INDIA BASIN

INFRASTRUCTURE PLAN

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1. INTRODUCTION / PROJECT DESCRIPTION

1.1 Purpose

This Infrastructure Plan is an exhibit to the Development Agreement (DA) between co-project sponsors BUILD and the San Francisco Recreation and Park Department (RPD) or its Assignees (Developer) and City and County of San Francisco (City). The Infrastructure Plan defines the infrastructure improvements (also referred to as Horizontal Improvements in the DA) required to construct the India Basin Development Project (Project), and identifies the responsibilities of the City and the Developer for design, construction and operation of the Infrastructure, including elements of sustainability, environmental remediation, demolition, grading, street and transportation systems, open space and parks, low pressure potable water system, Non-Potable water system, auxiliary water supply system, separated sewer system, stormwater system, stormwater management, and dry utility systems. The area encompassing these infrastructure improvements consists of approximately 29.26 acres owned by the Developer and the City, which is being redeveloped pursuant to the DA.

1.2 Project Description

The project as described in the project Environmental Impact Report preparedprepared for the City of San Francisco Planning Department isis co-sponsored by the Developer and the RPD and includes four distinct areas.

Table 1.0: Development Areas

Development Areas	Responsibility	Area (acres)
India Basin Shoreline Park	RPD	5.60
900 Innes	RPD	3.98
India Basin Open Space	Developer	6.20
700 Innes	Developer	22.42
Total		38.20

This Infrastructure Plan addresses the Developer's infrastructure obligation associated with 700 Innes and India Basin Open Space development areas only. References within this document to Project Site refer to 700 Innes and India Basin Open Space Development areas.

The 700 Innes site is approximately 22.42 acres that includes 17.12 acres of property controlled by the Developer and 5.30 acres of developed and undeveloped public rights of way. The site is generally bounded by Innes Avenue to the south, the eastern extent of Earl Street to the east, the western extent of Griffith Street to the West and the India Basin Open Space parcel to the north.

The India Basin Open Space includes approximately 6.2 acres owned by RPD that will be improved by the Developer as part of the redevelopment of the 700 Innes site. The India Basin Open Space site is an "L" shaped parcel that is bounded by the 700 Innes site and the Bay.

1.3 Land Use

Development of India Basin is envisioned to include a significant quantity of new multi-family residential units in a mixed-use setting. Land Use Designations and Permitted and Conditional Uses within each category are detailed in Chapter 4 of the India Basin Design Standards and Guidelines. The total development program appropriate for the site is being studied through the Environmental Impact Report (EIR). Development program limits and other requirements will be confirmed through the DA.

For the purposes of this Infrastructure Plan, the land use program at India Basin is anticipated to include residential, commercial, retail, and institutional/educational uses. The Project has been planned with two options for the principal development area of 700 Innes; a residential project and a commercial variant. The table below describes the program breakdown for these two options, plus the associated development being planned for the India Basin Open Space Area.

PROPOSED RESIDENTIAL PROJECT

Program	Development
Residential	1575 units
Commercial/Retail	209,106 sf

MAXIMUM COMMERCIAL VARIANT

Program	Development
Residential	500 units
Commercial/Retail	1,000,000 sf
Institutional/Education	50,000 sf

1.4 Infrastructure Plan Overview

This Infrastructure Plan describes and governs the construction and development of Infrastructure to be provided by the Developer for the Project, including associated off-site improvements needed to support the project. The Project will use the San Francisco Subdivision Regulations (Subdivision Regulations) as the basis for design standards, criteria, specifications, and acceptance procedures for Project Infrastructure. Developer acknowledges that the Infrastructure Plan proposes various novel concepts and non-standard features, designs, and public improvements that do not comply with City standards. The City retains its authority and discretion to grant exceptions to established standards, the Subdivision Regulations, and Municipal Code requirements, and to approve, approve subject to conditions, or reject these concepts and non-standard elements based on Developer's submission of additional analysis and detailed design. The India Basin Public Infrastructure Design Exceptions and Modifications Memorandum, attached hereto as Exhibit ___ represents the Project Sponsor's initial request for design exceptions and modifications to various City regulations, standards, and specifications. City agencies will consider this request and other subsequent requests on a case-by-case basis at the time when Developer submits the level of detailed design and analysis that will enable City agencies to comprehensively evaluate whether to approve, approve with conditions, or reject such requests. Notwithstanding any design described or shown in this Infrastructure Plan or in the Design Standards and Guidelines that may be associated with exceptions or modifications sought in the abovementioned Memorandum, the Memorandum is not binding on the Developer or the City, but is attached for illustrative purposes only.

This Infrastructure Plan also describes the Project Infrastructure obligations of the City. As a condition of the Developer's performance under this Infrastructure Plan, the Developer shall obtain requisite approvals in accordance with the DA.

This Infrastructure Plan focuses on the Infrastructure required to build the Project as described in the Project EIR. The EIR also includes a Project variant, which may or may not be implemented; this variant is also described, but is not a required component of the Infrastructure.

1.5 Property Acquisition, Dedication, and Easements

The mapping, street vacations, property acquisition, dedication and acceptance of streets and other Infrastructure improvements will occur through the Subdivision Map process in accordance with the San Francisco Subdivision Code (Subdivision Code) and Subdivision Regulations. Except as otherwise noted, Infrastructure described in this Infrastructure Plan shall be constructed within the public right-of-way. The City, on a case-by-case basis and in its discretion, may allow dedicated permanent easements within public open space areas to provide for access to and maintenance of Infrastructure facilities.

Developer shall install public utilities within easements, if the City allows such easements, in accordance with applicable City regulations. City policies for public acquisition and acceptance within any such dedicated public service easement areas, including provisions for maintenance access, shall apply.

A tentative map will be prepared for the Developer obligation area (700 Innes and India Basin Open Space). Following tentative map approval for each phase of Infrastructure Plans, Developer shall submit final maps with improvement plans for the public right of way and other required public improvements prior to permits for each phase of Infrastructure. Developer also may elect to apply for a permit to construct required public improvements independent of a subdivision map or prior to Final Map approval, and City, in its discretion,

may approve, approve with conditions, or reject such a permit. Final maps for each parcel (or groups of parcels) will be submitted for each development project.

1.6 Project Datum

All elevations referred to herein are based on CCSF 2013 NAVD88 Vertical Datum (SFVD13).

1.7 Master Plans

Each Infrastructure system described herein has been more fully described and evaluated in Draft Master Utility Plans (MUPs), which the Developer has simultaneously submitted to the City as reference information for the Infrastructure Plan. These MUPs identify the key design criteria and provide more detailed layouts of each Infrastructure system. The Infrastructure Plan will be approved by the City as part of the DA approval process. Approval of this Infrastructure Plan does not imply approval of the MUPs, which the City shall approve after DA execution and prior to submittal of street improvement plans for the first phase of development. Developer acknowledges that City review and approval of the MUPs may result in amendments to this Infrastructure Plan or conditions associated with the design of any improvements identified in the MUPs.

1.8 Conformance with EIR and Entitlements

This Infrastructure Plan has been developed to be consistent with the project description as well as mitigation measures contained in the 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.

1.9 Applicability of Codes and Standards

This Infrastructure Plan incorporates by reference the India Basin Design Standards and Guidelines and other approved Project documents. This Infrastructure Plan may be materially modified to the extent such modifications are in conformance with the Subdivision Regulations and applicable City standards and are mutually agreed to by the City and the Developer consistent with the terms of the DA.

1.10 Project Phasing

It is anticipated that the Developer will develop the Project in several phases as outlined in India Basin Proposed Phasing Memorandum submitted concurrently with this IP and subject to the approval process outlined in the DA. Each Phase will include Development Parcel(s) and associated Infrastructure to serve the incremental build-out of the Project. Phase Infrastructure will be defined in Improvement Plans and associated Public Improvement Agreement for each Phase to be approved by the City prior to filing a final map for the associated Development Parcel(s). The parties acknowledge that certain Infrastructure, as described in this Infrastructure Plan, such as abatement, demolition, environmental management, grading, and geotechnical improvements, may be required or desired at an earlier stage of development and in advance of specific Phase Infrastructure. The parties will cooperate in good faith in determining the scope and timing of such advance Infrastructure, so as not to delay the construction of Development Parcels and associated Phase Infrastructure.

Demolition or abandonment of existing Infrastructure and construction of each proposed Development Parcel and associated Phase Infrastructure will impact site accessibility. During construction of each Development Parcel and associated Phased Infrastructure, Developer, at its own cost, shall provide and maintain interim access for emergency vehicles, subject to San Francisco Fire Department (SFFD) requirements. Within active streets that remain open, Public Works, in its discretion, may authorize Developer, at Developer's cost, to maintain pedestrian access on at least one side of the street where such street is adjacent to an active construction area.

1.11 Acceptance of Phased Infrastructure

The City shall accept full, complete, and functional streets as designed to serve the needs of the associated Phase of development for purposes of City maintenance and liability within the public right-of way in accordance with the Subdivision Code and Subdivision Regulations.

1.12 Operation and Maintenance

With the exception of certain Streetscape Improvements and other improvements identified in the Finance Plan's Maintenance Matrix to be privately maintained, further described in Section 8.4.3 of this Infrastructure Plan, the City will be responsible for maintenance of improvements installed by the Developer upon acceptance, unless City, in its discretion, agrees to an alternate arrangement. All privately maintained improvements in the public right-of-way shall be subject to a Major Encroachment Permit approved no later than the first final subdivision map for development purposes.

2. SUSTAINABILITY

San Francisco is a city where environmental awareness, technology, innovation, and culture weave together to create unique opportunities for site design. India Basin is a neighborhood defined by social and environmental drivers that compel this development to be responsive to global and local challenges as well as resilient against infrastructure failure and catastrophic events. The unique site conditions and scale of the development enable it to leverage district-wide strategies to achieve a meaningful and measurable reduction in environmental impact. Urban and ecological systems are integrated to enhance the community's social, economic and environmental goals.

The Project site is located within its own watershed. The Project goals are to support a landscape that can remain adaptable to the future changes in climate with less frequent, but larger, storm events. In addition, the landscape and infrastructure will be set up to mitigate the Project from flooding and impacts due to sea level rise. Enhancing water quality is also an important aspect of the Project where the removing metals and sediment through landscaped treatment methods reduces further downstream impacts.

The Project is focused on reducing the environmental impact of greenhouse gas emissions (GHG) from transportation and building energy use while creating a resilient community. Expansion of the City's existing transit systems are proposed to connect the project to other districts through a network of pedestrian, bicycle, and bus routes and the site design includes a comprehensive network of pathways to promote a pedestrian-oriented district. The Project is targeting a Net Zero Energy Public Realm through on-site renewable energy and the Project will look to further reduce GHG emissions by potentially sourcing GHG-free electricity through renewable energy purchases. To create a resilient community, the Project is looking at strategies that will enable the community to maintain reduced operations and provide community support in a disaster event, including onsite renewables, an independent microgrid, and battery storage. These approaches will all be supported by efficient buildings that exceed code minimum energy performance.

A more detailed explanation of the sustainability features of the project can be found in the 3.0 District Sustainability and 6.2 Energy Efficiency Building sections of the Design Standards and Guidelines.

3. ENVIRONMENTAL REMEDIATION

Hazardous materials remediation actions for this property necessary to support site uses will be carried out consistent with site remediation plans approved by the San Francisco Department of Public Health (DPH) pursuant to Article 22A of the San Francisco Public Health Code, also known as the Maher Ordinance. The Maher Ordinance requires the Developer to retain the services of a qualified professional to prepare a site history report (typically a Phase I Environmental Site Assessment (ESA)) that meets the requirements of the Maher Ordinance. The Phase I ESA would determine the potential for site contamination and level of exposure risk associated with the proposed project. Based on that information, the Developer may be required to conduct soil and/or groundwater sampling and analysis. Where such analysis reveals the presence of hazardous substances in excess of state or federal standards, the Developer is required to submit a site mitigation plan (SMP) to DPH or other appropriate state or federal agency(ies), and to remediate any site contamination in accordance with an approved SMP prior to the issuance of any building permit. Both a Phase 1 and Phase 2 ESA have been prepared for the 700 Innes Property and are discussed in Chapter 3.6 Hazards and Hazardous Materials.

4. DEMOLITION, DECONSTRUCTION AND BUILDINGS TO REMAIN

4.1 Scope of Demolition

There are currently five buildings and structures on the 700 Innes property. Under both the proposed project and the variant, Developer would demolish the four buildings at 838-840 Innes Avenue and 888 Innes Avenue, and would relocate the historic building at 702 Earl Street, which is currently used as a residence, to the northern portion of the 700 Innes property closer to the shoreline. At the northwest corner of the property, Developer would remove an existing pier and eight associated creosote-treated piles. Also on the 700 Innes property, Developer shall create 0.1 acres of tidal marshland.

4.2 Demolition Phasing

The demolition and deconstruction of buildings on 700 Innes will be conducted as part of Phase 1 of the Project.

4.3 Historic Buildings

Table 2-2. Existing Buildings on the Project Site

Name of Building/Address	gsf	Historic Status	Existing Uses	To Remain?
702 Earl Street	11,000	CRHR eligible	Residential; workshop/studio[1]	Yes/ relocated
838–840 Innes Avenue	26,000	CRHR ineligible	Residential (rear unit); vacant (front unit)	No
888 Innes Avenue	3,750	Not CRHR eligible	Industrial/ production	No

Notes: CRHR = California Register of Historical Resources; gsf = gross square feet

[1] The 702 Earl Street Building would be relocated to a northeastern location on the 700 Innes property, closer to the shoreline.

Source: RPD and BUILD, 2016

4.4 Buildings to Remain

The building at 702 Earl Street will be relocated to the northern portion of the Project, and no other buildings on the Site will remain.

5. SEA LEVEL RISE

5.1 Sea Level Rise Introduction

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 National Research Council (NRC) report Sea-Level Rise for the Coasts of California, Oregon, and Washington. The NRC report contains sea level rise projections for the years 2030, 2050, and 2100 relative to year 2000. CO-CAT recommends the use of these projections for planning waterfront projects and that sea level rise values for planning be selected based on risk tolerance and adaptive capacity. This guidance has been largely adopted by state agencies including the Bay Conservation and Development Commission (BCDC) in formulating their policies for adaptation to sea level rise. Also, in December 14, 2015, the City released the Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco. City sea level rise evaluation is similar to NRC (2012) reported values for San Francisco. Table 5.1 summarizes these sea level rise (SLR) projections, including the low and high range values, for the San Francisco Bay area provided in NRC (2012) and the City (2014).

