEDA POINT
LANDSCAPING
BACKBONE INFRASTRUCTURE COST ESTIMATE

CITY OF ALAMEDA ALAMEDA COUNTY CALIFORNIA

0' 500' 1,500' 2,000'

SCALE: 1" = 500'

DATE: JULY, 2013

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Estimate Summary

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
COST ESTIMATE SUMMARY
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description		Amount
	BACKBONE INFRASTRUCTURE		
1	DEMOLITION / SITE PREPARATION	$	78,613,000
2	ENVIRONMENTAL REMEDIATION		BY OTHERS
3	FLOOD PROTECTION AND SITE GRADING	$	109,579,000
4	DEWATERING	$	10,221,000
5	SANITARY SEWER	$	20,517,000
6	STORM DRAIN	$	32,846,000
7	POTABLE WATER	$	15,958,000
8	RECYCLED WATER	$	2,853,000
9	DRY UTILITIES	$	19,761,000
10	ON-SITE STREET WORK	$	55,260,000
11	TRANSPORTATION	$	44,606,000
12	PARKS AND OPEN SPACE	$	64,918,000
13	PUBLIC BENEFITS	$	17,288,000
	SUBTOTAL BACKBONE INFRASTRUCTURE CONSTRUCTION COSTS ***(to nearest $10,000)***	**$**	**472,420,000**
	SOFT COSTS		
14	CONSTRUCTION ADMIN	$	15,117,000
15	PROFESSIONAL SERVICES	$	56,690,000
16	FEES	$	20,460,000
17	IMPROVEMENT ACCEPTANCE	$	1,890,000
	SUBTOTAL SOFT COSTS ***(to nearest $10,000)***	**$**	**94,160,000**
	TOTAL BACKBONE INFRASTRUCTURE COSTS ***(to nearest $10,000)***	**$**	**566,580,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
DEMOLITION / SITE PREPARATION
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	DEMOLITION / SITE PREPARATION						
1	Demo & Abatement of Ex Structures - *Resd Bldgs*	63	EA	$	50,000	$	3,150,000
2	Demo & Abatement of Ex Structures - *Multi-Family Bldgs*	63	EA	$	100,000	$	6,300,000
3	Demo & Abatement of Ex Structures - *Industrial (N)*	541,500	SF	$	7.50	$	4,061,250
4	Demo & Abatement of Ex Structures - *Industrial (S)*	1,186,000	SF	$	15.00	$	17,790,000
5	Demolition of Existing Pavement and Concrete *(Assume to be recycled and stockpiled)*	8,923,000	SF	$	0.75	$	6,692,250
6	Demolition of Ex Sea Plane Lagoon Ramps	4	EA	$	100,000	$	400,000
7	Clearing and Grubbing - *Open Space areas only*	65	AC	$	2,000	$	129,000
8	Slurry Fill Existing Utilities - *Development Parcels*	150,800	LF	$	10	$	1,508,000
9	Remove Existing Utilities - *Development Parcels*	146,300	LF	$	35	$	5,120,500
10	Remove Existing Utilities - *Within Proposed R/W's*	70,100	LF	$	35	$	2,453,500
11	Demolition of Ex Railroad Spurs	11,400	LF	$	25	$	285,000
12	Relocate Collaborative Housing	1	LS	$	15,000,000	$	15,000,000
	SUBTOTAL DEMOLITION / SITE PREPARATION COSTS					**$**	**62,890,000**
	25% CONTINGENCY					**$**	**15,722,500**
	TOTAL DEMOLITION / SITE PREPARATION COSTS					**$**	**78,613,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
ENVIRONMENTAL REMEDIATION
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit	Unit Price	Amount
	ENVIRONMENTAL REMEDIATION				
				SUBTOTAL ENVIRONMENTAL REMEDIATION COSTS	**BY OTHERS**
				25% CONTINGENCY	**BY OTHERS**
				TOTAL ENVIRONMENTAL REMEDIATION COSTS	**BY OTHERS**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
FLOOD PROTECTION AND SITE GRADING
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	FLOOD PROTECTION AND SITE GRADING						
	Assumes: The flood protection solution for the project site incorporates raised development areas and a perimeter system of raised roadways (berms) to protect Adaptive Reuse areas. These facilities are to provide protection from 100 year tide, plus 18" of sea level rise, and include the appropriate freeboard.						
	GEOTECHNICAL REMEDIATION						
1	Northern Shoreline Stabilization - *DDC*	255,000	SF	$	1	$	255,000
2	Northern Shoreline Stabilization - *Concrete Piles*	5,100	LF	$	2,500	$	12,750,000
3	Sea Plane Lagoon - *Northern Headwall*	3,020	LF	$	3,000	$	9,060,000
4	Sea Plane Lagoon - *Revetment Repairs*	3,400	LF	$	200	$	680,000
5	Sea Plane Lagoon - *Floodwall on Wharf*	2,200	LF	$	500	$	1,100,000
6	Liquefaction Remediation *- DDC Dev Areas & Roadways*	12,120,000	SF	$	1	$	12,120,000
7	Liquefaction Remediation *- DDC Berm*	906,050	SF	$	1	$	906,050
	Subtotal Geotechnical Remediation					$	36,871,050
	EARTHWORK						
8	Import - *Berms*						
	Raise to Flood Protection Elevation	95,200	CY	$	25	$	2,380,000
	Settlement due to DDC *- Assume 1'*	43,800	CY	$	25	$	1,095,000
	Settlement due to Increased Load *- Assume 1'*	43,800	CY	$	25	$	1,095,000
9	Import - *Replace Ex Pav and Concrete - Residential Parcels*	84,000	CY	$	25	$	2,100,000
	(Assume 1' Depth over Ex Pave / Concrete Demo)						
10	Import - *Development Areas*						
	Raise Above Flood Plain	591,500	CY	$	25	$	14,787,500
	Settlement due to Fill	295,750	CY	$	25	$	7,393,750
	Settlement due to DDC *- Excludes Parks*	299,000	CY	$	25	$	7,475,000
	Settlement due to Increased Structure Load *- Assume 1'*	233,500	CY	$	25	$	5,837,500
11	Rough Grade *- Assume 1' across Development Areas*	512,500	CY	$	3.50	$	1,793,750
12	Rock Slope Protection	11,800	LF	$	200	$	2,360,000
13	Finish Super Pad	237	AC	$	10,000	$	2,370,000
14	Settlement Acceleration Program *- Budget*	1	LS	$	450,000	$	450,000
15	Retaining Walls *- Budget*	1	LS	$	375,000	$	375,000
16	Erosion Control - *Phases 1 and 2*	302	AC	$	3,500	$	1,057,000
17	Erosion Control - *Phase 3*	22,245	LF	$	10	$	222,450
	Subtotal Earthwork					$	50,791,950
	SUBTOTAL FLOOD PROTECTION AND SITE GRADING COSTS					**$**	**87,663,000**
	25% CONTINGENCY					**$**	**21,915,750**
	TOTAL FLOOD PROTECTION AND SITE GRADING COSTS					**$**	**109,579,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
DEWATERING
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	DEWATERING						
1	Dewatering - *On-Site Roadways & Main Street*	64,770	LF	$	100	$	6,477,000
2	Groundwater Contamination Treatment - *Budget*	1	LS	$	1,700,000	$	1,700,000
					SUBTOTAL DEWATERING COSTS	**$**	**8,177,000**
					25% CONTINGENCY	**$**	**2,044,250**
					TOTAL DEWATERING COSTS	**$**	**10,221,000**

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ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
SANITARY SEWER
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	SANITARY SEWER						
1	36" Sanitary Sewer - *In existing pavement*	365	LF	$	275	$	100,375
2	24" Sanitary Sewer - *In existing pavement*	3,550	LF	$	250	$	887,500
3	24" Sanitary Sewer	50	LF	$	150	$	7,500
4	12" Sanitary Sewer - *In existing pavement*	3,305	LF	$	140	$	462,700
5	12" Sanitary Sewer	2,735	LF	$	70	$	191,450
6	8" Sanitary Sewer - *In existing pavement (to Lift Station)*	1,075	LF	$	100	$	107,500
7	8" Sanitary Sewer	31,750	LF	$	50	$	1,587,500
8	Manholes *(Assume 1 every 300')*	143	EA	$	6,000	$	858,000
9	Stubs to Future Development	101	EA	$	2,000	$	202,000
10	Lift Stations - *With back-up power*	6	EA	$	750,000	$	4,500,000
11	Temporary Lift Station - *Budget*	1	EA	$	500,000	$	500,000
12	Connect to Ex Pump Station 1	1	LS	$	100,000	$	100,000
13	Connect New Main to Existing Trunk Main	8	EA	$	10,000	$	80,000
14	Rehabilitate Existing Trunk Main - *Budget*	6,650	LF	$	20	$	133,000
15	Utilidors	2,575	LF	$	1,000	$	2,575,000
16	Maintain Service to Ex Buildings & Future Phases	3	LS	$	750,000	$	2,250,000
17	Connect Existing Lateral to New Main	80	EA	$	10,000	$	800,000
18	Replace Bay Mud - *Within Utility Trenches*	42,830	CY	$	25	$	1,070,750
					SUBTOTAL SANITARY SEWER COSTS	**$**	**16,413,275**
					25% CONTINGENCY	**$**	**4,103,319**
					TOTAL SANITARY SEWER COSTS	**$**	**20,517,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
STORM DRAIN
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	STORM DRAIN						
1	60" Storm Drain	2,845	LF	$	240	$	682,800
2	60" Storm Drain - *In existing pavement*	3,950	LF	$	360	$	1,422,000
3	48" Storm Drain	8,405	LF	$	192	$	1,613,760
4	48" Storm Drain - *In existing pavement*	375	LF	$	288	$	108,000
5	36" Storm Drain	8,775	LF	$	144	$	1,263,600
6	36" Storm Drain - *In existing pavement*	1,100	LF	$	216	$	237,600
7	24" Storm Drain	15,315	LF	$	96	$	1,470,240
8	18" Storm Drain	10,550	LF	$	72	$	759,600
9	Manholes *(Assume 1 every 300')*	171	EA	$	6,000	$	1,026,000
10	Multi-Purpose Basin						
	Excavation	45,000	CY	$	5	$	225,000
	Inlet / Outlet	3	EA	$	250,000	$	750,000
	Passive Landscaping	290,000	SF	$	2	$	580,000
	Access Road	44,000	SF	$	5	$	220,000
11	Force Mains *(12-24")*	1,100	LF	$	144	$	158,400
12	Emergency & Treatment Flow Pump Station *With Back-up Power*	1	EA	$	2,500,000	$	2,500,000
13	Retrofit Ex Outlets to Sea Plane Lagoon / Inner Harbor	5	EA	$	250,000	$	1,250,000
14	Mitigation for Storm Drain Outfall Retrofit	5	EA	$	100,000	$	500,000
15	Utilidors	3,125	LF	$	1,000	$	3,125,000
16	Interim Drainage to Existing Parcels to Remain *(Budget)*	1	LS	$	1,300,000	$	1,300,000
17	Stubs to Future Development *(Budget)*	104	EA	$	2,000	$	208,000
18	Existing Main Street Storm Drain Pump Modification	1	LS	$	250,000	$	250,000
19	Roadside Vegetated Swales / Water Quality Facilities	115,490	LF	$	40	$	4,619,600
20	Replace Bay Mud - *Within Utility Trenches*	80,280	CY	$	25	$	2,007,000
					SUBTOTAL STORM DRAIN COSTS	**$**	**26,277,000**
					25% CONTINGENCY	**$**	**6,569,250**
					TOTAL STORM DRAIN COSTS	**$**	**32,846,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
POTABLE WATER
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	POTABLE WATER						
1	16" Water Pipe *(Including appurtenances)*	11,220	LF	$	140	$	1,570,800
2	16" Water Pipe *(Including appurtenances) - In Ex Pavement*	2,875	LF	$	280	$	805,000
3	12" Water Pipe *(Including appurtenances)*	43,125	LF	$	120	$	5,175,000
4	8" Water Pipe *(Including appurtenances) - Big Whites*	3,975	LF	$	60	$	238,500
5	Stubs to Future Development	107	EA	$	2,000	$	214,000
6	Connect to Ex Waterline *(Including Meter & Backflow)*	59	EA	$	15,000	$	885,000
7	Fire Hydrants *(Assume 1 every 500')*	129	EA	$	4,000	$	516,000
8	Irrigation Services *(Assume 1 every 0.33 Mile)*	42	EA	$	2,000	$	84,000
9	Utilidors	3,450	LF	$	250	$	862,500
10	Maintain Service to Ex Buildings & Future Phases	1	LS	$	1,350,000	$	1,350,000
11	Connect Existing Lateral to New Main *(Includes Meter)*	104	EA	$	10,000	$	1,040,000
12	Reconnect Coast Guard Housing Pipeline	1	LS	$	25,000	$	25,000
					SUBTOTAL POTABLE WATER COSTS	**$**	**12,766,000**
					25% CONTINGENCY	**$**	**3,191,500**
					TOTAL POTABLE WATER COSTS	**$**	**15,958,000**

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ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
RECYCLED WATER
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	RECYCLED WATER						
1	12" Recycled Water Pipe *(Including appurtenances)*	28,855	LF	$	60	$	1,731,300
2	Stubs to Future Development	52	EA	$	2,000	$	104,000
3	Irrigation Services	21	EA	$	2,500	$	52,500
4	Utilidors	1,575	LF	$	250	$	393,750
					SUBTOTAL RECYCLED WATER COSTS	**$**	**2,282,000**
					25% CONTINGENCY	**$**	**570,500**
					TOTAL RECYCLED WATER COSTS	**$**	**2,853,000**

