OFFICE OF THE
CITY ADMINISTRATOR

Gavin Newsom, Mayor
Edwin M. Lee, City Administrator

December 21, 2007

Mr. Eric Simmons, CFM
National Flood Insurance Program
Region IX, Mitigation Division
U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, California 94607-4052

Subject: September 21, 2007 Preliminary Flood Insurance Rate Map
Comments from the City and County of San Francisco

Dear Mr. Simmons:

The City and County of San Francisco (CCSF) is submitting comments on the preliminary Flood Insurance Rate Map (FIRM) for San Francisco, issued by the Federal Emergency Management Agency (FEMA) on September 21, 2007.

Our requested changes to the preliminary FIRM are summarized in the enclosed table. Each of the changes is based on technical data. The data supporting each of the changes, prepared by the Port of San Francisco and the San Francisco Redevelopment Agency, is also enclosed.

We are also submitting technical comments from the Mayor's Office of Base Reuse and the Treasure Island Development Authority and its consultants (Moffat & Nichol). Based on the issues raised by Moffat & Nichol, we are not in the position to agree or disagree with your findings at this time, but wanted to begin discussions with FEMA about questions that were raised and how the resolution of these issues may affect the current preliminary FIRM as well as the more detailed analysis that FEMA is currently preparing.

It is our understanding that you will review the supporting data and revise the preliminary FIRM as appropriate. CCSF requests a review of the resulting changes to the FIRM prior to its finalization. Additionally, as we have discussed earlier, we request delaying publication of the final FIRM until the more detailed analysis of coastal high hazard areas of San Francisco Bay is complete, with the understanding that CCSF will join the National Flood Insurance Program in the meantime.

We look forward to your response. If you have questions, please do not hesitate to contact me at (415) 554-7124.

Sincerely,

Linda S. Yeung
Associate City Administrator

1 Dr. Carlton B. Goodlett Place, City Hall, Room 362, San Francisco, CA 94102
Telephone (415) 554-4851; Fax (415) 554-4849

City and County of San Francisco
Summary of Requested Changes to the September 21, 2007
Preliminary Flood Insurance Rate Map (FIRM)

December 21, 2007

The table below summarizes requested changes to the preliminary FIRM for the City and County of San Francisco (CCSF).

Item No.	Comment	Map Number	Supporting Data
1	Remove the Special Flood Hazard Area (SFHA) designation from Pier 41 south to pier 50 (inclusive) and remove the Port piers, wharf structures and landside improvements protected by these structures; and designate these areas as Zone X.	06075C 0120A	December 14, 2007 report and attachments prepared by the Port of San Francisco. See Appendix A.
2	Remove the SFHA designation from existing high ground to the north of Mission Creek in the Mission Bay North Redevelopment area and designate these areas as Zone X.	06075C 0120A	Topographic data provided by the San Francisco Redevelopment Agency and Winzler & Kelly. See Appendix B.

Cc: Ed Lee, City Administrator
The Honorable Sean Elsbernd
Brad Benson, Port of San Francisco
Ed Byrne, Port of San Francisco
Catherine Reilly, San Francisco Redevelopment Agency
John Roddy, City Attorney's Office
Bruce Storrs, City and County Surveyor
Jack Sylvan, Treasure Island Development Project

Appendix A

Port of San Francisco

Comments on FEMA Preliminary Flood Insurance Rate Map

See 4 separate binders and disk

Port of San Francisco

Comments on the FEMA Preliminary Flood Insurance Rate Map

by

Port of San Francisco Engineering Division
14 December 2007

Edward F. Byrne
Chief Harbor Engineer

Engineering Report
Table of Contents

A. INTRODUCTION

1. Background

This report documents and provides the technical basis for the Port of San Francisco's (Port) response and comments to FEMA's Preliminary Flood Insurance Rate Map (FIRM) published on September 21, 2007. The analysis and certifications included in this report show that: 1) the Port's piers and wharfs are structurally sufficient to withstand the effects of wave action and most of the pier decks are above the expected wave heights and therefore should be removed from the Special Flood Hazard Area (SFHA) and shown on the maps as Zone X; 2) the Port's seawall sections are structurally sufficient and have adequate height above the expected wave heights to provide protection against the 100-year flood event (1% annual chance flood) and therefore the landside improvements should be removed from the SFHA and shown on the maps as Zone X; and 3) the breakwaters are structurally sufficient to provide protection to many areas of the Port waterfront by reducing the wave height. Since the breakwaters provide significant flood protection, the Port requests that FEMA should re-analyze the projected 100-year flood elevations in the areas behind the breakwaters to account for their effect.

FEMA's team of coastal engineers reviewed historic data, coastal topography and performed a preliminary hydrological and hydraulic analysis including a probabilistic analysis to establish the impact 100-year flood event for the San Francisco waterfront. FEMA has now completed the preliminary analysis and has established a preliminary FIRM. This map depicts the water elevations anticipated for a 100-year flood for the Port's waterfront. The preliminary FIRM for the Port's waterfront is shown in Appendix A. Study of the preliminary FIRM indicates that much of the Port waterfront including the finger piers, marginal wharfs, Herb Caen Promenade and much of the Embarcadero roadway is within a SFHA designated as Zone V. Zone V is defined by FEMA for this San Francisco Bay study as:

> "Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply."

Since FEMA did not determine the BFEs for the Port's waterfront, the preliminary FIRM is based on Total Water Level (TWL) that was established by the analysis. The TWL elevations were transmitted to the Port in a spreadsheet format accompanied with a map showing the locations where the elevations were calculated. A copy of this FEMA transmittal is included in the Appendix B. The TWL elevation includes the effect of storm surge and wave and, thus, represents the maximum expected water elevation projected by FEMA's analysis. Initial analysis by the Port's Engineering Division indicates that most of the Port's finger piers, wharfs and roadways have a freeboard (or clearance) of one foot or more above the TWL elevations projected by FEMA for the 100 year storm event. FEMA informed the Port that the FEMA analysis did not account for the Port's waterfront seawall and breakwater structures which Provide considerable flood protection.

The engineering analyses and certifications included in this report demonstrate that the Port's waterfront facilities offer considerable protection to flooding that must to be considered in the determination of Special Flood Hazard areas along the Port's waterfront. This report analyzes only the Port waterfront facilities from Pier 41 on the north to Pier 50 in the south. Port facilities to the north of Pier 41, including the Fisherman's Wharf Area, are not addressed in this report since FEMA indicated further TWL analysis is required in this area. The Port requests that FEMA revise the analysis to include the wave dissipating effect of the existing local breakwaters in the area. The breakwaters were not included in the Preliminary FIRM analysis, so the TWL's are erroneously indicating higher flood elevations than will actually occur.

Port facilities to the south of Pier 50 are currently used for maritime operations. The existing waterfront structures provide adequate flood protection for this use. The Port is not submitting comment on FEMA's preliminary FIRM for any of the Port's facilities south of Pier 50.