Table 5.1: Sea Level Rise Projections for San Francisco, California (feet)

Time Period	Low	Projected	High
2000-2030	0.14	0.47	0.97
2000-2050	0.40	0.92	1.99
2000-2100	1.39	3.02	5.46

5.2 Adaptive Management Approach

The adaptive management approach for the development footprint, open space, and shoreline protection were developed based on the following primary criteria:

- Reserve the entire 100-foot shoreline band for public access and open space;
- Set buildings and immovable facilities high enough such that adaptations would not be necessary even for conservative estimates of SLR by the NRC;

- Elevate the designated Bay Trail such that adaptations would not be necessary for even conservative estimates of sea level rise for the year 2050 by the NRC; and
- Elevate the other public amenities (boardwalks, trails, overlooks, beaches, etc.) such that adaptations would not be necessary over the next 20 to 30 years.

The above set of criteria ensure 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.

5.3 Initial Infrastructure Design

Coastal flooding at the site includes two components: 1) combined high water and wave action along the perimeter shoreline, and 2) extreme still water elevations. Because the inland areas are not subject to wave action, the flood elevations for the inland areas are dictated by the one percent chance still water level.

Building Pads

Building pads are inboard of the shoreline and will be designed based on the one percent chance still water elevation, plus an allowance for 66 inches of SLR and extreme conditions in the amount of 42 inches, for a total of 108 inches, plus 6 inches of freeboard.

Open Space

Developer shall design open space and associated public access improvements to address the one percent chance total water level (1% TWL) or the 1% chance extreme still water elevation (1% SWL). The minimum open space elevation for upland open space will be based on the applicable flood elevation, 1% TWL or 1% SWL, plus an allowance for 66 inches of SLR and extreme conditions in the amount of 42 inches, for a total of 108 inches, plus 6 inches of freeboard. The shoreline open space will be based on the applicable flood elevation, 1% TWL or 1% SWL, plus an allowance for 24 inches of SLR. The minimum elevation may vary along the shoreline based on shoreline orientation, type, use and the proposed adjacent land use. It should be noted that the open space design may be dynamic and may include areas that extend to the Bay side of the existing shoreline and include some features which are below

the minimum grades discussed here, such as the seasonal and tidal wetlands, beaches, trails, and overlooks.

Storm Water System Design

The storm water system will be designed to conform to the requirements of the Subdivision Regulations. The design criteria in the Subdivision Regulations include adequate freeboard requirements to allow for a reduction in freeboard to accommodate SLR.

5.4 Infrastructure Adaptation for Future Sea Level Rise

Building Pads

Building pad grades will be set to accommodate the highest projections of SLR for 2100 and adjustments are not anticipated. SLR beyond an elevation that may impact building pads will require perimeter and storm water system improvements to protect the structures.

Open Space

For SLR values greater than the 2050 high estimate, the open space and associated public access designs will provide the ability to make future changes if over topping becomes a nuisance or hazardous at some locations, including in the seasonal and tidal wetlands, beaches, trails, and overlooks, or if other modifications are required, such as conversion of seasonal wetlands from fresh to brackish/tidal marsh, adjustments to living shoreline, boat ramp launch adjustment, etc. The appropriate type of adjustments will be determined through the decision making framework described below and may include increasing the shoreline elevations through the construction of small berms, the addition of low walls, or other appropriate measures.

Stormwater System

Developer shall design the stormwater system to accommodate the highest projections of SLR for 2100. See Section 14.3 for further discussion.

Stormwater Management

Stormwater management features are hydraulically linked to the stormwater system, and are designed using the same tide elevations as the hydraulic studies completed for the stormwater system. The Developer shall design stormwater management features to accommodate the highest projections of SLR for 2100. The BMPs are located and graded such that they are not impacted by highest projections of SLR for 2100.

5.5 Sea Level Rise Monitoring Program

As part of the Project, the Developer intends to create a Community Facilities District (CFD) that will fund a trust organization (Trust) that will create a monitoring program to review and synthesize SLR estimates prepared for San Francisco Bay by the National Oceanic Atmospheric Administration and State Agencies. The Trust will also conduct a periodic review of updated sea level rise guidance from Local, State, Federal and local regulatory agencies.

5.5.1 Decision Making Framework

When the data from the monitoring program demonstrates that SLR in San Francisco Bay has exceeded (or will soon exceed) the allowances designed for in the initial improvements, or if flooding issues due to SLR occur on a regular basis, Developer can make a range of additional improvements to protect the Project from flooding and periodic wave overtopping. The administrator of the Trust shall make the decision on which improvements are acceptable at the time improvements are required and the Developer shall apply for and obtain all necessary permits from all affected local, State, and federal agencies and construct said improvementimprovements. The decision as to which solution to implement will depend on a variety of factors, including, but not limited to:

- Consultation with the SFPUC and other local agencies,
- New local, State or Federal requirements about how to address SLR,
- Available technology and industry best practices at the time, and
- Both the observed rate of actual SLR and updated estimates of future SLR.

5.5.2 Funding Mechanism

The Project's financing plan includes a mechanism to create project-generated funding that will be dedicated to paying monitoring and flood protection improvements necessary to implement the Adaptive Management Strategy.

6. GEOTECHNICAL CONDITIONS

The geotechnical conditions are based on the preliminary geotechnical investigation by Langan Treadwell Rollo (Langan) for the proposed development, dated September 4, 2014. The report summarizes existing site conditions, geological and geotechnical site conditions, and presents preliminary conclusions and recommendations for the Project. The preliminary conclusions and recommendations are based on a review of the existing subsurface data and a preliminary geotechnical investigation, and are not intended for design. Design level investigation(s) should be performed for the Project. Elevations in the Geotechnical Conditions section reference SFVD13 datum.

6.1 Existing Site Geotechnical Conditions

The Project Site is primarily east of the edge of the historic San Francisco shoreline. It was filled between 1946 and 1968; only a small portion of the Project Site is west of the historic shoreline. In general, the site is blanketed by fill, underlain by Bay Mud, sand, Old Bay Clay and bedrock. The characteristics of each soil layer are summarized below:

Fill – The Project Site is blanketed by 16 to 41 feet of fill, extending to elevations ranging from 15 to -26 feet; fill thickness increases towards the bay. The fill consists primarily of loose to medium dense sand with varying amounts of silt, clay, gravel, concrete, brick and wood fragments. The fill includes isolated layers of stiff to hard clay.

Bay Mud – A weak and compressible marine clay and silt deposit, referred to as Bay Mud, underlies the fill. This layer ranges from 2 to 55 feet in thickness where explored within the project site and includes occasional layers of clayey sand. The Bay Mud layer is soft to stiff, and extends to depths ranging from 36 feet (Elevation -18 feet) to 83 feet (Elevation -76 feet). Bay Mud was not encountered in the borings west of Hudson Avenue. Based on consolidation tests performed on representative samples, the Bay Mud has a compression ratio of 0.12 to 0.26, and is slightly overconsolidated (primary settlement under the existing conditions is complete).

Sand – In general, the Bay Mud is underlain by relatively incompressible dense sand with varying amounts of clay and silt. The sand layer is about 5 to 33 feet thick and extends to depths ranging from 16 feet (Elevation 15 feet) to 98 feet (Elevation -91 feet). The sand near the bay includes 4- to 6-foot thick layers of very stiff to hard clay. The top 5 to 10 feet of the sand layer in some areas of the site consists of medium dense clayey sand.

Old Bay Clay – A medium stiff to hard clay and silt layer, locally known as Old Bay Clay, is present beneath the native sand. The thickness of the clay layer varies across the site from 9 to 50 feet (bottom of the clay between Elevation -12 and -139 feet). The Old Bay Clay slopes down and becomes thicker in the northeast corner of the site towards the bay. Consolidation test results indicate the Old Bay Clay is generally overconsolidated. Locally, the top of the Old Bay Clay layer is normally consolidated[1].

Residual Soil – The Old Bay Clay is underlain by strong, relatively incompressible residual soil (completely weather rock) consisting of very stiff to hard clay and very dense sand and gravel. The residual soil is 3 to 14 feet thick.

Bedrock – Bedrock of the Franciscan Complex consisting of shale, sandstone and serpentinite, underlies the residual soil. The bedrock surface slopes steeply from the ground surface west of the site to a depth of 23 feet near Innes Avenue (Elevation 8 feet), and slopes down to a depth of 149 feet (Elevation -143.5 feet) near the eastern side of the site. The bedrock encountered is moderately to closely fractured, soft to hard, plastic to moderately strong, and deeply to moderately weathered.

Groundwater – The groundwater at the site is likely at the elevation of the water in the Bay. Groundwater was measured in several of the boreholes at depths 7 feet to 33 feet (Elevation 0 and -7 feet, respectively). A pore water dissipation test in one of the exploration

[1] Normally consolidated soil has been loaded to a pressure equal to the existing overburden pressure.

points indicates groundwater is at 17 feet bgs (Elevation -6 feet). Monitoring wells on an adjacent site indicate groundwater along Earl Street is at Elevation -5 to -7 feet. The groundwater level at the project site is anticipated to vary a few feet seasonally and with the fluctuations in the water level of the San Francisco Bay. Based on the available groundwater level measurements the high groundwater level at the site is likely near Elevation -5 feet.

6.2 Site Geotechnical Approach

The main geotechnical issues at the project site are:

- the presence of uncontrolled fill across the site
- anticipated ground displacements within the fill and sand below the Bay Mud during a major earthquake on a nearby active fault
- presence of weak, compressible Bay Mud
- ground settlement under the anticipated building loads and new fill
- shoreline stability

During a major earthquake on a nearby active fault ground displacements (vertical and lateral) within the fill may be on the order of six inches. Lateral soil movement is anticipated within the northeastern portion of the site. About six inches of vertical, earthquake-induced ground settlement could occur within the project site; locally, total, earthquake-induced ground settlement could be on the order of 12 inches. Differential, earthquake-induced, vertical ground settlement might be on the order of four inches over a horizontal distance of 50 feet.

Consolidation of the Bay Mud and Old Bay Clay under the weight of the existing fill is nearly complete. However, the onsite fill was placed without mechanical effort/compaction. Structures supported on onsite fill will be subjected to excessive ground settlements induced by earthquake and building loads; in addition, differential settlement within the fill will be abrupt and erratic. Therefore, onsite fill should not be relied upon for foundation support.

To eliminate the need of a buttress, consisting of soil cement columns, that provided resistance gains lateral soil movement, the proposed structures will be at least 50 feet from

the edge of the soil that is susceptible to lateral spreading. To mitigate the magnitude of anticipated ground deformations under the design earthquake and building loads, the proposed structures will be supported on deep foundations gaining support in competent soil, generally encountered beneath the fill and Bay Mud. In addition to the building loads, piles in areas with liquefaction potential will be designed for the downdrag forces imposed by liquefaction-induced settlement in the fill and within some of the native sand below the Bay Mud. Lightweight, one-story structures may be supported on a stiffened mat foundation provided the mat is designed for the large anticipated differential ground settlement. Alternatively, lightweight structures may be supported on deep foundations.

A temporary surcharge program can be used to reduce the anticipated ground settlement from consolidation of the Bay Mud under the weight of new fill during the design life of the utilities. A temporary surcharge program includes placement of engineered fill and wick drains over the proposed utility areas. A horizontal drain (drain rock wrapped in filter fabric or a prefabricated drainage panel)/horizontal trench drains, is/are placed over the site grades prior to placement of the surcharge fill. Wick drains are typically installed in a triangular or square pattern through the fill and Bay Mud, allowing water squeezed out of the Bay Mud to migrate into the horizontal drainage system beneath the surcharge. Water from the horizontal drain(s) is directed to a suitable collection system. The height of the fill, duration of fill placement, and wick drain spacing are dependent on the subsurface conditions beneath the proposed utility areas, feasibility of wick drain installation, and time allocated for the surcharge program. The surcharge program is designed by the geotechnical engineer. The soil parameters needed for the design of the temporary surcharge program are determined by the geotechnical engineer during the design level geotechnical investigation.

Another option to reduce the anticipated consolidation settlement of the Bay Mud under the weight on new fill is to use lightweight fill if the City, in its discretion, allows such fill. The unit weight of lightweight fill typically ranges from 30 to 50 pounds per cubic foot. To balance the weight of new fill, onsite soil will need to be removed and replaced with lightweight fill. The

depth of onsite soil to be removed and replaced with lightweight fill will vary across the utility areas, and should be evaluated by the geotechnical engineer during the design level geotechnical investigation.

The stability of the shoreline outside the building areas will be evaluated during the design level phase of the proposed structures and mitigation measures be implemented, if needed.

6.3 Phases/Schedule of Design Level Geotechnical Investigations

The project geotechnical approach is based on a preliminary geotechnical investigation. Design level geotechnical investigations should be performed for each phase of development, phased to match the four planned development phases. However, the design phase of the geotechnical investigations for the structures adjacent to the 50-foot offset from the area susceptible to lateral soil movement should be performed prior to the four planned development phases, to confirm the offset. Similarly, the design level geotechnical investigation for the stability of the shoreline should be performed prior to the four planned development phases to confirm the anticipated shoreline deformations are acceptable and no additional mitigation measures are required. The Developer will provide geotechnical investigation results to SFPW for review and comment concurrent with construction document review and permitting process.

7. SITE GRADING

7.1 Existing Site Conditions

The site's highest elevations are along Innes Avenue and range from approximately 62 FeetSFVD13 at Earl Street to 33 feet at Griffith Street. The site generally slopes down steeply to New Hudson Avenue and then more gently to the San Francisco Bay shoreline top of bank at approximately 5 feet.

7.2 Proposed Grading Requirements

The Developer's Infrastructure obligations include the design and construction of the proposed grading plan within the areas identified in Table 1.2. A description of the grading design for the Project is included below. The conceptual grading plan for the Project is shown on Figure 7.0.

7.2.1 Roadway Areas

Some streets will be graded using a "saw tooth" design with a minimum 0.5% slope between grade breaks. Saw toothed grading alternates between high and low points creating a pattern resembling the edge of a saw. This pattern allows for positive drainage in the streets while maintaining minimal elevation differences between the high and low points. See Figure 7.1 for illustration of saw tooth grading.

The "saw-tooth" grading plan will be developed in conjunction with the design of the stormwater system. The run-off from a 100-year storm during a 100-year tide will be contained within the storm drain system below the street curb lines.

The "saw tooth" grading plan will provide overland release paths by increasing the elevation of the high points so that the downstream high point elevation of the flow line in the gutter is equal to or lower than the top of curb elevation at the upstream low point. This overland release design will protect the new building finished floors from storm/tides larger than the 5-year event or system maintenance issue such as blocked catch basin or pipes. This will continue through the downstream basins until there is capacity in the storm system or storm

water is released to the open space. The new building finish floor elevations will be above the back of walk/right of way elevation and therefore protected from flooding. Also some areas of the site are straight graded and direct overland flow to open space areas or the bay.