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ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
DRY UTILITIES
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	DRY UTILITIES						
1	Relocate Elec Transmission (115 kV) Poles - *Main St*	0	EA	$	50,000		N.I.C.
2	Relocate Exiting Street Lights - *Main St*	40	EA	$	5,000	$	200,000
3	Joint Trench Facilities - *Main St*	6,100	LF	$	120	$	732,000
4	Joint Trench Facilities - *Off-Site (to Substation)*	3,950	LF	$	240	$	948,000
5	Joint Trench Facilities - *On-Site*	58,645	LF	$	120	$	7,037,400
6	Additional Facilities for Multiple Utility Companies	59,495	LF	$	20	$	1,189,900
7	Electroliers - *Assume 1 every 120'*	467	EA	$	4,000	$	1,868,000
8	Utilidors	3,575	LF	$	250	$	893,750
9	Maintain Service to Ex Buildings - *During Construction*	1	LS	$	1,350,000	$	1,350,000
10	Establish New Connection to Historic Buildings to Remain	119	EA	$	10,000	$	1,190,000
11	Connect to Existing Substation	4	EA	$	100,000	$	400,000
					SUBTOTAL DRY UTILITIES COSTS	**$**	**15,809,050**
					25% CONTINGENCY	**$**	**3,952,263**
					TOTAL DRY UTILITIES COSTS	**$**	**19,761,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
ON-SITE STREET WORK
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit	Unit Price	Amount
	ON-SITE STREET WORK				
	Please see Appendix for the linear footage cost breakdowns				
1	Main Street Reconstruction				
	Pacific to Atlantic	1,150	LF	$ 295	$ 339,250
	Atlantic to Mitchell Mosley	3,350	LF	$ 695	$ 2,328,250
	Mitchell Mosley to Main Gate	2,525	LF	$ 720	$ 1,818,000
	Intersection Modification - *Atlantic Ave / Main St*	1	LS	$ 100,000	$ 100,000
	Intersection Modification - *Stargell Ave / Main St*	1	LS	$ 100,000	$ 100,000
	Intersection Modification - *Singleton Ave / Main St*	1	LS	$ 100,000	$ 100,000
	Intersection Modification - *Pacific / Main St*	1	LS	$ 500,000	$ 500,000
	Transition to Ex Roadway - *At Northern Boundary*	1	LS	$ 400,000	$ 400,000
	Transition to Ex Roadway - *At Southern Boundary*	0	LS	$ 100,000	$ -
	Traffic Signal Modification - *Atlantic Ave / Main St*	1	LS	$ 150,000	$ 150,000
	Traffic Signal Modification - *Stargell Ave / Main St*	1	LS	$ 150,000	$ 150,000
	Traffic Signal Modification - *Singleton Ave / Main St*	1	LS	$ 150,000	$ 150,000
	Traffic Signal Modification - *Pacific / Main St*	1	LS	$ 350,000	$ 350,000
	Relocate Ferry Entrance - *Including Signal*	1	LS	$ 500,000	$ 500,000
2	On-Site Streets				
	West Atlantic Avenue - *New*	1,750	LF	$ 905	$ 1,583,750
	Pacific Avenue - *New*	1,900	LF	$ 685	$ 1,301,500
	Island Collector - Commercial - *New*	8,575	LF	$ 500	$ 4,287,500
	Island Collector - Residential - *New*	5,650	LF	$ 475	$ 2,683,750
	Local Streets - Commercial or Residential - *New*	11,450	LF	$ 415	$ 4,751,750
	Local Streets - Residential - *New with Bike Lanes*	1,450	LF	$ 470	$ 681,500
	West Redline Avenue - *Reconstruction*	3,650	LF	$ 480	$ 1,752,000
	Essex Drive - *Reconstruction*	1,115	LF	$ 670	$ 747,050
	West Midway Avenue - *Reconstruction*	2,790	LF	$ 520	$ 1,450,800
	Tower Avenue - *Reconstruction*	2,775	LF	$ 535	$ 1,484,625
	Monarch Street - *Reconstruction*	2,735	LF	$ 530	$ 1,449,550
	Big Whites - *Reconstruction*	4,900	LF	$ 300	$ 1,470,000
	Lexington Street - *Reconstruction*	1,450	LF	$ 470	$ 681,500
	Lexington Street - *New*	1,450	LF	$ 520	$ 754,000
	Saratoga Street - *Reconstruction*	1,450	LF	$ 470	$ 681,500
	Saratoga Street - *New*	1,450	LF	$ 520	$ 754,000
	Pan Am Way - *Reconstruction*	1,050	LF	$ 455	$ 477,750
	Pan Am Way - *New*	425	LF	$ 480	$ 204,000
	Roadway Resurfacing - *Main Gate & Misc Roadways*	1,750	LF	$ 120	$ 210,000

Item	Description	Quantity	Unit		Unit Price		Amount
3	Central Avenue Realignment	1	LS	$	2,000,000	$	2,000,000
4	Traffic Signals - *On-Site (Budget)*	3	EA	$	250,000	$	750,000
5	Conform to Ex Intersections - *Budget During Construction*	33	EA	$	100,000	$	3,300,000
6	Temporary Access Roads to Ex Bldg's - *During Construction*	1	LS	$	1,500,000	$	1,500,000
7	Misc Frontage Improvements to Ex Bldg's to Remain	10,900	LF	$	100	$	1,090,000
8	Driveways - *Residential Alleys & Commercial Parking lots*	130	EA	$	1,000	$	130,000
9	Temp Barricades - *At Entrances to Future Development*	97	EA	$	1,500	$	145,500
10	Traffic Calming Budget	1	LS	$	650,000	$	650,000
11	Roundabout	1	EA	$	250,000	$	250,000
	SUBTOTAL ON-SITE STREET WORK COSTS					**$**	**44,208,000**
	25% CONTINGENCY					**$**	**11,052,000**
	TOTAL ON-SITE STREET WORK COSTS					**$**	**55,260,000**

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ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TRANSPORTATION
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Improvement Amount	Project Pro-Rata Share	Project Amount
	OFF-SITE PROJECT IMPROVEMENTS			
	VEHICLE IMPROVEMENTS			
1	Fernside Blvd / Otis Dr - *Intersection & Signal Improvements*	$ 300,000	100%	$ 300,000
2	Main St / Pacific Ave - *Signal Improvements*		*Included in Main Street Estimate*	
3	Webster St / RAMP - *Signal Improvements*	$ 50,000	100%	$ 50,000
4	Park St / Otis Dr - *Signal Improvements*	$ 50,000	100%	$ 50,000
5	Broadway / Tilden Way - *Signal Improvements*	$ 50,000	100%	$ 50,000
6	High St / Fernside Blvd - *Signal Improvements*	$ 50,000	100%	$ 50,000
7	Atlantic Ave / Constitution Way - *Signal Modification*	$ 150,000	100%	$ 150,000
	BICYCLE IMPROVEMENTS			
8	Stargell Avenue Class I Trail - *Main St to 5th Street*	$ 400,000	100%	$ 400,000
9	Main St Class I Trail - *RAMP to Pacific Ave*		*Included in Main Street Estimate*	
10	Central Ave Class I & II Trail - *Pacific Ave to 4th St*	N.I.C.	100%	N.I.C.
	Subtotal Off-Site Project Improvements			$ 1,050,000
	OFF-SITE PROJECT CONTRIBUTIONS - ***Pro-Rata Share***			
	VEHICLE IMPROVEMENTS			
11	Park St / Clement Ave - *Intersection Improvements*	$ 550,000	10%	$ 55,000
12	Park St / Encinal Ave - *Intersection Improvements*	$ 200,000	8%	$ 16,000
13	Broadway / Otis Dr - *Intersection Improvements*	$ 275,000	9%	$ 24,750
14	Tilden Way / Blanding Ave / Fernside Blvd - *Intersection Imp's*	$ 350,000	5%	$ 17,500
15	High St / Fernside Blvd - *Signal Improvements / Transit Priority*	$ 100,000	30%	$ 30,000
16	High St / Otis Dr - *Intersection Improvements*	$ 275,000	14%	$ 38,500
17	Island Dr / Otis Dr / Doolittle Dr - *Intersection Improvements*	$ 550,000	7%	$ 38,500
18	Fernside Blvd / Otis Dr - *Signal Improvements*	$ 50,000	10%	$ 5,000
19	Park St / Blanding Ave - *Intersection Improvements*	$ 215,000	12%	$ 25,800
20	Challenger Dr/Atlantic Ave - *Signal Improvements / Transit Priority*	$ 100,000	4%	$ 4,000
21	Park St / Lincoln Ave - *Signal Improvements / Transit Priority*	$ 100,000	10%	$ 10,000
	PEDESTRIAN IMPROVEMENTS			
22	Main St / Pacific Ave - *Signal Improvements*		*Included in Main Street Estimate*	
23	Webster St / RAMP - *Signal Improvements / Transit Priority*	$ 250,000	100%	$ 250,000
24	High St / Fernside Blvd - *Intersection Improvements*		*Included in Item #15*	
25	Atlantic Ave / Constitution Way - *Signal Modification*		*Included in Item #7*	

Item	Description	Improvement Amount	Project Pro-Rata Share	Project Amount
	TRANSIT IMPROVEMENTS			
26	Park St Transit Signal Priority - *Blanding Ave to Otis Dr*	$ 500,000	13%	$ 65,000
27	RAMP Transit Corridor Improvements - *Main St to Webster St* *(incl. transit signal priority, exclusive transit lane eastbound)*	$ 4,750,000	10%	$ 475,000
28	Stargell Ave Queue Jump Lanes - *Main St & 5th St Intersections*	$ 3,000,000	100%	$ 3,000,000
	BICYCLE IMPROVEMENTS			
29	Stargell Avenue Class I Trail - *Main St to 5th Street*		*Included in Item #8*	
30	Main St Class I Trail - *RAMP to Pacific Ave*		*Included in Main Street Estimate*	
31	Central Ave Class I & II Trail - *Pacific Ave to 4th St*		*Included in Item #10*	
32	Oak Street Bicycle Blvd - *Santa Clara Ave to Central Ave*	$ 100,000	10%	$ 10,000
	Subtotal Off-Site Project Contributions			$ 4,065,050
	ADDITIONAL PROJECT IMPROVEMENTS			
33	BRT - *Project Contribution*	$ 20,000,000	25%	$ 5,000,000
34	Shuttle Service	$ 1,000,000	100%	$ 1,000,000
35	Ferry Terminal - *Expand Pkg Lot @ Existing Terminal*	$ 570,000	100%	$ 570,000
36	Ferry Terminal - *New Terminal @ Seaplane Lagoon*	$ 10,000,000	100%	$ 10,000,000
37	Transit Center	$ 1,500,000	100%	$ 1,500,000
38	TDM Costs - *Establish Program & Monitoring*	$ 4,200,000	100%	$ 4,200,000
39	Cross Alameda Trail - *Class I Trail along RAMP from Main St to Constitution Way*	$ 1,900,000	100%	$ 1,900,000
40	Other Potential Project Improvements	$ 6,250,000	100%	$ 6,250,000
41	Wayfinding Directional Signage	$ 150,000	100%	$ 150,000
	Subtotal Additional Project Improvements			$ 30,570,000
			SUBTOTAL TRANSPORTATION COSTS	**$ 35,685,050**
			25% CONTINGENCY	**$ 8,921,263**
			TOTAL TRANSPORTATION COSTS	**$ 44,606,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
PARKS AND OPEN SPACE
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	PARKS AND OPEN SPACE						
1	Upgrade Existing Landscaping	6.0	AC	$	217,500	$	1,305,000
2	Primary Open Spaces	19.2	AC	$	435,000	$	8,352,000
3	Seaplane Lagoon Landscaping	15.4	AC	$	650,000	$	10,010,000
4	Sports Complex	1	LS	$	20,000,000	$	20,000,000
5	Enterprise Park *("Southeast Park")*	16.0	AC	$	350,000	$	5,600,000
6	Landscaping Buffer for Substation	25,000	SF	$	8	$	200,000
7	Bay Trail - *Main Street, Berms & Seaplane Lagoon*	503,400	SF	$	8	$	4,027,200
8	Northern Shoreline Parking & Landscaping	2.0	AC	$	350,000	$	700,000
9	Flood Protection Berm Landscaping	8.0	AC	$	217,500	$	1,740,000
					SUBTOTAL PARKS AND OPEN SPACE COSTS	**$**	**51,934,000**
					25% CONTINGENCY	**$**	**12,983,500**
					TOTAL PARKS AND OPEN SPACE COSTS	**$**	**64,918,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
PUBLIC BENEFITS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit	Unit Price	Amount
	PUBLIC BENEFITS				
1	Fire Station	1	LS	$ 4,500,000	$ 4,500,000
2	Marina	0	LS	BY OTHERS	BY OTHERS
3	Wetland Restoration / Creation	0	LS	BY OTHERS	BY OTHERS
4	Northwest Territories Open Space	0	LS	BY OTHERS	BY OTHERS
5	Corporation Yard - *Pro-Rata Share*	1	LS	$ 1,000,000	$ 1,000,000
6	Bay Trail - *NW Territories & VA Property*	1	LS	$ 8,330,000	$ 8,330,000
				SUBTOTAL PUBLIC BENEFITS COSTS	**$ 13,830,000**
				25% CONTINGENCY	**$ 3,457,500**
				TOTAL PUBLIC BENEFITS COSTS	**$ 17,288,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
CONSTRUCTION ADMIN
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	CONSTRUCTION ADMIN						
1	Construction Admin *(4% costs)*	0.04	LS	$	377,936,000	$	15,117,440
					SUBTOTAL CONSTRUCTION ADMIN COSTS	**$**	**15,117,000**
					25% CONTINGENCY		**N.I.C.**
					TOTAL CONSTRUCTION ADMIN COSTS	**$**	**15,117,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
PROFESSIONAL SERVICES
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	PROFESSIONAL SERVICES						
1	Professional Services *(15% costs)*	0.15	LS	$	377,936,000	$	56,690,400
					SUBTOTAL PROFESSIONAL SERVICES COSTS	**$**	**56,690,000**
					25% CONTINGENCY		**N.I.C.**
					TOTAL PROFESSIONAL SERVICES COSTS	**$**	**56,690,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
FEES
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Fee		Amount
	ENTITLEMENT FEES			
1	Entitlement Fees	*Not Included*		N.I.C.
	Subtotal Entitlement Fees			N.I.C.
	CITY PLAN CHECK & INSPECTION FEES			
2	Grading and Improvement Plan Review	*Assume 1% of Infrastructure Costs*	$	3,779,360
3	Grading and Improvement Bond	*Assume 1% of Infrastructure Costs*	$	3,779,360
4	Inspection Fee	*Assume 2% of Infrastructure Costs*	$	7,558,720
	Subtotal City Plan Check & Inspection Fees		$	15,117,440
	EBMUD FEES			
5	System Capacity Charge (Potable):			
	5/8"	($22,260 / unit x 0 units)	$	-
	1"	($55,760 / unit x 42 units	$	2,341,920
	1-1/2"	($111,520 / unit x 0 units)	$	-
	2"	($178,430 / unit x 0 units)	$	-
6	Design and Inspection Fee	$11,964 + $39 / LF x 61195 LF	$	2,398,569
7	Connection Fee:			
	5/8"	$1,114 / unit x 0 units	$	-
	1"	$1,114 / unit x 42 units	$	46,788
	1-1/2"	$3,001 / unit x 0 units	$	-
	2"	$3,306 / unit x 0 units	$	-
8	Fire Hydrant Fee	($3,012 / hydrant x 129 hydrants $16 / LF x 20 LF x 129)	$	429,828
9	EBMUD Bond	(1% of Water Costs)	$	127,660
10	Account Fee	($38 / unit x 42 units)	$	1,596
	Subtotal EBMUD Fees		$	5,346,361
		SUBTOTAL FEES	**$**	**20,464,000**
		25% CONTINGENCY		**N.I.C.**
		TOTAL FEES	**$**	**20,460,000**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
IMPROVEMENT ACCEPTANCE
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Amount
	IMPROVEMENT ACCEPTANCE						
1	Improvement Acceptance *(0.5% Costs)*	0.005	LS	$	377,936,000	$	1,889,680
	SUBTOTAL IMPROVEMENT ACCEPTANCE COSTS					**$**	**1,889,680**
	25% CONTINGENCY						**N.I.C.**
	TOTAL IMPROVEMENT ACCEPTANCE COSTS					**$**	**1,890,000**

