Appendix 8-2

Draft Mission Rock Infrastructure Plan

MISSION ROCK
INFRASTRUCTURE PLAN

SEPTEMBER 20, 2016

Prepared by

BKF Engineers
with assistance from the Seawall Lot 337 Association,
CMG, Perkins+Will, Langan Treadwell and Rollo, KPFF, ARUP,
Atelier Ten, Nelson Nygaard Consulting Associates, Moffatt & Nichol,
Evergreen Devco, Nibbi Brothers, Hathaway Dinwiddie,
and Coblentz Patch Duffy & Bass

TABLE OF CONTENTS

1. INTRODUCTION 1
1.1 Purpose 1
1.2 Infrastructure Plan Overview 1
1.3 Property Acquisition, Dedication, and Easements 1
1.4 Project Datum 2
1.5 Conformance with EIR & Entitlements 2
1.6 Applicability of Uniform Codes and Infrastructure Standards 2
1.7 Project Phasing 2
1.8 Phases of Infrastructure Construction 3

2. SUSTAINABILITY 5

3. ENVIRONMENTAL REMEDIATION 6
3.1 Historical Use Background 6
3.2 Environmental Constraints and Regulations 6
3.2.1 Maher Ordinance Requirements and Site Assessment 6
3.2.2 Use Restrictions 7
3.3 Anticipated Site Remediation Procedures 7
3.2.1 Maher Ordinance Compliance 7
3.2.2 Use Restriction Variance 8

4. SITE DEMOLITION 9
4.1 Scope of Demolition 9
4.2 Existing Utility Demolition 9
4.3 Phases of Demolition 10

5. SITE RESILIENCY 11
5.1 Overview 11
5.2 Project Datum 11
5.3 Federal Emergency Management Agency Regulations 11
5.3.1 Seawall 337, China Basin Park and Terry A Francois Boulevard FEMA Flood Plain Designations 12
5.3.2 Pier 48, Pier 50, and Coastal Perimeter FEMA Flood Plain Designation 12
5.4 Sea Level Rise 13
5.4.1 Sea Level Rise (SLR) Design Guidance 13
5.4.2 Sea Level Rise Design Parameters 14
5.4.3 Existing Mission Bay Grading for Resiliency 15
5.5 Proposed Site and Infrastructure Designs 15
5.5.1 Grading 15
5.5.2 Stormwater System 18
5.6 Adaptive Managements Strategies 19
5.6.1 Development Parcel Strategy 19
5.6.2 Shoreline Adaptation Strategy 19

6. GEOTECHNICAL CONDITION 21
6.1 Existing Site Geotechnical Conditions 21
6.2 Existing Site Geotechnical Constraints 21
6.2.1 Liquefaction/ Settlement of Sand Layers 21
6.2.2 Lateral Spreading 22
6.2.3 Settlement of Bay Mud 22
6.3 Geotechnical Approaches 22
6.3.1 Site Grading Strategies 23
6.3.2 Liquefaction and Lateral Spreading Mitigations 24
6.3.3 Flexible Utility Connections 25
6.3.4 Site Accessibility 25
6.4 Phases of Geotechnical Stabilization 25
6.5 Schedule for Additional Geotechnical Studies 26

7. SITE GRADING 27
7.1 Project Datum 27
7.2 Existing Site Conditions 27
7.3 Site Geotechnical Constraints and Approach 27
7.4 Project Grading Overview 27
7.5 Elevation and Grading Design Criteria 28
7.5.1 Elevation Design Criteria 28
7.6 Proposed Grading Designs 32
7.6.1 Building Areas 32
7.6.2 Proposed Roadways 32
7.6.3 Overland Release 32
7.7 Proposed Site Earthwork 33
7.8 Phases of Grading Activities and Approvals 33

8. STREET AND TRANSPORTATION INFRASTRUCTURE 34
8.1 Design Controls: Plan Overview 34
8.2 Public Street System 34
8.2.1 Public Street Layout and Parcelization 35
8.2.2 Roadway Dimensions 35
8.2.3 Structured Streets and Open Space Areas 36
8.3 Public Street Modes of Travel and Access 37
8.3.1 Pedestrian Circulation and Accessibility 37
8.3.2 Vehicular Circulation 38
8.3.3 Bicycle Circulation 38
8.3.4 Loading, Servicing, and Parking 39
8.3.5 Fire Department Access 40
8.4 Public Street Network and Hierarchy 40
8.4.1 Street Zones and Designs 41
8.4.2 Street Designs 43
8.5 Components of Public Streets 57
8.5.1 Curb Heights 57
8.5.2 Paving 57
8.5.3 Street Trees 58
8.5.4 Sustainable Water Strategies 60
8.5.5 Lighting 61

8.5.6 Accessible Loading 61
8.5.7 Driveway and Utility Coordination 62
8.6 Traffic Calming 62
8.6.1 Raised Intersections and Raised Crosswalks 62
8.6.2 Intersection Bulb-Outs 63
8.7 Off-Site Traffic Signalization 63
8.7.1 3rd Street and Existing Terry A Francois Boulevard 64
8.7.2 3rd Street and Channel Street 64
8.7.3 3rd Street and Mission Rock Street 64
8.7.4 3rd Street and Exposition Street 64
8.8 On-Site Traffic Controls 65
8.8.1 All-Way Stop-Controlled Intersections: DPW-Standard Curb Condition 65
8.8.2 All-Way Stop-Controlled Intersections: Table-top Intersections 65
8.8.3 2-Way Stop at Table-top Intersection 66
8.8.4 All-Way Stop-Controlled Intersections: Flush Intersections 66
8.9 Public Transportation System 67
8.10 SFMTA Infrastructure 67
8.11 Acceptance and Maintenance of Street Improvements 68
8.12 Phasing of New Roadway Construction 69

9. OPEN SPACE AND PARKS 70
9.1 Open Space 70
9.1.1 China Basin Park 70
9.1.2 Mission Rock Square 70
9.1.3 The Blue Greenway and Channel Wharf 70
9.1.4 Channel Street 70
9.1.5 Channel Lane 70
9.1.6 Pier 48 Apron 71

10. UTILITY LAYOUT AND SEPARATIONS 72
10.1 Utility Systems 72
10.2 Utility Layout and Separation Criteria 72
10.3 Conceptual Utility Layout 72
10.4 Utility Layout Requirement Variances 72
10.4.1 Utility Main Clearance to Face of Curb 73
10.4.2 Auxiliary Water Supply System Main within Sidewalk 73
10.4.3 Storm Drain Main and Sanitary Sewer Main Layout Order 73

11. LOW PRESSURE WATER SYSTEM 74
11.1 Existing Low Pressure Water System 74
11.2 Proposed Low Pressure Water System 74
11.2.1 Project Water Demands 74
11.2.2 Project Water Supply 74
11.2.3 Project Water Distribution System 75
11.2.4 Low Pressure Water Design Criteria 75
11.2.5 Proposed Fire Hydrant Locations 75
11.3 Off-Site Mitigations 76
11.4 Phases for Low Pressure Water System Construction 76
11.4.1 Existing Low Pressure Water System Demolition Phasing 77

12. SANITARY SEWER SYSTEM 78
12.1 Existing Sanitary Sewer System 78
12.2 Proposed Sanitary Sewer System 78
12.2.1 Proposed Sanitary Sewer Demands 78
12.2.2 Proposed Sanitary Sewer Capacity 79
12.2.3 Proposed Sanitary Sewer Design Basis 79
12.2.4 Proposed Sanitary Sewer Design Criteria 79
12.2.5 Proposed Sanitary Sewer Collection System 79
12.2.6 Structured Street Drainage 80
12.2.7 Design Criteria Variances 80
12.3 Phases for Sanitary Sewer System Construction 81
12.3.1 Existing Sanitary Sewer System Demolition Phasing 82

13. STORM DRAIN SYSTEM 83
13.1 Existing Storm Drain System 83
13.2 Conceptual Storm Drain System Design 83
13.2.1 Overview 83
13.2.2 5-Year Storm Design 83
13.2.3 100-Year Storm Design and Overland Release 84
13.2.4 Storm Drain Design Criteria 84
13.2.5 Conceptual Storm Drain System Layout 85
13.2.6 Storm Drain System Variances 86
13.3 Phases for Storm Drain System Construction 86

14. AUXILIARY WATER SUPPLY SYSTEM (AWSS) 87
14.1 Existing AWSS Infrastructure 87
14.2 AWSS Regulations and Requirements 87
14.3 Conceptual AWSS Infrastructure 87
14.4 Phases for AWSS Construction 88
14.4.1 AWSS Phased Installation 88

15. CENTRAL UTILITY DISTRICT INFRASTRUCTURE 89
15.1 Central Utility Plant 89
15.1.1 Central Utility Plant Components 89
15.1.2 Central Energy Plant 89
15.1.3 Heat Rejection and Cooling 90
15.1.4 Greywater Collection and Recycled Water Distribution 90
15.2 Phases for Central Utility District Infrastructure Construction 91

16. STORMWATER MANAGEMENT SYSTEM 92
16.1 Existing Stormwater Management System 92
16.2 Proposed Stormwater Management System 92
16.2.1 San Francisco Stormwater Management Requirements & Design Guidelines 92
16.2.2 Proposed Site Conditions and Baseline Assumptions 92
16.2.3 Stormwater Management Design Concepts and Master Plan 93

16.3 Stormwater Control Plan 94
16.4 Phases for Stormwater Management System Construction 94

17. DRY UTILITY SYSTEMS 96
17.1 Existing Electrical, Gas, and Communication Systems 96
17.2 Project Power Providers and Requirements 96
17.3 Proposed Joint Trench 96
17.4 Phases for Dry Utility Systems Construction 97

FIGURES

Figure 1.1 Existing Conditions Plan
Figure 1.2 Conceptual Parcelization

Figure 7.1 Existing Grading Plan
Figure 7.2 Conceptual Grading Plan
Figure 7.3 Street Sawtooth Grading

Figure 8.1 Public Realm Plan
Figure 8.2 Conceptual Site Plan & Street Layout
Figure 8.3 Roadway Dimensions
Figure 8.4 Plan View & Cross Sections Locations
Figure 8.5 Typical Street Cross Sections
Figure 8.6 Typical Street Cross Sections
Figure 8.7 Typical Street Cross Sections
Figure 8.8 Typical Street Cross Sections
Figure 8.9 Typical Street Cross Sections
Figure 8.10 Typical Street Cross Sections
Figure 8.11 Typical Street Cross Sections
Figure 8.12 Typical Street Cross Sections
Figure 8.13 Structured Street & Open Space Locations
Figure 8.14 Typical Structured Sheets
Figure 8.15 Pedestrian Circulation + Accessibility
Figure 8.16 Vehicular Circulation
Figure 8.17 Bicycle Circulation + Facilities
Figure 8.18 Loading, Servicing, + Parking
Figure 8.19 Pier 48 Service and Loading
Figure 8.20 Pier 50 Service and Loading
Figure 8.21 Conceptual Fire Truck Turning Analysis
Figure 8.22 Truck Turning Template
Figure 8.23 Truck Turning Enlargements
Figure 8.24 Truck Turning Enlargements
Figure 8.25 Truck Turning Enlargements
Figure 8.26 Truck Turning Enlargements
Figure 8.27 Truck Turning Enlargements
Figure 8.28 Street Design

FIGURES (Continued)

Figure 8.29 Shared Public Way
Figure 8.30 Shared Public Way Plan
Figure 8.31 Terry A Francois Boulevard
Figure 8.32 Terry A Francois Boulevard Plan
Figure 8.33 Bridgeview Street
Figure 8.34 Bridgeview Street Plan
Figure 8.35 Exposition Street
Figure 8.36 Exposition Street Plan
Figure 8.37 Long Bridge Street
Figure 8.38 Long Bridge Street Plan
Figure 8.39 3rd Street
Figure 8.40 3rd Street Plan
Figure 8.41 Mission Rock Street
Figure 8.42 Mission Rock Street Plan
Figure 8.43 Curb Heights Plan
Figure 8.44 Paving Diagram
Figure 8.45 Paving Types
Figure 8.46 Paving Types
Figure 8.47 Urban Forest Diagram
Figure 8.48 Urban Forest Criteria
Figure 8.49 Tree Planting at Structured Street
Figure 8.50 Stormwater Treatment Diagram
Figure 8.51 Stormwater Flow-Through Planter
Figure 8.52 Lighting Diagram
Figure 8.53 Lighting Zones
Figure 8.54 Accessible Loading at Exposition Street
Figure 8.55 Accessible Loading at Terry A Francois Boulevard
Figure 8.56 Accessible Loading at Shared Public Way
Figure 8.57 Typical Driveway Plan
Figure 8.58 Potential Traffic Calming Elements
Figure 8.59 Typical Raised Crossing & Bulb-Out Details
Figure 8.60 Off-Site Traffic Mitigations
Figure 8.61 On-Site Traffic Mitigations
Figure 8.62 Intersection Design
Figure 8.63 Typical Intersection All-Way Stop Intersection
Figure 8.64 Typical Table-Top Intersection
Figure 8.65 Two-Way Stop Intersection
Figure 8.66 Typical Flush Intersections
Figure 8.67 Mission Rock Street Intersections
Figure 8.68 3rd Street and Exposition Intersection

Figure 9.1 Public Open Spaces
Figure 9.2 Phasing

FIGURES (Continued)

Figure 10.1	Horizontal Utility Main Separation
Figure 10.2	Utility Variance Request Locations
Figure 11.1	Conceptual Low Pressure Water System
Figure 11.2	Typical Utility Section within Public Streets
Figure 11.3	Conceptual Fire Hydrant Locations
Figure 12.1	Conceptual Sanitary Sewer System
Figure 12.2	Typical Utility Section within Public Streets
Figure 12.3	Sanitary Sewer Variance Request Locations
Figure 13.1	Conceptual Storm Drainage System
Figure 13.2	Typical Utility Section within Public Streets
Figure 14.1	Conceptual Auxiliary Water Supply System
Figure 14.2	Typical Utility Section within Public Streets
Figure 15.1	Conceptual Utility District Infrastructure
Figure 15.2	Conceptual Greywater Infrastructure
Figure 15.3	Conceptual Recycled Water Infrastructure
Figure 16.1	Conceptual Stormwater Management Plan
Figure 17.1	Conceptual Dry Utility Systems
Figure 17.2	Typical Utility Section within Public Streets

APPENDICES

Appendix A	NOT USED
Appendix B	Hazardous Soil Remediation Plan Letter, September 12 2011
Appendix C	Soil Management Plan, June 1999
Appendix D	Covenant to Restrict Use of Property, recorded January 27, 2000
Appendix E	Covenant to Restrict Use of Property, recorded July 25 2002
Appendix F	Preliminary Geotechnical Recommendations and Summary Memorandum No. 1 (Langan Treadwell & Rollo - January 26, 2016)
Appendix G	Grading and Drainage Master Plan
Appendix H	NOT USED
Appendix I	Sea Level Rise Adaptation Strategy, September 6, 2016
Appendix J	Low Pressure Water Master Plan
Appendix K	Sanitary Sewer Master Plan
Appendix L	Conceptual Air Gap Manifold Detail
Appendix M	District Heating and Cooling Services at Mission Rock May 13, 2016
Appendix N	Stormwater Management Master Plan
Appendix O	NOT USED
Appendix P	Transportation Plan (Nelson Nygaard)

1. INTRODUCTION

1.1 Purpose

This Infrastructure Plan is an exhibit to the Development Agreement (DA) between Sea Wall Lot 337 Associates, LLC (Developer) and City and County of San Francisco (City), and Development and Disposition Agreement (DDA) between the Developer and the City, acting by and through the San Francisco Port Commission. The Infrastructure Plan describes the Horizontal Improvements (also referred to herein as Infrastructure) responsibilities of the City, Port, and Developer, including associated responsible parties in charge of implementing and operating the Infrastructure Improvements, and describes the Infrastructure improvements to be constructed for the Project, associated with Project sustainability, environmental remediation, demolition, grading, street and transportation improvements, open space and park improvements, potable water system, sanitary sewer system, storm drain system, central utility plant and eco-district system, stormwater management system, and dry utility system.

The Project Site includes approximately 28 acres including the existing 14.2-acre Seawall Lot 337, the 0.3-acre lot known as Block P20, the 6.0-acre Pier 48, the 2.2-acre China Basin Park, 3.5-acre Terry A Francois Boulevard, 1.4-acre Pier 48 and 50 access zone, and 0.5-acre of Marginal Wharf. Initially capitalized terms unless separately defined in this Infrastructure Plan have the meanings and content set forth in the DDA and DA.

1.2 Infrastructure Plan Overview

This Infrastructure Plan describes and governs the construction and development of all Infrastructure to be provided [by Developer] for the development of the Project on the Project Site, including associated off-site improvements needed to support the Project.

The Project infrastructure obligations of the City, Port and other City Agencies are described herein. A condition of the Developer's performance under this Infrastructure Plan is the obtaining of all requisite approvals in accordance with the DDA, DA and Interagency Cooperation Agreement (ICA).

1.3 Property Acquisition, Dedication, and Easements

The mapping, street vacations, property acquisition, dedication and acceptance of streets and other Infrastructure improvements is generally anticipated to occur through the subdivision mapping process. Except as otherwise noted, infrastructure described in this Infrastructure Plan shall be constructed within

the public right-of-way or dedicated easements to provide for access and maintenance of infrastructure facilities.

Public service easements will be allowed within the Project as necessary to provide infrastructure and services to the Project. Proposed public water, storm drain, sanitary sewer, recycled water, Auxiliary Water Supply System (AWSS), and power easements benefitting the SFPUC on private property will be reviewed on a case-by-case basis. Full access for vehicles and equipment for the maintenance and repair of utility mains will be provided. Public utilities within easements will be installed in accordance with the standards in this Infrastructure Plan and applicable City regulations for public acquisition and acceptance within public utility easement areas, including provisions for maintenance access. However, where different improvement standards are identified in this Infrastructure Plan, such standards shall control and Infrastructure shall not be required to be dedicated as public right-of-ways or improved to public right-of-way standards outlined in the City and County of San Francisco Subdivision Regulations.

1.4 Project Datum

Elevations, including tidal elevations, hydraulic grade lines (HGLs), and site elevations, referred to herein are on the Mission Bay Datum (MBD). The MBD is defined as the Mission Bay Datum which is the Old City Datum plus one hundred feet.

1.5 Conformance with EIR & Entitlements

This Infrastructure Plan has been developed to be consistent with Project mitigation measures required by the Draft Environmental Impact Report (EIR) and other entitlement documents. Regardless of the status of their inclusion in this Infrastructure Plan, the mitigation measures of the EIR shall apply to the Project.

1.6 Applicability of Uniform Codes and Infrastructure Standards

Future deviations from or modifications to this Infrastructure Plan and/or existing City Standards, Guidelines, and Codes are subject to the procedures and provisions of the DA and DDA.

1.7 Project Phasing

It is anticipated that the Mission Rock Site will be developed in several phases subject to the approval process outlined in the DA, DDA, and ICA. Each phase would include a Development Parcel or Parcels and associated Infrastructure and open space areas.

The parties acknowledge that certain Horizontal Improvements, as described in Sections 3, 4, 5, 6, 7, and 8 of the Infrastructure Plan, such as site preparation, removal or remediation of soils, grading, soil compaction and stabilization, may be required or desired at an earlier stage of development and in advance of such Phase Improvements. The parties will cooperate in good faith in determining the scope and timing of such advance Horizontal Improvements, so as not to delay the construction of Development Parcels and associated Phase Improvements, or affect the criteria for the proportional scope of Phase Improvements.

1.8 Phases of Infrastructure Construction

The construction of Infrastructure, as described in the Infrastructure Plan, master tentative map and other Project approvals, will be phased to serve the incremental build-out of the Project in accordance with the Project approvals. Phase Improvements, are the access, utility and open space improvements necessary to accommodate development of a particular Development Parcel or Parcels. Phase improvements will be described in subsequent improvement plans and associated improvements agreements or permits approved prior to filing a final map for the associated Development Parcels.

For each Development Parcel proposed for development, the associated adjacent and as needed Infrastructure to provide access and utilities to serve that development, such as streets, and improvements therein and thereon, will be constructed. Adjacent Infrastructure refers to infrastructure that is necessary and near to and may share a common border or end point with the proposed Development Parcel or Parcels.

The conceptual limits of the existing infrastructure to be demolished as well as conceptual layouts of the permanent and/or temporary infrastructure systems for each Development Parcel will be provided as part of the construction document submittals for that Development Parcel or Phase. Repairs and/or replacement of the existing facilities necessary to serve the Development Parcel will be designed and constructed by the Developer.

Where requested by Developer, and if the Port and other affected City Agency(s) with jurisdiction over the affected Infrastructure, determines it is appropriate in connection with the phased development of the Project, portions of the Phase Improvements may be constructed or installed as interim improvements. Interim improvements would be removed or abandoned, as determined by the Port and

other affected City Agency(s), when substitute permanent Phase Improvements are provided to serve a subsequent Development Parcel. Where a connection of interim Infrastructure to completed permanent Infrastructure Improvement has been approved or conditionally approved, such connection will not be grounds to reject or delay acceptance of or release security for such Infrastructure.

Demolition of existing Project Area infrastructure and construction of each proposed Development Parcel and associated Phase Improvements will impact site accessibility. During construction of each Development Parcel and associated Phase Improvements, interim access shall be provided and maintained for emergency vehicles, subject to San Francisco Fire Department (SFFD) approval, as well as pedestrian access on at least one side of the street around the construction perimeter that is American with Disabilities Act (ADA) compliant. Interim access to the existing parking will also be maintained and coordinated between the Port, Developer, and City, as required.

The City will be responsible for maintenance of proposed public Infrastructure installed by the Developer once construction of the new Infrastructure is complete and accepted by the San Francisco Department of Public Works (SFDPW), the SFMTA, the SFPUC, or other City of Port agency, except as otherwise specified in the DA. At all phases of development prior to full build out, the Developer shall demonstrate to the SFPUC that a functioning water and wastewater infrastructure system is in place at all times and complies with all City laws, codes and regulations.

2. SUSTAINABILITY

The Mission Rock Project will be a leading exemplar for sustainable design development through high performance infrastructure and attention to community health and prosperity. Improvements comply with the City and County of San Francisco and State sustainability requirements including Title 24 (Divisions 6 and 11), San Francisco Non-Potable Water Ordinance and The San Francisco Green Building Code. Key benefits of the Project's sustainable site design and infrastructure elements include improved health, cleaner environment, minimal water dependency and greenhouse gas-free energy. Anticipated sustainable infrastructure includes, but is not limited to, stormwater management facilities (i.e. landscaped park areas, landscape strips, flow-thru planters, bioretention areas), a central energy distribution plant and infrastructure, treatment of sewer flow for reuse within the buildings as greywater, green building material selection, and water fixture and lighting efficiency. A more detailed description of the sustainability strategies for the Project is found in the latest edition of the Sustainability Strategy Document, by Atelier Ten within the Project Development Agreement.

3. ENVIRONMENTAL REMEDIATION

3.1 Historical Use Background

The planned mixed-use Mission Rock development is proposed to be located in an area that was formerly an industrial property built upon filled marshland and shallow tidal flats between 1877 and 1913. The existing fill includes construction and demolition debris, rubble, rock and dirt originating from the nearby hills and the 1906 earthquake. The site has been historically used for railroad transportation, shipping related support structures and automobile parking. H&H Ship Service occupied the area from 1950 to 1996 for wastewater treatment and transfer operations to treat petroleum contaminated wastewater. In 1978 the Department of Health Services, now known as the Department of Toxic Substances Control (DTSC), declared wastes managed at the site to be hazardous under federal and state hazardous waste management regulations and the property was later designated as a hazardous waste facility. The DTSC approved a Closure Plan prepared by H&H Ship Service which was compliant with the California Hazardous Waste Control Law (HWCL) in 1995. As a requirement to the hazardous waste site closure, use restrictions are implemented on the Project site and a Soil Management Plan (SMP) was prepared by Geomatrix Consultants in 1999 as a guideline for soil handling (see Appendix C).

3.2 Environmental Constraints and Regulations

The Project site is subject to environmental monitoring regulations and use restrictions that will impact the Mission Rock Project improvements. The Developer is responsible for addressing and complying with the following regulations and restrictions for the site:

3.2.1 Maher Ordinance Requirements and Site Assessment

The Mission Rock Project site is within a location required to adhere to Article 20 of the City and County of San Francisco Department of Public Health (DPH) Ordinance 253-86. This Ordinance, also known as the Maher Ordinance, is established to serve as a general guideline for preparing site history and soil analysis reports that help identify existing hazardous material.

The Maher Ordinance site assessment requirements were satisfied during the previous parking lot construction with the development of an SMP, dated June 1999. The SMP provided a summary of the soil samples taken and the contaminants detected throughout the site. The primary chemicals detected in the soil included PNAs and metals such as antimony, arsenic, copper, lead, nickel and mercury. The groundwater sampling did not yield PNA contaminants, but did show low

concentrations of several metals. It was determined that the presence of the discovered chemicals within the soil and groundwater are not considered an unacceptable risk to future on-site construction workers, nearby residents and visitors. However, to best manage `the contaminated soil and groundwater, the SMP outlined removal, handling, stockpiling and disposal procedure requirements for the parking improvements, as well as future site development.

3.2.2 Use Restrictions

During previous improvements at the site, Covenant to Restrict Use of Property agreements were recorded between The Port of San Francisco and the DTSC restricting the use of the Seawall Lot 337 property. The use restrictions require that hazardous waste assessments compliant with the Maher Ordinance be performed on-site if more than 50 cubic yards of soil is to be disturbed and that the property shall not be used for any of the purposes stated in the Covenant to Restrict Use of Property Agreements of January 27, 2000 and July 25, 2002 (see Appendices D and E). Should the site be developed for any use of that which is listed as "restricted", then a variance request can be submitted to the DTSC for review.

3.3 Anticipated Site Remediation Procedures

The Developer will be responsible for adhering to the requirements stated in this section and will coordinate with the appropriate agency for environmental clearance prior to construction, as required. The Project requirements are described in the Hazardous Soil Remediation Plan Letter "Mission Rock Development – Seawall 337 San Francisco, CA 1868-00," dated September 12, 2011 by Ash Creek Associates, Inc. (See Appendix B).

3.2.1 Maher Ordinance Compliance

The anticipated site remediation procedures will remain consistent with the SMP. The SMP will also be updated as required to support the proposed redevelopment. These remediation construction procedures shall include, but not be limited to, dust control, erosion and sediment control, stockpile management and appropriate soil disposal and sampling. Any excess soil excavated will be profiled to determine suitable disposal options. Although chemical analysis results show that the soil samples collected on-site have metal and organic concentrations less than the Total Threshold Limit Concentrations (TTLCs), additional solubility testing of some of the metal contaminated soils will likely be needed to better identify the waste profile of soils

containing lead. Removed soil exceeding the Solubility Threshold Limit Concentrations (STLCs) of the state will be profiled as California Hazardous Waste and will be disposed of at the appropriately licensed landfill location.

The SMP findings are assumed to be consistent with the current parking lot site improvements and sufficient to meet the Maher Ordinance as design and construction proceed forward. These compliance assumptions will be discussed with the City and County of San Francisco DPH during a meeting with the Project team.

3.2.2 Use Restriction Variance

The Covenant to Restrict Use of Property agreements for the Project site state that residential housing is a restricted use of the property. Mission Rock is currently proposing high-density housing improvements on a portion of the site. It is the Project team's understanding that the intent of the Use Restriction is to prevent single family home development rather than multi-family residential improvements. If this assumption remains accurate, then the proposed high-density housing development will be an allowable use of the property. To comply with the recorded agreements, a meeting will be conducted with the DTSC and Port of San Francisco to review the proposed development, use restriction requirements and a potential variance for high density-housing, if required.

concentrations of several metals. It was determined that the presence of the discovered chemicals within the soil and groundwater are not considered an unacceptable risk to future on-site construction workers, nearby residents and visitors. However, to best manage `the contaminated soil and groundwater, the SMP outlined removal, handling, stockpiling and disposal procedure requirements for the parking improvements, as well as future site development.

3.2.2 Use Restrictions

During previous improvements at the site, Covenant to Restrict Use of Property agreements were recorded between The Port of San Francisco and the DTSC restricting the use of the Seawall Lot 337 property. The use restrictions require that hazardous waste assessments compliant with the Maher Ordinance be performed on-site if more than 50 cubic yards of soil is to be disturbed and that the property shall not be used for any of the purposes stated in the Covenant to Restrict Use of Property Agreements of January 27, 2000 and July 25, 2002 (see Appendices D and E). Should the site be developed for any use of that which is listed as "restricted", then a variance request can be submitted to the DTSC for review.

3.3 Anticipated Site Remediation Procedures

The Developer will be responsible for adhering to the requirements stated in this section and will coordinate with the appropriate agency for environmental clearance prior to construction, as required. The Project requirements are described in the Hazardous Soil Remediation Plan Letter "Mission Rock Development – Seawall 337 San Francisco, CA 1868-00," dated September 12, 2011 by Ash Creek Associates, Inc. (See Appendix B).

3.2.1 Maher Ordinance Compliance

The anticipated site remediation procedures will remain consistent with the SMP. The SMP will also be updated as required to support the proposed redevelopment. These remediation construction procedures shall include, but not be limited to, dust control, erosion and sediment control, stockpile management and appropriate soil disposal and sampling. Any excess soil excavated will be profiled to determine suitable disposal options. Although chemical analysis results show that the soil samples collected on-site have metal and organic concentrations less than the Total Threshold Limit Concentrations (TTLCs), additional solubility testing of some of the metal contaminated soils will likely be needed to better identify the waste profile of soils

containing lead. Removed soil exceeding the Solubility Threshold Limit Concentrations (STLCs) of the state will be profiled as California Hazardous Waste and will be disposed of at the appropriately licensed landfill location.

The SMP findings are assumed to be consistent with the current parking lot site improvements and sufficient to meet the Maher Ordinance as design and construction proceed forward. These compliance assumptions will be discussed with the City and County of San Francisco DPH during a meeting with the Project team.

3.2.2 Use Restriction Variance

The Covenant to Restrict Use of Property agreements for the Project site state that residential housing is a restricted use of the property. Mission Rock is currently proposing high-density housing improvements on a portion of the site. It is the Project team's understanding that the intent of the Use Restriction is to prevent single family home development rather than multi-family residential improvements. If this assumption remains accurate, then the proposed high-density housing development will be an allowable use of the property. To comply with the recorded agreements, a meeting will be conducted with the DTSC and Port of San Francisco to review the proposed development, use restriction requirements and a potential variance for high density-housing, if required.

4. SITE DEMOLITION

4.1 Scope of Demolition

The Developer will be responsible for the demolition and deconstruction of all non-retained existing buildings and infrastructure features. Demolition and deconstruction will include removal and disposal of hardscape, landscape, utilities, and temporary building structures. The demolition limit of work consists of the existing parking lot known as Giants Lot A, China Basin Park, Terry A Francois Boulevard and select sidewalk and vehicular pavement replacement along 3rd Street and Mission Rock Street. Where feasible, concrete and asphalt pavements will be recycled and used on-site or made available for use elsewhere. The existing Channel Wharf at the eastern end of Terry A Francois Boulevard will be renovated and Pier 48 will remain and undergo structural upgrades with the Project improvements. Soil removal associated with demolition activities will comply with the Project environmental permit requirements.

As part of the vegetation grubbing and clearing operation, trees and other plant materials will be removed, relocated or protected in placed, as required. Trees and plant materials removed as part of the demolition process will be recycled by composting or similar methods for on-site uses associated with the planting of new vegetation and erosion control to the extent feasible.

The Developer shall be responsible for providing for the permanent improvements proposed to replace the existing infrastructure in accordance with approved building and construction permits issued by the City. The extent of these improvements and associated demolition will be finalized during the construction document approval process.

4.2 Existing Utility Demolition

Existing utility demolition scope includes storm drain, sanitary sewer, water and dry utility infrastructure removal. All storm drain utilities and utilities associated with The Yard within the existing parking lot and Terry A Francois Boulevard will be removed and disposed of. A portion of the existing sanitary sewer pipe along Terry A Francois Boulevard will be removed as well and replaced with a sanitary sewer line which will connect the existing Pier 48 and Pier 50 laterals to the public system. Existing water infrastructure along Terry A Francois Boulevard and China Basin Park will also be removed, disposed of and replaced to accommodate the proposed improvements. Gas utilities throughout Terry A Francois Boulevard will be removed and existing laterals that serve Piers 48 and 50 will be protected in place. Existing outfalls on

Terry A Francois and China Bain Park will be protected in place during adjacent demolition activities. Where transite pipe (asbestos–cement pipe) is encountered, appropriate abatement methods will be used to satisfy applicable regulatory agency requirements.

4.3 Phases of Demolition

Demolition will occur in phases based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of demolition will be the minimum necessary to support the Development Phase and maintain minimum required parking allocations, access and utility connections. Such phased demolition will allow the existing utility services, vehicular and pedestrian access areas, and landscaped spaces to remain in place as long as possible and reduce disruption of existing uses on the site and adjacent facilities.

5. SITE RESILIENCY

5.1 Overview

Resilience is the ability to reduce risks and recover more easily from natural occurring events with large impacts on performance and use. The Project is located adjacent to the San Francisco Bay and faces potential risks from such events as earthquakes, settlement, liquefaction, lateral spreading, wave ride-up, sea level rise, and climate change. The Developer plans to build site resiliency into the Project by implementing disaster risk reduction and resilient infrastructure. The Project will identify development areas and utility infrastructure guidelines to accommodate tidal elevations, the 100-year Base Flood Elevation (BFE), and Sea Level Rise (SLR).

5.2 Project Datum

Elevations, including tidal elevations and site elevations, referred to herein are on the Mission Bay Datum (MBD). The MBD is defined as the Mission Bay Datum which is the Old City Datum, plus one hundred feet.

5.3 Federal Emergency Management Agency Regulations

The Federal Emergency Management Agency (FEMA) under the jurisdiction of the Department of Homeland Security has recently completed a Preliminary City and County of San Francisco Flood Insurance Study (SF FIS) Number 060298V00A, version 2.3.2.0, dated November 12, 2015. This study has helped inform the development of preliminary Flood Insurance Rate Maps (FIRM) that categorize sites within "Flood Zones" based on their susceptibility to flood events. Flood Zone designations are used to inform the design process and insurance requirements for buildings to ensure that protections are made for human health and safety based on the flood hazard potential at a particular site. Per the FEMA website, the following is a description of the various Flood Zone designations employed by FEMA:

> *"Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). SFHA are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30. Moderate flood hazard areas, labeled Zone B or Zone X (shaded) are also shown on the FIRM, and are the areas between the*

limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood. The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone C or Zone X (unshaded)."

5.3.1 Seawall 337, China Basin Park and Terry A Francois Boulevard FEMA Flood Plain Designations

Based on our review of the Preliminary Flood Insurance Rate Map 0602980119A (FIRM map), dated November 12, 2015, the Mission Rock development site, excluding Pier 48, Pier 50, and the coastal perimeter along China Basin Park, is located in a flood hazard classification of "Zone X." Per the FIRM map, the Zone X designation of our site describes the following:

> *"0.2% Annual Chance of Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas less than on square mile."*

With a Zone X designation, the Project site is subject to minor flood of less than a foot during large storm events, which is considered a low to moderate risk area.

Since the majority of the site is in Flood Zone X, FEMA does not require specific grading or flood-proofing requirements. Proposed site grading, described in greater detail in Section 7, will be designed to elevate the site higher than the existing condition to protect against the effects of SLR, which in turn will provide a greater level of protection against the potential for flooding the area. Proposed buildings with basements and loading docks will comply with FEMA regulations and provide appropriate flood-proofing measures to ensure compliance, if required.

5.3.2 Pier 48, Pier 50, and Coastal Perimeter FEMA Flood Plain Designation

Based on the Preliminary Flood Insurance Rate Map 0602980119A (FIRM map), dated November 12, 2015, Pier 48, Pier 50, and the coastal perimeter along China Basin Park are located in a special flood hazard area (SFHA) "Zone AE," which has a 100-year base flood elevation (BFE) of 11-feet (NAVD 88 datum). The more detailed Preliminary SF FIS, dated November 12, 2015 indicates a 1-percent annual chance Total Water Level Elevation (TWLE) of 11.4-feet (NAVD 88), which is the assumed 100-year BFE value for the pier structure for the purposes of this analysis. The TWLE is the maximum combined sea water level elevation, wave setup, and wave run-up considered for coastal BFEs.

The datum conversion is approximately 11.32-feet between NAVD 88 and Old City Datum, and 100 feet between the Old City Datum and MBD. Combining these datum conversions, the approximate conversion from elevation 11.4 feet (NAVD 88) to the MBD is 88.68 feet, resulting in a 100-year BFE of 100.08 feet (MBD) for Pier 48, Pier 50, and the coastal perimeter along China Basin Park.

Based on the FIRM map, the existing pier structures are subject to flooding from the 1% annual flood event (100-year event). The BFE refers to the minimum elevation at which Pier 48 and Pier 50 must be elevated or flood-proofed in compliance with FEMA/National Flood Insurance Program (NFIP) regulations to provide protection from the 1% annual flood event. Given a designation of SFHA "Zone AE" with a BFE of 11.4 feet (NAVD 88) / 100.08 feet (MBD), the Pier 48 and Pier 50 structures are subject to mandatory Flood Insurance coverage requirements from the NFIP. Since the Pier 48 and Pier 50 structures are a historical resource and will remain at its current elevation, there may be options for receiving variances for portions of the Flood Insurance requirements that the structure is subject to.

5.4 Sea Level Rise

5.4.1 Sea Level Rise (SLR) Design Guidance

The increase in elevation of the Earth's water bodies over time is referred to as SLR. As SLR occurs, there is increased pressure on infrastructure along shoreline areas to provide protections for infrastructure, health, and safety. Studies on the effects of climate change on surface water elevations across the Earth are evolving as more scientific data becomes available. The following is a brief chronology of the guidance documents that inform the SLR strategies being developed for the Project to date:

- The Intergovernmental Panel on Climate Change (IPCC) was formed in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) to provide policy makers with regular assessments of climate changes on a scientific basis. The IPCC issues reports which are produced by three working groups. The latest round of documents issued are based on their fifth assessment report which includes the following:

  - Working Group 1, "Climate Change 2013: The Physical Science Basis," dated 2013.
  - Working Group 2, "Climate Change 2014: Impacts, Adaptation, and Vulnerability, dated 2014.
  - Working Group 3, "Climate Change 2014: Mitigation of Climate Change," dated 2014.
  - IPCC, "Climate Change 2014: Synthesis Report," dated 2014.
- Governor Schwarzenegger issued Executive Order S-13-08 in 2008 directing state agencies to study and plan for the potential effects of SLR
- The National Research Council (NRC) issued the report titled "Sea Level Rise for the Coasts of California, Oregon, and Washington," dated June 2012 and revisions dated December 6, 2013.
- Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT) with science support from the Ocean Protection Council's Science Advisory Team and the California Ocean Science Trust issued "State of California Sea-Level Rise Document," dated March 2013
- City and County of San Francisco (CCSF) Sea-Level Rise Committee "Guidance for Incorporating Sea-Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation," September 2014.
- City and County of San Francisco (CCSF) "San Francisco Sea Level Rise Action Plan," March 2016.
- San Francisco Bay Conservation & Development Commission (BCDC) and Delta Alliance issued "Mission Creek Draft Sea Level Rise Adaptation Study," dated 2015.

5.4.2 Sea Level Rise Design Parameters

The minimum design elevations for the Project Development Area will accommodate potential future sea level rise estimates for San Francisco Bay. The SLR estimates for the Project were developed in response to the CCSF guidance, which is based on both the NRC and CO-CAT studies. Under CCSF SLR guidance, the Project will be designed to accommodate the SLR criteria provided in Table 5.1.

Table 5.1

SLR and Associated Planning Requirements

YEAR	SLR AND PLANNING REQUIREMENTS
2050 Mean SLR	11-inches by 2050. Planning for adaptive management required
2065 Mean SLR	16-inches by 2065. Planning for adaptive management required.
2100 Mean SLR	36-inches by 2100. Planning for adaptive management required.
2100 High SLR	66-inches by 2100. Planning for adaptive management not required.

The existing historical Pier 48 structure and Channel Wharf will remain at their current elevations and not incorporate provisions included in Table 5.1.

5.4.3 Existing Mission Bay Grading for Resiliency

The existing finished grades in Mission Bay adjacent to the Project site range from elevations 97-100.5 feet (MBD). Grading and hydrology designs for Mission Bay were established prior to the more recent SLR investigations of the past 8 years, and do not accommodate for the 2100 High SLR estimates as currently graded. The existing perimeter streets of the Project including 3rd Street and Mission Rock Street will remain at their approximate existing grades. Along the east edge of the Project, Terry A Francois Boulevard will be reconstructed relatively close to its current grade. For existing grades at the Project site and surrounding existing streets, refer to Figure 7.1.

5.5 Proposed Site and Infrastructure Designs

5.5.1 Grading

The proposed Project grading designs and approaches are documented in Section 7 Site Grading. The grading design criteria has been separated between:

- Elevation design criteria as it relates to tides, sea level rise, site elevations, hydraulic grade lines, and existing streets
- Grading design criteria as it relates to site slopes.

The following summarizes the grading approaches for site building parcels and roadway areas, open space areas, and historic structures:

- Maintain public access along the entire 100-foot shoreline band.
- In the zone between the development area and shoreline, provide access opportunities to water.
- Elevate and flood-proof proposed buildings and unadjustable structures to minimize the need for adaptive measures, even under high SLR estimates.
- Conform to grades of existing perimeter streets, pier structures, and wharf structure.

5.5.1.1 Building and Roadway Areas

The minimum elevation design criteria for the proposed building and streets within the Development Areas are shown in Table 5.2.

Table 5.2

Elevation Design Criteria

AREA	MINIMUM DESIGN CRITERIA
Development Area – Buildings	Provide a minimum finished floor elevation of 104.0 feet (98.5 feet 100-year SWL + 66 inches of 2100 High SLR) and/or flood-proof to 2100 High SLR projections for new occupied facilities.
Development Area – Parking Structures	The Block D Parking Garage entrances will be set based on the grade of the adjacent street. At a minimum, the garage entrances will be set with a minimum finish floor elevation of 99.83 feet (98.5 feet SWL + 16 inches of 2065 Mean SLR). As required, Adaptive Management Strategies will be incorporated within the structure to provide resiliency and protection through 2100.
Development Area – Proposed On-Site Streets	The street elevation shall accommodate 2 feet of freeboard between the 5-year storm drain system hydraulic grade line and the street gutter flow line. The starting hydraulic grade line design elevation for the 100-year storm for the storm drain system will be set based on the grade of the adjacent street's lowest top of curb elevation. Refer to Section 13.
Development Area – Pier 48	The pier structure will remain at existing elevation. As SLR occurs, Adaptive Management Strategies may be incorporated within the structure to provide resiliency and protection through 2100, subject to jurisdictional approval.

For adjacent streets serving the project, including 3rd Street and Mission Rock Street, street elevations will remain relatively close to their current elevations. Along the east edge of the project, Terry A Francois Boulevard will be reconstructed relatively close to its current elevation. Proposed streets within the development will slope up from the existing conform elevations of approximate elevations of 99-101.5 feet at 3rd Street, Terry A Francois Boulevard, Piers 48 and 50, and Mission Rock Street to elevations of approximately 102.9-104.3 feet at the center of the site. By elevating the center of the site, access can be provided to building finished floors, which are set to accommodate protection from the 2100 High SLR projections.

5.5.1.2 Shoreline Open Space Areas and Parks

5.5.1.2.1 China Basin Park

China Basin Park will maintain shoreline elevations close to the existing grade of approximately 100 feet (MBD). The park will transition to the Bay Trail at an approximate elevation of 102 feet (MBD) through the center of the park. The Bay Trail through the center of the park provides approximately 6 feet of freeboard from the King Tide elevation of 96 feet (MBD). When sea level rises above 48-inches, the park will function as a space where future adaptations will creatively be implemented to maintain flood protection for existing public access features. The promenade which interfaces between the south portion of the park and the northern part of the development area will maintain access to the public at an elevation of approximately 103.5 – 104 feet (MBD).

5.5.1.2.2 Historical Pier Structures

Pier 48 and Pier 50 are historical structures that will be maintained at existing elevations. The existing grades for accessible areas at Pier 48 range from 99.2 to 101.0 feet (MBD). Accessible areas at Pier 50 have existing grades of 99.5 to 100.9 feet (MBD). The low lying areas of the piers may be susceptible to the 100-year TWLE of 100.08. Since the existing pier structures are a historic resource, they will remain in place. To minimize impacts during a 100-year storm event, the interfacing street of Terry A Francois Boulevard will be regraded to channel stormwater away from the pier structures so that overland release to the

San Francisco Bay will occur between Pier 48 and Pier 50. Existing grades of the piers provide protection beyond 2050 Mean SLR for potential future flooding.

5.5.2 Stormwater System

The 100-year Still Water Level Elevation (SWLE) is the 100-year return period water elevation, which is defined as the water elevation that is exceeded on average once every 100 years or the water elevation with a 1% annual chance of occurrence.

The SWLE for the design of the Development Area is 98.5 feet (MBD). The 100-year return period water elevation for the Development Area includes the effects of tides, storm surges, and tsunamis. The SWLE has been included with the drainage design of the 100-year storm event and overland flow release.

With the project's proximity to the San Francisco Bay, the Project must consider tidal elevations for drainage outfall conditions. Tides are the daily rise and fall of the sea surface that is caused by the gravitation effects of the sun and moon rotating about the earth. The tidal elevation within the San Francisco Bay Area varies by location. For Mission Bay, the 2015 Subdivision Regulation provide a tidal elevation of 96.5 feet (MBD) for the Project which has been included in design to analyze the 5-year storm event.

The SLR and tidal elevations for the Project have been prepared in the SLR Adaptation Strategy Memorandum by Moffatt & Nichol in Appendix I. The tidal elevations, SWLE, and SLR for the Project have been compiled in Table 5.3.

Table 5.3

Tidal Elevations, SWL and SLR by Datum

Elevation	NAVD88	Old City Datum	MBD
100-Year SWLE +66" SLR (2100 High SLR)	15.3'	7.0'	104.0
100-Year SWLE +36" SLR (2100 Mean SLR)	12.8'	4.5'	101.5
100-Year SWLE+16" SLR (2065 Mean SLR)	11.1'	2.8'	99.8'
100-Year SWLE+11" SLR (2050 Mean SLR)	10.7'	2.4'	99.4'
100-Year SWLE	9.8'	1.5'	98.5'
MB Tidal Elevation	7.8'	-3.5'	96.5'
King Tide (Roughly)	7.3'	-4.0'	96.0'
Sea Level	0.0'	-11.3'	88.7'

5.6 Adaptive Managements Strategies

Sea Level Rise (SLR) has the potential to increase flooding risk along the shoreline areas as the 100-year SWLE, TWLE, and BFE increases over time. The Project will be built to protect against varying amounts of SLR and has allocated space for future adaptive management strategies to be implemented in the future to respond to adjusted SLR projections. Strategies for the Project have been developed for Development Areas, Shoreline, and Pier.

5.6.1 Development Parcel Strategy

The proposed strategy for the Development Parcel, including unadjustable structures, is to set proposed grades to a minimum of 104 feet (MBD), high enough to accommodate for the current 2100 High SLR projects thus adaptive management strategies are not required. The Parcel D Parking Garage entrances will be set based on the grade of the adjacent street to accommodate for 2065 Mean SLR.

5.6.2 Shoreline Adaptation Strategy

The shoreline adaptation strategy will be applicable to areas surrounding the Development Parcels. The Promenade and Bay Trail within China Basin Park will be raised to an elevation of 102 feet (MBD) to provide 3.5-feet of freeboard above present day BFE. The China Basin Park shoreline, Terry A Francois Boulevard, 3rd Street, and Mission Rock Street will be maintained at existing grades to provide protection to Development Parcels from inundation during the king tide events beyond 2080. Along the shoreline of China Basin Park, the entire 100-foot shoreline band will be reserved for public access. For sea level rise above 48 inches, the shoreline band will provide an opportunity for creative implementation of future adaptation strategies to maintain flood protection to Mission Bay and the Development Parcels. Adaptive management strategies within China Basin Park may include modifications to create a raised promenade with retaining walls, realignment of the promenade, reconfiguration of shoreline protection to provide flatter slopes and wave breaks. Beyond 2050, future adaptive management strategies may be implemented to the pier apron and below the pier structure to maintain flood protection for the structure.

Today, the National Oceanic and Atmospheric Administration (NOAA) monitors weather conditions and notifies the public of potential risk for flooding in low lying areas. Future adaptation of the shoreline would be enacted when published information from NOAA indicates that flooding to the public access areas would occur during king tide events.

6. GEOTECHNICAL CONDITION

Site geotechnical investigations have been completed and potential site wide geotechnical improvements have been identified by Langan Treadwell & Rollo, culminating in the development of the "Preliminary Geotechnical Investigation Seawall Lot 337 – Mission Bay" (Geotechnical Report) by Treadwell & Rollo, dated September 8, 2011 and subsequent evaluations. In addition, Langan Treadwell & Rollo has also provided a supplemental memorandum: "Preliminary Geotechnical Recommendations and Summary Memorandum No. 1" (Geotechnical Memorandum), dated January 26, 2016 for additional reference, which is attached as Appendix F.

6.1 Existing Site Geotechnical Conditions

The site was originally a shallow bay below water and a part of Mission Bay. It is understood the site was elevated using building rubble and debris from the 1906 San Francisco earthquake as fill. Borings indicate 13 to 37-feet of heterogeneous fill is underlain by approximately 46 to 72-feet of Bay Mud consisting of weak, soft to medium stiff, compressible clay. The over-consolidated Bay Mud at the site is evidence of complete settlement under the existing fill weight. Locations where Bay Mud has failed beneath the heavy fill loads show a "Bay Mud wave" condition and is comprised of clayey gravel and gravely clay. The borings also encountered the bedrock surface to be at a depth of approximately 160-feet near the northwest corner of the site and 260-feet near the northeast corner of the site.

Groundwater was encountered approximately 7 to 9-feet below grade (Elevations 91 to 93 feet). Other sites within Mission Bay have encountered groundwater measured at approximately five feet below grade (Elevation 94.5 feet).

6.2 Existing Site Geotechnical Constraints

6.2.1 Liquefaction/ Settlement of Sand Layers

Liquefaction is the transformation of soil from a solid state to a liquefied state during an earthquake where saturated soil builds up excessive pore water pressure and temporarily loses its strength. The result is immediate settlement and possible lateral movement of the sand material. Conservatively, all loose to medium dense soil materials (sands, silts and low plasticity clays) within both the artificial fills and underlying Bay Deposits are potentially liquefiable. The potential for soil liquefaction is likely to occur during a major earthquake. With the potentially liquefiable layers being random and discontinuous throughout the site, it is estimated the site will experience up to 3-inches of liquefaction-induced settlement within the fill material of the site. Along the west

end of Pier 48, the analysis indicated that 3 to 5-inches of liquefaction-induced settlement could occur.

6.2.2 Lateral Spreading

Lateral spreading is considered the most damaging type of liquefaction-induced ground failure caused by earthquakes. In this case, surficial soil is displaced along a shear zone that has formed within a liquefied layer resulting in surficial blocks sliding downward toward unbound space, such as the Bay. These conditions are common in multiple San Francisco regions, such as the Downtown and Mission Bay districts. The southeast corner and northwest portion of the Project have been identified as being susceptible to lateral spreading estimated to result in 4 to 6-feet of lateral displacement during a large earthquake.

6.2.3 Settlement of Bay Mud

The site is underlain by a layer of Bay Mud estimated to be 46 to 72-feet thick which appears to be over-consolidated. Placing the new fill on top of the existing bay mud layer will initiate a new cycle of consolidation settlements for the Bay Mud layer. It can be expected that for each additional foot of fill placed on the site, approximately 2-inches of settlement may occur at entrances to pile supported structures, 3-inches within streets, and 4-inches in open space areas. During an earthquake, an additional settlement of approximately 9 inches could potentially occur due to seismic densification and liquefaction. For proposed building and structures designed to be pile supported, it is anticipated that 1 to 2-inches of settlement may result from a major earthquake.

If mitigation measures or preventative designs are not incorporated, differential settlement may occur resulting in interrupted access, utility infrastructure damage, and accessibility issues

6.3 Geotechnical Approaches

Successful site development will require engineering design and project construction methods that account for the existing soil, existing conforms, and shoreline conditions. These improvements will help ensure that site accessibility and building access is maintained during seismic events, SLR, and minor long-term consolidation settlement. Proposed building will be constructed on piles with a similar approach proposed for the on-site streets and utilities supporting the new development. The

geotechnical design approaches considered and recommended for the Project have been summarized below and are documented in the Geotechnical Memorandum.

6.3.1 Site Grading Strategies

The proposed development will be elevated 1 to 5-feet above existing grade to accommodate for future sea level rise. The use of soil fill to raise the site would cause ground settlement of up to a few feet. At the existing Project conforms with Terry A Francois Boulevard and Piers 48 and 50 to the east, new constructed Mission Rock Street to the south, and existing 3rd Street to the west, proposed grades will match the approximate existing grades to mitigate the potential for settlement. To raise the center of the site, the design team has explored several different alternatives to adding soil fill to the site, which include the following strategies:

6.3.1.1 Soil Surcharging with Wick Drains

Adding mounds of surcharge soil with perforated wick drains to collect water across the site will induce Bay Mud Settlement in advance of Project construction. This effectively mitigates the settlement of Bay Mud that the new fill proposed as part of the finished Project would typically cause. Considering that parking operations must be maintained at the site prior and during build-out of the Project, this settlement mitigation solution is not appropriate for the development since parking availability would be eliminated or severely limited.

6.3.1.2 Deep Soil Mixing

Deep Soil Mixing (DSM) acts to improvement the stability of the underlying site by mechanically mixing cementitious binder slurry with weak and compressible soils. Due to the depth of the Bay Mud layers at the site extending down to nearly 90-feet below existing finished grade, DSM is both cost prohibitive and less practical than other solutions considered by the Geotechnical Memorandum.

6.3.1.3 Lightweight Fill to Raise Grades

Lightweight fill materials such as cellular concrete or Geofoam weigh less than traditional soil fill. Using such materials in lieu of soil to raise site grades significantly reduces the settlement of the Bay Mud layer. However, lightweight fill may present several utility installation and maintenance challenges. Installation of utilities can be difficult, as cutting

foam in the shape of the utilities may not be easily feasible. Long term maintenance of utilities within Geofoam would also require cutting of the Geofoam to access the utilities, which is a labor and cost intensive process. Additionally, storm drain and sanitary utilities will be installed as deep as 12 to 13-feet below finished grade, which is within the groundwater table, and can potentially cause uplift and complex dewatering strategies. Although lightweight fill is not anticipated to be used throughout the majority of the site, it may be utilized within park areas where utility grids and access for maintenance and operations is not a constraint.

6.3.1.4 Pile supported structures, streets and utilities

Due to the infeasibility of other options outlined above, the proposed Project streets are proposed to be pile supported "U-shaped" corridors that extend the width of the right-of-way and built to a depth required to support the installation of utilities. The "U-shaped" corridor would then be backfilled with soil to provide the typical street sub-surface condition, allow utilities to be installed with standard trenching method, and provide for long term utility and infrastructure maintenance using typical construction and City standards. Pile designs could include friction or end-bearing solutions with final designs prepared and approved during the construction document process. This is the preferred solution for mitigating site settlement issues, and with site structured street approaches are described in greater detail in Section 8 of this document.

6.3.2 Liquefaction and Lateral Spreading Mitigations

In order to mitigate the potential effects of earthquake induced lateral spreading and soil liquefaction, the Project proposed to incorporate solutions that would include Stone Columns, Deep Dynamic Compaction, or combination of both solutions.

Compaction Grouting and Rapid Impact Compaction (RIC) were also reviewed as potential solutions for mitigating lateral spreading and liquefaction. However, RIC has proven successful to depths of 10-feet, which is less than required for the site, and there is not enough soil overburden present in the site soils to handle the required pressures for Compaction Grouting.

6.3.3 Flexible Utility Connections

Portions of the site may experience differential settlement at the interface of pile supported buildings and the utility connections at 3rd Street, Mission Rock Street and Terry A Francois Boulevard. Differential settlement at these location could cause the utility connections to shear and break along this plane. Therefore, flexible utility connections, incorporating such solutions flexible pipe materials, ball joints or settlement vaults, may be installed at the interface of the structured street with an at-grade street (Terry A Francois Boulevard, Mission Rock Street, 3rd Street) to mitigate the displacement of the utility connections and ensure continuous utility service to the Project and adjacent development.

6.3.4 Site Accessibility

Minor Long-term settlement of the ground plane may occur along the site conforms at Mission Rock Street, 3rd Street, and Terry A Francois Boulevard. Where a pile-supported structure interfaces with the on-grade public streetscape, minor differential settlement may occur where the compressible material beneath the street begins to settle relative to pile supported buildings and proposed on-site streets. To mitigate areas where differential settlement is anticipated, grading and building designs will incorporate measures to ensure that continuous accessible paths of travel are maintained where building access points and private passageways interface with the public right-of-way. Where required, measures such as hinge slabs, gangways, and other adjustable surfaces, may be designed to mitigate the maximum anticipated long-term differential settlement.

6.4 Phases of Geotechnical Stabilization

Geotechnical stabilization will occur in phases based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of geotechnical stabilization will be the minimum necessary to support the Development Phase and maintain minimum required parking allocations, access and utility connections. Such phased geotechnical stabilization will allow the existing utility services, vehicular and pedestrian access areas, and landscaped spaces to remain in place as long as possible and reduce disruption of existing uses on the site and adjacent facilities. Additional geotechnical stabilization, such as mitigations for lateral spreading and liquefaction, may be completed above the minimum necessary per phase due to constructability and efficiency considerations.

6.5 Schedule for Additional Geotechnical Studies

Supplemental Geotechnical Studies and Reports will be prepared as required to support the proposed Project public improvements. In addition, Geotechnical Reports for private building parcels will be prepared and submitted to the City as part of the building permit process.

7. SITE GRADING

7.1 Project Datum

Elevations, including tidal elevations, hydraulic grade lines (HGLs), and site elevations, referred to herein are on the Section 7 Mission Bay Datum (MBD), unless identified otherwise. The MBD is defined as the Mission Bay Datum which is the Old City Datum plus one hundred feet.

7.2 Existing Site Conditions

The existing grade within the Project site slopes gradually east, west, and south away from the center of the existing parking lot with ground elevations ranging from approximately 101 feet elevation at high points to approximately 97 feet elevation to the south at low points in the existing parking lot. Along the western and eastern borders, the site is bounded by and conforms to the existing grades along 3rd Street and the Piers with ground elevations ranging from 99 feet to 100.5 feet in elevation. The northern border is bounded by the north interface of China Basin Park at the rip rap of China Basin. Along the southern border, there is a grade different of 3 feet to 4 feet of elevation between the existing parking lot and the newly constructed Mission Rock Street. The existing site elevations are shown in Figure 7.1.

7.3 Site Geotechnical Constraints and Approach

The geotechnical report and geotechnical memorandum were prepared for the Project by Langan Treadwell & Rollo. The Project site was originally a shallow bay below water as part of Mission Bay. It was later elevated by using building rubble and debris from the 1906 San Francisco earthquake as fill. Site investigation found the fill is underlain by Bay Mud, building rubble, and debris.

Placement of new fill on top of existing Bay Mud layers will initiate a new cycle of consolidation settlements. The Project Site may experience minor amounts of liquefaction, settlement, and lateral spreading due to existing sand layers and soft Bay Mud. The geotechnical engineer and explored different measures to mitigate these site constraints, which are described in greater detail in Section 6.

7.4 Project Grading Overview

The Developer will be responsible for the design and construction of the proposed grading for the Project. Below is a description of the grading design for the different areas of the site. The proposed Project grading plan is shown in Figure 7.2.

The Project is comprised of the Development Parcel at the center of the project, the Waterfront Promenade and China Basin Park to the north, and Terry A Francois Boulevard to the east that interfaces with Pier 48, Channel Wharf, and Pier 50. The Development Parcel consists of the private development blocks and structured street grids.

Proposed grading for the Project raises the Development Parcel to approximate elevations of 103.5 feet to 104.5 feet at the center of the site. The structured street grid grades will slope down to the existing adjacent streets, the San Francisco Bay and China Basin shorelines, or park areas. The streets and sidewalks have been designed to provide overland release and Americans with Disabilities Act (ADA) compliant accessible pathways throughout the site and adjacent parcels. The proposed street grid with interconnected open space and accessible pathways will be constructed to link 3rd Street with Terry A Francois Boulevard in the west-east direction and China Basin Park with Mission Rock Street in the north-south direction. Throughout the site, grades less than 5 percent are provided.

7.5 Elevation and Grading Design Criteria

The grading design criteria has been separated between:

- Elevation design criteria as it relates to tides, sea level rise, site elevations, hydraulic grade lines, and existing streets
- Grading design criteria as it relates to site slopes.

7.5.1 Elevation Design Criteria

The minimum elevations are based on the FEMA 100-year BFE. For existing perimeter roads serving the Project and adjacent properties, proposed infrastructure within these existing streets will be designed to accommodate tidal elevations. For more information on the Project as it relates the FEMA, refer to Section 5 Site Resiliency.

7.5.1.1 Sea Level Rise (SLR)

SLR will result in changing water levels in the San Francisco Bay that the Project will need to accommodate. The design criteria employed at the time of this Infrastructure Plan are based on the best scientific forecasts and potential design strategies currently available. The forecasts will very likely change over time and will provide guidance for the future.

The minimum design elevations for the Project Development Parcel will accommodate potential future SLR estimates for San Francisco Bay as discussed in Section 5 Site Resiliency. The Project will be designed to accommodate the SLR criteria provided in Table 7.1.

Table 7.1

SLR and Associated Planning Requirements

YEAR	SLR AND PLANNING REQUIREMENTS
2050 Mean SLR	11-inches by 2050. Planning for adaptive management required
2065 Mean SLR	16-inches by 2065. Planning for adaptive management required.
2100 Mean SLR	36-inches by 2100. Planning for adaptive management required.
2100 High SLR	66-inches by 2100. Planning for adaptive management not required.

The minimum SLR to be accommodated for the elevation design of structures and streets in the Development Parcel is 16-inches. To the extent feasible, the Project plans to develop structures in the Development Parcel to accommodate a 2100 High SLR of 66-inches above the BFE. For more information on the Project as it relates the Sea Level Rise, refer to Section 5 Site Resiliency and Table 5.1.

7.5.1.2 100-Year Base Flood Elevation and Tidal Elevation

The 100-year BFE is the 100-year return period water elevation, which is defined as the water elevation that is exceeded on average once every 100 years or the water elevation with a 1% annual chance of occurrence.

The BFE for the design of the Development Parcel is 98.5 feet. The 100-year return period water elevation for the Development Parcel includes the effects of tides, storm surges, and tsunamis. The BFE has been included with the drainage design of the 100-year storm event and overland flow release.

With the project's proximity to the San Francisco Bay, the Project must consider tidal elevations for drainage outfall conditions. Tides are the daily rise and fall of the sea surface that is caused by the gravitation effects of the sun and moon rotating about the earth. The tidal elevation within the San Francisco Bay Area varies by location.

For Mission Bay, the 2015 Subdivision Regulation provide a tidal elevation of 96.5 feet for the Project which has been included in design to analyze the 5-year storm event.

The SLR and tidal elevations for the Project have been prepared in the SLR Adaptation Strategy Memorandum by Moffat & Nichol in Appendix I, and are provided in Table 7.2.

Table 7.2

SLR and Tidal Elevations by Datum

Elevation	NAVD88	Old City Datum	MBD
FEMA 100-Year BFE +66″ SLR	15.3′	4.0′	104.0
FEMA 100-Year BFE	9.8′	1.5′	98.5′
MB Tidal Elevation	7.8′	-3.5′	96.5′
King Tide (Roughly)	7.3′	-4.0′	96.0′
Mean High High Water	6.2′	-5.5′	94.9′
Sea Level	0.0′	-11.3′	88.7′

7.5.1.3 Minimum Site Elevations

The minimum elevation design criteria for the Development Parcels are shown in Table 7.3.

Table 7.3

Elevation Design Criteria

AREA	MINIMUM DESIGN CRITERIA
Development Parcel – Buildings	Provide a minimum finished floor elevation of 104.0 feet (98.5 feet 100-year SWL + 66 inches of 2100 High SLR) for new occupied facilities.
Development Parcel – Parking Structures	The Block D Parking Garage entrances will be set based on the grade of the adjacent street. At a minimum, the garage entrances will be set with a minimum finish floor elevation of 99.83 feet (98.5 feet SWL + 16 inches of 2065 Mean SLR). As required, Adaptive Management Strategies will be incorporated within the structure to provide resiliency and protection through 2100.
Development Parcel – Proposed On-Site Streets	The street elevation shall accommodate 2 feet of freeboard between the 5-year storm drain system hydraulic grade line and the street gutter flow line. The starting hydraulic grade line design elevation for the 100-year storm for the storm drain system will be set based on the grade of the adjacent street's lowest top of curb elevation. Refer to Section 13.
Development Parcel – Pier 48	The pier structure will remain at existing elevation. As SLR occurs, Adaptive Management Strategies may be incorporated within the structure to provide resiliency and protection through 2100, subject to jurisdictional approval.

For adjacent streets serving the project, including 3rd Street and Mission Rock Street, street elevations will remain relatively close to their current elevations. Along the east edge of the project, Terry A Francois Boulevard will be constructed relatively close to its current elevation. Proposed streets within the development will slope up from the existing conform elevations of approximate elevations of 99-101.5 feet at 3rd Street, Terry A Francois Boulevard, Piers 48 and 50, and Mission Rock Street to elevations of approximately 102.9-104.3 feet at the center of the site. By elevating the center of the site, access can be provided to building finished floors, which are set to accommodate protection from the 2100 High SLR projections.

7.6 Proposed Grading Designs

7.6.1 Building Areas

Proposed finished floors will be set at a minimum of the 100-year tide level plus 66-inches of SLR to ensure protection from anticipated rising tide levels. Project development and grading designs will be developed to comply with the City requirements for accessible paths of travel.

7.6.2 Proposed Roadways

Proposed slopes along public streets and private alleys will be set at a maximum of 5 percent to provide ADA accessible pathways of travel without requiring handrails as shown in Figure 7.2. The proposed Public street system is designed in a saw tooth grading pattern as illustrated in Figure 7.3, such that adjacent high and low points have relatively the same elevations. At conforms, the site slopes down to the existing adjacent streets, China Basin, or park areas. With exception to Channel Street and Channel Lane, which will function primarily as pedestrian zones, handrails will be provided for stairs and accessible areas exceeding 5 percent, where required.

At street intersections, grades will be designed at a maximum slope of 2% to provide an accessible path of travel in crosswalks. In addition, vertical curves within the streets will be designed to both begin and end outside the limits of the crosswalk areas.

7.6.3 Overland Release

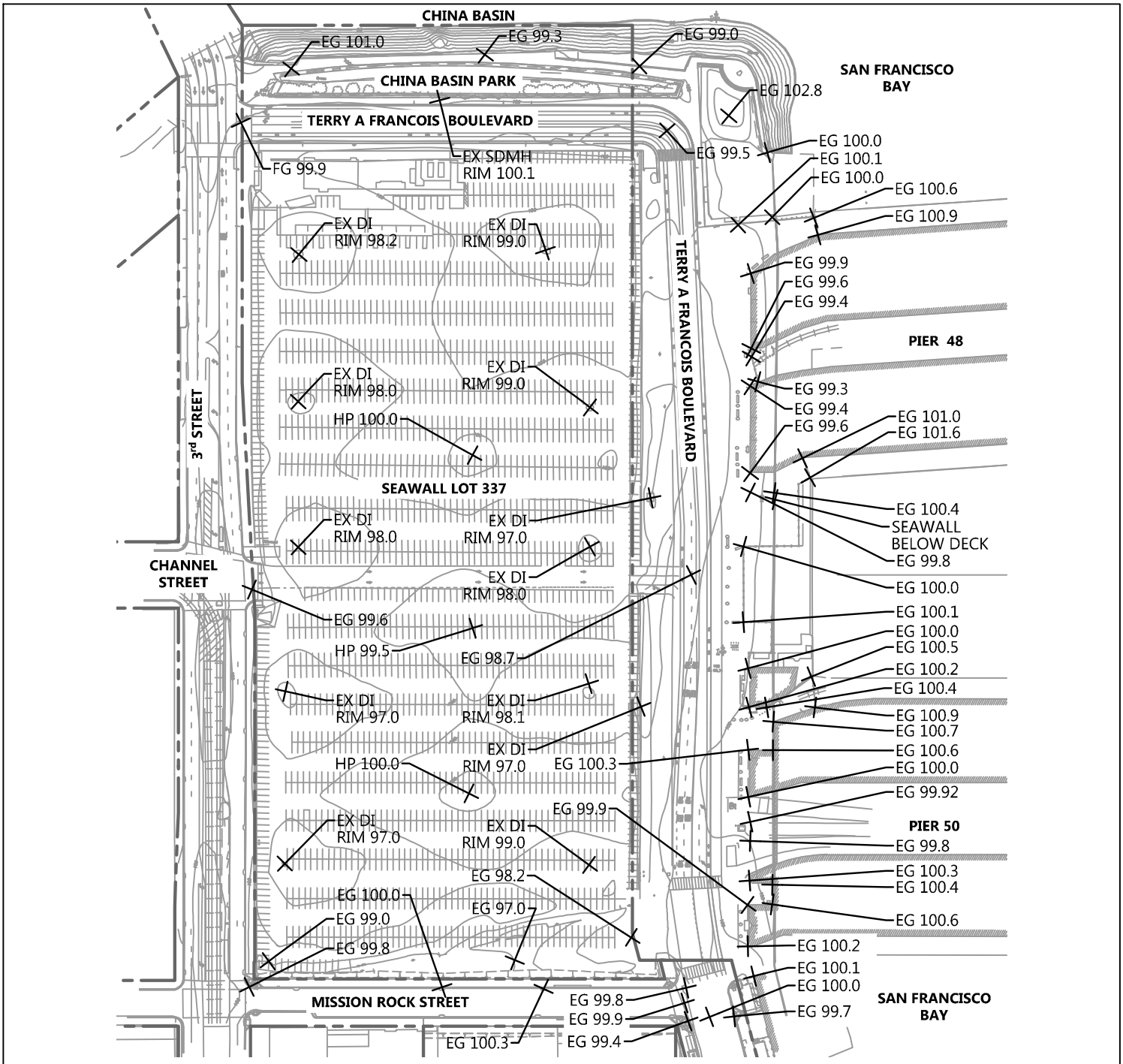
As required by the San Francisco Public Utilities Commission (SFPUC), grading and hydrology designs will be developed such that the 100-year HGL is contained within the top of curb elevations on opposite sides of a street throughout the Project site. For curbless streets of Terry A Francois Boulevard and Shared Public Way, grading and hydrology designs will be developed to contain the 100-year HGL within the street while providing a 4-foot wide accessible path on one side of the street. The proposed on-site street grid will be graded to provide overland release for the Project. The proposed Public street system is designed in a saw tooth grading pattern to facilitate overland flow of stormwater to adjacent streets.

7.7 Proposed Site Earthwork

The conceptual grading plan for the Project will require approximately 75,000 CY of gross earthwork to grade for topsoil within China Basin Park and the pile-supported structured streets. Within China Basin Park, grades will be elevated by a combination of topsoil and geo-foam. Private Development Parcels and Mission Rock Square will be pile-supported and not require additional fill to grade. To support grading activities, a Storm Water Pollution Prevention Plan (SWPPP) / Erosion and Sediment Control Plan (ESCP) will be submitted in parallel with future grading permits. Grading in conjunction with site remediation efforts will be performed by the Developer.

7.8 Phases of Grading Activities and Approvals

The Developer will grade the site based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of the grading proposed will be the minimum necessary to support the Development Phase. The new Development Phase will conform to the existing grades as close to the edge of the Development Phase area as possible while maintaining the integrity of the remainder of the Project. Repairs and/or replacement of the existing facilities necessary to support the proposed Development Phase will be designed and constructed by the Developer. Interim grading will be constructed and maintained by the Developer as necessary to maintain existing facilities impacted by proposed Development Phases.



LEGEND

EXISTING PARCEL LINE

EXISTING CONTOUR

N

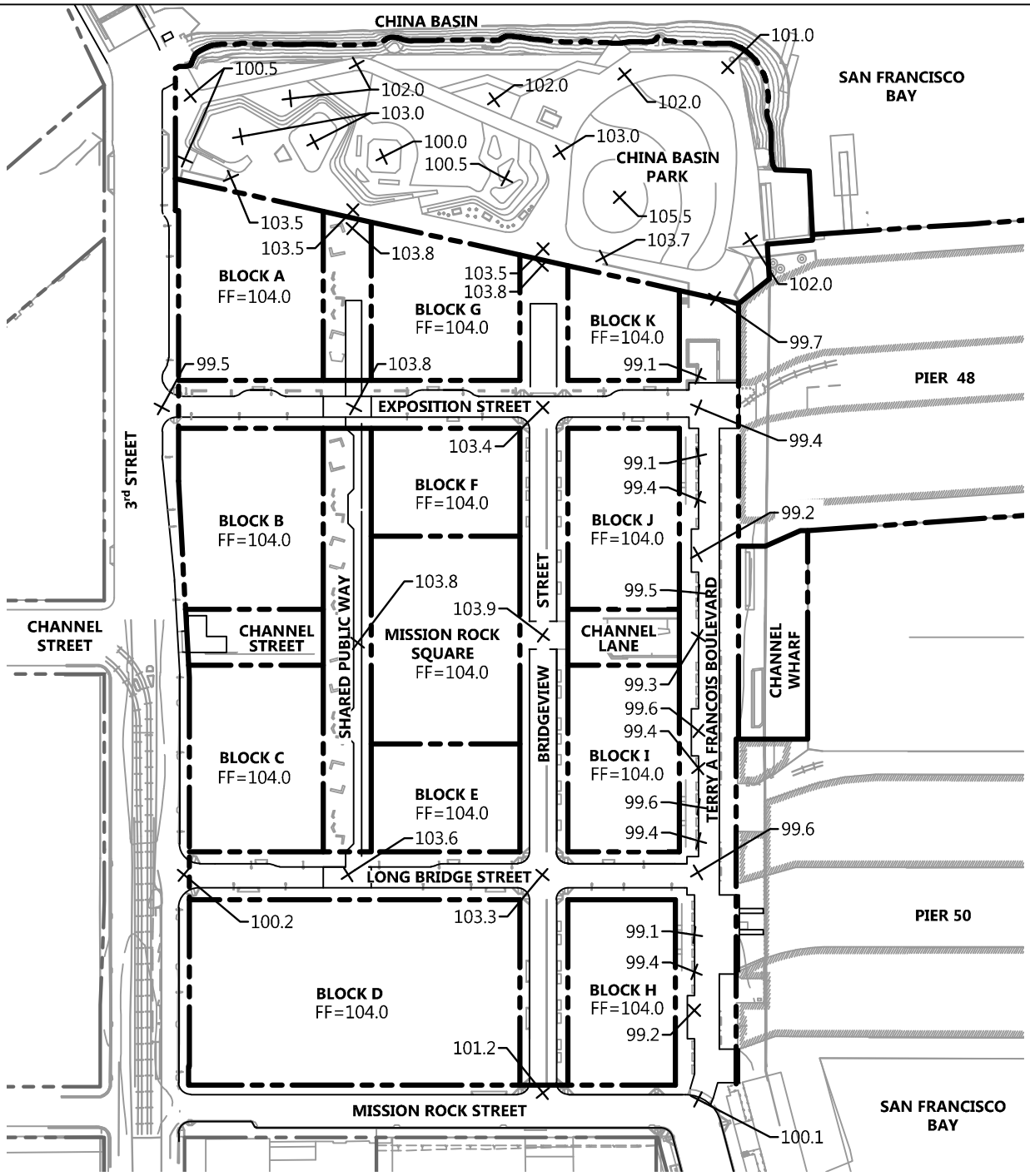
0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 7.1 Existing Grading Plan.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slb

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 7.1 - EXISTING GRADING PLAN



LEGEND

PROPOSED PARCEL LINE

EXISTING PARCEL LINE

103.6 PROPOSED ELEVATION

NOTE

ALL ELEVATION ARE BASED ON THE MISSION BAY DATUM. THE MISSION BAY DATUM EQUALS THE OLD CITY OF SAN FRANCISCO DATUM PLUS 100 FEET.

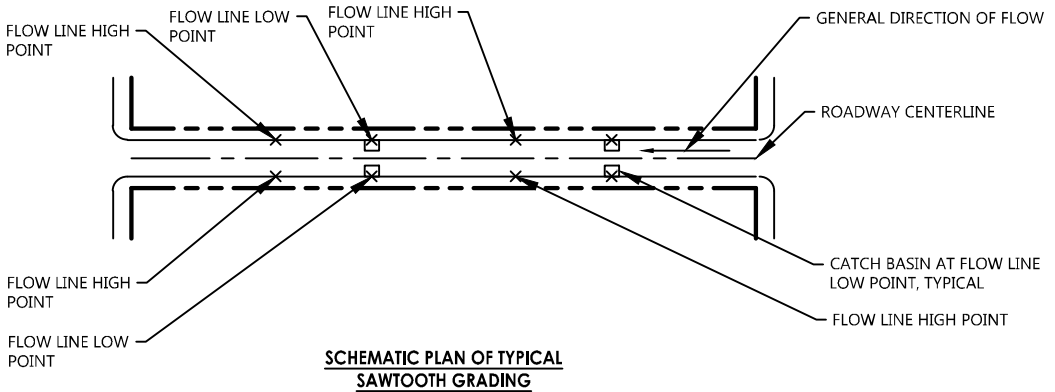
Source: BKF ENGINEERS, 07/2016

N

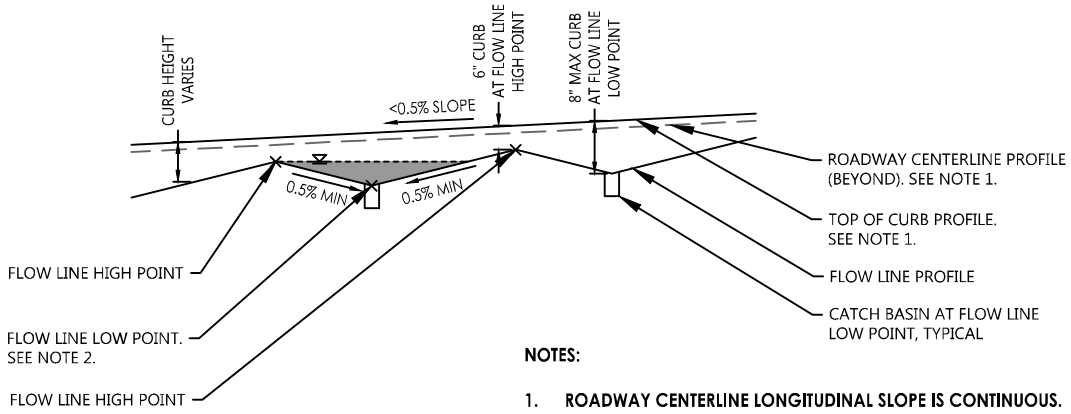
0 200

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 7.2 Conceptual Grading Plan.dwg
PLOT DATE: 09-19-16
PLOTTED BY: volk

MISSION ROCK INFRASTRUCTURE PLAN **FIGURE 7.2 - CONCEPTUAL GRADING PLAN**



SCHEMATIC PLAN OF TYPICAL SAWTOOTH GRADING



OPTION 1

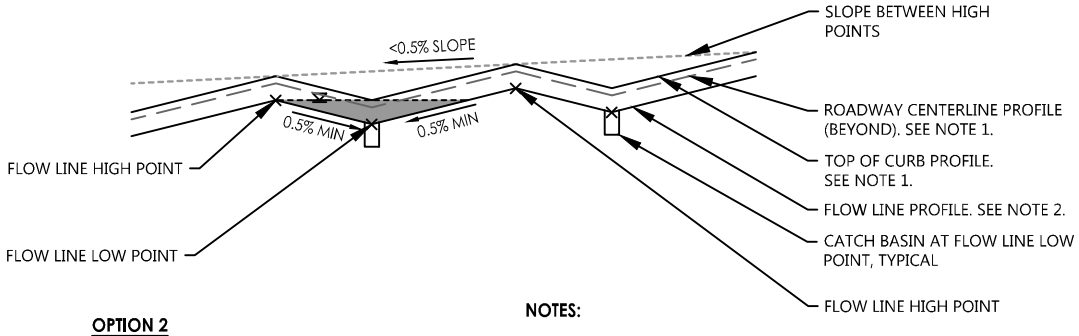
SCHEMATIC PROFILE OF SAWTOOTH GRADING WITH CONTINUOUS CENTERLINE AND TOP OF CURB

NOTES:

1. **ROADWAY CENTERLINE LONGITUDINAL SLOPE IS CONTINUOUS. TOP OF CURB FOLLOWS ROADWAY PROFILE.**

   STREET CROSS SLOPE VARIES BETWEEN 2% AND 5% AND CURB HEIGHT VARIES BETWEEN 6-INCHES AND 8-INCHES (EXCEPT AT CURB RETURNS, CROSSWALKS, ACCESSIBLE PARKING SPACES, AND ACCESSIBLE PASSENGER LOADING ZONES) TO ACHIEVE A FLOW LINE WITH A 0.5% MINIMUM LONGITUDINAL SLOPE.

2. **THE LOW POINT OF THE FLOW LINE COINCIDES WITH THE STEEPEST STREET CROSS SLOPE AND 8-INCH CURB.**



OPTION 2

SCHEMATIC PROFILE OF FLOW LINE SAWTOOTH GRADING WITH PARALLEL ROADWAY CENTERLINE AND TOP OF CURB

NOTES:

1. **ROADWAY CENTERLINE PROFILE AND TOP OF CURB FOLLOWS FLOW LINE PROFILE.**

2. **FLOW LINE HIGH POINT ELEVATIONS ARE LOWER THAN THE UPSTREAM TOP OF CURB LOW POINT ELEVATIONS.**

N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080008_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 7.3 Street Sawtooth Grading.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib

8. STREET AND TRANSPORTATION INFRASTRUCTURE

Mission Rock's street network will be comprised of short, walkable Development Parcels that connect to existing Mission Bay streets adjacent to the Project. The Project will prioritize pedestrian and bicycle safety and access to the buildings, streets, and open spaces at Mission Rock through careful consideration of transit and transportation connections, accessibility, traffic calming measures, and a centralized site parking facility instead of on-street parking. The bicycle network at Mission Rock will provide an important link for the district, connecting the Blue Greenway to the Embarcadero, and will include a variety of facilities that will provide choices for cyclists of all ages and skill levels. These facilities will be integral to the unique character of Mission Rock's streets.

8.1 Design Controls: Plan Overview

The Design Controls describe the public realm, open spaces, and streetscapes at Mission Rock represented in Figure 8.1. As a pedestrian-priority development, Mission Rock's street network will provide safe and easy access to open spaces, building entrances, and retail, with unique street types designed to the scale and speed of the pedestrian experience. A combination of traffic calming strategies will discourage unnecessary vehicle traffic and ensure that internal traffic will be low-speed and low-volume. The public realm will be tightly integrated with the design and scale of the ground floor of Mission Rock's buildings.

8.2 Public Street System

The Developer will be responsible for the design and construction of the public streets. Improvements will generally include the following:

- Pavement sections
- Concrete curbs and gutters
- Concrete sidewalk and curb ramps
- Traffic control signage and striping
- Traffic signals
- Street lighting
- Street landscaping and trees
- Stormwater management facilities (may include such methods as landscape strips, permeable pavements, and bio-retention areas)

- Street furnishings (includes, but are not limited to, benches, trash cans, bike support facilities and pedestrian scale lighting)
- Accessible on-street passenger loading zones with adjacent street level passenger loading aisles and curb ramps.
- Accessible curb ramps
- Raised crosswalks
- Tabled Intersections
- Roadway bulb-outs
- Class I and II bikeways
- Enhanced Paving

Streetscape and landscape improvements are further defined in the Design Controls and in Section 8.4.

8.2.1 Public Street Layout and Parcelization

A system of street and parcel numbers has been created to facilitate planning and design coordination and is shown on Section 1, Figure 1.2. The new grid network of public streets includes three streets oriented north to south: the Shared Public Way, Bridgeview Street, and the existing Terry A Francois Boulevard, which will be realigned and reconstructed. Exposition Street and Long Bridge Street will be oriented east to west. Property frontage improvements will result in partial renovation of the existing 3rd Street and Mission Rock Street sidewalks, with bicycle facilities to be coordinated with the City. Typical cross sections for the proposed streets and existing street improvements can be found on Figures 8.5 – 8.12.

8.2.2 Roadway Dimensions

Street widths—curb to curb—are designed to accommodate emergency access, bicycle facilities, passenger loading and building servicing, and vehicular access throughout the site. Typical vehicular travel lanes within streets will be 10.5-feet in width. Travel lanes are measured from the face of curb or outside edge of bicycle facilities. All streets except the Shared Public Way will provide for two-way traffic and fire access, with street widths varying from 22 to 34-feet. The Shared Public Way will provide a one-way 10' wide vehicular travelway within a Shared Zone that will be 20-feet clear. All buildings will be Type 1 Construction. Additional roadway dimension information is shown in Figure 8.3 and detailed cross section information can be found on Figures 8.5-8.12.

8.2.3 Structured Streets and Open Space Areas

Due to existing geotechnical constraints that make the Project site susceptible to settlement, liquefaction, and lateral spreading when fill is added to the site, the conceptual geotechnical approach is to provide structured street sections that are pile supported in fill areas. Refer to Section 6 for a detailed analysis of the Project's decision making process for selecting the structured street and open space area approach to mitigating the site geotechnical constraints. Pile-supporting Mission Rock's streets will provide a geotechnically sound foundation for standard street and open space construction that will support the street designs described in Section 8.4, while mitigating the site's tendency for differential settlement.

The proposed structured streets include Exposition Street, Long Bridge Street, Shared Public Way and Bridgeview Street. The proposed open space areas include Channel Street and Channel Lane. Structured street and open space area locations are identified in Figure 8.13. The structured streets and open space areas will be comprised of street pavement and/ or pedestrian concrete paving, landscape, utility infrastructure, and sidewalk improvements built on top of and within structural fill throughout the street sections within the public right-of-way. The concrete slab thickness at the bottom of the structure is expected to be 2-feet thick and walls will be 1 foot thick. The depth of the structured streets and open space areas will be a minimum of 6-feet deep beneath landscaping to provide sufficient room for tree roots and at least 1 foot deeper than the bottom of the deepest utility pipe per SFPUC vertical clearance requirements. Subdrains will be provided within the structured streets and open space areas to prevent accumulation of water and will drain to the sanitary sewer system as described in Section 12. A preliminary typical structured street cross section is shown on Figure 8.14.

Structured streets and open space areas will be supported by steel H-piles or precast, pre-stressed concrete piles with no down drag. There are two types of pile systems being considered for supporting the structured streets and open space areas. The first consideration is friction-only piles that extend below the Bay Mud sub-layers and gain friction in the clay and sand beneath. The second consideration is a combination of friction plus end-bearing piles which will extend to dense sand or bedrock approximately 100 – 160-feet beneath the bottom of the Bay Mud layers. These preliminary pile-supporting systems are further discussed in Appendix P and are subject to

final geotechnical studies and structural designs to be completed as part of the Construction Document process.

The structured streets and open space areas will be integrated within the Project's street grid and conform to existing and reconstructed streets of 3rd Street, Mission Rock Street, and Terry A Francois Boulevard. Final designs to determine pile spacing, depths, waterproofing and drainage will be completed as part of the Construction Document process.

8.3 Public Street Modes of Travel and Access

8.3.1 Pedestrian Circulation and Accessibility

Creating a safe, accessible, and comfortable pedestrian experience will be a priority on all streets at Mission Rock, with safe pedestrian street crossings and connections to Open Spaces.

Mission Rock's three north-south streets will have reduced-height or flush curbs separating the pedestrian realm from the vehicular travelway. In addition to privileging pedestrian access, this strategy will facilitate paratransit vehicle access that can serve all of Mission Rock's Development Parcels and open spaces. Passenger loading and building servicing strategies will be designed to minimize conflicts between pedestrians and vehicles, and to maximize the special streetlife elements that create a rich pedestrian experience.

8.3.1.1 Pedestrian Throughway

On all sidewalks and major pedestrian routes to and within Open Spaces, a pedestrian throughway that is 6'-0"-minimum width will be maintained. This throughway is defined as a universally accessible path of travel that does not exceed 5% maximum longitudinal slope and 2% maximum cross slope. See Section 8.4 for mandated minimum widths of pedestrian throughway and circulation routes for specific streets.

8.3.1.2 Access to Development Parcels and Open Spaces

Universal access to and within open spaces shall be provided for significant pedestrian connections, identified on Figure 8.15. Loading zones for vehicular and paratransit loading and unloading shall be provided, distributed to enable access to all Development Parcels and open spaces, with preference given to significant pedestrian connections.

8.3.2 Vehicular Circulation

All streets at Mission Rock shall have two-way low-volume, low-speed traffic circulation, with the exception of the Shared Public Way, which shall have one-way traffic in the northbound direction only. Circulation and controlled intersections are shown on Figure 8.16 and described in Sections 8.7 and 8.8.

8.3.2.1 Paseos

Paseos are proposed at the terminus of the Shared Public Way, Bridgeview Street, and Terry A Francois Boulevard at China Basin Park. These paseos shall accommodate Emergency Vehicle Access for a maximum distance of 150' from the Exposition Street ROW. The terminus of this access shall be clearly marked by permanent site furnishings or street trees. At Exposition Street, paseos shall include signage and design cues that prohibit access for unauthorized vehicular traffic.

8.3.2.2 Intersections

All stop-controlled and signalized intersections shall adhere to City standards for signage and street markings. Where crosswalks at uncontrolled intersections are proposed at Open Space connections, an appropriate combination of traffic control strategies, including crosswalk markings, shall be employed to maximize visibility and safe pedestrian crossing. Refer to Section 8.8 for more detailed information on intersection design and controls.

8.3.3 Bicycle Circulation

The Mission Rock development is dedicated to improving bicycle transportation throughout the Mission Bay area by implementing the 2009 San Francisco Bicycle Plan and providing infrastructure for improved cyclist safety. In addition to providing a key link within the Bay Trail, between the Blue Greenway south of the site and the Embarcadero north of the site, bicycle lanes of various class designations will be incorporated into the public streets throughout the site. Terry A Francois Boulevard will include the Blue Greenway, a multi-use trail along the waterfront, as well as sharrows within the Shared Zone. Bridgeview Street and Mission Rock Street will include cycle tracks that are separated from vehicular traffic using mountable curbs, horizontal buffers, or vertical barriers. Bridgeview Street and Terry A Francois Boulevard will accommodate the majority

of bicycle traffic traveling north and south through the site on protected bicycle facilities or multi-use trails, providing a safer environment that separates bicycles from vehicular traffic and prioritizes bicycle travel. Figure 8.17 indicates the conceptual strategy for these facilities at a network scale. Refer to Section 8.4 for specific street designs, bicycle facilities, and safety strategies.

8.3.4 Loading, Servicing, and Parking

Loading, servicing, and parking at Mission Rock will be distributed to minimize impact on the public realm pedestrian experience. While no permanent street parking will be provided, passenger loading across the site will be accommodated in dedicated areas. Servicing needs for all of Mission Rock's Development Parcels will be accommodated on Exposition Street and Long Bridge Street in dedicated zones. Additional commercial access will be provided on Terry A Francois Boulevard, to serve the Piers and Working Waterfront tenants. Figure 8.18 describes this conceptual strategy.

8.3.4.1 Loading

The Design Controls define where passenger loading zones are distributed in dedicated areas for the public realm; refer to the Transportation Plan for more detailed information. Dedicated zones to accommodate spaces for passenger loading shall be provided on Exposition and 3rd Streets, the Shared Public Way, and Terry Francois Boulevard. Refer to Section 8.6 for accessible loading stall details and Section 8.4 for streetscape designs.

8.3.4.2 Servicing

The Design Controls also define where servicing -- dedicated zones for commercial deliveries, freight loading, and building servicing -- may occur within the public realm. Dedicated zones to accommodate spaces for building servicing shall be provided on Exposition and Long Bridge Streets.

8.3.4.3 Large Vehicle Access

Exposition and Long Bridge Streets and Terry A Francois Boulevard shall accommodate commercial vehicle circulation. Access for WB-67 and WB-50 trucks to the valleys of Pier 48 and Pier 50, respectively, shall be maintained; refer to Figures 8.19 and 8.20 for access studies. Commercial vehicle access for trucks that are a maximum size of SU-30 shall be

accommodated in loading zones on the west side of the Terry A Francois Boulevard ROW for Working Waterfront tenants; see Section 8.4.

8.3.4.4 Parking and Driveways

Per Chapter 5 of the Design Controls, driveways may be provided for interior servicing of Development Parcels. If driveways are provided at all Development Parcels except Block D, they must be located on Exposition Street and Long Bridge Street. Driveways for the shared parking facility at Block D will be provided on Long Bridge Street, Bridgeview Street and Mission Rock Street. See Section 8.6 for information regarding placement of driveways relative to streetscape elements.

8.3.5 Fire Department Access

Based on the planning efforts undertaken during the Open Space and Streetscape Master Plan and meetings with the San Francisco Fire Department, intersection radii, street widths from curb to curb, and right-of-way layouts have been designed to accommodate fire truck turning movements at the Project intersections shown on Figure 8.21. Per the SFFD requirements, intersections are designed to accommodate the truck turning movements of the City of San Francisco 57-foot Articulated Fire Truck (Fire Truck), which is shown on Figure 8.22. Other emergency vehicles turning movements analyzed included the SFFD Engine, SFFD Rescue squad, and a second version of the 57-foot Articulated Truck. The SFFD 57-foot Articulated Fire Truck shown in figures 8.21-8.27 was the most restricted vehicle and thus was the basis for street layout designs. At intersection approaches and within intersections, the Fire Truck may encroach into the opposing vehicular travel lane to complete turning movements, but a minimum of 7-feet of refuge area is provided for any cars within these lanes. Figures 8.23-8.27 show enlargements of the fire truck turning movements for the San Francisco 57-foot Articulated Fire Truck at the site intersections.

8.4 Public Street Network and Hierarchy

The Mission Rock street network will include several street types with distinctive character, planting, traffic speed, and streetlife elements – site furniture, street trees, special paving, and understory planting that combine with active ground floor uses to enrich the pedestrian experience. These street types include:

- Shared Public Way: A pedestrian-oriented shared street with one-way, low-speed, low-volume traffic (Shared Public Way, 8.29-8.30).
- Working Waterfront: A shared street with two-way, low-speed, low-volume traffic that integrates industrial and maritime uses with the Blue Greenway (Terry A Francois Boulevard, 8.31-8.32).
- Neighborhood Street: Streets with generous sidewalks, stormwater treatment gardens, and slow traffic; vehicular travelway curb-separated from sidewalk; must include sharrows, standard bicycle lanes, or protected bicycle facilities (Bridgeview Street, 8.33-8.34; Exposition Street, 8.35-8.36; and Long Bridge Street, 8.37-8.38).
- Paseo: Non-vehicular street connection adjacent to China Basin Park that accommodates emergency vehicle access (Bridgeview Street, Terry A Francois Boulevard, and the Shared Public Way).
- District Street: Streets referencing OCII Mission Bay design standards that include sidewalk and bicycle improvements only (3rd Street, 8.39-8.40; Mission Rock Street, 8.41-8.42)

8.4.1 Street Zones and Designs

The streets will contribute to a varied public realm while satisfying above- and under-ground infrastructure needs at Mission Rock. Proposed streets largely conform to the 2015 Subdivision Regulations, with exceptions noted in Section 8.4.2: Street Designs. The public right-of-way must be open to the sky with the exception of permitted landscape and street-wall encroachments, and publicly accessible at all times unless subject to maintenance, operations, security and safety rights, or closure by Master Developer for events.

8.4.1.1 Street Zones: General Definitions

The overall dimension of each streetscape is divided into several sidewalk and roadway zones. The following zones apply to the pedestrian realm of all streets:

- Frontage Zone: A zone along building frontages for Active Edge uses such as seating, signage, and merchandizing, defined in Chapter 5 of the Design Controls.

- Pedestrian Throughway: An unobstructed path of travel for pedestrians that is 6'-0" minimum width and universally accessible, with longitudinal slopes not to exceed 5% maximum.
- Streetlife Zone: A zone within the sidewalk that houses streetscape elements such as trees, lighting, furnishings, and stormwater gardens; equivalent to a Furnishing Zone as defined in the 2015 Subdivision Regulations. See 8.4.1.3.
- Stormwater Treatment Zone: A zone at sidewalk grade on Exposition and Long Bridge Streets where large feature stormwater treatment gardens are proposed within the right-of-way.

The following zones apply to the roadway of Bridgeview, Exposition, Long Bridge, 3rd, and Mission Rock Streets:

- Loading Zone: A zone where temporary spaces for passenger loading and building servicing will be provided.
- Travel Lanes
- Bicycle Facilities

The following zone applies to the Shared Public Way and Terry A Francois Boulevard:

- Shared Zone: The Shared Zone will be shared by pedestrians and vehicles and will be flush with the pedestrian realm. The vehicular travelway will be located between pedestrian-only areas, and defined by visual and tactile detection cues, site furniture, and designed in accordance with applicable accessibility codes and guidance to ensure pedestrian safety. Crosswalks will be marked at regular intervals.

8.4.1.2 Street Markings

Street markings shall be in accordance with City and Port standards for street and intersection markings. See Section 8.8.

8.4.1.3 Streetlife Zone: Elements

Each street will include a Streetlife Zone, equivalent to a Furnishing Zone as defined by the 2015 Subdivision Regulations, which will include the following elements:

- Tree Planting. Trees should be adapted to the particular microclimate and shade conditions of each street, and sited with consideration of localized wind conditions. See Section 8.6 for street tree palette, distribution, and species attributes.
- Street Furnishings. Street furnishings, located in the Streetlife Zone, should contribute to wayfinding and identity of each street, and should be a mix of fixed and flexible, movable elements in accordance with specific standards and guidelines for each street. These performance criteria are provided in lieu of a specific palette:
    - Seating. Seating should be an inviting element allowing visual permeability and social use. Special street furnishings are encouraged to emphasize each street's unique character.
    - Accessibility. All street furnishings should be universally accessible, or modifiable to meet or exceed CBC and CAL-DAG minimum requirements.
    - Trash Receptacles. Trash receptacles should be standardized across the site. Location of selected receptacles should not impede visual access or mobility.
    - Bicycle Parking. Bicycle parking shall be provided at building and park entries within the Streetlife Zone as described on each street; refer to Transportation Plan for required minimum quantity. Bicycle racks should be standardized on all internal site streets, with the exception of Bridgeview Street.

8.4.2 Street Designs

8.4.2.1 Shared Public Way

The Shared Public Way will be a major pedestrian route linking important site anchors such as Mission Rock Square and China Basin Park to site arrival points for MUNI, vehicles, and bicycles, as well as the main site parking garage on Block D. Shared Public Ways are curbless streets that privilege pedestrian movement, following traditional street planning approaches in Europe and other pedestrian-friendly urban centers. The

Shared Public Way at Mission Rock will be a dynamic space with active ground-floor retail, street rooms, stormwater gardens, and tree groves that will create a lively and unique environment. These design elements will also serve as cues to differentiate pedestrian-dedicated areas from the shared pedestrian/vehicular zone. Vehicles on the Shared Public Way will be limited to low-volume, low-speed, one-way northbound travel for drop-off, pickup, and deliveries, with traffic volumes not anticipated to exceed 100 vehicles per hour. The Shared Public Way will include the following zones as shown in Figures 8.29 and 8.30:

8.4.2.1.1 Shared Public Way: Active Edges

Active Edges will be located along the retail frontages on both sides of the Shared Public Way and will include the following zones:

A) Pedestrian Throughway: An unobstructed, 6′-0-minimum clear width path of travel for pedestrians shall be maintained within the Active Edges on both sides of the ROW.

B) Furnishing Zone: A 6′-0″ maximum zone for furniture, signage, and merchandizing with tree planting shall be included in the 12′ active edge on the east side of the ROW.

C) Frontage Zone: A 2′-0″-maximum zone shall be maintained for furniture, signage, and merchandizing on the west side of the ROW.

8.4.2.1.2 Shared Public Way: Streetlife Zone

The Streetlife Zone will be a 20′-maximum width zone located along the Shared Zone for its entire length. This zone will provide for safe east-west connections across the ROW. This zone shall include:

A) Street Rooms: Special landscape areas with unique paving, built-in furniture, and ample space for flexible seating, small newsstands, and kiosks.

B) Tree Groves: Finely textured tree groves that provide dappled shade and enclosure along the entire Shared Public Way. See Section 8.6.

C) Stormwater Gardens: Stormwater treatment infrastructure that functions ecologically, aesthetically, and programmatically, designed to maximize permeability of movement and view and to encourage lingering, with integrated seating intimate enough for quiet contemplation. See Sections 8.6 and 16.

8.4.2.1.3 Shared Public Way: Shared Zone

The Shared Zone shall be a 20'-minimum clear zone shared by pedestrians and vehicles. It shall include a non-meandering 10' travel lane and will be separated from dedicated pedestrian-only areas with visual and tactile detection cues. Crosswalks shall be marked at regular intervals. This zone shall include:

A) One-way Traffic: Vehicular traffic for drop-off and loading only shall be permitted one-way northbound, from Long Bridge Street to Exposition Street. North of Exposition St., the street becomes a paseo; emergency vehicle access shall be permitted on the paseo between Blocks A and G. No vehicular access is permitted to or from Channel Street, nor Mission Rock Square. The Shared Public Way may be closed to vehicular traffic during special events.

B) Delineated Loading Areas: Paving and demarcation of 8'-wide loading zones shall be distinct from the 10'-wide vehicular travel lane. See Figure 8.56.

8.4.2.1.4 Shared Public Way: Vehicular Intersections

Raised (tabletop) intersections with visual/tactile detection marking the pedestrian route shall be provided at Exposition and Long Bridge Streets and will comply with applicable accessibility guidance. Refer to traffic calming design described in Sections 8.6 and 8.8.

8.4.2.1.5 Shared Public Way: Visual/Tactile Detection Cues

Visual/Tactile Detection Cues shall differentiate the Shared Zone travel lane and loading zones from dedicated pedestrian areas; these shall be coordinated in consultation with applicable codes and accessibility guidance and include the following:

A) Paving Strategies: Material tactics, including contrasting paving color, texture, or material type, shall ensure safe pedestrian connections across the Shared Zone. These cues shall delineate the shared zone for its entire length. Also see 8.5.2 and Figures 8.44-8.45.

B) Spatial Cues: Incorporate design and spatial cues such as a 'gateway' to the Shared Zone from Long Bridge Street -- a constricted entry point with physical elements that will provide a visual/physical cue for drivers to slow down. Tabletop intersections at Long Bridge and Exposition Street are proposed in order to maximize pedestrian safety and visibility. Additional spatial cues are described in Section 8.6: Traffic Calming Design.

8.4.2.1.6 Shared Public Way: Non-Standard Curbs and Drainage

The Shared Public Way is curbless on both sides of the vehicular-accessible Shared Zone, which is not in conformance with the Subdivision Regulations. A linear drainage element will convey surface runoff; this is not in conformance with the Subdivision Regulations. See Section 8.6.

8.4.2.2 Terry A Francois Boulevard

Terry A Francois Boulevard will be a unique Working Waterfront that supports active maritime, industrial, and production uses on the waterfront. Terry A Francois Boulevard will also connect the Blue Greenway to China Basin Park and the Embarcadero to contribute to uninterrupted public access along San Francisco's eastern waterfront. Connecting the Mission Rock development to its active and historical maritime context, the expression of craft and industrial character along Terry A Francois Boulevard will be central to the personality and experience of this working waterfront. Terry A Francois will include the following zones, shown in Figures 8.31 and 8.32:

8.4.2.2.1 Terry A Francois Boulevard: Waterfront Zone

Located adjacent to Pier 48, Pier 50, and Channel Wharf, the Waterfront Zone shall include the following zones within a minimum cumulative width of 22-feet, measured from Pier 50:

A) Blue Greenway: A multi-use trail located along the east side of the entire Terry A Francois Boulevard ROW, with a 16'-minimum clear path of travel for bikes and pedestrians.

B) Buffer/Furnishing Zone: A 3'-minimum width buffer comprised of furnishings and iconic lighting, located along the entire length of the Shared Zone. This zone will have contrasting paving and other cues to be coordinated with applicable accessibility codes and guidance.

8.4.2.2.2 Terry A Francois Boulevard: Shared Zone

The Shared Zone will be a 26'-minimum width zone with two-way traffic that is shared by pedestrians and vehicles from Mission Rock Street to Exposition Street. The Shared Zone will be separated from the Waterfront Zone and the Building-Front Zone with flush curbs per 8.4.2.2.7 and Buffer/Furnishing Zones per 8.4.2.2.1-B and 8.4.2.2.3-B.

8.4.2.2.3 Terry A Francois Boulevard: Building-Front Zone

The Building-Front Zone shall be contained within a maximum width of 24' adjacent to Blocks H, I, and J. The Building-Front Zone will include:

A) Pedestrian Throughway: A 12'-minimum width pedestrian throughway with 6' minimum unobstructed path of travel at street grade along Blocks H, I, and J. If an Elevated Walkway is provided within the property line of the adjacent Development Parcels per Chapter 5 of the Design Controls, accessible circulation and a dock lift or similar apparatus at the building face shall be provided within this zone.

B) Buffer/Furnishing Zone: A 3'-minimum width buffer comprised of furnishings, located along the entire length of the Shared Zone. This zone will have contrasting paving and other visual/tactile detection cues for pedestrians, to be coordinated with applicable accessibility codes and guidance.

C) Loading Area: A 9'-wide loading area that accommodates a maximum truck size of WB-30, located adjacent to the Shared Zone at Blocks H, I, and J. See Figure 8.55.

D) Streetlife Zone: A 9'-wide spill-out space, located between the Pedestrian Throughway and the Buffer/Furnishing Zone.

8.4.2.2.4 Terry A Francois Boulevard: Paseo North of Exposition Street

Between Block K and Pier 48, Terry A Francois Boulevard will become a paseo that will accommodate emergency vehicle access for up to 150' of its length and include the following zones:

A) Waterfront Zone at Pier 48: A 28'-wide zone, located adjacent to the Pier 48 bulkhead, shall accommodate the Blue Greenway per 4.3.1-A) and additional public space for Pier 48.

B) Vehicular Turnaround + Loading Spaces: A vehicular turnaround with loading area, accessed from the Shared Zone.

C) Pedestrian Throughway: A 6'-minimum clear path of travel for pedestrians, located along Block K.

8.4.2.2.5 Terry A Francois Boulevard: Vehicular Intersections

Flush intersections with visual/tactile detection marking the pedestrian route shall be provided at Exposition and Long Bridge Streets and Channel Wharf; these will comply with applicable accessibility guidance. Aural warnings will be integrated within paving adjacent to intersections.

8.4.2.2.6 Terry A Francois Boulevard: Streetscape Elements

Streetscape elements are an important aspect of experience and character of Terry A Francois Boulevard.

A) Placement: Streetscape elements shall be placed within the Buffer Zones at regular intervals as determined by applicable accessibility guidance. Additional permanent streetscape elements in the Waterfront or Building-Front Zones, if desired, shall not block throughway areas or impede circulation along Terry A Francois Boulevard.

B) Expression of Production Character: Street furnishings, especially benches, along Terry A Francois Boulevard shall express the industrial character of the

Working Waterfront Typology. Industrial and salvaged materials are strongly encouraged for these elements.

C) Consistency of Elements: Trash receptacles and bicycle racks shall be consistent for the length of this streetscape. Benches may be varied.

8.4.2.2.7 Terry A Francois Boulevard: Non-Standard Curbs and Drainage

Terry A Francois Boulevard has flush curb conditions on both sides of the vehicular-accessible Shared Zone, with flush intersections at Long Bridge and Exposition Street, which are not in conformance with the Subdivision Regulations.

8.4.2.3 Bridgeview Street

Bridgeview Street will be a Complete Street with dedicated bicycle infrastructure, active sidewalks, stormwater treatment gardens, and low-speed, low-volume vehicular traffic. An important north-south bicycle connection from China Basin Park to Mission Bay, Bridgeview Street will integrate protected bicycle facilities into the life and character of the street. Bridgeview Street will include the following zones, shown in Figures 8.33 and 8.34:

8.4.2.3.1 Bridgeview Street: Sidewalk Zones

Sidewalks on Bridgeview Street shall be 14'-wide along the east side of the street, and 12' along the west side. The sidewalk shall include:

A) Frontage Zone: A 2'-maximum width zone shall be maintained along building frontages for furniture, signage, and merchandizing.

B) Pedestrian Throughway: An unobstructed, 6'-minimum clear width path of travel for pedestrians shall be maintained between the Frontage Zone and the Streetlife Zone.

C) Streetlife Zone: A zone between the curb and pedestrian throughway with width as noted on Figure 8.33. This zone shall include trees, lighting, and furnishings that shall be consistent for the entire length of the street. Stormwater treatment gardens shall be included in the Streetlife Zone with minimum area as noted in Section 16.

D) Driveway Restrictions: Driveways shall not be permitted, except at the Block D parking garage.

8.4.2.3.2 Bridgeview Street: Roadway Zones

The 34'-wide roadway will accommodate two-way vehicular traffic from Exposition Street to Mission Rock Street and will include:

A) Bicycle Facility: A two-way Class 1 cycle track with total width of 12'-0" on the east side of the right-of-way. This facility shall be protected from vehicular traffic with a 4'-wide horizontal buffer that is flush with the cycle track surface.

B) Raised Cycle Track: A raised facility that is grade-separated from adjacent travel lanes with a 1'-wide, 2"-high mountable curb. All material transitions shall be flush with the cycle track.

C) Travel Lanes: Two 10'-6"-wide travel lanes shall be provided to accommodate two-way traffic.

8.4.2.3.3 Bridgeview Street: Paseo North of Exposition Street

Between Block G and Block K, Bridgeview Street will become a paseo that will accommodate emergency vehicle access and include the following zones:

A) Multi-Use Trail Connection: A 16'-minimum clear multi-use trail shall connect China Basin Park to the Class 1 bicycle facility. This connection shall include paving and signage delineating this shared use path and warning cues for pedestrians and cyclists at crossings.

B) Emergency Vehicle Clear Access Width: A 20'-minimum clear zone shall accommodate emergency vehicle access for up to 150', measured from the Exposition Street ROW.

C) Pedestrian Throughway: A 6'-minimum clear path of travel for pedestrians on each side of the right-of-way.

8.4.2.3.4 Bridgeview Street: Traffic Control and Calming Measures

The intersections of Bridgeview Street with Mission Rock and Exposition Streets will have full stop control. The intersection at Long Bridge Street will be a table-top intersection at cycle track grade with 2-way stop control for Long Bridge, but no

stop control for Bridgeview Street bicycle or vehicular traffic. See Section 8.8. A mid-block crosswalk at the intersection of Bridgeview Street, Mission Rock Square, and Channel Lane shall be included at this major pedestrian crossing. Bicycle facility treatment shall continue across the intersection, with signage to yield to pedestrians. See Figures 8.63, 8.65, and 8.67.

8.4.2.3.5 Bridgeview Street: Bicycle striping, signage, and wayfinding

Bicycle Signage and Wayfinding should refer to City, Port, and NACTO (National Association of City Transportation Officials) Urban Bikeway Standards. Signage should be mounted at the curb edge of the Streetlife Zone, or inset in bicycle facility paving. Before all intersections and at the northern paseo portion of Bridgeview Street, the cycle track shall include paved and signed warning cues for pedestrian crossings. Cycle track demarcation shall continue across intersections at Exposition and Long Bridge Streets to indicate that cyclists have the right-of-way. Signs should indicate that vehicles must yield to cyclists.

8.4.2.3.6 Bridgeview Street: Non-Standard Curbs and Drainage

Bridgeview Street has a raised cycle track with a 2" mountable curb separating the cycle track from the vehicular travel way, and a 4" curb separating the cycle track from the sidewalk on the east side of the street; these are not in conformance with the 2015 Subdivision Regulations.

8.4.2.4 Exposition Street

Exposition Street is designed to calm traffic and create a lush pedestrian connection with bulb-out gardens that will treat stormwater and provide seating. It will also accommodate service and loading demands for Blocks A, B, F, G, J, and K. Exposition Street will include the following zones, shown in Figures 8.35 and 8.36:

8.4.2.4.1 Exposition Street: Sidewalk Zones

Sidewalks on Exposition Street shall be 14'-wide along the south side of the street, and 20' along the north side, with inset loading zones for passenger loading and servicing access. The sidewalk shall include:

A) Frontage Zone: A 2′-maximum width zone shall be maintained along building frontages for furniture, signage, and merchandizing.

B) Pedestrian Throughway: An unobstructed, 6′-minimum clear width path of travel for pedestrians shall be maintained between the Frontage Zone and the Streetlife Zone.

C) Streetlife Zone: A zone between the curb and pedestrian throughway with width as noted on Figure 8.35. This zone shall include trees, lighting, stormwater treatment gardens, and furnishings that shall be consistent for the entire length of the street.

D) Stormwater Zone: An 8′-wide zone between the Streetlife Zone and Roadway on the north side of the right-of-way, at grade with the sidewalk, shall include large stormwater treatment gardens with unique integral seating located at the southeast and southwest corners of Blocks A, G, and K.

8.4.2.4.2 Exposition Street: Roadway Zones

The 26′-wide roadway will accommodate two-way vehicular traffic from 3rd Street to Terry A Francois Boulevard, and shall include:

A) Bicycle Facilities: A 5′-wide painted Class II bike lane in the west-bound direction, separated from vehicular traffic with a 6″-wide solid white line. Minimize utility covers and material transitions in this area. Eastbound sharrows shall be provided.

B) Loading Zone: An 8′-wide zone shall be provided at grade with the roadway, located between stormwater treatment gardens described in Figure 8.36, to provide passenger loading and servicing access per Section 2.5. See Section 8.5.6 and Figure 8.54.

C) Travel Lanes: Two 10′-6″-wide travel lanes shall be provided to accommodate two-way traffic.

8.4.2.4.3 Exposition Street: Traffic Control and Calming Measures

The intersection of Exposition Street with Bridgeview Street shall have full stop control for bicyclists and vehicles. At the Shared Public Way and Terry A Francois Boulevard, there shall be stop-controlled table-top or flush intersections with pedestrian throughway clearly delineated by crosswalks. At intersections, bicycle lane treatment shall continue across intersections at Bridgeview Street and the Shared Public Way. See Section 8.8 and Figures 8.63 and 8.66.

8.4.2.4.4 Exposition Street: Large Vehicle Circulation

Large vehicle circulation to and from Terry A Francois Boulevard and Pier 48 shall be accommodated on the roadway between Blocks K and J. See Figures 8.22-27.

8.4.2.5 Long Bridge Street

Long Bridge Street will be an important pedestrian entry point to the site from MUNI on 3rd Street. It is designed with wide throughways, shade trees, ample street furniture opportunities, and compact linear stormwater gardens. Long Bridge Street will accommodate service and loading demands for Blocks C, D, E, H, and I and will be the vehicular entry point for the Shared Public Way. Long Bridge Street will include the following zones, shown in Figures 8.37 and 8.38:

8.4.2.5.1 Long Bridge Street: Sidewalk Zones

Sidewalks on Long Bridge Street shall be 15'-wide on both sides of the right-of-way. The sidewalk will include:

A) Frontage Zone: A 2'-maximum width zone shall be maintained along building frontages for furniture, signage, and merchandizing.

B) Pedestrian Throughway: An unobstructed, 6'-minimum clear width path of travel for pedestrians shall be maintained between the Frontage Zone and the Streetlife Zone.

C) Streetlife Zone: A zone between the curb and pedestrian throughway with width as noted on Figure 8.37. This zone shall include trees, lighting, stormwater treatment gardens, and furnishings that shall be consistent for the entire length of the street.

D) Bulb-Out with Stormwater Treatment: A 4'-maximum width bulb-out that includes stormwater treatment gardens shall be provided on the north side of Long Bridge Street, on either side of the Shared Public Way intersection.

8.4.2.5.2 Long Bridge Street: Roadway Zones

The 30'-wide roadway will accommodate two-way vehicular traffic from 3rd Street to Terry A Francois Boulevard, and will include:

A) Loading Zone: An 8'-wide loading zone shall be provided at grade with the roadway on the north side of the right-of-way, to provide passenger loading and building servicing access. This zone shall be painted with a unique surface treatment that differentiates it from the travel lanes. This zone shall not interfere with fire truck access or turning movements at intersections. Refer to Transportation Plan for loading and servicing strategies.

B) Travel Lanes: Two 10'-6"-wide travel lanes shall be provided to accommodate two-way traffic.

C) Bicycle Markings: East- and west-bound sharrows shall be provided.

8.4.2.5.3 Long Bridge Street: Traffic Control and Calming Measures

The intersection of Long Bridge Street with Bridgeview Street shall have stop control for all Long Bridge Street traffic only. At the Shared Public Way and Terry A Francois Boulevard, there shall be stop-controlled table-top intersections with pedestrian throughway clearly delineated by crosswalks. See Section 8.8.

8.4.2.5.4 Long Bridge Street: Driveways at Block D Parking Facility

Driveways shall be provided at the Block D parking facility to accommodate ingress and egress. Refer to Transportation Plan.

8.4.2.6 3rd Street

3rd Street is Mission Rock's primary face to Mission Bay. A wide multi-modal street, its character is fundamentally different from the interior streets of Mission Rock. South of Long Bridge Street, the sidewalk is a key threshold into Mission Rock from the MUNI station at Mission Rock Street. 3rd Street will primarily adhere to approved San Francisco Office of Community Investment and Infrastructure (OCII) Mission Bay standards for

paving materials, trees, street furniture, and lighting. 3rd Street will include the following zones, shown in Figures 8.39 and 8.40:

8.4.2.6.1 3rd Street: Sidewalk Zones

The sidewalk on 3rd Street will be 12'-wide as shown in Figure 8.39 and will include:

A) Pedestrian Throughway: An unobstructed, 6'-minimum clear width path of travel for pedestrians shall be maintained between the building façade and the Streetlife Zone.

B) Streetlife Zone: A zone between the curb and pedestrian throughway with width as noted on Figure 8.39. This zone shall include trees, lighting, stormwater treatment gardens, and furnishings that shall be consistent for the entire length of the street.

8.4.2.6.2 3rd Street: Roadway Zones at Block A

At Block A only, the following shall be provided:

A) Loading Zone: An 8'-wide zone shall be provided at grade with the roadway to provide passenger loading and servicing access per Figure 8.18.

B) Bicycle Facility: A 6'-wide painted Class II bike lane in the north-bound direction, separated from vehicular traffic with a 6"-wide solid white line.

8.4.2.6.3 3rd Street: Emergency Vehicle Access Radii

Vehicular turning radii from Long Bridge Street and Exposition Street onto Third St have minimum requirements for emergency vehicle access. Refer Figures 8.21-8.27 for truck turning analysis.

8.4.2.7 Mission Rock Street

Mission Rock Street will provide an important link to the Blue Greenway at the terminus of Bridgeview Street. The Block H frontage will incorporate bicycle facilities connecting Bridgeview Street to the Blue Greenway on Terry A Francois Boulevard. Mission Rock Street will primarily adhere to approved San Francisco Office of Community Investment and Infrastructure (OCII) Mission Bay standards for paving materials, trees, street furniture, and lighting. South of Block H, a contraflow Class 1 cycle track will connect cyclists from Bridgeview Street to Terry A Francois Boulevard's Blue Greenway

infrastructure. Sidewalk improvements will extend along the north side of the right-of-way from Terry A Francois Boulevard to 3rd Street. Mission Rock Street will include the following zones, shown in Figures 8.41 and 8.42:

8.4.2.7.1 Mission Rock Street: Sidewalk Zones

Sidewalk improvements on Mission Rock Street shall be 12'-wide, on the north side of the right-of-way, as shown in Figure 8.41. The sidewalk shall include:

A) Frontage Zone: A 2'-maximum width zone shall be maintained along building frontages for furniture, signage, and merchandizing.

B) Pedestrian Throughway: An unobstructed, 6'-minimum clear width path of travel for pedestrians shall be maintained between the building frontage and the Streetlife Zone.

C) Streetlife Zone: A zone between the curb and pedestrian throughway with width as noted on Figure 8.41. This zone shall include trees, lighting, and furnishings that are consistent for the entire length of the street. Refer to OCII Mission Bay Standards.

D) Driveways: Driveways shall be permitted at the Parcel D parking garage.

8.4.2.7.2 Mission Rock Street: Bicycle Facilities

A) Bicycle Facility: A two-way Class 1 cycle track with total width of 8'-0" measured from the face of curb on the north side of the right-of-way, from Bridgeview Street to Terry Francois Boulevard. This facility shall be protected from vehicular traffic with a 1'-wide horizontal buffer that is flush with the cycle track surface, and a 46"-high vertical buffer.

B) Raised Cycle Track: If a raised facility is provided, it shall be grade-separated from adjacent travel lanes with a 1'-wide, 2"-high mountable curb. All material transitions shall be completely flush with the cycle track.

C) Cycle Track Warning Cues: At intersections, the cycle track shall include paved and signed warning cues indicating pedestrian crossings and vehicular intersections.

D) Cycle Track Intersections: Cycle track demarcation shall continue across intersections at Bridgeview Street and Terry Francois Boulevard to indicate the primary bicycle route. Proposed changes to existing roadway striping will be coordinated at a future date with SFMTA.

8.5 Components of Public Streets

8.5.1 Curb Heights

A variety of curb types will be installed throughout the site. Mission Rock Street, 3rd Street, Long Bridge Street and Exposition Street improvements will consist of crowned asphalt roadway and six inch curb and gutter on either side. Terry A Francois Boulevard will have flush curb for optimal pedestrian access. Shared Public Way and the northern end of Bridgeview are curbless streets with continuous paving across the right-of-way. Overland release and stormwater drainage information for curbless streets can be found in Section 7: Site Grading and Section 13: Storm Drainage System, respectively. Bridgeview Street will utilize both two inch mountable curb as well as four-inch and six-inch curb and gutter. The two inch mountable curb will delineate the class I cycle track bicycle facility from the vehicular travel lanes and the four-inch curb and gutter will elevate the adjacent landscape and sidewalk above the bike lanes. Finally, six inch vertical curb will be placed at the northern terminus of Terry A Francois Boulevard. Curb height variances from the City Subdivision Regulations will be reviewed and approved by the City on a case-by-case basis. For further reference of curb type locations throughout the site and typical curb details, see Figure 8.43.

8.5.2 Paving

Paving will be a key component that defines the character, connectivity, and identity of Mission Rock's varied streets and open spaces. See Figures 8.44, 8.45, and 8.46 for proposed paving by street and zone. All paving in areas with high pedestrian traffic will facilitate universal accessibility. Paving connections to surrounding streets should be carefully considered for their impact on the larger Mission Bay neighborhood.

The Pedestrian Throughway defined on each street shall be an accessible path of travel that is unobstructed by non-ADA-compliant paving or material treatments. Paving and built-in site elements shall be comprised of high-quality materials and finishes that are durable to withstand

high-intensity use in the Bay environment. All material textures in designated clear path of travel and accessible use areas shall be ADA-compliant.

Where trees are planted in paving, surfacing material shall allow air and water to reach tree roots. Tree grates or stabilized crushed zone are permitted in the Streetlife Zone and in Open Spaces outside of dedicated Pedestrian Throughways. Where trees are planted in planting areas on streets, finish grade shall be within 2" of adjacent pedestrian paving.

8.5.3 Street Trees

Planting at Mission Rock will function ecologically to help achieve the Project's goals for sustainability and contribute to a healthy environment. Composition and distribution of a diverse, adapted urban forest, stormwater gardens, and planted areas will create a resilient ecological framework to shape varied sensory experiences across the site and provide waterfront and urban habitat. See Figures 8.47, 8.48, and 8.49.

Trees will be used to block and mitigate wind, provide shade and reduce urban heat island effect, and to provide shelter for birds. Native or climate appropriate grasses, shrubs, and ground cover will provide as much species diversity as feasible in Mission Rock's planting areas, as well as function in stormwater treatment gardens. Upon construction, maintenance and management of tree and understory planting, soils, and irrigation will be essential to the successful function of the site's urban ecological systems.

Tree species shall be considered for their aesthetic and ecological benefits. Suggested species diversity in Figure 8.48 is a baseline; species selected for specific areas shall conform to this general distribution and diversity for the Mission Rock urban forest. Tree species suggested for each component of the Public Realm network have been selected in consultation with a certified arborist. If alternative species are chosen, they shall conform to the aesthetic and performance requirements outlined in Figure 8.48.

8.5.3.1 Wind Mitigation

Tree selection and maintenance will be vital to maintaining a comfortable public realm experience in both streets and open spaces. Trees shall be sited with consideration given to wind modeling at the neighborhood and local scale. Mandatory wind tolerances have been noted under the design criteria for tree species selection.

8.5.3.2 Tree Species Installation and Establishment

Trees shall receive adequate soil volume to sustain long-term health. Trees shall receive adequate irrigation and monitoring during a three-year establishment period. Large and medium-size trees shall be installed at a minimum size of 48"-box; small trees shall be installed at a minimum size of 36" box. Refer to Figure 8.48 for tree size and corresponding minimum size at installation. To meet functional requirements in both streets and open spaces, clear trunk requirements shall be achieved within five years of installation. Branches shall not interfere with pedestrian throughway (minimum 84" clearance measured from ground surface) or mandated fire truck vertical clearance of 13'-6" minimum (measured from roadway surface).

8.5.3.3 Tree Maintenance and Management

Trees in the Public Realm should be pruned yearly to sustain long-term health and to maintain desired growth habit. Determine appropriate water application after establishment (three years) in consultation with a certified arborist's comprehensive review of tree health on the site. Monitor water application yearly.

8.5.3.4 Recommended Soil Volume for Trees

Trees in the public realm should have adequate soil volume and infiltration, particularly trees planted in paving. Large tree species require 1500-2000 cubic feet of soil volume per tree; Medium tree species require 1000-1500 cubic feet of soil per tree; Small tree species require 800-1000 cubic feet of soil per tree. Tree species sizes are noted in Figure 8.48.

8.5.3.5 Minimum clearance at On-Structure Conditions

Where trees are planted in on-structure conditions, at least four feet of soil depth, and a continuous 6-12"- depth gravel drainage layer, should be maintained.

8.5.4 Sustainable Water Strategies

Mission Rock's landscapes and building systems will work together and be designed to conserve, re-use, and filter water. Site hydrology will be intertwined with daily life at Mission Rock in a unique and systematic way, with stormwater treatment gardens that are a part of the public realm experience in every streetscape and open space, building-integrated recycled water systems, and advanced greywater reuse strategies. Irrigation is an essential element of plant health and should be considered as part of the site hydrology strategy.

8.5.4.1 Stormwater Treatment

Stormwater treatment will be handled through a combination of treatment within specific streets, and in centralized, large feature stormwater gardens to which runoff is conveyed by gravity or force main for treatment. See Figures 8.50 and 8.51 for a conceptual diagram of the site stormwater treatment approach, and refer to Section 16 for detailed discussion and analysis of stormwater management.

8.5.4.2 Irrigation

All plant species shall receive establishment irrigation for a minimum of two years. Tree species shall receive establishment irrigation for three years or as deemed necessary for long-term health by a certified arborist. Refer to Mission Rock Sustainability Strategy for guidance about water usage. Planting design shall optimize irrigation efficacy by grouping plants with similar water needs into efficient irrigation hydrozones. Permanent irrigation infrastructure shall be provided for all trees, understory planting, stormwater treatment gardens, and lawn areas. Irrigation flow meters for all irrigation hydrozones will be installed to record and monitor water use across the site, and watering records kept for all site trees, with a yearly water audit to track the amount of water applied.

Efficient irrigation systems will be utilized, with drip irrigation except in lawn areas, where spray irrigation is acceptable. Refer to Local Model Water Efficient Landscape Ordinance for regulatory guidance. Recycled water shall be used for irrigation, with potable backup, to minimize potable water use. This use shall conform to applicable public health standards; edible plants and play areas shall not be irrigated with non-potable water.

See Sustainability Strategy for recycled water resources and minimum water quality treatment thresholds.

8.5.5 Lighting

Lighting will be an important component of nighttime identity, experience, and safety at Mission Rock. Lighting of special, unique character should reinforce key pedestrian routes in open spaces and along the Shared Public Way and Channel Lane and Channel Street. Where possible, a variety of lighting types should work together to create a warm, inviting, and safe nighttime environment. See Figures 8.42-8.53.

Lighting across the site will be scaled to the pedestrian and bicycle experience and will reinforce key pedestrian circulation routes and connections. Lighting strategies will also take care to protect site residents by minimizing light pollution. Lighting along the waterfront will operate on a gradient of intensity from a well-lit Promenade at the Buildings and Piers to a more uniformly diffused, minimal character along the water that will not disrupt the ecology of the Bay edge. Lighting strategies shall minimize glare, light trespass outside the development, and light pollution in areas adjacent to residential buildings and along the waterfront. Refer to Section 7.6 of the Design Controls and to the Sustainability Strategy for vertical development lighting controls. Site lighting will comply with applicable regulatory standards.

Lighting fixtures and bulbs shall meet or exceed applicable energy-efficiency standards. Lighting shall be designed to allow facial recognition along paths of travel. Lighting shall not create glare or "hot spots" that would inhibit visual acuity, or unnecessary vertical transmittance of light. Lighting strategies shall facilitate sight lines and perception of safety across the public realm. Lighting uniformity ranges in open spaces shall allow for variation in light levels to create hierarchy and a range of experiences.

8.5.6 Accessible Loading

Loading zones for vehicular and paratransit loading and unloading will be distributed around the site to enable access to all Development Parcels and open spaces, with preference given to significant pedestrian connections noted in Figure 8.15. Proposed configurations for loading stalls are described for the following conditions:

DPW-Standard Curb, 6" typical: Figure 8.54.

Non-DPW-Standard flush curb, Shared Public Way: Figure 8.56

Non-DPW-Standard flush curb, Terry A Francois Boulevard: Figure 8.55.

8.5.7 Driveway and Utility Coordination

Where feasible, utilities shall be placed and located in less conspicuous locations and below-grade. Locations shall be coordinated with tree spacing to ensure Urban Forestry standards are applied to the greatest extent possible. If provided at all Development Parcels except Block D, driveways shall be located only Exposition or Long Bridge Streets. Driveways for Block D shall be provided on Long Bridge, Bridgeview, and Mission Rock Streets. Driveways are not permitted on the Shared Public Way, Terry A Francois Boulevard, 3rd Street, or Bridgeview Street north of Long Bridge Street. Driveway locations shall be coordinated with placement of streetscape elements per Figure 8.57.

8.6 Traffic Calming

As part of the pedestrian and bicycle focused development plan outlined in the Mission Rock Transportation Plan, traffic calming elements are proposed to improve non-vehicular traffic safety and access. Proposed traffic calming elements for the Project street rights-of-way are identified in Figure 8.58 and include raised intersections, raised crosswalks, bulb-outs, and narrowed lane widths to accommodate bicycle infrastructure.

8.6.1 Raised Intersections and Raised Crosswalks

Raised, table-top intersections are proposed along the Shared Public Way, Terry A Francois Boulevard, and Bridgeview Street and described in greater detail in Section 8.8. A raised pedestrian crosswalk is proposed along Bridgeview Street adjacent to Mission Rock Square and Channel Lane. A City Standard driveway is also proposed on Terry Francois Boulevard at the Mission Rock Street intersection to provide additional traffic calming measures as vehicles enter Terry A Francois Boulevard. At raised crosswalk and intersection locations, the street pavement areas will be raised as much as 6-inches to match the adjacent curb heights and will change paving material for a more effective visual cue to motorists. Final grades are dependent on overland release feasibility studies.

Where table-top intersections and raised crossings are proposed, decorative crosswalk treatments or striped continental crosswalks shall be provided and comply with City and MUTCD standards and required review. Proposed decorative treatments shall meet ADA standards for slip-resistance. The design for these intersections and crosswalks will be coordinated with and are subject to the approval of the SFPUC, SFDPW, the SFMTA, and the San Francisco Fire Department (SFFD). Refer to Section 7: Site Grading for additional information about Project grading and overland release requirements. A typical raised crossing detail is shown on Figure 8.59.

The Project's HOA will be responsible for maintenance and restoration of the street sections, including pavement markings, within the raised intersection and raised crosswalk. Designs will incorporate measures to minimize maintenance and reduce the potential for dirt, silt and other debris to settle within the crosswalks.

8.6.2 Intersection Bulb-Outs

Bulb-outs have been strategically added along Long Bridge Street at the Shared Public Way intersection and along 3rd Street between Exposition Street and China Basin Park. These locations are expected to have a high concentration of pedestrian traffic traveling between the parking garage at Block D, the amenities along Shared Public Way, residential housing on the west side of 3rd Street, China Basin Park and AT&T Park just north of the development site. Bulb-outs will narrow driving lanes, create a shorter pedestrian crossing, make pedestrians more visible to motorists and require vehicles to reduce speeds. The final design for the bulb-outs will be coordinated with the SFMTA, SFDPW, SFMTA, and the SFFD. Bulb-out improvements will be constructed if the designs can meet the SFDPW and SFPUC requirements for overland drainage release and accessibility for persons with disabilities. Overland Release at these locations are studied in the Grading and Drainage Master Plan, which is included in Appendix G. A typical bulb-out detail is shown on Figure 8.59.

8.7 Off-Site Traffic Signalization

As shown in Figure 8.60 and described below, the Developer will be responsible for design and construction funding, either as partial contribution or in full, of traffic signal modifications or new traffic signals, as well as striping. Where possible, the electrical service for traffic signals will be located within the joint trench (see Section 18). Traffic signals shall be designed by and

constructed to the specifications of the SFMTA and SFDPW. If determined feasible, planned off-site intersection improvements include, but may not be limited to the following:

8.7.1 3rd Street and Existing Terry A Francois Boulevard

The existing traffic signal infrastructure at Terry A Francois Boulevard and 3rd Street will be removed or modified during the demolition of the northern segment of Terry A Francois Boulevard that currently provides east-west access across the site. The new intersection at this location will serve northbound and southbound vehicular and bike traffic as well as eastbound and westbound bike and pedestrian traffic. An updated signalized intersection is anticipated to provide safe crossing for bikes and pedestrians across 3rd Street. The developer will be responsible for SFMTA costs to review, design, coordinate and implement improvements including signal design and signal timing changes.

8.7.2 3rd Street and Channel Street

To accommodate improvements at the existing 3rd Street and Channel Street intersection, signal timing and phasing will be revised. Vehicular access on Channel Street will now terminate at 3rd Street and will no longer continue eastward onto the site. The left turn from southbound 3rd street and phasing segments will be removed from the signalization at the intersection. The developer will be responsible for SFMTA costs to review, design, coordinate and implement improvements including signal design and signal timing changes.

8.7.3 3rd Street and Mission Rock Street

The existing traffic signals at the 3rd Street and Mission Rock Street intersection are planned to remain in place. Restriping of the Mission Rock lanes will likely require phasing and timing design alterations for the intersection. Revisions to the existing signalization at 3rd Street and Mission Rock Street will be completed by the SFMTA.

8.7.4 3rd Street and Exposition Street

New traffic signals will be installed at the intersection of 3rd Street and Exposition Street to provide safe mobility for vehicular traffic, cyclists and pedestrians. Vehicles exiting the site from Exposition Street will be permitted to turn right and left onto 3rd Street. Northbound vehicles on 3rd Street will be allowed right turn access into the site at Expositions Street. Lerft turns from southbound 3rd Street vehicles onto Exposition Street will not be permitted. A pedestrian crosswalk will also be

incorporated across Exposition Street in the north-south direction. There will be no pedestrian crossing in the east-west direction across 3rd Street. The developer will be responsible for SFMTA costs to review, design, coordinate and implement improvements.

8.8 On-Site Traffic Controls

Traffic calming and stop-controlled intersections, rather than signalization, are the primary strategy for on-site traffic control. Stop signs will be added at most of the intersections, with final locations to be determined by traffic sight distance requirements, Project phasing and coordination with the City. Additional descriptions of the streetscape traffic control elements are included in the Open Space and Streetscape Master Plan. If implemented, stop signs on city streets will require legislation from SFMTA Board and traffic calming may also require SFMTA Board and/or public hearing.

8.8.1 All-Way Stop-Controlled Intersections: DPW-Standard Curb Condition

Mission Rock will have two all-way stop-controlled intersections at streets with DPW-Standard curbs, at the intersection of Bridgeview Street with Exposition Street (Figure 8.63) and the intersection of Bridgeview Street with Mission Rock Street (Figure 8.67). Bicycle and vehicular traffic will stop in all directions at these intersections. Crosswalks will be marked with City-standard markings, and DPW-Standard curb ramps will be provided at crosswalks. Bicycle facility treatment will continue across these intersections for all streets. Refer to Transportation Plan for traffic volume information at these intersections.

8.8.2 All-Way Stop-Controlled Intersections: Table-top Intersections

Mission Rock will have two all-way stop-controlled intersections that are also table-top intersections, raised to sidewalk grade, at the intersection of the Shared Public Way with Long Bridge Street and at Exposition Street. The Shared Public Way will have one-way northbound traffic only, from Long Bridge Street to Exposition Street. Refer to Transportation Plan for traffic volume information at these intersections.

8.8.2.1 Shared Public Way at Long Bridge Street

At the intersection of the Shared Public Way with Long Bridge Street, vehicular and bicycle traffic on Long Bridge Street will stop in both directions; Long Bridge Street traffic is permitted to turn onto the Shared Public Way at this intersection, but turning will be discouraged through design cues. Refer to Section 8.4.2 and Figure 8.64.

8.8.2.2 Shared Public Way at Exposition Street

At the intersection of the Shared Public Way with Exposition Street, vehicular and bicycle traffic on Exposition Street will stop in both directions and no turns will be permitted. Shared Public Way traffic will stop at the intersection with Exposition Street, and is permitted to turn right or left. The Shared Public Way becomes a paseo north of this intersection; vehicular traffic will not be permitted on the paseo, but it will accommodate emergency vehicle access for up to 150-feet of its length per Section 8.4. Approved removable or hydraulic bollards will be installed at Exposition Street to prohibit vehicular entry.

8.8.3 2-Way Stop at Table-top Intersection

Mission Rock will have one internal two-way stop-controlled intersection, at the intersection of Bridgeview Street with Long Bridge Street (Figure 8.65). Vehicular and bicycle traffic on Long Bridge Street will stop in both directions, while bicycle and vehicular traffic on Bridgeview Street will continue through without stopping. This will be a table-top intersection, raised approximately 2" to meet the grade of the raised cycle track. Crosswalks will be marked with City- standard markings, and DPW-Standard curb ramps will be provided at crosswalks. Bicycle facility treatment on Bridgeview Street will continue across this intersection. Refer to Transportation Plan for traffic volume information at these intersections.

8.8.4 All-Way Stop-Controlled Intersections: Flush Intersections

Mission Rock will have two all-way stop-controlled intersections that are also flush intersections, at the intersection of Terry A Francois Boulevard with Long Bridge Street and at Exposition Street. Grade transition will occur within the Terry A Francois Boulevard ROW. Terry A Francois Boulevard will have two-way traffic.

8.8.4.1 Terry A Francois Boulevard at Exposition Street (Figure 8.66).

At the intersection of Terry A Francois Boulevard with Exposition Street, vehicular and bicycle traffic on Exposition Street will stop; Exposition Street terminates at Terry A Francois Boulevard. For all vehicles except trucks servicing Pier 48, right turns only will be permitted onto Terry A Francois Boulevard. Northbound Terry A Francois Boulevard traffic will stop at the intersection with Exposition Street, and is permitted to turn left

only. Terry A Francois Boulevard becomes a paseo north of this intersection. The paseo will accommodate emergency vehicle access for up to 150-feet of its length. Approved removable or hydraulic bollards will be installed to restrict vehicular entry; vehicular traffic will be permitted only for passenger loading within a clearly delineated and signed area (refer to Section 8.4.3).

8.8.4.2 Terry A Francois Boulevard at Long Bridge Street.

At the intersection of Terry A Francois Boulevard with Long Bridge Street, vehicular and bicycle traffic on Long Bridge Street will stop; Long Bridge Street terminates at Terry A Francois Boulevard. Long Bridge Street traffic is permitted to turn onto Terry A Francois Boulevard in both directions at this intersection. Terry A Francois Boulevard traffic will stop at this intersection in both directions, and turning onto Long Bridge Street is permitted. This intersection will be coordinated with Pier 50 operational requirements.

8.9 Public Transportation System

The Mission Rock site is adjacent to the Muni light rail along King Street and 3rd Street and the Caltrain 4th and King station. It is nearby the Bay Area Rapid Transit (BART) stations for Embarcadero, Montgomery and Powell Street. The Transbay Transit Center, currently under construction, within the Financial District is also within close proximity to the proposed development. To encourage the use of these and other modes of sustainable transportation, the Mission Rock development has prioritized pedestrian, bike and transit access through the site. Ride share programs are also promoted within the design by incorporating loading and drop off zones throughout the proposed public street network.

Although there are no anticipated bus or light rail improvements associated with this Project, it is the Project team's understanding that SFMTA plans on enhancing the existing Muni transit networks near the Mission Bay area to improve commuter connections and efficiency throughout San Francisco. These improvements will be under the responsibility of SFMTA. For additional information regarding the public transportation system, refer to the Transportation Plan in Appendix P.

8.10 SFMTA Infrastructure

Where required, the following list of infrastructure items includes items to be owned, operated and maintained by the SFMTA within public rights-of-way:

- Security monitors and cameras

- Signals and Signal Interconnects, including Muni Bus Prioritization signals
- TPS signal preempt detectors
- Conduit containing TPS signal cables
- Shelters (with Vendor)
- Paint – poles and asphalt delineating coach stops
- Asphalt painting for transit lanes
- Departure prediction ("NextBus") monitors and related communications equipment
- Bicycle racks
- Crosswalk striping, except for areas with a raised intersection/crosswalk or with painted concrete special striping or other special decorative treatment
- Bike lane and facility striping
- APS/Pedestrian crossing signals
- Street Signs

8.11 Acceptance and Maintenance of Street Improvements

Upon acceptance of the new and/or improved public streets by the SFDPW, responsibility for the operation and maintenance of the roadway and streetscape elements will be designated as defined in the various City of San Francisco Municipal Codes. Acceptance of water and wastewater utility infrastructure within street improvements shall be subject to SFPUC approval. Proposed water and combined sewer infrastructure shall be designed to facilitate future access for maintenance. Conflicts between proposed public water and combined sewer infrastructure and the surface improvements proposed as part of the Project, including but not limited to dedicated transportation routes, trees, bulb-outs, traffic circles and medians, shall be minimized in the design of the infrastructure and surface improvements. The SFPUC will review all proposals for surface improvements above proposed public water and combined sewer infrastructure on a case-by-case basis to ensure that future access for maintenance is preserved. Street improvements installed to meet the SDG will be maintained by the private property owners or their Assignees.

As outlined in the DA, the Project HOA will be responsible for maintenance and restoration of the non-standard street pavement materials, including decorative paving. Restoration will include replacement of the pavement markings within areas with special striping or decorative treatments.

8.12 Phasing of New Roadway Construction

New roadway construction will occur in phases based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The Developer will construct the new street infrastructure in phases. The amount and location of roadway repair/ or replacement will be the minimum necessary to support the Development Phase and maintain minimum required parking allocations, access and utility connections. Such phased roadway construction will allow the existing utility services, vehicular and pedestrian access areas, and landscaped spaces to remain in place as long as possible and reduce disruption of existing uses on the site and adjacent facilities.

Temporary Fire truck turnaround areas, if any, will be coordinated with the SFFD and constructed by the Developer consistent with the Fire Code. Phasing of traffic signalization improvements will be based on cumulative development thresholds identified by the Project traffic consultant and/or the SFMTA coincident with the Phase applications, construction documents or as stated in the DA. Sidewalk and other accessible pedestrian paths of travel, either permanent or temporary, shall be provided to serve the pedestrian entrance and exit requirements of each Development Parcel prior to being released for occupancy. Such paths of travel will connect to the sidewalks along 3rd Street, Mission Rock Street and Terry A Francois Boulevard and hence to the public transit stations and bus stops thereon.

Impacts to improvements installed with previous phases of development due to the designs of the new phase will be the responsibility of the Developer and addressed prior to approval of the construction drawings for the Parcel.

PUBLIC REALM PLAN

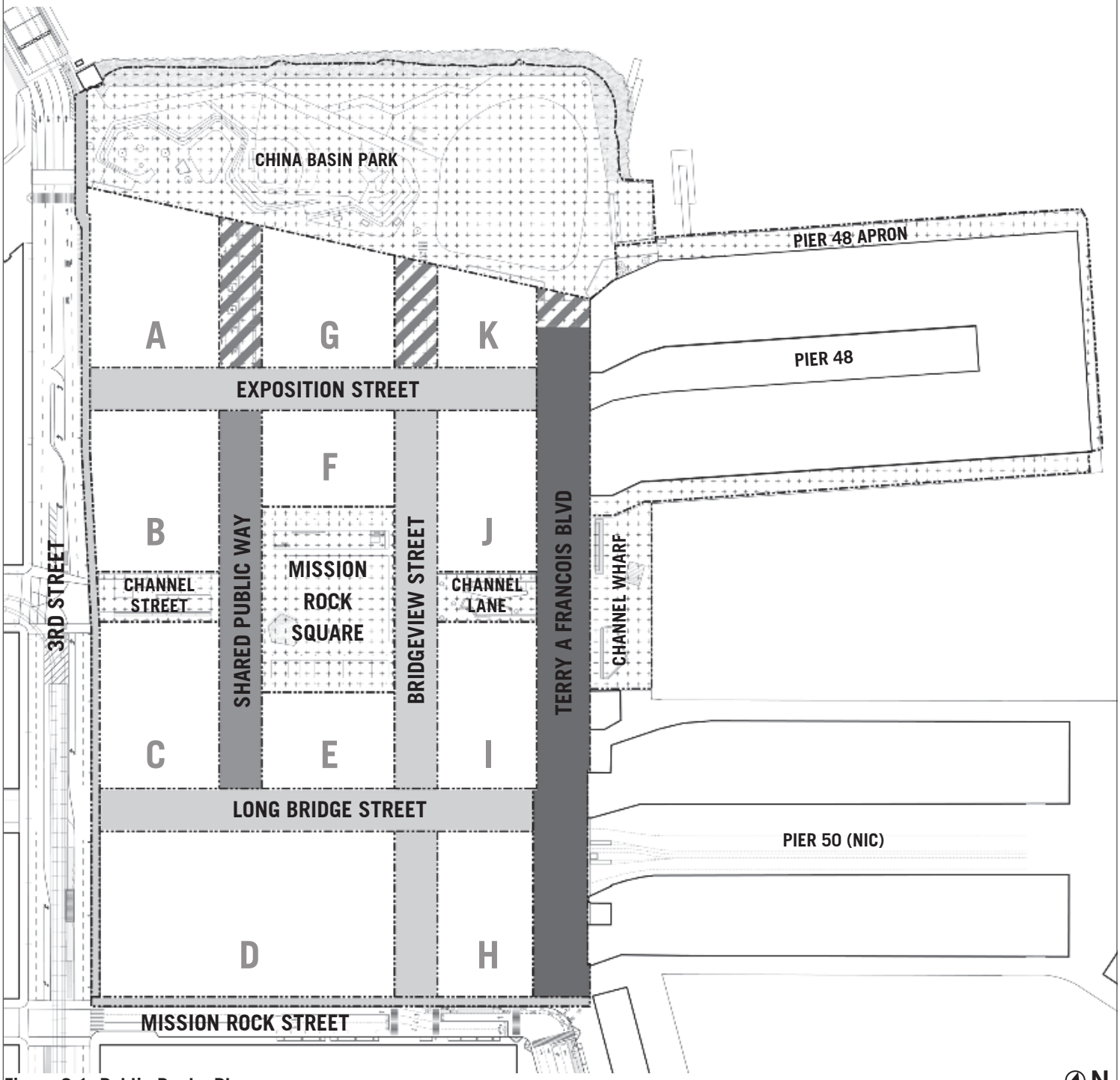


Figure 8.1: Public Realm Plan

Shared Public Way
- *Pedestrian access permitted across entire ROW; vehicular traffic permitted in Shared Zone only*
- *Traffic volumes anticipated not to exceed 100 cars per hour; one-way northbound traffic*
- *Flush curb on both sides of vehicular zone*

Working Waterfront (Terry A Francois Boulevard)
- *Pedestrian access permitted across entire ROW; vehicular traffic permitted in Shared Zone only*
- *Traffic volumes anticipated not to exceed 100 cars per hour; two-way traffic*
- *Flush curb on both sides of vehicular zone*

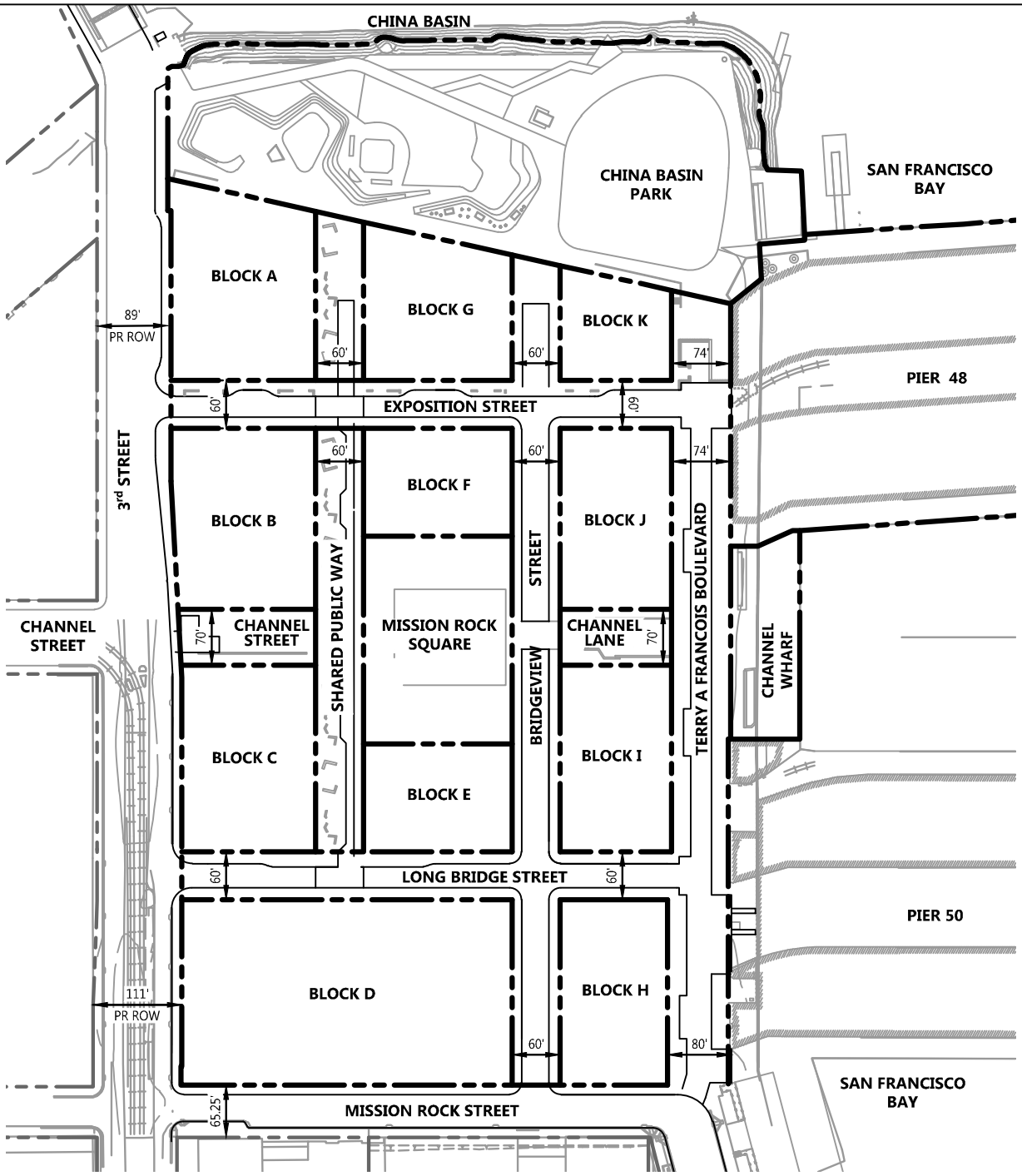
Vehicular/Neighborhood Street
- *Two-way street with curb-separated sidewalk*
- *Must include bicycle facilities or sharrows*
- *Loading and service access provided in dedicated areas*

Paseo (Open Space within R.O.W.)
- *Non-vehicular street connection; accommodates emergency vehicle access*

Open Space (Shown for reference only)

Limit of Work

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



LEGEND

PROPOSED PARCEL LINE

EXISTING PARCEL LINE

60' RIGHT-OF-WAY DIMENSIONS

N

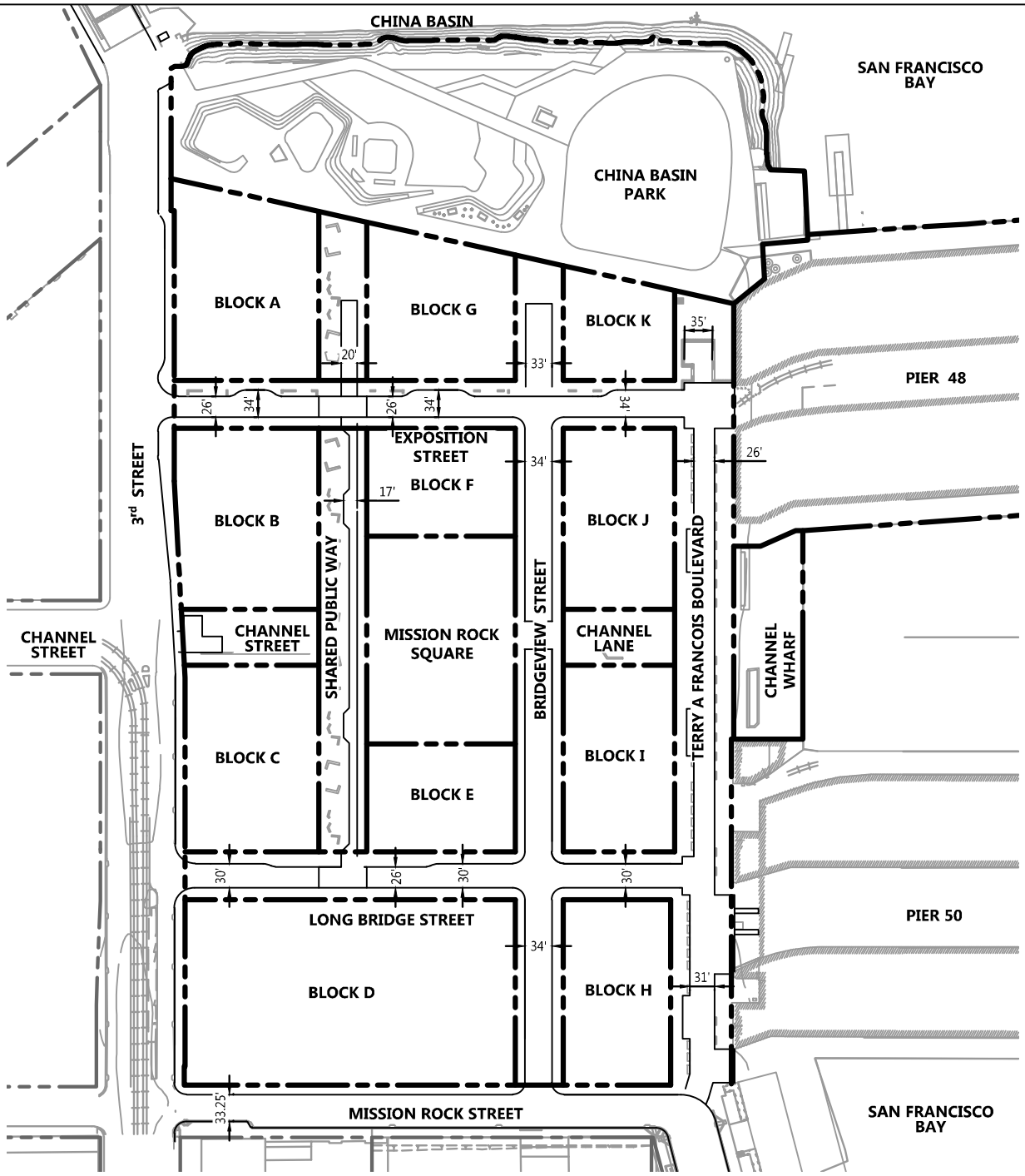
0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.2 Conceptual Site Plan & Street Layout.dwg
PLOT DATE: 09-16-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.2 - CONCEPTUAL SITE PLAN & STREET LAYOUT



LEGEND

PROPOSED PARCEL LINE

EXISTING PARCEL LINE

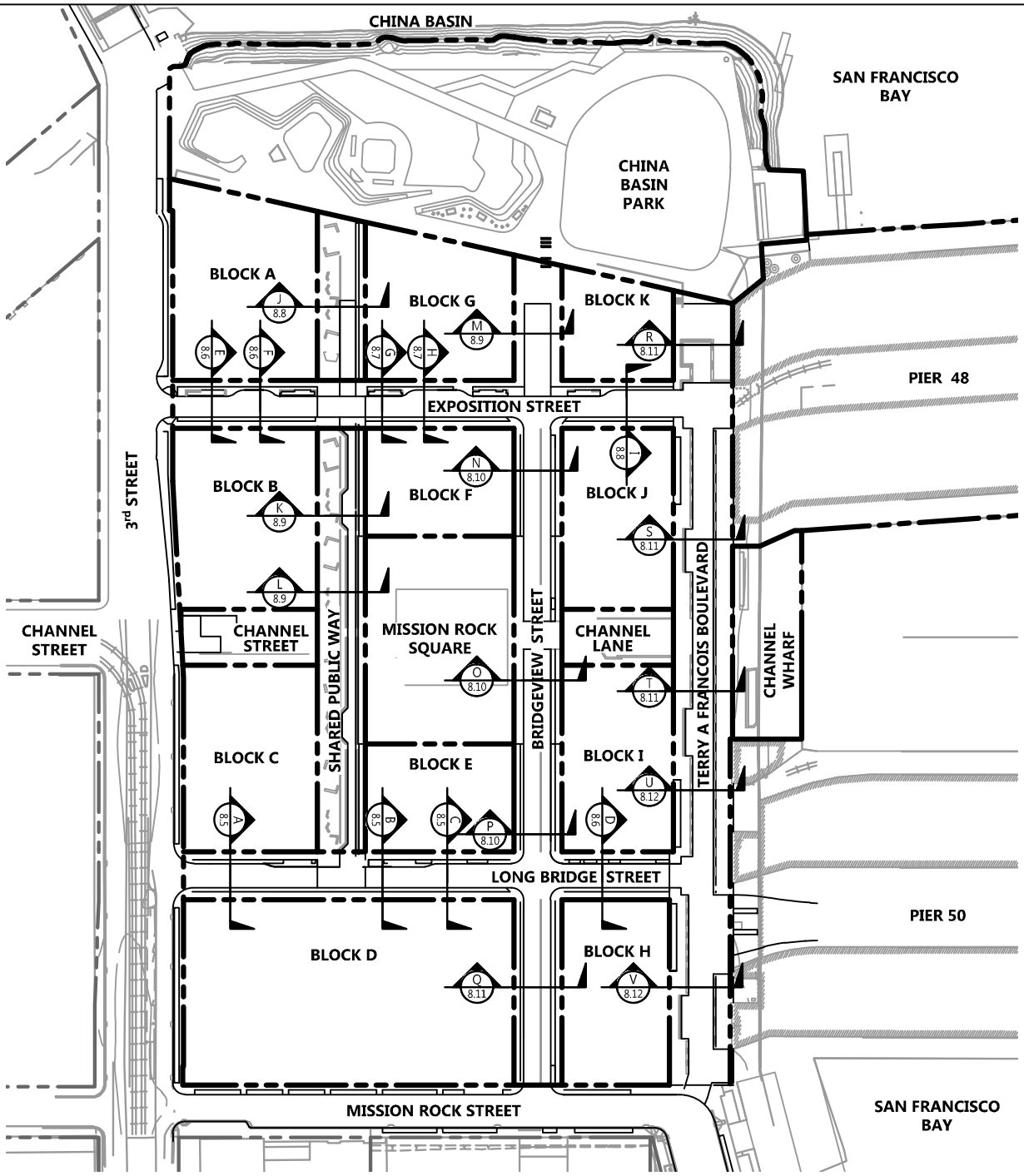
N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.3 Roadway Dimensions.dwg
PLOT DATE: 09-16-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN **FIGURE 8.3 - ROADWAY DIMENSIONS**



LEGEND

PROPOSED PARCEL LINE

EXISTING PARCEL LINE

SECTION LOCATION

NOTES

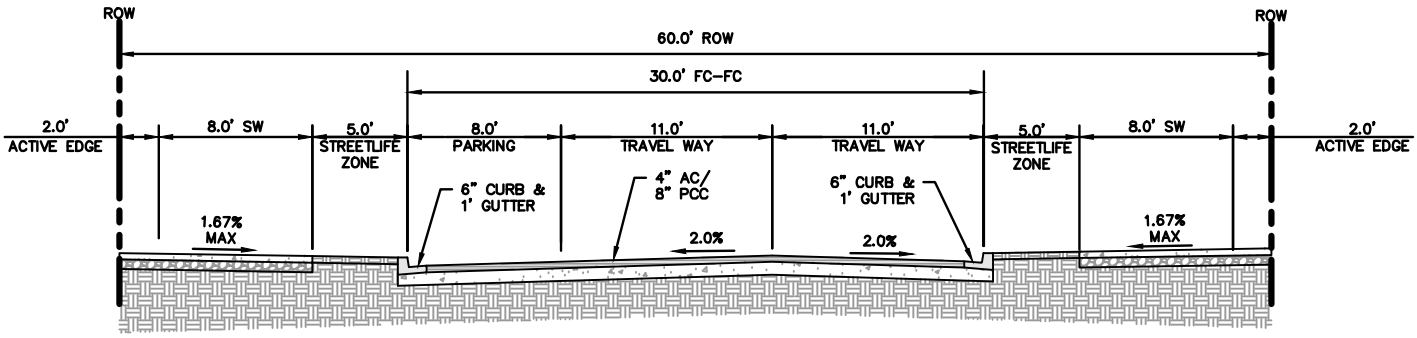
SEE FIGURES 8.5 - 8.12 FOR TYPICAL STREET CROSS SECTIONS.