The structural analyses and certifications for Port waterfront facilities from Pier 41 to Pier 50, included in the Appendices, indicate that areas currently shown in FEMA's preliminary FIRM in SFHAs are actually safe from flooding due to the protection provided by the existing facilities. The Port's waterfront facilities were originally designed, constructed and anchored to prevent flotation, collapse and lateral movement resulting from hydrostatic and hydrodynamic loads including buoyancy. This report presents an independent analysis performed by Port Structural Engineers in accordance with the Corps of Engineer's guidelines included in the "Criteria for Evaluating Coastal Flood-Protection Structures", USACE Technical Report CERC-89-15. The analysis demonstrates that each of the Port's waterfront facilities is sufficient to resist the flooding loads and forces. A FEMA Coastal Structures Form, including supporting calculations, has been completed for each facility certified by Port engineers.

The Port has a comprehensive Operations and Maintenance Manual for Waterfront Facilities that is used by Port inspection personnel to assure these critical structures continue to perform and operate satisfactorily and safely. A copy of this Manual in included in Appendix C. The Manual's Section III has been omitted to reduce the size of this report.

2. Preliminary Flood Insurance Rate Map (FIRM) for Port Waterfront

Figure 1 shows the portion of the preliminary FIRM issued by FEMA for the waterfront in Port jurisdiction. All of the Port's finger piers have been mapped in a V-Zone. Table 1 is an abbreviated listing of the Port's facilities and indicates the FEMA determined TWL elevation, the Port facility elevation and the differential height between the TWL predicted by FEMA and the actual height of the pier. The Port's facility elevation is based on the results of a survey and represents the lowest point of the facility.

In most cases the pier and wharf decks, and landside improvements are above the TWL and thus are not subject to flooding (elevation differences shown in the right hand column that are **bolded**). With one exception, the facility elevations that are below the TWL (bracketed by parentheses) are in the northern waterfront and are protected from wave action by the breakwaters as previously noted.

Table 1: Comparison of Port Facility Elevations to FEMA Projections for Total Water Level (TWL) During a 100 Year Storm Event			
Facility or Pier No. (Listed from north to south)	**Elevation (ft.)**	**FEMA's Preliminary TWL (ft.)**	**Elevation Diff. (ft.)**
Hyde St. Pier	12.0	14.76	(2.73)
47	10.8	13.48	(2.70)
45 outer end of pier	13.1	13.48	(0.35)
45 @ wharf	11.8	13.48	(1.70)
43.5	10.8	15.62	(4.79)
43	11.0	10.27	**0.76**
41	11.3	9.32	**2.01**
39	11.9	9.32	**2.54**
35	12.8	10.66	**2.18**
33	12.5	10.66	**1.86**
31	12.8	8.86	**3.96**
29	12.2	8.86	**3.34**
27	12.2	8.86	**3.30**
23	12.3	9.91	**2.43**
19	12.5	9.61	**2.87**
17	12.5	9.61	**2.87**
15	12.7	9.61	**3.06**
9	12.3	9.78	**2.50**
7	11.6	9.78	**1.82**
5 wharf	12.1	9.78	**2.32**
5 (Step down for public access)	10.4	9.78	**0.60**
3	12.1	9.78	**2.32**
1.5 wharf	12.1	9.78	**2.32**
1.5 (Step down for public access)	10.4	9.78	**0.64**
1	12.0	9.78	**2.17**
0.5	11.7	9.78	**1.90**
Ferry Plaza	11.6	9.78	**1.80**
Ag Building/Sinbad	11.1	9.78	**1.30**
14	15.1	9.78	**5.30**
Rincon Park	13.8	9.91	**3.90**
22.5	12.1	9.91	**2.14**
26	12.9	9.91	**2.95**
28	12.5	10.47	**2.01**

Table 1: Comparison of Port Facility Elevations to FEMA Projections for Total Water Level (TWL) During a 100 Year Storm Event			
Facility or Pier No. (Listed from north to south)	**Elevation (ft.)**	**FEMA's Preliminary TWL (ft.)**	**Elevation Diff. (ft.)**
30/32	13.0	10.47	**2.51**
38	12.9	10.53	**2.33**
40	13.0	10.53	**2.49**
AT&T Ball Park	13.2	11.84	**1.31**
48	12.1	10.99	**1.09**
50	12.0	10.73	**1.30**
54	12.6	10.73	**1.89**
Low Point, Top of Curb South of P54	11.6	10.73	**0.90**
Low Point on Paving @ P64	11.4	10.73	**0.66**
70	11.7	10.53	**1.13**
80	12.5	10.79	**1.67**
92	11.6	10.33	**1.23**
94 (N end)	11.5	12.07	(0.53)
94 (S end)	13.9	12.07	**1.85**
96	13.1	12.07	**1.03**

Table 1 Note: All elevations refer to NAVD 88.

B. BACKGROUND ON PORT FACILITIES AND MAINTENANCE PROGRAMS

1. Existing Structures

The Port of San Francisco's current improved waterfront began to take shape after the 1906 earthquake with the construction of the Port's concrete seawall along the water's edge. The Port's waterfront structures consist of seawalls, marginal wharves, piers and breakwaters. Appendix D presents a detailed plan of the Port's waterfront facilities. Following is a brief description of each of these waterfront structures.

a. Seawalls

The seawall was constructed in a number of different sections from 1908 to 1920 and is the primary flood control structure along the waterfront. The seawall construction varies considerably over the Port's waterfront; however, in the zone between Piers 41 to Pier 50 the seawall is generally a significant pile supported concrete structure that serves a dual purpose of retaining the land and protecting the landside improvements from the Bay waters. The seawall in many places was constructed with a marginal wharf, a piled deck structure extending from the top of the seawall away from the land and over the water. The marginal wharf in many cases is also used to structurally reinforce the seawall and, with its deck structure, provides additional flood protection by preventing wave over-topping. The seawall base is protected on the bay side by rip-rap to prevent scour during storm and tidal conditions. Appendix E presents the Port's analysis, certification and recent inspection reports for the Port's seawall sections from Pier 41 to Pier 50.

The analyses demonstrates that the 30 differing seawall construction sections, from Pier 41 to Pier 50 that make up the Port's seawall structure, are sound, structurally capable and have sufficient elevation to protect the landside improvements from the effects of the 100 year flood. Thus, the areas located landside of the seawall should not be in SFHA and should be designated in Zone X. In cases where marginal wharfs are attached to the seawall, the analysis shows that these wharfs have sufficient structural capacity and height above the 100 year flood elevations to have the decks be designated in Zone X. The marginal wharf analysis and certification are included with the pier analysis in Appendix G.

b. Breakwaters

Breakwaters along the Port's waterfront are used to protect and shelter the Port's harbors and marinas. In performing this function, the breakwaters eliminate storm waves in the sheltered areas and thus protect the shoreline from wave action and run-up. There are seven breakwaters on the waterfront starting with the Aquatic Park Breakwater on the northern most end of the Port. Between Aquatic Park and Pier 45 is the Fisherman's Wharf Breakwater, is a significant concrete breakwater designed and installed by the Corps of Engineers. Immediately adjacent to the Fisherman's Wharf breakwater is Pier 45, an earthfill pier with embankments covered in rip-rap. Pier 45 also protects the Fisherman's Wharf area. Pier 39 has two breakwaters, one to the east and the other to the west. Both the Pier 39 breakwaters are constructed of concrete panels and pilings. The Ferry Building and Ferry Plaza areas are protected from wave action originating from the south Bay by the Pier 14 breakwater, the newest breakwater on the

waterfront. This breakwater was installed in 2000, is composed of concrete panels and steel pilings and is used to protect the ferry landing areas along the Ferry Plaza. The South Beach Yacht Harbor is protected by concrete panel, concrete pile breakwaters that extend from Pier 40 southward to China Basin and then closes to the land at the AT&T Ballpark. Appendix F presents the Port's review, inspection reports and certification for these seven breakwaters.