7.3 Proposed Site Grading Design

The Developer will be responsible for the design and construction of the proposed grading plan for the India Basin Site. Proposed grading designs for the development will match the existing south to north drainage pattern of the existing site. Proposed site grading will ensure proper overland release and provide Americans with Disabilities Act (ADA) accessible pathways throughout and adjacent to the site by providing a new street grid that connects the existing Innes Avenue at the south with interconnected pathways and open spaces throughout the site. Multiple accessible paths of travel will connect the adjacent property to the east with the adjacent property to the west. Griffith Street, Arelious Walker Drive, and Earl Street will provide accessible paths of travel from Innes Avenue to the south, to the open spaces and shoreline to the north. Across the site, the base layer grades of 2 percent and top layer grades of less than 5 percent are provided as a priority item, where feasible. As required due to site constraints, public access areas with slopes exceeding 5 percent but less than 8.33 percent will comply with Code requirements. The conceptual grading plan for the India Basin Site is included in Figure 7.0.

7.4 Proposed Site Grading Conforms

Conceptual grading design generally conforms to the existing grades along the interface with Innes Avenue and existing buildings on the southwest edge of the project. At the western boundary of the project, the existing segment of Griffith Street will be reconstructed and result in a medium grade differential, requiring the placement of 10 to 15 feet of fill to provide overland release and drainage. At the eastern edge of the project, the development will be raised resulting in a large grade differential at New Hudson Avenue and conformance at the Bay Trail. At the north edge of the project, the site will conform to the existing bank with the exception of the northwest facing shoreline that will be reconstructed with stepped terraces and sloped banks ultimately begin installed.

Accessible paths of travel and sidewalks within the Project Site will be provided to join and be coordinated with accessible paths of travel adjacent to and bordering the project that connect to the adjacent Innes Avenue and proposed parks. To accommodate the grade differential between the proposed adjacent park to the west, stepped terraces or retaining walls will ultimately be installed. To accommodate the grade differential between the proposed adjacent park to the east, a sloped buffer zone will be installed.

As more detailed designs are developed during the construction document review process of the project, the grading at conforms may require adjustment and refinement based on future coordination with SFPW.

7.5 Overland Release

In the existing condition, the lowest elevations at the site are located at the northeast corner. The Project will have multiple release points throughout the site. In the event of flooding in this vicinity the flood will release east of the intersection of Griffith Street and New Hudson Street to the open space marsh lands area and ultimately to the San Francisco Bay. The treatment areas in the open space will release through the north end of site into the bay, and the Flats area will release through Beach Lane and Spring Lane to the Perched Beach area and eventually to the Bay.

7.6 Sea Level Rise Monitoring and Adaptation

The monitoring program will require periodic preparation of a report on the progress of the adaptive management strategy. The report will be prepared no less than every five years and more frequently if required by regulators. The report will include:

- The publication of the data collected and literature reviewed under the monitoring program;
- A review of changes in local, State or Federal regulatory environment related to SLR, and a discussion of how the Project is complying with applicable new regulatory requirements;

- A discussion of the improvements recommended to be made if sea levels reach the anticipated thresholds identified in the Decision Making Frameworks within the next five years, and
- A report of the funds collected for implementation of the adaptive management strategy, and a projection of funds anticipated to be available in the future.

7.7 Cut and Fill Quantities

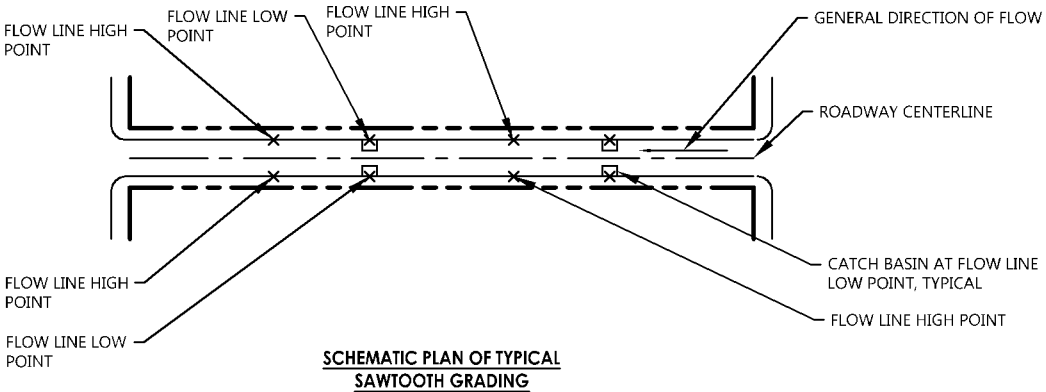
Cut up to 350,000 cubic yards; import fill up to 195,583 cubic yards.

7.8 Phases of Site Earthwork

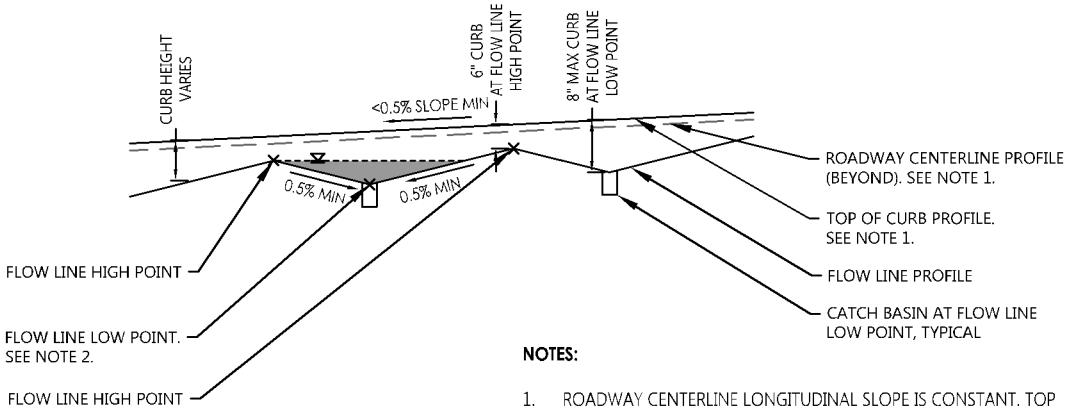
The Developer will grade the Project Site based on the principle of adjacency and as needed to facilitate a specific proposed Development Phase and consistent with the requirements of the DA. The new Development Phase will conform to the existing grades as close to the edge of the Development Phase area 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.

INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 7.0: CONCEPTUAL GRADING PLAN



SCHEMATIC PLAN OF TYPICAL SAWTOOTH GRADING



OPTION 1

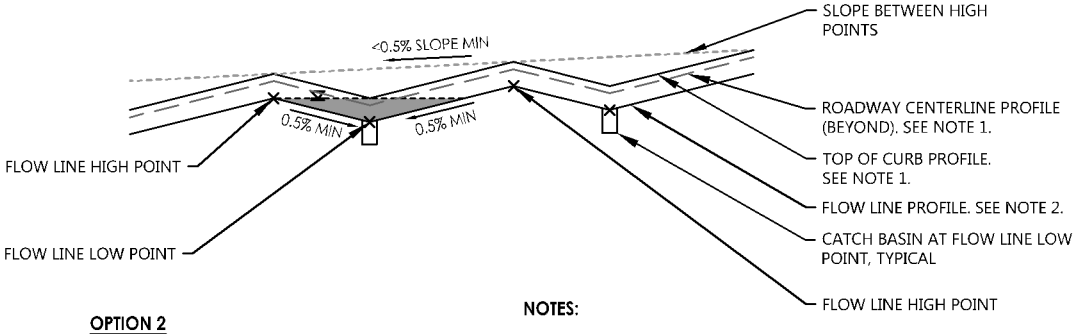
SCHEMATIC PROFILE OF FLOWLINE SAWTOOTH GRADING WITH CONSTANT SLOPE CENTERLINE AND TOP OF CURB

NOTES:

1. ROADWAY CENTERLINE LONGITUDINAL SLOPE IS CONSTANT. TOP OF CURB FOLLOWS ROADWAY CENTERLINE 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 SAWTOOTH 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.

Source: BKF ENGINEERS, 11/2016

8. STREET AND TRANSPORTATION SYSTEMS

8.1 Street and Transportation System Overview

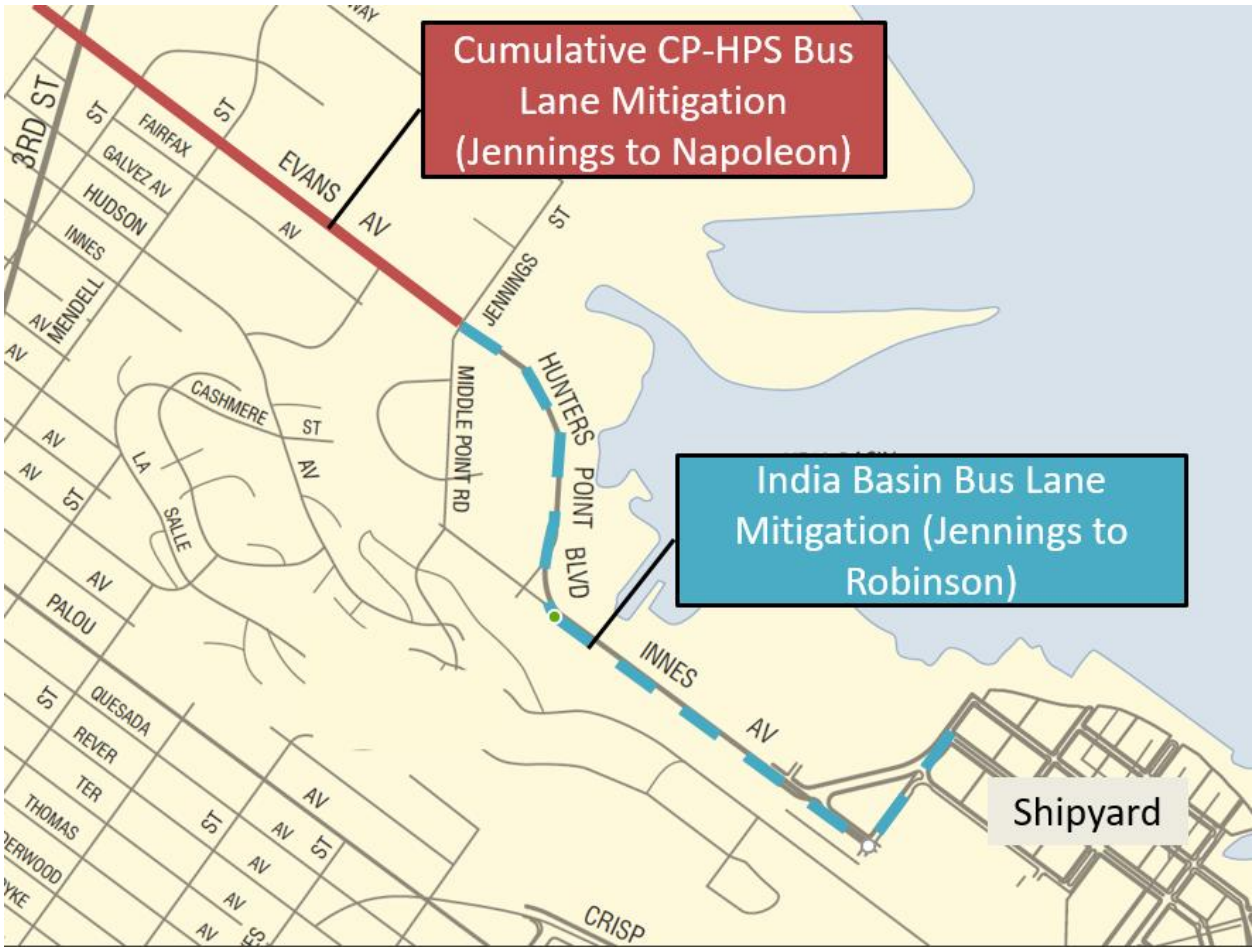
Following the guidelines and best practices detailed in the San Francisco Better Streets Plan (BSP), and the recommendations elaborated in the India Basin Transportation Action Plan (IBTAP), access and circulation at India Basin are considered holistically – integrating transit, bike, and pedestrian routes along with automobile, service and emergency vehicle access. The robust network of streets, laneways, pedestrian paths, trails, boardwalks, terraces, stairs and promenades creates a highly walkable, pedestrian-priority precinct that links into the surrounding neighborhood, connecting the Project Site to greater Bayview Hunters Point, and beyond.

8.2 Public Transportation

The site will eventually be served by several bus lines that run along Innes Ave, including the 44, 48 and HPX lines.

The City will be responsible for converting the curbside travel lane in each direction of the Evans Avenue—Hunters Point Boulevard—Innes Avenue—Donahue Avenue corridor from a mixed-flow lane to a transit-only lane between the Jennings Street/Evans Avenue/Middle Point Road and Donahue Street/Robinson Street intersections, to improve bus travel speed and travel time reliability along the corridor. The geographic extent is shown in the figure below.

The Developer shall fund, and the SFMTA shall implement, this conversion prior to the time the Project would result in an increase in transit travel time above the threshold of significance as described in the Project EIR, as determined through SFMTA monitoring. The project will provide electricity to locations on Innes adjacent to the project that are identified for Muni shelters. The final design will be determined by the SFMTA and construction of the design element will be subject to the City Traffic Engineer's final review and approval.



Other recommendations detailed in the IBTAP – including configuration of stop locations to access Northside Park, 900 Innes, and India Basin Shoreline Park – are currently being studied by SFMTA. Many of these transit improvements will be implemented as part of the Hunters Point Shipyard and Candlestick Point redevelopment effort.

The SFMTA ultimately will determine existing and planned transit access based on growth and development in the area.

8.3 Public Streets

The Developer will be responsible for the design and construction of public and private streets and other right-of-ways. Improvements will generally include the following:

- Pavement section

- Concrete curbs and gutters
- Concrete sidewalk and curb ramps
- Traffic control signs and striping
- Traffic signals
- Street lighting
- Street landscaping and trees
- Stormwater management facilities (may include such methods as landscape strips, and small 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 on-street parking spaces with adjacent curb ramps

The proposed primary point of entry into the site is Arelious Walker Drive, with Earl Street and Griffith Street serving as secondary points of entry. New Hudson Avenue provides the primary circulation route and retail corridor for the Project. Each of these access routes incorporates a pedestrian and/or transit friendly path to the site.

Arelious Walker Drive provides a generous pedestrian entry, bike sharing, and a transit plaza at the intersection with Innes Avenue. Widened sidewalk and bike sharing will be on the south side of the street with street parking on the north side.

Earl Street with its large trees marks the entry to the Project Site and creates a generous pedestrian zone. The northwest side of the street provides on-street parking and drop off adjacent to the potential school.