Appendix

Typical Unit Costs

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL UNIT CONSTRUCTION COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Unit		Unit Price
	DEMOLITION			
1	Demo of Existing Pavement and Concrete	SF	$	0.75
2	Demolition of Existing Sea Plane Lagoon Ramps	EA	$	100,000.00
3	Clearing and Grubbing	AC	$	2,000.00
4	Slurry Fill Existing Utilities - *Development Parcels*	LF	$	10.00
5	Remove Existing Utilities - *Development Parcels*	LF	$	35.00
6	Remove Existing Utilities - *Within Proposed R/W's*	LF	$	35.00
7	Demolition of Ex Railroad Spurs	LF	$	25.00
	GRADING			
8	Northern Shoreline Stabilization - *DDC*	SF	$	1.00
9	Northern Shoreline Stabilization - *Concrete Piles*	LF	$	2,750.00
10	Sea Plane Lagoon - *Northern Headwall*	LF	$	3,000.00
11	Sea Plane Lagoon - *Revetment Repairs*	LF	$	200.00
12	Liquefaction Remediation - *DDC Dev Areas and Roadways*	SF	$	1.00
13	Liquefaction Remediation - *DDC Berm*	SF	$	1.00
14	Import	CY	$	25.00
15	Rough Grade - *Assume 1' across Development Areas*	CY	$	3.50
16	Rock Slope Protection	LF	$	200.00
17	Finish Super Pad	AC	$	10,000.00
18	Erosion Control	AC	$	3,500.00
	DEWATERING			
19	Dewatering Budget	LF	$	100.00
	SANITARY SEWER			
20	36" Sanitary Sewer - *In existing pavement*	LF	$	275
21	24" Sanitary Sewer - *In existing pavement*	LF	$	250
22	24" Sanitary Sewer	LF	$	150
23	12" Sanitary Sewer - *In existing pavement*	LF	$	140
24	12" Sanitary Sewer	LF	$	70
25	8" Sanitary Sewer	LF	$	50
26	Manholes *(Assume 1 every 300')*	EA	$	6,000.00
27	Stubs to Future Development	EA	$	2,000.00
28	Lift Stations *(With Back-Up Power)*	EA	$	750,000.00
29	Temporary Lift Station	EA	$	500,000.00
30	Connect New Main to Existing Trunk Main	EA	$	10,000.00
31	Connect Existing Lateral to New Main	EA	$	10,000.00
32	Utilidors	LF	$	1,000.00
33	Replace Bay Mud - *Within Utility Trenches*	CY	$	25.00

Item	Description	Unit		Unit Price
	STORM DRAIN			
34	60" Storm Drain	LF	$	240.00
35	60" Storm Drain *- In existing pavement*	LF	$	360.00
36	48" Storm Drain	LF	$	192.00
37	48" Storm Drain *- In existing pavement*	LF	$	288.00
38	36" Storm Drain	LF	$	144.00
39	36" Storm Drain *- In existing pavement*	LF	$	216.00
40	24" Storm Drain	LF	$	96.00
41	18" Storm Drain	LF	$	72.00
42	Catch Basins	EA	$	3,200.00
43	Manholes *(Assume 1 every 500')*	EA	$	6,000.00
	Multi-Purpose Basin	CY	$	5.00
44	Excavation	EA	$	50,000.00
45	Inlet / Outlet	SF	$	3.00
46	Passive Landscaping	SF	$	5.00
47	Access Road			
48	Treatment Flow Force Mains *(12-24")*	LF	$	144.00
49	Emergency and Treatment Flow Pump Station *(With Back-Up Power)*	EA	$	1,000,000.00
50	Retrofit Ex Outlets to Sea Plane Lagoon / Inner Harbor	EA	$	250,000.00
51	Mitigation for Storm Drain Outfall Retrofit	EA	$	100,000.00
52	Utilidors	LF	$	1,000.00
53	Stubs to Future Development *(Budget)*	EA	$	2,000.00
54	Roadside Vegetated Swales / Water Quality Facilities	LF	$	40.00
55	Replace Bay Mud - *Within Utility Trenches*	CY	$	25.00
	POTABLE WATER			
56	16" Water Pipe *(Including appurtenances)*	LF	$	140.00
57	12" Water Pipe *(Including appurtenances)*	LF	$	120.00
58	8" Water Pipe *(Including appurtenances)*	LF	$	60.00
59	Stubs to Future Development	EA	$	2,000.00
60	Connect to Existing Waterline *(Including Meter and Backflow)*	EA	$	15,000.00
61	Fire Hydrants *(Assume 1 every 500')*	EA	$	4,000.00
62	Irrigation Services *(Assume 1 every 0.33 Mile)*	EA	$	2,000.00
63	Utilidors	LF	$	250.00
64	Connect Existing Lateral to New Main *(Includes Meter)*	EA	$	10,000.00
	RECLAIMED WATER			
65	8" Recycled Water Pipe *(Including appurtenances)*	LF	$	60.00
66	Stubs to Future Development	EA	$	2,000.00
67	Irrigation Services	EA	$	2,500.00
68	Utilidors	LF	$	250.00

Item	Description	Unit		Unit Price
	STREET WORK			
69	Clearing and Grubbing	LF	$	2.50
70	Demo Existing Pavement and Concrete	SF	$	1.00
71	Demo Existing Curb and Gutter	LF	$	10.00
72	Sawcut Existing Pavement	LF	$	4.00
73	Rough Grading	CY	$	10.00
74	Fine Grading	SF	$	0.50
75	AC Paving	SF-IN	$	0.55
76	Aggregate Base - *Assume On-Site Reuse*	SF-IN	$	0.10
77	2" AC Overlay	SF	$	2.00
78	SubGrade Fabric	SF	$	0.35
79	Pavement Sealant	SF	$	0.05
80	Curb and Gutter	LF	$	25.00
81	Median Curb	LF	$	20.00
82	Sidewalk	SF	$	5.00
83	Handicap Ramps *(Assume 1 every 500')*	LF	$	6.00
84	Signing / Striping / Monuments *- Budget (Main Street)*	LF	$	10.00
85	Signing / Striping / Monuments *- Budget (In-Tract)*	LF	$	5.00
86	Parkway Landscaping and Irrigation	SF	$	7.50
87	Median Landscaping and Irrigation	SF	$	7.50
88	Roadside Vegetated Swales	LF	$	40.00
89	Traffic Control	LF	$	40.00
90	Construction Sequencing	LF	$	20.00
91	Electroliers *(Assume 1 every 150')*	LF	$	26.67
92	Traffic Signals - *On-Site (Budget)*	EA	$	250,000.00
93	Conform to Existing Intersections	EA	$	100,000.00
94	Driveways *- Residential Alleys and Commercial Parking Lots*	EA	$	1,000.00
95	Temp Barricades *- At Entrances to Future Development*	EA	$	1,500.00
96	Roundabout	EA	$	250,000.00
97	Roadway Resurfacing	LF	$	120.00
	DRY UTILITIES			
98	Relocate Elec Transmission (115 kV) Poles - *Main St (Replace with Steel Poles)*	EA	$	50,000.00
99	Relocate Exiting Street Lights *- Main St*	LF	$	300.00
100	Joint Trench Facilities *- Main St*	LF	$	120.00
101	Joint Trench Facilities *- Off-Site (to Substation)*	LF	$	240.00
102	Joint Trench Facilities *- On-Site*	LF	$	120.00
103	Additional Facilities for Multiple Utility Companies	LF	$	20.00
104	Electroliers - *Assume 1 every 150'*	EA	$	4,000.00
105	Utilidors	LF	$	250.00
106	Establish New Connection to Historic Buildings to Remain	EA	$	10,000.00
	LANDSCAPING			
107	Upgrade Existing Landscaping	AC	$	217,500.00
108	Parks / Open Space	AC	$	435,000.00
109	Sea Plane Lagoon Landscaping	AC	$	650,000.00
110	Entry Monuments *(Budget)*	EA	$	100,000.00
111	Enterprise Park *("Southeast Park")*	AC	$	350,000.00
112	Landscaping Buffer for Substation	SF	$	8.00
113	Bay Trail - *Main Street and Berms*	SF	$	8.00
114	Northern Shoreline Parking and Landscaping	AC	$	350,000.00
115	Flood Protection Berm Landscaping	AC	$	217,500.00

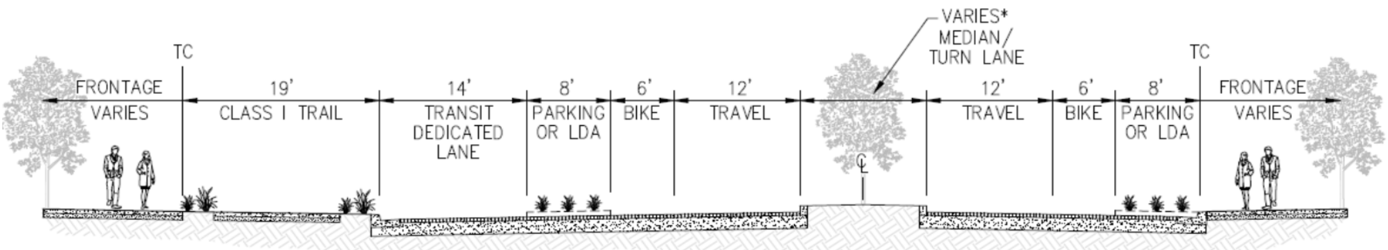
Street Linear Footage Costs

Carlson, Barbee & Gibson, Inc.
CIVIL ENGINEERS • SURVEYORS • PLANNERS

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

WEST ATLANTIC AVENUE
(Assumed Frontage: 10' Sidewalk)
(Assumed Median: 16' wide)



Item	Description	Quantity	Unit	Unit Price		Cost per LF	
1	Grading						*Included in Grading*
2	Remove Existing Pavement						*Included in Demolition*
3	Fine Grading	121	SF	$	0.50	$	60.50
4	5" AC	63	SF	$	2.75	$	173.25
5	22" AB *(Assume On-Site Re-Use)*	63	SF	$	2.20	$	138.60
6	SubGrade Fabric	66	SF	$	0.35	$	23.10
7	Pavement Sealant	63	SF	$	0.05	$	3.15
8	Curb & Gutter	2	LF	$	25.00	$	50.00
9	Median Curb	2	LF	$	20.00	$	40.00
10	Sidewalk	20	SF	$	6.50	$	130.00
11	Bike Path & Buffer	19	SF	$	3.00	$	57.00
12	Handicap Ramps *(Assume 2 every 500')*	1	LF	$	12.00	$	12.00
13	Signing / Striping / Monuments	1	LF	$	10.00	$	10.00
14	Median Irrigation and Landscaping	16	SF	$	7.50	$	120.00
15	Parkway Irrigation and Landscaping	0	SF	$	7.50	$	-
16	Roadway Low Points *(2 Filter Boxes & 18" x-ing per 300')*	1	LF	$	86.35	$	86.35
17	Electroliers						*Included in Dry Utilities*