N

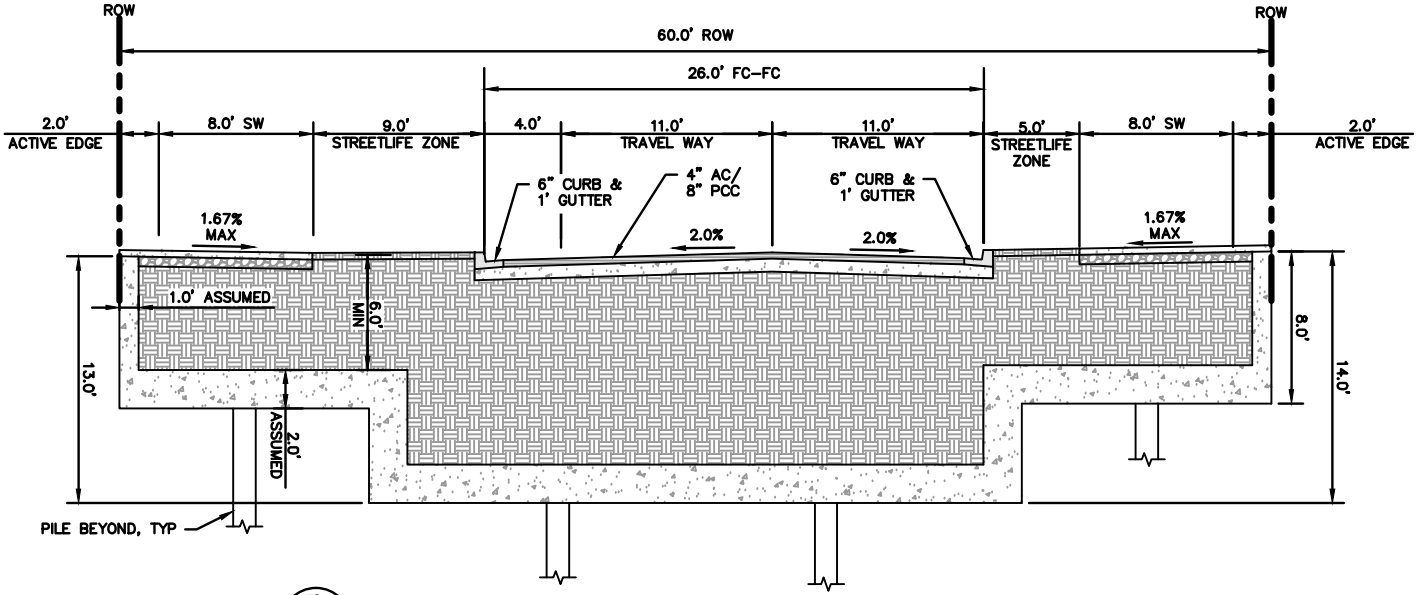
0 200

Source: BKF ENGINEERS, 07/2016

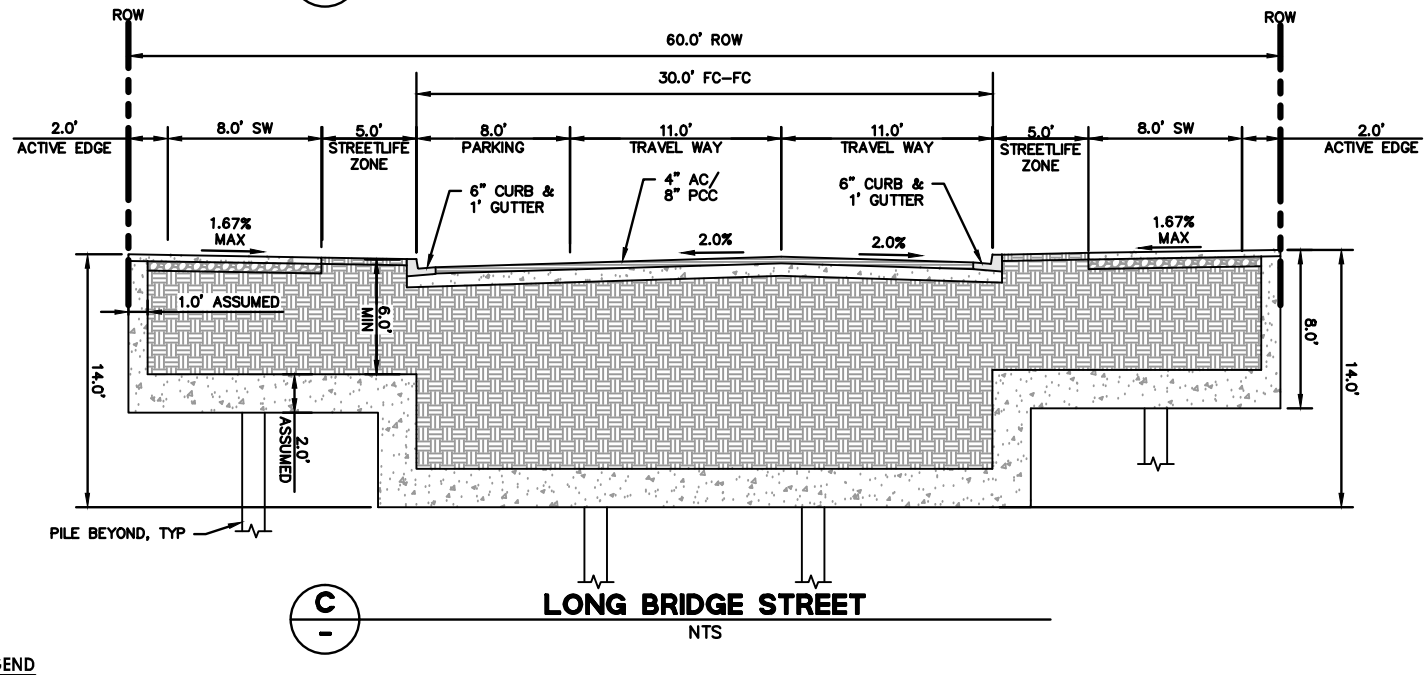
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.4 Plan View & Cross Section Locations.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



A — **LONG BRIDGE STREET**
NTS



B — **LONG BRIDGE STREET**
NTS



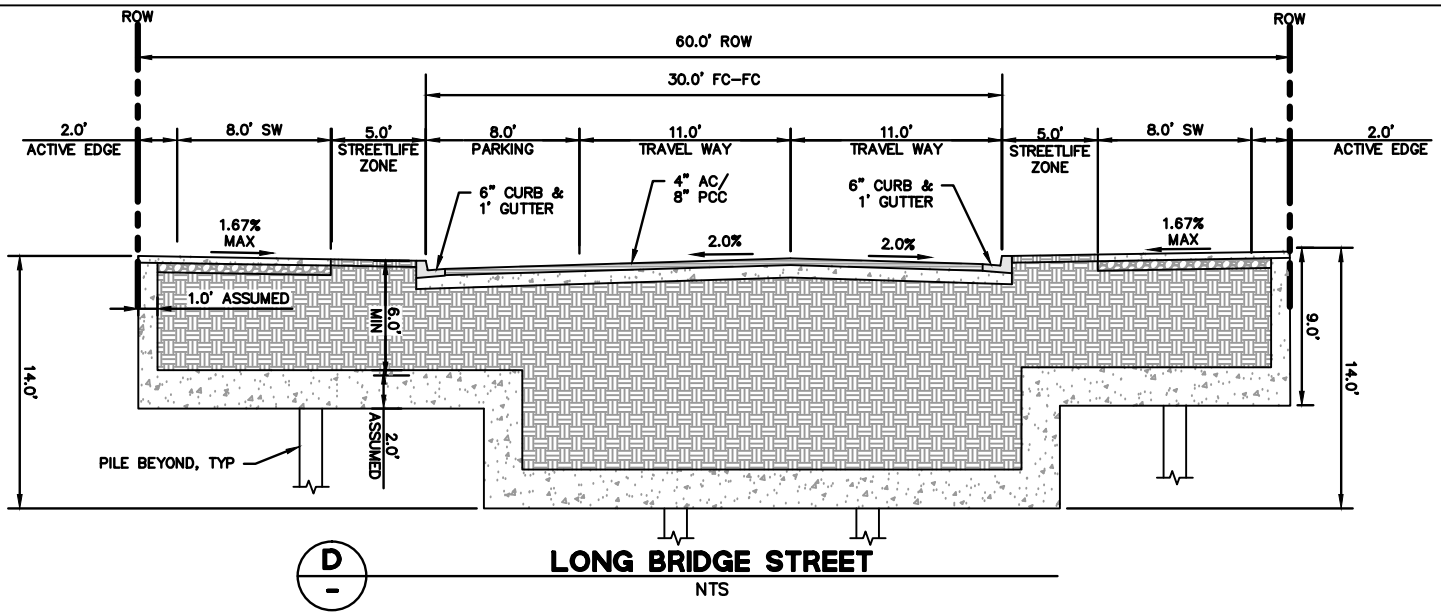
C — **LONG BRIDGE STREET**
NTS

LEGEND

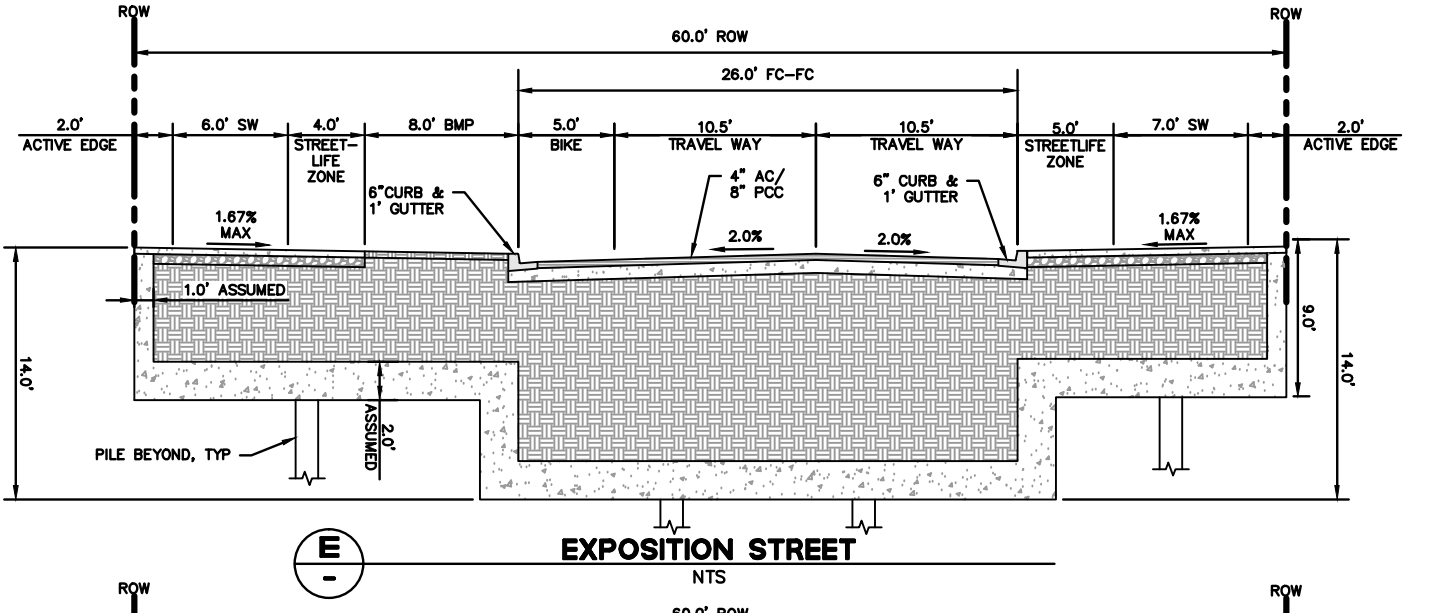
AC	ASPHALT CONCRETE
FC	FACE OF CURB
MIN	MINIMUM
PCC	PORTLAND CONCRETE CEMENT
ROW	RIGHT OF WAY
SW	SIDEWALK
TYP	TYPICAL

Source: BKF ENGINEERS, 07/2016

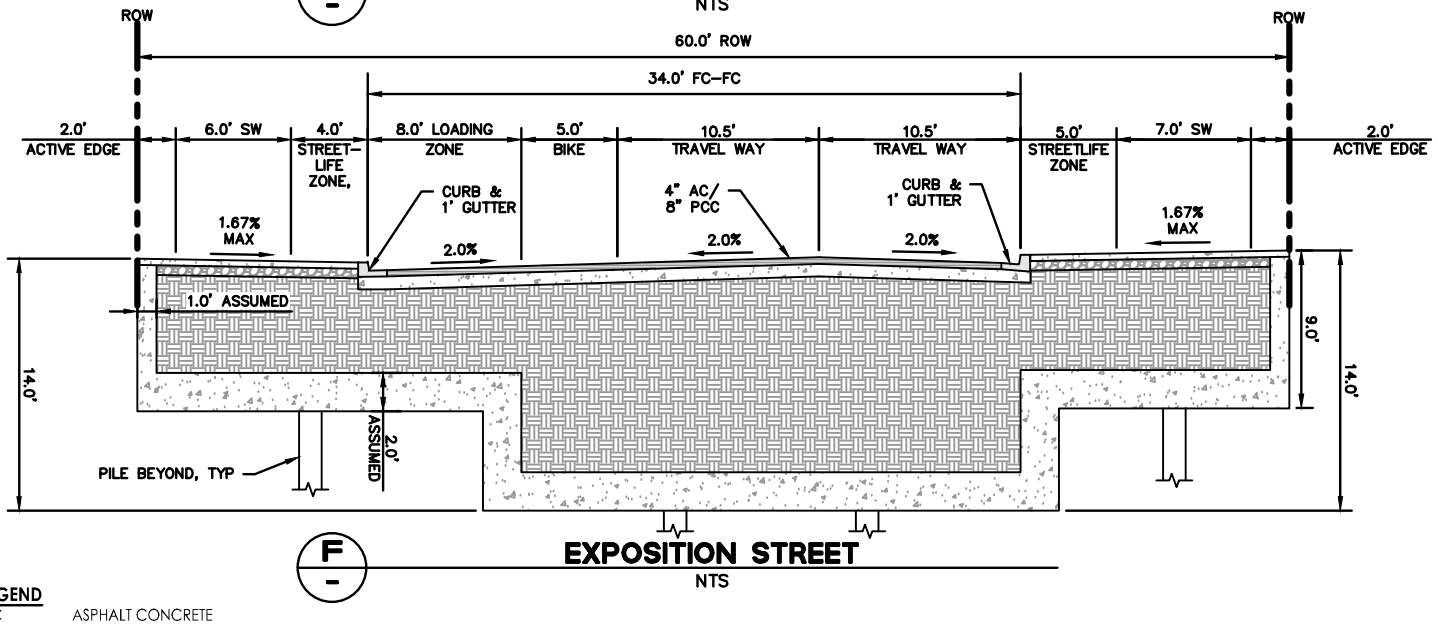
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.5-8.12 Typical Street Cross Sections.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



D — **LONG BRIDGE STREET**
NTS



E — **EXPOSITION STREET**
NTS



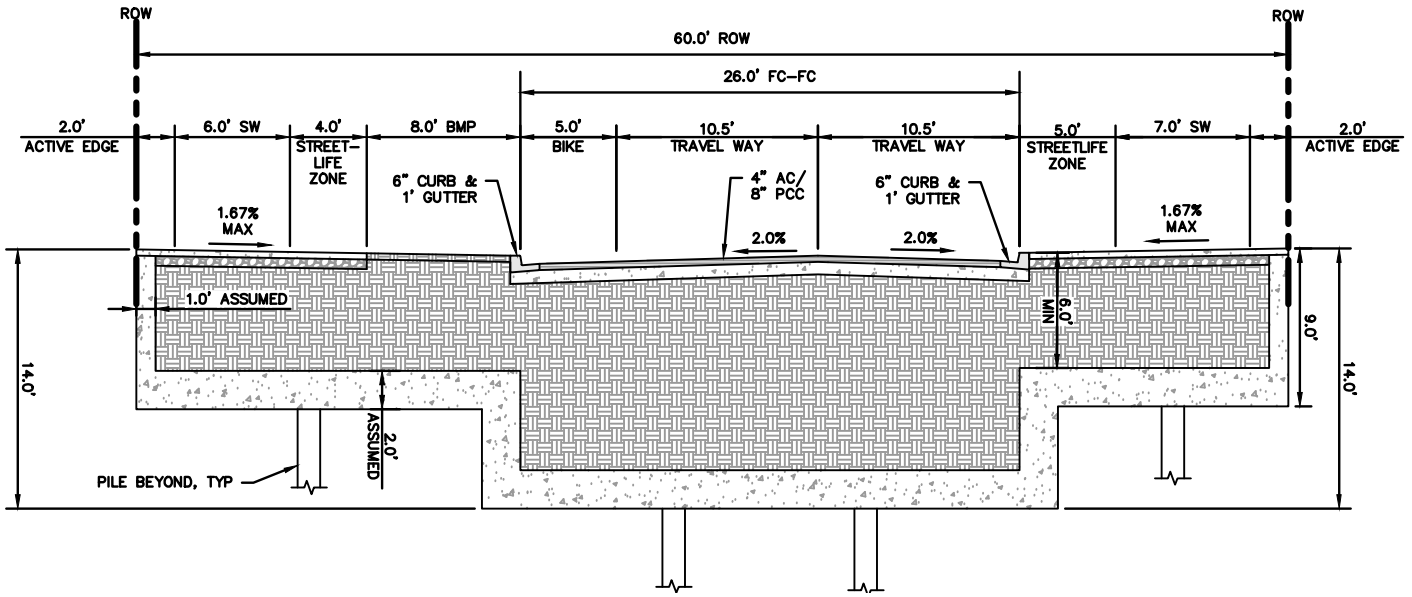
F — **EXPOSITION STREET**
NTS

LEGEND

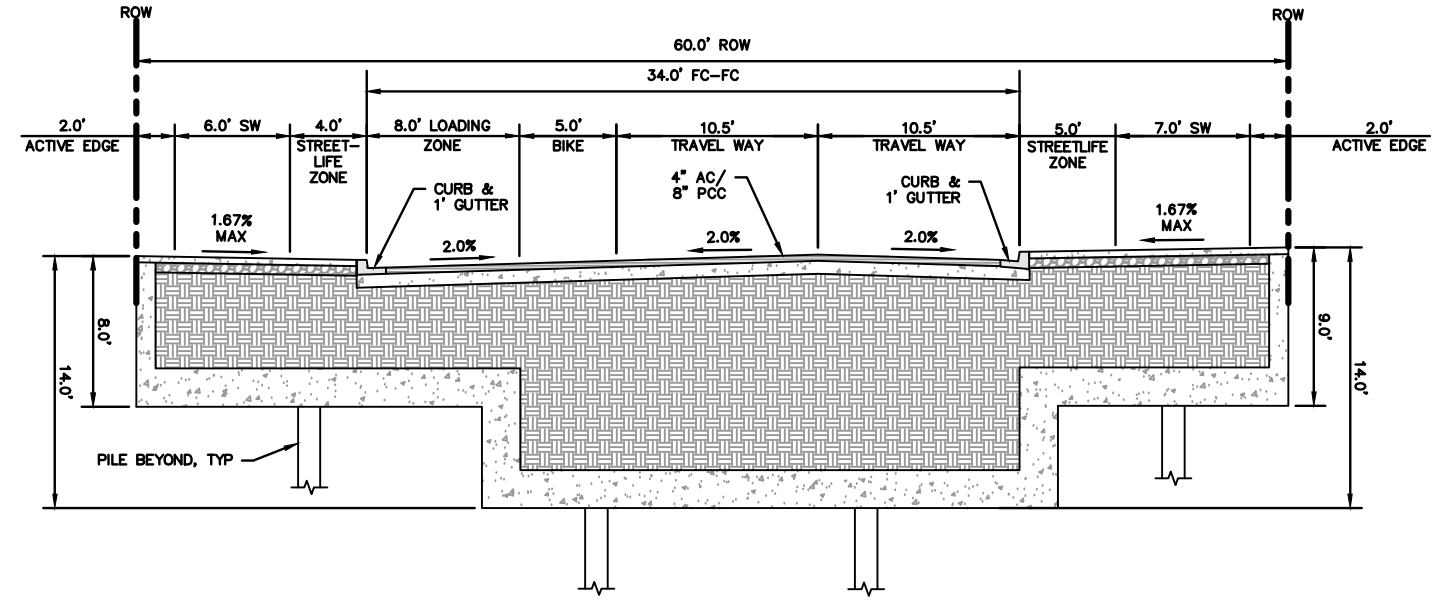
AC	ASPHALT CONCRETE
FC	FACE OF CURB
MIN	MINIMUM
PCC	PORTLAND CONCRETE CEMENT
ROW	RIGHT OF WAY
SW	SIDEWALK
TYP	TYPICAL

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006JMission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.5-8.12 Typical Street Cross Sections.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



G — **EXPOSITION STREET**
NTS



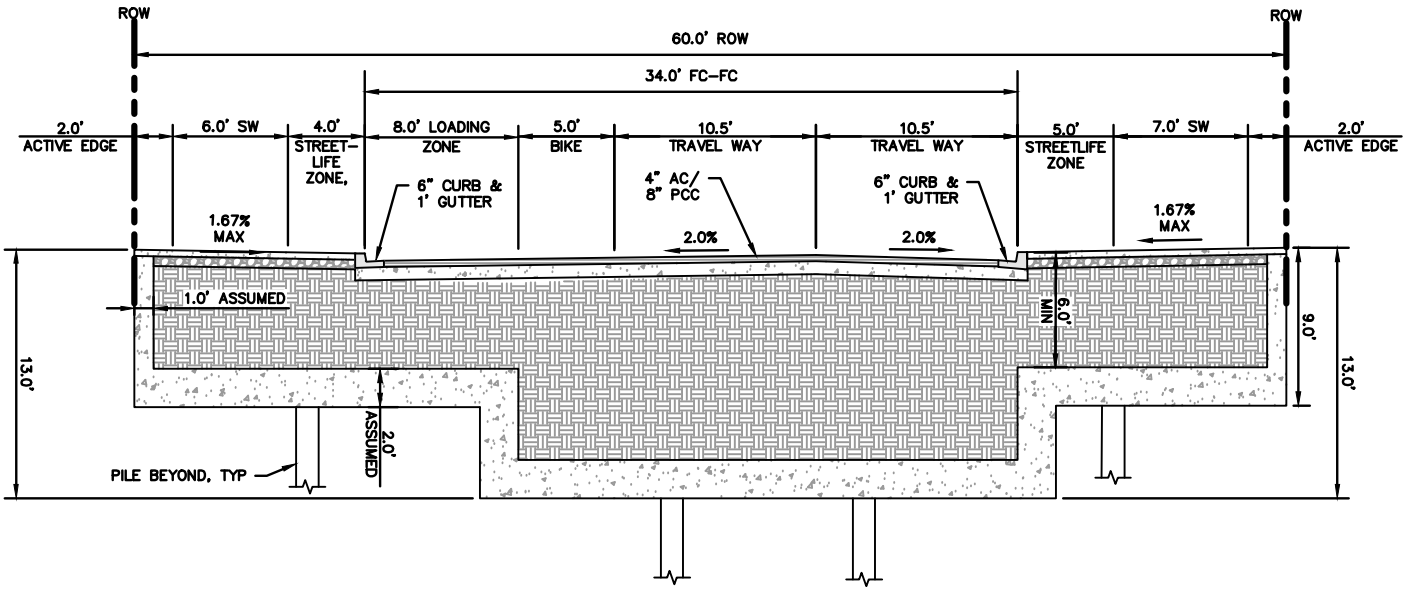
H — **EXPOSITION STREET**
NTS

LEGEND

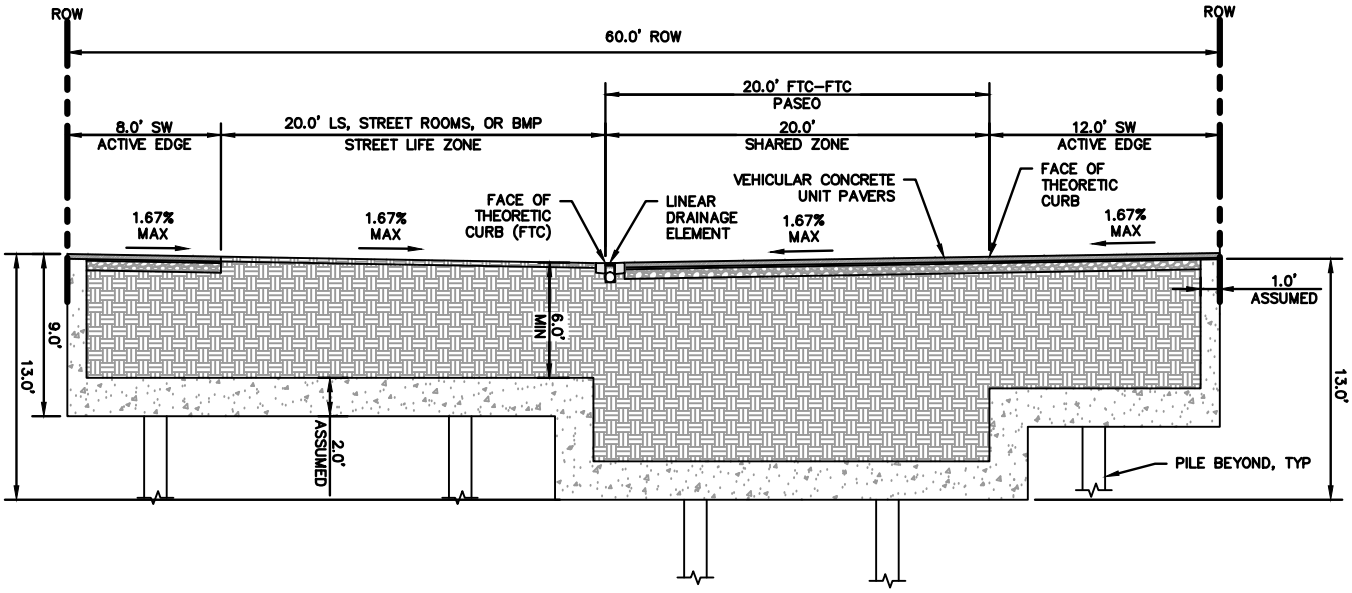
AC	ASPHALT CONCRETE
FC	FACE OF CURB
MIN	MINIMUM
PCC	PORTLAND CONCRETE CEMENT
ROW	RIGHT OF WAY
SW	SIDEWALK
TYP	TYPICAL

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.5-8.12 Typical Street Cross Sections.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slb



EXPOSITION STREET
NTS



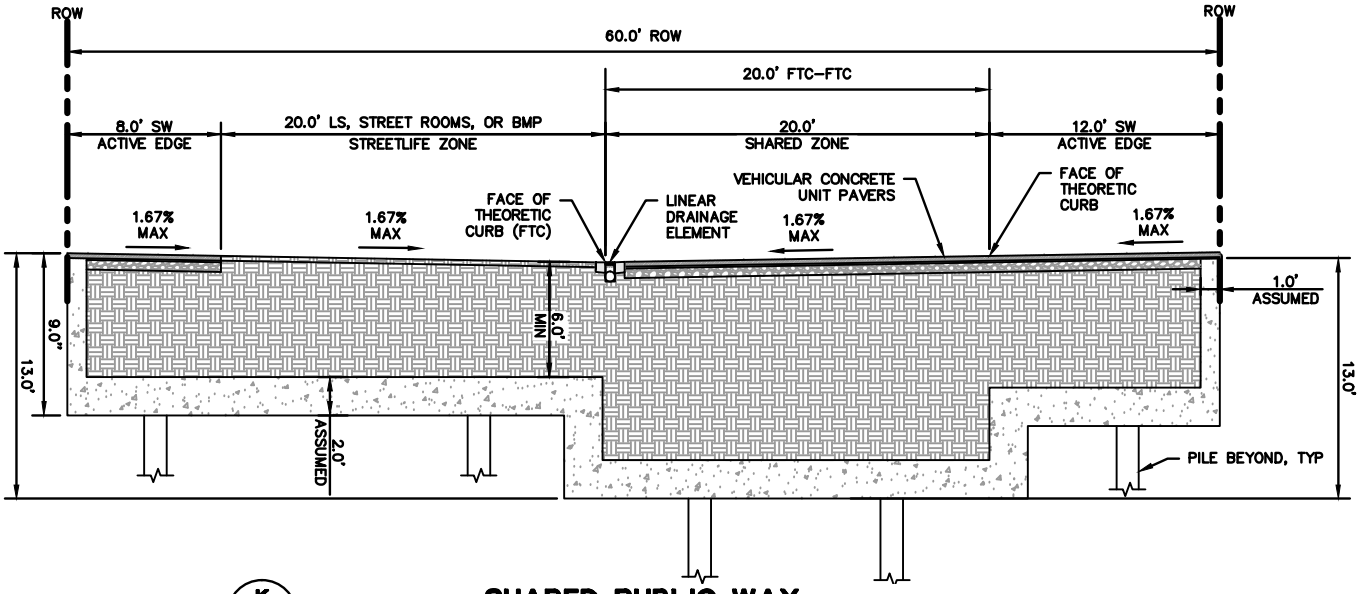
SHARED PUBLIC WAY
NTS

LEGEND

AC	ASPHALT CONCRETE
FC	FACE OF CURB
MIN	MINIMUM
PCC	PORTLAND CONCRETE CEMENT
ROW	RIGHT OF WAY
SW	SIDEWALK
TYP	TYPICAL

Source: BKF ENGINEERS, 07/2016

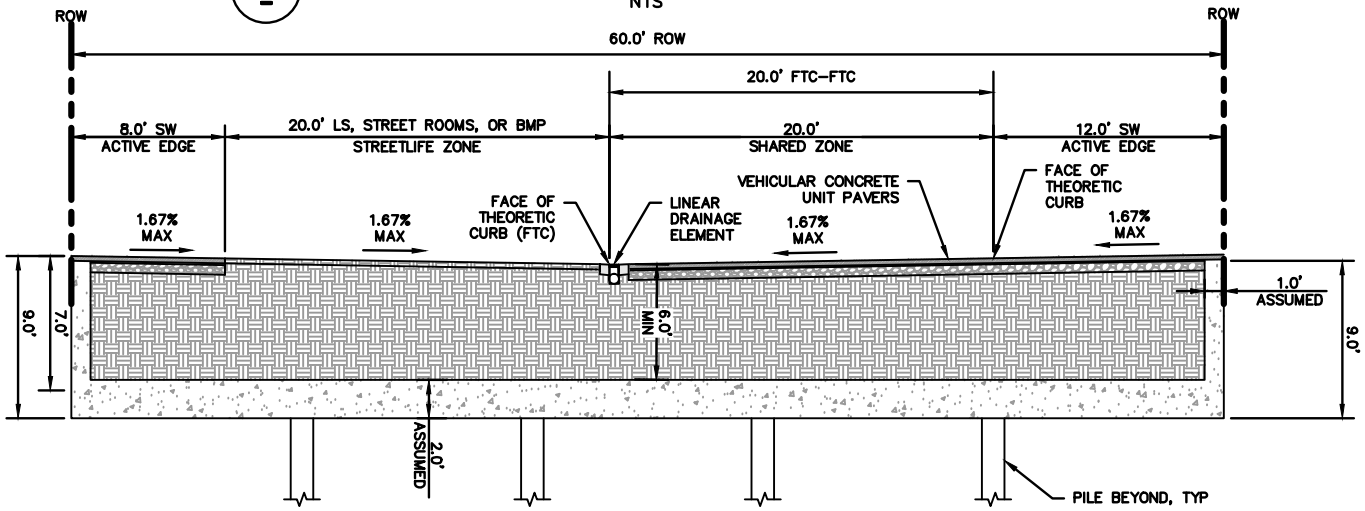
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.5-8.12 Typical Street Cross Sections.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slb



K
–

SHARED PUBLIC WAY

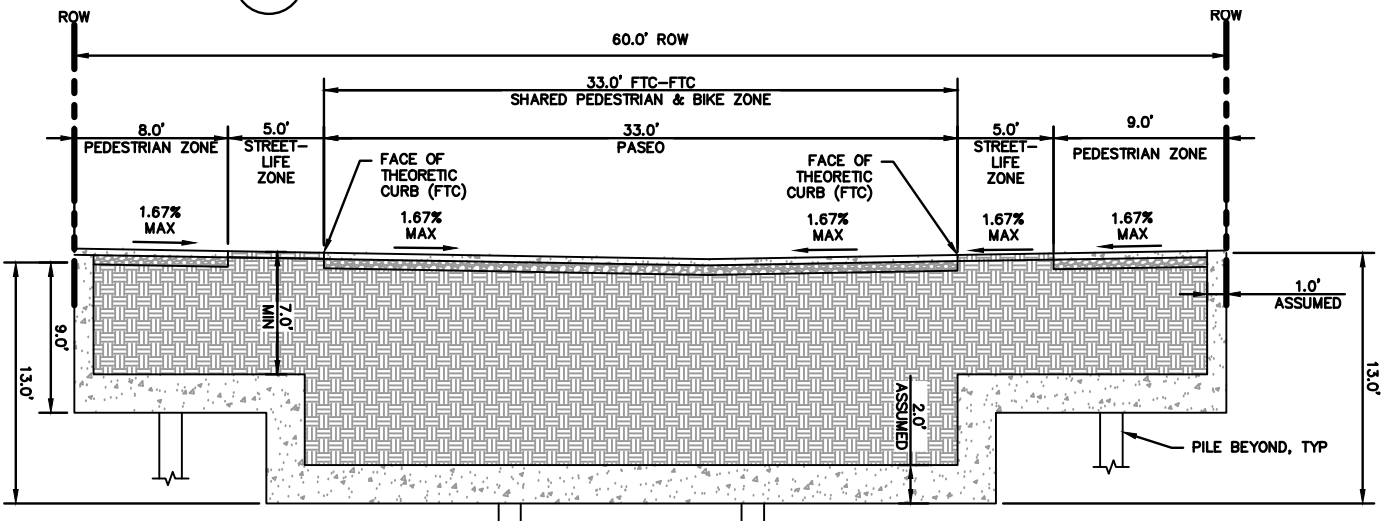
NTS



L
–

SHARED PUBLIC WAY

NTS



M
–

BRIDGEVIEW STREET

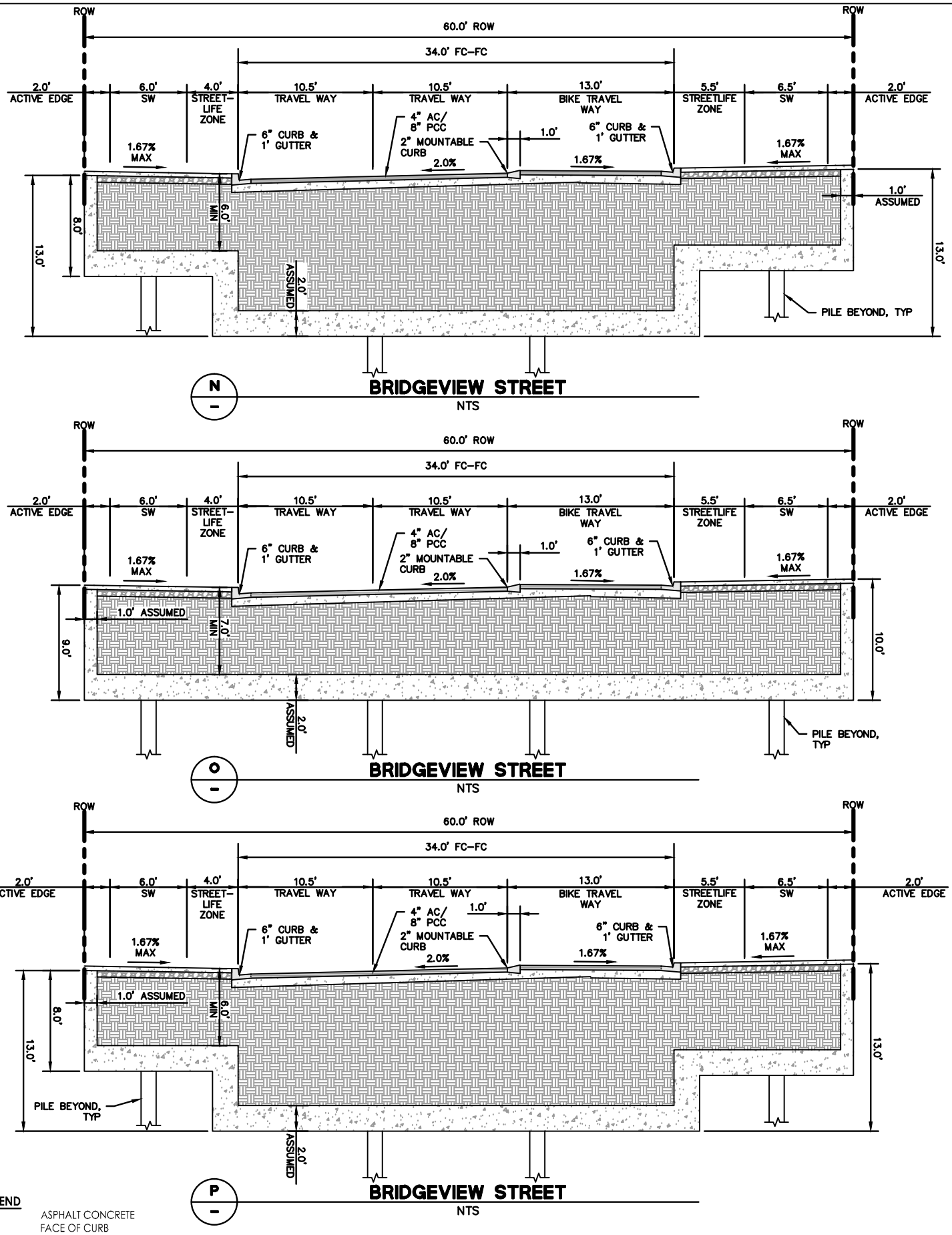
NTS

LEGEND

AC	ASPHALT CONCRETE
FC	FACE OF CURB
MIN	MINIMUM
PCC	PORTLAND CONCRETE CEMENT
ROW	RIGHT OF WAY
SW	SIDEWALK
TYP	TYPICAL

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006JMission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.5-8.12 Typical Street Cross Sections.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib

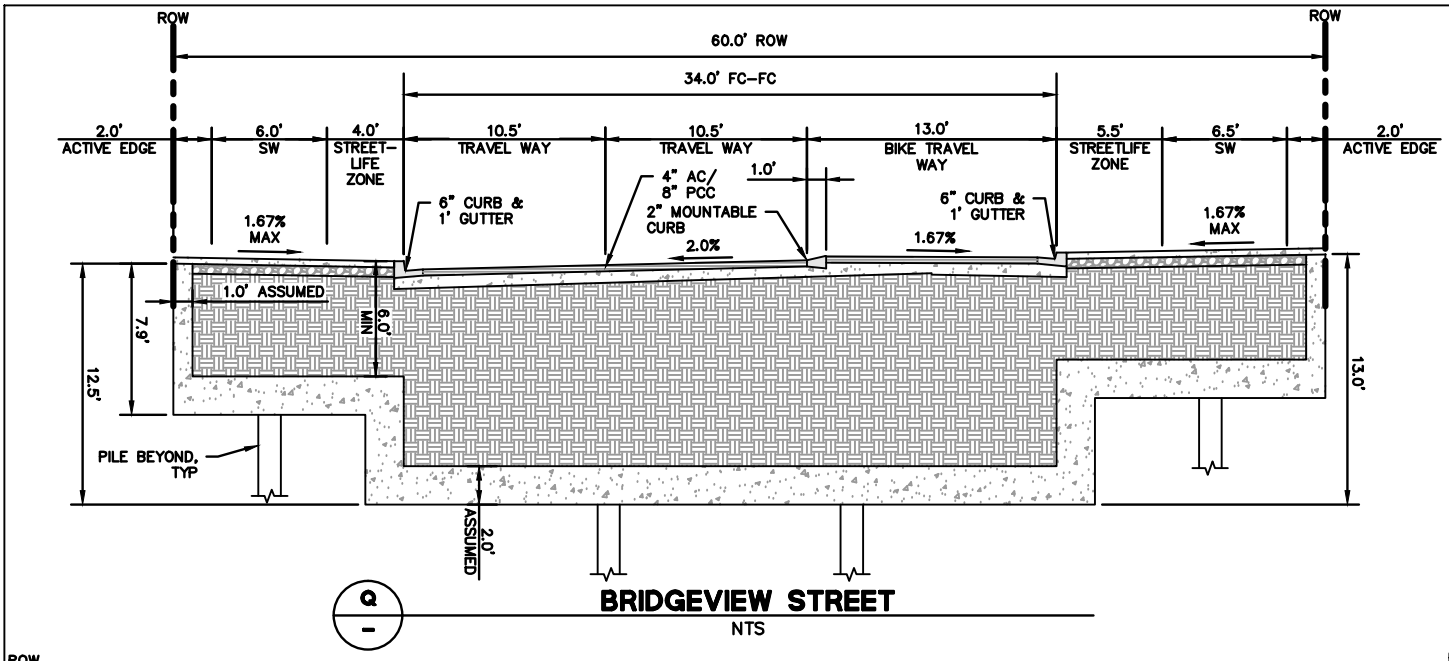


LEGEND

AC	ASPHALT CONCRETE
FC	FACE OF CURB
MIN	MINIMUM
PCC	PORTLAND CONCRETE CEMENT
ROW	RIGHT OF WAY
SW	SIDEWALK
TYP	TYPICAL

Source: BKF ENGINEERS, 07/2016

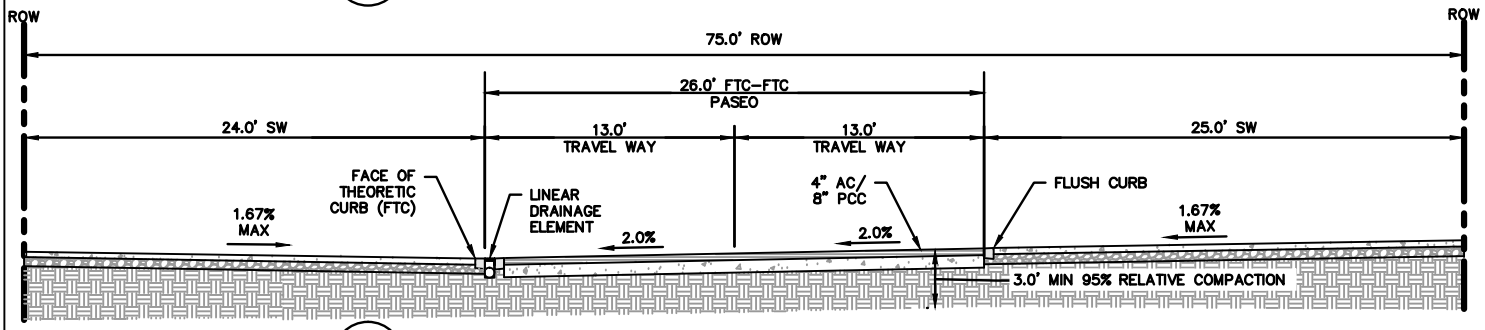
DRAWING NAME: \\BKF-SF\vol4\2008\080006.M\Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.5-8.12 Typical Street Cross Sections.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



Q
–

BRIDGEVIEW STREET

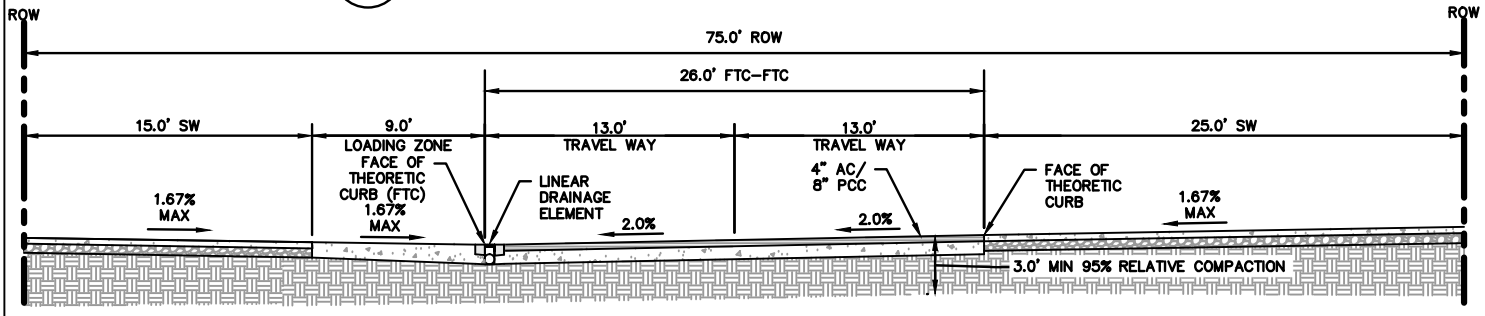
NTS



R
–

TERRY A FRANCOIS BOULEVARD

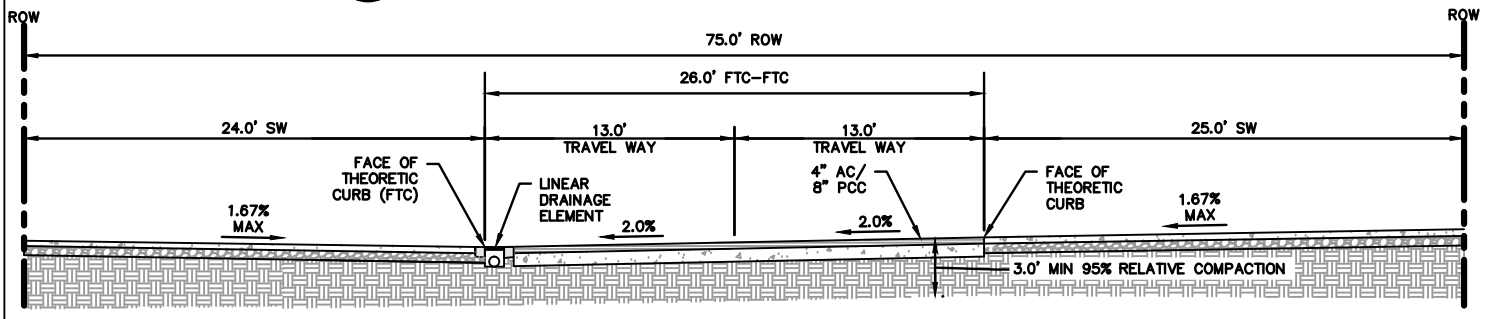
NTS



S
–

TERRY A FRANCOIS BOULEVARD

NTS



T
–

TERRY A FRANCOIS BOULEVARD

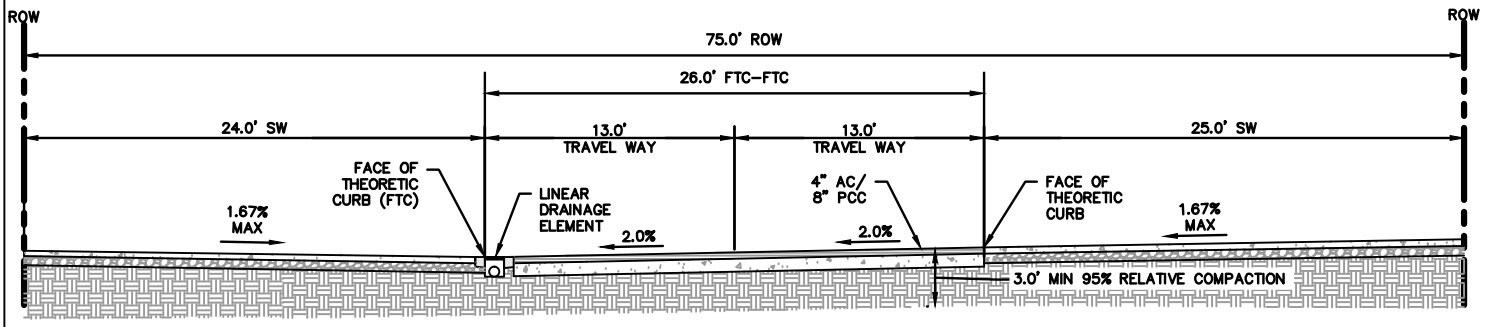
NTS

LEGEND

AC	ASPHALT CONCRETE
FC	FACE OF CURB
MIN	MINIMUM
PCC	PORTLAND CONCRETE CEMENT
ROW	RIGHT OF WAY
SW	SIDEWALK
TYP	TYPICAL

Source: BKF ENGINEERS, 07/2016

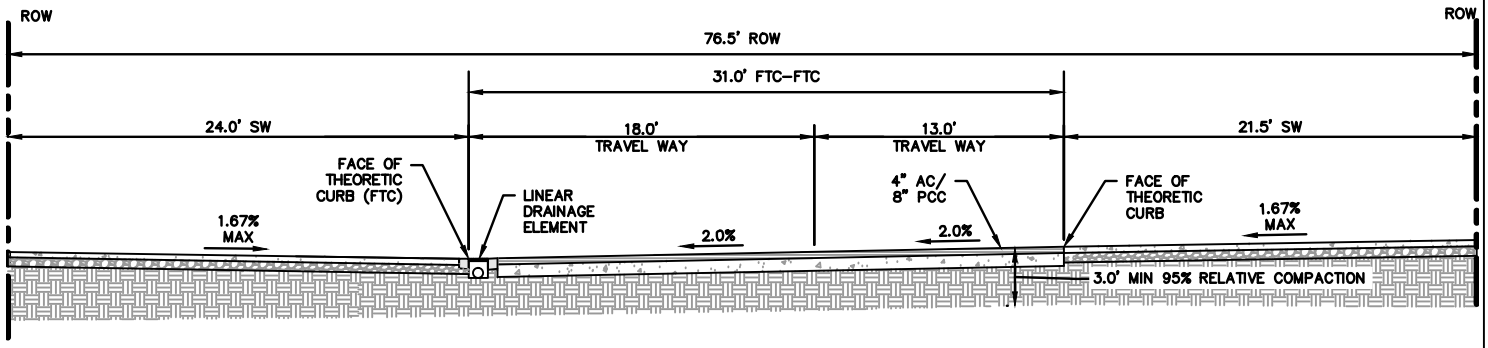
DRAWING NAME: \\BKF-SF\vol4\2008\080006.M\Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.5-8.12 Typical Street Cross Sections.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



U

TERRY A FRANCOIS BOULEVARD

NTS



V

TERRY A FRANCOIS BOULEVARD

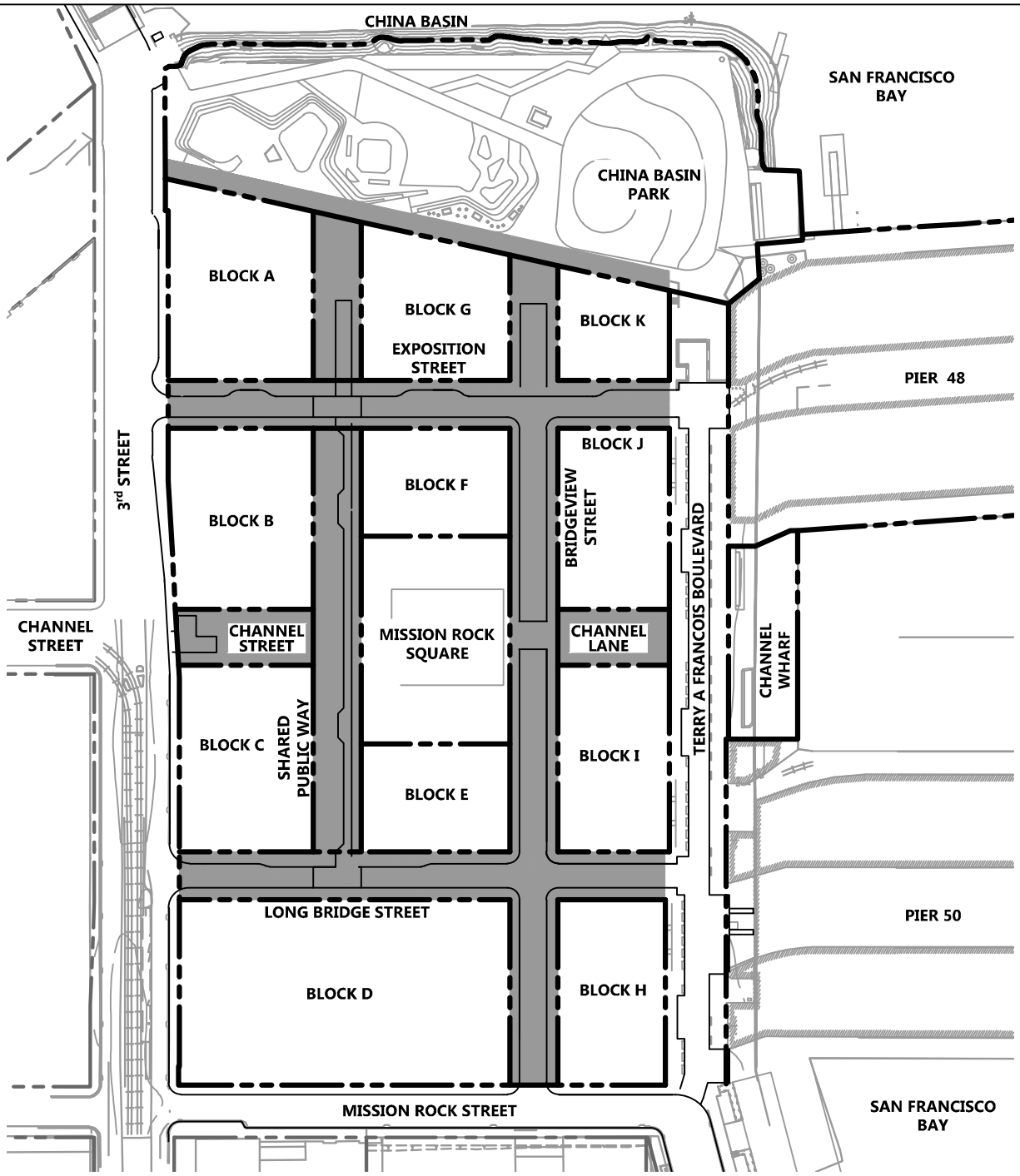
NTS

LEGEND

AC	ASPHALT CONCRETE
FC	FACE OF CURB
MIN	MINIMUM
PCC	PORTLAND CONCRETE CEMENT
ROW	RIGHT OF WAY
SW	SIDEWALK
TYP	TYPICAL

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.5-8.12 Typical Street Cross Sections.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slb



LEGEND

PROPOSED PARCEL LINE

EXISTING PARCEL LINE

STRUCTURED STREET OR OPEN SPACE AREA (210,000 SF)

N

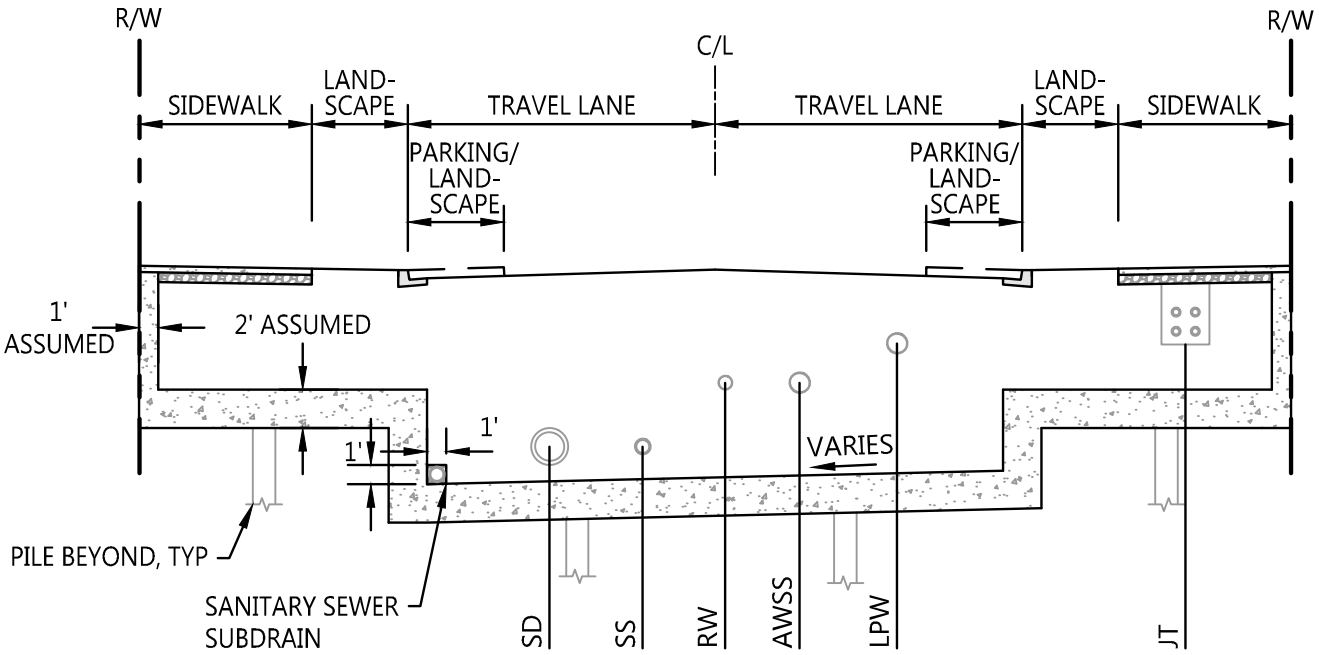
0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.13 Structured Streets Limits.dwg
PLOT DATE: 09-16-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.13 - STRUCTURED STREET & OPEN SPACE LOCATIONS



TYPICAL STRUCTURED STREET SECTION
NTS

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.14 Typical Structured Sheets.dwg
PLOT DATE: 09-09-16
PLOTTED BY: sllb

PEDESTRIAN CIRCULATION + ACCESSIBILITY

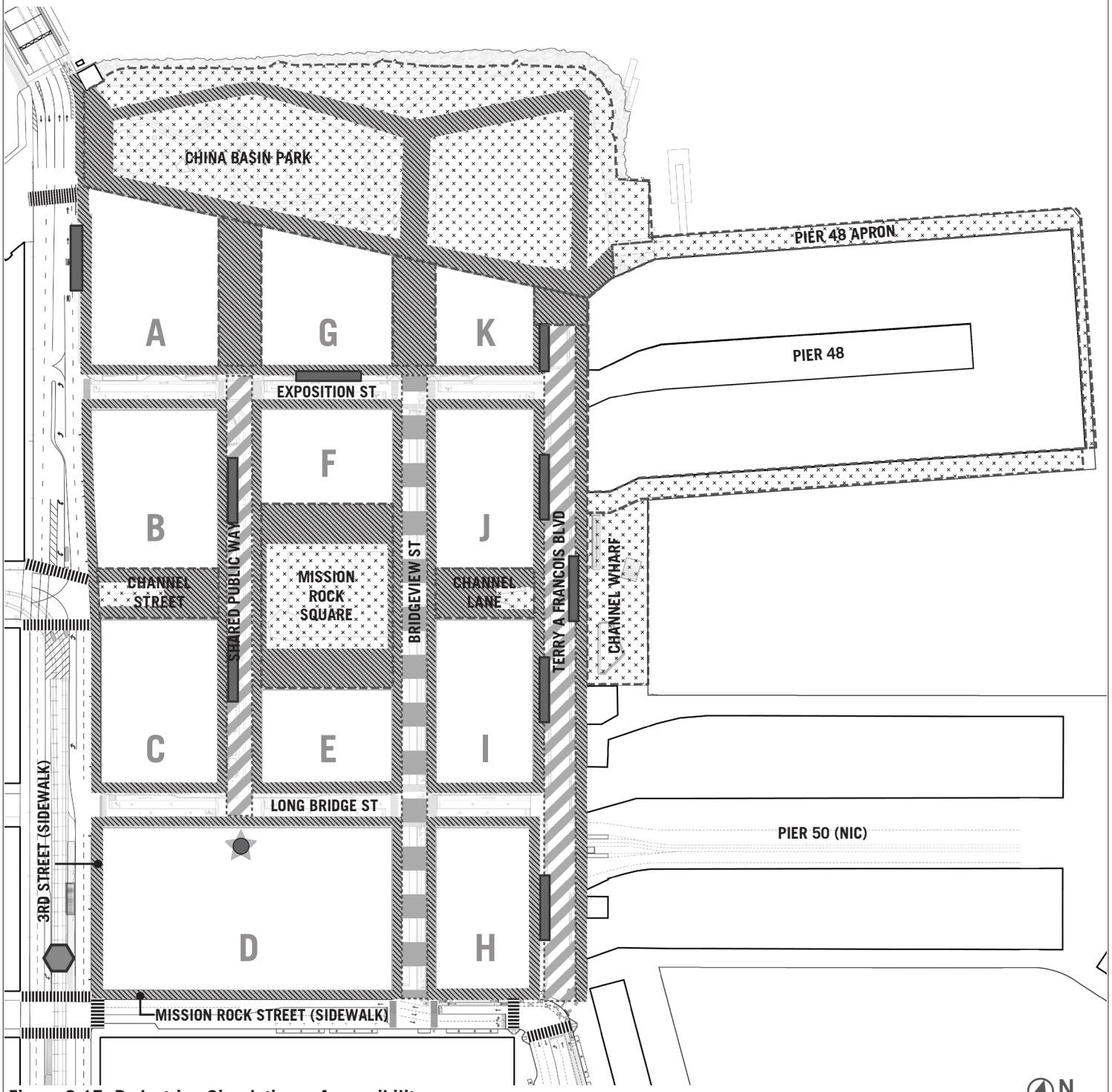


Figure 8.15: Pedestrian Circulation + Accessibility

< 5% Path of Travel (all sidewalks)
- *Accessible path of travel to all potential building entrance locations*

Accessible Loading Stall
- *Delineated drop-off area within ROW*
- *Located in central areas*
- *Curb ramps where required by curb condition*

Interior Accessible Drop-off/Parking Stall
- *Dedicated drop-off and parking spaces within public parking garage*

Shared Street with Flush Curb
- *Delineated drop-off areas as noted*
- *Entire vehicular area can be used for paratransit drop-off*

Vehicular Street with Reduced-Height Curb
- *4" curb accessible by paratransit vehicles for drop-off*

Open Space (Shown for reference only)

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

VEHICULAR CIRCULATION

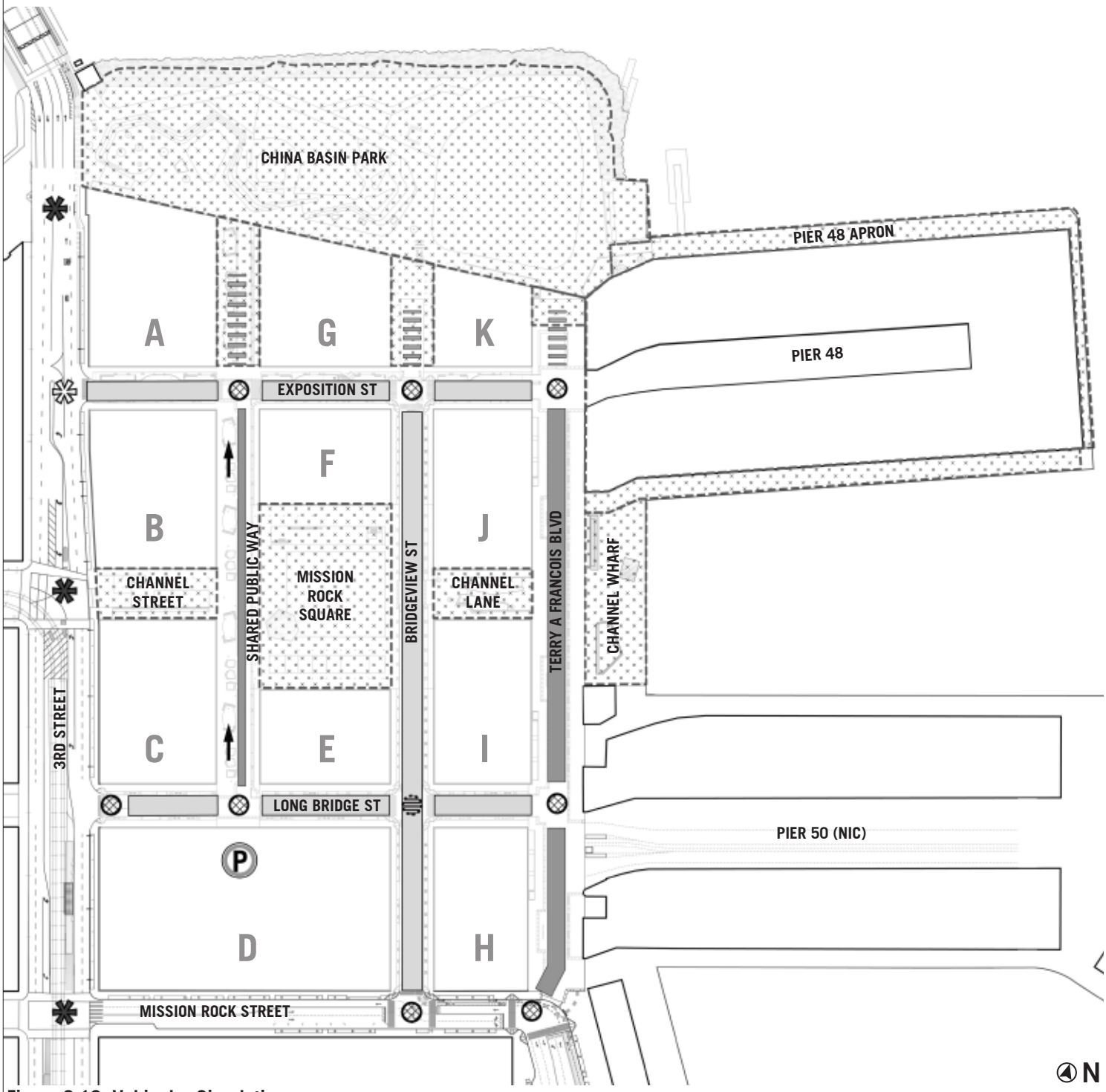


Figure 8.16: Vehicular Circulation

Shared Street (No Street Parking)	Shared Site Parking Location
2-Way Street (No Street Parking)	Stop Sign: All-Way
Paseo with Emergency Vehicle Access	Stop Sign: Two-Way
Open Space (Shown for reference only)	Existing Signalized Intersection
Direction of 1-Way Traffic	Proposed Signalized Intersection

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

BICYCLE CIRCULATION + FACILITIES

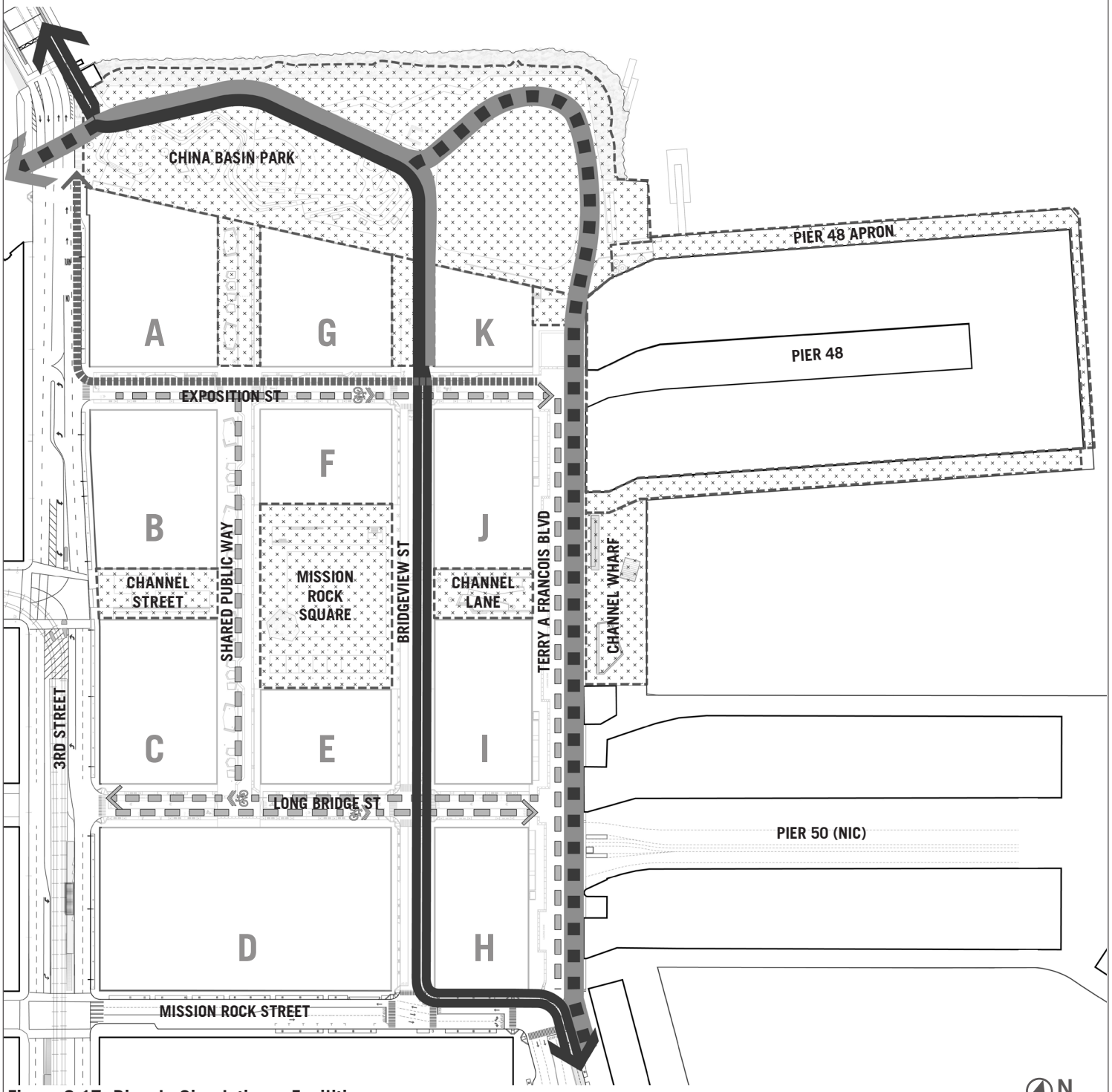


Figure 8.17: Bicycle Circulation + Facilities

Blue Greenway: China Basin Park
- Primary N-S Bicylcle Connection:Multi-Use Trail

Blue Greenway: Terry A Francois Blvd and China Basin Park
- Multi-Use Trail

Protected Cycle Track: Bridgeview + Mission Rock Streets
- Primary N-S Bicylcle Connection

Class II Bike Lane

Sharrows / Shared Travelway

Open Space (Shown for reference only)

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

LOADING, SERVICING, + PARKING

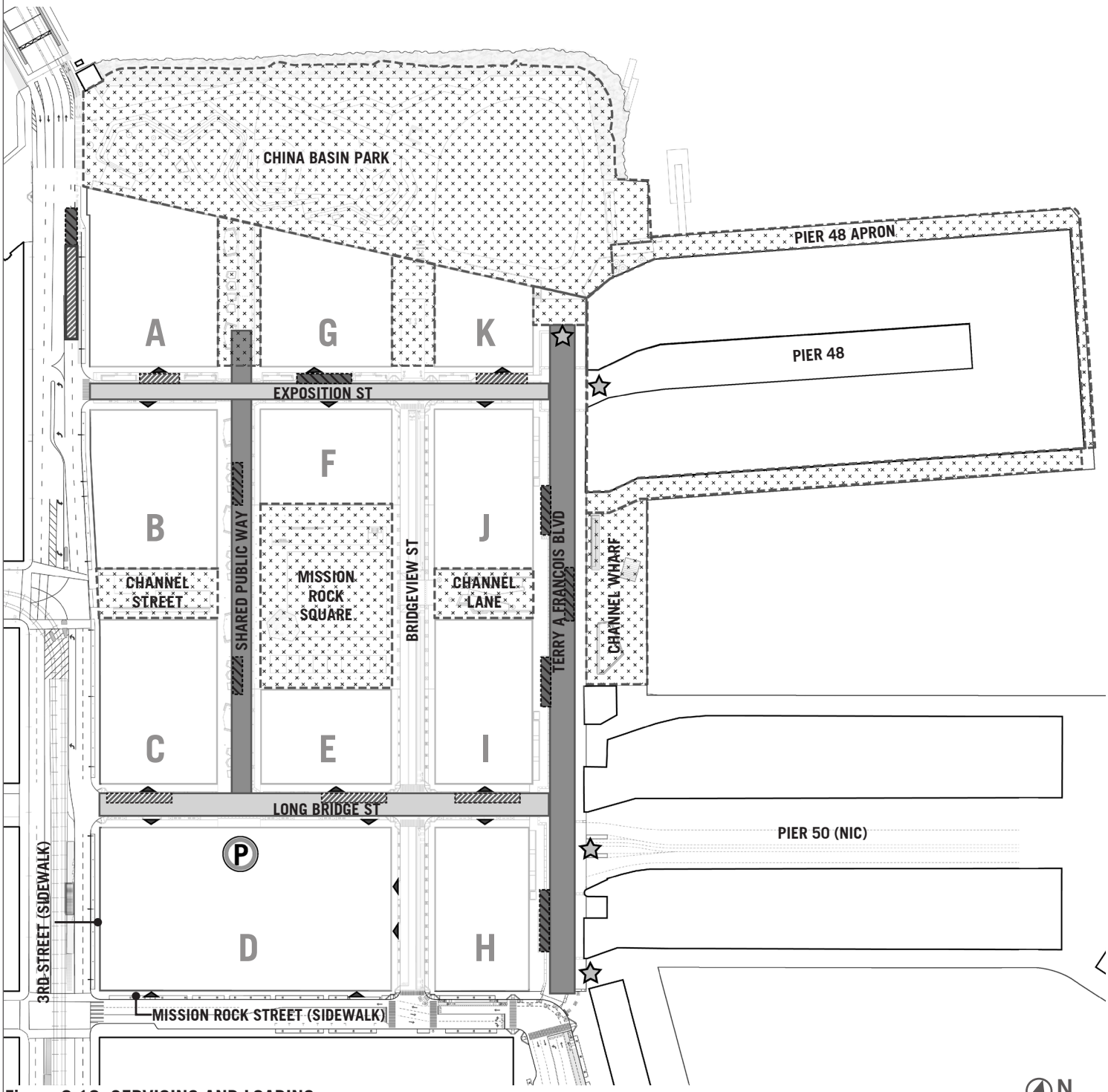
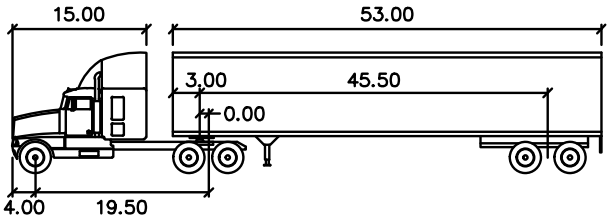


Figure 8.18: SERVICING AND LOADING

- Service Street
- Shared Street (Flush Curb)
- Passenger Loading + Servicing Zone
- Accessible Loading + Servicing Zone
- Open Space (Shown for reference only)
- Large Truck/Vehicle Access
- Potential Driveway Location (if provided)
- Shared Parking Facility

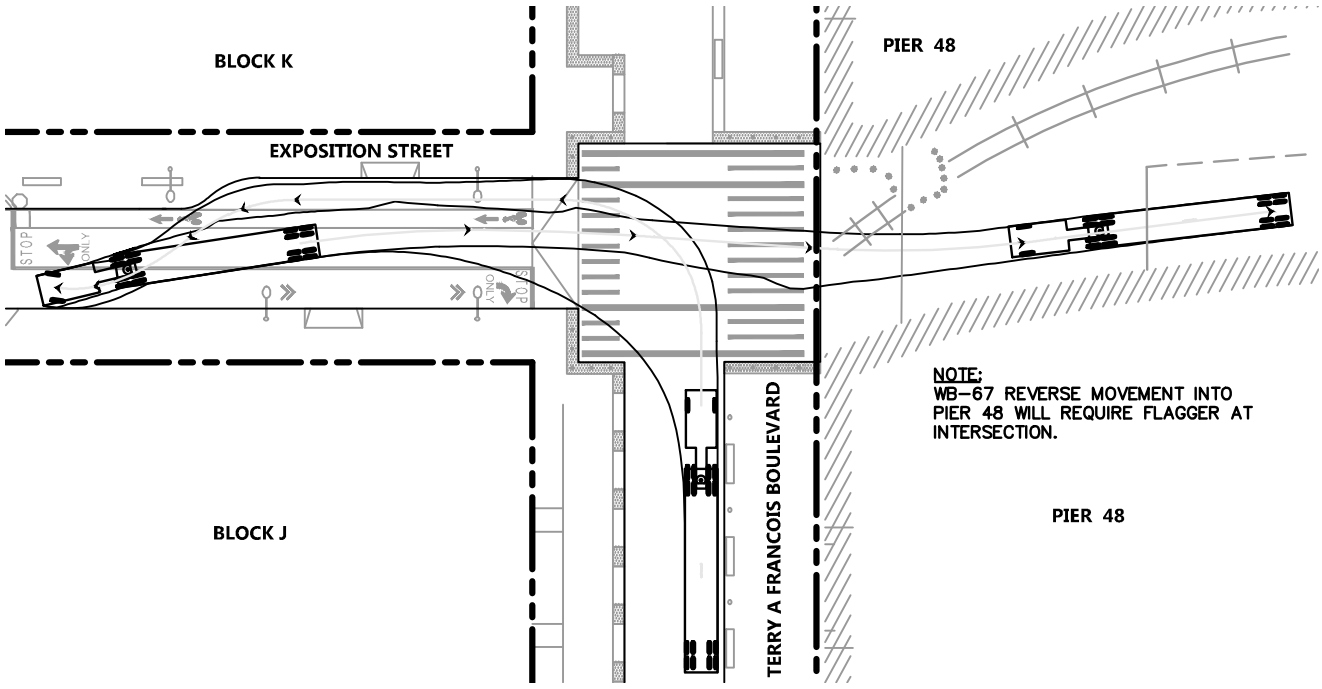
Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



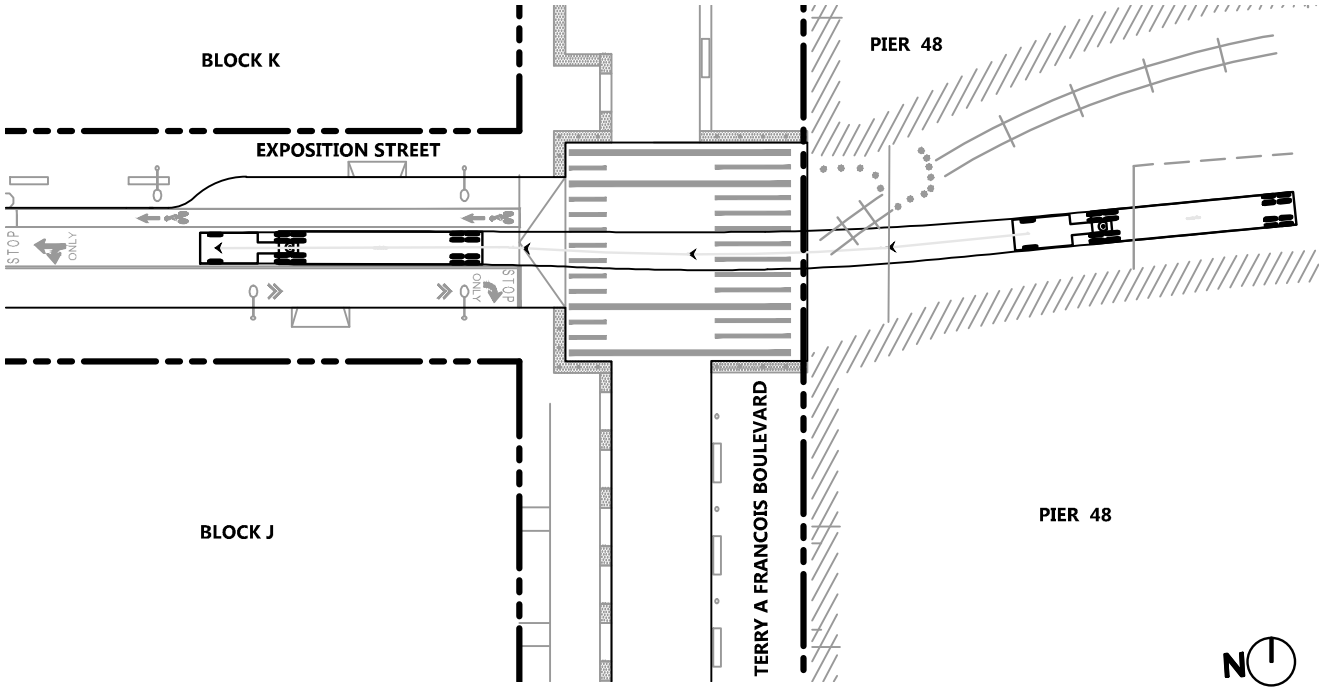
WB–67

	feet		feet
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 28.4
Tractor Track	: 8.00	Articulating Angle	: 75.0
Trailer Track	: 8.50		

WB-67 TRUCK TEMPLATE



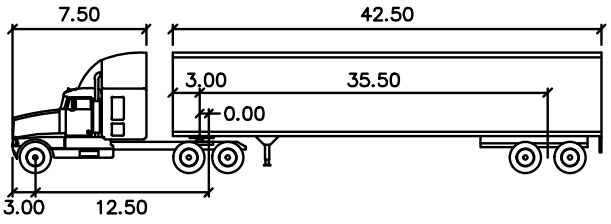
WB-67 TRUCK ENTERING PIER 48



WB-67 TRUCK EXITING PIER 48

Source: BKF ENGINEERS, 07/2016

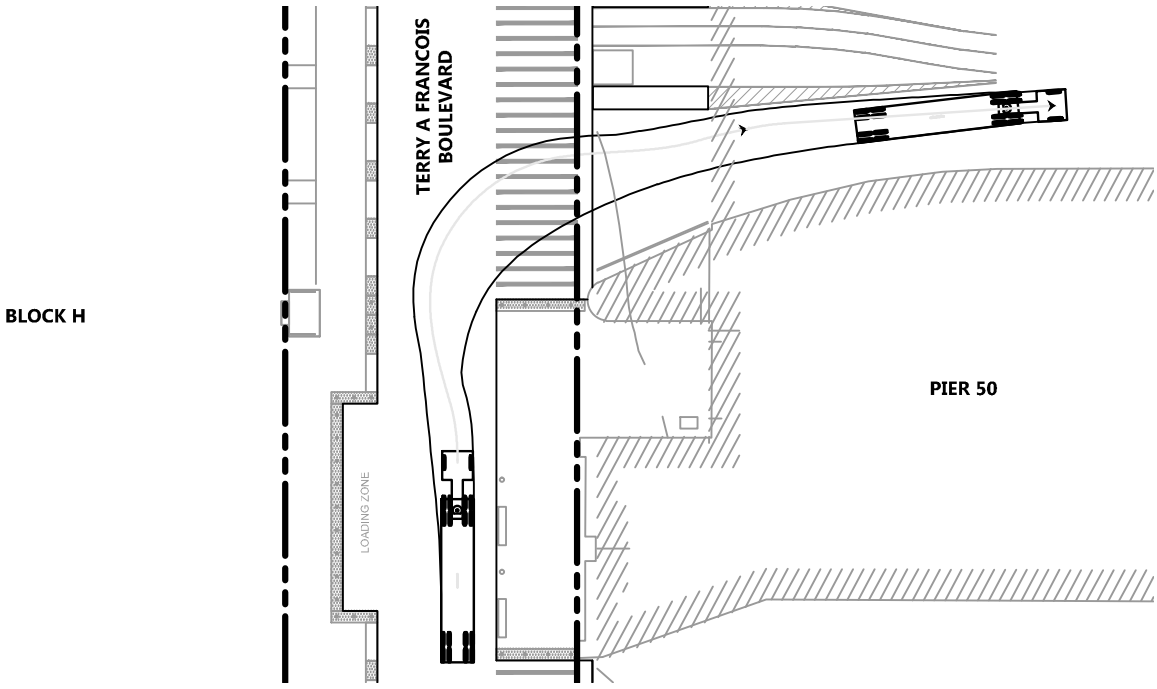
DRAWING NAME: \\bkf-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.19-20 Pier Turning.dwg
PLOT DATE: 09-15-16
PLOTTED BY: fell



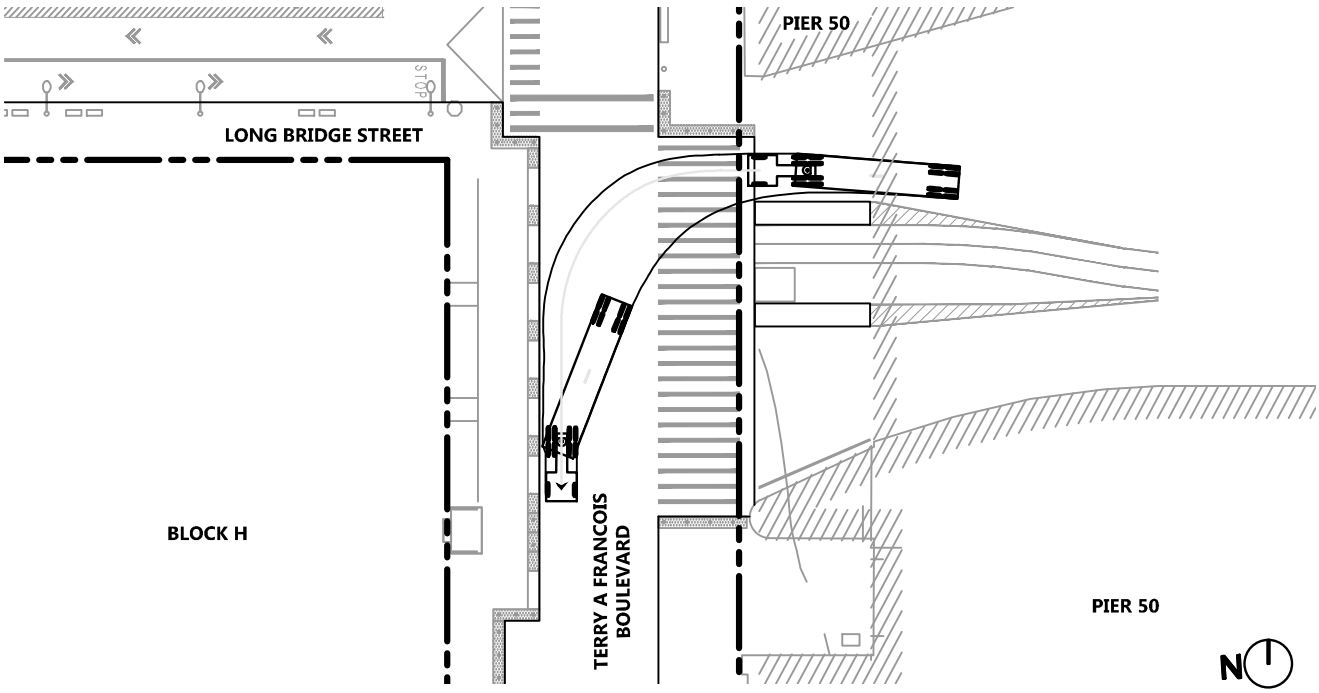
WB–50

	feet		feet
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

WB-50 TRUCK TEMPLATE



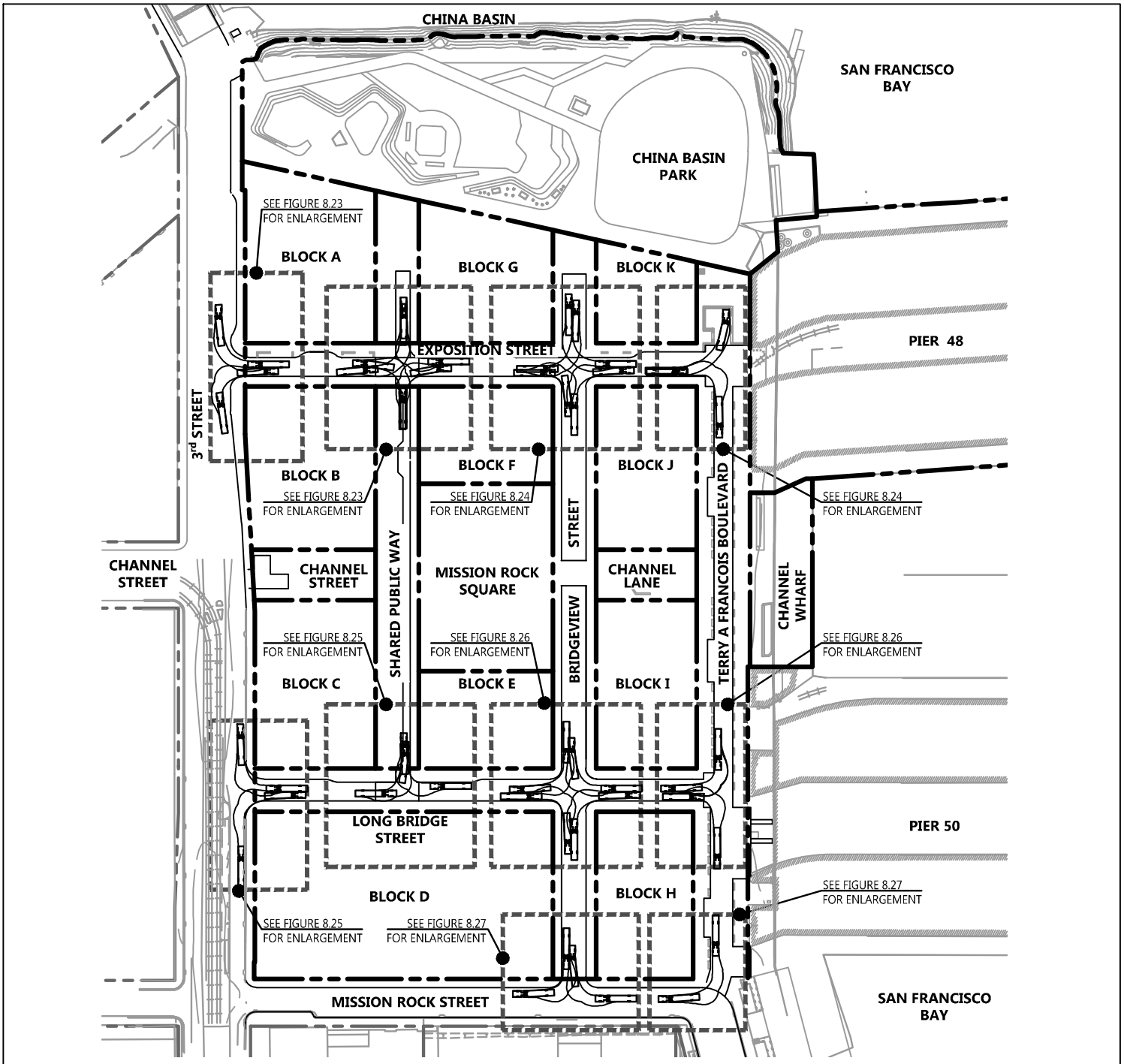
WB-50 TRUCK ENTERING PIER 50



WB-50 TRUCK EXITING PIER 50

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080008_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.19-20 Pier Turning.dwg
PLOT DATE: 09-15-16
PLOTTED BY: fell



LEGEND

PROPOSED PARCEL LINE

EXISTING PARCEL LINE

PROPOSED FIRE TRUCK PATH

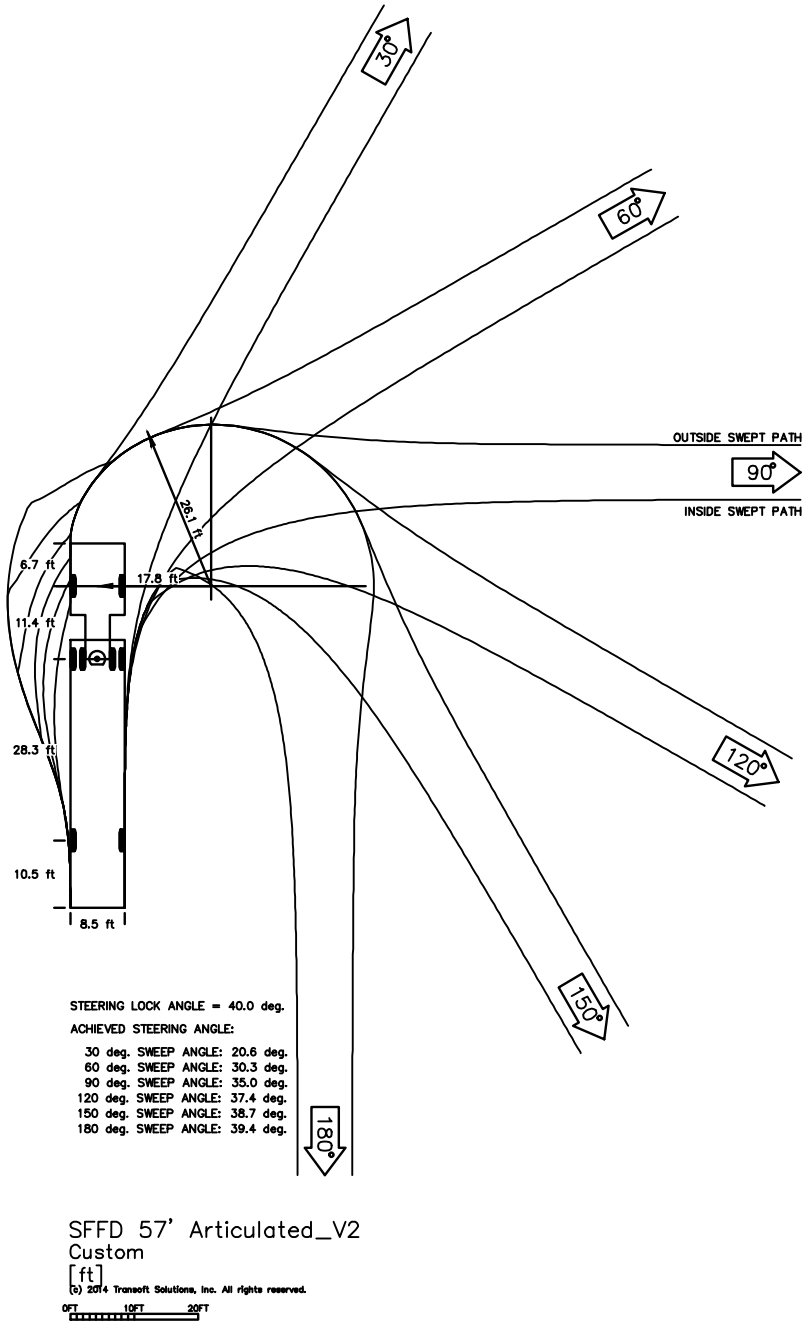
N

0 200

Source: BKF ENGINEERS, 07/2016

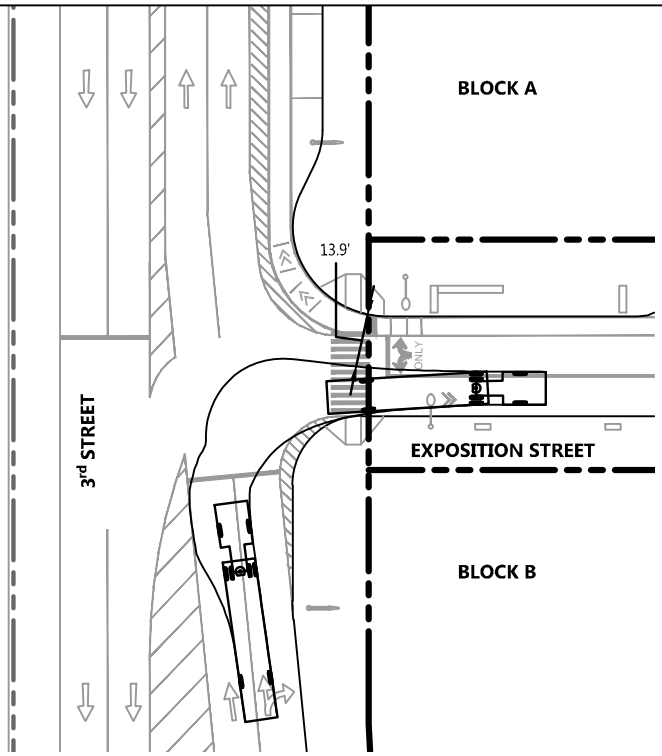
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.21 Conceptual Fire Truck Turning Analysis.dwg
PLOT DATE: 09-09-16 PLOTTED BY: slib

MISSION ROCK INFRASTRUCTURE PLAN **FIGURE 8.21 - CONCEPTUAL FIRE TRUCK TURNING ANALYSIS**

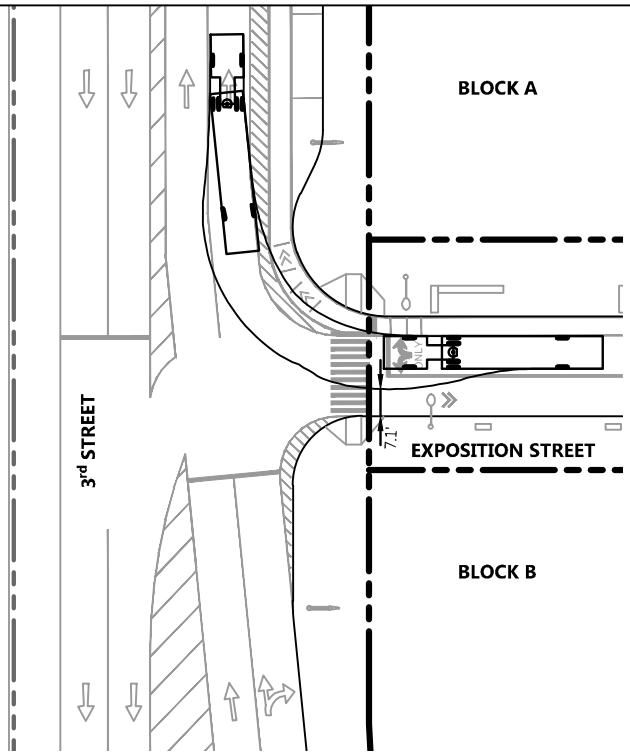


DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.22 Truck Turning Template.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib

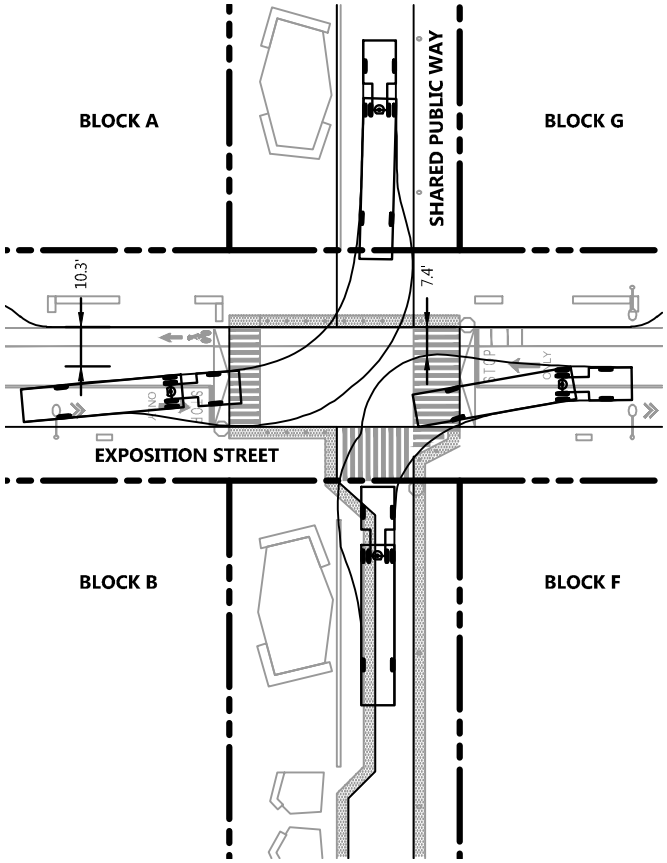
Source: BKF ENGINEERS, 07/2016



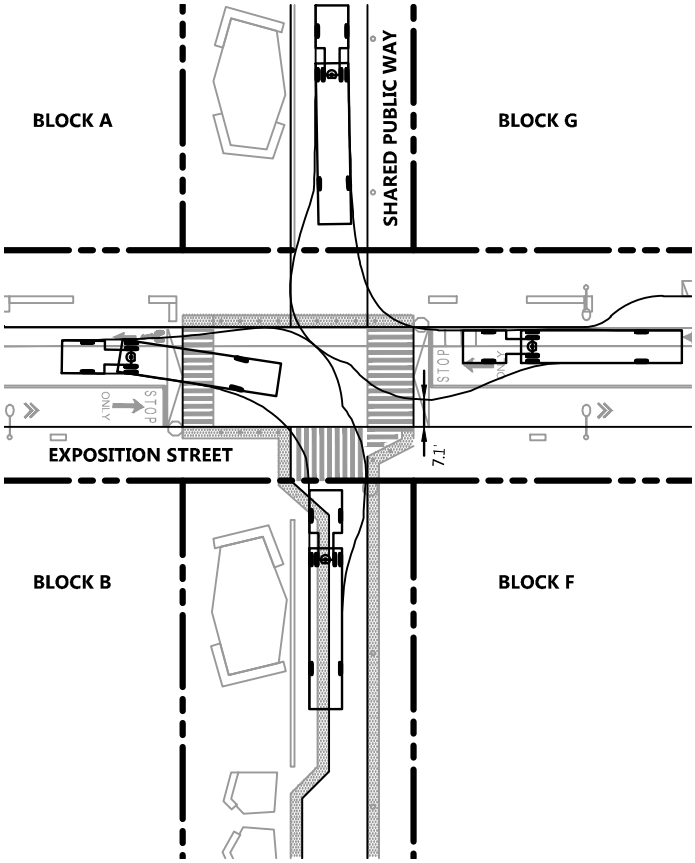
EXPOSITION STREET & 3rd STREET INTERSECTION
(NW-SE)



EXPOSITION STREET & 3rd STREET INTERSECTION
(NE-SW)



EXPOSITION STREET & SHARED
PUBLIC WAY INTERSECTION
(NW - SE)



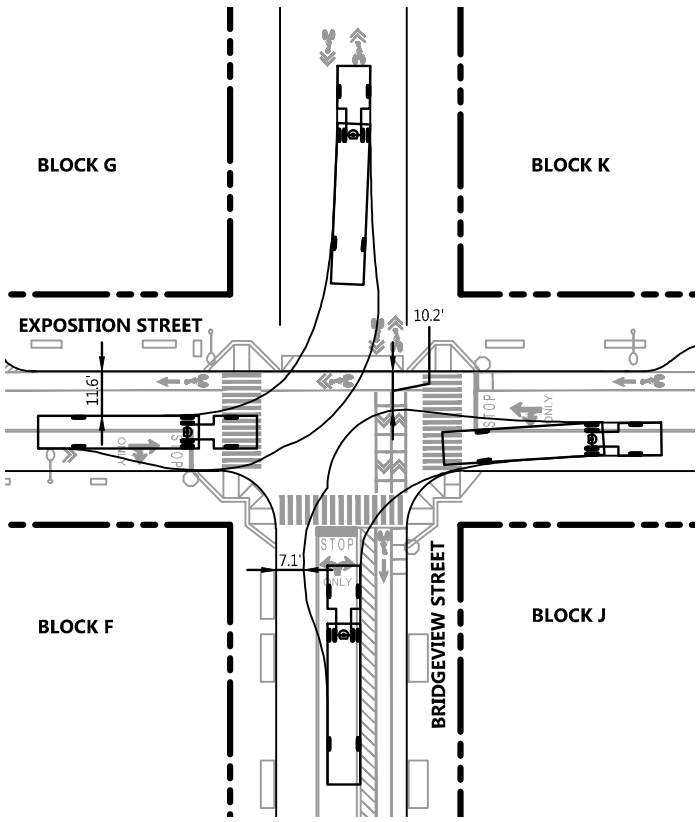
EXPOSITION STREET & SHARED
PUBLIC WAY INTERSECTION
(NE-SW)

N

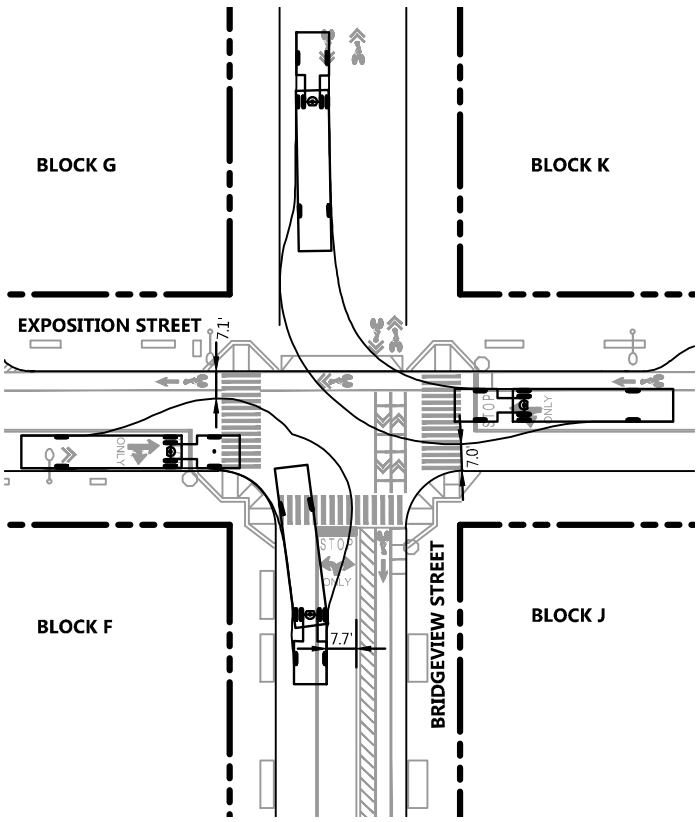
0 50

Source: BKF ENGINEERS, 07/2016

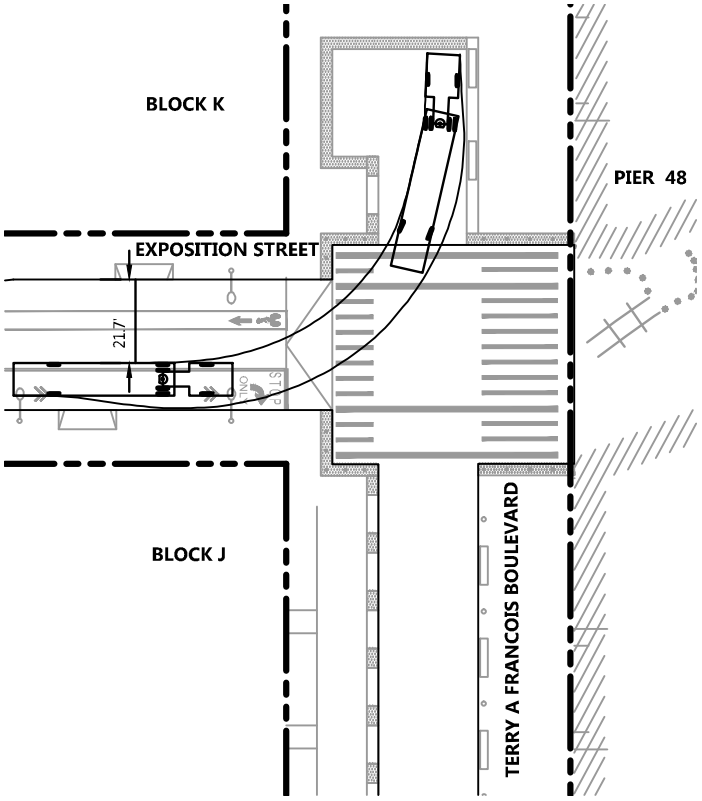
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.23-8.27 Truck Turning Enlargements.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



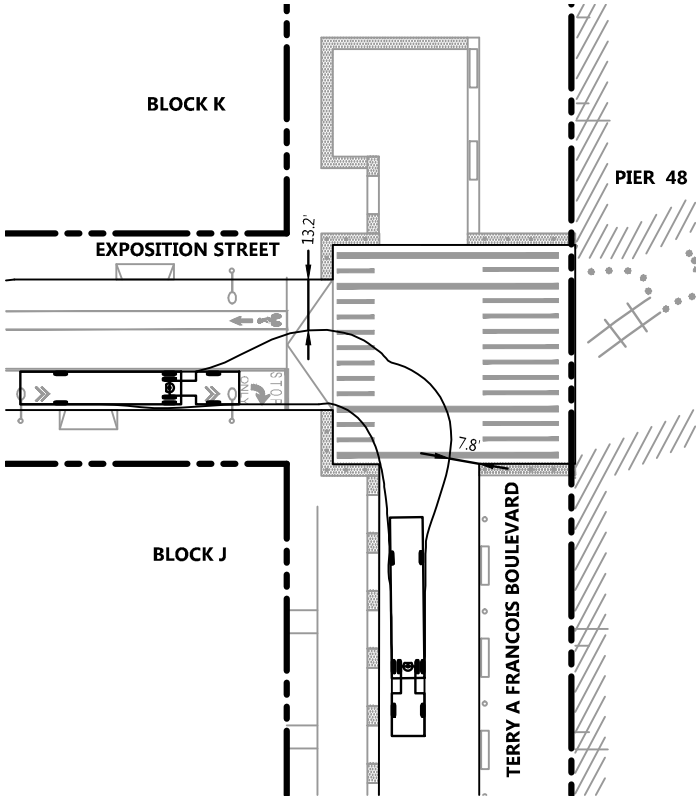
EXPOSITION STREET & BRIDGEVIEW STREET INTERSECTION (NW-SE)



EXPOSITION STREET & BRIDGEVIEW STREET INTERSECTION (NE-SW)



EXPOSITION STREET & TERRY A FRANCOIS BOULEVARD INTERSECTION (NW-SE)



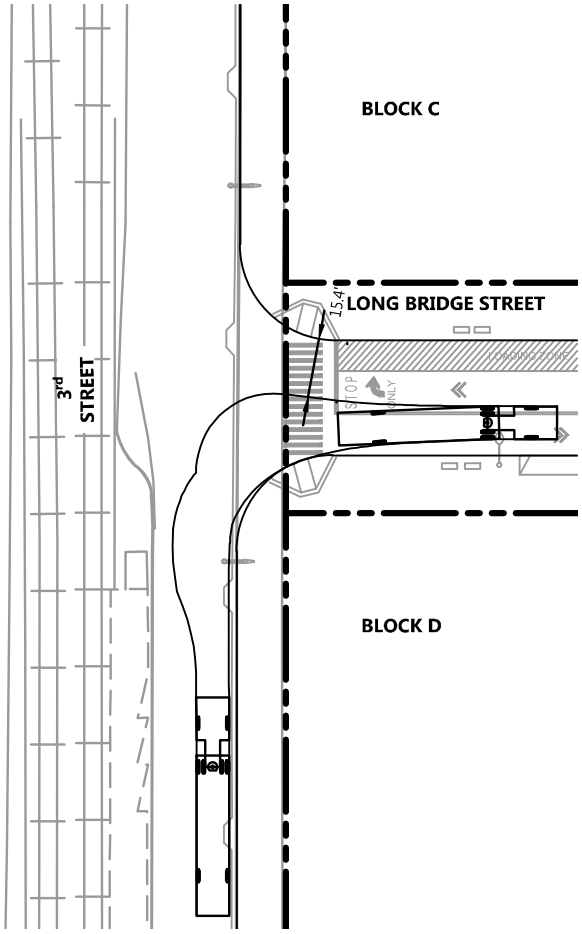
EXPOSITION STREET & TERRY A FRANCOIS BOULEVARD INTERSECTION (NE-SW)

N

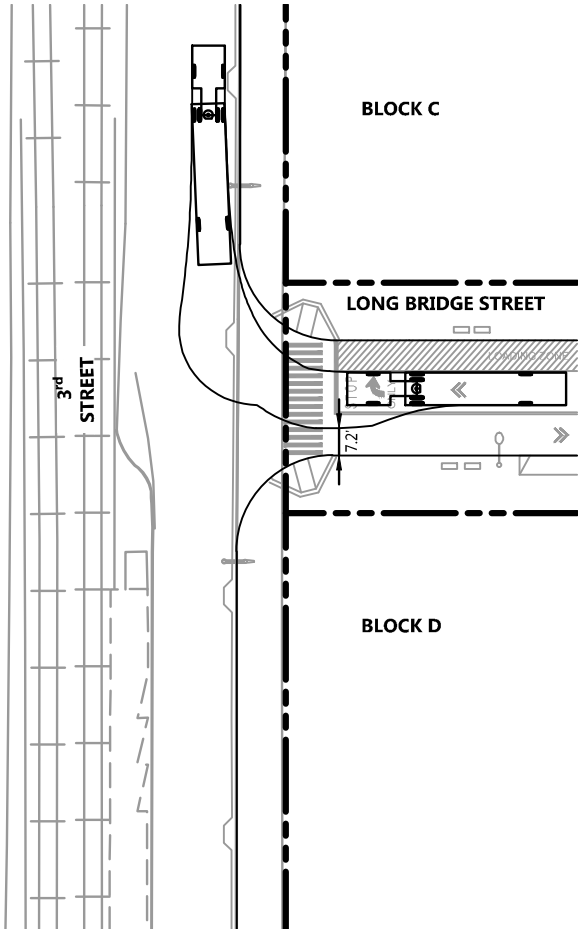
0 50

Source: BKF ENGINEERS, 07/2016

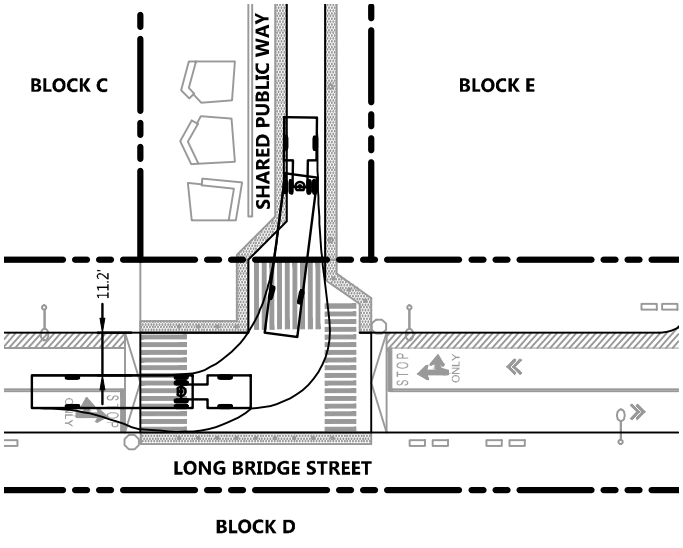
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.23-8.27 Truck Turning Enlargements.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



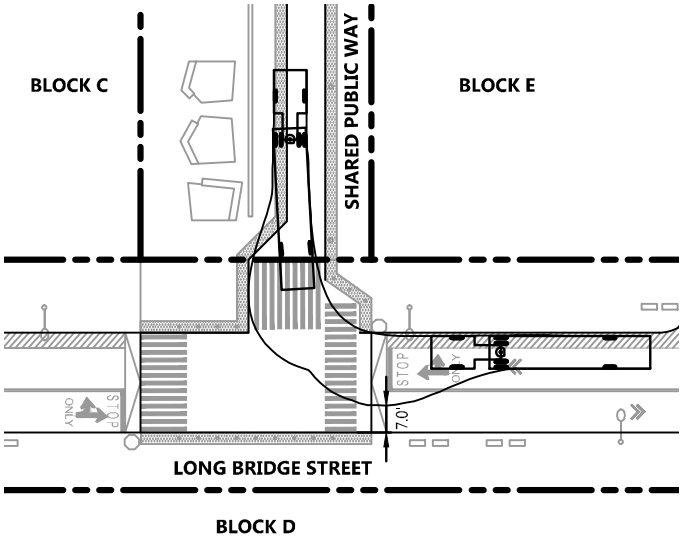
LONG BRIDGE STREET & 3rd STREET INTERSECTION (NW-SE)



LONG BRIDGE STREET & 3rd STREET INTERSECTION (NE-SW)



LONG BRIDGE STREET & SHARED PUBLIC WAY INTERSECTION (NW-SE)



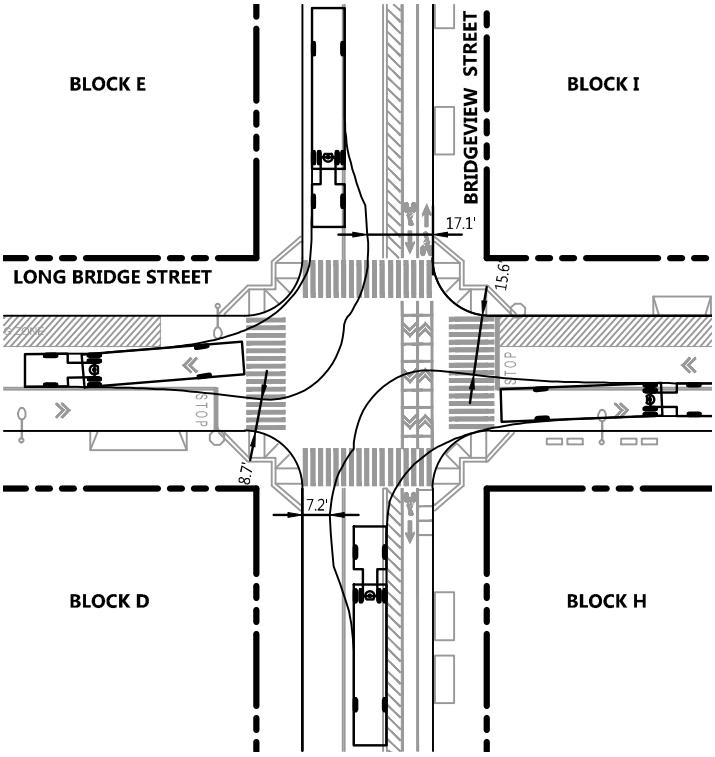
LONG BRIDGE STREET & SHARED PUBLIC WAY INTERSECTION (NE-SW)

N

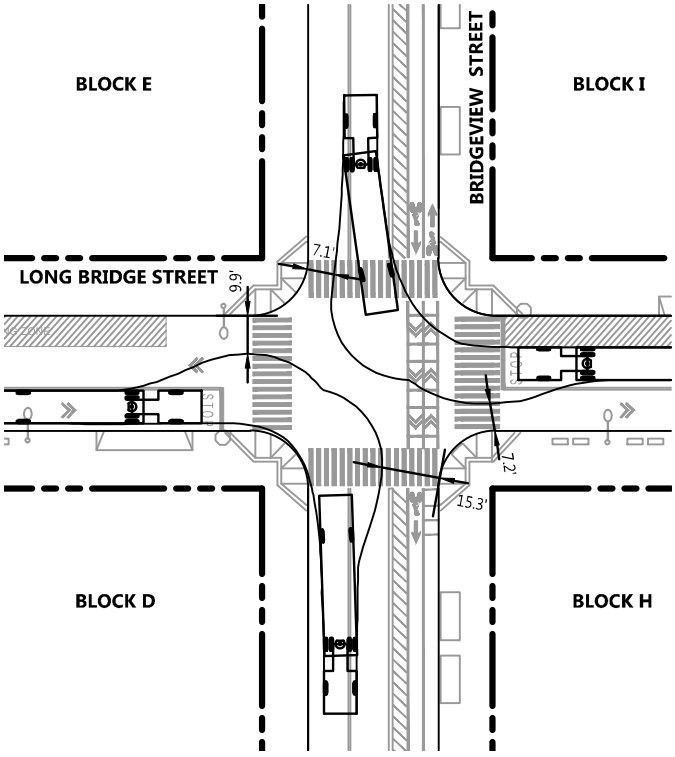
0 50

Source: BKF ENGINEERS, 07/2016

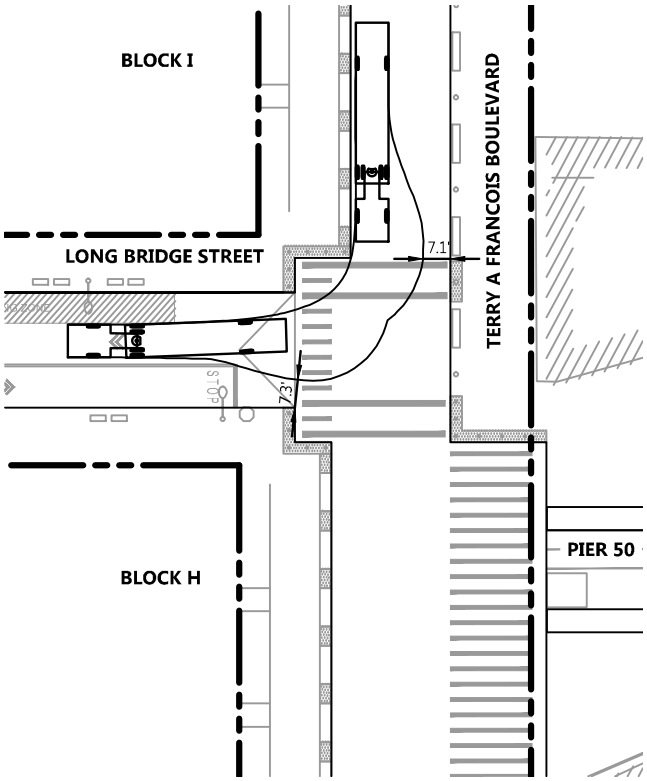
DRAWING NAME: \\BKF-SF\vol4\2008\080006JMission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.23-8.27 Truck Turning Enlargements.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



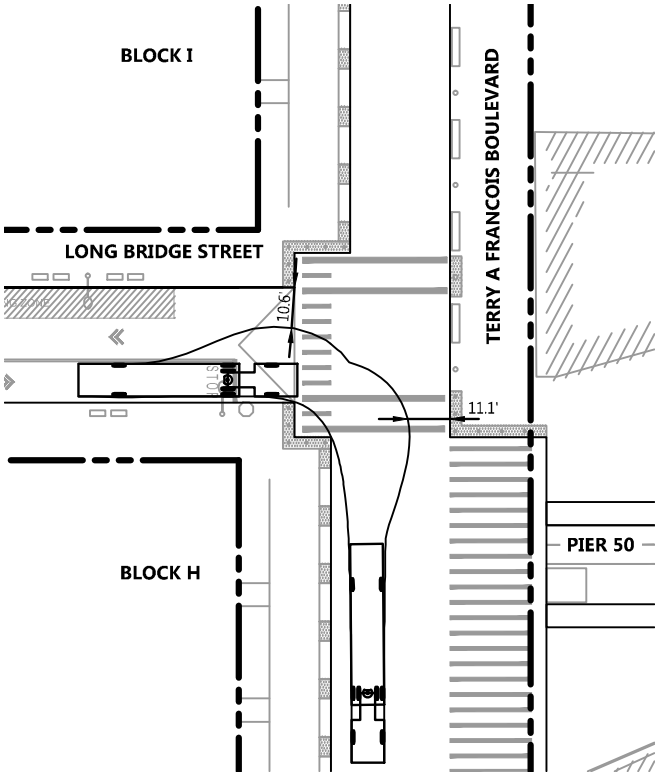
LONG BRIDGE STREET & BRIDGEVIEW STREET INTERSECTION (NW-SE)



LONG BRIDGE STREET & BRIDGEVIEW STREET INTERSECTION (NE-SW)



LONG BRIDGE STREET & TERRY A FRANCOIS BOULEVARD INTERSECTION (NW-SE)



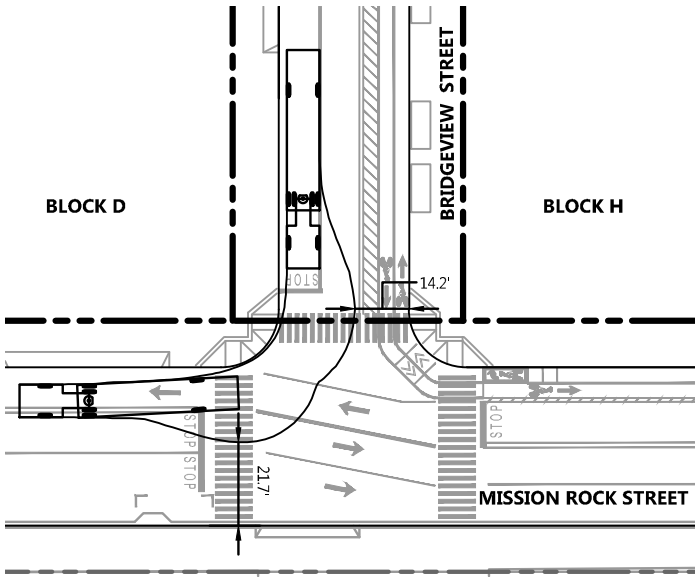
LONG BRIDGE STREET & TERRY A FRANCOIS BOULEVARD INTERSECTION (NE-SW)

N

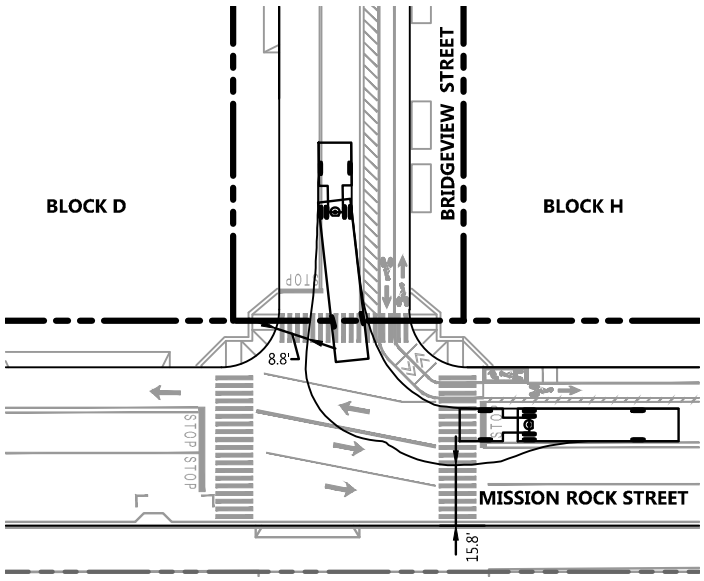
0 50

Source: BKF ENGINEERS, 07/2016

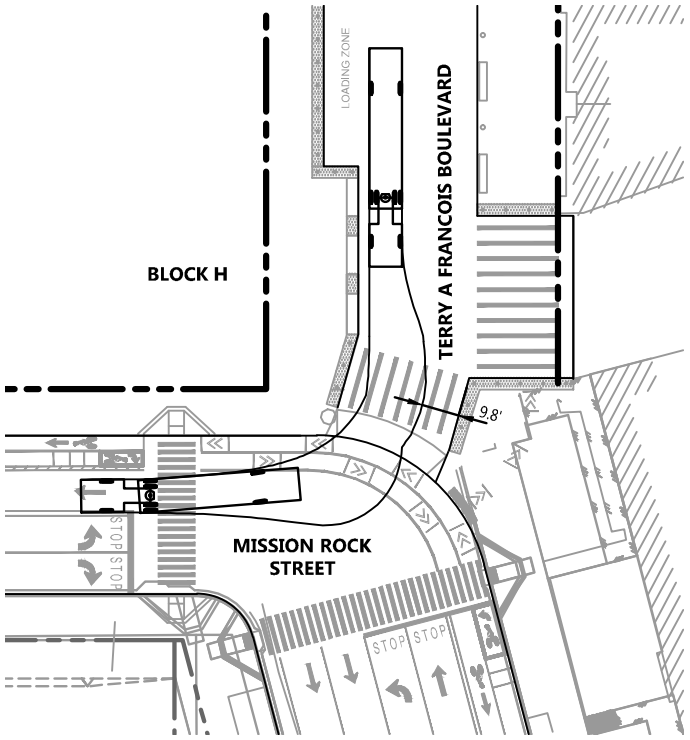
DRAWING NAME: \\BKF-SF\vol4\2008\080006\Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.23-8.27 Truck Turning Enlargements.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



MISSION ROCK STREET & BRIDGEVIEW STREET INTERSECTION (NW-SE)



MISSION ROCK STREET & BRIDGEVIEW STREET INTERSECTION (NE-SW)



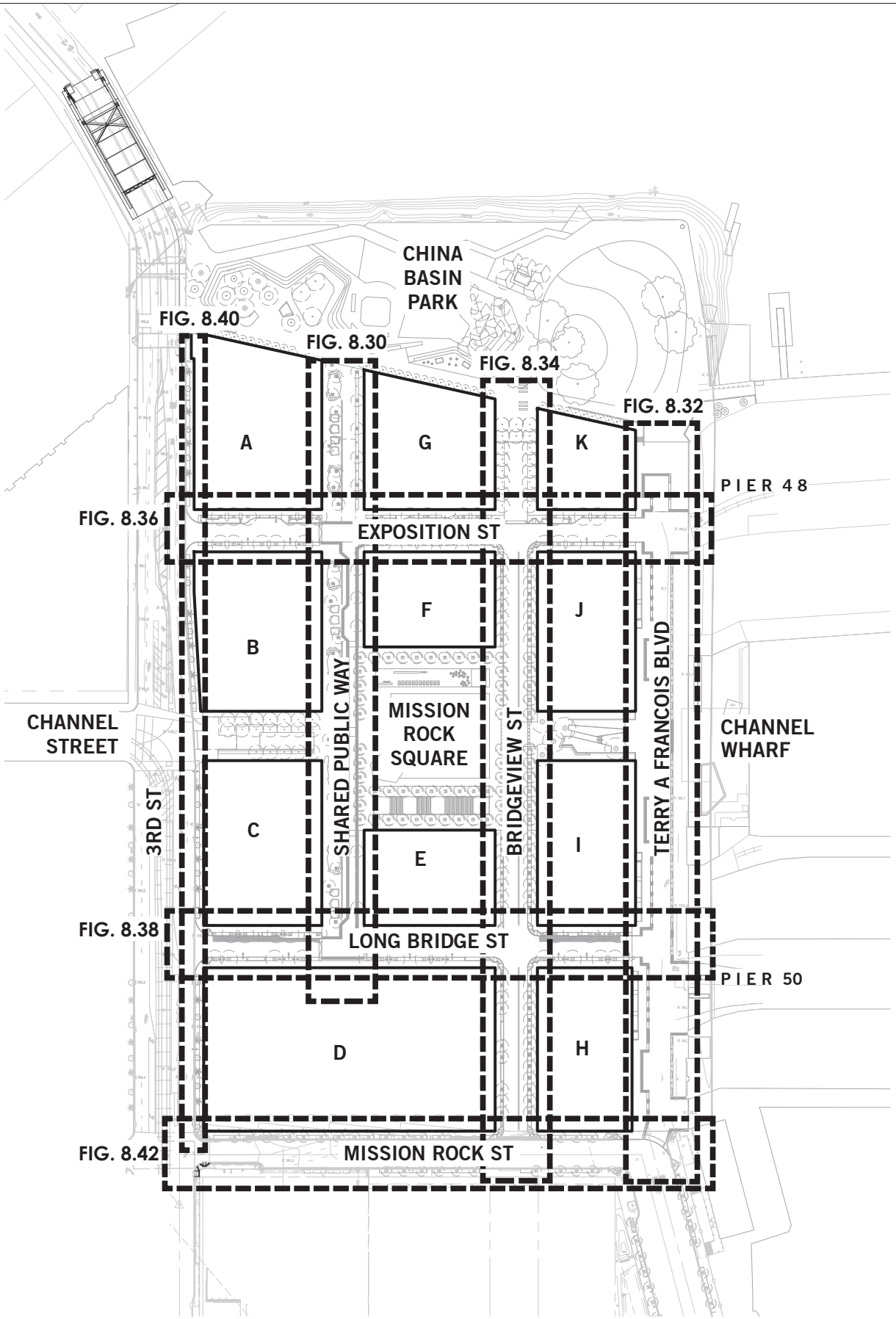
MISSION ROCK STREET & TERRY A FRANCOIS BOULEVARD INTERSECTION (NW-SE)

N

0 50

Source: BKF ENGINEERS, 07/2016

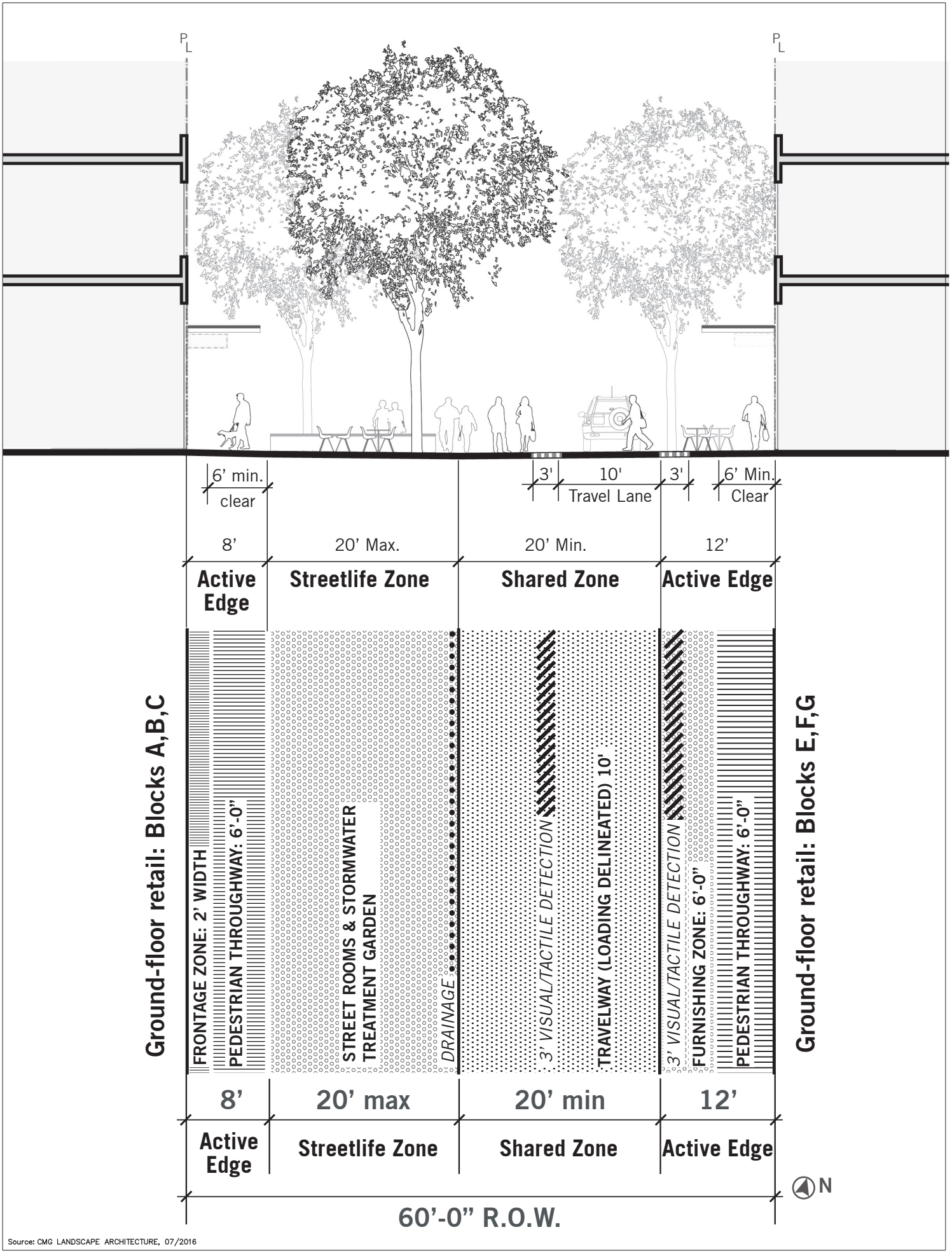
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.23-8.27 Truck Turning Enlargements.dwg
PLOT DATE: 09-15-16
PLOTTED BY: fell



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

MISSION ROCK INFRASTRUCTURE PLAN

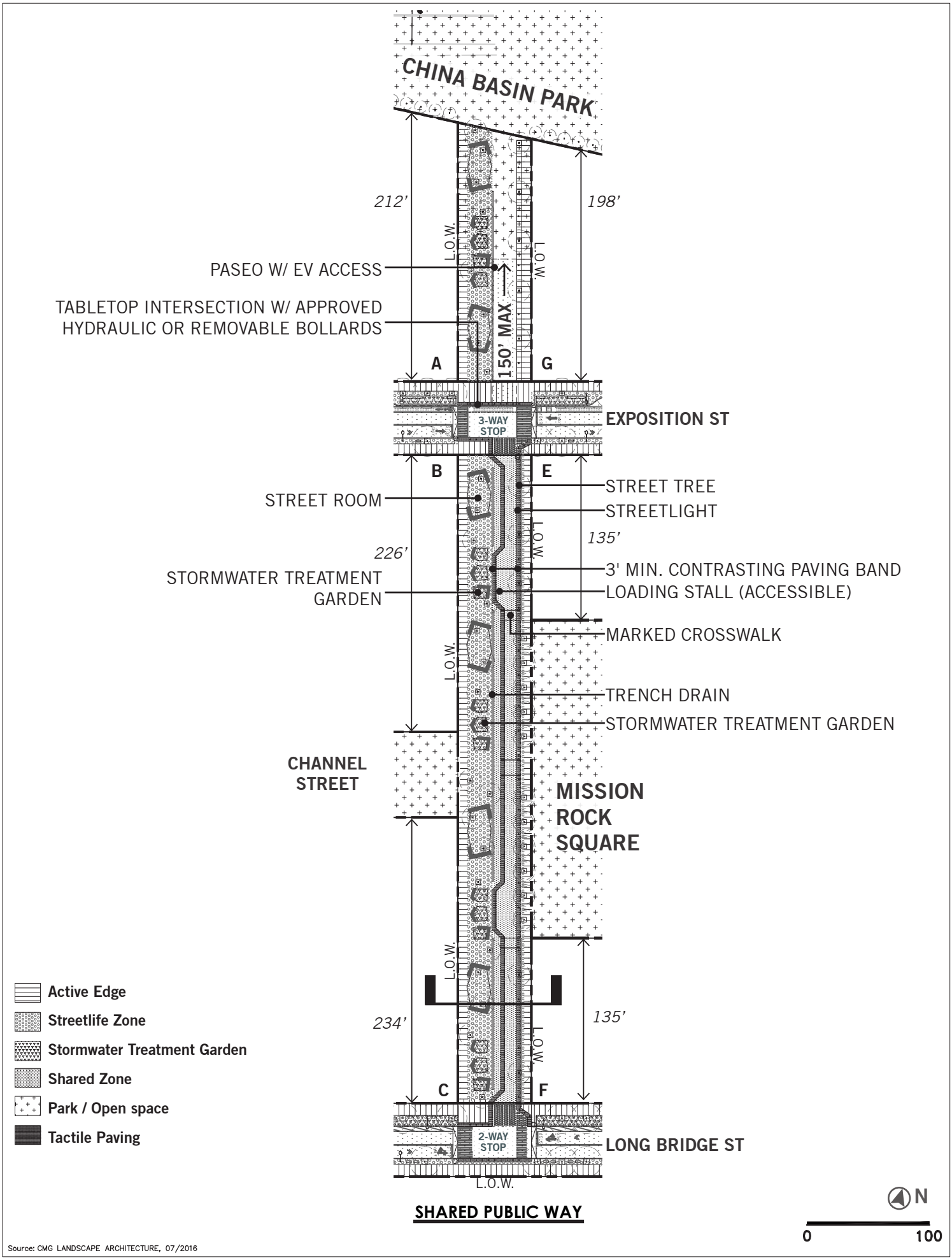
FIGURE 8.28 STREET DESIGN



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

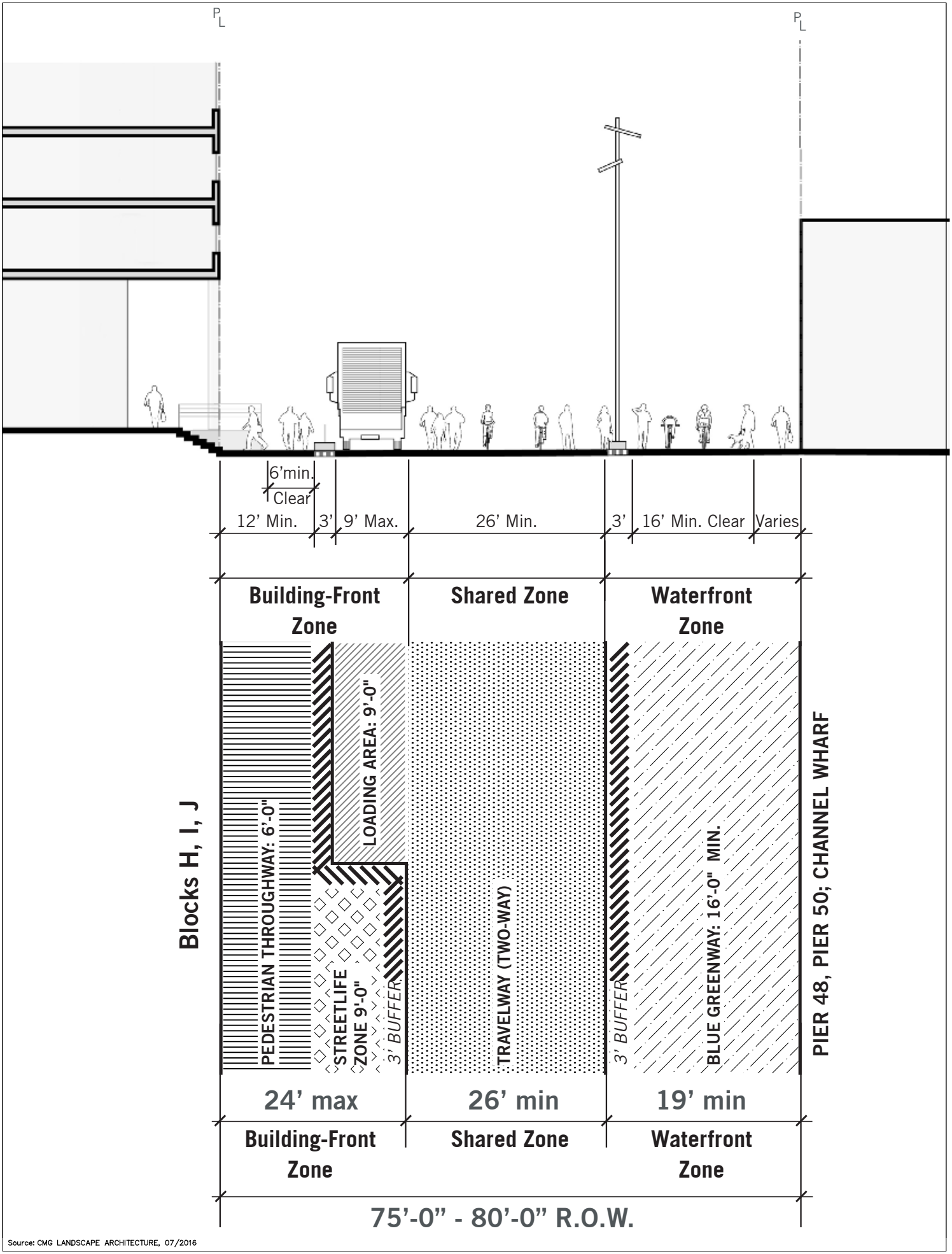
MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.29 SHARED PUBLIC WAY



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

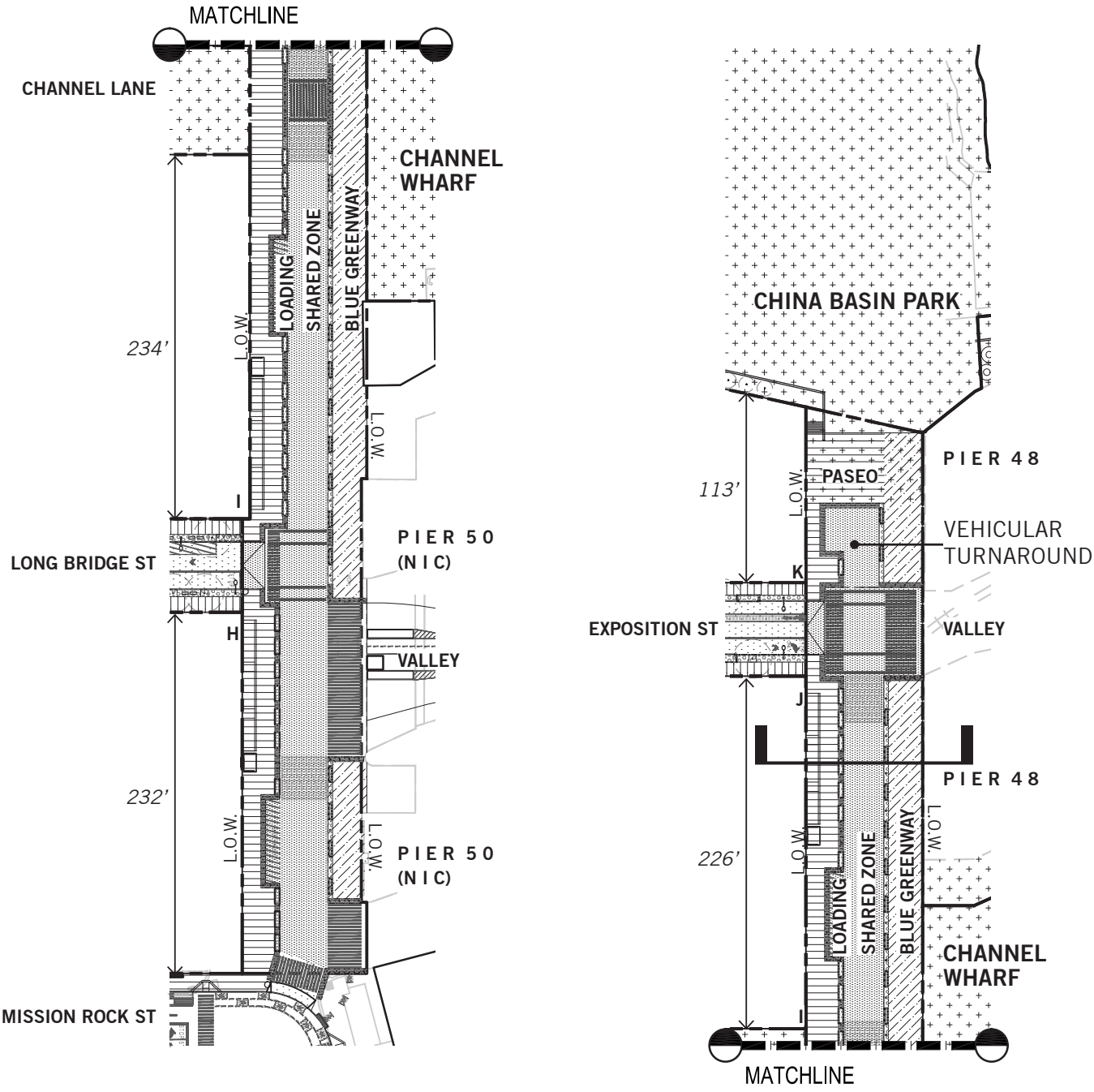
FIGURE 8.30 SHARED PUBLIC WAY PLAN



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.31 TERRY A FRANCOIS BOULEVARD



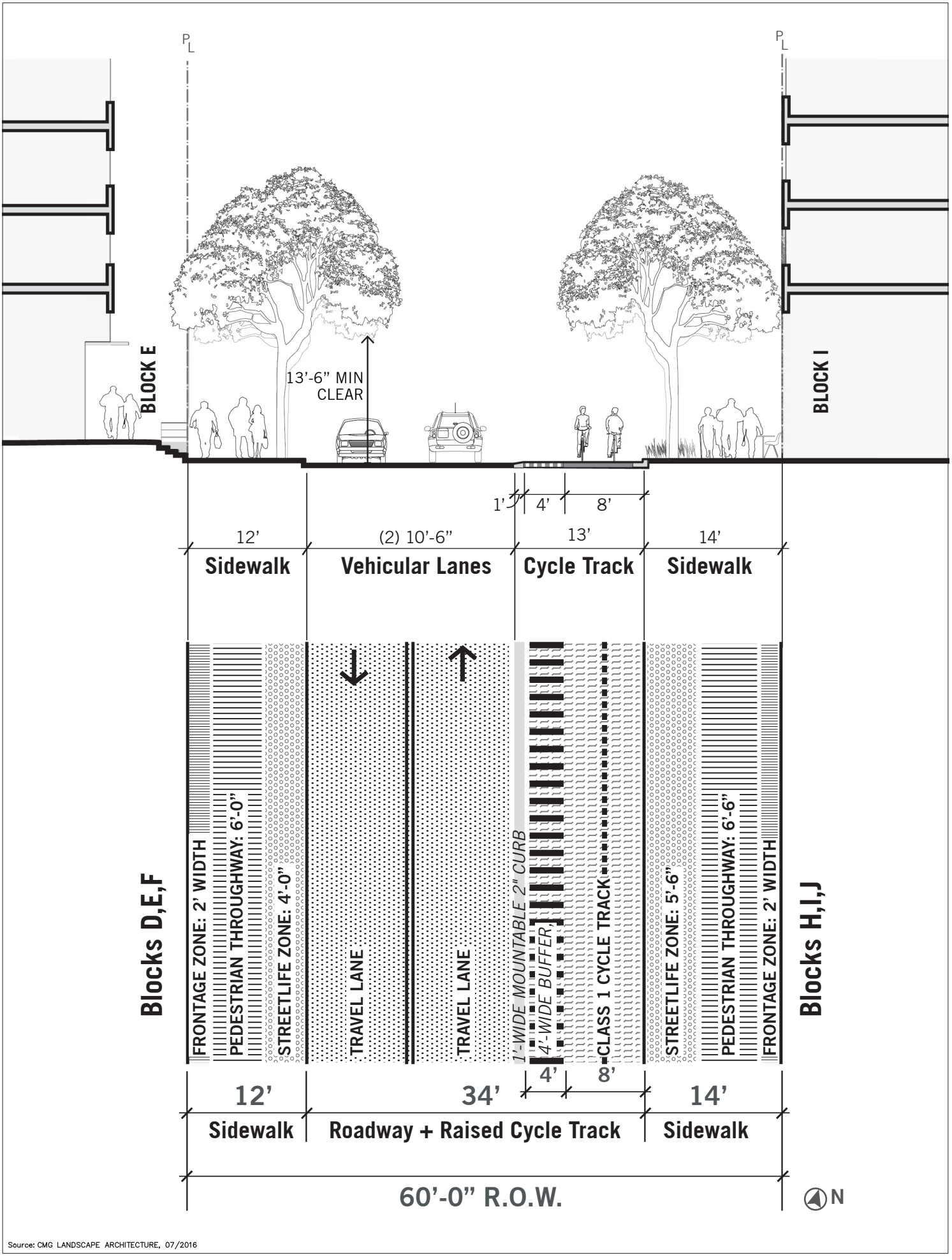
- Pedestrian Throughway
- 3' Buffer (Tactile Waring + Bollards)
- Shared Zone
- Loading Zone
- Waterfront Zone
- Park / Open Space
- Tactile Paving
- Noise Paving

TERRY FRANCOIS BOULEVARD

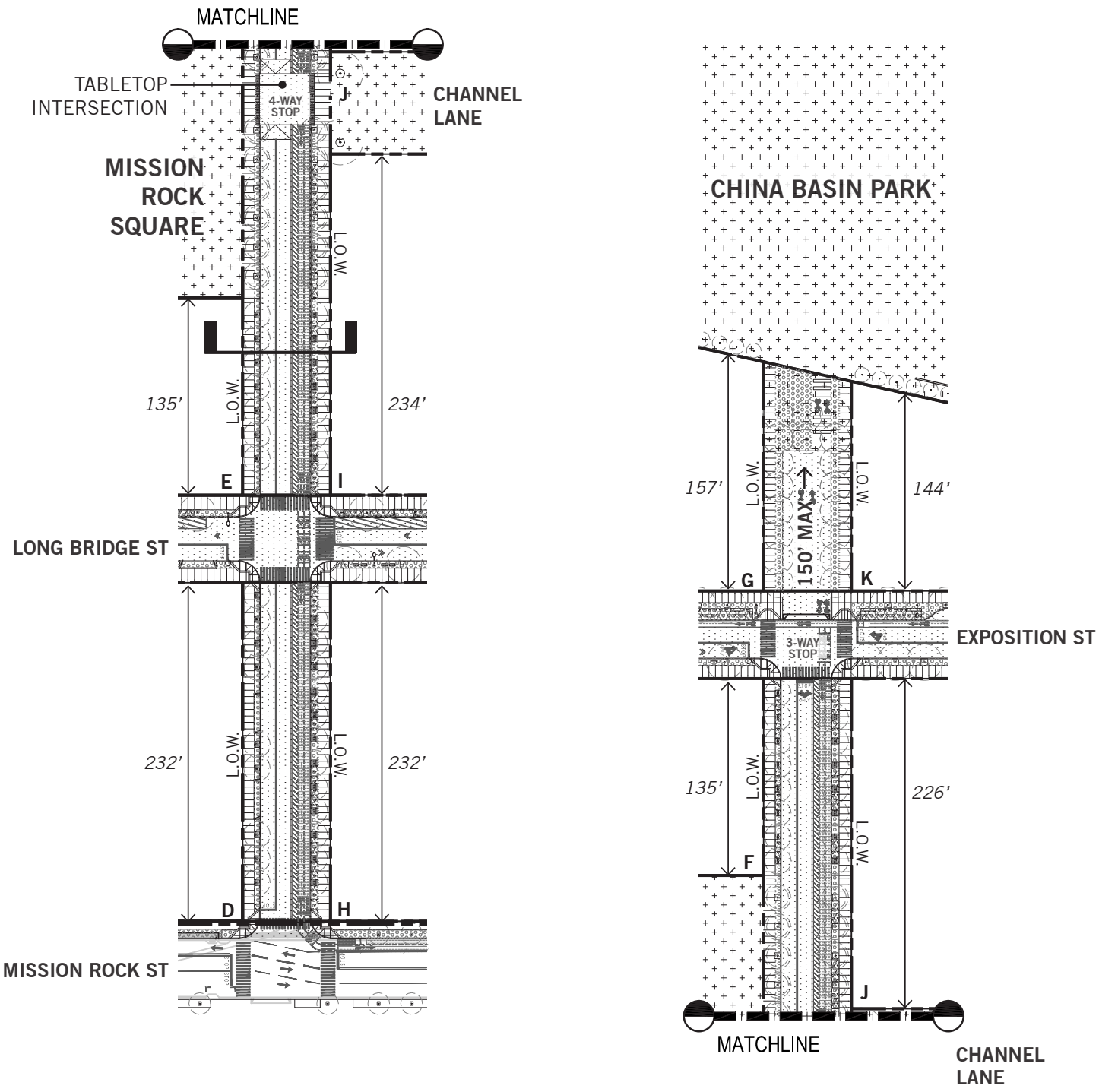
N

0 100

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



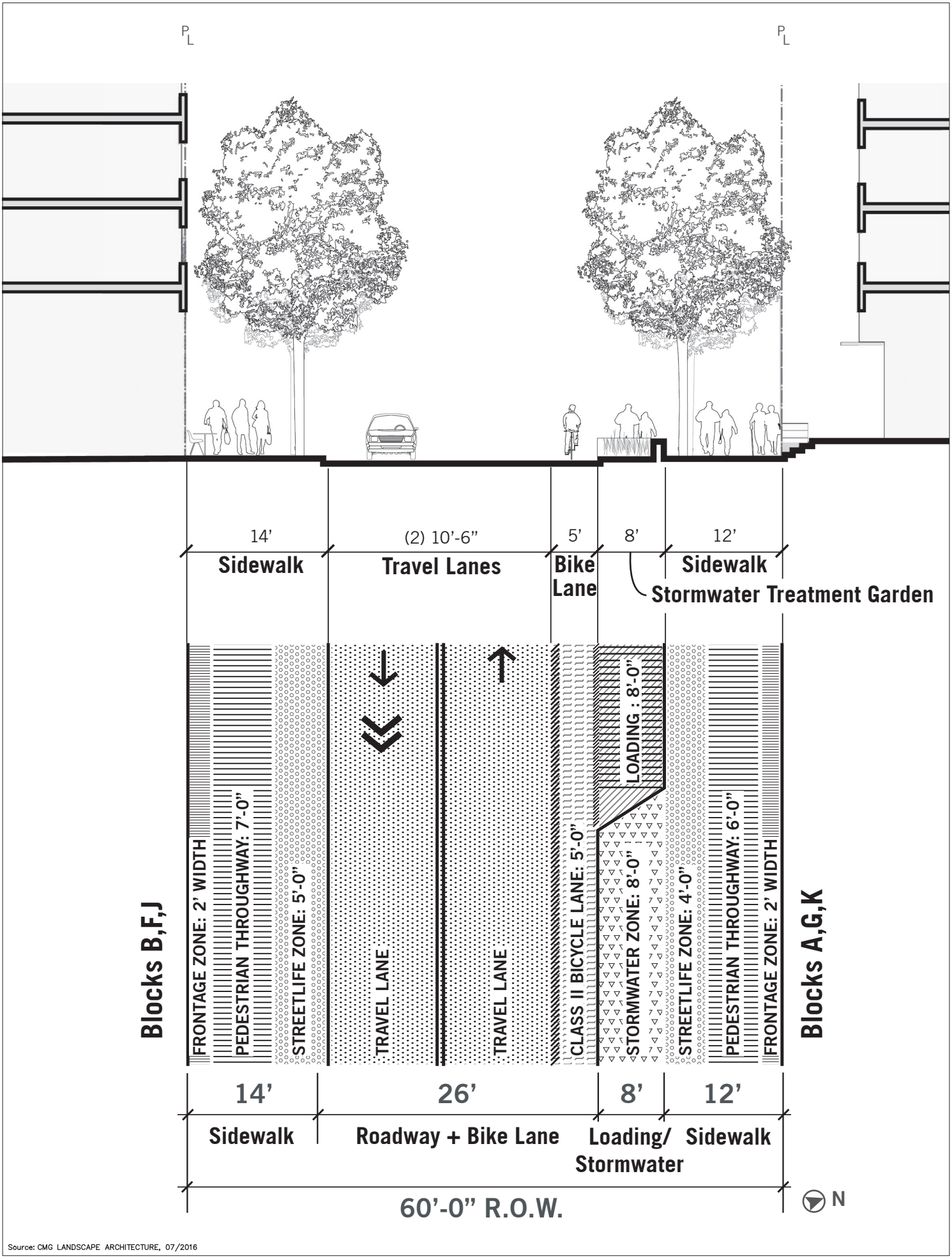
- Pedestrian Throughway
- Streetlife Zone
- Stormwater Treatment Garden
- Bike Lane / Cycle Track
- Travel Lane
- Tactile Pavers
- Cycle Track Buffer

BRIDGEVIEW STREET

N

0 100

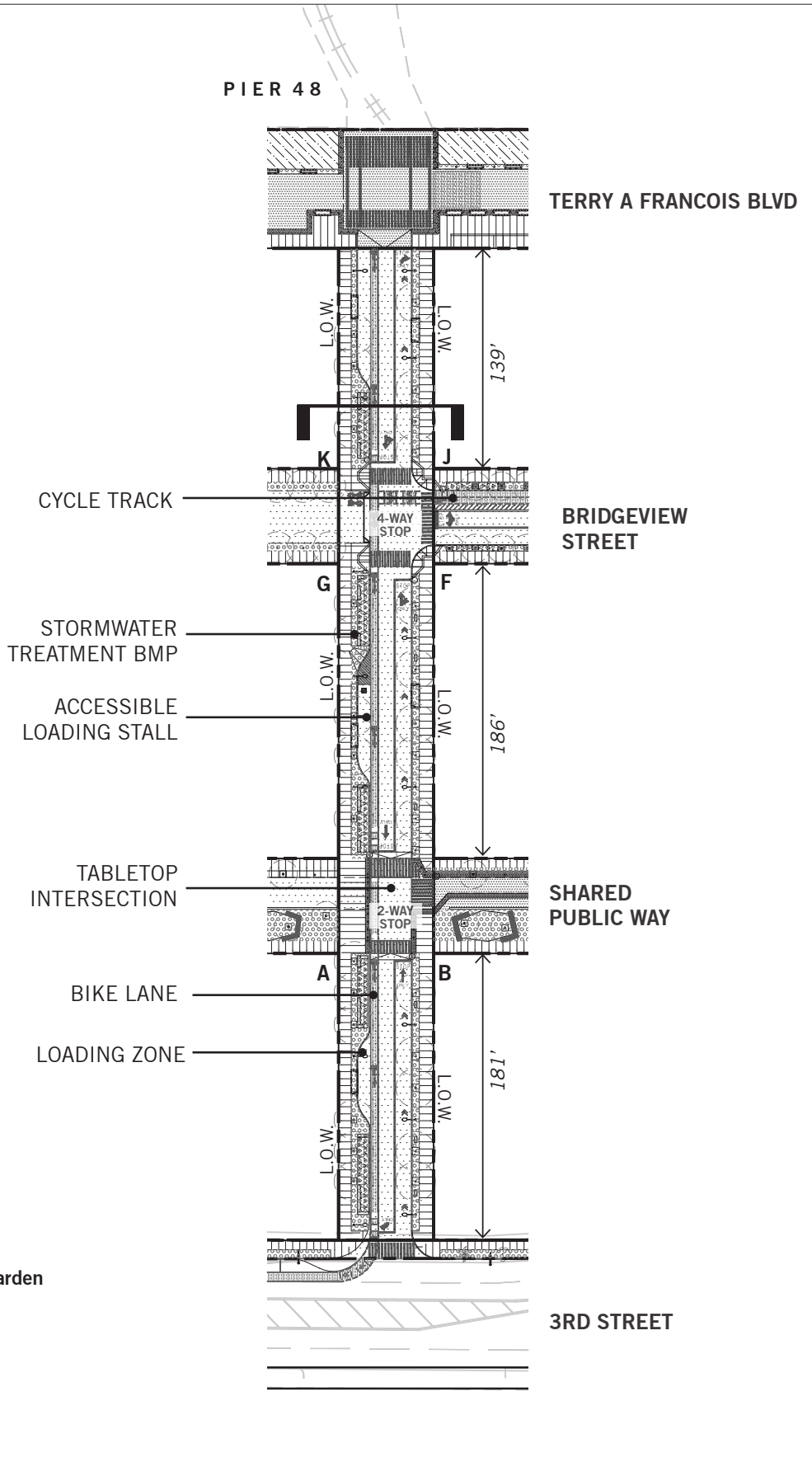
Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.35 EXPOSITION STREET

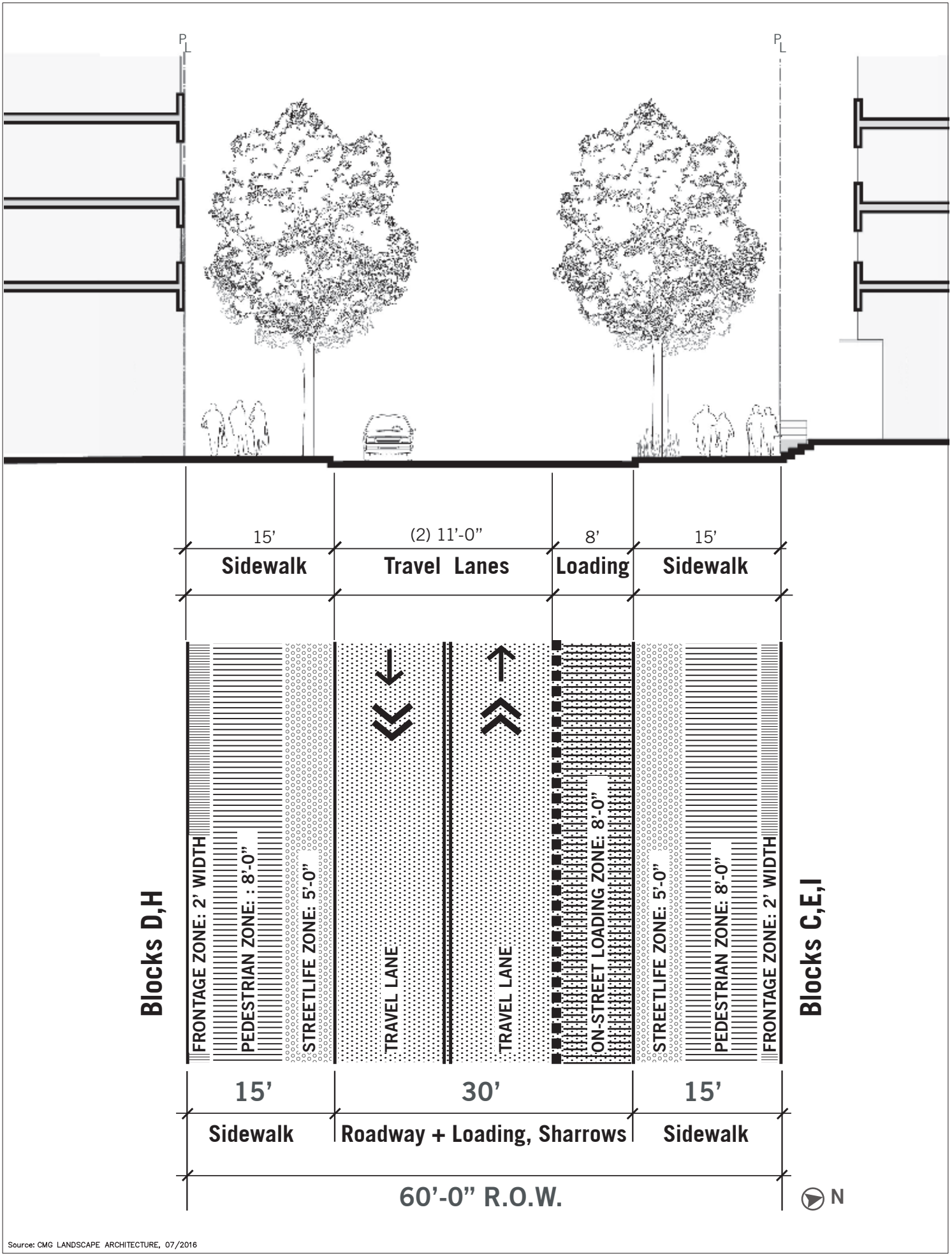


EXPOSITION STREET

N

0 100

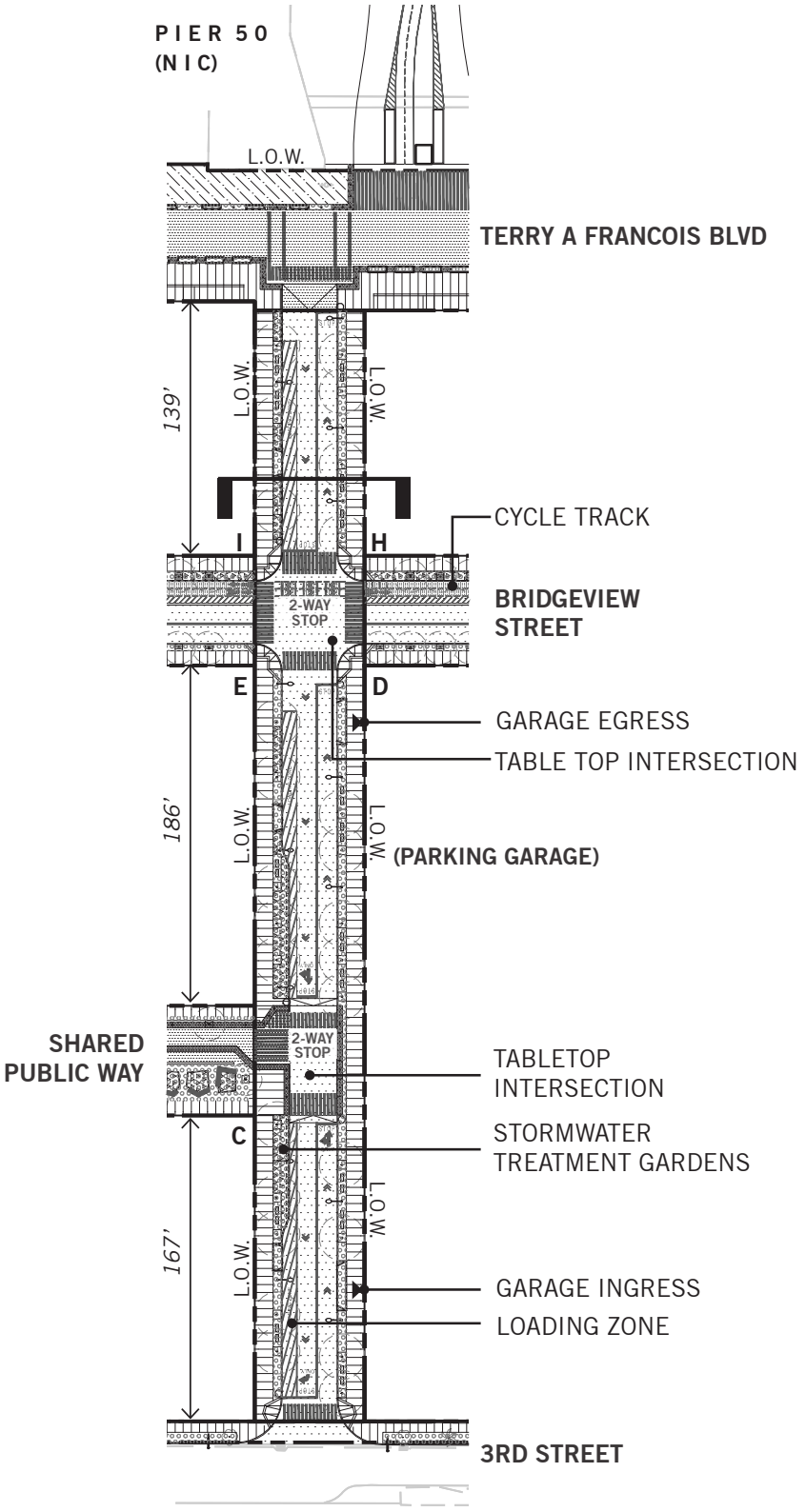
Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

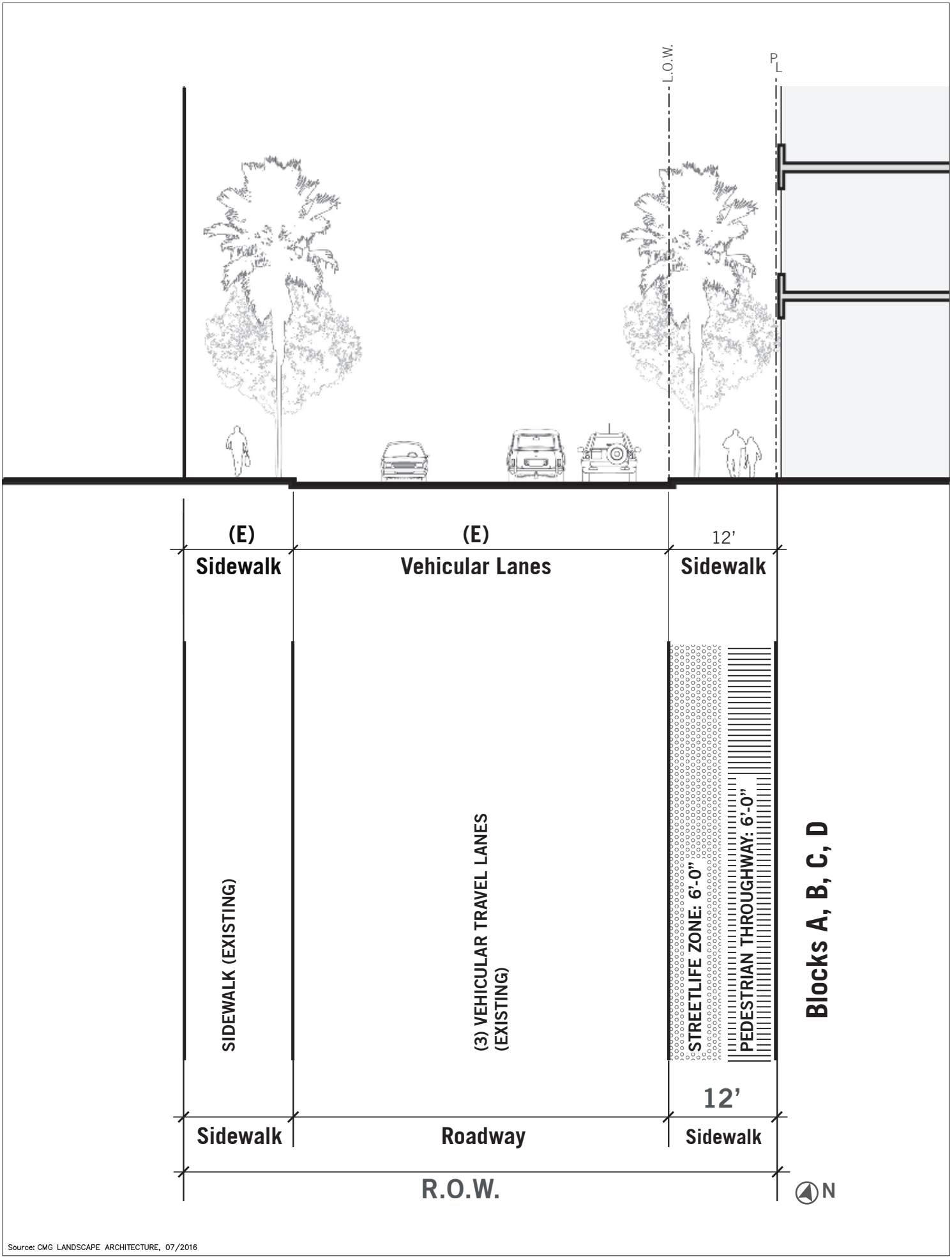
MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.37 LONG BRIDGE STREET

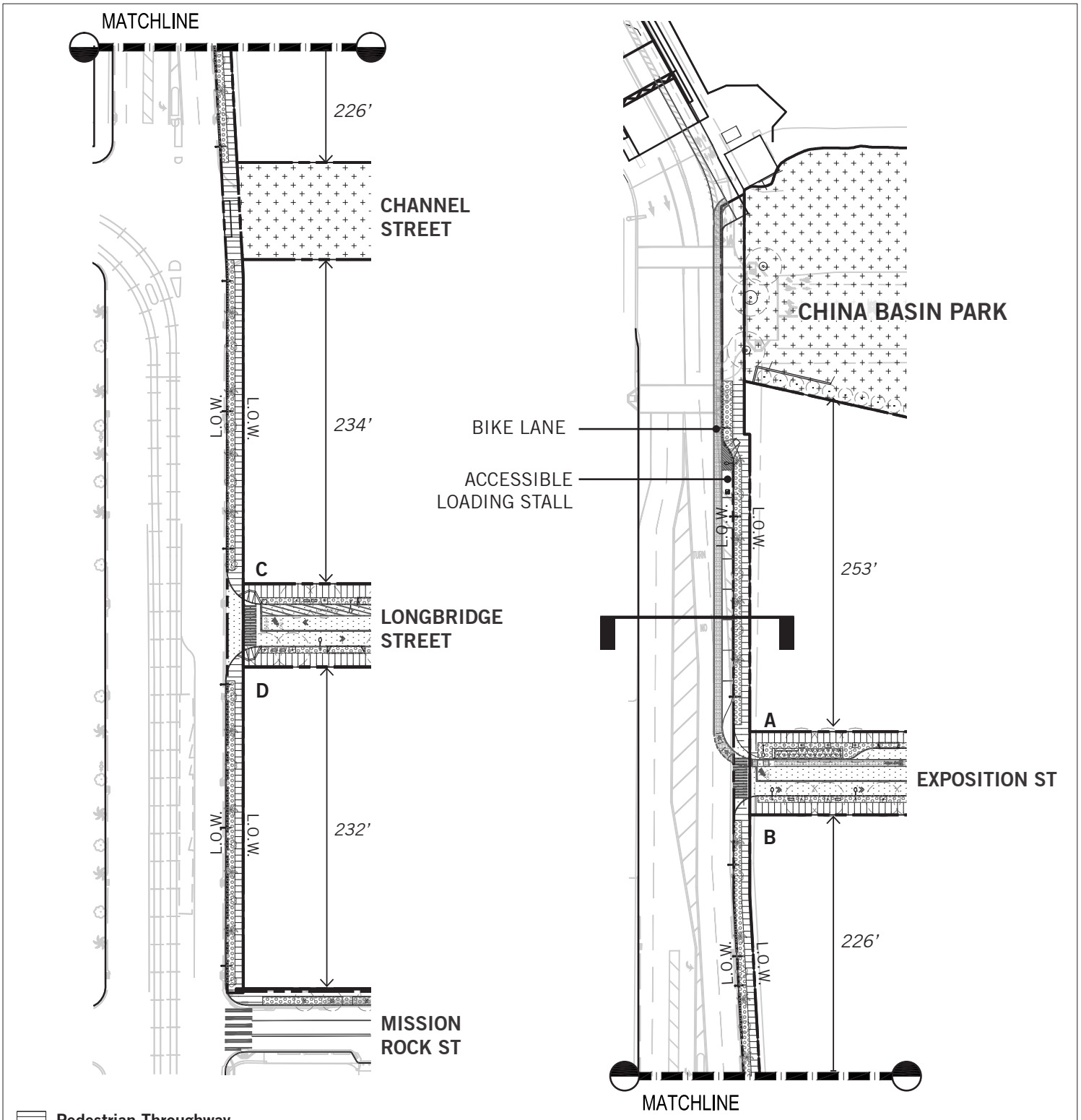


Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

FIGURE 8.38 LONG BRIDGE STREET PLAN



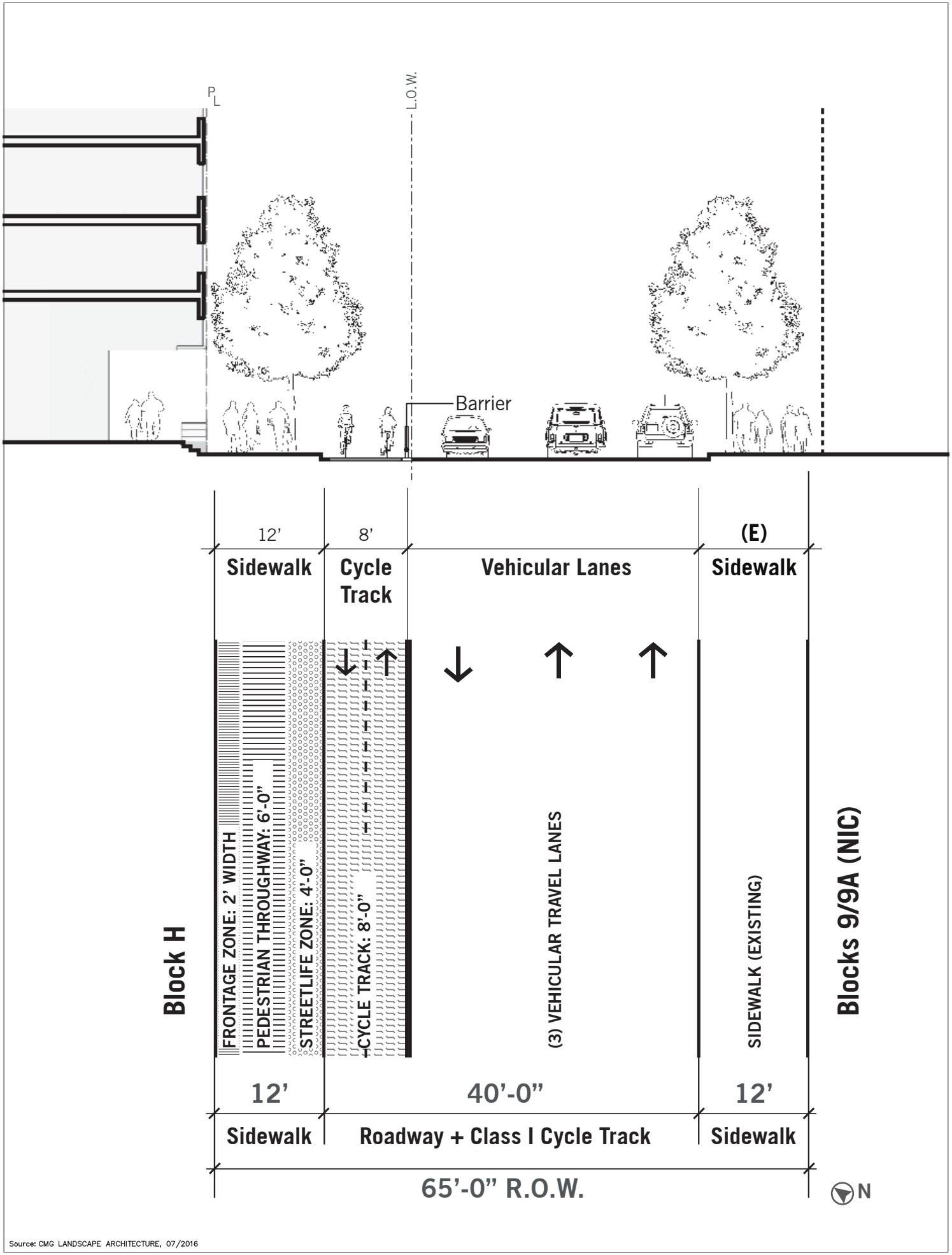
Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

MISSION ROCK INFRASTRUCTURE PLAN

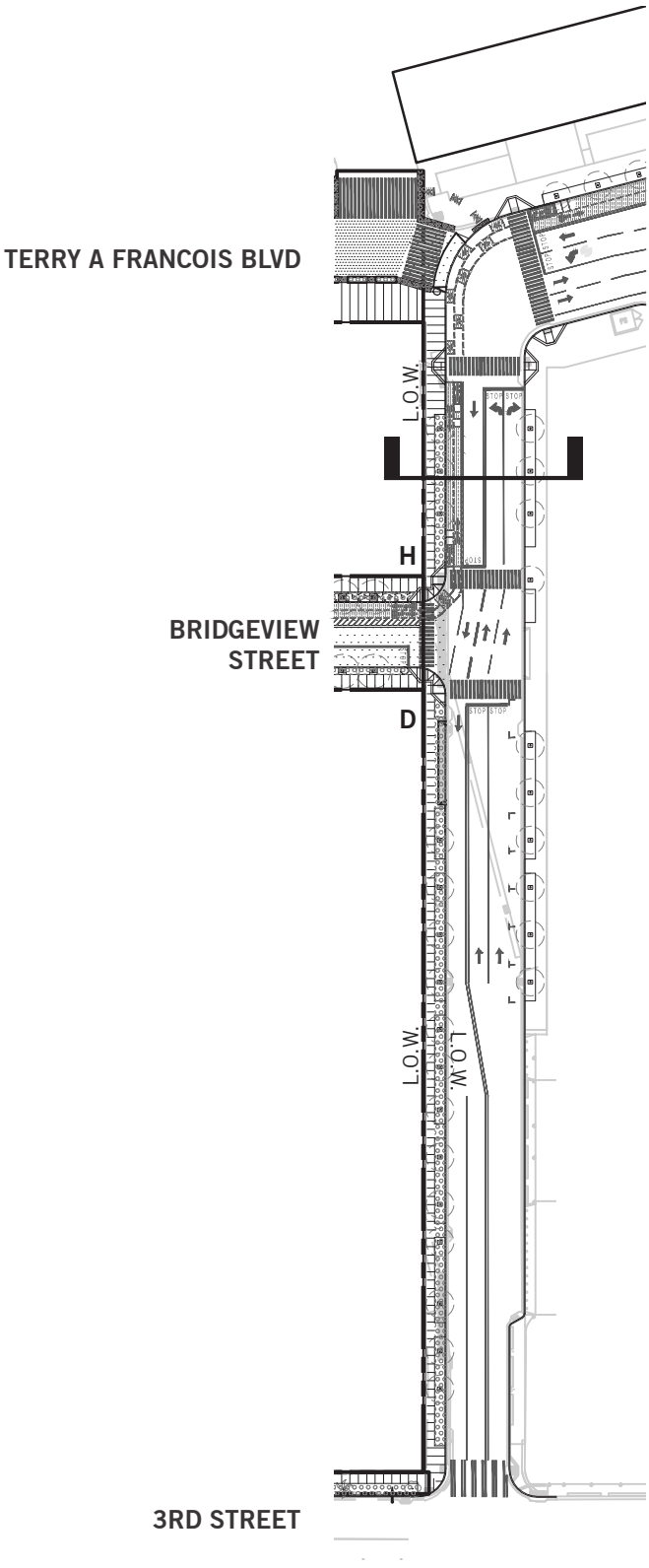
FIGURE 8.40 3RD STREET PLAN



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

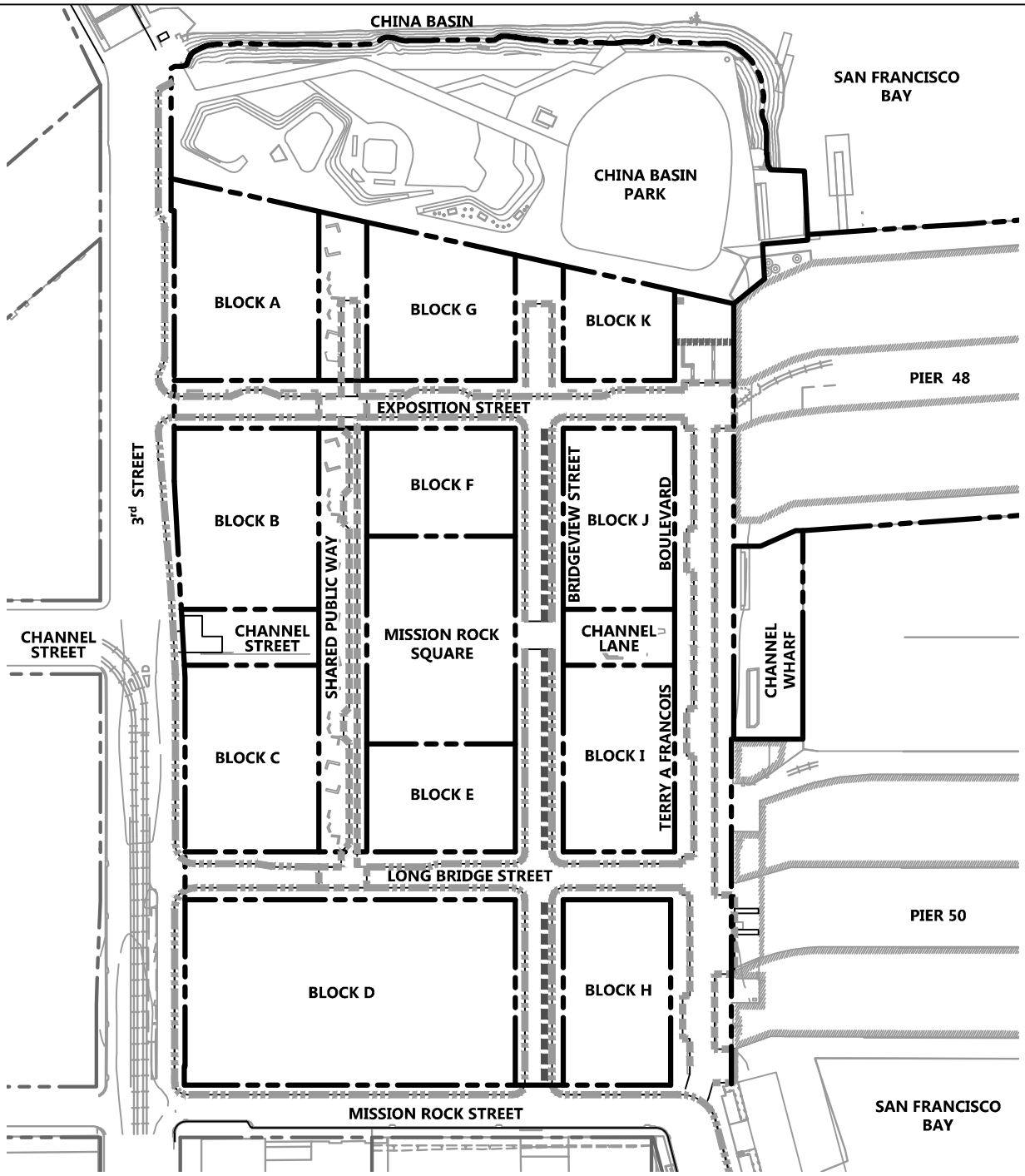
MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.41 MISSION ROCK STREET



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

FIGURE 8.42 MISSION ROCK STREET PLAN



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- FLUSH CURB
- 6" CURB
- 6" CURB & GUTTER
- 2" MOUNTABLE CURB AT CYCLE TRACK

N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.43 Curb Heights Plan.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slb

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.43 - CURB HEIGHTS PLAN

PAVING

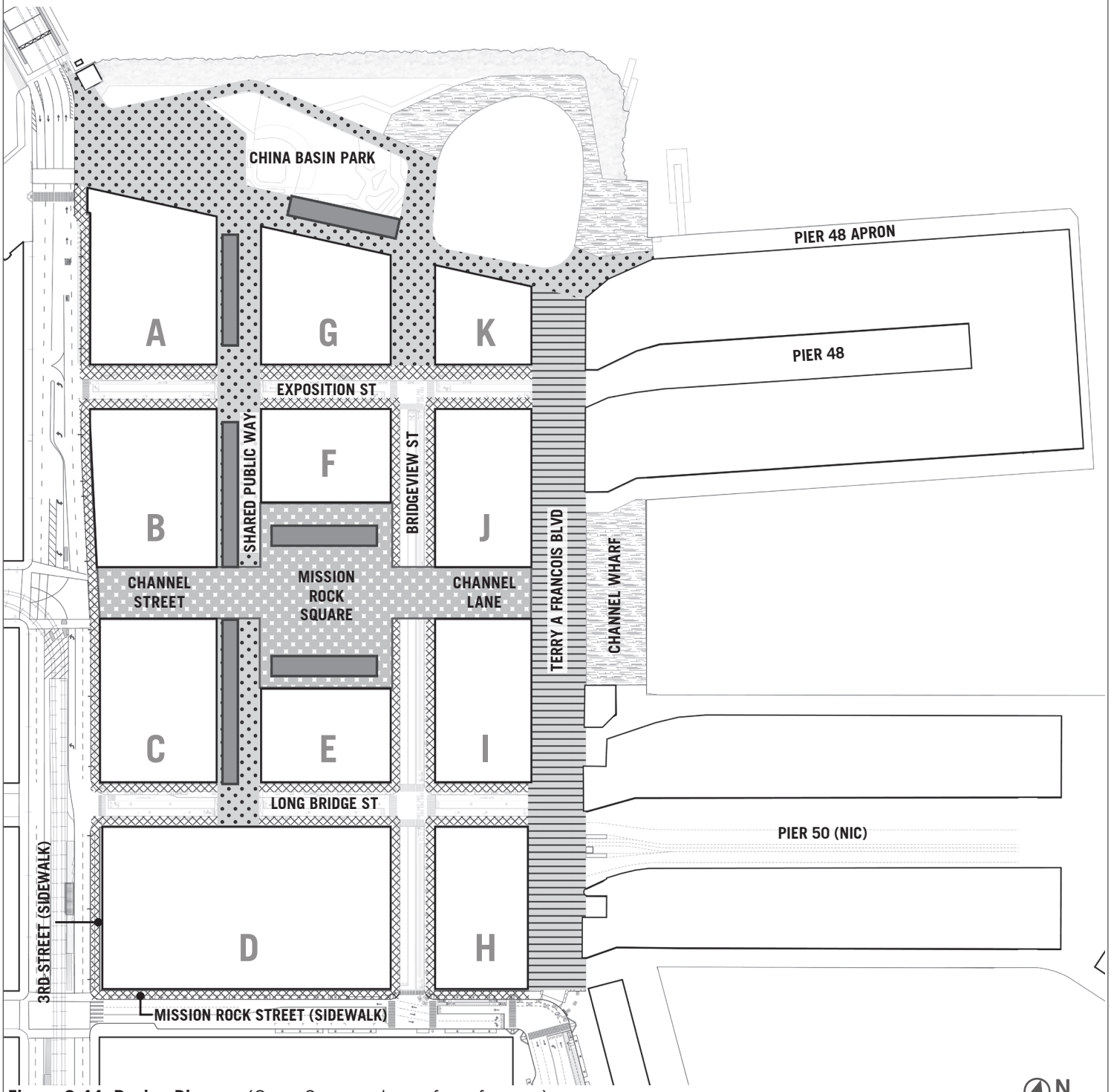


Figure 8.44: Paving Diagram (Open Spaces shown for reference)

- Sidewalk
- Working Waterfront Paving: Terry Francois Blvd.
- Pedestrian-Scale Paving: Shared Public Way, Paseos + Open Spaces
- Special Paving
- Open Space: Mission Rock Square, Channel Street + Channel Lane
- Open Space: Waterfront Paving

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

PAVING

SHARED PUBLIC WAY		
PAVING	**STREET ZONE**	**DESCRIPTION**
Active Edge	Pedestrian Throughway	Pedestrian Unit Pavers, with approved tree pit surfacing at trees.
	Furnishing Zone	
	Frontage Zone	
	Buffer at Shared Zone	Detectable Surface Paving: Alternate (non-DPW-Standard) tactile paving, with 70% visual contrast from adjacent paving and textured surface.
Streetlife Zone	Furnishing Zone	Pedestrian Unit Pavers, with approved tree pit surfacing at trees and special paving street rooms.
	Buffer at Shared Zone	Detectable Surface Paving: Alternate (non-DPW-Standard) tactile paving, with 70% visual contrast from adjacent paving and textured surface.
Shared Zone	Vehicular Travelway	Vehicular Unit Pavers
	Loading Zones	Vehicular Unit Pavers, with color contrast.
	Crosswalks	Textured Paving, contrasting from adjacent surfaces, with DPW-Standard detectable paving.
CURBS AND DRAINAGE		
Curb at Shared Zone		Curbless
Trench Drain		6" - 12" wide trench drain/linear drainage element, located outside of vehicular travelway.