Griffith Street is the northernmost entry street and forms the interface with India Basin Shoreline Park. Griffith Street provides a generous pedestrian-oriented entry and clearly defined gateway to the Project Site.

New Hudson Avenue offers a dedicated two-lane class 1 bikeway that is separated from the vehicular zone by a 3′ planted buffer and 2″ curb, serving as the primary bicycle access to the site. The right-of-way configuration features pedestrian-orientated treatments with generous sidewalk dimensions and ample zone for planting and furnishings to enable a robust public realm. New Hudson Avenue links the primary public spaces of the Project Site including the Public Market, Town Triangles, and the Big Green to each other and adjacent properties.

New Hudson Avenue is the access way to the Flats neighborhood of the Project Site, encompassing Beach Lane, Fairfax Lane, and Spring Lane. All three streets in the Flats are considered Shared Public Ways as described in the Better Streets Plan (BSP) – accommodating requirements for infrequent, low-volume vehicular access in a one way loop while maintaining flexible community use and prioritizing pedestrians. Developer shall record a notice, acceptable to the City, against all properties adjacent to Shared Public Ways concerning flooding potential.. The design intent is to calm traffic moving through this area to create a safe environment for pedestrians that encourages public recreational use and socialization. In order to prioritize pedestrian use of the entire right of way over vehicles and bicycles, these streets have a smaller width than other streets throughout the site and are designated as one way streets with entrance from New Hudson Avenue onto Beach Lane. The Flats are not meant to be highly traveled by vehicles and therefore no on-street parking has been designated other than designated drop off and delivery zones.

8.3.1 Public Street Layout and Parcelization

The street layout for the Project advances the vision of the BSP and demonstrates best practices for multifunctional networks. The Project's access and mobility improvements integrate transit, bike, and pedestrian routes alongside automobile, emergency vehicle access, and scale-appropriate maintenance routes.

Parcels shall connect with public right-of-ways and/or open spaces through a circulation network comprised of publicly-accessible paths, throughways, and clear widths that are in accordance with accessibility standards that would be equivalent to public routes. Parcels are illustrated in Figure 8.0 Parcel and Setbacks Plan. Public street cross section locations are identified on Figure 8.1 and public street cross sections are shown on Figures 8.2 and 8.3. Dimensions within the right-of-ways are also provided in Table 8.0.

Table 8.0: Right-of-Way Dimensions

Street	Right-of-Way Width (feet)	Street Elements with Width(feet)
Griffith Street	44.5	3.5 BF(NW)/10-13 TL/13-15 TL/15 SW(SE)
Arelious Walker Drive	78	23 SW(NW)/ 7 P /11-13 TL/13-15 TL /22 SW(SE)
Earl Street	46*-64	15-25 SW(NW)/8 P/10-12 TL/13-15TL/0 SW**-10 SW(SE)
New Hudson Avenue	65-94	15 SW(N)/6 B/6 B/ 3-15 BF/ 10-13 TL/10-13 TL/ 15-26 SW(S)
Beach Lane	40.5	9 SW(NW)/ 10 DR/10 TL/6.5 SW(SE)/ 5 BIO
Fairfax Lane	40.5	9 SW(NE)/ 10 DR/10 TL/6.5 SW(SW)/ 5 BIO
Spring Lane	40.5	9 SW(NW)/ 10 DR/10 TL/6.5 SW(SE)/ 5 BIO

*Right-of-way dedicated by Project varies with sidewalk width

** Portion of the sidewalk shifts into Northside Park as Earl Street transitions northeast from Innes Avenue. Sidewalk location is tentative and pending approval from Northside Park.

Abbreviations

ROW	Right-of-Way	B	Bike Lane
TL	Travel Lane	BF	Buffer
SW	Sidewalk	DR	Drop off/Loading
BIO	Bioretention	N	North
S	South	E	East
W	West		

8.4 Streetscape Design Considerations

8.4.1 Traffic Calming

Traffic calming measures will be provided as part of an effort to create pedestrian-friendly streets and improve safety and access for non-vehicular modes of travel. Proposed traffic calming measures include raised crosswalks and curb extensions. In addition a shared public way is proposed for the streets in flats area, which is the cluster of development north of New Hudson Avenue and east of Arelious Walker Drive, including Spring Lane, Fairfax Lane, and Beach Lane.

Raised crosswalks are proposed at pedestrian crossings along Griffith Street, New Hudson Avenue, Arelious Walker Drive and Earl Street. At these locations the street pavement areas will be raised to match curb heights adjacent to the intersections and crosswalks. If accessibility guidelines and overland release requirements cannot be met at the raised intersection, the Project will review options for incorporating an at-grade crossing with accessible curb ramps at these locations. The design for these intersections and crosswalks will be coordinated with and is subject to the approval of the SFPUC, SFPW, the SFMTA, and the SFFD, each in their respective discretion. Designs will incorporate measures to minimize maintenance and reduce the potential for dirt, silt and other debris to settle within the crosswalks. Raised crosswalks will be constructed to conform to applicable San Francisco PW accessibility guidelines and Americans with Disabilities Accessibility Guidelines (ADAAG).

Curb extensions provide additional room for pedestrians at key locations. Developer shall design curb extensions to maximize pedestrian space and minimize crossing distances as much as feasible, while allowing for vehicle movement. Developer shall construct curb extensions to conform to the San Francisco PW Standard Plan for Curb Bulb. The PUCSFPUC also shall review and approve the plan for such extensions to ensure that there are no utility conflicts.

The **shared public way** in the flats is intended to prioritize pedestrians and maximize flexibility for neighborhood activity while accommodating requirements for vehicular access in a low-volume one-way loop serving residents of the neighborhood. The shared public way will conform to all applicable codes and standards (and obtain any required exceptions and design modifications) and be constructed to comply with better streets guidelines for shared public ways. The shared public ways slope to one side with a flush curb on the high side of the roadway and a four-inch curb at the low side of the roadway. Bioretention and drain inlets will be provided on the low side of the roadway. Developer shall record a notice, acceptable to the City, against all properties adjacent to Shared Public Waysshared public ways concerning flooding potential. Sections for the shared public ways are included in the Roadway and Utility Section Supplement.

8.4.2 Fire Department Access

Fire trucks will utilize the entire travel way for turning movements at intersections. Intersections will be designed to provide 7 feet clear when fire trucks enter on-coming travel lanes.

Developer shall submit to the City for its initial review the final street layouts and cross sections during the Major Phase and Sub Phase applications. The City's approval the final street layouts and cross sections shall occur as part of its review and approval of 100% design improvement plans. As part of this process, SFFD shall review and approve final configurations for conformance to the Fire Code. Refer to Vehicle Turning Supplement prepared by BKF Engineers (submitted concurrently with Infrastructure Plan) for detailed fire truck turning studies through proposed roadway network.

8.4.3 Street Pavement Structural Section

The structural section for new on-grade roadways will comply with requirements of the Subdivision Code. Roadway cross sections will consist of eight inches of Portland Cement Concrete and two-inch asphalt concrete wearing surface. Alternative cross sections such as asphalt wearing surface over Class 2 aggregate base, decorative paving, and porous

paving may be used if approved by SFPW and other affected City departments. The City shall own and maintain standard roadways. City, in its own discretion, may agree to own alternative materials or non-standard improvements, but a private entity shall maintain all such alternative materials or non-standard improvements subject to a City-approved major encroachment permit or equivalent agreement.

City shall own and maintain City-standard curb and gutter. City, in its own discretion, may agree to own sidewalks and non-standard curb conditions such as flush curbs at shared public ways, but a private entity shall maintain all such alternative materials or non-standard improvements subject to a City-approved major encroachment permit or equivalent agreement.

8.4.4 Streetlights

The Developer will design, layout, and install all proposed streetlights for the project. Street lighting shall comply with City standards for photometric light levels and acceptable fixtures. Developer shall install streetlights selected from the SFPUC streetlight catalogue unless the SFPUC approves an alternate fixture. All lighting, whether street level or pedestrian-scale, shall be of adequate height to avoid conflicts with City services such as debris collection. Where possible, the electrical service for the streetlights will be located outside the joint trench (refer to Section 16.3). Any pedestrian-scale lighting shall be the maintenance responsibility of a private entity subject to a City-approved major encroachment permit or equivalent agreement unless the SFPUC agrees to assume ownership and maintenance of such lighting.

8.4.5 Utility Separation

Utility main layout and separations will be designed in accordance with the Subdivision Regulations and SFPUC utility standards, as appropriate. Utility separation requirements are presented in Table 8.4 Horizontal Utility Main Separation Matrix and shown on Figure 8.4.

Table 8.4: Horizontal Utility Layout

Utility Separation	Storm Sewer	Sanitary Sewer	Sanitary Sewer Force Main	Potable Water (LPW)	Auxiliary Water Supply System (AWSS)	Non-Potable Water
Face of Curb	4.5' clear to OD (Ref 2, copied LPW)	4.5' clear to OD (Ref 2, copied LPW)	4.5' clear to OD (Ref 2, copied LPW)	4.5' clear to OD (Ref 2)	4.5' clear to OD (Ref 2, copied LPW)	4.5' clear to OD (Ref 2, copied LPW)
Storm Drain		3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (Ref 1)	4' clear OD to OD (Ref 1 & 3)	3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (Ref 1)
Sanitary Sewer		---	3.5' min clear OD to OD (Ref 1)	10' clear OD to OD (Ref 3)	3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (Ref 1)
Sanitary Sewer Force Main		---	---	10' clear OD to OD (Ref 3)	3.5' min clear OD to OD (Ref 1)	3.5' min clear OD to OD (Ref 1)
Potable Water (LPW)		---	---	---	4' clear OD to OD (Ref 1 & 3)	4' clear OD to OD (Ref 1 & 3)
Auxiliary Water Supply System		---	---	---	---	3' clear to OD pipe (Ref 1)

Ref 1: SFPUC Subdivision Regulations Diagram No. 1 Minimum Utilities Separation for Wastewater and Water – Separate Sewer System, dated October, 2014

Ref 2: SFPUC, Water Enterprise City Distribution division -Detail CDD-LP-001B, Sheet 2, Dated October 2017

Ref 3: CA Code of Regulations Title 22 Section 64572

OD: Outside edge of pipe

8.5 Traffic Control and Signalization

As shown in Figure 8.5 and described below, the Developer will be responsible for all design and construction funding of new traffic signals and other intersection improvements identified in this Section 8.5 unless specified otherwise. Traffic signals shall be designed by and constructed to the specifications of the SFMTA and SFPW, unless otherwise authorized by SFMTA and SFPW.

8.5.1 Jennings Street/Evans Avenue (Intersection 2)

The intersection of Jennings Street/Evans Avenue is currently all-way stop-controlled and will be signalized by others as part of the Shipyard project. The Project EIR recommends reconfiguring the southbound and eastbound approaches at this intersection upon construction of the first phase of development of the Project. The southbound approach will be modified to include a 100-foot left turn pocket, which will require restricting parking on the west side of the street, removing approximately five parking spaces. The eastbound approach will be reconfigured from one shared through/left lane, one through lane, and one 100-foot left turn pocket to one 100-foot left turn pocket, one through lane, and one shared through/right turn lane. No additional right-of-way will be required for the modifications on the eastbound approach.

8.5.2 Hudson Avenue/Hunters Point Boulevard/Hawes Street (Intersection 3)

Installation of a new traffic signal at the intersection of Hudson Avenue/Hunters Point Boulevard/Hawes Street will be performed as part of the Shipyard project. Additionally, the Developer shall construct a design element at this intersection to protect cyclists making left turns at the multi-lane signalized intersection of Hunters Point Boulevard/Hudson Avenue from the right bike lane on southbound Hunters Point Boulevard to the cycletrack on Hudson Avenue. This design element will not be necessary in the event that a Class 1 cycletrack is provided along the east side of Hunters Point Boulevard north of the intersection with Hudson Street prior to buildout of the Project. The design element would include one of the following two measures:

Installation of a bicyclist left-turn lane with separate bicycle signal heads and an accompanying dedicated signal phase for the maneuver, or installation of a two-stage turn queue box; which is a space where cyclists can wait at the far side of an intersection, adjacent to the crosswalks and visible to other roadway users after crossing in one direction. Cyclists could then cross the other direction of the intersection when the signal changes.

The final design will be determined by the SFMTA. Design and construction of the design element will be subject to final review and approval of the City Traffic Engineer.

8.5.3 Hunters Point Boulevard/Innes Avenue (Intersection 4)

The Recreation and Park Department as part of the Park development will be responsible for installing a new traffic signal at the intersection of Hunters Point Boulevard/Innes Avenue as part of the Project. Design and construction of the proposed signal will be subject to final review and approval of the City Traffic Engineer.

8.5.4 Innes Avenue/Griffith Street (Intersection 5)

The intersection of Innes Avenue/Griffith Street will be signalized as part of the Project. This improvement will include the provision of a new eastbound left-turn lane along Innes Avenue at the Innes Avenue/Griffith Street intersection. Design and construction of the proposed signal will be subject to final review and approval of the City Traffic Engineer.

8.5.5 Innes Avenue/Arelious Walker Drive (Intersection 6)

The intersection of Innes Avenue/Arelious Walker Drive will be signalized as part of the Project. This improvement will include the provision of a new eastbound left-turn lane along Innes Avenue at the Innes Avenue/Griffith Street intersection. Design and construction of the proposed signal will be subject to final review and approval of the City Traffic Engineer.

8.5.6 Innes Avenue/Earl Street (Intersection 7)

The intersection of Innes Avenue/Earl Street will be signalized as part of the Project. This improvement will include the provision of a new eastbound left-turn lane along Innes Avenue at the Innes Avenue/New Griffith Street intersection. Construction of the proposed signal will be subject to final review and approval of the City Traffic Engineer.

8.5.7 On-site Traffic Control and Signalization

Traffic calming and stop-controlled intersections, rather than signalization, are the primary strategy for on-site traffic control. Stop signs will be added as part of the Project at some of the intersections, with final locations to be coordinated with the City and based on a traffic sight distance requirements and project phasing. 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.

8.6 Public Bike and Pedestrian Systems

The Developer will design, layout and install public bike and pedestrian paths throughout India Basin. Bike and pedestrian systems will conform to all applicable codes and standards. Ownership and maintenance of bike and pedestrian pathways will be per the Finance Plan's Maintenance Matrix. For design elements and conceptual location of bike and pedestrian paths, refer to the Design Standards and Guidelines.