Since the Port could only locate the design drawings for the Pier 14 Breakwater, review of the other six breakwaters was based on review of inspection reports, current condition assessment and past performance. These breakwaters have performed very well during past storm events and on-going inspections indicate that six of the seven breakwaters, the Aquatic Park Breakwater being the exception, are sound, structurally capable and have sufficient elevation to protect the landside improvements from the effects of the 100 year flood. The Port therefore requests that FEMA should re-analyze the TWL's in the areas behind the breakwaters to account for their effects.

The Aquatic Park Breakwater is the one exception. This breakwater has restricted access and needs repair due to piling deterioration, however, it continues, and will continue to provide protection to the adjacent waterfront for the near future. The Port understands that the US National Parks Department is pursuing funding to make these needed repairs. In the meantime, the Port will continue the regular inspections of this breakwater.

c. Piers & Wharfs

The Port of San Francisco has many finger piers integrally connected to and extending from the seawall, or seawall-marginal wharf structure, outward and away from the land, over the water. Most of these piers were constructed from 1908 through 1930, with some constructed as recently as 1970. The piers provide only minor flood control measures in that they limit the size of a wave that can pass below the structure by the presence of the beams and decking. The piers are generally constructed of concrete decks supported by concrete beams supported on piles. Some of the piers have wood decks supported on steel or concrete beams supported by piles. The piles are either reinforced concrete, concrete jacketed wood piles, or wood piles. Appendix G presents the Port's analysis, certification and recent inspection reports for the Port's piers from Pier 41 to Pier 50.

The analysis demonstrates that the 28 Port piers, between Pier 41 to Pier 50, are sound, structurally capable and have sufficient elevation to withstand and be safely higher than the effects of the 100 year flood. Given that the piers and wharfs are constructed to withstand the impact of the waves during the 100-year flood and the decks are above the TWL, these piers should be removed from the SFHA and should be designated in Zone X.

Two Port piers between Pier 41 to Pier 50 are not included in this response: Piers 36 and 22 ½. Pier 36 is condemned and no longer in use, and Pier 22 ½ is structurally compromised and has restricted loading. These two piers are not certified and are not considered to contribute to the Port's flood protection. The seawall sections adjacent to these piers are sound, certified and provide the necessary flood protection surrounding landside improvements.

2. Seismic Strengthening

Many of the Port's waterfront structures have been seismically strengthened to meet San Francisco Building Code requirements for earthquake loadings. Seismically upgrading these structures is very costly and significantly increases the structures ability to handle lateral loads, which also improves its ability to withstand any hydrodynamic loads. The following piers have been seismically upgraded to meet the code requirements at the time of the upgrade: Pier 45, Pier 39, Piers 27-29, and Piers 1.5 to 5, Pier 1, Ferry Plaza, Ferry Building, and Pier 48. The seismic upgrading of these piers included repairs and seismic strengthening of the adjacent seawall and marginal wharf. Although these structures were adequate to withstand the effects of the 100-year flood prior to being seismically strengthened, the added structural capacity and upgrading has greatly increased their overall durability and reduces future maintenance requirements.

3. Port Inspection and Assessment Program

The Port has a structural inspection and assessment program for all Port facilities. The Port's waterfront facilities including all the piers, seawall and breakwaters have been inspected within the last 4 years by California licensed Civil or Structural Engineers with experience in waterfront structures. This program is used to identify and assess any damage or deterioration to the structural systems and initiate appropriate actions in the case of damage or unsafe conditions. An inspected facility is categorized according to its condition and allowable use as follows:

Green – Unrestricted use. May require some minor repair, or minimal barricading or signage.

Yellow – Restricted use. May require limiting access and barricading until repairs completed.

Red – Unsafe notice. Requires barricading to prevent public access and use.

All of the Port's facilities that are required to protect the landside areas from flooding have been inspected and categorized as Green – Unrestricted use. This means that there may be areas requiring minor repair or maintenance, but the structure is capable of serving its intended function and purpose and can withstand the storm loadings as was intended in its original design and its current use.

The Port's Operation and Maintenance Manual for Waterfront Facilities is used to provide the protocol and frequency for the regular inspection and assessment of these structures. The O&M Manual includes forms required for reporting the results of an inspection and also establishes criteria for determining the priority and urgency of required repair depending on the type and location of damage. See Appendix C.

C. **CONCLUSION**

Based on the information presented by FEMA to the Port, flooding due to the 100-year event to the landside of the Port's Seawall is not a current problem. The TWL elevations determined by FEMA are below the deck heights for the majority of the Port's piers, wharfs and other waterfront facilities. The Port's existing waterfront structures, particularly the seawall and

breakwaters, protect the landside structures and facilities from flooding. These structures have been inspected and analyzed and found to safely withstand the hydrodynamic loads imposed upon them by projected 100-year flood conditions. Port engineers, having verified the capability of these structures, have certified the Port's waterfront structures are capable of resisting the impact 1% annual chance waves, and verified that the 100-year flood heights are below the pier and wharf decks. **Based on this analysis and certification, the Port hereby requests that FEMA revise the preliminary FIRMs for the San Francisco Bay from Pier 41 south to Pier 50 and remove the Port piers, wharf structures and landside improvements protected by these structures from the Special Flood Hazard Area Zone map designation and change the flood designation for these structures to Zone X .**

FEMA also is requested to perform an analysis of the Port's northern waterfront which considers the breakwaters that protect that area from flooding. The Fisherman's Wharf Harbors and the Hyde Street Harbor are completely surrounded by significant and competent breakwaters that greatly reduce the areas susceptibility to storm wave conditions. The Port anticipates that this FEMA refined analysis will lead to TWL elevations below the existing facility elevations and revise the FIRM to remove these facilities from any flood zone.

Appendix B

San Francisco Redevelopment Agency

Comments on FEMA Preliminary
Flood Insurance Rate Map

See enclosed disk from
Winzler & Kelly

San Francisco
Redevelopment Agency

One South Van Ness Avenue
San Francisco, CA 94103

415.749.2400

126-6107-148
December 18, 2007

Edwin Lee
City Administrator
City Hall – Room 362
1 Dr. Carlton B Goodlett Place
San Francisco, CA 94102

Dear Edwin,

We are forwarding the submittal from Catellus responding to the preliminary draft Flood Insurance Rate Maps, dated September 21, 2007, which were released by FEMA for the City and County of San Francisco.

Specifically, the attached data has been prepared to show that the building area north of Mission Creek, within the Mission Bay North Redevelopment Area, has been raised outside the Zone A flood area. The change in topography results from site improvements that have occurred on the properties to the north of Mission Creek since the date of the data used by FEMA in the preparation of the preliminary draft maps.