Terry A Francois Boulevard		
PAVING	**STREET ZONE**	**DESCRIPTION**
Building-Front Zone	Pedestrian Throughway	Pedestrian Unit Pavers or CIP Concrete Paving
	Streetlife Zone	
	Loading Zones	Vehicular Unit Pavers or CIP Concrete Paving.
	Buffer at Shared Zone	Detectable Surface Paving: Alternate (non-DPW-Standard) tactile paving, with 70% visual contrast from adjacent paving and textured surface.
Waterfront Zone	Blue Greenway	Pedestrian Unit Pavers or CIP Concrete Paving
	Buffer at Shared Zone	Detectable Surface Paving: Alternate (non-DPW-Standard) tactile paving, with 70% visual contrast from adjacent paving and textured surface.
Shared Zone	Vehicular Travelway	Vehicular Unit Pavers or CIP Concrete Paving
	Crosswalks	Textured Paving, contrasting from adjacent surfaces, with DPW-Standard detectable paving.
CURBS AND DRAINAGE		
Curb at Shared Zone		CIP Concrete Flush Curb
Trench Drain		6" - 12" wide Trench Drain, located outside of vehicular travelway.

BRIDGEVIEW STREET		
PAVING	**STREET ZONE**	**DESCRIPTION**
Sidewalk	Frontage Zone	DPW-Standard CIP Concrete or Pedestrian Unit Pavers
	Pedestrian Throughway	DPW-Standard CIP Concrete
	Streetlife Zone	Pedestrian Unit Pavers, with approved tree pit surfacing at trees.
Roadway	Raised Cycle Track	Painted Asphalt with 4'-wide contrasting buffer
	Travel Lanes	DPW-Standard Asphalt Concrete Paving
CURBS AND DRAINAGE		
Curb + Gutter, West Side		DPW-Standard, 6" Curb typical
Curb + Gutter, East Side		Non-DPW Standard 4" Vertical Curb
Curb at Raised Cycle Track		2"-high x 1'-wide Mountable Curb

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

PAVING

EXPOSITION STREET		
PAVING	**STREET ZONE**	**DESCRIPTION**
Sidewalk	Frontage Zone	DPW-Standard CIP Concrete or Pedestrian Unit Pavers
	Pedestrian Throughway	DPW-Standard CIP Concrete
	Streetlife Zone	Pedestrian Unit Pavers, with approved tree pit surfacing at trees
	Stormwater Treatment	Custom/Feature Flow-Through Planters with Understory Planting
Roadway	Travel Lanes	DPW-Standard Asphalt Concrete Paving
	Class II Bicycle Lane	Painted DPW-Standard Asphalt Concrete Paving
	Loading	DPW-Standard Asphalt Concrete Paving
CURBS AND DRAINAGE		
Curb + Gutter		DPW-Standard, 6" Curb typical

LONG BRIDGE STREET		
PAVING	**STREET ZONE**	**DESCRIPTION**
Sidewalk	Frontage Zone	DPW-Standard CIP Concrete or Pedestrian Unit Pavers
	Pedestrian Throughway	DPW-Standard CIP Concrete
	Streetlife Zone	Pedestrian Unit Pavers, with approved tree pit surfacing at trees
Roadway	Loading Zone	Painted DPW-Standard Asphalt Concrete Paving
	Travel Lanes	DPW-Standard Asphalt Concrete Paving
CURBS AND DRAINAGE		
Curb + Gutter		DPW-Standard, 6" Curb typical

MISSION ROCK STREET		
PAVING	**STREET ZONE**	**DESCRIPTION**
Sidewalk	Pedestrian Throughway	OCII / Mission Bay Standard CIP Concrete.
	Streetlife Zone	OCII / Mission Bay Standard Pedestrian Unit Pavers, with approved tree pit surfacing at trees
Roadway	Cycle Track	Painted Asphalt Concrete Paving
	Travel Lanes	DPW-Standard Asphalt Concrete Paving
CURBS AND DRAINAGE		
Curb + Gutter		DPW-Standard, 6" Curb typical. OCII / Mission Bay Standard

3RD STREET		
PAVING	**STREET ZONE**	**DESCRIPTION**
Sidewalk	Pedestrian Throughway	OCII / Mission Bay Standard CIP Concrete
	Streetlife Zone	OCII / Mission Bay Standard paving and approved tree pit surfacing at trees

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

URBAN FOREST

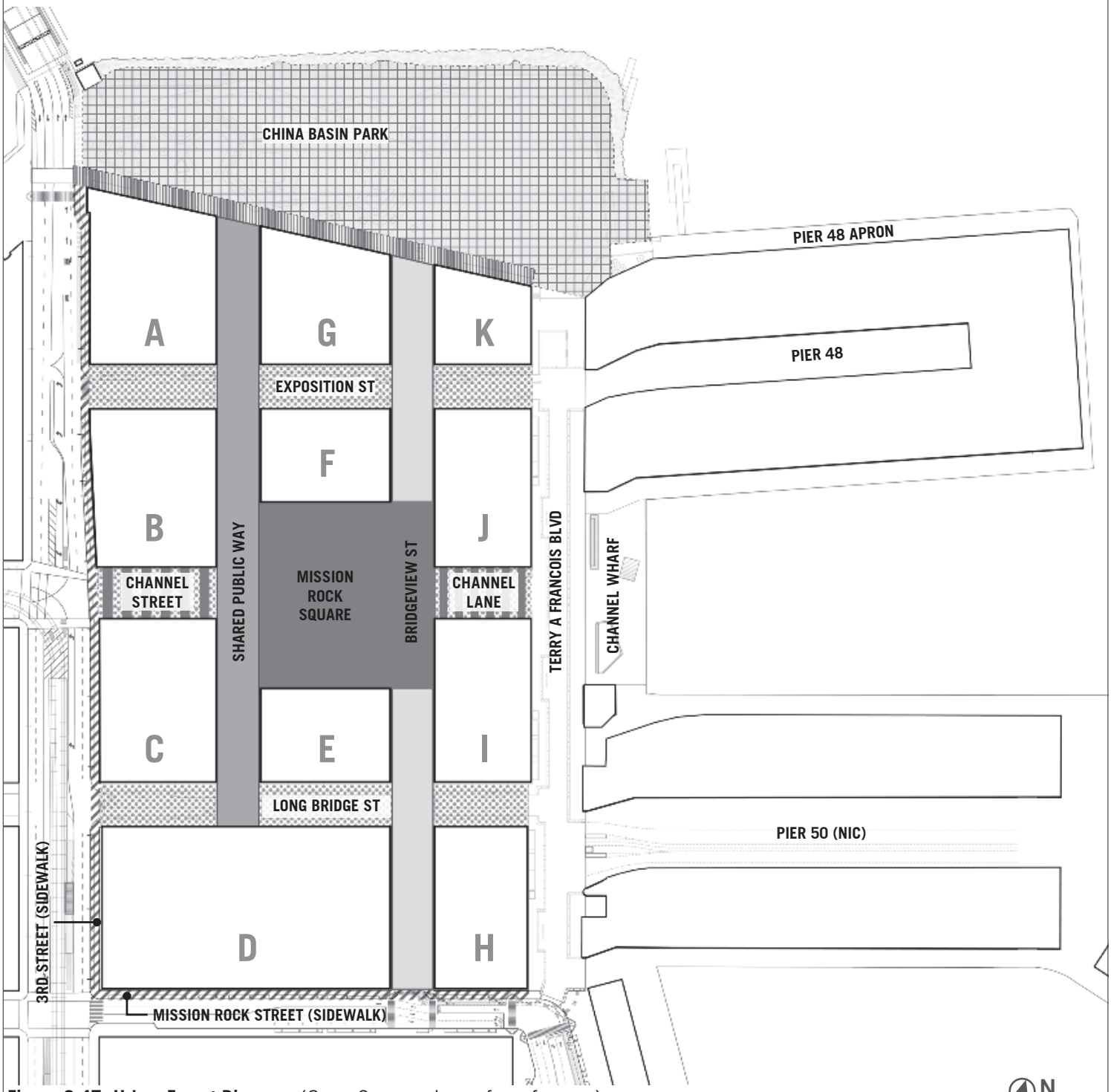


Figure 8.47: Urban Forest Diagram (Open Spaces shown for reference)

China Basin Park
- *Large, iconic specimen evergreen trees*

Park Promenade
- *Small to medium tree with upright habit, shade tolerance required*

Shared Public Way
- *Large, arching trees with fine-textured canopy*

Mission Rock Square
- *Large, uniform, upright trees with iconic seasonal character in leaf or flower*

Neighborhood Street Tree: Upright
- *Medium to large tree with upright habit*

Neighborhood Street Tree: Arching
- *Medium to large tree with arching habit, special seasonal character*

Channel St and Channel Lane
- *Wind-tolerant tree from Mission Rock Square, Neighborhood Street palettes*

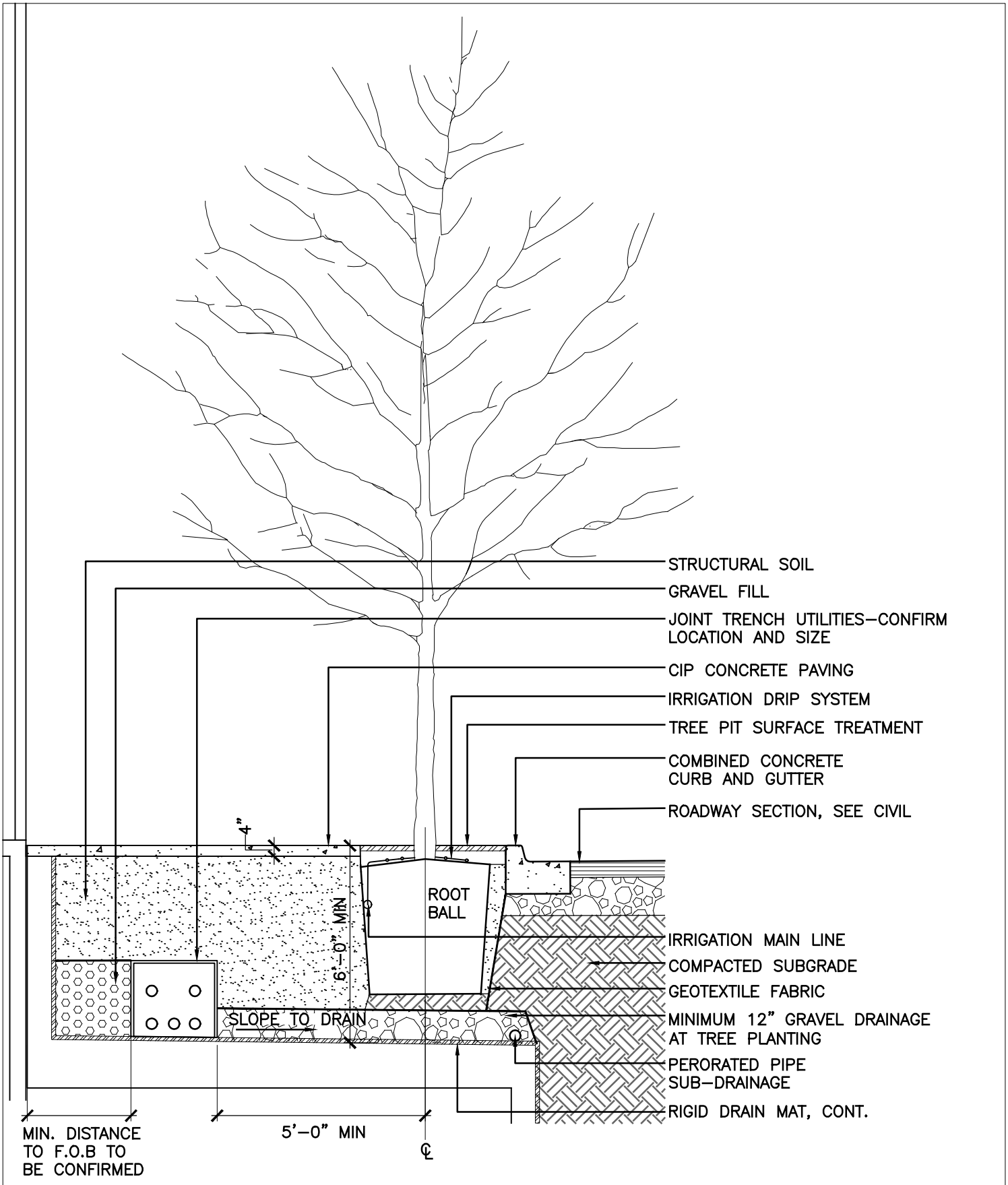
Mission Bay Street Trees
- *Per OCII Mission Bay Standards*

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

URBAN FOREST

Tree Type	Size	Tolerances	Water Use	Design Criteria	Recommended Species
China Basin Park: Specimen Tree	At Installation: Min. 48" Box At Maturity: 50' x 60' (HxW)	Wind: High Shade: Partial Shade	Low to Medium	• Iconic character • Windbreak • Healthy in paving and/or lawn • Coastal tolerance	• **Monterey Cypress** [*Cupressus macrocarpa*] • **New Zealand Christmas Tree** [*Metrosiderous excelsa*] • **Red-Flowering Gum** [*Corymbia ficifolia*]
China Basin Park: Park Promenade	At Installation: Min. 48" Box At Maturity: 30' x 35' (H)	Wind: Medium-High Shade: Deep Shade	Low	• Scaled to intimating walking experience • Ornamental leaves, flowers, and bark • Paving tolerant • Coastal tolerance	• **Red Oak cultivar** [*Quercus rubra 'Crimson Spire'*] • **Melaleuca** [*Melaleuca quinquenervia*]
Shared Public Way	At Installation: Min 48" Box At Maturity: 45'-50' (H)	Wind: High Shade: Partial Shade	Low	• Fine textured canopy • Trunk 13'-6" clear from paving, 48" box	• **Chinese Elm** [*Ulmus arvifolia*] • **Strawberry Tree** [*Arbutus 'Marina'*] • **Southern Live Oak** [*Quercus virginiana]*
Mission Rock Square	At Installation: Min 48" Box At Maturity: 45'-50' (H)	Wind: Medium Shade: Partial to Full Shade	Low	• Medium-Fine textured canopy • Winter/Summer interest • Trunk 8' clear from paving, 48" box	• **Ginkgo** [*Ginkgo biloba* cultivar] • **Freeman Maple** [*Acer x. freemanii*] • **Chinese Elm** [*Ulmus parvifolia*]
Neighborhood Street: Upright	At Installation: Min 48" Box At Maturity: 40' (H)	Wind: Medium Shade: Partial to Full Shade	Low	• Winter/Summer interest • Trunk 13'-6" clear from paving/travel lanes	• **Brisbane Box** [*Lophostemon confertus*] • **Red Oak cultivar** [*Quercus rubra 'Crimson Spire'*]
Neighborhood Street: Arching	At Installation: Min 48" Box At Maturity: 35'-40' (H)	Wind: Medium Shade: Partial Shade	Low	• Special flowering • Trunk 13'-6" clear from paving/travel lanes	• **Victorian Box** [*Pittosporum undulatum*] • **California Pepper** [*Schinus molle*] • **Cork Oak** [*Quercus suber*]
Channel Street / Channel Lane	*See description for: Mission Rock Square and/or Neighborhood Street Tree: Upright*				
Mission Bay Street Trees	*Per OCII / Mission Bay Standards*				

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



TYPICAL TREE PLANTING ON STRUCTURE

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

STORMWATER

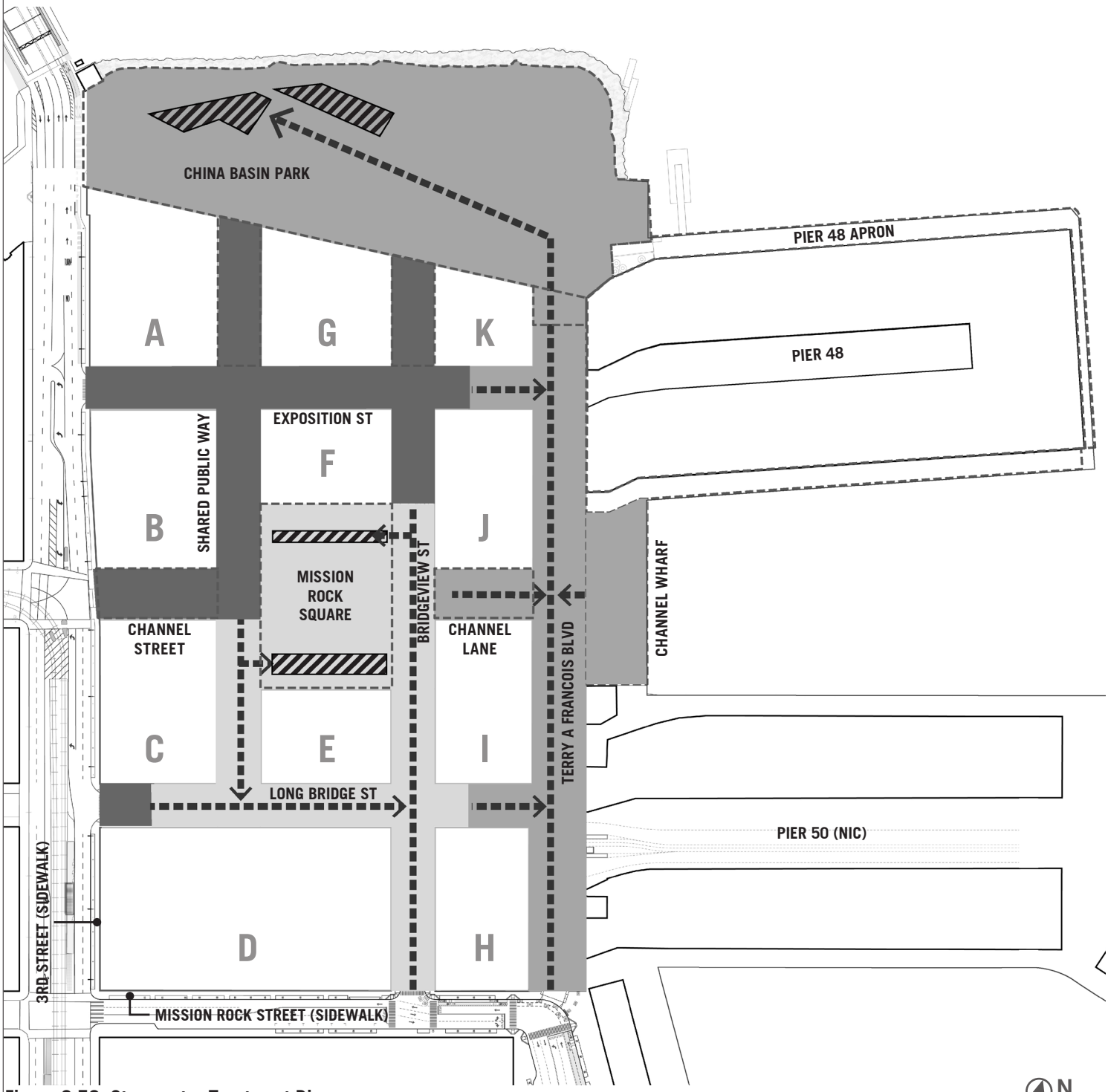
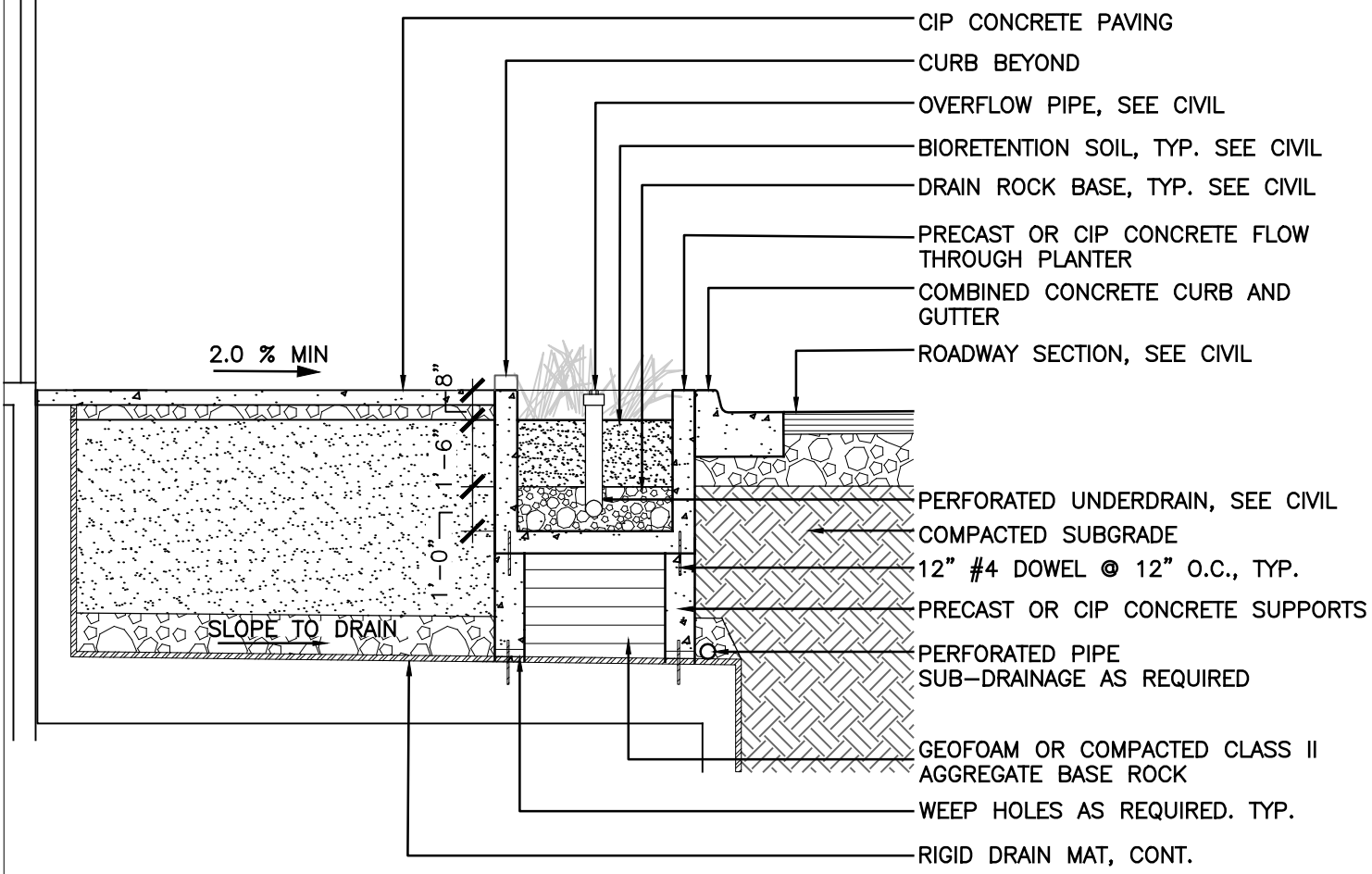


Figure 8.50: Stormwater Treatment Diagram

- Localized Treatment
- Centralized Treatment: Mission Rock Square
- Centralized Treatment: China Basin Park
- Large Feature Stormwater Gardens
- Storm Drain Conveyance
- Open Space (Shown for reference only)

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



TYPICAL STORMWATER FLOW THROUGH PLANTER

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

LIGHTING

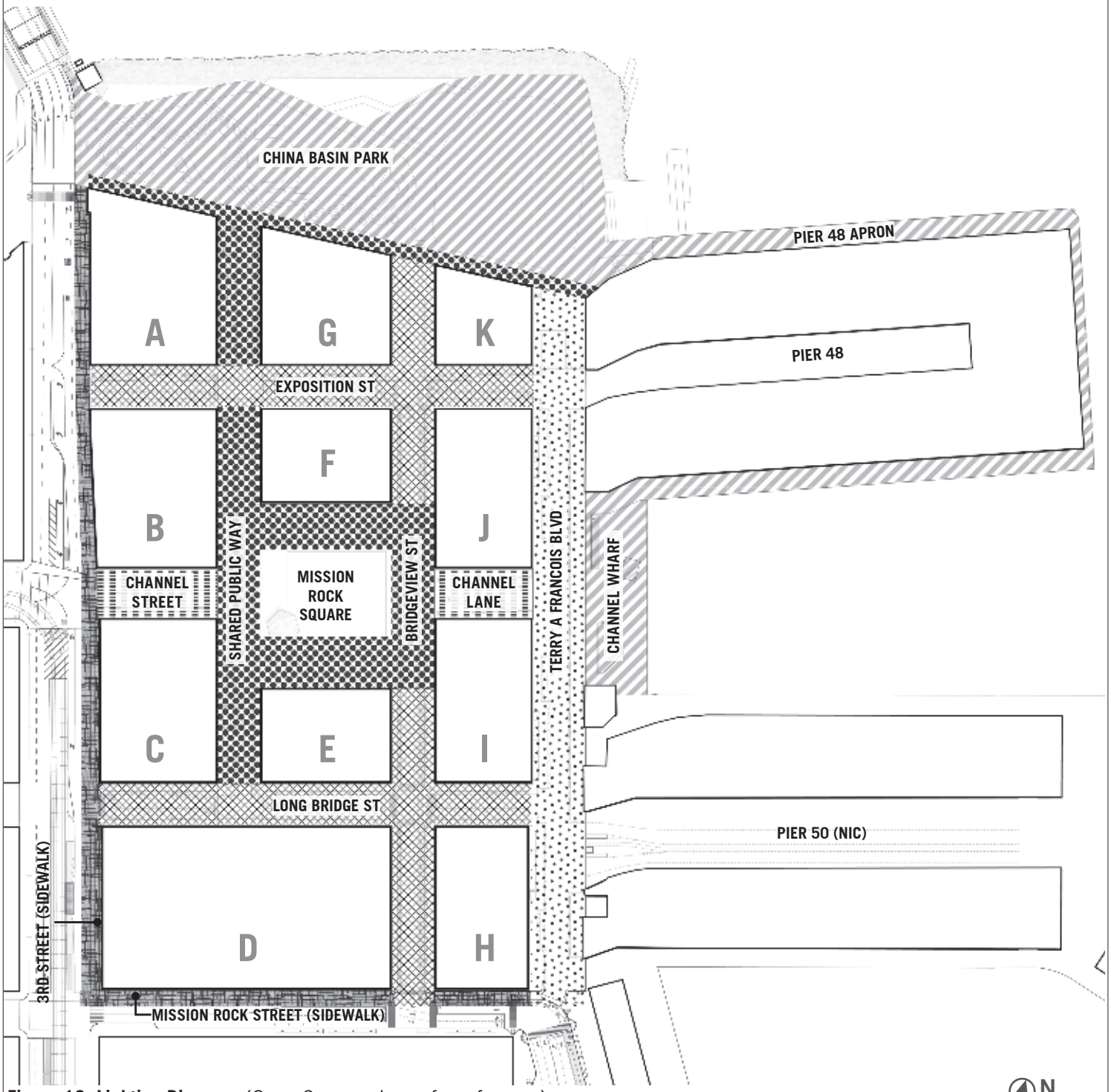


Figure 1G: Lighting Diagram (Open Spaces shown for reference)

Zone 1: Waterfront
- *Light levels should be brightest at the buildings, and less bright at the waterfront to minimize impact on the ecosystem at the water's edge.*

Zone 2: High-Activity, High Retail
- *Opportunity for feature lighting; variety of light types encouraged; contributing ambient light from ground floor uses.*

Zone 3: Working-Waterfront
- *Iconic lighting; intersections should be highly visible.*

Zone 4: Neighborhood Streets
- *Some contributing light from ground-floor uses, especially on Bridgeview Street; intersection should be highly visible.*

Zone 5: Gateways
- *Opportunity for overhead lighting.*

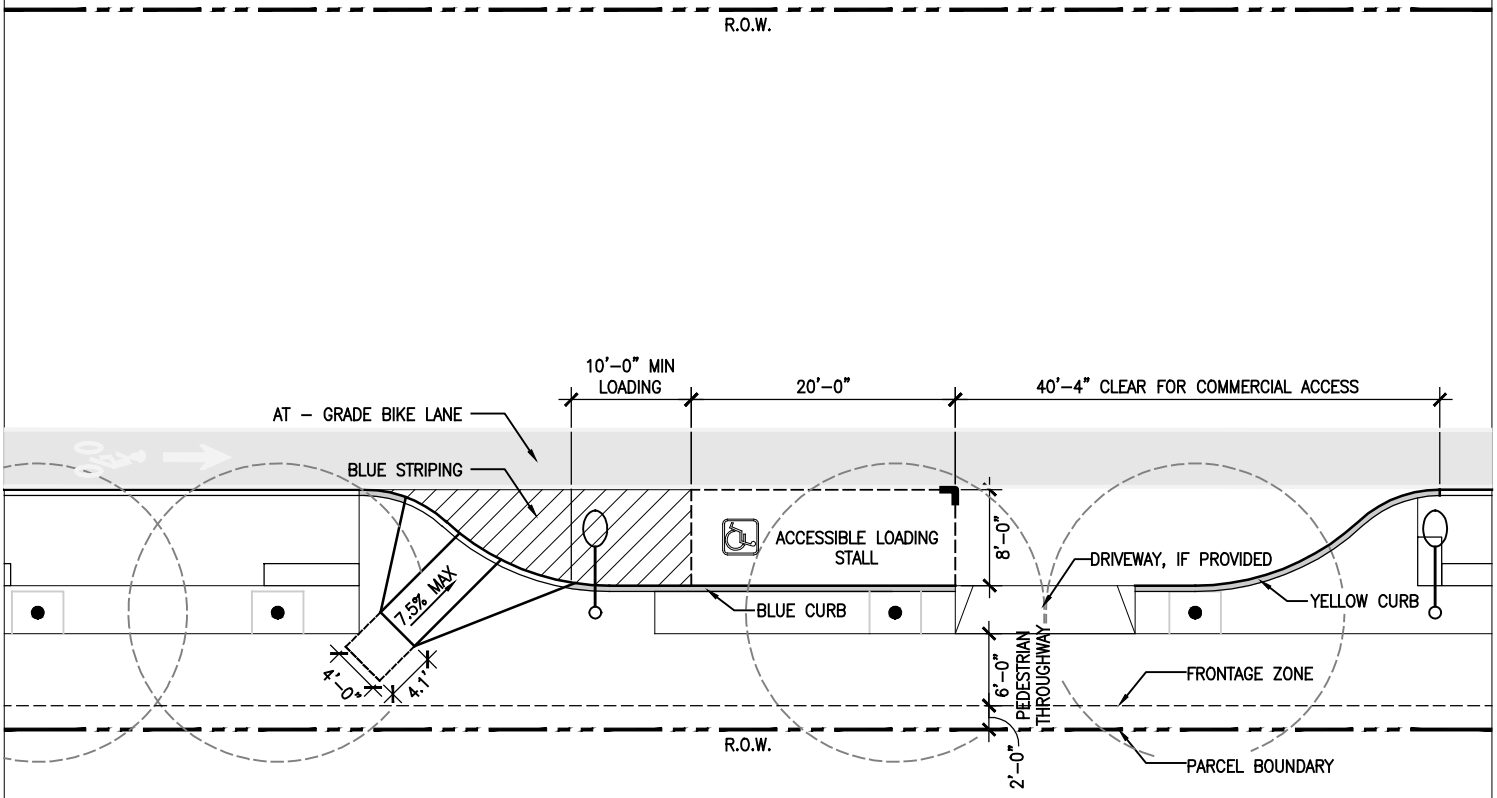
Zone 6: District Streets
- *Mission Bay. Refer to OCII Mission Bay controls.*

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

LIGHTING

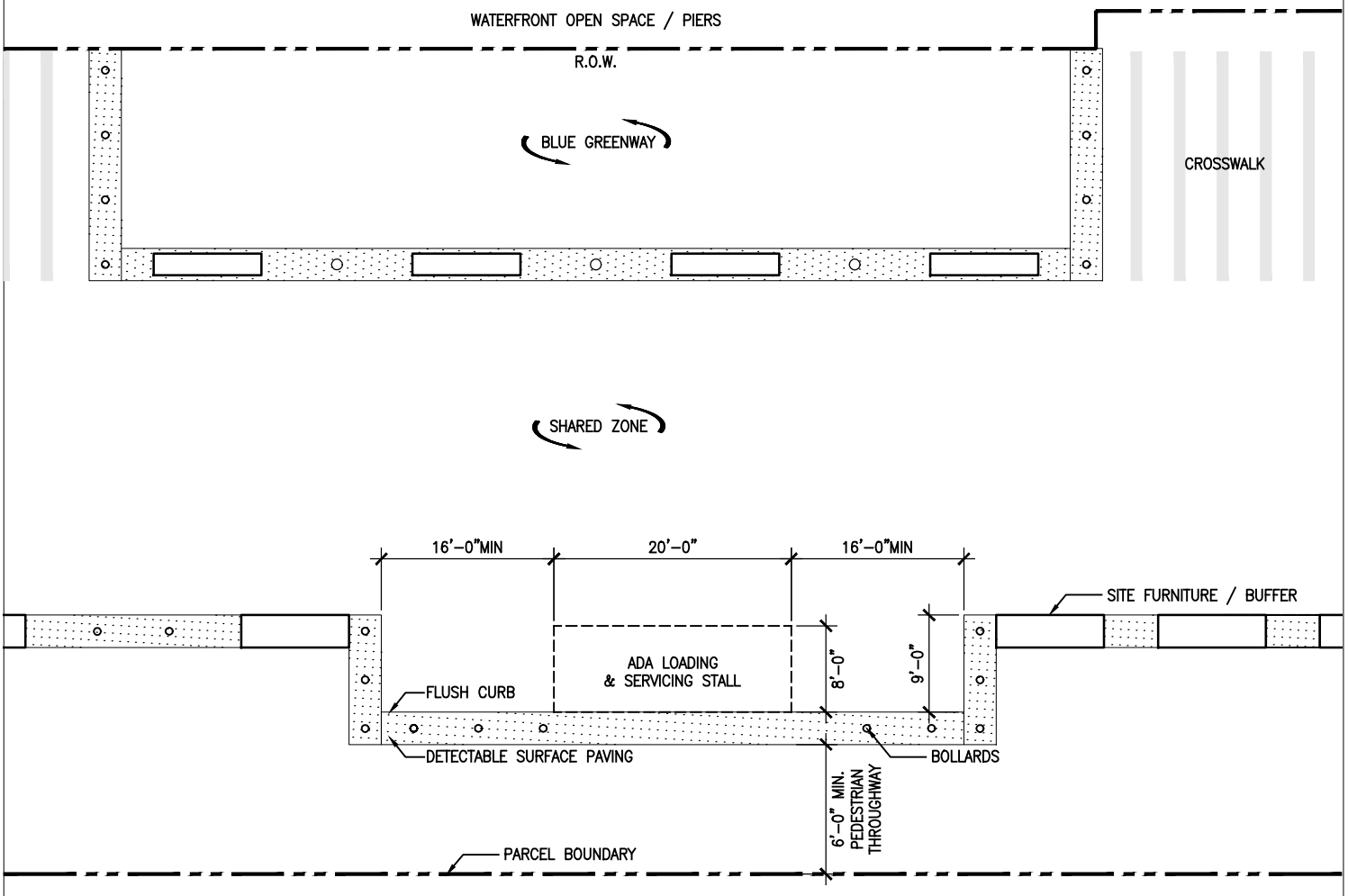
Lighting Zone	Lighting Zone: Description	Light Levels (Foot Candles)	Uniformity (Maximum - Minimum)
Zone 1: Waterfront	*Light levels should be brightest at the buildings, and less bright at the waterfront to minimize impact on the ecosystem at the water's edge.*		
	Non-Waterfront Paths	• 1 FC Average	• 10:1
	Planting/Lawn Areas	• 0.5-0.8 FC Average	• 40:1
	Plaza/Wharf Areas	• 0.8-1 FC Average	• 20:1
	Waterfront Paths	• 0.5-0.8 FC Average	• 5:1
Zone 2: High Activity, High-Retail Zone	*Opportunity for feature lighting; variety of light types encouraged; contributing ambient light from ground-floor uses.*		
	Mission Rock Square	• 0.5-0.8 FC Average	• 40:1
	Shared Public Way	• 1-1.2 FC Average	• 20:1
Zone 3: Working Waterfront	*Working Waterfront. Iconic lighting; intersections should be highly visible.*		
	Terry A Francois Boulevard	• 1-1.5 FC Average	• 5:1
Zone 4: Neighborhood Streets	*Some contributing light from ground-floor uses, especially on Bridgeview Street; intersections should be highly visible.*		
	Bridgeview Street	• 1-1.5 FC Average	• 5:1
	Exposition & Long Bridge Streets	• 1.5-2 FC Average	• 5:1
Zone 5: Gateways	*Opportunity for overhead lighting.*		
	Channel Street	• 1-1.2 FC Average	• 10:1
	Channel Lane	• 1-1.2 FC Average	• 10:1
Zone 6: District Streets	*Mission Bay. Refer to OCII Mission Bay controls.*		
	3rd & Mission Rock Streets (See OCII Standards)		

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

FIGURE 8.54: ACCESSIBLE LOADING AT EXPOSITION STREET

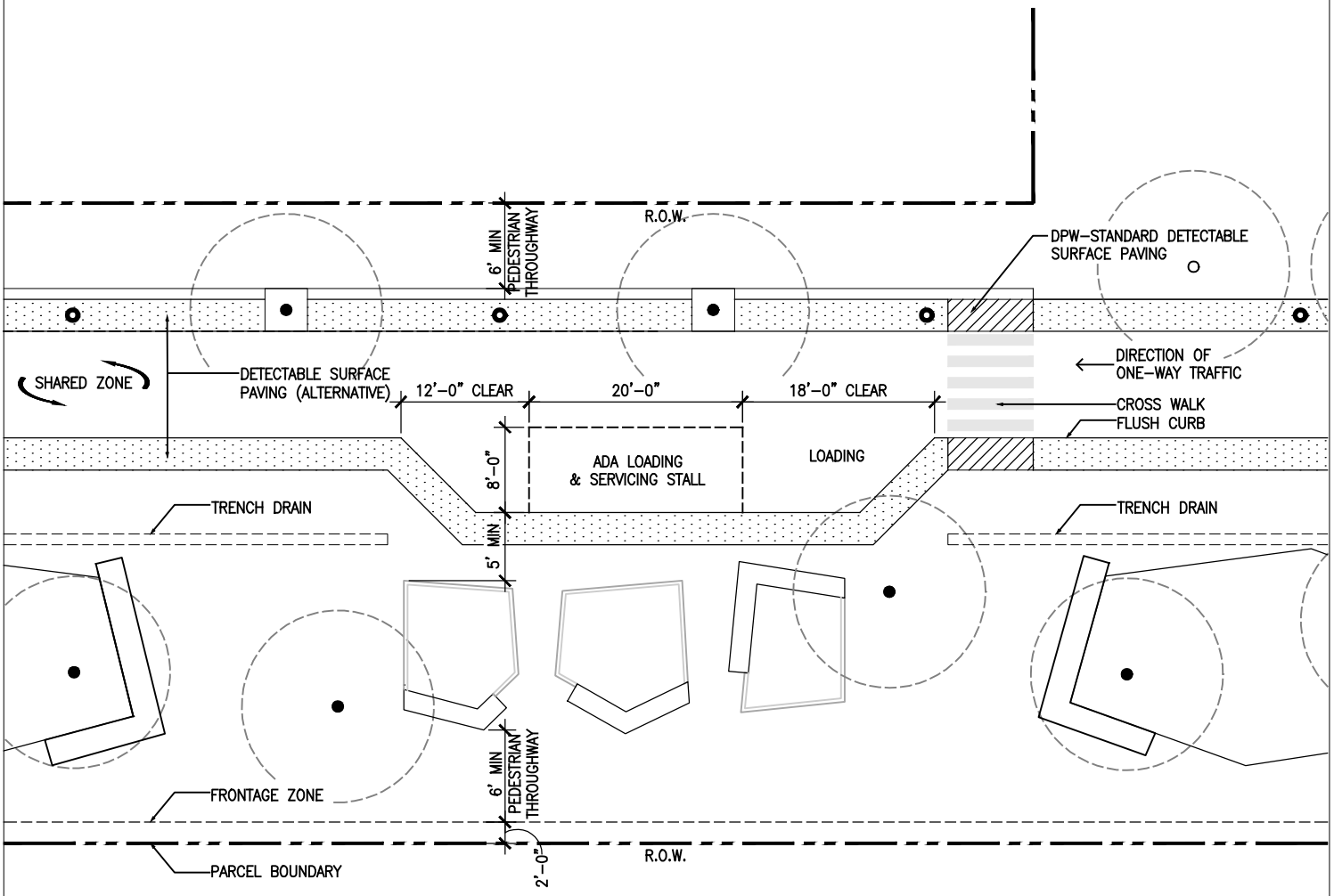


N

0 8

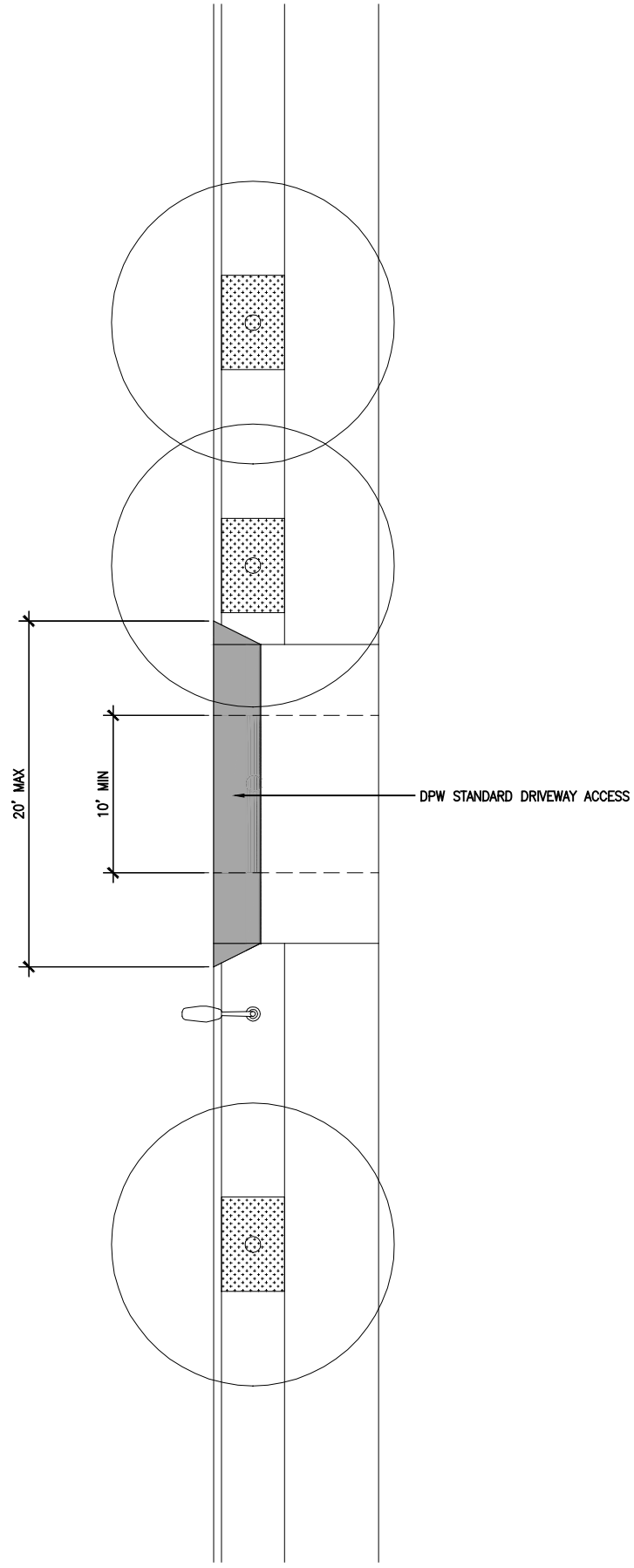
Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

FIGURE 8.55: ACCESSIBLE LOADING AT TERRY A FRANCOIS BOULEVARD



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

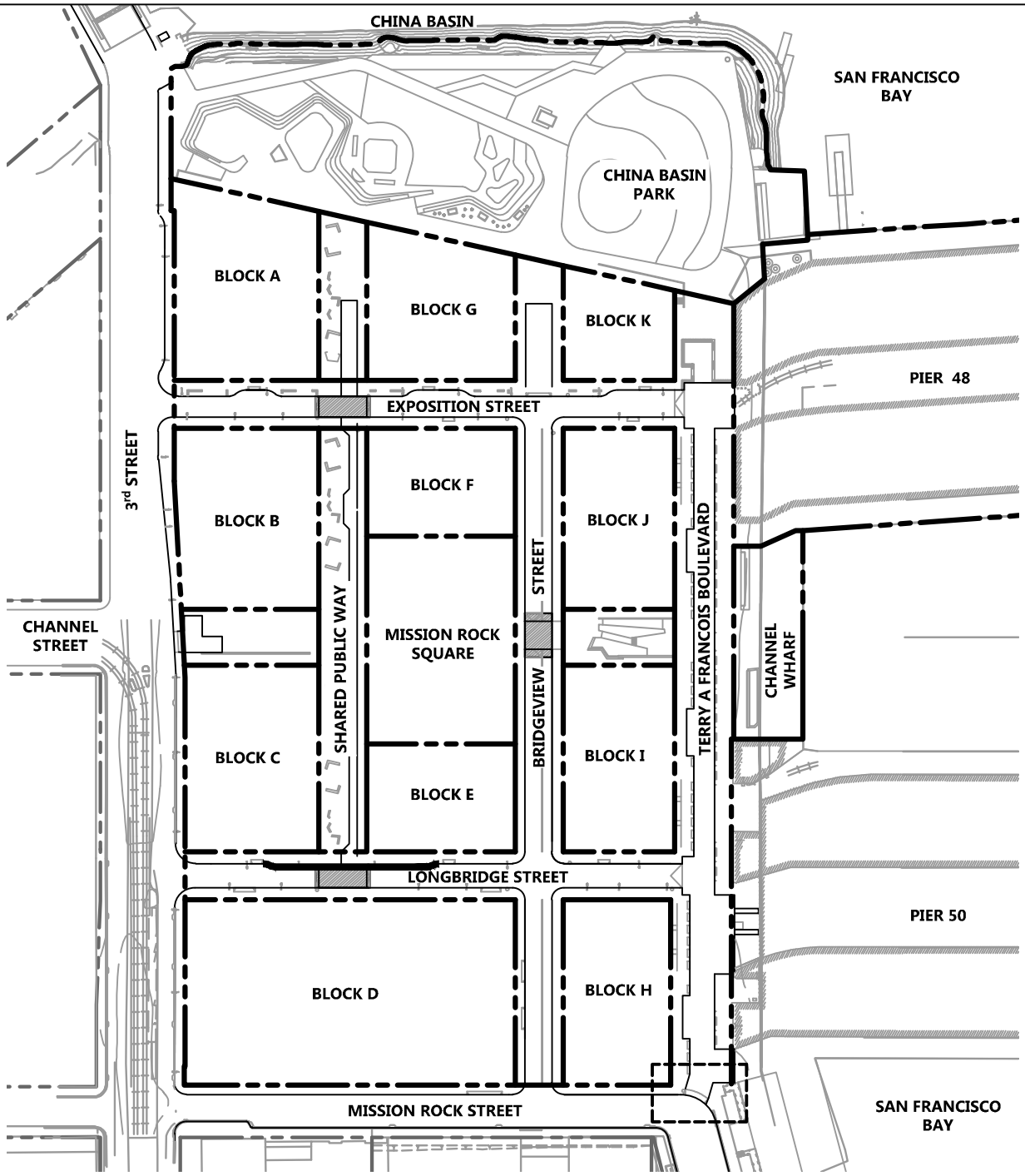
FIGURE 8.56: ACCESSIBLE LOADING AT SHARED PUBLIC WAY



NTS

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

FIGURE 8.57: TYPICAL DRIVEWAY PLAN



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- RAISED CROSSWALK, SEE FIGURE 8.59
- BULB-OUT LOCATIONS
- CITY STANDARD DRIVEWAY AT TERRY A FRANCOIS BOULEVARD & MISSION ROCK STREET INTERSECTION

N

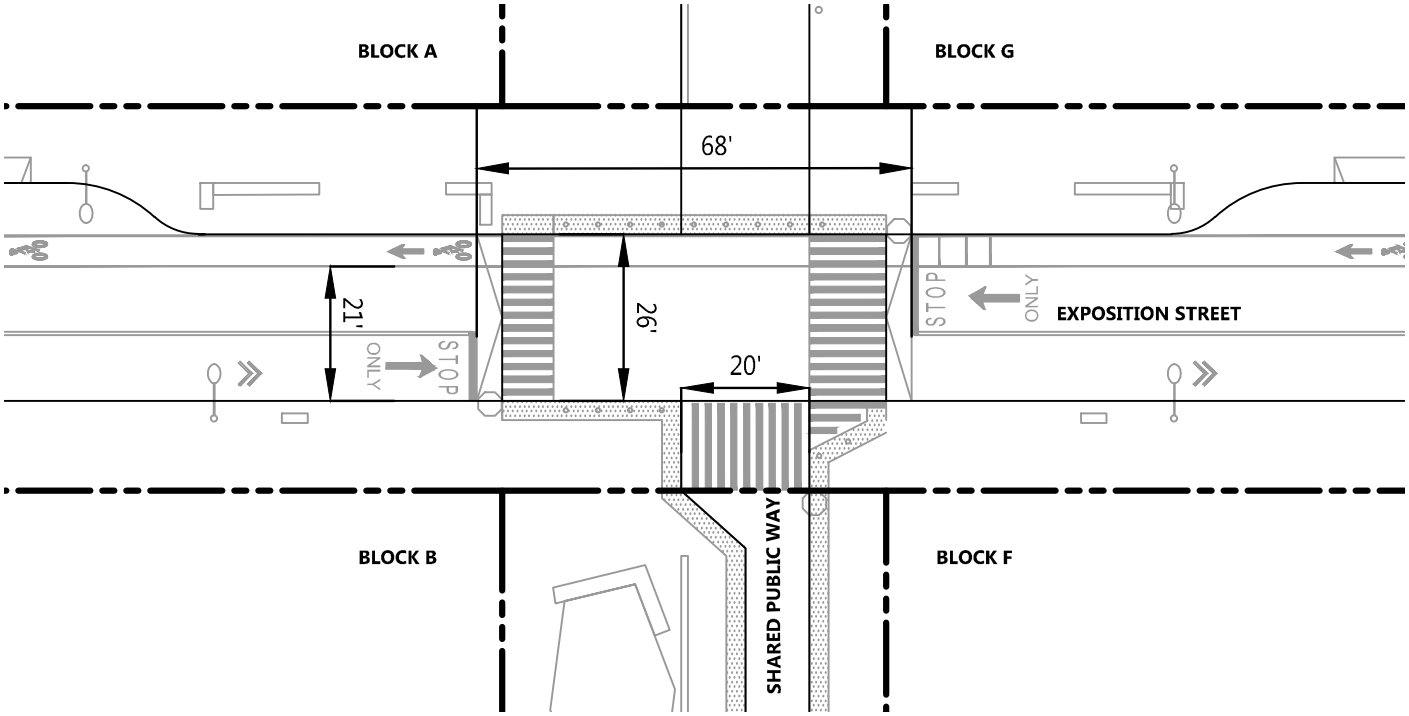
0 200

Source: BKF ENGINEERS, 07/2016

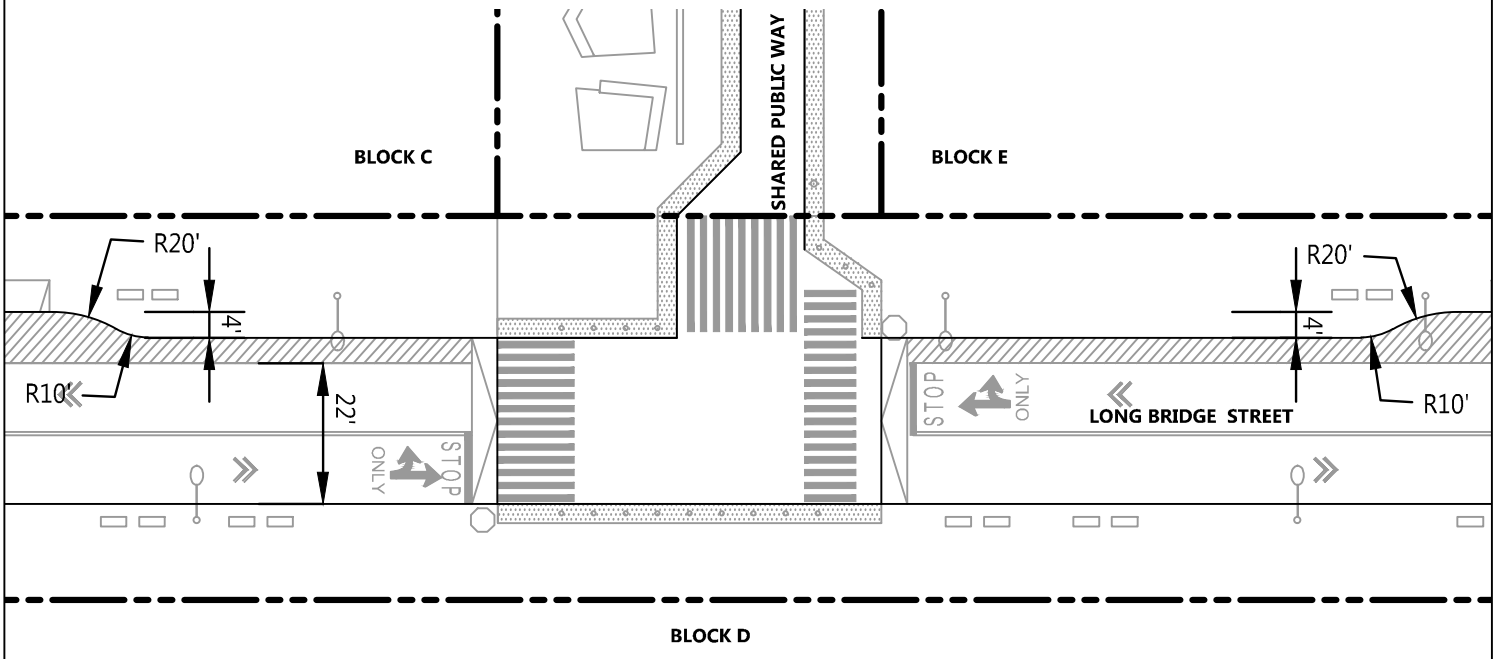
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.58 Potential Traffic Calming Elements.dwg
PLOT DATE: 09-16-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.58 - POTENTIAL TRAFFIC CALMING ELEMENTS



TYPICAL RAISED CROSSING



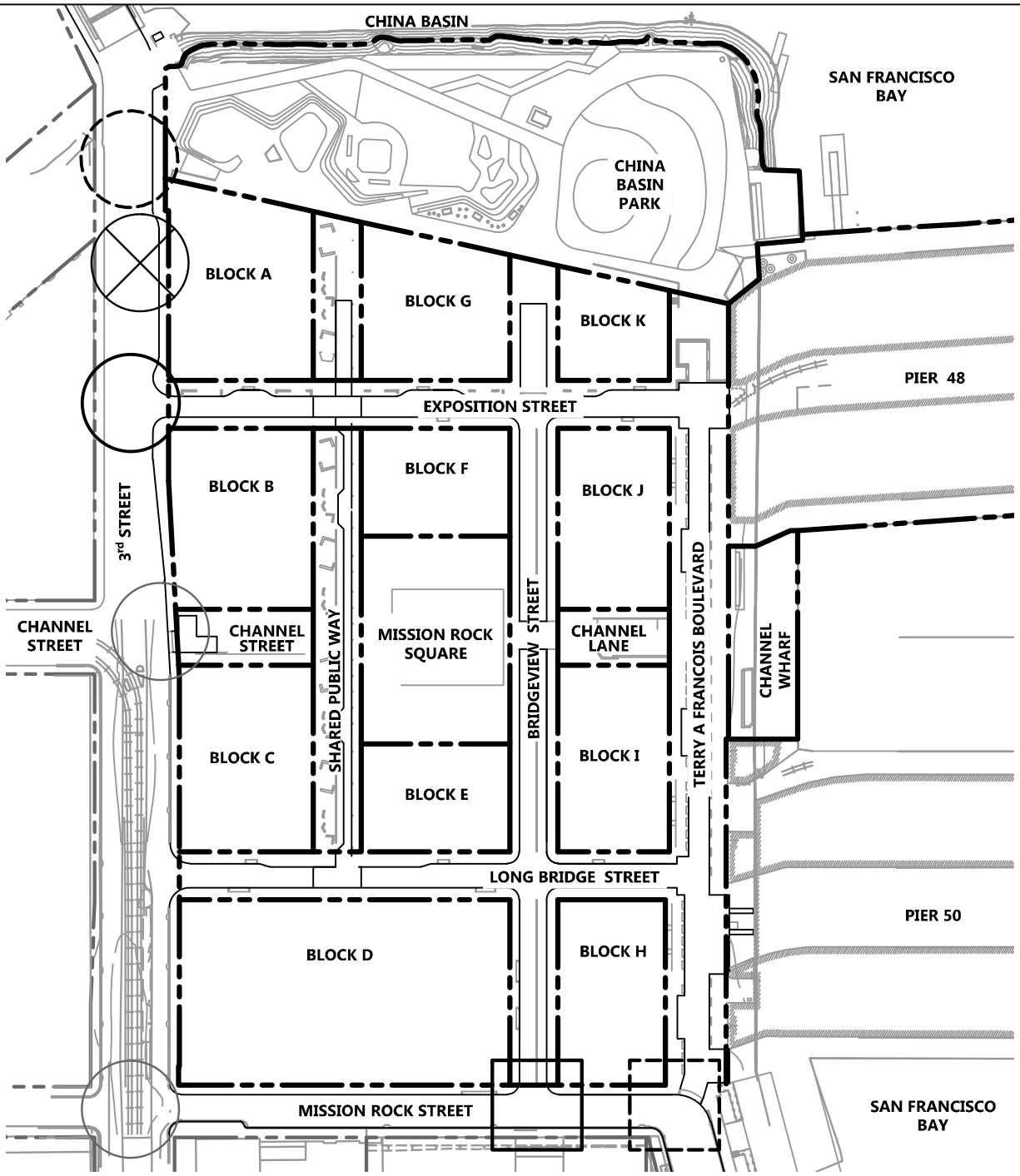
TYPICAL BULB-OUT

N

0 30

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.59 Typical Raised Crossing & Bulb-Out Details.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib



LEGEND

- PROPOSED PARCEL LINE
- EXISTING TRAFFIC SIGNAL TO REMAIN
- EXISTING TRAFFIC SIGNAL TO BE REMOVED
- NEW TRAFFIC SIGNAL
- EXISTING TRAFFIC SIGNAL TO BE MODIFIED
- NEW STOP-CONTROLLED SIGNS INTERSECTION
- NEW & REVISED STOP-CONTROLLED INTERSECTION

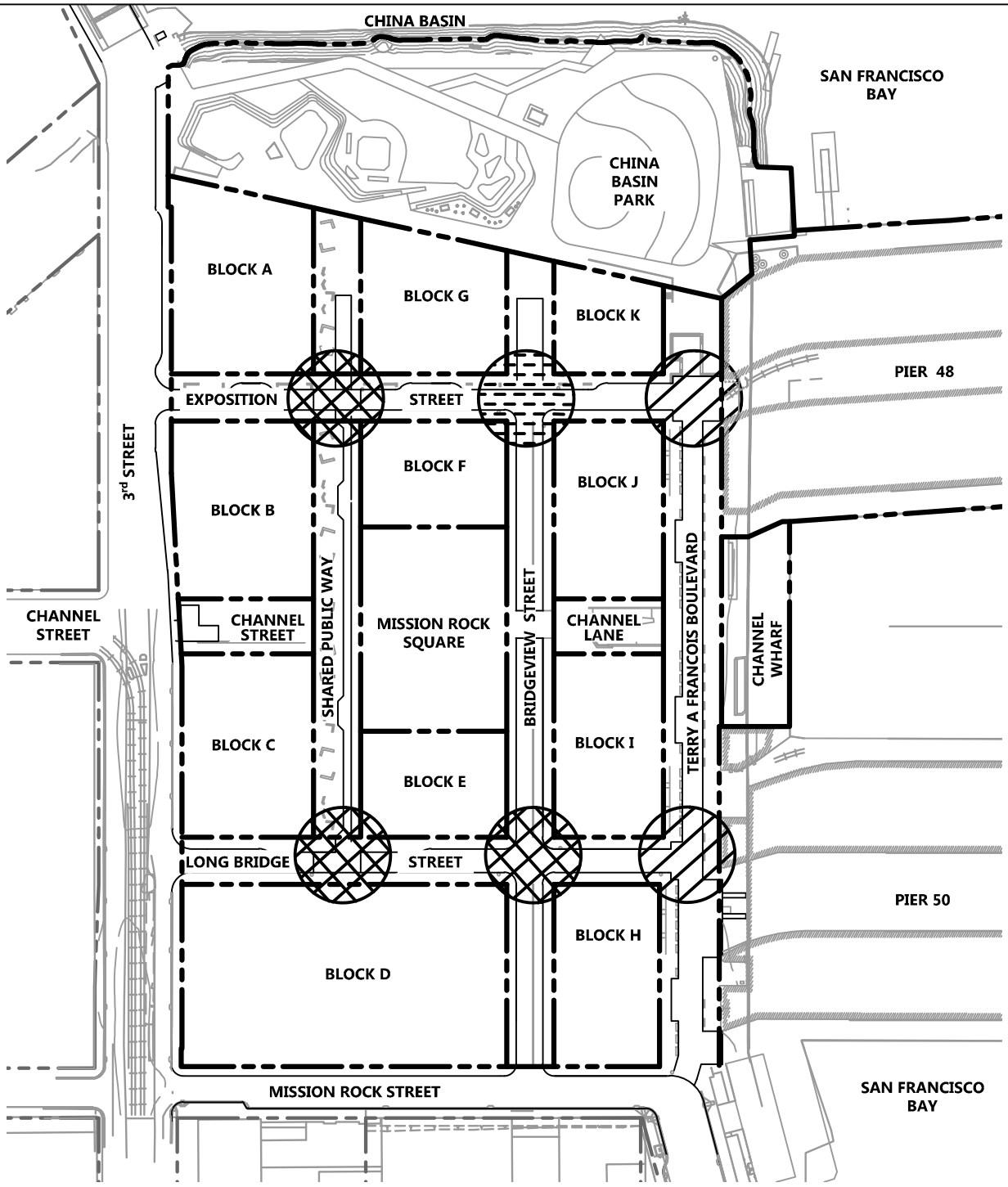
N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.60 Off-Site Traffic Mitigations.dwg
PLOT DATE: 09-09-16 PLOTTED BY: slb

MISSION ROCK INFRASTRUCTURE PLAN **FIGURE 8.60 - OFF-SITE TRAFFIC MITIGATIONS**



LEGEND

PROPOSED PARCEL LINE

THREE WAY STOP-CONTROLLED INTERSECTION

ONE WAY STOP-CONTROLLED INTERSECTION

TWO WAY STOP-CONTROLLED INTERSECTION

N

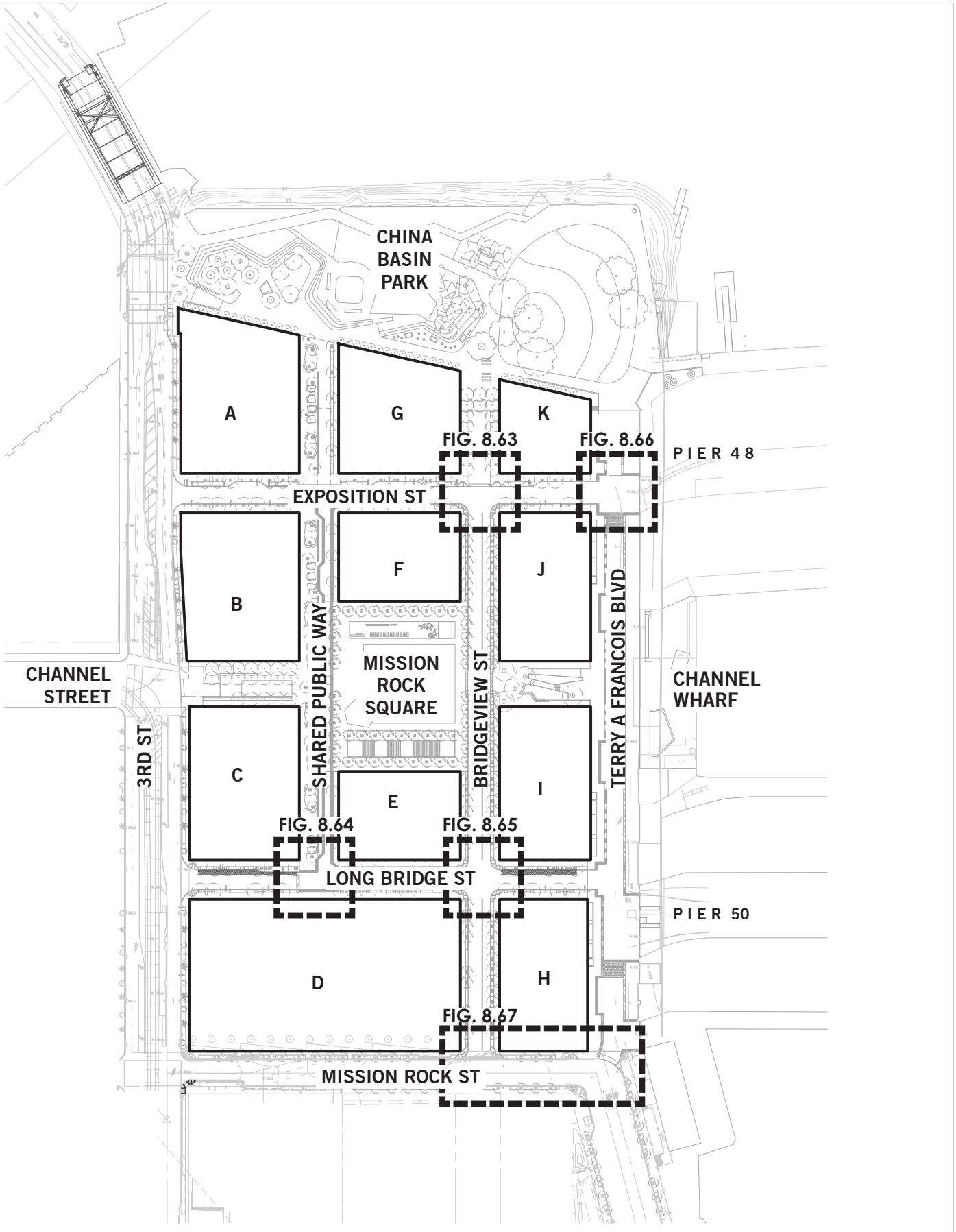
0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 8.61 On-site Traffic Mitigations.dwg
PLOT DATE: 09-16-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN

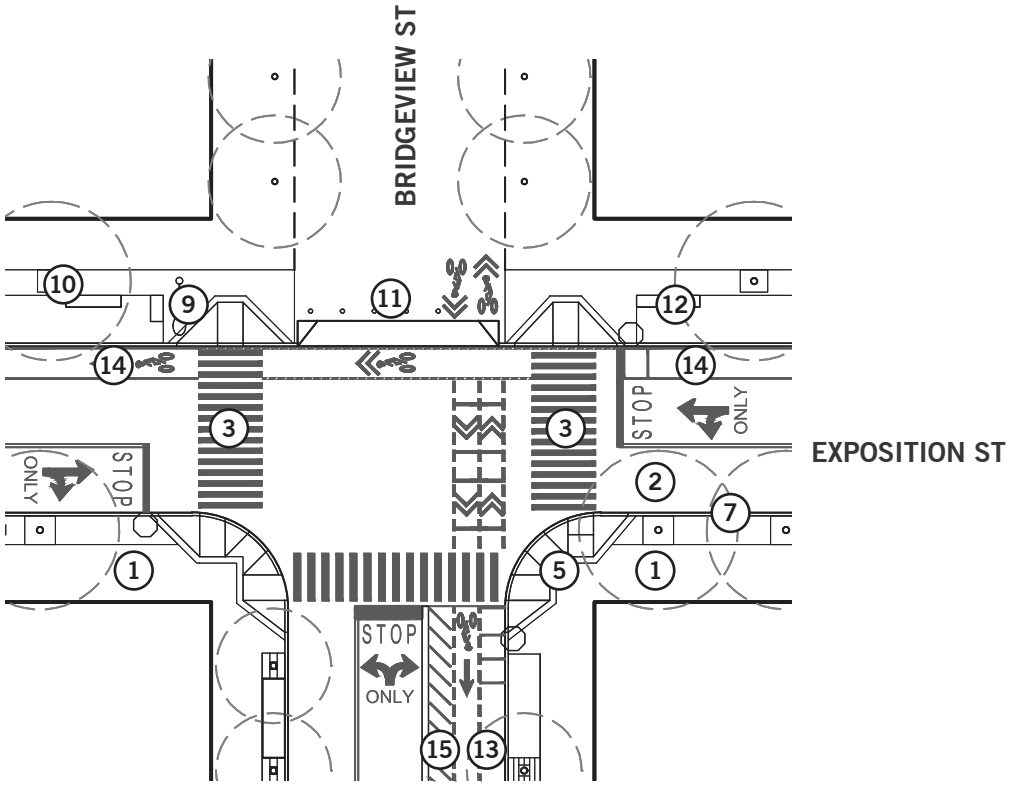
FIGURE 8.61 - ON-SITE TRAFFIC MITIGATIONS



Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 8.62 INTERSECTION DESIGN



TYPICAL INTERSECTION ALL-WAY STOP: EXPOSITION STREET AT BRIDGEVIEW STREET

1. Pedestrian Throughway
2. Vehicular Throughway
3. Crosswalk
4. Traffic Table
5. DPW Standard Curb Ramp
6. DPW Standard Detectable Surface Paving
7. DPW Standard Curb
8. Flush Curb
9. Streetlight
10. Street Tree
11. Bollards
12. Street Furnishing
13. Cycle Track (Raised)
14. Bike Lane at Roadway Grade
15. Cycle Track Buffer

N

0 30

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

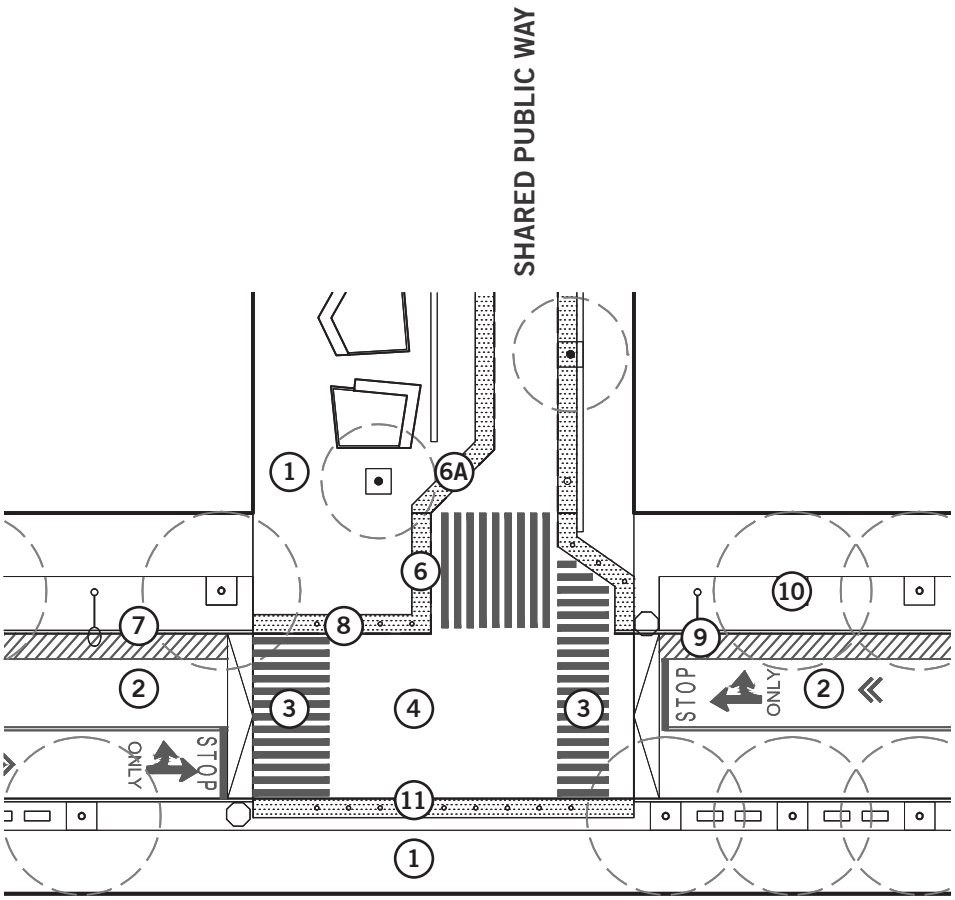


TABLE TOP INTERSECTION: SHARED PUBLIC WAY AT LONG BRIDGE STREET

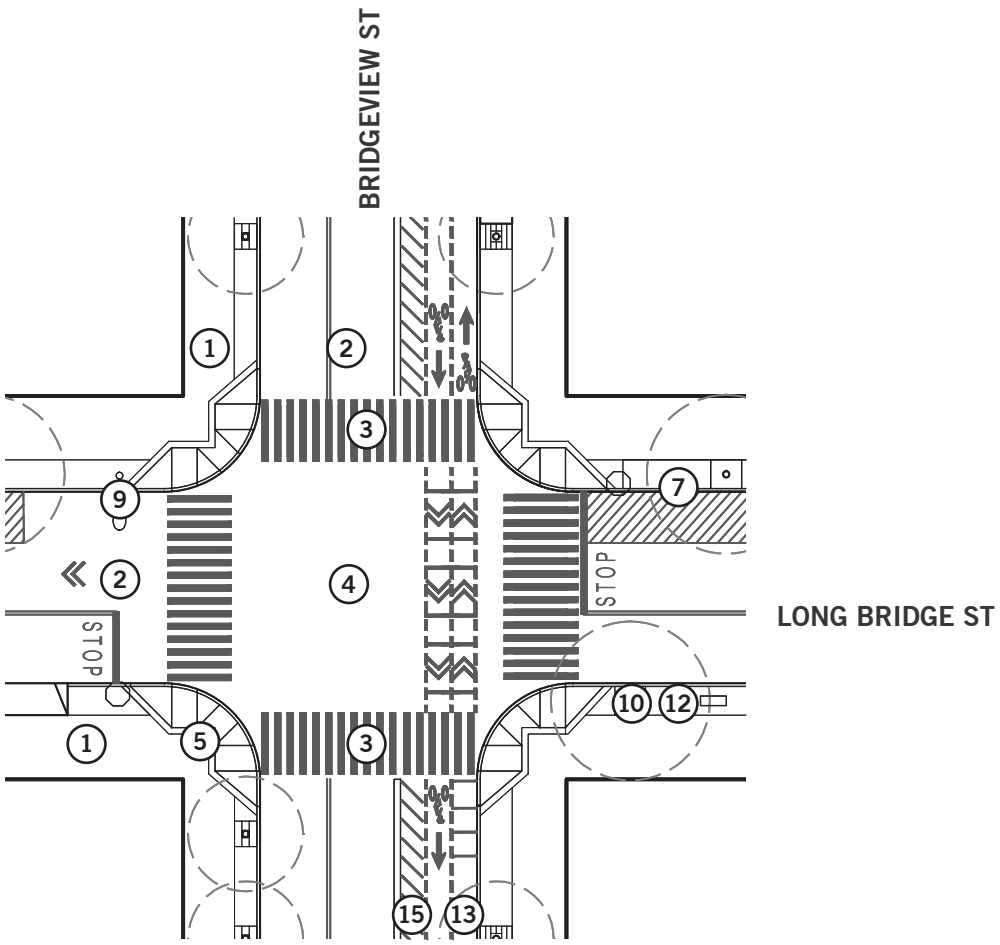
1. Pedestrian Throughway
2. Vehicular Throughway
3. Crosswalk
4. Traffic Table
5. DPW Standard Curb Ramp
6. DPW Standard Detectable Surface Paving
6A. Detectable Surface Paving: Alternative
7. DPW Standard Curb
8. Flush Curb
9. Streetlight
10. Street Tree
11. Bollards
12. Street Furnishing
13. Cycle Track (Raised)
14. Bike Lane at Roadway Grade

N

0 30

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

FIGURE 8.64 TYPICAL TABLE-TOP INTERSECTION



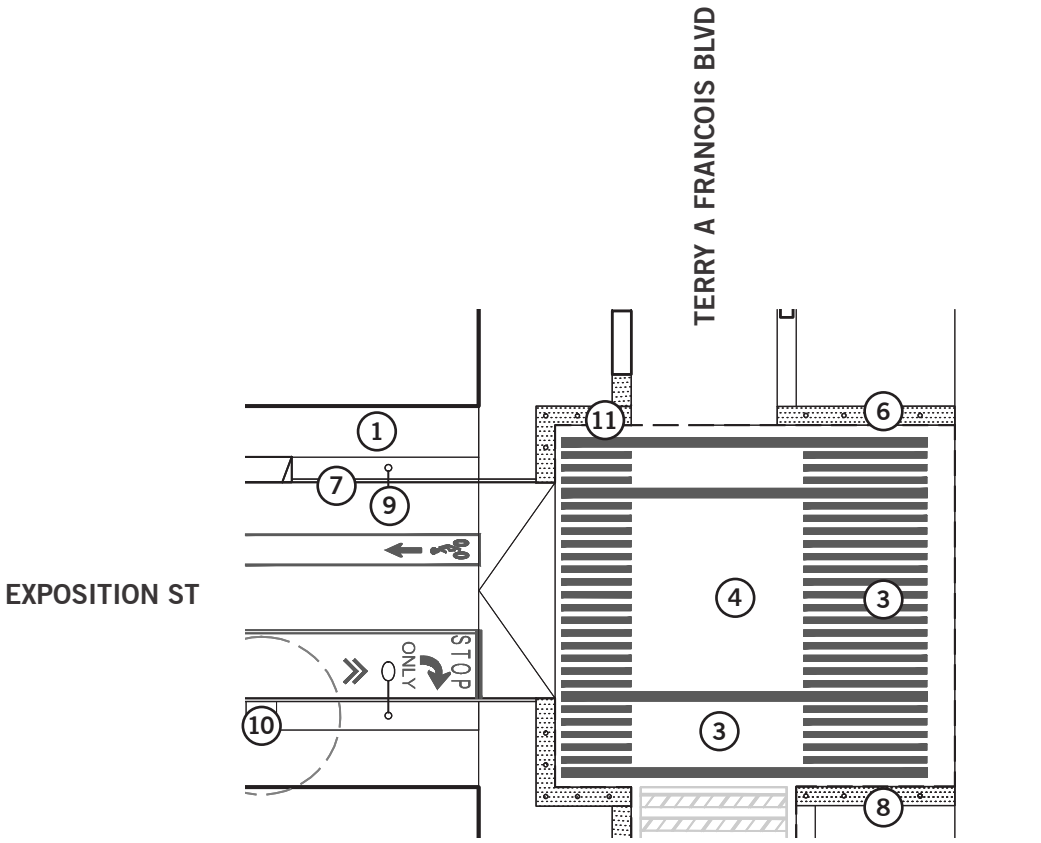
INTERSECTION TWO-WAY STOP: LONG BRIDGE STREET AT BRIDGEVIEW STREET

1. Pedestrian Throughway
2. Vehicular Throughway
3. Crosswalk
4. Traffic Table
5. DPW Standard Curb Ramp
6. DPW Standard Detectable Surface Paving
7. DPW Standard Curb
8. Flush Curb
9. Streetlight
10. Street Tree
11. Bollards
12. Street Furnishing
13. Cycle Track (Raised)
14. Bike Lane at Roadway Grade
15. Cycle Track Buffer

N

0 30

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016



FLUSH INTERSECTION: TERRY FRANCOIS BOULEVARD AT PIER 48

1. Pedestrian Throughway
2. Vehicular Throughway
3. Crosswalk
4. Traffic Table
5. DPW Standard Curb Ramp
6. DPW Standard Detectable Surface Paving
7. DPW Standard Curb
8. Flush Curb
9. Streetlight
10. Street Tree
11. Bollards
12. Street Furnishing
13. Cycle Track (Raised)
14. Bike Lane at Roadway Grade

N

0 30

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

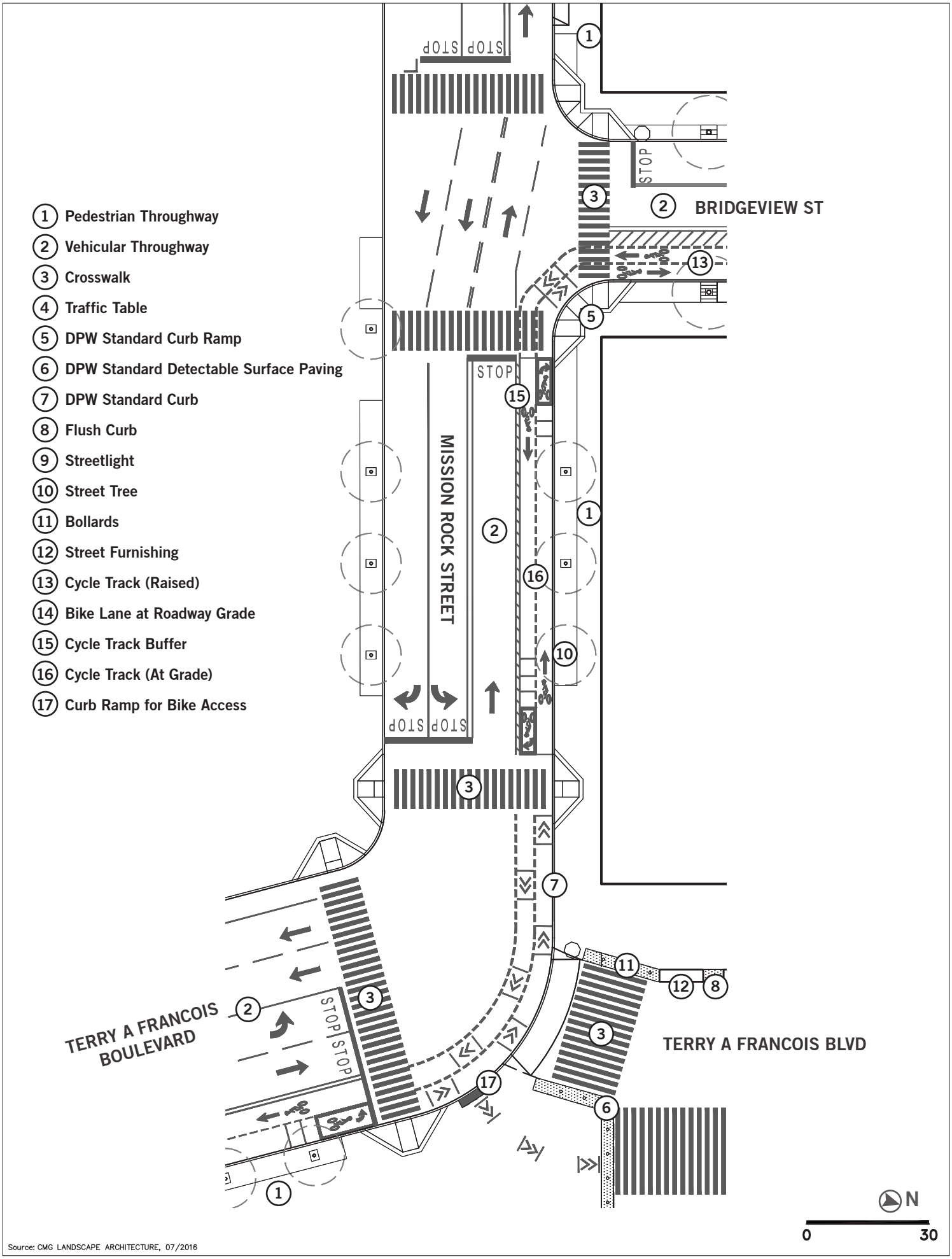


FIGURE 8.67 MISSION ROCK STREET INTERSECTIONS

9. OPEN SPACE AND PARKS

The following describes the phasing of construction of open space and parks in connection with the development of Development Parcels.

9.1 Open Space

Open space shall be Substantially Completed consistent with the following schedule:

9.1.1 China Basin Park

China Basin Park will be constructed in connection with the adjacent Development Parcels, A, G and K, as further described in the associated public improvement agreement(s) for such Development Parcels. Construction of China Basin Park, including, without limitation, the portions of the park located between and adjacent to Development Parcels A and G and Development Parcels G and K, may be sequenced in relation to the phasing of such adjacent Development Parcels or to accommodate the need for construction staging or likelihood of site disturbances associated with construction of the adjacent Development Parcels.

9.1.2 Mission Rock Square

Mission Rock Square will be constructed in connection with the adjacent Development Parcels (E and F), as further described in the associated public improvement agreement(s) for such Development Parcels. Construction may be sequenced or adjusted as needed to accommodate construction of adjacent Development Parcels.

9.1.3 The Blue Greenway and Channel Wharf

The Blue Greenway and Channel Wharf (as described herein) will be constructed in connection with the construction of the adjacent portion of Terry A Francois Boulevard.

9.1.4 Channel Street

Channel Street will be constructed in connection with the adjacent Development Parcels (B and C) as further described in the associated public improvement agreement(s) for such Development Parcels. Construction may be sequenced or adjusted as needed to accommodate construction of adjacent Development Parcels.

9.1.5 Channel Lane

Channel Lane will be constructed in connection with the adjacent Development Parcels (I and J) as further described in the associated public improvement agreement(s) for such Development

Parcels. Construction may be sequenced or adjusted as needed to accommodate construction of adjacent Development Parcels.

9.1.6 Pier 48 Apron

The Pier 48 apron will be renovated, replaced or constructed in connection with the development of Pier 48.

PUBLIC OPEN SPACES

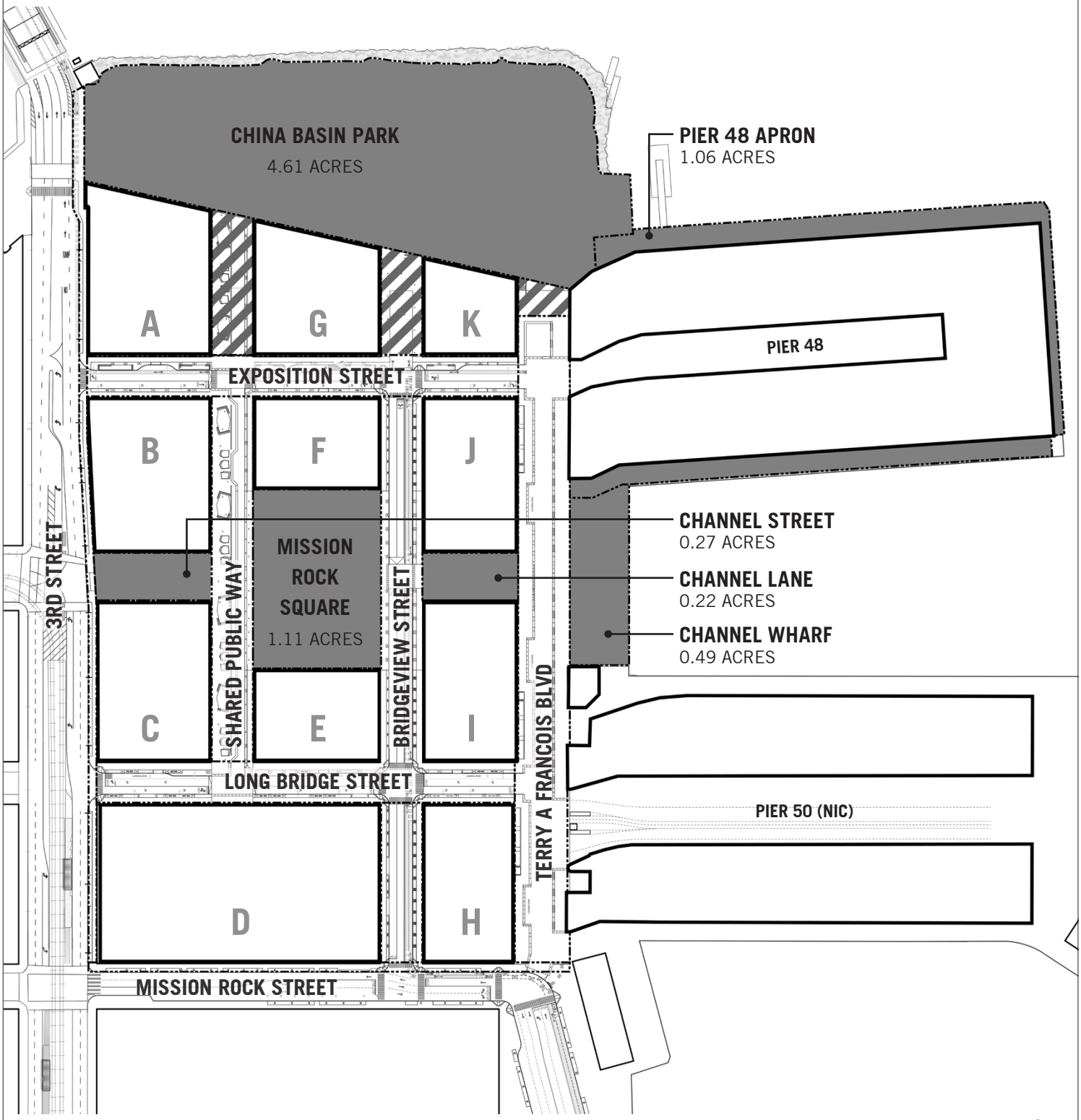


Figure 9.1: Public Open Spaces

Public Open Spaces

Paseo (Open Space within R.O.W.)
- Non-vehicular street connection; accommodates emergency vehicle access. Refer to Section 8.

Limit of Work

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

PHASING

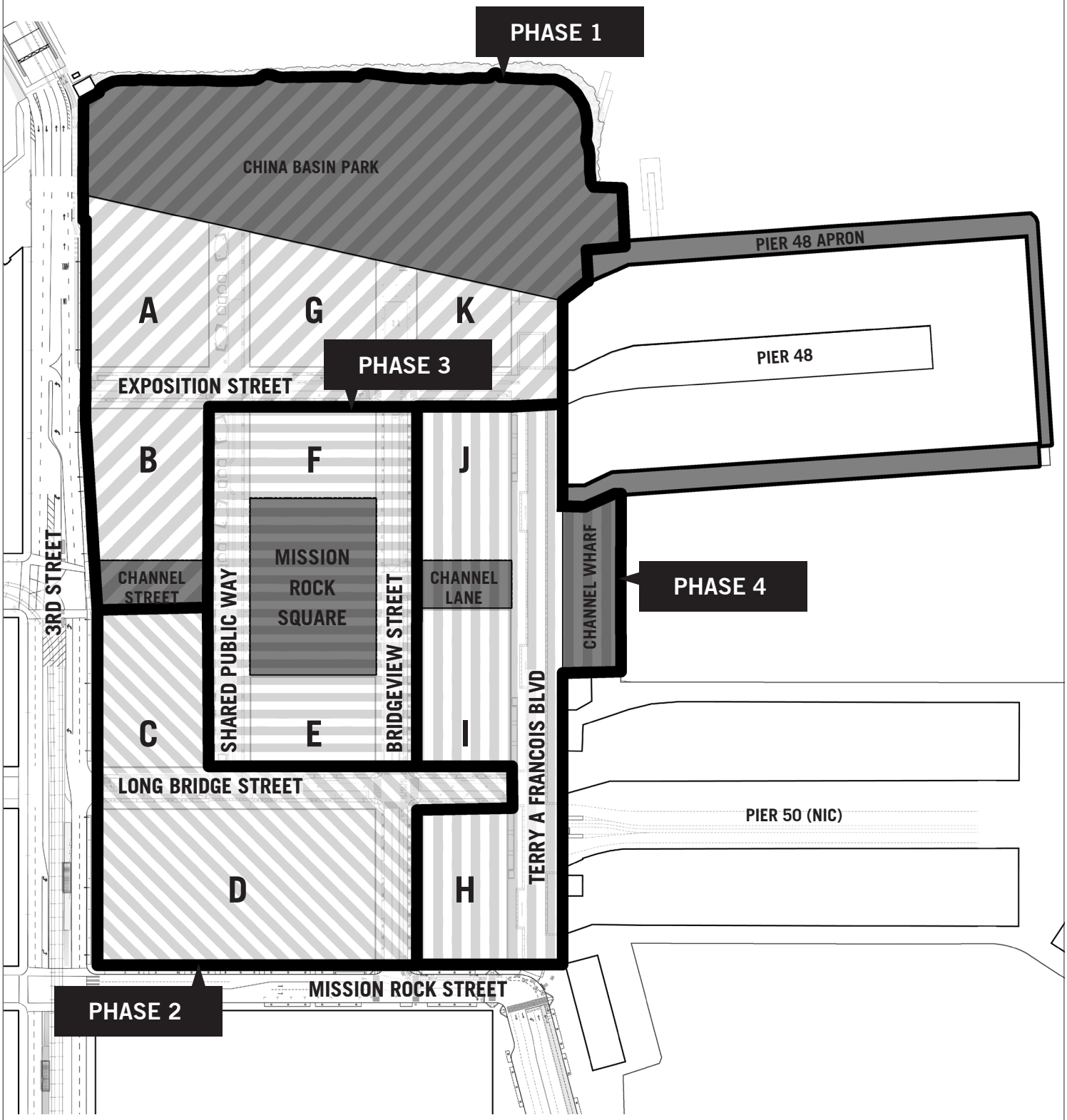


Figure 9.2: Phasing

Public Open Spaces

Phases of Development

Source: CMG LANDSCAPE ARCHITECTURE, 07/2016

10. UTILITY LAYOUT AND SEPARATIONS

10.1 Utility Systems

The Project proposes to install public utility systems, including the storm drainage system, separated sanitary sewer system, low pressure water (LPW) system, auxiliary water supply system (AWSS), and dry utility systems. Privately owned and maintained systems, district energy, greywater collection, and recycled water, will be installed to promote Project sustainability goals.

10.2 Utility Layout and Separation Criteria

Utility main layout and separations will be designed in accordance with the 2015 City of San Francisco Subdivision Regulations (Subdivision Regulations) or SFPUC Wastewater Utility Standards, as appropriate. The Project proposes district energy cooling, recycled water, and greywater collection systems which have utility separation requirements based on the Subdivision Regulations Minimum Utility Separation section and separation requirements provided by ARUP. Utility main separation requirements are presented in Figure 10.1 Horizontal Utility Main Separation Matrix.

10.3 Conceptual Utility Layout

The Project utility layout is designed to connect the proposed Project utility infrastructure to the existing adjacent public utility infrastructure facilities. The LPW system, shown on Figure 11.1, will be a looped system and have 3 connections to the existing LPW system on 3rd street and Mission Rock Street. The proposed separated sanitary system, shown on Figure 12.1, will have 3 connections to the existing sanitary sewer system on both 3rd Street and Mission Rock Street. The proposed storm drainage system, shown on Figure 13.1, will have 4 connections to the existing storm drain system on 3rd Street, a connection to the existing storm drain system on Mission Rock Street, a connection to the existing outfall at China Basin, and a connection to the existing outfall at Channel Wharf. The proposed AWSS, shown on Figure 14.1, will be a looped system with 2 connections to the existing AWSS infrastructure on 3rd Street. The district energy plant and infrastructure distribution, shown on Figure 15.1, and greywater collection, shown on Figure 15.2 will be centralized at Block A. The bay source system will be installed in China Basin Park to connect the district energy plant to the Bay. From Block A, District Energy and recycled water will be provided to all Parcels.

10.4 Utility Layout Requirement Variances

Due to constraints within the Project site, variances to standard sizing, spacing, and locations of utilities

will be required. A variance to utility standards and requirements must be approved by the department with authority over each utility. The separated sanitary sewer system, storm drainage system, LPW system, AWSS, and recycled water system exceptions must receive authorization from the SFPUC General Manager. In addition to SFPUC authorization, AWSS exceptions must receive authorization from SFFD. All locations for the utility variances listed in this section are shown in Figure 10.2.

10.4.1 Utility Main Clearance to Face of Curb

A bulb-out section, approximately 190-feet long, at the intersection of Long Bridge Street and Shared Public Way will be provided for traffic calming purposes. The bulb-out reduces the face-of-curb to face-of-curb width from 30-feet to 26-feet. The Low Pressure Water main separation to the face of curb is given priority which ultimately reduces the Storm Drain structure to face-of-curb separation to 0.3-feet from the required 4-feet clearance.

Shared Public Way will not have a curb. The theoretical street width is 20-feet which does not provide adequate width for the horizontal layout of District Energy pipes, a recycled water main, a low pressure water main, and a storm drainage main. The Project proposes to locate the storm drainage main underneath the theoretical curb at the edge of the theoretical travel way.

10.4.2 Auxiliary Water Supply System Main within Sidewalk

The street width of Terry A Francois Boulevard is inadequate to provide horizontal clearance for all proposed utility mains within the street pavement. The proposed AWSS main has been located underneath the blue greenway on the east side of Terry A Francois Boulevard, as agreed upon between the developer and the City, SFFD, and SFPUC.

10.4.3 Storm Drain Main and Sanitary Sewer Main Layout Order

Per the Subdivision Regulations, street utility order places the storm drain main closest to the face-of-curb, then the sanitary sewer main closer to the centerline of the street section. In Terry A Francois Boulevard and Exposition Street, the utility order of the storm drain main and the sanitary sewer main is switched to place the sanitary sewer main closest to the face-of-curb instead of the storm drain main. This change in layout order provides better alignment with the storm drain connection on 3rd Street and reduces crossing conflicts between the sanitary sewer and storm drain systems.

Figure 10.1 - HORIZONTAL UTILITY MAIN SEPARATION

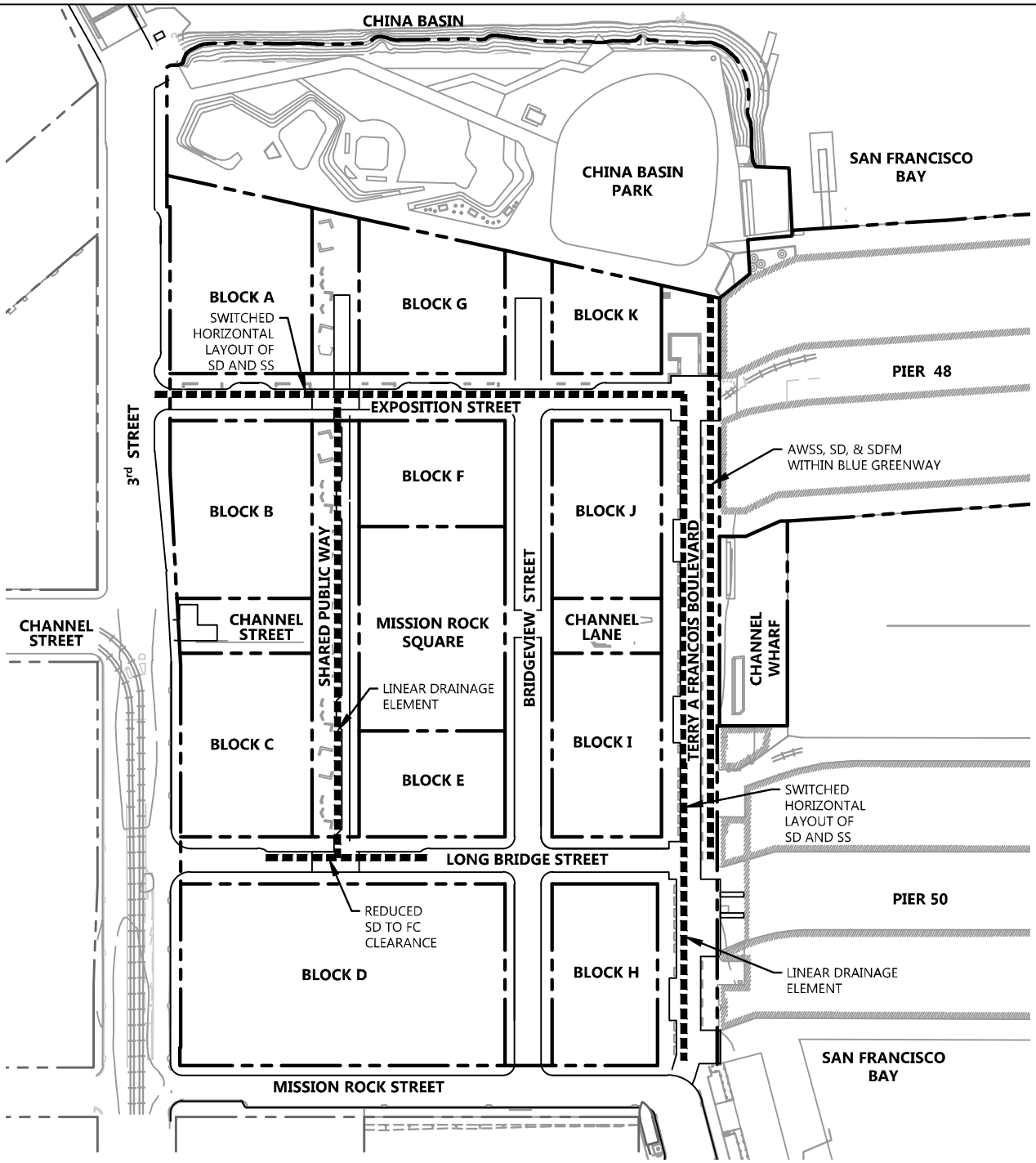
Utility Separation	Storm Drain	Sanitary Sewer	Sanitary Sewer Force Main	Potable Water (LPW)	Auxiliary Water Supply System	Recycled Water	Greywater Collection	District Energy
Face of Curb	6' clear to outside pipe, 4' clear to outside MH (Ref 1)	3.5' min clear from LG to OD (assumed from Ref 1 clearance)	3.5' min clear to OD (assumed from Ref 1)	4.5' clear to outside pipe (Ref 4) [see Note 1]	5' clear to outside pipe (Ref 1, copied LPW)	4.5' clear to outside pipe (assumed from Ref 4)	3' clear to outside pipe (assumed from Ref 1)	1' min clear to outside pipe (assumed from Ref 3)
Storm Drain	---	3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (assumed from Ref 1)	4' clear OD to OD (Ref 2)	3' clear to outside pipe (assumed from Ref 1)	3' clear to outside pipe (assumed from Ref 1)	3' clear to outside pipe (assumed from Ref 1)	3' min clear OD to OD (assumed from Ref 1)
Sanitary Sewer	---	---	3.5' min clear OD to OD (assumed from Ref 1)	10' clear OD to OD (Ref 2)	3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (assumed from Ref 1)	3.5' min clear OD to OD (assumed from Ref 1)
Sanitary Sewer Force Main	---	---	---	10' clear OD to OD (Ref 2)	3.5' min clear OD to OD (assumed from Ref 1)	3.5' min clear OD to OD (assumed from Ref 1)	3.5' min clear OD to OD (assumed from Ref 1)	3' min clear OD to OD (assumed from Ref 1)
Potable Water (LPW)	---	---	---	---	4' clear OD to OD (Ref 1 & 2)	4' clear OD to OD (Ref 1 & 2)	10' clear OD to OD (Ref 2)	4' clear OD to OD (assumed from Ref 1 & 2)
Auxiliary Water Supply System	---	---	---	---	---	3' clear to outside pipe (Ref 1)	3' clear to outside pipe (assumed from Ref 1)	3' min clear OD to OD (assumed from Ref 1)
Recycled Water	---	---	---	---	---	---	3' clear to outside pipe (assumed from Ref 1)	3' min clear OD to OD (assumed from Ref 1)
Greywater Collection	---	---	---	---	---	---	---	3' min clear OD to OD (assumed from Ref 1)

References

1 SFPUC Subdivision Regulations Diagram No. 2 Minimum Utilites Separation for Wastewater and Water - Separate Sewer System (dated October 2014)
2 CA Code of Regulations Title 22 Section 64572
3 District Energy Seperations Per ARUP Detail Mission Rock Typical Trench Sections District Energy (dated 01/12/2016)
4 SFPUC Drawing CDD-001 Standard Layout for Potable and Recycled Water Distributuion Main Installation (dated Nov 2015)

Notes

1 Due to street width constraints LPW clearance to Face of Curb reduced but not less than 4' clear (SPW & Long Bridge)



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- VARIANCE REQUEST LOCATION

ABBREVIATIONS

AWSS	AUXILIARY WATER SUPPLY SYSTEM
FC	FACE OF CURB
SD	STORM DRAIN MAIN
SS	SANITARY SEWER MAIN
FM	FORCE MAIN

N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 10.2 Utility Variance Request Locations.dwg
PLOT DATE: 09-08-16
PLOTTED BY: sllb

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 10.2 - UTILITY VARIANCE REQUEST LOCATIONS

11. LOW PRESSURE WATER SYSTEM

11.1 Existing Low Pressure Water System

Potable water service will be provided by a water supply, storage, and distribution system operated by the SFPUC. The system will be used for domestic water supply and low pressure fire hydrants. Existing LPW system infrastructure surrounds the site on Terry A Francois Boulevard (12-inch), 3rd Street (12-inch), and Mission Rock Street (12-inch). Fire hydrants and Piers 48 and 50 are serviced through the existing waterline in Terry A Francois Boulevard.

11.2 Proposed Low Pressure Water System

11.2.1 Project Water Demands

The Project water demands are identified in the Table 11.1 below and in the Low Pressure Water Master Plan (LPWMP) included as Appendix J. The LPWMP outlines the Project's methods used for calculating the flow demands. The Project proposes bay source cooling which provides significant water savings by reducing the quantity of cooling towers for the Project.

Table 11.1
Project Water Demands

Scenario	Demand (gpm)
Domestic Average Day Demand (ADD)	50
Maximum Day Demand (MDD) (includes peaking factor of 1.6)	721
Peak-Hour Demand (PHD) (includes peaking factor of 2.4)	1,081
Required Fire-Flow	1,875
Maximum Demand (Max Day Demand + Required Fire-Flow)	**2,596**

11.2.2 Project Water Supply

The Project has been accounted for in the SFPUC's latest City-wide demand projections provided in its 2013 Water Availability Study[1]. An excerpt from this document is included in the LPWMP. As concluded previously, the development would not require major expansions of the existing water system.

[1] http://www.sfwater.org/modules/showdocument.aspx?documentid=4168

11.2.3 Project Water Distribution System

The LPW system will be designed and constructed by the Developer, then owned and operated by the SFPUC upon completion of construction and acceptance of the improvements. The proposed LPW system is identified schematically in Figure 11.1. Along 3rd Street, two new LPW connections are proposed at Exposition Street and Long Bridge Street to provide an on-site looped system. This domestic water supply and fire protection system consists of 12-inch ductile iron pipe mains, low pressure fire hydrants, valves and fittings, and appurtenances. The LPW infrastructure will be located within the paved area of the street such that the outside wall of a water or sewer pipe is a minimum of 4.5-feet clear from the face-of-curb and a minimum of 5-feet clear from the center of proposed tree trunks.

Vertical and horizontal separation distances between adjacent separated sewer systems, potable water, and dry utilities will conform to the requirements outlined in Title 22 of the California Code of Regulations and the State of California Department of Health Services Guidance Memorandum 2003-02. Refer to the Typical Utility Section (Figure 11.2) for depth and relationship to other utilities. Required disinfection and connections to new mains will be performed by the SFPUC.

11.2.4 Low Pressure Water Design Criteria

The proposed low pressure water system is required to maintain a minimum pressure of 20 psi and a maximum velocity of 12 fps during a Maximum Day Demand and maintain a minimum pressure of 40 psi and a maximum velocity of 8 fps during a Peak Hour Demand. The Project water system is modeled in the LPWMP to confirm the on-site system infrastructure will meet pressure and flow requirements.

11.2.5 Proposed Fire Hydrant Locations

As shown on Figure 11.3, proposed on-site and off-site fire hydrants have been located at a maximum radial separation of 300-feet between hydrants. In addition, building fire department connections will be located within 100-feet of a fire hydrant. Final hydrant locations are subject to the approval of the SFFD, SFPUC, and will be located outside of the curb returns per DPW Order 175,387, where feasible. If fire hydrants are required by SFFD within the curb returns to meet SFFD requirements, the Project will work with the SFPUC and SFDPW to request an exception per Sections VI and VII of DPW Order 175,387 to accommodate the SFFD. Fire hydrants must not to

be located within landscape or bioretention areas and must have a paved direct path leading to the adjacent access road.

11.3 Off-Site Mitigations

Based on the report, "Computer Modeling and Analysis of the Low Pressure Water System, Mission Bay Development" by Winzler & Kelly dated May 2000, the existing 12-inch main along 3rd Street will have adequate capacity to support the Development and not require replacement.

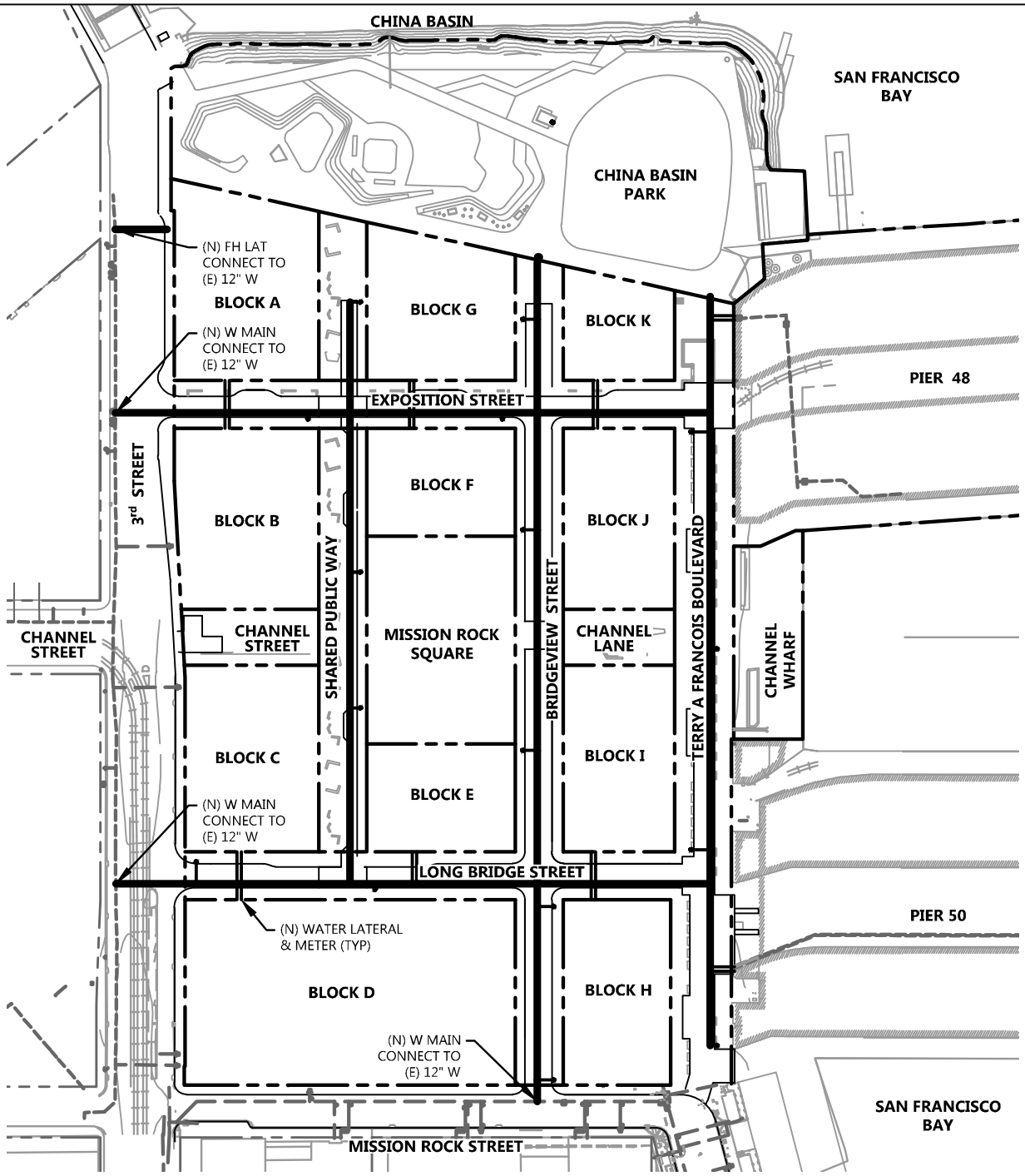
11.4 Phases for Low Pressure Water System Construction

The Developer will design and install the new LPW system based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of the proposed LPW systems installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system for the remainder of the Project. Repairs and/or replacement of the existing facilities necessary to support the proposed Development Phase will be designed and constructed by the Developer. Interim LPW systems will be constructed and maintained by the Developer as necessary to maintain existing LPW facilities impacted by proposed Development Phases.

The SFPUC will be responsible for maintenance of existing LPW facilities. The SFPUC will be responsible for the new LPW facilities once construction of the Development Phase or a new LPW facility is complete and accepted by the SFPUC. Impacts to improvements installed with previous Development Phases of the Project due to the designs of new Development Phases will be the responsibility of the Developer and addressed prior to approval of the construction drawings for the new Development Phase. For each Development Phase and prior to the submittal of Improvement Plans, the Developer will provide a Low Pressure Water Utility Report describing and depicting all existing LPW infrastructure to remain and demonstrates the Development Phase will provide the required pressures and flow of an anticipated MDD plus fire-flow.

11.4.1 Existing Low Pressure Water System Demolition Phasing

The existing LPW system adjacent to the site along 3rd Street and Mission Rock Street will remain. The existing on-site 12-inch LPW main loops through Terry A Francois Boulevard connecting 3rd Street at the Lefty O'Doul Bridge to Mission Rock Street. The portion of this main along the frontage of Pier 48 and Pier 50 will remain to provide the piers service. This main will then be replaced with a 12-inch main connected to the Mission Rock LPW system during the redevelopment of Terry A Francois Boulevard. New connections will be made to Pier 48 and Pier 50 branching from the new main.



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- EXISTING WATER LINE
- PROPOSED WATER LINE (12" DIP)
- PROPOSED WATER LATERAL

N

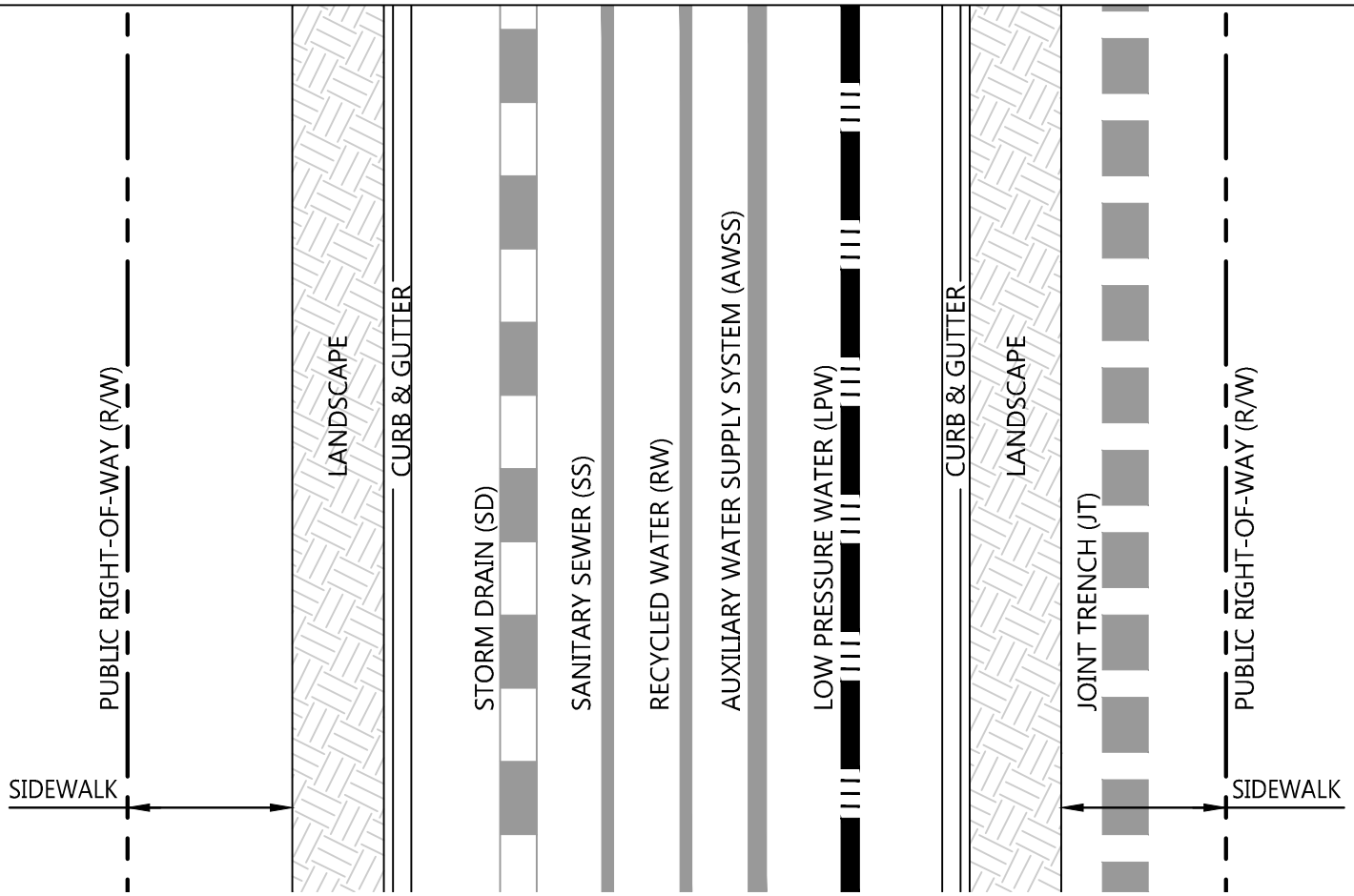
0 200

Source: BKF ENGINEERS, 07/2016

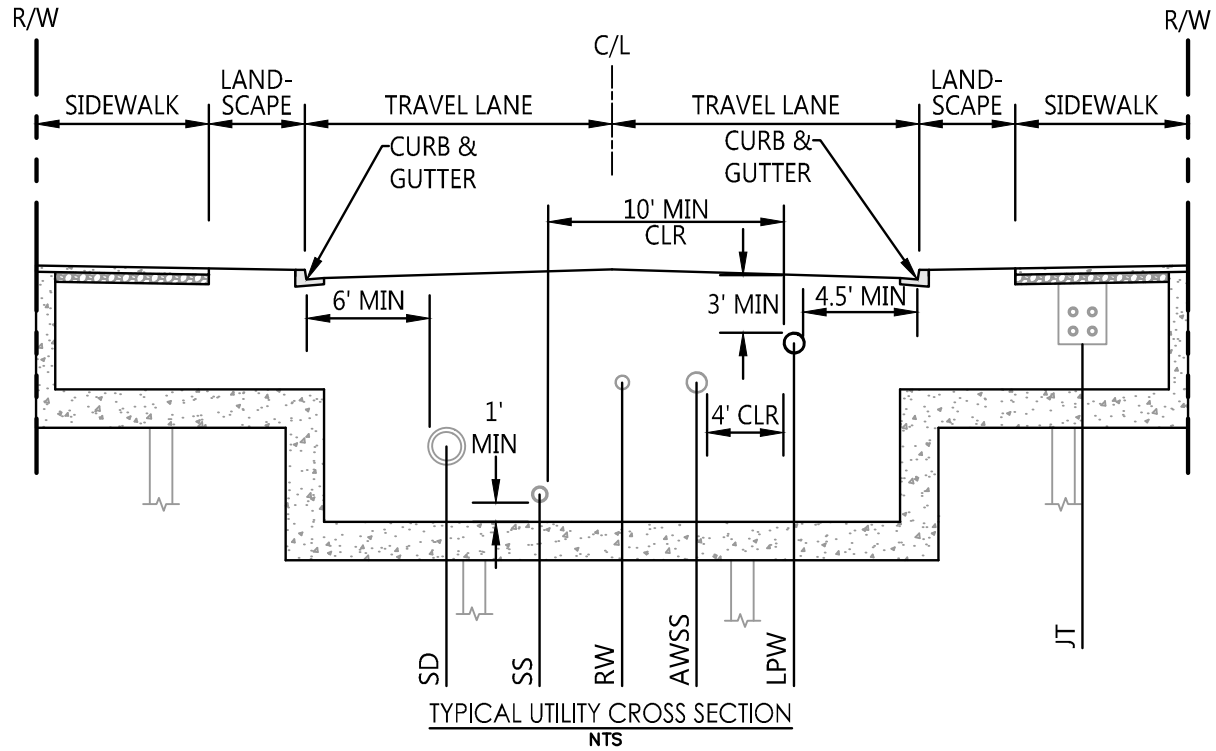
DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 11.1 Conceptual Low Pressure Water System.dwg
PLOT DATE: 09-19-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 11.1 - CONCEPTUAL LOW PRESSURE WATER SYSTEM



TYPICAL STREETS
NTS

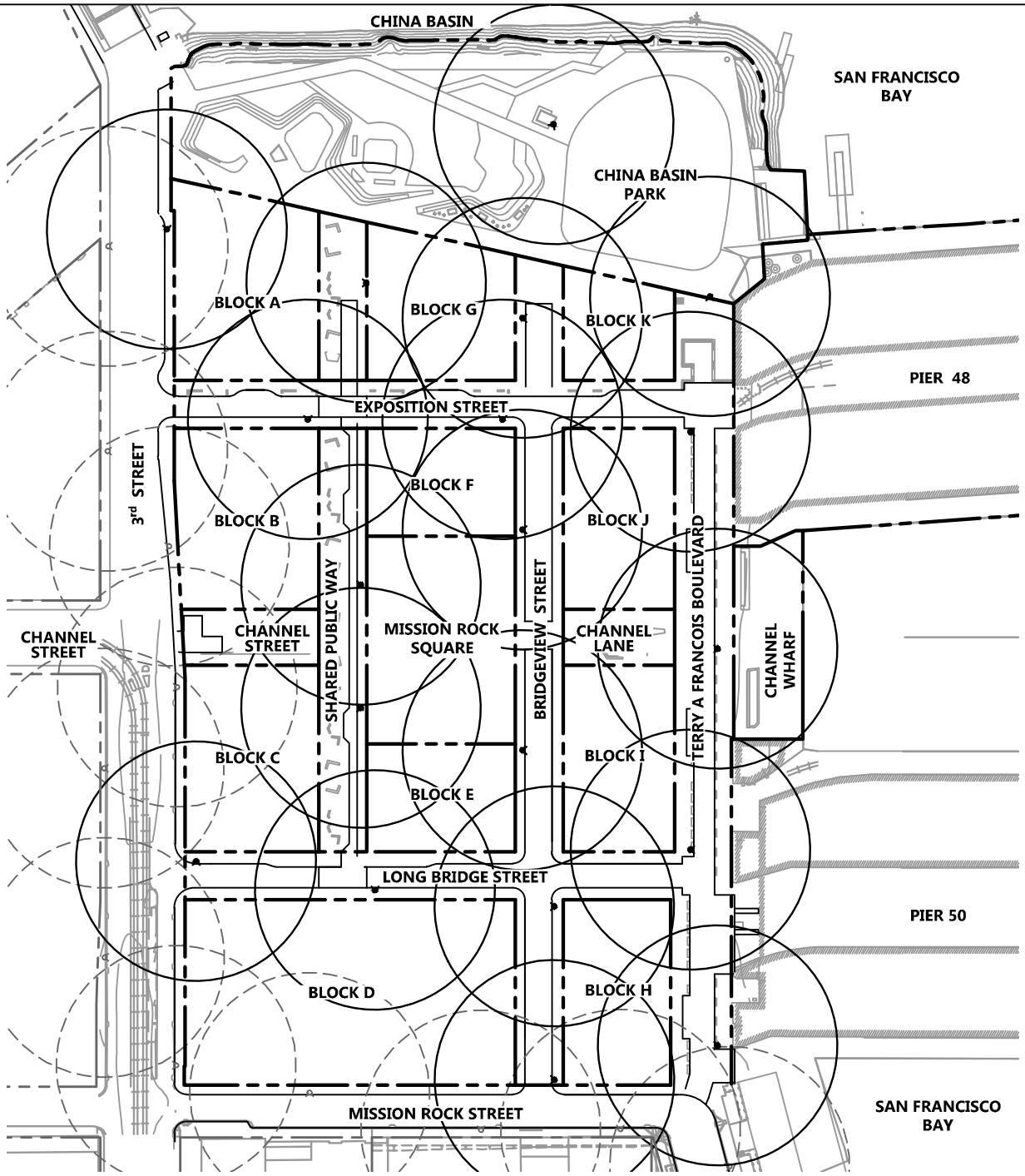


TYPICAL UTILITY CROSS SECTION
NTS

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 11.2_14.2 Typical Util Section.dwg
PLOT DATE: 09-08-16
PLOTTED BY: slib

FIGURE 11.2 - TYPICAL UTILITY SECTION WITHIN PUBLIC STREETS



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- PROPOSED FIRE HYDRANT
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT COVERAGE 150' RADIUS
- EXISTING FIRE HYDRANT COVERAGE 150' RADIUS

N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 11.3 Conceptual Fire Hydrant Locations.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib

MISSION ROCK INFRASTRUCTURE PLAN **FIGURE 11.3 - CONCEPTUAL FIRE HYDRANT LOCATIONS**

12. SANITARY SEWER SYSTEM

12.1 Existing Sanitary Sewer System

The existing uses of the site include a parking lot and China Basin Park. Although the site does not have existing sanitary sewer facilities, an existing sewer lateral off of Channel Street and 3rd Street was capped after two existing industrial building were demolished to build the parking lot.

The existing sanitary sewer infrastructure along the south and west side of the Project site has a separated sewer system. On the east side of the Project, Pier 48 and Pier 50 are served by a 15-inch sanitary storm sewer main that drains to the south within Terry A Francois Boulevard. Sanitary flows within Terry A Francois Boulevard are conveyed to a low spot in the main just south of the intersection at Mission Rock Street where there is pump station. A 6-inch force main from the San Francisco Port Pump Station at this location lifts sanitary flows into a 12-inch gravity sewer main within Mission Rock Street and is conveyed west into a 15-inch main as it reaches 3rd Street.

Existing separated sanitary sewer facilities within 3rd Street include an 8-inch main north of Channel Street which connects into a 21-inch main in between Channel Street and Mission Rock Street. The flows from the 21-inch main in 3rd Street and the 15-inch main in Mission Rock Street converge at the intersection of 3rd Street and Mission Rock Street and are conveyed through gravity sewer mains to Sanitary Sewer Pump Station #3 at Park 15 and ultimately conveyed to the San Francisco Southeast Treatment Plant prior to treatment and discharge to the Bay.

12.2 Proposed Sanitary Sewer System

12.2.1 Proposed Sanitary Sewer Demands

The Project sanitary sewer demands conservatively assume 95% return on potable water demands and 100% return on recycled water demands for Average Day Demands resulting in an Average Daily Dry Weather Flow (ADWF) of approximately 379,972 gallons per day (gpd). Applying a peaking factor of 3 to ADWF and including an infiltration rate of 0.003 cubic feet per second per acre, the Project is anticipated to generate a Peak Wet Weather Flow (PWWF) of 1,194,390 gallons per day or 1,621 gallons per minute (gpm). The Project's methods for calculation the flow demands are outlined in the SSMP included in Appendix L.

12.2.2 Proposed Sanitary Sewer Capacity

Preliminary sanitary sewer models for the entire site have been developed to confirm the sanitary sewer system designs and capacity and are included in the SSMP. Capacity of the existing 21-inch sanitary sewer main in 3rd Street is adequate to serve the Project. An analysis of the impacts of the proposed development demands on the existing upstream and downstream manholes will be reviewed as part of the SSMP review and approval process parallel to the review of the Project Infrastructure Plan.

12.2.3 Proposed Sanitary Sewer Design Basis

The proposed sanitary sewer system will be designed in accordance with the City of San Francisco 2015 Subdivision Regulations (Subdivision Regulations) or SFPUC Wastewater Utility Standards, as appropriate. These are described in detail in Appendix L.

12.2.4 Proposed Sanitary Sewer Design Criteria

Proposed 8-inch to 12-inch pipes are to be constructed from ASTM C-700 Extra Strength Vitrified Clay Pipe (VCP) and provided 6-feet of minimum cover. Proposed city main sewers within the development are to be constructed on approved crush rock bedding. The minimum residential and commercial service lateral size is 6-inches and 8-inches, respectively. Side sewers will have a fresh air inlet and trap in compliance with the Subdivision Regulations. Manhole covers will be solid with manhole spacing set at a maximum distance of 300 to 350-feet and at changes in size, grade, or alignment. Mains that are 8-inches to 12-inches in diameter shall have sufficient capacity to carry the design flow when running half full based on depth (d/D = 0.50). The slope of the main sewer will achieve a minimum flow velocity of 2 ft/sec under average flow conditions.

12.2.5 Proposed Sanitary Sewer Collection System

The proposed sanitary sewer system is identified schematically on Figure 12.1. The sanitary sewer system will be designed and constructed by the Developer. Sanitary sewer designs will be reviewed and approved by the SFPUC. Upon construction completion and improvement acceptance by the SFPUC, the new sanitary sewer system will be maintained and owned by the SFPUC. The proposed system will include sanitary sewer laterals connected to a new system of 8-inch to 12-inch gravity sanitary sewer mains.

The development will connect to the existing sanitary sewer main on 3rd Street at two locations. At the intersection of Channel Street and 3rd Street and the intersection of Long Bridge Street and 3rd Street, the on-site sanitary sewer system will connect to existing sanitary sewer main at new SFPUC manhole structures.

The remainder of the development sanitary sewer flows, in addition to the flows from Pier 48 and Pier 50, will connect to the new sanitary sewer main in Terry A Francois Boulevard.

See Figure 12.2 for a typical utility cross-section identifying the approximate sanitary sewer system depth and its horizontal relationship to other adjacent utilities.

12.2.6 Structured Street Drainage

Due to geotechnical constraints, the Project will provide structured street sections which will require subdrains to prevent accumulation of water on the structured street. Subdrains will be installed on all structured streets and be sloped to sanitary sewer connection locations. Sump pumps may be required where the structured street connects to Terry A Francois Boulevard, Mission Rock Street, and 3rd Street, if required for drainage at the low points.

12.2.7 Design Criteria Variances

Proposed pipe slopes and cover are constrained within the Project by the existing adjacent sanitary sewer system infrastructure. The existing adjacent sanitary sewer system does not have adequate depth or cover to provide compliant pipe covers. A minimum cover of 6-feet will be provided on top of mains within public streets, unless variance for a reduced cover depth of up to 4-feet is approved by the Director of Public Works with the consent of the SFPUC. Locations requiring the reduced cover variance are outlined in Figure 12.3.

With the cover and slope constraints, VCP sanitary sewer mains will not provide adequate flow velocities or capacities. To provide the minimum flow velocity of 2 ft/sec and sufficient flow capacity with the limited available pipe slopes, the Project will install fusion-welded high density polyethylene (HDPE) pipe SDR-17 or better as a variance with approval of the Director of Public Works with the consent of the SFPUC. The HDPE pipe has less friction than VCP and will provide adequate flow velocities and flow capacities.

Vertical and horizontal separation distances between adjacent sanitary sewer system, storm drain system, potable water, and dry utilities will conform to the requirements outlined in Title 22 of the California Code of Regulations and the State of California Department of Health Services Guidance Memorandum 2003-02. As shown in Figure 12.2 and described in Section 10, the sanitary sewer mains will be offset from the center of the street to ensure that adjacent water lines can be placed outside of the proposed bulb-outs while maintaining the required health code separation clearances. Horizontal clearances for proposed sanitary sewer infrastructure are provided in the Section 10 Utility Layouts and Separations and in the SSMP.

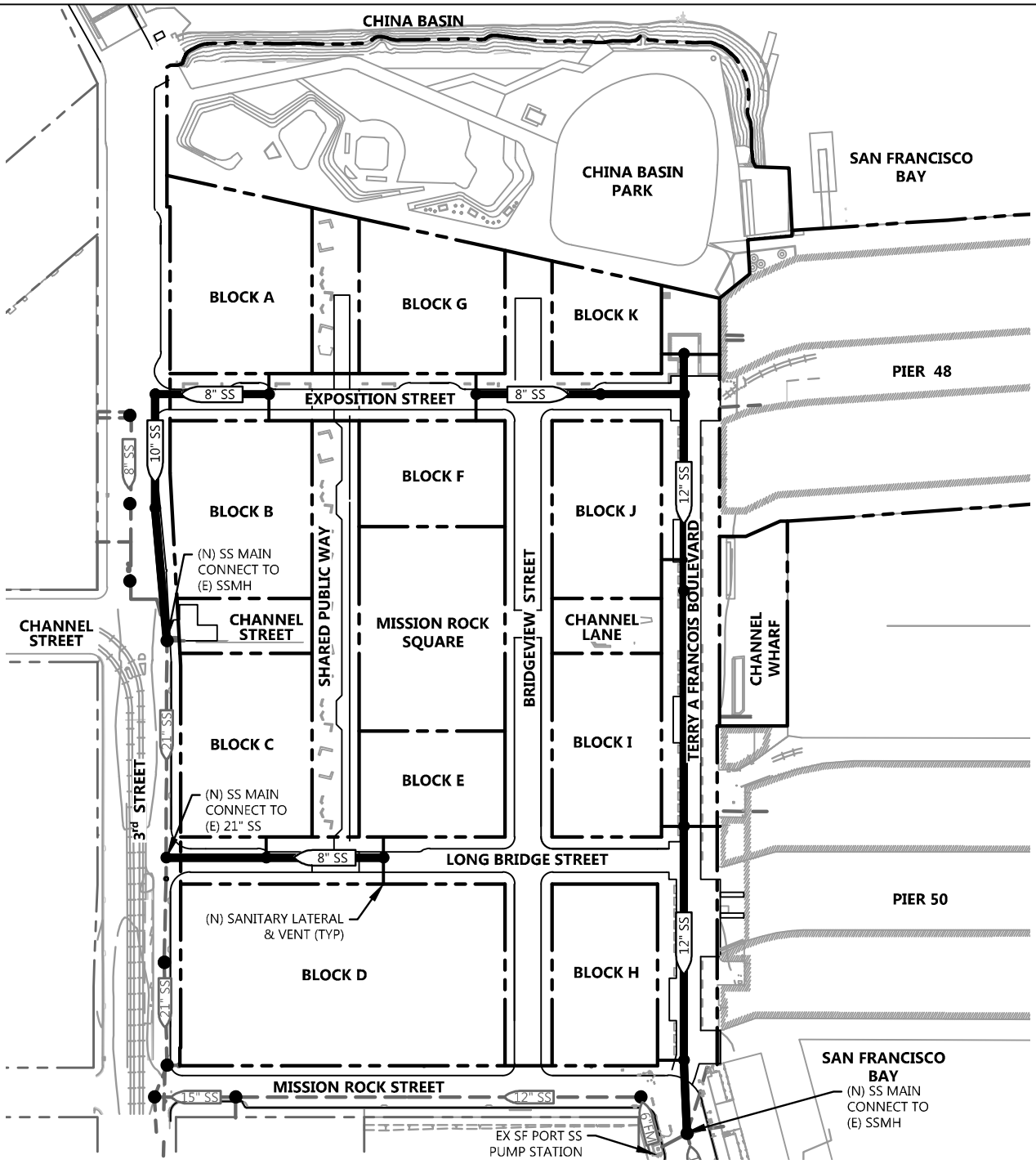
12.3 Phases for Sanitary Sewer System Construction

The Developer will design and install the new sanitary sewer system based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of the proposed sanitary sewer systems installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system for the remainder of the Project. Repairs and/or replacement of the existing facilities necessary to support the proposed Development Phase will be designed and constructed by the Developer. Interim sanitary sewer systems will be constructed and maintained by the Developer as necessary to maintain existing sanitary sewer facilities impacted by proposed Development Phases.

The SFPUC is responsible for maintenance of the existing sanitary sewer facilities. The SFPUC will be responsible for the new sanitary sewer system once construction of the Development Phase or new sanitary sewer system is complete and accepted by the SFPUC. Impacts to the improvement installed with previous Development Phases of the Project due to the designs of new Development Phases. The Developer will own and maintain interim facilities, as required, until completion of the Development Phase.

12.3.1 Existing Sanitary Sewer System Demolition Phasing

The existing sanitary sewer system adjacent to the site along 3rd Street and Mission Street will remain. The existing on-site 15-inch combined sewer main is located in Terry A Francois Boulevard east of Seawall Lot 337 and connects to the existing sanitary sewer manhole at the intersection of Mission Rock Street and Terry A Francois Boulevard. The portion of this main that along the frontage of Pier 48 and Pier 50 will remain to provide service to the Piers. This main will then be replaced with a 12-inch separated sanitary sewer system during the redevelopment of Terry A Francois Boulevard. New connections will be made to Pier 48 and Pier 50 branching from the new main.



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- PROPOSED SANITARY SEWER LINE (8" HDPE & 12" HDPE)
- EXISTING SANITARY SEWER LINE
- PROPOSED SANITARY SEWER MANHOLE
- EXISTING SANITARY SEWER MANHOLE
- 12" SS — PIPE SIZE AND FLOW DIRECTION

N

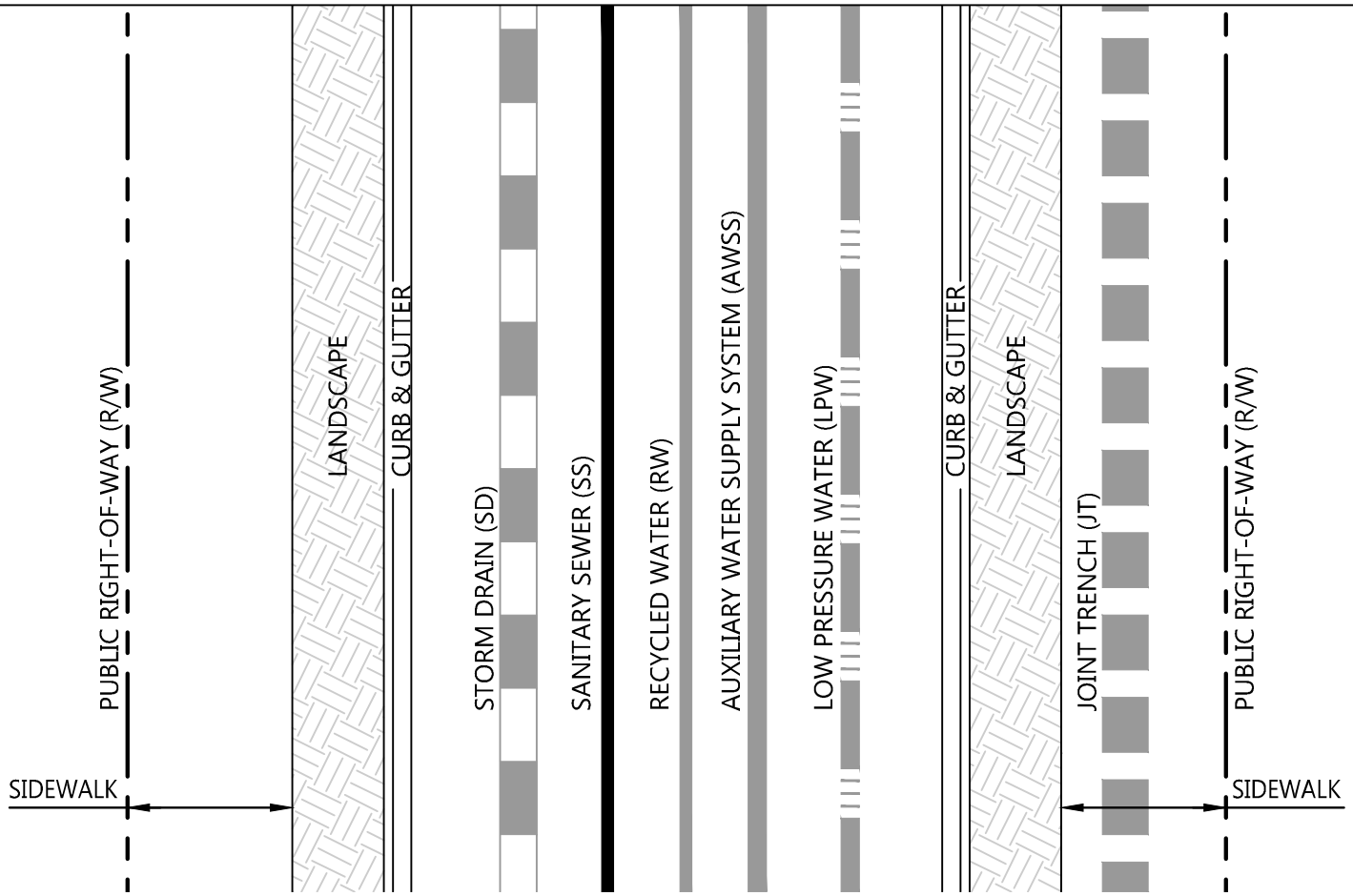
0 200

Source: BKF ENGINEERS, 07/2016

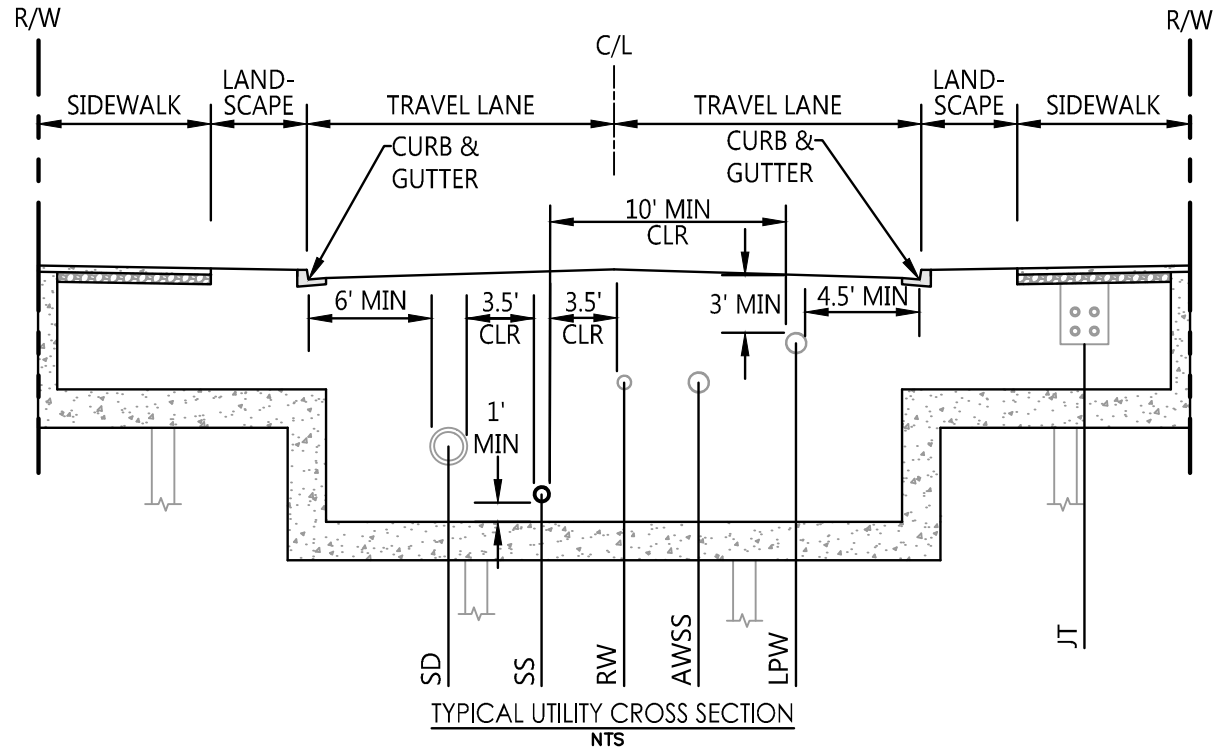
DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 12.1 Conceptual Sanitary Sewer System.dwg
PLOT DATE: 09-08-16
PLOTTED BY: sllb

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 12.1 - CONCEPTUAL SANITARY SEWER SYSTEM



TYPICAL STREETS
NTS

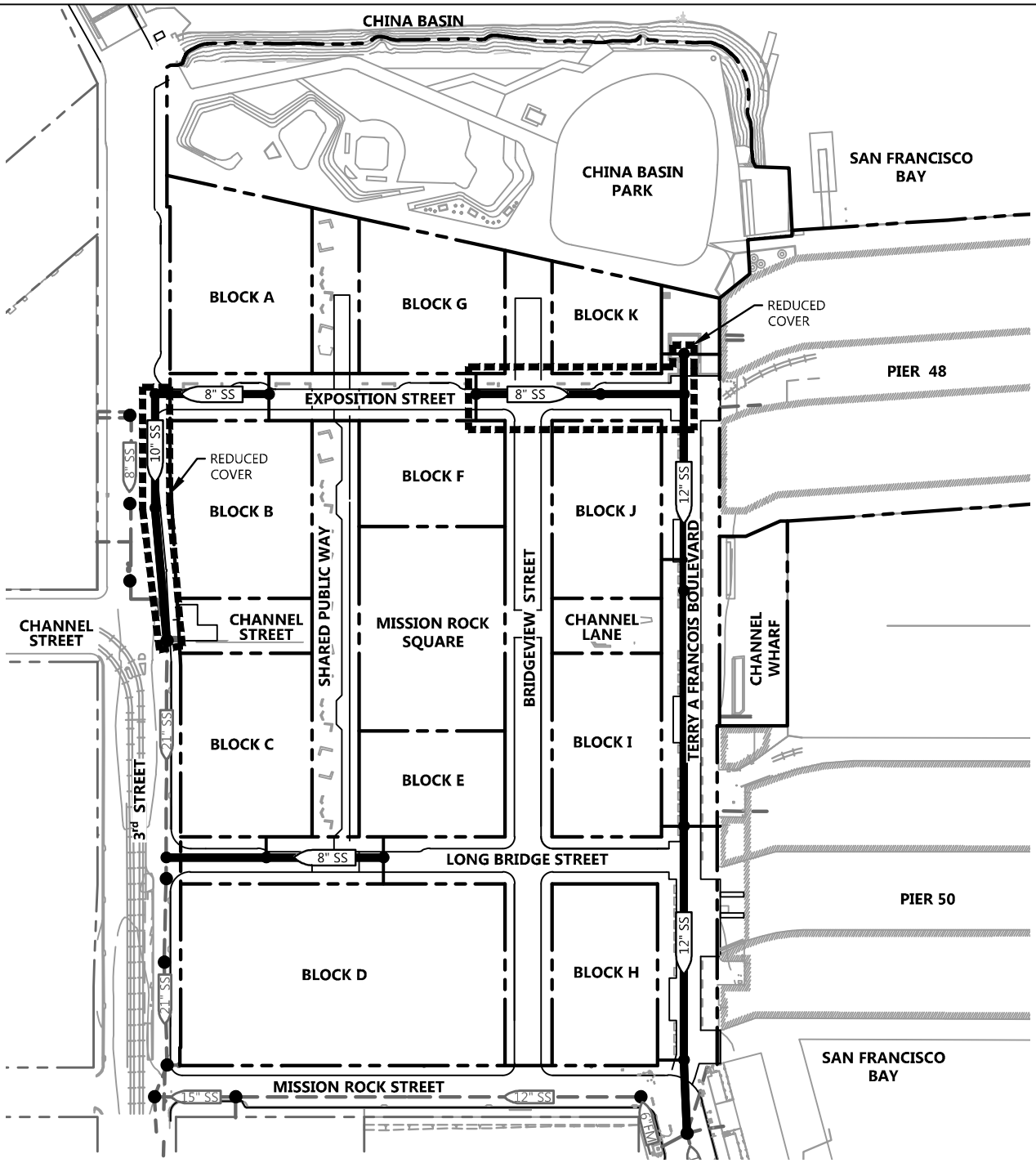


TYPICAL UTILITY CROSS SECTION
NTS

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 11.2_14.2 Typical Util Section.dwg
PLOT DATE: 09-08-16
PLOTTED BY: slib

FIGURE 12.2 - TYPICAL UTILITY SECTION WITHIN PUBLIC STREETS



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- PROPOSED SANITARY SEWER LINE (8" HDPE & 12" HDPE)
- EXISTING SANITARY SEWER LINE
- COVER VARIANCE REQUEST LOCATION
- PROPOSED SANITARY SEWER MANHOLE
- EXISTING SANITARY SEWER MANHOLE
- 12" SS — PIPE SIZE AND FLOW DIRECTION

N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 12.3 Sanitary Sewer Variance Request Locations.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 12.3 - SANITARY SEWER VARIANCE REQUEST LOCATIONS

13. STORM DRAIN SYSTEM

13.1 Existing Storm Drain System

The existing storm drain infrastructure within the vicinity of the Project site has a separated storm sewer system to the west, south, and east, and two separate culverts that drain to the San Francisco Bay. The west side of the Project is served by an existing separated storm drain system within 3rd Street that is routed to the future Mission Bay Stormwater Pump Station (SWPS) #3 for discharge to Mission Creek. Until SWPS #3 is constructed, stormwater flows continue past SWPS #3 into an existing 11' x 11' combined sewer box that drains to the existing Channel Street Pump Station. The re-aligned Mission Rock Street to the south has a new separated storm drain system that conveys stormwater to Mission Bay SWPS #6 to the south that discharges to the San Francisco Bay adjacent to the Radiance Development and Block P18. Both China Basin Park and Terry A Francois Boulevard (TFB) have storm drain systems that discharge directly to the San Francisco Bay through existing outfalls. The existing Pier 48 and Pier 50 structures have a separated storm drain system that discharge directly to the Bay from the piers.

13.2 Conceptual Storm Drain System Design

13.2.1 Overview

The Project will replace the existing on-site storm drain system with new storm drain systems connecting into the existing separated storm drain systems serving the site. The proposed separated storm drain system will be designed in accordance with the City of San Francisco 2015 Subdivision Regulations (Subdivision Regulations) and the 2016 Stormwater Management Requirements and Design Guidelines (SMR). The on-site storm drain system will be designed to convey the stormwater runoff from the 5-year storm event from the development parcels and streets. For the 100-year storm and overland release, the storm drain system, street section, and street grading will be designed to convey the stormwater runoff from the Development Parcels and streets. The proposed street grading and storm drain system has been designed to accommodate the 5-year storm event, 100-year storm event, and overland release per the Grading and Drainage Master Plan in Appendix G.

13.2.2 5-Year Storm Design

A storm drain system model for the entire site has been developed in the Grading and Drainage Master Plan to confirm the separated storm drain system is adequately sized to handle the 5-year storm event with a minimum of 2-feet of freeboard between the hydraulic grade line (HGL) of the

street and the flow line of the street grades. Storm drain system capacities within the existing 42-inch storm drain system in 3rd Street and the 21-inch storm drain main in Mission Rock Street are adequate to serve the entire buildout of the project.

13.2.3 100-Year Storm Design and Overland Release

A storm drain system model for the entire site has been developed in the Grading and Drainage Master Plan in Appendix G to confirm the storm drain system, street section, and street grading are able to convey the 100-year storm event and overland release without overtop the street curb. For the curbless street of TFB, this street was modeled to confirm that a 4-feet wide accessible path is maintained while overland release from the 100-year storm event occurs within the street. While Share Public Way (SPW) is also curbless, the analysis found the storm drain system was sized adequately prevent the HGL of the 100-year storm design from reaching the surface. The starting HGL for the model has assumed the top of curb elevation at adjacent street conforms along 3rd Street.

13.2.4 Storm Drain Design Criteria

As documented in the Subdivision Regulations or San Francisco Public Utility Commission (SFPUC) utility standards, as appropriate, proposed 6-inch to 21-inch pipes will be constructed from ASTM C-700 Extra Strength Vitrified Clay Pipe (VCP). Main extensions for 36-inch pipes or larger shall require monolithic reinforced concrete or reinforced concrete pipe subject to approval by the Director with consent of the SFPUC. High density polyethylene (HDPE) pipe SDR-17 or better will be used in place of VCP where approved by the Director of Public Works with the consent of the SFPUC. HDPE larger than 12-inch shall be mandrel tested.

Proposed City storm drain mains within the Project will be constructed on approved crush rock bedding. The minimum residential and commercial service lateral size is 6-inches and 8-inches, respectively. Manhole covers will be solid with manhole spacing set at a maximum distance of 300-feet to 350-feet and at changes in size, grade or alignment. Stormwater inlets will be installed per the Subdivision Regulations or SFPUC wastewater utility standards and outside of the curb returns crosswalks, accessible passenger loading zones and accessible parking spaces, where feasible. Trench drains within the bike and pedestrian zones of TFB and SPW will be installed to be American with Disabilities Act (ADA) compliant. Within vehicular zones on the curbless streets

of TFB and SPW, linear drainage elements will also be rated to handle heavy vehicle (H20) traffic loading.

A minimum depth of cover of 6-feet will be required on top of storm drain mains within public streets. A freeboard of 4-feet below pavement or ground will be required to conform to the Subdivision Regulations or SFPUC utility standards. If necessary, an alternative minimum cover of 4-feet and/or minimum freeboard of 2-feet below pavement or ground may be permitted by the Director with the consent of the SFPUC.

Vertical and horizontal separation distances between adjacent sanitary sewer system, storm drain system, potable water, district utilities, and dry utilities will conform to the requirements outlined in Section 10. Final approval of the storm drain location within the street section and variances is subject to SFPUC approval during the Project construction document review process.

13.2.5 Conceptual Storm Drain System Layout

The conceptual storm drain system is identified schematically on Figure 13.1. The storm drain system will be designed and constructed by the Developer. Street storm drains including street drainage within the new City street rights-of-way will be reviewed and approved by the SFPUC. The new storm drain system will be maintained and owned by the SFPUC, upon construction completion and improvement acceptance by the SFPUC. The proposed system will include storm drain laterals connected by a system of 12-inch to 42-inch gravity storm drain mains.

The conceptual storm drain system will connect to the existing storm drain systems at up to seven locations. Along 3rd Street, the on-site storm drain system will connect to existing 42-inch main through proposed manhole structures at Exposition Street, Channel Street, Long Bridge Street, China Basin Park, and the west half of Block D. The storm drain system within TFB will drain to a sump to pump low flows to China Basin Park for treatment. For larger storm events, TFB will connect into an existing 30-inch culvert draining to the San Francisco Bay between Pier 48 and Pier 50. China Basin Park storm drain system will connect into an existing 12-inch culvert draining to China Basin for discharge of treated stormwater or to the proposed connection to 3rd Street for larger storm events.

See Figure 13.2 for the approximate storm drain system depth and its relationship to other adjacent utilities.

13.2.6 Storm Drain System Variances

13.2.6.1 Freeboard and Cover Variances

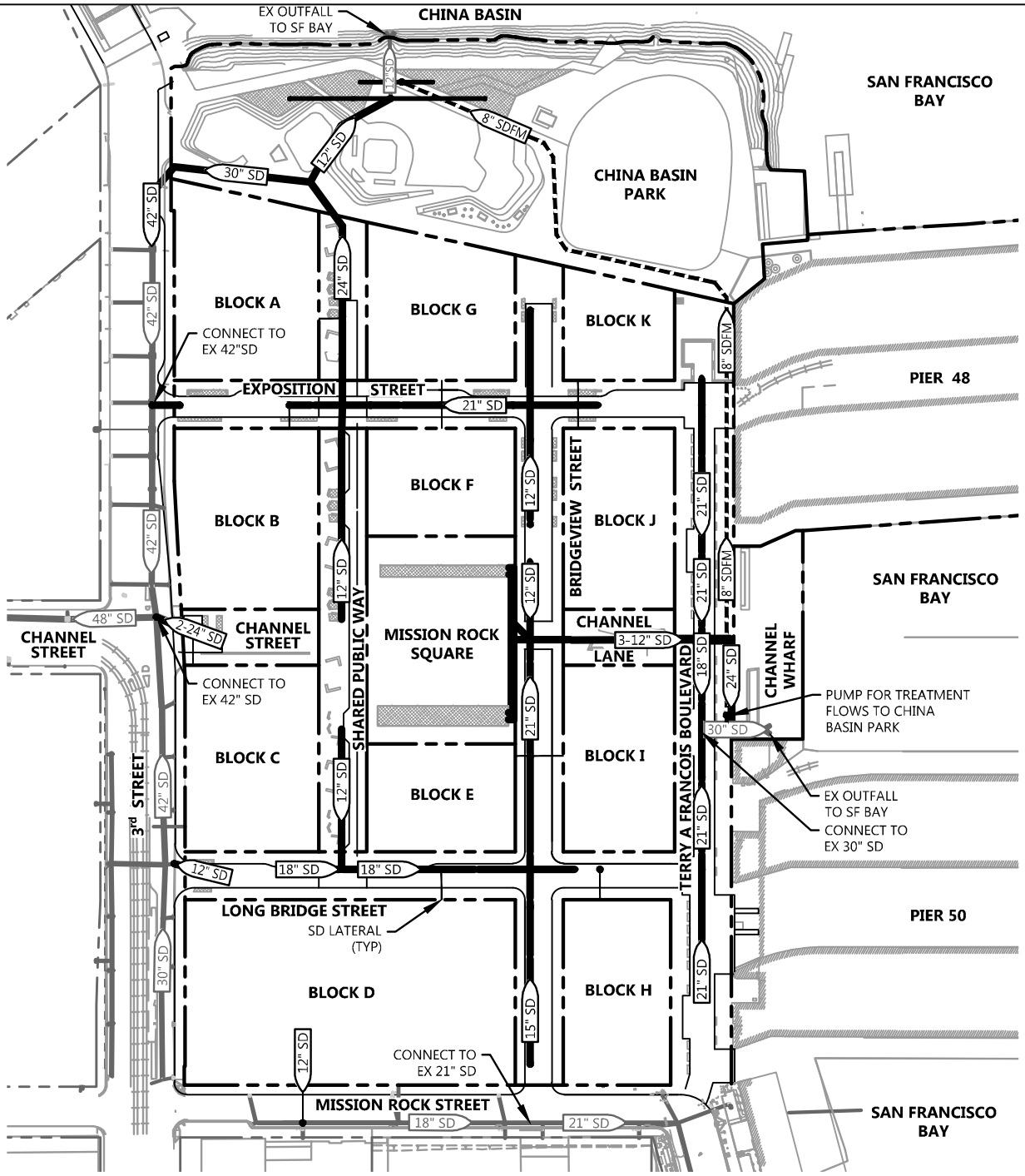
Due to existing conditions and constraints within the Project site, exceptions to the standard layout of utilities will be necessary. The conceptual storm drain system design will require a variance applicable to the Project's storm drain system since a reduced minimum cover of 4-feet on top of utilities is necessary. As a result, the 5-year storm design analysis showed that the conceptual storm drain system was only able to provide a minimum hydraulic grade line (HGL) of 2-feet of freeboard below the pavement or ground surface due to existing high starting HGL elevations at existing storm drain connections.

13.2.6.2 Variances for Curbless Streets

For TFB and SPW, a variance will be required for the curbless condition. Linear drainage elements are proposed along the theoretic face of curb of these curbless streets. While analysis of SPW for the 100-year storm event showed stormwater remained within the storm drain system below the surface, TFB was able to minimum a 4-feet wide accessible path during overland release within the curbless street.

13.3 Phases for Storm Drain System Construction

The Developer will design and install the new storm drain system based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of the proposed storm drain systems installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system for the remainder of the Project. Repairs and/or replacement of the existing facilities necessary to support the proposed Development Phase will be designed and constructed by the Developer. Interim storm drain systems will be constructed and maintained by the Developer as necessary to maintain existing drainage facilities impacted by proposed Development Phases.