8.7 Acceptance of Improvements

Upon acceptance of the new and/or improved public streets by the City, responsibility for the operation and maintenance of the City-standard public right-of-ways and streetscape elements will be designated as defined in the various City of San Francisco Municipal Codes and Maintenance Matrix. Acceptance of water, storm drain, sewer, streetlight and power infrastructure shall be subject to SFPUC approval. Proposed water, storm drain and sewer infrastructure shall be designed to facilitate future access for maintenance. Developer shall minimize conflicts between proposed public 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, streetlights and power facilities in the design of the infrastructure and surface improvements. The SFPUC shall review proposals for surface improvements above and near proposed public water, sewer, storm drain, streetlight and power infrastructure on a case-by-case basis to ensure that future access for maintenance and replacement is preserved. Private property owners or their assignees as approved by the City shall maintain street improvements installed to meet the City of San Francisco Stormwater Management Requirements (SMR).

As outlined in the Maintenance Matrix, a private entity shall maintain and restore the non-standard street pavement materials, including decorative paving, within the raised intersection and raised crosswalk subject to a City-approved major encroachment permit or equivalent agreement. Restoration shall include replacement of the pavement markings within areas with special striping or decorative treatments.

8.8 Phasing of Improvements

The 700 Innes and India Basin Open Space properties will be developed over phases and shall comprise vertical and horizontal improvements to the existing site.

Phasing of Improvements will align development of parcels and open space to provide for adequate access, necessary utilities, water drainage, required mitigation, and early activation of shared amenities during build-out as defined by the Project. Phasing shall comply with the requirements elaborated in Chapter 8 of the India Basin Design Standards and Guidelines, and with the DA.

8.9 SFMTA Infrastructure

Where required, and where implemented in accordance with SFMTA standards, the following list of infrastructure items includes items to be owned, operated, and maintained by the SFMTA within public right-of-ways:

- Signals and Signal Interconnects, including Muni Bus Prioritization signals
- TPS signal preempt detectors

- Conduit containing TPS signal cables
- Transit shelters
- 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

The Developer shall design and construct all street and traffic signs as well as pavement markings to the specifications and approvals of the SFMTA.

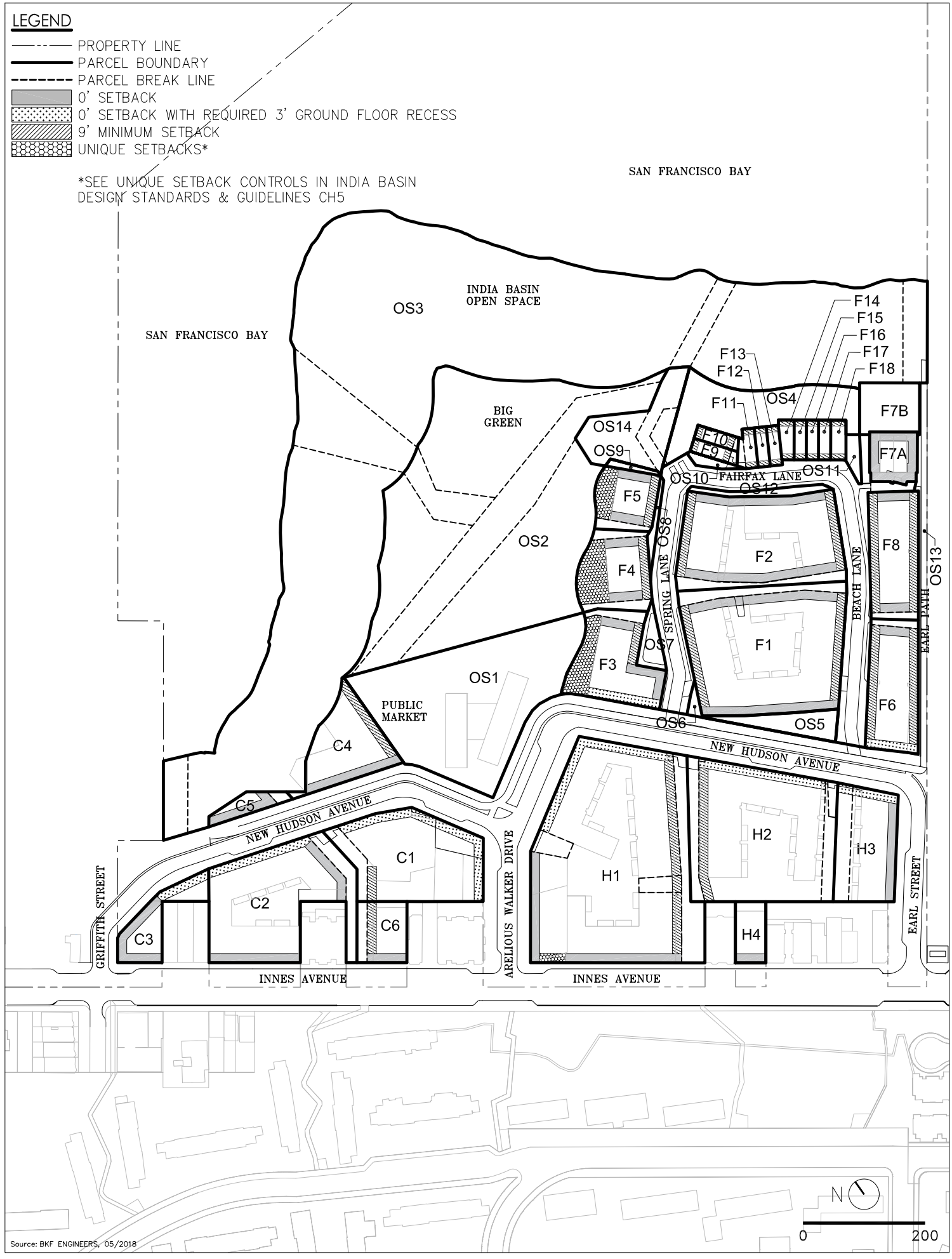


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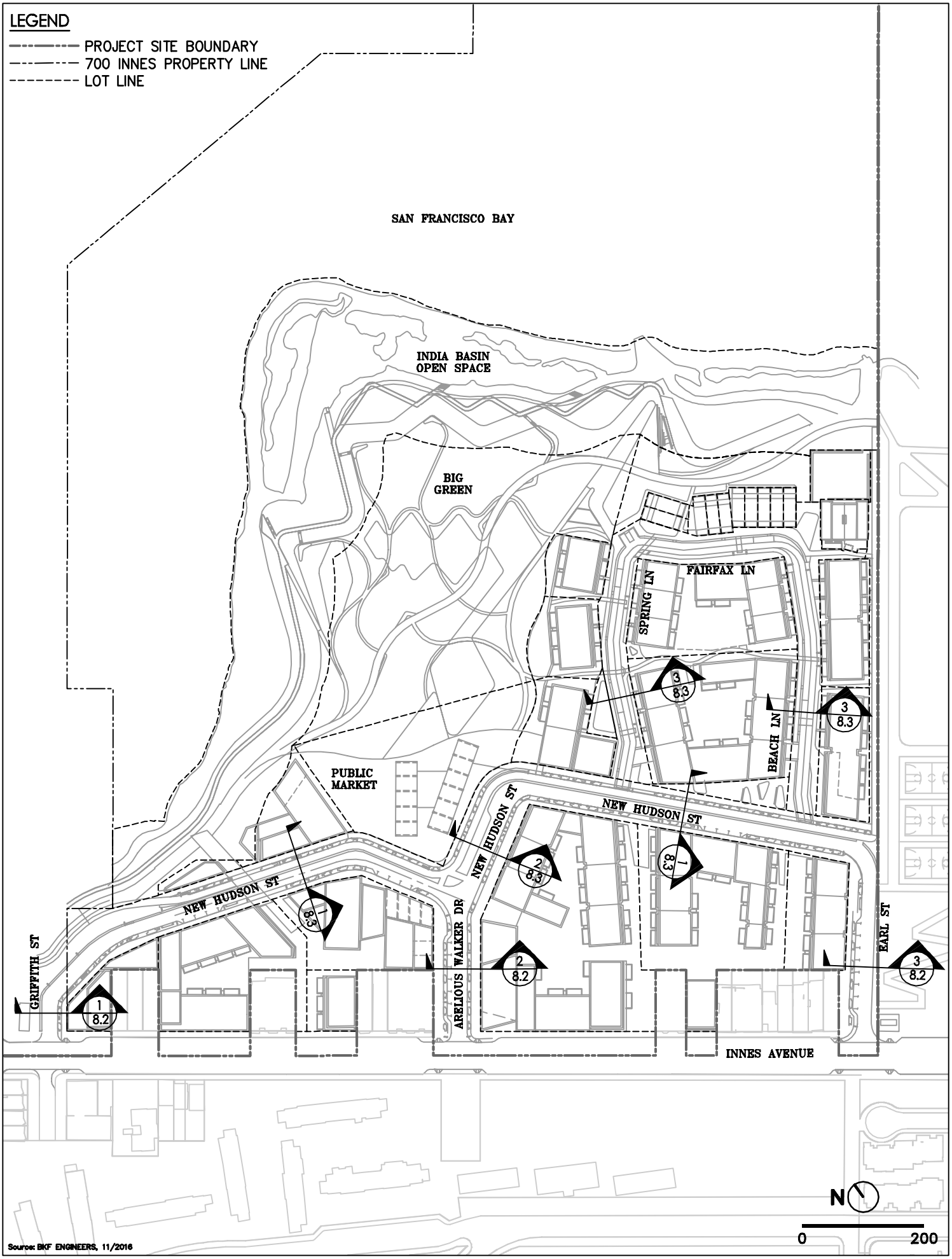
FIGURE 8.0: PARCELS AND SETBACKS PLAN



Source: BKF ENGINEERS, 11/2016

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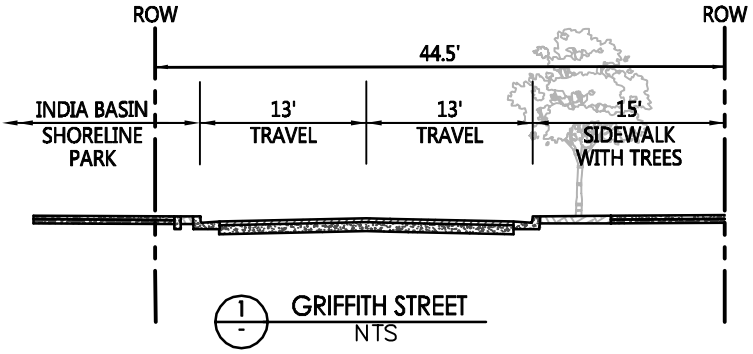
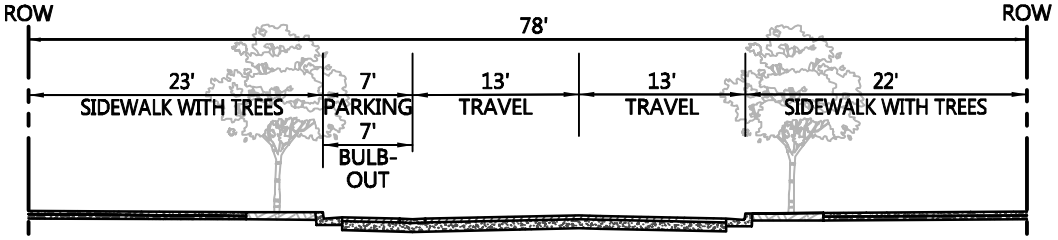
INDIA BASIN INFRASTRUCTURE PLAN

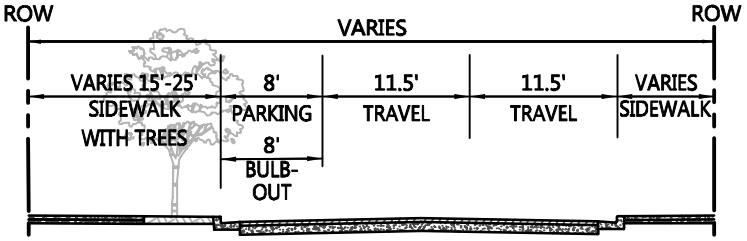
FIGURE 8.1: SITE PLAN



1 - GRIFFITH STREET
NTS



2 - ARELIOUS WALKER DRIVE
NTS



3 - EARL STREET
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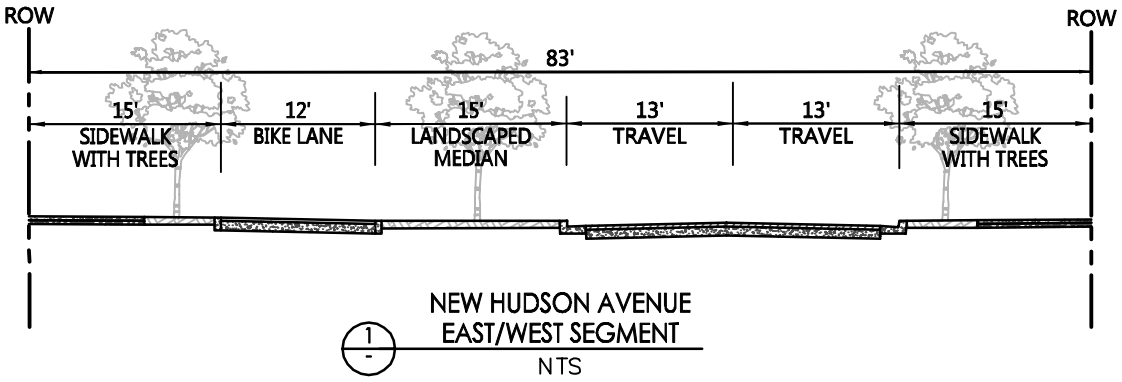
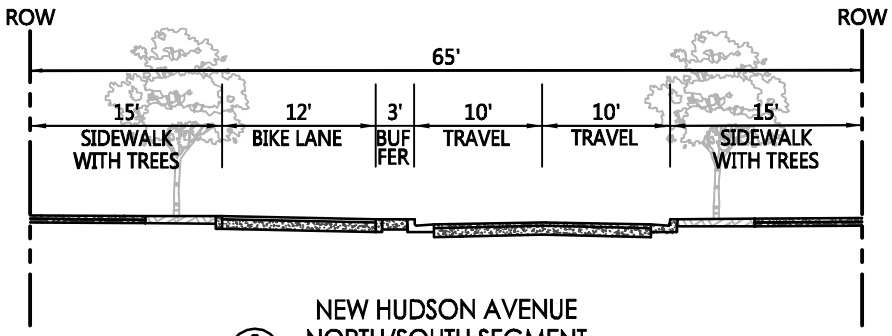
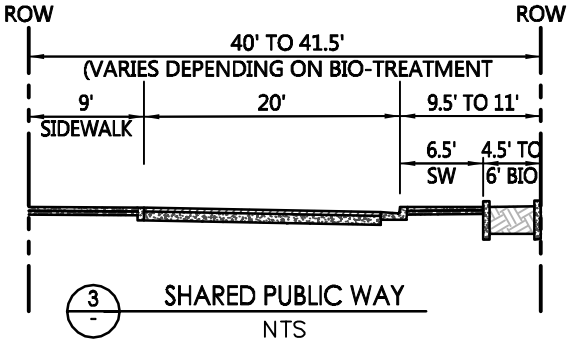