Based on this information, we are requesting that FEMA remove this area from Zone A. We understand that FEMA may require additional updated data and/or survey work if they decide that the information provided is not adequate. If needed, Catellus will have Winzler & Kelly provide any additional information requested by FEMA.

Thank you and please contact me with any questions.

Sincerely,

Catherine Reilly
Assistant Project Manager

Enclosed: Winzler & Kelly report and CD with AutoCAD data

WINZLER & KELLY
CONSULTING ENGINEERS

December 14, 2007

0334007009

Mr. Scott Shepard
ProLogis
Catellus Urban Construction
255 Channel Street
San Francisco, CA 94158

Attention: Mr Scott Shepard, Project Manager

Re: Mission Bay North of Channel
FEMA Mapping Zone A Boundary

Dear Mr. Shepard,

The attached maps present the proposed new boundary for Zone A of the Preliminary Flood insurance rate map (FIRM) for the 100-Year Storm Flood Event in for the area north of Mission Creek in San Francisco. The included maps are as follows:

Sheet 1 of 4 – NORTH OF CHANNEL 2007, FEMA FLOOD CONTROL BOUNDARY
Indicates topography and the limit of the Zone A 100-Year FEMA Flood Boundary. The plan includes Block N4 and N4A and a Portion of Block N5, along with the intersection of Berry Street and Berry Street Extension.

Sheet 2 of 4 – NORTH OF CHANNEL 2007, FEMA FLOOD CONTROL BOUNDARY
Indicates topography and the limit of the Zone A 100-Year FEMA Flood Boundary. The plan includes a portion of Block N3, N3A, N4 and N4A along with the intersection of Fifth Street and King Street.

Sheet 3 of 4 – NORTH OF CHANNEL 2007, FEMA FLOOD CONTROL BOUNDARY
Indicates topography and the limit of the Zone A 100-Year FEMA Flood Boundary. The plan includes Block N2 and a portion of Block N3, N3A, the China Basin Landing and the intersection of Fourth Street with King Street and Berry Street.

Sheet 4 of 4 – NORTH OF CHANNEL 2007, FEMA FLOOD CONTROL BOUNDARY
Indicates the topography and the limit of the Zone A 100-Year FEMA Flood Boundary and all areas in question from Sheets 1 through 3 above on an overall map.

417 Montgomery Street, Suite 700, San Francisco, CA 94104
tel: 415.283.4970 fax: 415.283.4980
www.w-and-k.com

Purpose:

The purpose of this map is to present the increased elevation of the constructed development north of Mission Creek within the Mission Bay North Redevelopment Project Area. This map and supporting documentation is intended for submittal to FEMA as part of the public review of the preliminary draft FIRM's released by FEMA on September 21, 2007. The information being submitted is indicative of what's on the ground, therefore results in the finished floor elevations of the buildings being above the flood elevation.

Background:

Review of the preliminary background information provided by the FEMA Map dated 9/21/2007 for shows the Mission Bay North of Channel area to fall within the transect profiles at -1.78' to +0.02' City and County of San Francisco (CCSF) datum (+9.57' to +11.33 navd 88 datum) with the total water level represented by an elevation of -1.1' CCSF datum (+10.25' NAVD 88 datum).

Vertical Datum Equations and Conversion:

NAVD 88 elevation = 0 feet
City & County of San Francisco CCSF elevation = -11.35 feet
Mission Bay elevation = CCSF +100' = +88.65 feet

The FEMA Mapping NAVD elevations are presented in metric and English units. The City and County of San Francisco (CCSF) and Mission Bay elevation datums use English units. To convert between datums, the following procedure should to be followed:

NAVD 88 : 0.00 feet elevation in NAVD 88 is 11.35 feet below CCSF datum. To convert NAVD 88 English units elevations to CCSF English Unit elevations add 11.35 feet.

CCSF: 0.00 feet elevation in CCSF is 11.35 feet above NAVD 88 datum. To convert CCSF English unit elevations to NAVD 88 elevations subtract 11.35 feet.

Mission Bay: 0.00 feet elevation in Mission Bay is 100.00 feet below the CCSF datum. To convert Mission Bay English unit elevations to CCSF elevations subtract 100.00 feet. To convert Mission Bay elevations to NAVD 88 English Unit elevations, first convert to CCSF and then to NAVD 88 using the above procedures.

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Horizontal Datum

Mapping is based on California Coordinate System NAD 83 Zone 3 and the Merger and Re-subdivision Map of Mission Bay dated June 1999, Prepared by Santina & Thompson, and as shown in Book Z of Maps, pages 97-119, Official Records of the City and County of San Francisco, CA.

Development Mapping:

For the following section, please refer to the plans sheets 1 through 4 described in the beginning of this document for locations of described blocks and mapping.

Existing surface information taken from aerial photo surveys prepared by Towill, Inc. dated 6-18-97 and from HJW GeoSpatial, Inc., Oakland, CA dated 1-04-06, as well as an Alta Survey prepared by Santina and Thompson for Phase I through III dated 3-1-99 and Phase IV dated 4-30-99. Supplemented by Telamon Engineering Consulting field survey dated 4-25-00. This data was used by FEMA for development of the preliminary FIRM Maps. This mapping was then used along with the design plans provided and developed by Winzler & Kelly and by Freyer and Lauretta Consulting Engineers and construction as-built drawings to determine elevations and confirm what, if any, locations would be affected by flooding.

The construction within normal tolerances as shown by construction as-built drawings has resulted in the land being raised out of the floodplain and constructed substanitally to the elevation shown on the approved documents. The blocks/parcels have been constructed to a minimum elevation of 10.35 NAVD (-1.00 CCSF, +99.00 MB).

The development has been constructed pursuant to the design documents prepared by Winzler & Kelly Consulting Engineers for Blocks N1, N2, N3-N3a, N4-N4a, And N5 between May 2001 and December 2004. Design plans for block NP1 and NP2 were performed by Catellus Consultant RBF Consulting. Improvements for Block NP3, NP4 and NP5 were designed by Catellus' consulting firm Freyer and Lauretta Consulting Engineers. All construction has been reported in as-built drawings.

Infrastructure construction, consisting of street, utilities, and onsite grading, of Blocks N1, N2, N3, N3A, N4, N4A, and N5 is complete. Construction of parks NP1, NP2 and NP3, adjacent to Mission Creek and Berry Street, are complete with parks NP4 and NP5 primarily complete.

Requirement Passed to Developers:

On-Site developments have been required to place all permanent improvements at or above elevation -1.0 feet CCSF (+10.35 feet NAVD 88, +99.0 feet Mission Bay). The ground and the building pads have been raised above the flood elevation.

WINZLER & KELLY
CONSULTING ENGINEERS

Conclusions:

The aerial and topographic survey plans were used along with the design plans provided and developed by Winzler & Kelly and by Freyer and Lauretta Consulting Engineers (see description below) and construction as-built drawings to determine elevations and confirm what, if any, locations would be affected by flooding.