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- 12" SD — EXISTING STORM DRAIN MAIN
- 12" SD — PROPOSED STORM DRAIN MAIN
- 8" SDFM — PROPOSED STORM FORCE MAIN
- EXISTING STORM DRAIN MANHOLE
- PROPOSED STORM DRAIN MANHOLE
- BIORETENTION AREA

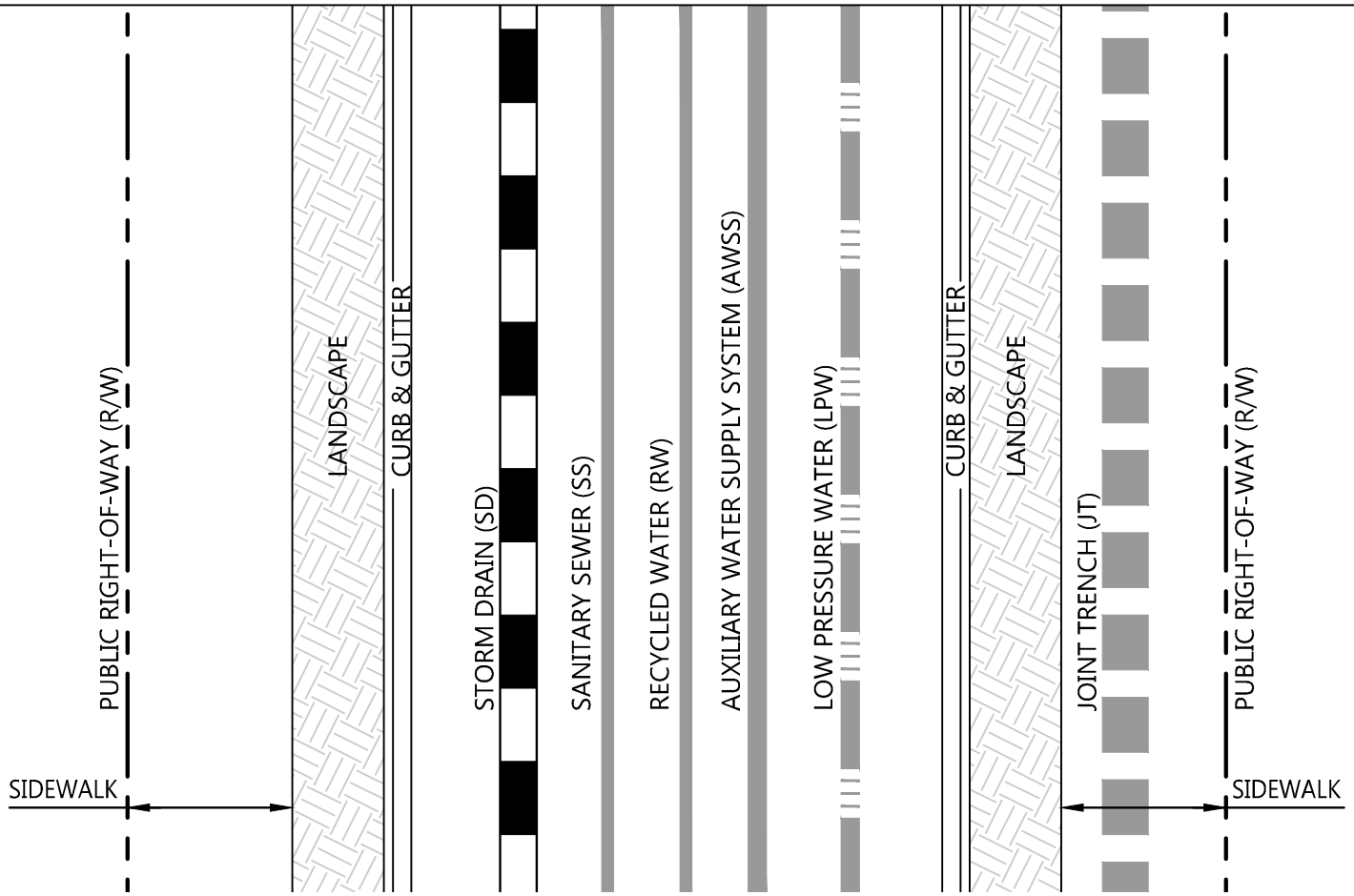
N

0 200

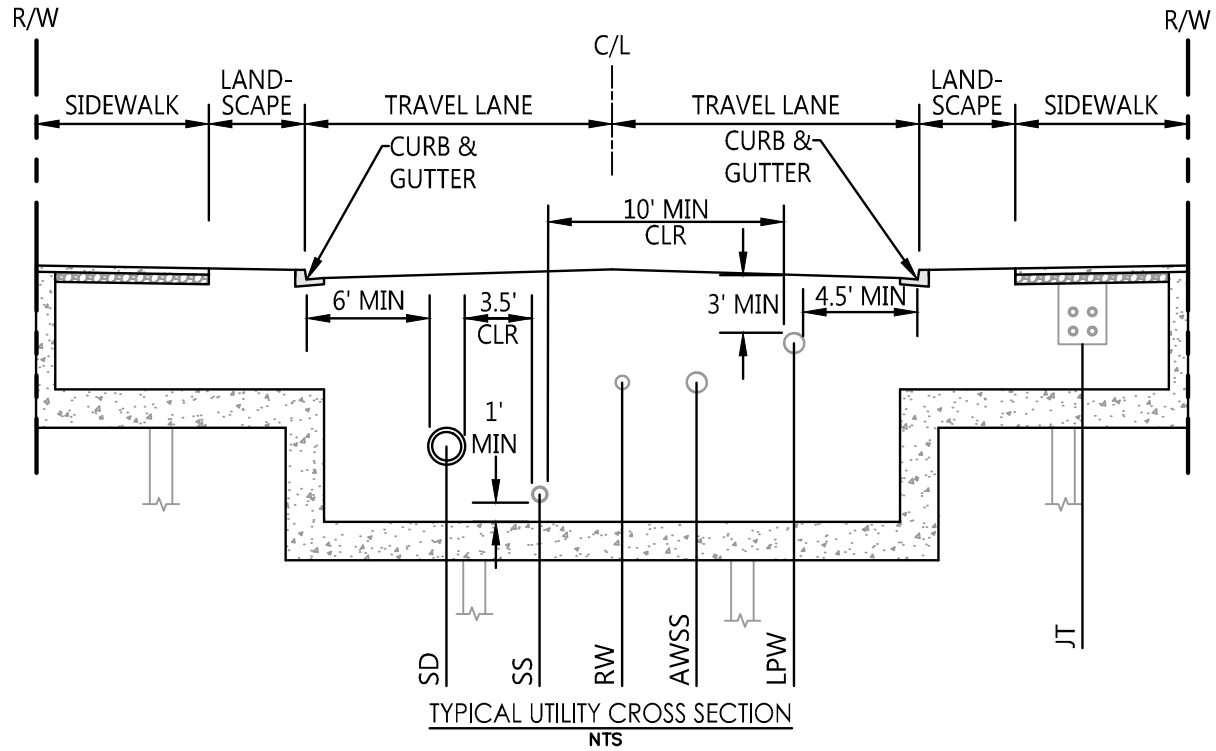
Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 13.1 Conceptual Storm Drainage System.dwg
PLOT DATE: 09-20-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN **FIGURE 13.1 - CONCEPTUAL STORM DRAINAGE SYSTEM**



TYPICAL STREETS
NTS



TYPICAL UTILITY CROSS SECTION
NTS

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 11.2_14.2 Typical Util Section.dwg
PLOT DATE: 09-08-16
PLOTTED BY: slib

FIGURE 13.2 - TYPICAL UTILITY SECTION WITHIN PUBLIC STREETS

14. AUXILIARY WATER SUPPLY SYSTEM (AWSS)

14.1 Existing AWSS Infrastructure

The San Francisco Public Utilities Commission (SFPUC), in cooperation with the San Francisco Fire Department (SFFD), owns and operates the Auxiliary Water Supply System (AWSS), a high-pressure non-potable water distribution system dedicated to fire suppression that is particularly designed for reliability after a major seismic event. Currently, a 12-inch AWSS main exists adjacent to the Project site on 3rd Street between Channel Street and Mission Rock Street.

14.2 AWSS Regulations and Requirements

New developments within the City and County of San Francisco (CCSF) must meet the fire suppression objectives that were developed by the SFPUC and SFFD. The SFPUC and SFFD work with the Developer to determine post-seismic fire suppression requirements during the planning phases of the Project. Requirements will be determined based on building density, fire flow and pressure requirements, City-wide objectives for fire suppression following a seismic event, and proximity of new facilities to existing AWSS facilities. AWSS improvements will be located in public right-of-way, on CCSF property, on Port of San Francisco property, or on private property within a public easement, as approved by SFPUC on a case by case basis.

14.3 Conceptual AWSS Infrastructure

To meet the SFPUC and SFFD AWSS requirements, the development may be required to incorporate infrastructure and facilities that may include, but are not limited to:

- Seismically reliable 12-inch high-pressure water piping and hydrants with connection to existing AWSS distribution system;
- Independent network of seismically reliable low-pressure piping and hydrants with connection to existing potable water distribution system at location that is determined to be seismically upgraded by SFPUC;
- Saltwater pump station that supplies saltwater to AWSS distribution piping following a major seismic event;
- Piping manifolds along waterfront that allow fire trucks to access and pump sea or bay water for fire suppression; and/or
- Portable water supply system (PWSS), including long reaches of hose and equipment mounted on dedicated trailers or trucks.

The proposed locations and types of AWSS infrastructure are identified schematically on Figure 14.1 and approximate AWSS main depths and its relationship to other adjacent utilities are shown on Figure 14.2. AWSS fire hydrants are provide at each street intersection within the Project site. The Project proposes a piping manifold in the Channel Wharf to allow fire trucks access to pump sea or bay water for fire suppression. A conceptual manifold detail is included in Appendix M. Final designs of the AWSS solution for the Project site will be determined by the SFPUC and SFFD in consultation with the Developer.

14.4 Phases for AWSS Construction

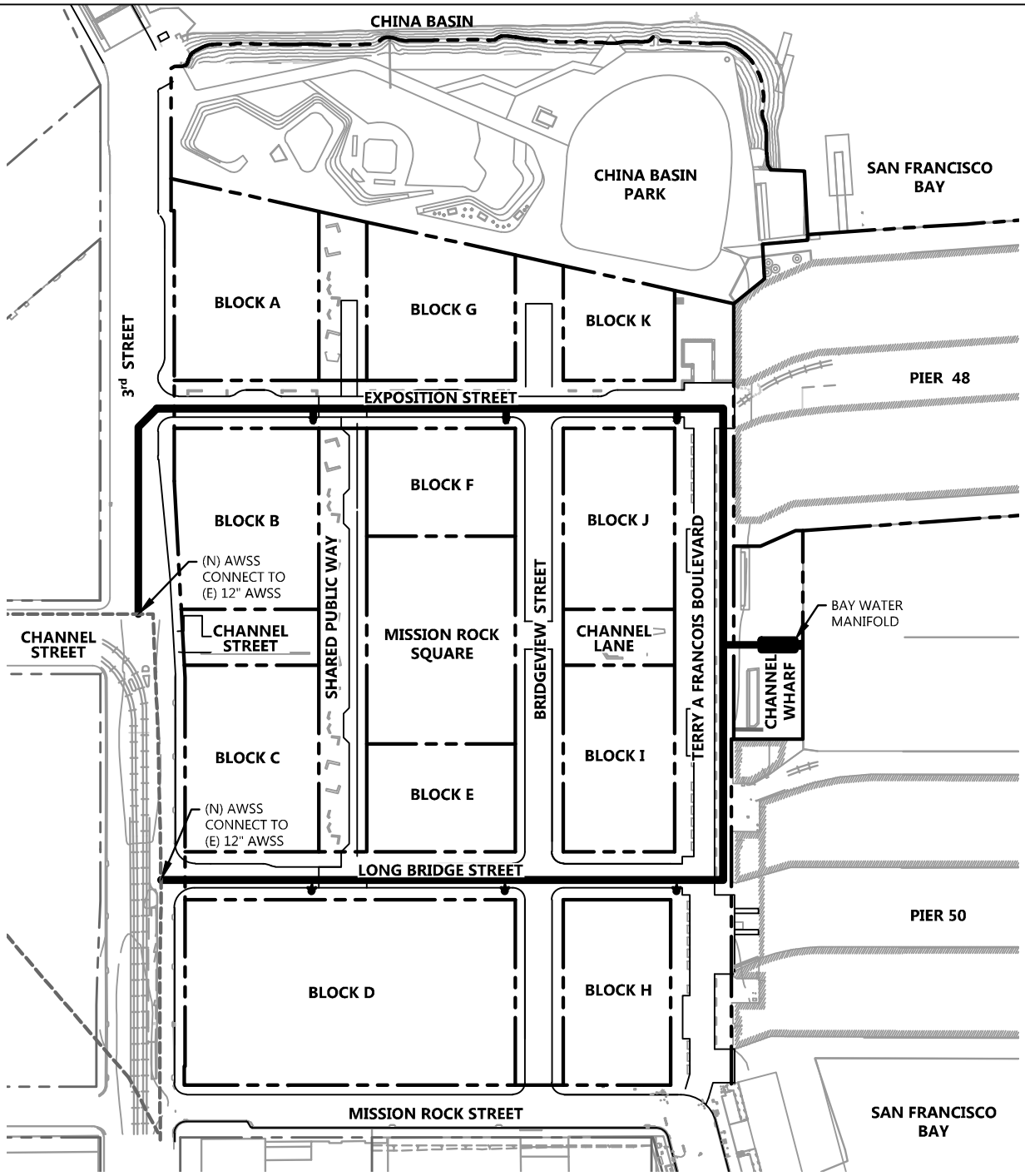
The Developer will design and install the new AWSS based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of the proposed AWSS installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system for the remainder of the Project. Repairs and/or replacement of the existing facilities necessary to support the proposed Development Phase will be designed and constructed by the Developer. Interim AWSS will be constructed and maintained by the Developer as necessary to maintain existing AWSS facilities impacted by proposed Development Phases.

The SFPUC will be responsible for the new AWSS facilities once construction of the improvements is complete and are accepted by the SFPUC. Impacts to improvements installed with previously constructed portions of the development due to the designs of other phases will be the responsibility of the Developer and addressed prior to approval of the construction drawings for the new phase.

14.4.1 AWSS Phased Installation

The Mission Rock AWSS will be installed within the phased structured streets. The existing AWSS adjacent to the site along 3rd Street will remain in place. The new system will connect to the existing system at the adjacent existing AWSS main along 3rd Street.

For each Development Phase, the SFPUC, in conjunction with its consultants, will provide an AWSS Report describing and depicting the pressures and flows the AWSS provides with the Phase. The construction documents will be completed by the SFPUC and the Developer.



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- PROPOSED AWSS LINE (12" DIP)
- EXISTING AWSS LINE
- FIRE HYDRANT, LATERAL, AND VALVE
- BAY WATER MANIFOLD

N

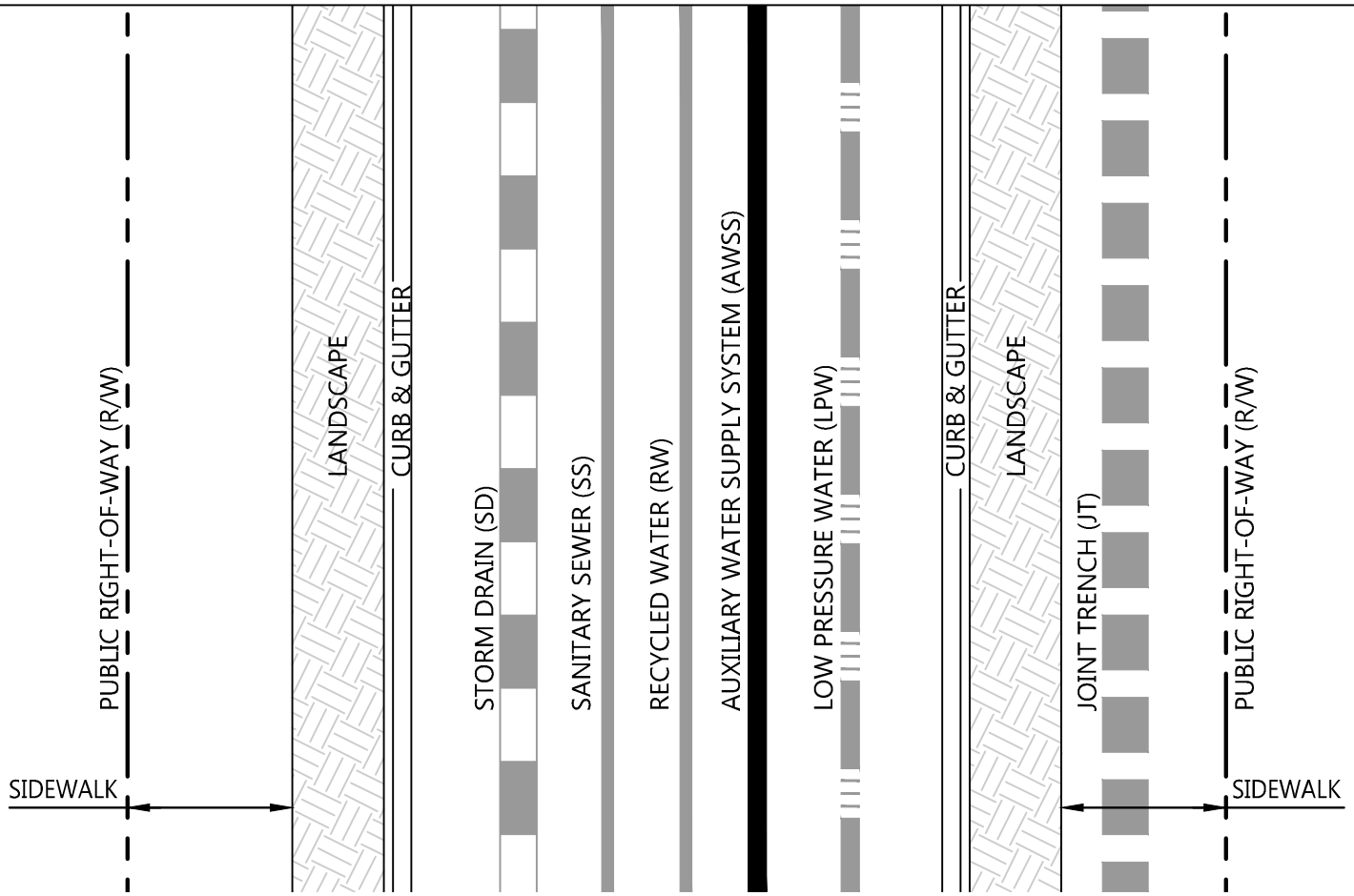
0 200

Source: BKF ENGINEERS, 07/2016

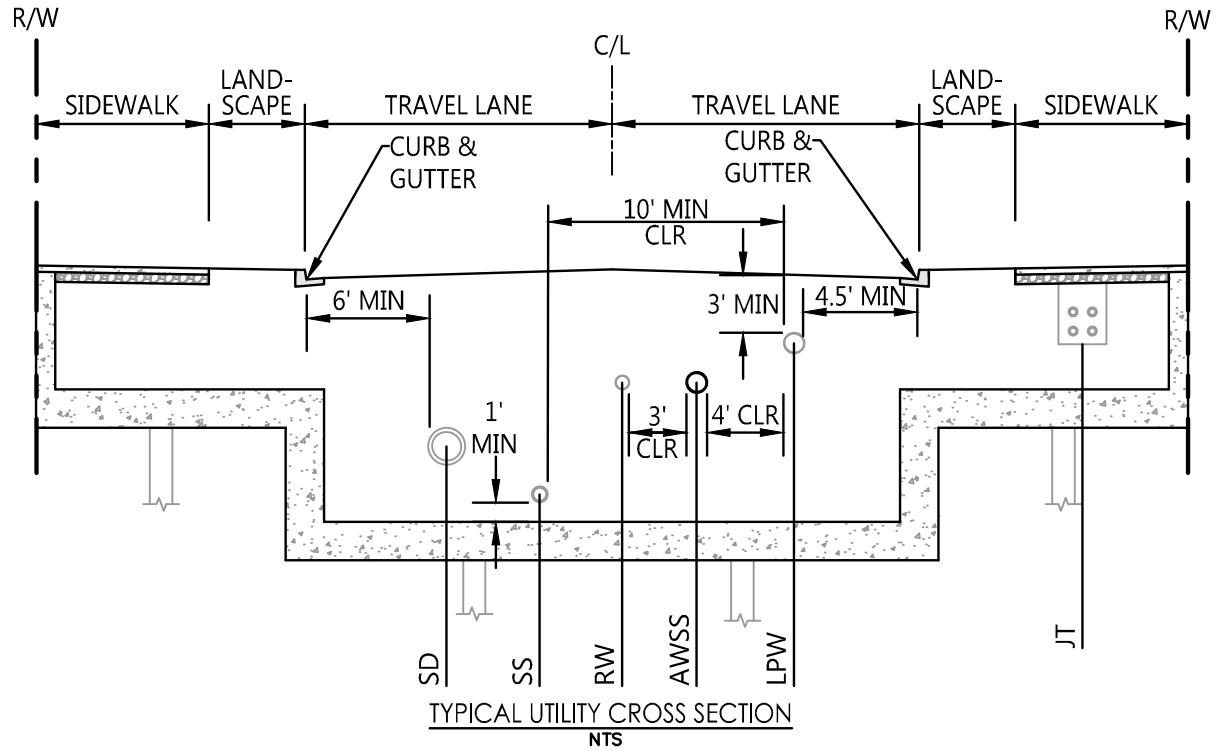
DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 14.1 Conceptual Auxiliary Water Supply System.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slib

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 14.1 - CONCEPTUAL AUXILIARY WATER SUPPLY SYSTEM



TYPICAL STREETS
NTS



TYPICAL UTILITY CROSS SECTION
NTS

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 11.2_14.2 Typical Util Section.dwg
PLOT DATE: 09-08-16
PLOTTED BY: slib

FIGURE 14.2 - TYPICAL UTILITY SECTION WITHIN PUBLIC STREETS

15. CENTRAL UTILITY DISTRICT INFRASTRUCTURE

15.1 Central Utility Plant

The Mission Rock development will utilize a central utility plant (CUP) in Block A for heating and cooling, greywater collection, and recycled water distribution infrastructure required to achieve the sustainability goals of the Project. The heating and cooling will be provided by a bay sourced cooling loop that will connect the Bay to the chillers at the CUP. Greywater will be collected and directed to the CUP for treatment before distribution throughout the Project for recycled water uses. The development is considered a Type-I Eco-District. The horizontal infrastructure maximizes efficiencies thereby conserving natural resources, providing budget certainty for thermal services and creating resilient utility infrastructure. In addition to providing a sustainable district energy system throughout the site, the Type-I Eco-District development will also meet the San Francisco Eco-District guidelines. For additional information, refer to the District Heating and Cooling Services at Mission Rock prepared by Arup, dated May 13, 2016 in Appendix M and the latest edition of the Sustainability Strategy prepared by Atelier Ten.

15.1.1 Central Utility Plant Components

The CUP comprises a central district energy distribution plant, bay source cooling, greywater treatment, and recycled water distribution plant at Block A. The central energy plant will provide chilled and heating hot water to each Development Parcel. The recycled water distribution plant will supply non-potable water to each Development Parcel. The distribution system will be developed with consideration to other site utilities, but is anticipated to be predominately routed through Shared Public Way, Bridgeview Street, and China Basin Park. Considerations for this utility routing include limiting the amount of district utilities that are parallel to the main public utilities in Exposition Street and Long Bridge Street and development phasing. Locations for each Development Parcel's heating hot water and chilled water connections, greywater collection point of connection, and recycled water distribution point of connection will be determined during the vertical design for each Development Parcel.

15.1.2 Central Energy Plant

The Project has a goal to use renewable energy for 100% of its building energy demands, thereby offsetting its projected greenhouse emissions. The central energy plant will be powered by 100% renewable energy. The renewable energy may be purchased from an off-site renewable energy provided and delivered to the site via SFPUC or PG&E. Chilled water and heating hot water supply

and return lines will distribute heating and cooling energy from the central energy plant at Block A to each Development Parcel. All Development Parcels will be required to connect to this system, which also significantly reduces the volume of water required by cooling towers. Chilled water and heating hot water supply lines are distributed to the Development Parcels from the central energy plant at Block A through Shared Public Way, Bridgeview Street, and China Basin Park.

15.1.3 Heat Rejection and Cooling

Bay water may be used for heat rejection and cooling in the district energy system to minimize the energy demand for cooling and provide significant water savings by reducing the need for cooling towers. Cooling will be provided by the bay source cooling loop that rejects heat from the chillers at the central plant to the Bay. This heat exchange requires very little energy. The HDPE Intake and outfall pipes will be placed within the Pier 48 footprint, at or slightly below the seabed elevation and on top of plastic lumber. The inlet screens will be in deep water, protected by the pier and accessible for maintenance. Secondary screening may also be provided at the pump station on-shore or near the bulkhead. The bay source heat rejection infrastructure will likely consist of two 24-inch pipes located in China Basin Park that provide a connection between the intake/outfall at Pier 48 and the central plant at Block A, shown on Figure 15.1. Backup cooling towers may be required for emergency or maintenance operations when the bay source cooling system is offline.

15.1.4 Greywater Collection and Recycled Water Distribution

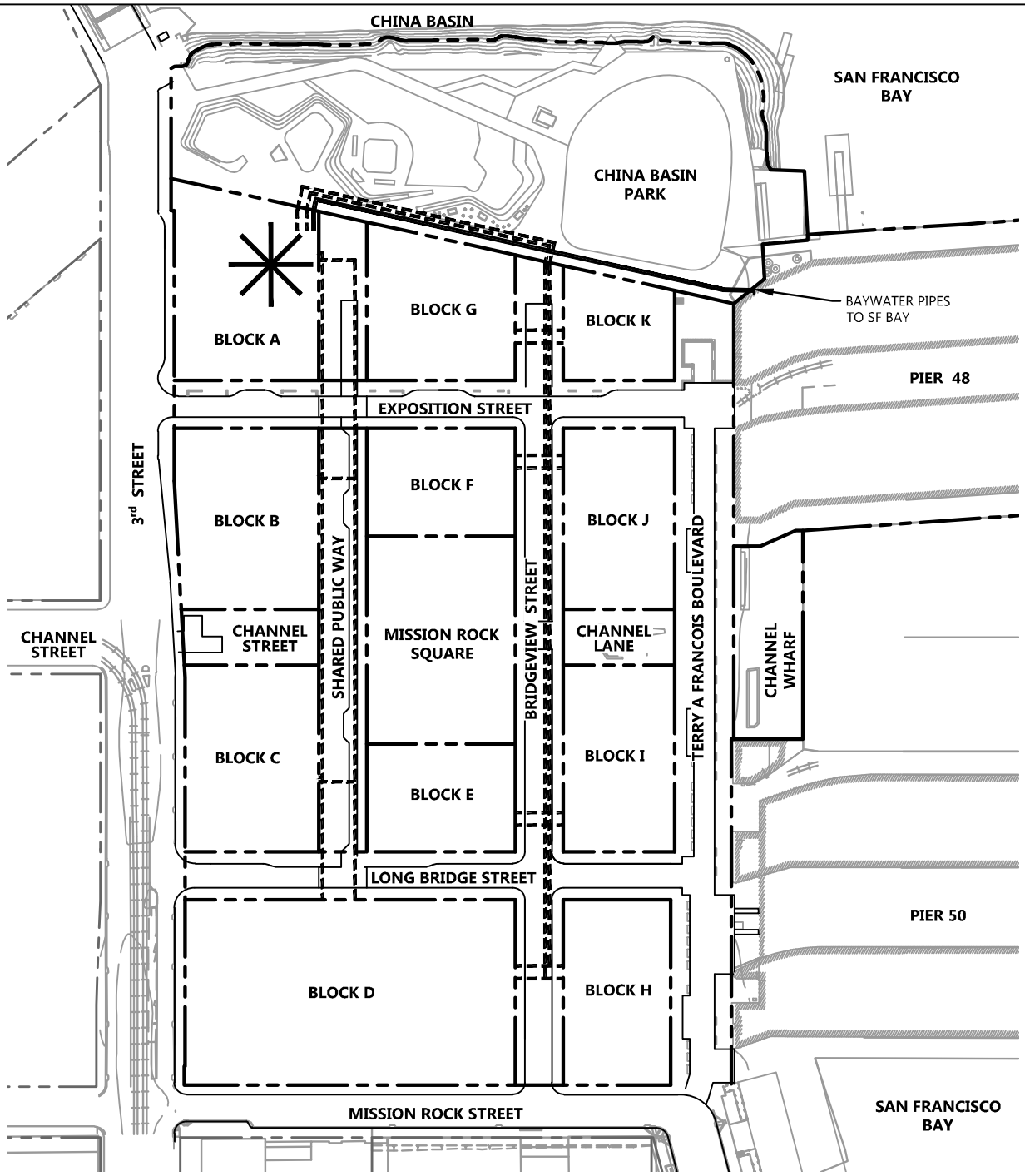
The Project has established a goal to use recycled water for 100% of the non-potable water demand. Non-potable water demands include irrigation, toilet flushing, and cooling towers. However, the demand for cooling towers is minimized by the bay source cooling and heat rejection system; thus, the non-potable demands for the purposes of this section include only irrigation and toilet flushing. Greywater will only be collected from the largest greywater-producing buildings. Greywater will be collected from Blocks A and K in Phase 1 and Block F in Phase 3 and conveyed to a centralized greywater treatment plant in Block A, as shown on Figure 15.2. Recycled water (treated greywater) is then distributed to the Development Parcels from the central greywater treatment plant at Block A through Shared Public Way, Bridgeview Street, and China Basin Park, as shown on Figure 15.3. The centralized approach optimizes the collection, treatment, and distribution systems by producing enough recycled water to meet 100% of the

site's flushing and irrigation demands while minimizing the amount of infrastructure. A backup connection to the City's recycled water main at 3rd Street will be required for emergency or maintenance operations when the greywater collection and recycled water distribution system is offline. An interim connection to the low pressure water main will be required until the City/SFPUC recycled water distribution system becomes fully functional.

15.2 Phases for Central Utility District Infrastructure Construction

The Developer will design and install the new central utility district infrastructure based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of the proposed central utility district infrastructure installed will be the minimum necessary to support the Development Phase.

The Developer will be responsible for maintenance of new central utility district infrastructure. Impacts to central utility district infrastructure installed with previous Development Phases of the Project due to the designs of new Development Phases will be the responsibility of the Developer and address prior to approval of the construction drawings for the new Development Phase.



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- DISTRICT ENERGY (12" CHW & 8" HHW)
- BAYWATER COOLING (24" HDPE)
- CENTRAL PLANT DISTRICT ENERGY DISTRIBUTION

N

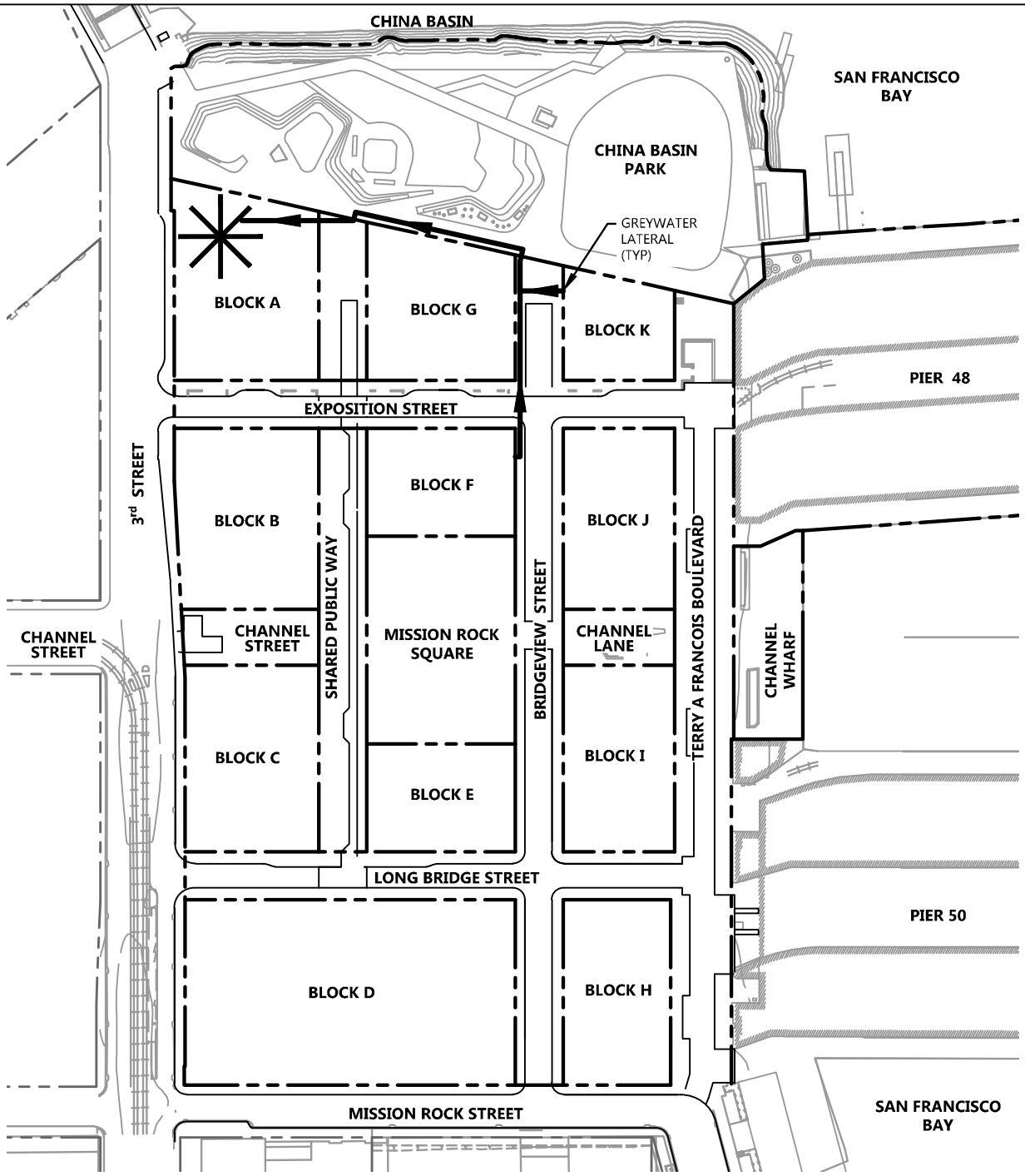
0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 15.1 Conceptual Utility District Infrastructure.dwg
PLOT DATE: 09-19-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 15.1 - CONCEPTUAL UTILITY DISTRICT INFRASTRUCTURE



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- PROPOSED GREYWATER LINE (8" DIP)
- GREYWATER COLLECTION & DISTRIBUTION

N

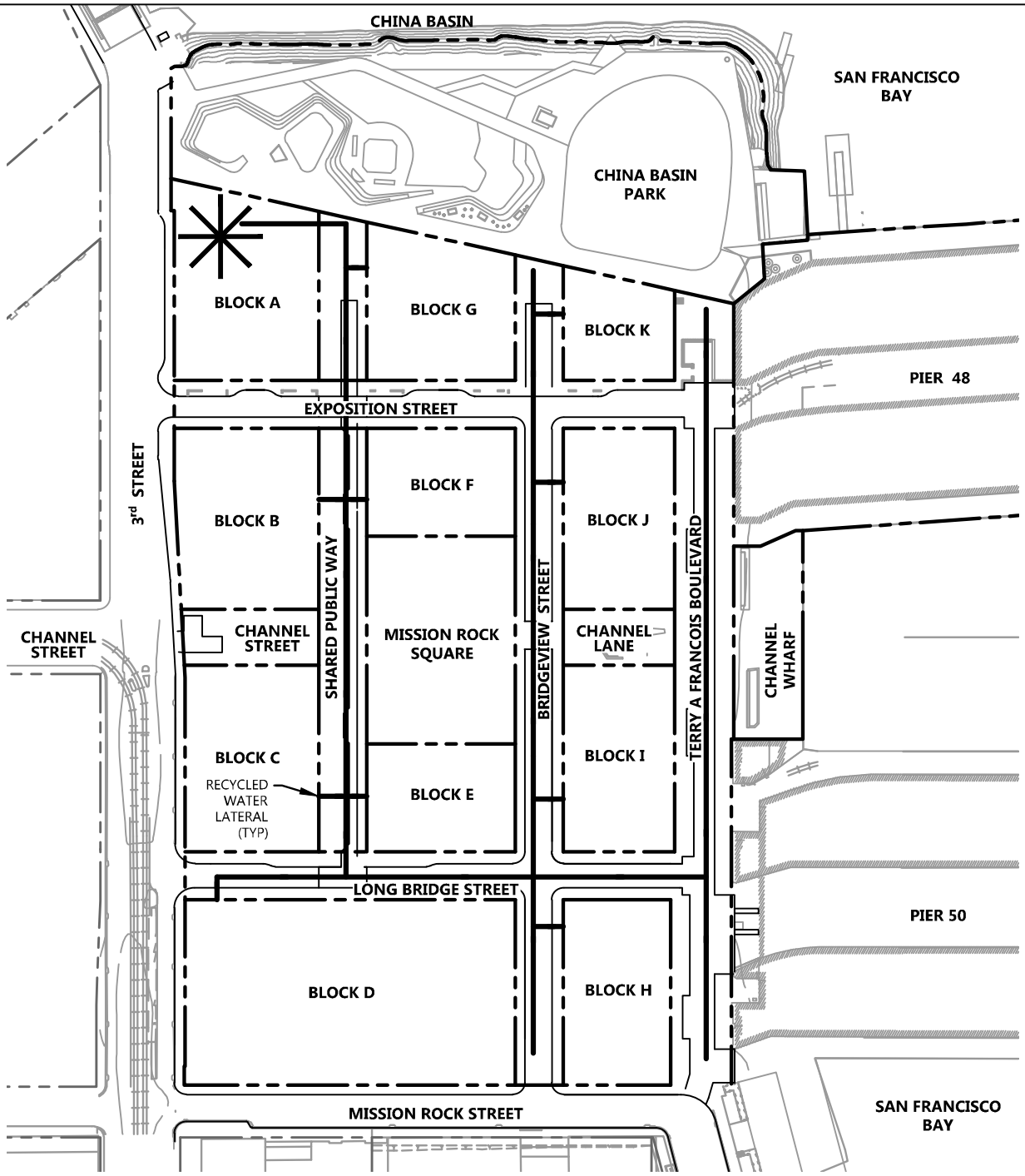
0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 15.2 Conceptual Greywater Infrastructure.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slb

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 15.2 - CONCEPTUAL GREYWATER INFRASTRUCTURE



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- PROPOSED RECYCLED WATER DISTRIBUTION LINE (8" DIP)
- GREYWATER COLLECTION & DISTRIBUTION

N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 15.3 Conceptual Recycled Water Infrastructure.dwg
PLOT DATE: 09-19-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN **FIGURE 15.3 - CONCEPTUAL RECYCLED WATER INFRASTRUCTURE**

16. STORMWATER MANAGEMENT SYSTEM

16.1 Existing Stormwater Management System

The existing site is approximately 96.6 percent impervious, mostly covered in pavement with a park to the north. The existing site drains to storm drain systems that discharged directly or indirectly to the San Francisco Bay. The west side of the Project is served by an existing storm drain system within 3rd Street that is routed to the future Mission Bay Stormwater Pump Station (SWPS) #3 for discharge to Mission Creek. Until SWPS #3 is constructed portions of the run-off discharge to an existing 11'x11' combined sewer. The re-aligned Mission Rock Street has a new storm drain system that conveys stormwater to Mission Bay SWPS #6 to the south that discharges to the San Francisco Bay adjacent to the Radiance Development and Block P18. Both China Basin Park and Terry A Francois Boulevard (TFB) have storm drain systems that discharge directly to the San Francisco Bay through existing outfalls. The existing site did not include any stormwater management systems to either treat or reduce runoff volumes.

16.2 Proposed Stormwater Management System

16.2.1 San Francisco Stormwater Management Requirements & Design Guidelines

The City of San Francisco 2016 Stormwater Management Requirements and Design Guidelines (SMR) is the regulatory guidance document describing requirements for post-construction stormwater management. Stormwater management performance requirements are determined based on the sewer system available to connect into as well as the jurisdiction of the sewer system. For Project areas that will connect into the City's existing separated storm drain system in 3rd Street and/or Mission Rock Street, the SMR requires the Project to implement a stormwater management plan that results in capture and treatment of all stormwater runoff from the 90th-percentile storm event prior to discharge to the separated storm sewer system. For Project areas served by the Port's separated storm drain system outfalling directly to the San Francisco Bay, the SMR requires the Project to implement a stormwater management plan that results in capture and treatment of all stormwater runoff from the 85th percentile storm event.

16.2.2 Proposed Site Conditions and Baseline Assumptions

The Project includes public streets, parks and plaza open space areas, and private development parcels. The Project will be designed to integrate Low Impact Development (LID) elements with stormwater best management practices (BMPs) to create a sustainable environment at the site and achieve compliance with the SMR. LID elements include landscaping, permeable paving

materials, and vegetated roofs to reduce stormwater runoff from hardscape surfaces. Stormwater treatment BMPs considered for the Project include street flow-through planters, bioretention areas, rain gardens, and green roofs to treat stormwater runoff prior to discharging to the public separated storm drain system.

Public streets will consist of at-grade streets or pile-supported structured streets with a combination of landscape strips, tree wells, permeable pavers, and street flow-through planters. China Basin Park will be elevated by a combination of planting soil and geofoam within the park and structured streets within the promenade. Mission Rock Square will be a pile-supported podium. China Basin Park and Mission Rock Square will include landscape strips, tree wells, and centralized bioretention areas. The private development parcels will be covered entirely with podium structures consisting of a combination of landscape planters, tree wells, green roofs, and pedestrian pathways.

16.2.3 Stormwater Management Design Concepts and Master Plan

The SMR requires the Project to implement BMPs to capture and treat stormwater runoff from all impervious areas for the design storm event. In order to confirm stormwater management requirements, a process flow diagram for the Project has been developed in the Stormwater Management Master Plan (see Appendix N). The process flow diagram illustrates the limits of the drainage management areas (DMAs), location of stormwater discharge to existing storm drain system, and jurisdiction of existing storm drain system. These three elements are used to determine the stormwater requirements per the SMR.

The conceptual stormwater management for the Project includes DMAs with either localized treatment or centralized treatment facilities. Localized treatment occurs in DMAs that are able to direct surface runoff to BMPs that are sized to treat stormwater runoff from impervious areas per the given design storm event. Private development parcels located within DMAs with localized treatment will allocate a space to implement BMP measures and treat stormwater for the design storm event prior to discharging into the adjacent storm drain system. Alternatively, these private development parcels also have the option to collect and reuse stormwater on-site.

For areas that are not able to treat surface runoff prior to entering the storm drain system, untreated runoff is pumped to centralized treatment facility located in either China Basin Park or

Mission Rock Square. Private development parcels within DMAs without localized treatment are not required to implement additional BMP measures on-site, however, these private development parcels may be required to pay an annual association fee for the maintenance of the centralized treatment system.

The Conceptual Stormwater Management Plan for the Project is presented in Figure 16.1. Stormwater management performance quantities and strategies has been developed and is presented in the Stormwater Management Master Plan found in Appendix N.

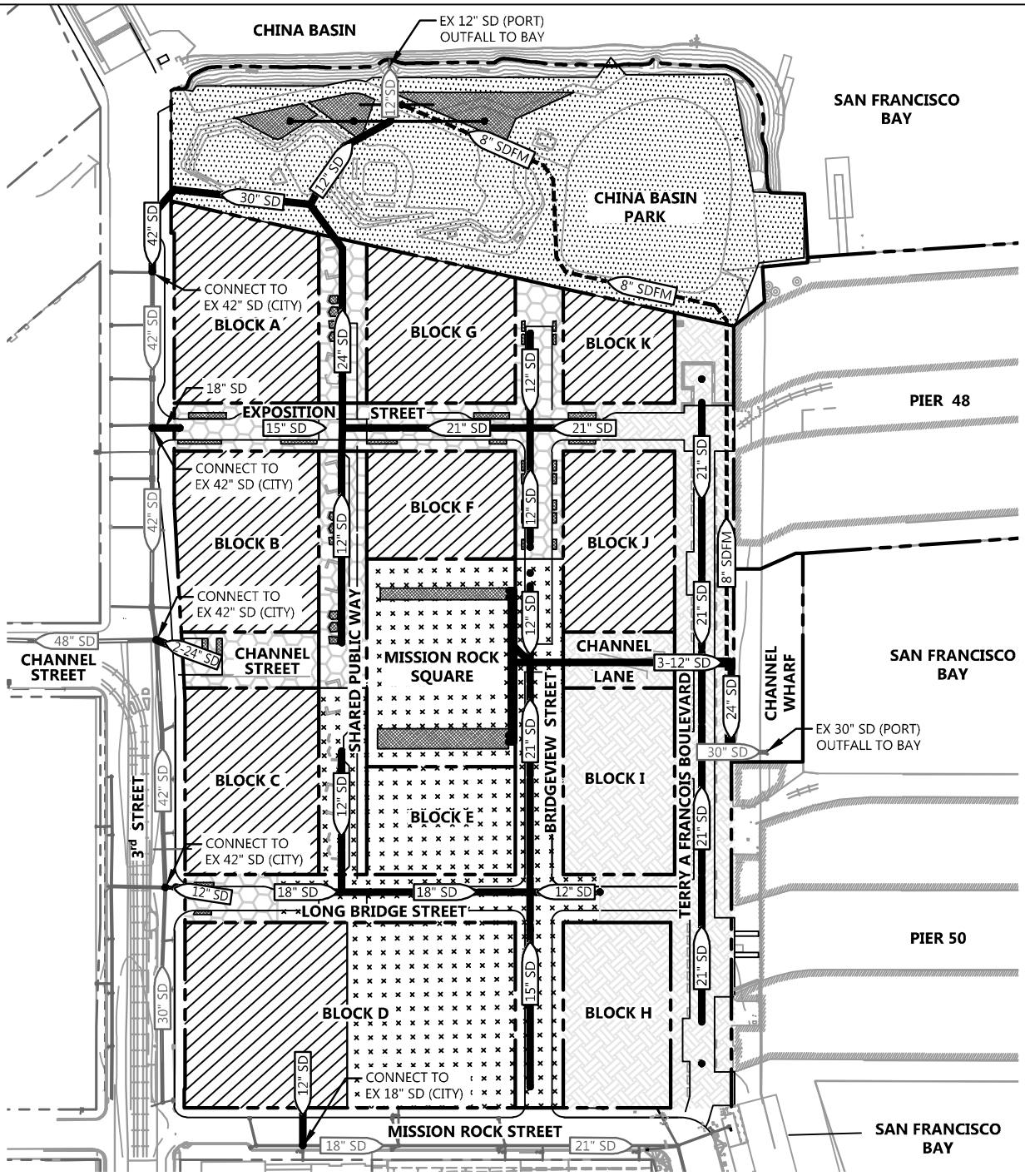
16.3 Stormwater Control Plan

Based on the designs reviewed and approved by the San Francisco Public Utility Commission (SFPUC) as part of the Stormwater Management Master Plan, the stormwater management strategies for the Mission Rock Redevelopment Site will be documented in a Stormwater Control Plan (SCP) in compliance with SFPUC and Port stormwater management regulations and the requirements of the SMR. The selected modeling methodology will be per the SFPUC and Port Accepted Hydrologic calculation methods. The Preliminary SCP for the public improvements will be submitted for review and approval before the 60% Improvement Plan for each phase of the project, and the Final SCP will be submitted with the 95% Improvement Plan for that phase or Development Parcel and prior to construction. For private development parcels, a Preliminary SCP and Final SCP shall be submitted for approval per SFPUC and Port stormwater management requirements.

16.4 Phases for Stormwater Management System Construction

The Developer will design and install the new stormwater management system based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount and location of the proposed stormwater management systems installed will be the minimum necessary to support the Development Phase. The new Development Phase will connect to the existing systems as close to the edge of the Development Phase area as possible while maintaining the integrity of the existing system for the remainder of the Project. The Developer will be required to go through the review process with the San Francisco Public Utility Commissions (SFPUC) and Port to seek approval for the Preliminary SCP and Final SCP for each Development Phase.

At all phases of the development, the Developer must provide functioning and adequate stormwater management in compliance with the SFPUC and Port's post-construction stormwater management requirements and the Stormwater Design Guidelines. A Stormwater Management Master Plan (see Appendix N) that outlines the project's stormwater management solutions for full build-out of the Project is included for review and approval in parallel with the Project's Infrastructure Plan. The Developer must complete the construction of the stormwater management improvements required for each development phase prior to receiving a temporary certification of occupancy for the development phase. Permanent or interim centralized stormwater management facilities necessary to achieve stormwater management compliance within a development phase will be constructed and operational prior to or in conjunction with that phase. Interim stormwater BMPs implemented as part of the on-site remediation will be preserved on undeveloped parcels. Stormwater management systems, which may include bioretention areas, street flow-through planters, pump stations, and storage areas located on public or private property within the Project, will be constructed and maintained by the property owner(s), Master Development Association, or its Assignees.



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- 30" SD — EXISTING STORM DRAIN LINE
- 12" SD — PROPOSED STORM DRAIN MAIN
- 8" SDFM — PROPOSED STORM DRAIN FORCE MAIN
- PROPOSED STORM DRAIN MANHOLE
- LOCALIZED STORMWATER TREATMENT AT DEVELOPMENT
- LOCALIZED STORMWATER TREATMENT AT STREETS
- PUMPED TO MISSION ROCK SQUARE FOR CENTRALIZED STORMWATER TREATMENT
- PUMPED TO CHINA BASIN PARK FOR CENTRALIZED STORMWATER TREATMENT
- DRAINED TO CHINA BASIN PARK FOR CENTRALIZED STORMWATER TREATMENT
- BIORETENTION AREA

N

0 200

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 16.1 Conceptual Stormwater Management Plan.dwg
PLOT DATE: 09-20-16
PLOTTED BY: fell

MISSION ROCK INFRASTRUCTURE PLAN **FIGURE 16.1 - CONCEPTUAL STORMWATER MANAGEMENT PLAN**

17. DRY UTILITY SYSTEMS

17.1 Existing Electrical, Gas, and Communication Systems

The existing parking lot is bordered by overhead PG&E electrical lines on Terry A Francois Blvd, 3rd Street and Mission Rock Street. The SFPUC has existing rights to the overhead PG&E lines serving Piers 48 and 50 and is responsible for invoicing the existing facilities. Existing street lighting and telecom infrastructure are also located along 3rd Street and Mission Rock Street. Site lighting is also located within the SWL Lot 337 property. 3rd Street serves as a municipal transportation route and contains multiple Overhead Contact System (OCS) lines, owned by SFMTA, which will be maintained during and after construction. Existing PG&E gas and AT&T, or other fiber providers, telecom lines, serving Piers 48 and 50 are located on Terry A Francois Blvd as well.

17.2 Project Power Providers and Requirements

Chapter 99 of the City of San Francisco Administrative Code requires the City to consider the feasibility of supplying electricity to new development projects. The SFPUC shall prepare an assessment of the feasibility of the City providing electric service to the development (the "Feasibility Study"). The Developer will cooperate with SFPUC in SFPUC's preparation of the Feasibility Study. The Feasibility Study shall include, but not be limited to, the following: 1) electric load projection and schedule; 2) evaluation of existing electric infrastructure and new infrastructure that will be needed; 3) analysis of purchase and delivery costs for electric commodity as well as transmission and distribution services that will be needed to deliver power to the development; 4) the potential for load reduction through energy efficiency and demand response; 5) business structure cost analysis; and 6) financial and cost recovery period analysis. Should the City elect to provide electric service to the Project, such service shall be provided by the City on terms and conditions generally comparable to, or better than, the electric service otherwise available to the Project. If the City determines that providing power services to the Project is infeasible, the developer will pursue PG&E or other power providers to serve the site.

17.3 Proposed Joint Trench

The proposed Joint Trench is identified schematically on Figures 17.1 and 17.2. Services and lighting will also be provided as required to China Basin Park and Mission Rock Square. Work necessary to provide the joint trench for dry utilities, typically installed within public streets and adjacent sidewalk area, consists of trench excavation and installation of conduit ducts for electrical, gas, and communication lines. In

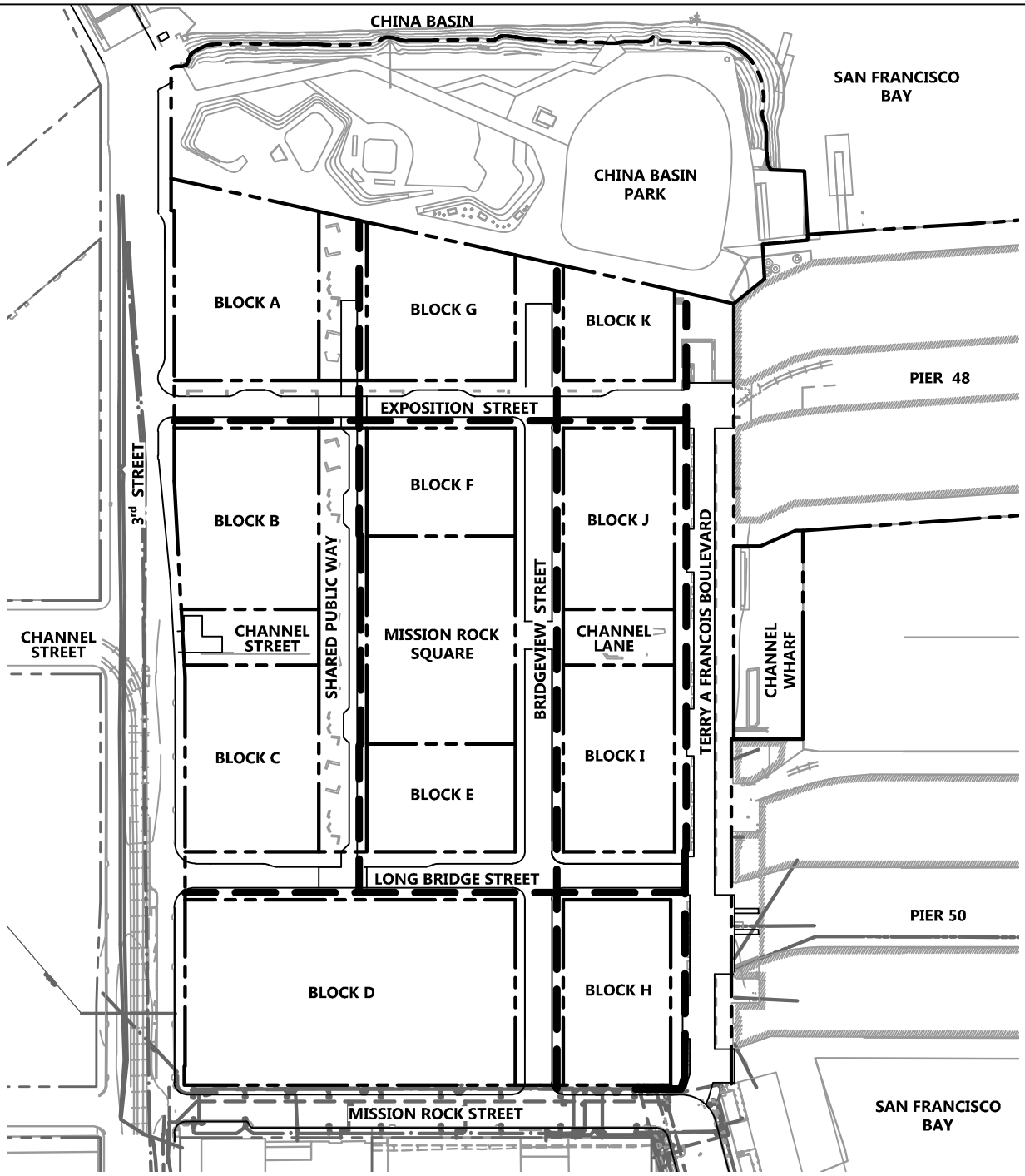
locations where public streets will be built upon structural piles, the joint trench utilities will be installed within the structured street section. Utility vaults, splice boxes, street lights and bases, wire and transformer allowance, and backfill will be included within the structured street section. Gas, Electric and power systems will be constructed per the applicable standards of the agency or company with controlling ownership of said facilities with street lighting infrastructure constructed per City standards. The utility owner/franchisee (such as SFPUC, PG&E, AT&T, Comcast and/or other communication companies) will be responsible for installing facilities such as transformers and wire. All necessary and properly authorized public utility improvements for which franchises are authorized by the City shall be designed and installed in the public right-of way in accordance with permits approved by SFDPW. Proposed dry utility infrastructure location and separation from parallel wet utilities shall comply with the utility owner's regulations. Joint trenches or utility corridors will be utilized wherever allowed. The location and design of joint trenches or utility corridors in the right-of way must be approved by SFDPW during the subdivision review process. The precise location of the joint trench in the right-of-way will be determined prior to recording the applicable Final Map and identified in the Project construction documents. Nothing in this Infrastructure Plan shall be deemed to preclude the Developer from seeking reimbursement for or causing others to obtain consent for the utilization of such joint trench facilities where such reimbursement or consent requirement is otherwise permitted by law.

17.4 Phases for Dry Utility Systems Construction

Joint trench design and installation will occur in phases based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project Phasing Plan. The amount of existing system replaced and new infrastructure installed along Terry A Francois Blvd, 3rd Street and Mission Rock Street will be the minimum necessary to support the Development Phase and piers. The new infrastructure will connect to the existing systems as close to the proposed development as possible while maintaining the integrity of the existing system. Repairs and/or replacement of the existing facilities necessary to serve the Development Phase will be designed and constructed by the Developer. Such phased dry utility installation will allow the existing utility services to remain in place as long as possible and reduce disruption of existing uses on the site and adjacent facilities.

The service providers will be responsible for maintenance of existing facilities until replaced by the Developer and will be responsible for the new power facilities once the Development Phase or new power facility is complete and accepted by the utility provider.

Impacts to improvements installed with previous phases of development due to the designs of the new phase will be the responsibility of the Developer and addressed prior to approval of the construction drawings for the new Development Phase.



LEGEND

- PROPOSED PARCEL LINE
- EXISTING PARCEL LINE
- PROPOSED JOINT TRENCH
- EXISTING ELECTRIC LINE
- EXISTING JT LINE
- EXISTING STREET LIGHT
- EXISTING JT STRUCTURE
- EXISTING ELECTRIC STRUCTURE

N

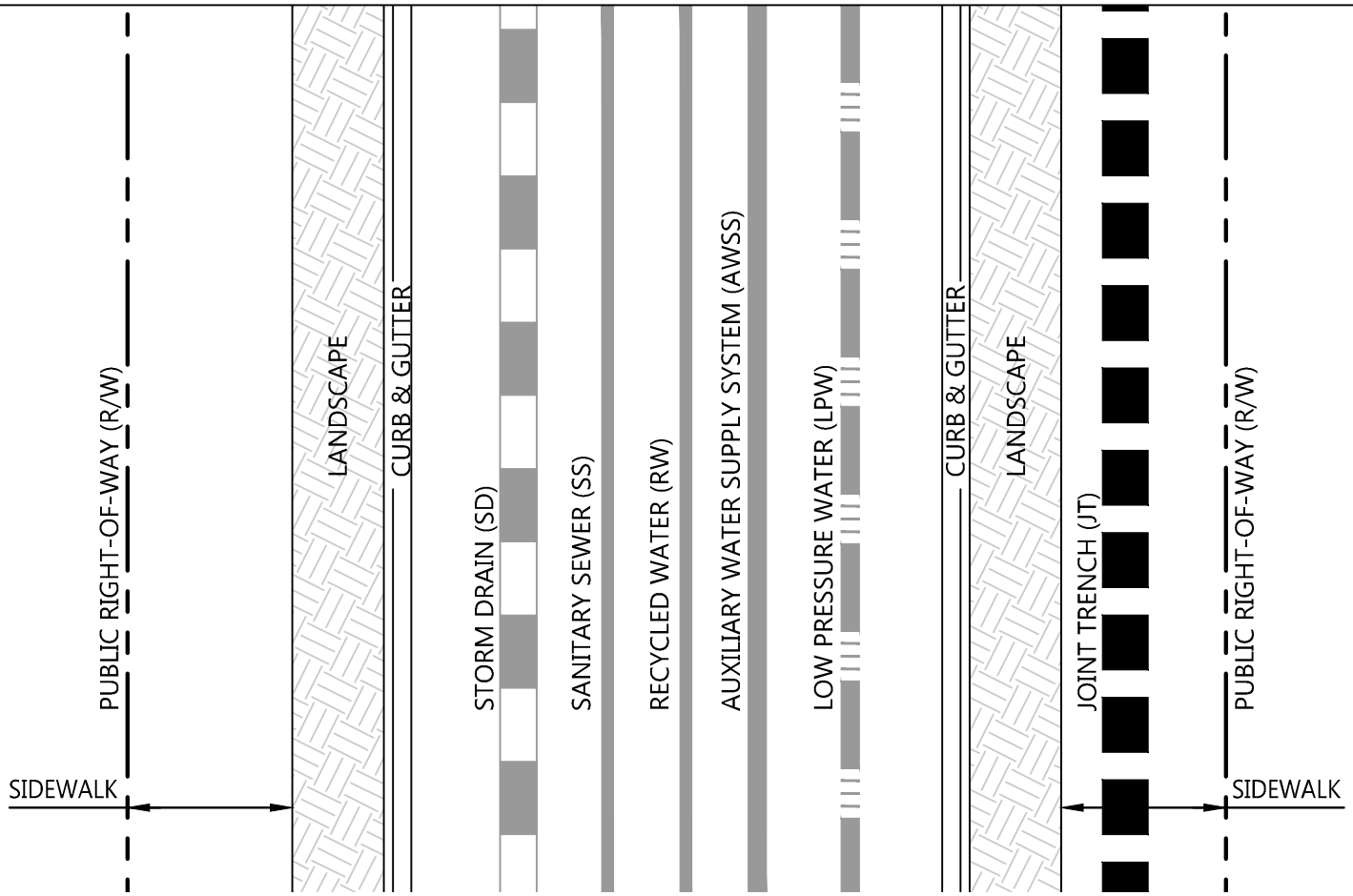
0 200

Source: BKF ENGINEERS, 07/2016

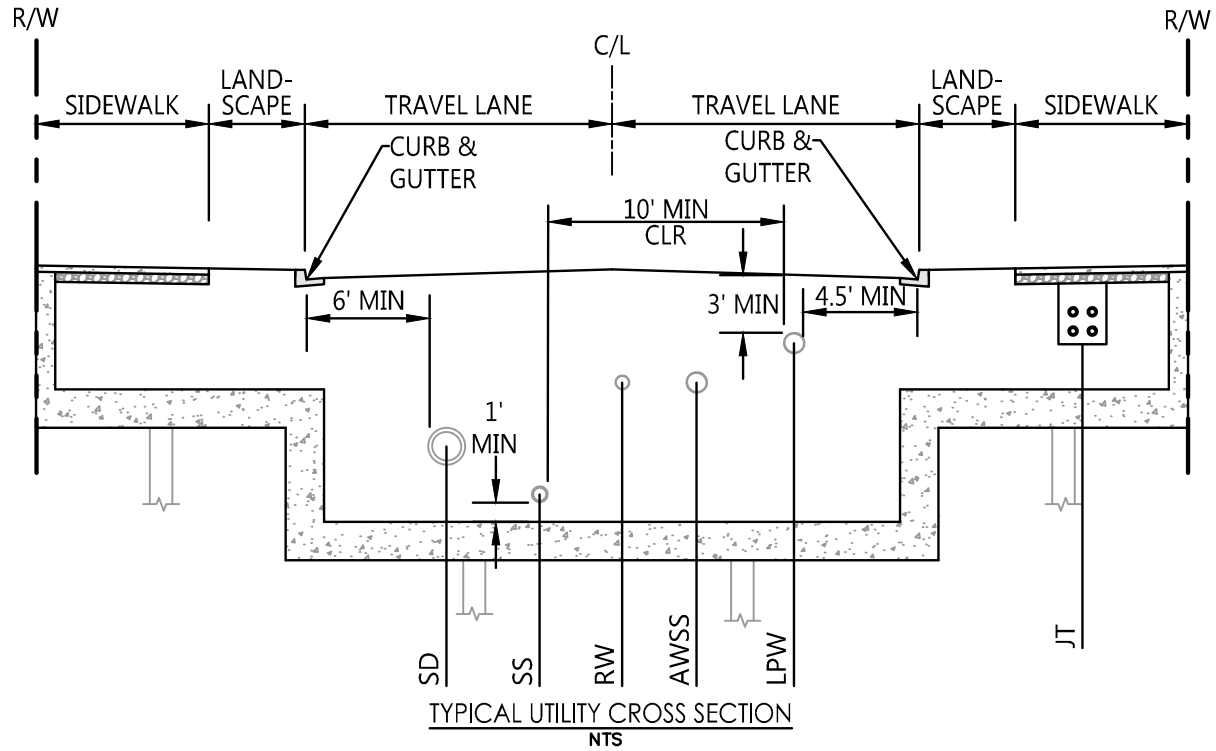
DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 17.1 Conceptual Dry Utility Systems.dwg
PLOT DATE: 09-09-16
PLOTTED BY: slb

MISSION ROCK INFRASTRUCTURE PLAN

FIGURE 17.1 - CONCEPTUAL DRY UTILITY SYSTEMS



TYPICAL STREETS
NTS



TYPICAL UTILITY CROSS SECTION
NTS

Source: BKF ENGINEERS, 07/2016

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Infrastructure Plan Exhibits\Plotted Sheets\Figure 11.2_14.2 Typical Util Section.dwg
PLOT DATE: 09-09-16
PLOTTED BY: sllb

FIGURE 17.2 - TYPICAL UTILITY SECTION WITHIN PUBLIC STREETS

APPENDIX A

(NOT USED)

APPENDIX B

Hazardous Soil Remediation Plan Letter,

September 12 2011

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

September 12, 2011

Jon Knorpp
Seawall Lot 337 Assoc., LLC
24 Willie Mays Plaza
San Francisco, CA 94107

Re: Mission Rock Development – Seawall Lot 337
San Francisco, California
1868-00

Dear Mr. Knorpp:

As requested, this letter outlines the anticipated steps to complete the environmental program related to potential hazardous substances in soil and groundwater at the subject site. Mission Rock Development is planning a mixed use development at Lot 337 in San Francisco, California (the Site). Figure 1 provides a Site Location Map. The Site is a former industrial property within the area subject to the requirements of Article 20 of the City and County of San Francisco Public Health Department Ordinance 253-86 (the Maher Ordinance). In addition, Covenant to Restrict Use of Property (Use Restrictions) were recorded in agreements between the City and County of San Francisco (City) and the California Department of Toxic Substance Control (DTSC) as a part of previous development of the Site. As described herein, these documents outline certain requirements that will need to be met prior to initiating the proposed site development.

□□□□□**R**□□□□□

Environmental investigations were performed at the Site in the 1990s when the Site was redeveloped for use as a parking lot and park. The scope of the investigations performed was developed to satisfy the requirements of the Maher Ordinance and to achieve site closure from the City and DTSC. Several documents were prepared documenting the scope and results of these investigations, including:

- Site Use History and Proposed Article 20 Sampling Program, Proposed Imperial Weitz Parking Lots South of China Basin Channel, San Francisco California prepared by Geomatrix Consultants, Inc. dated March 1999;
- Results or Article 20 Sampling Program and Health Risk Assessment, Proposed Imperial Weitz Parking Lots for the Giants Pacific Bell Ball Park Area e – Port of San Francisco, San Francisco California prepared by Geomatrix Consultants, Inc. dated June 1999;
- Preliminary Screening Evaluation, H&H Ship Service Company, San Francisco, California, prepared by Harding Lawson Associates dated September 14, 1995; and

3015 SW First Avenue
Portland, Oregon 97201-4707
(503) 924-4704 Portland
(360) 567-3977 Vancouver
(503) 943-6357 Fax
www.ashcreekassociates.com

- RCRA Closure Certification Report, Former H&H Ship Service Company, San Francisco, California, prepared by Harding Lawson Associates dated February 4, 1999.

Copies of these reports can be obtained at the Port of San Francisco website at the following link: http://www.sf-port.org/index.aspx?page=44

As part of the cleanup requirements to achieve site closure, a Soil Management Plan was prepared to detail methods and procedures for soil handling, stockpiling, disposal, and accessing to be used during and after site development. A copy of the Soil Management Plan is included as Attachment A to this letter. In addition, land use restrictions were described in the Use Restrictions and recorded in two agreements between the City and DTSC (one for the part of the Site that is South of Terry Francois Blvd and currently used as a parking lot and the second that is north of Terry Francois Blvd and is currently used as a park). A copy of each of the Use Restrictions are included as Attachment B to this letter. The Use Restrictions require, amongst other items, that Maher Ordinance assessments be performed if more than 50 cubic yards of soil are to be disturbed and a variance be obtained if the Site is to be developed for any of the uses listed as "restricted" in the Use Restriction.

□□T□□□□TE□□□□T□□□T□ES□T□□□□□□E□E□E□□□R□□ME□T□□□□□E□R□□□ES□

Based on a review of the available documents and the Use Restrictions for the Site, the following actions are anticipated to achieve environmental clearances of potentially hazardous substances in soil or groundwater necessary to complete the site development.

1) Use Variance. The current Use Restrictions do not allow residential development at the Site. It is our understanding that some of the Site may be developed for high-density housing as a part of the proposed development. The intent of the Use Restrictions is to preclude single family home development and it appears that high-density housing is an acceptable use of the Site. However, a variance to the Use Restrictions may be needed. A meeting with the DTSC and the Port of San Francisco (Port) will be conducted to discuss the proposed development and identify whether a variance will be needed from the provisions in the Use Restrictions. If a variance is required, the variance will be developed and written in conjunction with the DTSC and the Port.

2) Maher Ordinance. The Use Restrictions and City regulations require that the Maher Ordinance requirements be met prior to initiation of site development. Investigations satisfying the Maher Ordinance were performed in support of the previous development of the Site as a parking area and park. The investigations performed for the Maher Ordinance provided an understanding of both the soil and groundwater quality at the Site. A risk assessment was performed and did not identify unacceptable risk to construction workers or other receptors for that development. The scopes of the previous assessments are consistent with currently proposed site development and appear to be sufficient to meet the requirements of the Maher Ordinance. A meeting with the City and County of San Francisco Department of Public Health (DPH) will be conducted to discuss site conditions and the proposed development to illustrate how the previous investigations have collected the needed data to meet Maher Ordinance requirements for the new development.

   If the DPH agrees that sufficient data has been collected to meet the Maher requirements for the Site, a report will be prepared that summarizes the proposed development and existing data for DPH review and approval to document that the Maher Ordinance requirements have been met. If the DPH does not agree and requests additional site data, a work plan will be prepared identifying the work scope and procedures to collect the data the DPH is requesting to meet the Maher Ordinance requirements. The work plan will be submitted to the DPH for review. Upon DPH approval of the work plan, the work scope will be completed and a results report prepared for submittal to DPH to achieve closure on the Maher Ordinance requirements. The DTSC will be kept apprised of the activities being performed to meet the Maher Ordinance to satisfy the requirements of the Use Restrictions.

REMEDIATION PLAN

Based on our understanding of the Site, it is anticipated that site remediation will consist of implementation of a Soil Management Plan consistent to that previously developed for the Site (see Attachment A). The Soil Management Plan describes the methods and procedures for soil management during site construction and following site development, and maintenance of a site cover. Soil management during site construction will consist of dust control, erosion control, stockpile management, and appropriate soil disposal should excess soil be excavated during construction activities. If excess soil is generated, the excess soil would need to be profiled to determine appropriate disposal options. Based on chemical analysis results of soil samples collected from the Site, total metal and organic concentrations are less than the Total Threshold Limit Concentrations (TTLCs) for designation as California Hazardous Waste. However, additional solubility testing of some of the metals (e.g., lead) would likely be required by disposal facilities to better assess the waste profile for the soil. It is possible that the solubility of the lead using the Waste Extraction Test would exceed the Solubility Threshold Limit Concentrations (STLCs) of the state. The excess soil would then be profiled as California Hazardous waste and would need to be disposed of at the appropriately licensed landfill facility.

Please do not hesitate to contact me should you have any questions.

Sincerely,

Amanda Spencer, R.G., P.E.
Principal Hydrogeologist

ATTACHMENTS

Figure 1 – Site Location Map

Attachment A – Soil Management Plan
Attachment B – Use Restriction

Note: Base map prepared from USGS 7.5-minute quadrangle of San Francisco North, CA, dated 1993 as provided by usgs.gov.

CALIFORNIA

N

0 2,000 4,000

Approximate Scale in Feet

Site Location Map

Mission Rock Development – Seawall Lot 337
San Francisco, California

Ash Creek Associates, Inc.
Environmental and Geotechnical Consultants

Project Number	1868-00	Figure
September 2011		1

Attachment A

Soil **M**anagement Plan

GEOMATRIX

SOIL MANAGEMENT PLAN

Imperial Weitz Parking Lots for the Giants Pacific Bell Ball Park Area E - Port of San Francisco Property

San Francisco, California

Prepared for:

Imperial Weitz, LLC
800 Second Avenue, Suite 300
Des Moines, Iowa 50309

Prepared by:

Geomatrix Consultants, Inc.
2101 Webster Street, 12th Floor
Oakland, California 94612
(510) 663-4100

June 1999

Project No. 4952

Geomatrix Consultants

GEOMATRIX

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
2.0	BACKGROUND	1
	2.1 SITE SETTING AND HISTORICAL USAGE	1
	2.2 SITE INVESTIGATIONS	2
	2.2.1 Previous Site Investigations	2
	2.2.2 Recent Site Investigation	2
	2.3 PROPOSED DEVELOPMENT	3
	2.4 RISK ASSESSMENT	4
3.0	OBJECTIVES	4
4.0	PROPOSED SOIL MANAGEMENT PROCEDURES	5
	4.1 SOIL MANAGEMENT PROCEDURES FOR SITE CONSTRUCTION	5
	4.1.1 Dust Control	5
	4.1.2 Erosion Control	5
	4.1.3 Soil Stockpile Management	6
	4.1.4 Soil Disposal	6
	4.1.5 Site Access Control	6
	4.2 SOIL MANAGEMENT FOLLOWING SITE DEVELOPMENT	6
5.0	MAINTENANCE OF SITE COVER	7
6.0	CONTINGENCY PLAN	7
7.0	HEALTH AND SAFETY GUIDELINES	7
8.0	FACILITY MAP	8
9.0	REFERENCES	9

TABLES

Table 1	Summary of Analytical Results - Metals Detected in Soil Samples
Table 2	Summary of Analytical Results - Volatile Organic Compounds Detected in Soil Samples
Table 3	Summary of Analytical Results - Polynuclear Aromatic Compounds Detected in Soil Samples
Table 4	Summary of Analytical Results - Other Maher Parameters
Table 5	Summary of Analytical Results - Metals Detected in Grab Groundwater Samples
Table 6	Summary of Health Risk Assessment Results

GEOMATRIX

TABLE OF CONTENTS
(Continued)

FIGURES

Figure 1 Site Location Map
Figure 2 Site Plan Showing Sampling Locations

APPENDIXES

Appendix A Data Summaries from Previous Investigations
Appendix B Site Maps Illustrating Alternative Storm Drainage Systems

SOIL MANAGEMENT PLAN
Imperial Weitz Parking Lots for the
Giants Pacific Bell Ball Park
Area E - Port of San Francisco Property
San Francisco, California

1.0 INTRODUCTION

Geomatrix Consultants, Inc. (Geomatrix) has prepared this Soil Management Plan (SMP) on behalf of Imperial Weitz, LLC for the proposed 14-acre parking lot for the Giants' Pacific Bell Ball Park. The proposed parking lot site is located south of China Basin Channel and east of Third Street in San Francisco, California (the site; Figure 1). The site is part of a total of approximately 36 acres of parking to be developed by Imperial Weitz south of China Basin Channel and has been referred to as Area E in previous environmental documents prepared by Geomatrix on behalf of Imperial Weitz.

2.0 BACKGROUND

Imperial Weitz is proposing to construct a paved parking lot on the site. A site history review, environmental investigation and risk evaluation were performed to meet Article 20 requirements and assess potential risks to construction worker and site visitor health associated with soil and groundwater quality at the site. The following summarizes the results of the site history review, environmental investigations, and risk assessment, and describes the proposed parking lot development.

2.1 SITE SETTING AND HISTORICAL USAGE

The approximately 19 acre site is currently owned by the Port of San Francisco (the Port). The subject area was originally marshlands and shallow tidal flats bordering San Francisco Bay. It was filled between 1877 and 1913; the source of the fill is unknown but likely included construction debris and rubble from the 1906 earthquake and cut material from nearby hills and construction areas.

Historical site uses include: railroad trackage and support structures for rail-related activities, parking and shipping, and truck maintenance. H&H Shipping Service Company, Inc. (H&H) occupied the northeastern corner of the site from 1950 to 1996. H&H used the area for vehicle parking and offices, and maintained a tank cleaning area and drum storage unit. No known underground storage tanks (USTs) have been identified on the site. Recently, the site has been

leased by multiple tenants. Tenant uses consist of a recycling center, an automobile sales center, the Mission Rock Recovery Center, a moving company, maritime offices, and automobile storage.

2.2 SITE INVESTIGATIONS

2.2.1 Previous Site Investigations

Burlington Northern Santa Fe Railway Company ("the Railroad") conducted Phase I and Phase II Environmental Assessments of property formerly operated by the Railroad located east of Third Street, between Sixteenth Street and China Basin Channel; this property included the western half of the site. The scope of the Railroad's investigations included one soil boring in the southern portion of the site. Soil samples were collected at depths of 0.5, 5, and 8 feet bgs and analyzed for total petroleum hydrocarbons as gasoline (TPHg), TPH as motor oil (TPHmo), lead, nickel, arsenic, chromium, cadmium, and zinc. Results of chemical analyses on these soil samples indicated that several metals were present at concentrations exceeding typical regional background concentrations (Geomatrix, March 1999).

In addition, HLA has performed an investigation of the former H&H Shipping parcel located in the northeast corner of the site (HLA; 1999). Seventeen soil samples were collected and analyzed for metals, TPH as diesel (TPHd), TPHg, oil and grease, volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PNAs). Five groundwater samples were collected and one or more samples were analyzed for metals, TPHd, TPHg, benzene, toluene, ethylbenzene, xylenes [BTEX], PCBs, and PNAs. Several soil samples contained PNAs and metals; very low concentrations of some aromatic hydrocarbons and PCBs were detected in a few soil samples. The groundwater samples contained low to trace concentrations of several metals. Filtered groundwater samples did not contain PNAs; however, unfiltered samples contained low concentrations of several PNA compounds. PCBs and BTEX were not detected in the groundwater samples. Summary tables for the soil and groundwater analysis results of the H&H investigation are contained in Appendix A.

2.2.2 Recent Site Investigation

In April 1999, Geomatrix installed 8 soil borings and collected 16 soil samples (two soil samples per boring) and 2 groundwater samples (from 2 of the 8 locations) for chemical analysis. Sampling locations are illustrated on Figure 2. Primary chemicals detected in soil were PNAs and some metals (i.e., antimony, arsenic, copper, lead, nickel, and mercury). Soil sample results from the recent investigation are summarized in Tables 1 through 5. Several

metals were detected in groundwater; however, chemical concentrations were generally low to non-detect (Table 6). PNAs were not detected in the groundwater samples.

2.3 PROPOSED DEVELOPMENT

The proposed development for the subject area is asphalt paved parking. Two alternatives for storm drainage are being considered, as described below. Figures illustrating the two alternatives for the storm drainage system are contained in Appendix B.

Alternative 1

This alternative for the drainage system consists of a series of storm drainage lines and catch basins to collect and transport storm water from the parking lot site to the main City box culvert located on Channel Street, west of Fourth Street. During a 5 year storm event, the City system could reach capacity and overflows would result. Overflows from the parking lot site would be diverted to a small treatment plant to be located east of Fourth Street, near China Basin Channel. Under this alternative, Area E will be entirely paved with asphalt and surrounded by a 3- to 4-foot fence.

The catch basins will be installed in excavations with aerial dimensions of approximately 4 feet by 4 feet and extending to depths of 4 to 6 feet. Trenches will be excavated to install the piping; the trenches are anticipated to be approximately 2 to 3 feet wide and will extend between 4 to 6 feet below grade. Estimated maximum excavation depth for the piping system is 6 feet bgs. The parking area will be graded and bermed to enhance flow to each of the catch basins, and paved with asphaltic concrete.

Alternative 2

This alternative includes perimeter grassy drainage swales to collect and drain storm water overflows.

The parking area will contain a storm drain system to collect surface water runoff. The storm drain system will consist of a network of catch basins and drainage swales to collect storm water on the parking lot. The storm water will be conveyed through a series of pipes and the drainage swales to one point of discharge. The discharge pipe will collect into one main and flow into the City box sewer in Channel Street near Fourth Street.

The catch basins will be installed in excavations with aerial dimensions of approximately 4 feet by 4 feet and extending to depths of 4 to 6 feet. Trenches will be excavated to install the

piping; the trenches are anticipated to be approximately 2 to 3 feet wide and will extend between 4 to 6 feet below grade. Estimated maximum excavation depth for the piping system is 6 feet bgs. The swales will be approximately 32 feet in width and 2 to 3 feet in depth. The swales will be covered with a geotextile fabric and grass. The parking area will be graded and bermed to enhance flow to each of the catch basins, and paved with asphaltic concrete.

2.4 RISK ASSESSMENT

A health risk assessment (HRA) was conducted to evaluate the potential human health risks associated with the presence of chemicals in soil and groundwater assuming future use of the site as a parking lot with grassy swales (Geomatrix, May 1999). Potential noncarcinogenic hazard indexes and theoretical lifetime excess cancer risks were estimated for future on-site construction workers and future on-site visitors assuming conservative estimates of human exposure. Future on-site construction workers may be exposed to chemicals in soil across the site to the depth required for installation of the storm drain system or in groundwater if encountered in excavation areas. Following construction, potential exposure to future on-site visitors would be limited to exposed soil in the grass-covered swale areas.

The results of the HRA indicate that the presence of chemicals in soil and groundwater at the site should not pose an unacceptable noncarcinogenic or carcinogenic risk to future on-site construction workers and visitors. A summary table for the HRA results is provided as Table 7. Based on these results, it was also concluded that potential risks to nearby residents during construction and future on-site maintenance workers and trespassers after construction would also not be of concern.

3.0 OBJECTIVES

As described above, the results of the HRA indicate that chemicals in site soil do not present an unacceptable human health risk. However, dust from a construction site can present a nuisance if not controlled. Likewise, erosion of on-site soil during construction activities can increase the turbidity of surface water run-off.

Therefore, the objectives of the SMP are to:

- provide guidelines for soil handling, stockpiling, dust and erosion minimization and, if needed, soil disposal during site construction activities for the proposed parking lot; and

- describe procedures for soil management following site construction for the duration of the use of the Site as a parking lot.

4.0 PROPOSED SOIL MANAGEMENT PROCEDURES

The following two sections describe the soil management procedures that will be implemented during and following site construction.

4.1 SOIL MANAGEMENT PROCEDURES FOR SITE CONSTRUCTION

The following procedures will be implemented during site construction activities to minimize dust and control erosion.

4.1.1 Dust Control

The dust control measures to be implemented at the site correspond to the PM_{10} control measures recommended by the Bay Area Air Quality Management District (BAAQMD) in their California Environmental Quality Act Guidelines. These measures consist of:

- Water all active construction areas at least twice daily or as necessary to prevent visible dust plumes from migrating outside of the site limits.
- Mist or spray water while loading transportation vehicles.
- Minimize drop heights while loading transportation vehicles.
- Use tarpaulins or other effective covers for trucks carrying soils that travel on public streets.
- Pave, apply water 3 times daily, or apply non-toxic soil stabilizers on all unpaved access roads, parking areas, and staging areas.
- Sweep all paved access routes parking areas and staging areas daily, if visibly soiled.
- Sweep street daily if visible soil material is carried onto public streets from the site.

4.1.2 Erosion Control

A Stormwater Pollution Prevention Plan (SWPPP) will be developed by the site contractor prior to initiation of Site work that details procedures for minimizing erosion. The SWPPP will include elements such as silt traps and hay bales to minimize surface water runoff from the Site into storm drains or the San Francisco Bay, berms to control Site runoff, and covering soil stockpiles during the rainy season (November through March) to minimize sediment runoff.

4.1.3 Soil Stockpile Management

Temporary stockpiling of excavated soil may be necessary throughout site construction. Soil stockpiled at the Site will be lightly sprayed with water as needed to minimize dust. To the extent practical, the soil stockpiles will be covered with plastic sheeting or other similar material at times when not in active use. When a soil stockpile is uncovered during the rainy season, it will be surrounded by hay bales and/or silt traps to minimize sediment runoff.

4.1.4 Soil Disposal

Site development has been designed to minimize the generation of excess soil; therefore, soil requiring off-site disposal is not anticipated. Although not anticipated at this time, if excess soil is generated from the site, the excess soil will be profiled to determine appropriate disposal options. Handling and disposal of the soil will be conducted in accordance with all applicable state and federal laws.

Based on chemical analysis results of soil samples collected from the site, total metal and organic concentrations are less than the Total Threshold Limit Concentrations (TTLCs) for designation as California Hazardous Waste. However, additional solubility testing of some of the metals (e.g., lead) would likely be required by disposal facilities to better assess the waste profile for the soil.

4.1.5 Site Access Control

The construction site will be fenced to control pedestrian or vehicular entry, except at controlled points (i.e., gates). Gates will be closed and locked during non-construction hours. "No-trespassing" signs will be posted every 500 feet along the fencing.

4.2 SOIL MANAGEMENT FOLLOWING SITE DEVELOPMENT

Following site development, the soil will be covered by asphalt pavement or grass (in the swale areas) and it is unlikely that the soil will be accessed, with the exception of future maintenance work on subsurface utilities. The HRA assessed possible health risks to future maintenance workers at the parking lot and concluded that chemicals in soil at the site should not pose an unacceptable carcinogenic or noncarcinogenic risk (Geomatrix, May 1999). Soil management procedures during future site maintenance work requiring soil excavation will be as described in Section 4.1 of this SMP; if waste soil is generated, the soil will be disposed in accordance with the procedures described in Section 4.1.4.

5.0 MAINTENANCE OF SITE COVER

Procedures in this section are applicable only if Alternative 2 is selected for the storm drainage system.

Although the HRA concluded that soil in the grass-covered swale area would not present an unacceptable risk to human health for parking lot visitors or trespassers, it is prudent that the grass-covered swale areas be well maintained. Therefore, the swale areas will be inspected monthly during the baseball season, and quarterly during the off-season to visually observe the condition of the grass cover. Large areas of exposed soil (e.g., areas larger than several feet in diameter) should be reseeded as quickly as practical. A log of the parking area inspections ("Inspection Log") will be maintained at the site and will include written comments on the condition of the grass cover, areas requiring repairs, and repair dates.

Annual inspections of the paved parking areas will be performed to observe whether breaches in the pavement that may allow prolonged access to site soil are visible. If observed, the breach would be repaired such that the soil cover is maintained. Results of the annual inspections of the paved parking areas will be documented in the Inspection Log, described above.

6.0 CONTINGENCY PLAN

A Contingency Plan for this site is not warranted. The purpose of a Contingency Plan is to present response actions to an emergency situation. The results of the HRA indicate that exposure to site soil or groundwater while breaches in the pavement or grassy areas are being repaired would not present a situation requiring an emergency response.

7.0 HEALTH AND SAFETY GUIDELINES

A health and safety plan for site construction will be developed by the site contractor before initiation of the development activities. The results of the HRA indicate that the presence of chemicals in soil and groundwater at the site should not pose an unacceptable health risk to future construction workers or nearby receptors during construction or future maintenance workers, visitors or trespassers after construction. Therefore, a health and safety plan for known chemical hazards at the Site is not warranted, and the health and safety plan will focus on physical hazards. Additionally, contingency actions for encountering unanticipated buried hazards (e.g., drums, or other containers) will also be included in the health and safety plan.

8.0 FACILITY MAP

The final construction plan for the Site development is not complete. A copy of this plan will be forwarded to the SFDPH as an addendum to this SMP once it has been finalized.

9.0 REFERENCES

Geomatrix Consultants, Inc., 1999, Site Use History and Article 20 Sampling Program, March.

Harding Lawson Associates, 1999, RCRA Closure Certification Report, Former H&H Ship Service Facility, San Francisco, California, February 4.

GEOMATRIX

TABLE 1
SUMMARY OF ANALYTICAL RESULTS
METALS DETECTED IN SOIL SAMPLES[1]
Proposed Imperial Parking Area
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California
Concentrations are reported in milligrams per kilogram (mg/kg)

Sample I.D.	Sample Interval (feet bgs)	Antimony	Arsenic	Barium	Beryl-lium	Cadmium	Total Chrom-ium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanad-ium	Zinc
GMX-1-1.0	0.5 - 1.0	<5.0	<0.35	27	<5.0	<5.0	120	16	9.6	8.7	<0.1	<5.0	220	<5.0	<5.0	<5.0	36	37
GMX-1-4.5	4.5 - 5.0	<5.0	2.5	35	<5.0	<5.0	200	24	12	13	<0.1	<5.0	370	<5.0	<5.0	<5.0	20	32
GMX-2-1.0	0.5 - 1.0	<5.0	<0.35	170	<5.0	<5.0	62	15	50	220	0.13	<5.0	71	<5.0	<5.0	<5.0	49	150
GMX-2-4.5	4.5 - 5.0	<5.0	<0.35	160	<5.0	<5.0	91	17	31	54	<0.1	18	110	<5.0	<5.0	<5.0	40	83
GMX-3-1.0	0.5 - 1.0	33	64	84	<5.0	<5.0	35	12	93	250	0.28	<5.0	140	<5.0	<5.0	<5.0	20	250
GMX-3-4.5	4.5 - 5.0	15	7.7	76	<5.0	<5.0	110	14	44	98	0.23	<5.0	240	<5.0	<5.0	<5.0	24	130
GMX-4-1.0	0.5 - 1.0	<5.0	1.8	170	<5.0	<5.0	42	16	40	110	0.16	<5.0	100	<5.0	<5.0	<5.0	31	94
GMX-4-4.5	4.5 - 5.0	<5.0	<0.35	100	<5.0	<5.0	36	8.7	26	53	<0.1	<5.0	40	<5.0	<5.0	<5.0	27	60
GMX-5-1.0	0.5 - 1.0	<5.0	0.47	26	<5.0	<5.0	21	<5.0	7.1	42	<0.1	<5.0	20	<5.0	<5.0	<5.0	17	69
GMX-5-7.0	4.5 - 5.0	<5.0	2.5	47	<5.0	<5.0	11	<5.0	13	60	0.57	<5.0	12	<5.0	<5.0	<5.0	12	35
GMX-6-1.0	0.5 - 1.0	<5.0	<0.35	360	<5.0	<5.0	17	12	66	17	<0.1	<5.0	21	<5.0	<5.0	<5.0	28	40
GMX-6-4.5	4.5 - 5.0	<5.0	<0.35	210	<5.0	<5.0	43	14	46	62	0.18	<5.0	59	<5.0	<5.0	<5.0	29	55
GMX-7-1.0	0.5 - 1.0	<5.0	10	160	<5.0	<5.0	21	5.3	93	290	5.7	<5.0	28	<5.0	<5.0	<5.0	17	320
GMX-7-5.0	4.5 - 5.0	<5.0	<0.35	180	<5.0	<5.0	87	21	35	750	<0.1	<5.0	250	<5.0	<5.0	<5.0	29	160
GMX-8-1.0	0.5 - 1.0	<5.0	<0.35	680	<5.0	<5.0	21	32	130	18	<0.1	<5.0	34	<5.0	<5.0	<5.0	40	49
GMX-8-4.5	4.5 - 5.0	<5.0	5	100	<5.0	<5.0	6.8	<5.0	21	61	<0.1	<5.0	9.1	<5.0	<5.0	<5.0	12	41
Background[2]		5.5	19.1	323	1	2.7	99	22	69	16	0.4	7.4	120	5.6	1.8	27	74	106
95% UTL		25.7	45.7	572.3	5.0	5.0	190.0	32.8	133.1	602.0	4.0	14.0	379.8	5.0	5.0	5.0	53.7	311.7
95% UTL > Background?		Yes	Yes	Yes	NA	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	NA	No	Yes

Note:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed by Entech Analytical Laboratories of Sunnyvale, California, for Title 22 metals using EPA Methods 6000/7000 Series.

[2] Background = Lawrence Berkeley National Laboratory, 1995.

Abbreviations:

feet bgs = feet below ground surface.

< = analyte not detected at or above method detection limit shown.

NA = not applicable; sample results below detection limit reported by the analytical laboratory.

95% UTL = 95 percent upper tolerance limit.

GEOMATRIX

TABLE 2

SUMMARY OF ANALYTICAL RESULTS

VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES[1]

Proposed Imperial Parking Area
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California

Concentrations are reported in milligrams per kilogram (mg/kg)

Sample I.D.	Sample Interval (feet bgs)	Toluene	Ethyl-benzene	Xylenes	1,2,4-Trimethyl-benzene
GMX-1-1.0	0.5 - 1.0	0.030	<0.005	0.029	0.010
GMX-1-4.5	4.5 - 5.0	0.008	<0.005	<0.005	<0.005
GMX-2-1.0	0.5 - 1.0	0.013	<0.005	0.009	0.005
GMX-2-4.5	4.5 - 5.0	0.007	<0.005	<0.005	<0.005
GMX-3-1.0	0.5 - 1.0	0.014	<0.005	0.006	<0.005
GMX-3-4.5	4.5 - 5.0	0.023	<0.005	0.018	0.014
GMX-4-1.0	0.5 - 1.0	0.020	<0.005	0.030	<0.005
GMX-4-4.5	4.5 - 5.0	<0.005	<0.005	<0.005	<0.005
GMX-5-1.0	0.5 - 1.0	0.027	<0.005	0.014	0.008
GMX-5-7.0	4.5 - 5.0	<0.005	<0.005	<0.005	<0.005
GMX-6-1.0	0.5 - 1.0	0.037	<0.005	0.056	0.036
GMX-6-4.5	4.5 - 5.0	<0.005	<0.005	<0.005	<0.005
GMX-7-1.0	0.5 - 1.0	0.008	<0.005	0.009	<0.005
GMX-7-5.0	4.5 - 5.0	0.021	<0.005	0.009	<0.005
GMX-8-1.0	0.5 - 1.0	<0.005	0.023	0.046	<0.005
GMX-8-4.5	4.5 - 5.0	0.008	<0.005	0.010	<0.005

Note:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed by Entech Analytical Laboratories of Sunnyvale, California, for VOCs using EPA Method 8260B.

Abbreviations:
feet bgs = feet below ground surface.
< = indicates result less than the laboratory detection limit indicated.
VOCs = volatile organic compounds.

GEOMATRIX

TABLE 3
SUMMARY OF ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC COMPOUNDS DETECTED IN SOIL SAMPLES[1]

Proposed Imperial Parking Area

Area E - Port of San Francisco Property

South of China Basin Channel, San Francisco, California

Concentrations are reported in milligrams per kilogram (mg/kg)

Sample I.D.	Sample Interval (feet bgs)	Acenaph-thene	Acenaph-thylene	Anthra-cene	Benzo(a) anthra-cene	Benzo(b) fluor-anthene	Benzo(k) fluor-anthene	Benzo (g,h,i) perylene	Benzo(a) pyrene	Chrysene	Dibenzo (a,h) anthra-cene	Fluor-anthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naph-thalene[2]	Phenan-threne	Pyrene
GMX-1-1.0	0.5 - 1.0	<0.04	<0.04	<0.04	<0.04	<0.002	<0.04	<0.04	<0.04	0.089	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.058
GMX-1-4.5	4.5 - 5.0	<0.01	<0.01	0.023	<0.01	0.029	<0.01	<0.01	<0.01	<0.01	<0.01	0.025	<0.01	<0.01	<0.01	0.024	0.029
GMX-2-1.0	0.5 - 1.0	<0.02	0.024	0.103	0.141	<0.002	<0.02	<0.02	<0.02	0.08	<0.02	0.363[3]	<0.02	<0.02	<0.02	0.105	0.415[3]
GMX-2-4.5	4.5 - 5.0	<0.002	0.0024	0.0066	0.022	0.022	0.0048	<0.002	<0.002	0.011	<0.002	0.023	<0.002	<0.002	0.0058	0.0068	0.025
GMX-3-1.0	0.5 - 1.0	<0.02	<0.02	0.078	0.114	<0.002	<0.02	<0.02	<0.02	0.064	<0.02	0.169	<0.02	<0.02	<0.02	0.08	0.16
GMX-3-4.5	4.5 - 5.0	<0.01	<0.01	<0.01	0.025	0.04	<0.01	<0.01	<0.01	0.014	<0.01	0.036	<0.01	<0.01	<0.01	0.024	0.045
GMX-4-1.0	0.5 - 1.0	<0.04	<0.04	<0.04	0.072	<0.04	<0.04	<0.04	<0.04	0.061	<0.04	0.142	<0.04	<0.04	<0.04	0.071	0.183
GMX-4-4.5	4.5 - 5.0	0.053	0.107	0.129	<0.02	<0.2	<0.2	<0.2	0.295	0.18	<0.2	0.628[4]	<0.02	<0.2	0.057	0.668[4]	0.777[4]
GMX-5-1.0	0.5 - 1.0	<0.02	<0.02	<0.02	<0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.032	<0.02	<0.02	<0.02	0.02	0.034
GMX-5-7.0	4.5 - 5.0	<0.002	<0.002	0.026	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	0.011	<0.002	<0.002	<0.002	0.026	0.013
GMX-6-1.0	0.5 - 1.0	<0.04	<0.04	<0.04	0.205	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.046	<0.04	<0.04	<0.04	0.06	0.107
GMX-6-4.5	4.5 - 5.0	<0.01	<0.01	0.029	0.122	0.1	0.023	0.038	0.072	0.056	<0.01	0.11	<0.01	0.042	<0.01	0.029	0.111
GMX-7-1.0	0.5 - 1.0	<0.02	<0.02	0.024	0.187	<0.02	<0.02	<0.02	<0.02	0.098	<0.02	0.196	<0.02	<0.02	<0.02	0.194	0.224
GMX-7-5.0	4.5 - 5.0	<0.01	<0.01	<0.01	0.031	<0.01	<0.01	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.04	0.072	<0.01
GMX-8-1.0	0.5 - 1.0	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.288	<0.04	<0.04	0.095	0.156	0.374
GMX-8-4.5	4.5 - 5.0	0.019	0.078	<0.01	0.314[4]	0.457[4]	<0.01	<0.01	<0.01	0.323[4]	<0.01	0.772[4]	<0.01	<0.01	<0.01	0.288[4]	0.680[4]

Notes:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed by Advanced Technology Laboratories of Signal Hill, California, for PNAs using EPA Method 8270 SIMS.

[2] Detected concentration reported as part of EPA Method 8260.

[3] Results reported from a 1:100 dilution.

[4] Results reported from a 1:50 dilution.

Abbreviations:

feet bgs = feet below ground surface.

< = indicates result less than the laboratory detection limit indicated.

PNAs = polynuclear aromatic hydrocarbons.

GEOMATRIX

TABLE 4

SUMMARY OF ANALYTICAL RESULTS

OTHER MAHER PARAMETERS[1]

Proposed Imperial Parking Area
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California

Concentrations are reported in milligrams per kilogram (mg/kg) unless noted

Sample I.D.	Sample Interval (feet bgs)	Asbestos	Cyanide	Fluoride	Total Sulfide	pH (no units)	FID (ppmv)
GMX-1-1.0	0.5 - 1.0	<1%	<0.5	<0.5	<0.5	8.4	0
GMX-1-4.5	4.5 - 5.0	NA	NA	NA	NA	NA	
GMX-2-1.0	0.5 - 1.0	NA	NA	NA	NA	NA	100
GMX-2-4.5	4.5 - 5.0	<1%	NA	NA	NA	9.4	
GMX-3-1.0	0.5 - 1.0	NA	NA	NA	NA	NA	0
GMX-3-4.5	4.5 - 5.0	<1%	<0.5	<0.5	<0.5	8.8	
GMX-4-1.0	0.5 - 1.0	<1%	NA	NA	NA	9.4	100
GMX-4-4.5	4.5 - 5.0	NA	NA	NA	NA	NA	
GMX-5-1.0	0.5 - 1.0	<1%	<0.5	<0.5	<0.5	9.1	100
GMX-5-7.0	4.5 - 5.0	NA	NA	NA	NA	NA	
GMX-6-1.0	0.5 - 1.0	NA	NA	NA	NA	NA	1100
GMX-6-4.5	4.5 - 5.0	<1%	NA	NA	NA	9.2	
GMX-7-1.0	0.5 - 1.0	NA	NA	NA	NA	NA	10
GMX-7-5.0	4.5 - 5.0	<1%	<0.5	<0.5	<0.5	9.2	
GMX-8-1.0	0.5 - 1.0	<1%	NA	NA	NA	7.7	150
GMX-8-4.5	4.5 - 5.0	NA	NA	NA	NA	NA	

Note:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed for pH, cyanide, total sulfide, fluoride, and asbestos using EPA Methods 9045, 9010, 9030, and 340.2M, and polarized light microscopy. Analyses performed by Entech Analytical Laboratories, Inc. of Sunnyvale, California (pH and fluoride), Advanced Technology Laboratories of Signal Hill, California (cyanide and total sulfide), and EMSL Analytical, Inc. of Milpitas, California (asbestos).

Abbreviations:

feet bgs = feet below ground surface.
< = analyte not detected at or above method detection limit shown.
NA = not analyzed.
FID = flame ionization detector.
ppmv = parts per million vapor.

GEOMATRIX

TABLE 5

SUMMARY OF ANALYTICAL RESULTS
METALS DETECTED IN GRAB GROUNDWATER SAMPLES[1]

Proposed Imperial Parking Area
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California

Concentrations are reported in milligrams per liter (mg/l)

Sample I.D.	Sb	Ar	Ba	Be	Cd	Cr Total	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
GMX-1[2]	0.092/ 0.1	<0.005	0.1	<0.004	<0.005	<0.005	<0.005	<0.005	<0.015	<0.0005	0.018/ 0.02	0.010/ 0.011	<0.015	<0.005	<0.002	<0.010	0.014
GMX-5	<0.005	<0.005	1.7	<0.004	<0.005	0.006	0.008	<0.005	<0.015	<0.0005	0.051	0.006	<0.015	0.034	<0.002	<0.010	0.025

Notes:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed by Entech Analytical Laboratories, of Sunnyvale, California for Title 22 metals using EPA Methods 6000/7000 Series.

[2] Second result from duplicate sample GMX-11.

Abbreviation:

< = indicates result less than the laboratory detection limit indicated.

Sb = Antimony
Ar = Arsenic
Ba = Barium
Be = Beryllium
Cd = Cadmium
Cr Total = Total Chromium
Co = Cobalt
Cu = Copper
Pb = Lead
Hg = Mercury
Mo = Molybdenum
Ni = Nickel
Se = Selenium
Ag = Silver
Tl = Thallium
V = Vanadium
Zn = Zinc

GEOMATRIX

TABLE 6

SUMMARY OF HEALTH RISK ASSESSMENT RESULTS

Proposed Imperial Weitz Parking Lot Areas
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California

Noncancer Hazard Indexes

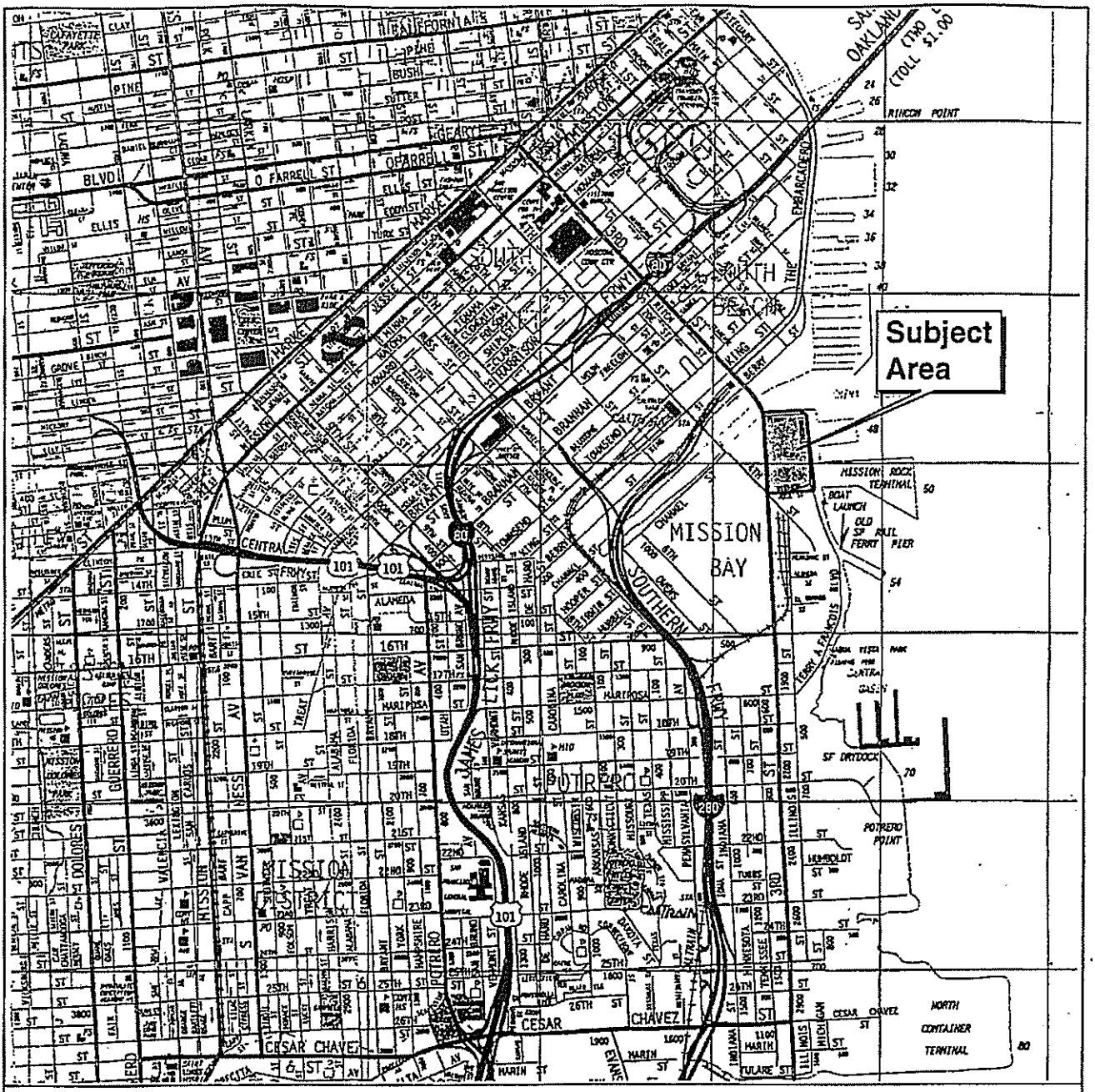
Scenario	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation of Particulates	Dermal Contact with Groundwater	Hazard Index
Future On-site Construction Worker	6E-02	2E-03	8E-04	7E-03	7E-02
Future On-site Visitor	1E-02	5E-03	7E-07	NA	1E-02

Theoretical Lifetime Excess Cancer Risks

Scenario	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation of Particulates	Dermal Contact with Groundwater	Excess Cancer Risk
Future On-site Construction Worker	3E-07	1E-08	7E-08	4E-06	4E-06
Future On-site Visitor	5E-07	3E-07	9E-10	NA	8E-07

Note:

NA = Not applicable



Base map from *The Thomas Guide, 1997Golden Gate Street Guide and Directory*. Reproduced with permission granted by THOMAS BROS. MAPS®. This map is copyrighted by THOMAS BROS. MAPS®. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission. All rights reserved.

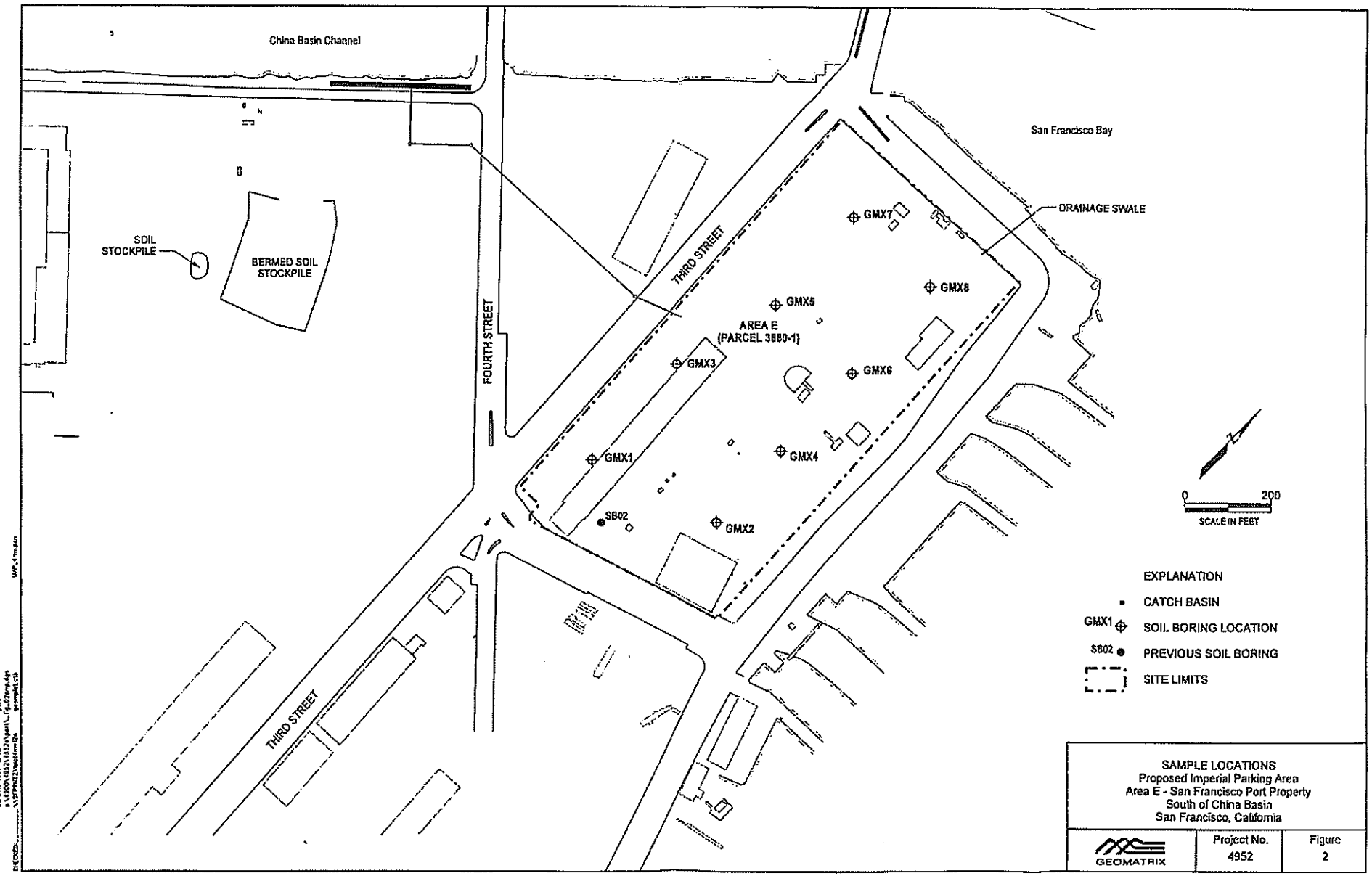
GEOMATRIX

SITE LOCATION MAP
Proposed Imperial Parking Area
Area E - San Francisco Port Property
South of China Basin
San Francisco, California

Figure 1

Project No. 4952

s:\4952\4952a\port_fig_01.ai



SAMPLE LOCATIONS
Proposed Imperial Parking Area
Area E - San Francisco Port Property
South of China Basin
San Francisco, California

GEOMATRIX	Project No. 4952	Figure 2

GEOMATRIX

APPENDIX A

Data Summaries from Previous Investigations

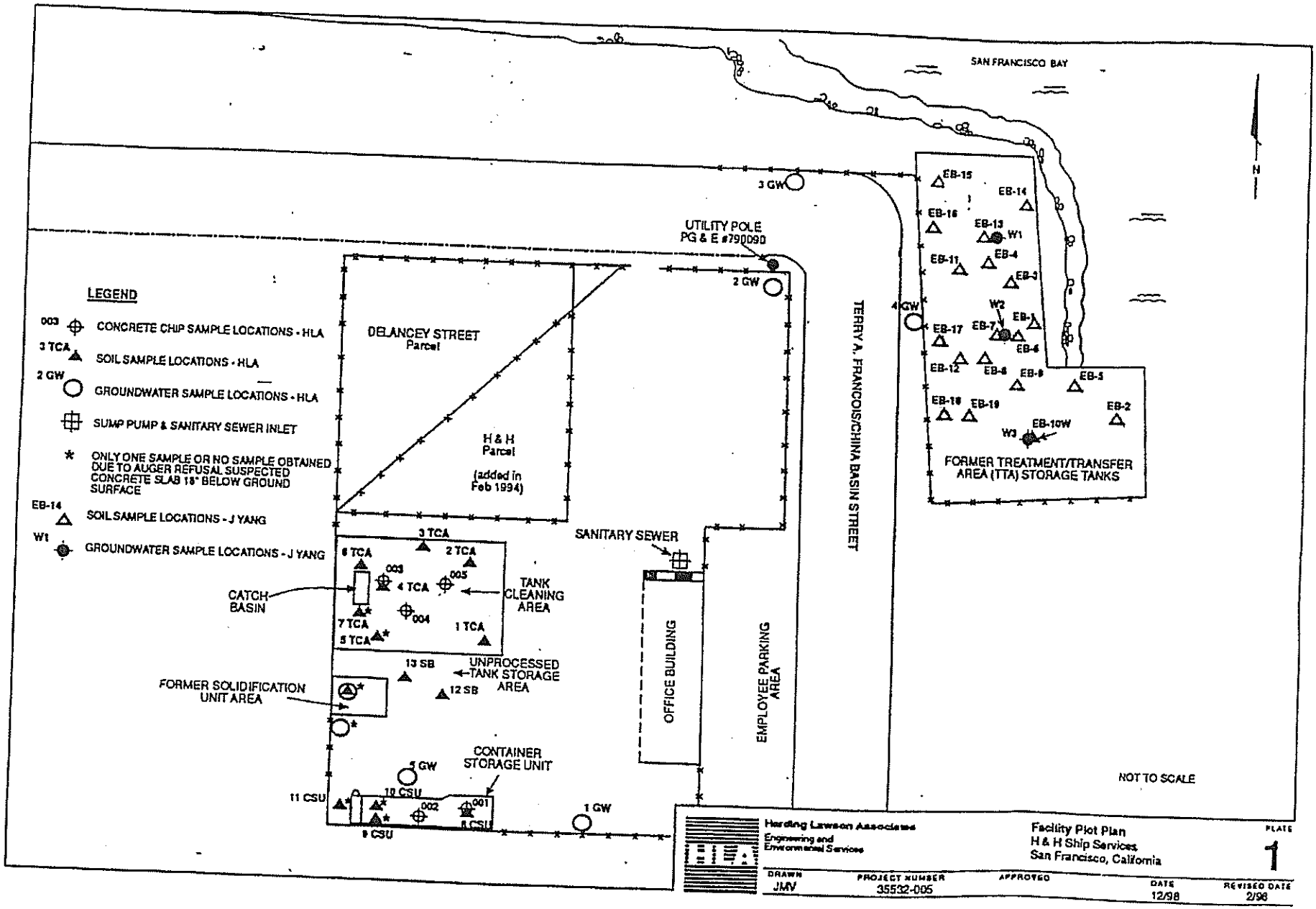

SAN FRANCISCO BAY
N
3 GW
UTILITY POLE
PG & E #790090
2 GW
4 GW
LEGEND
003 CONCRETE CHIP SAMPLE LOCATIONS - HLA
3 TCA SOIL SAMPLE LOCATIONS - HLA
2 GW GROUNDWATER SAMPLE LOCATIONS - HLA
SUMP PUMP & SANITARY SEWER INLET
* ONLY ONE SAMPLE OR NO SAMPLE OBTAINED DUE TO AUGER REFUSAL SUSPECTED CONCRETE SLAB 18" BELOW GROUND SURFACE
EB-14 SOIL SAMPLE LOCATIONS - J YANG
W1 GROUNDWATER SAMPLE LOCATIONS - J YANG
DELANCEY STREET Parcel
H & H Parcel
(added in Feb 1994)
TERRY A. FRANCOIS/CHINA BASIN STREET
EB-15
EB-14
EB-16
EB-13
W1
EB-11
EB-4
EB-3
W2
EB-1
EB-17
EB-7
EB-6
EB-12
EB-8
EB-9
EB-5
EB-18
EB-19
EB-2
W3
EB-10W
FORMER TREATMENT/TRANSFER AREA (TTA) STORAGE TANKS
3 TCA
6 TCA
2 TCA
003
005
4 TCA
CATCH BASIN
TANK CLEANING AREA
7 TCA
004
1 TCA
5 TCA
SANITARY SEWER
13 SB
UNPROCESSED TANK STORAGE AREA
12 SB
FORMER SOLIDIFICATION UNIT AREA
OFFICE BUILDING
EMPLOYEE PARKING AREA
CONTAINER STORAGE UNIT
5 GW
11 CSU
10 CSU
002
001
8 CSU
9 CSU
1 GW
NOT TO SCALE
Harding Lawson Associates
Engineering and Environmental Services
Facility Plot Plan
H & H Ship Services
San Francisco, California
PLATE 1
DRAWN JMV
PROJECT NUMBER 35532-005
APPROVED
DATE 12/98
REVISED DATE 2/99

Table 4. Summary of Chemicals Detected in Soil
Tank Cleaning Area, Container Storage Unit, and Solidification Unit
H & H Ship Service Company
San Francisco, California

Analyte	Units	Number of Detections	Number of Analyses	Frequency of Detection	Minimum Detected Conc.	Maximum Detected Conc.	Location of Maximum Conc.
Inorganics							
Arsenic	mg/kg	16	17	94%	ND	9.2E+01	3TCA-008
Barium	mg/kg	17	17	100%	3.8E+01	6.5E+02	12SB-023
Cadmium	mg/kg	1	17	6%	ND	5.3E-01	3TCA-008
Chromium	mg/kg	17	17	100%	7.3E+00	7.0E+01	1TCA-001
Cobalt	mg/kg	17	17	100%	3.8E+00	4.0E+01	3TCA-007
Copper	mg/kg	17	17	100%	8.9E+00	1.4E+02	10CSU-021
Lead	mg/kg	16	17	94%	ND	2.1E+02	1TCA-001
Mercury	mg/kg	16	17	94%	ND	4.8E-01	2TCA-005
Nickel	mg/kg	17	17	100%	1.3E+01	3.2E+02	6TCA-014
Silver	mg/kg	3	17	18%	ND	3.0E+00	3TCA-007
Thallium	mg/kg	11	17	65%	ND	1.1E+01	1TCA-001
Vanadium	mg/kg	17	17	100%	1.6E+01	4.6E+01	5TCA-013
Zinc	mg/kg	17	17	100%	3.2E+01	2.5E+02	4TCA-011
Petroleum							
Oil and Grease (Total)	mg/kg	17	17	100%	1.1E+02	6.4E+03	4TCA-011
Oil and Grease (Non-Polar)	mg/kg	16	17	94%	ND	5.0E+03	3TCA-007
TPH-Diesel	mg/kg	17	17	100%	5.0E+00	2.1E+03	4TCA-011
TPH-Gasoline	mg/kg	4	17	24%	ND	1.0E+02	4TCA-011
Toluene	mg/kg	17	17	100%	1.2E-02	1.3E+00	3TCA-007
Ethylbenzene	mg/kg	3	17	18%	ND	6.3E-01	4TCA-011
Xylene	mg/kg	6	17	35%	ND	9.3E+00	4TCA-011
PCBs							
Aroclor 1016	mg/kg	2	17	12%	ND	1.0E-01	5TCA-013
Aroclor 1254	mg/kg	7	17	41%	ND	2.4E-01	5TCA-013
Aroclor 1260	mg/kg	3	17	18%	ND	5.5E-01	5TCA-013
PAHs							
Acenaphthene	mg/kg	2	17	12%	ND	9.3E-01	8CSU-018
Acenaphthylene	mg/kg	3	17	18%	ND	1.5E+00	8CSU-018
Anthracene	mg/kg	5	17	29%	ND	3.1E+00	8CSU-018
Benz(a)anthracene	mg/kg	11	17	65%	ND	2.4E+00	8CSU-018
Benzo(b,k)fluoranthene	mg/kg	11	17	65%	ND	2.6E+00	8CSU-018
Benzo(a)pyrene	mg/kg	10	17	59%	ND	1.8E+00	8CSU-018
Benzo(g,h,i)perylene	mg/kg	10	17	59%	ND	6.6E-01	8CSU-018
Chrysene	mg/kg	11	17	65%	ND	2.3E+00	8CSU-018
Dibenz(a,h)anthracene	mg/kg	7	17	41%	ND	3.7E-01	8CSU-018
Fluoranthene	mg/kg	14	17	82%	ND	4.3E+00	8CSU-018
Fluorene	mg/kg	5	17	29%	ND	3.7E+00	8CSU-018
Indeno(1,2,3-cd)pyrene	mg/kg	9	17	53%	ND	7.0E-01	8CSU-018
Naphthalene	mg/kg	5	17	29%	ND	2.5E+00	4TCA-011
Phenanthrene	mg/kg	15	17	88%	ND	6.3E+00	8CSU-018
Pyrene	mg/kg	15	17	88%	ND	4.7E+00	8CSU-018

mg/kg Milligrams per kilogram.
Note: Only detected compounds are listed.

Table 6. Summary of Chemicals Detected in Groundwater
Tank Cleaning Area, Container Storage Unit, and Solidification Unit
H & H Ship Service Company
San Francisco, California

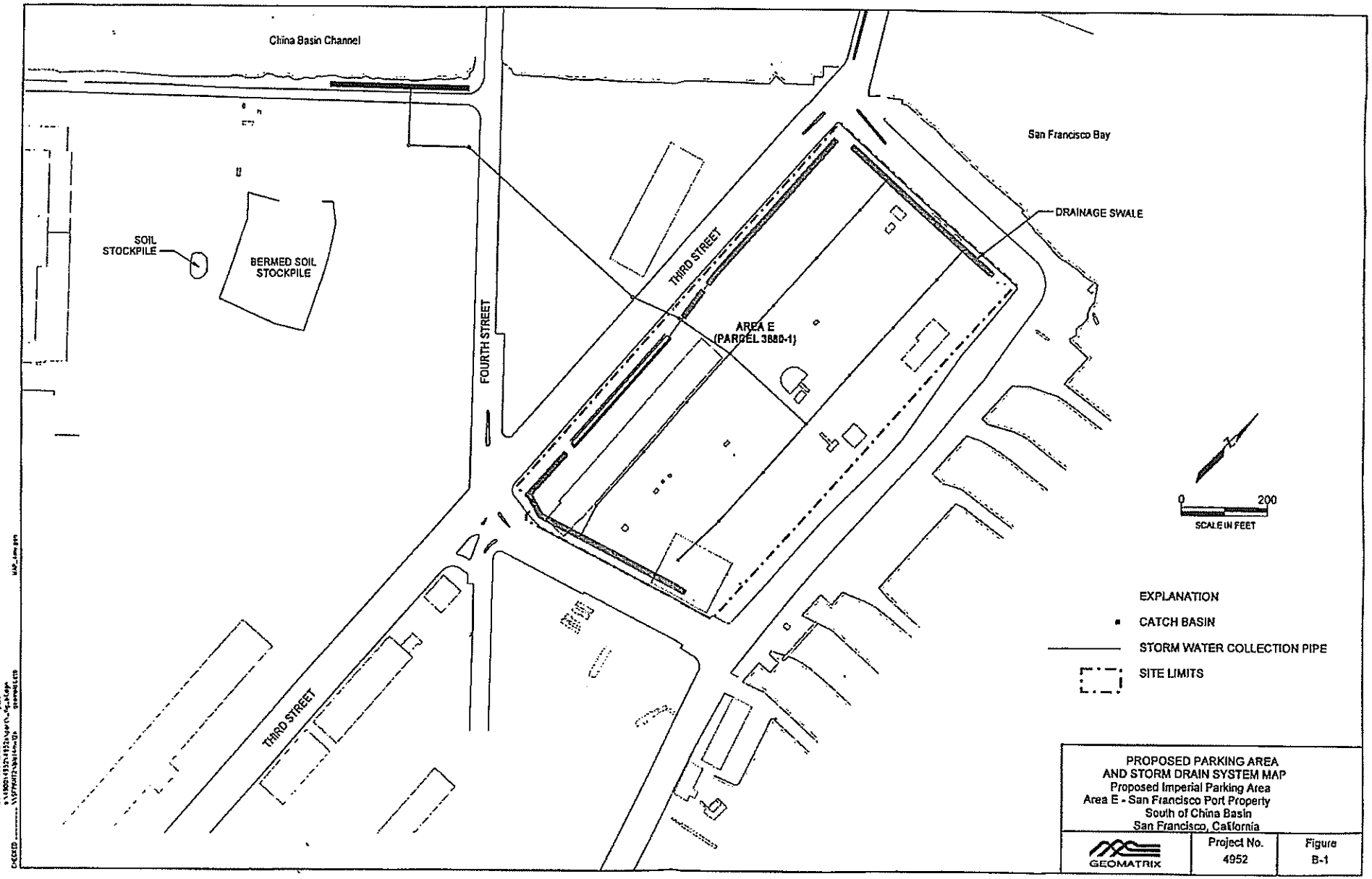
Chemical	Units	Number of Detections	Number of Analyses	Frequency of Detection	Minimum Detected Concentration	Maximum Detected Concentration	Location of Maximum Concentration
Inorganics (filtered)							
Arsenic	mg/L	1	5	20%	0.812	0.812	3GW
Barium	mg/L	5	5	100%	0.0847	0.748	3GW
Cobalt	mg/L	1	5	20%	0.0165	0.0165	2GW
Molybdenum	mg/L	1	5	20%	0.0207	0.0207	4GW
Nickel	mg/L	2	5	40%	0.0419	0.0683	2GW
Zinc	mg/L	1	5	20%	0.126	0.126	4GW
Inorganics (unfiltered)							
Arsenic	mg/L	2	4	50%	0.3	9.2	1GW
Barium	mg/L	4	4	100%	0.27	5.1	1GW
Cadmium	mg/L	3	4	75%	0.012	0.026	1GW
Chromium	mg/L	4	4	100%	0.049	1.1	3GW
Cobalt	mg/L	4	4	100%	0.31	2.5	3GW
Copper	mg/L	4	4	100%	0.056	2	2GW
Lead	mg/L	4	4	100%	0.66	5.6	2GW
Mercury	mg/L	4	4	100%	0.0017	2	4GW
Nickel	mg/L	4	4	100%	0.32	12	3GW
Thallium	mg/L	1	4	25%	0.15	0.15	1GW
Vanadium	mg/L	3	4	75%	0.061	0.47	1GW
Zinc	mg/L	4	4	100%	1	7.2	1GW
Petroleum (unfiltered)							
TPH-Diesel	mg/L	1	4	25%	2.4	2.4	1GW
PCBs (unfiltered) None Detected							
PAHs (unfiltered)							
Acenaphthylene	µg/L	1	5	20%	0.5	0.5	1GW
Anthracene	µg/L	1	5	20%	1.1	1.1	1GW
Benz(a)anthracene	µg/L	3	5	60%	0.14	5.1	1GW
Benzo(b)fluoranthene	µg/L	1	1	100%	0.56	0.56	5GW
Benzo(k)fluoranthene	µg/L	1	1	100%	0.12	0.12	5GW
Benzo(b,k)fluoranthene	µg/L	3	4	75%	0.6	10	1GW
Benzo(a)pyrene	µg/L	3	5	60%	0.34	6.8	1GW
Benzo(g,h,i)perylene	µg/L	3	5	60%	0.5	5.5	1GW
Chrysene	µg/L	2	5	40%	7	7	1GW
Dibenz(a,h)anthracene	µg/L	1	5	20%	1.2	1.2	1GW
Fluoranthene	µg/L	3	5	60%	0.7	10	1GW
Fluorene	µg/L	1	5	20%	1.5	1.5	5GW
Indeno(1,2,3-cd)pyrene	µg/L	1	5	20%	4.2	4.2	1GW
Naphthalene	µg/L	3	5	60%	0.5	1.1	5GW
Phenanthrene	µg/L	4	5	80%	0.5	4.8	1GW
Pyrene	µg/L	4	5	80%	0.6	10	1GW
PAHs (filtered) None Detected							

mg/L Milligrams per liter.
µg/L Micrograms per liter.
ND Not detected.
NA Not available.
Note: Only detected analytes are listed.

GEOMATRIX

APPENDIX B

Site Plans Illustrating Alternative Storm Drainage Systems



PROPOSED PARKING AREA
AND STORM DRAIN SYSTEM MAP
Proposed Imperial Parking Area
Area E - San Francisco Port Property
South of China Basin
San Francisco, California

GEOMATRIX	Project No. 4952	Figure B-1

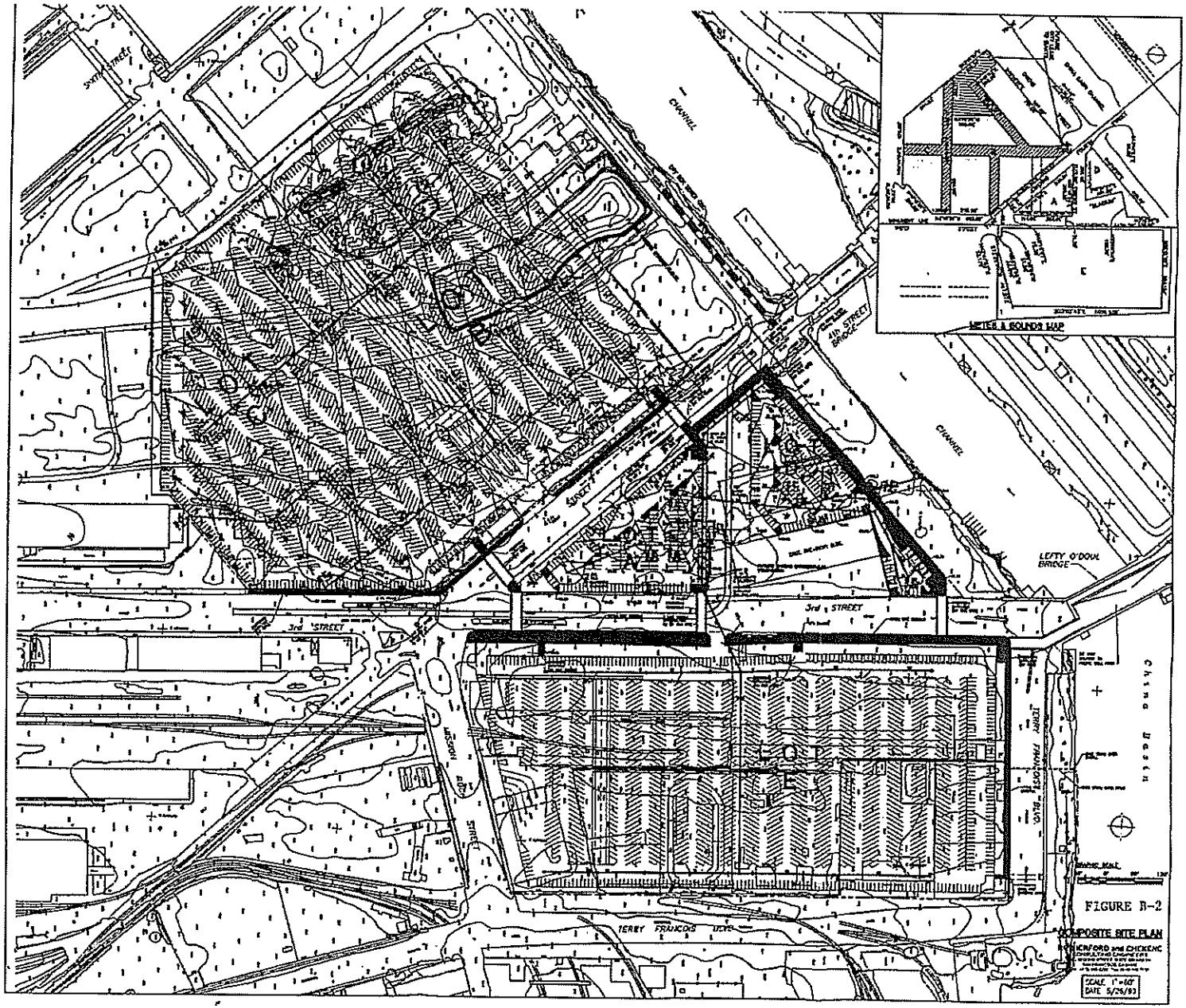


FIGURE B-2

COMPOSITE SITE PLAN

Attachment B

RECORDING REQUESTED BY:
The Port of San Francisco
Ferry Building
San Francisco, California 94111

WHEN RECORDED, MAIL TO:

Department of Toxic Substances Control
700 Heinz Avenue, Suite 300
Berkeley, California 94710
Attention: Mohinder S. Sandhu, P.E., Chief
Standardized Permits and Corrective
Action Branch

San Francisco Assessor-Recorder
Doris M. Ward, Assessor-Recorder
DOC- 2000-G723986-00
Acct 25-NO CHARGE DOCUMENT
Thursday, JAN 27, 2000 10:47:55
FRE $0.00
Ttl Pd $0.00 Nbr-0001346614
REEL H561 IMAGE 0199 oed/ER/1-16

N/C
16

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

(Re: H&H Site located at Seawall Lot 337, City and County of San Francisco)

This Covenant and Agreement ("Covenant") is made by and between COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

Re: H&H Site located at Seawall Lot 337, City and County of San Francisco

This Covenant and Agreement ("Covenant") is made by and between the City and County of San Francisco, a charter city and county in trust (the "Covenantor"), the current owner, of certain property situated in the City and County of San Francisco, State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the Department of Toxic Substances Control (the

"Department"). Pursuant to Civil Code section 1471(c), the Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials as defined in Health and Safety Code ("H&SC") section 25260. The Covenantor and the Department, collectively referred to as the "Parties", therefore intend that the use of the Property be restricted as set forth in this Covenant, in order to protect human health, safety and the environment.

ARTICLE I
STATEMENT OF FACTS

1.01. The Property, totaling approximately 14 acres, is more particularly described in Exhibit "A" and depicted in Exhibit "A-1", attached hereto and incorporated herein by this reference. The Property is located in the area now generally bounded by Terry Francois Boulevard on the North and East, in the City and County of San Francisco, California.

1.02. The site was created by filling marshlands and shallow tidal flats bordering San Francisco Bay between 1877 and 1913. Sources of fill are unknown, but likely included construction/demolition debris and rubble, and rock and dirt cut from nearby hills. Historical uses of the Site include railroad tracks and related support structures, parking and shipping by truck, and truck maintenance. From 1950 to 1996 H&H Ship Service operated a hazardous waste treatment facility, including a tank cleaning area and drum storage unit, and used portions of the Property for vehicle parking and offices.

In 1978 several of the wastes managed at the H&H Ship Service facility were determined to be hazardous wastes subject to federal and state hazardous waste management regulations. Since that time, the Department of Toxic Substances Control (or its predecessor in interest, the Department of Health Services) authorized H&H Ship Service's operations pursuant to an interim status document. Under this authorization the property was a hazardous waste facility (Facility), regulated by the Department, subject to the requirements of the California Hazardous Waste Control Law ("HWCL"), at Health and Safety Code ("H&S Code") section 25100 et seq., and the federal Resource Conservation and Recovery Act ("RCRA"), at 42 U.S.C. section 6901 et seq.

The Department is requiring this Covenant pursuant to the closure requirements of the HWCL, including H&S Code section 25246 and post-closure notices provisions of Title 22 California Code of Regulations [section 66265.119(b) for interim status hazardous waste facilities], as part of the facility closure. The Department circulated a closure plan, dated August 30, 1996 and a draft Categorical Exemption pursuant to the California Environmental Quality Act, Public Resources Code section 21000 et seq for

public review and comment from December 23, 1999 to January 24, 2000. The Department approved the closure plan, closure certification report titled, *RCRA Closure Certification Report, Former H&H Ship Service Facility, San Francisco, California, dated February 4, 1999*, containing a health risk assessment, and the Categorical Exemption on January 26, 2000. Hazardous wastes, which are also hazardous materials as defined in Health and Safety Code sections 25117 and 25260, including petroleum hydrocarbons, polynuclear aromatic hydrocarbons, metals and arsenic, remain in the soil and groundwater at the Site at concentrations below those which would pose a significant human health risk under proposed reuse scenarios. The health risk assessment did not evaluate an unrestricted land use scenario, recreational use involving direct contact with soil, or potential impacts from use of groundwater. Therefore a deed restriction to limit use of the property to those exposure scenarios evaluated and found to be below acceptable risk limits is required as part of the facility closure.

1.03. As detailed in the health risk assessment within the *RCRA Closure Certification Report*, as approved by the Department on January 26, 2000, portions of the surface and subsurface soils on the Site contain hazardous wastes and hazardous materials, as defined in H&S Code section 25117 and 25260, including the following contaminants of concern: arsenic (up to 92 mg/kg) and benzo(a)pyrene (up to 2.5 mg/kg). Groundwater beneath the Property is found within 10 to 20 feet below ground surface. Dissolved arsenic was found in groundwater at up to 812 ug/l. California drinking water standards are arsenic at 50 ug/l. Because the health risk assessment did not evaluate an unrestricted land use scenario, recreational use involving direct contact with soil, or potential impacts from use of groundwater, the Department concluded that use of the Property as a residence, hospital, school for persons under the age of 21, day care center, or recreational use involving direct contact with soil would entail an unacceptable potential human health risk. The Department further concluded that the Property, subject to the restrictions of this Covenant, does not present an unacceptable threat to human safety or the environment.

ARTICLE II
DEFINITIONS

2.01. Department. "Department" shall mean the California Department of Toxic Substances Control and shall include its successor agencies, if any.

2.02. Owner. "Owner" shall mean the Covenantor, its successors in interest, and their successors in interest, including heirs and assigns, who at any time hold title to all or any portion of the Property.

2.03. Occupant. "Occupant" shall mean Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

ARTICLE III
GENERAL PROVISIONS

3.01. Restrictions to Run With the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), upon and subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. Each and every one of the Restrictions: (a) shall run with the land pursuant to H&SC sections 25202.5, and 25202.6 and Civil Code section 1471; (b) shall inure to the benefit of and pass with each and every portion of the Property, (c) shall apply to and bind the respective successors in interest to the Property, (d) are for the benefit of, and shall be enforceable by the Department, and (e) are imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02. Binding Upon Owners/Occupants. Pursuant to Health and Safety Code section 25202.5(b), this Covenant shall be binding upon all of the owners of the land, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471(b), all successive owners of the Property are expressly bound hereby for the benefit of the covenantee(s) herein. "Owner" shall include "Covenantor".

3.04. Written Notice of Hazardous Substance Release. The Owner shall, prior to the sale, lease, or rental of the Property, give written notice that a release of hazardous substances has come to be located on or beneath the Property, pursuant to Health and Safety Code section 25359.7. Such written notice shall include a copy of this Covenant.

ARTICLE IV
RESTRICTIONS

4.01. Prohibited Uses. The Property shall not be used for any of the following purposes:

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation;

(b) A hospital for humans;

(c) A public or private school for persons under 21 years of age;

(d) A day care center for children; or

(e) Recreational use involving direct contact with soil.

4.02. Soil Management

(a) Any contaminated soils brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of state and federal law.

(b) If more than 50 cubic yards of any surface or subsurface soil will be disturbed, including excavation and grading, then the soil shall be evaluated for potential human health risks in compliance with Article 20 of the SF Municipal Code ("the Maher Ordinance"), and managed accordingly.

4.03. Prohibited Activities. The following activities shall not be conducted at the Property:

(a) No raising of food (e.g., cattle, food crops, cotton, etc.) shall be permitted on the property.

(b) No groundwater shall be extracted on the Property for purposes other than site remediation or construction dewatering without prior written approval by the Department.

4.04. Access for Department. Covenantor agrees that the Department shall have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department in order to protect the public health and safety.

ARTICLE V
ENFORCEMENT

5.01. Enforcement. Failure of the Covenantor and/or Owner to comply with any of the Restrictions specifically applicable to it shall be grounds for the Department, by reason of this Covenant, to require that the Covenantor and/or Owner modify or remove any improvements ("Improvements" herein shall mean all buildings, roads, driveways, and paved parking areas, constructed or placed upon any portion of the Property constructed in violation of the Restrictions.) Violation of this Covenant shall be grounds for the Department to file civil and/or criminal actions against the Covenantor and/or Owner as provided by law.

ARTICLE VI
VARIANCE, TERMINATION, AND TERM

6.01. Variance. Any Owner or, with the Owner's written consent, any Occupant of the Property or any portion thereof may apply to the Department for a written variance from the provisions of this Covenant. Such application shall be made in accordance with H&S Code section 25202.6.

6.02. Termination. Any Owner, and/or, with the Owner's written consent, any Occupant of the Property, or any portion thereof, may apply to the Department for a termination of the Restrictions or other terms of this Covenant as they apply to all or any portion of the Property. Such application shall be made in accordance with H&S Code section 25202.6.

6.03. Term. Unless ended in accordance with the Termination Paragraph above, by law, or by the Department in the exercise of its discretion, this Covenant shall continue in effect in perpetuity.

ARTICLE VII
MISCELLANEOUS

7.01. No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever.

7.02. Department References. All references to the Department include successor agencies/departments or other successor entity.

7.03. Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of San Francisco within ten (10) days of the Covenantor's receipt of a fully executed original.

7.04. Notices. Whenever any person gives or serves any notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served, or (2) three (3) business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner:

G723986

On or Before 12/31/00:

Port of San Francisco
3100 Ferry Building
San Francisco, CA 94111
Attention: Carol Bach,

With a copy to

Noreen Ambrose
Port General Counsel
Port of San Francisco
3100 Ferry Building
San Francisco, CA 94111.

After 12/31/00:

Port of San Francisco
Pier 1
San Francisco, CA 94111
Attention: Carol Bach,

With a copy to:
Noreen Ambrose
Port General Counsel
Port of San Francisco
Pier 1
San Francisco, CA 94111.

To Department:

California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue, Suite 300
Berkeley, CA 94710-2737
Attention: Branch Chief
Standardized Permits and Corrective Action Branch

Any party may change its address or the individual to whose attention a notice is to be sent by giving written notice in compliance with this paragraph.

7.05. Partial Invalidity. If any portion of the Restrictions or other term set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

G723986

IN WITNESS WHEREOF, the Parties execute this Covenant.

"Covenantor" City & County of San Francisco

Date: 1/26/2000

By: _____
DOUGLAS F. WONG
Its: Executive Director
Port of San Francisco

"Department" Department of Toxic Substances Control

Date: 1/26/00

By: _____
MOHINDER S. SANDHU
Its: Chief, Standardized Permits and Corrective Action Branch

G723986

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of San Francisco } ss.

On January 26, 2000, before me, Virna C. Wu, "Notary Public",
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared Douglas Farrell Wong,
Name(s) of Signer(s)

☒ personally known to me
☐ ~~proved to me on the basis of satisfactory~~ evidence

to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(~~ies~~), and that by his/~~her/their~~ signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

WITNESS my hand and official seal.

Signature of Notary Public

VIRNA CHERN WU
Commission # 1203557
Notary Public - California
San Francisco County
My Comm. Expires Dec 3, 2002

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Environmental Restriction

Document Date: 1/26/2000 Number of Pages: 8 + 6 (Parcel B, C, D)

Signer(s) Other Than Named Above: None

Capacity(ies) Claimed by Signer

Signer's Name: Douglas Farrell Wong

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: Port Executive Director

Signer Is Representing: Port of San Francisco

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

© 1997 National Notary Association • 9350 De Soto Ave., P.O. Box 2402 • Chatsworth, CA 91313-2402 Prod. No. 5907 Reorder: Call Toll-Free 1-800-876-6827

G723986

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of San Francisco } ss.

On January 26, 2000 (Date), before me, Virna C. Wu, "Notary Public" (Name and Title of Officer (e.g., "Jane Doe, Notary Public")),

personally appeared Mohinder Singh Sandhu (Name(s) of Signer(s)),

~~☐ personally known to me~~

☒ proved to me on the basis of satisfactory evidence

to be the person~~(s)~~ whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity~~(ies)~~, and that by his/her/their signature~~(s)~~ on the instrument the person~~(s)~~, or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.

WITNESS my hand and official seal.

Virna C. Wu
Signature of Notary Public

VIRNA CHERN WU
Commission # 1203557
Notary Public - California
San Francisco County
My Comm. Expires Dec 3, 2002

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Environmental Restriction

Document Date: 01/26/2000 Number of Pages: 8+6(Parcel A, C & D)

Signer(s) Other Than Named Above: None

Capacity(ies) Claimed by Signer

Signer's Name: Mohinder Singh Sandhu

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☒ Other: Chief, Standardized Permits & Corrective Action Branch

Signer Is Representing: Dept. of Toxic Substances Control

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

© 1997 National Notary Association • 9350 De Soto Ave., P.O. Box 2402 • Chatsworth, CA 91313-2402 Prod. No. 5907 Reorder: Call Toll-Free 1-800-876-6827

G723986

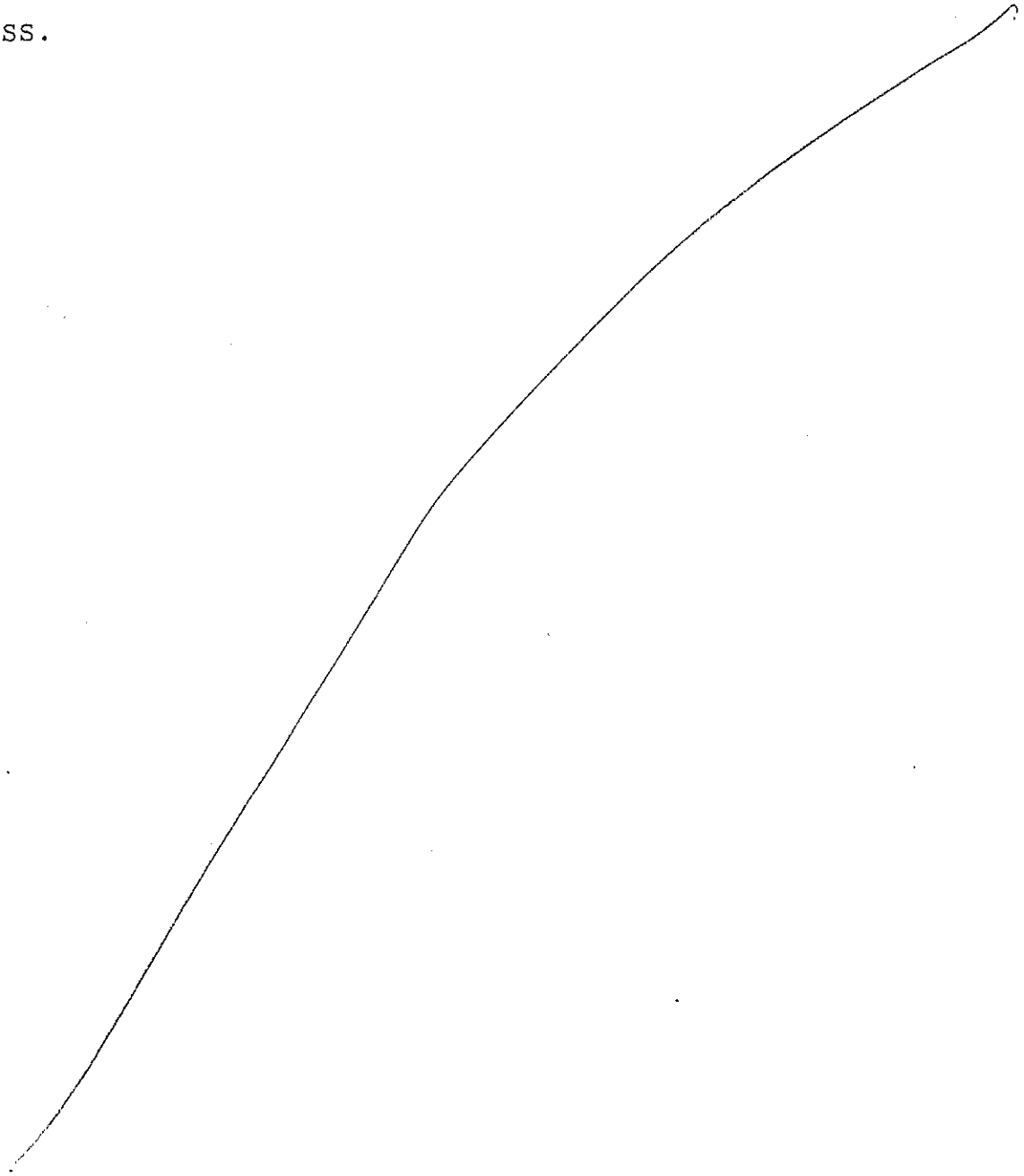
SEAWALL LOT 337

PARCEL A

ALL THAT CERTAIN REAL PROPERTY SITUATED AT THE CITY AND COUNTY OF SAN FRANCISCO, BEING A PORTION OF SEAWALL LOT 337 OF THE SAN FRANCISCO PORT AUTHORITY, DESCRIBED AS FOLLOWS; COMMENCING AT THE SOUTHWEST CORNER OF THE INTERSECTION OF TOWNSEND STREET AND DELANCEY STREET (FORMERLY FIRST STREET), SAID CORNER BEING INNER 14 OF THE INNER WATERFRONT LINE AS DESCRIBED IN THE RECORDS ON FILE AT THE OFFICE OF ENGINEERING OF THE SAN FRANCISCO PORT AUTHORITY; RUNNING THENCE ALONG SAID INNER WATERFRONT LINE AT S 3DEG 02'27" E A DISTANCE OF 2,217.59 FEET TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING ALONG THE LAST AFOREMENTIONED COURSE A DISTANCE OF 149.77 FEET; THENCE AT S 86DEG 57'33" W A DISTANCE OF 38.12 FEET; THENCE AT S 3DEG 14'22" E A DISTANCE OF 31.51 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 55.69 FEET; THENCE AT S 3DEG 02'27" E A DISTANCE OF 120.00 FEET; THENCE AT S 86DEG 45'38" W A DISTANCE OF 55.27 FEET; THENCE AT N 3DEG 14'22" W A DISTANCE OF 120.00 FEET; THENCE AT S 86DEG 45'38" W A DISTANCE OF 40.17 FEET; THENCE AT S 3DEG 14'22" E A DISTANCE OF 120.00 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 40.17 FEET; THENCE AT S 3DEG 14'22" E A DISTANCE OF 48.20 FEET; THENCE AT S 86DEG 57'33" W A DISTANCE OF 142.25 FEET; THENCE AT

G723986

S 86DEG 50'57" W A DISTANCE OF 111.99 FEET; THENCE AT
N 3DEG 10'55" W A DISTANCE OF 200.00 FEET; THENCE AT
N 86DEG 57'33" E A DISTANCE OF 171.00 FEET; THENCE AT
N 3DEG 02'27" W A DISTANCE OF 149.48 FEET; THENCE AT
N 86DEG 49'20" E A DISTANCE OF 121.29 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING AN AREA OF 70,765.20 SQUARE FEET, MORE OR LESS.

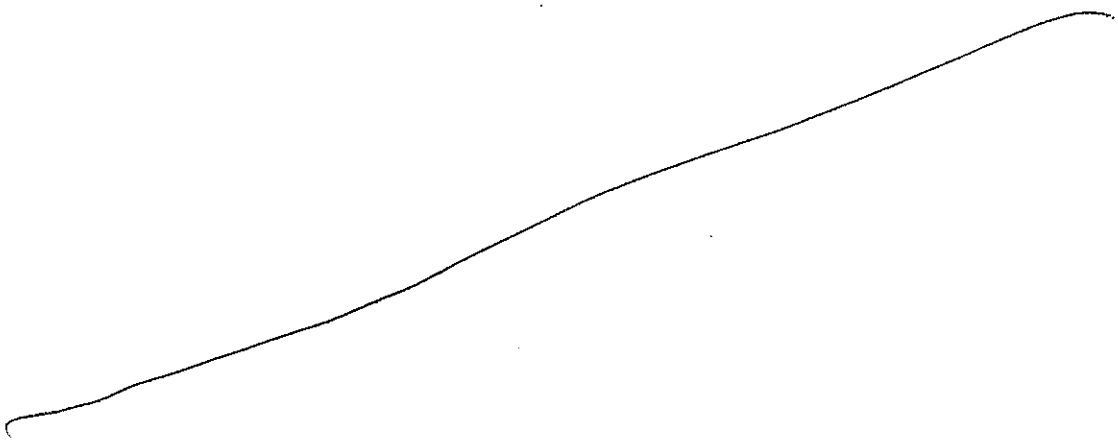


G723986

SEAWALL LOT 337

PARCEL C

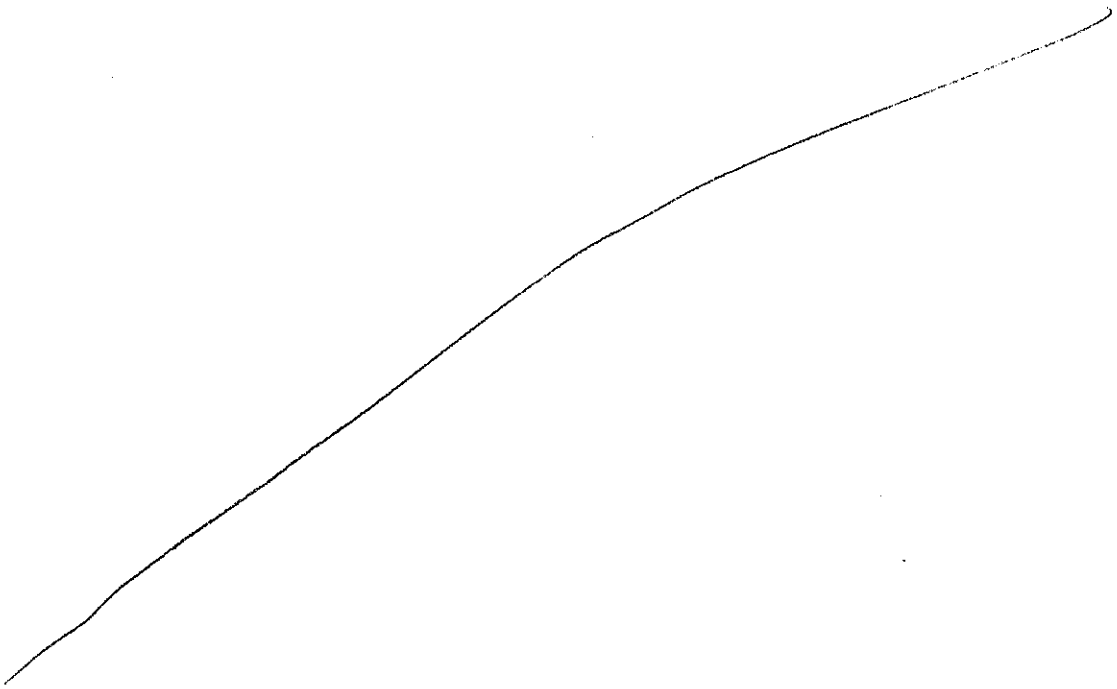
BEING A PORTION OF SEAWALL LOT 337 OF THE SAN FRANCISCO PORT AUTHORITY ,CITY AND COUNTY OF SAN FRANCISCO, BRIEFLY DESCRIBED AS FOLLOWS; COMMENCING AT THE SOUTHWEST CORNER OF THE INTERSECTION OF TOWNSEND STREET AND DELANCEY STREET (FORMERLY FIRST STREET), SAID CORNER BEING INNER 14 OF THE INNER WATERFRONT LINE AS DESCRIBED IN THE RECORDS ON FILE AT THE OFFICE OF ENGINEERING OF THE SAN FRANCISCO PORT AUTHORITY; RUNNING THENCE ALONG THE AFORESAID INNER WATERFRONT LINE AT S 3DEG 02'27" E A DISTANCE OF 2,367.36 FEET TO THE TRUE POINT OF BEGINNING; THENCE AT S 48DEG 02'27" E A DISTANCE OF 25.00 FEET; THENCE AT S 3DEG 02'27" E A DISTANCE OF 13.64 FEET; THENCE AT S 86DEG 45'38" W A DISTANCE OF 55.69 FEET; THENCE AT N 3DEG 14'22" W A DISTANCE OF 31.51 FEET; THENCE AT N 86DEG 57'33" E A DISTANCE OF 38.12 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING AN AREA OF 1,594.90 SQUARE FEET, MORE OR LESS.



G723986

ALSO INCLUDED IN THIS PARCEL IS A PORTION OF SEAWALL LOT 337 BRIEFLY DESCRIBED AS FOLLOWS;

COMMENCING AT THE SOUTHWEST CORNER OF THE INTERSECTION OF TOWNSEND STREET AND DELANCEY STREET (FORMERLY FIRST STREET) SAID POINT BEING INNER 14 OF THE INNER WATERFRONT LINE AS DESCRIBED IN THE RECORDS ON FILE AT THE OFFICE OF ENGINEERING OF THE SAN FRANCISCO PORT AUTHORITY; RUNNING THENCE ALONG THE AFORESAID INNER WATERFRONT LINE A DISTANCE OF 2,518.74 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 17.66 FEET TO THE TRUE POINT OF BEGINNING; THENCE AT S 3DEG 02'27" E DISTANCE OF 30.72 FEET; THENCE AT S 41DEG 57'33" W A DISTANCE OF 25.00 FEET; THENCE S 86DEG 57'33" W A DISTANCE OF 37.43 FEET; THENCE AT N 3DEG 14'22" W A DISTANCE OF 48.20 FEET; THENCE AT N 86DEG 45'38" E DISTANCE OF 55.27 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING AN AREA OF 2,509.60 SQUARE FEET, MORE OR LESS.



G723986

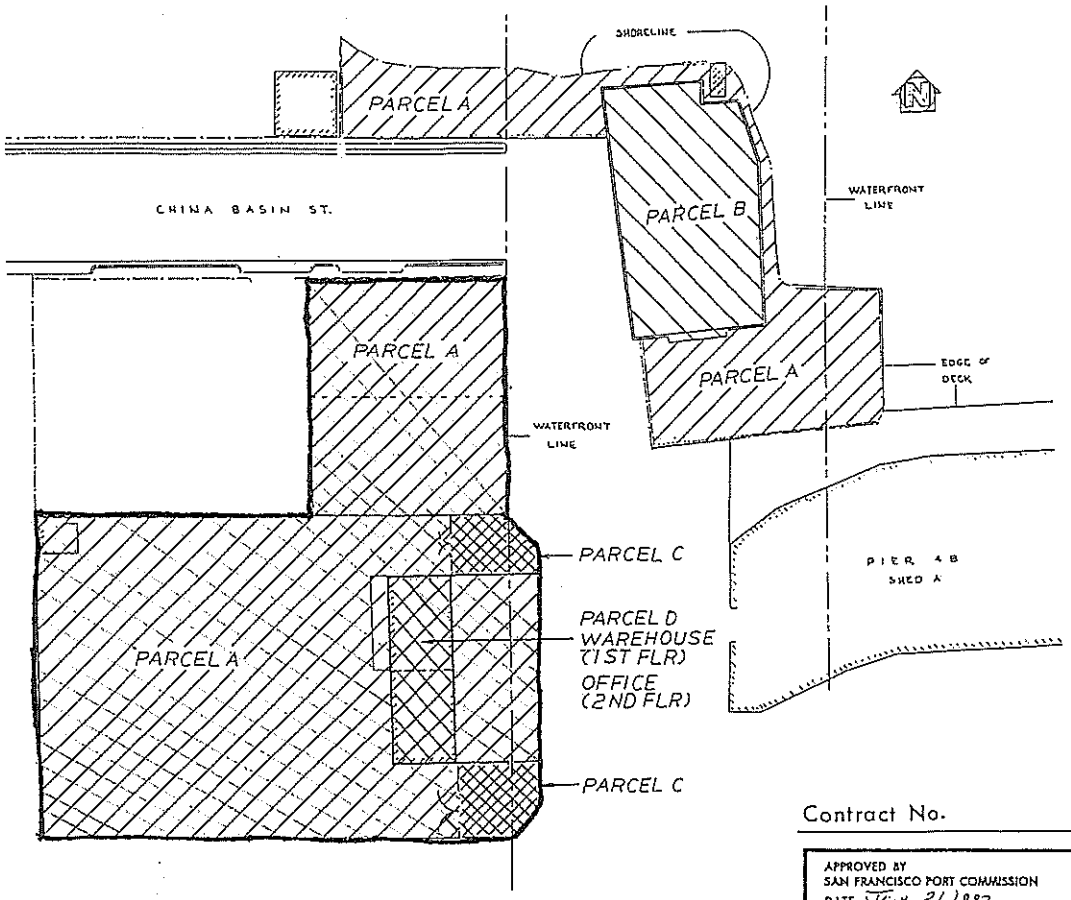
SEAWALL LOT 337

PARCEL D

PARCEL D IS A TWO-STORY WAREHOUSE AND OFFICE BUILDING LOCATED AT CHINA BASIN STREET WHOSE FOOTPRINT IS BRIEFLY DESCRIBED AS FOLLOWS;
COMMENCING AT THE SOUTHWEST CORNER OF THE INTERSECTION OF TOWNSEND STREET AND DELANCEY STREET (FORMERLY FIRST STREET), SAID POINT BEING INNER 14 OF THE INNER WATERFRONT LINE AS DESCRIBED IN THE RECORDS ON FILE AT THE OFFICE OF ENGINEERING OF THE SAN FRANCISCO PORT AUTHORITY; RUNNING THENCE SOUTHERLY ALONG THE AFORESAID INNER WATERFRONT LINE AT S 3DEG 02'27" E A DISTANCE OF 2,398.74 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 38.02 FEET TO THE TRUE POINT OF BEGINNING; THENCE AT S 3DEG 14'22" E A DISTANCE OF 120.00 FEET; THENCE AT S 86DEG 45'38" W A DISTANCE OF 40.17 FEET; THENCE AT N 3DEG 14'22" W A DISTANCE OF 120.00 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 40.17 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING AN AREA OF 4,820.00 SQUARE FEET, MORE OR LESS.

ALSO INCLUDED IN THIS PARCEL IS THE SECOND FLOOR OFFICE SPACE OF THE AFOREMENTIONED TWO- STORY BUILDING WITH AN AREA OF 2,414.00 SQUARE FEET, MORE OR LESS.

G723986



PARCEL A	91,844 SF
PARCEL B	14,071 SF
SUB TOTAL	105,915SF
PARCEL C	4,105SF
PARCEL D	
WAREHOUSE	4,820 SF
OFFICE	2,414 SF
TOTAL	117,254 SF

Contract No.

APPROVED BY
SAN FRANCISCO PORT COMMISSION
DATE Jan 21 1992
CHIEF ENGINEER

NO.	DATE	DESCRIPTION

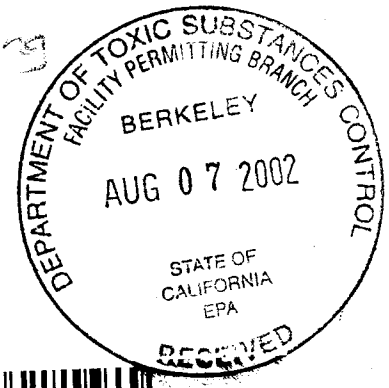
REVISIONS

PORT OF SAN FRANCISCO
SAN FRANCISCO PORT COMMISSION
DEPARTMENT OF ENGINEERING

EXHIBIT A-1
H & H SHIP SERVICE CO.
LEASE NO. L-11679

DRAWN BY E.C.C.	CHECKED BY
DESIGNED BY	DATE 4-27-92
SECTION HEAD	SCALE
DRAWING NO.	SHEET NO. OF SHEETS

20020507-0-Wong



RECORDING REQUESTED BY:
The Port of San Francisco
Ferry Building
San Francisco, California 94111

WHEN RECORDED, MAIL TO

Department of Toxic Substances Control
700 Heinz Avenue, Suite 300
Berkeley, California 94710
Attention: Mohinder S. Sandhu, P.E., Chief
Standardized Permits and Corrective Action Branch

San Francisco Assessor-Recorder
Doris M. Ward, Assessor-Recorder
DOC- 2002-H209674-00
Acct 25-NO CHARGE DOCUMENT
Thursday, JUL 25, 2002 12:45:40
Ttl Pd $0.00 Nbr-0001906468
REEL I187 IMAGE 0545
oj1/JL/1-14

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

(Re: H&H Site located at China Basin Channel and Terry Francois Blvd, City and County of San Francisco)

This Covenant and Agreement ("Covenant") is made by and between the City and County of San Francisco, a charter city and county in trust (the "Covenantor"), the current owner of certain property situated in the City and County of San Francisco, State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the Department of Toxic Substances Control (the "Department"). Pursuant to Civil Code section 1471(c) and the California Health and Safety Code, Section 25222.1, the Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials as defined in Health and Safety Code ("H&SC"), Section 25260. The Covenantor and the Department, collectively referred to as the "Parties", therefore intend that the use of the Property be restricted as set forth in this Covenant, in order to protect human health,

safety and the environment.

ARTICLE I
STATEMENT OF FACTS

1.01. The Property, totaling approximately 0.6 acres, is more particularly described in Exhibit "A" and depicted in Exhibit "A-1", attached hereto and incorporated herein by this reference. The Property is located in the area now generally bounded by Terry Francois Boulevard to the west, China Basin Channel to the north, and San Francisco Bay to the east, in the City and County of San Francisco, California.

1.02. The site was created by filling marshlands and shallow tidal flats bordering San Francisco Bay between 1877 and 1913. Sources of fill are unknown, but likely included construction/demolition debris and rubble, and rock and dirt cut from nearby hills. Historical uses of the Site include railroad tracks and related support structures and parking. From 1950 to 1996 H&H Ship Service occupied the area for wastewater treatment and transfer operations, including aboveground storage tanks for receiving, settling and treating wastewater containing petroleum.

In 1978 several of the wastes managed at the H&H Ship Service facility were determined to be hazardous wastes subject to federal and state hazardous waste management regulations. Since that time, the Department of Toxic Substances Control (or its predecessor in interest, the Department of Health Services) authorized H&H Ship Service's operations pursuant to an interim status document. Under this authorization the property was a hazardous waste facility (Facility), regulated by the Department, subject to the requirements of the California Hazardous Waste Control Law ("HWCL"), at Health and Safety Code ("H&S Code") section 25100 et seq., and the federal Resource Conservation and Recovery Act ("RCRA"), at 42 U.S.C. section 6901 et seq. Under Interim Status, the property was a portion of the Facility that was known as the Treatment/Transfer Area (TTA).

The Department is requiring this Covenant pursuant to the closure requirements of the HWCL, including H&S Code section 25246 and post-closure notices provisions of Title 22 California Code of Regulations [section 66265.119(b) for interim status hazardous waste facilities], as part of the facility closure. In 1994, the Department reviewed H&H's Closure Plan to ensure that the closure of the TTA met the requirements in Title 22, California Code of Regulations, Chapter 15, Article 7. The Department circulated the draft Closure Plan and Proposed Negative Declaration for public review and comment from August 11, 1994 to September 13, 1994. The Department approved the Closure Plan on January 13, 1995 and filed a Notice of Determination for the project with the

State Clearinghouse on February 15, 1995.

The Department reviewed the closure certification report titled, *RCRA Closure Certification Report, Former H&H Ship Service Facility, San Francisco, California,* (February 4, 1999), and subsequent submittals titled *Response to Comments, RCRA Closure Certification Report, Former H&H Ship Service Facility,* (November 2, 1999); *Results of Article 20 Sampling Program. Proposed China Basin Park Area* (July 2000); *Site Investigation and Surface Soil Sampling Results, Former H&H Ship Service Company – Treatment Transfer Area Parcel* (February 28, 2002); and *Addendum to the Article 20 Health Risk Assessment* (July 18, 2002). Upon filing of this deed restriction, the Department will approve the closure certification report.

Hazardous wastes, which are also hazardous materials as defined in Health and Safety Code sections 25117 and 25260, including petroleum hydrocarbons, polynuclear aromatic hydrocarbons, metals and arsenic, remain in the soil and groundwater at the Site at concentrations below those which would pose a significant human health risk under proposed reuse scenarios. Therefore a deed restriction to limit use of the property to those exposure scenarios evaluated and found to be below acceptable risk limits is required as part of the facility closure.

1.03. As detailed in the above-referenced reports, portions of the surface and subsurface soils on the Site contain hazardous wastes and hazardous materials, as defined in H&S Code section 25117 and 25260, including the following contaminants of concern: arsenic (up to 96 mg/kg)and benzo(a)pyrene (up to 11 mg/kg). Groundwater beneath the Property is found within 10 to 20 feet below ground surface. Dissolved arsenic was found in groundwater at up to 180 ug/l. The California drinking water standard for arsenic is 50 ug/l.

A review of the analytical results and the chemical distribution suggests that there are "hot spots". Hot spots are areas of affected soil or groundwater having concentrations higher than an empirically determined percentile of the distribution of concentrations in a particular population. 65 soil samples from 20 locations at various depths were collected within the TTA. Elevated concentrations of benzo(a)pyrene equivalent B(a)P EQ were measured in samples collected from two borings locations (EB-1, 19.8 milligrams per kilogram [mg/kg]) and (EB-20, 7.9 mg/kg). One surface soil sample (GMX-08) contained B(a)P EQ concentration of 1.5 mg/kg. All other concentrations of B(a)P EQ were less than 1 mg/kg. Elevated concentrations of arsenic and lead were observed in samples collected from borings EB-1 (3,000 mg/kg lead), EB-5 (96 mg/kg arsenic and 1,300 mg/kg lead), and EB-18 (2,400 mg/kg lead). Borings EB-1 and EB-5 are located in the eastern section of the TTA; GMX-08 is located near the northern perimeter; and borings EB-18 and EB-20 are located in the southwest section.

Based on these observations, borings EB-1, EB-5, GMX-08, EB-18, and EB-20 can be considered hot spots. However, each of borings is located under a concrete/asphalt

foundation or a compacted aggregate/crushed rock/roadbase material. The concrete/asphalt foundation or compacted aggregate/crushed rock/roadbase material serves as a physical barrier preventing direct contact with chemicals in soil; thus, there are no potential direct exposure pathways to chemicals at these hot spots by future receptors. If in the unlikely event that the concrete/asphalt foundation is removed, the excess cancer risk to a receptor from the hot spots would range from $9x10^{-5}$ to $3x10^{-6}$.

Imported topsoil at least 18 inches thick followed by a layer of sod will be placed over the existing asphalt-concrete foundation. The concrete is present at one foot thick to at least 3 feet thick across approximately two-third of the TTA. The remaining one-third of the TTA is currently overlain with an aggregate/crushed rock/roadbase material. The concrete/asphalt foundation and compacted aggregate/crushed rock/roadbase layer precludes a complete exposure pathway. Additional of the 18 inches of topsoil and sod layer will eliminate potential direct exposures to soil in fill material within the TTA.

In order to ensure that no complete pathways are established, the Department will require that the existing concrete/asphalt foundation remain undisturbed so long as the intended use of the Property is to be a recreational park. Additionally, the Department will require that the site be covered (capped) with at least eighteen (18) inches of imported topsoil on top of an indictor lining material to denote the separation of the topsoil from native fill. Because the health risk assessment also did not evaluate an unrestricted land use scenario or potential impacts from use of groundwater, the Department concluded that use of the Property as a residence, hospital, school for persons under the age of 21, or day care center would entail an unacceptable use. The Department further concluded that the Property, subject to the restrictions of this Covenant, does not present an unacceptable threat to human safety or the environment.

ARTICLE II
DEFINITIONS

2.01. Department. "Department" shall mean the California Department of Toxic Substances Control and shall include its successor agencies, if any.

2.02. Owner. "Owner" shall mean the Covenantor, its successors in interest, and their successors in interest, including heirs and assigns, who at any time hold title to all or any portion of the Property.

2.03. Occupant. "Occupant" shall mean Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

2.04. Cap. "Cap" shall mean eighteen (18) inches of imported topsoil on top of

an indicator lining material which is used to denote the separation of the imported topsoil from native fill.

2.05 Concrete/Asphalt Foundation. "Concrete/Asphalt Foundation" shall mean the existing concrete/asphalt surface which is overlain approximately two-third of the Property.