1 - NEW HUDSON AVENUE EAST/WEST SEGMENT
NTS

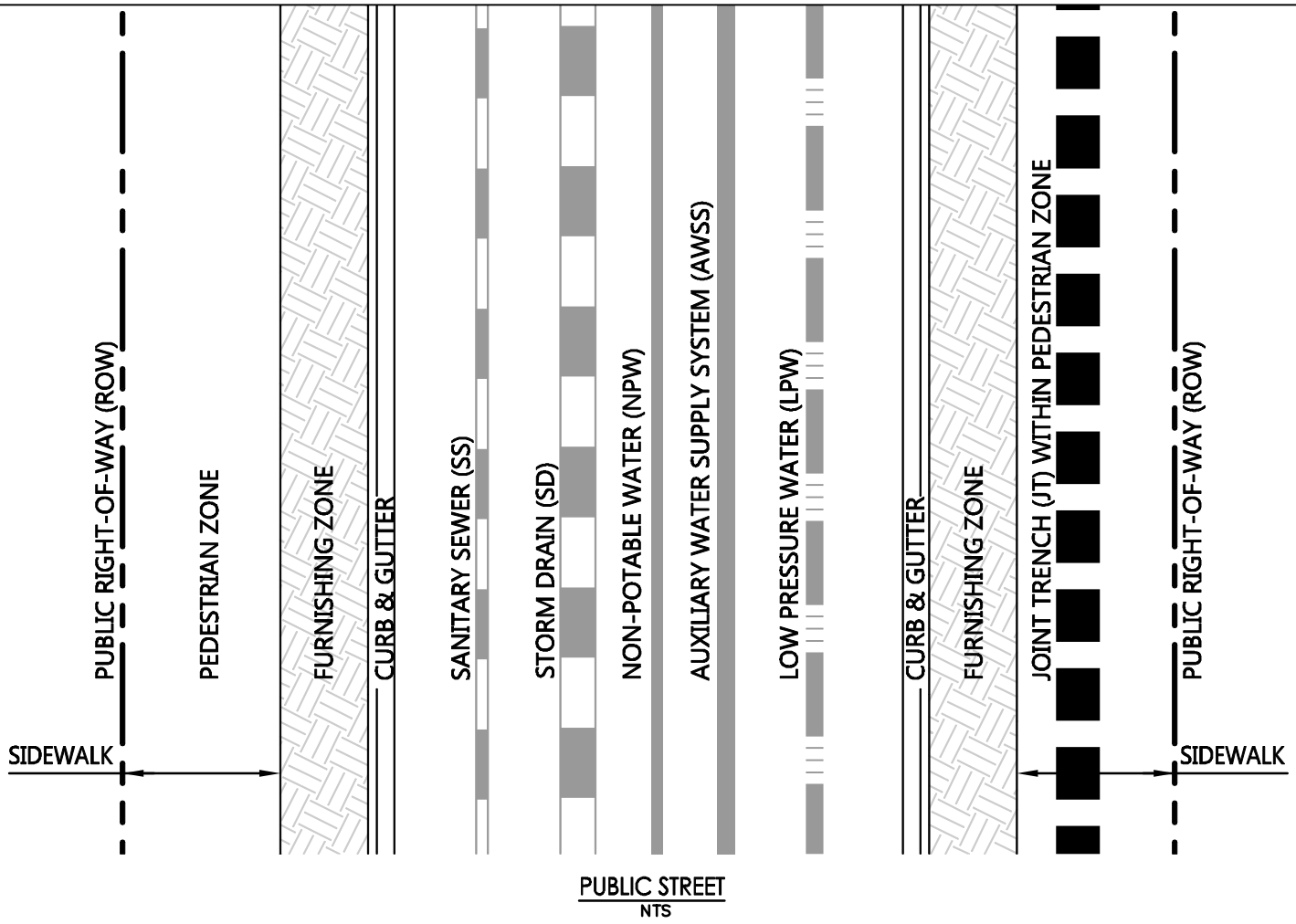


2 - NEW HUDSON AVENUE NORTH/SOUTH SEGMENT
NTS

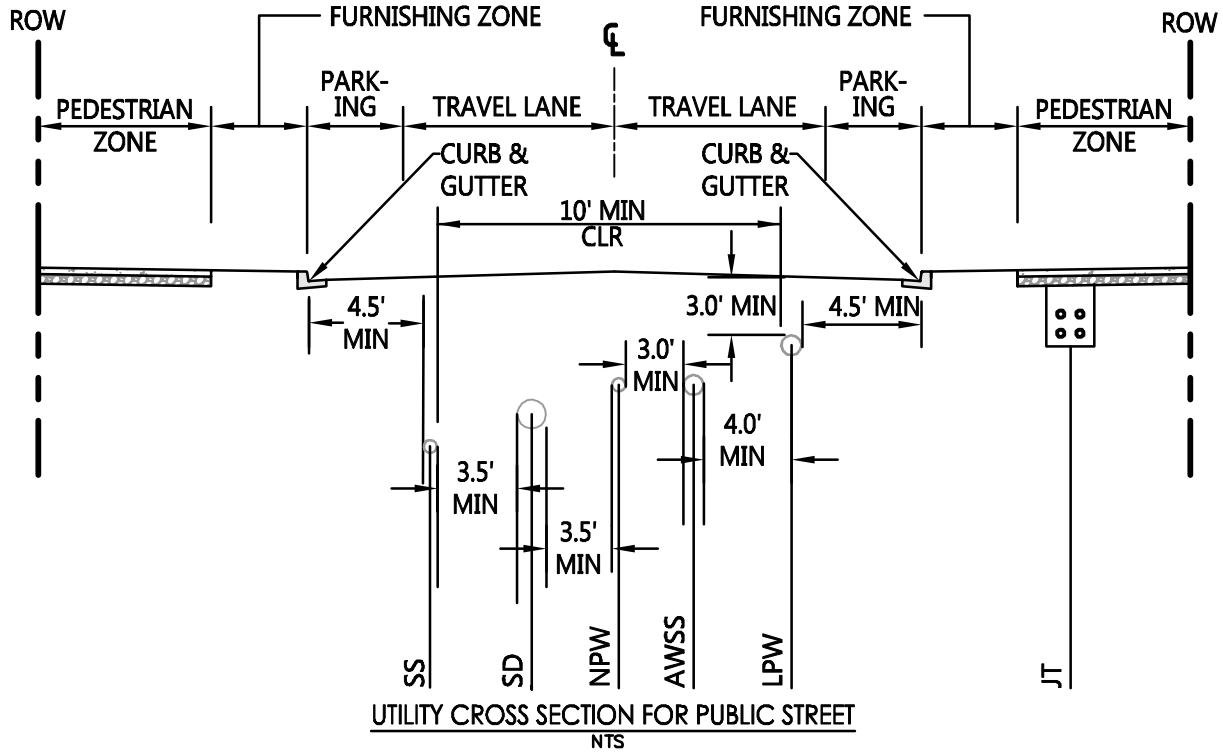


3 - SHARED PUBLIC WAY
NTS

Source: BKF ENGINEERS, 11/2016



PUBLIC STREET
NTS



UTILITY CROSS SECTION FOR PUBLIC STREET
NTS

Source: BKF ENGINEERS, 11/2016

DRAWING NAME: K:\Eng14\140089\DWG\Exhibits\Infrastructure Plan\PLOTTED SHEETS\Figure 8.1 Typical Utility Plan and Section.dwg
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PLOTTED BY: eade

FIGURE 8.4: TYPICAL UTILITY PLAN AND SECTION

\\FPSF03\Data\Projects\2015 Projects\SF15-0820_India_Basin_TIA\Graphics\GIS\MXD\BaseMap.mxd

INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 8.5: PROPOSED OFF-SITE INTERSECTION IMPROVEMENTS

9. OPEN SPACE AND PARKS

9.1 Proposed Public Parks

The Developer will construct one major public park—a new upland park known as the Big Green, in combination with an existing shoreline park known as the India Basin Open Space—and one major public plaza known as the Public Market Plaza as part of the Project. Land swap or parcel boundary realignment from State Lands and the City will be required to build the Big Green as proposed in the Design Standards and Guidelines. Stormwater management features will be incorporated into the park to treat stormwater generated on-site, promote site sustainability goals, and achieve compliance with the City SMR. Where feasible, blackwater management facilities may be incorporated into the park to treat blackwater, graywater and/or rain water generated from the Project, promote site sustainability goals, and achieve compliance with the SFPUC and Department of Public Health Guidelines. Figure 9.0 identifies the locations and areas of the proposed public parks at the Project Site. Wetlands will be incorporated into the park as mitigation for removed waters of the United States in the form of seasonal wetlands currently located on the Project Site. Park and Plaza improvements, which may include natural areas, play areas, public art and installations, a human-powered boat launch, trails and overlooks, an off-leash dog run, small to medium public pavilions, and gardens are described in detail in the Design Standards and Guidelines. Developer shall design and install these park and infrastructure improvements, including stormwater collection facilities, stormwater management facilities, blackwater management facilities, irrigation systems, drinking fountains, and fire hydrants, per applicable City standards. Park design shall be reviewed and approved by the Recreation and Park Department and as required by law. In addition, SFPW, and SFPUC prior to permit issuance shall inspect the parks and infrastructure improvements for compliance with the approved plans prior to being sanctioned for use. Stormwater Control Plan(s) for public improvement permits must be approved prior to issuance by SFPW.

9.2 Phasing, Operation and Maintenance

The Developer will construct the park improvements in phases to match the need for parkland generated by each of the phases in the Project DA, as well as the availability of utilities to each park area. Construction triggers that will dictate the completion of the proposed public park improvements are described in the DA. The maintenance of improvements within the parks, including stormwater management facilities within the park, will be funded through a mix of public and private sources and completed in part by the Recreation and Park Department and private contractors, as described in the DA. Phasing of stormwater management facilities to be located in open space and parks is defined in Section 15.4.

INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 9.0: PROPOSED PARKS AND PLAZAS

10. LOW PRESSURE POTABLE WATER SYSTEM

10.1 Existing Low Pressure Water System

Existing low pressure water (LPW) service to the Project Site is provided by a water supply, storage and distribution system owned and operated by SFPUC. The system provides domestic water supply and low-pressure fire hydrants. The existing LPW system includes an 8-inch and a 16-inch water main on Innes Avenue which will remain and two 8-inch water lines on Arelious Walker Drive that the Developer will remove or abandon with Project development.

10.2 Proposed Low Pressure Water System

10.2.1 Project Demands

The Project water demands are identified in Table 10.0 for the Proposed Residential Project and the Maximum Commercial Variant, and are also included in the Low Pressure Water Master Plan (LPWMP). The LPWMP outlines the Project's methods used for calculating domestic water demands, including specific unit water demands used.

Table 10.0: Project Domestic Water Demands

	Residential Project	Commercial Variant
Average Day Demand (ADD)	132 gpm	107 gpm
Maximum Day Demand (MDD) (Peaking Factor 1.2)	158gpm	128 gpm
Peak Hour Demand (PHD) (Peaking Factor 2.65)	350 gpm	284 gpm
Required Fire Flow	Varies-3,125 gpm max	Varies-3,125 gpm max
Maximum Day Demand (MDD + Fire Flow)	Varies-3,283 gpm max	Varies-3,253 gpm max

10.2.2 Project Supply

As required by the California Water Code, SFPUC prepared and approved a Water Supply Assessment (WSA) for the Project, and approved the WSA through Resolution 18-0107 on June 26, 2018. SFPUC concluded that there are adequate water supplies to serve the

Project and cumulative retail water demands during normal years, single dry years, and multiple dry years over a 20-year planning horizon.

10.2.3 Proposed Distribution System

The Developer's Infrastructure obligations include the design and construction of the proposed LPW distribution system within the areas described in Section 1.2. The proposed LPW distribution system is shown in Figure 10.0. The proposed LPW distribution system will connect to the existing LPW system at Innes Avenue and will be located within the paved area of the street.

Vertical and horizontal separation distances between adjacent sewer system, stormwater system, non-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. Figure 8.0 shows typical utility alignment and roadway sections.

Required disinfection of new mains and connections to existing mains must be performed by SFPUC at Developer's cost.

10.3 Low Pressure Water System Phasing

The Developer will design and construct 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 DA. 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. Developer shall design and construct repairs and/or replacement of the existing facilities necessary to support the proposed Development Phase. Temporary LPW systems will be constructed, owned, 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 SFPUC-owned LPW facilities. Impacts to improvements installed with previously constructed portions of the Project due to

the designs of other phases will be the Developer's responsibility and addressed prior to approval of the construction documents for the new Phase.

For each Development Phase, the Developer will provide a Low Pressure Water Utility Report describing and depicting the existing LPW infrastructure and the proposed phased improvements and demonstrate to SFPUC's satisfaction that the Development Phase will provide the required pressure and flow.

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INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 10.0: LOW PRESSURE WATER LOCATION

11. NON-POTABLE WATER SYSTEM

The Project Site is within the Designated Recycled Water Use Area as determined by San Francisco Public Works Code Article 22. The Project's non-potable water-use will comply with San Francisco's Non-Potable Water Program, and also minimize the Project's overall use of potable water. Required uses for non-potable water (NPW) include toilet flushing and irrigation. The Project also plans to use NPW to meet building cooling demands, as well as to irrigate adjacent parklands if the Recreation and Park Department, in its sole discretion, determines that this is acceptable and can reach an agreement with the Developer to address this use.

11.1 Existing Recycled Water System

The Project is located within the City's designated recycled water (RW) use area, however a City recycled water system is not currently available within or near the Project Site.

11.2 Proposed Non-Potable Water System

The Project will either implement parcel-based graywater reuse systems or a district-wide Decentralized Non-Potable Water Reuse System (DNWRS) to comply with the City's Non-Potable Water Program. The Developer's Infrastructure obligations include the design and construction of either the DNWRS or a NPW distribution system as shown in Figure 11.0, further described in Section 11.2.3.

11.2.1 Project Demands

The Project NPW demands are identified in Table 11.2 and in the Non-Potable Water Master Plan (NPWMP). The NPWMP outlines the Project's methods used for calculating non-potable water demands, including specific unit water demands used.

Table 11.0: Project Non-Potable Water Demands

	Residential Project	Commercial Variant
Average Day Demand (ADD)	42 gpm	54 gpm
Max Day Demand (MDD) (Peaking Factor 1.4)	59 gpm	76 gpm
Peak Hour Demand (PHD) (Peaking Factor 3.0)	126 gpm	162 gpm

11.2.2 Parcel-Based Graywater

A City source of RW is not available at the Project Site. Should the Project proceed with parcel-based graywater to address NPW demands, each parcel will implement graywater reuse to supply NPW demands within the building. In the event the irrigation of parks and open space can be provided with pipes from adjacent buildings, the Project would file an application for an exemption from requirements for RW in the proposed roadway network, and a RW distribution network would not be installed if the exemption is granted. In the event an exemption is not granted, a RW distribution system would be installed with cross-connections to the LPW system within the site, but not extending outside Project Site.