Based on the prior referenced design, aerial and topography/survey plans, it is determined that the proposed Mission Bay Buildings finished floor elevation will be above the 100-Year Storm Event Flood Elevation.
The area located outside of the FEMA subject boundary in question for this report for Mission Bay was not studied. Therefore, it is assumed that any areas not studied are in Zone A.

Sincerely,
WINZLER & KELLY

Mike Kincaid, P.E.
Principal

Attachment: 4 Sheets of Map

REGISTERED PROFESSIONAL ENGINEER
MICHAEL D. KINCAID
No. C24200
Exp 12-31-07
CIVIL
STATE OF CALIFORNIA
12.14.07

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NOTES:

(1) From BCDC for Park Street Bridge Tide Station - See letter from Michael Wilmer to KCA Engineers, dated May 6, 1996.

(2) From EBMUD Vertical Control and Datum Plane Comparison of Datum Plane, dated April 7, 1965.

(3) Minor differences exist between EBMUD & BCDC values.

(4) Substantially higher tides occured in 1973 and in 1983. See 'San Francisco Bay Tidal Stage vs. Frequency Study', dated October 1984, US Army Corps of Engineers, San Francsico District.

(5) Per Schaaf & Wheeler, letter to David Freyer, dated April 2, 2003.

(6) US Army Corps of Engineers Tidal data.

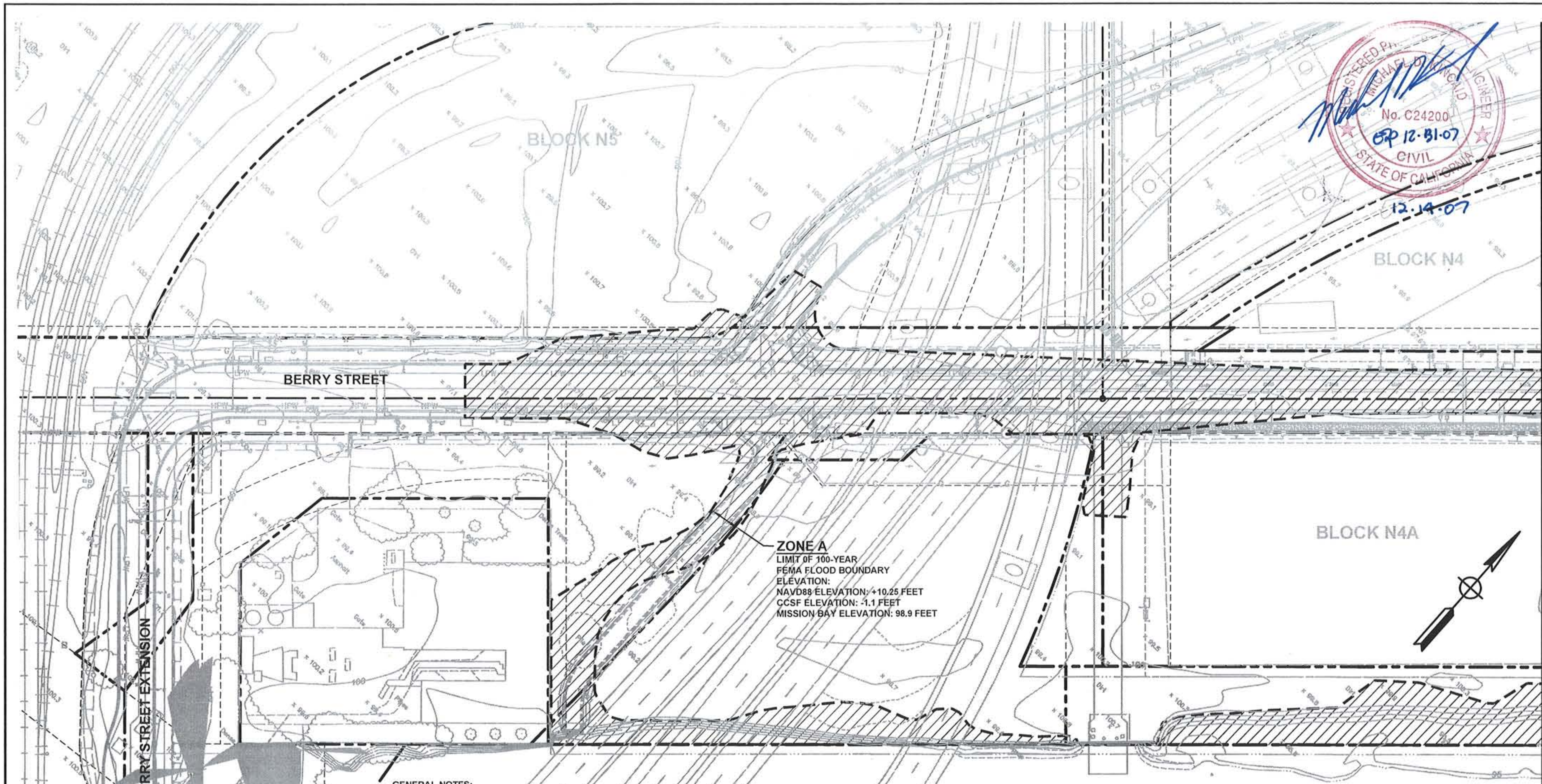
(7) Added NAVD 88 and FEMA 100-Year Flood Zone A Elevation.

SAN FRANCISCO BAY DATUM PLANES AND TIDAL INFORMATION *

FIGURE 1

WINZLER & KELLY CONSULTING ENGINEERS

* Based on original figure prepared by KCA Engineers



GENERAL NOTES:

PURPOSE:

TO PRESENT THE INCREASED ELEVATION OF THE CONSTRUCTED DEVELOPMENT NORTH OF MISSION CREEK WITHIN THE MISSION BAY NORTH REDEVELOPMENT PROJECT AREA. THIS MAP IS INTENDED FOR FEMA REVIEW AND SUPPORTING DOCUMENTATION.

BACKGROUND:

REVIEW OF THE PRELIMINARY BACKGROUND INFORMATION PROVIDED BY THE CITY SHOWS THE AREA TO FALL WITHIN THE TRANSECT PROFILES AT -1.78' TO +0.02' CCSF DATUM (+9.57' TO +11.33 NAVD 88 DATUM) WITH THE TOTAL WATER LEVEL REPRESENTED BY AN ELEVATION OF -1.1' CCSF DATUM (+10.25' NAVD 88 DATUM).

VERTICAL DATUM EQUATIONS:

NAVD 88 ELEVATION = 0 FEET
CITY & COUNTY OF SAN FRANCISCO ELEVATION = -11.35 FEET
MISSION BAY ELEVATION = CCSF +100' = +88.65 FEET

HORIZONTAL DATUM:

MAPPING IS BASED ON CALIFORNIA COORDINATE SYSTEM NAD 83 ZONE 3 AND THE MERGER AND RE-SUBDIVISION MAP OF MISSION BAY DATED JUNE 1999, PREPARED BY SANTINA & THOMPSON, AND AS SHOWN IN BOOK Z OF MAPS, PAGES 97-119, OFFICIAL RECORDS OF THE CITY AND COUNTY OF SAN FRANCISCO, CA.