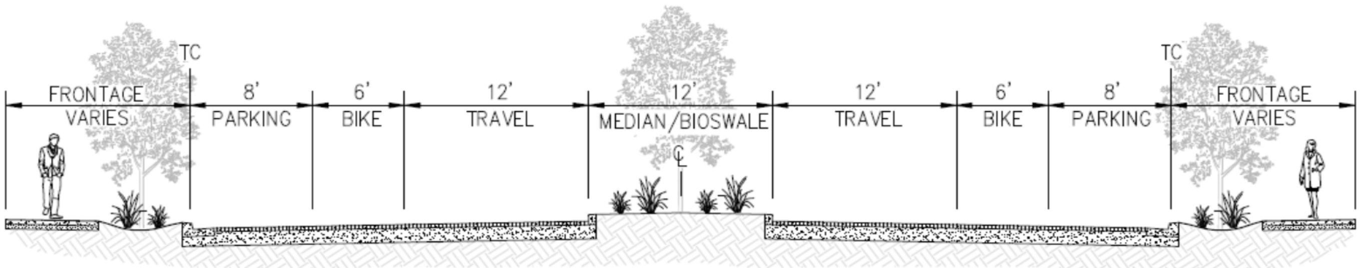
TOTAL WEST ATLANTIC AVENUE LINEAR FOOT COSTS $ 903.95

SAY $ 905.00

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Cost per LF
	PACIFIC AVENUE						
	(Assumed Frontage: 5' Sidewalk & 6' Landscaping)						
1	Grading						*Included in Grading*
2	Remove Existing Pavement / Median						*Included in Demolition*
3	Fine Grading	86	SF	$	0.50	$	43.00
4	5" AC	49	SF	$	2.75	$	134.75
5	22" AB *(Assume On-Site Re-Use)*	49	SF	$	2.20	$	107.80
6	SubGrade Fabric	52	SF	$	0.35	$	18.20
7	Pavement Sealant	49	SF	$	0.05	$	2.45
8	Curb & Gutter	2	LF	$	25.00	$	50.00
9	Median Curb	2	LF	$	20.00	$	40.00
10	Sidewalk	10	SF	$	6.50	$	65.00
11	Handicap Ramps *(assume 2 every 500')*	1	LF	$	12.00	$	12.00
12	Signing / Striping / Monuments	1	LF	$	10.00	$	10.00
13	Median Irrigation and Landscaping	12	SF	$	7.50	$	90.00
14	Parkway Irrigation and Landscaping	12	SF	$	7.50	$	90.00
15	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	21.33	$	21.33
16	Electroliers						*Included in Dry Utilities*
					TOTAL PACIFIC AVENUE LINEAR FOOT COSTS	**$**	**684.53**
					SAY	**$**	**685.00**



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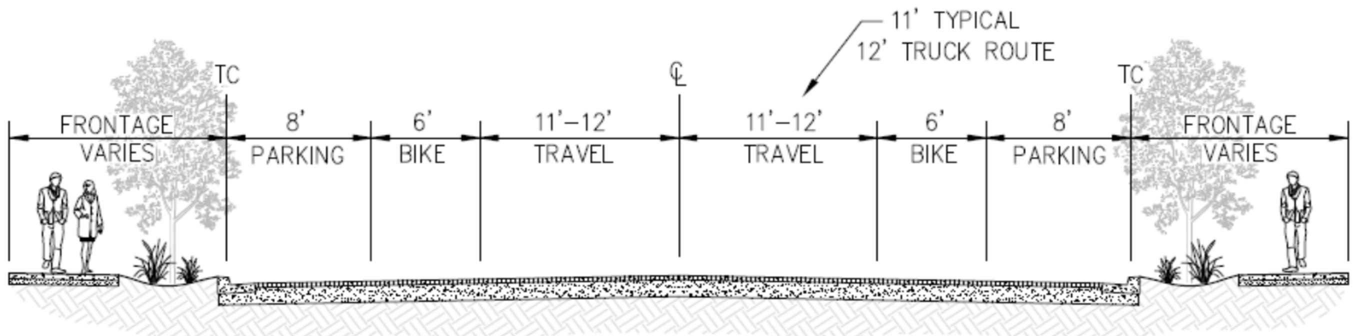
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

ISLAND COLLECTOR (COMMERCIAL)

(Assumed Frontage: 5' Sidewalk & 6' Landscaping)



Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Grading						*Included in Grading*
2	Remove Existing Pavement						*Included in Demolition*
3	Fine Grading	74	SF	$	0.50	$	37.00
4	4" AC	49	SF	$	2.20	$	107.80
5	16" AB *(Assume On-Site Re-Use)*	49	SF	$	1.60	$	78.40
6	SubGrade Fabric	52	SF	$	0.35	$	18.20
7	Pavement Sealant	49	SF	$	0.05	$	2.45
8	Curb & Gutter	2	LF	$	25.00	$	50.00
9	Sidewalk	10	SF	$	6.50	$	65.00
10	Handicap Ramps *(Assume 2 every 500')*	1	LF	$	12.00	$	12.00
11	Signing / Striping / Monuments	1	LF	$	7.50	$	7.50
12	Parkway Irrigation and Landscaping	12	SF	$	7.50	$	90.00
13	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	33.81	$	33.81
14	Electroliers						*Included in Dry Utilities*

TOTAL ISLAND COLLECTOR (COMMERCIAL) LINEAR FOOT COSTS $ 502.16

SAY $ 500.00

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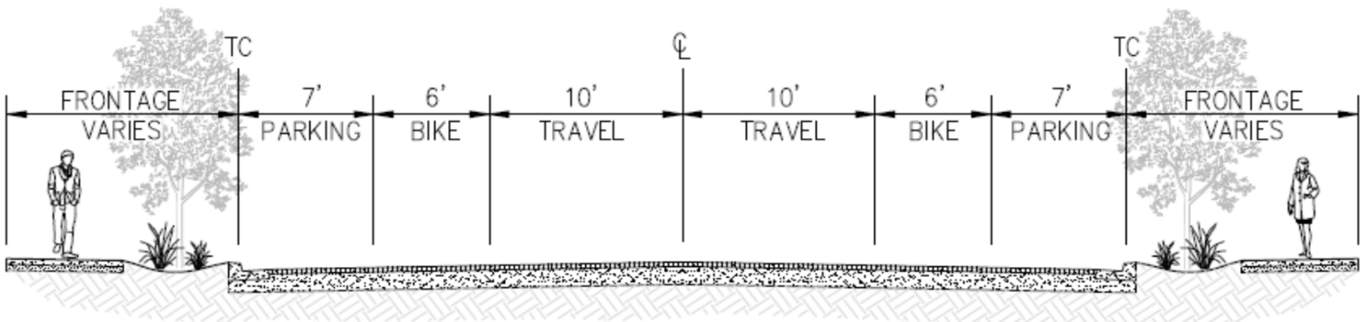
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit	Unit Price		Cost per LF	

ISLAND COLLECTOR (RESIDENTIAL)

(Assumed Frontage: 5' Sidewalk & 6' Landscaping)



Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Grading						*Included in Grading*
2	Remove Existing Pavement						*Included in Demolition*
3	Fine Grading	68	SF	$	0.50	$	34.00
4	4" AC	43	SF	$	2.20	$	94.60
5	16" AB *(Assume On-Site Re-Use)*	43	SF	$	1.60	$	68.80
6	SubGrade Fabric	46	SF	$	0.35	$	16.10
7	Pavement Sealant	43	SF	$	0.05	$	2.15
8	Curb & Gutter	2	LF	$	25.00	$	50.00
9	Sidewalk	10	SF	$	6.50	$	65.00
10	Handicap Ramps *(Assume 2 every 500')*	1	LF	$	12.00	$	12.00
11	Signing / Striping / Monuments	1	LF	$	7.50	$	7.50
12	Parkway Irrigation and Landscaping	12	SF	$	7.50	$	90.00
13	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	32.37	$	32.37
14	Electroliers						*Included in Dry Utilities*

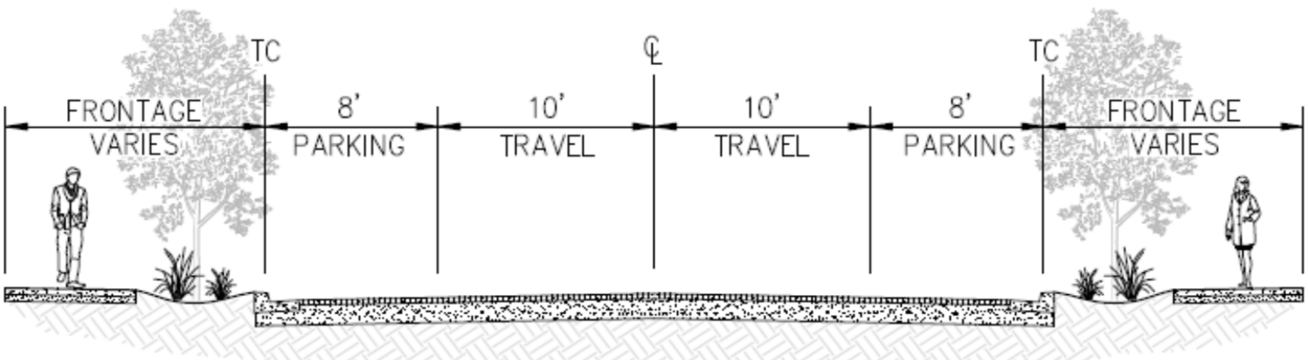
TOTAL ISLAND COLLECTOR (RESIDENTIAL) LINEAR FOOT COSTS $ 472.52

SAY $ 475.00

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Cost per LF
	LOCAL STREETS (COMMERCIAL & RESIDENTIAL)						
	(Assumed Frontage: 5' Sidewalk & 6' Landscaping)						

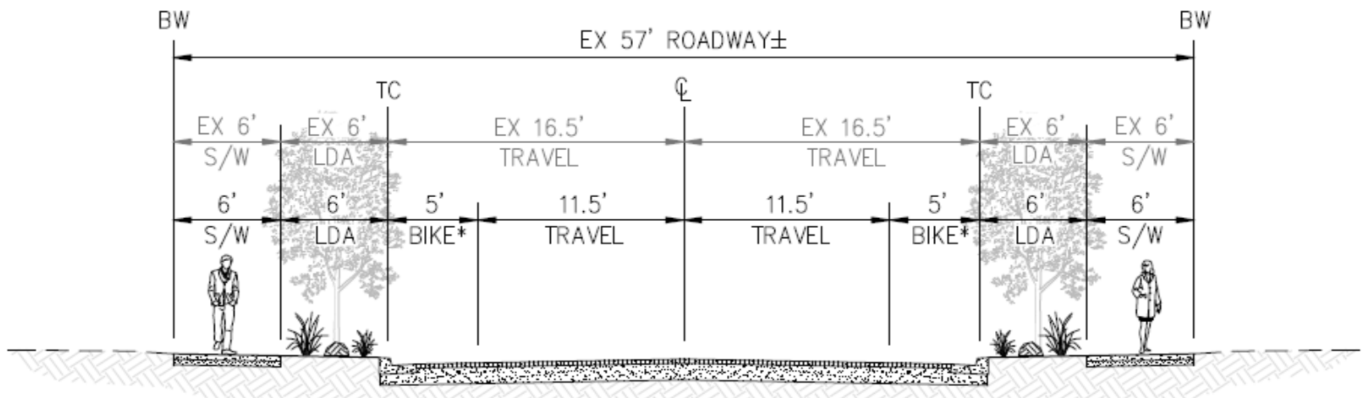


Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Grading						*Included in Grading*
2	Remove Existing Pavement						*Included in Demolition*
3	Fine Grading	58	SF	$	0.50	$	29.00
4	4" AC	33	SF	$	2.20	$	72.60
5	14" AB *(Assume On-Site Re-Use)*	33	SF	$	1.40	$	46.20
6	SubGrade Fabric	36	SF	$	0.35	$	12.60
7	Pavement Sealant	33	SF	$	0.05	$	1.65
8	Curb & Gutter	2	LF	$	25.00	$	50.00
9	Sidewalk	10	SF	$	6.50	$	65.00
10	Handicap Ramps *(Assume 2 every 500')*	1	LF	$	12.00	$	12.00
11	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
12	Parkway Irrigation and Landscaping	12	SF	$	7.50	$	90.00
13	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	29.97	$	29.97
14	Electroliers						*Included in Dry Utilities*
	TOTAL LOCAL STREETS (COMMERCIAL & RESIDENTIAL) STREET LINEAR FOOT COSTS					**$**	**414.02**
					SAY	**$**	**415.00**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit	Unit Price	Cost per LF
	WEST REDLINE AVENUE - RECONSTRUCTION				



Item	Description	Quantity	Unit	Unit Price	Cost per LF
1	Clearing & Grubbing	1	LF	$ 2.50	$ 2.50
2	Remove Existing Pavement / Concrete	42	SF	$ 1.00	$ 42.00
3	Demo Ex Curb & Gutter	2	LF	$ 10.00	$ 20.00
4	Fine Grading	57	SF	$ 0.50	$ 28.50
5	4" AC	30	SF	$ 2.20	$ 66.00
6	14" AB *(Assume On-Site Re-Use)*	30	SF	$ 1.40	$ 42.00
7	SubGrade Fabric	33	SF	$ 0.35	$ 11.55
8	Pavement Sealant	30	SF	$ 0.05	$ 1.50
9	Curb & Gutter	2	LF	$ 25.00	$ 50.00
10	Sidewalk	12	SF	$ 6.50	$ 78.00
11	Handicap Ramps *(Assume 2 every 500')*	1	LF	$ 12.00	$ 12.00
12	Signing / Striping / Monuments	1	LF	$ 5.00	$ 5.00
13	Parkway Irrigation and Landscaping	12	SF	$ 7.50	$ 90.00
14	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$ 29.25	$ 29.25
15	Electroliers				*Included in Dry Utilities*
	TOTAL WEST REDLINE AVENUE LINEAR FOOT COSTS				**$ 478.30**
				SAY	**$ 480.00**