2.03. ARTICLE III
GENERAL PROVISIONS

3.01. Restrictions to Run With the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), upon and subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. Each and every one of the Restrictions: (a) shall run with the land pursuant to H&SC sections 25202.5, and 25202.6 and Civil Code section 1471; (b) shall inure to the benefit of and pass with each and every portion of the Property, (c) shall apply to and bind the respective successors in interest to the Property, (d) are for the benefit of, and shall be enforceable by the Department, and (e) are imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02. Binding Upon Owners/Occupants. Pursuant to Health and Safety Code section 25202.5(b), this Covenant shall be binding upon all of the owners of the land, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471(b), all successive owners of the Property are expressly bound hereby for the benefit of the covenantee(s) herein. "Owner" shall include "Covenantor".

3.03. Written Notice of Hazardous Substance Release. The Owner shall, prior to the sale, lease, or rental of the Property, give written notice that a release of hazardous substances has come to be located on or beneath the Property, pursuant to Health and Safety Code section 25359.7. Such written notice shall include a copy of this Covenant.

3.04. Incorportion into Deeds and Leases. The Restrictions set forth herein shall be incorporated by reference in each and all deeds and leases for any portion of the Property.

3.05. Conveyance of Property. Covenantor agrees that the Owner shall provide notice to the Department not later than thirty (30) days after any conveyance of any ownership interest in the Property (excluding mortgages, liens, and other non-possessory encumbrances). The Department shall not, by reason of this Covenant, have authority to approve, disapprove, or otherwise affect such proposed conveyance, except as otherwise provided by law, by administrative order, or specific provision of this Covenant.

ARTICLE IV
RESTRICTIONS

4.01. Prohibited Uses. The Property shall not be used for any of the following purposes:

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation;

(b) A public or private school for persons under 21 years of age; or

(c) A hospital for humans; or

(c) A day care center for children.

4.02 Prohibited Activities. The following activities shall not be conducted at the Property:

(a) No raising of food (e.g., cattle, food crops, cotton, etc.) shall be permitted on the property.

(b) No groundwater shall be extracted on the Property for purposes other than site remediation or construction dewatering without prior written approval by the Department.

4.03 Non-Interference with the Cap. Covenantor agrees:

(a) No activities which will disturb the Cap (e.g. excavation, grading, removal, trenching, filling, earth movement, or mining) shall be permitted on the Property without prior review and approval by the Department.

(b) All uses and development of the Property shall preserve the integrity of the Cap.

(c) Any proposed alteration of the Cap shall require written approval by the Department.

(d) Covenantor shall notify the Department of each of the following: (i) The type, cause, location and date of any disturbance to the Cap which could affect the ability of the Cap to contain subsurface hazardous materials in the Property, and (ii) the type and date of repair of such disturbance. Notification to the Department shall be made as provided below within ten (10) working days of both the discovery of any such disturbance(s) and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other

Owners and Occupants.

4.04. Management of Native Fill and Concrete/Asphalt Foundation Material

(a) All uses and development of the Property shall preserve the integrity of the existing Concrete/Asphalt Foundation.

(b) No activities (e.g., excavation, grading, removal, trenching, filling, earth movement or mining) which will disturb the native fill and/or the Concrete/Asphalt Foundation material underlying the Cap as indicated in Exhibit B shall be permitted on the Property without a Department-approved Soil Management Plan and Health and Safety Plan.

(c) Native fill and/or Concrete/Asphalt Foundation material shall not be managed or handled such that it may migrate into the bay.

(d) Any native fill and/or Concrete/Asphalt Foundation material brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with the applicable state and federal laws and their implementing regulations.

(e) The Owner shall provide the Department written notice at least fourteen (14) days prior to any building, filling, grading, mining or excavating at the Property.

(f) If more than 50 cubic yards of any native fill will be disturbed, including excavation and grading, then the soil shall be evaluated for potential human health risks in compliance with Article 20 of the SF Municipal Code ("the Maher Ordinance"), and managed accordingly.

(g) Covenantor shall notify the Department of each of the following: (i) The type, cause, location and date of any disturbance to the native fill and/or Concrete/Asphalt Foundation which could affect the ability of the Concrete/Asphalt Foundation to contain subsurface hazardous materials in the Property, and (ii) the type and date of repair of such disturbance. Notification to the Department shall be made as provided below within ten (10) working days of both the discovery of any such disturbance(s) and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other Owners and Occupants.

4.05. Access for Department. Covenantor agrees that the Department shall

have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department in order to protect the public health and safety.

ARTICLE V
ENFORCEMENT

5.01. Enforcement. Failure of the Covenantor and/or Owner to comply with any of the Restrictions specifically applicable to it shall be grounds for the Department, by reason of this Covenant, to require that the Covenantor and/or Owner modify or remove any improvements ("Improvements" herein shall mean all buildings, roads, driveways, and paved parking areas, constructed or placed upon any portion of the Property constructed in violation of the Restrictions.) Violation of this Covenant shall be grounds for the Department to file civil and/or criminal actions against the Covenantor and/or Owner as provided by law.

ARTICLE VI
VARIANCE, TERMINATION, AND TERM

6.01. Variance. Any Owner or, with the Owner's written consent, any Occupant of the Property or any portion thereof may apply to the Department for a written variance from the provisions of this Covenant. Such application shall be made in accordance with H&S Code section 25202.6.

6.02. Termination. Any Owner, and/or, with the Owner's written consent, any Occupant of the Property, or any portion thereof, may apply to the Department for a termination of the Restrictions or other terms of this Covenant as they apply to all or any portion of the Property. Such application shall be made in accordance with H&S Code section 25202.6.

6.03. Term. Unless ended in accordance with the Termination Paragraph above, by law, or by the Department in the exercise of its discretion, this Covenant shall continue in effect in perpetuity.

ARTICLE VII
MISCELLANEOUS

7.01. No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever.

7.02. Department References. All references to the Department include successor agencies/departments or other successor entity.

7.03. Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of San Francisco within ten (10) days of the Covenantor's receipt of a fully executed original.

7.04. Notices. Whenever any person gives or serves any notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served, or (2) three (3) business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner:

Carol Bach
Assist. Deputy Director, Environmental Health and Safety
Port of San Francisco
Pier 1
San Francisco, CA 94111

With a copy to:

Noreen Ambrose
Port General Counsel
Port of San Francisco
Pier 1
San Francisco, CA 94111.

To Department:

California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue, Suite 300
Berkeley, CA 94710-2737
Attention: Chief, Standardized Permits and Corrective Action Branch

Any party may change its address or the individual to whose attention a notice is to be sent by giving written notice in compliance with this paragraph.

7.05. Partial Invalidity. If any portion of the Restrictions or other term set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

H209674

IN WITNESS WHEREOF, the Parties execute this Covenant.

"Covenantor"

Date: 7/24/02

By: //original signed by//
DOUGLAS F. WONG
Its: Executive Director

"Department"

Date: 7/24/02

By: //original signed by//
Mohinder S. Sandhu, P.E.
Its: Chief, Standardized Permits and Corrective Action Branch

H209674

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of San Francisco } ss.

On July 24, 2002 (Date) before me, Virna C. Wu "Notary Public" (Name and Title of Officer (e.g., "Jane Doe, Notary Public"))

personally appeared Mohinder Singh Sandhu (Name(s) of Signer(s))

☒ personally known to me
☐ ~~proved to me on the basis of satisfactory evidence~~

to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/her/their authorized capacity(~~ies~~), and that by his/~~her/their~~ signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

WITNESS my hand and official seal.

VIRNA CHERN WU
Commission # 1203557
Notary Public - California
San Francisco County
My Comm. Expires Dec 3, 2002

Place Notary Seal Above

//original signed by// (Signature of Notary Public)

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document
Title or Type of Document: Covenant to Restrict Use of Property
Document Date: None Number of Pages: 10 Pages + Exhibits A & B
Signer(s) Other Than Named Above: None

Capacity(ies) Claimed by Signer
Signer's Name: Mohinder Singh Sandhu
☒ Individual
☒ Corporate Officer — Title(s): _____
☒ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☒ Other: Port Executive Director
Signer Is Representing: Port of San Francisco

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

© 1997 National Notary Association • 9350 De Soto Ave., P.O. Box 2402 • Chatsworth, CA 91313-2402 Prod. No. 5907 Reorder: Call Toll-Free 1-800-876-6827

H209674

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of San Francisco } ss.

On July 24, 2002 (Date), before me, Virna C. Wu "Notary Public" (Name and Title of Officer (e.g., "Jane Doe, Notary Public"))

personally appeared Mohinder Singh Sandhu (Name(s) of Signer(s))

☐ ~~personally known to me~~
☒ proved to me on the basis of satisfactory evidence

to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she~~/they executed the same in his/~~her~~/their authorized capacity(~~ies~~), and that by his/~~her~~/their signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

WITNESS my hand and official seal.

VIRNA CHERN WU
Commission # 1203557
Notary Public - California
San Francisco County
My Comm. Expires Dec 3, 2002

Place Notary Seal Above

//original signed by//
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Convenant to Restrict Use of Property Environmental Restriction

Document Date: None Number of Pages: 10 Pages + Exhibits A & B

Signer(s) Other Than Named Above: None

Capacity(ies) Claimed by Signer

Signer's Name: Mohinder Singh Sandhu

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☒ Other: Chief, Standardized Permits & Corrective Action Branch

Signer Is Representing: Department of Toxic Substances Control

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

© 1997 National Notary Association • 9350 De Soto Ave., P.O. Box 2402 • Chatsworth, CA 91313-2402 Prod. No. 5907 Reorder: Call Toll-Free 1-800-876-6827

H[illegible]9674

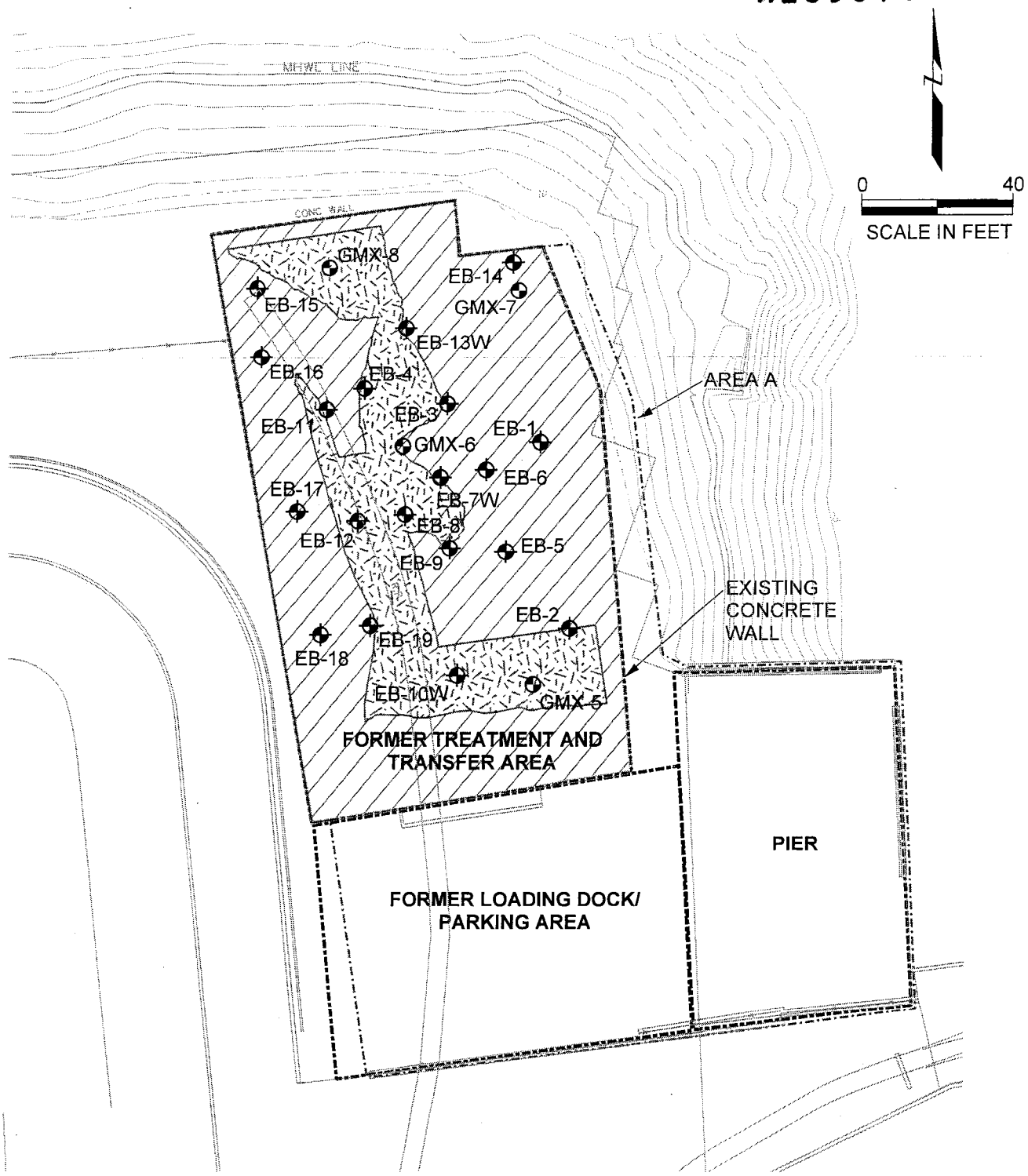
EXHIBIT A

H&H Parcel – Tank Treatment Area

All that certain real property of the San Francisco Port Commission, City and County of San Francisco, State of California, situate at the northeast corner of Terry A. Francois Boulevard (formerly China Basin Street), more particularly described as follows:

Commencing at the point of intersection of the northwesterly line of Townsend Street with the southwesterly line of Delancey Street (formerly First Street), said point being Inner 14 of the Inner Waterfront Line as described in records on file in the office of Engineering of said San Francisco Port Commission; Thence along said Inner Waterfront Line, S 03°02'27" E a distance of 2132.11 feet; Thence N 86°51'14" E a distance of 65.28 feet, to the True Point Of Beginning; Thence S 10°21'36" E a distance of 127.93 feet; Thence N 80°50'39" E a distance of 4.70 feet; Thence S 09°13'14" E a distance of 68.59 feet; Thence N 81°09'11" E a distance of 146.17 feet; Thence N 03°21'24" W a distance of 85.74 feet; Thence S 88°44'14" W a distance of 54.91 feet; Thence N 66°55'27" W a distance of 9.19 feet; Thence N 07°12'31" W a distance of 68.86 feet; Thence N 21°58'29" W a distance of 44.82 feet; Thence S 83°22'07" W a distance of 28.09 feet; Thence N 05°44'30" W a distance of 14.69 feet; Thence S 81°59'17" W a distance of 65.99 feet; Thence S 10°21'36" E a distance of 30.22 feet to the True Point Of Beginning; Containing 26,592 square feet (0.61 acres), more or less.

H209674



EXPLANATION

- Soil samples collected at multiple depths by J. Yang and Assoc. March 15, 1995
- Surface soil samples collected by Geomatrix, November 16, 2001
- Area of aggregate/crushed rock/ road base material
- Concrete/asphalt foundation

EXHIBIT B

S:\3600s\3608\3608.001_0718.ai

APPENDIX C

Soil Management Plan, June 1999

GEOMATRIX

SOIL MANAGEMENT PLAN

Imperial Weitz Parking Lots for the Giants Pacific Bell Ball Park Area E - Port of San Francisco Property

San Francisco, California

Prepared for:

Imperial Weitz, LLC
800 Second Avenue, Suite 300
Des Moines, Iowa 50309

Prepared by:

Geomatrix Consultants, Inc.
2101 Webster Street, 12th Floor
Oakland, California 94612
(510) 663-4100

June 1999

Project No. 4952

Geomatrix Consultants

GEOMATRIX

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
2.0	BACKGROUND	1
	2.1 SITE SETTING AND HISTORICAL USAGE	1
	2.2 SITE INVESTIGATIONS	2
	2.2.1 Previous Site Investigations	2
	2.2.2 Recent Site Investigation	2
	2.3 PROPOSED DEVELOPMENT	3
	2.4 RISK ASSESSMENT	4
3.0	OBJECTIVES	4
4.0	PROPOSED SOIL MANAGEMENT PROCEDURES	5
	4.1 SOIL MANAGEMENT PROCEDURES FOR SITE CONSTRUCTION	5
	4.1.1 Dust Control	5
	4.1.2 Erosion Control	5
	4.1.3 Soil Stockpile Management	6
	4.1.4 Soil Disposal	6
	4.1.5 Site Access Control	6
	4.2 SOIL MANAGEMENT FOLLOWING SITE DEVELOPMENT	6
5.0	MAINTENANCE OF SITE COVER	7
6.0	CONTINGENCY PLAN	7
7.0	HEALTH AND SAFETY GUIDELINES	7
8.0	FACILITY MAP	8
9.0	REFERENCES	9

TABLES

Table 1	Summary of Analytical Results - Metals Detected in Soil Samples
Table 2	Summary of Analytical Results - Volatile Organic Compounds Detected in Soil Samples
Table 3	Summary of Analytical Results - Polynuclear Aromatic Compounds Detected in Soil Samples
Table 4	Summary of Analytical Results - Other Maher Parameters
Table 5	Summary of Analytical Results - Metals Detected in Grab Groundwater Samples
Table 6	Summary of Health Risk Assessment Results

GEOMATRIX

TABLE OF CONTENTS
(Continued)

FIGURES

Figure 1 Site Location Map
Figure 2 Site Plan Showing Sampling Locations

APPENDIXES

Appendix A Data Summaries from Previous Investigations
Appendix B Site Maps Illustrating Alternative Storm Drainage Systems

SOIL MANAGEMENT PLAN
Imperial Weitz Parking Lots for the
Giants Pacific Bell Ball Park
Area E - Port of San Francisco Property
San Francisco, California

1.0 INTRODUCTION

Geomatrix Consultants, Inc. (Geomatrix) has prepared this Soil Management Plan (SMP) on behalf of Imperial Weitz, LLC for the proposed 14-acre parking lot for the Giants' Pacific Bell Ball Park. The proposed parking lot site is located south of China Basin Channel and east of Third Street in San Francisco, California (the site; Figure 1). The site is part of a total of approximately 36 acres of parking to be developed by Imperial Weitz south of China Basin Channel and has been referred to as Area E in previous environmental documents prepared by Geomatrix on behalf of Imperial Weitz.

2.0 BACKGROUND

Imperial Weitz is proposing to construct a paved parking lot on the site. A site history review, environmental investigation and risk evaluation were performed to meet Article 20 requirements and assess potential risks to construction worker and site visitor health associated with soil and groundwater quality at the site. The following summarizes the results of the site history review, environmental investigations, and risk assessment, and describes the proposed parking lot development.

2.1 SITE SETTING AND HISTORICAL USAGE

The approximately 19 acre site is currently owned by the Port of San Francisco (the Port). The subject area was originally marshlands and shallow tidal flats bordering San Francisco Bay. It was filled between 1877 and 1913; the source of the fill is unknown but likely included construction debris and rubble from the 1906 earthquake and cut material from nearby hills and construction areas.

Historical site uses include: railroad trackage and support structures for rail-related activities, parking and shipping, and truck maintenance. H&H Shipping Service Company, Inc. (H&H) occupied the northeastern corner of the site from 1950 to 1996. H&H used the area for vehicle parking and offices, and maintained a tank cleaning area and drum storage unit. No known underground storage tanks (USTs) have been identified on the site. Recently, the site has been

leased by multiple tenants. Tenant uses consist of a recycling center, an automobile sales center, the Mission Rock Recovery Center, a moving company, maritime offices, and automobile storage.

2.2 SITE INVESTIGATIONS

2.2.1 Previous Site Investigations

Burlington Northern Santa Fe Railway Company ("the Railroad") conducted Phase I and Phase II Environmental Assessments of property formerly operated by the Railroad located east of Third Street, between Sixteenth Street and China Basin Channel; this property included the western half of the site. The scope of the Railroad's investigations included one soil boring in the southern portion of the site. Soil samples were collected at depths of 0.5, 5, and 8 feet bgs and analyzed for total petroleum hydrocarbons as gasoline (TPHg), TPH as motor oil (TPHmo), lead, nickel, arsenic, chromium, cadmium, and zinc. Results of chemical analyses on these soil samples indicated that several metals were present at concentrations exceeding typical regional background concentrations (Geomatrix, March 1999).

In addition, HLA has performed an investigation of the former H&H Shipping parcel located in the northeast corner of the site (HLA; 1999). Seventeen soil samples were collected and analyzed for metals, TPH as diesel (TPHd), TPHg, oil and grease, volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PNAs). Five groundwater samples were collected and one or more samples were analyzed for metals, TPHd, TPHg, benzene, toluene, ethylbenzene, xylenes [BTEX], PCBs, and PNAs. Several soil samples contained PNAs and metals; very low concentrations of some aromatic hydrocarbons and PCBs were detected in a few soil samples. The groundwater samples contained low to trace concentrations of several metals. Filtered groundwater samples did not contain PNAs; however, unfiltered samples contained low concentrations of several PNA compounds. PCBs and BTEX were not detected in the groundwater samples. Summary tables for the soil and groundwater analysis results of the H&H investigation are contained in Appendix A.

2.2.2 Recent Site Investigation

In April 1999, Geomatrix installed 8 soil borings and collected 16 soil samples (two soil samples per boring) and 2 groundwater samples (from 2 of the 8 locations) for chemical analysis. Sampling locations are illustrated on Figure 2. Primary chemicals detected in soil were PNAs and some metals (i.e., antimony, arsenic, copper, lead, nickel, and mercury). Soil sample results from the recent investigation are summarized in Tables 1 through 5. Several

metals were detected in groundwater; however, chemical concentrations were generally low to non-detect (Table 6). PNAs were not detected in the groundwater samples.

2.3 PROPOSED DEVELOPMENT

The proposed development for the subject area is asphalt paved parking. Two alternatives for storm drainage are being considered, as described below. Figures illustrating the two alternatives for the storm drainage system are contained in Appendix B.

Alternative 1

This alternative for the drainage system consists of a series of storm drainage lines and catch basins to collect and transport storm water from the parking lot site to the main City box culvert located on Channel Street, west of Fourth Street. During a 5 year storm event, the City system could reach capacity and overflows would result. Overflows from the parking lot site would be diverted to a small treatment plant to be located east of Fourth Street, near China Basin Channel. Under this alternative, Area E will be entirely paved with asphalt and surrounded by a 3- to 4-foot fence.

The catch basins will be installed in excavations with aerial dimensions of approximately 4 feet by 4 feet and extending to depths of 4 to 6 feet. Trenches will be excavated to install the piping; the trenches are anticipated to be approximately 2 to 3 feet wide and will extend between 4 to 6 feet below grade. Estimated maximum excavation depth for the piping system is 6 feet bgs. The parking area will be graded and bermed to enhance flow to each of the catch basins, and paved with asphaltic concrete.

Alternative 2

This alternative includes perimeter grassy drainage swales to collect and drain storm water overflows.

The parking area will contain a storm drain system to collect surface water runoff. The storm drain system will consist of a network of catch basins and drainage swales to collect storm water on the parking lot. The storm water will be conveyed through a series of pipes and the drainage swales to one point of discharge. The discharge pipe will collect into one main and flow into the City box sewer in Channel Street near Fourth Street.

The catch basins will be installed in excavations with aerial dimensions of approximately 4 feet by 4 feet and extending to depths of 4 to 6 feet. Trenches will be excavated to install the

piping; the trenches are anticipated to be approximately 2 to 3 feet wide and will extend between 4 to 6 feet below grade. Estimated maximum excavation depth for the piping system is 6 feet bgs. The swales will be approximately 32 feet in width and 2 to 3 feet in depth. The swales will be covered with a geotextile fabric and grass. The parking area will be graded and bermed to enhance flow to each of the catch basins, and paved with asphaltic concrete.

2.4 RISK ASSESSMENT

A health risk assessment (HRA) was conducted to evaluate the potential human health risks associated with the presence of chemicals in soil and groundwater assuming future use of the site as a parking lot with grassy swales (Geomatrix, May 1999). Potential noncarcinogenic hazard indexes and theoretical lifetime excess cancer risks were estimated for future on-site construction workers and future on-site visitors assuming conservative estimates of human exposure. Future on-site construction workers may be exposed to chemicals in soil across the site to the depth required for installation of the storm drain system or in groundwater if encountered in excavation areas. Following construction, potential exposure to future on-site visitors would be limited to exposed soil in the grass-covered swale areas.

The results of the HRA indicate that the presence of chemicals in soil and groundwater at the site should not pose an unacceptable noncarcinogenic or carcinogenic risk to future on-site construction workers and visitors. A summary table for the HRA results is provided as Table 7. Based on these results, it was also concluded that potential risks to nearby residents during construction and future on-site maintenance workers and trespassers after construction would also not be of concern.

3.0 OBJECTIVES

As described above, the results of the HRA indicate that chemicals in site soil do not present an unacceptable human health risk. However, dust from a construction site can present a nuisance if not controlled. Likewise, erosion of on-site soil during construction activities can increase the turbidity of surface water run-off.

Therefore, the objectives of the SMP are to:

- provide guidelines for soil handling, stockpiling, dust and erosion minimization and, if needed, soil disposal during site construction activities for the proposed parking lot; and

- describe procedures for soil management following site construction for the duration of the use of the Site as a parking lot.

4.0 PROPOSED SOIL MANAGEMENT PROCEDURES

The following two sections describe the soil management procedures that will be implemented during and following site construction.

4.1 SOIL MANAGEMENT PROCEDURES FOR SITE CONSTRUCTION

The following procedures will be implemented during site construction activities to minimize dust and control erosion.

4.1.1 Dust Control

The dust control measures to be implemented at the site correspond to the PM_{10} control measures recommended by the Bay Area Air Quality Management District (BAAQMD) in their California Environmental Quality Act Guidelines. These measures consist of:

- Water all active construction areas at least twice daily or as necessary to prevent visible dust plumes from migrating outside of the site limits.
- Mist or spray water while loading transportation vehicles.
- Minimize drop heights while loading transportation vehicles.
- Use tarpaulins or other effective covers for trucks carrying soils that travel on public streets.
- Pave, apply water 3 times daily, or apply non-toxic soil stabilizers on all unpaved access roads, parking areas, and staging areas.
- Sweep all paved access routes parking areas and staging areas daily, if visibly soiled.
- Sweep street daily if visible soil material is carried onto public streets from the site.

4.1.2 Erosion Control

A Stormwater Pollution Prevention Plan (SWPPP) will be developed by the site contractor prior to initiation of Site work that details procedures for minimizing erosion. The SWPPP will include elements such as silt traps and hay bales to minimize surface water runoff from the Site into storm drains or the San Francisco Bay, berms to control Site runoff, and covering soil stockpiles during the rainy season (November through March) to minimize sediment runoff.

4.1.3 Soil Stockpile Management

Temporary stockpiling of excavated soil may be necessary throughout site construction. Soil stockpiled at the Site will be lightly sprayed with water as needed to minimize dust. To the extent practical, the soil stockpiles will be covered with plastic sheeting or other similar material at times when not in active use. When a soil stockpile is uncovered during the rainy season, it will be surrounded by hay bales and/or silt traps to minimize sediment runoff.

4.1.4 Soil Disposal

Site development has been designed to minimize the generation of excess soil; therefore, soil requiring off-site disposal is not anticipated. Although not anticipated at this time, if excess soil is generated from the site, the excess soil will be profiled to determine appropriate disposal options. Handling and disposal of the soil will be conducted in accordance with all applicable state and federal laws.

Based on chemical analysis results of soil samples collected from the site, total metal and organic concentrations are less than the Total Threshold Limit Concentrations (TTLCs) for designation as California Hazardous Waste. However, additional solubility testing of some of the metals (e.g., lead) would likely be required by disposal facilities to better assess the waste profile for the soil.

4.1.5 Site Access Control

The construction site will be fenced to control pedestrian or vehicular entry, except at controlled points (i.e., gates). Gates will be closed and locked during non-construction hours. "No-trespassing" signs will be posted every 500 feet along the fencing.

4.2 SOIL MANAGEMENT FOLLOWING SITE DEVELOPMENT

Following site development, the soil will be covered by asphalt pavement or grass (in the swale areas) and it is unlikely that the soil will be accessed, with the exception of future maintenance work on subsurface utilities. The HRA assessed possible health risks to future maintenance workers at the parking lot and concluded that chemicals in soil at the site should not pose an unacceptable carcinogenic or noncarcinogenic risk (Geomatrix, May 1999). Soil management procedures during future site maintenance work requiring soil excavation will be as described in Section 4.1 of this SMP; if waste soil is generated, the soil will be disposed in accordance with the procedures described in Section 4.1.4.

5.0 MAINTENANCE OF SITE COVER

Procedures in this section are applicable only if Alternative 2 is selected for the storm drainage system.

Although the HRA concluded that soil in the grass-covered swale area would not present an unacceptable risk to human health for parking lot visitors or trespassers, it is prudent that the grass-covered swale areas be well maintained. Therefore, the swale areas will be inspected monthly during the baseball season, and quarterly during the off-season to visually observe the condition of the grass cover. Large areas of exposed soil (e.g., areas larger than several feet in diameter) should be reseeded as quickly as practical. A log of the parking area inspections ("Inspection Log") will be maintained at the site and will include written comments on the condition of the grass cover, areas requiring repairs, and repair dates.

Annual inspections of the paved parking areas will be performed to observe whether breaches in the pavement that may allow prolonged access to site soil are visible. If observed, the breach would be repaired such that the soil cover is maintained. Results of the annual inspections of the paved parking areas will be documented in the Inspection Log, described above.

6.0 CONTINGENCY PLAN

A Contingency Plan for this site is not warranted. The purpose of a Contingency Plan is to present response actions to an emergency situation. The results of the HRA indicate that exposure to site soil or groundwater while breaches in the pavement or grassy areas are being repaired would not present a situation requiring an emergency response.

7.0 HEALTH AND SAFETY GUIDELINES

A health and safety plan for site construction will be developed by the site contractor before initiation of the development activities. The results of the HRA indicate that the presence of chemicals in soil and groundwater at the site should not pose an unacceptable health risk to future construction workers or nearby receptors during construction or future maintenance workers, visitors or trespassers after construction. Therefore, a health and safety plan for known chemical hazards at the Site is not warranted, and the health and safety plan will focus on physical hazards. Additionally, contingency actions for encountering unanticipated buried hazards (e.g., drums, or other containers) will also be included in the health and safety plan.

8.0 FACILITY MAP

The final construction plan for the Site development is not complete. A copy of this plan will be forwarded to the SFDPH as an addendum to this SMP once it has been finalized.

9.0 REFERENCES

Geomatrix Consultants, Inc., 1999, Site Use History and Article 20 Sampling Program, March.

Harding Lawson Associates, 1999, RCRA Closure Certification Report, Former H&H Ship Service Facility, San Francisco, California, February 4.

GEOMATRIX

TABLE 1
SUMMARY OF ANALYTICAL RESULTS
METALS DETECTED IN SOIL SAMPLES[1]
Proposed Imperial Parking Area
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California
Concentrations are reported in milligrams per kilogram (mg/kg)

Sample I.D.	Sample Interval (feet bgs)	Antimony	Arsenic	Barium	Beryl-lium	Cadmium	Total Chrom-ium	Cobalt	Copper	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanad-ium	Zinc
GMX-1-1.0	0.5 - 1.0	<5.0	<0.35	27	<5.0	<5.0	120	16	9.6	8.7	<0.1	<5.0	220	<5.0	<5.0	<5.0	36	37
GMX-1-4.5	4.5 - 5.0	<5.0	2.5	35	<5.0	<5.0	200	24	12	13	<0.1	<5.0	370	<5.0	<5.0	<5.0	20	32
GMX-2-1.0	0.5 - 1.0	<5.0	<0.35	170	<5.0	<5.0	62	15	50	220	0.13	<5.0	71	<5.0	<5.0	<5.0	49	150
GMX-2-4.5	4.5 - 5.0	<5.0	<0.35	160	<5.0	<5.0	91	17	31	54	<0.1	18	110	<5.0	<5.0	<5.0	40	83
GMX-3-1.0	0.5 - 1.0	33	64	84	<5.0	<5.0	35	12	93	250	0.28	<5.0	140	<5.0	<5.0	<5.0	20	250
GMX-3-4.5	4.5 - 5.0	15	7.7	76	<5.0	<5.0	110	14	44	98	0.23	<5.0	240	<5.0	<5.0	<5.0	24	130
GMX-4-1.0	0.5 - 1.0	<5.0	1.8	170	<5.0	<5.0	42	16	40	110	0.16	<5.0	100	<5.0	<5.0	<5.0	31	94
GMX-4-4.5	4.5 - 5.0	<5.0	<0.35	100	<5.0	<5.0	36	8.7	26	53	<0.1	<5.0	40	<5.0	<5.0	<5.0	27	60
GMX-5-1.0	0.5 - 1.0	<5.0	0.47	26	<5.0	<5.0	21	<5.0	7.1	42	<0.1	<5.0	20	<5.0	<5.0	<5.0	17	69
GMX-5-7.0	4.5 - 5.0	<5.0	2.5	47	<5.0	<5.0	11	<5.0	13	60	0.57	<5.0	12	<5.0	<5.0	<5.0	12	35
GMX-6-1.0	0.5 - 1.0	<5.0	<0.35	360	<5.0	<5.0	17	12	66	17	<0.1	<5.0	21	<5.0	<5.0	<5.0	28	40
GMX-6-4.5	4.5 - 5.0	<5.0	<0.35	210	<5.0	<5.0	43	14	46	62	0.18	<5.0	59	<5.0	<5.0	<5.0	29	55
GMX-7-1.0	0.5 - 1.0	<5.0	10	160	<5.0	<5.0	21	5.3	93	290	5.7	<5.0	28	<5.0	<5.0	<5.0	17	320
GMX-7-5.0	4.5 - 5.0	<5.0	<0.35	180	<5.0	<5.0	87	21	35	750	<0.1	<5.0	250	<5.0	<5.0	<5.0	29	160
GMX-8-1.0	0.5 - 1.0	<5.0	<0.35	680	<5.0	<5.0	21	32	130	18	<0.1	<5.0	34	<5.0	<5.0	<5.0	40	49
GMX-8-4.5	4.5 - 5.0	<5.0	5	100	<5.0	<5.0	6.8	<5.0	21	61	<0.1	<5.0	9.1	<5.0	<5.0	<5.0	12	41
Background[2]		5.5	19.1	323	1	2.7	99	22	69	16	0.4	7.4	120	5.6	1.8	27	74	106
95% UTL		25.7	45.7	572.3	5.0	5.0	190.0	32.8	133.1	602.0	4.0	14.0	379.8	5.0	5.0	5.0	53.7	311.7
95% UTL > Background?		Yes	Yes	Yes	NA	NA	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	NA	No	Yes

Note:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed by Entech Analytical Laboratories of Sunnyvale, California, for Title 22 metals using EPA Methods 6000/7000 Series.

[2] Background = Lawrence Berkeley National Laboratory, 1995.

Abbreviations:

feet bgs = feet below ground surface.

< = analyte not detected at or above method detection limit shown.

NA = not applicable; sample results below detection limit reported by the analytical laboratory.

95% UTL = 95 percent upper tolerance limit.

GEOMATRIX

TABLE 2

SUMMARY OF ANALYTICAL RESULTS

VOLATILE ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES[1]

Proposed Imperial Parking Area
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California

Concentrations are reported in milligrams per kilogram (mg/kg)

Sample I.D.	Sample Interval (feet bgs)	Toluene	Ethyl-benzene	Xylenes	1,2,4-Trimethyl-benzene
GMX-1-1.0	0.5 - 1.0	0.030	<0.005	0.029	0.010
GMX-1-4.5	4.5 - 5.0	0.008	<0.005	<0.005	<0.005
GMX-2-1.0	0.5 - 1.0	0.013	<0.005	0.009	0.005
GMX-2-4.5	4.5 - 5.0	0.007	<0.005	<0.005	<0.005
GMX-3-1.0	0.5 - 1.0	0.014	<0.005	0.006	<0.005
GMX-3-4.5	4.5 - 5.0	0.023	<0.005	0.018	0.014
GMX-4-1.0	0.5 - 1.0	0.020	<0.005	0.030	<0.005
GMX-4-4.5	4.5 - 5.0	<0.005	<0.005	<0.005	<0.005
GMX-5-1.0	0.5 - 1.0	0.027	<0.005	0.014	0.008
GMX-5-7.0	4.5 - 5.0	<0.005	<0.005	<0.005	<0.005
GMX-6-1.0	0.5 - 1.0	0.037	<0.005	0.056	0.036
GMX-6-4.5	4.5 - 5.0	<0.005	<0.005	<0.005	<0.005
GMX-7-1.0	0.5 - 1.0	0.008	<0.005	0.009	<0.005
GMX-7-5.0	4.5 - 5.0	0.021	<0.005	0.009	<0.005
GMX-8-1.0	0.5 - 1.0	<0.005	0.023	0.046	<0.005
GMX-8-4.5	4.5 - 5.0	0.008	<0.005	0.010	<0.005

Note:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed by Entech Analytical Laboratories of Sunnyvale, California, for VOCs using EPA Method 8260B.

Abbreviations:
feet bgs = feet below ground surface.
< = indicates result less than the laboratory detection limit indicated.
VOCs = volatile organic compounds.

GEOMATRIX

TABLE 3
SUMMARY OF ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC COMPOUNDS DETECTED IN SOIL SAMPLES[1]

Proposed Imperial Parking Area

Area E - Port of San Francisco Property

South of China Basin Channel, San Francisco, California

Concentrations are reported in milligrams per kilogram (mg/kg)

Sample I.D.	Sample Interval (feet bgs)	Acenaph-thene	Acenaph-thylene	Anthra-cene	Benzo(a) anthra-cene	Benzo(b) fluor-anthene	Benzo(k) fluor-anthene	Benzo (g,h,i) perylene	Benzo(a) pyrene	Chrysene	Dibenzo (a,h) anthra-cene	Fluor-anthene	Fluorene	Indeno (1,2,3-cd) pyrene	Naph-thalene[2]	Phenan-threne	Pyrene
GMX-1-1.0	0.5 - 1.0	<0.04	<0.04	<0.04	<0.04	<0.002	<0.04	<0.04	<0.04	0.089	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.058
GMX-1-4.5	4.5 - 5.0	<0.01	<0.01	0.023	<0.01	0.029	<0.01	<0.01	<0.01	<0.01	<0.01	0.025	<0.01	<0.01	<0.01	0.024	0.029
GMX-2-1.0	0.5 - 1.0	<0.02	0.024	0.103	0.141	<0.002	<0.02	<0.02	<0.02	0.08	<0.02	0.363[3]	<0.02	<0.02	<0.02	0.105	0.415[3]
GMX-2-4.5	4.5 - 5.0	<0.002	0.0024	0.0066	0.022	0.022	0.0048	<0.002	<0.002	0.011	<0.002	0.023	<0.002	<0.002	0.0058	0.0068	0.025
GMX-3-1.0	0.5 - 1.0	<0.02	<0.02	0.078	0.114	<0.002	<0.02	<0.02	<0.02	0.064	<0.02	0.169	<0.02	<0.02	<0.02	0.08	0.16
GMX-3-4.5	4.5 - 5.0	<0.01	<0.01	<0.01	0.025	0.04	<0.01	<0.01	<0.01	0.014	<0.01	0.036	<0.01	<0.01	<0.01	0.024	0.045
GMX-4-1.0	0.5 - 1.0	<0.04	<0.04	<0.04	0.072	<0.04	<0.04	<0.04	<0.04	0.061	<0.04	0.142	<0.04	<0.04	<0.04	0.071	0.183
GMX-4-4.5	4.5 - 5.0	0.053	0.107	0.129	<0.02	<0.2	<0.2	<0.2	0.295	0.18	<0.2	0.628[4]	<0.02	<0.2	0.057	0.668[4]	0.777[4]
GMX-5-1.0	0.5 - 1.0	<0.02	<0.02	<0.02	<0.002	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.032	<0.02	<0.02	<0.02	0.02	0.034
GMX-5-7.0	4.5 - 5.0	<0.002	<0.002	0.026	<0.002	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	0.011	<0.002	<0.002	<0.002	0.026	0.013
GMX-6-1.0	0.5 - 1.0	<0.04	<0.04	<0.04	0.205	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.046	<0.04	<0.04	<0.04	0.06	0.107
GMX-6-4.5	4.5 - 5.0	<0.01	<0.01	0.029	0.122	0.1	0.023	0.038	0.072	0.056	<0.01	0.11	<0.01	0.042	<0.01	0.029	0.111
GMX-7-1.0	0.5 - 1.0	<0.02	<0.02	0.024	0.187	<0.02	<0.02	<0.02	<0.02	0.098	<0.02	0.196	<0.02	<0.02	<0.02	0.194	0.224
GMX-7-5.0	4.5 - 5.0	<0.01	<0.01	<0.01	0.031	<0.01	<0.01	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.04	0.072	<0.01
GMX-8-1.0	0.5 - 1.0	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.288	<0.04	<0.04	0.095	0.156	0.374
GMX-8-4.5	4.5 - 5.0	0.019	0.078	<0.01	0.314[4]	0.457[4]	<0.01	<0.01	<0.01	0.323[4]	<0.01	0.772[4]	<0.01	<0.01	<0.01	0.288[4]	0.680[4]

Notes:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed by Advanced Technology Laboratories of Signal Hill, California, for PNAs using EPA Method 8270 SIMS.

[2] Detected concentration reported as part of EPA Method 8260.

[3] Results reported from a 1:100 dilution.

[4] Results reported from a 1:50 dilution.

Abbreviations:

feet bgs = feet below ground surface.

< = indicates result less than the laboratory detection limit indicated.

PNAs = polynuclear aromatic hydrocarbons.

GEOMATRIX

TABLE 4

SUMMARY OF ANALYTICAL RESULTS

OTHER MAHER PARAMETERS[1]

Proposed Imperial Parking Area
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California

Concentrations are reported in milligrams per kilogram (mg/kg) unless noted

Sample I.D.	Sample Interval (feet bgs)	Asbestos	Cyanide	Fluoride	Total Sulfide	pH (no units)	FID (ppmv)
GMX-1-1.0	0.5 - 1.0	<1%	<0.5	<0.5	<0.5	8.4	0
GMX-1-4.5	4.5 - 5.0	NA	NA	NA	NA	NA	
GMX-2-1.0	0.5 - 1.0	NA	NA	NA	NA	NA	100
GMX-2-4.5	4.5 - 5.0	<1%	NA	NA	NA	9.4	
GMX-3-1.0	0.5 - 1.0	NA	NA	NA	NA	NA	0
GMX-3-4.5	4.5 - 5.0	<1%	<0.5	<0.5	<0.5	8.8	
GMX-4-1.0	0.5 - 1.0	<1%	NA	NA	NA	9.4	100
GMX-4-4.5	4.5 - 5.0	NA	NA	NA	NA	NA	
GMX-5-1.0	0.5 - 1.0	<1%	<0.5	<0.5	<0.5	9.1	100
GMX-5-7.0	4.5 - 5.0	NA	NA	NA	NA	NA	
GMX-6-1.0	0.5 - 1.0	NA	NA	NA	NA	NA	1100
GMX-6-4.5	4.5 - 5.0	<1%	NA	NA	NA	9.2	
GMX-7-1.0	0.5 - 1.0	NA	NA	NA	NA	NA	10
GMX-7-5.0	4.5 - 5.0	<1%	<0.5	<0.5	<0.5	9.2	
GMX-8-1.0	0.5 - 1.0	<1%	NA	NA	NA	7.7	150
GMX-8-4.5	4.5 - 5.0	NA	NA	NA	NA	NA	

Note:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed for pH, cyanide, total sulfide, fluoride, and asbestos using EPA Methods 9045, 9010, 9030, and 340.2M, and polarized light microscopy. Analyses performed by Entech Analytical Laboratories, Inc. of Sunnyvale, California (pH and fluoride), Advanced Technology Laboratories of Signal Hill, California (cyanide and total sulfide), and EMSL Analytical, Inc. of Milpitas, California (asbestos).

Abbreviations:

feet bgs = feet below ground surface.
< = analyte not detected at or above method detection limit shown.
NA = not analyzed.
FID = flame ionization detector.
ppmv = parts per million vapor.

GEOMATRIX

TABLE 5

SUMMARY OF ANALYTICAL RESULTS
METALS DETECTED IN GRAB GROUNDWATER SAMPLES[1]

Proposed Imperial Parking Area
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California

Concentrations are reported in milligrams per liter (mg/l)

Sample I.D.	Sb	Ar	Ba	Be	Cd	Cr Total	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
GMX-1[2]	0.092/ 0.1	<0.005	0.1	<0.004	<0.005	<0.005	<0.005	<0.005	<0.015	<0.0005	0.018/ 0.02	0.010/ 0.011	<0.015	<0.005	<0.002	<0.010	0.014
GMX-5	<0.005	<0.005	1.7	<0.004	<0.005	0.006	0.008	<0.005	<0.015	<0.0005	0.051	0.006	<0.015	0.034	<0.002	<0.010	0.025

Notes:

[1] Soil samples collected by Geomatrix Consultants, Inc. and analyzed by Entech Analytical Laboratories, of Sunnyvale, California for Title 22 metals using EPA Methods 6000/7000 Series.

[2] Second result from duplicate sample GMX-11.

Abbreviation:

< = indicates result less than the laboratory detection limit indicated.

Sb = Antimony
Ar = Arsenic
Ba = Barium
Be = Beryllium
Cd = Cadmium
Cr Total = Total Chromium
Co = Cobalt
Cu = Copper
Pb = Lead
Hg = Mercury
Mo = Molybdenum
Ni = Nickel
Se = Selenium
Ag = Silver
Tl = Thallium
V = Vanadium
Zn = Zinc

GEOMATRIX

TABLE 6

SUMMARY OF HEALTH RISK ASSESSMENT RESULTS

Proposed Imperial Weitz Parking Lot Areas
Area E - Port of San Francisco Property
South of China Basin Channel, San Francisco, California

Noncancer Hazard Indexes

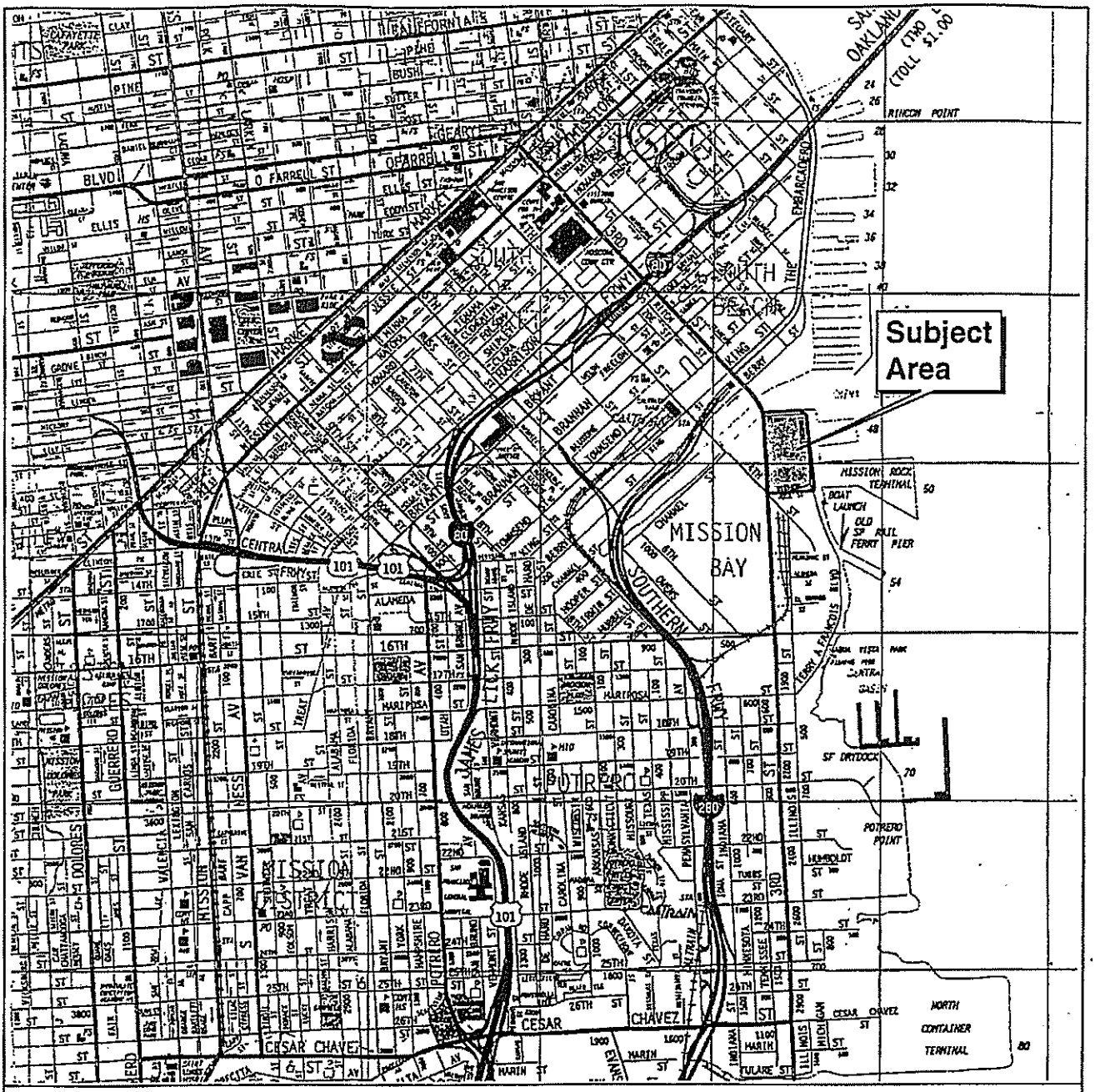
Scenario	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation of Particulates	Dermal Contact with Groundwater	Hazard Index
Future On-site Construction Worker	6E-02	2E-03	8E-04	7E-03	7E-02
Future On-site Visitor	1E-02	5E-03	7E-07	NA	1E-02

Theoretical Lifetime Excess Cancer Risks

Scenario	Incidental Ingestion of Soil	Dermal Contact with Soil	Inhalation of Particulates	Dermal Contact with Groundwater	Excess Cancer Risk
Future On-site Construction Worker	3E-07	1E-08	7E-08	4E-06	4E-06
Future On-site Visitor	5E-07	3E-07	9E-10	NA	8E-07

Note:

NA = Not applicable



Base map from *The Thomas Guide, 1997Golden Gate Street Guide and Directory*. Reproduced with permission granted by THOMAS BROS. MAPS®. This map is copyrighted by THOMAS BROS. MAPS®. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission. All rights reserved.

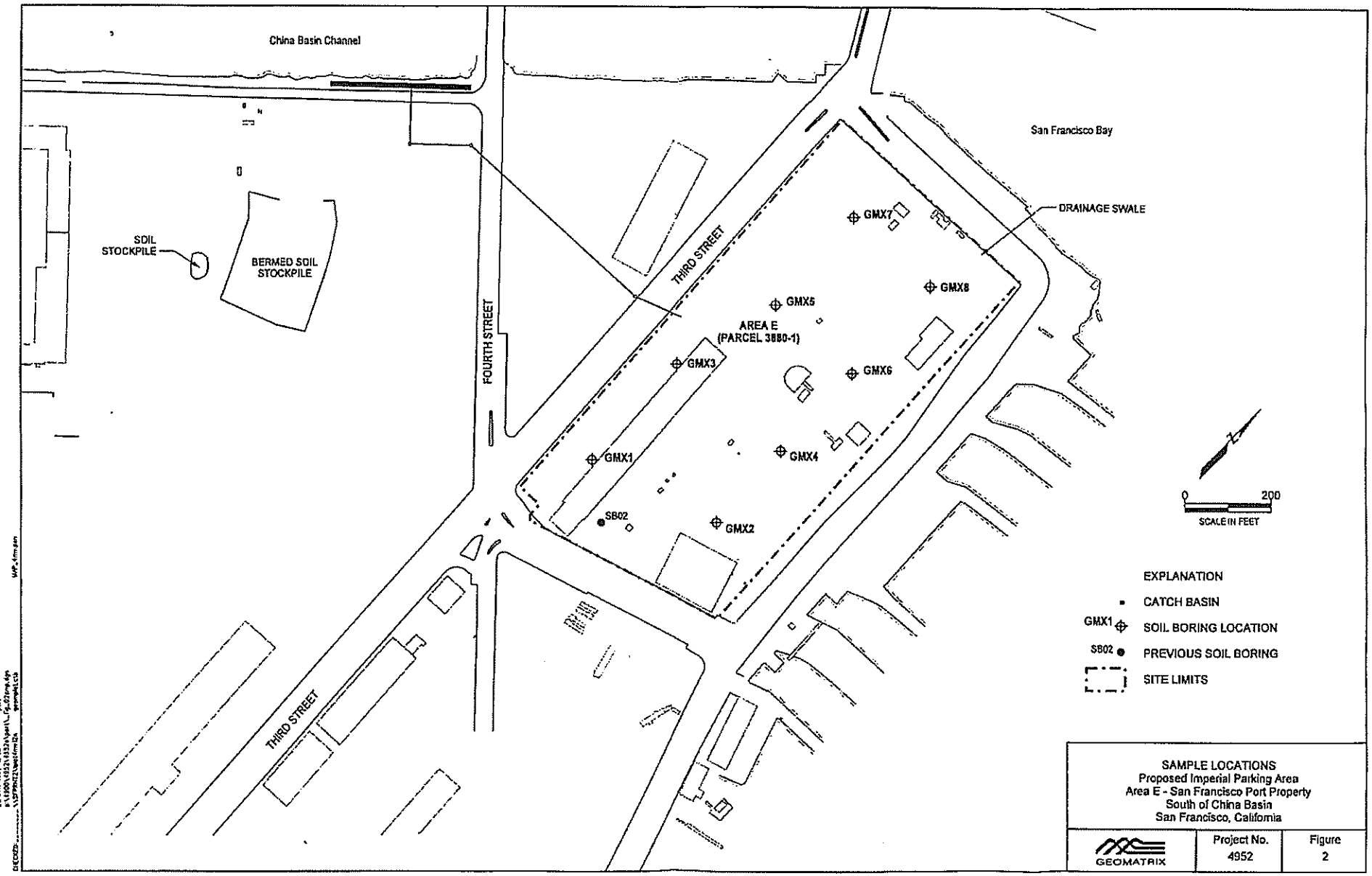
GEOMATRIX

SITE LOCATION MAP
Proposed Imperial Parking Area
Area E - San Francisco Port Property
South of China Basin
San Francisco, California

Figure 1

Project No. 4952

s:\4952\4952a\port_fig_01.ai



SAMPLE LOCATIONS
Proposed Imperial Parking Area
Area E - San Francisco Port Property
South of China Basin
San Francisco, California

GEOMATRIX	Project No. 4952	Figure 2

GEOMATRIX

APPENDIX A

Data Summaries from Previous Investigations

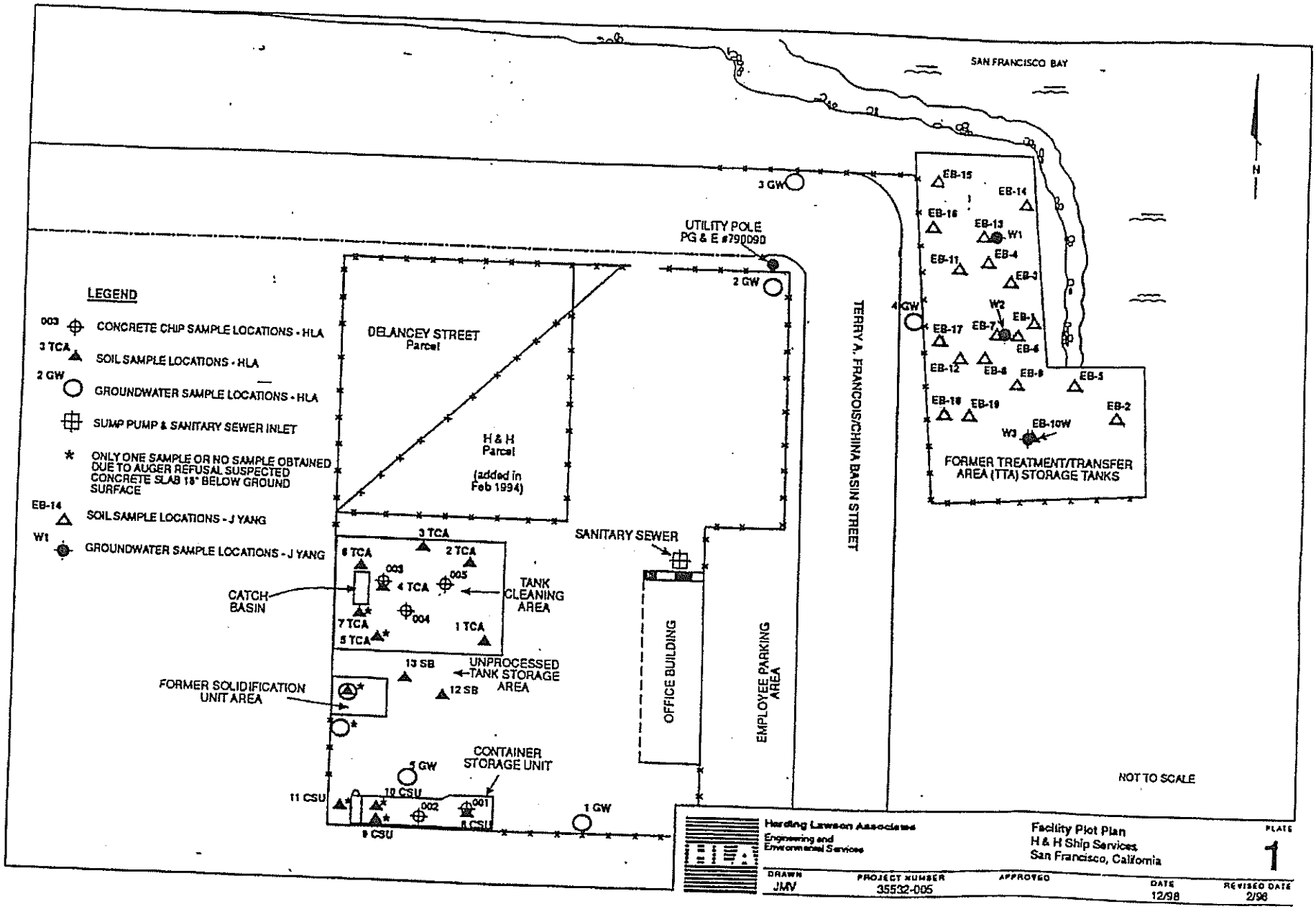

SAN FRANCISCO BAY
N
3 GW
UTILITY POLE
PG & E #790090
2 GW
4 GW
LEGEND
003 CONCRETE CHIP SAMPLE LOCATIONS - HLA
3 TCA SOIL SAMPLE LOCATIONS - HLA
2 GW GROUNDWATER SAMPLE LOCATIONS - HLA
SUMP PUMP & SANITARY SEWER INLET
* ONLY ONE SAMPLE OR NO SAMPLE OBTAINED DUE TO AUGER REFUSAL SUSPECTED CONCRETE SLAB 18" BELOW GROUND SURFACE
EB-14 SOIL SAMPLE LOCATIONS - J YANG
W1 GROUNDWATER SAMPLE LOCATIONS - J YANG
DELANCEY STREET Parcel
H & H Parcel
(added in Feb 1994)
TERRY A. FRANCOIS/CHINA BASIN STREET
EB-15
EB-14
EB-16
EB-13
W1
EB-11
EB-4
EB-3
W2
EB-1
EB-17
EB-7
EB-6
EB-12
EB-8
EB-9
EB-5
EB-18
EB-19
EB-2
W3
EB-10W
FORMER TREATMENT/TRANSFER AREA (TTA) STORAGE TANKS
3 TCA
6 TCA
2 TCA
003
005
4 TCA
CATCH BASIN
TANK CLEANING AREA
7 TCA
004
1 TCA
5 TCA
SANITARY SEWER
13 SB
UNPROCESSED TANK STORAGE AREA
12 SB
FORMER SOLIDIFICATION UNIT AREA
OFFICE BUILDING
EMPLOYEE PARKING AREA
CONTAINER STORAGE UNIT
5 GW
11 CSU
10 CSU
002
001
8 CSU
9 CSU
1 GW
NOT TO SCALE
Harding Lawson Associates
Engineering and Environmental Services
Facility Plot Plan
H & H Ship Services
San Francisco, California
PLATE 1
DRAWN JMV
PROJECT NUMBER 35532-005
APPROVED
DATE 12/98
REVISED DATE 2/99

Table 4. Summary of Chemicals Detected in Soil
Tank Cleaning Area, Container Storage Unit, and Solidification Unit
H & H Ship Service Company
San Francisco, California

Analyte	Units	Number of Detections	Number of Analyses	Frequency of Detection	Minimum Detected Conc.	Maximum Detected Conc.	Location of Maximum Conc.
Inorganics							
Arsenic	mg/kg	16	17	94%	ND	9.2E+01	3TCA-008
Barium	mg/kg	17	17	100%	3.8E+01	6.5E+02	12SB-023
Cadmium	mg/kg	1	17	6%	ND	5.3E-01	3TCA-008
Chromium	mg/kg	17	17	100%	7.3E+00	7.0E+01	1TCA-001
Cobalt	mg/kg	17	17	100%	3.8E+00	4.0E+01	3TCA-007
Copper	mg/kg	17	17	100%	8.9E+00	1.4E+02	10CSU-021
Lead	mg/kg	16	17	94%	ND	2.1E+02	1TCA-001
Mercury	mg/kg	16	17	94%	ND	4.8E-01	2TCA-005
Nickel	mg/kg	17	17	100%	1.3E+01	3.2E+02	6TCA-014
Silver	mg/kg	3	17	18%	ND	3.0E+00	3TCA-007
Thallium	mg/kg	11	17	65%	ND	1.1E+01	1TCA-001
Vanadium	mg/kg	17	17	100%	1.6E+01	4.6E+01	5TCA-013
Zinc	mg/kg	17	17	100%	3.2E+01	2.5E+02	4TCA-011
Petroleum							
Oil and Grease (Total)	mg/kg	17	17	100%	1.1E+02	6.4E+03	4TCA-011
Oil and Grease (Non-Polar)	mg/kg	16	17	94%	ND	5.0E+03	3TCA-007
TPH-Diesel	mg/kg	17	17	100%	5.0E+00	2.1E+03	4TCA-011
TPH-Gasoline	mg/kg	4	17	24%	ND	1.0E+02	4TCA-011
Toluene	mg/kg	17	17	100%	1.2E-02	1.3E+00	3TCA-007
Ethylbenzene	mg/kg	3	17	18%	ND	6.3E-01	4TCA-011
Xylene	mg/kg	6	17	35%	ND	9.3E+00	4TCA-011
PCBs							
Aroclor 1016	mg/kg	2	17	12%	ND	1.0E-01	5TCA-013
Aroclor 1254	mg/kg	7	17	41%	ND	2.4E-01	5TCA-013
Aroclor 1260	mg/kg	3	17	18%	ND	5.5E-01	5TCA-013
PAHs							
Acenaphthene	mg/kg	2	17	12%	ND	9.3E-01	8CSU-018
Acenaphthylene	mg/kg	3	17	18%	ND	1.5E+00	8CSU-018
Anthracene	mg/kg	5	17	29%	ND	3.1E+00	8CSU-018
Benz(a)anthracene	mg/kg	11	17	65%	ND	2.4E+00	8CSU-018
Benzo(b,k)fluoranthene	mg/kg	11	17	65%	ND	2.6E+00	8CSU-018
Benzo(a)pyrene	mg/kg	10	17	59%	ND	1.8E+00	8CSU-018
Benzo(g,h,i)perylene	mg/kg	10	17	59%	ND	6.6E-01	8CSU-018
Chrysene	mg/kg	11	17	65%	ND	2.3E+00	8CSU-018
Dibenz(a,h)anthracene	mg/kg	7	17	41%	ND	3.7E-01	8CSU-018
Fluoranthene	mg/kg	14	17	82%	ND	4.3E+00	8CSU-018
Fluorene	mg/kg	5	17	29%	ND	3.7E+00	8CSU-018
Indeno(1,2,3-cd)pyrene	mg/kg	9	17	53%	ND	7.0E-01	8CSU-018
Naphthalene	mg/kg	5	17	29%	ND	2.5E+00	4TCA-011
Phenanthrene	mg/kg	15	17	88%	ND	6.3E+00	8CSU-018
Pyrene	mg/kg	15	17	88%	ND	4.7E+00	8CSU-018

mg/kg Milligrams per kilogram.
Note: Only detected compounds are listed.

Table 6. Summary of Chemicals Detected in Groundwater
Tank Cleaning Area, Container Storage Unit, and Solidification Unit
H & H Ship Service Company
San Francisco, California

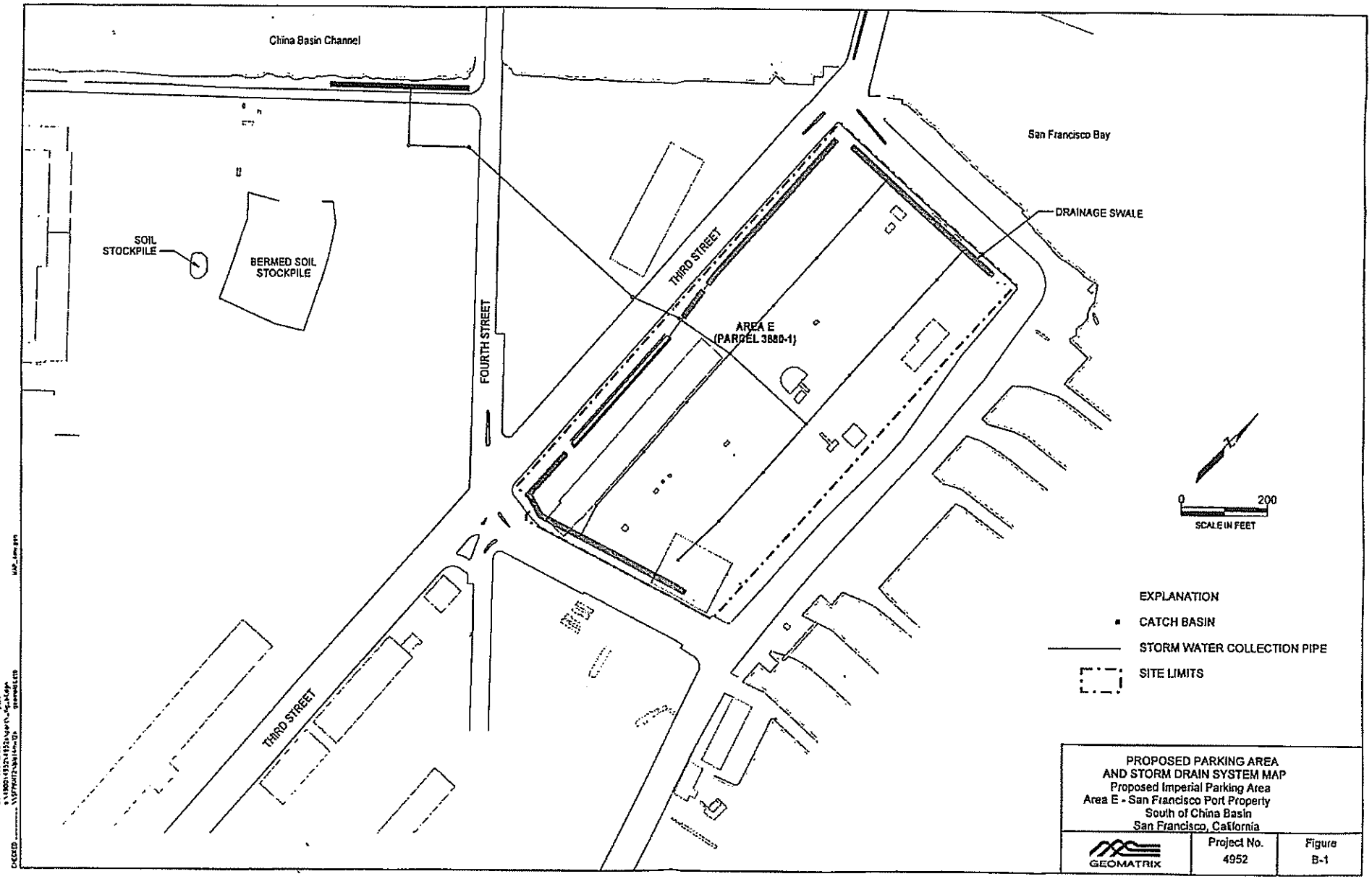
Chemical	Units	Number of Detections	Number of Analyses	Frequency of Detection	Minimum Detected Concentration	Maximum Detected Concentration	Location of Maximum Concentration
Inorganics (filtered)							
Arsenic	mg/L	1	5	20%	0.812	0.812	3GW
Barium	mg/L	5	5	100%	0.0847	0.748	3GW
Cobalt	mg/L	1	5	20%	0.0165	0.0165	2GW
Molybdenum	mg/L	1	5	20%	0.0207	0.0207	4GW
Nickel	mg/L	2	5	40%	0.0419	0.0683	2GW
Zinc	mg/L	1	5	20%	0.126	0.126	4GW
Inorganics (unfiltered)							
Arsenic	mg/L	2	4	50%	0.3	9.2	1GW
Barium	mg/L	4	4	100%	0.27	5.1	1GW
Cadmium	mg/L	3	4	75%	0.012	0.026	1GW
Chromium	mg/L	4	4	100%	0.049	1.1	3GW
Cobalt	mg/L	4	4	100%	0.31	2.5	3GW
Copper	mg/L	4	4	100%	0.056	2	2GW
Lead	mg/L	4	4	100%	0.66	5.6	2GW
Mercury	mg/L	4	4	100%	0.0017	2	4GW
Nickel	mg/L	4	4	100%	0.32	12	3GW
Thallium	mg/L	1	4	25%	0.15	0.15	1GW
Vanadium	mg/L	3	4	75%	0.061	0.47	1GW
Zinc	mg/L	4	4	100%	1	7.2	1GW
Petroleum (unfiltered)							
TPH-Diesel	mg/L	1	4	25%	2.4	2.4	1GW
PCBs (unfiltered) None Detected							
PAHs (unfiltered)							
Acenaphthylene	µg/L	1	5	20%	0.5	0.5	1GW
Anthracene	µg/L	1	5	20%	1.1	1.1	1GW
Benz(a)anthracene	µg/L	3	5	60%	0.14	5.1	1GW
Benzo(b)fluoranthene	µg/L	1	1	100%	0.56	0.56	5GW
Benzo(k)fluoranthene	µg/L	1	1	100%	0.12	0.12	5GW
Benzo(b,k)fluoranthene	µg/L	3	4	75%	0.6	10	1GW
Benzo(a)pyrene	µg/L	3	5	60%	0.34	6.8	1GW
Benzo(g,h,i)perylene	µg/L	3	5	60%	0.5	5.5	1GW
Chrysene	µg/L	2	5	40%	7	7	1GW
Dibenz(a,h)anthracene	µg/L	1	5	20%	1.2	1.2	1GW
Fluoranthene	µg/L	3	5	60%	0.7	10	1GW
Fluorene	µg/L	1	5	20%	1.5	1.5	5GW
Indeno(1,2,3-cd)pyrene	µg/L	1	5	20%	4.2	4.2	1GW
Naphthalene	µg/L	3	5	60%	0.5	1.1	5GW
Phenanthrene	µg/L	4	5	80%	0.5	4.8	1GW
Pyrene	µg/L	4	5	80%	0.6	10	1GW
PAHs (filtered) None Detected							

mg/L Milligrams per liter.
µg/L Micrograms per liter.
ND Not detected.
NA Not available.
Note: Only detected analytes are listed.

GEOMATRIX

APPENDIX B

Site Plans Illustrating Alternative Storm Drainage Systems



PROPOSED PARKING AREA
AND STORM DRAIN SYSTEM MAP
Proposed Imperial Parking Area
Area E - San Francisco Port Property
South of China Basin
San Francisco, California

GEOMATRIX	Project No. 4952	Figure B-1

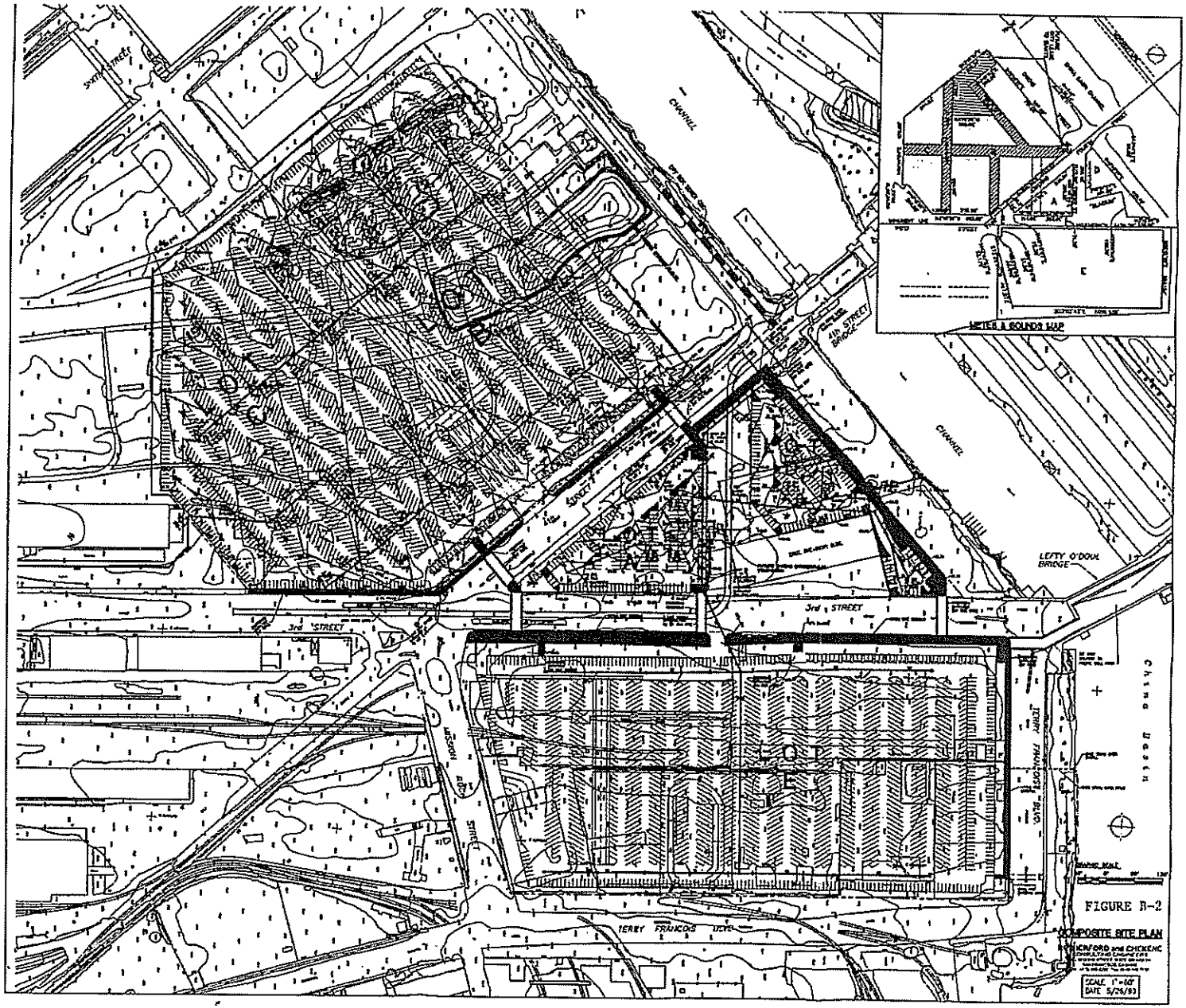


FIGURE B-2

COMPOSITE SITE PLAN

APPENDIX D

Covenant to Restrict Use of Property, recorded January 27, 2000

RECORDING REQUESTED BY:
The Port of San Francisco
Ferry Building
San Francisco, California 94111

WHEN RECORDED, MAIL TO:

Department of Toxic Substances Control
700 Heinz Avenue, Suite 300
Berkeley, California 94710
Attention: Mohinder S. Sandhu, P.E., Chief
Standardized Permits and Corrective
Action Branch

San Francisco Assessor-Recorder
Doris M. Ward, Assessor-Recorder
DOC- 2000-G723986-00
Acct 25-NO CHARGE DOCUMENT
Thursday, JAN 27, 2000 10:47:55
FRE $0.00
Ttl Pd $0.00 Nbr-0001346614
REEL H561 IMAGE 0199 oed/ER/1-16

N/C
16

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

(Re: H&H Site located at Seawall Lot 337, City and County of San Francisco)

This Covenant and Agreement ("Covenant") is made by and between COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

Re: H&H Site located at Seawall Lot 337, City and County of San Francisco

This Covenant and Agreement ("Covenant") is made by and between the City and County of San Francisco, a charter city and county in trust (the "Covenantor"), the current owner, of certain property situated in the City and County of San Francisco, State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the Department of Toxic Substances Control (the

"Department"). Pursuant to Civil Code section 1471(c), the Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials as defined in Health and Safety Code ("H&SC") section 25260. The Covenantor and the Department, collectively referred to as the "Parties", therefore intend that the use of the Property be restricted as set forth in this Covenant, in order to protect human health, safety and the environment.

ARTICLE I
STATEMENT OF FACTS

1.01. The Property, totaling approximately 14 acres, is more particularly described in Exhibit "A" and depicted in Exhibit "A-1", attached hereto and incorporated herein by this reference. The Property is located in the area now generally bounded by Terry Francois Boulevard on the North and East, in the City and County of San Francisco, California.

1.02. The site was created by filling marshlands and shallow tidal flats bordering San Francisco Bay between 1877 and 1913. Sources of fill are unknown, but likely included construction/demolition debris and rubble, and rock and dirt cut from nearby hills. Historical uses of the Site include railroad tracks and related support structures, parking and shipping by truck, and truck maintenance. From 1950 to 1996 H&H Ship Service operated a hazardous waste treatment facility, including a tank cleaning area and drum storage unit, and used portions of the Property for vehicle parking and offices.

In 1978 several of the wastes managed at the H&H Ship Service facility were determined to be hazardous wastes subject to federal and state hazardous waste management regulations. Since that time, the Department of Toxic Substances Control (or its predecessor in interest, the Department of Health Services) authorized H&H Ship Service's operations pursuant to an interim status document. Under this authorization the property was a hazardous waste facility (Facility), regulated by the Department, subject to the requirements of the California Hazardous Waste Control Law ("HWCL"), at Health and Safety Code ("H&S Code") section 25100 et seq., and the federal Resource Conservation and Recovery Act ("RCRA"), at 42 U.S.C. section 6901 et seq.

The Department is requiring this Covenant pursuant to the closure requirements of the HWCL, including H&S Code section 25246 and post-closure notices provisions of Title 22 California Code of Regulations [section 66265.119(b) for interim status hazardous waste facilities], as part of the facility closure. The Department circulated a closure plan, dated August 30, 1996 and a draft Categorical Exemption pursuant to the California Environmental Quality Act, Public Resources Code section 21000 et seq for

public review and comment from December 23, 1999 to January 24, 2000. The Department approved the closure plan, closure certification report titled, *RCRA Closure Certification Report, Former H&H Ship Service Facility, San Francisco, California, dated February 4, 1999*, containing a health risk assessment, and the Categorical Exemption on January 26, 2000. Hazardous wastes, which are also hazardous materials as defined in Health and Safety Code sections 25117 and 25260, including petroleum hydrocarbons, polynuclear aromatic hydrocarbons, metals and arsenic, remain in the soil and groundwater at the Site at concentrations below those which would pose a significant human health risk under proposed reuse scenarios. The health risk assessment did not evaluate an unrestricted land use scenario, recreational use involving direct contact with soil, or potential impacts from use of groundwater. Therefore a deed restriction to limit use of the property to those exposure scenarios evaluated and found to be below acceptable risk limits is required as part of the facility closure.

1.03. As detailed in the health risk assessment within the *RCRA Closure Certification Report*, as approved by the Department on January 26, 2000, portions of the surface and subsurface soils on the Site contain hazardous wastes and hazardous materials, as defined in H&S Code section 25117 and 25260, including the following contaminants of concern: arsenic (up to 92 mg/kg) and benzo(a)pyrene (up to 2.5 mg/kg). Groundwater beneath the Property is found within 10 to 20 feet below ground surface. Dissolved arsenic was found in groundwater at up to 812 ug/l. California drinking water standards are arsenic at 50 ug/l. Because the health risk assessment did not evaluate an unrestricted land use scenario, recreational use involving direct contact with soil, or potential impacts from use of groundwater, the Department concluded that use of the Property as a residence, hospital, school for persons under the age of 21, day care center, or recreational use involving direct contact with soil would entail an unacceptable potential human health risk. The Department further concluded that the Property, subject to the restrictions of this Covenant, does not present an unacceptable threat to human safety or the environment.

ARTICLE II
DEFINITIONS

2.01. Department. "Department" shall mean the California Department of Toxic Substances Control and shall include its successor agencies, if any.

2.02. Owner. "Owner" shall mean the Covenantor, its successors in interest, and their successors in interest, including heirs and assigns, who at any time hold title to all or any portion of the Property.

2.03. Occupant. "Occupant" shall mean Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

ARTICLE III
GENERAL PROVISIONS

3.01. Restrictions to Run With the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), upon and subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. Each and every one of the Restrictions: (a) shall run with the land pursuant to H&SC sections 25202.5, and 25202.6 and Civil Code section 1471; (b) shall inure to the benefit of and pass with each and every portion of the Property, (c) shall apply to and bind the respective successors in interest to the Property, (d) are for the benefit of, and shall be enforceable by the Department, and (e) are imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02. Binding Upon Owners/Occupants. Pursuant to Health and Safety Code section 25202.5(b), this Covenant shall be binding upon all of the owners of the land, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471(b), all successive owners of the Property are expressly bound hereby for the benefit of the covenantee(s) herein. "Owner" shall include "Covenantor".

3.04. Written Notice of Hazardous Substance Release. The Owner shall, prior to the sale, lease, or rental of the Property, give written notice that a release of hazardous substances has come to be located on or beneath the Property, pursuant to Health and Safety Code section 25359.7. Such written notice shall include a copy of this Covenant.

ARTICLE IV
RESTRICTIONS

4.01. Prohibited Uses. The Property shall not be used for any of the following purposes:

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation;

(b) A hospital for humans;

(c) A public or private school for persons under 21 years of age;

(d) A day care center for children; or

(e) Recreational use involving direct contact with soil.

4.02. Soil Management

(a) Any contaminated soils brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of state and federal law.

(b) If more than 50 cubic yards of any surface or subsurface soil will be disturbed, including excavation and grading, then the soil shall be evaluated for potential human health risks in compliance with Article 20 of the SF Municipal Code ("the Maher Ordinance"), and managed accordingly.

4.03. Prohibited Activities. The following activities shall not be conducted at the Property:

(a) No raising of food (e.g., cattle, food crops, cotton, etc.) shall be permitted on the property.

(b) No groundwater shall be extracted on the Property for purposes other than site remediation or construction dewatering without prior written approval by the Department.

4.04. Access for Department. Covenantor agrees that the Department shall have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department in order to protect the public health and safety.

ARTICLE V
ENFORCEMENT

5.01. Enforcement. Failure of the Covenantor and/or Owner to comply with any of the Restrictions specifically applicable to it shall be grounds for the Department, by reason of this Covenant, to require that the Covenantor and/or Owner modify or remove any improvements ("Improvements" herein shall mean all buildings, roads, driveways, and paved parking areas, constructed or placed upon any portion of the Property constructed in violation of the Restrictions.) Violation of this Covenant shall be grounds for the Department to file civil and/or criminal actions against the Covenantor and/or Owner as provided by law.

ARTICLE VI
VARIANCE, TERMINATION, AND TERM

6.01. Variance. Any Owner or, with the Owner's written consent, any Occupant of the Property or any portion thereof may apply to the Department for a written variance from the provisions of this Covenant. Such application shall be made in accordance with H&S Code section 25202.6.

6.02. Termination. Any Owner, and/or, with the Owner's written consent, any Occupant of the Property, or any portion thereof, may apply to the Department for a termination of the Restrictions or other terms of this Covenant as they apply to all or any portion of the Property. Such application shall be made in accordance with H&S Code section 25202.6.

6.03. Term. Unless ended in accordance with the Termination Paragraph above, by law, or by the Department in the exercise of its discretion, this Covenant shall continue in effect in perpetuity.

ARTICLE VII
MISCELLANEOUS

7.01. No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever.

7.02. Department References. All references to the Department include successor agencies/departments or other successor entity.

7.03. Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of San Francisco within ten (10) days of the Covenantor's receipt of a fully executed original.

7.04. Notices. Whenever any person gives or serves any notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served, or (2) three (3) business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner:

G723986

On or Before 12/31/00:

Port of San Francisco
3100 Ferry Building
San Francisco, CA 94111
Attention: Carol Bach,

With a copy to

Noreen Ambrose
Port General Counsel
Port of San Francisco
3100 Ferry Building
San Francisco, CA 94111.

After 12/31/00:

Port of San Francisco
Pier 1
San Francisco, CA 94111
Attention: Carol Bach,

With a copy to:
Noreen Ambrose
Port General Counsel
Port of San Francisco
Pier 1
San Francisco, CA 94111.

To Department:

California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue, Suite 300
Berkeley, CA 94710-2737
Attention: Branch Chief
Standardized Permits and Corrective Action Branch

Any party may change its address or the individual to whose attention a notice is to be sent by giving written notice in compliance with this paragraph.

7.05. Partial Invalidity. If any portion of the Restrictions or other term set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

G723986

IN WITNESS WHEREOF, the Parties execute this Covenant.

"Covenantor" City & County of San Francisco

Date: 1/26/2000

By: _____
DOUGLAS F. WONG
Its: Executive Director
Port of San Francisco

"Department" Department of Toxic Substances Control

Date: 1/26/00

By: _____
MOHINDER S. SANDHU
Its: Chief, Standardized Permits and Corrective Action Branch

G723986

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of San Francisco } ss.

On January 26, 2000, before me, Virna C. Wu, "Notary Public",
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")

personally appeared Douglas Farrell Wong,
Name(s) of Signer(s)

☒ personally known to me
☐ ~~proved to me on the basis of satisfactory~~ evidence

to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(~~ies~~), and that by his/~~her/their~~ signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

WITNESS my hand and official seal.

Signature of Notary Public

VIRNA CHERN WU
Commission # 1203557
Notary Public - California
San Francisco County
My Comm. Expires Dec 3, 2002

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Environmental Restriction

Document Date: 1/26/2000 Number of Pages: 8 + 6 (Parcel B, C, D)

Signer(s) Other Than Named Above: None

Capacity(ies) Claimed by Signer

Signer's Name: Douglas Farrell Wong

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: Port Executive Director

Signer Is Representing: Port of San Francisco

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

© 1997 National Notary Association • 9350 De Soto Ave., P.O. Box 2402 • Chatsworth, CA 91313-2402 Prod. No. 5907 Reorder: Call Toll-Free 1-800-876-6827

G723986

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of San Francisco } ss.

On January 26, 2000 (Date), before me, Virna C. Wu, "Notary Public" (Name and Title of Officer (e.g., "Jane Doe, Notary Public")),

personally appeared Mohinder Singh Sandhu (Name(s) of Signer(s)),

~~☐ personally known to me~~

☒ proved to me on the basis of satisfactory evidence

to be the person~~(s)~~ whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity~~(ies)~~, and that by his/her/their signature~~(s)~~ on the instrument the person~~(s)~~, or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.

WITNESS my hand and official seal.

Virna C. Wu
Signature of Notary Public

VIRNA CHERN WU
Commission # 1203557
Notary Public - California
San Francisco County
My Comm. Expires Dec 3, 2002

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Environmental Restriction

Document Date: 01/26/2000 Number of Pages: 8+6(Parcel A, C & D)

Signer(s) Other Than Named Above: None

Capacity(ies) Claimed by Signer

Signer's Name: Mohinder Singh Sandhu

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☒ Other: Chief, Standardized Permits & Corrective Action Branch

Signer Is Representing: Dept. of Toxic Substances Control

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

© 1997 National Notary Association • 9350 De Soto Ave., P.O. Box 2402 • Chatsworth, CA 91313-2402 Prod. No. 5907 Reorder: Call Toll-Free 1-800-876-6827

G723986

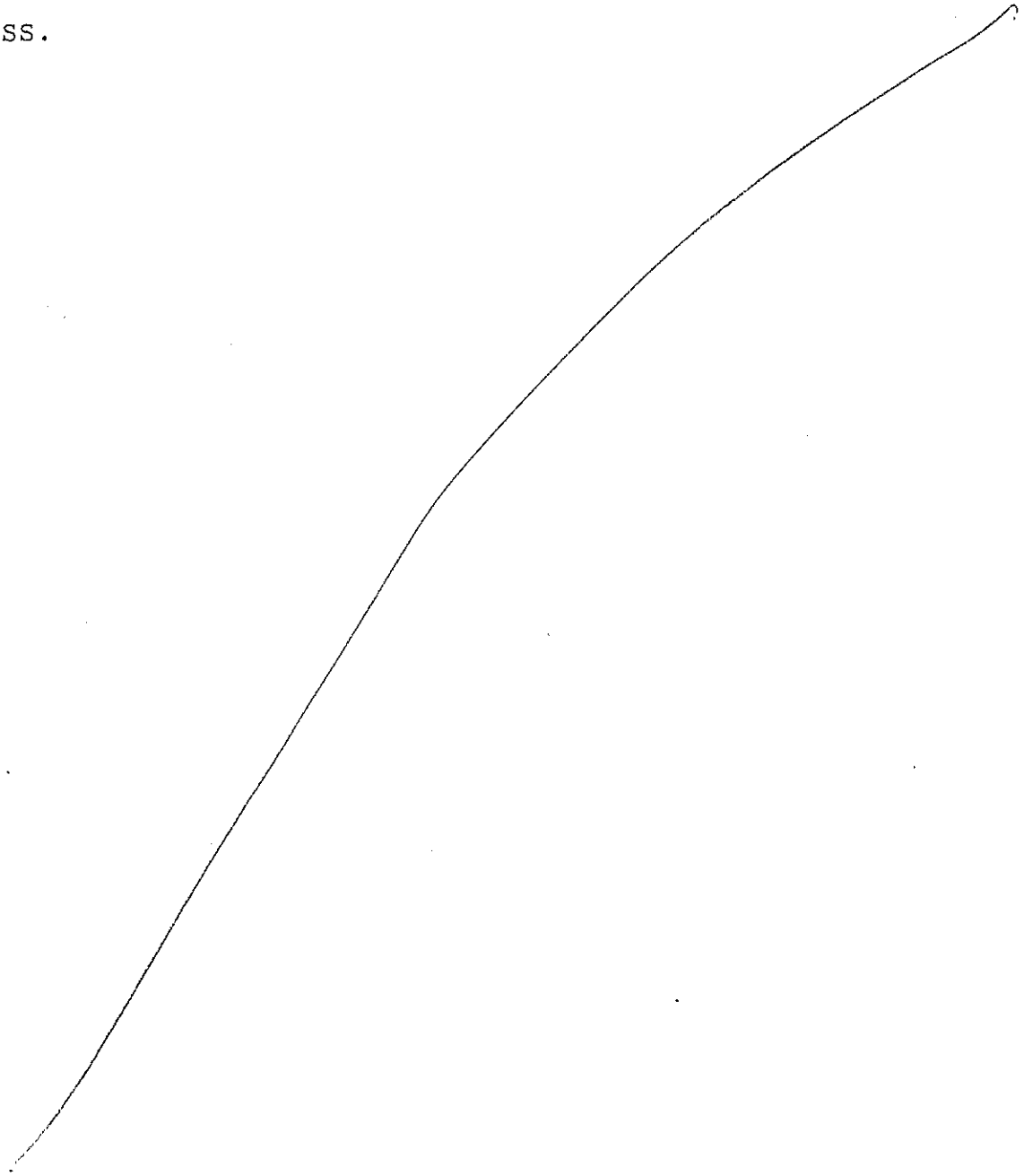
SEAWALL LOT 337

PARCEL A

ALL THAT CERTAIN REAL PROPERTY SITUATED AT THE CITY AND COUNTY OF SAN FRANCISCO, BEING A PORTION OF SEAWALL LOT 337 OF THE SAN FRANCISCO PORT AUTHORITY, DESCRIBED AS FOLLOWS; COMMENCING AT THE SOUTHWEST CORNER OF THE INTERSECTION OF TOWNSEND STREET AND DELANCEY STREET (FORMERLY FIRST STREET), SAID CORNER BEING INNER 14 OF THE INNER WATERFRONT LINE AS DESCRIBED IN THE RECORDS ON FILE AT THE OFFICE OF ENGINEERING OF THE SAN FRANCISCO PORT AUTHORITY; RUNNING THENCE ALONG SAID INNER WATERFRONT LINE AT S 3DEG 02'27" E A DISTANCE OF 2,217.59 FEET TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING ALONG THE LAST AFOREMENTIONED COURSE A DISTANCE OF 149.77 FEET; THENCE AT S 86DEG 57'33" W A DISTANCE OF 38.12 FEET; THENCE AT S 3DEG 14'22" E A DISTANCE OF 31.51 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 55.69 FEET; THENCE AT S 3DEG 02'27" E A DISTANCE OF 120.00 FEET; THENCE AT S 86DEG 45'38" W A DISTANCE OF 55.27 FEET; THENCE AT N 3DEG 14'22" W A DISTANCE OF 120.00 FEET; THENCE AT S 86DEG 45'38" W A DISTANCE OF 40.17 FEET; THENCE AT S 3DEG 14'22" E A DISTANCE OF 120.00 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 40.17 FEET; THENCE AT S 3DEG 14'22" E A DISTANCE OF 48.20 FEET; THENCE AT S 86DEG 57'33" W A DISTANCE OF 142.25 FEET; THENCE AT

G723986

S 86DEG 50'57" W A DISTANCE OF 111.99 FEET; THENCE AT
N 3DEG 10'55" W A DISTANCE OF 200.00 FEET; THENCE AT
N 86DEG 57'33" E A DISTANCE OF 171.00 FEET; THENCE AT
N 3DEG 02'27" W A DISTANCE OF 149.48 FEET; THENCE AT
N 86DEG 49'20" E A DISTANCE OF 121.29 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING AN AREA OF 70,765.20 SQUARE FEET, MORE OR LESS.

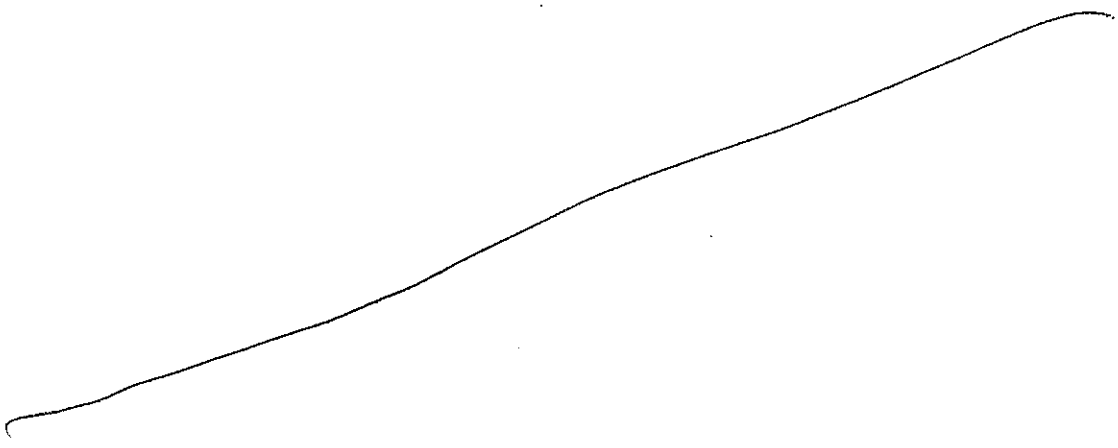


G723986

SEAWALL LOT 337

PARCEL C

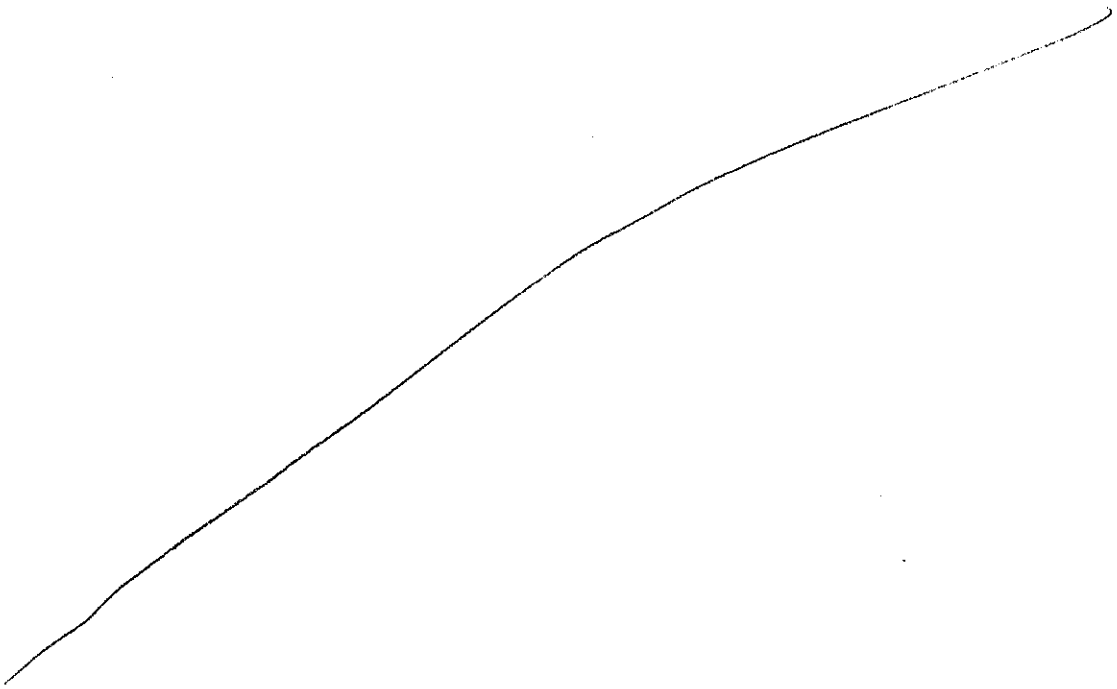
BEING A PORTION OF SEAWALL LOT 337 OF THE SAN FRANCISCO PORT AUTHORITY ,CITY AND COUNTY OF SAN FRANCISCO, BRIEFLY DESCRIBED AS FOLLOWS; COMMENCING AT THE SOUTHWEST CORNER OF THE INTERSECTION OF TOWNSEND STREET AND DELANCEY STREET (FORMERLY FIRST STREET), SAID CORNER BEING INNER 14 OF THE INNER WATERFRONT LINE AS DESCRIBED IN THE RECORDS ON FILE AT THE OFFICE OF ENGINEERING OF THE SAN FRANCISCO PORT AUTHORITY; RUNNING THENCE ALONG THE AFORESAID INNER WATERFRONT LINE AT S 3DEG 02'27" E A DISTANCE OF 2,367.36 FEET TO THE TRUE POINT OF BEGINNING; THENCE AT S 48DEG 02'27" E A DISTANCE OF 25.00 FEET; THENCE AT S 3DEG 02'27" E A DISTANCE OF 13.64 FEET; THENCE AT S 86DEG 45'38" W A DISTANCE OF 55.69 FEET; THENCE AT N 3DEG 14'22" W A DISTANCE OF 31.51 FEET; THENCE AT N 86DEG 57'33" E A DISTANCE OF 38.12 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING AN AREA OF 1,594.90 SQUARE FEET, MORE OR LESS.



G723986

ALSO INCLUDED IN THIS PARCEL IS A PORTION OF SEAWALL LOT 337 BRIEFLY DESCRIBED AS FOLLOWS;

COMMENCING AT THE SOUTHWEST CORNER OF THE INTERSECTION OF TOWNSEND STREET AND DELANCEY STREET (FORMERLY FIRST STREET) SAID POINT BEING INNER 14 OF THE INNER WATERFRONT LINE AS DESCRIBED IN THE RECORDS ON FILE AT THE OFFICE OF ENGINEERING OF THE SAN FRANCISCO PORT AUTHORITY; RUNNING THENCE ALONG THE AFORESAID INNER WATERFRONT LINE A DISTANCE OF 2,518.74 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 17.66 FEET TO THE TRUE POINT OF BEGINNING; THENCE AT S 3DEG 02'27" E DISTANCE OF 30.72 FEET; THENCE AT S 41DEG 57'33" W A DISTANCE OF 25.00 FEET; THENCE S 86DEG 57'33" W A DISTANCE OF 37.43 FEET; THENCE AT N 3DEG 14'22" W A DISTANCE OF 48.20 FEET; THENCE AT N 86DEG 45'38" E DISTANCE OF 55.27 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING AN AREA OF 2,509.60 SQUARE FEET, MORE OR LESS.



G723986

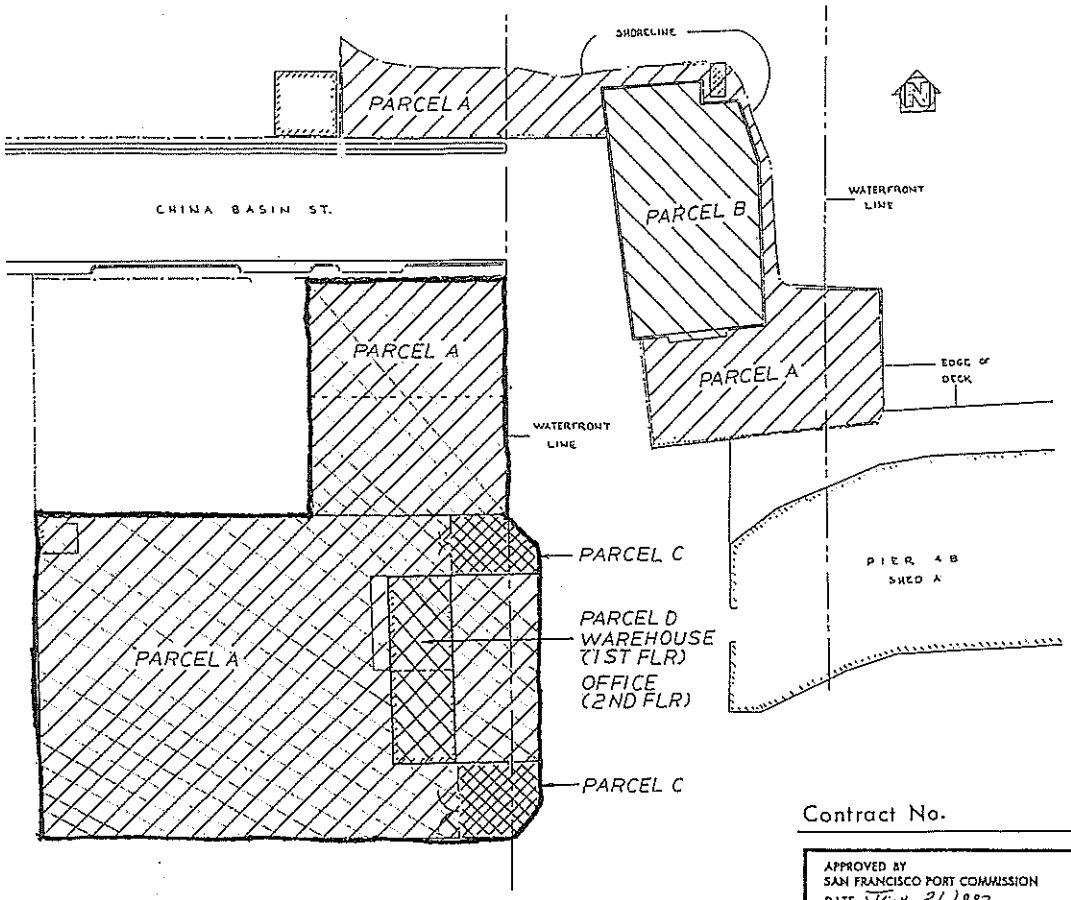
SEAWALL LOT 337

PARCEL D

PARCEL D IS A TWO-STORY WAREHOUSE AND OFFICE BUILDING LOCATED AT CHINA BASIN STREET WHOSE FOOTPRINT IS BRIEFLY DESCRIBED AS FOLLOWS;
COMMENCING AT THE SOUTHWEST CORNER OF THE INTERSECTION OF TOWNSEND STREET AND DELANCEY STREET (FORMERLY FIRST STREET), SAID POINT BEING INNER 14 OF THE INNER WATERFRONT LINE AS DESCRIBED IN THE RECORDS ON FILE AT THE OFFICE OF ENGINEERING OF THE SAN FRANCISCO PORT AUTHORITY; RUNNING THENCE SOUTHERLY ALONG THE AFORESAID INNER WATERFRONT LINE AT S 3DEG 02'27" E A DISTANCE OF 2,398.74 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 38.02 FEET TO THE TRUE POINT OF BEGINNING; THENCE AT S 3DEG 14'22" E A DISTANCE OF 120.00 FEET; THENCE AT S 86DEG 45'38" W A DISTANCE OF 40.17 FEET; THENCE AT N 3DEG 14'22" W A DISTANCE OF 120.00 FEET; THENCE AT N 86DEG 45'38" E A DISTANCE OF 40.17 FEET TO THE TRUE POINT OF BEGINNING, CONTAINING AN AREA OF 4,820.00 SQUARE FEET, MORE OR LESS.

ALSO INCLUDED IN THIS PARCEL IS THE SECOND FLOOR OFFICE SPACE OF THE AFOREMENTIONED TWO- STORY BUILDING WITH AN AREA OF 2,414.00 SQUARE FEET, MORE OR LESS.

G723986



PARCEL A	91,844 SF
PARCEL B	14,071 SF
SUB TOTAL	105,915SF
PARCEL C	4,105SF
PARCEL D	
WAREHOUSE	4,820 SF
OFFICE	2,414 SF
TOTAL	117,254 SF

Contract No.

APPROVED BY
SAN FRANCISCO PORT COMMISSION
DATE Jan 21 1992
CHIEF ENGINEER

NO.	DATE	DESCRIPTION

REVISIONS

PORT OF SAN FRANCISCO
SAN FRANCISCO PORT COMMISSION
DEPARTMENT OF ENGINEERING

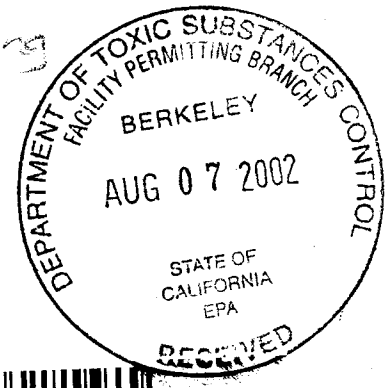
EXHIBIT A-1
H & H SHIP SERVICE CO.
LEASE NO. L-11679

DRAWN BY E.C.C.	CHECKED BY
DESIGNED BY	DATE 4-27-92
SECTION HEAD	SCALE
DRAWING NO.	SHEET NO. OF SHEETS

APPENDIX E

Covenant to Restrict Use of Property, recorded July 25 2002

20020507-0-Wong



RECORDING REQUESTED BY:
The Port of San Francisco
Ferry Building
San Francisco, California 94111

WHEN RECORDED, MAIL TO

Department of Toxic Substances Control
700 Heinz Avenue, Suite 300
Berkeley, California 94710
Attention: Mohinder S. Sandhu, P.E., Chief
Standardized Permits and Corrective Action Branch

San Francisco Assessor-Recorder
Doris M. Ward, Assessor-Recorder
DOC- 2002-H209674-00
Acct 25-NO CHARGE DOCUMENT
Thursday, JUL 25, 2002 12:45:40
Ttl Pd $0.00 Nbr-0001906468
REEL I187 IMAGE 0545
oj1/JL/1-14

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

(Re: H&H Site located at China Basin Channel and Terry Francois Blvd, City and County of San Francisco)

This Covenant and Agreement ("Covenant") is made by and between the City and County of San Francisco, a charter city and county in trust (the "Covenantor"), the current owner of certain property situated in the City and County of San Francisco, State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the Department of Toxic Substances Control (the "Department"). Pursuant to Civil Code section 1471(c) and the California Health and Safety Code, Section 25222.1, the Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials as defined in Health and Safety Code ("H&SC"), Section 25260. The Covenantor and the Department, collectively referred to as the "Parties", therefore intend that the use of the Property be restricted as set forth in this Covenant, in order to protect human health,

safety and the environment.

ARTICLE I
STATEMENT OF FACTS

1.01. The Property, totaling approximately 0.6 acres, is more particularly described in Exhibit "A" and depicted in Exhibit "A-1", attached hereto and incorporated herein by this reference. The Property is located in the area now generally bounded by Terry Francois Boulevard to the west, China Basin Channel to the north, and San Francisco Bay to the east, in the City and County of San Francisco, California.

1.02. The site was created by filling marshlands and shallow tidal flats bordering San Francisco Bay between 1877 and 1913. Sources of fill are unknown, but likely included construction/demolition debris and rubble, and rock and dirt cut from nearby hills. Historical uses of the Site include railroad tracks and related support structures and parking. From 1950 to 1996 H&H Ship Service occupied the area for wastewater treatment and transfer operations, including aboveground storage tanks for receiving, settling and treating wastewater containing petroleum.

In 1978 several of the wastes managed at the H&H Ship Service facility were determined to be hazardous wastes subject to federal and state hazardous waste management regulations. Since that time, the Department of Toxic Substances Control (or its predecessor in interest, the Department of Health Services) authorized H&H Ship Service's operations pursuant to an interim status document. Under this authorization the property was a hazardous waste facility (Facility), regulated by the Department, subject to the requirements of the California Hazardous Waste Control Law ("HWCL"), at Health and Safety Code ("H&S Code") section 25100 et seq., and the federal Resource Conservation and Recovery Act ("RCRA"), at 42 U.S.C. section 6901 et seq. Under Interim Status, the property was a portion of the Facility that was known as the Treatment/Transfer Area (TTA).

The Department is requiring this Covenant pursuant to the closure requirements of the HWCL, including H&S Code section 25246 and post-closure notices provisions of Title 22 California Code of Regulations [section 66265.119(b) for interim status hazardous waste facilities], as part of the facility closure. In 1994, the Department reviewed H&H's Closure Plan to ensure that the closure of the TTA met the requirements in Title 22, California Code of Regulations, Chapter 15, Article 7. The Department circulated the draft Closure Plan and Proposed Negative Declaration for public review and comment from August 11, 1994 to September 13, 1994. The Department approved the Closure Plan on January 13, 1995 and filed a Notice of Determination for the project with the

State Clearinghouse on February 15, 1995.

The Department reviewed the closure certification report titled, *RCRA Closure Certification Report, Former H&H Ship Service Facility, San Francisco, California,* (February 4, 1999), and subsequent submittals titled *Response to Comments, RCRA Closure Certification Report, Former H&H Ship Service Facility,* (November 2, 1999); *Results of Article 20 Sampling Program. Proposed China Basin Park Area* (July 2000); *Site Investigation and Surface Soil Sampling Results, Former H&H Ship Service Company – Treatment Transfer Area Parcel* (February 28, 2002); and *Addendum to the Article 20 Health Risk Assessment* (July 18, 2002). Upon filing of this deed restriction, the Department will approve the closure certification report.

Hazardous wastes, which are also hazardous materials as defined in Health and Safety Code sections 25117 and 25260, including petroleum hydrocarbons, polynuclear aromatic hydrocarbons, metals and arsenic, remain in the soil and groundwater at the Site at concentrations below those which would pose a significant human health risk under proposed reuse scenarios. Therefore a deed restriction to limit use of the property to those exposure scenarios evaluated and found to be below acceptable risk limits is required as part of the facility closure.

1.03. As detailed in the above-referenced reports, portions of the surface and subsurface soils on the Site contain hazardous wastes and hazardous materials, as defined in H&S Code section 25117 and 25260, including the following contaminants of concern: arsenic (up to 96 mg/kg)and benzo(a)pyrene (up to 11 mg/kg). Groundwater beneath the Property is found within 10 to 20 feet below ground surface. Dissolved arsenic was found in groundwater at up to 180 ug/l. The California drinking water standard for arsenic is 50 ug/l.

A review of the analytical results and the chemical distribution suggests that there are "hot spots". Hot spots are areas of affected soil or groundwater having concentrations higher than an empirically determined percentile of the distribution of concentrations in a particular population. 65 soil samples from 20 locations at various depths were collected within the TTA. Elevated concentrations of benzo(a)pyrene equivalent B(a)P EQ were measured in samples collected from two borings locations (EB-1, 19.8 milligrams per kilogram [mg/kg]) and (EB-20, 7.9 mg/kg). One surface soil sample (GMX-08) contained B(a)P EQ concentration of 1.5 mg/kg. All other concentrations of B(a)P EQ were less than 1 mg/kg. Elevated concentrations of arsenic and lead were observed in samples collected from borings EB-1 (3,000 mg/kg lead), EB-5 (96 mg/kg arsenic and 1,300 mg/kg lead), and EB-18 (2,400 mg/kg lead). Borings EB-1 and EB-5 are located in the eastern section of the TTA; GMX-08 is located near the northern perimeter; and borings EB-18 and EB-20 are located in the southwest section.

Based on these observations, borings EB-1, EB-5, GMX-08, EB-18, and EB-20 can be considered hot spots. However, each of borings is located under a concrete/asphalt

foundation or a compacted aggregate/crushed rock/roadbase material. The concrete/asphalt foundation or compacted aggregate/crushed rock/roadbase material serves as a physical barrier preventing direct contact with chemicals in soil; thus, there are no potential direct exposure pathways to chemicals at these hot spots by future receptors. If in the unlikely event that the concrete/asphalt foundation is removed, the excess cancer risk to a receptor from the hot spots would range from $9x10^{-5}$ to $3x10^{-6}$.

Imported topsoil at least 18 inches thick followed by a layer of sod will be placed over the existing asphalt-concrete foundation. The concrete is present at one foot thick to at least 3 feet thick across approximately two-third of the TTA. The remaining one-third of the TTA is currently overlain with an aggregate/crushed rock/roadbase material. The concrete/asphalt foundation and compacted aggregate/crushed rock/roadbase layer precludes a complete exposure pathway. Additional of the 18 inches of topsoil and sod layer will eliminate potential direct exposures to soil in fill material within the TTA.

In order to ensure that no complete pathways are established, the Department will require that the existing concrete/asphalt foundation remain undisturbed so long as the intended use of the Property is to be a recreational park. Additionally, the Department will require that the site be covered (capped) with at least eighteen (18) inches of imported topsoil on top of an indictor lining material to denote the separation of the topsoil from native fill. Because the health risk assessment also did not evaluate an unrestricted land use scenario or potential impacts from use of groundwater, the Department concluded that use of the Property as a residence, hospital, school for persons under the age of 21, or day care center would entail an unacceptable use. The Department further concluded that the Property, subject to the restrictions of this Covenant, does not present an unacceptable threat to human safety or the environment.

ARTICLE II
DEFINITIONS

2.01. Department. "Department" shall mean the California Department of Toxic Substances Control and shall include its successor agencies, if any.

2.02. Owner. "Owner" shall mean the Covenantor, its successors in interest, and their successors in interest, including heirs and assigns, who at any time hold title to all or any portion of the Property.

2.03. Occupant. "Occupant" shall mean Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

2.04. Cap. "Cap" shall mean eighteen (18) inches of imported topsoil on top of

an indicator lining material which is used to denote the separation of the imported topsoil from native fill.

2.05 Concrete/Asphalt Foundation. "Concrete/Asphalt Foundation" shall mean the existing concrete/asphalt surface which is overlain approximately two-third of the Property.

2.03. ARTICLE III
GENERAL PROVISIONS

3.01. Restrictions to Run With the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), upon and subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. Each and every one of the Restrictions: (a) shall run with the land pursuant to H&SC sections 25202.5, and 25202.6 and Civil Code section 1471; (b) shall inure to the benefit of and pass with each and every portion of the Property, (c) shall apply to and bind the respective successors in interest to the Property, (d) are for the benefit of, and shall be enforceable by the Department, and (e) are imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02. Binding Upon Owners/Occupants. Pursuant to Health and Safety Code section 25202.5(b), this Covenant shall be binding upon all of the owners of the land, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471(b), all successive owners of the Property are expressly bound hereby for the benefit of the covenantee(s) herein. "Owner" shall include "Covenantor".

3.03. Written Notice of Hazardous Substance Release. The Owner shall, prior to the sale, lease, or rental of the Property, give written notice that a release of hazardous substances has come to be located on or beneath the Property, pursuant to Health and Safety Code section 25359.7. Such written notice shall include a copy of this Covenant.

3.04. Incorportion into Deeds and Leases. The Restrictions set forth herein shall be incorporated by reference in each and all deeds and leases for any portion of the Property.

3.05. Conveyance of Property. Covenantor agrees that the Owner shall provide notice to the Department not later than thirty (30) days after any conveyance of any ownership interest in the Property (excluding mortgages, liens, and other non-possessory encumbrances). The Department shall not, by reason of this Covenant, have authority to approve, disapprove, or otherwise affect such proposed conveyance, except as otherwise provided by law, by administrative order, or specific provision of this Covenant.

ARTICLE IV
RESTRICTIONS

4.01. Prohibited Uses. The Property shall not be used for any of the following purposes:

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation;

(b) A public or private school for persons under 21 years of age; or

(c) A hospital for humans; or

(c) A day care center for children.

4.02 Prohibited Activities. The following activities shall not be conducted at the Property:

(a) No raising of food (e.g., cattle, food crops, cotton, etc.) shall be permitted on the property.

(b) No groundwater shall be extracted on the Property for purposes other than site remediation or construction dewatering without prior written approval by the Department.

4.03 Non-Interference with the Cap. Covenantor agrees:

(a) No activities which will disturb the Cap (e.g. excavation, grading, removal, trenching, filling, earth movement, or mining) shall be permitted on the Property without prior review and approval by the Department.

(b) All uses and development of the Property shall preserve the integrity of the Cap.

(c) Any proposed alteration of the Cap shall require written approval by the Department.

(d) Covenantor shall notify the Department of each of the following: (i) The type, cause, location and date of any disturbance to the Cap which could affect the ability of the Cap to contain subsurface hazardous materials in the Property, and (ii) the type and date of repair of such disturbance. Notification to the Department shall be made as provided below within ten (10) working days of both the discovery of any such disturbance(s) and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other

Owners and Occupants.

4.04. Management of Native Fill and Concrete/Asphalt Foundation Material

(a) All uses and development of the Property shall preserve the integrity of the existing Concrete/Asphalt Foundation.

(b) No activities (e.g., excavation, grading, removal, trenching, filling, earth movement or mining) which will disturb the native fill and/or the Concrete/Asphalt Foundation material underlying the Cap as indicated in Exhibit B shall be permitted on the Property without a Department-approved Soil Management Plan and Health and Safety Plan.

(c) Native fill and/or Concrete/Asphalt Foundation material shall not be managed or handled such that it may migrate into the bay.

(d) Any native fill and/or Concrete/Asphalt Foundation material brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with the applicable state and federal laws and their implementing regulations.

(e) The Owner shall provide the Department written notice at least fourteen (14) days prior to any building, filling, grading, mining or excavating at the Property.

(f) If more than 50 cubic yards of any native fill will be disturbed, including excavation and grading, then the soil shall be evaluated for potential human health risks in compliance with Article 20 of the SF Municipal Code ("the Maher Ordinance"), and managed accordingly.

(g) Covenantor shall notify the Department of each of the following: (i) The type, cause, location and date of any disturbance to the native fill and/or Concrete/Asphalt Foundation which could affect the ability of the Concrete/Asphalt Foundation to contain subsurface hazardous materials in the Property, and (ii) the type and date of repair of such disturbance. Notification to the Department shall be made as provided below within ten (10) working days of both the discovery of any such disturbance(s) and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other Owners and Occupants.

4.05. Access for Department. Covenantor agrees that the Department shall

have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department in order to protect the public health and safety.

ARTICLE V
ENFORCEMENT

5.01. Enforcement. Failure of the Covenantor and/or Owner to comply with any of the Restrictions specifically applicable to it shall be grounds for the Department, by reason of this Covenant, to require that the Covenantor and/or Owner modify or remove any improvements ("Improvements" herein shall mean all buildings, roads, driveways, and paved parking areas, constructed or placed upon any portion of the Property constructed in violation of the Restrictions.) Violation of this Covenant shall be grounds for the Department to file civil and/or criminal actions against the Covenantor and/or Owner as provided by law.

ARTICLE VI
VARIANCE, TERMINATION, AND TERM

6.01. Variance. Any Owner or, with the Owner's written consent, any Occupant of the Property or any portion thereof may apply to the Department for a written variance from the provisions of this Covenant. Such application shall be made in accordance with H&S Code section 25202.6.

6.02. Termination. Any Owner, and/or, with the Owner's written consent, any Occupant of the Property, or any portion thereof, may apply to the Department for a termination of the Restrictions or other terms of this Covenant as they apply to all or any portion of the Property. Such application shall be made in accordance with H&S Code section 25202.6.

6.03. Term. Unless ended in accordance with the Termination Paragraph above, by law, or by the Department in the exercise of its discretion, this Covenant shall continue in effect in perpetuity.

ARTICLE VII
MISCELLANEOUS

7.01. No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever.

7.02. Department References. All references to the Department include successor agencies/departments or other successor entity.

7.03. Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of San Francisco within ten (10) days of the Covenantor's receipt of a fully executed original.

7.04. Notices. Whenever any person gives or serves any notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served, or (2) three (3) business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner:

Carol Bach
Assist. Deputy Director, Environmental Health and Safety
Port of San Francisco
Pier 1
San Francisco, CA 94111

With a copy to:

Noreen Ambrose
Port General Counsel
Port of San Francisco
Pier 1
San Francisco, CA 94111.

To Department:

California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue, Suite 300
Berkeley, CA 94710-2737
Attention: Chief, Standardized Permits and Corrective Action Branch

Any party may change its address or the individual to whose attention a notice is to be sent by giving written notice in compliance with this paragraph.

7.05. Partial Invalidity. If any portion of the Restrictions or other term set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

H209674

IN WITNESS WHEREOF, the Parties execute this Covenant.

"Covenantor"

Date: 7/24/02

By: //original signed by//
DOUGLAS F. WONG
Its: Executive Director

"Department"

Date: 7/24/02

By: //original signed by//
Mohinder S. Sandhu, P.E.
Its: Chief, Standardized Permits and Corrective Action Branch

H209674

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of San Francisco } ss.

On July 24, 2002 (Date) before me, Virna C. Wu "Notary Public" (Name and Title of Officer (e.g., "Jane Doe, Notary Public"))

personally appeared Mohinder Singh Sandhu (Name(s) of Signer(s))

☒ personally known to me
☐ ~~proved to me on the basis of satisfactory evidence~~

to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/her/their authorized capacity(~~ies~~), and that by his/~~her/their~~ signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

WITNESS my hand and official seal.

VIRNA CHERN WU
Commission # 1203557
Notary Public - California
San Francisco County
My Comm. Expires Dec 3, 2002

Place Notary Seal Above

//original signed by// (Signature of Notary Public)

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document
Title or Type of Document: Covenant to Restrict Use of Property
Document Date: None Number of Pages: 10 Pages + Exhibits A & B
Signer(s) Other Than Named Above: None

Capacity(ies) Claimed by Signer
Signer's Name: Mohinder Singh Sandhu
☒ Individual
☒ Corporate Officer — Title(s): _____
☒ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☒ Other: Port Executive Director
Signer Is Representing: Port of San Francisco

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

© 1997 National Notary Association • 9350 De Soto Ave., P.O. Box 2402 • Chatsworth, CA 91313-2402 Prod. No. 5907 Reorder: Call Toll-Free 1-800-876-6827

H209674

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of San Francisco } ss.

On July 24, 2002 (Date), before me, Virna C. Wu "Notary Public" (Name and Title of Officer (e.g., "Jane Doe, Notary Public"))

personally appeared Mohinder Singh Sandhu (Name(s) of Signer(s))

☐ ~~personally known to me~~
☒ proved to me on the basis of satisfactory evidence

to be the person(~~s~~) whose name(~~s~~) is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she~~/they executed the same in his/~~her~~/their authorized capacity(~~ies~~), and that by his/~~her~~/their signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

WITNESS my hand and official seal.

VIRNA CHERN WU
Commission # 1203557
Notary Public - California
San Francisco County
My Comm. Expires Dec 3, 2002

Place Notary Seal Above

//original signed by//
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Convenant to Restrict Use of Property Environmental Restriction

Document Date: None Number of Pages: 10 Pages + Exhibits A & B

Signer(s) Other Than Named Above: None

Capacity(ies) Claimed by Signer

Signer's Name: Mohinder Singh Sandhu

☐ Individual
☐ Corporate Officer — Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☒ Other: Chief, Standardized Permits & Corrective Action Branch

Signer Is Representing: Department of Toxic Substances Control

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

© 1997 National Notary Association • 9350 De Soto Ave., P.O. Box 2402 • Chatsworth, CA 91313-2402 Prod. No. 5907 Reorder: Call Toll-Free 1-800-876-6827

H[illegible]9674

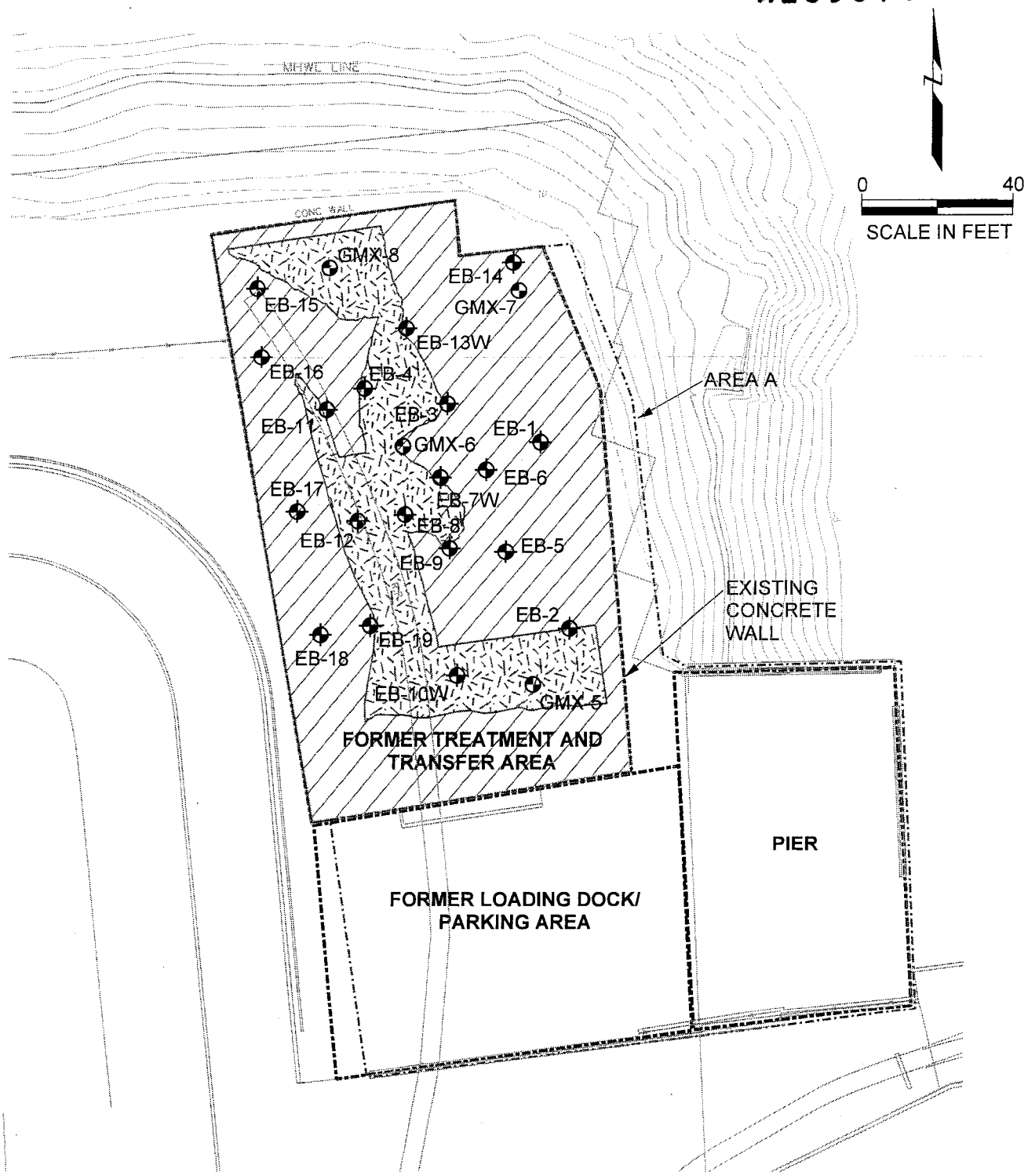
EXHIBIT A

H&H Parcel – Tank Treatment Area

All that certain real property of the San Francisco Port Commission, City and County of San Francisco, State of California, situate at the northeast corner of Terry A. Francois Boulevard (formerly China Basin Street), more particularly described as follows:

Commencing at the point of intersection of the northwesterly line of Townsend Street with the southwesterly line of Delancey Street (formerly First Street), said point being Inner 14 of the Inner Waterfront Line as described in records on file in the office of Engineering of said San Francisco Port Commission; Thence along said Inner Waterfront Line, S 03°02'27" E a distance of 2132.11 feet; Thence N 86°51'14" E a distance of 65.28 feet, to the True Point Of Beginning; Thence S 10°21'36" E a distance of 127.93 feet; Thence N 80°50'39" E a distance of 4.70 feet; Thence S 09°13'14" E a distance of 68.59 feet; Thence N 81°09'11" E a distance of 146.17 feet; Thence N 03°21'24" W a distance of 85.74 feet; Thence S 88°44'14" W a distance of 54.91 feet; Thence N 66°55'27" W a distance of 9.19 feet; Thence N 07°12'31" W a distance of 68.86 feet; Thence N 21°58'29" W a distance of 44.82 feet; Thence S 83°22'07" W a distance of 28.09 feet; Thence N 05°44'30" W a distance of 14.69 feet; Thence S 81°59'17" W a distance of 65.99 feet; Thence S 10°21'36" E a distance of 30.22 feet to the True Point Of Beginning; Containing 26,592 square feet (0.61 acres), more or less.

H209674



EXPLANATION

- Soil samples collected at multiple depths by J. Yang and Assoc. March 15, 1995
- Surface soil samples collected by Geomatrix, November 16, 2001
- Area of aggregate/crushed rock/ road base material
- Concrete/asphalt foundation

EXHIBIT B

S:\3600s\3608\3608.001_0718.ai

APPENDIX F

Preliminary Geotechnical Recommendations and Summary Memorandum No. 1 (Langan Treadwell & Rollo – January 26, 2016)

LANGAN TREADWELL ROLLO

Memorandum

555 Montgomery Street, Suite 1300 San Francisco, CA 94111 T: 415.955.5200 F: 415.955.5201

To: Ms. Fran Weld – San Francisco Giants
Mr. Jon Knorpp – San Francisco Giants

From: Cary E. Ronan, GE 2741
Lori A. Simpson, GE 2396

cc: Mr. Gerry Tierney – Perkins + Will Architects
Mr. Marc Press – KPFF Structural Engineers
Mr. Darin Peterson – Hathaway Dinwiddie General Contractors
Mr. Joe Olla – Nibbi Brothers

Date: 26 January 2016

PROJECT: Mission Rock Development
Seawall Lot 337
San Francisco, California
Langan Project No. 750604203

Subject: Preliminary Geotechnical Recommendations and
Summary Memorandum No. 1

This memorandum is in fulfillment of our proposal dated 20 January 2016. It presents preliminary geotechnical design recommendations and a summary of geotechnical issues and concepts regarding development at SWL337 that have not been formally memorialized, in addition to an overview summary of some geotechnical issues that have been discussed in the previously published documents listed above. The topics addressed in this memorandum include:

1) axial capacity of piles bearing above bedrock, including friction-only piles in clay and friction plus end-bearing piles bearing in dense sand
2) impacts of raising site and surrounding street grades, including settlement and downdrag, and measures to mitigate adverse impacts, including discussion of surcharge/wick drains, Geofoam, ground improvement/deep soil mixing beneath streets, and pile-supported streets
3) preliminary geotechnical recommendations for design of the Mission Rock Square garage (MRSG)
4) liquefaction mitigation considerations, including discussion of deep dynamic compaction (DDC), compaction grouting, rapid impact compaction (RIC), and stone columns

We have previously studied the Mission Rock development site by performing: 1) a preliminary geotechnical investigation at Seawall Lot 337 (SWL337), 2) a liquefaction and lateral spreading evaluation for SWL337 and Pier 48 shoreline, and 3) a geotechnical evaluation of the shoreline conditions at Pier 48. The results of these evaluations were presented in reports dated 8 September 2011, 23 December 2013, and 5 March 2014 (draft), respectively.

PROPOSED DEVELOPMENT

Plans for the SWL337 site, which is bound by Terry A. Francois Boulevard on the north and east, Third Street on the west, and Mission Rock Street on the south, include constructing 12 structures between 90 and 240 feet in height (Blocks A through K, mixed residential and commercial), a large open park in the central portion of the site (Mission Rock Square), another large open park at the northern portion of the site (China Basin Park), a three-level, below-grade parking garage beneath Mission Rock Square (MRSG), and associated infrastructure, including streets, sidewalks, and utilities, as shown on Figure 1. We understand site grades will be raised to accommodate future sea level rise; the high point will be at the middle of the site at Mission Rock Square and may be about four to six feet above existing and surrounding Third Street and Terry Francois Boulevard grades. We further understand up to 1-1/2 and 4-1/2 feet of fill was placed recently (since 1997) to raise grades along the southern approximately 750 to 800 feet of Third Street adjacent to SWL337 and Mission Rock Street, respectively, and no new fill is planned along either of these streets or along Terry Francois Boulevard. On the basis of a review of drawings by Perkins + Will (Option 1 – Channel Street/Channel Plaza Entry/Exit Ramp Plan, dated 17 December 2013), it appears the lowest finished floor of the garage will be approximately 30 feet below the proposed finished grade of Mission Rock Square Park. Pier 48 will also be upgraded and be part of the Mission Rock Development.

SUBSURFACE CONDITIONS

Originally, the site was below water in a shallow bay known as Mission Bay. Starting in the 1880s, the bay was reclaimed by placing fill. Based on historic maps, we believe the majority of the site was reclaimed between 1880 and 1906. Some of the material used to reclaim the site is likely building rubble and debris from the 1906 San Francisco earthquake.

Boring logs from investigations of the site and the site vicinity indicate the site is underlain by approximately 13 to 37 feet of heterogeneous fill which varies in density and, in some areas, contains rubble comprised of brick, rock and debris. The fill is underlain by approximately 46 to 72 feet of weak, soft to medium stiff, compressible clay, locally referred to as Bay Mud. Where tested, the Bay Mud at the site appears to be slightly overconsolidated, which indicates that settlement of the Bay Mud is complete under the weight of existing fill. The deeper fill material (below a depth of about 20 to 25 feet) adjacent to thin fill (thinner than about 15 feet) is indicative of a "Bay Mud wave". A Bay Mud wave can occur when heavy fill loads are placed on the Bay Mud and cause a bearing capacity failure of the Bay Mud. As the Bay Mud fails, the gravel sinks into the soil and the Bay Mud pushes up around the failure zone, causing the thick and thin fill soil profile. The Bay Mud wave fill material encountered at this site is generally comprised of clayey gravel and gravelly clay.

The borings drilled at the site indicate the Bay Mud is generally underlain by an older marine clay, known as Old Bay Clay that is 68 to 74 feet thick where explored. Old Bay Clay is typically stiff to very stiff and overconsolidated. In one area of the site, a 28-foot-thick layer of dense to

very dense clayey sand was encountered below the Bay Mud, which was, in turn, underlain by Old Bay Clay. Sand may be present beneath the Bay Mud in other unexplored areas of the site, as well.

Alluvial sand and clay layers are typically encountered below the Old Bay Clay. Dense to very dense sand layers with varying fines contents are present below the Old Bay Clay in some of the borings around the site. The top of this sand layer was encountered at approximately 165 to 180 feet below the existing ground surface and, where present, the sand is about 10 to 15 feet thick near the project site. Based on available borings this sand layer is not present across the entire site and, where present, varies in thickness, fines content, and density.

The top of the bedrock surface has been encountered in borings around the site at depths of about 160 feet (near the northwest corner of the site) to 260 feet (in the northeast corner of the site) below the ground surface. The bedrock surface appears to be steeply sloping down from west to east in the northern portion of the site and more gently sloping up along the eastern side of the site from a depth of 260 feet at the northeast corner to 220 feet at the southeast corner. The bedrock surface and quality are expected to vary significantly across the site.

Groundwater was encountered at the site and in the site vicinity approximately 7 to 9 feet below the existing ground surface (bgs), corresponding to approximate Elevations 91 to 93 feet[1], but has been found within five feet of the ground surface at some sites in Mission Bay. No springs or seepages were observed on site.

AXIAL PILE CAPACITY FOR PILES BEARING ABOVE BEDROCK

We provided estimates of axial and lateral capacities of 14-inch steel H-piles driven to bedrock in our preliminary geotechnical investigation report, dated 8 September 2011. Since then, the design team has requested preliminary axial capacities for piles bearing above bedrock, i.e. friction-only piles in clay and friction plus end-bearing piles bearing in dense sand. Preliminary pile capacities for all of these cases are presented below.

End-Bearing Piles

Piles can typically encounter refusal in very dense, relatively clean sand layers (typically less than 10 percent fines, passing the No. 200 sieve), at least 10 feet thick. If significant fines are present, the pile will generally continue driving through the layer. Although some borings encountered a relatively dense sand at depth, a continuous sand layer does not appear to be present across the site. However, as described in the subsurface section above, there may be

[1] Elevations reference Mission Bay datum, which is based on San Francisco City datum (SFCD) plus 100 feet.

a dense, end-bearing sand layer present below the Bay Mud in a few areas of the site; it should be noted that this condition is not typical across Mission Bay sites. Additionally, dense sand may be present below the Old Bay Clay in some areas of the site. The capacities provided in our preliminary report are for piles with downdrag loads on them. We have been requested to provide capacities of piles without downdrag loads imposed on them. For completeness, we are including end-bearing pile capacities for piles bearing in dense sand or bedrock for driven 14-inch steel H-piles or 14-inch-square precast prestressed concrete piles with no downdrag in Table 1.

TABLE 1

Preliminary Estimated Single Pile Axial Capacity
End-Bearing Driven 14-Inch Steel H-Piles or 14-Inch-Square Precast Prestressed Concrete Piles (No Downdrag)

Estimated Pile Tip Elevation (feet, SFCD + 100 feet)	Anticipated End-Bearing Condition	$Q_{ultimate}$ Axial Capacity (kips)	$Q_{allowable}$ Dead plus Live (kips)	$Q_{allowable}$ Total Design Load (kips)
Average of -150	Bedrock	960	480	640
30 (representative of conditions in the vicinity of Boring BSWL337-2)	Dense Sand just below Bay Mud	500	175	230
-60	Dense Sand below Old Bay Clay	860	430	570

Notes:
1) Capacities of piles presented in Table 1 represent the capacity of the soil and bedrock only; the structural capacity of the pile should be checked and should govern if less.
2) For the bedrock and deeper sand (tip at Elevation -60 feet) end-bearing piles, $Q_{allowable}$ includes a factor of safety of 2 (these capacities are based on nearby pile load tests).
3) $Q_{allowable}$ for the shallower sand end-bearing piles (tip at Elevation 30 feet), dead plus live loads represents a factor of safety of 2 for friction and 3 for end-bearing.
4) $Q_{allowable}$ for total design loads (including earthquake loads) represents a 1/3 increase over $Q_{allowable}$ for dead plus live loads.

Friction-Only Piles Bearing in Clay

We developed preliminary friction-only capacity for piles extending below the Bay Mud and gaining friction in the sand and clay below the Bay Mud; these capacities are presented on Figure 2. The capacities shown on Figure 2 consider:

- capacity starting at the bottom of the Bay Mud (see Figure 1 for estimated contours of the bottom of Bay Mud elevations)
- piles do not gain capacity in the fill and Bay Mud
- a factor of safety of 2

IMPACTS OF RAISING SITE AND SURROUNDING STREET GRADES

As previously described, site grades will be raised to accommodate future sea level rise; the high point will be at the middle of the site at Mission Rock Square and may be about four to six feet above surrounding Third Street and Terry Francois Boulevard grades. We further understand up to 1-1/2 and 4-1/2 feet of fill was recently placed to raise grades along the southern portion of Third Street and Mission Rock Street, respectively, and no additional fill is planned along either of these streets or along Terry Francois Boulevard.

Using soil fill to raise grades will create a new cycle of consolidation settlement of the Bay Mud beneath the site, causing ground settlement of up to several feet. This settlement will create differential settlement between pile-supported buildings, where there will be little to no settlement, and surrounding streets, sidewalks, and other improvements. The differential settlement will affect utility connections and building entrances. The settlement will also cause an additional load (downdrag) to act on piles on the order of 200 to 225 kips, as the fill and Bay Mud move downward relative to the pile, thus reducing the pile capacity.

Where site grades have been raised in the public right-of-way around the site, the design team will need to accommodate the effects of settlement. Within the site, however, there are a variety of ways the site grades can be raised. The design team has explored several alternatives to adding soil fill loads to the site, including:

- preloading the site with soil mound surcharge and wick drains to "pre-settle" the Bay Mud, such that adding new fill would not cause new settlement of the Bay Mud (Surcharge and Wick Drains)
    - Because of the Giants' baseball operations and parking needs and the time required for the surcharge program, this option was deemed to be infeasible; the mounds would need to be at least ten feet tall, making parking access impractical.

- improving the ground through the bottom of the Bay Mud using deep soil mixing (DSM) (Ground Improvement)
    - We understand that for DSM to be a cost-effective alternative over piles, the depth of the soil to improve should be less than about 30 to 40 feet. With the thickness of fill and Bay Mud at this site averaging on the order of 90 feet, it would be cost prohibitive and impractical to try to improve the ground to support new fill loads.
- using lightweight foam (geofoam, or similar) to raise site grades (geofoam)
    - Utilities and streets would need to be supported on and within geofoam; when they needed to be repaired, the geofoam would need to be cut through and replaced in kind. We anticipate on-going maintenance of the geofoam would be required, which could be difficult.
    - Several of the gravity-fed utilities require that trenches be on the order of 10 to 12 feet deep; this would put Geofoam below groundwater, which renders installation and maintenance difficult and impractical.
- supporting the streets and utility corridors on piles (Pile-Supported Streets)
    - This option was deemed to be the most practical, economical, and feasible for the site because:
        - relatively little street and utility settlement would occur and, thus, relatively little to no differential settlement between pile-supported streets and adjacent pile-supported buildings would occur
        - by pile supporting the streets, no new fill would be required; therefore, no downdrag loads would be induced on new piles supporting adjacent buildings (except where the streets surrounding the site have been raised)

Therefore, on a preliminary basis, the Mission Rock design team is moving forward with evaluating pile-supported streets and utility corridors for the proposed development.

We estimate that, due to the relatively recent placement of new fill along the southern portion of Third Street and along Mission Rock Street, new piles along the western and southern edges of SWL337 will be subjected to downdrag. We estimate this will affect piles for the southern 50 feet of planned structures at Parcels D and H and the proposed Bridgeview Street and for the western 25 feet of Parcels B, C, and D and the proposed Channel and Bosque Streets.

PRELIMINARY RECOMMENDATIONS FOR MISSION ROCK SQUARE GARAGE

Plans are to construct a three-level below-grade garage below the Mission Rock Square park and surrounding streets that will abut proposed Parcels B, C, E, F, I, and J, as shown on Figure 2. Preliminary plans show that the proposed lowest garage finished floor will be at approximate Elevation 73 feet. We are currently planning a geotechnical investigation in the

MRSG footprint to develop site-specific preliminary geotechnical recommendations for design; however, we have performed preliminary analyses based on the existing data at the site, and have the following preliminary conclusions:

- We are anticipating that the structural loads of the MRSG plus some new soil atop the garage may be nearly balanced by the weight of soil removed for the excavation of the MRSG, such that the new loads may be nearly a "net zero" addition.
- Although there may be a nearly "net zero" new load addition, there will be some rebound/heave of Bay Mud below the garage due to removal of soil load and some recompression of the Bay Mud as the new loads are applied.
- We anticipate it may be difficult logistically to add the same amount of fill at the proposed street and ramp areas as can be added in the park area, such that there may be some differential settlement between these structures.
- We are anticipating that a pile-supported mat or "raft" foundation system may be appropriate for support of the MRSG; piles will likely be required mainly for settlement and uplift/heave control rather than actual structural load support.
- The shoring system should consist of a relatively rigid soil-cement-mixed, secant pile, soldier pile tremie concrete (SPTC) or diaphragm cutoff wall to resist earth and water pressures
- With a cutoff shoring wall extending into relatively impermeable Bay Mud, only the interior of the excavation will require dewatering.
- A concrete working pad with steel reinforcement should be constructed at the base of the excavation to reduce the potential for base heave and provide a relatively stable working pad for construction activities.
- On a preliminary basis, we estimate the allowable bearing capacity of the Bay Mud at Elevation 73 feet is on the order of 1,400 pounds per square foot (psf) for the temporary construction condition; this value includes a factor of safety of 2. For the permanent condition, we estimate the allowable bearing capacity of the Bay Mud at Elevation 73 feet is on the order of 1,900 psf; this value includes a factor of safety of 3. Care should be taken to minimize disturbance of the Bay Mud during construction. Disturbed Bay Mud will have lower strength and lower bearing capacity.

LIQUEFACTION MITIGATION CONSIDERATIONS

As discussed in our 23 December 2013 letter, *Liquefaction and Lateral Spread Potential at Seawall Lot 337*, there is a potential for the fill across the majority of the site to liquefy[2] and settle during a major earthquake. Additionally, we estimate there are localized areas within the site that are susceptible to lateral spreading[3] as a result of liquefaction.

If liquefaction occurs, the ability of piles to resist lateral loads will be reduced, induced moments in the piles will be increased, and passive resistance at basement walls, pile caps and grade beams will be reduced. Where lateral spreading occurs, additional loading on piles and basement walls will occur due to the soil movement, which could cause significant foundation damage.

The Mission Rock design team is currently undergoing a study of the comparison of effects on design with and without liquefaction at the site. However, based on our experience, it may not be practical to design a foundation system to accommodate the loss of lateral capacity due to liquefaction and the lateral movement from lateral spreading. Deep foundation elements such as piles would need to be designed to resist large lateral deflections and associated moments.

Should it be decided to improve the ground against liquefaction, on the basis of our experience with different methods of improvement, we judge that the most appropriate methods to mitigate the potential for liquefaction and lateral spreading to occur at the site are:

- deep dynamic compaction[4] (DDC)
- stone columns[5]

---

2 Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cyclic loading. Soil susceptible to liquefaction includes loose to medium dense sand and gravel, low-plasticity silt, and some low-plasticity clay deposits.

3 Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. The surficial blocks are transported downslope or in the direction of a free face, such as a bay, by earthquake and gravitational forces. Lateral spreading is generally the most pervasive and damaging type of liquefaction-induced ground failure generated by earthquakes.

4 Deep dynamic compaction (DDC) consists of the systematic dropping of a 10- to 20-ton weight or tamper from heights as high as 40 to 80 feet. The weight or tamper typically drops about 5 to 15 times per location at a rate of one to three drops per minute. Depending on the total energy input into the ground and subsurface conditions, deep dynamic compaction can generally be effective at densifying granular soils up to 20 to 30 feet deep.

5 Stone columns are a ground improvement technique that results in in-situ densification of granular soil. Stone column installation is accomplished using vibrating probes that are inserted to the desired depth of improvement and withdrawn. The voids created through densification are backfilled with gravel or crushed rock and compacted while withdrawing the probe, leaving a dense stone column typically 3 to 4 feet in diameter surrounded by densified soil.

Compaction grouting[6] and rapid impact compaction[7] (RIC) were also considered; however, both of these ground improvement methods were rejected for this site. Because of the grout injection pressures required for compaction grouting, we believe there is insufficient overburden (soil weight) to resist heave and properly improve the fill. Additionally, it has been our experience across Mission Bay that RIC has been only moderately successful in improving the ground and mitigating the potential for liquefaction and lateral spreading and, when successful on recent projects, the ground improvement was evident only in the upper about 10 feet. There are potentially liquefiable layers at the site that extend deeper than 10 feet below ground.

Further details regarding the use of DDC and stone columns at the site are provided in our 23 December 2013 letter.

PLANNED INVESTIGATION AND EVALUATIONS

We are planning additional subsurface investigation at the site, including drilling four borings at the four corners of the proposed MRSG footprint and three additional borings in the western portion of the site to fill in data gaps from previous investigations. Drilling for the additional investigation is currently scheduled to begin on 16 February 2016. The results of our investigation will be presented in a data report, which will present all of the previous borings and cone penetration tests (CPTs) performed at the site and the laboratory test results. We will also perform additional engineering analyses for the MRSG and will present those results and preliminary recommendations in a separate letter report. Other on-going analyses include evaluating the impacts on design with and without liquefaction, including site-specific seismic ground response analysis.

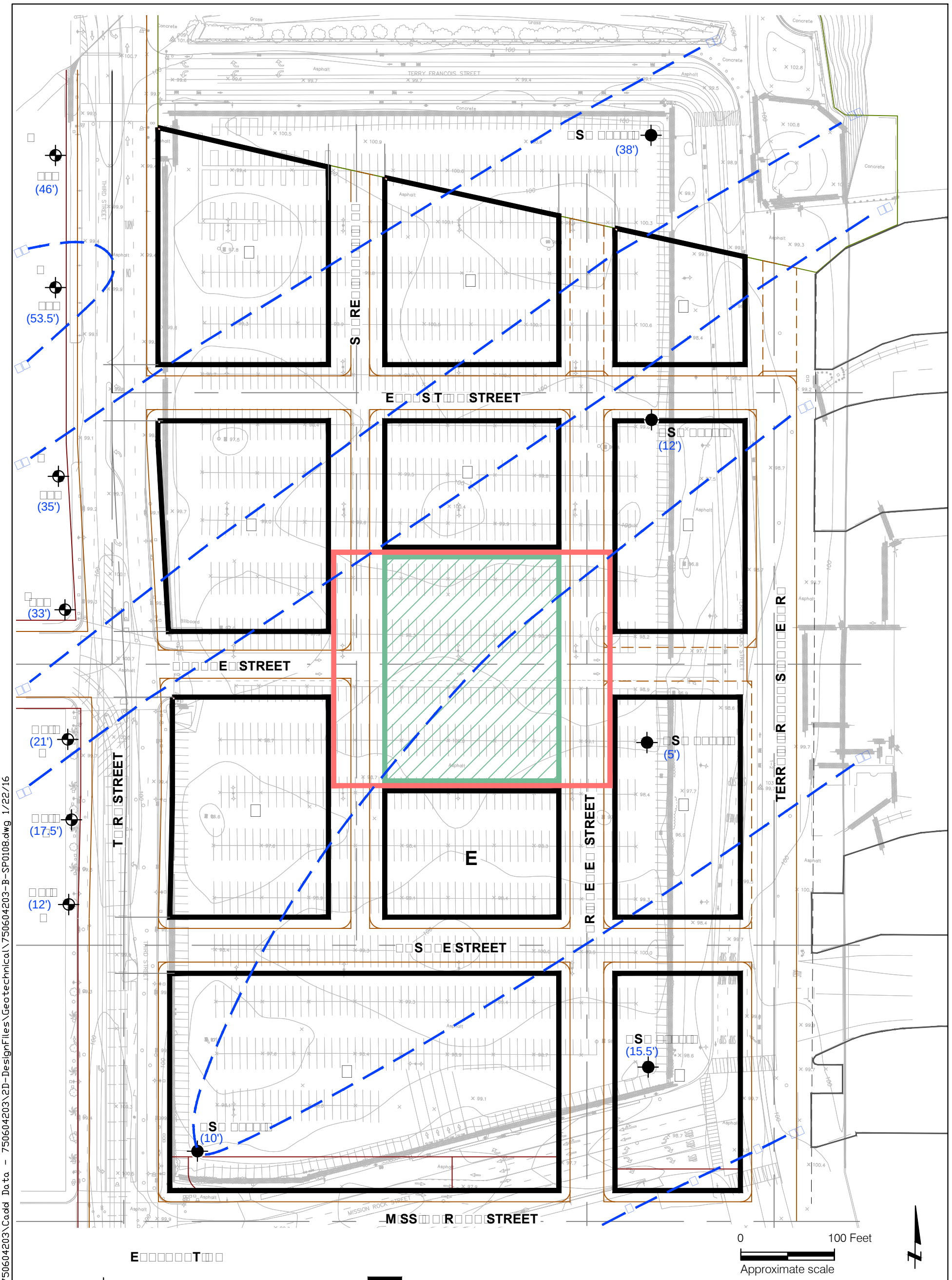
We trust that the foregoing is sufficient for the design team's needs at this time. If you have any questions, please call.

750604203.05B_CER_SWL 337_GTK Preliminary Design and Summary Memo_R1

Attachments: Figure 1 – Proposed Site Plan
Figure 2 – Allowable Friction Capacity, Driven 14-Inch Steel H-Pile and 14-Inch Square Precast Prestressed Concrete Piles

[6] Compaction grouting is a ground improvement technique in which cement grout is injected under high pressure to increase the density of the soil, thereby reducing the liquefaction potential.

[7] The rapid impact compaction method uses a Rapid Impact Compactor (RIC) to impart energy by dropping a 7.5 ton weight from a controlled height of about 1 m onto a patented foot. Applications include compaction of loose soils to improve bearing capacity and mitigation of liquefaction potential.



Boring drilled for SWL 337 Preliminary investigation (July 2011)

Boring drilled for previous investigation

Proposed Mission Rock Square below-grade garage

Proposed Mission Rock Square park

Proposed parcel for new development (mixed-use commercial and residential)

(46') Elevation of bottom of Bay Mud (feet, San Francisco City datum (SFCD) +100 feet)

Contour of elevation of bottom of Bay Mud (feet, SFCD +100 feet)

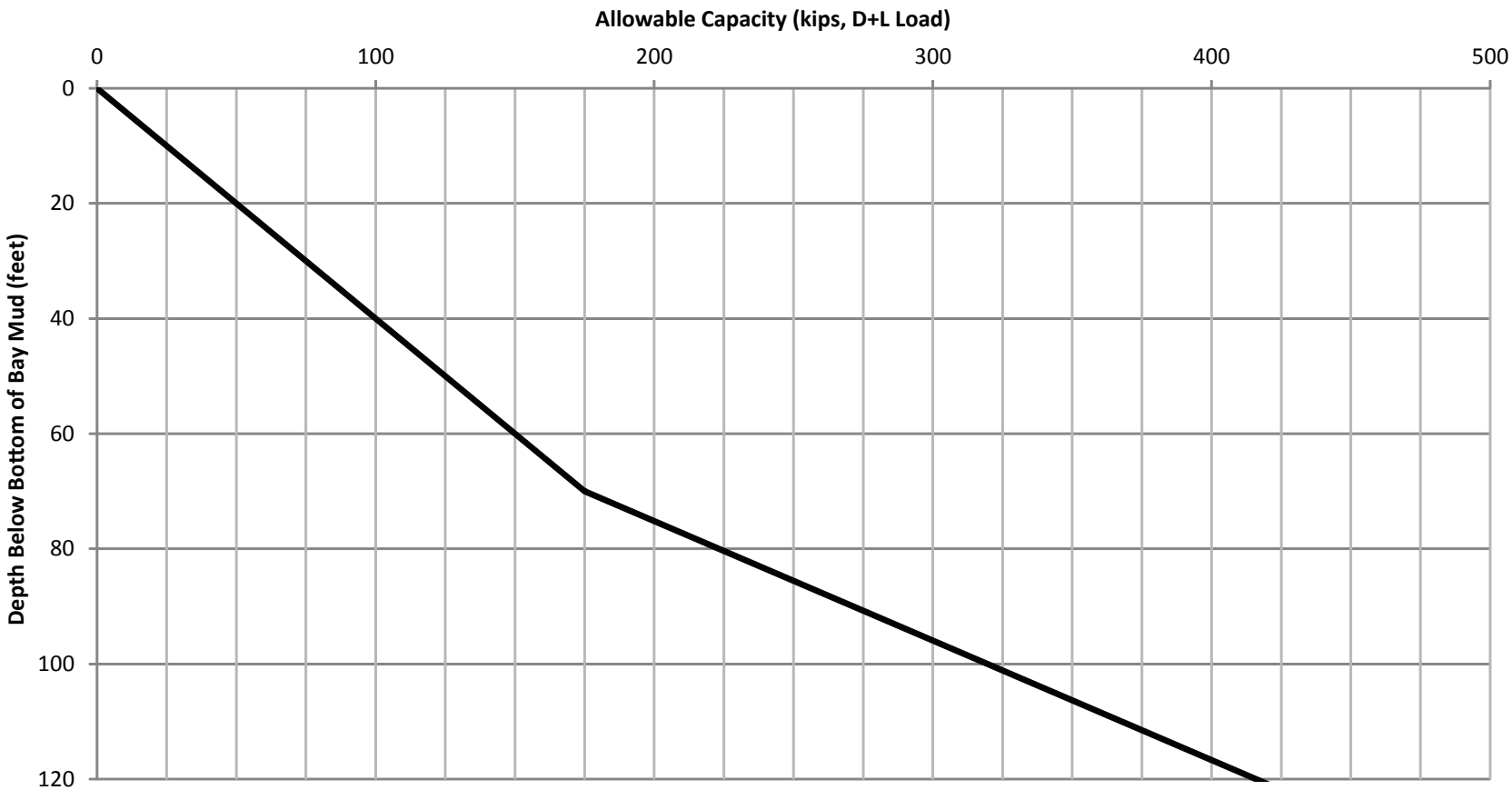
References: Base map from a drawing titled "Seawall Lot 337, Working Exhibit", by BKF Engineers, dated 07/19/2011. and "SWL 337/Parcel Plan", by Perkins + Will, undated.

San Francisco, California

Date 01/22/16	Project No. 750604203	Figure 1

LANGAN TREADWELL ROLLO

\\langan.com\data\OAK\data2\750604203\Cadd Data - 750604203\2D-DesignFiles\Geotechnical\750604203-B-SP0108.dwg 1/22/16



Notes:
1) Where refusal in dense sand or bedrock is encountered, the pile capacities in Table 1 will apply. Bedrock depths are expected to range between 100 to 160 feet below the bottom of Bay Mud.
2) Pile capacities do not include downdrag.
3) Pile capacities include a factor of safety of 2.

MISSION ROCK DEVELOPMENT
SEAWALL LOT 337
San Francisco, California

ALLOWABLE FRICTION CAPACITY, DRIVEN 14-INCH STEEL H-PILE AND 14-INCH-SQUARE PRECAST PRESTRESSED CONCRETE PILES

Date 01/21/16	Project No. 750604203	Figure 2

LANGAN TREADWELL ROLLO

APPENDIX G

Grading and Drainage Master Plan

Mission Rock Redevelopment

Grading and Storm Drain System Master Plan

September 20, 2016

150 California Street, Suite 650
San Francisco, CA 94111
415.930.7900

Prepared by Statement

This Grading and Storm Drain System Master Plan for the Mission Rock Redevelopment has been prepared by BKF Engineers under the direction of Mr. Todd Michael Adair, P.E., Principal/Vice President.

TABLE OF CONTENTS

SECTION 1: INTRODUCTION AND PROJECT DESCRIPTION 1
1.0 Introduction 1
1.1 Project Overview 1
1.2 Existing Conditions 2
1.3 Proposed Conditions 2
1.4 Project Datum 2
Section 1 Figures 3

SECTION 2: GRADING 4
2.1 Grading Master Plan Overview 4
2.2 Elevation and Grading Design Criteria 4
2.2.1 Grading Design Criteria 4
2.2.2 Elevation Design Criteria 6
2.2.2.1 General 6
2.2.2.2 Sea Level Rise 7
2.2.2.3 100-Year Base Flood Elevation and Tidal Elevation 7
2.2.2.4 Minimum Elevation 9
2.3 Existing Site Grading 10
2.4 Proposed Site Grading 10
2.4.1 Proposed Site Grading at Conforms 11
2.4.2 Proposed Building and Roadway Areas 11
2.4.3 Cut/Fill Quantities 12
2.4.4 Monitoring of Existing Utilities 12
Section 2 Figures 13

SECTION 3: GEOTECHNICAL CONDITIONS 14
3.1 Existing Site Geotechnical Conditions 14
3.2 Existing Site Geotechnical Constraints 14
3.2.1 Liquefaction/Settlement of Sand Layers 14
3.2.2 Lateral Spreading 15
3.2.3 Settlement of Bay Mud 15
3.3 Geotechnical Approaches 16

SECTION 4: STORM DRAIN SYSTEM 17
4.1 Overview 17
4.2 Design Criteria 18
4.2.1 Stormwater Runoff Design Criteria 18
4.2.2 Runoff Curve Number 19
4.2.2 Time of Concentration 19
4.2.3 Pervious and Impervious Surface Areas 19
4.2.4 5-year Design Storm 19
4.2.5 100-year storm Design Storm 20
4.3 Starting Hydraulic Grade Line 21
4.3.1 5-year Storm 21
4.3.2 100-Year Storm and Overland Release 22

4.4 Overland Flow and 100-Year Storm Event 22
4.4.1 Overview 22
4.4.2 Overland Flow Design Criteria 23
4.5 Model Analysis and Results 24
4.5.0 Storm Design Model Overview 24
4.5.1 5-Year Storm Event Analysis and Results 24
4.5.2 Overland Release and 100-Year Storm Event Analysis and Results 24
Section 4 Figures 26

FIGURES

Section 1 Figures

Figure 1.1 – Project Location
Figure 1.2 – Project Site Layout

Section 2 Figures

Figure 2.1 – Existing Site Grading
Figure 2.2 – Proposed Site Grading

Section 4 Figures

Figure 4.1 – Existing Site Drainage Areas
Figure 4.2 – Proposed Site Drainage Areas

Section 4 Figures

Figure 4.3 –Proposed Storm Drain System
Figure 4.4 – Storm Drain System Model Node Identification

APPENDICES

Appendix A – References

Appendix B – 5-Year Storm Results
XPSWMM Output

Appendix C – Overland Flow and 100-Year Storm Results
XPSWMM Output

SECTION 1: INTRODUCTION AND PROJECT DESCRIPTION

1.0 Introduction

This Grading and Storm Drain System Master Plan has been prepared for the Mission Rock Redevelopment Project. The purpose of the document is to establish the design criteria for development of the site grading and drainage to comply with governing subdivision requirements. The objective of this plan is to provide the developer and governing agencies with the following information and analysis to confirm the design approach for site grading and drainage infrastructure. This master plan will be comprised of the following:

- Existing Conditions and Site Constraints
- Design Criteria
- Proposed Grading and Drainage Plan
- Analysis of the 5-year storm event
- Analysis of the 100-year storm event and overland release
- Summary of Analyses and Results

Development of the stormwater management strategy for the project is discussed in the Stormwater Management Master Plan.

1.1 Project Overview

The Mission Rock Redevelopment ("The Project") is located within the City and County of San Francisco, along the eastern border of San Francisco within District 9 Mission Bay. The site is bounded by China Basin Park and China Basin to the north, Terry A Francois Boulevard and San Francisco Bay to the east, Mission Rock Street to the south, and 3rd Street to the west. The Project comprises a mixed-use community including residential, retail, commercial office space, recreational park, shared access way, public open space, Pier 48, and Channel Wharf. The existing China Basin Park will be redeveloped and expanded as part of this project. Pier 50 east off of Terry A Francois Boulevard is not a part of the project but will remain open during construction. Figure 1.1 illustrates the regional location of the project.

1.2 Existing Conditions

The Project is approximately 17 acres. It was initially developed to serve as part of the Port's shipping terminal and industrial site. The project site was previously an industrial warehouse and storage lot until it was acquired in 2000 to function as the San Francisco Giants Parking Lot. In 2003, the northern portion of site was redeveloped as China Basin Park.

1.3 Proposed Conditions

The Project comprises eleven development parcels ranging from half an acre to almost two acres. These will include approximately 1,500 residential units, approximately 1,762,000 square feet of commercial space, Mission Rock Square of nearly 48,400 square feet, a garage with 2,800 parking spaces, and a grid of public streets. China Basin Park will also be expanded to approximately 4 acres.

The project proposes street improvements to Terry A Francois Boulevard which interfaces with the existing Pier 48 and Pier 50. While these piers are not a part of this project, Pier 48 plans to redevelop 212,000 square feet of space to be the production and distribution facility for Anchor Brewing Company which will also include a restaurant, museum, and public attractions. The proposed Project site plan is shown in Figure 1.2.

1.4 Project Datum

Elevations, including tidal elevations, hydraulic grade lines (HGLs), and site elevations, referred to herein are on the MB Datum. The "MB Datum" is defined as the Mission Bay Datum which is the Old City of San Francisco Datum plus one hundred feet.

Section 1 Figures

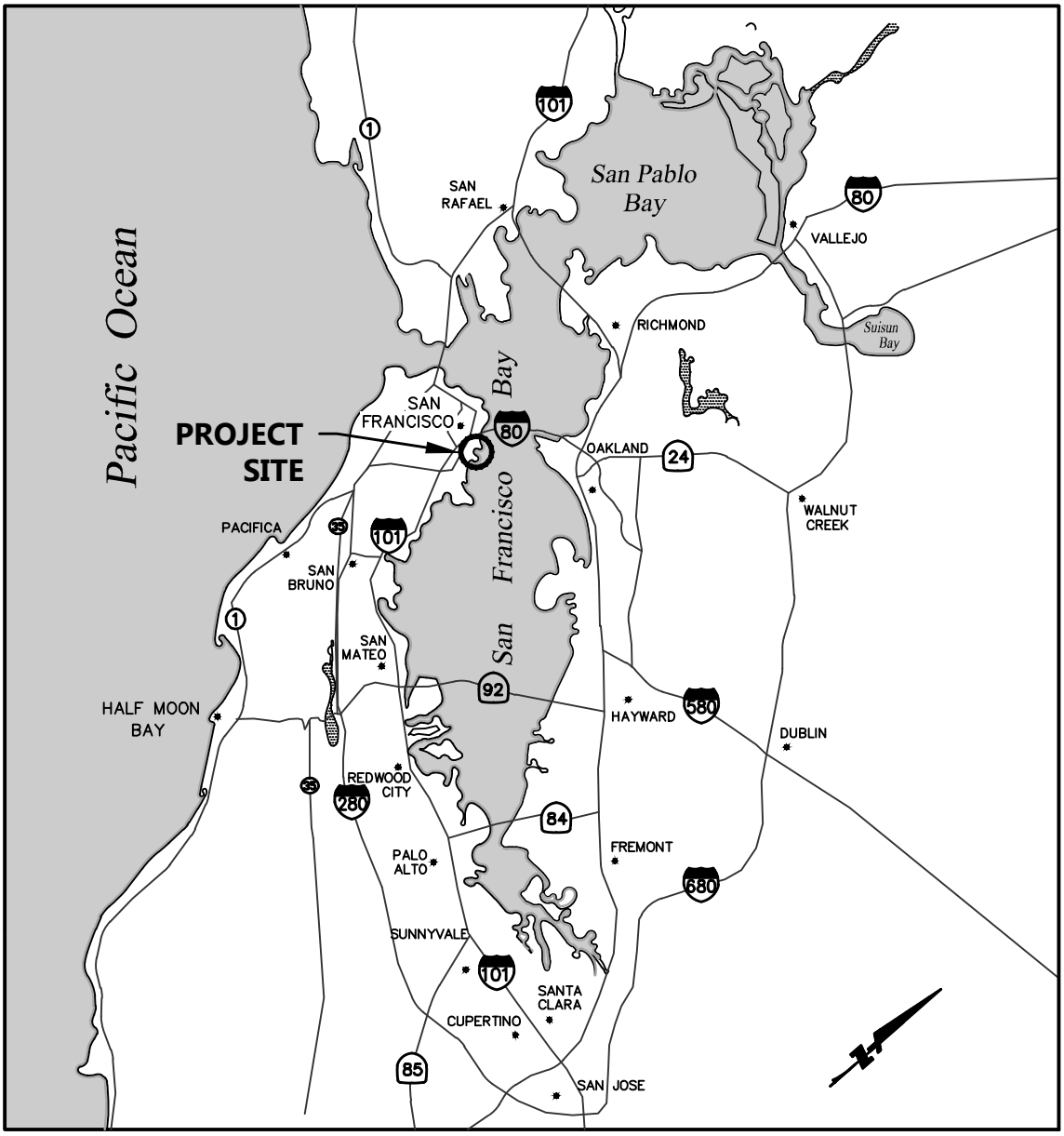


FIGURE 1.1 PROJECT LOCATION

© BKF Engineers

SAN FRANCISCO BAY

PIER 48

CHANNEL WHARF

PIER 50

TERRY A FRANCOIS BOULEVARD

CHINA BASIN

CHINA BASIN PARK

BLOCK K

BLOCK J

CHANNEL LANE

BLOCK I

BLOCK H

BRIDGEVIEW STREET

BLOCK G

EXPOSITION STREET

BLOCK F

MISSION ROCK SQUARE

BLOCK E

LONG BRIDGE STREET

MISSION ROCK STREET

SHARED PUBLIC WAY

BLOCK D
(PARKING STRUCTURE WITH TOWER)

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

3rd STREET

CHANNEL STREET

N

GRAPHIC SCALE
100 0 100

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE

DATE:	09/20/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT GRADING AND DRAINAGE MASTER PLAN

FIGURE 1.2
PROJECT SITE LAYOUT

DRAWING NAME: \\Bkf-sf\Vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Grading & Storm Drain\Figure 1.2 Project Site Layout.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

SECTION 2: GRADING

2.1 Grading Master Plan Overview

Proposed grading for the Project raises the development area to an elevation of 103 feet to 104 feet in the center of the site. The proposed street grid would be graded in a saw tooth pattern, result in high and low points having relatively equal elevations. Proposed street grades will slope down from the center of the site to the adjacent grades of 3rd Street, Mission Rock Street, proposed Terry A Francois Boulevard, the San Francisco Bay shoreline, and park areas. The streets and sidewalks have been designed to provide overland release and provide Americans with Disabilities Act (ADA) compliant accessible pathways throughout the site and adjacent parcels. The proposed street grid with interconnected open space and accessible pathways will be constructed to link 3rd Street with Terry A Francois Boulevard in the west-east direction and China Basin Park with Mission Rock Street in the north-south direction. Throughout the site, longitudinal street grades of less than 5 percent are provided.

2.2 Elevation and Grading Design Criteria

The grading design criteria has been separated between:

- Grading design criteria as it relates to site slopes.
- Elevation design criteria as it relates to tidal elevation, sea level rise, existing site elevations, and hydraulic grade lines

2.2.1 Grading Design Criteria

The Mission Rock grading is based on the design criteria established in the 2015 Subdivision Regulations for Mission Bay. The Project grading design criteria is presented in Table 2.1.

Table 2.1
Grading Design Criteria per 2015 Subdivision Regulations for Mission Bay

Parameter	Design Criteria
Typical Street Section	2" AC over 8" PCC
Minimum street longitudinal grade	0.5% between grade breaks.
Maximum street longitudinal grade	5%
Street cross slope	2%
Maximum street slope in any direction at transit stops, accessible parking spaces, and accessible passenger loading zones	2%
Street intersection grade	Approximate 2% platform, extended beyond the crosswalk and if applicable, ADA parking.
Crosswalks	Americans with Disabilities Act, California Building Code, and the San Francisco Building Code.
Sidewalks	Americans with Disabilities Act, California Building Code, San Francisco Building Code, and San Francisco Standard Specifications. Longitudinal slope: 5% maximum Cross slope: 1.67% maximum, up to 2% maximum with approval from the San Francisco Port & San Francisco Department of Public Works
Accessible Curb Ramps	Maximum ramp slope: 7.5% Maximum Cross-Slope: 2% max Minimum Width: 4'2" Flared sides: 6-9% max slope Level Landing: 4'2"x4'2" minimum area with maximum cross slope of 1.5%

Requirement for vertical curve	Changes in longitudinal street grades in which the absolute value of the algebraic difference in grades exceeds 1.5%.
Minimum flow line slope	0.5%
Minimum curb height	6 inches (in vehicular areas) 0 inches (Shared Public Way and Terry A Francois Boulevard)
Concrete gutter width	1 foot except in front of curb ramps. 2 feet at curbs ramp.
Maximum curb height except at curb returns, crosswalks, accessible parking spaces, and accessible passenger loading zones	8 inches, with approval from the Department of Public Works on a case-by-case basis
100-year storm	Flow in excess of the 5-year storm up to and including the 100-year storm in pipes, channels and/or the street right-of-way, between the top of curb to top of curb with no freeboard. The City Engineer with the consent of the PUC may approve an exception to this standard on a case-by-case basis including curbless streets.