11.2.3 District DNWRS

The DNWRS system, if implemented, will be located north of the Public Market and west of Spring Lane in the Big Green. The DNWRS may collect blackwater, graywater, and/or rainwater from the Project, and will include the following in one centralized location: feed tank, trash trap, bioreactor, disinfection and storage tank, and possibly heat recovery. Wastewater flows in excess of the non-potable demand will be discharged to the municipal sewer. Liquid waste from the reactor is assumed to be discharged to municipal sewer or be hauled away by truck to a location permitted to accept liquid waste, in compliance with the hazardous Materials Business Plans for Wastewater Treatment and Reuse Systems. Trash trap waste is assumed to be disposed of with other landfill waste. The DNWRS will be enclosed and odor control unit(s) will be installed and vented to the atmosphere. The footprint of the facility will be approximately 10,000 to 20,000 square feet and will be sized for a total capacity up to 150,000 gallons per day (depending on final Project demands) and designed to allow expansion of the treatment capacity by phase.

Should the project proceed with the Decentralized Non-Potable Water Reuse System, the following would apply:

11.2.3.1 Proposed Non-Potable Water Supply

With a DNWRS, NPW will be supplied by a DNWRS that will divert flows from the sewer system, treat these flows, and generate NPW for use on site. Excess sewer flow would be pumped to Innes Avenue for discharge to the City's sewer system in Innes Avenue which would require agreement with SFPUC.

11.2.3.2 Proposed Distribution System

Under the DNWRS scenario, the Developer's Infrastructure obligation includes the design and construction of the proposed non-potable water distribution system within the Project Site as shown on Figure 11.0. A private entity may own and operate the NPW system once complete with a Major Encroachment Permit, or alternatively, the Developer may explore the possibility that the SFPUC would own and operate the NPW distribution system. The NPW system consists of the backbone improvements - such as NPW mains, fittings, and valves – but does not include the service laterals, meters, and appurtenant installations. Developer may request to defer installation of laterals in certain cases where the adjacent vertical development will lag the infrastructure construction. The City, in its discretion and subject to a case-by-case determination and any conditions deemed appropriate, may approve such a request as an exception.

Vertical and horizontal separation distances between sanitary sewer system, storm drain system, NPW 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 and the Subdivision Regulations. Utility Section Supplement showing each proposed street section with proposed utilities is submitted concurrently with this Infrastructure Plan. Figure 8.4 shows typical utility alignment and roadway sections.

11.3 Non-Potable Water System Phasing

The Developer will design and install the new NPW 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 DA. 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.

The operator of a DNWRS will be responsible for the new, phased NPW facilities once construction of the improvements is complete, and a major encroachment permit will be needed for the NPW distribution system. Developer shall be responsible for impacts to improvements installed with previously constructed portions of the Project due to the designs of other phases. Developer shall address such impacts to City's satisfaction prior to approval of the construction documents for the new Phase.

For each Development Phase, the Developer will provide a Non-Potable Water Utility Report describing and depicting the existing NPW infrastructure and the proposed phased improvements and demonstrate that the Development Phase will provide the required pressure and flow.

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INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 11.0: NON-POTABLE WATER LOCATION

12. AUXILIARY WATER SUPPLY SYSTEM (AWSS)

12.1 Existing AWSS Infrastructure

The SFPUC, in cooperation with the 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 there is an AWSS main in Evans Avenue which does not extend to Project frontage. Additionally, there is AWSS that will be constructed east of the Project Site in Innes Avenue by the Candlestick-Hunters Point Shipyard Development. The AWSS Study dated January 23, 2009 included potential AWSS expansion areas extending AWSS from Evans Avenue along Innes Avenue to the eastern frontage of the Project Site, which could be connected to the Candlestick-Hunters Point Shipyard Development improvements.

12.2 AWSS Regulations and Requirements

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

12.3 AWSS Phasing

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 DA. 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.

Impacts to improvements installed with previously constructed portions of the Project due to the designs of other phases will be Developer's responsibility and addressed prior to approval of the construction documents for the new Phase.

For each Development Phase, the SFPUC, in conjunction with its consultants, will provide alternatives showing pipe alignment and size at varying fire flows, and the final decision will be negotiated between SFFD and the developer. The construction documents will be completed by the Developer for review by the SFPUC.

13. SEPARATED SEWER SYSTEM

13.1 Existing Sewer System

The Project Site is located in the City's MS4 area. Approximately half of the Project Site is located within the separate storm and sewer system area and the other half is within the combined sewer area. The existing sewer system in place consists of a 12-inch gravity line and a 6-inch sewer force main in Arelious Walker Drive.

13.1.1 Service Area

The Project Site is located on an approximately 23.1 acre site in the Bayview Hunters Point neighborhood, consisting of 6.2 acres of Open Space and 16.9 acres of private parcels and platted streets.

13.1.2 Existing Demands

Based on the October 13th, 2016 memorandum by Sherwood Design Engineers, the existing sanitary sewer generation averages 4,472 gallons per day and a maximum demand of 10 gallons per minute.

13.1.3 Gravity Collection System

The existing sewer system consists of a 12-inch gravity line which drains to the 21-inch combined sewer main in Innes Avenue, flowing east to west and ultimately increasing to a 30-inch main continuing west to the wastewater treatment plant at Arelious Walker Drive.

13.1.4 Pump Station

There is an existing pump station at the end of Arelious Walker Drive to pump wastewater into the force main for discharge into an SFPUC manhole at the intersection with Innes Avenue. These facilities were never conveyed to the SFPUC and are currently unused (the lots created when Arelious Walker Drive was constructed have never been developed). There is no pump within the pump station; and the system will be demolished as part of the Project.

13.2 Proposed Sanitary Sewer System

Stormwater will be managed separately from wastewater as it is the intent to change the designation of the Project Site to be fully encompassed by the MS4 separate sewer area (see Section 14). To serve the Project, a dedicated sanitary sewer (SS) collection system will be constructed throughout the Project Site and will be offered for dedication to the SFPUC for ownership and maintenance.

As noted in Section 11, the project will either construct a DNWRS or will construct NPW reuse systems at each building. Should the Project not proceed with implementation of the DNWRS, NPW distribution mains will be temporarily connected to the LPW system located in Innes Avenue until RW is supplied to the Project Site by the City.

The current design assumes that a DNWRS is constructed, and that the majority of the wastewater generated will be treated and reused in the on-site NPW system. The DNWRS will only treat wastewater needed to meet on-site NPW demands. Excess wastewater will be pumped to Innes Avenue for discharge to the City's sewer system in Innes Avenue.

Wastewater generation, collection infrastructure, and treatment and discharge volumes to City infrastructure for both scenarios are described in the following sections.

13.2.1 Drainage Areas

Due to the site topography, the Project Site will be divided into three main sewersheds, as shown in Figure 13.0. All sewersheds ultimately culminate at the location of the DNWRS. A diversion structure will route the required flow to serve non-potable demands to the DNWRS (See Section 11.2—Proposed Non-Potable System). One pump station, located adjacent to the DNWRS, will pump sewer flows that are not diverted to the DNWRS for on-site treatment to the existing sewer in Innes Avenue (See Section 13.2.4).

All gravity piping, force mains and pump stations will be sized to match anticipated sanitary sewer flows as further described in Sections 13.2.2 through 13.2.5.

13.2.2 Sanitary Sewer Flows

Wastewater generation is driven by potable and Non-Potable demands outlined in Sections 10 and 11, respectively. Average Dry Weather Flows (ADWF) are assumed to be 95% of the total interior water demand (based on an average of 5% consumptive water uses across all building-use categories). ADWF, Peak Dry Weather Flows (PDWF), Average Wet Weather Flows (AWWF), and Peak Wet Weather flows (PWWF) are shown in Table 13.0. Detailed sanitary sewer flow calculations can be found in the Sanitary Sewer Master Plan.

TABLE 13.0: PROJECT SANITARY SEWER FLOWS

Parameter		Residential Project	Commercial Variant
Average Dry Weather Flows (ADWF),	95% of Interior Water Demand	148,570 gpd	112,580 gpd
Peak Dry Weather Flows (PDWF)	PDWF = 3 * ADWF	445,700 gpd	337,730 gpd
Average Wet Weather Flows (AWWF)	AWWF = ADWF + infiltration	175,990 gpd	139,990 gpd
Peak Wet Weather Flows (PWWF)	PWWF = PDWF + infiltration	473,120 gpd	365,140 gpd

13.2.3 Proposed Gravity Collection System

The public sewer systems will be designed per Subdivision Regulations and SFPUC standards. In subdivision processing, including the review and approval of subdivision improvement plans, the Developer shall propose the precise location and final design of the wastewater systems. This proposal shall be consistent with this Infrastructure Plan and regulatory requirements, including the SFPUC design standards and specifications.

A conceptual layout and preliminary sizing of the proposed wastewater collection system is shown on Figure 13.0. The minimum allowable SS pipe size (8 inches) will be sufficient to convey PWWF for the majority of the gravity SS mains throughout the Project Site. The maximum pipe size is 12 inches. Refer to the Sanitary Sewer Master Plan (SSMP) for detailed information on sanitary sewer design criteria, hydraulic calculations and methodology.

13.2.4 Pump Station

One pump station is currently proposed and will be sized to convey the peak flow as described below. The proposed pump station will be located adjacent to the DNWRS, at the termination point for all on-site sewer lines. This station will pump sewer flows that are not diverted to the DNWRS for on-site treatment into a force main that will connect to the existing combined sewer in Innes Avenue. The proposed pump station location is shown in Figure 13.0. The pump station shall be built to Hydraulic Institute (HI) standards and will include duplex pumps, alarm systems and emergency backup power connections.

The pump station and force main will be sized to handle the PWWF for the Project at full-buildout to ensure both have adequate capacity to accommodate all wastewater production during times when there is limited demand for NPW or the DNWRS is taken off line for maintenance. PWWFs for the entire project are presented in Table 13.2 and will require installation of a 6-inch force main between the pump station and Innes Avenue.

TABLE 13.2: PUMP STATION AND FORCE MAIN PEAK FLOW RATES

Contributing Sewershed	Force Main Pipe Diameter (in)	Project Scenario	PWWF (gpm)	PWWF Total Dynamic Head (ft)
All	6	Residential	329	60.1
		Commercial	254	66.7

In the event that the pump station fails, adequate storage will be included for two days of the peak day volume.

13.2.5 On-Site Treatment

A DNWRS is proposed in the location shown on Figure 13.0. The wastewater treatment process will meet California Code of Regulations (CRC). The treated wastewater must meet SF Department of Public Health's water quality requirements for blackwater per Health Code Article 12C for tertiary disinfected NPW intended for unrestricted reuse application including: landscape irrigation, cooling tower make-up and toilet flushing. Monitoring of

and reporting on treatment performance as well as system controls and operations will meet local and state standards.

Average daily flows to be treated at the DNWRS are driven by the Project Site's recycled water demands; the remaining site-generated wastewater will be discharged to the City's combined sewer. Alternatively, this wastewater could be treated for export offsite in a district scale NPW reuse scheme. This water would be available for neighboring park parcels or others to purchase, and would require an agreement with adjacent owners/projects if the system is private operated.

Table 13.3 indicates the anticipated average daily flows treated on-site versus discharged off-site to the public sewer. Detailed analysis is included in the SSMP.

TABLE 13.3: ON-SITE TREATMENT AND DISCHARGE TO CITY SEWER

	Residential Project	**Commercial Variant**
On-site Treatment, gpd (% of Total Site WW)	74,030 (48%)	92,804 (76%)
Discharge off-site, gpd (% of Total Site WW)	81,609 (52%)	28,999 (24%)

13.2.6 Solids Management

The management of solids will be carefully considered as part of the DNWRS design. It is anticipated that screenings will be washed and compacted as part of the unit operation. These solids, consisting of items such as rags and plastics, will be contained in a roll-off bin system and hauled offsite periodically. Should an activated sludge process be selected, primary sedimentation will not be required and the majority of the solids produced will be biological solids wasted from the activated sludge process. In this case, a waste activated sludge pumping system would return these solids to the municipal sanitary sewer system for treatment at the Southeast Treatment Plant. Should a fixed film process (e.g., recirculating packed bed filter, treatment wetlands) be selected, the majority of solids produced onsite will be primary solids. These solids would be periodically removed from primary sedimentation tanks via pump-out ports. These solids can be removed from the

site in vactor trucks or liquefied and pumped into the municipal sanitary sewer based on a mutually agreed upon arrangement between the Developer and the City.

13.3 Separated Sewer System Phasing

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 DA. 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. Temporary sanitary sewer may be constructed and maintained by the Developer as necessary to maintain service to existing buildings.

13.4 Ownership & Maintenance

All sanitary sewer conveyance and pump station infrastructure will be publicly owned and located within the public ROW, City-owned property, or a utility easement. All utility easements and fee dedications will require SFPUC review and approval on a case-by-case basis.