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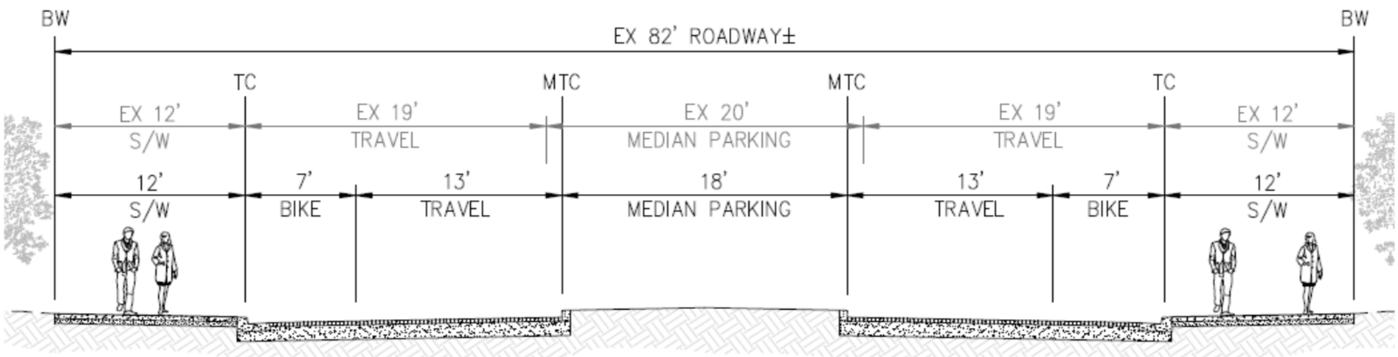
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

ESSEX DRIVE - RECONSTRUCTION

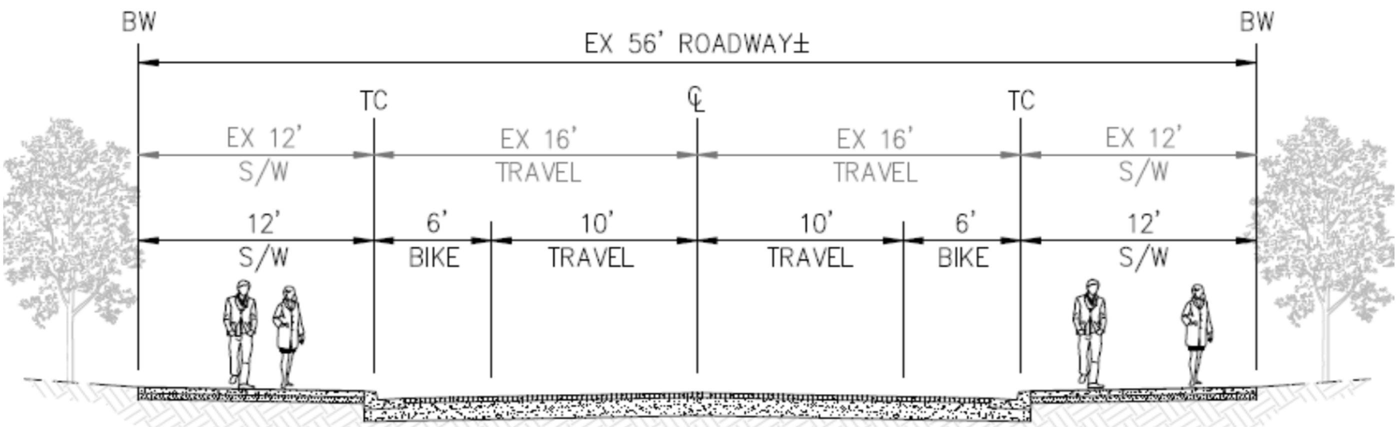


Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Clearing & Grubbing	0	LF	$	2.50	$	-
2	Remove Existing Pavement / Concrete	82	SF	$	1.00	$	82.00
3	Demo Ex Curb & Gutter	2	LF	$	10.00	$	20.00
4	Fine Grading	82	SF	$	0.50	$	41.00
5	4" AC	55	SF	$	2.20	$	121.00
6	14" AB *(Assume On-Site Re-Use)*	55	SF	$	1.40	$	77.00
7	SubGrade Fabric	58	SF	$	0.35	$	20.30
8	Pavement Sealant	55	SF	$	0.05	$	2.75
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Sidewalk	24	SF	$	6.50	$	156.00
11	Handicap Ramps *(Assume 2 every 500')*	1	LF	$	12.00	$	12.00
12	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
13	Parkway Irrigation and Landscaping	0	SF	$	7.50	$	-
14	Roadway Low Points *(2 Filter Boxes & 18" x-ing per 300')*	1	LF	$	80.59	$	80.59
15	Electroliers						*Included in Dry Utilities*
	TOTAL ESSEX DRIVE LINEAR FOOT COSTS					**$**	**667.64**
					SAY	**$**	**670.00**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

WEST MIDWAY AVENUE - RECONSTRUCTION

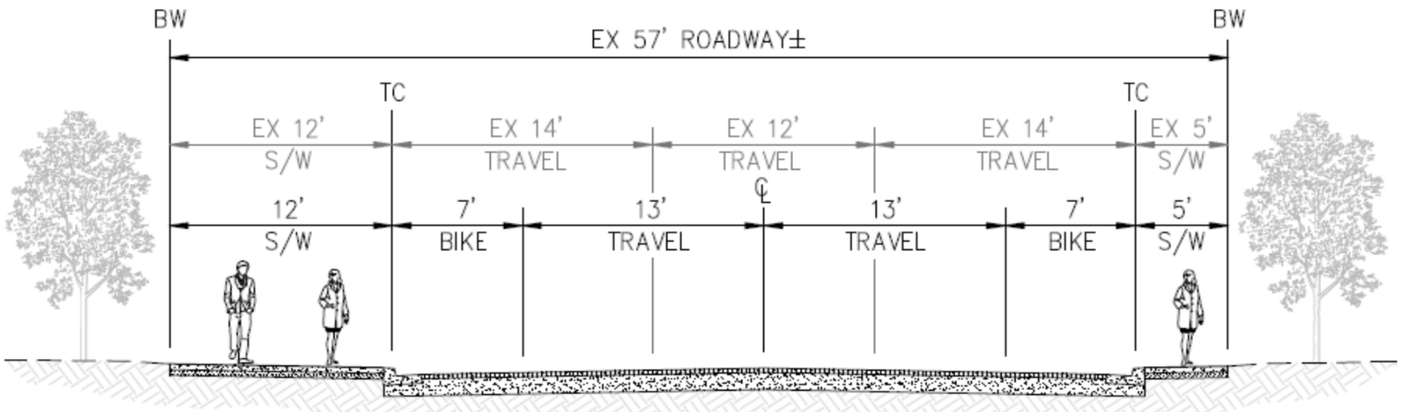


Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Clearing & Grubbing	0	LF	$	2.50	$	-
2	Remove Existing Pavement / Concrete	56	SF	$	1.00	$	56.00
3	Demo Ex Curb & Gutter	2	LF	$	10.00	$	20.00
4	Fine Grading	56	SF	$	0.50	$	28.00
5	4" AC	29	SF	$	2.20	$	63.80
6	14" AB *(Assume On-Site Re-Use)*	29	SF	$	1.40	$	40.60
7	SubGrade Fabric	32	SF	$	0.35	$	11.20
8	Pavement Sealant	29	SF	$	0.05	$	1.45
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Sidewalk	24	SF	$	6.50	$	156.00
11	Handicap Ramps *(Assume 2 every 500')*	1	LF	$	12.00	$	12.00
12	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
13	Parkway Irrigation and Landscaping	0	SF	$	7.50	$	-
14	Roadway Low Points *(2 Filter Boxes & 18" x-ing per 300')*	1	LF	$	74.35	$	74.35
15	Electroliers						*Included in Dry Utilities*
	TOTAL WEST MIDWAY AVENUE LINEAR FOOT COSTS					**$**	**518.40**
					SAY	**$**	**520.00**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

TOWER AVENUE - RECONSTRUCTION



Item	Description	Quantity	Unit	Unit Price	Cost per LF
1	Clearing & Grubbing	0	LF	$ 2.50	$ -
2	Remove Existing Pavement / Concrete	57	SF	$ 1.00	$ 57.00
3	Demo Ex Curb & Gutter	2	LF	$ 10.00	$ 20.00
4	Fine Grading	57	SF	$ 0.50	$ 28.50
5	4" AC	37	SF	$ 2.20	$ 81.40
6	14" AB *(Assume On-Site Re-Use)*	37	SF	$ 1.40	$ 51.80
7	SubGrade Fabric	40	SF	$ 0.35	$ 14.00
8	Pavement Sealant	37	SF	$ 0.05	$ 1.85
9	Curb & Gutter	2	LF	$ 25.00	$ 50.00
10	Sidewalk	17	SF	$ 6.50	$ 110.50
11	Handicap Ramps *(Assume 2 every 500')*	1	LF	$ 12.00	$ 12.00
12	Signing / Striping / Monuments	1	LF	$ 5.00	$ 5.00
13	Parkway Irrigation and Landscaping	0	SF	$ 7.50	$ -
14	Roadway Low Points *(2 Filter Boxes & 18" x-ing per 300')*	1	LF	$ 76.27	$ 76.27
15	Electroliers *(assume 1 every 150')*	1	LF	$ 26.67	$ 26.67
	TOTAL TOWER AVENUE LINEAR FOOT COSTS				**$ 534.98**
	SAY				**$ 535.00**

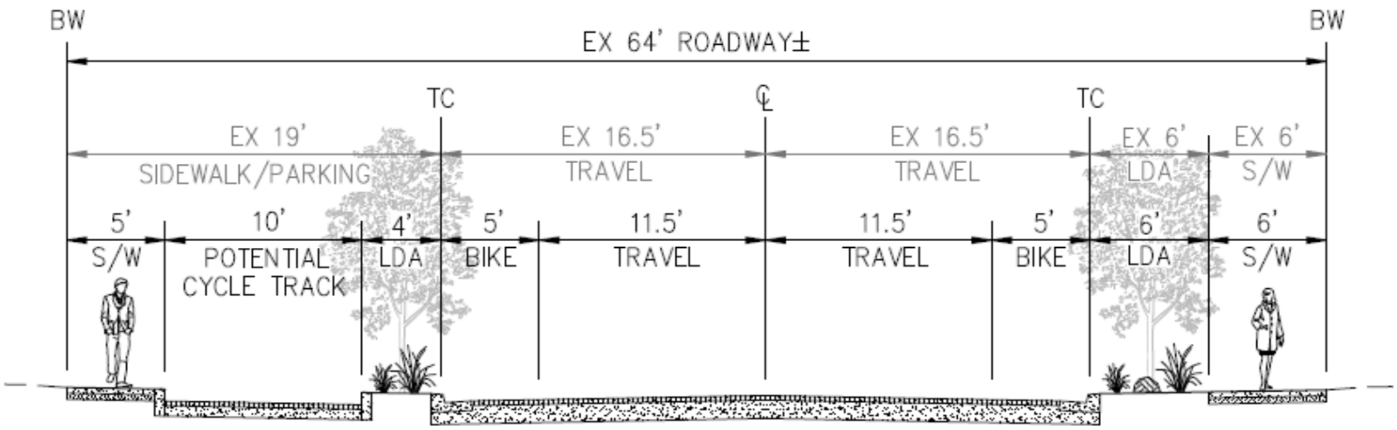
Carlson, Barbee & Gibson, Inc.