DEVELOPMENT MAPPING:

EXISTING SURFACE INFORMATION TAKEN FROM AERIAL PHOTO SURVEYS PREPARED BY TOWILL, INC. DATED 6-18-97 AND HJW GEOSPATIAL, INC., OAKLAND, CA DATED 1-04-06, AS WELL AS AN ALTA SURVEY PREPARED BY SANTINA AND THOMPSON FOR PHASE I THROUGH III DATED 3-1-99 AND PHASE IV DATED 4-30-99. SUPPLEMENTED BY TELAMON ENGINEERING CONSULTING FIELD SURVEY DATED 4-25-00.

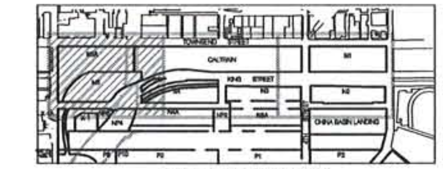
THE DEVELOPMENT HAS BEEN CONSTRUCTED PURSUANT TO THE DESIGN DOCUMENTS PREPARED BY WINZLER & KELLY CONSULTING ENGINEERS FOR BLOCK N1, N2, N3-N3A, N4-N4A, AND N5 BETWEEN MAY 2001 AND DECEMBER 2004. IMPROVEMENTS FOR BLOCK NP1 AND NP2 WERE DESIGNED BY CATELLUS CONSULTANT RBI CONSULTING. IMPROVEMENTS FOR BLOCK NP3, NP4 AND NP5 WERE DESIGNED BY CATELLUS CONSULTANT FREYER AND LAURETTA CONSULTING ENGINEERS. ALL HAS BEEN CONSTRUCTED AS REPRESENTED BY THE AS-BUILT DRAWINGS.

THE CONSTRUCTION WITHIN NORMAL TOLERANCES, AS SHOWN BY CONSTRUCTION AS-BUILT DRAWINGS, HAS RESULTED IN THE LAND BEING RAISED OUT OF THE FLOODPLAIN AND CONSTRUCTED SUBSTANTIALLY TO THE ELEVATION SHOWN ON THE APPROVED DOCUMENTS. THE DEFINED BLOCKS/PARCELS HAVE BEEN CONSTRUCTED TO A MINIMUM ELEVATION OF 10.35 NAVD (-1.00 CCSF, +99.00 MB).

INFRASTRUCTURE CONSTRUCTION, CONSISTING OF STREET, UTILITIES, AND ONSITE GRADING, OF BLOCKS N1, N2, N3, N3A, N4, N4A, AND N5 IS COMPLETE. CONSTRUCTION OF PARKS NP1, NP2 AND NP3, ADJACENT TO MISSION CREEK AND BERRY STREET, ARE COMPLETE WITH PARKS NP4 AND NP5 PRIMARILY COMPLETE.

REQUIREMENT PASSED TO DEVELOPERS

ON-SITE DEVELOPMENTS HAVE BEEN REQUIRED TO PLACE ALL PERMANENT IMPROVEMENTS AT OR ABOVE ELEVATION -1.0 FEET CCSF (+10.35 FEET NAVD, 99.0 FEET MISSION BAY).



SHEET INDEX

1"=20' 20' 0' 20' 40'

MATCH LINE SEE SHEET 2

REVISIONS	SYM. / DESCRIPTION / DATE / APPROVED

CATELLUS
OWNER: FOCIL-MB, LLC
PROJECT MANAGER: CATELLUS URBAN

WINZLER & KELLY CONSULTING ENGINEERS
417 MONTGOMERY ST SUITE 500 SAN FRANCISCO CA 94104 PH (415) 283-4970 FAX (415) 283-4980

DES MK | DR WHS | SUPV MK | CHK MK

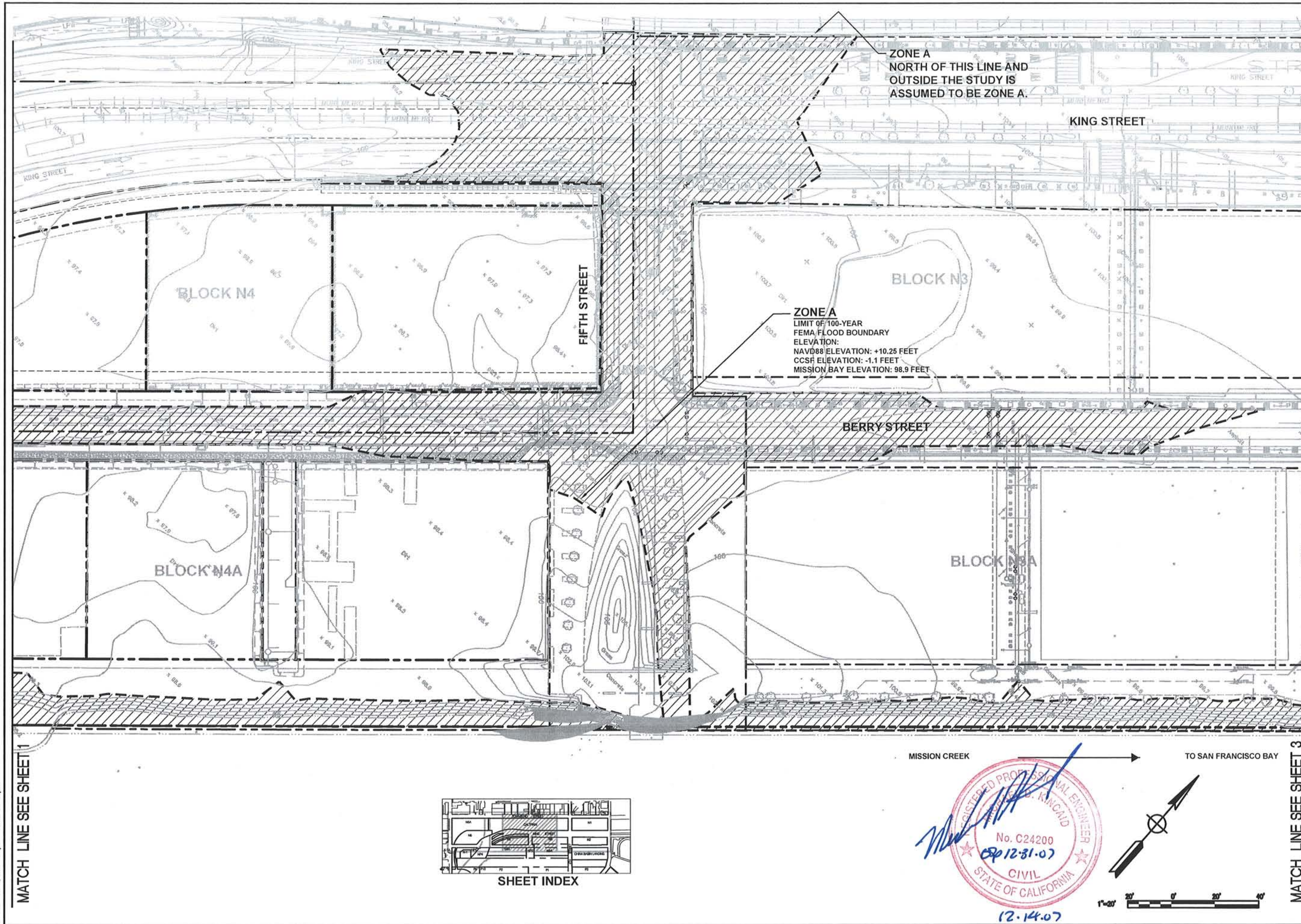
BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