2.2.2 Elevation Design Criteria

2.2.2.1 General

The minimum design elevations for the Project Development Area will accommodate potential future Sea Level Rise (SLR) estimates for San Francisco Bay. The SLR estimates for the project were developed in response to the City and County of San Francisco (CCSF) guidance, which is based on both the National Research Council (NRC) and Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT) studies referenced in Appendix A. Under CCSF SLR guidance, the project will be designed to accommodate the SLR criteria provided in Table 2.2.

2.2.2.2 Sea Level Rise

The minimum design elevations for the Project Development Area will accommodate potential future sea level rise estimates for San Francisco Bay. The SLR estimates for the project were developed in response to the CCSF guidance, which is based on both the NRC and CO-CAT studies. Under CCSF SLR guidance, the project will be designed to accommodate the SLR criteria provided in Table 2.2.

Table 2.2
SLR and Associated Planning Requirements

YEAR	SLR AND PLANNING REQUIREMENTS
2050 Mean SLR	11-inches by 2050. Planning for adaptive management required
2065 Mean SLR	16-inches by 2065. Planning for adaptive management required.
2100 Mean SLR	36-inches by 2100. Planning for adaptive management required.
2100 High SLR	66-inches by 2100. Planning for adaptive management not required.

The existing historical Pier 48 structure will remain at its current elevation and will not incorporate provisions included in Table 2.2.

2.2.2.3 Tidal Elevation and 1% Still Water Level Elevation

With the project's proximity to the San Francisco Bay, the project must consider tidal elevations for drainage outfall conditions. Tides are the daily rise and fall of the sea surface that is caused by the gravitation effects of the sun and moon rotating about the earth. The tidal elevation within the San Francisco Bay Area varies by location. For Mission Bay, the 2015 Subdivision Regulation provide a tidal elevation of 96.5 feet (MB datum) for the project which has been included in design to analyze the 5-year storm event.

The 1% Still Water Level (SWL) elevation is the 100-year return period water elevation, which is defined as the water elevation that is exceeded on average once every 100 years or the water elevation with a 1% annual chance of occurrence.

The SWL elevation for the Project is 98.5 feet (MB Datum) based on the SLR memo prepared by Moffatt & Nichol referenced in Appendix A. The 100-year return period water elevation for the Development Area includes the effects of tides, storm surges, and tsunamis. The SWL has been included with the drainage design of the 100-year storm event and overland flow release.

The SLR and tidal elevations for the Project have been prepared in the SLR Adaptation Strategy Memorandum by Moffat & Nichol and are provided in Table 2.3.

Table 2.3
SLR and Tidal Elevations by Datum

Elevation	NAVD88	Old City Datum	MBD
FEMA 100-Year BFE +66″ SLR	15.3′	4.0′	104.0
FEMA 100-Year BFE	9.8′	1.5′	98.5′
MB Tidal Elevation	7.8′	-3.5′	96.5′
King Tide (Roughly)	7.3′	-4.0′	96.0′
Mean High High Water	6.2′	-5.5′	94.9′
Sea Level	0.0′	-11.3′	88.7′

2.2.2.4 Minimum Elevation

The minimum elevation design criteria for the proposed building and streets within the Development Parcels are shown in Table 2.4.

Table 2.4
Elevation Design Criteria per Project Subdivision Regulations

AREA	MINIMUM DESIGN CRITERIA
Development Parcel – Buildings	Provide a minimum finished floor elevation of 104.0 feet (98.5 feet 100-year SWL + 66 inches of 2100 High SLR) for new occupied facilities.
Development Parcel – Parking Structures	The Block D Parking Garage entrances will be set based on the grade of the adjacent street. At a minimum, the garage entrances will be set with a minimum finish floor elevation of 99.83 feet (98.5 feet SWL + 16 inches of 2065 Mean SLR). As required, Adaptive Management Strategies will be incorporated within the structure to provide resiliency and protection through 2100.
Development Parcel – Proposed On-Site Streets	The street elevation shall accommodate 2 feet of freeboard between the 5-year storm drain system hydraulic grade line and the street gutter flow line. The starting hydraulic grade line design elevation for the 100-year storm for the storm drain system will be set based on the grade of the adjacent street's lowest top of curb elevation. Refer to Section 13.
Development Parcel – Pier 48	The pier structure will remain at existing elevation. As SLR occurs, Adaptive Management Strategies may be incorporated within the structure to provide resiliency and protection through 2100, subject to jurisdictional approval.

For adjacent streets serving the project, including 3rd Street and Mission Rock Street, street elevations will remain relatively close to their current elevations. Along the east edge of the project, Terry A Francois Boulevard will be constructed relatively close to its current elevation. Proposed streets within the development will slope up from the existing conform elevations of approximate elevations of 99-101.5 feet at 3rd Street, Terry A Francois Boulevard, Piers 48 and 50, and Mission Rock Street to elevations of approximately 102.9-104.3 feet at the center of the site. By elevating the center of the site, access can be provided to building finished floors, which are set to accommodate protection from the 2100 High SLR projections.

2.3 Existing Site Grading

The existing grade within the Project site slopes gradually east, west, and south away from the center of the existing parking lot with ground elevations ranging from approximately 101 feet elevation at high points to approximately 97 feet elevation to the south at low points in the existing parking lot. Along the western and eastern borders, the site is bounded by and conforms to the existing grades along 3rd Street and the Piers with ground elevations ranging from 99 feet to 100 feet in elevation. The northern border is bounded by the north interface of China Basin Park at the rocks of China Basin. Along the southern border, there is a grade different of 3 feet to 4 feet of elevation between the existing parking lot and the newly construction Mission Rock Street. The existing site elevations are shown in Figure 2.1.

2.4 Proposed Site Grading

The Developer will be responsible for the design and construction of the proposed grading for the Project. Below is a description of the grading design for the different areas of the site. The proposed project grading plan is shown in Figure 2.2.

2.4.1 Proposed Site Grading at Conforms

Conceptual grading designs generally conform to the existing grades along the north interface of China Basin Park at the rocks of China Basin, the east interface along the existing Pier 48 and Pier 50, the south interface of the newly constructed Mission Rock Street, and the existing grades along 3rd Street at the western edge of the project. These project perimeter conforms will remain relatively close to their existing ground elevation of 99 feet to 100 feet of elevation. The grades at each conform are provided on the proposed project grading plan in Figure 2.2.

2.4.2 Proposed Building and Roadway Areas

The proposed on-site street grid will be graded to provide overland release for the Project. As required by the San Francisco Public Utilities Commission (SFPUC), grading and hydrology designs will be developed such that the 100-year HGL is contained within the top of curb elevations on opposite sides of a street throughout the Project site.

Site development and grading designs will be developed to comply with the City requirements for accessible paths of travel. Proposed slopes along public streets and private alleys will be set at a maximum of 5 percent to provide ADA accessible pathways of travel without requiring handrails. A minimum street centerline longitudinal slope of 0.5% is being used for the design to facilitate overland flow of stormwater to adjacent streets.

At street intersections, grades will be designed at a maximum slope of 2% to provide an accessible path of travel in crosswalks. In addition, vertical curves within the streets will be designed to both begin and end outside the limits of the crosswalk areas.

2.4.3 Cut/Fill Quantities

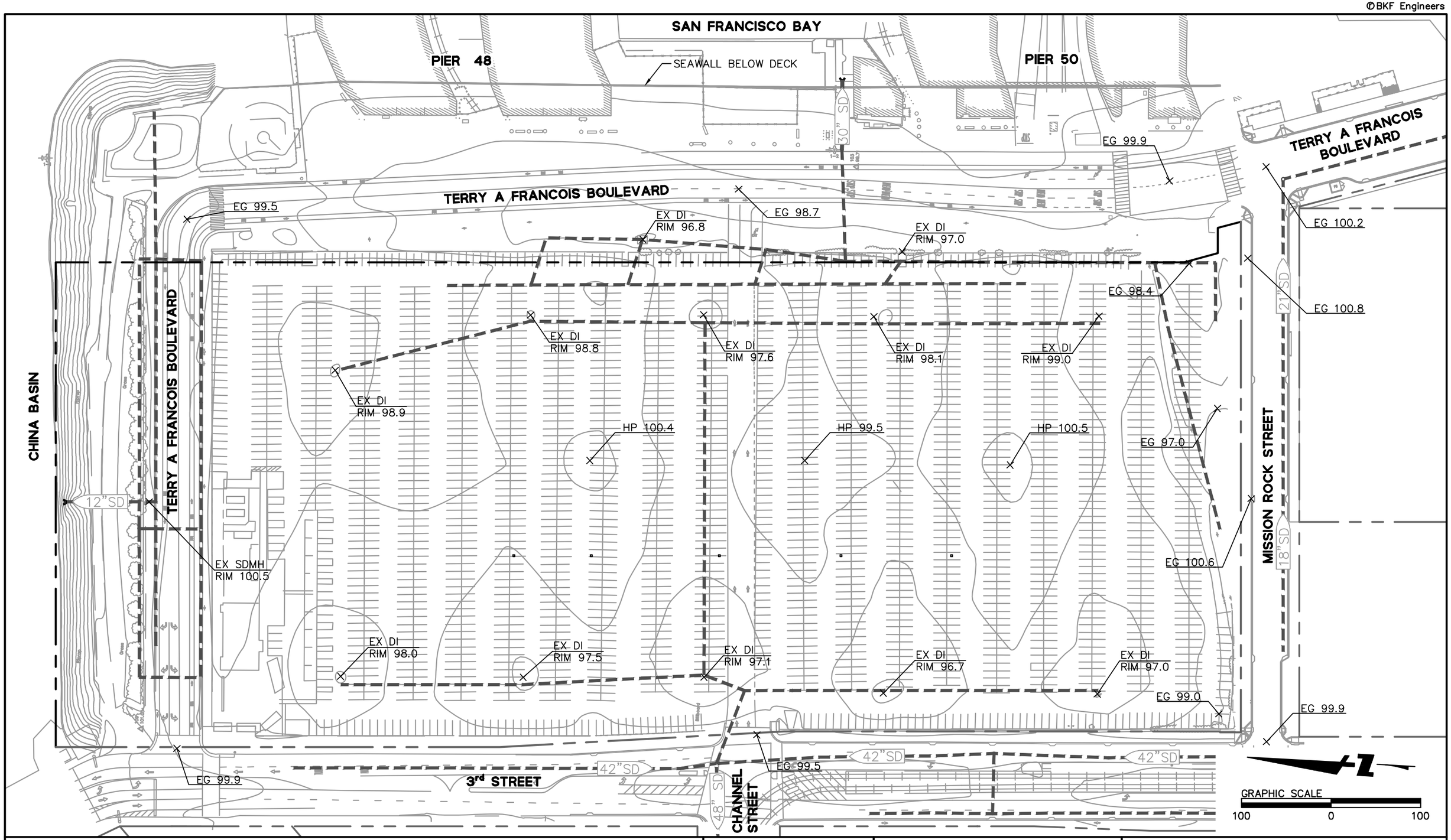
The conceptual grading plan for the Project will require approximately 100,000 CY of fill to grade for topsoil within China Basin Park and the pile-supported structured streets. Within China Basin Park, grades will be elevated by a combination of topsoil and geofoam. Private Development Parcels and Mission Rock Square will be pile-supported and not require additional fill to grade. To support grading activities, a Storm Water Pollution Prevention Plan (SWPPP) / Erosion and Sediment Control Plan (ESCP) will be submitted in parallel with future grading permits. Grading in conjunction with site remediation efforts will be performed by the Developer.

2.4.4 Monitoring of Existing Utilities

Any construction activities that can produce vibration or movement in existing utilities will require monitoring of existing utilities. A monitoring plan shall be submitted to and approved by SFPUC Wastewater Enterprise (WWE) Collection System Division (CSD) prior to construction permit approval. The plan will specify what method of monitoring will be used; how often the monitoring shall occur; what types of work triggers the need for monitoring; which utilities need monitoring; and what distance from the work will trigger the need for monitoring.

Section 2 Figures

© BKF Engineers



LEGEND

- EXISTING PARCEL BOUNDARIES
- EXISTING STORM DRAIN MAIN

ABBREVIATIONS

DI	DROP INLET
EG	EXISTING GRADE
EX	EXISTING
HP	HIGH POINT
SDMH	STORM DRAIN MANHOLE

DATE:	09/20/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
GRADING AND DRAINAGE MASTER PLAN

FIGURE 2.1
EXISTING SITE CONDITIONS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Grading & Storm Drain\Figure 2.1 Existing Site Grading.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

© BKF Engineers

SAN FRANCISCO BAY
CHANNEL WHARF
PIER 48
PIER 50
EG 100.0±
EG 100.0±
TERRY A FRANCOIS BOULEVARD
HP 99.57
LP 99.38
HP 99.41
LP 99.38
HP 99.61
LP 99.56
LP 99.51
FG 100.03
LP 99.70
LP 99.37
FG 99.93
0.5%
HP 99.81
FG 100.05
FG 99.59
FG 99.45
LP 99.57
HP 99.34
HP 99.74
HP 99.74
HP 99.82
LP 99.62
HP 99.55
HP 99.49
3.4%
4.8%
CHANNEL LANE
BLOCK K
FF 104.0
BLOCK J
FF 104.0
BLOCK I
FF 104.0
BLOCK H
FF 104.0
HP 103.48
LP 103.71
FG 102.41
HP 102.95
HP 102.85
HP 103.21
HP 103.28
HP 103.09
HP 103.17
FG 101.23
BRIDGEVIEW STREET
0.3%
2.7%
HP 103.76
LP 102.92
HP 103.00
LP 102.65
LP 103.08
FG 103.37
FG 103.56
HP 104.24
LP 103.29
FG 102.99
LP 103.20
HP 102.99
LP 102.96
CHINA BASIN
CHINA BASIN PARK
BLOCK G
FF 104.0
BLOCK F
FF 104.0
MISSION ROCK SQUARE
FF 104.0
BLOCK E
FF 104.0
LONG BRIDGE STREET
MISSION ROCK STREET
LP 103.27
HP 103.04
HP 103.75
FG 103.42
HP 103.42
LP 103.60
HP 103.57
LP 103.73
LP 103.46
HP 103.75
LP 103.27
FG 103.20
FG 103.49
FG 103.77
LP 103.49
EXPOSITION STREET
SHARED PUBLIC WAY
BLOCK D
FF 104.0
(PARKING STRUCTURE WITH TOWER)
HP 103.44
LP 103.67
HP 103.94
LP 103.90
HP 103.62
FG 103.94
FG 103.57
HP 103.81
LP 103.57
FG 103.54
LP 103.14
HP 103.33
CHANNEL STREET
BLOCK A
FF 104.0
BLOCK B
FF 104.0
BLOCK C
FF 104.0
3.5%
4.8%
3.4%
FG 104.00
FG 102.00
FG 99.52
HP 102.00
FG 99.50
FG 100.17
3rd STREET
CHANNEL STREET
GRAPHIC SCALE
100 0 100

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE

ABBREVIATIONS

FF	FINISH FLOOR
FG	FINISH GRADE
HP	HIGH POINT
LP	LOW POINT

DATE: 09/20/2016
SCALE: 1"=100'
DESIGN: JVH
DRAWN BY: JVH
APPROVED: MAO
JOB NO: 20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT GRADING AND DRAINAGE MASTER PLAN

FIGURE 2.2
PROPOSED PROJECT GRADING

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Grading & Storm Drain\Figure 2.2 Proposed Site Grading.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

SECTION 3: GEOTECHNICAL CONDITIONS

Site geotechnical investigations have been completed and potential site wide geotechnical improvements have been identified by Treadwell & Rollo, culminating in the development of the "Preliminary Geotechnical Investigation Seawall Lot 337 – Mission Bay" (Geotechnical Report) by Treadwell & Rollo, dated September 8, 2011. The report is attached as Appendix B.

3.1 Existing Site Geotechnical Conditions

The site was originally a shallow bay below water and a part of Mission Bay. It is understood the site was elevated using building rubble and debris from the 1906 San Francisco earthquake as fill. Borings indicate the fill is underlain by approximately 46-feet to 72-feet of Bay Mud consisting of weak, soft to medium stiff, compressible clay. Where portions of the fill material mixed with Bay Mud is known as mud wave fill material comprised of clayey gravel and gravelly clay.

Groundwater was encountered approximately seven to nine feet below grade (Elevations 91 to 93 feet). Other sites within Mission Bay have encountered groundwater measured at approximately five feet below grade (Elevation 94.5 feet, MBD).

3.2 Existing Site Geotechnical Constraints

3.2.1 Liquefaction/Settlement of Sand Layers

Liquefaction is the transformation of soil from a solid state to a liquefied state during an earthquake where saturated soil builds up excessive pore water pressure and temporarily loses its strength. The result is immediate settlement and possible lateral movement of the sand material.

Conservatively, all loose to medium dense soil materials (sands, silts and low plasticity clays) within both the artificial fills and underlying Bay Deposits are potentially liquefiable. The potential for soil liquefaction is likely to occur during a major earthquake. With the potentially liquefiable layers being random and discontinuous throughout the site, it is estimated the site will experience up to 3

inches of liquefaction-induced settlement within the fill material of the site. Along the west end of Pier 48, the analysis indicated that 3-inches to 5-inches of liquefaction-induced settlement could occur.

3.2.2 Lateral Spreading

Lateral spreading is considered the most damaging type of liquefaction-induced ground failure caused by earthquakes. In this case, surficial soil is displaced along a shear zone that has formed within a liquefied layer resulting in surficial blocks sliding downward toward unbound space, such as the Bay. The southeast corner and northwest portion of the project have been identified as being susceptible to lateral spreading estimated to result in 4-feet to 6-feet of lateral displacement during a large earthquake. The project proposes to use deep dynamic compaction (DDC) and/or stone columns to mitigate lateral spreading.

3.2.3 Settlement of Bay Mud

The site is underlain by a layer of Bay Mud estimated to be 46-feet to 72-feet thick which appears to be over-consolidated. Placing the new fill on top of the existing bay mud layer will initiate a new cycle of consolidation settlements for the Bay Mud layer. It can be expected that for each additional foot of fill placed on the site, approximately 2-inches of settlement may occur at entrances to pipe supported structures, 3-inches within streets, and 4-inches in open space areas.

During an earthquake, an additional settlement of approximately 9 inches could potentially occur due to seismic densification and liquefaction. For proposed building and structures designed to be pile supported, it is anticipated that 1-inch to 2-inches of settlement may result from a major earthquake. The project plans to pile support buildings, streets, and utility corridors to mitigate settlement of Bay Mud.

If mitigation measures or preventative designs are not incorporated, differential settlement may occur resulting in interrupted access, utility infrastructure damage, and accessibility issues.

3.3 Geotechnical Approaches

Successful site development will require engineering design and project construction methods that account for the existing soil, existing conforms, and shoreline conditions. These improvements will help ensure that site accessibility and building access is maintained during seismic events, sea level rise, and minor long-term consolidation settlement.

The proposed development will be elevated 1.5-feet to 4.5-feet above existing grade to accommodate for future sea level rise. The use of soil fill to raise the site will cause ground settlement of up to several feet. The design team has explored several different alternatives to adding soil fill to the site. The geotechnical design approach recommended for the project has been summarized in the "Preliminary Geotechnical Recommendations and Summary Memorandum No. 1" prepared by Treadwell & Rollo, dated January 26, 2016.

In order to raise the site and mitigate differential settle between buildings, streets, sidewalks, and utility infrastructure, the design team is proceeding with the following geotechnical recommendations provided Treadwell & Rollo:

- Deep Dynamic Compaction (DDC)
- Stone Columns (alternative to DDC)
- Pile supported buildings
- Pile supported streets and utility corridors

SECTION 4: STORM DRAIN SYSTEM

4.1 Overview

In general, San Francisco is served by either a combined storm and sanitary sewer systems or separated storm sewer systems. The project is located within Mission Bay which is served by a separated storm sewer systems. The existing project site consists of six separate watershed areas shown in Figure 4.1.

The existing China Basin Park and the adjacent northern portion of Terry A Francois Boulevard are collected in an existing storm drain system that drains to China Basin via a 12-inch culvert. A series of existing drop inlets along the east side of the parking lot and west side of Terry A Francois collects stormwater from the east portion of the existing parking lot, Terry A Francois Boulevard, frontage of the piers, and Channel Wharf. Drainage from this area is conveyed to a 30-inch culvert that discharges east through a Seawall 337 to the San Francisco Bay underneath Channel Wharf. The remainder of the existing parking lot drains to a storm drain system on Channel Street which is routed to the Mission Bay Stormwater Pump Station No. 3 which discharges to China Basin. Mission Rock Street to the south has a new storm drain system that conveys stormwater to Mission Bay Stormwater Pump Station No. 6 to the south that discharges to the San Francisco Bay.

The project will replace the existing storm drain system with a new on-site storm drain system connecting into the existing storm drain systems previously utilized. The proposed drainage areas serving the project are shown in Figure 4.2.

4.2 Design Criteria

4.2.1 Stormwater Runoff Design Criteria

The storm drain system will be designed to convey, at a minimum, the stormwater runoff from the 5-year storm from the Project parcels and streets with a minimum of 2-feet of freeboard from the finish ground surface above. The storm drain system, street section, and street grading will be designed to convey the stormwater runoff from the 100-year storm from the parcels and streets. Street sections will be designed to convey excess flows in the form of overland release discussed in Section 4.4.

Stormwater runoff is computed using Santa Barbara Urban Hydrograph (SBUH) method. The SBUH method is based on the Soil Conservation Service (SCS) curve number (CN) approach. Key variables for the SBUH method include:

- Runoff CN at the site
- Time of Concentration
- Pervious and impervious land/surface areas
- Design storm

4.2.2 Runoff Curve Number

The curve number (CN) for a surface varies based on the hydrologic soil group (HSG) of the native (or existing) soils at the site. The HSG is a NRCS classification system in which soils are categorized into four runoff potential groups. The groups range from Type A soils, with high permeability and little runoff production, to Type D soils, which have low permeability rates and high runoff production.

The project has not performed any percolation tests to characterize soil permeability. To be conservative, the project soils are categorized as Hydrologic Soil Group (HSG) Type "D" soils, which correspond to a CN of 80.

4.2.2 Time of Concentration

The time of concentration (Tc) is the time for a drop of water to travel from the farthest point on the upstream end of the drainage area to the hydraulically remote point. Conservatively, the minimum time-of-concentration, 5 minutes, is used for all project drainage areas, including the development parcels, parks, and streets.

4.2.3 Pervious and Impervious Surface Areas

Pervious areas within the Project site include landscaped features in the development parcels, and landscaping within the proposed parks and street (rights-of-way.) The parcels are planned to be zero lot line buildings and a portion of those roofs may include landscape features. Proposed parks are expected to be 50% pervious. Proposed development blocks are expected to be 15% pervious. Landscape areas within the on-site street rights-of-way vary for different tributary areas.

4.2.4 5-year Design Storm

The rainfall intensity (I) is based on the 5-year storm Intensity–Duration–Frequency (IDF) curve as defined in the "San Francisco Rainfall Rate Table 1941," Plan L-3903.4 dated February 1941. The 5-year storm IDF curve is shown in Table 4.1.

Table 4.1
5-Year Storm IDF Curve

Duration (min)	5	6	7	10	15	20	25	30	35	40	45
Intensity (in/hr)	3.13	2.92	2.74	2.32	1.84	1.53	1.30	1.14	1.01	0.92	0.86

A design storm hyetograph was created from the IDF curve rainfall data using alternating block method. The pipes are sized to convey runoff from the 5-year storm event with a minimum freeboard of 2-feet.

4.2.5 100-year storm Design Storm

The 100-year storm rainfall intensity is be based on the 100-year storm Intensity–Duration–Frequency (IDF) curve. The 100-year storm IDF curve is defined by the best-fit log-linear line of the Rainfall Depth Duration Frequency table for the San Francisco City Station E70 7772 00 published by the California Department of Water Resources.

The 100-year Intensity-Duration-Frequency (IDF) curve equation is:

$$I = \frac{11.802}{T_C^{0.54}}$$

The 100-year storm IDF curve is tabulated in Table 4.2.

Table 4.2
100-Year Storm Intensity – Duration – Frequency (IDF) Curve

Duration (min)	5	6	7	10	15	20	25	30	35	40	45
Intensity (in/hr)	4.95	4.48	4.13	3.40	2.73	2.34	2.08	1.88	1.73	1.61	1.51

4.3 Starting Hydraulic Grade Line

4.3.1 5-year Storm

The starting Hydraulic Grade Line (HGL) for the gravity storm drain systems that outfall directly to San Francisco Bay or China Basin is provide by the 2015 Subdivision Regulations to be the Tidal Elevation of 96.5 feet (MB Datum) during the 5-year storm event. The proposed storm drain system for site is managed by separated storm drain systems connecting into existing storm drain lines. Four of the separated storm drain systems connect into the SFPUC's existing 42-inch line in 3rd Street. To determine the HGL in 3rd Street, the HGL from the 48-inch line in Channel Street was used. The starting HGL for Channel Street was determined based on hydraulic analysis prepared by BKF on February 2012 for the Mission Bay Project – Stormwater Pump Station No. 3.

The follow starting HGL for the 5-year storm were used to design the storm drain system at these locations:

- Existing 48-inch line in Channel Street,
  EX-SDMH #01 HGL = 96.60
- Bridgeview Street connecting into the 21-inch line at Mission Rock Street,
  SDMH #200 HGL = 98.48
- Terry A Francois Boulevard discharging into the San Francisco Bay,
  Outfall #1 HGL = 96.5 (Tidal Elevation, 2015 Subdivision Regulation)
- China Basin Park discharging into the China Basin,
  Outfall #2 HGL = 96.5 (Tidal Elevation, 2015 Subdivision Regulation)

The starting HGL for the 5-year storm at each proposed storm drain connection or outfall is shown in Figure 4.3.

4.3.2 100-Year Storm and Overland Release

The starting hydraulic grade line for the gravity storm drain systems that outfall directly to San Francisco Bay or China Basin is 98.5 feet per the 100-year stillwater elevation provided for the project. To accommodate overland flow release for the 100-year storm, the starting hydraulic grade line is assumed to be top of curb elevation where each street conforms to an existing street. The follow starting Hydraulic Grade Lines (HGL) were used to design the site grading and storm drain system for the 100-year storm and overland flow release at these discharge locations:

- Discharge #1: Exposition Street at 3rd Street, HGL = 99.60
- Discharge #2: Channel Street at 3rd Street, HGL = 99.70
- Discharge #3: Long Bridge Street at 3rd Street, HGL = 100.50
- Discharge #4: Bridgeview Street at Mission Rock Street, HGL = 101.00
- Discharge #5: Terry A Francois Boulevard discharging into the San Francisco Bay, Outfall #1 HGL = 98.5 (1% Still Water Level, Moffatt & Nichol)
- Discharge #6: China Basin Park discharging into the China Basin, Outfall #2 HGL = 98.5 (1% Still Water Level, Moffatt & Nichol)

The starting HGL for the 100-year storm at each proposed storm drain connection or outfall is shown in Figure 4.3. The overland flow release at each discharge location is shown in Figure 4.2.

4.4 Overland Flow and 100-Year Storm Event

4.4.1 Overview

Overland flow occurs when the capacity of the storm drain system is exceeded and the hydraulic grade line (HGL) of the storm drain system surcharges above the flow line elevation of the catch basin. As a result, stormwater flows into the street. Streets and the storm drain system are designed to convey the stormwater runoff to existing storm drain system. The combination of the proposed site grading and storm drain system is designed to accommodate the 100-year storm event.

4.4.2 Overland Flow Design Criteria

The storm drain system, street section, and street grading will be designed to convey the stormwater runoff from the 100-year storm from the parcels and streets. The 100-year stormwater runoff will be computed using Santa Barbara Urban Hydrograph (SBUH) method outlined in Section 4.2 above.

Surface drainage for proposed streets will be designed to meet the 2015 Subdivision Regulations design criteria:

a) Subdivider shall grade streets to provide a continuous downhill path.

b) Subdivider shall design street and drainage channel cross-sections to provide a transport channel for overland or surface flow in excess of the 5-year storm capacity of the sewer system. The channel capacity shall be the difference between the sewer capacity and the quantity of runoff generated by the 100-year storm as defined by the City-furnished data, applied over the tributary area involved.

Overland flow within the street must be contained between the face of curb to face of curb with no freeboard unless otherwise approved by the Director of Public Works with the consent of the PUC on a case-by-case basis. Saw-tooth grading of the street, as illustrated in Figure 2.3, will be implemented to provide a continuous downhill path for overland release to be conveyed within the street section away from structures.

Along the curbless streets of Shared Public Access Way and Terry A Francois Boulevard, the street sections shall be designed as a drainage channel so that overland flow release remains within the public street righ-of-way and is able to provide 4.0' accessible path on each side of the street section.

The proposed overland flow discharge points and hydraulic design criteria for overland flow are presented in Section 4.3.2 above. The Manning's n (roughness coefficient) for street/gutter flow is 0.016. The proposed overland release locations can be seen in Figure 4.2.

4.5 Model Analysis and Results

4.5.0 Storm Design Model Overview

The storm drain system and site grading was analyzed using Storm Water Management Modeling (XPSWMM) program by XP Solutions. The model incorporates the design storm event entering the system at different points. The model routes flow hydrographs through the pipes and produces dynamic hydraulic grade line elevations for the system. Models were developed and run for a 5-year storm, 24-hour and 100-year, 24-hour storm to verify that the proposed system conforms to the requirements laid out in Section 2. The storm drain system model with node identification is shown in Figure 4.3.

4.5.1 5-Year Storm Event Analysis and Results

The analysis showed that using pipe sizes that range from 12-inches to 24-inches will maintain the peak hydraulic grade line 2 feet below the gutter flow line for all pipes. Maximum velocity for the storm drain lines were below 10 feet per second (fps). The detailed storm drain system model results for the 5-year storm are provided in Appendix B.

4.5.2 Overland Release and 100-Year Storm Event Analysis and Results

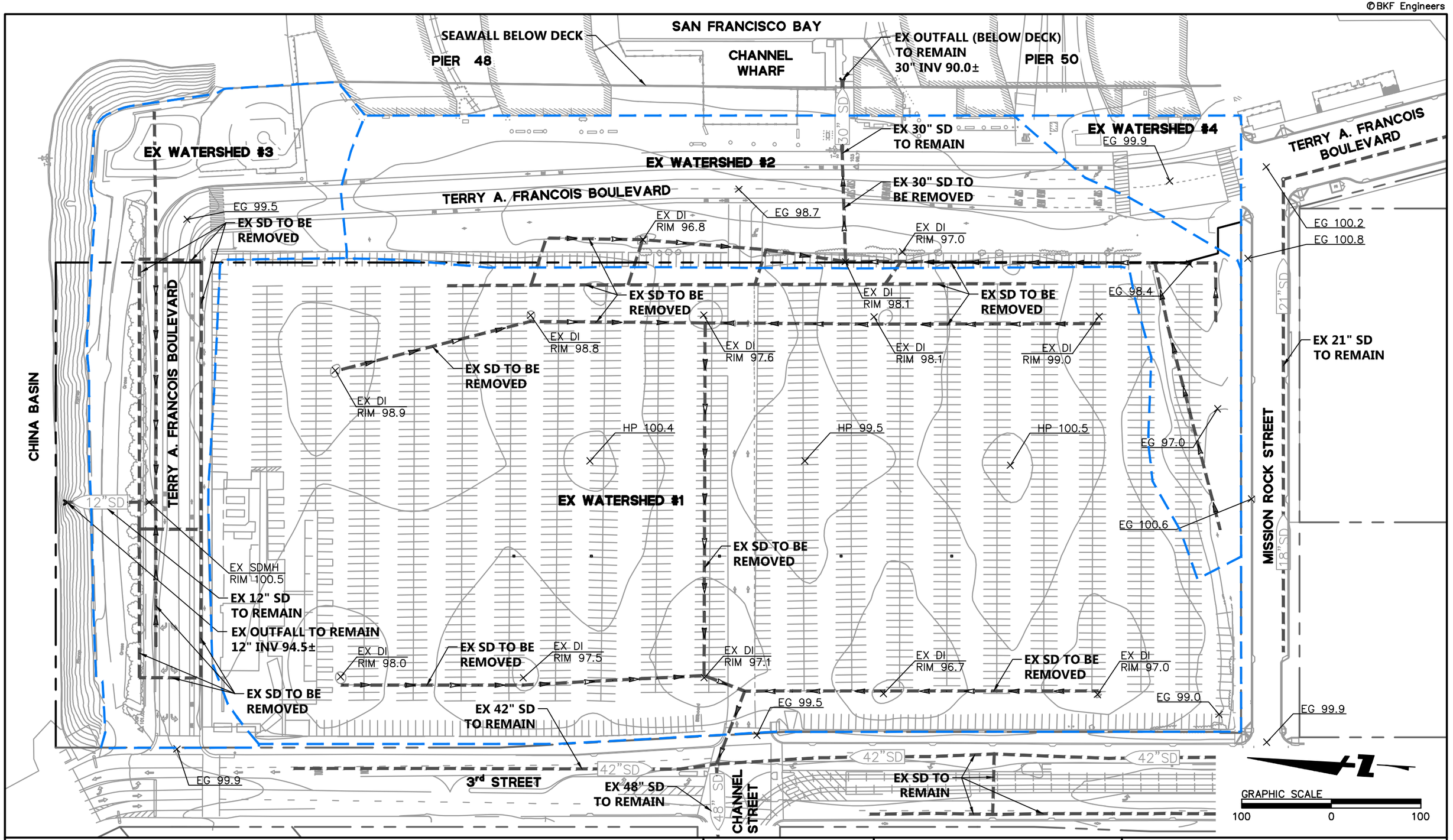
For the 100-year storm analysis, the model was expanded to include street grades and section to convey overland release where stormwater surcharged the storm drain system. The analysis showed that the same pipe sizes modeled for the 5-year storm event in combination with proposed street grades and street sections would be sufficient to convey runoff from a 100-year storm event within the public street right-of-way section without crossing over property lines.

For Terry A Francois Boulevard and Shared Public Way, the analysis showed the curbless streets were able to contain the 100-year HGL within the street while providing a 4-foot wide accessible path on one side of the street.

The detailed storm drain system model results for the overland release and 100-year storm event analysis are provided in Appendix C.

Section 4 Figures

© BKF Engineers



LEGEND

- EXISTING PARCEL BOUNDARIES
- EXISTING STORM DRAIN MAIN
- EXISTING WATERSHED BOUNDARY

ABBREVIATIONS

DI	DROP INLET	MH	MANHOLE
EG	EXISTING GRADE	SD	STORM DRAIN
EX	EXISTING		
HP	HIGH POINT		
INV	INVERT		

DATE:	09/20/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT GRADING AND DRAINAGE MASTER PLAN

FIGURE 4.1
EXISTING SITE DRAINAGE AREAS

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Grading & Storm Drain\Figure 4.1 Existing Site Drainage Areas.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

© BKF Engineers

SAN FRANCISCO BAY

STORMWATER TREATMENT FLOWS TO BIORETENTION AREA IN CHINA BASIN PARK

PIER 48

CHANNEL WHARF

EX SD OUTFALL #1

PIER 50

8"SDFM

8"SDFM

24"SD

30"SD

21"SD

21"SD

3-12"SD

18"SD

21"SD

21"SD

TERRY A FRANCOIS BOULEVARD

CONNECT TO EX 30" SD

WATERSHED #3

WATERSHED #6

BLOCK K

BLOCK J

CHANNEL LANE

BLOCK I

BLOCK H

8"SDFM

21"SD

12"SD

BRIDGEVIEW STREET

12"SD

12"SD

12"SD

21"SD

15"SD

21"SD

CHINA BASIN

CHINA BASIN PARK

EX SD OUTFALL #2

BLOCK G

EXPOSITION STREET

21"SD

BLOCK F

MISSION ROCK SQUARE

WATERSHED #2

BLOCK E

18"SD

LONGBRIDGE STREET

MISSION ROCK STREET

18"SD

12"SD

12"SD

24"SD

12"SD

SHARED PUBLIC WAY

12"SD

BLOCK D

CONNECT TO EX 18" SD

12"SD

30"SD

WATERSHED #1

BLOCK A

WATERSHED #7

BLOCK B

CHANNEL STREET

WATERSHED #4A

BLOCK C

WATERSHED #4B

18"SD

WATERSHED #5

CONNECT TO EX 42" SD

CONNECT TO EX 42" SD

2-24"SD

12"SD

CONNECT TO EX 12" SD

OVERLAND RELEASE

42"SD

42"SD

42"SD

42"SD

3rd STREET

OVERLAND RELEASE

48"SD

CHANNEL STREET

OVERLAND RELEASE

GRAPHIC SCALE

100 0 100

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE
- BIORETENTION AREA
- WATERSHED BOUNDARY
- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- PROPOSED OVERLAND RELEASE

DRAWING NAME: K:\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Grading & Storm Drain\Figure 4.2 Proposed Site Drainage Areas.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

DATE: 09/20/2016
SCALE: 1"=100'
DESIGN: JVH
DRAWN BY: JVH
APPROVED: MAO
JOB NO: 20080006

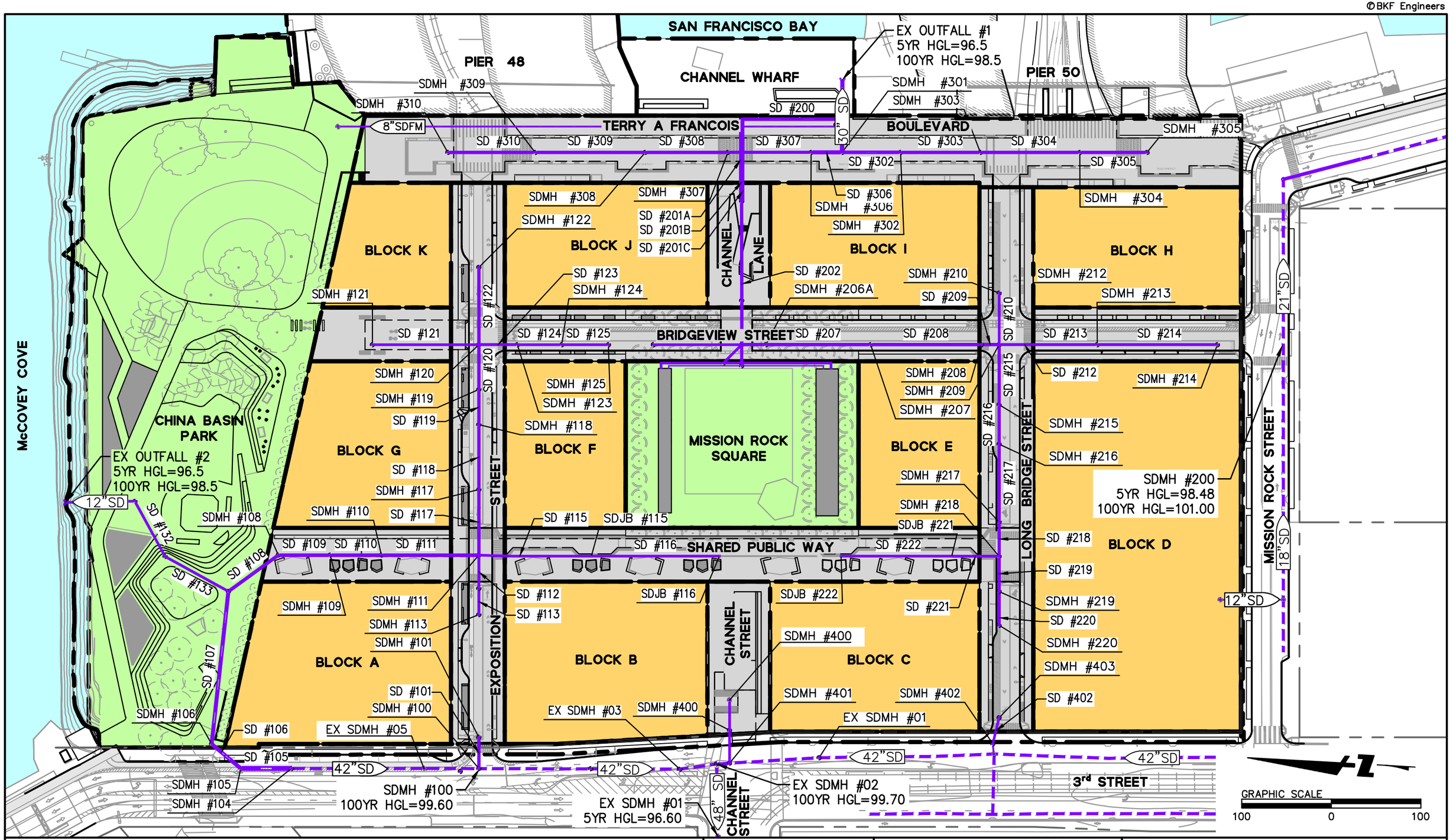
GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT GRADING AND DRAINAGE MASTER PLAN

FIGURE 4.2
PROPOSED SITE DRAINAGE AREAS

© BKF Engineers



DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Grading & Storm Drain\Figure 4.3 Proposed Storm Drain System.dwg
PLOT DATE: 09-20-16
PLOTTED BY: fell

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE
- EXISTING STORM DRAIN LINE
- PROPOSED STORM DRAIN LINE
- 12"SD — PIPE SIZE AND DIRECTION
- PROPOSED STORM DRAIN STRUCTURE

DATE:	09/20/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
GRADING AND DRAINAGE MASTER PLAN

FIGURE 4.3
STORM DRAIN SYSTEM MODEL NODE IDENTIFICATION

APPENDIX A

References

References

City and County of San Francisco Sea-Level Rise Committee. "Guidance for Incorporating Sea-Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation," September 2014.

Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT). "State of California Sea-Level Rise Document," March 2013.

Department of Public Works, City and County of San Francisco. "Subdivision Regulations," 2015.

Devick, Christopher and Trivedi, Dilip. "Mission Rock Development Seawall Lot 337 Sea Level Rise Adaptation Strategy – Draft," Moffatt & Nichol, July 21, 2016.

The National Research Council (NRC). "Sea Level Rise for the Coasts of California, Oregon, and Washington," December 6, 2013.

Ronan, Cary and Simpson, Lori. "Preliminary Geotechnical Investigation Seawall Lot 337 – Mission Bay," Treadwell & Rollo, September 8, 2011.

Ronan, Cary and Simpson, Lori. "Preliminary Geotechnical Recommendations and Summary Memorandum No. 1," Treadwell & Rollo, January 26, 2016.

APPENDIX B

5-Year Storm Results

XPSWMM Output

Appendix B-1
5-Year Storm Hydrology, XPSWMM Node Table

Node Name	Area (ac)	Impervious Percentage	Unit Hydrograph Method	Infiltration Reference	Rainfall Reference	Total Rainfall (in)	Total Infiltration (in)	Total Runoff Depth (in)	Time of Concentration (min)	Max Flow (cfs)	Catchment Total Rainfall Depth (in)	Catchment Rainfall Intensity (in)	Catchment Total Evaporation (in)	Catchment Total Infiltration (in)	Catchment Total Runoff Depth (in)	Catchment Max Flow (cfs)
SDMH-100	1.74	85.00		CN	5-year	2.69	-0.06	2.62	5.00	3.20	2.69	1.84	0.00	0.06	2.60	3.20
SDMH-101	0.18	88.50	Santa Barbara	CN	5-year	2.69	0.57	2.12	5.00	1.92	2.69	1.84	0.00	0.49	2.20	0.30
SDMH-104	1.43	85.00	Santa Barbara	CN	5-year	2.69	0.56	2.13	5.00	2.33	2.69	1.84	0.00	0.56	2.10	2.33
SDMH-105	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-106	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-107	4.05	57.00	Santa Barbara	CN	5-year	2.69	1.01	1.68	5.00	5.45	2.69	1.84	0.00	1.01	1.70	5.45
SDMH-108	0.00	0.00	Santa Barbara	CN	5-year	2.69	0.40	2.29	5.00	0.29	2.69	1.84	0.00	0.40	2.30	0.29
SDMH-109	0.14	94.90	Santa Barbara	CN	5-year	2.69	0.38	2.31	5.00	0.24	2.69	1.84	0.00	0.38	2.30	0.24
SDMH-110	1.12	86.40	Santa Barbara	CN	5-year	2.69	0.53	2.16	5.00	1.83	2.69	1.84	0.00	0.53	2.20	1.83
SDMH-111	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-112	0.12	90.60	Santa Barbara	CN	5-year	2.69	0.46	2.23	5.00	0.20	2.69	1.84	0.00	0.46	2.20	0.20
SDMH-113	0.92	85.00	Santa Barbara	CN	5-year	2.69	0.56	2.13	5.00	1.50	2.69	1.84	0.00	0.56	2.10	1.50
SDMH-115	0.21	95.00	Santa Barbara	CN	5-year	2.69	0.37	2.31	5.00	0.36	2.69	1.84	0.00	0.37	2.30	0.36
SDMH-116	0.21	94.70	Santa Barbara	CN	5-year	2.69	0.38	2.31	5.00	0.36	2.69	1.84	0.00	0.38	2.30	0.36
SDMH-117	0.17	85.30	Santa Barbara	CN	5-year	2.69	0.55	2.14	5.00	0.28	2.69	1.84	0.00	0.55	2.10	0.28
SDMH-118	0.00	0.00	Santa Barbara	CN	5-year	2.69	0.57	2.12	5.00	1.36	2.69	1.84	0.00	0.31	2.40	0.21
SDMH-119	0.20	91.50	Santa Barbara	CN	5-year	2.69	1.05	1.64	5.00	0.26	2.69	1.84	0.00	1.05	1.60	0.26
SDMH-120	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-121	0.89	83.20	Santa Barbara	CN	5-year	2.69	0.59	2.10	5.00	1.43	2.69	1.84	0.00	0.59	2.10	1.43
SDMH-122	0.53	86.30	Santa Barbara	CN	5-year	2.69	0.56	2.13	5.00	2.04	2.69	1.84	0.00	0.53	2.20	0.87
SDMH-123	0.00	0.00	Santa Barbara	CN	5-year	2.69	0.45	2.24	5.00	0.13	2.69	1.84	0.00	0.45	2.20	0.13
SDMH-124	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-125	0.79	85.90	Santa Barbara	CN	5-year	2.69	0.54	2.15	5.00	1.29	2.69	1.84	0.00	0.54	2.10	1.29
SDMH-200	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-201	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-202	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-203	1.11	91.20	Santa Barbara	CN	5-year	2.69	0.44	2.24	5.00	1.86	2.69	1.84	0.00	0.44	2.20	1.86
SDMH-205	0.16	92.90	Santa Barbara	CN	5-year	2.69	0.41	2.27	5.00	0.27	2.69	1.84	0.00	0.41	2.30	0.27
SDMH-206	0.12	92.10	Santa Barbara	CN	5-year	2.69	0.43	2.26	5.00	0.20	2.69	1.84	0.00	0.43	2.30	0.20
SDMH-207	0.17	87.70	Santa Barbara	CN	5-year	2.69	0.51	2.18	5.00	0.28	2.69	1.84	0.00	0.51	2.20	0.28
SDMH-208	0.10	89.40	Santa Barbara	CN	5-year	2.69	0.48	2.21	5.00	0.17	2.69	1.84	0.00	0.48	2.20	0.17
SDMH-209	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-210	0.06	91.50	Santa Barbara	CN	5-year	2.69	0.44	2.25	5.00	0.10	2.69	1.84	0.00	0.44	2.20	0.10
SDMH-212	0.07	91.50	Santa Barbara	CN	5-year	2.69	0.44	2.25	5.00	0.12	2.69	1.84	0.00	0.44	2.20	0.12
SDMH-213	0.11	87.90	Santa Barbara	CN	5-year	2.69	0.51	2.18	5.00	0.18	2.69	1.84	0.00	0.51	2.20	0.18
SDMH-214	0.16	86.60	Santa Barbara	CN	5-year	2.69	0.57	2.12	5.00	1.78	2.69	1.84	0.00	0.53	2.20	0.26
SDMH-215	0.09	93.20	Santa Barbara	CN	5-year	2.69	0.41	2.28	5.00	0.15	2.69	1.84	0.00	0.41	2.30	0.15
SDMH-216	0.70	84.80	Santa Barbara	CN	5-year	2.69	0.56	2.13	5.00	1.14	2.69	1.84	0.00	0.56	2.10	1.14
SDMH-217	1.19	99.00	Santa Barbara	CN	5-year	2.69	0.30	2.39	5.00	2.06	2.69	1.84	0.00	0.29	2.40	2.06
SDMH-218	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-219	0.00	0.00	Santa Barbara	CN	5-year	2.69	0.47	2.22	5.00	0.20	2.69	1.84	0.00	0.47	2.20	0.20
SDMH-220	0.11	88.20	Santa Barbara	CN	5-year	2.69	0.50	2.19	5.00	0.18	2.69	1.84	0.00	0.50	2.20	0.18
SDMH-221	0.12	93.60	Santa Barbara	CN	5-year	2.69	0.40	2.29	5.00	0.20	2.69	1.84	0.00	0.40	2.30	0.20
SDMH-222	0.18	94.40	Santa Barbara	CN	5-year	2.69	0.38	2.30	5.00	0.31	2.69	1.84	0.00	0.38	2.30	0.31
OUTFALL-01	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-300	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-301	0.75	85.00	Santa Barbara	CN	5-year	2.69	0.56	2.13	5.00	1.22	2.69	1.84	0.00	0.56	2.10	1.22

Appendix B-1
5-Year Storm Hydrology, XPSWMM Node Table

Node Name	Area (ac)	Impervious Percentage	Unit Hydrograph Method	Infiltration Reference	Rainfall Reference	Total Rainfall (in)	Total Infiltration (in)	Total Runoff Depth (in)	Time of Concentration (min)	Max Flow (cfs)	Catchment Total Rainfall Depth (in)	Catchment Rainfall Intensity (in)	Catchment Total Evaporation (in)	Catchment Total Infiltration (in)	Catchment Total Runoff Depth (in)	Catchment Max Flow (cfs)
SDMH-302	0.32	100.00	Santa Barbara	CN	5-year	2.69	0.00	2.41	5.00	0.56	2.69	1.84	0.00	0.00	2.40	0.56
SDMH-303	0.20	97.60	Santa Barbara	CN	5-year	2.69	0.32	2.36	5.00	0.34	2.69	1.84	0.00	0.32	2.40	0.34
SDMH-304	0.35	97.00	Santa Barbara	CN	5-year	2.69	0.57	2.12	5.00	1.18	2.69	1.84	0.00	0.33	2.40	0.60
SDMH-305	0.98	89.00	Santa Barbara	CN	5-year	2.69	0.49	2.20	5.00	1.63	2.69	1.84	0.00	0.48	2.20	1.63
SDMH-306	0.17	1.00	Santa Barbara	CN	5-year	2.69	1.69	1.00	5.00	0.13	2.69	1.84	0.00	1.69	1.00	0.13
SDMH-307	0.54	92.40	Santa Barbara	CN	5-year	2.69	0.42	2.27	5.00	0.91	2.69	1.84	0.00	0.42	2.30	0.91
SDMH-308	0.39	98.20	Santa Barbara	CN	5-year	2.69	0.31	2.38	5.00	0.67	2.69	1.84	0.00	0.31	2.40	0.67
SDMH-309	0.27	96.60	Santa Barbara	CN	5-year	2.69	0.34	2.35	5.00	0.46	2.69	1.84	0.00	0.34	2.30	0.46
SDMH-310	0.32	100.00	Santa Barbara	CN	5-year	2.69	0.00	2.41	5.00	0.56	2.69	1.84	0.00	0.00	2.40	0.56
SDMH-400	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-401	0.00	0.00	Santa Barbara	CN	5-year	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-402	1.17	79.10	Santa Barbara	CN	5-year	2.69	0.66	2.03	5.00	1.84	2.69	1.84	0.00	0.66	2.00	1.84
SDMH-404	0.16	88.60		CN	5-year	2.69	0.49	2.20	5.00	0.27	2.69	1.84	0.00	0.49	2.20	0.27

Appendix B-2
5-Year Storm Hydraulics, XPSWMM Node Table

Node Name	EGL Relative to Ground (ft)	Node Inflow (ft^3)	Volume of Inflow (ft^3)	Volume of Outflow (ft^3)	Volume of Ponded Flow Stored (ft^3)	Flood Loss (ft^3)	Continuity Error Volume (% of Inflow)	Continuity Error Volume (ft^3)	Continuity Error Volume (% of Node)
SDMH-100	1.89	16546.7	16546.6	0	0	0	0.081	194.29	0.09
SDMH-101	2.66	9098.8	9098.8	0	0	0	0.002	-5.62	-0.03
SDMH-104	2.03	11041.6	11041.6	0	0	0	0.044	105.23	0.07
SDMH-105	1.76	0	0	0	0	0	0.014	33.40	0.02
SDMH-106	2.33	0	0	0	0	0	0.029	69.85	0.05
SDMH-107	6.66	24651.7	24651.7	0	0	0	0.052	-125.41	-0.09
SDMH-108	5.04	0	0	0	0	0	0	0.06	0.00
SDMH-109	4.52	1173.5	1173.5	0	0	0	0.001	1.31	0.00
SDMH-110	4.30	8749.4	8749.4	0	0	0	0.006	13.67	0.02
SDMH-111	4.55	0	0	0	0	0	0.001	-2.96	0.00
SDMH-112	3.91	970.7	970.7	0	0	0	0.001	-3.44	-0.02
SDMH-113	4.04	7103.7	7103.7	0	0	0	0	0.28	0.00
SDMH-115	4.05	1761.7	1761.7	0	0	0	0.005	-12.63	-0.18
SDMH-116	4.35	1757.4	1757.4	0	0	0	0.001	-1.43	-0.04
SDMH-117	3.75	1315.9	1315.9	0	0	0	0	-0.41	0.00
SDMH-118	3.36	0	0	0	0	0	0.002	-3.71	-0.01
SDMH-119	2.97	1187	1187	0	0	0	0	0.08	0.00
SDMH-120	2.94	0	0	0	0	0	0	-0.92	0.00
SDMH-121	3.37	6769.6	6769.6	0	0	0	0.001	2.98	0.02
SDMH-122	2.48	9696.3	9696.3	0	0	0	0.001	-1.27	-0.01
SDMH-123	2.48	0	0	0	0	0	0	-0.89	-0.01
SDMH-124	2.48	0	0	0	0	0	0	-0.92	-0.01
SDMH-125	2.54	6145.8	6145.8	0	0	0	0	-0.15	0.00
SDMH-200	2.64	0	0	0	0	0	0.019	-46.31	-0.05
SDMH-201	2.14	0	0	0	0	0	0.008	19.53	0.02
SDMH-202	5.34	0	0	0	0	0	0.004	-10.17	-0.01
SDMH-203	4.95	9023.8	9023.8	-1	0	0	0.001	-3.11	0.00
SDMH-205	3.72	1319.2	1319.2	0	0	0	0	-0.30	-0.01
SDMH-206	4.11	982.8	982.8	0	0	0	0.004	9.60	0.01
SDMH-207	3.38	1342.5	1342.5	0	0	0	0.005	13.25	0.02
SDMH-208	2.54	800.9	800.9	0	0	0	0.001	3.54	0.01
SDMH-209	2.88	0	0	0	0	0	0.002	5.80	0.01
SDMH-210	2.90	489	489	0	0	0	0	-0.66	-0.07
SDMH-212	2.53	570.5	570.5	0	0	0	0.001	2.20	0.01
SDMH-213	2.69	870.1	870.1	0	0	0	0.001	-1.22	-0.01
SDMH-214	2.11	8459.8	8459.8	-1.7	0	0	0.001	-1.23	-0.01
SDMH-215	2.80	743.9	743.9	0	0	0	0.001	1.50	0.00
SDMH-216	2.48	5396	5396	0	0	0	0.001	2.56	0.01
SDMH-217	2.48	10317.9	10317.9	0	0	0	0	-1.08	0.00
SDMH-218	3.20	0	0	0	0	0	0	-0.38	-0.01
SDMH-219	2.48	0	0	0	0	0	0	0.00	0.00
SDMH-220	2.66	872.3	872.3	0	0	0	0	-0.72	-0.04

Node Name	EGL Relative to Ground (ft)	Node Inflow (ft^3)	Volume of Inflow (ft^3)	Volume of Outflow (ft^3)	Volume of Ponded Flow Stored (ft^3)	Flood Loss (ft^3)	Continuity Error Volume (% of Inflow)	Continuity Error Volume (ft^3)	Continuity Error Volume (% of Node)
SDMH-221	2.95	995.1	995.1	0	0	0	0.001	-2.07	-0.04
SDMH-222	3.04	1502.6	1502.6	0	0	0	0	-0.94	-0.03
OUTFALL-01	3.86	4542	0	81424.5	0	0	0.089	-215.67	-0.14
SDMH-300	3.17	0	0	0	0	0	0.039	93.56	0.06
SDMH-301	2.54	5791	5791	0	0	0	0.019	45.26	0.07
SDMH-302	2.35	2797.5	2797.5	0	0	0	0.019	45.00	0.13
SDMH-303	2.28	1714.2	1714.2	0	0	0	0.012	29.49	0.10
SDMH-304	2.11	5745.5	5745.5	0	0	0	0.007	16.99	0.06
SDMH-305	2.39	7823	7822.9	0	0	0	0.004	9.31	0.06
SDMH-306	2.33	615.4	615.4	0	0	0	0.02	49.31	0.20
SDMH-307	2.20	4433.8	4433.8	0	0	0	0.01	24.90	0.10
SDMH-309	1.98	2295.2	2295.2	0	0	0	0.006	14.56	0.15
SDMH-310	2.10	2797.5	2797.5	0	0	0	0.002	5.41	0.10
SDMH-400	2.34	0	0	0	0	0	0.025	59.95	0.21
SDMH-401	2.25	0	0	0	0	0	0.001	3.34	0.02
SDMH-402	4.28	8599.1	8599.1	0	0	0	0.001	-2.28	-0.01
SDMH-403	2.54	0	0	0	0	0	0.002	-5.66	-0.22
SDMH-404	3.65	1273	1273	0	0	0	0	-0.41	-0.02

Appendix B-3
5-Year Storm Hydraulics, XPSWMM Link Table

Link Name	Upstream Node Name	Downstream Node Name	Diameter (ft)	Length (ft)	Conduit/ Road Slope	Roughness	Ground Elev (US, ft)	Ground Elev (DS, ft)	Invert Elev (US, ft)	Invert Elev (DS, ft)	Max Water Elev (US, ft)	Max Water Elev (DS, ft)	Freeboard (US, ft)	Freeboard (DS, ft)	Max Flow (cfs)	Time to Peak (hr)	Max Velocity (ft/s)	Max Depth (ft)	Max d/D (depth/dia)
SD-100	SDMH-101	SDMH-100	1.75	42.5	0.73%	0.013	99.90	99.15	91.11	90.80	97.24	97.35	2.66	1.94	1.91	12.00	0.80	6.55	3.74
SD-105	SDMH-105	SDMH-104	3.5	56.6	0.19%	0.013	99.50	99.50	91.33	91.22	97.60	97.44	1.90	2.07	14.71	12.10	1.50	6.27	1.79
SD-106	SDMH-106	SDMH-105	2.5	42.6	0.70%	0.013	100.35	99.50	91.63	91.33	97.88	97.60	2.47	1.90	14.70	12.10	3.00	6.27	2.51
SD-107	SDMH-107	SDMH-106	2.5	171.3	2.00%	0.014	105.08	100.35	95.06	91.63	98.29	97.88	6.79	2.47	14.68	12.10	3.00	6.25	2.50
SD-108	SDMH-108	SDMH-107	2	68.8	0.33%	0.013	103.71	105.08	95.29	95.06	98.54	98.29	5.17	6.79	9.54	12.10	3.00	3.25	1.63
SD-109	SDMH-109	SDMH-108	2	57.9	0.35%	0.013	103.42	103.71	95.49	95.29	98.79	98.54	4.64	5.17	9.52	12.10	3.00	3.30	1.65
SD-110	SDMH-110	SDMH-109	2	57.4	0.33%	0.013	103.42	103.42	95.68	95.49	99.05	98.79	4.39	4.64	9.28	12.10	2.90	3.37	1.69
SD-111	SDMH-111	SDMH-110	2	108.6	0.34%	0.013	103.93	103.42	96.05	95.68	99.34	99.05	4.62	4.39	7.54	12.10	2.40	3.37	1.69
SD-112	SDMH-112	SDMH-111	1.25	37.2	1.99%	0.013	103.33	103.93	96.79	96.05	99.42	99.34	3.93	4.62	1.64	12.00	2.40	3.29	2.63
SD-113	SDMH-113	SDMH-112	1.25	29.2	2.02%	0.013	103.48	103.33	97.38	96.79	99.46	99.42	4.04	3.93	1.47	12.00	3.40	2.63	2.11
SD-115	SDMH-115	SDMH-111	1	125.6	0.97%	0.013	103.51	103.93	97.27	96.05	99.48	99.34	4.05	4.62	0.91	12.10	1.90	3.29	3.29
SD-116	SDMH-116	SDMH-115	1	143.0	0.50%	0.013	103.84	103.51	97.98	97.27	99.52	99.48	4.35	4.05	0.53	12.10	1.90	2.21	2.21
SD-117	SDMH-117	SDMH-111	1.75	73.2	0.34%	0.013	103.32	103.93	96.30	96.05	99.53	99.34	3.81	4.62	5.17	12.10	2.10	3.29	1.88
SD-118	SDMH-118	SDMH-117	1.75	72.5	0.34%	0.013	103.07	103.32	96.55	96.30	99.67	99.53	3.42	3.81	4.89	12.10	2.00	3.23	1.85
SD-119	SDMH-119	SDMH-118	1.75	39.2	0.33%	0.013	102.78	103.07	96.68	96.55	99.78	99.67	3.02	3.42	4.87	12.10	2.00	3.12	1.78
SD-120	SDMH-120	SDMH-119	1.75	50.0	0.34%	0.013	102.89	102.78	96.85	96.68	99.92	99.78	2.99	3.02	4.60	12.10	2.00	3.10	1.77
SD-121	SDMH-121	SDMH-120	1	118.8	1.34%	0.013	103.50	102.89	98.44	96.85	100.16	99.92	3.37	2.99	1.39	12.00	3.30	3.08	3.08
SD-122	SDMH-122	SDMH-120	1.75	86.4	0.50%	0.013	102.46	102.89	97.28	96.85	100.01	99.92	2.48	2.99	2.00	12.00	2.10	3.08	1.76
SD-123	SDMH-123	SDMH-120	1.25	43.1	0.35%	0.013	102.51	102.89	97.00	96.85	100.02	99.92	2.51	2.99	1.34	12.10	1.10	3.08	2.46
SD-124	SDMH-124	SDMH-123	1	49.6	0.32%	0.013	102.64	102.51	97.16	97.00	100.14	100.02	2.52	2.51	1.25	12.10	1.60	3.02	3.02
SD-125	SDMH-125	SDMH-124	1	52.1	0.35%	0.013	102.76	102.64	97.34	97.16	100.24	100.14	2.54	2.52	1.25	12.00	1.70	2.98	2.98
SD-200	SDMH-200	SDMH-300	2	112.3	2.00%	0.013	100.12	100.15	92.76	90.22	97.30	96.87	2.83	3.28	8.29	12.10	2.60	6.36	3.18
SD-201	SDMH-201	SDMH-200	1	89.7	0.30%	0.013	100.40	100.12	94.18	92.76	98.08	97.30	2.32	2.83	2.76	12.10	3.50	3.90	3.90
SD-201	SDMH-201	SDMH-200	1	89.7	0.30%	0.013	100.40	100.12	94.18	92.76	98.08	97.30	2.32	2.83	2.76	12.10	3.50	3.90	3.90
SD-201	SDMH-201	SDMH-200	1	89.7	0.30%	0.013	100.40	100.12	94.18	92.76	98.08	97.30	2.32	2.83	2.76	12.10	3.50	3.90	3.90
SD-202	SDMH-202	SDMH-201	1.75	108.7	0.29%	0.013	104.08	100.40	94.50	94.18	98.56	98.08	5.52	2.32	8.29	12.10	3.40	4.06	2.32
SD-203	SDMH-203	SDMH-202	1.75	49.4	0.30%	0.013	104.04	104.08	94.65	94.50	98.99	98.56	5.05	5.52	8.29	12.10	3.40	4.34	2.48
SD-205	SDMH-205	SDMH-203	1	98.7	1.00%	0.013	102.88	104.04	96.64	94.65	99.16	98.99	3.72	5.05	0.26	12.10	1.30	3.34	3.34
SD-206	SDMH-206	SDMH-203	1.75	27.1	0.30%	0.013	103.39	104.04	94.73	94.65	99.19	98.99	4.21	5.05	6.36	12.10	2.60	4.46	2.55
SD-207	SDMH-207	SDMH-206	1.75	116.9	0.30%	0.013	102.94	103.39	95.08	94.73	99.47	99.19	3.47	4.21	6.16	12.10	2.50	4.46	2.55
SD-208	SDMH-208	SDMH-207	1.75	123.6	0.31%	0.013	102.37	102.94	95.46	95.08	99.75	99.47	2.62	3.47	5.88	12.10	2.40	4.39	2.51
SD-209	SDMH-209	SDMH-208	1.75	19.8	0.30%	0.013	102.82	102.37	95.52	95.46	99.87	99.75	2.95	2.62	5.70	12.10	2.40	4.35	2.49
SD-210	SDMH-210	SDMH-209	1	42.8	0.42%	0.013	102.82	102.82	95.70	95.52	99.93	99.87	2.90	2.95	0.16	12.10	0.30	4.35	4.35
SD-212	SDMH-212	SDMH-209	1.25	38.1	0.29%	0.013	102.53	102.82	95.63	95.52	99.97	99.87	2.57	2.95	1.94	12.00	1.60	4.35	3.48
SD-213	SDMH-213	SDMH-212	1.25	71.5	0.29%	0.013	102.78	102.53	95.84	95.63	100.06	99.97	2.72	2.57	1.87	12.00	1.50	4.34	3.47
SD-214	SDMH-214	SDMH-213	1.25	134.2	0.31%	0.014	102.30	102.78	96.25	95.84	100.19	100.06	2.11	2.72	1.73	12.00	1.40	4.22	3.38
SD-215	SDMH-215	SDMH-209	1.5	67.0	0.49%	0.013	102.97	102.82	95.85	95.52	100.11	99.87	2.86	2.95	3.70	12.10	2.10	4.35	2.90
SD-216	SDMH-216	SDMH-215	1.5	43.9	0.50%	0.013	102.75	102.97	96.07	95.85	100.24	100.11	2.51	2.86	3.56	12.10	2.00	4.26	2.84
SD-217	SDMH-217	SDMH-216	1.5	87.0	0.49%	0.013	102.89	102.75	96.50	96.07	100.41	100.24	2.49	2.51	2.54	12.10	1.90	4.17	2.78
SD-218	SDMH-218	SDMH-217	1.5	38.2	0.52%	0.013	103.63	102.89	96.70	96.50	100.43	100.41	3.20	2.49	1.24	12.20	1.10	3.90	2.60
SD-219	SDMH-219	SDMH-218	1.5	39.3	0.99%	0.013	102.91	103.63	97.09	96.70	100.43	100.43	2.48	3.20	-0.62	11.90	1.00	3.73	2.13
SD-220	SDMH-220	SDMH-219	1.5	37.8	1.00%	0.013	103.09	102.91	97.47	97.09	100.44	100.43	2.66	2.48	0.33	12.10	1.70	3.34	1.91
SD-221	SDMH-221	SDMH-218	1	85.8	0.30%	0.013	103.41	103.63	96.96	96.70	100.46	100.43	2.95	3.20	0.58	12.20	1.20	3.73	3.73
SD-222	SDMH-222	SDMH-221	1	123.6	0.50%	0.013	103.51	103.41	97.58	96.96	100.47	100.46	3.04	2.95	0.36	12.20	1.70	3.50	3.50
SD-300	SDMH-300	OUTFALL-01	2.5	73.3	0.30%	0.013	100.15	100.50	90.22	90.00	96.87	96.50	3.28	4.00	15.69	12.00	3.20	6.65	2.66
SD-301	SDMH-301	SDMH-300	2.5	60.0	0.30%	0.013	99.64	100.15	90.40	90.22	97.08	96.87	2.56	3.28	-8.40	0.00	-2.40	6.68	2.67
SD-302	SDMH-302	SDMH-301	2	65.2	0.51%	0.013	99.51	99.64	90.73	90.40	97.14	97.08	2.37	2.56	-4.06	0.00	-2.10	6.68	3.34
SD-303	SDMH-303	SDMH-302	1.75	89.1	0.51%	0.013	99.51	99.51	91.18	90.73	97.21	97.14	2.30	2.37	3.14	12.00	-1.50	6.41	3.66
SD-304	SDMH-304	SDMH-303	1.75	111.1	0.50%	0.013	99.40	99.51	91.74	91.18	97.28	97.21	2.12	2.30	2.80	12.00	1.10	6.03	3.44
SD-305	SDMH-305	SDMH-304	1.75	75.1	0.51%	0.013	99.70	99.40	92.12	91.74	97.31	97.28	2.39	2.12	1.62	12.00	0.90	5.54	3.17
SD-306	SDMH-306	SDMH-301	2.5	34.6	0.49%	0.013	99.46	99.64	90.86	90.40	97.12	97.08	2.34	2.56	-3.95	0.00	-2.30	6.39	2.56
SD-307	SDMH-307	SDMH-306	1.5	93.0	0.51%	0.013	99.39	99.46	91.33	90.86	97.19	97.12	2.20	2.34	2.58	12.00	-1.30	6.26	3.58
SD-308	SDMH-308	SDMH-307	1.75	92.3	0.50%	0.013	99.23	99.39	91.79	91.33	97.22	97.19	2.01	2.20	1.68	12.00	1.00	5.86	3.35

Appendix B-3
5-Year Storm Hydraulics, XPSWMM Link Table

Link Name	Upstream Node Name	Downstream Node Name	Diameter (ft)	Length (ft)	Conduit/ Road Slope	Roughness	Ground Elev (US, ft)	Ground Elev (DS, ft)	Invert Elev (US, ft)	Invert Elev (DS, ft)	Max Water Elev (US, ft)	Max Water Elev (DS, ft)	Freeboard (US, ft)	Freeboard (DS, ft)	Max Flow (cfs)	Time to Peak (hr)	Max Velocity (ft/s)	Max Depth (ft)	Max d/D (depth/dia)
SD-309	SDMH-309	SDMH-308	1.75	122.6	0.50%	0.013	99.21	99.23	92.40	91.79	97.23	97.22	1.98	2.01	1.01	12.00	0.90	5.43	3.10
SD-310	SDMH-310	SDMH-309	1.75	97.7	0.50%	0.013	99.34	99.21	92.89	92.40	97.24	97.23	2.10	1.98	0.55	12.00	0.80	4.83	2.76
SD-400	SDMH-401	EX-SDMH-02	1	40.4	0.20%	0.013	99.24	100.00	90.40	90.32	97.27	97.97	2.30	2.36	1.83	12.00	2.30	7.65	7.65
SD-401	SDMH-402	SDMH-401	1	50.0	2.00%	0.013	101.50	99.24	91.40	90.40	97.26	97.27	4.28	2.30	1.83	12.00	2.30	6.87	6.87
SD-403	SDMH-403	EX-SDMH-05	1	10.0	0.30%	0.013	99.60	99.77	96.46	92.00	97.09	97.58	2.55	2.64	-1.55	25.00	-2.70	1.15	1.15
SD-404	SDMH-404	SDMH-403	1	30.0	0.30%	0.013	100.52	99.60	96.55	96.46	96.93	97.09	3.65	2.55	0.26	12.00	1.30	0.63	0.63

APPENDIX C

Overland Flow and 100-Year Storm Results

XPSWMM Output

Appendix C-1
100-Year Storm Hydrology, XPSWMM Node Table

Node Name	Area (ac)	Impervious Percentage	Unit Hydrograph Method	Infiltration Reference	Rainfall Reference	Total Rainfall (in)	Total Infiltration (in)	Total Runoff Depth (in)	Time of Concentration (min)	Max Flow (cfs)	Catchment Total Rainfall Depth (in)	Catchment Rainfall Intensity (in)	Catchment Total Evaporation (in)	Catchment Total Infiltration (in)	Catchment Total Runoff Depth (in)	Catchment Max Flow (cfs)
SDMH-100	1.74	85.00		CN	100-year	5.59	-0.06	5.50	5.00	4.76	5.59	2.74	0.00	0.09	5.50	4.76
SDMH-101	0.18	88.50	Santa Barbara	CN	100-year	5.59	0.62	4.97	5.00	3.04	5.59	2.74	0.00	0.53	5.10	0.47
SDMH-104	1.43	85.00	Santa Barbara	CN	100-year	5.59	0.60	4.98	5.00	3.69	5.59	2.74	0.00	0.60	5.00	3.69
SDMH-105	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-106	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-107	4.05	57.00	Santa Barbara	CN	100-year	5.59	1.17	4.42	5.00	9.75	5.59	2.74	0.00	1.17	4.40	9.75
SDMH-108	0.00	0.00	Santa Barbara	CN	100-year	2.69	0.40	2.29	5.00	0.29	2.69	1.84	0.00	0.40	2.30	0.29
SDMH-109	0.14	94.90	Santa Barbara	CN	100-year	5.59	0.40	5.19	5.00	0.37	5.59	2.74	0.00	0.40	5.20	0.37
SDMH-110	1.12	86.40	Santa Barbara	CN	100-year	5.59	0.57	5.01	5.00	2.90	5.59	2.74	0.00	0.57	5.00	2.90
SDMH-111	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-112	0.12	90.60	Santa Barbara	CN	100-year	5.59	0.49	5.10	5.00	0.31	5.59	2.74	0.00	0.49	5.10	0.31
SDMH-113	0.92	85.00	Santa Barbara	CN	100-year	5.59	0.60	4.98	5.00	2.37	5.59	2.74	0.00	0.60	5.00	2.37
SDMH-115	0.21	95.00	Santa Barbara	CN	100-year	5.59	0.40	5.19	5.00	0.55	5.59	2.74	0.00	0.40	5.20	0.55
SDMH-116	0.21	94.70	Santa Barbara	CN	100-year	5.59	0.40	5.19	5.00	0.55	5.59	2.74	0.00	0.40	5.20	0.55
SDMH-117	0.17	85.30	Santa Barbara	CN	100-year	5.59	0.60	4.99	5.00	0.44	5.59	2.74	0.00	0.60	5.00	0.44
SDMH-118	0.00	0.00	Santa Barbara	CN	100-year	2.69	0.57	2.12	5.00	1.36	2.69	1.84	0.00	0.31	2.40	0.21
SDMH-119	0.20	91.50	Santa Barbara	CN	100-year	5.59	1.22	4.37	5.00	0.48	5.59	2.74	0.00	1.22	4.40	0.48
SDMH-120	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-121	0.89	83.20	Santa Barbara	CN	100-year	5.59	0.64	4.95	5.00	2.29	5.59	2.74	0.00	0.64	4.90	2.29
SDMH-122	0.53	86.30	Santa Barbara	CN	100-year	5.59	0.60	4.98	5.00	3.23	5.59	2.74	0.00	0.58	5.00	1.37
SDMH-123	0.00	0.00	Santa Barbara	CN	100-year	2.69	0.45	2.24	5.00	0.13	2.69	1.84	0.00	0.45	2.20	0.13
SDMH-124	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-125	0.79	85.90	Santa Barbara	CN	100-year	5.59	0.58	5.00	5.00	2.04	5.59	2.74	0.00	0.58	5.00	2.04
SDMH-200	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-201	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-202	0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-203	1.11	91.20	Santa Barbara	CN	100-year	5.59	0.48	5.11	5.00	2.89	5.59	2.74	0.00	0.47	5.10	2.89
SDMH-205	0.16	92.90	Santa Barbara	CN	100-year	5.59	0.44	5.15	5.00	0.42	5.59	2.74	0.00	0.44	5.10	0.42
SDMH-206	0.12	92.10	Santa Barbara	CN	100-year	5.59	0.46	5.13	5.00	0.31	5.59	2.74	0.00	0.46	5.10	0.31
SDMH-207	0.17	87.70	Santa Barbara	CN	100-year	5.59	0.55	5.04	5.00	0.44	5.59	2.74	0.00	0.55	5.00	0.44
SDMH-208	0.10	89.40	Santa Barbara	CN	100-year	5.59	0.51	5.08	5.00	0.26	5.59	2.74	0.00	0.51	5.10	0.26
SDMH-212	0.07	91.50		CN	100-year	5.59	0.47	5.12	5.00	0.18	5.59	2.74	0.00	0.47	5.10	0.18
SDMH-213	0.11	87.90	Santa Barbara	CN	100-year	5.59	0.54	5.04	5.00	0.28	5.59	2.74	0.00	0.54	5.00	0.28
SDMH-214	0.16	86.60	Santa Barbara	CN	100-year	5.59	0.62	4.97	5.00	2.83	5.59	2.74	0.00	0.57	5.00	0.41
SDMH-215	0.09	93.20	Santa Barbara	CN	100-year	5.59	0.43	5.15	5.00	0.23	5.59	2.74	0.00	0.43	5.20	0.23
SDMH-216	0.70	84.80	Santa Barbara	CN	100-year	5.59	0.61	4.98	5.00	1.80	5.59	2.74	0.00	0.61	5.00	1.80
SDMH-217	1.19	99.00	Santa Barbara	CN	100-year	5.59	0.31	5.28	5.00	3.13	5.59	2.74	0.00	0.31	5.30	3.13
SDMH-218	0.00	0.00	Santa Barbara			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-219	0.00	0.00	Santa Barbara	CN	100-year	2.69	0.47	2.22	5.00	0.20	2.69	1.84	0.00	0.47	2.20	0.20
SDMH-220	0.11	88.20		CN	100-year	5.59	0.54	5.05	5.00	0.28	5.59	2.74	0.00	0.54	5.00	0.28
SDMH-221	0.12	93.60	Santa Barbara	CN	100-year	5.59	0.43	5.16	5.00	0.31	5.59	2.74	0.00	0.42	5.20	0.31
SDMH-222	0.18	94.40	Santa Barbara	CN	100-year	5.59	0.41	5.18	5.00	0.47	5.59	2.74	0.00	0.41	5.20	0.47
OUTFALL-01	0.00	0.00	Santa Barbara			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-300	0.00	0.00	Santa Barbara			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-301	0.75	85.00		CN	100-year	5.59	0.60	4.98	5.00	1.93	5.59	2.74	0.00	0.60	5.00	1.93
SDMH-302	0.32	100.00		CN	100-year	5.59	0.00	5.30	5.00	0.84	5.59	2.74	0.00	0.00	5.30	0.84
SDMH-303	0.20	97.60	Santa Barbara	CN	100-year	5.59	0.34	5.25	5.00	0.53	5.59	2.74	0.00	0.34	5.20	0.53

SDMH-304	0.35	97.00	Santa Barbara	CN	100-year	5.59	0.62	4.97	5.00	1.85	5.59	2.74	0.00	0.35	5.20	0.92
SDMH-305	0.98	89.00	Santa Barbara	CN	100-year	5.59	0.52	5.07	5.00	2.54	5.59	2.74	0.00	0.52	5.10	2.54
SDMH-306	0.17	1.00	Santa Barbara	CN	100-year	5.59	2.21	3.38	5.00	0.33	5.59	2.74	0.00	2.21	3.40	0.33
SDMH-307	0.54	92.40	Santa Barbara	CN	100-year	5.59	0.45	5.14	5.00	1.41	5.59	2.74	0.00	0.45	5.10	1.41
SDMH-308	0.39	98.20	Santa Barbara	CN	100-year	5.59	0.33	5.26	5.00	1.02	5.59	2.74	0.00	0.33	5.30	1.02
SDMH-309	0.27	96.60	Santa Barbara	CN	100-year	5.59	0.36	5.23	5.00	0.71	5.59	2.74	0.00	0.36	5.20	0.71
SDMH-310	0.32	100.00	Santa Barbara	CN	100-year	5.59	0.00	5.30	5.00	0.84	5.59	2.74	0.00	0.00	5.30	0.84
SDMH-400	0.00	0.00	Santa Barbara			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-401	0.00	0.00	Santa Barbara	CN	100-year	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SDMH-402	1.17	79.10		CN	100-year	5.59	0.72	4.86	5.00	2.98	5.59	2.74	0.00	0.72	4.90	2.98
SDMH-404	0.16	88.60	Santa Barbara	CN	100-year	5.59	0.53	5.06	5.00	0.41	5.59	2.74	0.00	0.53	5.10	0.41

Appendix C-2
100-Year Storm Hydraulics, XPSWMM Node Table

Node Name	Ground Elevation (Spill Crest, ft)	Invert Elevation (ft)	EGL Relative to Ground (ft)	Node Inflow (ft^3)	Volume of Inflow (ft^3)	Volume of Outflow (ft^3)	Volume of Ponded Flow Stored (ft^3)	Flood Loss (ft^3)	Continuity Error Volume (% of Inflow)	Continuity Error Volume (ft^3)	Continuity Error Volume (% of Node)
SDMH-100	99.65	90.80	-0.37	34707	34706.9	0	2348.8	0	0.011	245.63	0.01
SDMH-101	100.40	91.11	0.39	21324.2	21324.2	0	0	0	0	1.40	0.00
SDMH-104	99.50	91.22	-0.39	25860.2	25860.2	0	2282.5	0	0.003	71.98	0.00
SDMH-105	99.50	91.33	-0.28	0	0	1684553.8	0	1684553.78	0.002	38.79	0.00
SDMH-106	100.35	91.63	-0.02	0	0	0	0	0	0	-6.96	0.00
SDMH-107	105.08	95.06	3.88	64979.5	64979.5	0	0	0	0.005	-105.23	-0.03
SDMH-108	103.71	95.29	2.10	0	0	0	0	0	0.001	15.48	0.01
SDMH-109	103.42	95.49	1.47	2636.3	2636.3	0	0	0	0.001	16.36	0.01
SDMH-110	103.42	95.68	1.17	20371.5	20371.5	0	0	0	0.001	20.56	0.01
SDMH-111	103.93	96.05	1.30	0	0	0	0	0	0	9.87	0.01
SDMH-112	103.33	96.79	0.55	2220.6	2220.6	0	0	0	0	2.96	0.01
SDMH-113	103.48	97.38	0.65	16637.4	16637.3	0	0	0	0	0.92	0.00
SDMH-115	103.51	97.27	0.76	3956	3956	0	0	0	0	-7.74	-0.05
SDMH-116	103.84	97.98	1.04	3951.3	3951.3	0	0	0	0	-3.55	-0.05
SDMH-117	103.32	96.30	0.60	3078.1	3078.1	0	0	0	0.001	15.83	0.01
SDMH-118	103.57	96.55	0.76	0	0	0	0	0	0	10.63	0.01
SDMH-119	103.40	96.68	0.52	3167.8	3167.8	0	0	0	0	9.55	0.01
SDMH-120	103.39	96.85	0.30	0	0	0	0	0	0.001	12.71	0.01
SDMH-121	103.50	98.44	-0.01	15975.3	15975.3	0	54.7	0	0.001	-17.63	-0.06
SDMH-122	102.96	97.28	-0.13	22656.7	22656.7	0	1081.9	0	0.007	-144.50	-0.32
SDMH-123	103.10	97.00	0.04	0	0	0	0	0	0	1.76	0.01
SDMH-124	103.20	97.16	0.12	0	0	0	0	0	0.001	14.41	0.05
SDMH-125	103.30	97.34	0.19	14339.6	14339.6	0	0	0	0	0.05	0.00
SDMH-200	100.52	92.76	0.32	0	0	0	0	0	0.009	-199.80	-0.10
SDMH-201	100.80	94.18	0.04	0	0	0	0	0	0	-2.60	0.00
SDMH-205	102.88	96.64	1.05	2988.6	2988.6	0	0	0	0.001	-22.55	-0.38
SDMH-206	103.39	94.73	1.46	2234.2	2234.2	0	0	0	0.001	23.15	0.02
SDMH-207	102.94	95.08	0.76	3108.7	3108.7	0	0	0	0.001	16.25	0.01
SDMH-208	102.37	95.46	-0.06	1841.4	1841.4	0	0	0	0	-6.52	0.00
SDMH-209	102.82	95.52	0.28	0	0	0	0	0	0.001	15.54	0.01
SDMH-210	102.82	95.70	0.30	1114.4	1114.4	0	0	0	0	0.01	0.00
SDMH-212	102.53	95.63	-0.04	1300.1	1300.1	1175.8	0	1175.844	0	3.17	0.01
SDMH-213	103.28	95.84	0.58	2013.2	2013.2	0	0	0	0	8.17	0.02
SDMH-214	102.80	96.25	-0.05	19853.1	19853.2	0	467.8	0	0.027	-572.12	-1.42
SDMH-215	103.47	95.85	0.55	1683.1	1683.1	0	0	0	0	0.23	0.00
SDMH-216	103.25	96.07	0.17	12648.4	12648.4	0	0	0	0	-1.00	0.00
SDMH-217	103.39	96.50	0.23	22781.2	22781.2	0	0	0	0.001	-30.79	-0.05
SDMH-218	104.13	96.70	0.95	0	0	0	0	0	0	-8.85	-0.06
SDMH-219	103.41	97.09	0.24	0	0	0	0	0	0	-6.21	-0.15
SDMH-220	103.09	97.47	-0.08	2015.6	2015.6	0	447.9	0	0	-2.62	-0.07
SDMH-221	103.41	96.96	0.17	2247.8	2247.8	-1.4	0	0	0	-2.62	-0.02
SDMH-222	103.51	97.58	0.23	3382.7	3382.7	0	0	0	0	-1.89	-0.03

OUTFALL-01	100.40	90.00	1.47	5721.8	0	186184.9	0	0	0.008	-165.88	-0.05
SDMH-300	100.55	90.22	1.18	0	0	0	0	0	0.011	-234.90	-0.07
SDMH-301	100.04	90.40	0.56	13563.1	13563.1	0	0	0	0.021	449.41	0.27
SDMH-302	99.91	90.73	0.32	6150.6	6150.6	0	0	0	0.004	-95.25	-0.12
SDMH-303	99.91	91.18	0.20	3807.3	3807.3	0	0	0	0.002	-36.58	-0.05
SDMH-304	99.80	91.74	0.03	13134.6	13134.7	0	0	0	0.009	-192.80	-0.31
SDMH-305	100.10	92.12	0.29	18016.4	18016.4	0	0	0	0.001	-20.75	-0.06
SDMH-306	99.86	90.86	0.35	2086	2086	0	0	0	0.009	182.49	0.31
SDMH-307	99.79	91.33	0.22	10066.1	10066.1	0	0	0	0.003	59.35	0.11
SDMH-309	99.61	92.40	0.00	5119.3	5119.3	0	25.1	0	0.006	-129.77	-0.58
SDMH-310	99.74	92.89	0.13	6150.6	6150.6	0	0	0	0.001	-23.64	-0.19
SDMH-400	100.00	90.42	-0.05	0	0	0	4158.8	0	0.033	-708.69	-0.18
SDMH-401	100.24	90.40	-0.32	0	0	0	804.6	0	0	-4.82	-0.01
SDMH-402	101.50	91.40	0.48	20645.2	20645.3	0	0	0	0	0.86	0.00
SDMH-403	99.60	96.46	0.00	0	0	279069.3	0	279069.324	0	7.14	0.00
SDMH-404	100.52	96.55	0.56	2936.6	2936.6	0	0	0	0	2.71	0.05

Appendix C-3
100-Year Storm Hydraulics, XPSWMM Link Table

Link Name	Upstream Node Name	Downstream Node Name	Diameter (ft)	Road Depth (ft)	Length (ft)	Conduit/ Road Slope	Roughness	Ground Elev (US, ft)	Ground Elev (DS, ft)	Invert Elev (US, ft)	Invert Elev (DS, ft)	Max Water Elev (US, ft)	Max Water Elev (DS, ft)	Freeboard (US, ft)	Freeboard (DS, ft)	Max Flow (cfs)	Time to Peak (hr)	Max Velocity (ft/s)	Max Depth (ft)	Max d/D (depth/dia)
SD-100	SDMH-101	SDMH-100	1.75		42.5	0.73%	0.013	100.40	99.65	91.11	90.80	100.01	99.99	0.39	-0.34	3.04	12.10	1.20	9.19	5.25
SD-105	SDMH-105	SDMH-104	3.5		56.6	0.19%	0.013	99.50	99.50	91.33	91.22	99.50	99.83	0.00	-0.33	-20.88	12.40	-2.10	8.62	2.46
SD-106	SDMH-106	SDMH-105	2.5		42.6	0.70%	0.013	100.35	99.50	91.63	91.33	100.09	99.50	0.26	0.00	21.06	12.10	4.20	8.46	3.38
SD-107	SDMH-107	SDMH-106	2.5		171.3	2.00%	0.014	105.08	100.35	95.06	91.63	101.01	100.09	4.07	0.26	21.06	12.10	4.30	8.46	3.38
SD-108	SDMH-108	SDMH-107	2		68.8	0.33%	0.013	103.71	105.08	95.29	95.06	101.42	101.01	2.29	4.07	11.55	12.10	3.60	6.13	3.06
SD-109	SDMH-109	SDMH-108	2		57.9	0.35%	0.013	103.42	103.71	95.49	95.29	101.77	101.42	1.65	2.29	11.51	12.10	3.60	6.28	3.14
SD-110	SDMH-110	SDMH-109	2		57.4	0.33%	0.013	103.42	103.42	95.68	95.49	102.16	101.77	1.27	1.65	11.19	12.10	3.50	6.47	3.24
SD-111	SDMH-111	SDMH-110	2		108.6	0.34%	0.013	103.93	103.42	96.05	95.68	102.56	102.16	1.37	1.27	9.26	12.20	2.90	6.51	3.26
SD-112	SDMH-112	SDMH-111	1.25		37.2	1.99%	0.013	103.33	103.93	96.79	96.05	102.72	102.56	0.61	1.37	2.67	12.10	2.10	6.51	5.21
SD-113	SDMH-113	SDMH-112	1.25		29.2	2.02%	0.013	103.48	103.33	97.38	96.79	102.83	102.72	0.65	0.61	2.36	12.10	1.90	5.93	4.75
SD-115	SDMH-115	SDMH-111	1		125.6	0.97%	0.013	103.51	103.93	97.27	96.05	102.75	102.56	0.77	1.37	1.09	12.10	1.40	6.51	6.51
SD-116	SDMH-116	SDMH-115	1		143.0	0.50%	0.013	103.84	103.51	97.98	97.27	102.81	102.75	1.04	0.77	0.55	12.10	0.70	5.48	5.48
SD-117	SDMH-117	SDMH-111	1.75		73.2	0.34%	0.013	103.32	103.93	96.30	96.05	102.69	102.56	0.64	1.37	7.23	12.30	3.00	6.51	3.72
SD-118	SDMH-118	SDMH-117	1.75		72.5	0.34%	0.013	103.57	103.32	96.55	96.30	102.78	102.69	0.79	0.64	7.03	12.30	2.90	6.39	3.65
SD-119	SDMH-119	SDMH-118	1.75		39.2	0.33%	0.013	103.40	103.57	96.68	96.55	102.85	102.78	0.55	0.79	7.02	12.30	2.90	6.23	3.56
SD-120	SDMH-120	SDMH-119	1.75		50.0	0.34%	0.013	103.39	103.40	96.85	96.68	103.00	102.85	0.40	0.55	6.80	12.30	2.80	6.17	3.53
SD-120	SDMH-120	SDMH-119		0.5	50.0	-0.02%	0.025	103.39	103.40	96.85	96.68	103.00	102.92	0.40	0.55	0.00	12.10	0.10	0.10	0.20
SD-121	SDMH-121	SDMH-120	1		118.8	1.34%	0.013	103.50	103.39	98.44	96.85	103.51	103.00	-0.01	0.40	2.15	12.00	2.70	6.15	6.15
SD-122	SDMH-122	SDMH-120	1.5		86.4	0.50%	0.013	102.96	103.39	97.28	96.85	103.09	103.00	-0.13	0.40	4.30	12.30	2.40	6.15	4.10
SD-122	SDMH-122	SDMH-120		0.5	86.4	-0.50%	0.025	102.96	103.39	97.28	96.85	103.09	103.09	-0.13	0.40	0.87	12.10	0.20	0.63	1.26
SD-123	SDMH-123	SDMH-120	1.25		43.1	0.35%	0.013	103.10	103.39	97.00	96.85	103.06	103.00	0.04	0.40	2.13	12.20	1.70	6.15	4.92
SD-123	SDMH-123	SDMH-120		0.5	43.1	-0.88%	0.025	103.10	103.39	97.00	96.85	103.06	103.06	0.04	0.40	0.54	12.10	0.10	0.55	1.11
SD-124	SDMH-124	SDMH-123	1		49.6	0.32%	0.013	103.20	103.10	97.16	97.00	103.08	103.06	0.12	0.04	1.59	12.40	2.00	6.06	6.06
SD-124	SDMH-124	SDMH-123		0.5	49.6	0.26%	0.025	103.20	103.10	97.16	97.00	103.08	103.06	0.12	0.04	1.58	12.10	0.60	0.55	1.11
SD-125	SDMH-125	SDMH-124	1		52.1	0.35%	0.013	103.30	103.20	97.34	97.16	103.11	103.08	0.19	0.12	1.34	11.90	1.70	5.92	5.92
SD-125	SDMH-125	SDMH-124		0.5	52.1	0.23%	0.025	103.30	103.20	97.34	97.16	103.11	103.08	0.19	0.12	1.22	12.10	0.60	0.44	0.87
SD-200	SDMH-200	SDMH-300	2		112.3	2.00%	0.013	100.52	100.55	92.76	90.22	99.73	100.18	0.79	1.31	9.28	12.10	2.90	9.66	4.83
SD-201	SDMH-201	SDMH-200	1		89.7	0.30%	0.013	100.80	100.52	94.18	92.76	100.53	99.73	0.27	0.79	2.99	12.10	3.70	6.35	6.35
SD-201	SDMH-201	SDMH-200	1		89.7	0.30%	0.013	100.80	100.52	94.18	92.76	100.53	99.73	0.27	0.79	2.99	12.10	3.70	6.35	6.35
SD-201	SDMH-201	SDMH-200	1		89.7	0.30%	0.013	100.80	100.52	94.18	92.76	100.53	99.73	0.27	0.79	2.99	12.10	3.70	6.35	6.35
SD-201	SDMH-201	SDMH-200		0.4	89.7	0.31%	0.025	100.80	100.52	94.18	92.76	100.53	100.20	0.27	0.79	0.38	12.10	0.50	0.13	0.33
SD-202	SDMH-202	SDMH-201	1.75		108.7	0.29%	0.013	104.08	100.80	94.50	94.18	101.14	100.53	2.94	0.27	9.30	11.90	3.80	6.64	3.79
SD-203	SDMH-203	SDMH-202	1.75		49.4	0.30%	0.013	104.04	104.08	94.65	94.50	101.67	101.14	2.37	2.94	9.30	11.90	3.80	7.02	4.01
SD-205	SDMH-205	SDMH-203	1		98.7	1.00%	0.013	102.88	104.04	96.64	94.65	101.83	101.67	1.05	2.37	0.42	12.10	1.30	6.02	6.02
SD-206	SDMH-206	SDMH-203	1.75		27.1	0.30%	0.013	103.39	104.04	94.73	94.65	101.85	101.67	1.54	2.37	7.25	12.30	3.00	7.12	4.07
SD-207	SDMH-207	SDMH-206	1.75		116.9	0.30%	0.013	102.94	103.39	95.08	94.73	102.10	101.85	0.84	1.54	7.10	12.30	2.90	7.12	4.07
SD-208	SDMH-208	SDMH-207	1.75		123.6	0.31%	0.013	102.37	102.94	95.46	95.08	102.36	102.10	0.02	0.84	6.90	12.30	2.80	7.02	4.01
SD-209	SDMH-209	SDMH-208	1.75		19.8	0.30%	0.013	102.82	102.37	95.52	95.46	102.46	102.36	0.37	0.02	6.78	12.30	2.80	6.94	3.96
SD-210	SDMH-210	SDMH-209	1		42.8	0.42%	0.013	102.82	102.82	95.70	95.52	102.53	102.46	0.30	0.37	0.23	12.40	-0.60	6.94	6.94
SD-212	SDMH-212	SDMH-209	1.25		38.1	0.29%	0.013	102.53	102.82	95.63	95.52	102.53	102.46	0.00	0.37	3.76	12.40	3.00	6.94	5.55
SD-213	SDMH-213	SDMH-212	1.25		71.5	0.29%	0.013	103.28	102.53	95.84	95.63	102.68	102.53	0.60	0.00	3.68	12.40	2.90	6.90	5.52
SD-214	SDMH-214	SDMH-213	1.25		134.2	0.31%	0.014	102.80	103.28	96.25	95.84	102.85	102.68	-0.05	0.60	3.57	12.40	2.80	6.84	5.47
SD-214	SDMH-214	SDMH-213		0.5	134.2	-0.36%	0.025	102.80	103.28	96.25	95.84	102.85	102.85	-0.05	0.60	0.03	12.10	0.00	0.55	1.09
SD-216	SDMH-216	SDMH-215	1.5		43.9	0.50%	0.013	103.25	103.47	96.07	95.85	103.06	102.82	0.19	0.65	4.59	12.10	2.50	6.99	4.66
SD-216	SDMH-216	SDMH-215		0.5	43.9	-0.50%	0.025	103.25	103.47	96.07	95.85	103.06	103.03	0.19	0.65	0.07	12.10	0.20	0.28	0.55
SD-217	SDMH-217	SDMH-216	1.5		87.0	0.49%	0.013	103.39	103.25	96.50	96.07	103.16	103.06	0.23	0.19	3.23	12.30	1.80	6.99	4.66
SD-217	SDMH-217	SDMH-216		0.5	87.0	0.16%	0.025	103.39	103.25	96.50	96.07	103.16	103.06	0.23	0.19	1.04	12.10	0.50	0.31	0.62
SD-218	SDMH-218	SDMH-217	1.5		38.2	0.52%	0.013	104.13	103.39	96.70	96.50	103.17	103.16	0.96	0.23	1.67	12.30	-1.20	6.66	4.44
SD-219	SDMH-219	SDMH-218	1.5		39.3	0.99%	0.013	103.41	104.13	97.09	96.70	103.17	103.17	0.24	0.96	1.31	12.30	0.80	6.47	3.70
SD-220	SDMH-220	SDMH-219	1.5		37.8	1.00%	0.013	103.09	103.41	97.47	97.09	103.17	103.17	-0.08	0.24	1.29	12.30	1.20	6.08	3.48
SD-221	SDMH-221	SDMH-218	1		85.8	0.30%	0.013	103.41	104.13	96.96	96.70	103.24	103.17	0.17	0.96	0.78	12.10	1.10	6.47	6.47
SD-222	SDMH-222	SDMH-221	1		123.6	0.50%	0.013	103.51	103.41	97.58	96.96	103.28	103.24	0.23	0.17	0.47	12.10	1.20	6.28	6.28
SD-300	SDMH-300	OUTFALL-01	2.5		73.3	0.30%	0.013	100.55	100.40	90.22	90.00	100.18	98.50	1.31	1.90	-36.65	0.00	-7.40	9.96	3.98
SD-301	SDMH-301	SDMH-300	2.5		60.0	0.30%	0.013	100.04	100.55	90.40	90.22	99.44	100.18	0.60	1.31	31.66	0.00	6.40	9.96	3.98
SD-302	SDMH-302	SDMH-301	2		65.2	0.51%	0.013	99.91	100.04	90.73	90.40	99.53	99.44	0.38	0.60	-20.18	0.00	-6.30	9.04	4.52
SD-303	SDMH-303	SDMH-302	1.75		89.1	0.51%	0.013	99.91	99.91	91.18	90.73	99.69	99.53	0.22	0.38	4.23	12.10	1.70	8.80	5.03

SD-303	SDMH-303	SDMH-302		0.4	89.1	0.00%	0.025	99.91	99.91	91.18	90.73	99.69	99.59	0.22	0.38	0.13	12.10	0.20	0.18	0.45
SD-304	SDMH-304	SDMH-303	1.75		111.1	0.50%	0.013	99.80	99.91	91.74	91.18	99.76	99.69	0.04	0.22	-5.39	0.00	-2.20	8.51	4.86
SD-304	SDMH-304	SDMH-303		0.4	111.1	-0.10%	0.025	99.80	99.91	91.74	91.18	99.76	99.70	0.04	0.22	1.05	12.10	0.30	0.30	0.76
SD-305	SDMH-305	SDMH-304	1.75		75.1	0.51%	0.013	100.10	99.80	92.12	91.74	99.81	99.76	0.29	0.04	-16.80	0.00	-7.00	8.02	4.58
SD-305	SDMH-305	SDMH-304		0.4	75.1	0.40%	0.025	100.10	99.80	92.12	91.74	99.81	99.76	0.29	0.04	0.10	12.10	0.20	0.36	0.91
SD-306	SDMH-306	SDMH-301	2.5		34.6	0.49%	0.013	99.86	100.04	90.86	90.40	99.49	99.44	0.37	0.60	-44.71	0.00	-9.00	8.75	3.50
SD-307	SDMH-307	SDMH-306	1.5		93.0	0.51%	0.013	99.79	99.86	91.33	90.86	99.57	99.49	0.22	0.37	-12.37	0.00	-5.20	8.63	4.93
SD-307	SDMH-307	SDMH-306		0.4	93.0	-0.08%	0.025	99.79	99.86	91.33	90.86	99.57	99.53	0.22	0.37	0.07	12.10	0.10	0.14	0.34
SD-308	SDMH-308	SDMH-307	1.75		92.3	0.50%	0.013	99.73	99.79	91.79	91.33	99.60	99.57	0.13	0.22	-10.03	0.10	-4.10	8.24	4.71
SD-308	SDMH-308	SDMH-307		0.4	92.3	-0.07%	0.025	99.73	99.79	91.79	91.33	99.60	99.57	0.13	0.22	0.35	12.10	0.20	0.24	0.59
SD-309	SDMH-309	SDMH-308	1.75		122.6	0.50%	0.013	99.61	99.73	92.40	91.79	99.61	99.60	0.00	0.13	-10.16	0.10	-4.20	7.81	4.46
SD-309	SDMH-309	SDMH-308		0.4	122.6	-0.10%	0.025	99.61	99.73	92.40	91.79	99.61	99.60	0.00	0.13	0.72	12.20	0.20	0.39	0.97
SD-310	SDMH-310	SDMH-309	1.75		97.7	0.50%	0.013	99.74	99.61	92.89	92.40	99.61	99.61	0.13	0.00	-3.19	0.10	-1.50	7.21	4.12
SD-310	SDMH-310	SDMH-309		0.4	97.7	0.13%	0.025	99.74	99.61	92.89	92.40	99.61	99.61	0.13	0.00	0.14	12.10	0.10	0.40	1.00
SD-400	SDMH-401	EX-SDMH-02	1		40.4	0.20%	0.013	100.24	100.00	90.40	90.32	100.38	100.04	-0.14	-0.04	2.17	12.10	2.60	9.98	9.98
SD-401	SDMH-402	SDMH-401	1		50.0	2.00%	0.013	101.50	100.24	91.40	90.40	101.02	100.38	0.48	-0.14	2.98	12.10	3.60	9.98	9.98
SD-403	SDMH-403	EX-SDMH-05	1		10.0	0.30%	0.013	99.60	99.77	96.46	92.00	99.60	100.06	0.00	-0.29	-3.14	12.10	-3.90	3.63	3.63
SD-404	SDMH-404	SDMH-403	1		30.0	0.30%	0.013	100.52	99.60	96.55	96.46	99.96	99.60	0.56	0.00	0.41	12.10	0.50	3.41	3.41

APPENDIX H

(NOT USED)

APPENDIX I

Sea Level Rise Adaptation Strategy, September 6, 2016

moffatt & nichol

2185 N. California Blvd. Suite 500
Walnut Creek, CA 94596

(925) 944-5411
www.moffattnichol.com

MEMORANDUM

To: **Jon Knorpp, Managing Director**

From: **Christopher Devick P.E. and Dilip Trivedi P.E.**

Date: **September 06, 2016**

Subject: **Mission Rock Development Seawall Lot 337**
Sea Level Rise Adaptation Strategy

M&N Job No.: **7530-02**

This memorandum serves to summarize the present understanding of sea level rise projections being used by regulatory agencies, flood elevations proposed by Federal Emergency Management Agency (FEMA), minimum proposed grades and a proposed adaptation strategy for the Mission Rock Development Project in San Francisco, CA.

Sea Level Rise Projections

In March 2013, the Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT) released their State of California Sea-Level Rise Guidance Document based on the recently published (June 2012) National Academy of Sciences (NAS) Sea-Level Rise for the Coasts of California, Oregon, and Washington. Table 1 summarizes the sea level rise (SLR) projections, including the low and high range values, for the San Francisco Bay area. Further, the CO-CAT guidance recommends that sea level rise values for planning be selected based on risk tolerance and adaptive capacity.

Table 1 Sea Level Rise Projections for San Francisco, California (feet; NAS 2012 Report)

Year	Projections	Ranges
2030	6 ± 2 in	2 to 12 in
2050	11 ± 4 in	5 to 24 in
2100	36 ± 10 in	17 to 66 in

Reference Water levels

Water levels used in developing the sea level rise strategy included the Base Flood Elevation for the development areas, and King Tide for China Basin Park as described below.

The *Base Flood Elevation* (BFE) is a regulatory standard for insurance purposes. The definition of the BFE, per FEMA, is *"The flood having a one percent chance of being equaled or exceeded in any given year."* Since development areas with building structures are subject to flood plain ordinance review by City building permit officials, the BFE is an appropriate reference water level to use for establishing finish floor elevations. The BFE can be represented by the 1% still water level, which was estimated based on

work conducted by BakerAECOM[1] for a flood study of the Central Bay region that included the vicinity of the proposed project.

King tide is a colloquial term for an especially high tide, such as a perigean spring tide that occur when the gravitational pull of the sun and the moon are in alignment. They occur only a few times a year and therefore are a good indicator for the potential disruption of use for areas such as open space and park areas. The elevation representative of a king tide was estimated based on a review of tidal elevation observations at the National Oceanographic and Atmospheric Administration Alameda, CA tide gauge. The estimated BFE and King Tide for the Project site are provided in Table 2.

Table 2: King Tide and Base Flood Elevations

Water Level	NAVD88, feet	Old City Datum, feet	Mission Bay Datum, feet
King Tide	7.3	-4.0	96.0
Base Flood Elevation (1% Still Water Level)	9.8	-1.5	98.5

Proposed Minimum Grades

The proposed minimum grades were developed for the project based on the following criteria:

- Reserve the entire 100-foot shoreline band for public access;
- Elevate buildings and immovable facilities high enough such that adaptations would not be necessary even for conservative estimates of SLR;
- Rather than elevate the zone between the development area and the shoreline for flood protection, maximize access opportunities to the water.

Based on these criteria, the following design elements have been adopted:

1. For the development area, the proposed strategy will raise existing grades to a minimum elevation of 104 feet Mission Bay Datum (MBD), which will provide a minimum of 5.5 feet (66 inches) of freeboard above present day BFE. Streets placed on fill would be pile supported within the raised development grade. This is necessitated by geotechnical considerations.
2. For the China Basin Park area, the promenade and Bay Trail are proposed to be raised to elevation 102 feet MBD which will provide approximately 6 feet of freeboard above the King Tide (or 3.5 feet of freeboard above present day BFE). Proposed grading for the Park includes transitioning from BayTrail/Promenade elevations of 102 MBD to development grade elevations of 104 feet MBD.

[1] BakerAECOM. 2012. A Central San Francisco Bay Coastal Flood Hazard Study San Francisco County, California Study Report. November 2, 2012.

3. The shoreline, Pier 48, Pier 50, Terry A. Francois Boulevard, 3rd Street and Mission Rock Street will remain at current elevations; proposed grading includes transitioning from these locations to Bay Trail/Promenade elevations of 102 feet MBD.

The above set of criteria and proposed grades are based on the principles of 'living with the Bay' and 'managed retreat' rather than elevating shoreline spaces now against future SLR. It also implies that the proposed improvements along the shoreline are for the purpose of flood protection for the open space area and do not serve as a levee or flood protection element for the developed area.

Shoreline Adaptation Strategy

In the development footprint, the proposed minimum grades (104 MBD) provide an elevation which will address potential flooding for even the highest estimates of sea level rise in 2100 for the San Francisco Bay Area by the NRC. Therefore, based on current sea level rise projections, the earliest when adaptions for the development area may be needed is 2100.

For the space between the development area and the Bay Trail/Promenade, proposed minimum grades (102 MBD) will address potential flooding beyond 2080 for even the highest estimates of sea level rise. From a functional perspective, the proposed grades (102 MBD, or 6 feet above King Tide) will address potential future flooding from King Tide events even beyond 2100. For higher estimates of sea level rise, the China Basin Park area functions as the space where future adaptations could be creatively implemented to maintain flood protection for the constructed public access features. Strategies to address larger amounts of sea level rise may include modifications to raise the promenade and reconfiguring the shoreline protection to provide flatter slopes and wave breaks. This will ensure continued protection of the public access open space areas from flooding.

In general, adaptation actions at the shoreline would be implemented when published information from NOAA indicate that flooding to the public access areas will occur during king tides. To implement future adaptions for sea level rise for the Park Area, a fund from an infrastructure financing district or community facilities district could be established now for the improvements needed to address sea level rise greater than the 3.5 feet (42 inches) allowance that is included in the proposed grades.

APPENDIX J

Low Pressure Water Master Plan

Mission Rock Redevelopment

Low Pressure Water System Master Plan

September 19, 2016

BkF ENGINEERS SURVEYORS PLANNERS
100+ YEARS

150 California Street, Suite 650
San Francisco, CA 94111
415.930.7900

Prepared by Statement

This Low Pressure Water System Master Plan for the Mission Rock Redevelopment has been prepared by BKF Engineers under the direction of Mr. Todd Michael Adair, P.E., Principal/Vice President.

TABLE OF CONTENTS

SECTION 1: INTRODUCTION AND PROJECT DESCRIPTION 1
1.1 Project Overview 1
1.2 Existing Conditions 1
1.3 Proposed Conditions 1
1.4 Project Datum 1
Section 1 Figures 2

SECTION 2: LOW PRESSURE WATER SYSTEM PLANNING 3
2.1 Low Pressure Water System Overview and Supply 3
2.2 Existing Low Pressure Water System Layout 3
2.3 Low Pressure Water System Design Criteria 3
2.3.1 Demands 4
2.3.2 Clearance Requirements 5
2.4 Proposed Low Pressure Water System Layout 6
2.4.1 Proposed Fire Hydrant Locations 6
Section 2 Figures 7

SECTION 3: LOW PRESSURE WATER SYSTEM MODEL DEVELOPMENT 8
3.1 Low Pressure Water System Model Water Demands 8
3.1.1 Average Day Demand 8
3.1.2 Maximum Day Demand 8
3.1.3 Peak Hour Demand 8
3.1.4 Fire Flow Demand 9
3.1.1 Project Water Demand Summary 9
3.2 Low Pressure Water System Model Boundary Conditions 10

SECTION 4: LOW PRESSURE WATER SYSTEM MODEL ANALYSIS 11
4.1 Low Pressure Water System Model Scenarios 11
Section 4 Figures 12

SECTION 5: LOW PRESSURE WATER SYSTEM MODEL SCENARIO RESULTS 13
5.1 Proposed Low Pressure Water System Model Results 13

FIGURES

Section 1 Figures

Figure 1.1 – Project Location
Figure 1.2 – Project Site Layout

Section 2 Figures

Figure 2.1 – Existing Low Pressure Water System
Figure 2.2 – Proposed Low Pressure Water System

Section 4 Figures

Figure 4.1 – Proposed Low Pressure Water Model Pipe and Node Identification

APPENDICES

Appendix A – Mission Rock Land Use and Occupancy

Appendix B – Low Pressure Water System Demand Calculations

Appendix C – California Fire Code Appendix B

Appendix D – Model Demand Scenarios
Appendix D-1 - Model Demand Scenario: Static
Appendix D-2 - Model Demand Scenario: Peak Hour Demand
Appendix D-3 - Model Demand Scenario: Maximum Day Demand and Fire Flow

Appendix E – SFFD Field Flow Test

Appendix F – San Francisco Planning Department Memorandum: "Projections of Growth 2015-2035" January 2013 included in the 2013 SFPUC Water Availability Study

SECTION 1: INTRODUCTION AND PROJECT DESCRIPTION

1.1 Project Overview

The Mission Rock Redevelopment ("The Project") is located within the City and County of San Francisco, along the eastern border of San Francisco within District 9 Mission Bay. The site is bounded by 3rd Street to the west, Mission Rock Street to the south and McCovey Cove to the north and San Francisco Bay ("Bay") to the east. The Project comprises a mixed-use community including residential, retail, community use, research and development, and parks and recreational open space. Figure 1.1 illustrates the regional location of the Project.

1.2 Existing Conditions

The Project is approximately 28 acres in size. The Project includes the San Francisco Giants Parking Lot A, Pier 48, China Basin Park, the Marginal Wharf, Terry A Francois Boulevard, and a portion of Parcel P20 of the Mission Bay Development. Until the San Francisco Giants Parking Lot A was constructed in 2000, the parking lot was a former warehouse and storage lot. China Basin Park was formerly a warehouse and storage lot until the park was completed in 2003.

1.3 Proposed Conditions

The Project comprises eleven development parcels ranging from half an acre to almost two acres. These will include 1.1 million to 1.6 millsion gsf of residential uses, 972,000 to 1.4 million gsf of commercial uses, and 241,000 to 245,000 gsf of retail uses on the ground floor of each development parcel, and associated parking garages. The Project will also include a grid of new public streets and a redeveloped China Basin Park. The proposed Project site plan is shown in Figure 1.2.

1.4 Project Datum

Elevations referred to herein are on the MB Datum. The "MB Datum" is defined as the Mission Bay Datum which is the Old City of San Francisco Datum plus one hundred feet.

Section 1 Figures

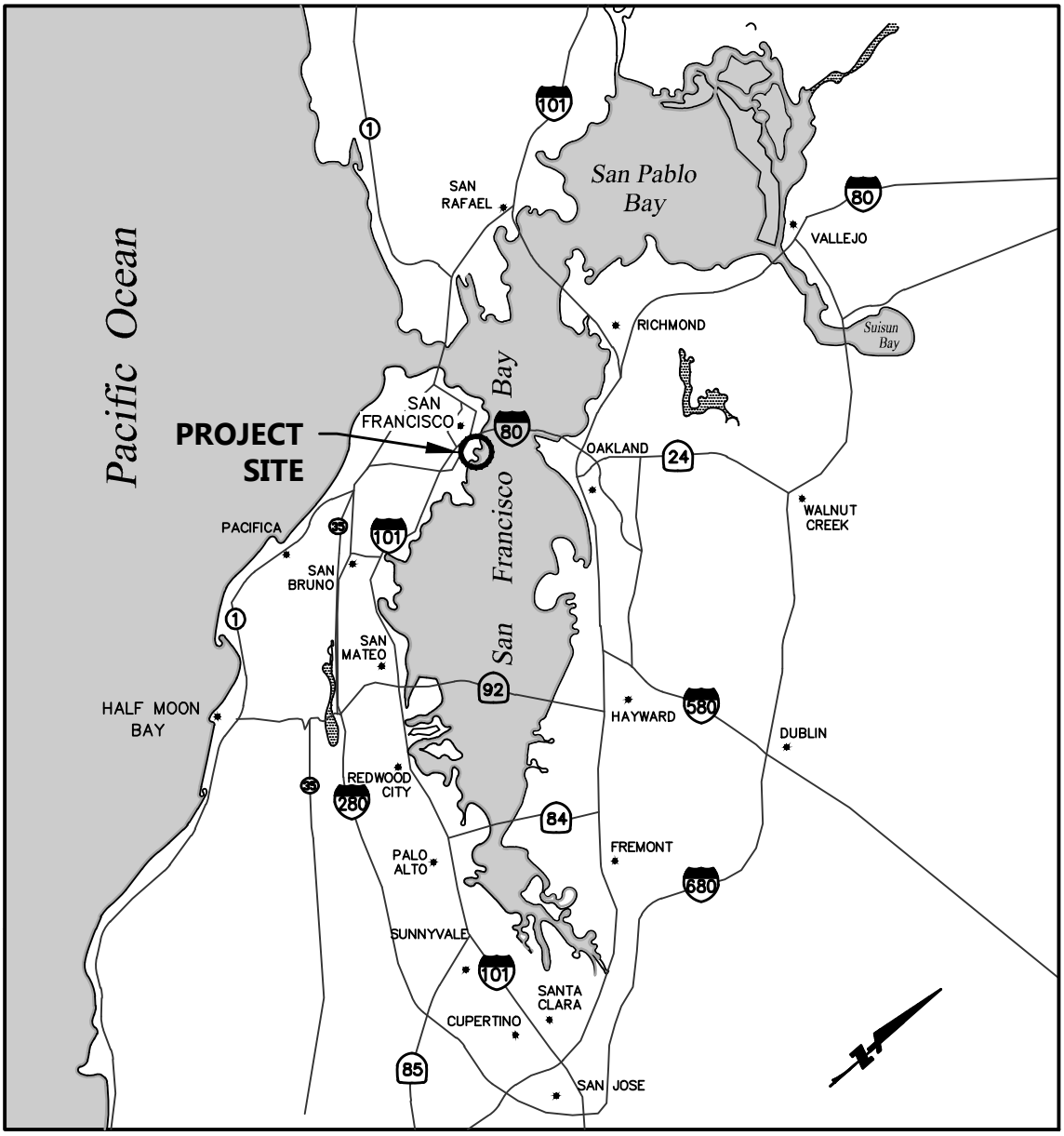


FIGURE 1.1 PROJECT LOCATION

©BKF Engineers

PIER 48

CHANNEL WHARF

PIER 50

TERRY A FRANCOIS BOULEVARD

BLOCK K

BLOCK J

CHANNEL LANE

BLOCK I

BLOCK H

CHINA BASIN

CHINA BASIN PARK

EXPOSITION STREET

BRIDGEVIEW STREET

LONG BRIDGE STREET

MISSION ROCK STREET

BLOCK G

BLOCK F

MISSION ROCK SQUARE

BLOCK E

BLOCK D

SHARED PUBLIC WAY

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

3rd STREET

CHANNEL STREET

GRAPHIC SCALE

100 0 100

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
LOW PRESSURE WATER MASTER PLAN

FIGURE 1.2
PROJECT SITE LAYOUT

DRAWING NAME: K:\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Low Pressure Water\Figure 1.2 Project Site Layout.dwg
PLOT DATE: 08-31-16
PLOTTED BY: hdj

SECTION 2: LOW PRESSURE WATER SYSTEM PLANNING

2.1 Low Pressure Water System Overview and Supply

The low pressure water system will be designed and constructed by the Developer, then owned and operated by the SFPUC upon completion of construction and acceptance of improvements by the SFPUC. The design of the low pressure water system is based on the design criteria established in the 2015 City of San Francisco Subdivision Regulations. The low pressure water system will serve the potable water demands and the fire flow demands for the Project.

The Project has also been accounted for in the SFPUC's latest City-wide demand projections provided in its 2013 Water Availability Study. Appendix A of the 2013 Water Availability Study included proposed and entitled projects. This document is included as Appendix F. Therefore, the Project will not require major expansion of the existing public water system serving the site. PUC

2.2 Existing Low Pressure Water System Layout

Potable water is supplied to the Project by the San Francisco Public Utilities Commission (SFPUC) through an existing 12-inch diameter steel pipe in 3rd Street. Currently, a waterline runs underneath Terry A Francois Boulevard and connects 3rd Street to Mission Rock Street, serving fire hydrants and Piers 48 and 50. The existing low pressure water mains adjacent to the site are shown in Figure 2.1.

2.3 Low Pressure Water System Design Criteria

The design criteria used for the development of the low pressure water model is based on established industry operations standards and regulatory agency requirements.

The low pressure water system will be designed and constructed in accordance with the City Distribution Division (CDD) Standard Plans and Specifications and to applicable City, State, and Federal codes and standards unless otherwise permitted. The low pressure water facilities will be located within the public right-of-way to allow for access and maintenance of facilities.

Low pressure water system design criteria are presented in Table 2.1.

Table 2.1
Low Pressure Water System Design Criteria

Parameter	Value
Pipe size	Pipe diameters of 12 inches shall be used for all distribution and feeder mains.
Pipe Material	Ductile Iron
Hazen Williams C-value for proposed pipes	130
Maximum static pressure	100 psi
Maximum velocity during PHD	8 fps
Minimum pressure during PHD	40 psi
Maximum velocity during MDD+FF	12 fps
Minimum system pressure during MDD+FF	20 psi

NOTES:
fps – feet per second
psi – pounds per square inch
gpm – gallons per minute

2.3.1 Demands

The design criteria are dependent on the demand scenario. Table 2.2 presents the low pressure water system demand and peaking factor for the demand scenario.

Table 2.2
Low Pressure Water System Demand and Peaking Factor

Parameter	Value
Domestic Water Demand	Varies by use, summarized in Table 3.1
Fire Flow Demands (FF)	1,875 gpm for 3 hours (Per 2013 CFC B105.2)
Maximum Day Demand (MDD)	MDD = 1.6 ADD
Peak Hour Demand (PHD)	PHD = 2.4 ADD

NOTE:
ADD – Average Day Demand
gpm – gallons per minute

2.3.2 Clearance Requirements

Vertical and horizontal separation distances between adjacent separated sewer system, potable water, and dry utilities will conform to the requirements outlined in Title 22 of the California Code of Regulations and the State of California Department of Health Services Guidance Memorandum 2003-02. Required disinfection and connections to new mains will be performed by the SFPUC. Low pressure water system clearance requirements are presented in Table 2.3.

Table 2.3
Low Pressure Water System Clearance Requirements

Parameter	Distance
Outside Diameter of Sanitary Sewer Pipe to Outside Diameter of Low Pressure Water Pipe	10 feet minimum horizontal clearance
Face of Curb to Outside Diameter of Low Pressure Water Pipe	4.5 feet minimum horizontal clearance
Dry Utilities to Outside Diameter of Low Pressure Water Pipe	3 feet minimum horizontal clearance
Center of Fire Hydrants to Face of Curb	24 inches – 27 inches
Tree Trunk to Outside Diameter of Low Pressure Water Pipe	5 feet minimum horizontal clearance

NOTE:
Clearance requirements which cannot be met due to bulb-outs and narrow street widths or proximity to existing utilities will be evaluated on a case by case basis by the SFPUC and will be addressed during the construction document approval process.

2.4 Proposed Low Pressure Water System Layout

Along 3rd Street and Terry A Francois Boulevard, two new water connections are proposed at Exposition Street and Long Bridge Street to provide an on-site looped system.

The existing line which loops around the site through Terry A Francois Boulevard will be removed and replaced to accommodate the reconstruction of Terry A Francois Boulevard.

Final water system infrastructure designs for improvements within the new project streets will be submitted to the SFPUC for approval as part of the construction documents.

The proposed low pressure water system is shown in Figure 2.2.

2.4.1 Proposed Fire Hydrant Locations

Proposed fire hydrants will be located at a maximum radial separation of 150 feet between hydrants. In addition, building fire department connections will be located within 100-feet of a fire hydrant. Final hydrant locations are subject to the approval of the SFFD, Port Fire Marshal, and SFPUC and will be located outside of the curb returns per DPW Order 175,387, where feasible. If fire hydrants are required within the curb returns to meet SFFD and Port Fire Marshal requirements, the Project will work with the SFPUC and SFDPW to request an exception per Sections VI and VII of DPW Oder 175,387.

Section 2 Figures

©BKF Engineers

PIER 48

PIER 50

TERRY A FRANCOIS BOULEVARD

EXISTING WATER MAIN TO BE REMOVED

EXISTING WATER MAIN TO BE REMOVED

EXISTING WATER LINES TO BE REMOVED

CHINA BASIN

CHINA BASIN PARK

EXISTING WATER LINE TO BE REMOVED

EXISTING 12" WATER MAIN

EXISTING 12" WATER MAIN

EXISTING 12" WATER MAIN

MISSION ROCK STREET

3rd STREET

CHANNEL STREET

GRAPHIC SCALE

100 0 100

LEGEND

- EXISTING PARCEL BOUNDARIES
- EXISTING WATER MAIN
- EXISTING WATER MAIN TO BE REMOVED
- EXISTING FIRE HYDRANT

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
LOW PRESSURE WATER MASTER PLAN

FIGURE 2.1
EXISTING LOW PRESSURE WATER SYSTEM

DRAWING NAME: K:\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Low Pressure Water\Figure 2.1 Existing Low Pressure Water System.dwg
PLOT DATE: 08-31-16
PLOTTED BY: halj

©BKF Engineers

PIER 48

CHANNEL WHARF

PIER 50

12" LPW

TERRY A FRANCOIS BOULEVARD

BLOCK K

BLOCK J

CHANNEL LANE

BLOCK I

BLOCK H

BRIDGEVIEW STREET

CHINA BASIN

CHINA BASIN PARK

BLOCK G

BLOCK F

MISSION ROCK SQUARE

BLOCK E

LONG BRIDGE STREET

MISSION ROCK STREET

EXPOSITION STREET

SHARED PUBLIC WAY

BLOCK D

EXISTING 12" WATER MAIN

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

CONNECT TO EXISTING 12" WATER MAIN

CONNECT TO EXISTING 12" WATER MAIN

CONNECT TO EXISTING 12" WATER MAIN

3rd STREET

CHANNEL STREET

GRAPHIC SCALE

100 0 100

LEGEND

- PARCEL BOUNDARY
- EXISTING WATER MAIN
- PROPOSED LOW PRESSURE WATER PIPE
- 12" LPW — LOW PRESSURE WATER PIPE SIZE
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
LOW PRESSURE WATER MASTER PLAN

FIGURE 2.2
PROPOSED LOW PRESSURE WATER SYSTEM

DRAWING NAME: K:\2005\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Low Pressure Water\Figure 2.2 Proposed Low Pressure Water System.dwg
PLOT DATE: 08-31-16 PLOTTED BY: hdj

SECTION 3: LOW PRESSURE WATER SYSTEM MODEL DEVELOPMENT

3.1 Low Pressure Water System Model Water Demands

3.1.1 Average Day Demand

The low pressure water Average Day Demand (ADD) is based on information provided by ARUP and the SFPUC 2013 Water Study and is intended to be representative of the projected typical day water use. The average day demand assumes recycled water uses are supplied by low pressure water to be conservative. Table 3.1 provides total water average day demands by land use. See Appendix A and Appendix B for a more detailed breakdown.

Table 3.1
Potable Water Average Daily Demand Summary

Land Use	Size (SF)	Average Daily Demand (GPD)
Residential	1,017,894	101,789
Commercial	1,361,181	204,012
Retail	264,777	18,534

3.1.2 Maximum Day Demand

Maximum Day Demand (MDD) represents the maximum volume of water used in a 24-hour period for the entire year. A water system is typically evaluated under a maximum day plus fire flow demand condition as this condition allows the system to be stressed at a higher demand rate to ascertain if pipeline carrying capacities are adequate in a fire emergency. To develop MDD, a peaking factor of 1.6 was applied to ADD consistent with the Mission Bay development analysis.

3.1.3 Peak Hour Demand

Peak Hour Demand (PHD) represents the highest hourly demand for the entire system, and simulates the highest flow rate expected. To determine the PHD, a peaking factor was applied to increase the ADD. Peaking factors are typically obtained from historical data, but because the proposed project is entirely new construction, historical data is not available. A peaking factor of 2.4 was applied to ADD consistent with the Mission Bay development analysis.

3.1.4 Fire Flow Demand

Per the California Fire Code (CFC) Appendix B, the required fire-flow (FF) in GPM is specified in a Table B105.1 based on California Building Code construction type and the fire-flow calculation area defined in CFC Section B104.3 for Type I construction as the area of the three largest successive floors. The largest fire-flow calculation area for the Project will be 126,450 square feet of a Type I building. CFC Table B105.1 specifies fire-flow calculation areas for Type I buildings between 112,701 and 128,700 square feet require 3,750 GPM of FF. A blanket assumption was made indicating that all new structures will have automatic sprinkler systems, thus qualifying structures for up to a 75% reduction in minimum FF, per section B105.2 of the CFC. To be conservative, the flow was reduced by 50% to 1,875 GPM.

3.1.1 Project Water Demand Summary

The Project water demands per scenario are presented in Table 3.2. See Appendix B for a more detailed breakdown.

Table 3.2
Project Water Demands Summary

Scenario	Demand (gpm)
Domestic Average Day Demand (ADD)	375
Maximum Day Demand (MDD) (includes peaking factor of 1.6)	600
Peak-Hour Demand (PHD) (includes peaking factor of 2.4)	900
Required Fire-Flow	1,875
Maximum Demand (Max Day Demand + Required Fire-Flow)	**2,475**

3.2 Low Pressure Water System Model Boundary Conditions

Fire-Flow test conducted by the City of San Francisco Public Utilities Commission on April 8, 2016 were used to calibrate to the existing system. Hydrant test data and modeling results are shown in tables 3.2 and 3.3 and in Appendix E.

Table 3.2
CDD Field Results for Mission Rock Pressure / Flow Testing

	Pressure Gage		
Hydrant Test	Static	Residual	Total GPM
1	62	59	1075

Table 3.3
BKF Model Calibration Results

	Pressure Gage 1		
Hydrant Test	Static	Residual	Total GPM
1	62	58.8	1075

The calibrated model residual pressures are within 1% of recorded pressure from the fire hydrant test. The calibrated model was then used to model proposed low pressure water system improvements.

SECTION 4: LOW PRESSURE WATER SYSTEM MODEL ANALYSIS

4.1 Low Pressure Water System Model Scenarios

The Project low pressure water system model was created in Bentley WaterCAD V8i SELECTseries 5.

A series of model scenarios were created to reflect the range of demand usage patterns and confirm conformance to the Low Pressure Water System Design Criteria outlined in Table 2.2. The pipes and node numbers which correspond to the model outputs are shown in figure 4.1.

The following low pressure water model demand scenarios were developed:

- Static
- Peak Hour Demand (PHD)
- Maximum Day Plus Fire Flow Demand (MDD+FF)

Section 4 Figures

©BKF Engineers

PIER 48

CHANNEL WHARF

PIER 50

J-302 J-303 J-304 J-305 J-307

P-302 12" LPW P-304 P-305 12" LPW P-307

TERRY A FRANCOIS BOULEVARD

J-301 J-306

12" LPW P-108 12" LPW P-208

BLOCK K BLOCK J CHANNEL LANE BLOCK I BLOCK H

J-107 J-106 J-120 J-220 J-207 J-211

P-107 P-207

BRIDGEVIEW STREET

P-120 12" LPW P-121 P-220

P-106

J-105 J-206

12" LPW P-105 12" LPW P-206

CHINA BASIN

CHINA BASIN PARK

BLOCK G BLOCK F MISSION ROCK SQUARE BLOCK E

J-104 J-205

J-103 J-110 J-210 J-204

P-205

P-110 12" LPW P-111 P-210 J-203

SHARED PUBLIC WAY

EXPOSITION STREET

LONG BRIDGE STREET

MISSION ROCK STREET

P-103 J-102 12" LPW P-203

12" LPW P-102 EXISTING 12" WATER MAIN

J-202

J-101 BLOCK A BLOCK B CHANNEL STREET BLOCK C BLOCK D

J-201

CONNECT TO EXISTING 12" WATER MAIN

CONNECT TO EXISTING 12" WATER MAIN

CONNECT TO EXISTING 12" WATER MAIN

12" LPW P-101 12" LPW P-201

3rd STREET

CHANNEL STREET

P-001 P-003 P-004 P-006 P-007 P-008

J-001 J-002 J-003

GRAPHIC SCALE

100 0 100

LEGEND

- PARCEL BOUNDARY
- EXISTING WATER MAIN
- PROPOSED LOW PRESSURE WATER PIPE
- 12" LPW — LOW PRESSURE WATER PIPE SIZE
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE
- R-2 — MODEL RESERVOIR

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
LOW PRESSURE WATER MASTER PLAN

FIGURE 4.1
LOW PRESSURE WATER SYSTEM MODEL NODE IDENTIFICATION

DRAWING NAME: K:\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Low Pressure Water\Figure 4.1 Low Pressure Water Pipe and Node Identification.dwg
PLOT DATE: 08-31-16
PLOTTED BY: halj

SECTION 5: LOW PRESSURE WATER SYSTEM MODEL SCENARIO RESULTS

5.1 Proposed Low Pressure Water System Model Results

The proposed low pressure water system, as shown Figure 2.2 and Figure 4.1, is designed to meet the design criteria. Table 5.1 summarizes the pressure and velocity results from the Project low pressure water system model. Refer to Appendix D for detailed results for each model scenario.

Table 5.1
Low Pressure Water System Results

Parameter	Requirement	Minimum	Maximum
Static Pressure (psi)	100 max	60.3	62.4
PHD Pressure (psi)	(40 - 100)	57.3	59.7
PHD Velocity (fps)	(0 – 8)	0.03	1.31
MDD+FF Pressure (psi)	(20 – 100)	41.0	43.1
MDD+FF Velocity (fps)	(0 – 12)	4.23	6.41

The MDD+FF Scenario, detailed in Appendix D-3 is the scenario that sets pipe sizes. The system as outlined provides 1,875 gpm for fire protection and the maximum daily demand at each node while maintaining minimum pressures on-site.

APPENDIX A

Mission Rock Land Use and Occupancy

Mission Rock Land Use and Occupancy

Existing Piers Approximate Occupancy

Parcel	Primary Use	Residential Area (SF)	Commercial Area (SF)	Retail Area (SF)	Parking Area (SF)	Total Areas (SF)
Pier 48[(6)]	Commercial		181,158			181,158
Pier 50[(6)]	Commercial		349,500			349,500
SUBTOTAL EXISTING POTABLE WATER DEMAND (GPM)						

Proposed Mission Rock Land Use and Occupancy

Parcel	Primary Use[(1)]	Residential Area[(1)] (SF)	Commercial Area[(1)] (SF)	Retail Area[(5)] (SF)	Parking Area[(1)] (SF)	Residential Occupancy[(2)] (Persons)	Commercial Occupancy[(3)] (Persons)	Retail Occupancy[(4)] (Persons)	Block Occupancy (Persons)
Block A	Residential	350,200		28,860		700		222	922
Block B	Commercial		242,654	30,766			971	237	1,207
Block C	Commercial		324,548	31,855			1,298	245	1,543
Block D1	Residential	238,828				478			478
Block D2	Parking				837,230				0
Block E	Commercial		125,275	43,698			501	336	837
Block F	Residential	307,720		43,698		615		336	952
Block G	Commercial		279,698				1,119		1,119
Block H	Commercial		129,914				520		520
Block I	Commercial		129,634	43,154			519	332	850
Block J	Commercial		129,458	42,745			518	329	847
Block K	Residential	121,146				242			242
Land Use Area Totals		**1,017,894**	**1,361,181**	**264,777**	**837,230**	**2,036**	**5,445**	**2,037**	
								TOTAL OCCUPANCY	**9,517**

NOTES

1 Residential, Commercial, and Parking occupancy areas based on the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
2 Residential occupancy density is assumed to be 500 SF/ person consistent with the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
3 Commercial occupancy density is assumed to be 250 SF/ person consistent with the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
4 Retail occupancy density is assumed to be 130 SF/ person consistent with the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
5 Retail occupancy areas assumed based on block retail frontage and areas based on the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
6 Pier 48 & 50 square footages are approximated from existing building sizes.

APPENDIX B

Low Pressure Water System Demand Calculations

Mission Rock Preliminary Potable Water Demands

Existing Piers Potable Water Demand

Parcel	Primary Use	Residential Area[1] (SF)	Commercial Area[1] (SF)	Retail Area[1] (SF)	Parking Area[1] (SF)	Potable Water Load Rate	Potable Water Load Units	Average Day Demand[6] (GPD)	Average Day Demand[6] (GPM)	Average Day Demand[6] (CFS)
Pier 48	Commercial		181,158			Record Data[2]		55,677	38.7	0.086
Pier 50	Commercial		349,500			Record Data[3]		53,053	36.8	0.082
SUBTOTAL EXISTING POTABLE WATER DEMAND (GPM)								**108,730**	**76**	**0.168**

Proposed Mission Rock Potable Water Demand

Parcel	Primary Use[1]	Residential Occupancy[1] (Persons)	Commercial Area[1] (SF)	Retail Area[1] (SF)	Residential Demand[4] (GPD)	Commercial Demand[5] (GPD)	Retail Demand[5] (GPD)	Average Day Demand[6] (GPD)	Average Day Demand[6] (GPM)	Average Day Demand[6] (CFS)
Block A	Residential	700		28,860	35,020		2,020	37,040	51.4	0.115
Block B	Commercial		242,654	30,766		16,986	2,154	19,139	26.6	0.059
Block C	Commercial		324,548	31,855		22,718	2,230	24,948	34.7	0.077
Block D1	Residential	478			23,883			23,883	33.2	0.074
Block D2	Parking							0	0.0	0.000
Block E	Commercial		125,275	43,698		8,769	3,059	11,828	16.4	0.037
Block F	Residential	615		43,698	30,772		3,059	33,831	47.0	0.105
Block G	Commercial		279,698			19,579		19,579	27.2	0.061
Block H	Commercial		129,914			9,094		9,094	12.6	0.028
Block I	Commercial		129,634	43,154		9,074	3,021	12,095	16.8	0.037
Block J	Commercial		129,458	42,745		9,062	2,992	12,054	16.7	0.037
Block K	Residential	242			12,115			12,115	16.8	0.037
SUBTOTAL PROPOSED POTABLE WATER DEMAND (GPM)								**215,606**	**299**	**0.667**

TOTAL AVERAGE DAY DEMAND, ADD[7] (GPM)	**375**
MAXIMUM DAY DEMAND, MDD[8] (GPM)	**600**
PEAK HOUR DEMAND, PHD[8] (GPM)	**900**

Water Demand Assumption Summary[4][5]

Residential:	50 GPD/Person
Commercial:	0.07 GPD/SF
Retail:	0.07 GPD/SF

Fire-Flow Demand

Parcel	Type	Site Area (SF)	Calculation Area (SF)	Fire-Flow Requirement (GPM)	Fire-Flow (50%) (GPM)
Block A	I	42,150	126,450	3,750	1,875
Block D2	I	95,906	95,906	3,250	1,625
FIRE-FLOW DEMAND, FF[9] (GPM)					**1,875**

MAX DEMAND[10] (GPM)	**2,475**

NOTES

1 Land uses, areas, and occupancy densities are based on the latest edition of the Sustainability Strategy provided by Atelier Ten.
2 Pier 48 daily water demand taken from 2013 Record Data from Anchor Steam.
3 Pier 50 daily water demand assumed as 105% water to wastewater generation ratio from the Mission Bay sanitary sewer system analysis in 2004.
4 Residential water demand assumed to be 50 gallons per day per capita; taken from Treasure Island Low Pressure Water Master Utility Plan.
5 Commercial and retail water demands assumed to be 0.07 gallons per day per square foot; taken from TI LPW MUP
6 Average Day Demand is taken over a 12-hour use period. Piers 48 and 50 are taken over a 24-hour use period.
7 Total Average Day Demand, ADD, is a sum of the existing Piers and the proposed Mission Rock Development water demands.
8 MDD and PHD are determined by applying a peaking factor of 1.6 and 2.4, respectively, to ADD which is consistent with the Mission Bay Development Analysis.
9 Fire-flow demand determined to be the larger of the two largest blocks.
10 Max demand is a total of the fire-flow requirement plus Maximum Day Demand.

APPENDIX C

California Fire Code Appendix B

CALIFORNIA FIRE CODE – MATRIX ADOPTION TABLE
APPENDIX B – FIRE-FLOW REQUIREMENTS FOR BUILDINGS

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting Agency	BSC	SFM		HCD			DSA		OSHPD				BSCC	DHS	AGR	DWR	CEC	CA	SL	SLC
		T-24	T-19*	1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																				
Adopt Entire Chapter as amended (amended sections listed below)		X																		
Adopt only those sections that are listed below																				
[California Code of Regulations, Title 19, Division 1]																				
Chapter / Section																				
B105.2		X																		

* The *California Code of Regulations* (CCR), Title 19, Division 1 provisions that are found in the *California Fire Code* are a reprint from the current CCR, Title 19, Division 1 text for the code user's convenience only. The scope, applicability and appeals procedures of CCR, Title 19, Division I remain the same.

APPENDIX B

FIRE-FLOW REQUIREMENTS FOR BUILDINGS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION B101
GENERAL

B101.1 Scope. The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

SECTION B102
DEFINITIONS

B102.1 Definitions. For the purpose of this appendix, certain terms are defined as follows:

FIRE-FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

FIRE-FLOW CALCULATION AREA. The floor area, in square feet (m^2), used to determine the required fire flow.

SECTION B103
MODIFICATIONS

B103.1 Decreases. The fire chief is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

B103.2 Increases. The fire chief is authorized to increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall not be more than twice that required for the building under consideration.

B103.3 Areas without water supply systems. For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the fire code official is authorized to utilize NFPA 1142 or the *California Wildland-Urban Interface Code.*

SECTION B104
FIRE-FLOW CALCULATION AREA

B104.1 General. The fire-flow calculation area shall be the total floor area of all floor levels within the exterior walls, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

B104.2 Area separation. Portions of buildings which are separated by fire walls without openings, constructed in accordance with the *California Building Code,* are allowed to be considered as separate fire-flow calculation areas.

B104.3 Type IA and Type IB construction. The fire-flow calculation area of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

Exception: Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

SECTION B105
FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings. The minimum fire-flow and flow duration requirements for one- and two-family

dwellings having a fire-flow calculation area that does not exceed 3,600 square feet (344.5 m^2) shall be 1,000 gallons per minute (3785.4 L/min) for 1 hour. Fire-flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet (344.5m^2) shall not be less than that specified in Table B105.1.

Exception: A reduction in required fire-flow of 50 percent, as approved, is allowed when the building is equipped with an approved automatic sprinkler system.

B105.2 Buildings other than one- and two-family dwellings. The minimum fire-flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table B105.1.

Exceptions:

1. A reduction in required fire-flow of up to 75 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire-flow shall not be less than 1,500 gallons per minute (5678 L/min) for the prescribed duration as specified in Table B105.1.
2. *[SFM] Group B, S-2 and U occupancies having a floor area not exceeding 1,000 square feet, primarily constructed of noncombustible exterior walls with wood or steel roof framing, having a Class A roof assembly, with uses limited to the following or similar uses:*
   - *2.1. California State Parks buildings of an accessory nature (restrooms).*
   - *2.2. Safety roadside rest areas, (SRRA), public restrooms.*
   - *2.3. Truck inspection facilities, (TIF), CHP office space and vehicle inspection bays.*
   - *2.4. Sand/salt storage buildings, storage of sand and salt.*

TABLE B105.1
MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600		)	29,301-32,600	4,750	
203,701-225,200	114,601-126,700		)	32,601-36,000	5,000	
225,201-247,700	126,701-139,400		)	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

Block A
Residential
Area * 3 = 126,450 SF

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Types of construction are based on the *California Building Code*.

b. Measured at 20 psi residual pressure.

CALIFORNIA FIRE CODE – MATRIX ADOPTION TABLE
APPENDIX C – FIRE HYDRANT LOCATIONS AND DISTRIBUTION

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting Agency	BSC	SFM		HCD			DSA		OSHPD				BSCC	DHS	AGR	DWR	CEC	CA	SL	SLC
		T-24	T-19*	1	2	1/AC	AC	SS	1	2	3	4								
Adopt Entire Chapter																				
Adopt Entire Chapter as amended (amended sections listed below)		X																		
Adopt only those sections that are listed below																				
[California Code of Regulations, Title 19, Division 1]																				
Chapter / Section																				
C101.1		X																		

* The *California Code of Regulations* (CCR), Title 19, Division 1 provisions that are found in the *California Fire Code* are a reprint from the current CCR, Title 19, Division 1 text for the code user's convenience only. The scope, applicability and appeals procedures of CCR, Title 19, Division I remain the same.

APPENDIX C

FIRE HYDRANT LOCATIONS AND DISTRIBUTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION C101
GENERAL

C101.1 Scope. Fire hydrants shall be provided in accordance with this appendix for the protection of buildings, or portions of buildings, hereafter constructed.

Exception: *[SFM] Group B, S-2 and U occupancies having a floor area not exceeding 1,000 square feet, primarily constructed of noncombustible exterior walls with wood or steel roof framing, having a Class A roof assembly, with uses limited to the following or similar uses:*

1. *California State Parks buildings of an accessory nature (restrooms).*
2. *Safety roadside rest areas, (SRRA), public restrooms.*
3. *Truck inspection facilities, (TIF), California Highway Patrol (CHP) office space and vehicle inspection bays.*
4. *Sand/salt storage buildings, storage of sand and salt.*

SECTION C102
LOCATION

C102.1 Fire hydrant locations. Fire hydrants shall be provided along required fire apparatus access roads and adjacent public streets.

SECTION C103
NUMBER OF FIRE HYDRANTS

C103.1 Fire hydrants available. The minimum number of fire hydrants available to a building shall not be less than that listed in Table C105.1. The number of fire hydrants available to a complex or subdivision shall not be less than that determined by spacing requirements listed in Table C105.1 when applied to fire apparatus access roads and perimeter public streets from which fire operations could be conducted.

SECTION C104
CONSIDERATION OF EXISTING FIRE HYDRANTS

C104.1 Existing fire hydrants. Existing fire hydrants on public streets are allowed to be considered as available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads.

SECTION C105
DISTRIBUTION OF FIRE HYDRANTS

C105.1 Hydrant spacing. The average spacing between fire hydrants shall not exceed that listed in Table C105.1.

Exception: The fire chief is authorized to accept a deficiency of up to 10 percent where existing fire hydrants provide all or a portion of the required fire hydrant service.

Regardless of the average spacing, fire hydrants shall be located such that all points on streets and access roads adjacent to a building are within the distances listed in Table C105.1.

TABLE C105.1
NUMBER AND DISTRIBUTION OF FIRE HYDRANTS

FIRE-FLOW REQUIREMENT (gpm)	MINIMUM NUMBER OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS[a, b, c] (feet)	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT[d]
1,750 or less	1	500	250
2,000-2,250	2	450	225
2,500	3	450	225
3,000	3	400	225
3,500-4,000	4	350	210
4,500-5,000	5	300	180
5,500	6	300	180
6,000	6	250	150
6,500-7,000	7	250	150
7,500 or more	8 or more[e]	200	120

For SI: 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m.

a. Reduce by 100 feet for dead-end streets or roads.

b. Where streets are provided with median dividers which cannot be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis up to a fire-flow requirement of 7,000 gallons per minute and 400 feet for higher fire-flow requirements.

c. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards.

d. Reduce by 50 feet for dead-end streets or roads.

e. One hydrant for each 1,000 gallons per minute or fraction thereof.

APPENDIX D

Model Demand Scenarios

APPENDIX D - 1

Model Demand Scenarios

Static

Node Report

Label	Elevation (ft)	Pressure (psi)
H-Pressure	99.4	62.0
J-000	99.3	62.1
J-001	99.0	62.2
J-002	99.3	62.1
J-003	99.3	62.1
J-101	103.2	60.4
J-102	103.4	60.3
J-103	103.3	60.4
J-104	103.2	60.4
J-105	103.4	60.3
J-106	102.0	60.9
J-201	100.6	61.5
J-202	101.9	61.0
J-203	103.0	60.5
J-204	103.2	60.4
J-205	103.3	60.4
J-206	102.0	60.9
J-210	103.4	60.3
J-301	99.7	61.9
J-302	98.6	62.4
J-303	98.6	62.4
J-304	99.0	62.2
J-305	99.5	62.0
J-306	99.6	62.0
J-307	99.9	61.8

APPENDIX D - 2

Model Demand Scenarios

Peak Hour Demands

Node Report

Label	Demand (gpm)	Elevation (ft)	Hydraulic Grade (ft)	Pressure (psi)
H-Pressure	0	99.4	236.8	59.5
J-000	0	99.3	236.4	59.3
J-001	0	99.0	236.9	59.7
J-002	0	99.3	236.4	59.3
J-003	0	99.3	236.4	59.3
J-101	187	103.2	236.3	57.6
J-102	0	103.4	236.3	57.5
J-103	0	103.3	236.2	57.5
J-104	178	103.3	236.2	57.5
J-105	0	103.2	236.2	57.5
J-106	0	103.4	236.2	57.5
J-107	81	102.0	236.2	58.1
J-110	0	103.5	236.2	57.4
J-120	0	103.8	236.2	57.3
J-201	0	100.6	236.3	58.7
J-202	163	101.9	236.3	58.1
J-203	0	102.9	236.2	57.7
J-204	0	103.0	236.2	57.6
J-205	39	103.2	236.2	57.6
J-206	0	103.3	236.2	57.5
J-207	71	102.0	236.2	58.1
J-210	0	103.5	236.2	57.4
J-220	0	103.6	236.2	57.4
J-301	93	99.7	236.2	59.1
J-302	0	98.6	236.2	59.5
J-303	0	98.6	236.2	59.5
J-304	0	99.0	236.2	59.4
J-305	0	99.5	236.2	59.2
J-306	0	99.6	236.2	59.1
J-307	88	99.9	236.2	59.0

Pipe Report

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)
P-101	12	140	130	464	1.31
P-102	12	101	130	276	0.78
P-103	12	58	130	276	0.78
P-104	12	72	130	314	0.89
P-105	12	114	130	135	0.38
P-106	12	43	130	135	0.38
P-107	12	72	130	163	0.46
P-108	12	144	130	83	0.23
P-110	12	200	130	37	0.11
P-111	12	170	130	37	0.11
P-120	12	147	130	28	0.08
P-121	12	276	130	28	0.08
P-201	12	101	130	436	1.24
P-202	12	53	140	436	1.24
P-203	12	144	130	274	0.78
P-204	12	26	130	236	0.67
P-205	12	49	130	236	0.67
P-206	12	154	130	197	0.56
P-207	12	70	130	169	0.48
P-208	12	146	130	99	0.28
P-210	12	220	130	37	0.11
P-220	12	167	130	28	0.08
P-302	12	119	130	93	0.26
P-303	12	24	130	10	0.03
P-304	12	246	130	10	0.03
P-305	12	277	130	10	0.03
P-306	12	43	130	10	0.03
P-307	12	107	130	88	0.25

APPENDIX D - 3

Model Demand Scenarios

Maximum Day Demand and Fire Flow

Node Report

Label	Demand (gpm)	Fire Flow (Required) (gpm)	Total Flow (gpm)	Pressure (Residual @ Total Flow) (psi)	Velocity of Maximum Pipe (ft/s)
J-101	125	1,875	2,000	41.90	4.84
J-102	0	1,875	1,875	41.70	4.53
J-103	0	1,875	1,875	41.70	4.33
J-104	119	1,875	1,994	41.50	4.98
J-105	0	1,875	1,875	41.50	4.41
J-106	0	1,875	1,875	41.30	4.23
J-107	54	1,875	1,929	41.80	4.96
J-110	0	1,875	1,875	41.40	4.23
J-120	0	1,875	1,875	41.00	4.23
J-201	0	1,875	1,875	43.00	4.65
J-202	109	1,875	1,984	42.40	4.53
J-203	0	1,875	1,875	41.90	4.23
J-204	0	1,875	1,875	41.70	5.13
J-205	26	1,875	1,901	41.60	4.81
J-206	0	1,875	1,875	41.40	4.23
J-207	47	1,875	1,922	41.80	4.99
J-210	0	1,875	1,875	41.40	4.23
J-220	0	1,875	1,875	41.10	4.23
J-301	62	1,875	1,937	42.10	6.42
J-302	0	1,875	1,875	43.10	4.37
J-303	0	1,875	1,875	43.10	4.29
J-304	0	1,875	1,875	42.80	4.23
J-305	0	1,875	1,875	42.70	4.23
J-306	0	1,875	1,875	42.70	4.37
J-307	59	1,875	1,934	42.00	6.41

APPENDIX E

SFPUC Field Fire Flow Test

9/1/14

Send Acct

SAN FRANCISCO FIRE DEPARTMENT
BUREAU OF FIRE PREVENTION
PLAN CHECK DIVISION/WATER FLOW
1660 MISSION STREET, 4TH FLOOR
SAN FRANCISCO, CA 94103
FAX # 415-575-6933

REQUEST FOR WATER FLOW INFORMATION

E-MAILED 4-8-16

DATE: 12/19/2014

REQUEST IS FOR: ☒ **FIRE FLOW** (Per 2013 SFFC Appendix B)
☐ **SPRINKLER DESIGN** (Per 2013 NFPA 13, Sec. 23.2.1.1—"system design data within 12 months")

ADDRESS FOR WATER FLOW INFORMATION:
Property bounded by 3rd Street., Terry Francios Blvd., and Mission Rock St.

CROSS STREETS (*BOTH ARE REQUIRED*):
3rd Street / Mission Rock St.

PROVIDE SITE SKETCH HERE:
(See attached)

***MUST* SPECIFY STREET FOR POINT OF CONNECTION:** 3rd Street and Mission Rock Street

OCCUPANCY (CHECK ONE): ☒ R3 ☐ R2 ☒ Commercial (B) ☐ Assembly (A) ☐ Other_____

HAZARD CLASSIFICATION: ☐ LIGHT ☐ ORD 1 ☐ ORD 2 ☐ EXT 1 ☐ EXT 2 ☐ Other_____

CAR-STACKER: ☐ YES ☒ NO

NUMBER OF STORIES: Varies, 3-18 **APPROX HEIGHT OF BLDG:** Varies, 45-240 **FT**

CONTACT PERSON: Alyssa Jacobson **CONTACT ADDRESS:** 150 California Street, San Francisco

PHONE (415)930-7904 **FAX** (415)930-7999

EMAIL: ajacobson@bkf.com

☐ **START!**---Complete this form and attach a check made payable to 'S.F.F.D' in the amount of **$115** for a records search.
☐ You will be notified by email or FAX if a field flow test is required. You will be required to submit a separate check for $230 if the additional field flow test is required.
☐ Water flow information will be returned by EMAIL, FAX or U.S. MAIL.
Incomplete forms will be returned.
PLEASE ALLOW 7-14 WORKING DAYS FOR PROCESSING.

Field Flow Test required.
Payment by check only, made payable to SFFD for $240.00

**********Official use only**********

Flow data provided by: Deer Date Forwarded: 4-8-16

Flow data: ☒ **FIELD FLOW TEST** ☐ **RECORDS ANALYSIS**

STATIC 62 **PSI**
RESIDUAL 59 **PSI**
FLOW 1075 **GPM**
12 **" MAIN on** 3rd St.

Gate Page: 122 (123)

If you have any questions please contact Inspector Harshman @ 415-865-5742 or email Kjell.Harshman@sfgov.org

***SFFD Notes: _____

APPENDIX F

San Francisco

Planning Department Memorandum:

"Projections of Growth 2015-2035" January 2013

Included in the

2013 SFPUC Water Availability Study

SAN FRANCISCO
PLANNING DEPARTMENT

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

Reception:
415.558.6378

Fax:
415.558.6409

Planning
Information:
415.558.6377

January 28, 2013

Michael P. Carlin
Deputy General Manager, SFPUC
525 Golden Gate Street
San Francisco, CA 94102

Subject: Projections of growth 2015-2035

Dear Michael:

I am forwarding you the Department's current growth projections as requested by Paula Kehoe, Manager, Water Resources Planning, SFPUC. Table 1 shows the projections for the requested years 2015-2035 from the Planning Department's long range Land Use Allocation (LUA) 2012.

Table 1: Development Projections

	2015	2020	2025	2030	2035
Households	361,452	377,684	393,630	410,227	426,235
Jobs	621,772	677,531	691,342	706,848	733,858

Source: ABAG SCS 2012 (May). SF Planning, Land Use Allocation 2012.

The Planning Department routinely updates its long range LUA when ABAG updates their regional projections, typically, every two years. The Department uses the LUA for a variety of purposes, including analyzing impacts of plans and projects undergoing the environmental review process. This past summer, the Department updated its LUA for the recently released ABAG Sustainable Community Strategy Jobs-Housing Connections Scenario (ABAG SCS 2012).

In updating the LUA, the Department's method uses the best information available to allocate the growth to location. That information includes proposed and entitled projects (the "pipeline"), area plan development potential, and parcels with high development potential located outside area plan boundaries. The Planning Department assumed full buildout over the forecast period of the six large development projects at the beginning of their environmental review, namely Giants/Mission Rock (Sea Wall Lot 337 & Pier 48), Warriors Arena (Piers 30-32), Pier 70 Master Plan, 5M (901 Mission Street-Chronicle Building), Moscone Center Expansion, and the Central Corridor Plan.

If you or your staff have any questions, please contact Scott Edmondson, AICP, by email (Scott.Edmondson@sfgov.org) or telephone (415-575-6818).

Sincerely,

John Rahaim
Director of Planning

CC: Paula Kehoe (SFPUC), Scott Edmondson & Aksel Olsen (Planning Department)

APPENDIX K

Sanitary Sewer Master Plan

Mission Rock Redevelopment

Sanitary Sewer System Master Plan

September 19, 2016

BkF ENGINEERS SURVEYORS PLANNERS
100+ YEARS

150 California Street, Suite 650
San Francisco, CA 94111
415.930.7900

Prepared by Statement

This Sanitary Sewer System Master Plan for the Mission Rock Redevelopment has been prepared by BKF Engineers under the direction of Mr. Todd Michael Adair, P.E., Principal/Vice President.

TABLE OF CONTENTS

SECTION 1: INTRODUCTION AND PROJECT DESCRIPTION 1
1.1 Project Overview 1
1.2 Existing Conditions 1
1.3 Proposed Conditions 1
1.4 Project Datum 1
Section 1 Figures 2

SECTION 2: SANITARY SEWER SYSTEM 3
2.1 Existing Sanitary Sewer System 3
2.2 Design Criteria 4
2.2.1 Design Criteria Variances 4
2.3 Proposed Sanitary Sewer System Layout 5
2.3.1 System Horizontal Layout 5
2.3.2 System Vertical Layout 6
2.3.3 Monitoring of Existing Utilities 6
Section 2 Figures 7

SECTION 3: SANITARY SEWER FLOW 8
3.1 Sanitary Flow Design Criteria 8
3.2 Average Dry Weather Flow (ADWF) 8
3.3 Peak Dry Weather Flow (PDWF) 8
3.5 Infiltration 9
3.3 Peak Wet Weather Flow (PWWF) 9
3.4 Greywater Collection and Recycled Water Distribution 9
3.5 Sanitary Sewer Flow Distribution 9
Section 3 Figures 10

SECTION 4: MODEL ANALYSIS AND RESULTS 11
4.1 Sanitary Sewer Flow Analysis 11
4.2 Sanitary Sewer Model Results Discussion 12
4.3 Exceptions to Design Standards 12

FIGURES

Section 1 Figures

Figure 1.1 – Project Location
Figure 1.2 – Project Site Layout

Section 2 Figures

Figure 2.1 – Existing Sanitary Sewer System
Figure 2.2 – Proposed Sanitary Sewer System and Drainage Areas

Section 3 Figures

Figure 3.1 – Sanitary Sewer System Model Node Identification
Figure 3.2 – Project Sanitary Sewer Flow Distribution

APPENDICES

Appendix A – Mission Rock Land Use and Occupancy

Appendix B – Sanitary Sewer System Load Calculations

Appendix C – Model Average Dry Weather Flow Scenarios
Appendix C-1 – Model Average Dry Weather Flow Scenario: With Greywater Collection Installed
Appendix C-2 – Model Average Dry Weather Flow Scenario: Without Greywater Collection

Appendix D – Model Peak Wet Weather Flow Scenarios
Appendix D-1 – Model Peak Wet Weather Flow Scenario: With Greywater Collection Installed
Appendix D-2 – Model Peak Wet Weather Flow Scenario: Without Greywater Collection

Appendix E – Mission Bay Project Separated Sanitary Sewer Analysis Excerpt

SECTION 1: INTRODUCTION AND PROJECT DESCRIPTION

1.1 Project Overview

The Mission Rock Redevelopment ("The Project") is located within the City and County of San Francisco, along the eastern border of San Francisco within District 9 Mission Bay. The site is bounded by 3rd Street to the west, Mission Rock Street to the south and McCovey Cove to the north and San Francisco Bay ("Bay") to the east. The Project comprises a mixed-use community including residential, retail, community use, research and development, and parks and recreational open space. Figure 1.1 illustrates the regional location of the Project.

1.2 Existing Conditions

The Project is approximately 28 acres in size. The Project includes the San Francisco Giants Parking Lot A, Pier 48, China Basin Park, the Marginal Wharf, Terry A. Francois Boulevard, and a portion of Parcel P20 of the Mission Bay Development. Until the San Francisco Giants Parking Lot A was constructed in 2000, the parking lot was a former warehouse and storage lot. China Basin Park was formerly a warehouse and storage lot until the park was completed in 2003.

1.3 Proposed Conditions

The Project comprises eleven development parcels ranging from half an acre to almost two acres. These will include 1.1 million to 1.6 millsion gsf of residential uses, 972,000 to 1.4 million gsf of commercial uses, and 241,000 to 245,000 gsf of retail uses on the ground floor of each development parcel, and associated parking garages. The Project will also include a grid of new public streets and a redeveloped China Basin Park. The proposed Project site plan is shown in Figure 1.2.

1.4 Project Datum

Elevations referred to herein are on the MB Datum. The "MB Datum" is defined as the Mission Bay Datum which is the Old City of San Francisco Datum plus one hundred feet.

Section 1 Figures

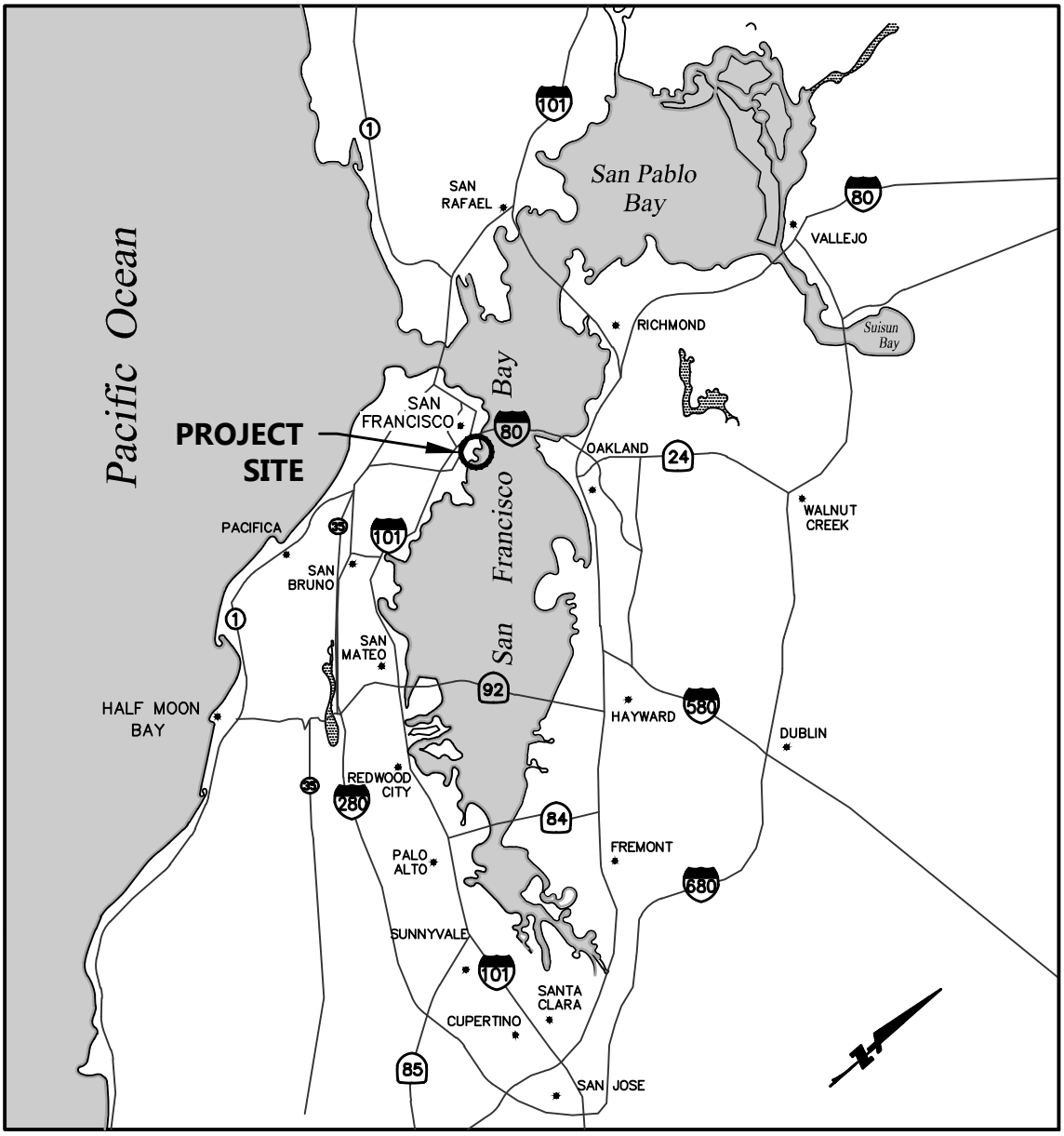


FIGURE 1.1 PROJECT LOCATION

©BKF Engineers

SAN FRANCISCO BAY

PIER 48

CHANNEL WHARF

PIER 50

TERRY A FRANCOIS BOULEVARD

CHINA BASIN

CHINA BASIN PARK

BLOCK K

BLOCK J

CHANNEL LANE

BLOCK I

BLOCK H

BRIDGEVIEW STREET

BLOCK G

EXPOSITION STREET

BLOCK F

MISSION ROCK SQUARE

BLOCK E

LONG BRIDGE STREET

BLOCK D
(PARKING STRUCTURE WITH TOWER)

MISSION ROCK STREET

SHARED PUBLIC WAY

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

3rd STREET

CHANNEL STREET

GRAPHIC SCALE
100 0 100

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT SANITARY SEWER MASTER PLAN

FIGURE 1.2
PROJECT SITE LAYOUT

DRAWING NAME: K:\2008\080006_mission rock\ENG\Exhibits\master plan exhibits\sanitary sewer\Figure 1.2 Project Site Layout.dwg
PLOT DATE: 08-31-16
PLOTTED BY: halj

SECTION 2: SANITARY SEWER SYSTEM

2.1 Existing Sanitary Sewer System

The existing uses of the site include a parking lot and China Basin Park. Although the site does not have existing sanitary sewer facilities, an existing sewer lateral off of Channel Street and 3rd Street was capped after two existing industrial building were demolished to build the parking lot.

The existing sanitary sewer infrastructure adjacent to the Project site has a separated sewer system. On the east side of the Project, Pier 48 and Pier 50 are served by a 15-inch sanitary sewer main that drains to the south within Terry A. Francois Boulevard. Sanitary flows within Terry A. Francois Boulevard are conveyed to a low spot in the main just south of the intersection at Mission Rock Street where there is pump station. A 6-inch force main from the San Francisco Port Pump Station at this location lifts sanitary flows into a 12-inch gravity sewer main within Mission Rock Street and is conveyed east into a 15-inch main as it reaches 3rd Street.

Existing separated sanitary sewer facilities within 3rd Street include an 8-inch main north of Channel Street which connects into a 21-inch main in between Channel Street and Mission Rock Street. The flows from the 21-inch main in 3rd Street and the 15-inch main in Mission Rock Street converge at the intersection of 3rd Street and Mission Rock Street and are conveyed through gravity sewer mains to Sanitary Sewer Pump Station #3 at Park 15 and ultimately conveyed to the San Francisco Southeast Treatment Plant prior to treatment and discharge to the Bay.

2.2 Design Criteria

The proposed separated sewer system is intended to convey sanitary sewer flow from the Project. The physical and capacity design criteria for the sanitary sewer system are presented in Table 2.1.

Table 2.1
Mission Rock Separated Sewer Main Design Criteria

Parameter	Criteria/Value
Minimum pipe size	12-inch diameter unless Director of DPW with consent of SFPUC approves otherwise
Pipe material for pipe sizes 6-inch to 21-inch inside diameter	VCP (ASTM C-700 Extra Strength) HDPE with special approval from SFDPW
Manhole spacing	300-feet preferred 350-feet maximum
Minimum depth of cover for mains	6-feet minimum unless otherwise approved by the SFPUC on a case-by-case basis
Minimum flow velocity *(average sanitary flow)*	2 fps
Minimum infiltration intensity	0.003 second feet per acre
Manning's n (roughness coefficient) for proposed pipes	VCP: 0.013 HDPE: 0.010
Maximum Pipe Flow Depth Ratio, *d/D* *(peak sanitary flow)*	0.50
Sewer Generation	100 GPD / capita

NOTES:
VCP = Vitrified Clay Pipe
fps = feet per second
d/D = ratio of the depth of flow (*d*) to the pipe inside diameter (*D*)

2.2.1 Design Criteria Variances

Due to constraints within the site and adjacent existing infrastructure, the Project will request variances to the design criteria of the 2015 Subdivision Regulations. The existing sanitary sewer main in 3rd Street has insufficient pipe cover. This prevents the Project's sanitary sewer connection to 3rd Street from meeting the pipe cover criteria. Additionally, the Project proposes the use of HDPE for sanitary sewer

pipes to provide adequate sanitary flow velocities and capacities. For the purpose of this Master Plan, the sanitary sewer pipes will be modeled as HDPE.

2.3 Proposed Sanitary Sewer System Layout

2.3.1 System Horizontal Layout

The proposed sanitary sewer system layout is shown on Figure 2.2. At Exposition Street and 3rd Street, the system will connect to an existing 8-inch main through an existing manhole. At Long Bridge Street and 3rd Street, the system will connect to the existing 21-inch sanitary sewer main in 3rd Street with a new manhole. At Terry A Francois Boulevard and Mission Rock Street, the system will connect to at an existing manhole south of Mission Rock Street. The proposed sanitary sewer mains will maintain a 10-foot separation to potable water mains based on the Title 22 requirements. Sanitary sewer manholes and mains will not be located in the parking lane. Pipe and structure clearance requirements are presented in Table 2.2.

Table 2.2
Separated Sanitary Sewer System Clearance Requirements

Parameter	Distance
Outside Diameter of Sanitary Sewer Pipe to Outside Diameter of Potable Water Pipes	10 feet minimum horizontal clearance
Outside Diameter of Sanitary Sewer Pipe to Outside Diameter of Other Utilities	3.5 feet minimum horizontal clearance
Face of Curb to Outside Diameter of Sanitary Sewer Pipe	4 feet minimum horizontal clearance
Face of Curb to Outside Diameter of Sanitary Sewer Manhole barrel or base (whichever is larger)	4 feet minimum horizontal clearance
Above ground roadway area above sanitary sewer for vehicle and equipment access, servicing, and maintenance of wastewater assets	8 feet minimum clearance directly above sanitary sewer and 10 feet directly adjacent. (for a total of 18 feet)

NOTE:
Clearance requirements which cannot be met due to bulb-outs and narrow street widths or proximity to existing utilities will be evaluated on a case by case basis by the SFPUC and will be addressed during the design process.

2.3.2 System Vertical Layout

The proposed sanitary sewer system minimum depth of cover is 6 feet. The following conditions apply:

- For each project with pipes having less than 6-feet cover, specific pipe cover calculations and/or different pipe standard dimension ratio (SDR) or material shall be submitted.
- For pipes with less than 5-feet cover, pipe bedding shall be determined during final design and modified as necessary.
- Gravity sewer laterals shall take precedence in placement of utilities when the sewer mains do not have 5-feet minimum cover. Other utilities will be designed to accommodate the sewer laterals.
- Casings shall be provided for sewer laterals when less than 1-foot vertical separation from other utilities is required or when laterals are installed below other utility structures (e.g. stormwater best management practices, BMP's).