CIVIL ENGINEERS • SURVEYORS • PLANNERS

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

MONARCH STREET - RECONSTRUCTION



Item	Description	Quantity	Unit	Unit Price		Cost per LF	
1	Clearing & Grubbing	1	LF	$	2.50	$	2.50
2	Remove Existing Pavement / Concrete	58	SF	$	1.00	$	58.00
3	Demo Ex Curb & Gutter	1	LF	$	10.00	$	10.00
4	Fine Grading	64	SF	$	0.50	$	32.00
5	4" AC	30	SF	$	2.20	$	66.00
6	14" AB *(Assume On-Site Re-Use)*	30	SF	$	1.40	$	42.00
7	SubGrade Fabric	33	SF	$	0.35	$	11.55
8	Pavement Sealant	30	SF	$	0.05	$	1.50
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Median Curb *(Cycle Track)*	2	LF	$	20.00	$	40.00
11	Sidewalk	11	SF	$	6.50	$	71.50
12	Bike Path *(AC)*	10	SF	$	3.00	$	30.00
13	Handicap Ramps *(Assume 1 every 500')*	1	LF	$	6.00	$	6.00
14	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
15	Parkway Irrigation and Landscaping	10	SF	$	7.50	$	75.00
16	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	29.25	$	29.25
17	Electroliers				*Included in Dry Utilities*		
	TOTAL MONARCH STREET LINEAR FOOT COSTS					**$**	**530.30**
					SAY	**$**	**530.00**

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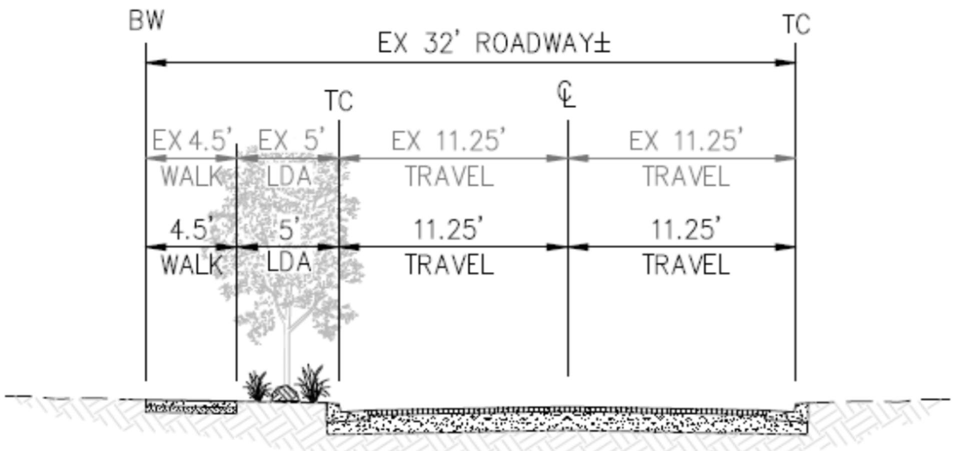
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

BIG WHITES - RECONSTRUCTION



Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Clearing & Grubbing	1	LF	$	2.50	$	2.50
2	Remove Existing Pavement / Concrete	27	SF	$	1.00	$	27.00
3	Demo Ex Curb & Gutter	2	LF	$	10.00	$	20.00
4	Fine Grading	32	SF	$	0.50	$	16.00
5	4" AC	19.5	SF	$	2.20	$	42.90
6	14" AB *(Assume On-Site Re-Use)*	19.5	SF	$	1.40	$	27.30
7	SubGrade Fabric	22.5	SF	$	0.35	$	7.88
8	Pavement Sealant	19.5	SF	$	0.05	$	0.98
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Sidewalk	4.5	SF	$	6.50	$	29.25
11	Handicap Ramps *(Assume 1 every 500')*	1	LF	$	6.00	$	6.00
12	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
13	Parkway Irrigation and Landscaping	5	SF	$	7.50	$	37.50
14	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	26.73	$	26.73
15	Electroliers						*Included in Dry Utilities*

TOTAL BIG WHITES LINEAR FOOT COSTS $ 299.03

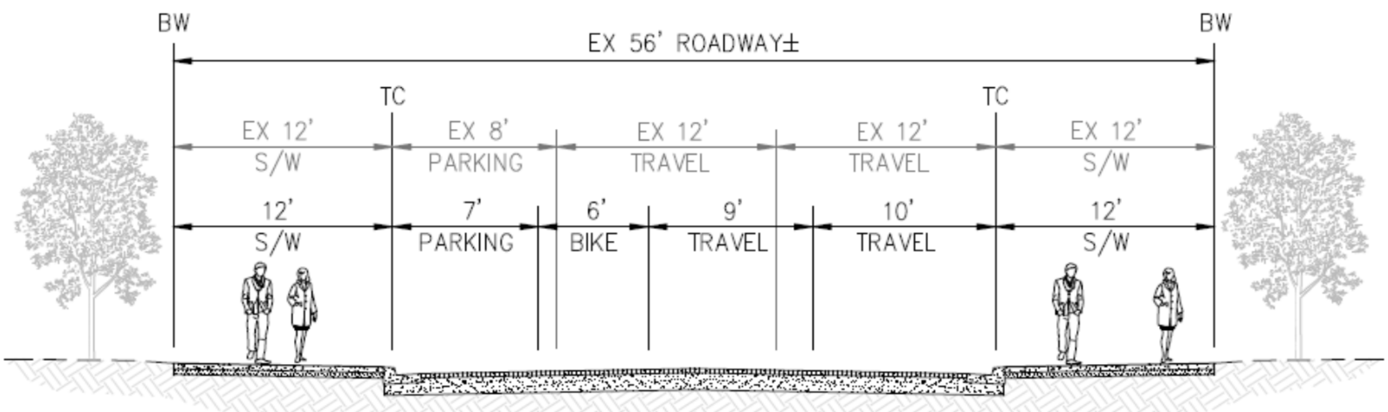
SAY $ 300.00

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

LEXINGTON STREET

Note: Costs below are for Lexington Street south of West Ranger Avenue.



Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Clearing & Grubbing	0	LF	$	2.50	$	-
2	Remove Existing Pavement / Concrete	56	SF	$	1.00	$	56.00
3	Demo Ex Curb & Gutter	0	LF	$	10.00	$	-
4	Fine Grading	56	SF	$	0.50	$	28.00
5	4" AC	29	SF	$	2.20	$	63.80
6	14" AB *(Assume On-Site Re-Use)*	29	SF	$	1.40	$	40.60
7	SubGrade Fabric	32	SF	$	0.35	$	11.20
8	Pavement Sealant	29	SF	$	0.05	$	1.45
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Sidewalk	24	SF	$	6.50	$	156.00
11	Handicap Ramps *(Assume 1 every 500')*	1	LF	$	6.00	$	6.00
12	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
13	Parkway Irrigation and Landscaping	0	SF	$	7.50	$	-
14	Roadway Low Points *(2 Filter Boxes & 18" x-ing per 300')*	1	LF	$	74.35	$	74.35
15	Electroliers *(Assume 1 every 150')*	1	LF	$	26.67	$	26.67
					TOTAL LEXINGTON STREET LINEAR FOOT COSTS	**$**	**519.06**
					SAY	**$**	**520.00**

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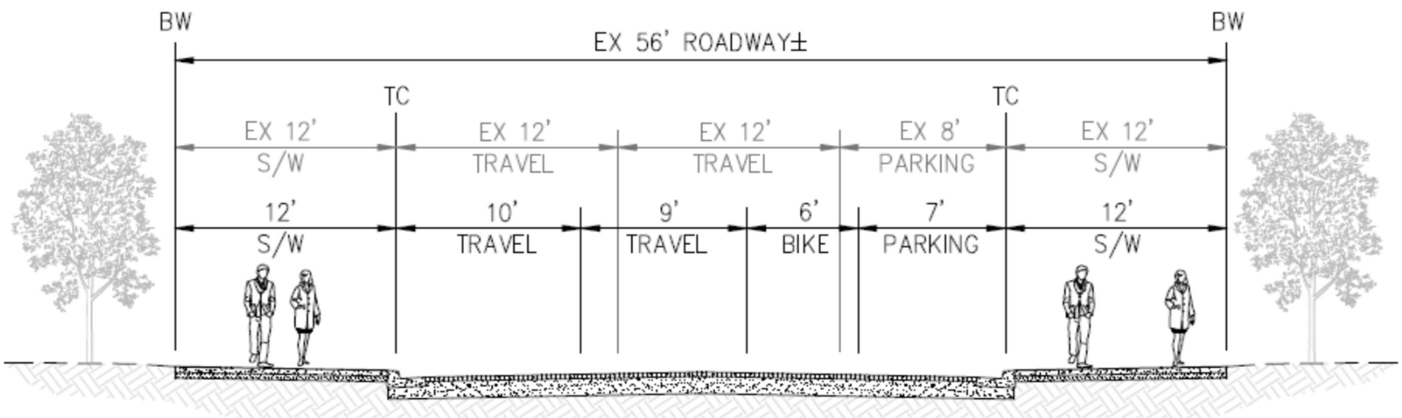
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

SARATOGA STREET

Note: Costs below are for Saratoga Street south of West Ranger Avenue.



Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Clearing & Grubbing	0	LF	$	2.50	$	-
2	Remove Existing Pavement / Concrete	56	SF	$	1.00	$	56.00
3	Demo Ex Curb & Gutter	0	LF	$	10.00	$	-
4	Fine Grading	56	SF	$	0.50	$	28.00
5	4" AC	29	SF	$	2.20	$	63.80
6	14" AB *(Assume On-Site Re-Use)*	29	SF	$	1.40	$	40.60
7	SubGrade Fabric	32	SF	$	0.35	$	11.20
8	Pavement Sealant	29	SF	$	0.05	$	1.45
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Sidewalk	24	SF	$	6.50	$	156.00
11	Handicap Ramps *(Assume 1 every 500')*	1	LF	$	6.00	$	6.00
12	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
13	Parkway Irrigation and Landscaping	0	SF	$	7.50	$	-
14	Roadway Low Points *(2 Filter Boxes & 18" x-ing per 300')*	1	LF	$	74.35	$	74.35
15	Electroliers *(Assume 1 every 150')*	1	LF	$	26.67	$	26.67
	TOTAL SARATOGA STREET LINEAR FOOT COSTS					**$**	**519.06**
					SAY	**$**	**520.00**

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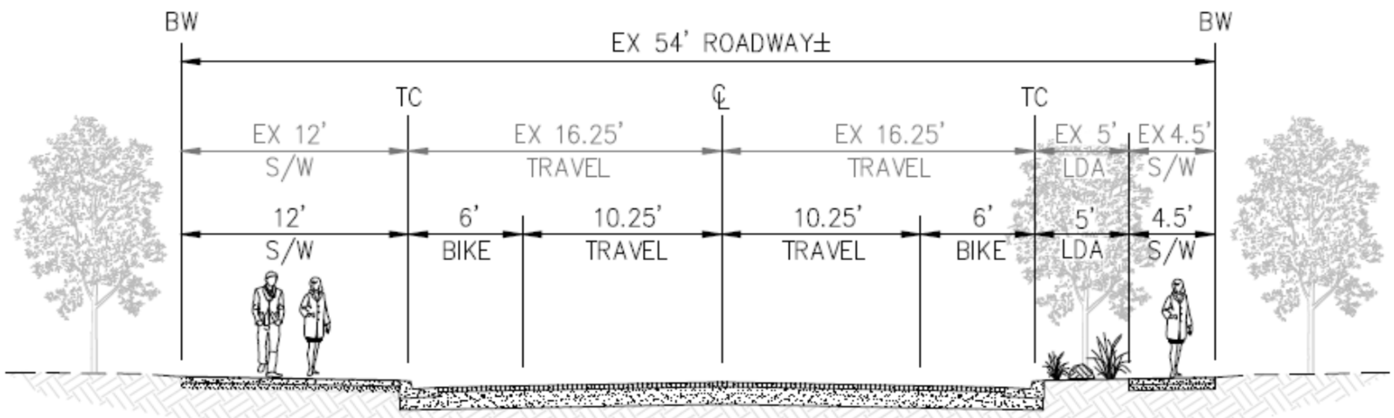
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

PAN AM WAY

Note: Costs below are for Pan Am Way north of West Redline Avenue.



Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Clearing & Grubbing	1	LF	$	2.50	$	2.50
2	Remove Existing Pavement / Concrete	49	SF	$	1.00	$	49.00
3	Demo Ex Curb & Gutter	2	LF	$	10.00	$	20.00
4	Fine Grading	54	SF	$	0.50	$	27.00
5	4" AC	29.5	SF	$	2.20	$	64.90
6	14" AB *(Assume On-Site Re-Use)*	29.5	SF	$	1.40	$	41.30
7	SubGrade Fabric	32.5	SF	$	0.35	$	11.38
8	Pavement Sealant	29.5	SF	$	0.05	$	1.48
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Sidewalk	16.5	SF	$	6.50	$	107.25
11	Handicap Ramps *(Assume 1 every 500')*	1	LF	$	6.00	$	6.00
12	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
13	Parkway Irrigation and Landscaping	5	SF	$	7.50	$	37.50
14	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	29.13	$	29.13
15	Electroliers *(Assume 1 every 150')*	1	LF	$	26.67	$	26.67
	TOTAL PAN AM WAY LINEAR FOOT COSTS					**$**	**479.10**
					SAY	**$**	**480.00**

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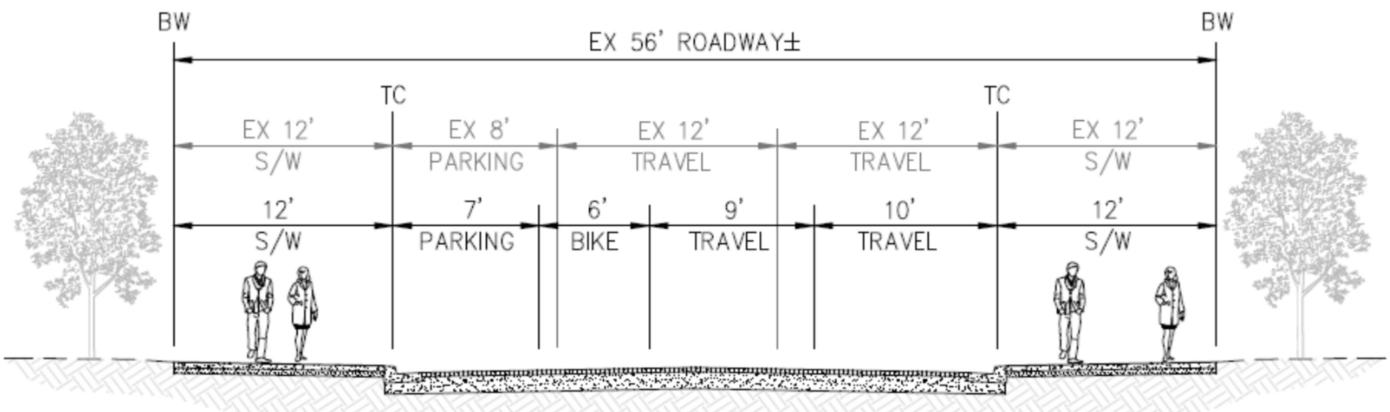
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