MISSION BAY PROJECT - SAN FRANCISCO, CA

NORTH OF CHANNEL 2007 FEMA FLOOD CONTROL BOUNDARY

T&K JOB NUMBER 0334007007

SHEET 1 OF 4



CATELLUS

WINZLER & KELLY CONSULTING ENGINEERS

MISSION BAY PROJECT · SAN FRANCISCO, CA

NORTH OF CHANNEL 2007
FEMA FLOOD CONTROL BOUNDARY

0334007007

SHEET 2 OF 4

KING STREET

BERRY STREET

FOURTH STREET

THIRD STREET

CHINA BASIN LANDING
3803-05

BLOCK N3

BLOCK N2

LOT A

PARCEL 1

PARCEL 2

PARCEL 3

ZONE A
LIMIT OF 100-YEAR
FEMA FLOOD BOUNDARY
ELEVATION:
NAVD88 ELEVATION: +10.25 FEET
CCSF ELEVATION: -1.1 FEET
MISSION BAY ELEVATION: 98.9 FEET

MISSION CREEK → TO SAN FRANCISCO BAY

MISSION CREEK → TO SAN FRANCISCO BAY

MATCH LINE SEE SHEET 2

SHEET INDEX

REGISTERED PROFESSIONAL ENGINEER
WILLIAM D. KINCAID
No. C24200
Exp 12.31.07
CIVIL
STATE OF CALIFORNIA
12.14.07

1"=20' 20' 0' 20' 40'

DRAWING NAME: \\Server\Jobs\Projects\Catellus - MB\02340-07-007 FEMA Boundary Map\MXD-FEMA-FLOOD-MAP.dwg
PLOT DATE: Dec 12, 2007 - 4:24pm
PLOTTED BY: Alejandro

NO.	DATE	REVISIONS	BY	CHK	APPROVED
1			WMS	MJK	

CATELLUS
OWNER: FOCIL-MB, LLC
PROJECT MANAGER: CATELLUS URBAN

WINZLER & KELLY
417 MONTGOMERY ST. 5TH FLR.
SAN FRANCISCO, CA 94104
PH (415) 834-3870
FAX (415) 263-8160

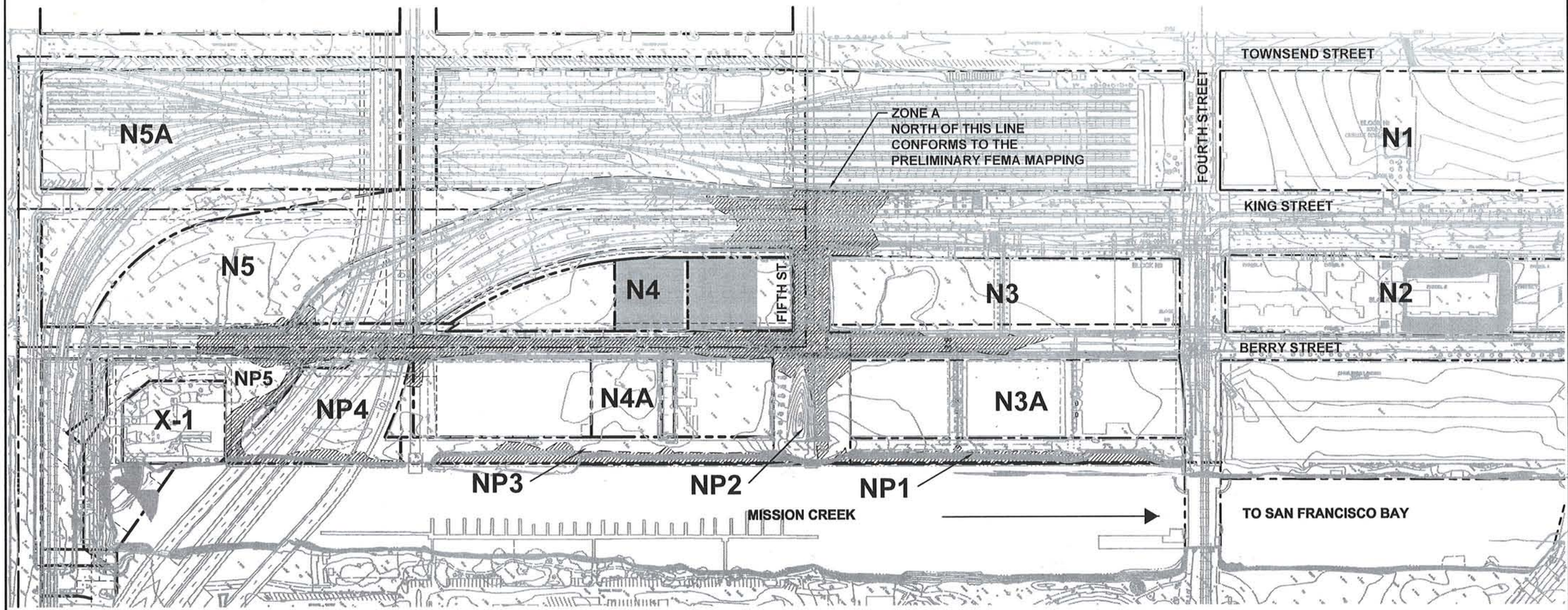
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

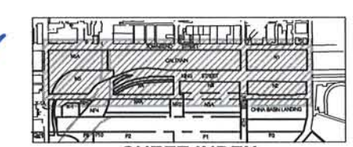
MISSION BAY PROJECT - SAN FRANCISCO, CA

NORTH OF CHANNEL 2007 FEMA FLOOD CONTROL BOUNDARY

TAX ASSESSOR'S MAP
0334007007

SHEET 3 OF 4





REGISTERED PROFESSIONAL ENGINEER
No. C24200
12.31.07
CIVIL
STATE OF CALIFORNIA
12.14.07

1"=120' 120' 0' 120' 240'

CATELLUS
OWNER: FOCIL-MB, LLC
PROJECT MANAGER: CATELLUS URBAN

WINZLER & KELLY
CONSULTING ENGINEERS
717 MARKET STREET, 5TH FLOOR
SAN FRANCISCO, CA 94103
FAX: (415) 243-4880

NO.	DESCRIPTION	DATE	APPROVED
	REVISIONS		

DR	WHS	
CH	MK	
QC	MK	
SUP	MK	

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY
0 1"

MISSION BAY PROJECT - SAN FRANCISCO, CA

NORTH OF CHANNEL 2007 FEMA FLOOD CONTROL BOUNDARY

TAX ASSESSOR'S MAP NO.
0334007007

SHEET 4 OF 4

DRAWING NAME: \\Server5\Work\Projects\Catellus - MB\02304-07-007 FEMA Boundary Map\MDC-FEMA-FLOOD-MAP.dwg
PLOT DATE: Dec 12, 2007 - 4:27pm PLOTTED BY: Alejandro

Appendix C

Mayor's Office of Base Reuse and Development
and
Treasure Island Development Authority

Comments on FEMA Preliminary
Flood Insurance Rate Map

CITY & COUNTY OF SAN FRANCISCO

OFFICE OF BASE REUSE AND DEVELOPMENT
CITY HALL, ROOM 448
1 DR. CARLTON B. GOODLETT PLACE
SAN FRANCISCO, CA 94102
415.554.5313 FAX 415.558.7844

GAVIN NEWSOM, MAYOR

December 20, 2007

Edwin Lee
City Administrator
City Hall, Room 362
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102

Dear Ed,

On behalf of the Mayor's Office of Base Reuse and the Treasure Island Development Authority, I am forwarding comments and questions from Moffat & Nichol on the draft Flood Insurance Rate Maps (FIRM) prepared by FEMA, specifically as they relate to Treasure Island.