2.3.3 Monitoring of Existing Utilities

Any construction activities that can produce vibration or movement in existing utilities will require monitoring of existing utilities. A monitoring plan shall be submitted to and approved by SFPUC Waste Water Enterprise (WWE) Collection System Division (CSD) prior to start of work. The plan will specify what method of monitoring will be used; how often the monitoring shall occur; what types of work triggers the need for monitoring; which utilities need monitoring; and what distance from the work will trigger the need for monitoring. It will include videoing of the existing lines which are to stay in use before and after construction activities.

Section 2 Figures

©BKF Engineers

SAN FRANCISCO BAY

PIER 48

EX SS LATERAL

CHANNEL WHARF

PIER 50

EX SS LATERAL

15" SS

15" SS

15" SS

15" SS

TERRY A FRANCOIS BOULEVARD

EX 15" SS MAIN
TO BE REMOVED

EX 15" SS MAIN
TO BE REMOVED

6"FM

EX SF PORT
SS PUMP
STATION

CHINA BASIN

CHINA BASIN PARK

EX PARKING LOT

MISSION ROCK

12" SS

15" SS

21" SS

21" SS

27" SS

8" SS

CHANNEL STREET

3rd STREET

GRAPHIC SCALE
100 0 100

LEGEND

PARCEL BOUNDARY
8" SS EXISTING SANITARY SEWER LINE
EXISTING SEWER MANHOLE

ABBREVIATIONS

EX	EXISTING
FM	FORCE MAIN
SF	SAN FRANCISCO
SS	SANITARY SEWER

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT SANITARY SEWER MASTER PLAN

FIGURE 2.1
EXISTING SANITARY SEWER SYSTEM

DRAWING NAME: K:\2008\080006_mission rock\ENG\Exhibits\master plan exhibits\sanitary sewer\Figure 2.1 Existing Sanitary Sewer Water System.dwg
PLOT DATE: 08-31-16
PLOTTED BY: halj

©BKF Engineers

SAN FRANCISCO BAY

PIER 48

EX SS LATERAL

CHANNEL WHARF

PIER 50

EX SS LATERAL

TERRY A FRANCOIS BOULEVARD

12" SS

12" SS

12" SS

12" SS

15" SS

6"FM

CONNECT TO EX SEWER MANHOLE

EX SF PORT SS PUMP STATION

CHINA BASIN

CHINA BASIN PARK

BLOCK K

BLOCK J

CHANNEL LANE

BLOCK I

BLOCK H

8" SS

8" SS

BRIDGEVIEW

STREET

BLOCK G

BLOCK F

MISSION ROCK SQUARE

BLOCK E

EXPOSITION STREET

LONG BRIDGE STREET

MISSION ROCK STREET

12" SS

SHARED PUBLIC WAY

8" SS

BLOCK D
(PARKING STRUCTURE WITH TOWER)

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

8" SS

8" SS

8" SS

CONNECT TO EX SS MANHOLE

CONNECT TO EX 21" SS MAIN

ABBREVIATIONS

EX EXISTING
CS COMBINED SEWER
FM FORCE MAIN
SF SAN FRANCISCO
SS SANITARY SEWER

10" SS

10" SS

21" SS

21" SS

27" SS

15" SS

NEW SS MAIN EXTENSION BY ADJACENT HOTEL PROJECT

8" SS

CHANNEL STREET

3rd STREET

GRAPHIC SCALE
100 0 100

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE
- 8" SS — EXISTING SANITARY SEWER
- 12" SS — PROPOSED SANITARY SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER MANHOLE

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT SANITARY SEWER MASTER PLAN

FIGURE 2.2
PROPOSED SANITARY SEWER SYSTEM

DRAWING NAME: K:\2008\080006_mission rock\ENG\Exhibits\master plan exhibits\sanitary sewer\Figure 2.2 Proposed Sanitary Sewer Water System.dwg
PLOT DATE: 09-31-16
PLOTTED BY: halj

SECTION 3: SANITARY SEWER FLOW

The sanitary sewer flows used for the analyses are based on potable water demand and recycled water demand for each land use as outlined in the Low Pressure Water Master Plan and shown in Appendix A and Appendix B.

3.1 Sanitary Flow Design Criteria

The sanitary sewer system will be designed to convey average dry weather flow (ADWF) and peak wet weather flow (PWWF) at 50% of the pipe diameter, respectively. The ADWF is based on the low pressure water average daily demand, recycled water daily demand, and regulation design loads as described in Section 3.2.

3.2 Average Dry Weather Flow (ADWF)

The sanitary sewer ADWF is intended to be representative of the average dry sanitary sewer generation. The sanitary sewer ADWF is based on 95% return of potable water uses and 100% return of recycled water uses. Table 3.1 represents sanitary sewer load for each land use shown in Appendix B.

Table 3.1
Demand and Load Factors per Land Use

Land Use	95% Potable Water Demand	100% Recycled Water Demand
Residential	47.5 gpd/person	6.5 gpd/person
Commercial	67 gpd/1,000 SF	35 gpd/1,000 SF
Retail	67 gpd/1,000 SF	35 gpd/1,000 SF
Parking	20 gpd/1,000 SF	N/A

NOTES:
Demand factors are described in Appendix B

3.3 Peak Dry Weather Flow (PDWF)

The sanitary sewer PDWF is intended to be representative of the peak hour dry sanitary sewer generation. The sanitary sewer PDFW is assumed to be based on the ADWF by a factor of 3 consistent with the Mission Bay Project Separated Sanitary Sewer Analysis by Olivia Chen Consultants, dated February 21, 2002.

3.5 Infiltration

The Project site sits above approximately 13 feet of heterogeneous fill with Bay Mud beyond the fill layer and groundwater is approximately 7 to 9 feet below the existing grade. The sanitary sewer infrastructure within the structure streets may be less likely to experience infiltration. Pending special approval from SFPUC for use of fusion welded HDPE, the likelihood of infiltration would also decrease. Per the Subdivision Regulations, the infiltration shall be estimated as 0.003 cfs per acre or 1,938.57 gallons per day per acre. The infiltration is to be added to the sanitary sewer flow of pipe sewers.

3.3 Peak Wet Weather Flow (PWWF)

The sanitary sewer PWWF incorporates infiltration of groundwater that enters the sanitary sewer pipelines during PDWF. PWWF typically occurs during the wet weather season.

3.4 Greywater Collection and Recycled Water Distribution

Greywater is defined as the collection of wastewater produced from baths, showers, sinks, and washing machines. The Project proposes the utilization of greywater collection, treatment, and recycled water distribution to reduce the overall impact on potable water demand for irrigation as well as reduction of sanitary sewer loads on wastewater treatment plants.

The Project has three parcels as potential greywater collection sites. These parcels will have their ADWF reduced by the estimated greywater collection per Water Reuse Estimates by Atelier Ten, which are included in the latest edition of the Sustainability Strategy.

3.5 Sanitary Sewer Flow Distribution

Each parcel's total sanitary sewer flow is directed to a sanitary sewer manhole within the streets bordering the parcel as shown in Figure 3.2. The parcel flow entering a manhole node represents a sanitary sewer lateral point of connection. The nodes and pipes are identified in Figure 3.1.

Section 3 Figures

©BKF Engineers

SAN FRANCISCO BAY

PIER 48

EX SS LATERAL

CHANNEL WHARF

PIER 50

EX SS LATERAL

EX SSMH #3

TERRY A FRANCOIS BOULEVARD

SS #305

SS #304
12" SS

SS #303
12" SS

SS #302
12" SS

SS #301
12" SS

15" SS

SSMH #303

SSMH #305

SS #306
8" SS

SSMH #304

SSMH #302

SSMH #301

6"FM

CONNECT TO EX
SEWER MANHOLE

EX SF PORT
SS PUMP
STATION

BLOCK K

BLOCK J

CHANNEL
LANE

BLOCK I

BLOCK H

SSMH #306

SS #307
8" SS

BRIDGEVIEW

STREET

CHINA BASIN

CHINA BASIN
PARK

BLOCK G

EXPOSITION STREET

SSMH #307

BLOCK F

MISSION ROCK
SQUARE

BLOCK E

LONG BRIDGE STREET

MISSION ROCK STREET

12" SS

SSMH #202

SHARED PUBLIC WAY

SS #202
8" SS

BLOCK D
(PARKING STRUCTURE
WITH TOWER)

SSMH #102

BLOCK A

BLOCK B

CHANNEL
STREET

BLOCK C

SS #102
8" SS

CONNECT TO EX
SS MANHOLE

CONNECT TO EX
21" SS MAIN

SS #201
8" SS

SSMH #200

SSMH #101

SSMH # 100

SS #101
10" SS

SS #100
10" SS

21" SS

21" SS

27" SS

EX SSMH #2

EX SSMH #1

NEW SS MAIN EXTENSION BY
ADJACENT HOTEL PROJECT

8" SS

CHANNEL
STREET

3rd STREET

15" SS

GRAPHIC SCALE
100 0 100

ABBREVIATIONS

EX	EXISTING
CS	COMBINED SEWER
FM	FORCE MAIN
SF	SAN FRANCISCO
SS	SANITARY SEWER

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE
- 8" SS — EXISTING SANITARY SEWER
- 12" SS — PROPOSED SANITARY SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER MANHOLE

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
SANITARY SEWER MASTER PLAN

FIGURE 3.1
SANITARY SEWER SYSTEM MODEL
PIPE & NODE IDENTIFICATION

DRAWING NAME: K:\2008\080006_mission rock\ENG\Exhibits\master plan exhibits\sanitary sewer\Figure 3 Sanitary Sewer Model.dwg
PLOT DATE: 08-31-16
PLOTTED BY: hal

©BKF Engineers

SAN FRANCISCO BAY

PIER 48

26.3 GPM
EX SS LATERAL

CHANNEL WHARF

PIER 50

35.5 GPM
EX SS LATERAL

TERRY A FRANCOIS BOULEVARD

12" SS
12" SS
12" SS
12" SS
15" SS

6"FM

EX SF PORT
SS PUMP
STATION

10.4 GPM
BLOCK K

8" SS
8" SS

24.3 GPM
BLOCK J

CHANNEL
LANE

24.4 GPM
BLOCK I

18.3 GPM
CONNECT TO EX
SEWER MANHOLE
BLOCK H

BRIDGEVIEW
STREET

CHINA BASIN

CHINA BASIN
PARK

39.4 GPM
BLOCK G

34.7 GPM
BLOCK F

MISSION ROCK
SQUARE

BLOCK E
23.8 GPM

LONG BRIDGE STREET

59.1 GPM

EXPOSITION STREET

MISSION ROCK STREET

12" SS

SHARED PUBLIC WAY

8" SS

BLOCK D
(PARKING STRUCTURE
WITH TOWER)

34.2 GPM
BLOCK A

38.5 GPM
BLOCK B

CHANNEL
STREET

50.2 GPM
BLOCK C

8" SS
8" SS

CONNECT TO EX
SS MANHOLE

CONNECT TO EX
21" SS MAIN

ABBREVIATIONS

ADWF	AVERAGE DAILY WEATHER FLOWS
EX	EXISTING
CS	COMBINED SEWER
FM	FORCE MAIN
SF	SAN FRANCISCO
SS	SANITARY SEWER

10" SS
10" SS
21" SS
21" SS
27" SS

15" SS

NEW SS MAIN EXTENSION BY
ADJACENT HOTEL PROJECT

8" SS

CHANNEL
STREET

3rd STREET

GRAPHIC SCALE
100 0 100

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE
- 8" SS — EXISTING SANITARY SEWER
- 12" SS — PROPOSED SANITARY SEWER
- PROPOSED SEWER MANHOLE
- EXISTING SEWER MANHOLE
- 23.8 GPM — PROPOSED SS ADWF

DRAWING NAME: K:\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\Sanitary Sewer\Figure 3 Sanitary Sewer Model.dwg
PLOT DATE: 09-19-16 PLOTTED BY: halj

DATE:	09/19/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT SANITARY SEWER MASTER PLAN

FIGURE 3.2
SANITARY SEWER SYSTEM MODEL FLOW DISTRIBUTION

SECTION 4: MODEL ANALYSIS AND RESULTS

The separated sanitary sewer system was analyzed using the SewerCAD program by Bentley. The model incorporates the different sanitary sewer flow rates entering the system at different points. The model routes flow through the pipes and produces hydraulic depths and flow velocities for the system. Models were developed and run for ADWF and PWWF with and without greywater collection systems installed to verify that the proposed system conforms to the requirements laid out in Section 2.

4.1 Sanitary Sewer Flow Analysis

The two sanitary sewer flow constraints are velocity and pipe capacity. The lowest sanitary sewer flow velocity scenario will occur during the ADWF with greywater collection (Minimum Generation). The largest flow scenario will occur during the PWWF without greywater collection (Maximum Generation). The ADWF and PWWF model results are detailed in Appendix B and C and summarized in Table 4.1 and Table 4.2.

Table 4.1
Sanitary Sewer System Results – ADWF Analysis (Minimum Generation)

Parameter	Requirement	Minimum	Maximum
Pipe Percentage Full	50% maximum	7.0%	16.9%
Flow Velocity	2 fps minimum	2.0 fps	4.1 fps

Table 4.2
Sanitary Sewer System Results – PWWF Analysis (Maximum Generation)

Parameter	Requirement	Minimum	Maximum
Pipe Percentage Full	50% maximum	22.6%	49.9%
Flow Velocity	2 fps minimum	2.7 fps	5.6 fps

4.2 Sanitary Sewer Model Results Discussion

The analyses show that pipe sizes ranging from 8 inches to 12 inches would be sufficient to convey ADWF and PDWF with the exception of two pipes within 3rd Street. The existing sanitary sewer mains along 3rd Street have less than the required six feet of cover. As a result, the proposed sanitary sewer connections to 3rd Street cannot meet the required pipe 6-feet of cover as it connects into the existing sanitary sewer main.

The restricted cover in 3rd Street prevents the proposed sanitary sewer mains in 3rd Street from having sufficient slope to meet the minimum required flow velocity. The reduction of pipe sizes from the 12-inch minimum to 8-inch is required to provide sufficient flow velocities. The City has already approved the extension of an 8-inch pipe on the west side of the existing 42-inch storm drain main for the Mission Bay Block 1 Improvement Plan. An existing storm drain manhole off the 42-inch storm drain main prevents the Project's sewer main from being able to connect to this approved 8-inch sanitary sewer main for Mission Bay Block 1. A separate 8-inch sanitary sewer main extension on the east side of the existing 42-inch storm drain will be required for this project to connect into the existing sanitary sewer infrastructure within 3rd Street.

4.3 Exceptions to Design Standards

The sanitary sewer model was performed using VCP as the pipe material per the Subdivision Regulations. Flow velocity and pipe capacities will improve with the use of fusion welded HDPE. Additionally, utilizing fusion welded HDPE will reduce the likelihood of infiltration into the sanitary sewer system, reducing the ultimate sanitary sewer flow directed to the Southwest Treatment Plant.

APPENDIX A

Mission Rock Land Use and Occupancy

Mission Rock Land Use and Occupancy

Existing Piers Approximate Occupancy

Parcel	Primary Use	Residential Area (SF)	Commercial Area (SF)	Retail Area (SF)	Parking Area (SF)	Total Areas (SF)
Pier 48[(6)]	Commercial		181,158			181,158
Pier 50[(6)]	Commercial		349,500			349,500
SUBTOTAL EXISTING POTABLE WATER DEMAND (GPM)						

Proposed Mission Rock Land Use and Occupancy

Parcel	Primary Use[(1)]	Residential Area[(1)] (SF)	Commercial Area[(1)] (SF)	Retail Area[(5)] (SF)	Parking Area[(1)] (SF)	Residential Occupancy[(2)] (Persons)	Commercial Occupancy[(3)] (Persons)	Retail Occupancy[(4)] (Persons)	Block Occupancy (Persons)
Block A	Residential	350,200		28,860		700		222	922
Block B	Commercial		242,654	30,766			971	237	1,207
Block C	Commercial		324,548	31,855			1,298	245	1,543
Block D1	Residential	238,828				478			478
Block D2	Parking				837,230				0
Block E	Commercial		125,275	43,698			501	336	837
Block F	Residential	307,720		43,698		615		336	952
Block G	Commercial		279,698				1,119		1,119
Block H	Commercial		129,914				520		520
Block I	Commercial		129,634	43,154			519	332	850
Block J	Commercial		129,458	42,745			518	329	847
Block K	Residential	121,146				242			242
Land Use Area Totals		**1,017,894**	**1,361,181**	**264,777**	**837,230**	**2,036**	**5,445**	**2,037**	
								TOTAL OCCUPANCY	**9,517**

NOTES

1 Residential, Commercial, and Parking occupancy areas based on the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
2 Residential occupancy density is assumed to be 500 SF/ person consistent with the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
3 Commercial occupancy density is assumed to be 250 SF/ person consistent with the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
4 Retail occupancy density is assumed to be 130 SF/ person consistent with the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
5 Retail occupancy areas assumed based on block retail frontage and areas based on the latest edition of the Sustainability Strategy site information provided by Atelier Ten.
6 Pier 48 & 50 square footages are approximated from existing building sizes.

APPENDIX B

Sanitary Sewer System Load Calculations

Mission Rock Preliminary Wastewater Generation

Existing Piers Wastewater Generation

Parcel	Primary Use	Residential Area[1]	Commercial Area[1]	Retail Area[1]	Parking Area[1]	Total Areas	Wastewater Load		Greywater Collected[6]	Average Wastewater Generation[7]		
		(SF)	(SF)	(SF)	(SF)	(SF)	Rate	Units	(GPD)	(GPD)	(GPM)	(CFS)
Pier 48	Commercial	0	181,158	0	0	181,158	Record Data[2]		0	37,860	26.3	0.059
Pier 50	Commercial	0	349,500	0	0	349,500	Record Data[3]		0	50,400	35.0	0.078
SUBTOTAL EXISTING BASE WASTEWATER LOAD										**88,260**	**61**	**0.137**

Proposed Mission Rock Minimum Wastewater Generation (Greywater Collected)

Parcel	Primary Use[1]	Potable Water (95% return)[4]				Recycled Water (100% return)[5]			Greywater Collected[6]	Average Wastewater Generation[7]		
		Residential	Commercial	Retail	Parking	Residentia	Commercial	Retail		(GPD)	(GPM)	(CFS)
		(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)			
Block A	Residential	33,269		1,919		4,553		1,010	16,109	24,642	34.2	0.076
Block B	Commercial		16,136	2,046			8,493	1,077	0	27,752	38.5	0.086
Block C	Commercial		21,582	2,118			11,359	1,115	0	36,175	50.2	0.112
Block D1	Residential	22,689				3,105			0	25,793	35.8	0.080
Block D2	Parking				16,745				0	16,745	23.3	0.052
Block E	Commercial		8,331	2,906			4,385	1,529	0	17,151	23.8	0.053
Block F	Residential	29,233		2,906		4,000		1,529	14,155	23,514	32.7	0.073
Block G	Commercial		18,600				9,789		0	28,389	39.4	0.088
Block H	Commercial		8,639				4,547		0	13,186	18.3	0.041
Block I	Commercial		8,621	2,870			4,537	1,510	0	17,538	24.4	0.054
Block J	Commercial		8,609	2,843			4,531	1,496	0	17,479	24.3	0.054
Block K	Residential	11,509				1,575			5,573	7,511	10.4	0.023
								GREYWATER COLLECTED	35,837			
SUBTOTAL PROPOSED BASE WASTEWATER MINIMUM LOAD										**255,875**	**355**	**0.792**

Infiltration Rate

Site	Area	Infiltration Rate[8]	Average Daily Infiltration	
	(Acres)	(GPD/Acre)	(GPD)	(GPM)
Mission Rock	21.6	1,938.57	41,873	29.1
Existing Piers	6.5	1,938.57	12,601	8.8
TOTAL INFILTRATION			**54,474**	**38**

TOTAL AVERAGE DRY-WEATHER FLOW, ADWF (GPM)	**417**
PEAK DRY-WEATHER FLOW, PDWF[7] (GPM)	**1,250**
PEAK WET-WEATHER FLOW, PWWF[10] (GPM)	**1,288**

Wastewater Generation Assumptions

95% of Potable Water Demand[4]

Residential:	47.5 GPD / Person
Commercial:	0.067 GPD / SF
Retail:	0.067 GPD / SF
Parking:	0.020 GPD / SF

100% of Recycled Water Demand[5]

Residential:	6.5 GPD / Person
Commercial:	0.035 GPD / SF
Retail:	0.035 GPD / SF

NOTES

1 Land uses, areas, and occupancy densities are based on the latest edition of the Sustainability Strategy provided by Atelier Ten.
2 Pier 48 daily water demand taken as the average daily usage from 2013 Record Data from Anchor Steam.
3 Pier 50 daily water demand assumed as 35 gpm from the Mission Bay sanitary sewer system analysis in 2004.
4 Wastewater generation due to potable water sources are assumed to have a 95% return rate.
5 Wastewater generation due to recycled water sources are assumed to have a 100% return rate.
6 Greywater Collection based on 4194 Mission Rock Water Reuse Flows Option 2B dated 01/29/2016.
7 Average Wastewater Generation is taken over a 12-hour use period. Piers 48 and 50 are taken over a 24-hour use period.
8 Infiltration rate of 0.003 cfs per acre or 1,938.57 GPD per acre is per the 2015 Subdivision Regulationis Section XVII.E.1.
9 Peak Dry-Weather Flow factor of 3 consistent with the Mission Bay sanitary sewer analysis.
10 Peak Wet-Weather Flow is the sum of PDWF plus the Total Infiltration.

Mission Rock Preliminary Wastewater Generation

Existing Piers Wastewater Generation

Parcel	Primary Use	Residential Area[1]	Commercial Area[1]	Retail Area[1]	Parking Area[1]	Total Areas	Wastewater Load		Greywater Collected[6]	Average Wastewater Generation[7]		
		(SF)	(SF)	(SF)	(SF)	(SF)	Rate	Units	(GPD)	(GPD)	(GPM)	(CFS)
Pier 48	Commercial	0	181,158	0	0	181,158	Record Data[2]		0	37,860	26.3	0.059
Pier 50	Commercial	0	349,500	0	0	349,500	Record Data[3]		0	50,400	35.0	0.078
SUBTOTAL EXISTING BASE WASTEWATER LOAD										**88,260**	**61**	**0.137**

Proposed Mission Rock Maximum Wastewater Generation (Greywater NOT Collected)

Parcel	Primary Use[1]	Potable Water (95% return)[4]				Recycled Water (100% return)[5]			Greywater Collected[6]	Average Wastewater Generation[7]		
		Residential	Commercial	Retail	Parking	Residentia	Commercial	Retail				
		(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPD)	(GPM)	(CFS)
Block A	Residential	33,269		1,919		4,553		1,010	0	40,751	56.6	0.126
Block B	Commercial		16,136	2,046			8,493	1,077	0	27,752	38.5	0.086
Block C	Commercial		21,582	2,118			11,359	1,115	0	36,175	50.2	0.112
Block D1	Residential	22,689				3,105			0	25,793	35.8	0.080
Block D2	Parking				16,745				0	16,745	23.3	0.052
Block E	Commercial		8,331	2,906			4,385	1,529	0	17,151	23.8	0.053
Block F	Residential	29,233		2,906		4,000		1,529	0	37,669	52.3	0.117
Block G	Commercial		18,600				9,789		0	28,389	39.4	0.088
Block H	Commercial		8,639				4,547		0	13,186	18.3	0.041
Block I	Commercial		8,621	2,870			4,537	1,510	0	17,538	24.4	0.054
Block J	Commercial		8,609	2,843			4,531	1,496	0	17,479	24.3	0.054
Block K	Residential	11,509				1,575			0	13,084	18.2	0.040
								GREYWATER COLLECTED	0			
SUBTOTAL PROPOSED BASE WASTEWATER MAXIMUM LOAD										**291,712**	**405**	**0.903**

Infiltration Rate

Site	Area	Infiltration Rate[8]	Average Daily Infiltration	
	(Acres)	(GPD/Acre)	(GPD)	(GPM)
Mission Rock	21.6	1,938.57	41,873	29.1
Existing Piers	6.5	1,938.57	12,601	8.8
TOTAL INFILTRATION			**54,474**	**38**

TOTAL AVERAGE DRY-WEATHER FLOW, ADWF (GPM)	**466**
PEAK DRY-WEATHER FLOW, PDWF[7] (GPM)	**1,399**
PEAK WET-WEATHER FLOW, PWWF[10] (GPM)	**1,437**

Wastewater Generation Assumptions

95% of Potable Water Demand[4]

Residential:	47.5 GPD / Person
Commercial:	0.067 GPD / SF
Retail:	0.067 GPD / SF
Parking:	0.020 GPD / SF

100% of Recycled Water Demand[5]

Residential:	6.5 GPD / Person
Commercial:	0.035 GPD / SF
Retail:	0.035 GPD / SF

NOTES

1 Land uses, areas, and occupancy densities are based on the latest edition of the Sustainability Strategy provided by Atelier Ten.
2 Pier 48 daily water demand taken as the average daily usage from 2013 Record Data from Anchor Steam.
3 Pier 50 daily water demand assumed as 35 gpm from the Mission Bay sanitary sewer system analysis in 2004.
4 Wastewater generation due to potable water sources are assumed to have a 95% return rate.
5 Wastewater generation due to recycled water sources are assumed to have a 100% return rate.
6 For maximum wastewater generation, greywater collection is assumed to be offline.
7 Average Wastewater Generation is taken over a 12-hour use period. Piers 48 and 50 are taken over a 24-hour use period.
8 Infiltration rate of 0.003 cfs per acre or 1,938.57 GPD per acre is per the 2015 Subdivision Regulationis Section XVII.E.1.
9 Peak Dry-Weather Flow factor of 3 consistent with the Mission Bay sanitary sewer analysis.
10 Peak Wet-Weather Flow is the sum of PDWF plus the Total Infiltration.

APPENDIX C

Model Average Dry Weather Flow Scenarios

APPENDIX C - 1

Model Average Dry Weather Flow Scenario:

With Greywater Collection Installed

Conduit Report

Pipe Label	Inside Diameter (in)	Slope (%)	Flow (gal/min)	Capacity (gal/min)	Cover (ft)	Velocity (ft/s)	Percent Full (%)
SS 100	9.4	0.4	72.8	673.20	4.3	2.03	10.8
SS 101	9.4	0.4	72.8	669.30	3.5	2.02	10.9
SS 102	7.6	0.8	72.8	566.30	6.0	2.75	12.9
SS 201	9.4	1.7	133.1	1418.60	7.0	4.11	9.4
SS 202	9.4	0.7	82.9	884.50	5.8	2.56	9.4
SS 301	11.2	0.7	210.8	1416.20	8.1	3.33	14.9
SS 302	11.2	0.6	192.5	1298.40	6.0	3.05	14.8
SS 303	11.2	0.3	133.1	963.80	4.5	2.22	13.8
SS 304	11.2	0.3	108.8	905.20	4.2	2.00	12.0
SS 305	7.6	0.7	36.7	523.00	4.1	2.13	7.0
SS 306	7.6	1.0	72.1	627.40	6.5	2.95	11.5
SS 307	7.6	1.3	72.1	699.40	4.8	3.19	10.3

APPENDIX C - 2

Model Average Dry Weather Flow Scenario:

Without Greywater Collection

Conduit Report

Pipe Label	Inside Diameter (in)	Slope (%)	Flow (gal/min)	Capacity (gal/min)	Cover (ft)	Velocity (ft/s)	Percent Full (%)
SS 100	9.4	0.4	95.1	673.20	4.3	2.20	14.1
SS 101	9.4	0.4	95.1	669.30	3.5	2.19	14.2
SS 102	7.6	0.8	95.1	566.30	6.0	2.98	16.8
SS 201	9.4	1.7	133.1	1418.60	7.0	4.11	9.4
SS 202	9.4	0.7	82.9	884.50	5.8	2.56	9.4
SS 301	11.2	0.7	238.2	1416.20	8.1	3.45	16.8
SS 302	11.2	0.6	219.9	1298.40	6.0	3.17	16.9
SS 303	11.2	0.3	160.5	963.80	4.5	2.34	16.7
SS 304	11.2	0.3	136.2	905.20	4.2	2.14	15.0
SS 305	7.6	0.7	44.5	523.00	4.1	2.26	8.5
SS 306	7.6	1.0	91.7	627.40	6.5	3.17	14.6
SS 307	7.6	1.3	91.7	699.40	4.8	3.42	13.1

APPENDIX D

Model Peak Wet Weather Flow Scenarios

APPENDIX D - 1

Model Peak Wet Weather Flow Scenario:

With Greywater Collection Installed

Conduit Report

Pipe Label	Inside Diameter (in)	Slope (%)	Flow (gal/min)	Capacity (gal/min)	Cover (ft)	Velocity (ft/s)	Percent Full (%)
SS 100	9.4	0.4	225.6	660.10	4.3	2.76	34.2
SS 101	9.4	0.4	222.9	658.20	3.5	2.74	33.9
SS 102	7.6	0.9	220.6	576.10	6.0	3.81	38.3
SS 201	9.4	1.7	403.8	1418.60	7.0	5.63	28.5
SS 202	9.4	0.7	251.1	884.50	5.8	3.51	28.4
SS 301	11.2	0.5	659.5	1485.80	8.2	3.92	44.4
SS 302	11.2	0.6	602.4	1370.80	6.0	4.32	43.9
SS 303	11.2	0.3	417.3	1001.20	4.5	3.14	41.7
SS 304	11.2	0.3	337.4	919.30	4.2	2.78	36.7
SS 305	7.6	0.6	111.0	490.10	4.1	2.81	22.6
SS 306	7.6	1.0	220.5	626.00	6.4	4.05	35.2
SS 307	7.6	1.3	218.8	692.60	4.8	4.35	31.6

APPENDIX D - 2

Model Peak Wet Weather Flow Scenario: Without Greywater Collection

Conduit Report

Pipe Label	Inside Diameter (in)	Slope (%)	Flow (gal/min)	Capacity (gal/min)	Cover (ft)	Velocity (ft/s)	Percent Full (%)
SS 100	9.4	0.4	292.7	660.10	4.3	2.95	44.3
SS 101	9.4	0.4	290.0	658.20	3.5	2.94	44.1
SS 102	7.6	0.9	287.7	576.10	6.0	4.07	49.9
SS 201	9.4	1.7	403.8	1418.60	7.0	5.63	28.5
SS 202	9.4	0.7	251.1	884.50	5.8	3.51	28.4
SS 301	11.2	0.5	741.6	1485.80	8.2	4.04	49.9
SS 302	11.2	0.6	684.5	1370.80	6.0	4.46	49.9
SS 303	11.2	0.3	499.4	1001.20	4.5	3.28	49.9
SS 304	11.2	0.3	419.5	919.30	4.2	2.95	45.6
SS 305	7.6	0.6	134.2	490.10	4.1	2.95	27.4
SS 306	7.6	1.0	279.4	626.00	6.4	4.3	44.6
SS 307	7.6	1.3	277.7	692.60	4.8	4.63	40.1

APPENDIX E

Excerpt From
Mission Bay Project
Separated Sanitary Sewer Analysis
By Olivia Chen Consultants, Inc.
Dated February 21, 2002

LEGEND

48/86 AVERAGE/MAXIMUM SANITARY FLOW IN GPM

SANITARY SEWER (SYSTEM 2)

SANITARY SEWER (SYSTEM M)

SYSTEM BOUNDARY

FLOW INJECTION

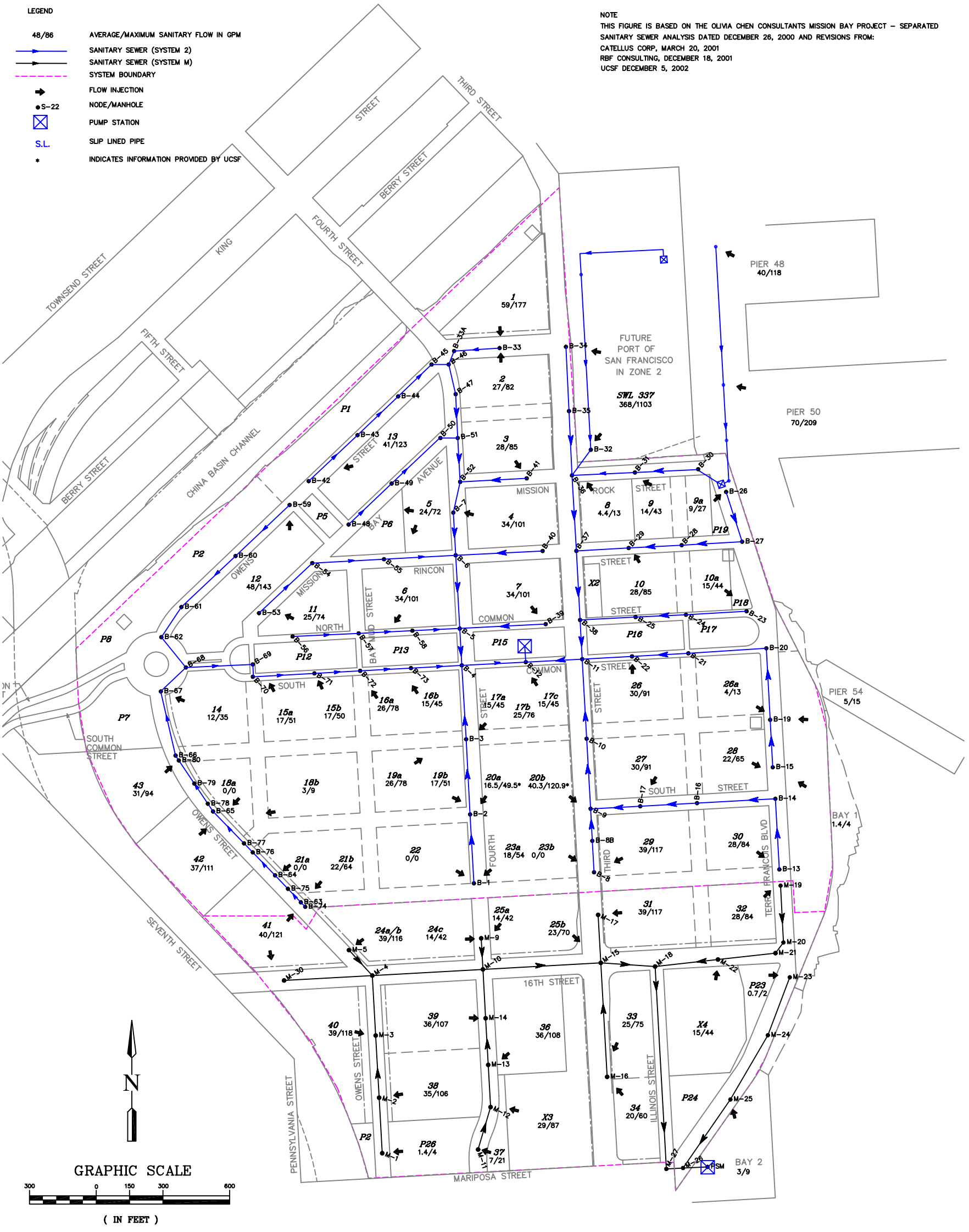
●S-22 NODE/MANHOLE

PUMP STATION

S.L. SLIP LINED PIPE

* INDICATES INFORMATION PROVIDED BY UCSF

NOTE
THIS FIGURE IS BASED ON THE OLIVIA CHEN CONSULTANTS MISSION BAY PROJECT – SEPARATED SANITARY SEWER ANALYSIS DATED DECEMBER 26, 2000 AND REVISIONS FROM:
CATELLUS CORP, MARCH 20, 2001
RBF CONSULTING, DECEMBER 18, 2001
UCSF DECEMBER 5, 2002



GRAPHIC SCALE

300 0 150 300 600

(IN FEET)

Olivia Chen Consultants, Inc. Civil · Environmental · Geotechnical Job No. 1407.01.001	Mission Bay Project Separated Sanitary Sewer Analysis	Flow Distribution	Figure 3

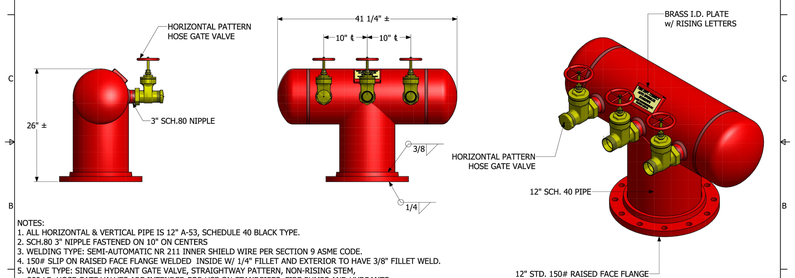
L:\CATELLUS\1407\1407.01\07 Drawings_Plans\model_base_rev 1-04.dwg
2/5/02

APPENDIX L

Conceptual Air Gap Manifold Detail

3 PORTS FIRE DEPARTMENT CONNECTION w/ GATE VALVES
PW/FDC-32612-GV

Placer WATERWORKS Inc.
Fabrication of Infrastructure Parts and Accessories
1325 Furneaux Road, Plumas Lakes, CA. 95961
(530) 742-9675
www.placerwaterworks.com



NOTES:
1. ALL HORIZONTAL & VERTICAL PIPE IS 12" A-53, SCHEDULE 40 BLACK TYPE.
2. SCH.80 3" NIPPLE FASTENED ON 10" ON CENTERS
3. WELDING TYPE: SEMI-AUTOMATIC NR 211 INNER SHIELD WIRE PER SECTION 9 ASME CODE.
4. 150# SLIP ON RAISED FACE FLANGE WELDED INSIDE W/ 1/4" FILLET AND EXTERIOR TO HAVE 3/8" FILLET WELD.
5. VALVE TYPE: SINGLE HYDRANT GATE VALVE, STRAIGHTWAY PATTERN, NON-RISING STEM, 300 LB. HOSE GATE VALVES ARE INTENDED FOR USE ON STANDPIPES, FIRE PUMPS AND HYDRANTS.
6. STANDARD EQUIPMENT: FEMALE NPT INLET X MALE HOSE THREAD OUTLET, FORGED BRASS WITH RED HAND WHEEL, SOLID WEDGE DISC WITH TAPERED SEATS. (FEMALE X MALE)
7. GIACOMINI GATE VALVE IS FM APPROVED & UL LISTED 618R
8. ENTIRE FIXTURE IS ABRASIVE BLASTED SSPC SP-5WHITE METAL 2-3 MILS ANGULAR PROFILE THEN POWDER COATED RED W/ 4-6 MIL FILM THICKNESS.
10. ALL WELDING IS DONE PER AWS D1.1 SECTION 3 FCAW PROCESS/ PWW WPS NO. WP.061
10. NOT RECOMMENDED FOR WET SYSTEM
CAT#: Custom: 3 PORTS - FDC/32612-GV

Copyrighted 2016 Placer Waterworks, Inc.© All Right Reserved - For Authorization for Duplication may obtain thru: kkern@placerwaterworks.com

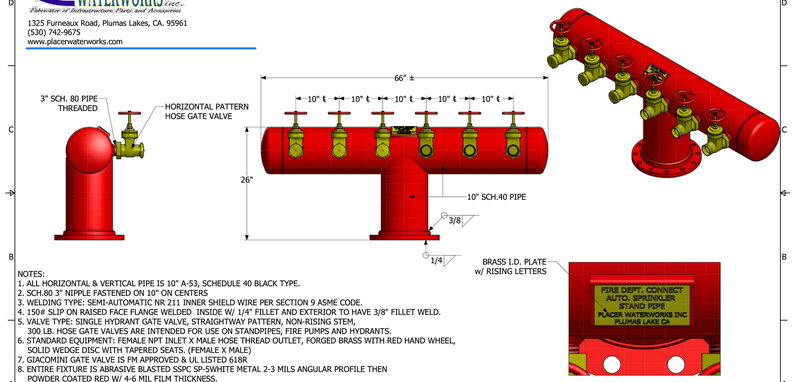
*** CB: K.K 3/21/2016 REV. 00

1 – 3 PORT FIRE DEPARTMENT CONNECTION
NOT TO SCALE

DETAIL IS STILL BEING COORDINATED WITH MANUFACTURER

6 PORTS FIRE DEPARTMENT CONNECTION w/ GATE VALVES

Placer WATERWORKS Inc.
Fabrication of Infrastructure Parts and Accessories
1325 Furneaux Road, Plumas Lakes, CA. 95961
(530) 742-9675
www.placerwaterworks.com



BRASS I.D. PLATE DETAIL

NOTES:
1. ALL HORIZONTAL & VERTICAL PIPE IS 10" A-53, SCHEDULE 40 BLACK TYPE.
2. SCH.80 3" NIPPLE FASTENED ON 10" ON CENTERS
3. WELDING TYPE: SEMI-AUTOMATIC NR 211 INNER SHIELD WIRE PER SECTION 9 ASME CODE.
4. 150# SLIP ON RAISED FACE FLANGE WELDED INSIDE W/ 1/4" FILLET AND EXTERIOR TO HAVE 3/8" FILLET WELD.
5. VALVE TYPE: SINGLE HYDRANT GATE VALVE, STRAIGHTWAY PATTERN, NON-RISING STEM, 300 LB. HOSE GATE VALVES ARE INTENDED FOR USE ON STANDPIPES, FIRE PUMPS AND HYDRANTS.
6. STANDARD EQUIPMENT: FEMALE NPT INLET X MALE HOSE THREAD OUTLET, FORGED BRASS WITH RED HAND WHEEL, SOLID WEDGE DISC WITH TAPERED SEATS. (FEMALE X MALE)
7. GIACOMINI GATE VALVE IS FM APPROVED & UL LISTED 618R
8. ENTIRE FIXTURE IS ABRASIVE BLASTED SSPC SP-5WHITE METAL 2-3 MILS ANGULAR PROFILE THEN POWDER COATED RED W/ 4-6 MIL FILM THICKNESS.
9. ALL WELDING IS DONE PER AWS D1.1. FCAW PROCESS.
10. NOT RECOMMENDED FOR WET SYSTEM
CAT#: Custom: 6 PortS Fire Department Connection W/ Gate Valves

Copyrighted 2013 Placer Waterworks, Inc.© All Right Reserved - For Authorization for Duplication may obtain thru: kkern@placerwaterworks.com

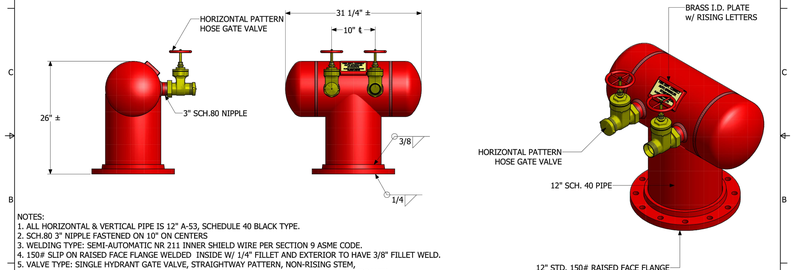
*** CB: K.K 3/05/2013 REV. 01

2 – 6 PORT FIRE DEPARTMENT CONNECTION
NOT TO SCALE

DETAIL IS STILL BEING COORDINATED WITH MANUFACTURER

2 PORTS FIRE DEPARTMENT CONNECTION w/ GATE VALVES
PW/FDC-22612-GV

Placer WATERWORKS Inc.
Fabrication of Infrastructure Parts and Accessories
1325 Furneaux Road, Plumas Lakes, CA. 95961
(530) 742-9675
www.placerwaterworks.com



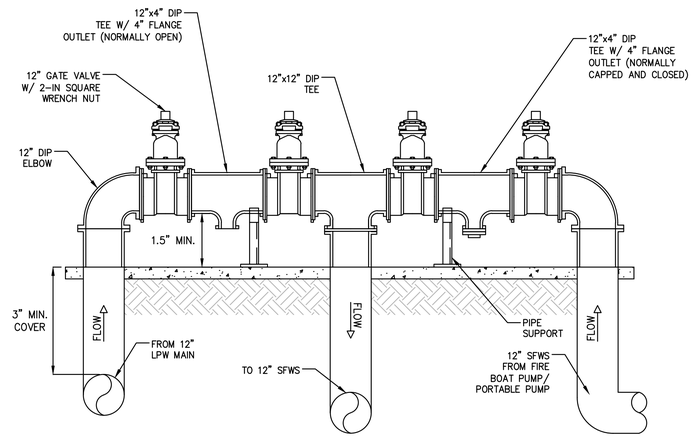
NOTES:
1. ALL HORIZONTAL & VERTICAL PIPE IS 12" A-53, SCHEDULE 40 BLACK TYPE.
2. SCH.80 3" NIPPLE FASTENED ON 10" ON CENTERS
3. WELDING TYPE: SEMI-AUTOMATIC NR 211 INNER SHIELD WIRE PER SECTION 9 ASME CODE.
4. 150# SLIP ON RAISED FACE FLANGE WELDED INSIDE W/ 1/4" FILLET AND EXTERIOR TO HAVE 3/8" FILLET WELD.
5. VALVE TYPE: SINGLE HYDRANT GATE VALVE, STRAIGHTWAY PATTERN, NON-RISING STEM, 300 LB. HOSE GATE VALVES ARE INTENDED FOR USE ON STANDPIPES, FIRE PUMPS AND HYDRANTS.
6. STANDARD EQUIPMENT: FEMALE NPT INLET X MALE HOSE THREAD OUTLET, FORGED BRASS WITH RED HAND WHEEL, SOLID WEDGE DISC WITH TAPERED SEATS. (FEMALE X MALE)
7. GIACOMINI GATE VALVE IS FM APPROVED & UL LISTED 618R
8. ENTIRE FIXTURE IS ABRASIVE BLASTED SSPC SP-5WHITE METAL 2-3 MILS ANGULAR PROFILE THEN POWDER COATED RED W/ 4-6 MIL FILM THICKNESS.
10. ALL WELDING IS DONE PER AWS D1.1 SECTION 3 FCAW PROCESS/ PWW WPS NO. WP.061
10. NOT RECOMMENDED FOR WET SYSTEM
CAT#: Custom: 2 PORTS - FDC/22612-GV

Copyrighted 2016 Placer Waterworks, Inc.© All Right Reserved - For Authorization for Duplication may obtain thru: kkern@placerwaterworks.com

*** CB: K.K 3/21/2016 REV. 00

3 – 2 PORT FIRE DEPARTMENT CONNECTION
NOT TO SCALE

DETAIL IS STILL BEING COORDINATED WITH MANUFACTURER



4 – AIR GAP MANIFOLD
NOT TO SCALE

TICD
TREASURE ISLAND
COMMUNITY DEVELOPMENT
TREASURE ISLAND
DEVELOPMENT AUTHORITY

LICENSE STAMP

TREASURE ISLAND DEVELOPMENT AUTHORITY
CITY OF SAN FRANCISCO COUNTY OF SAN FRANCISCO CALIFORNIA 94130

TREASURE ISLAND
SUB-PHASE 1B, 1C & 1E IMPROVEMENT PLANS

STREETS
95% CONSTRUCTION DOCUMENTS

NO.	DESCRIPTION	BY	DATE
	REVISIONS		

DRAWN BY:
PROJECT NO. 20140015-12
CHK:
DATE: 4/6/2016

DETAILS

SHEET TITLE

SCALE AS SHOWN

C10.17-1T

146 OF 429

DRAWING NO.

NOT FOR CONSTRUCTION

DRAWING NAME: Z:\AGS\project\2014\AGS-14-003 Treasure Island-BKF-AGS JV\5_Production\1_Drawings\2_Sheets\TI-C10.17 FDC Details.dwg
PLOT DATE: 04-06-16 PLOTTED BY: jimmy.fu

811 Know what's Call 811 below. before you dig.

APPENDIX M

District Heating and Cooling Services at Mission Rock
May 13, 2016

REQUEST FOR QUALIFICATIONS

District Heating and Cooling Services
At Mission Rock

San Francisco, California

Submission Date: **May 13, 2016**

Table of Contents

1 INTRODUCTION 1

2 PROCUREMENT INFORMATION 2

2.1 Procurement Process 2
2.2 Submission of Qualifications 3
2.3 Questions 3
2.4 Evaluation of Qualifications 3
2.5 No Reimbursement for Costs 4
2.6 Representations 4
2.7 Eligible Respondents 4
2.8 Additional Contract Requirements 4

3 GLOSSARY OF DEFINITIONS 5

4 DESCRIPTION OF THE PROJECT SITE 7

4.1 Background 7
4.2 Project Site 7

5 DESCRIPTION OF THE PROJECT 11

5.1 Project Goals and Objectives 11
5.2 Project Technical Opportunity 12
5.3 Project Commercial Opportunity 17

6 REQUIREMENTS FOR THE SOQ 21

6.1 Proposed Project Team 21
6.2 Previous Experience 21
6.3 Technical Response 22
6.4 Commercial Responses 22
6.5 Blue Sky Discussion 23

ATTACHMENT A: Draft Memorandum of Understanding A-1

ATTACHMENT B: Site Plan B-2

ATTACHMENT C: Draft Schematic of Planned Utilities C-1

ATTACHMENT D: Supplementary Technical Information D-1

D.1 Thermal Generation Details D-1

D.2 Distribution Details D-1
D.3 Building Interconnections D-3
D.4 Anchor Brewing Process Loads D-3

ATTACHMENT E: Assumptions D-1

Tables:

Table 1: Phasing Program and Land use details 8
Table 2: Indicative Performance Thresholds 11
Table 3: Project Site Performance Requirements and Sustainability Targets 12
Table 4: DES conceptual design basic information 13
Table 5: Estimated Non-Concurrent Peak Heating and Cooling – By Parcel 13
Table 6: Estimated Non-Concurrent Peak Heating and Cooling, without P48 – By Phase 14
Table 7: Load diversities 14
Table 8: Estimated Concurrent Peak Heating and Cooling 14
Table 9: Estimated Peak Non-Concurrent Heating and Cooling for Anchor 16
Table 10: Potential Commercial Allocations 17

Figures:

Figure 1: Potential CUP Siting Locations 15
Figure 2: Typical Bay Water Intake/Outflow Section D-2
Figure 3: Chilled and Hot Water Combined Trench - Maximum Section D-2
Figure 4: Chilled Water Trench - Maximum Section D-2
Figure 5: Heat Hot Water Trench - Maximum Section D-3
Figure 6: Substation Depiction D-3
Figure 7: Ultimate Energy Consumption Split (400,000 Barrels/Year, no Brewery Efficiency) D-4
Figure 8: Hypothetical Ultimate Energy Consumption Estimates (400,000 barrels/year) D-5
Figure 9: Development Thermal Load Map D-6

1 INTRODUCTION

Through this Request for Qualifications ("RFQ"), Seawall Lot 337 Associates LLC ("Master Developer") is soliciting Statements of Qualifications ("SOQs") from energy services companies ("Respondent" or "DES Developer") that describe their proposal and capabilities to build, own, and operate ("BOO") a district scale heating and cooling plant as well as operate and maintain a district scale distribution system (the "Project") in the Mission Rock development ("Project Site"), which is a private real estate development located on public land that will be ground leased from the Port of San Francisco for a period not to exceed 75 years.

The intention is for the Project to be developed through a private-to-private partnership between the Master Developer and DES Developer. The Master Developer is open to a variety of business models and commercial structures and is input from the DES Developer to this end.

Master Developer is interested in selecting a firm that has direct experience in developing, designing, building, financing, operating and maintaining projects similar to the Project, and that will deliver the Project to meet the goals, standards, performance requirements, and schedule outlined this RFQ.

2 PROCUREMENT INFORMATION

2.1 Procurement Process

This RFQ provides the information necessary for Respondents to prepare and submit SOQs for consideration by Master Developer. The following describes the general procurement process:

- Collecting SOQs in response to this RFQ is the first step in selecting a firm.
- Once SOQs are received, Master Developer will choose a shortlist of Respondents for in depth site visits and interviews.
- After interviews, a DES Developer will be selected and enter into a Memorandum of Understanding (MOU), under which Master Developer and DES Developer will negotiate the final terms and conditions of an Energy Service Agreement (ESA).

This RFQ is not an offer to enter into an agreement with any Respondent; it is a request to receive SOQs from companies interested in developing the Project. The Master Developer reserves the right to reject all SOQs, in whole or in part, and/or enter into negotiations with any party to provide such services, whether or not a SOQ has been submitted. Master Developer will not have any obligation to any Respondent unless and until it has entered into a written agreement with terms and conditions agreed to by to Master Developer. Master Developer may enter into discussions or negotiations with a Respondent with respect to any SOQ or otherwise, which shall not be deemed to be an acceptance of such SOQ or an agreement with the Respondent.

The City and County of San Francisco ("City"), the Port of San Francisco ("Port"), and various other agencies are aware of the Project and have been involved in the process to date; however, it should be noted that this is a private RFQ that does not fall under the City's Public Procurement Policies or any other competitive bidding requirements. During the RFQ process, no Public Agency may be contacted in regards to the Project.

2.1.1 Procurement Schedule

- Release: March 28, 2016
- Onsite Project Presentation and Q&A: Week of April 11th
  Location:
  Arup Office
  560 Mission St, Floor 7
  San Francisco, CA 94105
- Submission Due Date: May 13, 2016
- Anticipated Selection Date: June 15, 2016
- MOU Execution: no later than June 30, 2016
- ESA Substantially Complete: November 1, 2016 (estimated)

2.2 Submission of Qualifications

Statements of Qualifications must be submitted via internet link only, which is provided below. No hard copies will be accepted.

[Internet link to be provided]

SOQs must use a minimum of 11 point font and be no more than 25 pages not including attachments. Attachments should be limited to items such as resumes, information on requested projects, and other materials pertinent to the evaluation but not suitable for including in written response.

Materials submitted as part of the SOQ will be subject to provisions in the NDA executed by the Respondents prior to receiving this RFQ. However, Master Developer may wish to use ideas or concepts presented by Respondents in the SOQ and reserves the right to do so subject to confidentiality.

2.3 Questions

Respondents shall direct all questions regarding this RFQ in writing to the Point of Contact. The Point-of-Contact may or may not choose to answer questions and may share questions and answers with all responding parties unless it is clearly marked as confidential information by the submitting Respondent.

2.3.1 Point of Contact

The below individuals are designated as Point-of-Contact for this RFQ:

Fran Weld, Vice President Development, San Francisco Giants
fweld@sfgiants.com

Orion Fulton, Sr. Manager, Arup
Orion.fulton@arup.com

2.4 Evaluation of Qualifications

Master Developer reserves the right to select the best Respondent for its partnership requirements; however, in general, the evaluation of the Qualifications shall be based on, but not limited to:

- Prior project experience with developing and operating similar scale systems;
- History of partnerships with other organizations, experience with urban systems with multiple off-takers;
- Ability to vertically integrate the development process; and
- Compatibility with Master Developer's stated goals and requirements in this RFQ.

Master Developer intends to evaluate SOQs submitted in response to this RFQ based on the completeness of the information provided, the business and technical merits as they address the goal of the Project, and any other factors that the Master Developer determines.

Following the submission of SOQs, Master Developer may request supplemental information from Respondents on an individual or group basis and may elect to meet with certain Respondents in person. Master Developer intends to select a Respondent that will serve the best interests of the Project as determined by Master Developer in its sole discretion.

2.5 No Reimbursement for Costs

In submitting an SOQ, Respondent acknowledges and accepts that any costs incurred from the participation in this RFQ procurement process shall be at the sole risk and responsibility of the Respondent, and the Master Developer will not compensate Respondents for any expenses incurred in qualifications preparation or for any presentations that may be made.

2.6 Representations

Master Developer makes no representations of any kind that an award will be made as a result of this RFQ. Master Developer reserves the right to accept or reject any or all SOQs, delete any item/requirements from this RFQ when deemed to be in Master Developer's best interest, consider factors not included in this RFQ, or select a DES Developer that did not respond to the RFQ.

2.7 Eligible Respondents

Only individual firms or lawfully formed business organizations may apply. The Master Developer intends to contract only with a Prime Firm. This does not preclude a Respondent from using subcontractors or consultants, but a Prime Firm must be identified and be the entity submitting the SOQ. The Prime Firm must demonstrate in the SOQ it has the ability to represent any and all subcontractors or members of its team. Joint Ventures are not encouraged.

2.8 Additional Contract Requirements

Under its agreement with the Port, Master Developer, as well as The Prime Firm and all other members of the Project Team, are obligated to comply with all applicable City and Port requirements in effect at the time that Master Developer's Development Agreement with the Port is executed. In submitting an SOQ, a Respondent acknowledges and accepts that if selected, it will be obligated to comply with all City and Port requirements, including without limitation, Non-Discrimination in Contracts and Property Contracts (Admin. Code Chapters 12B and 1C) and Health Care Accountability Ordinance (Admin. Code Chapter 12Q). DES Developers are obligated to become familiar with all applicable local, state, and Federal requirements and to comply with them fully as they are amended from time to time. City ordinances are currently available on the web at www.sfgov.org. It is a stated goal of Master Developer to promote and encourage contracting and subcontracting opportunities for Local Business Enterprises ("LBE") in all contracts. The target goals for each phase of development are:

- Entitlements 10%
- Horizontal Infrastructure Development 20%

3 GLOSSARY OF DEFINITIONS

The following terms and acronyms are used within this RFQ:

Arup	Master Developer's procurement advisor
BOO	Build Own Operate
BTU or btu	British Thermal Unit
CHP	Combined heat and power system
City	City and County of San Francisco
CUP	Central Utility Plant
DES	District Energy System
DES Developer	The entity selected as the preferred contracting entity via the RFQ evaluation process, that once selected, that will perform the works described in this RFQ and its SOQ
Project	The district scale heating and cooling plant and related O&M functions
EIR	Environmental Impact Report
ESA	Energy Service Agreement
ETS	Energy Transfer Stations
GAAP	Generally accepted accounting principles
gsf	Gross square feet
HUB	Historically underutilized business
IFRS	International financial reporting standards
kW	Kilowatt
kWh	Kilowatt-hour
Lead A/E Firm	Lead architecture and/or design engineering firm
Lead Contractor(s)	Contractor(s) in the Project Team who are responsible for engineering, procurement and construction ("EPC") and Operation and Maintenance ("O&M") functions
Master Developer	Seawall Lot 337 Associates LLC
MMBTH	One million BTUs per hour
Mission Rock	The name for the development of Seawall Lot 337 and Pier 48, for the purposes of this RFQ, see "Project Site" below
MOU	Memorandum of Understanding
MW	Megawatt
O&M	Operation and Maintenance
PA	Project Agreement
PG&E	Pacific Gas & Electric
psig	Pounds per square inch gauge
Prime Firm	The organization considered to be lead Respondent/DES Developer entity (if not a joint venture)
Port	Port of San Francisco
Project Site	Seawall Lot 337 and Pier 48; the area that the DES serves
Project Team	All key entities that comprise the DES Developer organization

Public Agency	Port, City, SFPUC, PG&E, or other agency representing the public interest
Respondent	The contracting organization/entity that submits the SOQ, on behalf of the Project Team.
RFQ	Request for Qualifications
SEC	Security and Exchange Commission
SFPUC	San Francisco Public Utilities Commission
SOQ	Statement of Qualifications
T&C's	Terms and conditions
Vertical Developers	Future holders of individual ground leases within the Project Site to build commercial real estate

4 DESCRIPTION OF THE PROJECT SITE

4.1 Background

In 2008, the San Francisco Giants won a public bid for the exclusive development rights to this property. Over the last eight years, the Giants, which formed Sea Wall Lot 337 Associates LLC to act as master developer, have worked with the community to develop a comprehensive land use plan, and in November of 2015, this plan was voted on and passed by the voters of San Francisco.

A key element of the future neighborhood is a robust sustainability plan. This plan will outline topics such as material selection, climate change resiliency, water re-use, and energy; and the DES is expected to play a central role in achieving some of the sustainability goals.

4.1.1 Urban context

Given its size and location, SWL 337 is one of the Port's most desirable development sites. Consistent with the Port's land use policy document, the Waterfront Land Use Plan, the Port engaged in a multi-year public planning process culminating in the following vision statement for development of the parcel:

> *Create a vibrant and unique mixed-use urban neighborhood focused on a major new public open space at the water's edge. This new neighborhood should demonstrate the highest quality of design and architecture, and the best in sustainable development with a mix of public and economic uses that creates a public destination which enlivens the Central Waterfront, celebrates the San Francisco Bay shoreline, and energizes development at Mission Bay.*

The Project Site also includes Pier 48, a pile-supported 212,500 square-foot facility containing about 181,200 square feet of enclosed warehouse space and a 31,300 square-foot valley. Pier 48 is bounded by China Basin on the north, Pier 50 on the south, and Terry Francois Boulevard to the west. Pier 48 was originally constructed in 1928 and is the southernmost pier structure in the Port of San Francisco Embarcadero Waterfront Historic District, which is listed in the National Register of Historic Places.

Through the planning process, the Port identified the following objective for Pier 48, if included in any development proposal for SWL 337:

> *Propose a use program for Pier 48 that is publicly-oriented and water-related to the extent possible, and which complements and enhances the public use and enjoyment of the major new open space at China Basin. The Pier 48 use program must be consistent with the public trust, and any improvements must comply with the Secretary of the Interior Standards for Rehabilitation.*

4.2 Project Site

Seawall Lot 337 and Pier 48 are owned by the Port of San Francisco, and together form the Project Site. Seawall Lot 337 is a rectangular parcel bound by Terry A. Francois Boulevard to

the north and east, Third Street to the west, Mission Rock Street to the south. Seawall Lot 337 is currently a surface parking lot just south of AT&T Park known as Parking Lot A.

The Project Site will include 8 acres of parks and open space, approximately 3.5 million square feet of development with a mix of housing, offices, parking, and neighborhood serving retail, as well as historic Pier 48 which may become home for a new brewery by Anchor Brewing. More information can be found at http://missionrock.org/index.html#.

See Attachment B for a site plan showing land uses and phasing.

4.2.1 Relationship of Parties

- Port of San Francisco: Owners of Project Site
- The City of San Francisco: land use and development regulation,
- Seawall Lot 337 Associates LLC: Master Developer, holds the exclusive rights to develop Mission Rock
- Anchor Brewery: Intended tenant for Pier 48
- Arup: Master Developer's DES concept designer & procurement advisor

4.2.2 Land Use Program and Phasing

Phasing

The Project Site is divided into 12 buildable Parcels not including Pier 48, 11 of which will be developed in Phases of Parcels. The 11th parcel (parcel D2) would hold the structured parking. The table below shows the draft phasing program, including the Mission Rock ground-level parking and Pier 48:

Table 1: Phasing Program and Land use details

Phase	Parcel	Land Use	Building Height	Building Stories	Gross SF (a)
1	A	Residential	240 ft.	23 Stories	413,900
	B	Office	118 ft.	8 Stories	274,750
	G	Office	188 ft.	13 Stories	303,064
	K	Residential	120 ft.	11 Stories	130,469
	Pier 48	Industrial	n/a	n/a	263,000
2	C	Office	188 ft.	13 Stories	354,826
	D1	Residential	240 ft.	23 Stories	240,494
	D2	Parking	100 ft.	10 Stories	851,130
3	E	Office	90 ft.	6 Stories	141,330

Phase	Parcel	Land Use	Building Height	Building Stories	Gross SF (a)
	F	Residential	240 ft.	23 Stories	323,775
	Mission Rock Square	Parking	0 ft.	0 Stories	227,180
4	H (Flex)	Office	90 ft.	6 Stories	151,932
	I (Flex)	Residential	120 ft.	11 Stories	200,315
	J (Flex)	Office	90 ft.	6 Stories	151,982
TOTAL	**-**	**-**	**1824 ft.**	**153 Stories**	**3,977,647**

Land Use Program

A key element of the Master Developer's land use program is the ability to respond to future market demands through flexible zoning. To this end, eight parcels are proposed to be designated as either predominantly residential (Parcels A, D, F, and K) or commercial/office (Parcels B, C, E, and G) above the lower-floor active uses, while three parcels would be flexible to allow either type of land use (Parcels H, I, and J) above the lower floor.

On the flexible parcels, the land uses (i.e., residential or office/commercial), would be determined at the time of filing for design approvals for block development proposals. Parcels designated for flexible zoning would ultimately be developed for either predominantly residential or pre-dominantly commercial/office uses above the lower floor. In all circumstances, ground floor retail and restaurant uses would be included in the flexible zoning parcels. The square footage for the flex option by land use is as follows:

- Commercial: 1,377,884 gsf
- Parking: 1,078,310 gsf
- Production: 263,000 gsf

For more information, the following describes in general terms the type of land uses proposed at the Project Site.

- **Retail, Restaurant, and Ground Floor Spaces.** 241,038 gsf to 244,777 gsf of retail and restaurant space located on the ground floor of residential and commercial buildings throughout the site. These totals do not include development at Pier 48.
- **Housing.** Housing will be located throughout the site, between 1,048 and 1,579 residential units predominantly consisting of one and two bedroom apartments. Housing would be provided on Parcel A, D, F, K and potentially on flexible Parcels H, I, and/or J.
- **Office.** Office space would primarily be located along Third Street and the south end of the proposed Mission Rock Square and at China Basin Park. Between 972,175 gross sq. ft. to 1,361,181 gsf of office space would be developed on Seawall Lot 337. Office uses would be provided on Parcels B, C, E, and G and potentially on the flexible Parcels H, I, and/or J.
- **Open Spaces and Parks.** Approximately eight acres of new and expanded public open spaces would be included: expanded China Basin Park totaling 5.12 acres, Mission Rock

Square totaling 1.1 acres and located in the center of the Project Site. Channel Wharf would be a 0.5-acre, hardscaped plaza, located between Pier 48 and Pier 50. Lastly, the Pier 48 Aprons, totaling 1.1 acres, would be preserved and improved for public access, waterfront promenade, and maritime operations.

- **Parking.** Included in the proposed parking structure on Parcel D at the southwest corner of the Project Site would be 2,300 parking spaces for use by the Project and for the ballpark games and events, and other public parking, including commuter parking/park-and-ride. In addition to the above-grade structural garage parking on Parcel D, 700 parking stalls would be located under Mission Rock Square and adjacent streets. During game days, approximately 2,000 of the parking structure stalls in the two proposed garages would be available for use to the patrons of AT&T Park. An additional approximately 100 parking stalls would be provided within residential and commercial buildings, for a maximum of 3,100 off-street parking spaces.
- **Pier 48.** Pier 48 would be rehabilitated in compliance with the Secretary of the Interior's Standards for the Treatment of Historic Properties, with a mix of uses in the 240,000-sf rehabilitated pier, including light industrial/manufacturing, barging, ancillary office, storage, retail, restaurants, tours, events, and continued maritime operations on the east and south side and along Channel Plaza.

It is currently anticipated that the Anchor Brewing Company would occupy all of the interior usable space of Pier 48 under a 30-year Port interim lease. The retail/restaurant spaces provided at Pier 48 would include 11,000 gsf of brewery retail/exhibition space, 11,000 gsf of brewery restaurant space, and 10,000 gsf of other retail space. An additional 7,875 gsf of office space would be provided on Pier 48. The brewery/distillery would be up to 190,500 gsf and a separate production area would consist of 9,625 gsf.

4.2.3 Site Utilities

Utility provider contracts are still being developed. The Master Developer is currently undecided between Pacific Gas & Electric (PG&E) and San Francisco Public Utilities Commission (SFPUC) as the power utility. Input on this decision may be solicited from the DES Developer once the MOU is signed.

The opportunity to provide electricity into the development from the DES is described further in Section 5.2.4.

4.2.4 Project Site Entitlement Schedule

Key milestones in the Mission Rock entitlements are as follows:

- Publish Public Draft EIR July/Aug 2016
- Financial Negotiations with City through September 2016
- EIR Certification January 2017
- Port and City Approvals January 2017
- Regional (BCDC) and State (SLC) Approvals February 2017
- Begin Design of Phase 1 March 2017
- Complete construction of first building in Phase 1 Q1 2019 [approximate]

5 DESCRIPTION OF THE PROJECT

5.1 Project Goals and Objectives

5.1.1 Project Goal

The Project goal is to develop a district scale solution to heating and cooling buildings at the Project Site that meets the stated performance and sustainability objectives.

5.1.2 Project Objectives

The following are the primary project objectives (described without any order of importance or preference):

- Enter into a long-term contract(s) that provides vertical developers with budget certainty and economic value for thermal services;
- Leverage the creative problem solving capacity of the energy marketplace;
- Be a good steward of natural resources, including water resources; utilize reclaimed water service for cooling tower fill (assuming a source is available);
- Achieve a resilient utility infrastructure (with appropriate redundancy) that will deliver critical energy requirements during normal and emergency conditions;
- Fit proposed CUP or CUPs within allocated parcel space(s) and heights;
- Review, comment, and provide concurrence for DES distribution design;
- Meet Minimum Performance Requirements (see Section 5.1.3); and
- Help achieve the sustainability objectives (see Section 5.1.4).

5.1.3 Minimum Performance Standards

Though not yet formalized, the Master Developer will set energy efficiency and environmental performance thresholds that the DES Developer will need to meet. For purposes of the RFQ, indicative performance thresholds are provided in Table 2 below.

Table 2: Indicative Performance Thresholds

Annual Average Efficiency				
Chilled water plant	Maximum	0.45	kW/ Ton	Inclusive of chillers, all primary & secondary distribution pumps, and heat rejection
Heat recovery chiller plant	Maximum	0.68	kW/ Ton	Inclusive of chillers, all primary & secondary distribution pumps, and heat rejection
Boiler combustion	Minimum	86.50%	%	Per individual boiler fuel & btu meter trend data
Chilled water distribution	Minimum	98.75%	%	Per plant leaving chilled water btu meter & aggregate of customer chilled water btu meter trend data
Hot water distribution	Minimum	98.25%	%	Per plant leaving hot water btu meter & aggregate of customer hot water btu meter trend data

5.1.4 Sustainability Objectives for Vertical Development

The Master Developer has sustainability performance requirements and targets for both horizontal and vertical development. [1] These sustainability performance requirements and targets for Mission Rock, shown in Table 3, are consistent with San Francisco Eco-Districts guidelines, of which Mission Rock is a Type-1 Eco-District. [2] The DES Developer will assist in achieving these by delivering energy that is highly efficient and environmentally friendly.

Table 3: Project Site Performance Requirements and Sustainability Targets

Performance requirements	Sustainability targets
• Up to 26% better than ASHRAE 90.1-2010 • Net zero potable water use for non-potable uses • LEED Gold for commercial buildings • LEED Gold for residential buildings	• Each building type can exceed future code and achieve an exceptional level of energy performance. • The Mission Rock development looks to improve upon the city's leading emissions performance by further reducing annual carbon emissions associated with energy use by up to 19%. • 100% renewable energy by 2030 • Water conservation and reuse strategies with a target of up to 47% reduction in annual carbon emissions associated with water. • Municipal solid waste diversion in San Francisco is about twice the national average, significantly decreasing the GHG emissions associated with landfill waste disposal. As there is still room for improvement in waste diversion, Mission Rock is targeting a further 25% reduction in annual carbon emissions associated with waste, compared to current San Francisco performance.

5.2 Project Technical Opportunity

The main technical scope is to offer central combined heating and cooling with bay heat rejection and cooling (if permissible). However, there are a number of enhancement opportunities on the technical delivery discussed in this section.

The chosen DES Developer will be required to satisfy themselves of the peak design loads for the Site after the MOU is executed. However, for purposes of this RFQ, Arup's reference design and load calculation shall be used.

The DES is comprised of three major components:

[1] The sustainability plan is currently in draft form and may change during this procurement, with possible input from the DES Developer

[2] http://www.sf-planning.org/index.aspx?page=3051

- One or more central utility plants (CUP or CUPs)
- A thermal utility distribution system
- The energy transfer stations (ETS) within each building/parcel

Table 4 summarizes reference design information and further information is provided in subsequent sections and in Attachments D and E:

Table 4: DES conceptual design basic information

Design and Construction Stage	
CUP	Central Combined Heating & Cooling + Bay Heat Rejection & Cooling
CUP System	• Centralized heat recovery chillers • Centralized electric water cooled chillers • Centralized low/medium temperature hot water boilers • Plate-and-frame "free-cooling" heat exchangers (bay-water) • Plate-and-frame "heat-rejection" heat exchangers (bay-water) • Balance of bay-water heat rejection and cooling plant • Minimal cooling towers
Distribution System	• The planning basis for the distribution portion of the DES has assumed a 6-pipe system comprising of: • Chilled water (CHW) supply and return pipes • Heating hot water (HHW) supply and return pipes • Bay water intake and outflow pipes • Parcel level electrical infrastructure

5.2.1 Estimated Heating and Cooling by Phase

Non-concurrent Peak Loads

The land-use heating and cooling peak load density assumptions (see Attachment E) yield the following peak non-concurrent loads in the tables below.

Table 5: Estimated Non-Concurrent Peak Heating and Cooling – By Parcel

PARCEL	PRIMARY USE	PARCEL AREA (sqft)	TOTAL GFA (sqft)	Cooling (Tons)	Heating (MMBH)
A	Residential	42,150	413,900	591.3	4.1
B	Commercial	40,209	274,750	686.9	4.1
C	Commercial	39,124	354,826	887.1	5.3
D1	Residential	9,745	240,494	343.6	2.4
D2	Parking	86,161	851,130	n/a	n/a
E	Commercial	25,110	141,330	353.3	2.1
F	Residential	25,110	323,775	462.5	3.2
G	Commercial	33,057	303,064	757.7	4.5
H	Commercial	31,144	151,932	379.8	2.3
I	Residential	32,543	200,315	286.2	2.0

PARCEL	PRIMARY USE	PARCEL AREA (sqft)	TOTAL GFA (sqft)	Cooling (Tons)	Heating (MMBH)
J	Commercial	31,515	151,982	380.0	2.3
K	Residential	17,857	130,469	186.4	1.3
P48	Production	259,328	263,000	657.5	1.3

TOTAL, without P48	**5,315**	**33.8**
TOTAL, with P48	**5,972**	**35.1**

Table 6: Estimated Non-Concurrent Peak Heating and Cooling, without P48 – By Phase

Assumed Phase	Parcel	Heating (MMBH)	Cooling (Tons)
1	A, B, G, K	14.1	2,222
2	C, D1, D2	7.7	1,231
3	E, F	5.4	816
4	H, I, J	6.6	1,046
Total:	**-**	**33.8**	**5,315**

Concurrent Peak Loads

Arup estimates that the concurrent load diversities for the mix of uses in the flex parcel option are:

Table 7: Load diversities

	Cooling	Heating
w/out P48	10%	2%
w/P48	8%	2%

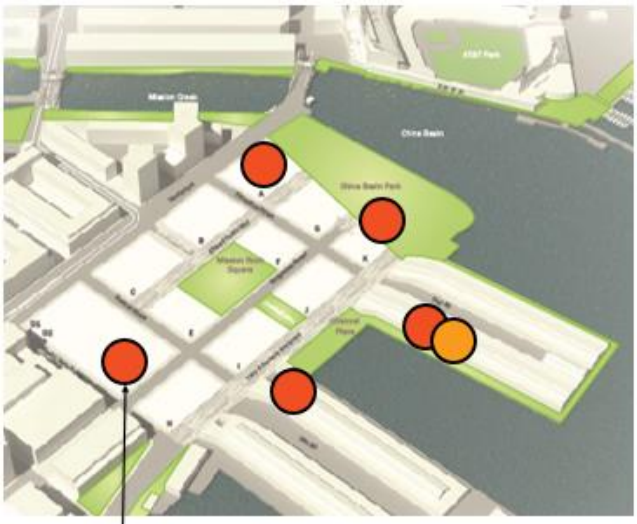
Table 8: Estimated Concurrent Peak Heating and Cooling

	Cooling (Tons)	Heating (MMBH)
w/out P48	4,791	33.1
w/P48	5,517	34.3

5.2.2 Plant Location Considerations

Possible plant locations are constrained by size, phasing, and general location. The potential locations for siting CUP's are illustrated in Figure 1 below.

Figure 1: Potential CUP Siting Locations



Process Plant

- Anchor plant for brewing process
- High pressure steam required
- Medium-high temperature hot water required (170 ºF)
- Low temperature chilled water required (< 36 ºF)
- Total area is currently unknown

Comfort Heating/Cooling Plant

- Central plants for building comfort heating & cooling equipment
- Elevated chilled water preferable (> 50 ºF)
- Low temperature hot water preferable (< 150 ºF)
- Connection to Bay to reduce cooling towers & maximize cooling efficiency
- Total area is between 24K & 35K sf plus some roof space (TBD)
    - Phase 1 Plant ~12K to ~20K sf

Available when parcel is built. Refer to assumed phasing plan elsewhere in the RFQ.

A consideration relating to siting the CUP is the nature of Pier 48. It has a limited clear height that roughly ranges between 20 feet at the edges and 35 feet at the core, load bearing limits due to pile foundation and bay muds, and sea level rise considerations.

Potential partners will need to propose solutions that are nimble and flexible so that the complexity and uncertainty introduced by the project phasing can be overcome.

5.2.3 Distribution System Considerations

The distribution system routing options are being planned along with other utilities in the public rights-of-way (ROW). Utilities are generally constrained along Exposition St and Bosque St. Further, utilities will not be placed in the Terry A Francois Blvd ROW until parcels I/J/K are built. A large parking structure is planned at the podium level beneath Mission Rock Square between parcels B and C to the West and parcels I and J to the East and between Exposition St to the North and Bosque St to the South. Rights-of-way for Shared Public Way and Bridgeview Way are currently being considered for the distribution system but this may require running the pipes inside the garage. Finally, the ROW north of parcels A, G, and K and South of China Basin Park is generally free of utilities. Please see Attachment B for a draft schematic of the planned utilities.

The selected DES Developer will be expected to provide input to, and ultimately concur with, the routing and design of the distribution system.

5.2.4 Anchor Brewing

It is currently anticipated that the Anchor Brewing Company would occupy all of the interior usable space of Pier 48 under a 30-year Port interim lease. Anchor Brewing has indicated that it will be developing, as part of the new brewery, a process plant capable of supporting the

production of approximately 200,000 barrels annually. This figure is subject to change by Anchor.

The technical opportunity includes the following heating and cooling loads for the Anchor site. This does not include any heating and cooling loads that Anchor may require for their production needs. See Attachment D section D.5 for more details on Anchor's production loads.

Table 9: Estimated Peak Non-Concurrent Heating and Cooling for Anchor

Assumed Phase	Parcel	Heating (MMBH)	Cooling (Tons)
n/a	P48	1.3	658

Anchor Brewing Enhancement Opportunities:

There may be an opportunity to:

- Pre-heat the Anchor Brewing process hot water using the district heating system and distribution, thereby reducing the required steam boiler capacity in the Anchor Brewing process plant. This might be achievable under a scenario where an extensive distribution run from the closest main branch is not required.
- Operate and Maintain the Anchor Brewing process plant under a performance contract or other form of contract. This will require discussions with Anchor Brewing directly during the RFQ procurement.
- Run microturbines for cogeneration of electricity as part of the Anchor Brewing process plant operation. Again, discussions with Anchor Brewing directly during the RFQ procurement will be required to better understand this opportunity. [The environmental impacts of cogeneration may be addressed as part of the Mission Rock EIR.]

5.2.5 Bay Water Heat Rejection & Cooling

The inclusion of bay water as a means for heat rejection & cooling is an important aspect of the DES design as it relates to sustainability performance. Not only will it save considerable amounts of energy and water, it will also alleviate site design concerns related to cooling towers that would otherwise be needed. Master Developer expects this technology to be pursued as part of the DES design, construction, and operation.

The following is the current proposed approach for installing the bay water system, which was developed for purposes of examining potential environmental impacts in the EIR:

1. Based on the soil conditions at the site (young bay mud & rubble debris), directional drilling is not recommended.
2. The intake and outfall pipelines would be HDPE, placed at or just below the existing seabed, supported on plastic lumber attached the piles with 316SS hardware.
3. The outfall and intake pipelines & structures should be within the footprint of the Pier 48.
4. The inlet manifold should be placed one bent in from the pier head. The inlet screens will be in deep water, protected by the pier, and maintenance will have direct access to the screens.

5. If necessary to extend the pipeline offshore, it would likely be directly buried, which would require minor dredging and placement of rock riprap. Maintenance of the screens will be more costly and may require support piles.
6. The outfall is typically easier to install and the engineer will determine the placement and the number of duckbill diffusers.
7. The Pump Station is recommended to remain onshore or near the bulkhead. At Pier 15, a project precedent, the intake screens, pump station, secondary screens, and outfall are at one location near the outer third of the pier.
8. If secondary screening is required, it should be near the pump station.

5.3 Project Commercial Opportunity

5.3.1 Introduction to Potential Commercial Structure

An "off-balance sheet" approach is the preferred approach of the Master Developer, where the DES Developer builds, owns, and operates the CUP and provides routine and lifecycle operations and maintenance for the distribution system up to the energy transfer station in each building. The Master Developer is interested in feedback on potential commercial structures throughout this section (see Section 6.4).

The anticipated payment structure will:

- Mitigate market risk through a DES connection mandate for all properties and, to the extent feasible, phasing of the real estate development so that annual capital requirements and annual cash flows yield sufficient returns for the DES Developer.
- Obligate DES Developer to (i) design and construct the CUP according to agreed specifications; provide a provide a security package that includes but is not limited to parent company guarantee, warranties, liquidated damages and/or holdbacks of the design and construction work; (ii) provide project financing; (iii) operate and maintain the CUP and distribution system and (iv) provide required reporting and customer service activities, and;
- Grant DES Developer the right to receive payments according to the agreed schedule at agreed rates for a number of years to be determined after substantial completion of the Project (which will include, among other things, that the CUP is available for use), under the terms and conditions negotiated by the parties.

The following table displays the potential commercial roles for the parties involved in the CUP and distribution system:

Table 10: Potential Commercial Allocations

	CUP	Distribution system
Ownership	DES Developer	Port/Nonprofit/DES Developer
Permitting	DES Developer	Master Developer/DES Developer
Site Use	DES Developer will lease from SWL	Franchise agreement/lease within public right of way
Design and construction	DES Developer	Port or Master Developer with support of DES Developer
Commissioning	DES Developer	DES Developer

	CUP	Distribution system
Financing	DES Developer	On-balance sheet taxable from Master Developer with buy-out by the Port using tax exempt CFD
Billing and Customer Service	DES Developer	n/a
Routine O&M	DES Developer	DES Developer
Lifecycle	DES Developer	DES Developer

5.3.2 Off-take Agreement

It is assumed that each individual property owner will have a retail agreement to purchase from the DES Developer, based on rates negotiated under the ESA.

Alternative Off-take Opportunities:

Master Developer is considering an energy non-profit organization to act as the single off-taker for the ESA. The goal is for this organization to help reduce counterparty credit risk for the DES Developer by buying thermal power on behalf of the property owners in Mission Rock. The DES Developer, in turn, would not have to factor the credit risk (including the ongoing costs of billings/collections) of individual customers and could accept a lower rate of return.

Master Developer is interested in discussing with the partner the viability of this option as well as other commercial structures.

5.3.3 Energy Non-Profit

The Master Developer is interested in establishing a non-profit that could perform all or some of the following roles as they relate to the Project:

- Rates Negotiation: The non-profit entity would help to reduce counterparty credit risk for the DES Developer by buying thermal power, and would negotiate rates for Mission Rock property owners.
- Ownership: The non-profit could own the distribution system and contract the O&M to the DES Developer. The nonprofit could also own the full DES System, or to secure a credit enhancement for the full system from the Port.
- Financing: The non-profit could be used to secure conduit financing for the distribution system or the CUP.

The Master Developer would set up this organization, with it or the Port acting as the credit-worthy backer. Establishment and maintenance (reporting, auditing) costs for the nonprofit are expected to be nominal for a non-charity nonprofit.

Running the nonprofit requires the establishment of a board and the election of board members. Possible board seats could include voting and non-voting members, who would meet regularly (quarterly, bi-yearly) and would determine meetings and expenditures. Such board members may include:

- Master Developer

- The Port
- Elected seats for Mission Rock property owners/customers

5.3.4 Financing

The DES Developer will be responsible for the formation of capital necessary to deliver the Project. The Master Developer does not have a preference for a specific financing structure. However, it is expected that financing for the Project will include a combination of equity and debt (bank debt, taxable and/or tax-exempt bonds).

The distribution system is to be financed on Master Developer's balance sheet, which would be eventually bought out by the Port.

Alternative Financing Opportunities:

In addition to the above, Master Developer is interested in feedback on the following possible financing options:

- The DES Developer providing upfront capital for the distribution system and the Port buying out their equity with the CFD tax exempt financing.
- A nonprofit entity providing 63-20 conduit financing (or similar) for the CUP or the distribution system.

5.3.5 Operations and Maintenance

Master Developer will include stipulations for output product availability (up-time) and other performance specifications as part of negotiations under the MOU. The DES Developer will be responsible for all operations and maintenance activities necessary to make sure that availability and performance requirements are met.

Prior to beginning output product sales, and annually thereafter, the DES Developer shall provide independent, certified calibration and operational checks of all revenue meters.

5.3.6 Billing/Customer Service

Master Developer and the DES Developer will negotiate an appropriate means and mechanism for invoicing. The DES Developer will be responsible for providing a negotiated level of customer service, inclusive of response and resolution of issues raised by Master Developer within a contractually agreed time period.

5.3.7 Entitlement and Permitting

Master Developer will be responsible for all entitlements and approvals from authorities having jurisdiction over the Project Site.

The DES Developer will be responsible for all permitting related to the CUP.

The distribution system will be a joint permitting effort between the Master Developer and the DES Developer.

DES Developer will be responsible for all ongoing permitting related to DES operations.

5.3.8 Reporting

The DES Developer will be responsible for providing all routine, periodic, and incident reporting as negotiated between the Master Developer and DES Developer.

6 REQUIREMENTS FOR THE SOQ

The following are the minimum requirements for the SOQ. Please structure your SOQ so that it mirrors the structure of this section, addressing each requirement in order.

In the Technical and Commercial Responses, the Master Developer is seeking to gain an understanding of how your Project Team would approach the Project, not on the final solutions. Technical and Commercial Responses will be subject to further negotiation and refinement post-selection when the DES Developer will be able to conduct full due diligence and determine feasibility, among other things.

Qualifications shall be prepared simply, providing a straightforward description of the Respondent's ability to meet the requirements of this RFQ. Emphasis shall be on the quality, completeness, clarity of content, responsiveness to the requirements, and an understanding of Master Developer's needs.

6.1 Proposed Project Team

- Provide a statement of interest for the Project including a narrative describing the unique qualifications of the Project Team as they pertain to the Project.
- Provide a brief history of the Prime Firm and the Prime Firm's experience in similar projects. In addition, please discuss any known limitations to the Project Team's ability to fulfill the scope as outlined herein.
- Provide resumes (limit one page each) giving the experience and expertise of the key professional members that would be working on this deal from the Prime Firm as well as for the lead for engineering, procurement and construction ("EPC") services and the lead for O&M services (together "Lead Contractor(s)"), including their experience with similar projects, the number of years with the firm, and their city of residence.
- Provide a statement on the availability and commitment of the key professionals in the Prime Firm and Lead Contractor(s) that will be assigned to the Project.

6.2 Previous Experience

- List a maximum of five (5) projects for which the Prime Firm has provided services that are most directly related to the Project. Wherever possible, provide representative projects where the proposed Prime Firm, Lead Contractor(s), lead A/E Firm and other key sub-contractors have worked together. List the projects in order of priority, with the most relevant project listed first. Provide the following information for each project listed:
    - Project name, location, contract delivery method, and description.
    - Color images (photographic or machine reproductions).
    - Final Construction Cost, including Change Orders.
    - Final Project size in gross square feet; Final Project power and thermal capacity.
    - Type of construction (new, renovation, or expansion).
    - Actual start and finish dates for design.
    - Actual Notice to Proceed and Substantial Completion dates for construction.
    - Description of professional services Prime Firm and contractors provided for the project.

- Name of Project Manager (individual responsible to the System/University for the overall success of the project).
- Sources of funding/financing.

- Provide references for each project listed above, identify the following:
  - The Owner's name and representative who served as the day-to-day liaison during the design and construction, and O&M phases of the Project, including name, title, telephone number and email.
  - Contractor's name and representative who served as the day-to-day liaison during the pre-construction and/or construction phase of the project, including name, title, telephone number and email.
  - Length of business relationship with the owner.

References shall be considered relevant based on specific project participation and experience with the Prime Firm and/or Lead Contractor(s).

6.3 Technical Response

- Please describe generally the Project Team's suggested technical approach to the Project. In doing so, please describe how your approach would achieve stated goals and requirements of the Project listed in Sections 5.1.3 and 5.1.3 above. Highlight your experience with delivering the proposed technological solutions (e.g. from other projects preferably submitted with your SOQ). Please also include additional ideas or innovations not addressed in this RFQ.
- Describe the Project Team's approach to construction, commissioning and start-up. Please include in the narrative how the approach will take into account the phased nature of the Mission Rock development. Please specifically address the Team's approach to plant locations and any sequencing required to reach the final CUP build-out.
- Please describe the Project Team's approach to O&M. Include discussion and examples of reliability assurance, water and energy conservation practices in operations, energy efficiency practices in operations, safety practices, quality assurances, controls and monitoring approaches.

6.4 Commercial Responses

- Please describe generally the commercial structure you envisage for the Project. Provide a deal structure diagram showing key parties and major agreements. Please also address the Alternative Off-taker Opportunity and Nonprofit Opportunity mentioned in Sections 5.3.2 and 5.3.3 above and discuss what benefits and challenges these opportunities may present. Highlight your experience with the proposed commercial structure (e.g. from other projects, preferably projects submitted with your SOQ).
- Please identify the primary risks that the Project Team anticipates for the Project, categorized by Design, Construction and O&M, along with recommended mitigation measures for those risks.
- Please demonstrate the Prime Firm's ability to secure financing for the Project (i.e. as a BOO). In doing so, please state what key debt requirements you might expect given your suggested structure (e.g. gearing requirements). Please also address the Alternative Financing

Opportunities mentioned in Section 5.3.2 above. Highlight your experience with similar financings involved on projects (preferably projects submitted with your SOQ).

- Detail the DES Developer's ability and demonstrated experience in providing financing for:
  - Similar projects within specified financial closing time parameters;
  - Projects utilizing offtake agreements for multiple retail customers; and
  - Projects where you were a counterparty to single, non-profit off-taker.

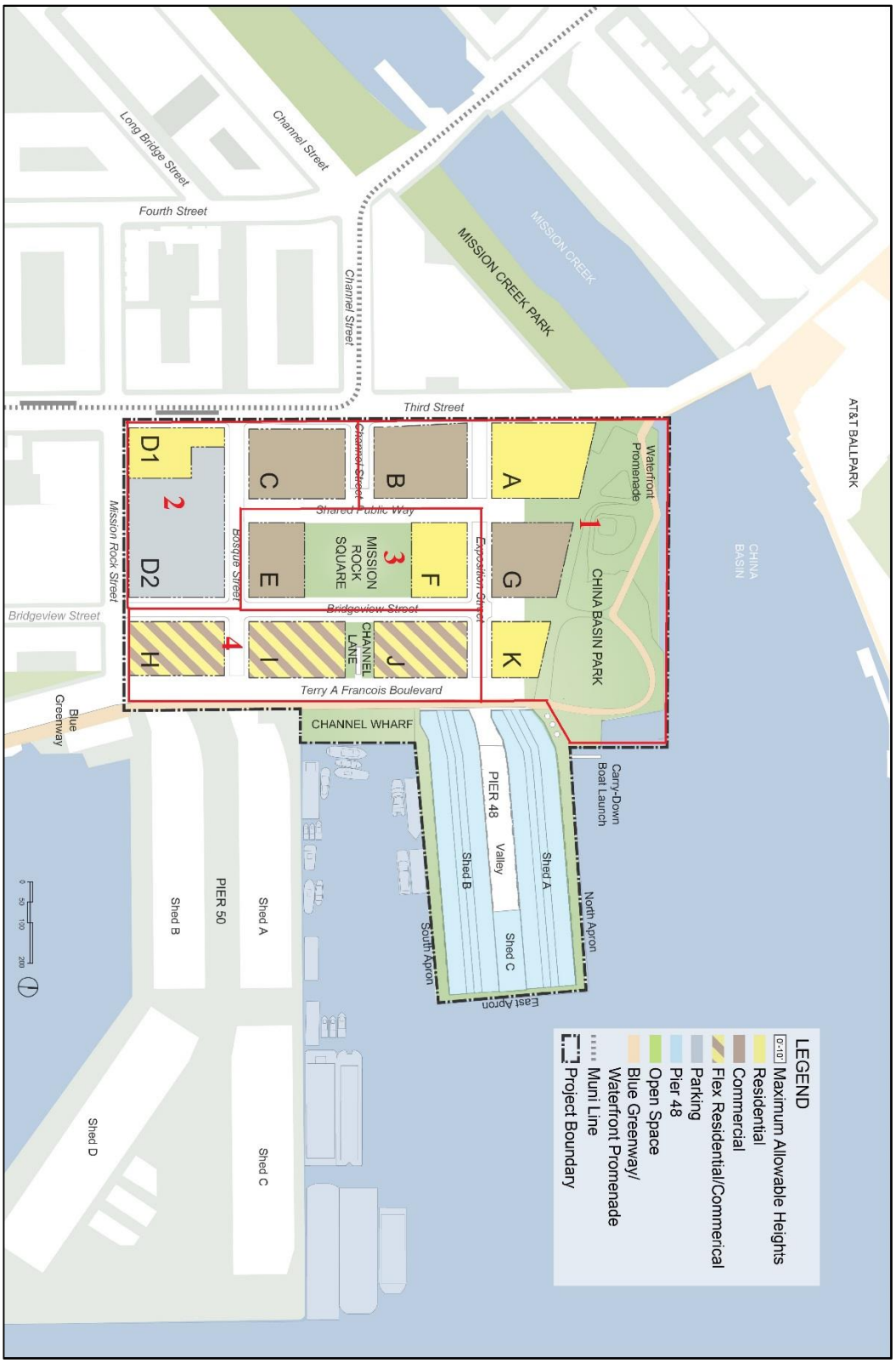
6.5 Blue Sky Discussion

- Please also provide additional ideas or areas for consideration that have not been included in the scope of this RFQ.
- Please note the Master Developer may be running a separate RFQ for a water treatment system for Mission Rock. Please reach out to the Point of Contact if Respondent is interested in similarly designing, building, owning or operating a water treatment system. Respondents that are interested in this opportunity should state in this section of the SOQ the possible benefits the Master Developer and other end users might see as a result of the Project Team delivering and operating both systems jointly.

ATTACHMENT A: Draft Memorandum of Understanding

[To be released]

ATTACHMENT B: Site Plan



ATTACHMENT C: Draft Schematic of Planned Utilities

ATTACHMENT D: Supplementary Technical Information

D.1 Thermal Generation Details

The planning basis for the generation portion of the DES assumes:

- Centralized heat recovery chillers
- Centralized electric water cooled chillers
- Centralized low/medium temperature hot water boilers
- Plate-and-frame "free-cooling" heat exchangers (bay-water)
- Plate-and-frame "heat-rejection" heat exchangers (bay-water)
- Balance of bay-water heat rejection and cooling plant (tanks, screens, etc.)
- Cooling towers[3]

D.2 Distribution Details

The planning basis for the distribution portion of the DES assumes a 6-pipe system comprising of:

- Chilled water (CHW) supply and return pipes
- Heating hot water (HHW) supply and return pipes
- Bay water intake and outflow pipes

The HHW and CHW systems are assumed to be direct bury, insulated piping systems, steel for HHW and HDPE for CHW. The bay water piping is assumed to be uninsulated, direct bury steel pipe.

Distribution routing and pipe sizing will be driven by CUP location and configuration and project phasing. Right of way corridors within the project site are relatively narrow, and site roadways are pile supported to mitigate differential settlement relative to the buildings, reducing the space available for utility installation. Pipe routing and building points of connection will need to be coordinated with site and building design teams.

Representative trench sections are presented in the figures below:

[3] Capacity to be limited by greater of (1) heat rejection capacity needed above 24" bay-water capacity, and (2) heat rejection requirements during scheduled bay-water system down-time

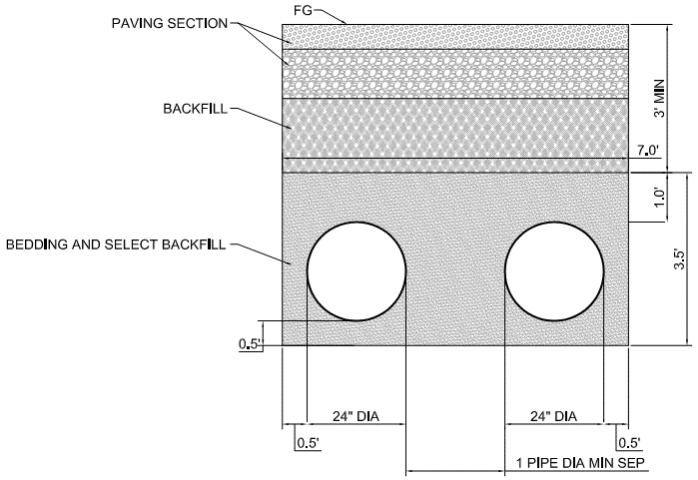


Figure 2: Typical Bay Water Intake/Outflow Section

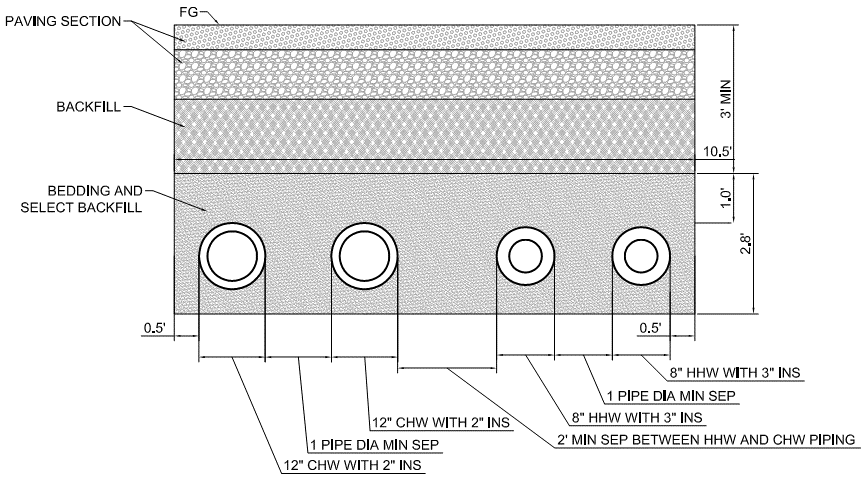


Figure 3: Chilled and Hot Water Combined Trench - Maximum Section

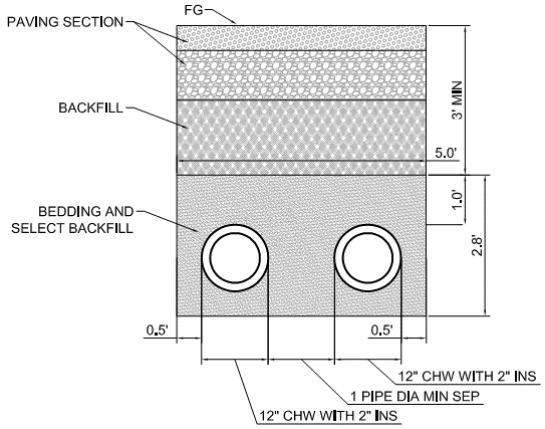


Figure 4: Chilled Water Trench - Maximum Section

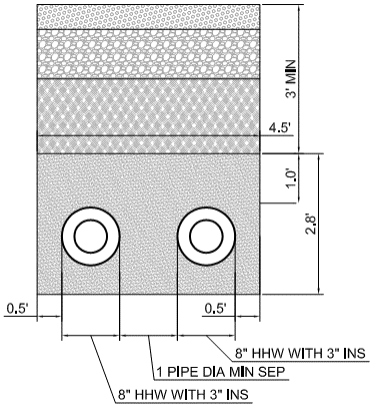


Figure 5: Heat Hot Water Trench - Maximum Section

D.3 Building Interconnections

The planning basis for the building interconnection portion of the DTES has assumed pairs of plate-and-frame heat exchangers for each of the hot water and chilled water services. As part of a partnership, the developer will be taking on the responsibility of collaborating with the vertical development team on the design, coordination, and commissioning of these systems.

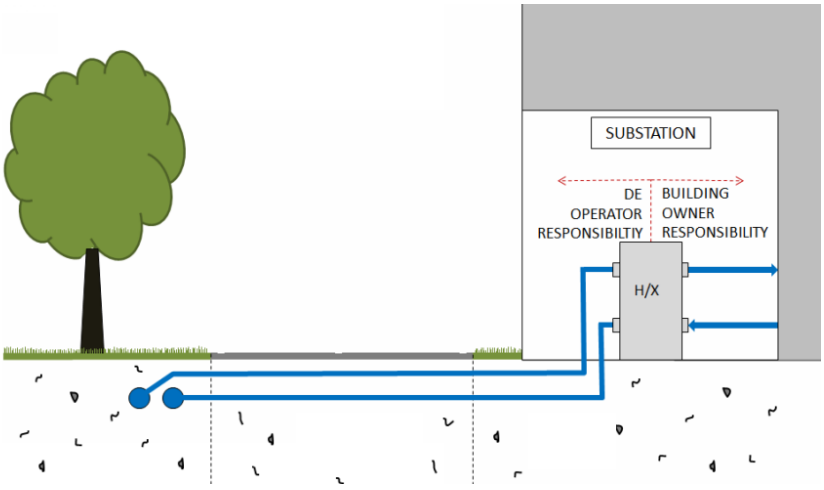


Figure 6: Substation Depiction

D.4 Anchor Brewing Process Loads

Anchor Brewing process loads account for a major portion of the site energy consumption.

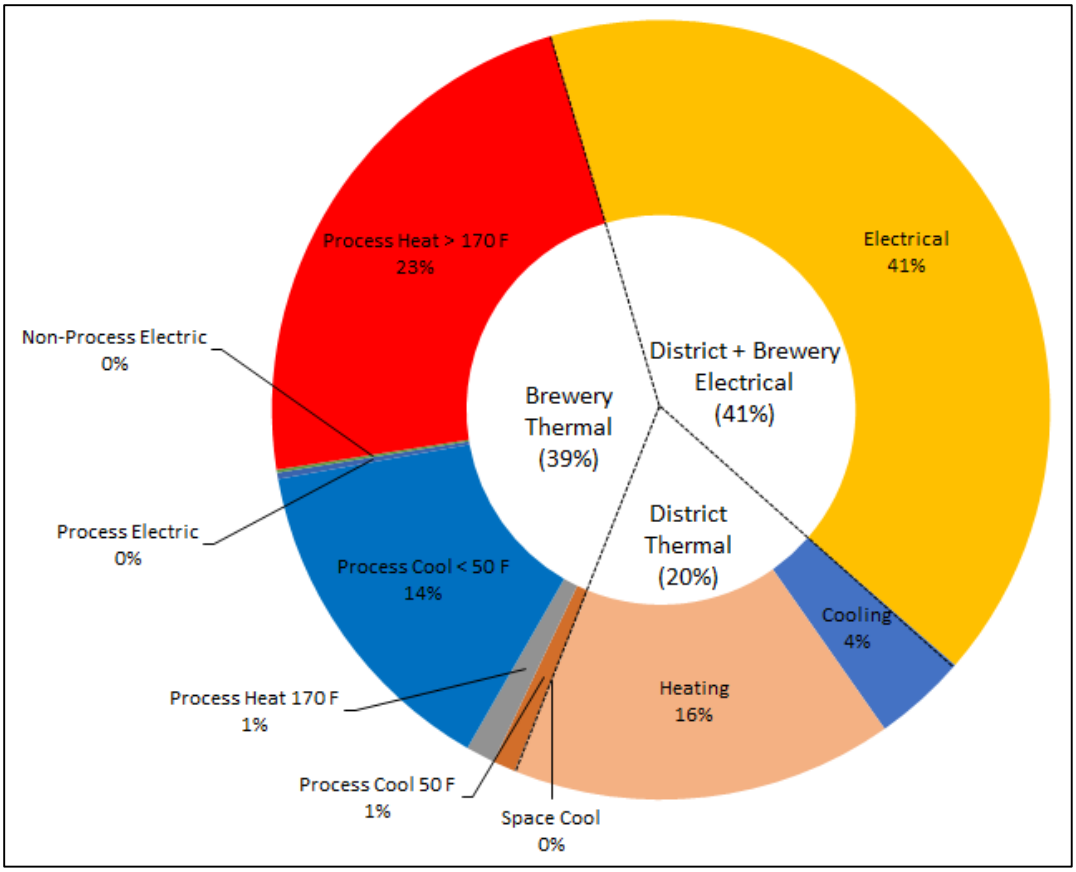


Figure 7: Ultimate Energy Consumption Split (400,000 Barrels/Year, no Brewery Efficiency)

Applying plausible levels of energy efficiency to all brewery end-uses generates the hypothetical energy consumption estimates summarized in Figure 8. This illustrates the sensitivity of the brewery energy efficiency as an input to the load estimation exercise.

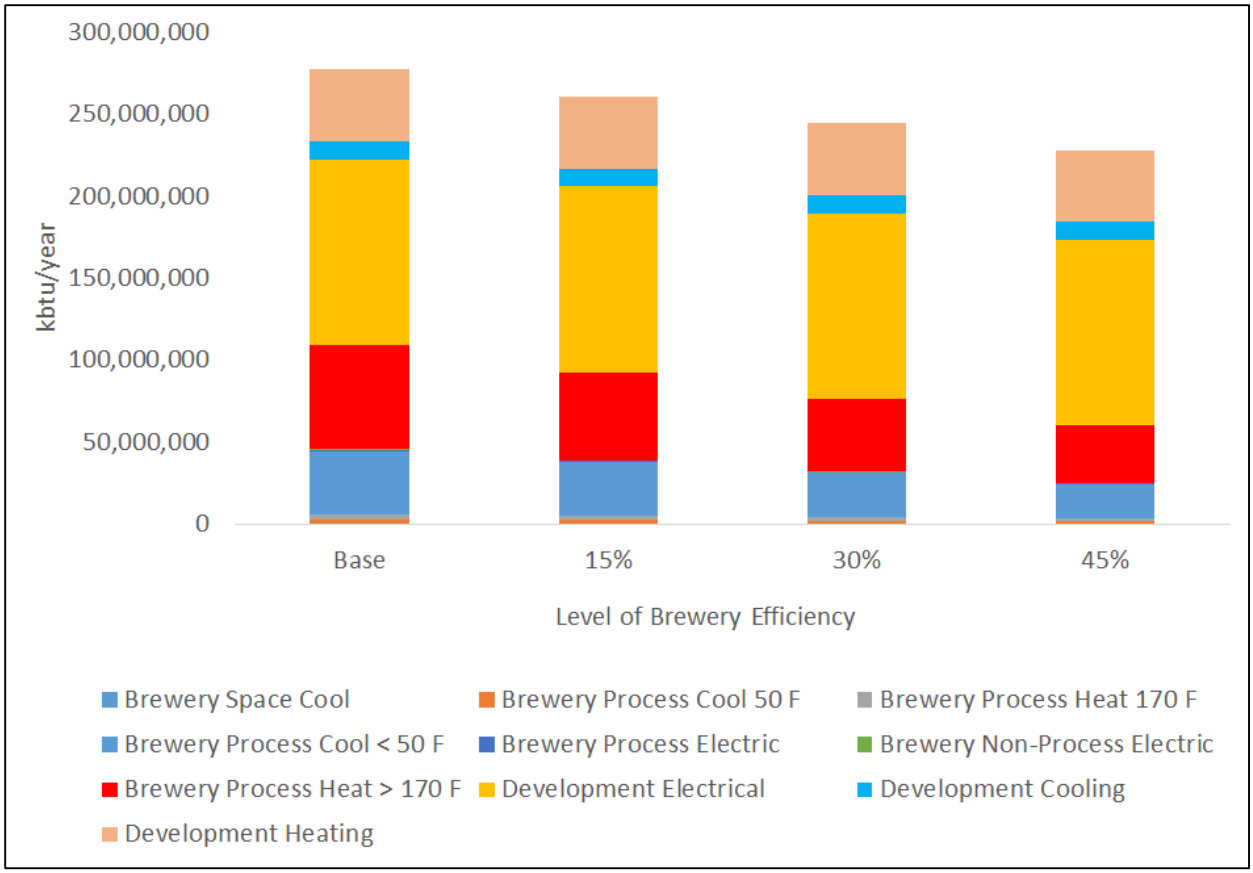


Figure 8: Hypothetical Ultimate Energy Consumption Estimates (400,000 barrels/year)

Unlike the district, the Anchor brewing process entails several high-temperature, steam, and low-temperature chilled water loads as illustrated in **Figure 9**.

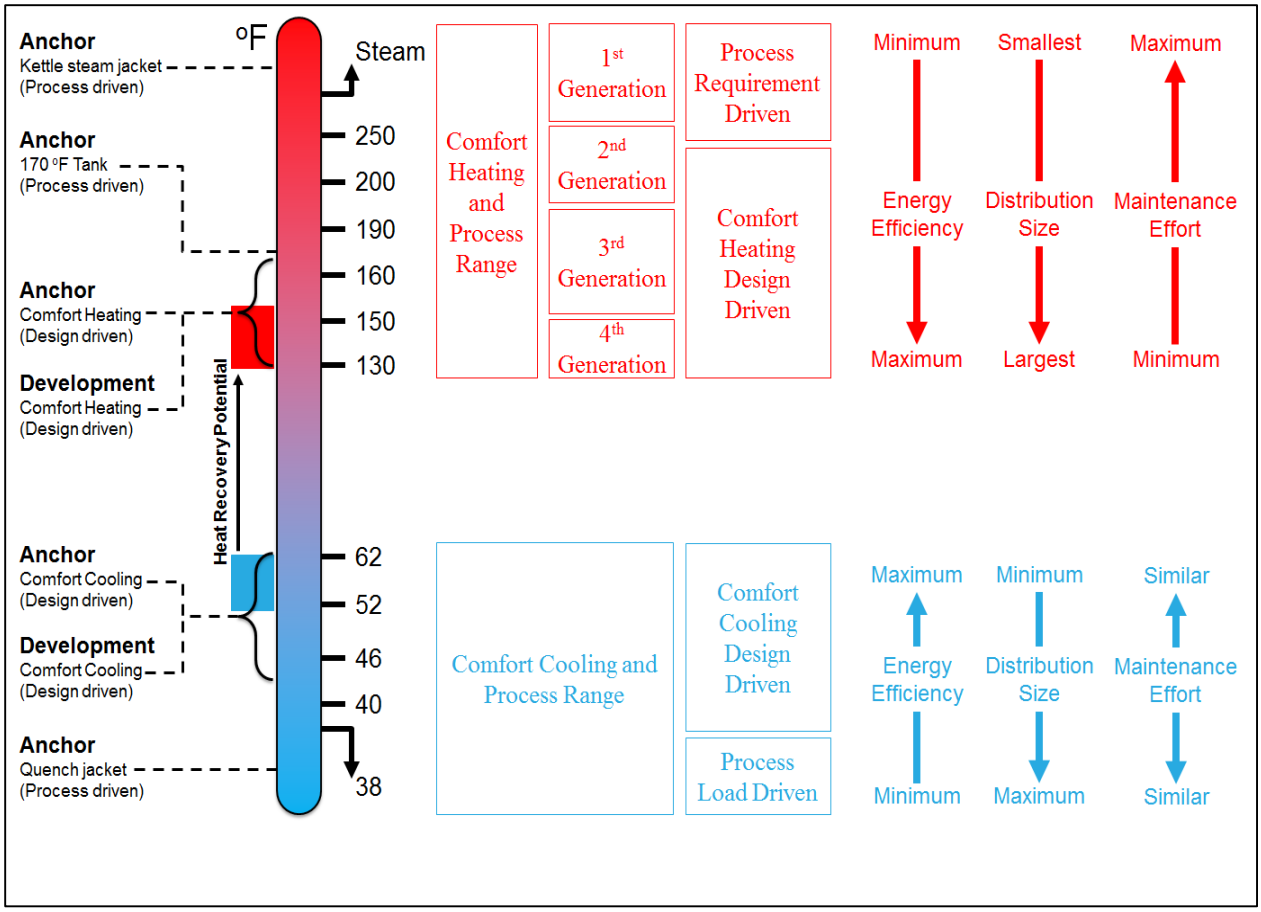


Figure 9: Development Thermal Load Map

It is not thermodynamically efficient to aggregate and supply these significantly different load categories from a single plant, or to overproduce steam or low-temperature chilled water to serve low-temperature heating and elevated chilled water cooling loads respectively.

Anchor Brewing has indicated that the brewing process, loads, and therefore the process plant requirements will continue to be updated as of and after the publication of this RFQ.

For these reasons, the current approach is to site the Anchor Brewing process plant as close as possible to the loads it serves (i.e. on Pier 48), and not over-size it to additionally serve the Project Site (or a portion thereof).

There may be opportunities to pre-heat the Anchor Brewing process hot water using the district heating system and distribution. This might be achievable under a scenario where an extensive distribution run from the closest main branch is not required, and could be beneficial if a significant resulting reduction in the Anchor brewing plant (essentially steam boiler capacity) can be achieved.

ATTACHMENT E: Assumptions

Given the early planning nature of this work, Arup developed and shared a series of technical assumptions during the 2013 feasibility study. These assumptions were approved for planning purposes, and are being carried forward for purposes of a reference design in the RFQ. These assumptions are tabulated below.

Standard Office Cooling EUI	Energy Utilization Intensities	1.3	kbtu/sq.ft./year
Standard Office Heating EUI	Energy Utilization Intensities	9.5	kbtu/sq.ft./year
Standard Office Electric EUI	Energy Utilization Intensities	41.3	kbtu/sq.ft./year
Biotech Office Cooling EUI	Energy Utilization Intensities	15.3	kbtu/sq.ft./year
Biotech Office Heating EUI	Energy Utilization Intensities	10.9	kbtu/sq.ft./year
Biotech Office Electric EUI	Energy Utilization Intensities	89.3	kbtu/sq.ft./year
Residential Cooling EUI	Energy Utilization Intensities	1.4	kbtu/sq.ft./year
Residential Heating EUI	Energy Utilization Intensities	23.2	kbtu/sq.ft./year
Residential Electric EUI	Energy Utilization Intensities	22.20	kbtu/sq.ft./year
Retail Cooling EUI	Energy Utilization Intensities	7.6	kbtu/sq.ft./year
Retail Heating EUI	Energy Utilization Intensities	5.0	kbtu/sq.ft./year
Retail Electric EUI	Energy Utilization Intensities	54.5	kbtu/sq.ft./year
Brewery Space Heating EUI	Energy Utilization Intensities	0.1	kbtu/sq.ft./year
Brewery Space Cool EUI	Energy Utilization Intensities	3.6	kbtu/sq.ft./year
Brewery Process Electric EUI	Energy Utilization Intensities	36	kbtu/barrel/year
Brewery Non-Process Electric EUI	Energy Utilization Intensities	18	kbtu/barrel/year
Brewery Process Heat > 170 F EUI	Energy Utilization Intensities	190	kbtu/barrel/year
Brewery Process Heat 170 F EUI	Energy Utilization Intensities	10	kbtu/barrel/year
Brewery Process Cool > 50 F EUI	Energy Utilization Intensities	26.6	kbtu/barrel/year
Brewery Process cool < 50 F EUI	Energy Utilization Intensities	145	kbtu/barrel/year
BAU Cooling Efficiency	Avg. Annual Equipment Efficiencies	0.55	kW/Ton
BAU Heating Efficiency	Avg. Annual Equipment Efficiencies	80%	%
BAU Electric Efficiency	Avg. Annual Equipment Efficiencies	99%	%
Vapor Compression Chillers	Avg. Annual Equipment Efficiencies	0.364	kW/Ton
Absorption Chillers	Avg. Annual Equipment Efficiencies	1	COP
Organic Refrigerant Chillers	Avg. Annual Equipment Efficiencies	0.70	kW/Ton

Gas Hot Water Boilers	Avg. Annual Equipment Efficiencies	82%	%
CHP/CCHP Thermal Efficiency	Avg. Annual Equipment Efficiencies	41.6%	%
CHP/CCHP Electrical Efficiency	Avg. Annual Equipment Efficiencies	45.1%	%
CHP/CCHP Max Turndown	Avg. Annual Equipment Efficiencies	85%	%
CHP/CCHP Max Heat Dumping	Avg. Annual Equipment Efficiencies	15%	%
Electric Only Fuel Cell Thermal Efficiency	Avg. Annual Equipment Efficiencies	51.7%	%
Electric Only Fuel Cell Electrical Efficiency	Avg. Annual Equipment Efficiencies	20%	%
Heat Recovery Chillers	Avg. Annual Equipment Efficiencies	0.60	kW/Ton
Cooling Towers	Avg. Annual Equipment Efficiencies	0.053	kW/Ton
Heat Dump Radiators	Avg. Annual Equipment Efficiencies	0.106	kW/Ton
Vapor Compression Chiller w/ Deep Lake Condenser Water	Avg. Annual Equipment Efficiencies	0.35	kW/Ton
Heat Recovery Chiller w/ Deep Lake Condenser Water	Avg. Annual Equipment Efficiencies	0.59	kW/Ton
Anchor Steam Existing Steam Boiler Plant	Avg. Annual Equipment Efficiencies	65%	%
New Steam Boiler Plant	Avg. Annual Equipment Efficiencies	78%	%
CHW Network Thermal Efficiency	DE Network Thermal Efficiencies	97.0%	%
HHW Network Thermal Efficiency	DE Network Thermal Efficiencies	95.5%	%
CW Network Thermal Efficiency	DE Network Thermal Efficiencies	98.0%	%
Pump Efficiency	District Pumping Efficiency	80%	%
Motor Efficiency	District Pumping Efficiency	90%	%
Average Network Pressure Head	District Pumping Efficiency	1.75	ft./100 ft.
CHW Design Supply T	Chilled Water Network Parameters	50	F
CHW Design Cooling Delta T	Chilled Water Network Parameters	13	F
CHW Total Network Length	Chilled Water Network Parameters	3,680	ft.
CHW Heat Exchanger Pressure Drop	Chilled Water Network Parameters	15	ft.
CHW Valves, Fittings, Bends Loss	Chilled Water Network Parameters	40%	% of Total Straight Pipe Loss
HHW Design Heating Delta T	Heating Hot Water Network Parameters	35	F
HHW Total Network Length	Heating Hot Water Network Parameters	3,680	ft.
HHW Heat Exchanger Pressure Drop	Heating Hot Water Network Parameters	15	ft.
HHW Valves, Fittings, Bends Loss	Heating Hot Water Network Parameters	40%	% of Total Straight Pipe Loss
CW Design Cooling Delta T	Condenser Water Network Parameters	15	F
CW Total Network Length	Condenser Water Network Parameters	3,680	ft.

CW Heat Exchanger Pressure Drop	Condenser Water Network Parameters	15	ft.
CW Valves, Fittings, Bends Loss	Condenser Water Network Parameters	40%	% of Total Straight Pipe Loss
Reversible Heat Pump Cooling Efficiency	Avg. Annual Equipment Efficiencies	0.711	kW/Ton
Reversible Heat Pump Heating Efficiency	Avg. Annual Equipment Efficiencies	0.708	kW/Ton
Reversible Heat Pump - Cooling with Colder Bay/River Water	Avg. Annual Equipment Efficiencies	0.675	kW/Ton
Bay Water Flow rate (Heat Rejection)	Bay Water Heat Rejection Parameters	3	gpm/ton
Bay Water Pump Efficiency (Heat Rejection)	Bay Water Heat Rejection Parameters	80%	%
Bay Water Pump Motor Efficiency (Heat Rejection)	Bay Water Heat Rejection Parameters	90%	%
Bay Water Network Length (Heat Rejection)	Bay Water Heat Rejection Parameters	4,000	ft.
Bay Water Average Network Pressure Head (Heat Rejection)	Bay Water Heat Rejection Parameters	1.75	ft./100 ft.
Bay Water Design Delta T (Heat Rejection)	Bay Water Heat Rejection Parameters	10	F
Bay Water Heat Exchanger Pressure Drop (Heat Rejection)	Bay Water Heat Rejection Parameters	15	ft.
Bay Water Valves, Fittings, Bends Loss (Heat Rejection)	Bay Water Heat Rejection Parameters	40%	% of Total Straight Pipe Loss
Bay Water Flow rate (Cooling)	Bay Water Cooling Parameters	2	gpm/ton
Bay Water Pump Efficiency (Cooling)	Bay Water Cooling Parameters	80%	%
Bay Water Pump Motor Efficiency (Cooling)	Bay Water Cooling Parameters	90%	%
Bay Water Network Length (Cooling)	Bay Water Cooling Parameters	8,000	ft.
Bay Water Average Network Pressure Head (Cooling)	Bay Water Cooling Parameters	1.75	ft./100 ft.
Bay Water Design Delta T (Cooling)	Bay Water Cooling Parameters	13	F
Bay Water Heat Exchanger Pressure Drop (Cooling)	Bay Water Cooling Parameters	15	ft.
Bay Water Valves, Fittings, Bends Loss (Cooling)	Bay Water Cooling Parameters	40%	% of Total Straight Pipe Loss
Residential Cooling Load Density	Space Cooling Load Densities	700	sq.ft./Ton
Retail Cooling Load Density	Space Cooling Load Densities	350	sq.ft./Ton
Commercial Cooling Load Density	Space Cooling Load Densities	400	sq.ft./Ton
Brewery Cooling Load Density	Space Cooling Load Densities	400	sq.ft./Ton
Residential Heating Load Density	Space Heating Load Densities	10	btu/h/sq.ft.
Retail Heating Load Density	Space Heating Load Densities	20	btu/h/sq.ft.
Commercial Heating Load Density	Space Heating Load Densities	15	btu/h/sq.ft.
Brewery Heating Load Density	Space Heating Load Densities	5	btu/h/sq.ft.

Nominal Heating Plant Efficiency (Sizing)	Nominal Equipment Efficiencies	85%	%
Bay Minimum Winter Temperature	Bay Water Cooling Parameters	48	F
Bay Maximum Summer Temperature	Bay Water Cooling Parameters	70	F
Parking Structure Conditioning		Unconditioned	Conditioned/ Unconditioned
Branch Pipe Sizing Criteria	Chilled Water Network Parameters	7	fps
Main Pipe Sizing Criteria	Chilled Water Network Parameters	10	fps

APPENDIX N

Stormwater Management Master Plan

Mission Rock Redevelopment

Stormwater Management Master Plan

September 20, 2016

BkF
100+ YEARS
ENGINEERS
SURVEYORS
PLANNERS

150 California Street, Suite 650
San Francisco, CA 94111
415.930.7900

Prepared by Statement

This Stormwater Management Master Plan for the Mission Rock Redevelopment has been prepared by BKF Engineers under the direction of Mr. Todd Michael Adair, P.E., Principal/Vice President.

TABLE OF CONTENTS

SECTION 1: INTRODUCTION AND PROJECT DESCRIPTION 1
1.0 Introduction 1
1.1 Project Overview 1
1.2 Existing Site Conditions 2
1.3 Proposed Site Conditions 2
1.4 Project Datum 2
Section 1 Figures 3

SECTION 2: STORMWATER MANAGEMENT 4
2.1 Existing Stormwater System 4
2.1.1 Overview 4
2.1.2 Existing Site Separated Sewer System 4
2.2 Stormwater Requirements 5
2.2.1 State Stormwater Regulations 5
2.3 Stormwater Management Design Criteria 6
2.3.1 Centralized Treatment Area 6
2.3.2 BMP Sizing 6
2.4 Proposed BMPs 7
2.4.1 Centralized Treatment 7
2.4.2 Bioretention Area/Flow-Through Planters 7
2.4.3 Maintenance/Ownership of BMPs 8
Section 2 Figures 9

SECTION 3: Conceptual Stormwater Management 10
3.1 Proposed BMP Sizing 10
3.2.1 Treatment Locations 11
3.2.2 Discharge Locations 12
3.2 Methodology 12
3.3 Results 13

FIGURES

Section 1 Figures

Figure 1.1 – Project Location
Figure 1.2 – Project Site Layout
Figure 1.3 – Project Site Phasing

Section 2 Figures

Figure 2.1 – Flow-Through Planter Details

Section 3 Figures

Figure 3.1 – Existing Site Drainage Plan
Figure 3.2 – Conceptual Stormwater Management Plan
Figure 3.3 – Proposed Bioretention Area Sizing
Figure 3.4 – Conceptual Process Flow Diagram

APPENDICES

Appendix A – BMP Sizing Spreadsheets

SECTION 1: INTRODUCTION AND PROJECT DESCRIPTION

1.0 Introduction

This Stormwater Management Master Plan has been prepared for the Mission Rock Redevelopment Project. The purpose of the document is to establish the design criteria for development of the stormwater management and treatment systems to comply with governing subdivision requirements. The objective of this plan is to provide the developer and governing agencies with the following information and analysis to confirm the design approach for site stormwater management. This master plan will be comprised of the following:

- Existing Conditions and Site Constraints
- Design Criteria
- Conceptual Stormwater Management Plan
- Proposed Bioretention Area Sizing
- Conceptual Process Flow Diagram for Stormwater Flow Routing
- Summary of Results

Development of the grading and drainage design strategy for the Project is discussed in the Grading and Drainage Master Plan.

1.1 Project Overview

The Mission Rock Redevelopment ("The Project") is located within the City and County of San Francisco, along the eastern border of San Francisco within District 9 Mission Bay. The site is bounded by China Basin Park and China Basin to the north, Terry A Francois Boulevard and San Francisco Bay to the east, Mission Rock Street to the south, and 3rd Street to the west. The Project comprises a mixed-use community including residential, retail, commercial office space, recreational park, shared access way, public open space, Pier 48, and Channel Wharf. The existing China Basin Park will be redeveloped and expanded as part of this Project. Pier 50 east of of Terry A Francois Boulevard is not a part of the Project but will remain open during construction. Figure 1.1 illustrates the regional location of the Project.

1.2 Existing Site Conditions

The Project is approximately 17 acres. It was initially developed to serve as part of the Port's shipping terminal and industrial site. The Project site was previously an industrial warehouse and storage lot until it was acquired in 2000 to function as the San Francisco Giants Parking Lot. In 2003, the northern portion of site was redeveloped as China Basin Park.

1.3 Proposed Site Conditions

The Project comprises eleven development parcels ranging from half an acre to almost two acres. These will include residential units, commercial office and retail space, Mission Rock Square, a parking garage, and a grid of public streets. China Basin Park will also be expanded to approximately 4 acres.

The Project proposes street improvements to Terry A Francois Boulevard which interfaces with the existing Pier 48 and Pier 50. While these piers are not a part of this Project, Pier 48 plans to redevelop existing space to accommodate a production and distribution facility for Anchor Brewing Company which will also include a restaurant, museum, and public attractions. The proposed Project site plan is shown in Figure 1.2.

1.4 Project Datum

Elevations, including tidal elevations, hydraulic grade lines (HGLs), and site elevations, referred to herein are on the MB Datum. The "MB Datum" is defined as the Mission Bay Datum which is the Old City of San Francisco Datum plus one hundred feet.

Section 1 Figures

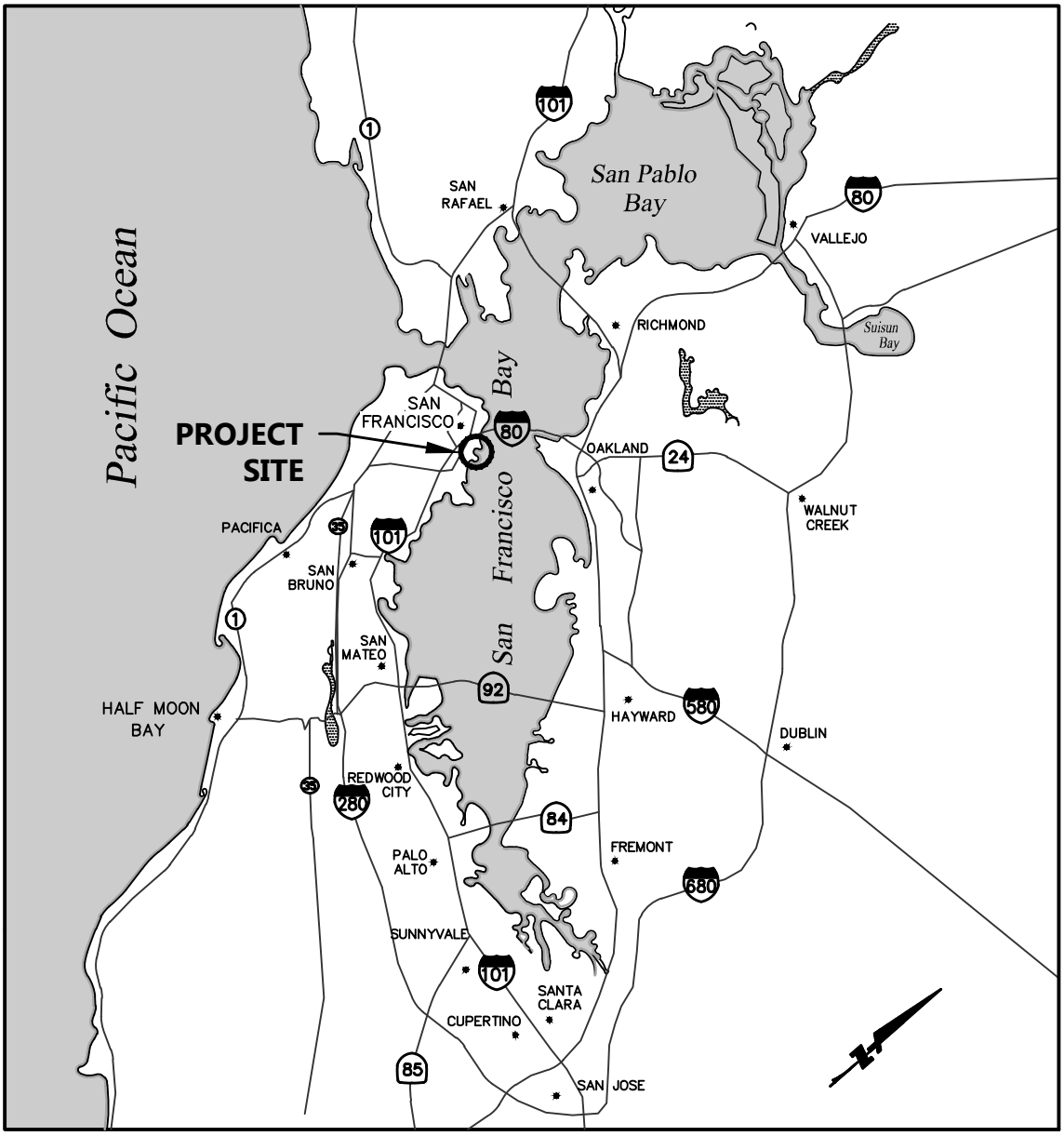


FIGURE 1.1 PROJECT LOCATION

© BKF Engineers

SAN FRANCISCO BAY

PIER 48

CHANNEL WHARF

PIER 50

TERRY A FRANCOIS BOULEVARD

CHINA BASIN

CHINA BASIN PARK

BLOCK K

BLOCK J

CHANNEL LANE

BLOCK I

BLOCK H

BRIDGEVIEW STREET

BLOCK G

EXPOSITION STREET

BLOCK F

MISSION ROCK SQUARE

BLOCK E

LONG BRIDGE STREET

MISSION ROCK STREET

SHARED PUBLIC WAY

BLOCK D
(PARKING STRUCTURE WITH TOWER)

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

3rd STREET

CHANNEL STREET

GRAPHIC SCALE
100 0 100

LEGEND

- PROJECT BOUNDARY
- PARCEL BOUNDARY
- STREET
- DEVELOPMENT PARCEL
- PARKS AND OPEN SPACE
- BIORETENTION AREAS

DATE:	09/20/2016
SCALE:	1"=100'
DESIGN:	JVH
DRAWN BY:	JVH
APPROVED:	MAO
JOB NO:	20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
STORMWATER MANAGEMENT MASTER PLAN
FIGURE 1.2
PROJECT SITE LAYOUT

DRAWING NAME: \\Bkf-sf\Vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\SWMP\Figure 1.2 Project Site Layout.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

SECTION 2: STORMWATER MANAGEMENT

2.1 Existing Stormwater System

2.1.1 Overview

In general, San Francisco is served by either a combined storm and sanitary sewer systems or separated storm sewer systems. The Project is located within Mission Bay which is served by a separated storm sewer system. Within Mission Bay, stormwater is managed by the San Francisco Public Utility Commission (SFPUC) or the San Francisco Port (SF Port). The existing site has existing storm drain systems that connect to either SFPUC or SF Port storm drain infrastructure. Watershed draining treatment flows to existing storm drains in 3rd Street will be required to comply with codes developed by the SFPUC. For watershed draining treatment flows to existing outfalls to the San Francisco Bay will be required to comply with SF Port regulations.

2.1.2 Existing Site Separated Sewer System

The existing Project site consists of four separate watershed areas shown in Figure 3.1 that drain to existing storm drain infrastructure in the adjacent City streets or Port outfalls. Currently there are no stormwater management systems in place to treat stormwater prior to leaving the site.

The existing China Basin Park and the adjacent northern portion of Terry A Francois Boulevard are collected in an existing storm drain system that drains to China Basin via a 12-inch culvert. A series of existing drop inlets along the east side of the parking lot and west side of Terry A Francois collects stormwater from the east portion of the existing parking lot, Terry A Francois Boulevard, frontage of the piers, and Channel Wharf. Drainage from this area is conveyed to a 30-inch culvert that discharges east through a Seawall 337 to the San Francisco Bay underneath Channel Wharf. The remainder of the existing parking lot drains to a storm drain system on Channel Street which is routed to the Mission Bay Stormwater Pump Station No. 3 which discharges to China Basin. Mission Rock

Street to the south has a new storm drain system that conveys stormwater to Mission Bay Stormwater Pump Station No. 6 to the south that discharges to the San Francisco Bay.

2.2 Stormwater Requirements

2.2.1 State Stormwater Regulations

As required by the California State Water Quality Control Board's National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS00004, new and redeveloped Projects under the jurisdiction of the Port of San Francisco or the SFPUC that create and/ or replace 2,500 square feet or more of impervious surface are required to comply with the MS4 performance requirements. Since the Mission Rock Development will exceed 2,500 square feet of impervious surface installation, stormwater treatment strategies will be implemented throughout the site.

2.2.2 San Francisco Stormwater Management Requirements and Design Guidelines (SMR)

The City of San Francisco 2016 Stormwater Management Requirements and Design Guidelines (SMR) is the regulatory guidance document describing requirements for post-construction stormwater management. Stormwater management performance requirements are determined based on the sewer system available to connect into as well as the jurisdiction of the sewer system. For Project areas that will connect into the City's existing separated storm drain system in 3rd Street and/or Mission Rock Street, the SMR requires the Project to implement a stormwater management plan that results in capture and treatment of all stormwater runoff from the 90th-percentile storm event prior to discharge to the separated storm sewer system. For Project areas served by the Port's separated storm drain system outfalling directly to the San Francisco Bay or China Basin, the SMR requires the Project to implement a stormwater management plan that results in capture and treatment of all stormwater runoff from the 85th

percentile storm event. Based on the designs reviewed and approved by the San Francisco Public Utility Commission (SFPUC) as part of the Stormwater Management Master Plan, the stormwater management strategies for the Mission Rock Redevelopment Site will be documented in a Stormwater Control Plan (SCP) in compliance with SFPUC and Port stormwater management regulations and the requirements of the SMR.

2.3 Stormwater Management Design Criteria

The SMR presents the several Best Management Practices (BMPs) and Low-Impact Development (LID) design tools to treat stormwater runoff. This Master Plan will present the BMPs that are currently planned to be implemented by the Project in the public streets, private Development Parcels, and open space areas. Each of the private Development Parcels will be required to independently meet the SMR requirements. The BMPs presented herein are not intended to preclude the use of other BMPs in the future. This Master Plan is not intended to be inclusive of all possible stormwater management BMP types, configurations, or designs for varied site conditions. Flexibility in the selection and design of BMPs to accommodate specific site conditions will be necessary.

2.3.1 Centralized Treatment Area

Many of the watershed areas include centralized treatment areas where a large centralized location will provide stormwater treatment from the entire watershed including private Development Parcels. Private Development Parcels will not be required to implement any stormwater treatment measures on their parcels if the stormwater treatment is provided in designated off-parcel, centralized treatment areas as approved by the SFPUC.

2.3.2 BMP Sizing

The stormwater treatment BMP will be designed in conformance with SMR and will utilize the 2016 edition of the City Standard MS4 BMP Sizing Calculators for Water Quality for the SFPUC and San Francisco Port jurisdictions. The SFPUC requires capture and treatment of all impervious area runoff from rain events up

to the 90th percentile event whereas the Port requires up to the 85th percentile rain event. Through implementing sustainable design strategies, the Project can achieve the performance requirements for each watershed within both jurisdictions throughout the proposed site.

2.4 Proposed BMPs

Three types of BMPs are proposed:

1. Centralized Treatment Areas
2. Bioretention Areas
3. Flow-Through Planters

The SMR provides additional design information regarding bioretention areas and flow-through planters.

2.4.1 Centralized Treatment

The Project will utilize centralized treatment facilities will be to collect stormwater from watersheds and pump to larger bioretention areas for treatment located within either Mission Rock Square or China Basin Park. Landscaping will be selected for stormwater treatment, biological habitat benefits and aesthetics, while providing screening of any structural elements.

2.4.2 Bioretention Area/Flow-Through Planters

Bioretention refers to the use of stormwater facilities that rely on vegetation and either native or engineered soils to capture, infiltrate, transpire, and remove pollutants from runoff, thereby reducing stormwater volume, attenuating peak flow, and improving stormwater quality. Bioretention BMPs feature vegetation that can tolerate periodic inundation and contain engineered soils with high organic content. If designed properly, they can be an aesthetic and habitat amenity, as well as a stormwater treatment facility.

Bioretention systems can be designed as infiltration-based systems if the native

soils beneath the facility are sufficiently permeable and there are no other constraints to infiltration such as soil or groundwater contamination. However, due to geotechnical site constraints, infiltration throughout the site will be infeasible. Thus, the Project BMPs will be lined and treated stormwater will be collected via perforated pipe and connect to the Project's storm drain systems. Bioretention is proposed along Shared Public Way, the northern end of Bridgeview Street, Channel Street, and Channel Lane.

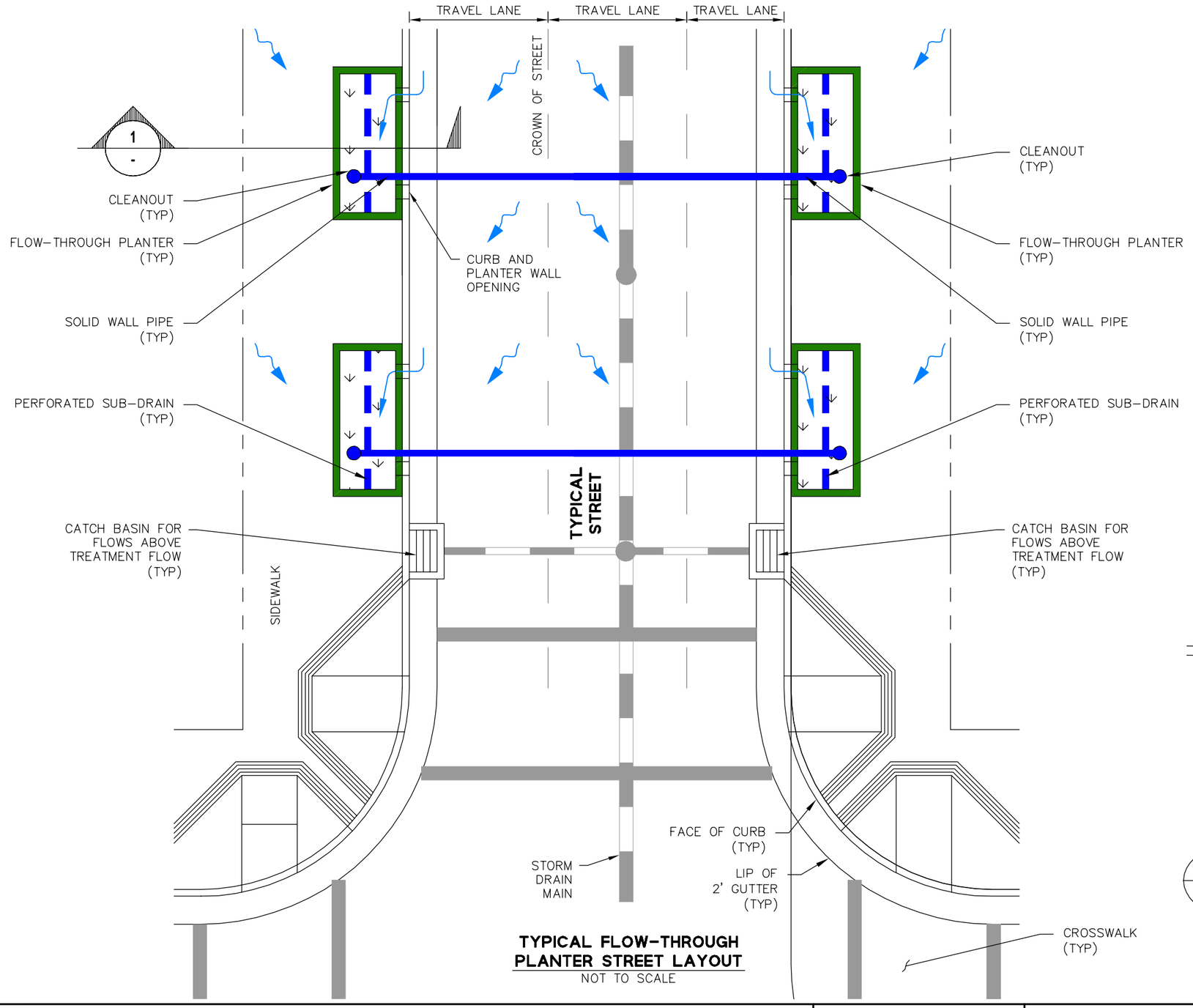
The Project will implement flow-through planters along Exposition Street, the northern side of Bridgeview Street Street, and western side of Long Bridge Street. Flow-through planters are a form of bioretention planters designed to collect runoff directly from the streets as illustrated in Figure 2.1.

2.4.3 Maintenance/Ownership of BMPs

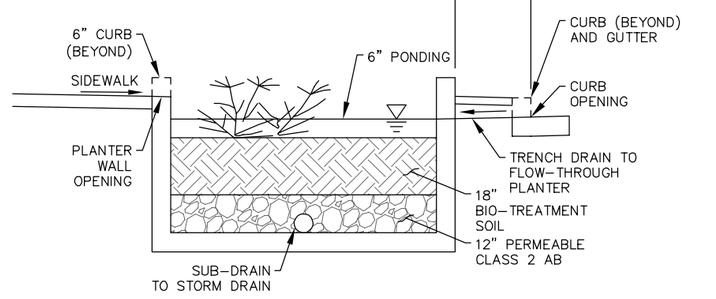
The SFPUC will be responsible for maintaining BMPs within the public Right-of-Ways (ROW) and parks such as flow-through planters within Exposition Street, Channel Street, Shared Public Way, the northern side of Bridgeview Street, and the western side of Long Bridge Street. SFPUC will not accept or maintain BMPs within the private Development Parcels, and the maintenance obligations will be the HOA's responsibility. A BMP maintenance agreement similar to what is required for the SCPs will be recorded with the County of San Francisco.

Section 2 Figures

© BKF Engineers



TYPICAL FLOW–THROUGH PLANTER STREET LAYOUT
NOT TO SCALE



1 / – **SOLID–BOTTOM FLOW–THROUGH PLANTER**
NOT TO SCALE

LEGEND
STORMWATER FLOW DIRECTION

DATE: 09/20/2016
SCALE:
DESIGN:
DRAWN BY:
APPROVED:
JOB NO: 20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468–6676
415/468–6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930–7900
415/930–7949 (FAX)

MISSION ROCK REDEVELOPMENT
STORMWATER MANAGEMENT MASTER PLAN

FIGURE 2.1 – FLOW–THROUGH PLANTER STREET DETAILS

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\SWMP\Figure 2.1 Flow-Through Planters.dwg
PLOT DATE: 09-20-16 PLOTTED BY: feli

SECTION 3: Conceptual Stormwater Management

The Project is served by both the SFPUC and the Port. To show Project compliance with the SMR requirements, BKF developed a process flow diagram (Figure 3.4) to trace the path of treatment and discharge location to either the City or Port's existing storm drain infrastructure. The discharge location was used to determine the performance measure applied to BMP sizing criteria of each watershed. To determine BMP sizing for each watershed, BKF utilized the 2016 edition of the City Standard MS4 BMP Sizing Calculators for Water Quality for the SFPUC and San Francisco Port jurisdictions.

For watersheds discharging to 3rd Street and Mission Rock Street storm drain infrastructure, the SFPUC requires capture and treatment of all impervious area runoff from rain events up to the 90th percentile event. For watersheds connecting to existing Port storm drain infrastructure discharging directly to the San Francisco Bay or China Basin, the Port requires treatment up to the 85th percentile rain event. Through implementing sustainable design strategies, the Project can achieve the performance requirements for each watershed within both jurisdictions throughout the proposed site.

3.1 Proposed BMP Sizing

Given that the Mission Rock site is within a separated sewer system regulated by MS4 BMP sizing, the proposed stormwater treatment strategies are being designed to capture and treat all impervious area runoff throughout the site. The Project site includes public streets, open space areas, and private Development Parcels. The site is divided into seven watershed areas as shown on Figures 3.2 and 3.3. Site infrastructure within each watershed area is summarized in the Table 3.1 below:

Table 3.1
Watershed Area Descriptions

Watershed Area	Public Streets	Private Development Parcels	Open Space Area
1	East Exposition Street, North Shared Public Way, North Bridgeview Street	A, B, F, G, K, J	-
2	East Long Bridge Street, South Shared Public Way, South Bridgeview Street	E and East Development Parcel D	-
3	Terry A Francois Boulevard, East Exposition Street	H & I	Channel Lane
4	West Long Bridge Street	C	Channel Street
5	-	West Development Parcel D	-
6	-	-	China Basin Park
7	West Exposition Street	-	-

3.2.1 Treatment Locations

Due to grading and geotechnical site constraints, watershed areas throughout the Mission Rock Development vary between localized and centralized treatment strategies. Where feasible, impervious surfaces will be locally treated by flow-through planters or nearby bioretention areas. At these locations, stormwater will surface flow to local BMPs for treatment and then gravity flow to a final discharge point. In locations where localized treatment is infeasible, centralized strategies are used and stormwater is collected by storm drain inlets, pumped to a non-local BMP for treatment and then gravity flow to a final discharge point. A summary of the treatment method and BMP location for each watershed area can be found in Table 3.2 below.

3.2.2 Discharge Locations

After treatment, stormwater throughout the site is collected by the proposed storm drain system and directed to discharge locations that either utilizing an existing outfall to the San Francisco Bay or connect to the existing separated sewer system. Stormwater that discharges to an existing outfall in the San Francisco Bay is governed by the Port of San Francisco. Stormwater that discharges to an existing storm drain main within the public right of way is governed by the SFPUC. A summary of the discharge locations and agency jurisdiction for each watershed can be found in Table 3.2 below.

Table 3.2
Watershed Data

Watershed	BMP Treatment Method	BMP Treatment Location	Discharge Location	Jurisdiction
1	Localized Treatment	Watershed 1	Outfall to SF bay	SF PORT
2	Centralized Treatment	Mission Rock Square	Outfall to SF bay	SF PORT
3	Centralized Treatment	China Basin Park	Outfall to SF bay	SF PORT
4	Localized Treatment	Watershed 4	3rd Street	SFPUC
5	Localized Treatment	Watershed 5	Mission Rock Street	SFPUC
6	Centralized Treatment	China Basin Park	Outfall to China Basin	SF PORT
7	Localized Treatment	Watershed 7	3rd Street	SFPUC

3.2 Methodology

To show Project compliance with stormwater management requirements, BKF used the City Standard MS4 BMP Sizing Calculator for Water Quality under SFPUC and Port of San Francisco jurisdictions.

3.3 Results

The Mission Rock Development stormwater management strategies comply with the State NPDES General Permit No. CAS00004 and City SMR requirements. Watershed areas within the SFPUC jurisdiction provide capture and treatment of all impervious area runoff from rain events up to the 90th percentile event. Similarly, drainage management areas (DMAs) within the Port of San Francisco jurisdiction allow capture and treatment of all impervious area runoff from rain events up to the 85th percentile event. A summary of the localized and centralized treatment area sizes provided within each watershed area throughout the site can be found in Table 3.3 below.

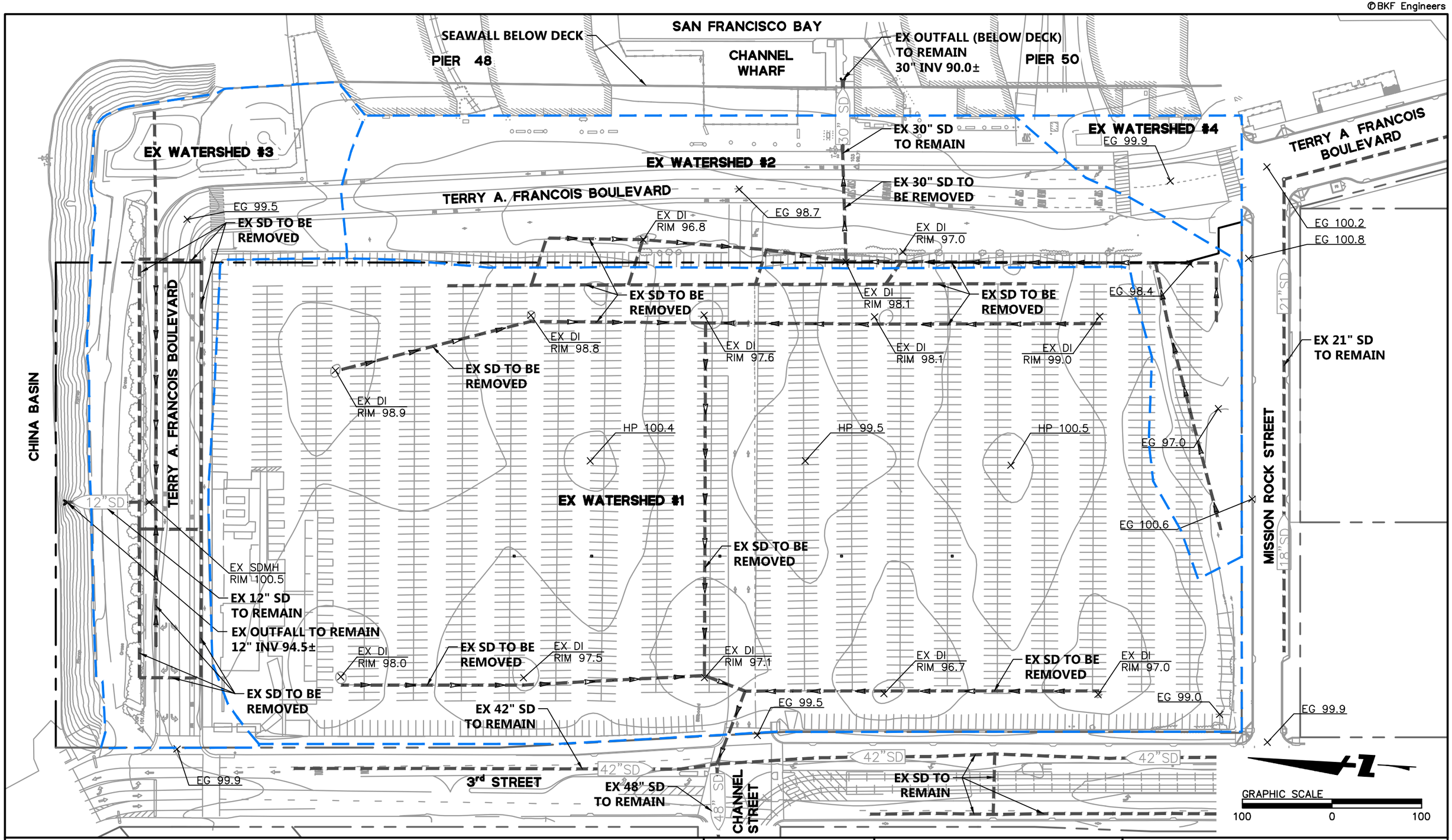
Table 3.3
Summary of Stormwater Treatment Sizing

Watershed	DMA (SF)	Jurisdiction	BMP Performance Requirements (SF)	Minimum BMP Size (SF)	BMP Treatment Location	Total BMP (SF)
1	263,635	SF PORT	85th Percentile, 24-Hr Storm	7,910	Watershed 1	7,910
2	151,740	SF PORT	85th Percentile, 24-Hr Storm	4,325	Mission Rock Square	4,325
3	184,200	SF PORT	85th Percentile, 24-Hr Storm	5,540	China Basin Park	Pumped to China Basin Park
4	56,870	SFPUC	90th Percentile, 24-Hr Storm	1,990	Watershed 4	1,990
5	45,330	SFPUC	90th Percentile, 24-Hr Storm	1,587	Watershed 5	1,587
6	176,290	SF PORT	85th Percentile, 24-Hr Storm	5,024	China Basin Park	11,000
7	5,850	SFPUC	90th Percentile, 24-Hr Storm	205	Watershed 7	205

The findings in Table 3 show that using the proposed landscape and bioretention areas within public streets, Development Parcels and open space areas is sufficient to achieve 90th percentile rain event runoff capture and treatment within SFPUC jurisdiction as well as 85th percentile rain event runoff capture and treatment within the Port of San Francisco jurisdiction. The MS4 BMP Sizing Calculator computations and associated hydrographs can be found in Appendix A.

Section 3 Figures

© BKF Engineers



LEGEND

- EXISTING PARCEL BOUNDARIES
- EXISTING STORM DRAIN MAIN
- EXISTING WATERSHED BOUNDARY

ABBREVIATIONS

DI	DROP INLET	MH	MANHOLE
EG	EXISTING GRADE	SD	STORM DRAIN
EX	EXISTING		
HP	HIGH POINT		
INV	INVERT		

DATE: 09/20/2016
SCALE: 1"=100'
DESIGN: JVH
DRAWN BY: JVH
APPROVED: MAO
JOB NO: 20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
STORMWATER MANAGEMENT MASTER PLAN
FIGURE 3.1
EXISTING SITE DRAINAGE PLAN

DRAWING NAME: K:\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\SMMP\Figure 3.1 Existing Site Drainage Plan.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

© BKF Engineers

SAN FRANCISCO BAY

PUMP TREATMENT FLOWS FROM WATERSHED 3 TO WATERSHED 6 FOR TREATMENT

DISCHARGE TO BAY

CHECK VALVE

TREATED/5YR/100YR FLOWS FROM WATERSHED 2 & BIPASS 5YR/100YR FLOWS FROM WATERSHED 3 TO BAY

DIVERSION WELL

CHANNEL WHARF

PIER 48

PIER 50

WATERSHED #3

WATERSHED #6

TERRY A FRANCOIS BOULEVARD

TREATED/5YR/100YR FLOWS FROM WATERSHED 2

PUMP #2 (LOW FLOW) FOR TREATMENT FLOWS TO WATERSHED 6

CHANNEL LANE

BLOCK K
(LOCALIZED TREATMENT)

BLOCK J

BLOCK I

BLOCK H

CHINA BASIN

WATERSHED #1

BRIDGEVIEW STREET

WATERSHED #2

CHINA BASIN PARK

DISCHARGE TO BAY

FLOW SPLITTER WELL

CHECK VALVE

EXPOSITION STREET

BLOCK F
(LOCALIZED TREATMENT)

TREATED/5YR/100YR FLOWS FROM WATERSHED 2

MISSION ROCK SQUARE

BLOCK E

LONG BRIDGE STREET

BLOCK D

MISSION ROCK STREET

BLOCK G
(LOCALIZED TREATMENT)

TREATED FLOWS FROM WATERSHED 1, 3, & 6

TREATED FLOWS FROM WATERSHED 1

CENTRALIZED TREATMENT FOR WATERSHED 2

SHARED PUBLIC WAY

DIVERSION WELL

LOCALIZED TREATMENT IN WATERSHED 1, TYP

DEVELOPMENT AREA WITH LOCALIZED TREATMENT

WATERSHED #5

BLOCK D
(LOCALIZED TREATMENT)

DIVERSION WELL

5YR/100YR FLOWS FROM WATERSHED 1 & 6

BLOCK A
(LOCALIZED TREATMENT)

BLOCK B
(LOCALIZED TREATMENT)

CHANNEL STREET

WATERSHED #4.A
BLOCK C
(LOCALIZED TREATMENT)

WATERSHED #4.B

TREATED/5YR/100YR FLOWS FROM WATERSHED 4.A

TREATED/5YR/100YR FLOWS FROM WATERSHED 4.B

CENTRALIZED TREATMENT FOR WATERSHEDS 1, 3, & 6 (TYPICAL OF 3)

WATERSHED #7

TREATED/5YR/100YR FLOWS FROM WATERSHED 7

3rd STREET

5YR/100YR FLOWS FROM WATERSHED 1 & 6

CHANNEL STREET

GRAPHIC SCALE
100 0 100

LEGEND

- WATERSHED BOUNDARY
- UNTREATED STORMWATER RUNOFF
- TREATED STORMWATER
- PUMPED FLOWS
- OUTFALL
- BIORETENTION AREAS
- TREATMENT FOR 85-PERCENTILE STORM (SF PORT)
- TREATMENT FOR 90-PERCENTILE STORM (SFPUC)

DATE: 09/20/2016
SCALE:
DESIGN:
DRAWN BY:
APPROVED:
JOB NO: 20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
STORMWATER MANAGEMENT MASTER PLAN

FIGURE 3.2
CONCEPTUAL STORMWATER MANAGEMENT PLAN

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\SWMP\SW_Process Flow Diagram.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

© BKF Engineers

SAN FRANCISCO BAY

CHANNEL WHARF
WHARF DMA=23,840 SF
3% BIO=720 SF

PIER 48

PIER 50

WATERSHED #3 WATERSHED 3 DMA=184,200 SF
TOTAL BIO=5,540 SF

STREET DMA=86,910 SF
3% BIO=2,610 SF

TERRY A FRANCOIS BOULEVARD

WATERSHED #6
DMA=176,290 SF
PERV AREA=67,540 SF
IMP AREA=100,435 SF
4% BIO=3,910 SF

CHINA BASIN

CHANNEL LANE
DMA=9,750 SF
3% BIO=300 SF

BLOCK K
DMA=17,860 SF
3% BIO=540 SF

BLOCK J
DMA=31,515 SF
3% BIO=940 SF

BLOCK I
DMA=32,550 SF
3% BIO=980 SF

BLOCK H
DMA=31,150 SF
3% BIO=930 SF

WATERSHED #1

BRIDGEVIEW STREET

WATERSHED #2

CHINA BASIN PARK

6,200 SF

EXPOSITION STREET

STREET DMA=73,730 SF
3% BIO=2,210 SF

BLOCK G
DMA=33,060 SF
3% BIO=990 SF

BLOCK F
DMA=25,110 SF
3% BIO=750 SF

MISSION ROCK SQUARE
DMA=48,370 SF
3% BIO=1,450 SF

BLOCK E
DMA=25,120 SF
3% BIO=760 SF

LONG BRIDGE STREET

WATERSHED 2 DMA=151,740 SF
TOTAL BIO=4,580 SF

BLOCK D
DMA=50,580 SF
3% BIO=1,520 SF

MISSION ROCK STREET

2,515 SF

2,285 SF

WATERSHED 1 DMA=263,635 SF
TOTAL BIO=7,910 SF

SHARED PUBLIC WAY

WATERSHED 2
CENTRALIZED BIORETENTION
BIO NEEDED=6,030 SF

CHANNEL STREET
DMA=11,900 SF
3.5% BIO=420 SF

STREET DMA=76,040 SF
3% BIO=2,300 SF

WATERSHED #5

BLOCK D
DMA=45,330 SF
3.5% BIO=1,590 SF

BLOCK A
DMA=42,150 SF
3% BIO=1,270 SF

BLOCK B
DMA=40,210 SF
3% BIO=1,210 SF

CHANNEL STREET

WATERSHED #4.A
BLOCK C
DMA=39,120 SF
3.5% BIO=1,370 SF

WATERSHED #4.B
STREET DMA=5,850 SF
3.5% BIO=210 SF

WATERSHED 3 & 6
CENTRALIZED BIORETENTION
BIO NEEDED=9,720 SF
TOTAL BIO=10,060 SF

WATERSHED #7
STREET DMA=5,850 SF
3.5% BIO=210 SF

3rd STREET

CHANNEL STREET

GRAPHIC SCALE
100 0 100

LEGEND

- WATERSHED BOUNDARY
- UNTREATED STORMWATER RUNOFF
- TREATED STORMWATER
- PUMPED FLOWS
- OUTFALL
- BIORETENTION AREAS
- TREATMENT FOR 85-PERCENTILE STORM (SF PORT)
- TREATMENT FOR 90-PERCENTILE STORM (SFPUC)

DATE: 09/20/2016
SCALE:
DESIGN:
DRAWN BY:
APPROVED:
JOB NO: 20080006

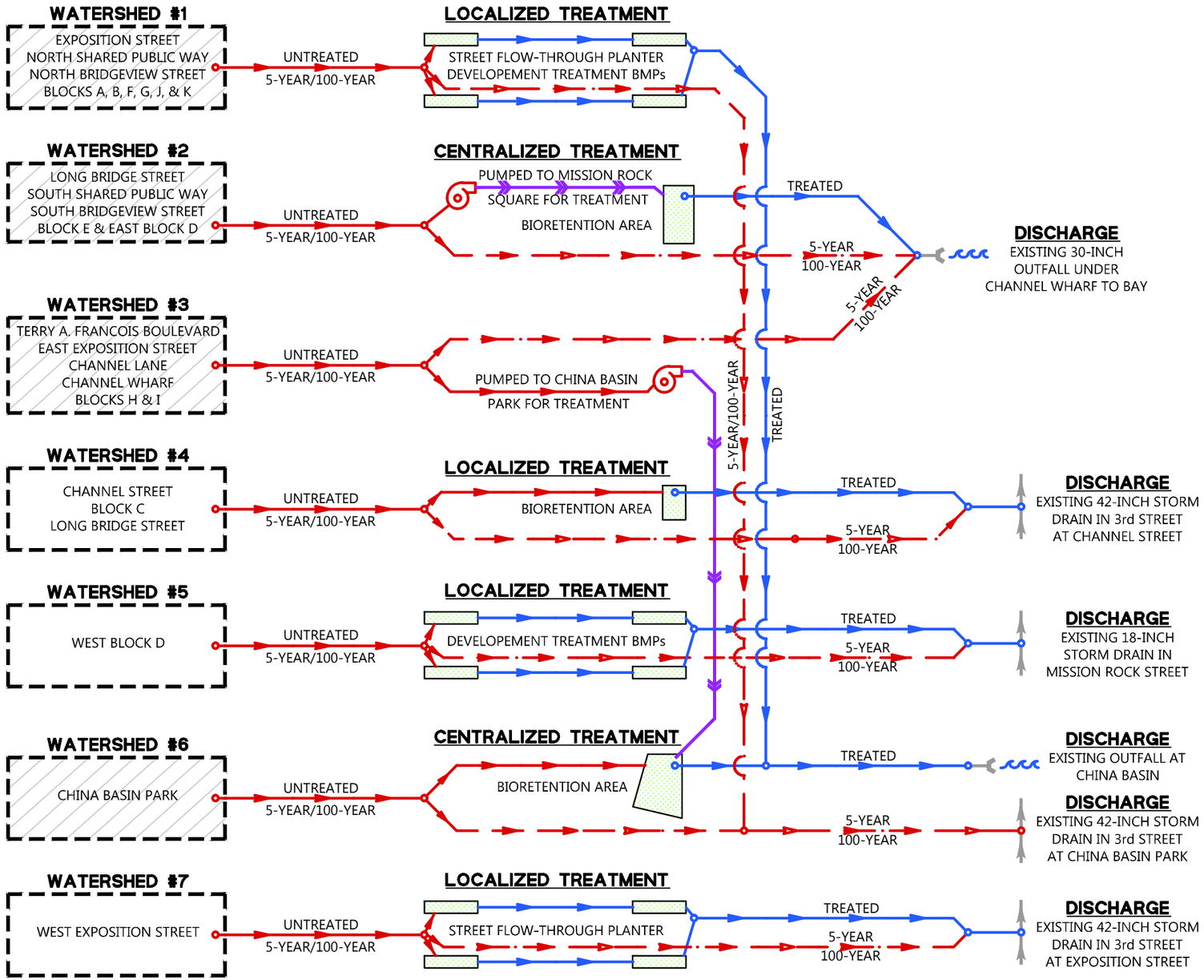
GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
STORMWATER MANAGEMENT MASTER PLAN
FIGURE 3.3
PROPOSED BIORETENTION AREA SIZING

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\SWMP\SW_Process Flow Diagram.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

© BKF Engineers



LEGEND

- WATERSHED BOUNDARY
- UNTREATED STORMWATER RUNOFF
- TREATED STORMWATER
- PUMPED FLOWS
- EXISTNG STORM DRAIN
- 5-YEAR/100-YEAR BIPASS STORMWATER RUNOFF
- BIORETENTION AREAS
- TREATMENT FOR 85-PERCENTILE STORM (SF PORT)
- TREATMENT FOR 90-PERCENTILE STORM (SFPUC)
- PUMP (LOW FLOW)
- OUTFALL

DATE: 09/20/2016
SCALE:
DESIGN:
DRAWN BY:
APPROVED:
JOB NO: 20080006

GIANTS DEVELOPMENT SERVICES LLC
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 650
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT
STORMWATER MANAGEMENT MASTER PLAN
FIGURE 3.4
CONCEPTUAL PROCESS FLOW DIAGRAM

DRAWING NAME: \\BKF-SF\vol4\2008\080006_Mission Rock\ENG\Exhibits\Master Plan Exhibits\SWMP\SW_Process Flow Diagram.dwg
PLOT DATE: 09-20-16
PLOTTED BY: volk

APPENDIX A

MS4 BMP Sizing Calculator for

Water Quality Calculations

(SFPUC and Port of San Francisco Jurisdictions)

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #1	Date:	19-Sep-2016
Jurisdiction:	Port of San Francisco		
Total Project Site Area (ft^2):	263,635	The Sizing Calculator is not recommend for large or complex sites. See 'BMP Sizing Instructions' worksheet for site size restrictions.	
Impervious Area Created or Replaced (ft^2):	237,667		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 85th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 1 - Enter the site's infiltration characteristics

HSG Soil Type:	D
Is Infiltration Feasible or Proposed?	No
If No, Please Select Why:	High Groundwater
Measured Infiltration Rate (in/hr):	0.001
Infiltration Testing Method:	Not Conducted
Infiltration Rate Correction Factor:	0
Design Infiltration Rate (in/hr):	0.00

STEP 2 - Enter the site's runoff pathway information to estimate the Time of Concentration (Tc)

Means of Conveying Runoff to BMPs:	Overland
Ave. Site Slope in Direction of Flow (%):	1.0%
Maximum Flow Length (ft):	100
Pretreatment Conveyance Swale U/S of Bioretention?	No

STEP 3a - Enter the sites EXSITING and PROPOSED areas of impervious, pervious, and BMP surfaces.

		Surface Type	Existing (ft^2)	Proposed (ft^2)	Curve Number
Conventional Surfaces	Impervious	Pavement (Conventional)	263,635	237,667	98
		Roof (Conventional)	0	0	98
		Gravel on Soils	0	0	91
		Other:	0	0	
		Impervious Areas Subtotal	*263,635*	*237,667*	
	Pervious	Grass/Lawn	0	7,909	80
		Landscaping at Grade (Low Density) / SIA	0	0	77
		Landscaping at Grade (High Density)	0	0	73
		Tree Well	0	2,636	35
		Traditional Planter on Podium	0	7,909	74
		Other:	0	0	
		Pervious Areas Subtotal	*0*	*18,454*	--
Stormwater BMPs	Reduce	Rainwater Harvesting Cistern	--	--	--
		Bioretention (No Underdrain, No Liner)	--	0	--
		Infiltration Trench	--	0	--
		Dry Well / Infiltration Gallery	--	--	--
		Bioretention Swale (No Underdrain)	--	0	--
		Permeable Pavement (No Underdrain)	--	0	--
		Permeable Pavement (Underdrain)	--	0	--
		Vegetated Roof	--	0	--
	Biotreat	Bioretention/FTP (Underdrain, No Liner)	--	0	--
		Bioretention/FTP (Underdrain, Liner)	--	7,514	--
		Bioretention Swale (Underdrain)	--	0	--
		Media Filter (pre-approval required)	--	0	--
		BMP Areas Subtotals	*0*	*7,514*	--
		Total Project Site Areas	***263,635***	***263,635***	--

BMPs in Series

Are BMPs in Series Proposed?	No
First BMP in Series	
Receiving BMP in Series	

STEP 3b - Enter stormwater BMP design information AND the conventional areas from Step 3a that drain to each BMP.

		Drainage Areas		BMP Depths and Volumes					Outlet Design	
		Impervious Area Draining to BMP (ft^2)	Pervious Area Draining to BMP (ft^2)	BMP Ponding Depth (ft)	BMP Media Depth (ft)	Gravel Storage Depth (ft)	Height of Underdrain Above Base (ft)	Storage Volume (gallons)	Outlet Diameter (in)	Approx. Drawdown Time (hrs)
Stormwater BMPs	Reduce	0	0	0.00	--	0.00	--	0	0.00	0 days
				0.5	1.50		--	0	--	0
				--	--	3.50	--	0	--	0
				0.0	--	3.50	--		--	0
		0	0	0.00	0.00	0.00	--	0	--	0
			0	--	--	1.00	--	0	--	0
			0	--	--	1.00	0.167	0	4	0.0
				--	0.5	--	--	0	4	0.0
	Biotreat			0.5	1.50		0.167	0	4	0.0
		237,667	18,454	0.5	1.50	1.00	--	75,872	4	5.0
		0	0	0.00	0.00	0.00	0.00	0	0	0.0
		0	--	--	--	--	--	--	--	--
		237,667	*18,454*					*75,872*		

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #1	Date:	19-Sep-2016
Jurisdiction:	Port of San Francisco		
Total Project Site Area (ft^2):	263,635	The Sizing Calculator is not recommend for large or complex sites. See 'BMP Sizing Instructions' worksheet for site size restrictions.	
Impervious Area Created or Replaced (ft^2):	237,667		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 85th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 4 - Check that site and drainage management areas are entered correctly. (Note: MS4 = municipal separate storm sewer systems.)

Project Site Surfaces	Existing Area (ft^2)	Proposed Area (ft^2)	% of Total Project Area	CHECK OF AREAS
Impervious Area Draining to BMP	0	237,667	90%	**OK**
Impervious Area Draining Directly to MS4	263,635	0	0%	
Pervious Area Draining to BMP	0	18,454	7%	**OK**
Pervious Area Draining Directly to MS4	0	0	0%	
BMP Area	0	7,514	3%	
Total Area	263,635	263,635		**OK**

STEP 5 - Check if the performance requirements are met. If not, review stormwater BMP performance output in Step 7, then return to Step 3 to adjust stormwater strategies.

Rain Event	Runoff Volume Requiring Treatment (ft^3)	TREATED Volume Captured & Treated (ft^3)	UNTREATED Volume of BMP Overflow (ft^3)	UNTREATED Vol from Imperv Area Direct to Sewer (ft^3)	Percent of Treatment Volume Captured (%)	Requirement Met?
85th Percentile Rainfall Event	11179	11179	0	0	**100%**	**PASS**

STEP 6 - Review the table below to see how each BMP performs during the water quality design storm. The site's runoff hydrographs are shown in the "Rainfall and Hydrographs" tab.