LEXINGTON STREET - RECONSTRUCTION

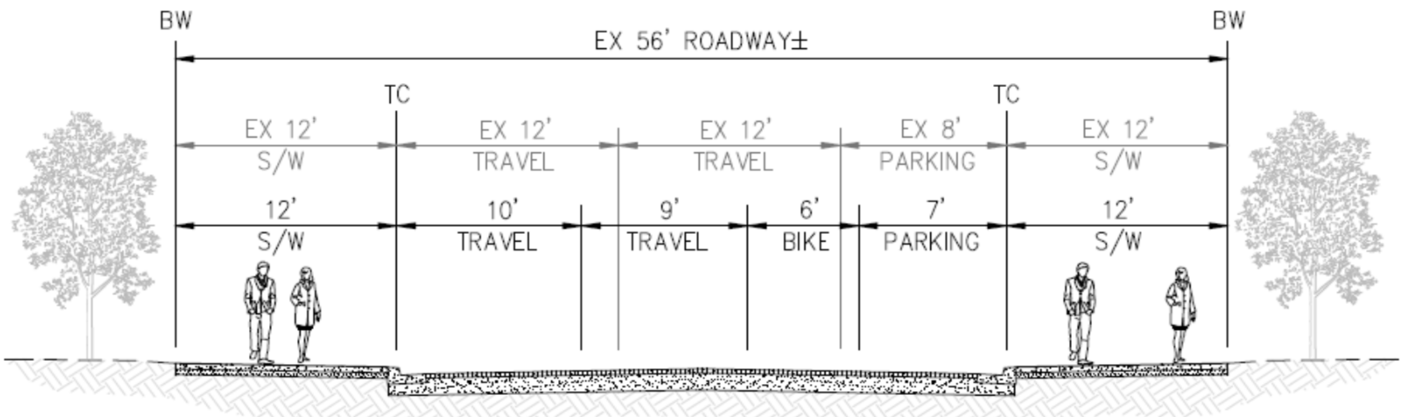


Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Clearing & Grubbing	0	LF	$	2.50	$	-
2	Remove Existing Pavement / Concrete	56	SF	$	1.00	$	56.00
3	Demo Ex Curb & Gutter	2	LF	$	10.00	$	20.00
4	Fine Grading	56	SF	$	0.50	$	28.00
5	4" AC	29	SF	$	2.20	$	63.80
6	14" AB *(Assume On-Site Re-Use)*	29	SF	$	1.40	$	40.60
7	SubGrade Fabric	32	SF	$	0.35	$	11.20
8	Pavement Sealant	29	SF	$	0.05	$	1.45
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Sidewalk	24	SF	$	6.50	$	156.00
11	Handicap Ramps *(Assume 1 every 500')*	1	LF	$	6.00	$	6.00
12	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
13	Parkway Irrigation and Landscaping	0	SF	$	7.50	$	-
14	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	29.01	$	29.01
15	Electroliers						*Included in Dry Utilities*
	TOTAL LEXINGTON STREET LINEAR FOOT COSTS					**$**	**467.06**
					SAY	**$**	**470.00**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

SARATOGA STREET - RECONSTRUCTION



Item	Description	Quantity	Unit	Unit Price	Cost per LF
1	Clearing & Grubbing	0	LF	$ 2.50	$ -
2	Remove Existing Pavement / Concrete	56	SF	$ 1.00	$ 56.00
3	Demo Ex Curb & Gutter	2	LF	$ 10.00	$ 20.00
4	Fine Grading	56	SF	$ 0.50	$ 28.00
5	4" AC	29	SF	$ 2.20	$ 63.80
6	14" AB *(Assume On-Site Re-Use)*	29	SF	$ 1.40	$ 40.60
7	SubGrade Fabric	32	SF	$ 0.35	$ 11.20
8	Pavement Sealant	29	SF	$ 0.05	$ 1.45
9	Curb & Gutter	2	LF	$ 25.00	$ 50.00
10	Sidewalk	24	SF	$ 6.50	$ 156.00
11	Handicap Ramps *(Assume 1 every 500')*	1	LF	$ 6.00	$ 6.00
12	Signing / Striping / Monuments	1	LF	$ 5.00	$ 5.00
13	Parkway Irrigation and Landscaping	0	SF	$ 7.50	$ -
14	Roadway Low Points *(2 Filter Boxes & 18" x-ing per 300')*	1	LF	$ 29.01	$ 29.01
15	Electroliers				*Included in Dry Utilities*

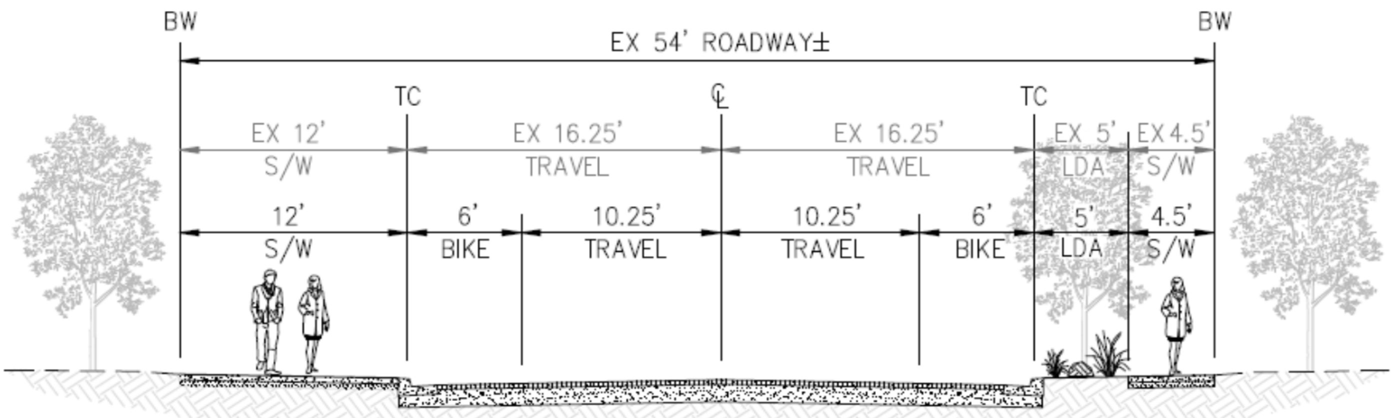
TOTAL SARATOGA STREET LINEAR FOOT COSTS $ 467.06

SAY $ 470.00

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

PAN AM WAY - RECONSTRUCTION

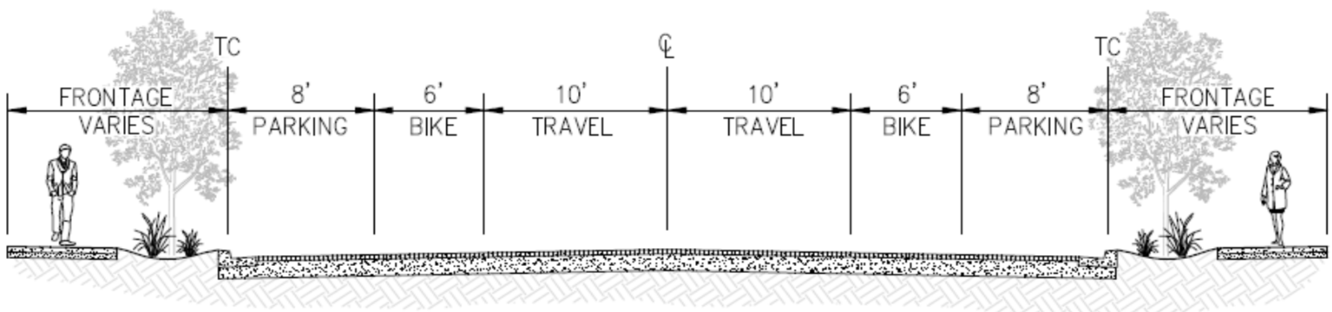


Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Clearing & Grubbing	1	LF	$	2.50	$	2.50
2	Remove Existing Pavement / Concrete	49	SF	$	1.00	$	49.00
3	Demo Ex Curb & Gutter	2	LF	$	10.00	$	20.00
4	Fine Grading	54	SF	$	0.50	$	27.00
5	4" AC	29.5	SF	$	2.20	$	64.90
6	14" AB *(Assume On-Site Re-Use)*	29.5	SF	$	1.40	$	41.30
7	SubGrade Fabric	32.5	SF	$	0.35	$	11.38
8	Pavement Sealant	29.5	SF	$	0.05	$	1.48
9	Curb & Gutter	2	LF	$	25.00	$	50.00
10	Sidewalk	16.5	SF	$	6.50	$	107.25
11	Handicap Ramps *(Assume 1 every 500')*	1	LF	$	6.00	$	6.00
12	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
13	Parkway Irrigation and Landscaping	5	SF	$	7.50	$	37.50
14	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	29.13	$	29.13
15	Electroliers						*Included in Dry Utilities*
					TOTAL PAN AM WAY LINEAR FOOT COSTS	**$**	**452.43**
					SAY	**$**	**455.00**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

LOCAL STREETS (RESIDENTIAL) - WITH BIKE LANES
(Assumed Frontage: 5' Sidewalk & 6' Landscaping)



Item	Description	Quantity	Unit		Unit Price		Cost per LF
1	Grading						*Included in Grading*
2	Remove Existing Pavement						*Included in Demolition*
3	Fine Grading	70	SF	$	0.50	$	35.00
4	4" AC	45	SF	$	2.20	$	99.00
5	14" AB *(Assume On-Site Re-Use)*	45	SF	$	1.40	$	63.00
6	SubGrade Fabric	48	SF	$	0.35	$	16.80
7	Pavement Sealant	45	SF	$	0.05	$	2.25
8	Curb & Gutter	2	LF	$	25.00	$	50.00
9	Sidewalk	10	SF	$	6.50	$	65.00
10	Handicap Ramps *(Assume 2 every 500')*	1	LF	$	12.00	$	12.00
11	Signing / Striping / Monuments	1	LF	$	5.00	$	5.00
12	Parkway Irrigation and Landscaping	12	SF	$	7.50	$	90.00
13	Roadway Low Points *(2 CB's & 18" crossing every 300')*	1	LF	$	32.85	$	32.85
14	Electroliers						*Included in Dry Utilities*

TOTAL LOCAL STREETS (COMMERCIAL & RESIDENTIAL) STREET LINEAR FOOT COSTS $ 470.90

SAY $ 470.00

Carlson, Barbee & Gibson, Inc.
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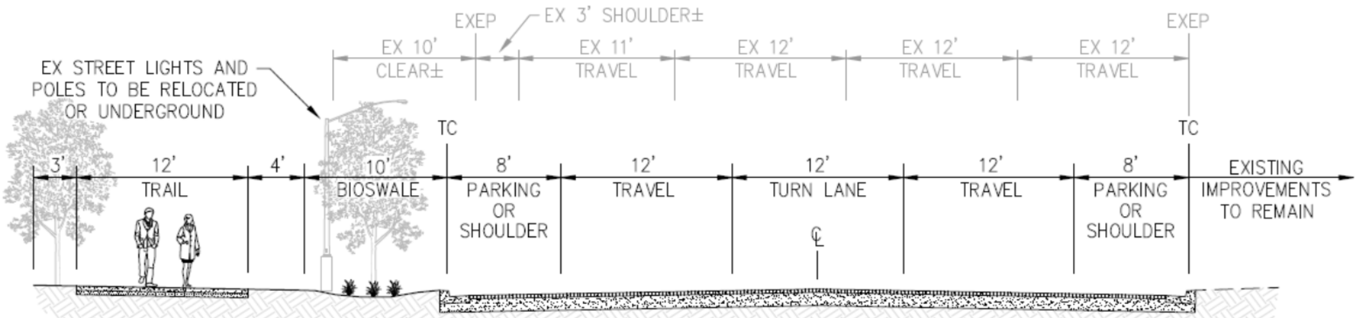
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit	Unit Price	Cost per LF
	MAIN STREET - MITCHELL MOSLEY TO MAIN GATE				