While the attached memorandum does not include specific requests for map revisions, it does raise questions that we hope to have the opportunity to discuss and resolve with FEMA as the FIRM mapping process progresses.

Thank you and please feel free to contact me in regard to this submittal.

Regards,

Jack Sylvan
Mayor's Office of Base Reuse and Development

Enclosed: Memorandum from Moffat and Nichol

MOFFATT & NICHOL

2001 N. Main Street
Suite 360
Walnut Creek, California 94596

(925) 944-5411
Fax (925) 944-4732

MEMORANDUM

To: Kheay Loke, Stephen Proud, Todd Adair

From: Dilip Trivedi

Date: December 6, 2007

Subj: Comments on Preliminary FEMA Map
Treasure Island Development Project
M&N File No: 6101-01

This memo provides comments on the Preliminary Flood Insurance Rate Map (FIRM) provided by the City of San Francisco electronically to us. FEMA had also presented the methodology for developing these maps in a meeting on October 16, 2007 at the Port of San Francisco.

Some general comments are provided first, followed by an understanding of the methodology used in the analysis, followed by specific comments on the methodology (numbered in same order).

General comments

1. The FIRM, when finalized in 2008, will influence development in all areas mapped within the flood zone. Typically, FEMA issues a Flood Insurance Study (FIS) along with the FIRM maps which provides a detailed description of criteria, data, and methodology which was used in developing the FIRM map. Also, the methodology for mapping flood prone areas along the Pacific Coast has changed substantially from previous FEMA guidance. It is critical for us to obtain either the FIS or other detailed studies which describe how the flood areas were mapped. FEMA should provide that to the City for review prior to finalization of the FIRM.
2. It can be expected that several Map Revisions will be requested of FEMA after finalization of the FIRM. FEMA should provide the key (or minimum) coastal criteria that will be used in their evaluation of requests for Letters of Map Revision (LOMR) so every applicant does not have to conduct a coastal study for their site.
3. The Total Water Level spreadsheet shows abnormal peaks with significantly different extreme water levels at adjacent transects. I suspect this is because the spreadsheet shows the results of analysis at discrete transects. It is unclear how this is affecting the FIRM maps and the floodplain limits shown on the maps. An explanation of this will be useful.
4. The flood plain limit for Treasure Island shown on the FIRM map is apparently day-lighting a contour elevation, which implies that a Base Flood Elevation (BFE) must have been estimated. However, the map states that a BFE was not computed. In the absence of a BFE, the entire analysis completed by FEMA will have to be redone for a LOMR request for areas presently mapped as Special Flood Hazard Areas (SFHA). We believe FEMA should provide the BFE considering the level of analysis already completed. If not, they should provide the water levels and wave heights used in developing the TWL, so we can determine the flood limit for the LOMR application.

5. This comment is related to the preceding comment about BFE. From the map it appears that Building 3 and the Torpedo Building, as well as the wastewater treatment plant, are outside the flood zone. Can FEMA confirm this ?
6. The schedule for finalizing the FIRM maps is unclear. It appears that the data that went into developing the FIRM maps was insufficient. If, over the next year, the map is being finalized, then will FEMA update their bathymetry data with new transects along the shoreline if provided to them by you ?

Understanding of Methodology

1. Bathymetry for the Bay was obtained from NOAA navigation charts and other available land survey data provided by the City
2. The effect of existing shoreline protection structures on wave heights and run-up were not taken into account (smooth slopes were assumed)
3. It was assumed that perimeter levees, if present, would not be maintained because they are non-certified levees and a collapsed levee profile was used in the analysis
4. FEMA's contractors (Nolte & DHI) used the Direct Integration Method (DIM) to combine 33 years of data for various coastal criteria to estimate the 1% chance Total Water Level (TWL) and consequent flooding potential
5. 33 years of continuously recorded water levels were used in the analysis
6. 33 years of swell data for offshore was obtained from the GROW database and supplemented with CDIP buoy data for Fisherman's Wharf
7. 33 years of continuously recorded wind data from the SFO gage was used to estimate wind-waves
8. Wave setup was determined using FEMA's recommended guidelines as described in their Final Draft Guideance document
9. The water level and wave data were combined on a real-time basis to compute TWL for each time step, and then a 100-year TWL was determined statistically from the time series
10. TWL for swell and sea state conditions was determined separately and the higher of the two was used in the analysis.
11. Shoreline areas higher than the 1% water level, but within 30 feet of the shoreline where significant overtopping occurs, were mapped as Zone V.
12. Shoreline areas lower than the 1% water level were mapped as Zone A. The limit of coastal flooding shown on the flood maps was determined based on "daylighting" a water surface on the existing topography of Treasure Island. These areas have no Zone V designations. Base Flood Elevations were not determined in this study.
13. Areas landward of Zone A were mapped as Zone X (areas outside of a 500-year flood event)

Specific Comments on Methodology & Results For Treasure Island

1. The bathymetry around Treasure Island has not been surveyed since the time of the original construction and conditions may be different than shown on the NOAA charts. If

water depths are shallower, it will result in smaller wave heights because they will break farther from the shoreline.

2. Existing shoreline protection structures (revetment around Treasure Island) will dissipate wave energy as they break on the structure and reduce wave run-up commensurately.
3. It was unclear from the presentation whether the revetment along the TI shoreline was treated as a levee and a degraded profile was used in the analysis
4. No comment
5. Question: Which gages within the Bay were used in the analysis ?
   There is variation in water levels between the Presidio gage and at different locations within the Bay.
6. No comment
7. The topography around SFO, which affects wind direction and speed, is quite different from that around Treasure Island. Alameda Air Station data may be more appropriate for Treasure Island.
8. No comment
9. Question: Were two separate TWLs developed (one each for tide + swell, and tide + sea) or was the higher component of the swell or sea used in a single TWL analysis ?
10. Same as comment 9.
11. No comment. However, if structure geometry is taken into account (roughness for rip-rap protection), the TWL would reduce and the Zone V designated areas would change considerably.
12. Is this “daylighting” elevation analogous to a Base Flood Elevation ? If so, it should be stated in the FIRM map.
13. Question: Why should areas protected from the 0.2% flood event (500-year return period) receive any designation ?