For BMPs in Series Only

	Stormwater BMPs	Inflows	Outflows		Volume In	Volume Retained			Volume Out to MS4		Volume to Receiving BMP	
		Peak Flow to BMP (cfs)	Peak Rate of Discharged Flow (cfs)	Peak Rate of Overflow (cfs)	Total Runoff to BMP (ft^3)	Infiltration + E/T (ft^3)	Reuse (ft^3)	Volume Remaining in Storage (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)
Reduce	Rainwater Harvesting Cistern	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Bioretention (No Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Infiltration Trench	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Dry Well / Infiltration Gallery	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Bioretention Swale (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Permeable Pavement (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Permeable Pavement (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Vegetated Roof	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, Liner)	1.157	0.508	0.000	11179	861	0	0	10318	0	--	--
Biotreat	Bioretention Swale (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
	Media Filter	0.000	--	--	0			--			--	--
	Totals				***11,179***	***861***	***0***	***0***	***10,318***	***0***	***0***	***0***

*NOTE: With the exception of Cisterns, BMPs should not have any "**Volume Remaining In Storage**". There should also not be any "**Untreated**" runoff. Untreated volumes are indicated in the table by red font.*

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #2	Date:	19-Sep-2016
Jurisdiction:	Port of San Francisco		
Total Project Site Area (ft^2):	151,740	The Sizing Calculator is not recommend for large or complex sites. See 'BMP Sizing Instructions' worksheet for site size restrictions.	
Impervious Area Created or Replaced (ft^2):	136,794		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 85th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 1 - Enter the site's infiltration characteristics

HSG Soil Type:	D
Is Infiltration Feasible or Proposed?	No
If No, Please Select Why:	High Groundwater
Measured Infiltration Rate (in/hr):	0.001
Infiltration Testing Method:	Not Conducted
Infiltration Rate Correction Factor:	0
Design Infiltration Rate (in/hr):	0.00

STEP 2 - Enter the site's runoff pathway information to estimate the Time of Concentration (Tc)

Means of Conveying Runoff to BMPs:	Overland
Ave. Site Slope in Direction of Flow (%):	1.0%
Maximum Flow Length (ft):	100
Pretreatment Conveyance Swale U/S of Bioretention?	No

STEP 3a - Enter the sites EXSITING and PROPOSED areas of impervious, pervious, and BMP surfaces.

		Surface Type	Existing (ft^2)	Proposed (ft^2)	Curve Number
Conventional Surfaces	Impervious	Pavement (Conventional)	151,740	136,794	98
		Roof (Conventional)	0	0	98
		Gravel on Soils	0	0	91
		Other:	0	0	
		Impervious Areas Subtotal	*151,740*	*136,794*	
	Pervious	Grass/Lawn	0	4,552	80
		Landscaping at Grade (Low Density) / SIA	0	0	77
		Landscaping at Grade (High Density)	0	0	73
		Tree Well	0	1,517	35
		Traditional Planter on Podium	0	4,552	74
		Other:	0	0	
		Pervious Areas Subtotal	*0*	*10,622*	--
Stormwater BMPs	Reduce	Rainwater Harvesting Cistern	--	--	--
		Bioretention (No Underdrain, No Liner)	--	0	--
		Infiltration Trench	--	0	--
		Dry Well / Infiltration Gallery	--	--	--
		Bioretention Swale (No Underdrain)	--	0	--
		Permeable Pavement (No Underdrain)	--	0	--
		Permeable Pavement (Underdrain)	--	0	--
		Vegetated Roof	--	0	--
	Biotreat	Bioretention/FTP (Underdrain, No Liner)	--	0	--
		Bioretention/FTP (Underdrain, Liner)	--	4,325	--
		Bioretention Swale (Underdrain)	--	0	--
		Media Filter (pre-approval required)	--	0	--
		BMP Areas Subtotals	*0*	*4,325*	--
		Total Project Site Areas	***151,740***	***151,740***	--

BMPs in Series

Are BMPs in Series Proposed?	No
First BMP in Series	
Receiving BMP in Series	

STEP 3b - Enter stormwater BMP design information AND the conventional areas from Step 3a that drain to each BMP.

		Drainage Areas		BMP Depths and Volumes					Outlet Design	
		Impervious Area Draining to BMP (ft^2)	Pervious Area Draining to BMP (ft^2)	BMP Ponding Depth (ft)	BMP Media Depth (ft)	Gravel Storage Depth (ft)	Height of Underdrain Above Base (ft)	Storage Volume (gallons)	Outlet Diameter (in)	Approx. Drawdown Time (hrs)
Stormwater BMPs	Reduce	0	0	0.00	--	0.00	--	0	0.00	0 days
				0.5	1.50		--	0	--	0
				--	--	3.50	--	0	--	0
				0.0	--	3.50	--		--	0
		0	0	0.00	0.00	0.00	--	0	--	0
			0	--	--	1.00	--	0	--	0
			0	--	--	1.00	0.167	0	4	0.0
				--	0.5	--	--	0	4	0.0
	Biotreat			0.5	1.50		0.167	0	4	0.0
		136,794	10,622	0.5	1.50	1.00	--	43,670	4	2.9
		0	0	0.00	0.00	0.00	0.00	0	0	0.0
		0	--	--	--	--	--	--	--	--
		136,794	*10,622*					*43,670*		

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #2	Date:	19-Sep-2016
Jurisdiction:	Port of San Francisco		
Total Project Site Area (ft^2):	151,740	The Sizing Calculator is not recommend for large or complex sites. See 'BMP Sizing Instructions' worksheet for site size restrictions.	
Impervious Area Created or Replaced (ft^2):	136,794		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 85th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 4 - Check that site and drainage management areas are entered correctly. (Note: MS4 = municipal separate storm sewer systems.)

Project Site Surfaces	Existing Area (ft^2)	Proposed Area (ft^2)	% of Total Project Area	CHECK OF AREAS
Impervious Area Draining to BMP	0	136,794	90%	**OK**
Impervious Area Draining Directly to MS4	151,740	0	0%	
Pervious Area Draining to BMP	0	10,622	7%	**OK**
Pervious Area Draining Directly to MS4	0	0	0%	
BMP Area	0	4,325	3%	
Total Area	151,740	151,740		**OK**

STEP 5 - Check if the performance requirements are met. If not, review stormwater BMP performance output in Step 7, then return to Step 3 to adjust stormwater strategies.

Rain Event	Runoff Volume Requiring Treatment (ft^3)	TREATED Volume Captured & Treated (ft^3)	UNTREATED Volume of BMP Overflow (ft^3)	UNTREATED Vol from Imperv Area Direct to Sewer (ft^3)	Percent of Treatment Volume Captured (%)	Requirement Met?
85th Percentile Rainfall Event	6434	6434	0	0	**100%**	**PASS**

STEP 6 - Review the table below to see how each BMP performs during the water quality design storm. The site's runoff hydrographs are shown in the "Rainfall and Hydrographs" tab.

For BMPs in Series Only

	Stormwater BMPs	Inflows	Outflows		Volume In	Volume Retained			Volume Out to MS4		Volume to Receiving BMP	
		Peak Flow to BMP (cfs)	Peak Rate of Discharged Flow (cfs)	Peak Rate of Overflow (cfs)	Total Runoff to BMP (ft^3)	Infiltration + E/T (ft^3)	Reuse (ft^3)	Volume Remaining in Storage (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)
Reduce	Rainwater Harvesting Cistern	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Bioretention (No Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Infiltration Trench	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Dry Well / Infiltration Gallery	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Bioretention Swale (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Permeable Pavement (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Permeable Pavement (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Vegetated Roof	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, Liner)	0.666	0.217	0.000	6434	350	0	0	6084	0	--	--
Biotreat	Bioretention Swale (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
	Media Filter	0.000	--	--	0			--			--	--
	Totals				***6,434***	***350***	***0***	***0***	***6,084***	***0***	***0***	***0***

*NOTE: With the exception of Cisterns, BMPs should not have any "**Volume Remaining In Storage**". There should also not be any "**Untreated**" runoff. Untreated volumes are indicated in the table by red font.*

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #3	Date:	19-Sep-2016
Jurisdiction:	Port of San Francisco		
Total Project Site Area (ft^2):	184,200	The Sizing Calculator is not recommend for large or complex sites. See 'BMP Sizing Instructions' worksheet for site size restrictions.	
Impervious Area Created or Replaced (ft^2):	166,056		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 85th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 1 - Enter the site's infiltration characteristics

HSG Soil Type:	D
Is Infiltration Feasible or Proposed?	No
If No, Please Select Why:	High Groundwater
Measured Infiltration Rate (in/hr):	0.001
Infiltration Testing Method:	Not Conducted
Infiltration Rate Correction Factor:	0
Design Infiltration Rate (in/hr):	0.00

STEP 2 - Enter the site's runoff pathway information to estimate the Time of Concentration (Tc)

Means of Conveying Runoff to BMPs:	Overland
Ave. Site Slope in Direction of Flow (%):	1.0%
Maximum Flow Length (ft):	100
Pretreatment Conveyance Swale U/S of Bioretention?	No

STEP 3a - Enter the sites EXSITING and PROPOSED areas of impervious, pervious, and BMP surfaces.

		Surface Type	Existing (ft^2)	Proposed (ft^2)	Curve Number
Conventional Surfaces	Impervious	Pavement (Conventional)	184,200	166,056	98
		Roof (Conventional)	0	0	98
		Gravel on Soils	0	0	91
		Other:	0	0	
		Impervious Areas Subtotal	*184,200*	*166,056*	
	Pervious	Grass/Lawn	0	5,526	80
		Landscaping at Grade (Low Density) / SIA	0	0	77
		Landscaping at Grade (High Density)	0	0	73
		Tree Well	0	1,842	35
		Traditional Planter on Podium	0	5,526	74
		Other:	0	0	
		Pervious Areas Subtotal	*0*	*12,894*	--
Stormwater BMPs	Reduce	Rainwater Harvesting Cistern	--	--	--
		Bioretention (No Underdrain, No Liner)	--	0	--
		Infiltration Trench	--	0	--
		Dry Well / Infiltration Gallery	--	--	--
		Bioretention Swale (No Underdrain)	--	0	--
		Permeable Pavement (No Underdrain)	--	0	--
		Permeable Pavement (Underdrain)	--	0	--
		Vegetated Roof	--	0	--
	Biotreat	Bioretention/FTP (Underdrain, No Liner)	--	0	--
		Bioretention/FTP (Underdrain, Liner)	--	5,250	--
		Bioretention Swale (Underdrain)	--	0	--
		Media Filter (pre-approval required)	--	0	--
		BMP Areas Subtotals	*0*	*5,250*	--
		Total Project Site Areas	***184,200***	***184,200***	--

BMPs in Series

Are BMPs in Series Proposed?	No
First BMP in Series	
Receiving BMP in Series	

STEP 3b - Enter stormwater BMP design information AND the conventional areas from Step 3a that drain to each BMP.

	Drainage Areas		BMP Depths and Volumes					Outlet Design	
	Impervious Area Draining to BMP (ft^2)	Pervious Area Draining to BMP (ft^2)	BMP Ponding Depth (ft)	BMP Media Depth (ft)	Gravel Storage Depth (ft)	Height of Underdrain Above Base (ft)	Storage Volume (gallons)	Outlet Diameter (in)	Approx. Drawdown Time (hrs)
Rainwater Harvesting Cistern	0	0	0.00	--	0.00	--	0	0.00	0 days
Bioretention (No Underdrain, No Liner)			0.5	1.50		--	0	--	0
Infiltration Trench			--	--	3.50	--	0	--	0
Dry Well / Infiltration Gallery			0.0	--	3.50	--		--	0
Bioretention Swale (No Underdrain)	0	0	0.00	0.00	0.00	--	0	--	0
Permeable Pavement (No Underdrain)		0	--	--	1.00	--	0	--	0
Permeable Pavement (Underdrain)		0	--	--	1.00	0.167	0	4	0.0
Vegetated Roof			--	0.5	--	--	0	4	0.0
Bioretention/FTP (Underdrain, No Liner)			0.5	1.50		0.167	0	4	0.0
Bioretention/FTP (Underdrain, Liner)	166,056	12,894	0.5	1.50	1.00	--	53,011	4	3.5
Bioretention Swale (Underdrain)	0	0	0.00	0.00	0.00	0.00	0	0	0.0
Media Filter (pre-approval required)	0	--	--	--	--	--	--	--	--
166,056	*12,894*						*53,011*		

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #3	Date:	19-Sep-2016
Jurisdiction:	Port of San Francisco		
Total Project Site Area (ft^2):	184,200	The Sizing Calculator is not recommend for large or complex sites. See 'BMP Sizing Instructions' worksheet for site size restrictions.	
Impervious Area Created or Replaced (ft^2):	166,056		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 85th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 4 - Check that site and drainage management areas are entered correctly. (Note: MS4 = municipal separate storm sewer systems.)

Project Site Surfaces	Existing Area (ft^2)	Proposed Area (ft^2)	% of Total Project Area	CHECK OF AREAS
Impervious Area Draining to BMP	0	166,056	90%	**OK**
Impervious Area Draining Directly to MS4	184,200	0	0%	
Pervious Area Draining to BMP	0	12,894	7%	**OK**
Pervious Area Draining Directly to MS4	0	0	0%	
BMP Area	0	5,250	3%	
Total Area	184,200	184,200		**OK**

STEP 5 - Check if the performance requirements are met. If not, review stormwater BMP performance output in Step 7, then return to Step 3 to adjust stormwater strategies.

Rain Event	Runoff Volume Requiring Treatment (ft^3)	TREATED Volume Captured & Treated (ft^3)	UNTREATED Volume of BMP Overflow (ft^3)	UNTREATED Vol from Imperv Area Direct to Sewer (ft^3)	Percent of Treatment Volume Captured (%)	Requirement Met?
85th Percentile Rainfall Event	7811	7811	0	0	**100%**	**PASS**

STEP 6 - Review the table below to see how each BMP performs during the water quality design storm. The site's runoff hydrographs are shown in the "Rainfall and Hydrographs" tab.

For BMPs in Series Only

	Stormwater BMPs	Inflows	Outflows		Volume In	Volume Retained			Volume Out to MS4		Volume to Receiving BMP	
		Peak Flow to BMP (cfs)	Peak Rate of Discharged Flow (cfs)	Peak Rate of Overflow (cfs)	Total Runoff to BMP (ft^3)	Infiltration + E/T (ft^3)	Reuse (ft^3)	Volume Remaining in Storage (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)
Reduce	Rainwater Harvesting Cistern	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Bioretention (No Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Infiltration Trench	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Dry Well / Infiltration Gallery	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Bioretention Swale (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Permeable Pavement (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Permeable Pavement (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Vegetated Roof	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, Liner)	0.808	0.462	0.000	7811	481	0	0	7329	0	--	--
Biotreat	Bioretention Swale (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
	Media Filter	0.000	--	--	0			--			--	--
	Totals				***7,811***	***481***	***0***	***0***	***7,329***	***0***	***0***	***0***

*NOTE: With the exception of Cisterns, BMPs should not have any "**Volume Remaining In Storage**". There should also not be any "**Untreated**" runoff. Untreated volumes are indicated in the table by red font.*

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #4	Date:	19-Sep-2016
Jurisdiction:	SF Public Utilities Commission		
Total Project Site Area (ft^2):	56,870		
Impervious Area Created or Replaced (ft^2):	50,899		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 90th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 1 - Enter the site's infiltration characteristics

HSG Soil Type:	D
Is Infiltration Feasible or Proposed?	No
If No, Please Select Why:	High Groundwater
Measured Infiltration Rate (in/hr):	0.001
Infiltration Testing Method:	Not Conducted
Infiltration Rate Correction Factor:	0
Design Infiltration Rate (in/hr):	0.00

STEP 2 - Enter the site's runoff pathway information to estimate the Time of Concentration (Tc)

Means of Conveying Runoff to BMPs:	Overland
Ave. Site Slope in Direction of Flow (%):	1.0%
Maximum Flow Length (ft):	100
Pretreatment Conveyance Swale U/S of Bioretention?	No

STEP 3a - Enter the sites EXSITING and PROPOSED areas of impervious, pervious, and BMP surfaces.

		Surface Type	Existing (ft^2)	Proposed (ft^2)	Curve Number
Conventional Surfaces	Impervious	Pavement (Conventional)	56,870	50,899	98
		Roof (Conventional)	0	0	98
		Gravel on Soils	0	0	91
		Other:	0	0	
		Impervious Areas Subtotal	*56,870*	*50,899*	
	Pervious	Grass/Lawn	0	1,706	80
		Landscaping at Grade (Low Density) / SIA	0	0	77
		Landscaping at Grade (High Density)	0	0	73
		Tree Well	0	569	35
		Traditional Planter on Podium	0	1,706	74
		Other:	0	0	
		Pervious Areas Subtotal	*0*	*3,981*	--
Stormwater BMPs	Reduce	Rainwater Harvesting Cistern	--	--	--
		Bioretention (No Underdrain, No Liner)	--	0	--
		Infiltration Trench	--	0	--
		Dry Well / Infiltration Gallery	--	--	--
		Bioretention Swale (No Underdrain)	--	0	--
		Permeable Pavement (No Underdrain)	--	0	--
		Permeable Pavement (Underdrain)	--	0	--
		Vegetated Roof	--	0	--
	Biotreat	Bioretention/FTP (Underdrain, No Liner)	--	0	--
		Bioretention/FTP (Underdrain, Liner)	--	1,990	--
		Bioretention Swale (Underdrain)	--	0	--
		Media Filter (pre-approval required)	--	0	--
		BMP Areas Subtotals	*0*	*1,990*	--
		Total Project Site Areas	***56,870***	***56,870***	--

BMPs in Series

Are BMPs in Series Proposed?	No
First BMP in Series	
Receiving BMP in Series	

STEP 3b - Enter stormwater BMP design information AND the conventional areas from Step 3a that drain to each BMP.

		Drainage Areas		BMP Depths and Volumes					Outlet Design	
		Impervious Area Draining to BMP (ft^2)	Pervious Area Draining to BMP (ft^2)	BMP Ponding Depth (ft)	BMP Media Depth (ft)	Gravel Storage Depth (ft)	Height of Underdrain Above Base (ft)	Storage Volume (gallons)	Outlet Diameter (in)	Approx. Drawdown Time (hrs)
Stormwater BMPs	Reduce	0	0	0.00	--	0.00	--	0	0.00	0 days
				0.5	1.50		--	0	--	0
				--	--	3.50	--	0	--	0
				0.0	--	3.50	--		--	0
		0	0	0.00	0.00	0.00	--	0	--	0
			0	--	--	1.00	--	0	--	0
			0	--	--	1.00	0.167	0	4	0.0
				--	0.5	--	--	0	4	0.0
	Biotreat			0.5	1.50		0.167	0	4	0.0
		50,899	3,981	0.5	1.50	1.00	--	20,100	4	2.4
		0	0	0.00	0.00	0.00	0.00	0	0	0.0
		0	--	--	--	--	--	--	--	--
		50,899	*3,981*					*20,100*		

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #4	Date:	19-Sep-2016
Jurisdiction:	SF Public Utilities Commission		
Total Project Site Area (ft^2):	56,870		
Impervious Area Created or Replaced (ft^2):	50,899		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 90th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 4 - Check that site and drainage management areas are entered correctly. (Note: MS4 = municipal separate storm sewer systems.)

Project Site Surfaces	Existing Area (ft^2)	Proposed Area (ft^2)	% of Total Project Area	CHECK OF AREAS
Impervious Area Draining to BMP	0	50,899	90%	OK
Impervious Area Draining Directly to MS4	56,870	0	0%	
Pervious Area Draining to BMP	0	3,981	7%	OK
Pervious Area Draining Directly to MS4	0	0	0%	
BMP Area	0	1,990	4%	
Total Area	56,870	56,870		OK

STEP 5 - Check if the performance requirements are met. If not, review stormwater BMP performance output in Step 7, then return to Step 3 to adjust stormwater strategies.

Rain Event	Runoff Volume Requiring Treatment (ft^3)	TREATED Volume Captured & Treated (ft^3)	UNTREATED Volume of BMP Overflow (ft^3)	UNTREATED Vol from Imperv Area Direct to Sewer (ft^3)	Percent of Treatment Volume Captured (%)	Requirement Met?
90th Percentile Rainfall Event	2942	2942	0	0	100%	PASS

STEP 6 - Review the table below to see how each BMP performs during the water quality design storm. The site's runoff hydrographs are shown in the "Rainfall and Hydrographs" tab.

For BMPs in Series Only

	Stormwater BMPs	Inflows	Outflows		Volume In	Volume Retained			Volume Out to MS4		Volume to Receiving BMP	
		Peak Flow to BMP (cfs)	Peak Rate of Discharged Flow (cfs)	Peak Rate of Overflow (cfs)	Total Runoff to BMP (ft^3)	Infiltration + E/T (ft^3)	Reuse (ft^3)	Volume Remaining in Storage (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)
Reduce	Rainwater Harvesting Cistern	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Bioretention (No Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Infiltration Trench	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Dry Well / Infiltration Gallery	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Bioretention Swale (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Permeable Pavement (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Permeable Pavement (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Vegetated Roof	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, Liner)	0.300	0.184	0.000	2942	90	0	0	2852	0	--	--
Biotreat	Bioretention Swale (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
	Media Filter	0.000	--	--	0			--			--	--
	Totals				***2,942***	***90***	***0***	***0***	***2,852***	***0***	***0***	***0***

*NOTE: With the exception of Cisterns, BMPs should not have any "**Volume Remaining In Storage**". There should also not be any "**Untreated**" runoff. Untreated volumes are indicated in the table by red font.*

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #5	Date:	19-Sep-2016
Jurisdiction:	SF Public Utilities Commission		
Total Project Site Area (ft^2):	45,330		
Impervious Area Created or Replaced (ft^2):	40,570		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 90th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 1 - Enter the site's infiltration characteristics

HSG Soil Type:	D
Is Infiltration Feasible or Proposed?	No
If No, Please Select Why:	High Groundwater
Measured Infiltration Rate (in/hr):	0.001
Infiltration Testing Method:	Not Conducted
Infiltration Rate Correction Factor:	0
Design Infiltration Rate (in/hr):	0.00

STEP 2 - Enter the site's runoff pathway information to estimate the Time of Concentration (Tc)

Means of Conveying Runoff to BMPs:	Overland
Ave. Site Slope in Direction of Flow (%):	1.0%
Maximum Flow Length (ft):	100
Pretreatment Conveyance Swale U/S of Bioretention?	No

STEP 3a - Enter the sites EXSITING and PROPOSED areas of impervious, pervious, and BMP surfaces.

		Surface Type	Existing (ft^2)	Proposed (ft^2)	Curve Number
Conventional Surfaces	Impervious	Pavement (Conventional)	45,330	40,570	98
		Roof (Conventional)	0	0	98
		Gravel on Soils	0	0	91
		Other:	0	0	
		Impervious Areas Subtotal	*45,330*	*40,570*	
	Pervious	Grass/Lawn	0	1,360	80
		Landscaping at Grade (Low Density) / SIA	0	0	77
		Landscaping at Grade (High Density)	0	0	73
		Tree Well	0	453	35
		Traditional Planter on Podium	0	1,360	74
		Other:	0	0	
		Pervious Areas Subtotal	*0*	*3,173*	--
Stormwater BMPs	Reduce	Rainwater Harvesting Cistern	--	--	--
		Bioretention (No Underdrain, No Liner)	--	0	--
		Infiltration Trench	--	0	--
		Dry Well / Infiltration Gallery	--	--	--
		Bioretention Swale (No Underdrain)	--	0	--
		Permeable Pavement (No Underdrain)	--	0	--
		Permeable Pavement (Underdrain)	--	0	--
		Vegetated Roof	--	0	--
	Biotreat	Bioretention/FTP (Underdrain, No Liner)	--	0	--
		Bioretention/FTP (Underdrain, Liner)	--	1,587	--
		Bioretention Swale (Underdrain)	--	0	--
		Media Filter (pre-approval required)	--	0	--
		BMP Areas Subtotals	*0*	*1,587*	--
		Total Project Site Areas	***45,330***	***45,330***	--

BMPs in Series

Are BMPs in Series Proposed?	No
First BMP in Series	
Receiving BMP in Series	

STEP 3b - Enter stormwater BMP design information AND the conventional areas from Step 3a that drain to each BMP.

	Drainage Areas		BMP Depths and Volumes					Outlet Design	
	Impervious Area Draining to BMP (ft^2)	Pervious Area Draining to BMP (ft^2)	BMP Ponding Depth (ft)	BMP Media Depth (ft)	Gravel Storage Depth (ft)	Height of Underdrain Above Base (ft)	Storage Volume (gallons)	Outlet Diameter (in)	Approx. Drawdown Time (hrs)
Rainwater Harvesting Cistern	0	0	0.00	--	0.00	--	0	0.00	0 days
Bioretention (No Underdrain, No Liner)			0.5	1.50		--	0	--	0
Infiltration Trench			--	--	3.50	--	0	--	0
Dry Well / Infiltration Gallery			0.0	--	3.50	--		--	0
Bioretention Swale (No Underdrain)	0	0	0.00	0.00	0.00	--	0	--	0
Permeable Pavement (No Underdrain)		0	--	--	1.00	--	0	--	0
Permeable Pavement (Underdrain)		0	--	--	1.00	0.167	0	4	0.0
Vegetated Roof			--	0.5	--	--	0	4	0.0
Bioretention/FTP (Underdrain, No Liner)			0.5	1.50		0.167	0	4	0.0
Bioretention/FTP (Underdrain, Liner)	40,570	3,173	0.5	1.50	1.00	--	16,021	4	2.4
Bioretention Swale (Underdrain)	0	0	0.00	0.00	0.00	0.00	0	0	0.0
Media Filter (pre-approval required)	0	--	--	--	--	--	--	--	--
BMP Areas Subtotals									
Total Project Site Areas	*40,570*	*3,173*					*16,021*		

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #5	Date:	19-Sep-2016
Jurisdiction:	SF Public Utilities Commission		
Total Project Site Area (ft^2):	45,330		
Impervious Area Created or Replaced (ft^2):	40,570		

Project Requirement:

Project Size:	**Large Project**
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 90th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 4 - Check that site and drainage management areas are entered correctly. (Note: MS4 = municipal separate storm sewer systems.)

Project Site Surfaces	Existing Area (ft^2)	Proposed Area (ft^2)	% of Total Project Area	CHECK OF AREAS
Impervious Area Draining to BMP	0	40,570	90%	**OK**
Impervious Area Draining Directly to MS4	45,330	0	0%	
Pervious Area Draining to BMP	0	3,173	7%	**OK**
Pervious Area Draining Directly to MS4	0	0	0%	
BMP Area	0	1,587	4%	
Total Area	45,330	45,330		**OK**

STEP 5 - Check if the performance requirements are met. If not, review stormwater BMP performance output in Step 7, then return to Step 3 to adjust stormwater strategies.

Rain Event	Runoff Volume Requiring Treatment (ft^3)	TREATED Volume Captured & Treated (ft^3)	UNTREATED Volume of BMP Overflow (ft^3)	UNTREATED Vol from Imperv Area Direct to Sewer (ft^3)	Percent of Treatment Volume Captured (%)	Requirement Met?
90th Percentile Rainfall Event	2345	2345	0	0	**100%**	**PASS**

STEP 6 - Review the table below to see how each BMP performs during the water quality design storm. The site's runoff hydrographs are shown in the "Rainfall and Hydrographs" tab.

For BMPs in Series Only

	Stormwater BMPs	Inflows	Outflows		Volume In	Volume Retained			Volume Out to MS4		Volume to Receiving BMP	
		Peak Flow to BMP (cfs)	Peak Rate of Discharged Flow (cfs)	Peak Rate of Overflow (cfs)	Total Runoff to BMP (ft^3)	Infiltration + E/T (ft^3)	Reuse (ft^3)	Volume Remaining in Storage (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)
Reduce	Rainwater Harvesting Cistern	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Bioretention (No Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Infiltration Trench	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Dry Well / Infiltration Gallery	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Bioretention Swale (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Permeable Pavement (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Permeable Pavement (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Vegetated Roof	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, Liner)	0.239	0.147	0.000	2345	69	0	0	2276	0	--	--
Biotreat	Bioretention Swale (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
	Media Filter	0.000	--	--	0			--			--	--
	Totals				***2,345***	***69***	***0***	***0***	***2,276***	***0***	***0***	***0***

*NOTE: With the exception of Cisterns, BMPs should not have any "**Volume Remaining In Storage**". There should also not be any "**Untreated**" runoff. Untreated volumes are indicated in the table by red font.*

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #6	Date:	19-Sep-2016
Jurisdiction:	Port of San Francisco		
Total Project Site Area (ft^2):	176,290	The Sizing Calculator is not recommend for large or complex sites. See 'BMP Sizing Instructions' worksheet for site size restrictions.	
Impervious Area Created or Replaced (ft^2):	158,925		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 85th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 1 - Enter the site's infiltration characteristics

HSG Soil Type:	D
Is Infiltration Feasible or Proposed?	No
If No, Please Select Why:	High Groundwater
Measured Infiltration Rate (in/hr):	0.001
Infiltration Testing Method:	Not Conducted
Infiltration Rate Correction Factor:	0
Design Infiltration Rate (in/hr):	0.00

STEP 2 - Enter the site's runoff pathway information to estimate the Time of Concentration (Tc)

Means of Conveying Runoff to BMPs:	Overland
Ave. Site Slope in Direction of Flow (%):	1.0%
Maximum Flow Length (ft):	100
Pretreatment Conveyance Swale U/S of Bioretention?	No

STEP 3a - Enter the sites EXSITING and PROPOSED areas of impervious, pervious, and BMP surfaces.

		Surface Type	Existing (ft^2)	Proposed (ft^2)	Curve Number
Conventional Surfaces	Impervious	Pavement (Conventional)	176,290	158,925	98
		Roof (Conventional)	0	0	98
		Gravel on Soils	0	0	91
		Other:	0	0	
		Impervious Areas Subtotal	*176,290*	*158,925*	
	Pervious	Grass/Lawn	0	5,289	80
		Landscaping at Grade (Low Density) / SIA	0	0	77
		Landscaping at Grade (High Density)	0	0	73
		Tree Well	0	1,763	35
		Traditional Planter on Podium	0	5,289	74
		Other:	0	0	
		Pervious Areas Subtotal	*0*	*12,340*	--
Stormwater BMPs	Reduce	Rainwater Harvesting Cistern	--	--	--
		Bioretention (No Underdrain, No Liner)	--	0	--
		Infiltration Trench	--	0	--
		Dry Well / Infiltration Gallery	--	--	--
		Bioretention Swale (No Underdrain)	--	0	--
		Permeable Pavement (No Underdrain)	--	0	--
		Permeable Pavement (Underdrain)	--	0	--
		Vegetated Roof	--	0	--
	Biotreat	Bioretention/FTP (Underdrain, No Liner)	--	0	--
		Bioretention/FTP (Underdrain, Liner)	--	5,024	--
		Bioretention Swale (Underdrain)	--	0	--
		Media Filter (pre-approval required)	--	0	--
		BMP Areas Subtotals	*0*	*5,024*	--
		Total Project Site Areas	***176,290***	***176,290***	--

BMPs in Series

Are BMPs in Series Proposed?	No
First BMP in Series	
Receiving BMP in Series	

STEP 3b - Enter stormwater BMP design information AND the conventional areas from Step 3a that drain to each BMP.

		Drainage Areas		BMP Depths and Volumes					Outlet Design	
		Impervious Area Draining to BMP (ft^2)	Pervious Area Draining to BMP (ft^2)	BMP Ponding Depth (ft)	BMP Media Depth (ft)	Gravel Storage Depth (ft)	Height of Underdrain Above Base (ft)	Storage Volume (gallons)	Outlet Diameter (in)	Approx. Drawdown Time (hrs)
Stormwater BMPs	Reduce	0	0	0.00	--	0.00	--	0	0.00	0 days
				0.5	1.50		--	0	--	0
				--	--	3.50	--	0	--	0
				0.0	--	3.50	--		--	0
		0	0	0.00	0.00	0.00	--	0	--	0
			0	--	--	1.00	--	0	--	0
			0	--	--	1.00	0.167	0	4	0.0
				--	0.5	--	--	0	4	0.0
	Biotreat			0.5	1.50		0.167	0	4	0.0
		158,925	12,340	0.5	1.50	1.00	--	50,735	4	3.3
		0	0	0.00	0.00	0.00	0.00	0	0	0.0
		0	--	--	--	--	--	--	--	--
		158,925	*12,340*					*50,735*		

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #6	Date:	19-Sep-2016
Jurisdiction:	Port of San Francisco		
Total Project Site Area (ft^2):	176,290	The Sizing Calculator is not recommend for large or complex sites. See 'BMP Sizing Instructions' worksheet for site size restrictions.	
Impervious Area Created or Replaced (ft^2):	158,925		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 85th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 4 - Check that site and drainage management areas are entered correctly. (Note: MS4 = municipal separate storm sewer systems.)

Project Site Surfaces	Existing Area (ft^2)	Proposed Area (ft^2)	% of Total Project Area	CHECK OF AREAS
Impervious Area Draining to BMP	0	158,925	90%	**OK**
Impervious Area Draining Directly to MS4	176,290	0	0%	
Pervious Area Draining to BMP	0	12,340	7%	**OK**
Pervious Area Draining Directly to MS4	0	0	0%	
BMP Area	0	5,024	3%	
Total Area	176,290	176,290		**OK**

STEP 5 - Check if the performance requirements are met. If not, review stormwater BMP performance output in Step 7, then return to Step 3 to adjust stormwater strategies.

Rain Event	Runoff Volume Requiring Treatment (ft^3)	TREATED Volume Captured & Treated (ft^3)	UNTREATED Volume of BMP Overflow (ft^3)	UNTREATED Vol from Imperv Area Direct to Sewer (ft^3)	Percent of Treatment Volume Captured (%)	Requirement Met?
85th Percentile Rainfall Event	7475	7475	0	0	**100%**	**PASS**

STEP 6 - Review the table below to see how each BMP performs during the water quality design storm. The site's runoff hydrographs are shown in the "Rainfall and Hydrographs" tab.

For BMPs in Series Only

	Stormwater BMPs	Inflows	Outflows		Volume In	Volume Retained			Volume Out to MS4		Volume to Receiving BMP	
		Peak Flow to BMP (cfs)	Peak Rate of Discharged Flow (cfs)	Peak Rate of Overflow (cfs)	Total Runoff to BMP (ft^3)	Infiltration + E/T (ft^3)	Reuse (ft^3)	Volume Remaining in Storage (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)
Reduce	Rainwater Harvesting Cistern	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Bioretention (No Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Infiltration Trench	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Dry Well / Infiltration Gallery	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Bioretention Swale (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Permeable Pavement (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Permeable Pavement (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Vegetated Roof	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, Liner)	0.774	0.451	0.000	7475	449	0	0	7026	0	--	--
Biotreat	Bioretention Swale (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
	Media Filter	0.000	--	--	0			--			--	--
	Totals				***7,475***	***449***	***0***	***0***	***7,026***	***0***	***0***	***0***

*NOTE: With the exception of Cisterns, BMPs should not have any "**Volume Remaining In Storage**". There should also not be any "**Untreated**" runoff. Untreated volumes are indicated in the table by red font.*

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #7	Date:	19-Sep-2016
Jurisdiction:	SF Public Utilities Commission		
Total Project Site Area (ft^2):	5,850		
Impervious Area Created or Replaced (ft^2):	5,236		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 90th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 1 - Enter the site's infiltration characteristics

HSG Soil Type:	D
Is Infiltration Feasible or Proposed?	No
If No, Please Select Why:	High Groundwater
Measured Infiltration Rate (in/hr):	0.001
Infiltration Testing Method:	Not Conducted
Infiltration Rate Correction Factor:	0
Design Infiltration Rate (in/hr):	0.00

STEP 2 - Enter the site's runoff pathway information to estimate the Time of Concentration (Tc)

Means of Conveying Runoff to BMPs:	Overland
Ave. Site Slope in Direction of Flow (%):	1.0%
Maximum Flow Length (ft):	100
Pretreatment Conveyance Swale U/S of Bioretention?	No

STEP 3a - Enter the sites EXSITING and PROPOSED areas of impervious, pervious, and BMP surfaces.

		Surface Type	Existing (ft^2)	Proposed (ft^2)	Curve Number
Conventional Surfaces	Impervious	Pavement (Conventional)	5,850	5,236	98
		Roof (Conventional)	0	0	98
		Gravel on Soils	0	0	91
		Other:	0	0	
		Impervious Areas Subtotal	*5,850*	*5,236*	
	Pervious	Grass/Lawn	0	176	80
		Landscaping at Grade (Low Density) / SIA	0	0	77
		Landscaping at Grade (High Density)	0	0	73
		Tree Well	0	59	35
		Traditional Planter on Podium	0	176	74
		Other:	0	0	
		Pervious Areas Subtotal	*0*	*410*	--
Stormwater BMPs	Reduce	Rainwater Harvesting Cistern	--	--	--
		Bioretention (No Underdrain, No Liner)	--	0	--
		Infiltration Trench	--	0	--
		Dry Well / Infiltration Gallery	--	--	--
		Bioretention Swale (No Underdrain)	--	0	--
		Permeable Pavement (No Underdrain)	--	0	--
		Permeable Pavement (Underdrain)	--	0	--
		Vegetated Roof	--	0	--
	Biotreat	Bioretention/FTP (Underdrain, No Liner)	--	0	--
		Bioretention/FTP (Underdrain, Liner)	--	205	--
		Bioretention Swale (Underdrain)	--	0	--
		Media Filter (pre-approval required)	--	0	--
		BMP Areas Subtotals	*0*	*205*	--
		Total Project Site Areas	***5,850***	***5,850***	--

BMPs in Series

Are BMPs in Series Proposed?	No
First BMP in Series	
Receiving BMP in Series	

STEP 3b - Enter stormwater BMP design information AND the conventional areas from Step 3a that drain to each BMP.

		Drainage Areas		BMP Depths and Volumes					Outlet Design	
		Impervious Area Draining to BMP (ft^2)	Pervious Area Draining to BMP (ft^2)	BMP Ponding Depth (ft)	BMP Media Depth (ft)	Gravel Storage Depth (ft)	Height of Underdrain Above Base (ft)	Storage Volume (gallons)	Outlet Diameter (in)	Approx. Drawdown Time (hrs)
Stormwater BMPs	Reduce	0	0	0.00	--	0.00	--	0	0.00	0 days
				0.5	1.50		--	0	--	0
				--	--	3.50	--	0	--	0
				0.0	--	3.50	--		--	0
		0	0	0.00	0.00	0.00	--	0	--	0
			0	--	--	1.00	--	0	--	0
			0	--	--	1.00	0.167	0	4	0.0
				--	0.5	--	--	0	4	0.0
	Biotreat			0.5	1.50		0.167	0	4	0.0
		5,236	410	0.5	1.50	1.00	--	2,068	4	2.4
		0	0	0.00	0.00	0.00	0.00	0	0	0.0
		0	--	--	--	--	--	--	--	--
		5,236	*410*					*2,068*		

Version 2.0
May 2016

SAN FRANCISCO PUBLIC UTILITIES COMMISSION - URBAN WATERSHED MANAGEMENT PROGRAM

MS4 BMP SIZING CALCULATOR for WATER QUALITY

525 Golden Gate, 11th Floor
San Francisco, CA 94102

MS4 BMP SIZING CALCULATOR - *Only use for subwatersheds less than 2 acres, and sites less than 5 acres.*

Project Address:	Mission Rock Redevelopment	Applicant Name:	James Dallosta
Project Name (Alias):	Mission Rock Redevelopment	Company:	BKF Engineers
Subwatershed Name (if applicable):	Watershed #7	Date:	19-Sep-2016
Jurisdiction:	SF Public Utilities Commission		
Total Project Site Area (ft^2):	5,850		
Impervious Area Created or Replaced (ft^2):	5,236		

Project Requirement:

Project Size:	Large Project
Implement stormwater BMPs to capture and treat all impervious area runoff from rain events up to the 90th percentile event.	

LEGEND:

User Input
Default Value
Locked
Comment

STEP 4 - Check that site and drainage management areas are entered correctly. (Note: MS4 = municipal separate storm sewer systems.)

Project Site Surfaces	Existing Area (ft^2)	Proposed Area (ft^2)	% of Total Project Area	CHECK OF AREAS
Impervious Area Draining to BMP	0	5,236	90%	OK
Impervious Area Draining Directly to MS4	5,850	0	0%	
Pervious Area Draining to BMP	0	410	7%	OK
Pervious Area Draining Directly to MS4	0	0	0%	
BMP Area	0	205	4%	
Total Area	5,850	5,850		OK

STEP 5 - Check if the performance requirements are met. If not, review stormwater BMP performance output in Step 7, then return to Step 3 to adjust stormwater strategies.

Rain Event	Runoff Volume Requiring Treatment (ft^3)	TREATED Volume Captured & Treated (ft^3)	UNTREATED Volume of BMP Overflow (ft^3)	UNTREATED Vol from Imperv Area Direct to Sewer (ft^3)	Percent of Treatment Volume Captured (%)	Requirement Met?
90th Percentile Rainfall Event	303	303	0	0	100%	PASS

STEP 6 - Review the table below to see how each BMP performs during the water quality design storm. The site's runoff hydrographs are shown in the "Rainfall and Hydrographs" tab.

	Stormwater BMPs	Inflows	Outflows		Volume In	Volume Retained			Volume Out to MS4		For BMPs in Series Only: Volume to Receiving BMP	
		Peak Flow to BMP (cfs)	Peak Rate of Discharged Flow (cfs)	Peak Rate of Overflow (cfs)	Total Runoff to BMP (ft^3)	Infiltration + E/T (ft^3)	Reuse (ft^3)	Volume Remaining in Storage (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)	Detained Discharge Volume (ft^3)	Overflow Volume (ft^3)
Reduce	Rainwater Harvesting Cistern	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Bioretention (No Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Infiltration Trench	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Dry Well / Infiltration Gallery	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Bioretention Swale (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	0	0
Reduce	Permeable Pavement (No Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Permeable Pavement (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Reduce	Vegetated Roof	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, No Liner)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
Biotreat	Bioretention/FTP (Underdrain, Liner)	0.031	0.018	0.000	303	9	0	0	294	0	--	--
Biotreat	Bioretention Swale (Underdrain)	0.000	0.000	0.000	0	0	0	0	0	0	--	--
	Media Filter	0.000	--	--	0			--			--	--
	Totals				***303***	***9***	***0***	***0***	***294***	***0***	***0***	***0***

*NOTE: With the exception of Cisterns, BMPs should not have any "**Volume Remaining In Storage**". There should also not be any "**Untreated**" runoff. Untreated volumes are indicated in the table by red font.*

Version 2.0
May 2016

APPENDIX O

(NOT USED)

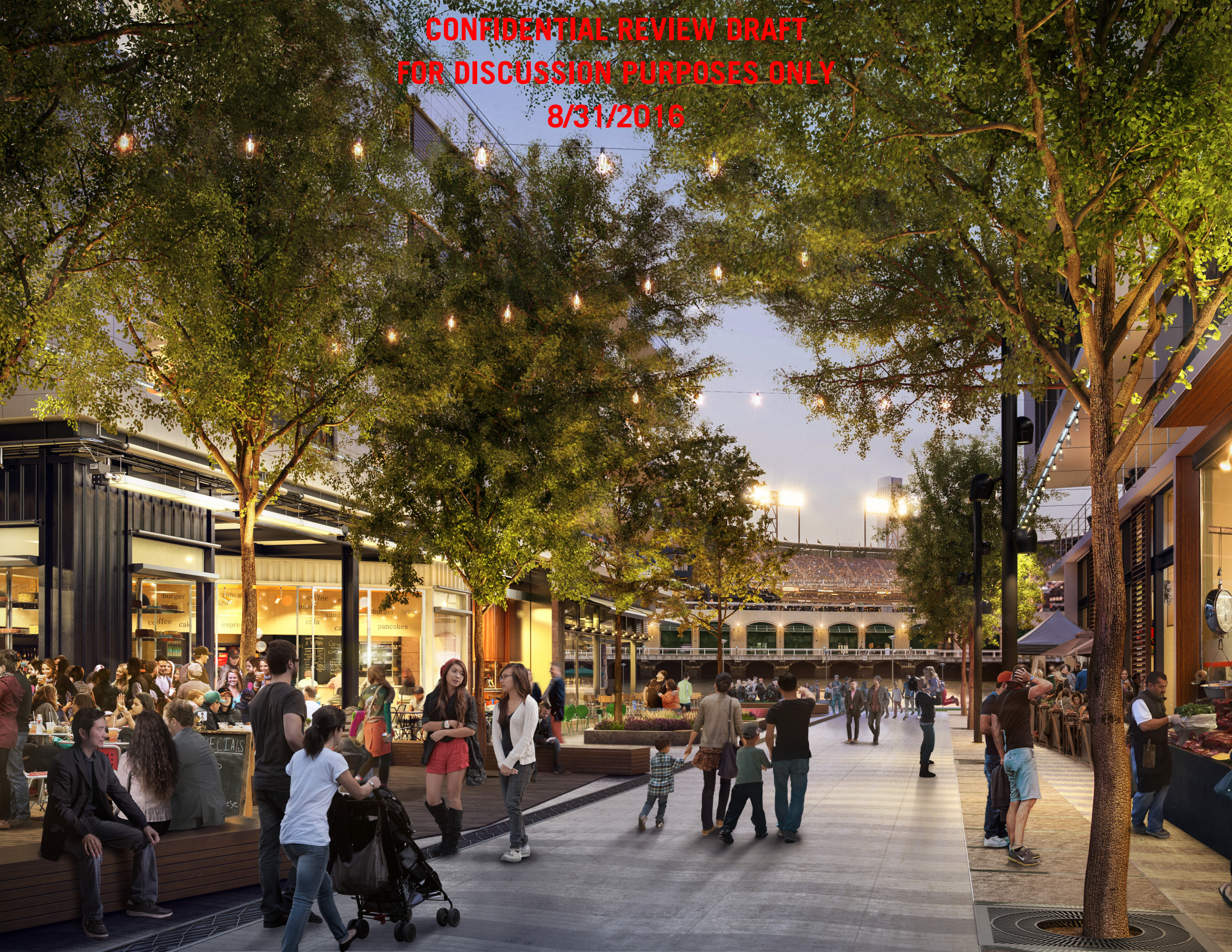
APPENDIX P

Transportation Plan
(by Nelson Nygaard)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

MISSION ROCK

TRANSPORTATION PLAN


CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

MISSION ROCK

TRANSPORTATION PLAN

1 I INTRODUCTION 1
1.1 OVERVIEW 2
1.2 GOALS 3
1.3 STRATEGIES 4

2 I PROJECT CONTEXT 7
2.1 TRENDS IN POLICY AND TRAVEL BEHAVIOR 8
2.2 NEARBY NETWORKS 11
2.3 TECHNOLOGY-BASED TRANSPORTATION 16

3 I GETTING AROUND AT MISSION ROCK 19
3.1 NON-MOTORIZED CIRCULATION 20
3.2 TRANSIT ACCESS 23
3.3 VEHICULAR CIRCULATION 24
3.4 CONCLUSIONS 28

4 I TRANSPORTATION DEMAND MANAGEMENT 29
4.1 PLANNED STRATEGIES 30
4.2 MARKETING AND COMMUNICATIONS 40
4.3 CONCLUSIONS 42

5 I EVENT MANAGEMENT 45
5.1 PRIMARY EVENTS 47
5.2 SECONDARY EVENTS 50
5.3 ON-SITE EVENTS 51
5.4 CONCLUSIONS 54

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

MISSION ROCK DESIGN DOCUMENTS

The Transportation Plan comprises the fourth in a set of five documents which together describe the requirements for the development of Mission Rock.

Mission Rock
VISION and DESIGN INTENT

This document contains the big picture thinking and aspirations that will guide the process for the design and implementation of Mission Rock.

Mission Rock
DESIGN CONTROLS (DC)

This document guides the development of the open spaces, streets, and buildings at Mission Rock. The DC ensures that the site will be developed in a way that is consistent with the vision as defined in the Mission Rock Vision and Design Intent document.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Mission Rock
SUSTAINABILITY STRATEGY

Targets for carbon reduction are outlined in the Sustainability Strategy. This document explains how the infrastructure, buildings, and community will work together to achieve these targets, in a way that is consistent with the DC.

Mission Rock
INFRASTRUCTURE PLAN

The design of the landscape, buildings, and sustainability strategies will be closely coordinated with the infrastructure planning at Mission Rock. This plan regulates the complex coordination of streets, utilities, and services.

Mission Rock
TRANSPORTATION PLAN

This plan describes the ways in which the site will be designed to support the mobility choices of all users, with a special emphasis on safe and comfortable conditions for pedestrians and cyclists.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

[THIS PAGE INTENTIONALLY LEFT BLANK]

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

1 INTRODUCTION

Located just steps from the center of the Bay Area's transportation system and along one of the premiere bicycle and pedestrian routes in the region, Mission Rock is poised to be a model for sustainable transportation. With a multitude of mobility choices built directly into the site's DNA, it will be one of the first true 21st Century developments in San Francisco.

Small, walkable blocks, wide sidewalks, and a diverse mix of uses will make it easy for those who live or work at Mission Rock to avoid traveling far to eat or shop for everyday necessities. A range of cycling facilities will ensure that cyclists of all ages and skill levels are comfortable navigating the site on two wheels. The opening of the Central Subway will mean frequent, rapid service to Market Street and downtown is just steps away via the T-Third Muni Metro line, and access to the Peninsula and South Bay is just a few minutes further at Caltrain's 4th and King Street terminal. Supplemented by a suite of services and incentives that will make it easy to choose any mode, this wide range of mobility options mean the site will truly be a good fit for any modern lifestyle.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

The site, aerial view from the northwest

1.1 OVERVIEW

This document details how Mission Rock will achieve this vision. It starts by laying out the elements of the project's context that make it an ideal fit for a moment in which San Franciscans are choosing to accomplish more and more each year by a range of modes (Chapter 2). It walks through plans for the design of the site's internal streets, describing how bikes, pedestrians, and vehicles will circulate through the site and connect to its surroundings (Chapter 3). Mission Rock is committed to a robust set of infrastructure investments and ongoing programs that will make it easy to choose modes that are sometimes harder to use like walking, biking, and taking transit, and Chapter 4 details the planned package of transportation demand management (TDM) programs. With AT&T Park just steps away from the site, event-related travel will have an important impact on circulation patterns. Chapter 5 walks through how circulation will be managed around events to help reduce impacts on residents and employees, both on the site and in the surrounding neighborhood.

Note that this document focuses on the site's transportation programs at full build-out. The *Infrastructure Plan* discusses how the project will be phased and implications for the site's physical infrastructure, including transportation.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

1.2 GOALS

Mission Rock aims to do the following through its transportation program:

1. Facilitate lifestyles that can comfortably avoid high levels of vehicle miles traveled (VMT) by providing a robust set of sustainable choices for movement to and from the site

2. Create a vibrant, pedestrian-oriented, and visually interesting public realm within the site

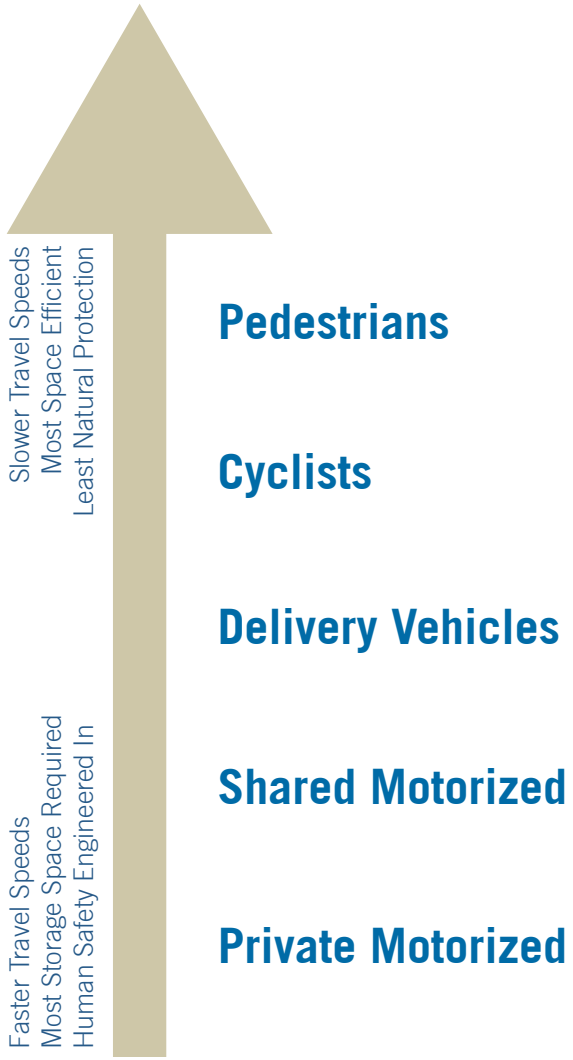
3. Connect seamlessly to the site's broader context, including the City's growing bike network and the Mission Bay neighborhood's developing network of streets and sidewalks

4. Ensure that the site is adaptable to new transportation technologies and changing travel habits over time

5. Play a productive role in the City's efforts to manage event-related travel

Bridgeview Street imagined

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016



A modal hierarchy for Mission Rock

1.3 STRATEGIES

The project will accomplish those goals through the following primary strategies:

- Prioritize movement on-site using a modal hierarchy that puts the focus on the most space-efficient and environmentally sustainable modes
- Encourage the use of higher-priority modes through convenience and meaningful incentives
- Design a highly connective street grid with generous and active pedestrian areas
- Allow for a diverse mix of uses that enables residents and employees to avoid long trips for daily necessities
- Design for safety through smart deployment of traffic calming strategies on internal streets
- Facilitate bike connectivity by adding an important link to City and regional bike networks through the site and providing safe and comfortable routing options for people of all cycling skill levels
- Create generous curb-side loading areas to:
  - Facilitate site access for people with mobility limitations and for families with small children
  - Facilitate the use of taxis and ride hail services, which can help obviate the need to bring a private automobile to the site
  - Help site users avoid vehicle trips by facilitating convenient delivery of goods
- Actively manage parking to ensure it is used efficiently as part of the larger multimodal network
- Work in concert with neighborhood groups to help in responsibly managing event-related travel

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

The figure on this page shows the site's urban street grid and mixed land-use plan. The site plan and approach to circulation are two key ingredients in making the transportation vision come to life.

Primary Land Uses

- Residential
- Commercial
- Flex (Residential or Commercial)
- Structured Parking
- Working Waterfront
- Open Space

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

[THIS PAGE INTENTIONALLY LEFT BLANK]

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

2 PROJECT CONTEXT

Mission Rock's location, mix of uses, density, and design approach are all consistent with regional trends in land use and transportation and supportive of Bay Area planning agencies' efforts to direct new housing toward urban infill locations near transit stations. The site's mix of uses, including residential, commercial, and retail, will make it easy for residents and employees to take care of most needs within a short walk, and the project's location will naturally facilitate the use of transit and other shared modes for longer-distance trips.

This chapter details the context into which Mission Rock fits. It looks at the broader trends and policy context, as well as the array of local transportation resources that will help make the site's sustainable, multimodal vision come to life.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

SFMTA has installed "red carpet" transit-only treatments around the city in recent years (SFMTA)

Cycling rates have increased dramatically in recent years (FLICKR USER RICHARD MASONER)

2.1 TRENDS IN POLICY AND TRAVEL BEHAVIOR

Mission Rock fits into a larger context of city, regional, and state policy encouraging transit-oriented mixed-use development, as well as the emergence of new transportation options that are changing the way Bay Area residents travel to work and play. The project is poised to both take advantage of the new mobility options and further encourage these shifts.

2.1.1 STATE, REGIONAL, AND CITY POLICIES

Starting in 2006, the State of California began laying out a constellation of policies aimed at reducing the size of the state's ecological footprint. Assembly Bill (AB) 32, signed into law in 2006, required that the state reduce greenhouse gas emissions to 1990 levels by 2020, a 15 percent reduction relative to expected trends. Senate Bill (SB) 375 was the first major policy aimed at implementing AB 32. It required that each major region in the state create a "sustainable communities strategy" that would use a combination of land use and transportation planning to create more sustainable development patterns.

Plan Bay Area is this Bay Area's sustainable communities strategy, and concentrating growth around the existing transit system is a key pillar of the plan. The plan identified Priority Development Areas with strong transit access and higher existing densities, and Mission Rock sits along a major axis of priority development areas along the eastern edge of San Francisco.

Infill and transit-oriented development are the two most important strategies for developing in a more sustainable fashion. When projects are located in areas that are already developed, they generally allow their inhabitants to travel shorter distances to reach jobs, grocery stores, and other daily destinations. When located near existing transit networks, they make transit the default mobility option.

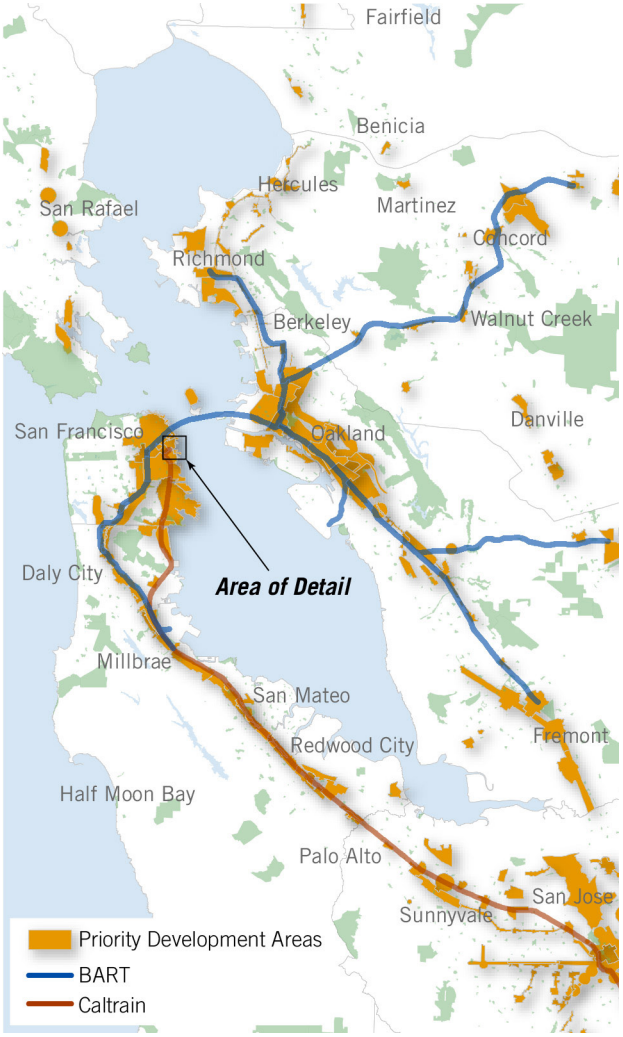
Infill development has long been a priority for the City of San Francisco, and the City has an array of policies aimed at aligning the transportation system to denser development patterns. Policies include the city's long-standing "transit first" policy, a 20% bicycle mode share goal, and a collection of recent policy changes – known as the Transportation Sustainability Program - that aim to further invest in transit, bike, and pedestrian network improvements, align the environmental review process with other city policies, and shift travel behavior toward non-motorized or shared modes. Mission Rock's transportation program is consistent with this approach.

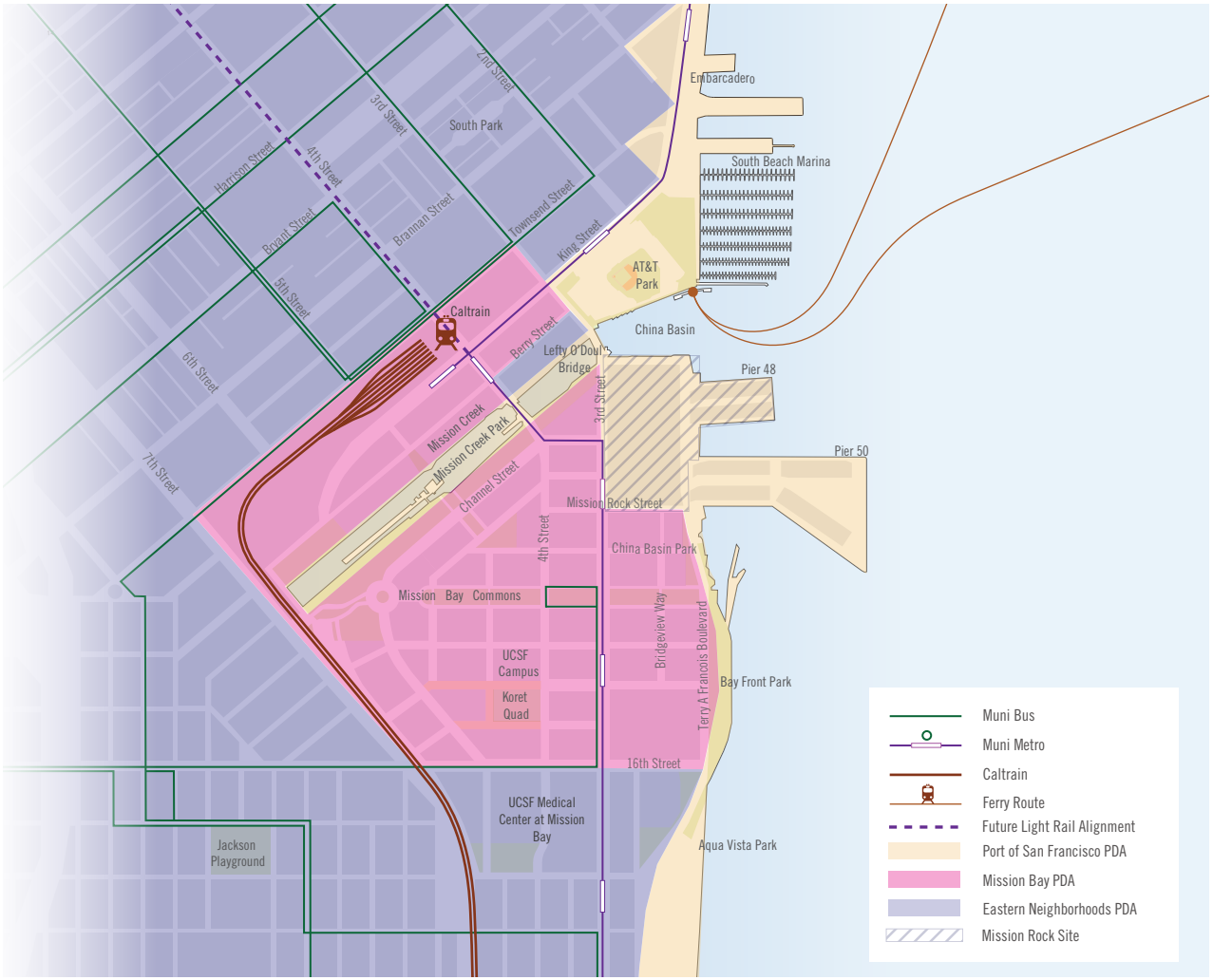
With these policies in the background, travel behavior in San Francisco seems to be steadily shifting toward transit and non-motorized modes, and the market for developments that enable transit-, bicycle-, and pedestrian-oriented lifestyles has strengthened. The last few years have seen increases in transit ridership (including record ridership levels on BART and Caltrain in recent years) and major increases in cycling, particularly for commutes.

2.1.2 THE IMPACT OF TECHNOLOGY

New technology-enabled travel options have also emerged, making it easier to routinely travel longer distances or make trips that do not align well to the transit network without

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

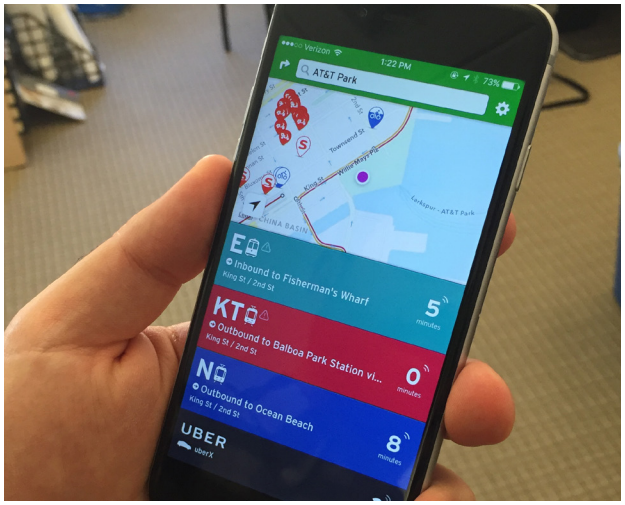




Plan Bay Area's Priority Development Areas (PDAs)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Google's autonomous vehicle prototype (WIKIMEDIA COMMONS, USER GRENDELKHAN)



Smartphones have revolutionized access to transportation information (NELSON\NYGAARD)

owning a car. Car share companies like Zipcar and City Car Share have made it easy to rent vehicles, stored conveniently in small pods across the city, for short periods. This allows people who do not own a car to conveniently accomplish errands that require hauling more than one can carry on transit or a bicycle. Transportation network companies (TNCs) like Uber and Lyft and taxi hailing apps like Flywheel have made it far easier and more convenient to hail rides for trips the transit system is less well set up to handle – across town or late at night.

These trends and the new suite of travel options seem to be affecting people's behavior. A recent study showed that newcomers to the city began taking advantage of them as they emerged, with nine in 10 net new households in the city since 2000 not owning an automobile, according to data from the U.S. Census Bureau.

2.1.3 THE FUTURE OF TRANSPORTATION

More dramatic changes could be in the offing. In the middle of 2016, several companies announced the first limited public use of autonomous vehicles, in Pittsburgh (Uber) and Singapore (nuTonomy). Google has been developing its own autonomous vehicles and testing them around its Mountain View headquarters for several years, and several other major Bay Area companies are also working hard – sometimes in partnership with more traditional auto companies – to develop their own models. When autonomous vehicles emerge in large numbers, the Bay Area is likely to be an area that adopts them quickly.

The precise effects self-driving cars will have on urban environments is unclear, given that the technology is still in the early stages of development. What is clear, though, is that they have the potential to dramatically change the way we get around, as the advent of motorized mobility did 100 years ago. Indeed, the emergence of automobiles in the early 1900s reshaped the economics and urban space needs of the transportation system.

If autonomous vehicles are used mainly as shared mobility resources, rather than privately held ones in the pattern of the vast majority of small vehicles today, they could lead to shifts like a major drop in parking demand and a major increase in the need for passenger loading space. Even if they emerge as privately owned mobility resources, though, the urban parking footprint is likely to go down. For example, if autonomous vehicles are able to communicate with each other while parking, they could theoretically squeeze together more efficiently, in much the same way as cars parked by valet can be lined up and parked in more narrow columns than can self-parked cars.

Mission Rock is set up to weather these changes well. As Chapter 3 describes, the site's curbs prioritize loading and delivery activities, which have already taken on increasing importance with growth in online shopping and, more recently, the earliest releases of new mobility technologies. The ways in which the site's transportation program has been shaped by its location will also help its design stay current in a world of changing mobility patterns. As detailed in the following sections, Mission Rock is located at the heart of the region's bicycle, pedestrian, transit, and roadway networks, giving future residents, employees, and visitors a wide range of natural options for getting around, even in the absence of new technologies.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

2.2 NEARBY NETWORKS

2.2.1 NON-MOTORIZED NETWORKS

2.2.1.1 Pedestrian

Most trips begin or end on foot, so safe and robust pedestrian space is the backbone of any high quality transportation system.

The Embarcadero, 3rd Street, and Fourth Street are the major pedestrian routes between Mission Rock and the jobs and transit connections in SoMa and Downtown San Francisco. Pedestrian facilities on the Embarcadero are wide and spacious, while sidewalks through SoMa are typically more narrow and less well maintained. The City's Central Corridor Plan aims to steadily improve pedestrian conditions as the area grows and changes in the coming years. Mission Bay's street network is also in the process of being built out. Once the area's development is complete, all streets in the area will have sidewalks on both sides that are six feet wide, and in many places 10 or 12 feet.

2.2.1.2 Bicycle

San Francisco continues to build bicycle lanes of various class distinctions throughout San Francisco as part of its implementation of the 2009 San Francisco Bicycle Plan. In Mission Bay, dedicated bicycle lanes exist on Terry A. Francois Boulevard, Fourth Street, and 16th Street. The facilities on Terry A. Francois Boulevard will soon be improved to a full two-way cycle track as part of the larger Blue Greenway plan, which aims to create a high quality bicycle and pedestrian route all along the San Francisco waterfront. New or improved bicycle facilities are slated for multiple streets running north to Market Street, including 2nd, 3rd, and 5th streets.

Mission Rock's connections to the broader bicycle network and planned routes

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Local transit connections

2.2.2 TRANSIT NETWORKS

Mission Rock is served by several local and regional transit networks within a half-mile walk, including bus, light rail, and commuter rail. More regional connections are available a bit further to the north, along Market Street, the Embarcadero and in eastern SoMa, where there are additional regional rail, bus, and ferry options.

2.2.2.1 Local Transit – Muni

Muni provides local transit service throughout San Francisco. The following Muni routes have stops within a quarter-mile of Mission Rock:

- **Light Rail** – N-Judah, T-Third, and E-Embarcadero
- **Bus** – 10-Townsend, 30-Stockton, 45-Union-Stockton, 47-Van Ness, 55-16th Street, 81X-Caltrain Express, 83X-Mid-Market Express

Notable investments and plans underway by SFMTA include:

- The **Central Subway** project will place the T-Third line in a subway along Fourth Street north of Bryant Street and along Stockton Street, extending it 1.7 miles north through the SoMa, Union Square, and Chinatown neighborhoods. This will provide a more direct connection between the Mission Bay neighborhood and BART at Powell Station, as well as transit-, job-, and destination-rich neighborhoods near and north of Market Street. The project is due to open to the public in 2019.
- **Muni Forward** is a comprehensive update to Muni routes and service plans. A subset of lines called the Rapid Network is receiving particular attention through the

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

project, including increases in service frequency and other improvements. Service along 16th Street, through the Mission and into Mission Bay, will see notable improvements through the project, including transit-only lanes, stop consolidation, transit signal priority, and additional transit bulbs and islands. An early Muni Forward improvement that directly affected Mission Bay was the implementation of the 55-16th Street bus, creating a direct connection between the BART station at 16th and Mission streets and the center of Mission Bay, at 3rd and Mission Bay Boulevard North. In several years, that route will be replaced by a re-routed 22-Fillmore, a trolley bus that provides crosstown connections along 16th Street through the Mission and north along Church and Fillmore streets to the Lower Height, Fillmore, Pacific Heights, and the Marina.

2.2.2.2 Regional Transit

Caltrain

Caltrain provides commuter rail service between San Francisco and the South Bay, with stops along the Peninsula, into San Jose and, during peak periods, south to Gilroy. Caltrain offers local, limited stop and "baby bullet" express routes which all serve San Francisco. Caltrain's northernmost station is located about a quarter mile from the Mission Rock site at the intersection of 4th and King streets in San Francisco and is the busiest in the Caltrain system.

Notable planned Caltrain investments include:

- **Caltrain electrification** will replace the existing diesel service with electrified service between San Francisco and San Jose by 2020, allowing for increased speeds and service levels along the Peninsula corridor. The electrification project will also accommodate shared use of the corridor by Caltrain and planned high-speed rail service.
- Caltrain's **Downtown Extension** would connect Caltrain to the new Transbay Transit Center. The alignment of the extension is still being determined and is among the items being advanced in the Planning Department's Railyard Alternatives and I-280 Boulevard Feasibility Study.

BART (Bay Area Rapid Transit)

BART provides regional transit service to the East Bay, Peninsula, and other parts of San Francisco. The closest stations to Mission Rock — Embarcadero and Montgomery — are a little more than one mile from the neighborhood. When it opens, the Central Subway will provide a rapid light rail connection between the site and Powell Station. BART is the region's rail spine, and it operates every 5 to 15 minutes on lines serving downtown San Francisco during the afternoon peak and every 20 minutes during non-peak times, including weekends.

Ferries

SF Bay Ferry (operated by the Water Emergency Transportation Authority, or WETA) and Golden Gate Ferry provide daily ferry service between the San Francisco Ferry Building and the North and East Bay. Aside from services at the San Francisco Ferry Building, the nearest terminal is currently just beyond AT&T Park's center field gate, where ferries provide service to and from home baseball games. WETA and the City are exploring the potential for a new

Caltrain (CALTRAIN)

SF Bay Ferry (FLICKR USER PHOCA2004)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Local street network

terminal in Mission Bay near 16th Street, though planning is in the very initial stages.

Transbay Transit Center: Regional Bus and High Speed Rail

The under-construction Transbay Transit Center is located approximately one mile northeast of Mission Rock and will be open by the time the development is built out. The Transit Center will provide bus connections to regional destinations, as well as access to Greyhound and Amtrak Thruway Connection buses. Once the Downtown Extension is complete, the center will also be the terminal for California High-Speed Rail and Caltrain.

2.2.3 VEHICULAR CIRCULATION AND PARKING

Mission Rock is located near the center of the Bay Area's auto network, providing easy access to the region's freeway system but also exposing drivers in the area to congestion resulting from the large number of daily trips to, from, and through northeast San Francisco.

2.2.3.1 Local Streets

Third, 4th, and 16th streets are the key arterials providing vehicular access to and from Mission Rock and the broader Mission Bay neighborhood. Lefty O'Doul Bridge is also a drawbridge that is used several times per day, causing traffic congestion at one of the key access/egress points for the site on 3rd Street. The bridge is a historic landmark for which major structural modification is not an option, though the city is planning to realign lanes traveling across the bridge

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

in the coming years to make space along its the eastern edge for bicycle and pedestrian facilities as part of the Blue Greenway.

2.2.3.2 Regional Connections

For connections to the region, ramps to Interstate-80 and access to the East Bay are located approximately a half mile north of the site, via 4th and 5th streets. Interstate 280 provides the main connection to the South Bay, and ramps are located less than a half mile of the site to the west, via King Street, or slightly further to the southwest, at Mariposa Street.

2.2.3.3 Parking

As of SFMTA's most recent parking inventory in 2011, the Mission Bay and the Central Waterfront area had approximately 7,000 off-street parking spaces, and SoMa had an additional 26,000 spaces. Many of the spaces in Mission Bay are reserved for the users of specific sites like University of California, San Francisco's hospital and medical campus, but a sizable share of the spaces in SoMa are in paid publicly accessible lots and garages. Parking supplies in that area have shrunk somewhat in recent years, as surface parking lots have been redeveloped.

Many streets in SoMa and Mission Bay also have on-street parking. A large share of the on-street parking in both neighborhoods is currently metered, with prices increasing for nearby special events.

Parking facilities near Mission Rock (2015)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

City Car Share (WIKIMEDIA COMMONS, USER MARIORDO)

Bay Area Bike Share (WIKIMEDIA COMMONS, USER MARIORDO)

2.3 TECHNOLOGY-BASED TRANSPORTATION

As noted earlier, technology-based transportation companies offering car share, bike share, and app-based ride hailing (e.g. Lyft and Uber) are changing the way people travel. These innovative services have enjoyed early and growing adoption by Bay Area residents, particularly San Franciscans, and they are widely available in the areas around the project.

Car-share has emerged as a strong mobility option for households without cars. Efforts to quantify the impacts of car sharing have found that car share members drive 40% fewer miles than the average driver and take 46% more public transit trips, 10% more bicycle trips, and 26% more walking trips. The average household reduces its vehicle ownership by 50% after joining a car-share service.

Bike share provides another short-term mobility option, offering hourly rental of bicycles. Unlike car share programs offered in San Francisco, bike share allows for one-way rentals. Bay Area Bike Share is poised to expand dramatically throughout San Francisco by the time Mission Rock opens, with a plan to expand to 7,000 bicycles by 2018.

Scooter sharing is another service that has emerged in San Francisco in recent years. Scoot offers $3 one-way rentals of its fleet of more than 400 small two- and four-wheeled vehicles. The two-wheelers travel as fast as 30 miles per hour, and the four-wheeled "mini-cars" travel 25 miles per hour. Users of the service find nearby vehicles and unlock them using the company's smartphone app.

TNCs like Lyft and Uber provide on-demand booking of one-way car trips via smart phone app, and have recently expanded to facilitate shared vehicle trips (through Lyft Line and UberPool).

The rest of the private transit market is an evolving landscape, consisting of long-distance employer shuttles, short-distance institutional and transportation management

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

association (TMA) shuttles, on-demand commuter shuttles, and other services.

Long-distance employer-sponsored shuttles currently make trips to many office campuses outside of San Francisco (e.g. technology companies in the South Bay). An SFMTA pilot that designates certain Muni bus stops for shuttle use is ongoing, but a stop consolidation policy requiring pick-up and drop-off at a more limited number of shuttle hubs is currently under consideration by the City of San Francisco. As such, the future of these services is unclear.

There are a number of **short-distance shuttles** in operation in the project area. Currently, the Mission Bay TMA operates five routes from Mission Bay to Market Street and points throughout SoMa. Most of the routes operate only during peak periods Monday through Friday. Several companies also offer shuttle service within San Francisco. For example, Levi's operates a shuttle between Caltrain and BART stations and the company's headquarters in Levi's Plaza.

Chariot, which operates **on-demand commuter shuttles** using 14-passenger vans, operated 28 routes during the morning and evening commute periods as of July 2016. The service utilizes white curb loading zones for passenger drop-off and pick-up. Chariot recently expanded many of its routes and now serves points in the South Bay and East Bay, in addition to intra-San Francisco routes.

Two **water taxi** companies currently run limited service between points along the Bay, including the San Francisco Ferry Building. Over time, water taxi operations may expand with growing demand, and there is potential for a landing at Pier 48 and, outside winter, at AT&T Park's ferry dock.

These evolving transportation services provide people in San Francisco with new options to move around the city and the region, further supporting a multimodal lifestyle not dependent upon ownership or use of a private vehicle.

Scoot (FLICKR USER MARTIN WICHARY)

Water taxi service in Chicago (FLICKR USER LUKE GORDON)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

[THIS PAGE INTENTIONALLY LEFT BLANK]

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

3 GETTING AROUND AT MISSION ROCK

Mission Rock will be designed to give all users high quality choices for how they move about the site and how they get to and from it. The site will feature generous and active pedestrian areas throughout, and the bicycle network will give cyclists of different ages and skill levels high quality options. Wide sidewalks and wayfinding will help people find the variety of nearby transit options, and Mission Rock's entire street grid will provide comfortable access to the waterfront and, at Pier 48, a variety of water transportation options as well.

This chapter expands on these ideas, laying out the vision for how people will get around Mission Rock. Note that the project's *Design Controls* go into more detail on dimensions and materials.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Tabletop intersections bring the street to sidewalk level for crossings and naturally slow cars down (WIKIMEDIA COMMONS, USER PICASDRE)

Bulbouts (also known as curb extensions) narrow streets at pedestrian crossings to slow traffic and make pedestrians more visible (WIKIMEDIA COMMONS, USER THISISBOSSI)

3.1 NON-MOTORIZED CIRCULATION

Mission Rock's streets will be designed with the site's modal hierarchy in mind, prioritizing the safe and comfortable movement of pedestrians. They will include a variety of features that will help ensure that pedestrians feel safe and comfortable moving throughout the site by keeping vehicle speeds slow and ensuring that those on foot or on bicycles are highly visible to motorists.

All crossings will be marked using high visibility paint and other treatments, as specified in the *Design Controls*. Some will be reinforced by bulbouts that bring curbs to the edge of travel lanes, shortening crossing distances and making pedestrians who are readying to cross more visible to drivers. At others, "tabletop" treatments will bring the roadway to sidewalk level and change paving materials through intersections. The changes in grade and visual treatment have been shown to make motorists instinctively slow down through these sensitive zones.

On the site's curbed streets, a combination of street furnishings, lighting treatments, and generous sidewalks will make pedestrian space vibrant, inviting, and comfortable even when pedestrian volumes are higher before and after events. Lighting will be at a pedestrian scale, and furnishings like benches and planters will create variety and a sense of protection from vehicle flows between the curbs. All three north-south streets will transition seamlessly into China Basin Park via vehicle-free zones at their northern ends.

3.1.1 SHARED STREETS

Shared streets, in which all modes mix across the entire street cross-section, will form the backbone of north-south pedestrian circulation, strategically placed along key paths of travel. These streets will be curbless, following street design approaches seen in Europe along key walking corridors and high streets. Visual and tactile cues like changes in the color or texture of pavers, bollards, street furniture, light fixtures, plantings, and tactile warning strips will differentiate between areas dedicated to pedestrian movement and areas shared by pedestrians, bicycles, and vehicles. These types of streets are somewhat rare in San Francisco, but the Mission Rock team has worked closely with the City to design the streets in a way that works with local norms and regulations. The *Design Controls* document describes the design of these streets in more detail.

The Shared Public Way will be a key retail corridor through the site, creating a vibrant connection between AT&T Park to the north and the ballpark's main parking facility at the southern end of Mission Rock. Lined with ground-floor shops and cafes, the street will feature patio seating and displays that extend the ground-floor uses into the right-of-way, creating "street rooms" that invite people to stroll and linger. The street will only allow northbound vehicle movement, and entrances to the zone will feature signs and other visual cues to make clear that vehicle access is for drop-off, pick-up, and deliveries only.

Terry A. Francois Boulevard, along the eastern edge of the site, will be a slightly different shared street, mixing the area's maritime history with a newer identity as a place where people come together for all kinds of activities. The boulevard will feature a slow two-way, plaza-like shared zone for all modes between wide zones reserved for

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

walking, biking, and loading. The Blue Greenway will extend through the site on the east side of the street, and the west side will allow pedestrian and loading access to ground-floor maker spaces, which will be raised slightly above street level in an ode to traditional industrial and warehouse building vocabulary.

3.1.2 BICYCLE FACILITIES AND CIRCULATION

In keeping with the rest of the transportation program, Mission Rock's approach to bicycle circulation is about providing choices, with facilities designed for leisurely riders along the waterfront and higher speed facilities along more direct routes to SoMa, Downtown, and other points north of the site.

Even in cities with higher rates of bicycle commuting like San Francisco, researchers estimate that a considerable number of additional people might consider cycling if there were a network of slower, more protected facilities that made them feel safe and comfortable while riding. Mission Rock will provide routes to and through the site that speak to this need, and these facilities will connect to a large and growing network of bicycle facilities in the surrounding area.

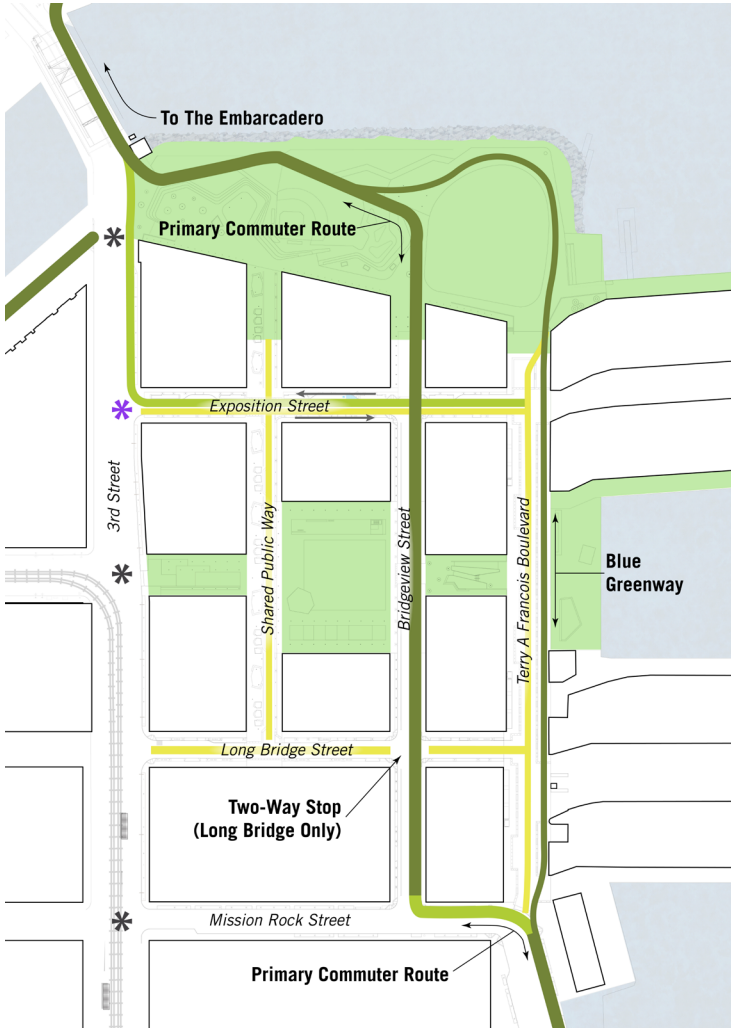
The Blue Greenway's connection through the site will provide a comfortable route for cyclists of all ages. Visual cues at north and south gateways to the multi-use path will encourage slower bicycle speeds, opening space for younger and older cyclists, as well as pedestrians.

A cycle track route along Bridgeview Street will provide a higher speed connection between the Embarcadero and points south of the site for commuters and more

Shared Public Way, the shared street that will serve as the primary north-south pedestrian route through the site

Terry A. Francois Boulevard, another shared street, will have a more maritime-industrial character

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016



Bicycle circulation concept

experienced cyclists. A green-painted two-way track protected by curbs or another buffering approach will clearly reserve a piece of the right-of-way for cyclists. A two-way stop will control cross-traffic on Long Bridge Street to enable a faster and smoother ride for north- and south-bound cyclists. The cycle track will be raised through the intersection or given another type of traffic calming treatment to slow cars turning east off Bridgeview, through the cycle track. To connect to high quality bicycle facilities planned for Lefty O'Doul Bridge and the Embarcadero, the route will rejoin the Blue Greenway in China Basin Park. Northbound cyclists will be able to bypass the park via a painted bicycle lane along Exposition and 3rd streets.

The *Design Controls* document contains more detail on the planned design of these facilities. That document will be updated as the design team works with the City to ensure that bicycle facilities on the site connect seamlessly with improved facilities north and south of the site, to be implemented in the next several years.

For cyclists with destinations in Mission Rock, the site will provide a variety of bicycle storage options, including a network of spaces in public areas and conveniently located secure spaces inside the site's residential and office buildings. The project team anticipates that Bay Area Bike Share will provide at least one bike share pod on the site, connecting to the much expanded bike share network that is expected to hit streets in 2017.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

3.2 TRANSIT ACCESS

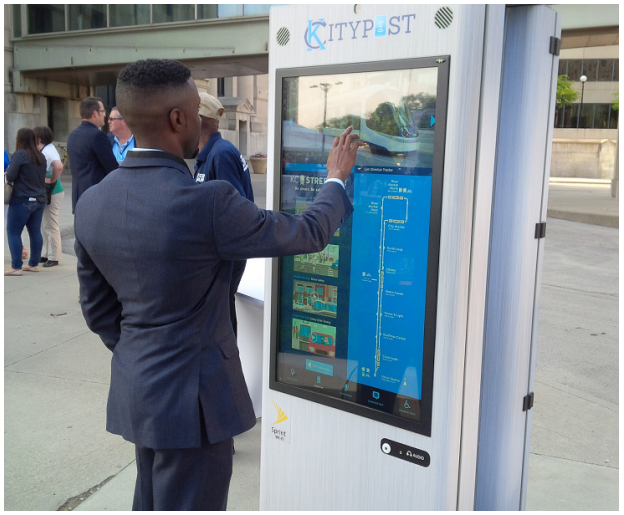
The Mission Rock site offers close, comfortable connections to several of fast, high frequency, and high capacity transit options. By the time Mission Rock opens for occupancy, the T-Third Muni light rail line will have begun providing quick access to Market Street via 4th Street and the Central Subway. Caltrain's San Francisco terminal is located less than a half mile from the site, and BART will be a short one-mile walk or quick T-Third ride away. Bay Area Bike Share will also provide a fast and convenient way to get to transit nodes like Market Street's subway stations and the Transbay Terminal, and the Mission Bay Shuttle may also provide additional service to these key hubs.

The project team will implement a multi-pronged signage and wayfinding strategy to ensure that residents, employees, and visitors understand just how convenient it is to access these high quality mobility options. Outdoor static wayfinding will show basic directions and distances to nearby transit stops, and interactive information kiosks in key places on the site will provide access to more specific directions and real-time transit service information. For residents and employees, a Mission Rock website and screens in building lobbies will both show real-time transit information.

Elements of the site's transportation demand management program will also encourage transit use. See Chapter 4 and the Mission Rock *TDM Strategy* for more information on transit-supportive programs and incentives.

Wayfinding signage in Amsterdam (FLICKR, ANDREY KARMATSKY)

Transit screens set up in an office lobby (TRANSITSCREEN.COM)



Interactive information kiosk (USDOT)

Directional wayfinding to transit (FLICKR, CHRIS HEATHCOTE)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Projected passenger loading circulation patterns and loading zones

3.3 VEHICULAR CIRCULATION

Mission Rock's street network will be dense, highly connective, and strongly tied into its surroundings. The interior street grid will link up with the developing Mission Bay street network at several points, continuing east-west and north-south streets that currently dead-end at the edges of the project site. Bridgeview Way, which today runs between South Street and the southern border of the project site at Mission Rock Street, will continue as Bridgeview Street through the site to China Basin Park. Long Bridge Street, which today links Third and Fourth Streets will extend to the waterfront at Terry A. Francois Boulevard.

Most vehicles will enter the site from 3rd Street, the main north-south vehicular route through Mission Bay. The figures on this page show estimated typical vehicle flows through the site at peak periods, extrapolated from traffic modeling done for the Transportation Impact Assessment. With the site's major garage located near the southwestern corner of the project site, most private vehicle traffic should stay at the southern and western edges of the site.

Vehicular circulation through the rest of the site should mostly consist of delivery vehicles and cars dropping off or picking up passengers. With the only major parking facility located at the southern end of the site, most private vehicles are expected to stay along the edges.

As specified in the *Design Controls*, passenger loading spaces on the Shared Public Way, Bridgeview Street, and Terry A. Francois Boulevard each have curb conditions that meet the standards of the Americans with Disabilities Act, for pick-up and drop-off of passengers with mobility limitations.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

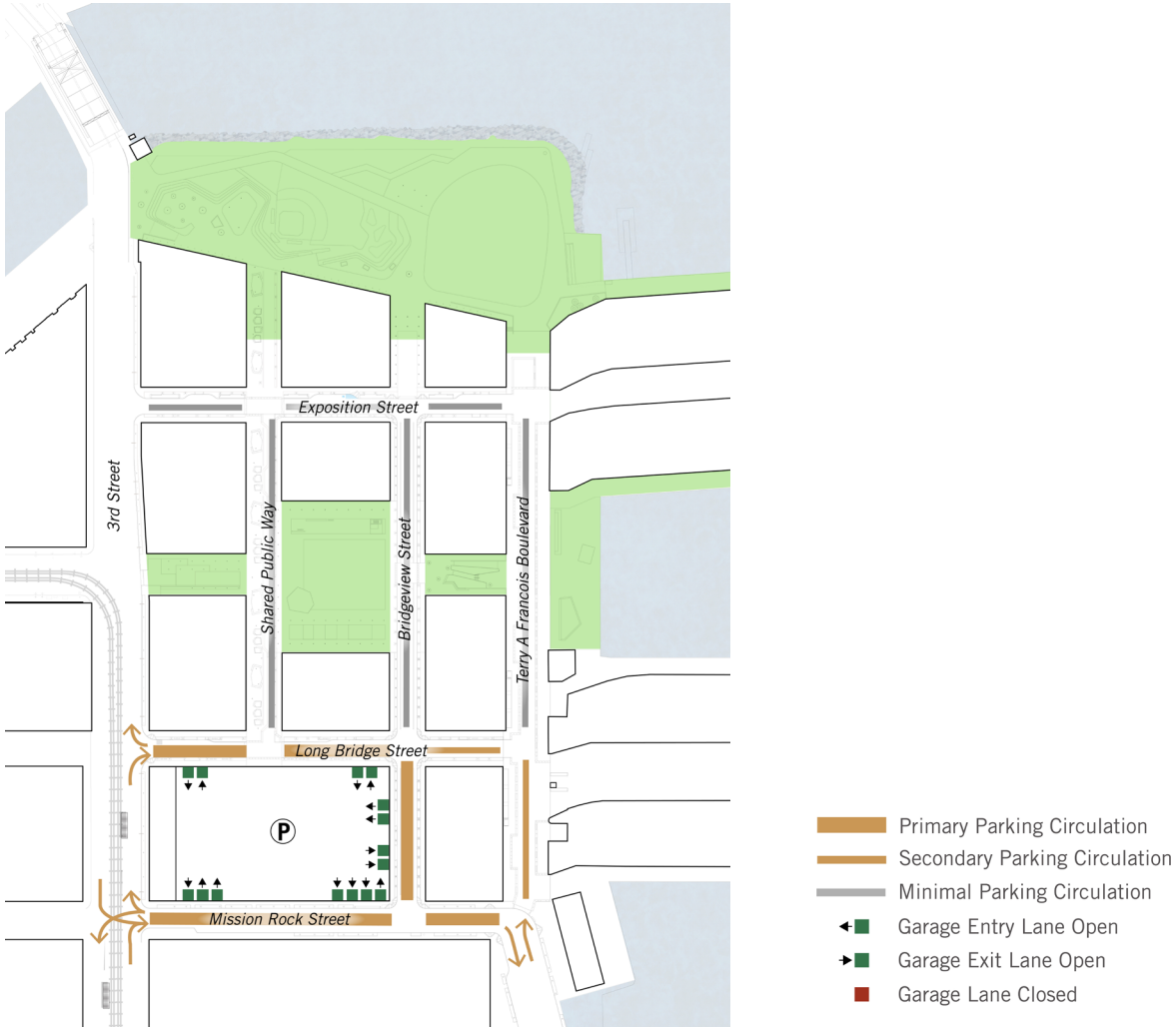
During specified hours, parcel delivery will be concentrated around other loading zones on Exposition and Long Bridge streets and Terry A. Francois Boulevard. Outside of those hours, these spaces would open up to use by private cars picking up and dropping off passengers and for-hire passenger vehicles like taxis and TNCs.

The shared streets – Shared Public Way and Terry A. Francois Boulevard – are expected to see very low traffic volumes, consisting mainly of loading for passengers with mobility limitations. "Traffic calming" treatments like changes in paving materials and changes in roadway grades will help ensure that volumes and speeds stay low (see the *Design Controls* for more detail). Channel Lane and Channel Street will each be closed to vehicle traffic.

3.3.1 INTERSECTION CONTROLS

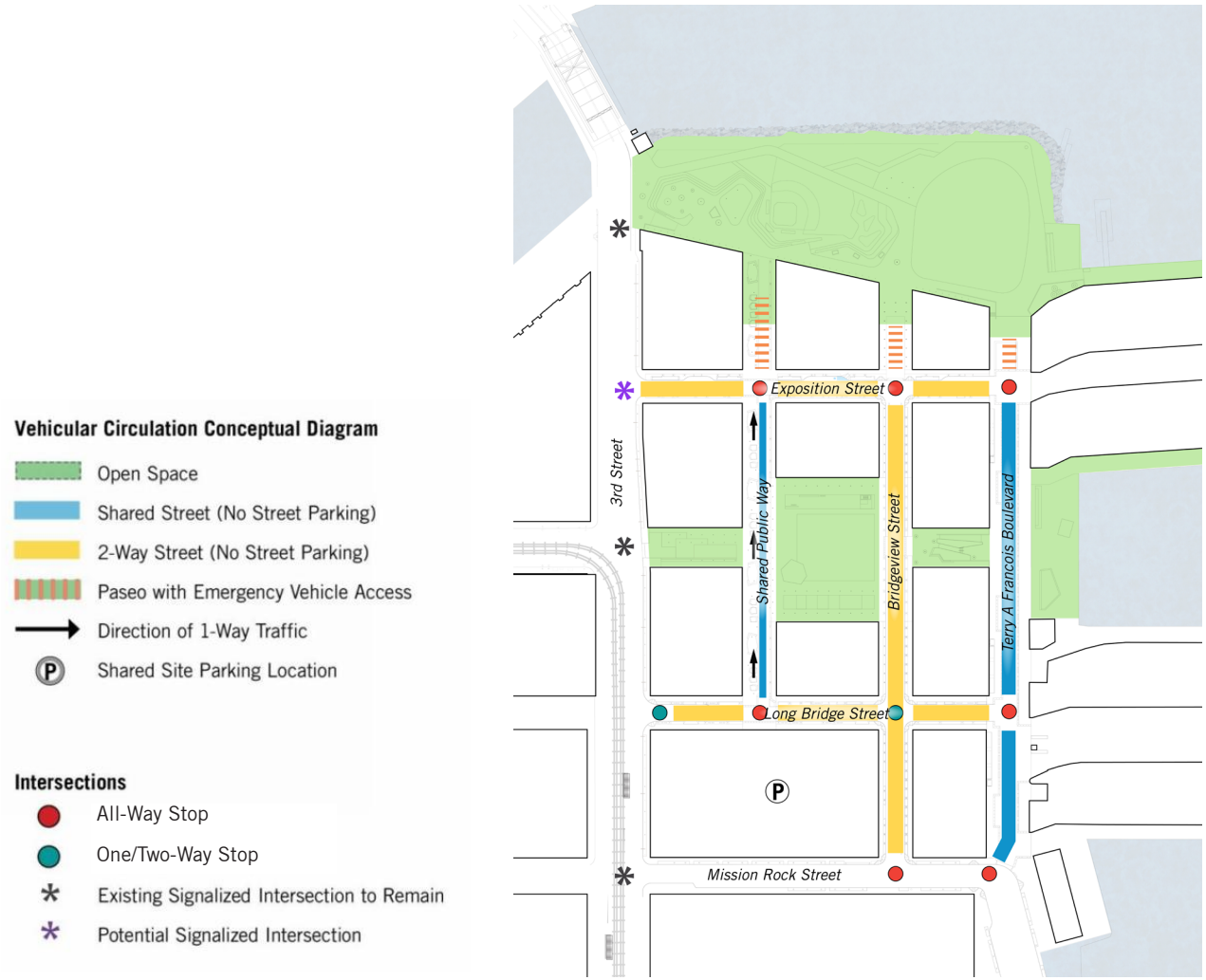
Most internal intersections will be controlled by all-way stop signs. As noted earlier, one intersection along Bridgeview Street will only stop cross traffic on Long Bridge Street to allow for smooth and efficient cycling along the route.

Mission Rock Street's interface with 3rd Street will be controlled by traffic signals, as it is today. A signal that currently controls the intersection of 3rd Street and Terry A. Francois Boulevard and halts traffic when Lefty O'Doul Bridge is raised for boat traffic entering Mission Creek is anticipated to remain where it is, allowing for signalized control of what will be an important pedestrian and bicycle connection between China Basin Park and a linear park on the west side of 3rd Street. An additional signal is anticipated at the intersection of 3rd and Exposition streets. The exact



Projected parking-related circulation patterns and garage access control plan

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016



Proposed intersection control plan

sequence of signals along 3rd Street will be determined in a future phase of project development, in close coordination with the San Francisco Municipal Transportation Agency and the Department of Public Works.

In keeping with the way major entries and exits from AT&T Park's main parking lot are managed before and after events today, intersections around the site's parking garage will likely be controlled by traffic control personnel (also known as parking control officers, or PCOs) before and after events. See Chapter 5 for more on traffic control before and after major events.

3.3.2 PARKING

Strategic parking management is a cornerstone of the Mission Rock transportation program. A parking garage on the site's southwestern parcel will be the site's main parking facility, with space for 2,300 to 3,000 vehicles. The garage will be used to serve the needs of both users of Mission Rock and users of AT&T Park, replacing the surface parking lot that currently covers the entire site.

The garage will be managed around major AT&T Park events in much the same way as the surface lot is today: To ensure that there is adequate space available for event attendees, prices will be raised around event times to incentivize regular users to clear the garage. When there is not an AT&T Park event on the calendar, available capacity in the facility could serve the needs of some users of Chase Center (the Golden

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

State Warriors' planned arena and event center at 16th and 3rd streets) as well.

Outside of event times, all parking at Mission Rock will be a resource shared flexibly by all of the users of the site. This arrangement is an alternative to the traditional suburban model of requiring that a certain number of spaces be reserved for each individual use (i.e. office, residential, retail, or restaurant), with enough to accommodate each use's estimated peak demand. Sharing allows a more limited number of spaces to go further by taking advantage of the fact that different uses have different peak periods. For example, peak demand for parking related to office uses tends to take place in the late morning or early afternoon, while peak demand for residential uses is typically overnight. One set of parking spaces can serve both needs. The figures at the right illustrate how this approach to parking management typically results in the need for fewer spaces.

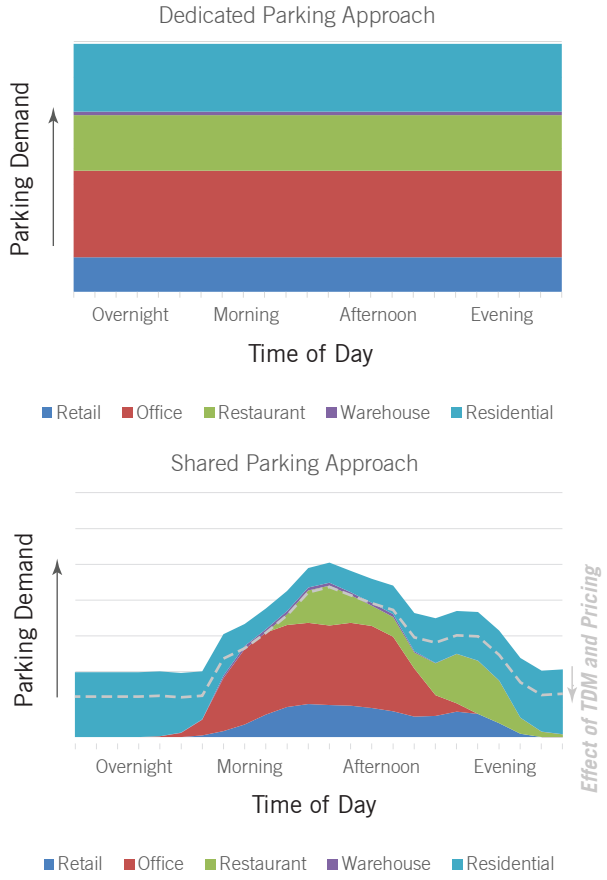
While most spaces will be designed for a typical self-park arrangement, with parking stall widths of eight to nine feet and vehicle circulation lanes, a portion of the spaces for long-term users could be in more space-efficient vehicle stackers. Between 50 and 100 of the vehicle spaces will also be reserved for car share and scooter share vehicles (see additional information about vehicle sharing programs in Chapter 4).

3.3.2.1 Parking Pricing

The price of parking has been shown to be a highly effective mechanism in changing parking and travel behavior. Parking prices at Mission Rock will be set according to levels of demand: During times with higher levels of typical demand, parking might have a higher price, encouraging the use of other modes. Prices would not change in real time based on current occupancy, but might be adjusted overall a few times a year based on recent occupancy data. Prices might automatically increase by a pre-set amount during peak periods, based on typical demand patterns, or for scheduled events.

Given the project's desire to encourage people to the most sustainable mode that fits their lifestyle, hourly, daily, and monthly parking prices will be set based on market prices in the surrounding neighborhood. Disseminating pricing and availability information is critical to ensuring that users are able to change behavior in response to changes in price. Real-time parking information will be shared in a variety of ways, including the Mission Rock website and dynamic signs at entrances to the site.

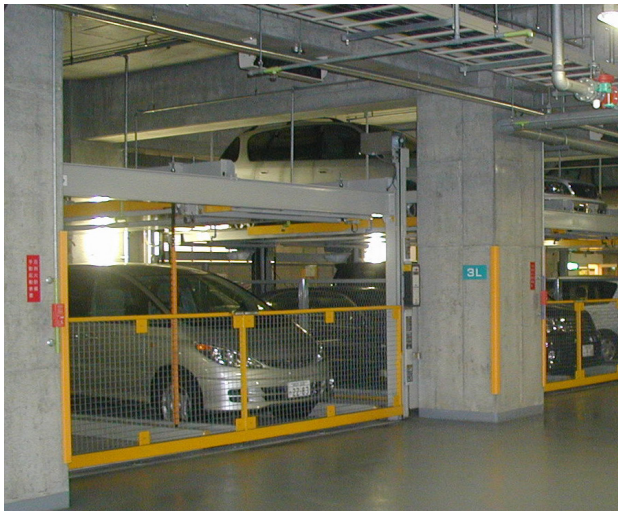
The price of parking at Mission Rock will be unbundled from residential and commercial leases, which means parking will not be included in rental agreements by default – residents and employees will need to purchase a daily or monthly parking permit separately. This approach is in-line with City of San Francisco policy and ensures that site users who do not own a car or do not plan to commute to the site by single-occupancy vehicle are not burdened with the price of parking they do not plan to use.



These figures illustrate how the concept of shared parking often results in reduced parking supplies overall. Because different uses see peak demand at different times, the total parking needed at any given time in a shared arrangement can be as much as one third less than what would be needed if each use had to accommodate peak demand separately. Pricing and TDM can reduce demand further.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Dynamic parking information board (NELSON\NYGAARD)



Car stacker (SAEPARKINGSOLUTIONS.COM.AU)

3.3.3 EMERGENCY ACCESS

All of Mission Rock's streets have been designed to provide appropriate clearance for emergency vehicles like large fire trucks. Corners have also been designed to accommodate the turning needs of large vehicles. The site's highly connective street grid will help facilitate emergency access to all of the site's buildings. Streets closed to general vehicle traffic will be made accessible to emergency vehicles as needed. The *Infrastructure Plan* contains further detail on the streets' technical specifications that allow for the safe circulation of emergency and other larger vehicles.

Mission Rock's design reflects the future of transportation in San Francisco. More and more, people count on having convenient access to several ways of getting around, and Mission Rock provides comfortable facilities for all kinds of lifestyles. Mission Rock is designed to be safe and comfortable to pedestrians and cyclists, to create easy paths of access to the wealth of nearby public transit options, and to ensure that those who rely on motorized transportation can be dropped off or picked up in convenient locations around the site.

3.4 CONCLUSIONS

Of course, circulation infrastructure is only part of the program. The next chapter details the strategies and up-front investments that will help further incentivize the use of sustainable, space-efficient modes of transportation.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

4 TRANSPORTATION DEMAND MANAGEMENT

Mission Rock's transit-rich context and its bicycle and pedestrian-oriented approach make the site a prime candidate for robust and effective transportation demand management (TDM). This chapter describes a comprehensive TDM program that will enable Mission Rock to actively manage travel demand through a variety of up-front infrastructure investments and ongoing programs. Ultimately, a robust TDM program will reinforce Mission Rock's forward-thinking vision and its aspirations to be an active and vibrant district that is inclusive and safe for all users.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Strategy Type	Up-Front Investments	Ongoing Investments
4.1.1 Transit	*4.1.1.1 Real-Time Transit Information and Marketing Screens*	*4.1.1.1 Dynamic Transportation Information* *4.1.1.2 Clipper Cards*
4.1.2 Bicycle	*4.1.2.2 Bike Share Memberships* *4.1.2.3 Bicycle Community Programming* *4.1.2.7 Bicycle Valet*	*4.1.2.1 On-Site Bike Share* *4.1.2.4 Bicycle Resource Center* *4.1.2.5 Bicycle Parking* *4.1.2.6 Showers and Lockers*
4.1.3 Motorized Transport	*4.1.2.2 Scooter Share Memberships* *4.1.2.4 Car Share Memberships*	*4.1.2.1 On-Site Shared Scooters* *4.1.2.3 On-Site Car Share Parking Spaces*
4.1.4 Parking	*4.1.4.1 Parking Pricing* *4.1.4.3 Unbundled Parking*	*4.1.4.2 Real-time Parking Pricing and Availability Information*

4.1 PLANNED STRATEGIES

Cities and campuses alike have implemented TDM programs to reduce single-occupancy vehicle (SOV) travel and find the optimal balance of transportation modes to accommodate growth. New residents and office tenants increasingly demand convenient access to quality multimodal infrastructure, and in urban areas like San Francisco, they assume that parking will be treated as a limited commodity that will be priced based on occupancy levels and market rates. The Mission Rock TDM Strategy is in line with these expectations and exceeds them in important ways to maximize user satisfaction and foster travel choices that are sustainable in all senses of the word.

The Mission Rock TDM Plan consists of a package of cost-effective strategies that will work together to effect behavioral change. Strategies include incentives, programs, and infrastructure improvements, and they include many that have been successfully implemented in other mixed-use and urban environments.

The tables on this and the opposite page give an overview of the individual programs that comprise the site's overall TDM

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

strategy. The text that follows provides some information on these programs, but for more detail, see the *TDM Strategy* document. A few of these recommendations have also been directly integrated into the design of Mission Rock, as codified in the *Design Controls* and other design documents.

Note that TDM programs work together to reduce demand, providing users with a complete package of incentives and infrastructure that can allow them the flexibility to use the mode that makes the most sense for them on a given day. This is in-line with the overall approach to transportation at Mission Rock - providing a variety of high quality mobility choices.

The collection of programs has been thoughtfully crafted into the cohesive strategy outlined in this chapter and further detailed in the *TDM Strategy* document. While some TDM strategies like parking pricing have a more direct effect on travel behavior, others like facilitating delivery services play a more supportive role. Individual strategies would be unlikely to have the same impact in the absence of other strategies.

Strategy Type	Up-Front Investments	Ongoing Investments
4.1.5 Buildings	*4.1.5.1 In-Building Concierge Services* *4.1.5.2 Coordinated Delivery Services* *4.1.5.3 CSA Partnerships* *4.1.5.6 Childcare Services*	*4.1.5.4 Cold and Dry Delivery Storage Space* *4.1.5.5 Convenient Zones for Loading and Building Servicing* *4.1.5.6 Childcare Facilities* *4.1.5.7 Collaborative Work Space* *4.1.5.8 Elevator Design* *4.1.5.9 Affordable Housing*
4.1.6 All Areas	*4.1.6.2 Mobile-Friendly Mission Rock Transportation Website* *4.1.6.3 Site-wide transportation staff* *4.1.6.4 Mission Bay Transportation Management Association (TMA)*	*4.1.6.1 Signage and Wayfinding Across Modes* *4.1.6.5 Improved Walking Conditions*

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Real-time transit information in Seattle (FLICKR USER ORAN VIRIYINCY)

Bay Area Bike Share (FLICKR USER DAVID GOEHRING)

4.1.1 TRANSIT STRATEGIES

4.1.1.1 Real-time Transit Information and Marketing Screens

Dynamic transit information and transportation marketing to residents, employees, and visitors will be displayed on screens in building lobbies, or a similar approach will be used based on state-of-the-practice technology at the time of occupancy. Information will be also displayed in other high traffic areas, such as collaborative work spaces inside residential and office buildings around the site or childcare facility entrances. Making such information readily available can increase residents' awareness of local transit options and facilitate efficient trip planning.

4.1.1.2 Clipper Cards

Clipper Card pre-loaded with some cash value will be provided to all residents upon move-in, and business tenants will be required to offer employees the same. Clipper is the Bay Area's transit fare payment card and can be used on more than 20 of the region's transit agencies, including BART, Muni, and the ferries. Providing Clipper Cards upon move-in can increase residents' awareness of nearby transit options and increases the ease with which they can start using it. Clipper Cards can also be customized through a bulk purchase through the Metropolitan Transportation Commission, helping site users further associate Mission Rock with transit access.

Providing Clipper Cards could increase the ease of using transit for employees and residents who currently do not have Clipper. For individuals who already have cards, the one-time financial subsidy could help lower one barrier to increased transit use.

4.1.2 BICYCLE STRATEGIES

4.1.2.1 On-Site Bike Share

At least one high visibility space will be made available for a Bay Area Bike Share dock on site, with the possibility of additional docks depending on Bay Area Bike Share's intended Mission Bay expansion. Prominently located bike share docks can increase awareness of bike share as a viable transportation option while also facilitating use. Each bicycle dock would be provided and maintained by Bay Area Bike Share.

4.1.2.2 Bike Share Memberships

Bay Area Bike Share memberships will be offered to all residents upon move-in. Members of BABS can take free, unlimited 30-minute one-way bicycle rides between bike share stations.

Providing residents and employees with bike share memberships could help tenants with minimal experience cycling in San Francisco a low-cost and low-obligation opportunity to try cycling, and it would provide residents with a quick and easy way to get to the Transbay Transit Center and Market Street, for BART connections and a variety of other transit options and recreational activities.

4.1.2.3 Bicycle Community Programming

Through the site transportation staff, regular bicycle parties or happy hours for the bicycling community will be hosted at Mission Rock, potentially paired with gear giveaways. Bicycle-oriented programs and events encourage bicycling by raising public acceptance and support for non-motorized transportation and building connections between residents

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

who regularly bicycle, making biking a fun, social activity. Integrating bicycling into the social fabric of the Mission Rock community will raise the profile of bicycling as a viable mode of transportation and encourage people to try biking for a portion of trips.

4.1.2.4 Bicycle Resource Center

Bicycle maintenance spaces will be established near major secure bicycle parking areas with resources like a bicycle stand, a workbench, tools, and a basic repair kit. Bicycle resource centers can provide dedicated spaces for residents and employees to get information about bicycling as well as tools and parts for bicycle repairs and maintenance. These dedicated spaces contribute to social acceptance of bicycling and reduce one key barrier associated with owning a bicycle – concern about complications related to ongoing maintenance – by providing tools and parts through a vending machine at low prices.

This strategy will also include working to incorporate a bicycle store in the site retail plan and establishing a resource center containing a vending machine for bicycle parts, a "fix-it" work station with basic tools, and bicycle pumps somewhere else within the site at an easily accessible location.

4.1.2.5 Bicycle Parking

Given the importance of non-motorized transportation to the site's overall design concept, more bicycle parking will be provided than is required by San Francisco City Code. This will include secure Class I parking spaces in residential and office buildings and a network of Class II bicycle parking spaces throughout public areas.

Class I parking consists of secure long-term bicycle parking, including bicycle lockers, bicycle cages, and bicycle rooms. Class II bicycle parking refers to more short-term bicycle parking, including on-street bicycle racks. The site's location in a flat part of San Francisco and the numerous planned bicycle facilities through the site imply a strong potential for very high rates of bicycle usage, and this will be encouraged through easy access to ample, convenient bicycle parking. Bicycle parking facilities will also be available to accommodate various types of bicycles including those with cargo and trailer attachments.

There are several methods of providing secure (Class I) bicycle parking spaces for residents and employees. Bicycle cages can be placed at convenient locations within buildings, and bicycle owners who qualify can receive a key or access card to use the cages for a set period of time (e.g. during work hours). The access card can be the same as one used to access an elevator or parking garage. Public bicycle parking is often considered secure when it is situated in well-lit, highly visible areas.

4.1.2.6 Showers and Lockers

The site will meet the San Francisco Code requirement to provide shower and clothes locker facilities for tenants and employees in buildings with certain uses. Offices (including childcare, business services, and light manufacturing) that exceed 10,000 square feet must provide at least one shower and six clothes lockers; for facilities between 20,000 and 50,000 square feet, the building must provide two showers and 12 lockers. Those exceeding 50,000 square feet must provide four showers and 24 lockers. Retail sales and restaurants exceeding 25,000 square feet must also

Bicycle fix-it station (FLICKR USER JOE)

Bicycle room (Class I parking) (NELSON\NYGAARD)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

SF Bicycle Coalition bicycle valet AT&T Park (NELSON\ NYGAARD)

provide one shower and six clothes lockers; those exceeding 50,000 square feet must provide at least two showers and 12 lockers.

4.1.2.7 Bicycle Valet

Free bicycle valet services will be provided for on-site events. Complementing the bicycle parking available on a daily basis, bicycle valet services during special events can encourage people to travel to and from events by bicycle by eliminating the challenge of finding safe and convenient bicycle parking in an area crowded with event attendees. These services also raise public acceptance and support for non-motorized transportation by building connections with visitors.

4.1.3 MOTORIZED VEHICLE STRATEGIES

4.1.3.1 On-Site Shared Scooters

Off-street parking spaces will be reserved for 15 scooters and five quad vehicles (approximately six car parking spaces in total). Electric scooters are highly convenient in a dense urban environment and may have additional marketing value, given the cache scooters carry among certain population segments. One of the benefits of Scoot's network is the ability to travel point-to-point, instead of needing to return scooters to their point of origin. Scoot already has pods within a short walk of Mission Rock. The parking garage would accommodate space for a scooter dock, which the scooter share vendor would provide and maintain.

4.1.3.2 Electric Scooter Memberships

Pending a partnership with Scoot Networks, annual Scoot memberships will be offered to all new residents, and Scoot Networks could provide its scooter orientation on-site. Like a bike share membership, a scooter share membership could help establish new travel behavior patterns upon move-in. This strategy would entail forming a partnership with Scoot or another electric scooter share vendor to provide free memberships in exchange to reserving space for electric scooter parking on-site.

4.1.3.3 On-Site Car Share Parking Spaces

Designated car share spaces will be provided in the parking garage, with flexibility to increase over time in response to demand. The number of spaces provided will exceed the amount required by the San Francisco Zoning Code.

Research indicates that a single car-share vehicle can remove as many as 20 private cars from the transportation network. Spaces will be located in high-visibility parking spots within the parking garage, which will be publicly accessible. Clear exterior signage will increase these spaces' visibility and emphasize the convenience of car share. Depending on the car share vendor provided, additional partnerships with ChargePoint may be required to provide infrastructure for electric vehicle charging.

4.1.3.4 Car Share Memberships

First-year car share memberships will be offered to all households upon move in. Depending on specifics of agreements with car share vendors, membership fees could be reduced or waived and some rental credit could be provided. These memberships could help establish new behavioral patterns upon moving in. Pairing access to car sharing vehicles with car sharing memberships is also shown to be more effective than implementing one or the other on its own.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

4.1.4 PARKING STRATEGIES

4.1.4.1 Parking Pricing

The price of parking has been shown to be a highly effective mechanism in changing travel behavior, and as such, parking will be priced strategically at Mission Rock. During times of higher demand, parking could have a higher price, encouraging the use of other modes. Prices will not change in real time based on current occupancy, but instead might automatically increase by a pre-set amount during peak periods, based on typical demand patterns, or for scheduled events. Prices might be adjusted overall a few times a year based on recent occupancy data.

By refining the price of parking periodically, it would be possible to keep parking occupancy rates relatively close to the optimal level, typically around 90% for off-street parking. Researchers have found that parking facilities function efficiently (i.e. without requiring excessive parking-search time) up to roughly this level of occupancy. Demand-responsive pricing has been successfully piloted in San Francisco, Berkeley, Los Angeles, and other cities, and the AT&T Park lot on which Mission Rock will be built currently employs a form of this concept.

4.1.4.2 Real-Time Parking Pricing and Availability Information

Dynamic displays (or use another state-of-the-practice price-information sharing strategy) will be installed to show real-time parking price and availability information. This information will also be made available through other channels like a Mission Rock transportation website; this will require installing technology and associated information systems to automatically monitor parking usage. For market-based parking pricing to be truly effective, the dynamic between price and availability must be clearly communicated to drivers. Making such information readily available to potential drivers, particularly at parking garage entrances, decreases the likelihood of drivers' circling for parking or potentially increases the possibility of choosing other modes.

4.1.4.3 Unbundled Parking

Parking costs will be unbundled from all residential, commercial, and retail leases and ensure that the users of parking are the ones who ultimately pay for it. "Unbundling" parking means that the cost for parking is separate from the cost of residential and commercial units. It is an increasingly common practice in urban areas, and it is required in San Francisco. Thirty percent of San Francisco households do not own a vehicle, and unbundled parking makes housing more affordable those who do not need a parking space. This approach provides a financial reward to households who decide to dispense with one of their cars, and it can help attract households who wish to live in a transit-oriented neighborhood where it is possible to live well with only one car, or even no car, per household. Unbundling parking costs changes parking from a required purchase to an optional amenity, so that households can freely choose how many spaces they wish to lease.

Unbundling parking tends to reduce demand for parking by specifically calling out and making optional the previously hidden cost of "free" parking. This in turn allows developers to provide less parking, which increases the developable area for more lucrative land uses such as additional housing units. For this strategy to work optimally for office users, the

Car share spaces (NELSON\NYGAARD)

Parking pricing information sign (NELSON\NYGAARD)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

CSA box (FLICKR USER NIKI SUBLIME)

In-building concierge (FLICKR USER ALAN LIGHT)

users of parking – not their employers – must be the ones who ultimately pay daily or monthly costs.

4.1.5 BUILDING STRATEGIES

4.1.5.1 In-Building Concierge Services

The managers of individual buildings will be encouraged to appoint an in-building concierge to provide information about local merchants and coordinate/facilitate delivery services for residents. In-building concierge services and/or multi-purpose front-desk staff can facilitate valet parking, farm-to-table produce delivery, cold and dry storage for grocery or produce delivery, and secure package delivery. Concierge staff could also provide information about the nearest stores and services like dry cleaning and laundry service, as well as pickup/delivery services from local merchants. Residents would pay for all services.

The site-wide transportation staff would provide centralized transportation support to the in-building concierges. The combination of these services will provide targeted travel information, consolidating or eliminating the need for additional trips.

4.1.5.2 Coordinated Delivery Services

Site-wide partnerships with delivery service companies could be established, along with a centralized staging location for parcel delivery and a distribution system that relies on non-motorized transportation to deliver packages to the various buildings within the development. In the absence of an official partnership, ways of making ordering in more appealing instead of making separate trips off the property for daily needs would be facilitated, thus reducing vehicle trips in the process. One potential way to do this would be to offer direct ordering through the Mission Rock website. Each building would manage these services individually as needed.

4.1.5.3 Community-Supported Agriculture Partnerships

Local community-supported agriculture (CSA) deliveries will be coordinated and encouraged. Fostering the use of local CSA organizations has the potential to reduce greenhouse gas emission and vehicle-trips by providing project residents convenient access to locally sourced food, reducing the number of trips and vehicle miles traveled by both vendors and consumers. This strategy could also have marketing benefits and reinforce the site's overall message about sustainability.

4.1.5.4 Cold and Dry Delivery Storage Space

Individual building managers will be encouraged to provide storage space near the concierge and elevators to store packages, perishables, laundry, and other deliveries. Providing storage space for groceries, laundry, and other packages can have a direct effect on reducing trips by encouraging and facilitating online ordering. A centralized storage facility within each building can also consolidate delivery trips by enabling delivery vehicles to only make one stop for multiple recipients instead of several.

4.1.5.5 Convenient Zones for Loading and Building Servicing

Passenger loading and building servicing zones are integrated into Mission Rock's overall street design. These zones will reduce the need for personal vehicle trips by facilitating deliveries and also enabling easy pick-up and drop-off of seniors and people with disabilities by locating them near elevators and at corners with curb ramps.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

4.1.5.6 Childcare Facilities and Services

Mission Rock will aim to attract a provider of on-site childcare services and facilities to ensure easy access for Mission Rock residents and employees. Ensuring that childcare services are provided on-site at Mission Rock would break down a key barrier for parents to taking non-auto modes to work by bringing such services within walking distance and near the many commute options around the Mission Rock site. The childcare services could be provided on the ground floor of a northern parcel, near China Basin Park. Other family-friendly amenities will also be established, including storage spaces with room to store car seats, strollers, and other family-related equipment.

4.1.5.7 Collaborative Work Space

The developers of individual parcels will be encouraged to establish a collaborative work space in each residential building. A typical offering in residential buildings today, business services rooms can help encourage and facilitate working from home, which can directly reduce trips to and from the site.

Work spaces could include rentable work rooms that can be reserved in advance, equipped with video conference equipment, high-speed internet connections, projectors, white boards, basic office supplies, and printing, scanning, and faxing services. For residents interested in using this work space long term, dedicated mailboxes for businesses could be set aside and located nearby. The developers and managers of individual buildings will ultimately be responsible for developing and maintaining these business services rooms and ensuring that they are equipped with appropriate equipment.

4.1.5.8 Elevator Design

In keeping with current building practices, elevators will be designed to easily accommodate bicycles, strollers, and wheelchairs. This can increase the visibility of bicycling and improve the family friendliness and accessibility of the project. Appropriate wayfinding and signage for elevators will also be provided. Signage can educate residents about using the appropriate elevators to transport bicycles and other wheeled conveyances.

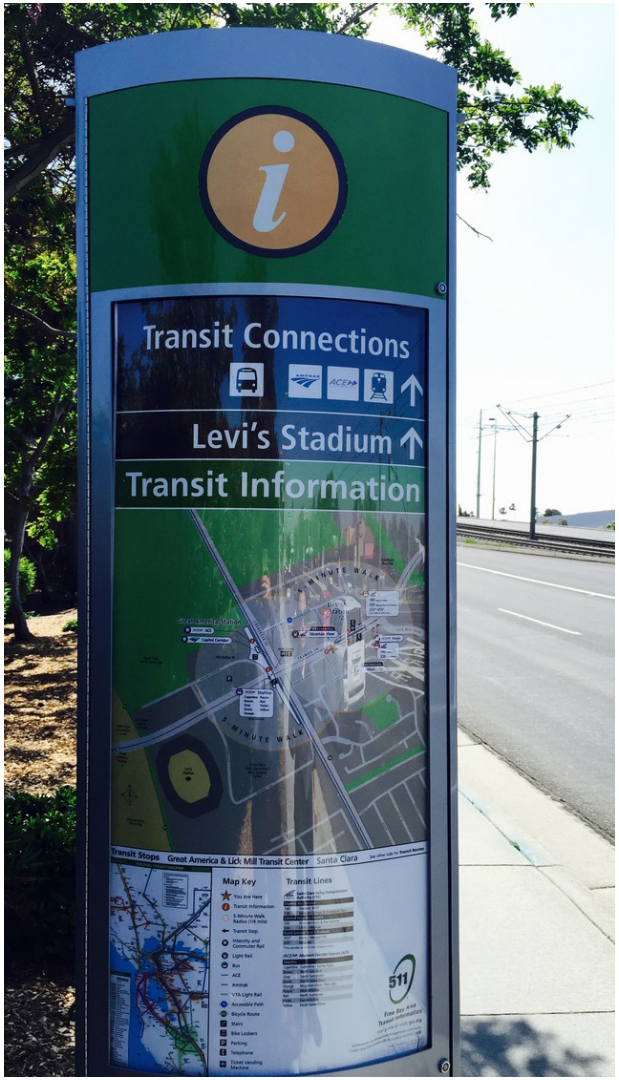
4.1.5.9 Affordable Housing

Forty percent of on-site units will be restricted to inclusionary affordable housing, to be provided in a balanced manner throughout the phasing of the development. Affordable units are generally associated with lower rates of trip-making, as residents living in affordable housing typically own fewer cars per household than residents of market-priced units. They are more likely to use transit and are less likely to require parking, reducing overall vehicle trip generation.

4.1.6 ALL-REALM STRATEGIES

4.1.6.1 Signage and Wayfinding across Modes

Signage and wayfinding will be installed at key points throughout the development. Signs can help indicate points of connection between different modes, as well as estimated travel times and directions by mode, and they can help increase people's understanding of travel options. Clear signage is also important for ensuring safety for all types of users, differentiating spaces for different users within shared public spaces.



Transit-focused wayfinding (NELSON\NYGAARD)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

The informative website of a TMA in Mountain View. The site is mobile-friendly, as the images on the next page show.

4.1.6.2 Mobile-Friendly Mission Rock Transportation Website

A site-wide website will be maintained with a dynamic and engaging section dedicated to transportation information and services, with specific portals for each user type (or the state-of-the-practice equivalent to this strategy, per changes in technology by the time of first occupancy). A mobile-friendly website oriented toward all residents, employees, and visitors providing online access to concierge services and transportation programs can help raise awareness and visibility of transportation options and facilitates connections among transportation modes. The transportation information on the website will likely include but not be limited to real-time transit information and a transportation tab with all nearby options (e.g. Muni, car share, scooter share, ride-sourcing apps) showing locations and availability.

4.1.6.3 On-Site Transportation Staff

A site-wide, dedicated transportation staff will be hired and tasked with providing individualized advice and information on transportation options to residents and employees. This can help raise awareness and understanding of transportation options and ensure that site users can find non-auto transportation options that meet their unique travel

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

needs.

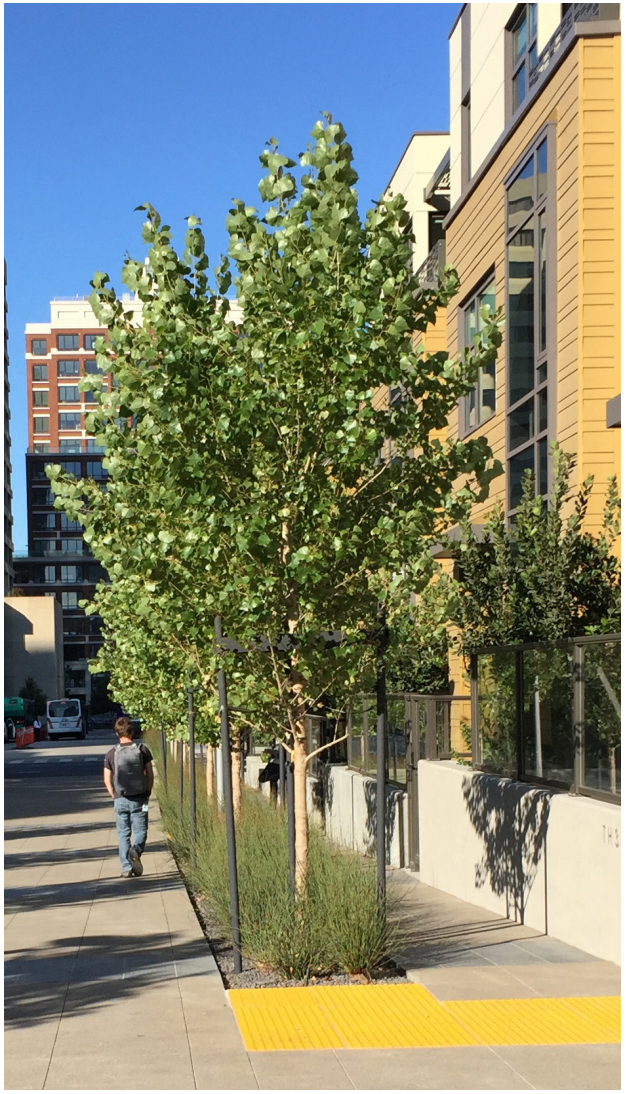
Other staff, such as the in-building concierge or those tasked with organizing bicycle events and maintaining the bicycle resource room, could also provide similar targeted information and facilitate discussions around using different modes. This dedicated transportation staff would act as a centralized transportation resource to the in-building concierges, providing up-to-date transportation information and expert support to front-line staff that are less likely to have the same depth of knowledge of the transportation system.

4.1.6.4 Mission Bay Transportation Management Association (TMA)

Mission Rock's project planners will work with the Mission Bay TMA to figure out the best ways to coordinate on TDM implementation and data collection. Currently, the Mission Rock development is within the coverage area of the Mission Bay TMA, which provides several shuttle services connecting the area with Caltrain, BART, and local and regional buses, as well as guidance on walking, bicycling, and carpooling. A transportation management association (TMA) is typically a nonprofit, member-based organization that provides transportation services in a particular area, formed to address the transportation needs and challenges of a particular destination with a distinct geographic boundary, such as a central business district. TMAs address parking and circulation through employee commute programs, trip planning, information about various travel options, and other tools.

4.1.6.5 Improved Walking Conditions

High-quality pedestrian design features (high connectivity, wide sidewalks, highly visible crossings, and others) are directly integrated in the design of Mission Rock. As described in the Mission Rock *Design Controls*, the development will add over half a mile of complete streets, including new and improved sidewalks and pedestrian crossings. Today, many sidewalks in Mission Bay are narrow or missing in areas. The new streets within Mission Rock will greatly improve the overall walking conditions of the neighborhood and facilitate safer and more convenient pedestrian connections. A pedestrian-oriented urban design is essential for residents, employees, and visitors to fully take advantage of the other TDM strategies, supporting access to all of the available transportation options and programs throughout the site and nearby. These improvements help shape the environment for the other TDM strategies to succeed.



High-quality design for pedestrians (NELSON\NYGAARD)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Signage that combines directional and map-based wayfinding (NELSON\NYGAARD)

4.2 MARKETING AND COMMUNICATIONS

A strong communication strategy is critical to the success of any TDM program, ensuring that residents, employees, and visitors receive information about relevant resources and incentives at appropriate times and through channels that are easily accessible. Incorporating consistent branding into all communications can help create a sense of place and establish a cohesive identity for the transportation program. Branding can be used to support marketing and communication efforts, particularly on signage and wayfinding, to emphasize that residents, employees, and visitors can travel seamlessly through the area.

The TDM strategies cited in the chapter include three main channels for transportation-related communications: its site-wide transportation staff, a mobile-friendly web portal for site users, and physical signage and other wayfinding mechanisms on site. This section includes examples of communication tactics and channels to illustrate how specific channels can help reach target audiences.

4.2.1 SITE-WIDE TRANSPORTATION STAFF

Led by a coordinator, Mission Rock transportation staff would be responsible for maintaining information about TDM programs and acting as a point of contact to assist residents, employees, and visitors with transportation-related questions, concerns, or general assistance. The transportation coordinator would have the authority to implement TDM strategies, oversee the management and marketing of all measures, and monitor success of the TDM program.

The transportation staff might also be responsible for compiling a print and/or electronic transportation handbook to be distributed to residents on move-in and employees on hiring. This handbook could include information on transportation programs, policies, and service options, in addition to the following information:

- Transportation staff contact information, including information for the in-building concierges (if relevant)
- Commute trip planning information, including links to the regional 511 Rideshare program
- Clipper Card and vehicle (including car, bicycle, and scooter) share membership subsidies and parking policies
- Information on accessing other TDM program details and amenities, such as the in-building storage facilities
- Walking and biking routes within the area, estimated walking and cycling times to key locations, including transit hubs, and a link to the San Francisco bicycle map
- Local transit options and schedules, including links to Muni, BART, and Caltrain schedules, route maps, and existing trip planner mobile applications

The handbook would be distributed to all prospective residential tenants and all prospective employees who receive an offer to work within the development as part of welcome packets or employee orientation, or posted in prominent locations for all residents and employees.

To make sure information stays useful to residents and employees over time, transportation staff will endeavor to keep all information and materials up to date and relevant.

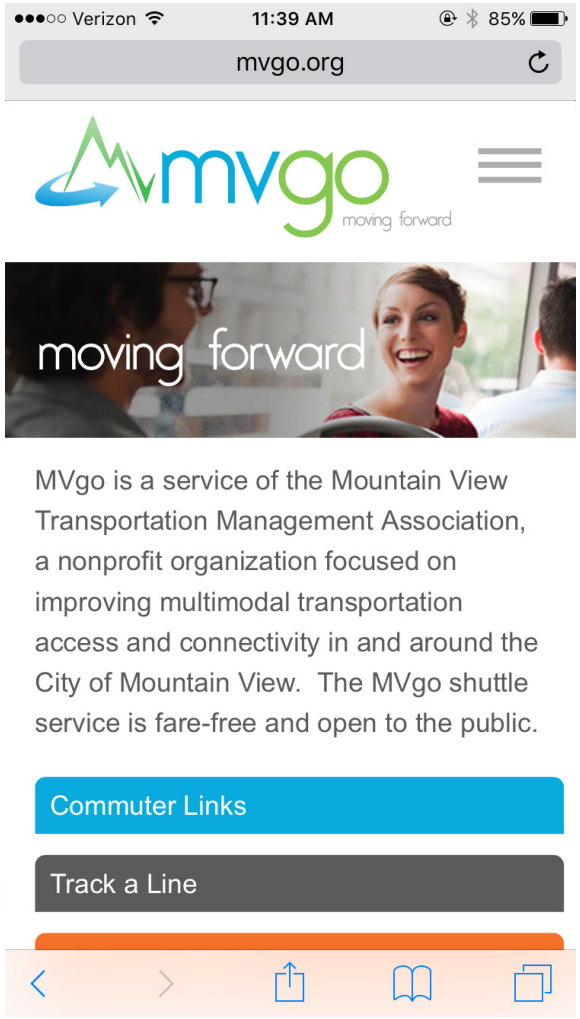
CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

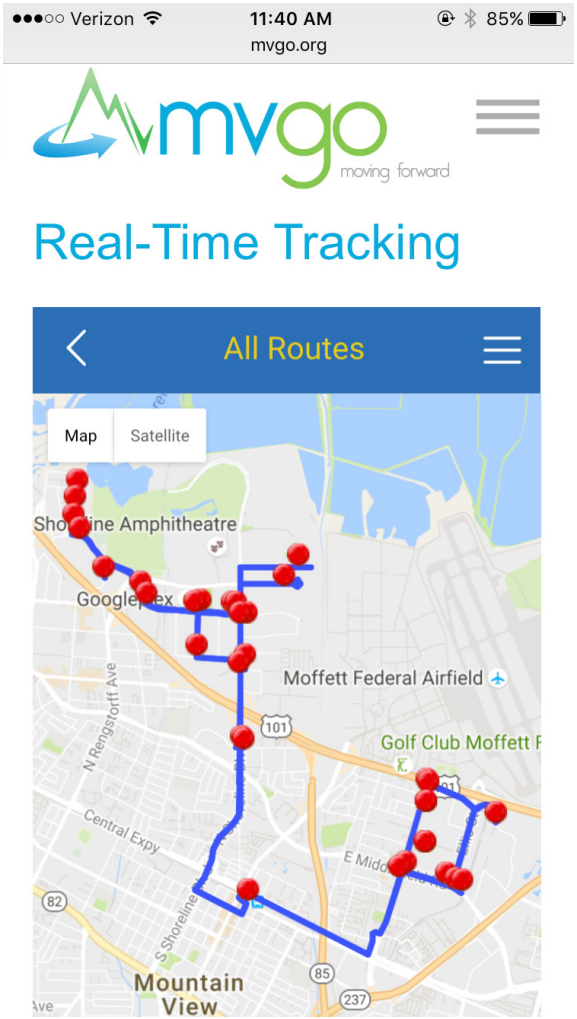
4.2.2 MOBILE-FRIENDLY WEBSITE

Mobile-friendly websites are a way to create a dynamic and engaging repository for transportation information, point-to-point navigation tools, travel suggestions, user engagement campaigns, and other efforts to raise awareness of alternatives to drive-alone travel options and residents, employees, and visitors to use them. In addition to supporting the information already provided in the resident and employee handbook, this website could include the following:

- Real-time transit information
- Real-time parking pricing and availability information
- Notifications of upcoming transportation-related events, such as bicycle parties and farmers' markets, and alerts
- Integration with internet delivery services for ordering
- Registration for car share, bicycle share, and/or scooter share memberships
- Room reservations for the collaborative workspace
- On-site childcare services enrollment
- Specific pages or portals for residents, employees, and visitors so that each of these audiences has access to the appropriate and relevant travel information
- Functionality which allows for tracking travel behavior and enables gamification for incentives

Establishing specific portals for each audience can allow for the delivery of targeted, individualized TDM information for each of the audience groups. Each of the portals could also





The mobile-friendly version of the Mountain View TMA's website. The TMA offers real-time transit information and links to a variety of other resources.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

provide specific information on costs and multimodal options available for traveling to and from Mission Rock, as well as information on nearby attractions and services and links to citywide or regional information. The images on the previous pages show an example of computer and mobile-friendly versions of landing pages for this type of website.

4.2.3 SIGNAGE AND WAYFINDING

Clear, consistent, and predictable signage and wayfinding can help residents, employees, and visitors navigate the site easily. Signage can also bring awareness to important information such as parking prices and availability, bicycle parking locations, estimates of bicycle and pedestrian travel times, and other information on Mission Rock programs or services. Simply providing information on non-motorized travel prominently can increase the likelihood that people will select biking or walking as their mode of transportation.

The efficacy of signage and wayfinding is dependent on the design and placement of signs. Signage should be clear and provide relevant information at key decision points in people's journeys, in areas that are highly visible, and in clear lines of sight. For instance, when entering the site, cyclists should be able to clearly understand the route options along the Blue Greenway's path through the site, Exposition Street, and Bridgeview Street. This signage will be especially important for safety along the shared public ways, to ensure that users understand the encouraged forms of travel and appropriate behavior on each mode. Temporary signage may be used in areas more highly trafficked by residents or employees, to provide information on specific events or programs, such as CSA pick up locations.

Wayfinding examples throughout the chapter show how it can be used in vibrant, mixed-use areas. Some signs offer clear guidance for the nearby area at several scales while providing clear directional guidance to nearby transportation hubs and popular destinations.

For further information on the design considerations that will be accounted for in designing signage for the Mission Rock site, see section 2.10 of the *Design Controls*.

4.2.3.1 Transportation Information Kiosks

Transportation information kiosks in the public realm can provide centralized locations for relevant transportation information for trips within Mission Rock and to nearby services and attractions. These kiosks could be placed throughout the site, at strategic decision-making locations where residents, employees, and visitors might need the information, such as the intersection of Terry A. Francois Boulevard and Mission Rock Street, China Basin Park, and Mission Rock Square. The kiosks could include transit schedules and fare information, walking and cycling routes, real-time transit information, and Bay Area Bike Share dock locations and bicycle availability.

It is recommended that these kiosks be digital, interactive displays (as shown in the accompanying image) to allow information to be updated easily and regularly. These boards would be maintained and updated as needed by the transportation staff.

While the information kiosks can provide detailed information on transportation options to visitors and others new or unfamiliar with Mission Rock and the surrounding area, real-time transit screen technology is designed to offer an opportunity to understand transportation options at a quick glance. This would be particularly useful for employees and residents, those who make recurring trips frequently and don't need detailed guidance.

Each of the communication-based TDM measures are pertinent to residents, employees, and visitors at different times during their life cycle at Mission Rock. As such, it is critical to think strategically about when to share what with each of these key segments to reach certain groups of users.

The mobile-friendly Mission Rock website will be an important avenue for sharing information about programs, policies, and services. It is reasonable to assume that the website will act as a front-line communications vehicle to reach all of those who have or may be interested in having a connection with the site. Signage and wayfinding will be seen on a daily basis and is an important element for users of the development to efficiently navigate Mission Rock. The site-wide transportation staff will provide key information for residents and employees at the time of move-in or hire, and will provide as needed services over time.

4.3 CONCLUSIONS

Establishing a robust TDM program reaffirms Mission Rock's commitment to sustainability and inclusivity. The program will encourage the site's residents, employees, and visitors to use the most environmentally friendly and spatially efficient mode possible for each trip, with an emphasis on cycling, walking, and shared rides.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

TDM Measure	Target Audience		
	Resident	Employee	Visitor
4.1.1.1 Real-Time Transit Information	■	■	■
4.1.1.2 Clipper Cards	■		
4.1.2.2 Bike Share Memberships	■		
4.1.2.1 On-Site Bike Share	■	■	■
4.1.2.7 Bicycle Valet			■
4.1.2.3 Bicycle Community Programming	■	■	
4.1.2.4 Bicycle Resource Center	■	■	
4.1.2.5 Bicycle Parking	■	■	■
4.1.2.6 Showers and Lockers		■	
4.1.2.1 On-Site Shared Scooters	■	■	■
4.1.2.2 Scooter Share Memberships	■		
4.1.2.4 On-Site Car Share	■	■	■
4.1.2.4 Car Share Memberships	■		
4.1.4.1 Parking Pricing	■	■	■
4.1.4.2 Real-Time Parking information	■	■	■

TDM Measure	Target Audience		
	Resident	Employee	Visitor
4.1.5.1 In-Building Concierge Services	■	■	
4.1.5.2 Coordinated Delivery Services	■	■	
4.1.5.3 CSA Partnerships	■	■	
4.1.5.4 Cold and Dry Delivery Storage Space	■		
4.1.5.5 Convenient Zones for Loading	■	■	■
4.1.5.6 Childcare Services	■	■	
4.1.5.7 Collaborative Work Space	■		
4.1.5.8 Elevator Design	■	■	■
4.1.6.2 Mobile-Friendly Website	■	■	■
4.1.6.3 Site-Wide Transportation Staff	■	■	■
4.1.6.4 Mission Bay TMA Coordination		■	
4.1.6.1 Signage and Wayfinding	■	■	■
4.1.6.5 Improved Walking Conditions	■	■	■

Target audience for each TDM program

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

[THIS PAGE INTENTIONALLY LEFT BLANK]

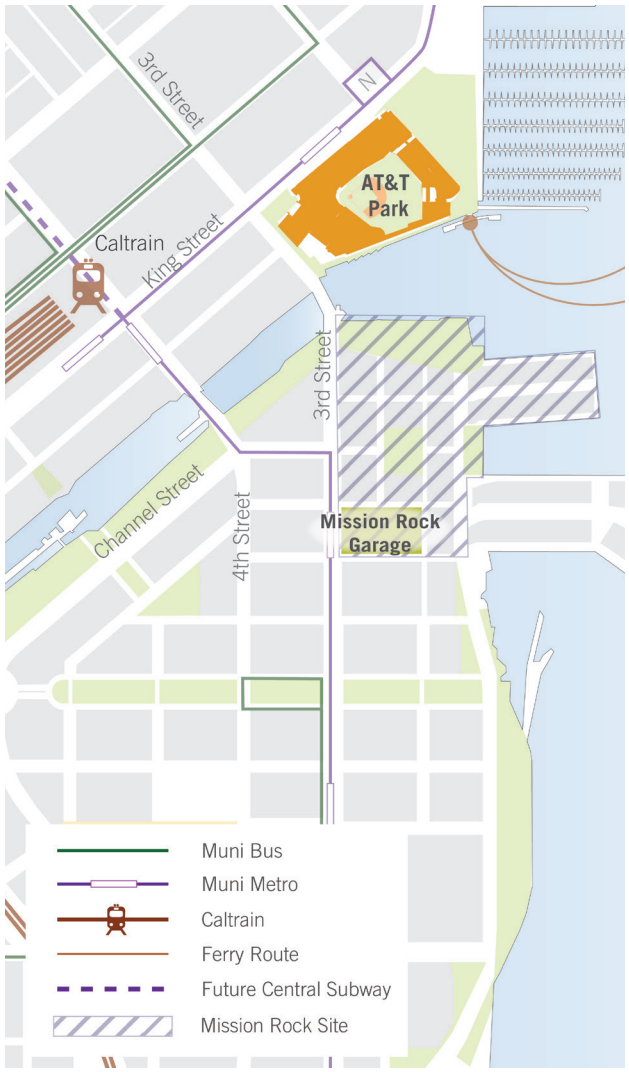
CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

5 EVENT MANAGEMENT

The energy and excitement generated by San Francisco's premiere event venues will be part of what makes Mission Rock a fun and interesting place to live, work, and play. AT&T Park will bring thousands of good-natured baseball fans to the area during the summer months, and the planned Chase Center will bring the Warriors' spirited fans through the winter and spring. Concerts and smaller events at both venues and in Mission Rock's two smaller event spaces will bring the area to life at other times.

Mission Rock will be designed and actively managed to maximize the best aspects of these festivities while responsibly managing the potential inconveniences that large crowds can cause. This chapter outlines the basic site's anticipated approach to managing pedestrian activity, vehicle flows, and bicycle parking around them to ensure that residents and employees can enjoy the energy without the hassle.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016



Mission Rock and AT&T Park

As the team has since it moved to AT&T Park in 2000, the San Francisco Giants will continue to work closely with the City and with citizens advisory committees in the area to manage the effects of event crowds on surrounding neighborhoods, through measures like deploying traffic control officers (known in San Francisco as parking control officers, or PCOs). In addition to such measures, the Mission Rock transportation staff might also be empowered to take additional actions like closing on-site streets or individual lanes to vehicle traffic and encouraging the use of non-auto modes for travel to events. This chapter describes how these types of strategies might be combined for three scenarios, representing the likely range of common events: A primary event at AT&T Park (40,000+ attendees), a secondary event at AT&T Park (15,000 to 25,000 attendees), and on-site events (2,000 to 5,000 attendees) in China Basin Park and Mission Rock Square. More detailed event management plans will be developed in the future.

Given their storage-space needs, automobiles naturally pose challenges for organizers of any large event. As such, most scenarios include some restrictions on vehicle movement through the site, and the *TDM Strategy*'s efforts to reduce reliance on single-occupancy vehicles for travel to and from the site will be particularly crucial during these times. However, some vehicle movement will be accommodated. Mission Rock's 2,300 to 3,000-space parking garage will serve as AT&T Park's main parking facility, replacing the surface lot on which Mission Rock will be built. During AT&T Park and Mission Rock events, curb space around the site will also provide important capacity for passenger loading.

Parking control officers (PCOs) (NELSON\NYGAARD)

Adjustments to vehicle circulation on game days, to account for high pedestrian volumes (NELSON\NYGAARD)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

5.1 PRIMARY EVENTS

AT&T Park, 35,000 to 40,000+ Attendees

A primary event at AT&T Park will be the most common scenario, occurring between 80 and 100 times per year, depending on whether the Giants make the playoffs and on how many non-baseball events (like concerts or other sporting events) AT&T Park hosts.

5.1.1 MANAGEMENT STRATEGIES

5.1.1.1 Parking Pricing

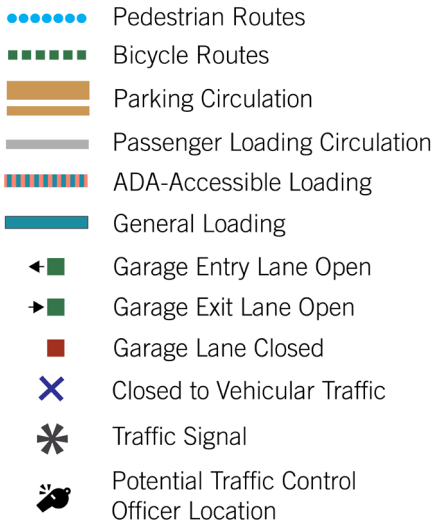
As noted in Chapter 4, it is anticipated that the Mission Rock garage will be actively managed around event times to ensure that there is space available for AT&T Park event attendees. To encourage regular users of the garage to find alternative ways to get to the site on event days, parking prices could be raised during a period covering a few hours before and after AT&T Park events. This approach has already been successfully employed to manage parking demand in the existing main AT&T Park lots, Lot A and Pier 48. People arriving at the garage around event times could pay a flat event rate that might amount to a total that is higher than typical hourly rates would be (i.e. if the event period is six hours long, the flat event rate would exceed the total cost of parking for six hours at typical hourly rates).

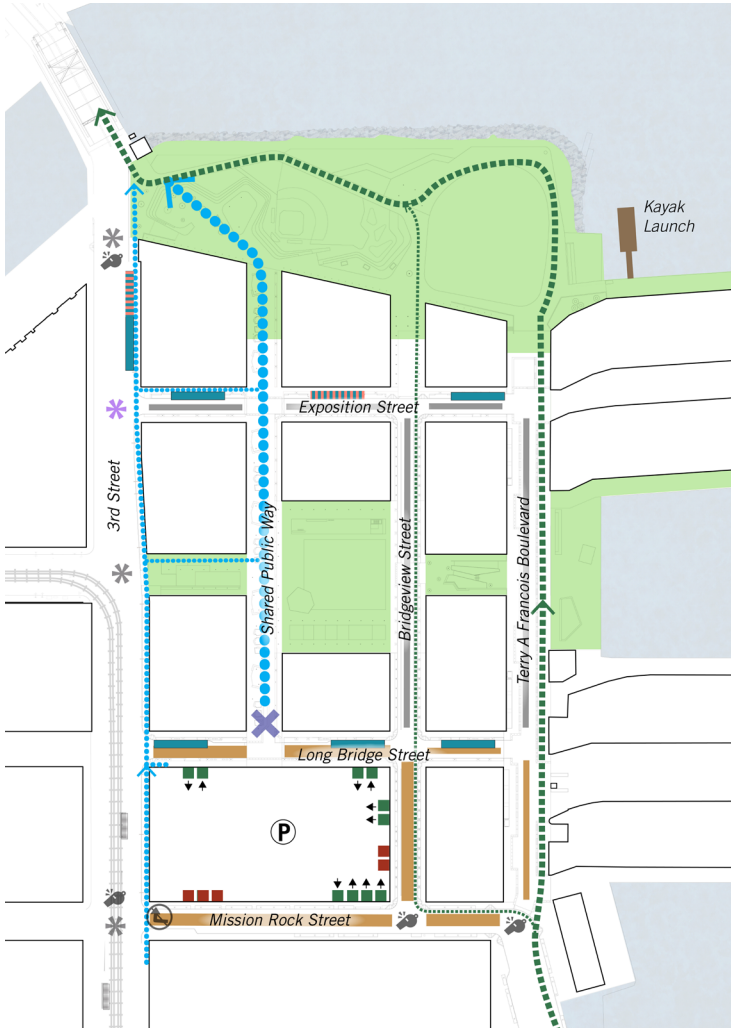
Vehicle Flows and Curb Space

Vehicular circulation through Mission Rock could be restricted during primary events in anticipation of high pedestrian volumes through the site. The Shared Public Way is a particularly critical north-south pedestrian route, providing the most direct path of travel between the main garage and the ballpark. As such, it is anticipated that the street would be closed to vehicle traffic around major event

Giants games at AT&T Park regularly sell out, bringing a festive atmosphere to the neighborhood

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016





Pre-event circulation patterns

times. Right turns from Mission Rock Street to 3rd Street could also be prohibited before events, to reduce volumes on Mission Rock Street in front of the Public Safety Building. Left turns into and out of the site at 3rd Street's intersections with Long Bridge will be prohibited at all times, as will left turns into Exposition Street. The eastern-most lane on 3rd Street between Exposition and King streets will also likely be closed before and after events, as it is today, to facilitate the movement of large volumes of pedestrians near the ballpark.

Garage entrances and exits would be managed to allow for efficient processing of major vehicle flows. The largest flows are anticipated on Mission Rock Street, from which vehicles will be able to access the highest-capacity pre-event entrance to the main garage, as well as the highest capacity post-event exit. To ensure that emergency vehicles have clear access to a main Public Safety Building driveway on the south side of Mission Rock Street, event vehicles will be encouraged to enter and exit the garage via Terry A. Francois Boulevard, and a garage entry/exit near the corner of Mission Rock and 3rd streets could be closed to reinforce this behavior. PCOs may also be helpful in this area to actively manage vehicle flows and ensure that one lane on Mission Rock Street is always open for potential emergency vehicle movement. Smaller volumes are anticipated around secondary garage pre-event entrances and post-event exits on Long Bridge Street and Bridgeview Street.

Most vehicular circulation through the site is expected to be for passenger pick-up and drop-off. Key passenger loading locations will include the north side of Exposition Street and the east side of the block of 3rd Street just north of Exposition Street. Primary loading zones for people with mobility limitations include the east side of 3rd Street

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

north of Exposition Street and an accessible loading zone on Exposition Street between the Shared Public Way and Bridgeview Street.

To manage vehicle movement at points of potential conflict between modes, this plan recommends the use of PCOs in a total of four places: Mission Rock and 3rd, Mission Rock and Bridgeview Street, and Mission Rock and Terry A. Francois Boulevard, and at the 3rd Street crossing just south of Lefty O'Doul Bridge.

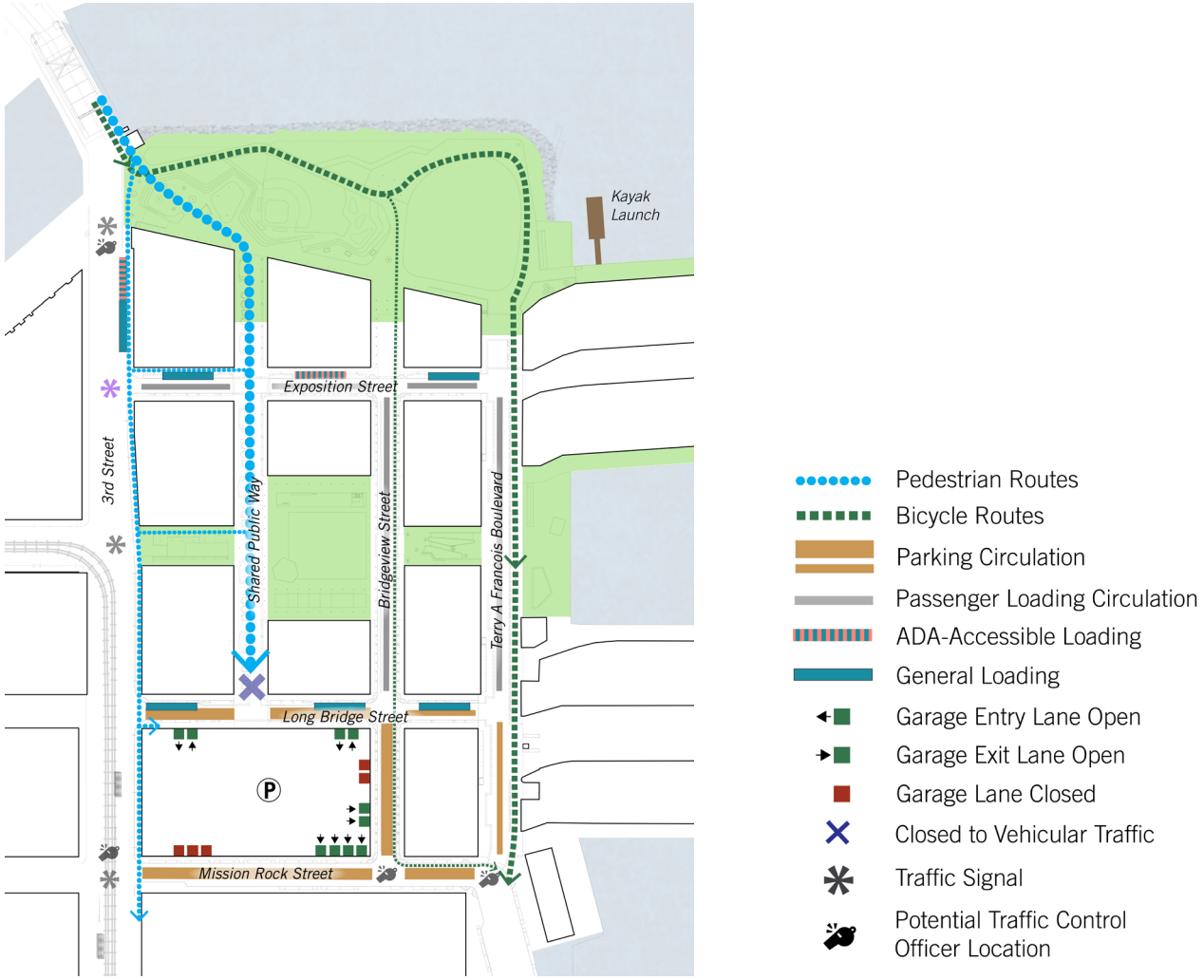
5.1.1.2 Pedestrians

It is anticipated that all pedestrian paths of travel will be open, but pedestrian activity is likely to concentrate along the Shared Public Way and 3rd Street, the two key north-south routes between Long Bridge Street and the ballpark.

5.1.1.3 Bicycles

Primary bicycle flows south of China Basin are expected to be along the Blue Greenway to and from bicycle parking facilities immediately around AT&T Park. Some cyclists may also use Bridgeview Street, but they might be less likely to do so than in normal conditions due to larger numbers of vehicles turning into and out of the garage. Cyclists will be encouraged to dismount at the western end of China Basin Park to reduce conflicts with the heavy pedestrian flows across Lefty O'Doul Bridge.

Some event attendees will also likely lock their bicycles on the Mission Rock site, to visit on-site bars and restaurants before or after games or to avoid crowds closer to the venue. An additional ballpark bicycle valet facility could also be located on the Mission Rock site, if usage of the main valet facility warrants it.

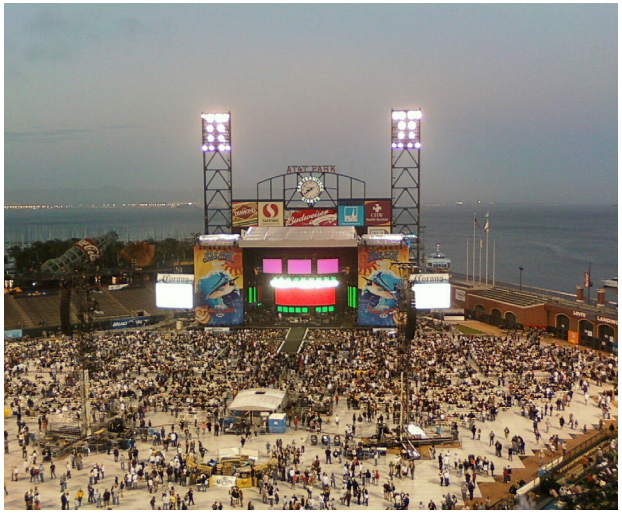


Post-event circulation patterns

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Football at AT&T Park (FLICKR USER ELTON LIN)

Opera at AT&T Park (SFOPERA.COM)



Concert at AT&T Park (FLICKR USER REBECCA WILLIAMSON)

Race at AT&T Park (FLICKR USER PRESIDIO OF MONTEREY)

5.2 SECONDARY EVENTS

AT&T Park, 15,000 to 25,000 Attendees

Circulation patterns at Mission Rock are anticipated to be similar around smaller events at AT&T Park. The Shared Public Way could be closed, and the relative intensity of different vehicle flows should be consistent with the basic patterns seen for the biggest events at the ballpark, though overall flows should be much smaller. Bicycle and pedestrian circulation patterns are also expected to be consistent with those anticipated for larger events.

Given lower levels of expected parking demand, it is anticipated that the garage would generally not need to use flat-rate event pricing around secondary events. Event attendees would be able to park in available spaces as long as spaces are available. However, communications related to AT&T Park events would likely still encourage the use of other modes to access the ballpark, in the interest of reducing congestion and parking demand overall.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

5.3 ON-SITE EVENTS

Mission Rock, 500 to Several Thousand Attendees

Mission Rock will have two spaces equipped to host large events. The Great Lawn in China Basin Park will have room to host concerts, movie nights, and other large gatherings. Mission Rock Square will likely host a broader range of events, from staged performances to farmers markets or craft fares, with thousands of people flowing through the space over a several-hour period.

The garage's public parking prices could be converted to event rates for a period covering several hours before and after the biggest events, to discourage use by regular users.

5.3.1 CHINA BASIN PARK EVENT

5.3.1.1 Vehicle Circulation and Passenger Loading

For the biggest China Basin Park events, Terry A. Francois Boulevard and Exposition Street could be closed to through traffic, with the streets reserved for event-related pick-up and drop-off. To make vehicle flows efficient and predictable for pedestrians crossing these key streets, Terry A. Francois Boulevard could be converted to a one-way street northbound, and Exposition Street could be one-way westbound to complete a site-wide circuit.

It is anticipated that the north end of Terry A. Francois Boulevard, at or north of the intersection with Exposition Street, would be the main drop-off and pick-up location for people with mobility limitations. Taxi, TNC, and other vehicular loading could be focused along Exposition Street west of Terry A. Francois Boulevard.

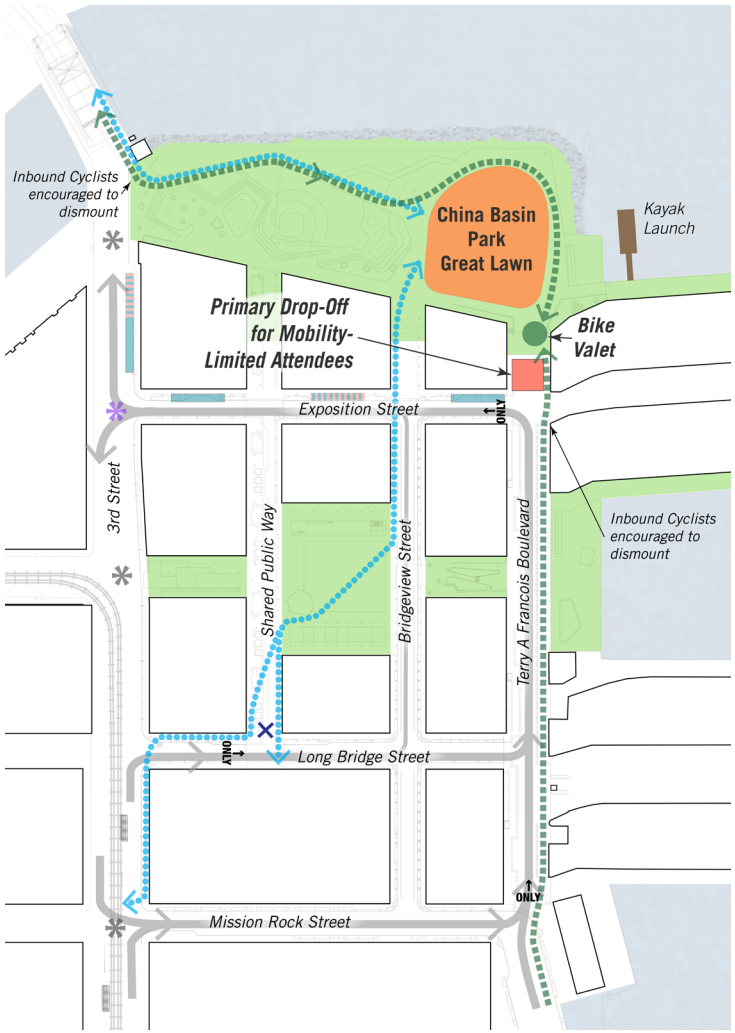
Movie in a public park (FLICKR USER AARON MOLINA)

Stern Grove concert series (NELSON\NYGAARD)

Farmers market (NELSON\NYGAARD)

Shakespeare in the Park (FLICKR USER COREY TEMPLETON)

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016



China Basin Park event circulation patterns

5.3.1.2 Pedestrian Circulation

Pedestrian traffic is likely to focus along two major routes: 1) through China Basin Park and up 3rd Street to/from the Caltrain terminal at 4th and King streets and toward BART on Market Street, and 2) through the site to/from the parking garage and the Muni light rail station on 3rd Street south of Channel Lane. Flows through the site can be expected to concentrate on Bridgeview Street north of Mission Rock Square, in the square, and along the Shared Public Way and Long Bridge Street, en-route to the parking facility and the Muni station at the southwestern corner of the site. PCOs may be helpful on Exposition Street at Shared Public Way and Bridgeview Street, to enable vehicles picking up or dropping off passengers to exit the site.

5.3.1.3 Bicycle Circulation and Parking

Bicycle valet facilities could be located along the Blue Greenway, just southeast of the event space, and cyclists will also be able to use the network of public bicycle parking spaces throughout the site.

Cyclists from the north could be encouraged to dismount at the edge of China Basin Park and walk their bicycles around the event space to the bicycle valet facility. Cyclists from the south could be encouraged to dismount as they approach the area for pick-up and drop-off of attendees with mobility limitations.

5.3.2 MISSION ROCK SQUARE EVENT

5.3.2.1 Vehicle Circulation and Passenger Loading

For the biggest Mission Rock Square events, Shared Public

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

Way could be closed to vehicle traffic, and Bridgeview Street between Long Bridge and Exposition streets will be closed to all but pick-up and drop-off of people with mobility limitations. As for China Basin Park events, Terry A. Francois Boulevard and Exposition Street could create a one-way loop for taxi, TNC, and other vehicular drop-off, and they could be closed to through traffic.

5.3.2.2 Pedestrian Circulation

Major pedestrian flows to transit nodes north and northwest of the site are anticipated to follow the Shared Public Way through China Basin Park to 3rd Street. Flows southwest to the main garage and the T-Third Muni light rail stop would follow Shared Public Way to the south and Long Bridge Street between Shared Public Way and 3rd Street.

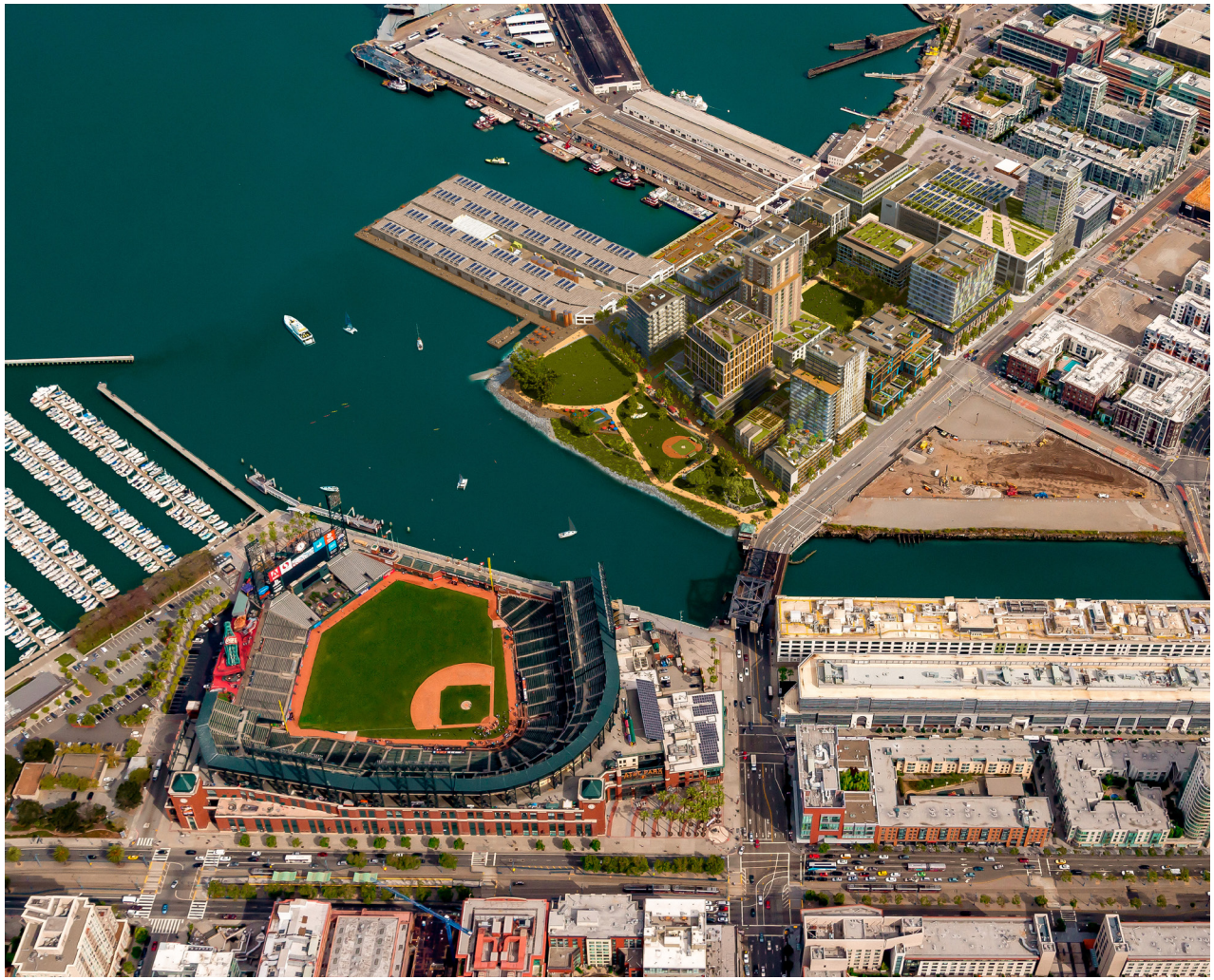
5.3.2.3 Bicycle Circulation and Parking

Bicycle valet could be located on Channel Lane east of Mission Rock Square. The main flows of cyclists from points south would follow the Blue Greenway to Channel Lane. Temporary signage at the north end of the site would encourage cyclists to follow the Blue Greenway to Channel Lane. The cycle track on Bridgeview Street could be closed to bicycle traffic temporarily, to make way for large pedestrian flows and for the primary loading area for event attendees with mobility limitations.

Mission Rock residents, employees, and visitors would also be encouraged to travel to and from the site on foot, bike, or transit on days with events on-site or at AT&T Park. Site transportation staff would keep and prominently display a calendar of major events as a planning resource for regular users of the site.

Mission Rock Square event circulation patterns

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016



AT&T Park and Mission Rock

5.4 CONCLUSIONS

Those who live and work near AT&T Park enjoy the exciting, festive atmosphere created by such a premiere urban event space, and they also know it takes some extra planning to make trips to and from the area as smooth as possible. The Giants and the transportation staff at Mission Rock will work hard to aid in this planning by providing users of the site ready access to an abundance great information and a range of travel choices.

In the same spirit, the Giants and the Mission Rock team are committed to working with neighborhood organizations to responsibly manage event-related transportation conditions and make sure inconveniences related to events are kept to a minimum.

CONFIDENTIAL REVIEW DRAFT
FOR DISCUSSION PURPOSES ONLY
8/31/2016

[THIS PAGE INTENTIONALLY LEFT BLANK]