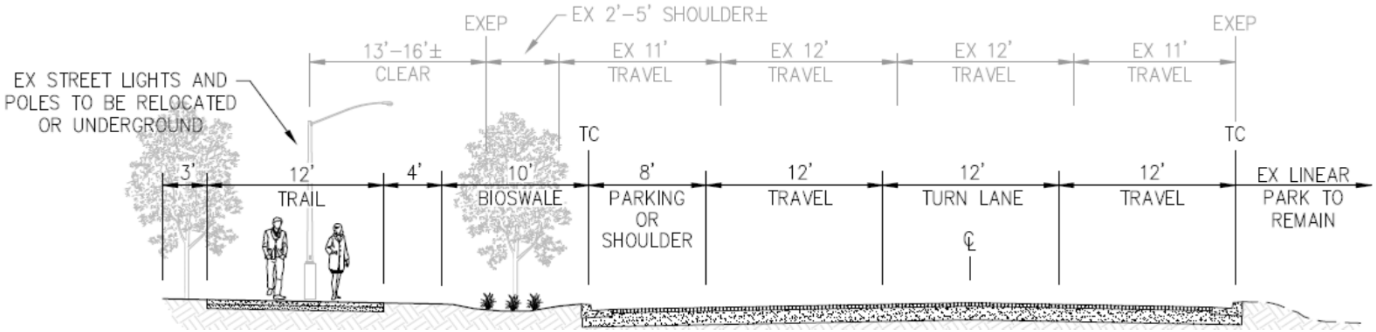
Item	Description	Quantity	Unit	Unit Price	Cost per LF
1	Clearing & Grubbing	1	LF	$ 2.50	$ 2.50
2	Grading	5	CY	$ 10.00	$ 50.00
3	Fine Grading	62	SF	$ 0.50	$ 31.00
4	Sawcut Existing Pavement	0	LF	$ 4.00	$ -
5	Remove Existing Pavement / Concrete	50	SF	$ 1.00	$ 50.00
6	Demo Ex Curb & Gutter	0	LF	$ 10.00	$ -
7	5" AC	49	SF	$ 2.75	$ 134.75
8	22" AB *(Assume On-Site Re-Use)*	49	SF	$ 2.20	$ 107.80
9	SubGrade Fabric	52	SF	$ 0.35	$ 18.20
10	Pavement Sealant	49	SF	$ 0.05	$ 2.45
11	Curb & Gutter	2	LF	$ 25.00	$ 50.00
12	Median Curb	0	LF	$ 20.00	$ -
13	Sidewalk	0	SF	$ 6.50	$ -
14	Bike Path & Buffer - *See Bay Trail In-Tract Costs*	0	SF	$ 3.00	$ -
15	Handicap Ramps *(Assume 2 every 500')*	1	LF	$ 12.00	$ 12.00
16	Signing / Striping / Monuments	1	LF	$ 10.00	$ 10.00
17	Local Storm Drain *(24" main & 18" crossings every 300')*	1	LF	$ 110.00	$ 110.00
18	Storm Drain Catch Basins *(Assume 2 every 300')*	1	LF	$ 21.33	$ 21.33
19	Roadside Vegetated Swales	1	LF	$ 60.00	$ 60.00
20	Median Irrigation and Landscaping	0	SF	$ 7.50	$ -
21	Parkway Irrigation and Landscaping	0	SF	$ 7.50	$ -
22	Traffic Control	1	LF	$ 40.00	$ 40.00
23	Construction Sequencing	1	LF	$ 20.00	$ 20.00
24	Electroliers *(See Relocation In-Tract Costs)*	0	LF	$ 26.67	$ -
	TOTAL MAIN STREET RECONSTRUCTION LINEAR FOOT COSTS				**$ 720.03**
				SAY	**$ 720.00**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit	Unit Price	Cost per LF

MAIN STREET - ATLANTIC AVENUE TO MITCHELL MOSLEY



Item	Description	Quantity	Unit	Unit Price	Cost per LF
1	Clearing & Grubbing	1	LF	$ 2.50	$ 2.50
2	Grading	7	CY	$ 10.00	$ 70.00
3	Fine Grading	54	SF	$ 0.50	$ 27.00
4	Sawcut Existing Pavement	0	LF	$ 4.00	$ -
5	Remove Existing Pavement / Concrete	51	SF	$ 1.00	$ 51.00
6	Demo Ex Curb & Gutter	0	LF	$ 10.00	$ -
7	5" AC	41	SF	$ 2.75	$ 112.75
8	22" AB *(Assume On-Site Re-Use)*	41	SF	$ 2.20	$ 90.20
9	SubGrade Fabric	44	SF	$ 0.35	$ 15.40
10	Pavement Sealant	41	SF	$ 0.05	$ 2.05
11	Curb & Gutter	2	LF	$ 25.00	$ 50.00
12	Median Curb	0	LF	$ 20.00	$ -
13	Sidewalk	0	SF	$ 6.50	$ -
14	Bike Path & Buffer - *See Bay Trail In-Tract Costs*	0	SF	$ 3.00	$ -
15	Handicap Ramps *(Assume 2 every 500')*	1	LF	$ 12.00	$ 12.00
16	Signing / Striping / Monuments	1	LF	$ 10.00	$ 10.00
17	Local Storm Drain *(24" main & 18" crossings every 300')*	1	LF	$ 110.00	$ 110.00
18	Storm Drain Catch Basins *(Assume 2 every 300')*	1	LF	$ 21.33	$ 21.33
19	Roadside Vegetated Swales	1	LF	$ 60.00	$ 60.00
20	Median Irrigation and Landscaping	0	SF	$ 7.50	$ -
21	Parkway Irrigation and Landscaping	0	SF	$ 7.50	$ -
22	Traffic Control	1	LF	$ 40.00	$ 40.00
23	Construction Sequencing	1	LF	$ 20.00	$ 20.00
24	Electroliers *(See Relocation In-Tract Costs)*	0	LF	$ 26.67	$ -
	TOTAL MAIN STREET RECONSTRUCTION LINEAR FOOT COSTS				**$ 694.23**
	SAY				**$ 695.00**

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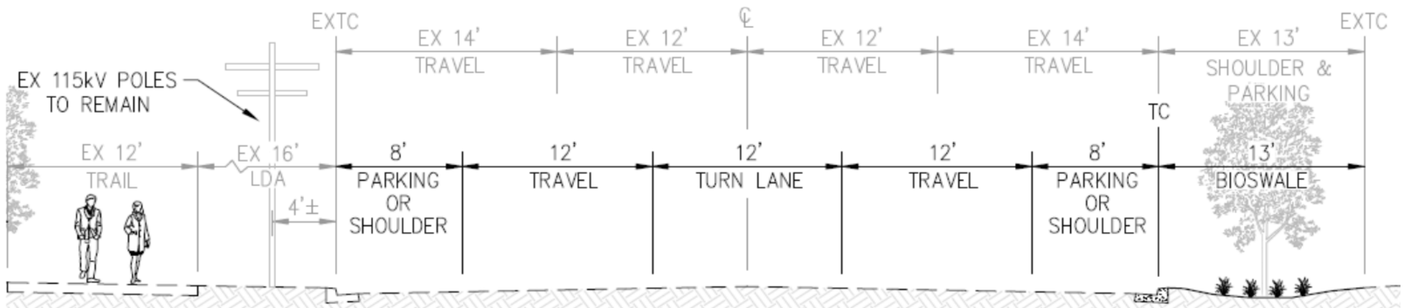
ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPICAL PER FOOT STREET COSTS
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

MAIN STREET - PACIFIC AVENUE TO ATLANTIC AVENUE



Item	Description	Quantity	Unit	Unit Price		Cost per LF	
1	Clearing & Grubbing	0	LF	$	2.50	$	-
2	Grading	0	CY	$	10.00	$	-
3	Fine Grading	0	SF	$	0.50	$	-
4	Sawcut Existing Pavement	0	LF	$	4.00	$	-
5	Remove Existing Pavement / Concrete	13	SF	$	1.00	$	13.00
6	Demo Ex Curb & Gutter	1	LF	$	10.00	$	10.00
7	5" AC	0	SF	$	2.75	$	-
8	22" AB *(Assume On-Site Re-Use)*	0	SF	$	2.20	$	-
9	2" AC Overlay Existing Pavement	52	SF	$	2.00	$	104.00
10	SubGrade Fabric	0	SF	$	0.35	$	-
11	Pavement Sealant	0	SF	$	0.05	$	-
12	Curb & Gutter	1	LF	$	25.00	$	25.00
13	Median Curb	0	LF	$	20.00	$	-
14	Sidewalk	0	SF	$	6.50	$	-
15	Bike Path & Buffer - *See Bay Trail In-Tract Costs*	0	SF	$	3.00	$	-
16	Handicap Ramps *(Assume 2 every 500')*	1	LF	$	12.00	$	12.00
17	Signing / Striping / Monuments	1	LF	$	10.00	$	10.00
18	Local Storm Drain *(24" main & 18" crossings every 300')*	0	LF	$	110.00	$	-
19	Storm Drain Catch Basins *(Assume 2 every 300')*	0	LF	$	21.33	$	-
20	Roadside Vegetated Swales	1	LF	$	60.00	$	60.00
21	Median Irrigation and Landscaping	0	SF	$	7.50	$	-
22	Parkway Irrigation and Landscaping	0	SF	$	7.50	$	-
23	Traffic Control	1	LF	$	40.00	$	40.00
24	Construction Sequencing	1	LF	$	20.00	$	20.00
25	Electroliers *(Assume 1 every 150')*	0	LF	$	26.67	$	-

TOTAL MAIN STREET RECONSTRUCTION LINEAR FOOT COSTS $ 294.00

SAY $ 295.00

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
FERRY PARKING LOT EXPANSION
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Cost per LF
	FERRY PARKING LOT EXPANSION (24,000 SF PAVEMENT±)						
1	Clearing & Grubbing	23,000	SF	$	2.50	$	57,500
2	Grading - Import 1'	1,000	CY	$	25	$	25,000
3	Fine Grading	26,000	SF	$	1	$	26,000
4	Sawcut Existing Pavement	375	LF	$	4	$	1,500
5	Remove Existing Pavement / Concrete	3,000	SF	$	1	$	3,000
6	Demo Ex Curb & Gutter	375	LF	$	10	$	3,750
7	Remove Existing Fence at Dog Park	550	LF	$	5	$	2,750
8	4" AC	24,000	SF	$	2.20	$	52,800
9	14" AB *(Assume On-Site Re-Use)*	24,000	SF	$	2.10	$	50,400
10	Pavement Slurry Existing Parking Lot	52,000	SF	$	1	$	52,000
11	SubGrade Fabric	24,000	SF	$	0.35	$	8,400
12	Pavement Sealant	24,000	SF	$	0.05	$	1,200
13	Median Curb	300	LF	$	20	$	6,000
14	8' Sidewalk	2,500	SF	$	6.50	$	16,250
15	Handicap Ramps	1	EA	$	3,000	$	3,000
16	Signing / Striping / Monuments	1	LS	$	5,000	$	5,000
17	Restripe Existing Parking Lot	1	LS	$	5,000	$	5,000
18	18" Storm Drain	250	LF	$	72	$	18,000
19	Storm Drain Field Inlets	3	EA	$	3,200	$	9,600
20	Irrigation and Landscaping	1	LS	$	50,000	$	50,000
21	Traffic Control	1	LS	$	5,000	$	5,000
22	Construction Sequencing	1	LS	$	5,000	$	5,000
23	Electroliers	10	EA	$	4,000	$	40,000
24	New Fence Line at Dog Park	125	LF	$	50	$	6,250

TOTAL FERRY PARKING LOT EXPANSION COSTS	**$**	**453,400**
25% CONTINGENCY	**$**	**113,350**
TOTAL FERRY PARKING LOT EXPANSION COSTS	**$**	**570,000**
TOTAL FERRY PARKING LOT EXPANSION COSTS (PER SF)	**$**	**23.75**

ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
STARGELL AVENUE BIKE PATH
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Cost per LF
	STARGELL AVENUE BIKE PATH						
1	Clearing & Grubbing	1	LF	$	2.50	$	2.50
2	Fine Grading	20	SF	$	1	$	20
3	Bike Path - *Class I Trail*	10	SF	$	3	$	30
4	Jogging Path - C*ompacted Rock*	5	SF	$	2	$	10
5	Reconfigure Existing Landscape - *@ Shinsei Gardens*	1	LF	$	12	$	12
6	Handicap Ramps	1	LF	$	7.50	$	7.50
7	Furniture - *Benches, Signs, Etc.*	1	LF	$	5	$	5
8	Lighting	1	LF	$	50	$	50
9	Passive Landscaping	5	SF	$	1	$	5
	SUBTOTAL STARGELL AVENUE BIKE PATH LINEAR FOOT COSTS					**$**	**142.00**
	TOTAL LF						**2,800**
	SUBTOTAL STARGELL AVENUE BIKE PATH COSTS					**$**	**400,000**

Carlson, Barbee & Gibson, Inc.
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ALAMEDA POINT
BACKBONE INFRASTRUCTURE
ENGINEER'S PRELIMINARY CONSTRUCTION COST ESTIMATE
NORTHWEST TERRITORIES BAY TRAIL
ALAMEDA, CALIFORNIA

August 8, 2013
Job No.: 1087-010

Item	Description	Quantity	Unit		Unit Price		Cost per LF
	NORTHWEST TERRITORIES BAY TRAIL - RAISE TO ELEVATION 5.1 (CITY DATUM)						
1	Clearing & Grubbing / Existing Pavement Removal	1	LF	$	28	$	28
2	Fine Grading *(20' Flat, 2:1 to Existing Ground)*	32	SF	$	1	$	32
3	Borrow Dirt from On-Site Source *(Raise Elevation Average 2.0'+/-)*	2	CY	$	10	$	20
4	Bay Trail	12	SF	$	3	$	36
5	Rock Slope Protection	1	LF	$	100	$	100
6	Fencing	2	LF	$	20	$	40
7	Furniture - *Benches, Signs, Etc.*	1	LF	$	5	$	5
8	Lighting	1	LF	$	50	$	50
9	Passive Landscaping	12	SF	$	1	$	12
	SUBTOTAL RAISE TO ELEVATION 5.1 (CITY DATUM) LINEAR FOOT COSTS					**$**	**323**
	TOTAL LF						**22,150**
	SUBTOTAL RAISE TO ELEVATION 5.1 (CITY DATUM) COSTS					**$**	**7,154,000**
	NORTHWEST TERRITORIES BAY TRAIL - AT GRADE						
10	Clearing & Grubbing / Existing Pavement Removal	1	LF	$	28	$	28
11	Fine Grading *(20' Flat, 2:1 to Existing Ground)*	32	SF	$	1	$	32
12	Bay Trail	12	SF	$	3	$	36
13	Fencing	2	LF	$	20	$	40
14	Furniture - *Benches, Signs, Etc.*	1	LF	$	5	$	5
15	Lighting	1	LF	$	50	$	50
16	Passive Landscaping	12	SF	$	1	$	12
	SUBTOTAL AT GRADE LINEAR FOOT COSTS					**$**	**203**
	TOTAL LF						**5,800**
	SUBTOTAL AT GRADE COSTS					**$**	**1,177,000**
	TOTAL NORTHWEST TERRITORIES BAY TRAIL COSTS ***(Excluding Contingencies and Soft Costs)***					**$**	**8,330,000**