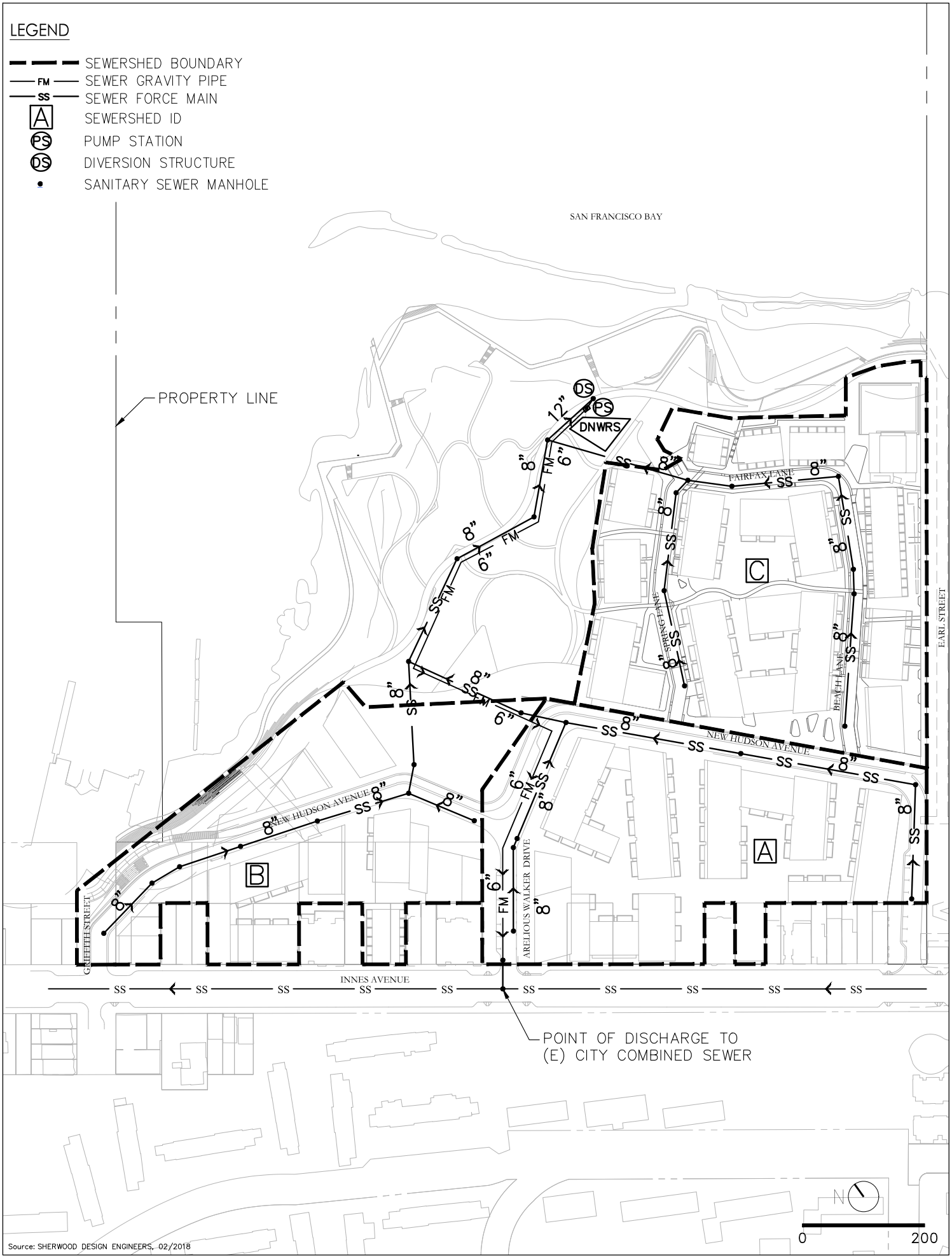
Ownership of on-site wastewater treatment infrastructure (DNWRS, diversion structure and associated infrastructure) will be determined during the first Development Phase; several arrangements are possible and will be evaluated as the project progresses. All ownership and O&M arrangements will comply with requirements of Article 12C of the City and County of San Francisco Health Code. The ownership and maintenance alternatives being evaluated include:

- 3rd Party: The Developer would be responsible for contracting a 3rd party to own and operate the DNWRS. The Developer would set up a maintenance entity (Community Facilities District) to pay for on-going operation of the DNWRS by the 3rd party contractor.

- City owned & operated: The DNWRS would be offered for dedication to SFPUC and, if accepted, the SFPUC would own and maintain the facility.

In the event that at the time of infrastructure permitting recycled water is available to the Project, on-site wastewater treatment infrastructure would likely not be constructed. In this alternative, recycled water would be provided via this presumably public.

In all scenarios, all SS conveyance infrastructure will be publicly owned and located within the public ROW or a utility easement. The pump station will be publicly owned and located on property owned in fee by the City.



INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 13.0: PROPOSED SANITARY SEWER SYSTEM

14. STORMWATER SYSTEM

14.1.1 Existing Stormwater System

The Project Site is primarily undeveloped and the entire site slopes to the north from Innes Avenue toward the Bay. This slope varies from five to ten percent between Innes Avenue and the New Hudson Avenue right-of-way, where it then flattens to between one and two percent. The dry land portions of the site terminate at an eight- to ten-foot high embankment at the edge of the Bay. Within the flatter area below New Hudson Avenue, several small mounds of dumped fill rise between 15 and 20 feet above the surrounding terrain, all located on the east side of Arelious Walker Drive.

Approximately half of the Project Site, including all of Arelious Walker Drive, is currently located within the MS4 area, as designated by the SFPUC. The only storm drain infrastructure on the site is a series of catch basins and 12-inch storm drain line in Arelious Walker Drive. This line flows downhill to an inactive pump station inside a locked utility fence adjacent to the Bay, from which the project survey indicates a 14-inch force main connects this system up to the Innes Avenue combined sewer at the intersection with Arelious Walker Drive.[2] There is an existing 36" concrete stormwater outfall located just north of Arelious Walker Drive extending through existing wetlands adjacent to the San Francisco Bay. It is uncertain if this structure is in use. The structure will be demolished as part of the Project.

Given that the Arelious Walker Drive storm drain system is the only existing facility on the undeveloped portions of the Project Site, the majority of rainfall is currently either absorbed into the ground or runs off as overland sheet flow to the Bay shoreline. There are no records of storm drain connections for the existing improved properties, but it is assumed the runoff from building roofs and front yard areas is discharged through lateral connections to the Innes Avenue combined sewer. Because the terrain drops away sharply from Innes, the rear portions

[1] It is noted that a pumped stormwater connection to the City sewer is not consistent with the SFPUC Separate Sewer (MS4) Area designation that covers nearly half of the Project Site, including all of Arelious Walker Drive, thus confirming the fact that these improvements were never conveyed to the SFPUC.

of these lots most likely drain north to the vacant part of the site and the Bay. The existing storm drain infrastructure described above is shown in site survey included in Appendix A.

14.1.2 Proposed Stormwater System

The Project plans to collect all stormwater runoff in a storm drain network for discharge to the San Francisco Bay (The Bay). This will require expanding the extent of the City's NPDES Phase II Municipal Separate Storm Sewer System (MS4) Permit. These permits set the stormwater treatment requirements per the San Francisco Bay Region of the California Regional Water Quality Control Board (CRWQCB). The Project proposes to change the MS4 boundary such that the Project Site is fully encompassed by the MS4 permit to discharge treated stormwater to The Bay. The Developer is responsible for initiating and completing the application, providing a schedule and plan, and identifying all new outfalls.

Stormwater conveyance infrastructure is described in this section; Section 15 includes further detail on stormwater quality management.

14.1.3 Drainage Areas

The Project consists of multiple blocks of mixed-use development, with residential and commercial buildings surrounding courtyards built on podiums, as described in Section 1. These improvements, which include new public roadways on both existing and reconfigured right-of-ways, will be spread along the entire Innes Avenue frontage and extend almost to the Bay along the Project Site's easterly boundary. The remainder of the Project will be a combination of public and privately owned open space (referred to as "The Big Green") along the Bay shoreline and in the northwestern part of the Project Site. Open space, planters on podiums and unpaved portions of the public roadways will be considered as pervious for the estimation of stormwater runoff. Table 14.0 summarizes the planned land cover for both the Commercial and Residential variants described in Section 1, which do not vary despite the difference in land use.

TABLE 14.0
Proposed Land Cover

	Pervious Area		Impervious Area		Total Area	
	Ac	%	Ac	%	Ac	%
Developed Areas	1.7	10%	15.4	90%	17.1	100%
India Basin Open Space	5.4	90%	0.6	10%	6.0	100%

The Project Site is divided into four main watersheds, labeled A-D in Figure 14.0. The conveyance system, outfall locations and water quality features associated with watershed are summarized below. Specific design criteria and methodology for sizing of collection and stormwater conveyance systems are detailed in the Stormwater Collection and Treatment Master Plan.

Watershed A:

Stormwater runoff from watershed A will be conveyed in a gravity storm drain system sized to convey the 5-year storm eventand discharge to the Bay at outfall Y. Water quality events requiring treatment will be diverted to The Big Green for treatment in centralized bioretention areas. Runoff from storm events exceeding the 5-year event up to the 100-year event will flow overlandthrough public streets and across the Big Green and discharge into the Bay.

Watershed B:

Stormwater runoff from watershed B will be conveyed in gravity storm drain pipe network sized to convey the 5-year storm event to outfall Y. Given the lower topography in Watershed B, runoff from the water quality events will be diverted to a stormwater lift station and pumped to the Big Green for treatment in a centralized bioretention basin. Flows in excess of the 5-year storm event will be conveyed overland within public streets to the low point on the west end of New Hudson Avenue (Figure 14.1). From this low point, stormwater will be routed safely through an overland flow easement to discharge into the Bay.

Watershed C:

Stormwater from private parcels in Watershed C will be directed to private bioretention facilities to receive treatment prior to entering the piped storm drain system. Stormwater runoff from the public ROW will be treated in publicly owned roadside bioretention planters prior to entering the piped storm drain system. Storm events exceeding the water quality event will bypass into a gravity storm drain system sized to convey the 100-year storm. The storm drain system serving watershed C will discharge to the Bay at outfall Y. The storm drain system within watershed C is designed to convey the 100-year storm (rather than the 5-year storm) given that the street design proposed for this area will limit overland conveyance of large storms within the street section.

Watershed D:

Stormwater from private parcels in Watershed D will be directed to private bioretention facilities to receive treatment prior to entering the piped storm drain system. Stormwater runoff from the public ROW will be treated in publicly-owned roadside bioretention areas prior to entering the piped storm drain system. As within Watershed C, the street design proposed in this area necessitates a collection and conveyance system sized to convey the 100-year storm.

The Big Green:

Stormwater runoff within the Big Green will be collected into the piped storm drain system, designed to handle the 5-year storm event.

14.1.4 Stormwater Collection System

A summary of the storm drain system is provided below. Refer to the Stormwater Collection and Treatment Master Plan for detailed information on collection and conveyance system design, hydraulic criteria and modeling.

Collection and Piped Conveyance System

A separate storm drain system (carrying no wastewater) will be constructed in all proposed streets within the Project Site sized to convey, at a minimum, the 5-year storm (See Figure

14.0). Piped storm drain conveyance in the "Flats," will be designed to carry the runoff from a 100-year storm given that the alternative street design proposed for this area will limit opportunities for overland conveyance of large storms.

All piped conveyance infrastructure will be designed to meet National, State and City requirements. The location of catch basins and drainage inlets within public streets, as well as minimum pipe sizes required to accommodate runoff from a 5-year storm, will be in accordance with SFPW and SFPUC requirements. Discharge of runoff from all storm events will be to the Bay at two proposed outfalls, described below.

Overland Flow (100-yr Flood Event)

The street sections are designed to have the capacity to convey runoff from the 100-year storm event, without overtopping the street's curbs and flooding private property. The exceptions are Spring, Beach and Fairfax Lanes in "The Flats" (Watershed C & D) where, due to the alternative street design described in Section 3, the piped collection and conveyance system are sized for the 100-year storm event. These streets only need to be designed to have the capacity to convey the flow resulting from a water main break within the street section (under the assumption that the nearest inlet could be entirely blocked). Table 14.1 includes the design flow in comparison to street capacity for the street sections shown in Figure 14.0.

At downhill cul-de-sacs and sumps, overland surface drainage channels located within dedicated easements shall be provided if necessary to convey water safely to the Bay and prevent flooding of adjoining property. See Figure 14.1 for the overland release strategy. Easements require SFPUC approval on a case-by-case basis.

Within the Big Green (RPD-owned land), the developer will work out the necessary rights to ensure overland flow paths are maintained within this land.

Table 14.1
Overland Flow Calculations

Section ID (Figure 14.1)	Street Name	100-yr Peak Flow Q (cfs)	Water Main Break Q (cfs)	Street Capacity Q_{max} (cfs)
1	New Hudson Avenue	29.5*	10	29.6
2	Arelious Walker	4.8	10*	27.7
3	Earl Street	1.8	10*	27.7
4	Spring Lane	NA (Storm drain sized to carry flow)	10*	17.4
5	Beach Lane		10*	15.2
6	Fairfax Lane		10*	10.5

*Indicates controlling flow condition

14.1.5 Stormwater Lift Station

Given the site topography, a stormwater lift station will be needed to lift the water quality storm event into the centralized bioretention basin located within The Big Green. A diversion structure (Figure 14.1), located upstream of the lift station, will be designed to divert the smaller water quality storm events to the lift station, while bypassing higher flows directly to the downstream gravity conveyance system. The peak flow rate for that will need to be conveyed by the lift station is 0.92 cfs (415 gpm).

14.1.6 Outfalls

Two outfalls are proposed to be constructed along the shoreline. The recommended outfall elevation for both outfalls is 9.0-feet NAVD88. This elevation ensures the outfalls will be accessible and maintainable at current the Mean Tide Level of 3.3-feet, as well as at future Mean Tide Level considering the highest projections of SLR for 2100 (66-inches), which corresponds to a future Mean Tide Level of 8.8-feet.

The outfall elevation and design also considers the existing shoreline condition and elevation of the marsh plain. Both outfalls will be designed as direct pipe discharges, and include appropriate measures for shoreline erosion protection. The proposed outfall elevation is high enough to allow for installation of 1 to 2-feet of riprap for energy

dissipation, and low enough to minimize the potential for erosion at the transitional slope from the Big Green down to the Marsh Plain.

See Figure 14.3 for schematic details of the two proposed outfalls. The developer is responsible for permitting all new outfalls.

14.1.7 Trash Capture

The Project must comply with Track 1 of the State Water Board's adopted Trash Amendments. To comply, full capture systems shall be included throughout the entire stormwater system to control trash from being discharged into receiving waters. Full capture systems for storm drains are defined as treatment controls (either a single device or a series of devices) that trap all particles 5 mm or greater and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour, storm in the sub-drainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.

All trash capture designs shall be incorporated into all design submittals for review and approval by SFPUC Regulatory Compliance Staff. Prior to installation the full capture systems must be certified by the Executive Director, or designee, of the State Water Board. Uncertified systems will not be accepted by the City. To request certification, the Developer shall work with the SFPUC to develop a certification request letter, including supporting documentation, to the State Water Board's Executive Director. The Executive Director or designee is responsible for issuing a written response either approving or denying the proposed certification.

14.1.8 Sea Level Rise Monitoring and Adaptation

Refer to Section 5 of this report for a description of the anticipated SLR elevations.

The storm drain design considers the highest projections of SLR for 2100 (66 inches). The system is designed to discharge by gravity under these future conditions, while maintaining the hydraulic gradeline (HGL) at a minimum of 2 feet below the ground surface as required by

the Subdivision Regulations. Additional description of the system and hydraulic modeling is provided in the Stormwater Collection and Treatment Master Plan.

14.1.9 Stormwater System Phasing

The Project will design and install the new SD System based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the ProjectDA. 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 outfall associated with the storm drain conveyance system shall be constructed in the same phase. Repairs and/or replacement of the existing facilities necessary to support the proposed Development Phase will be designed and constructed by the Developer. Temporary SD connections may be constructed and maintained by the Developer as necessary to maintain service to existing buildings.

14.1.10 Ownership and Maintenance

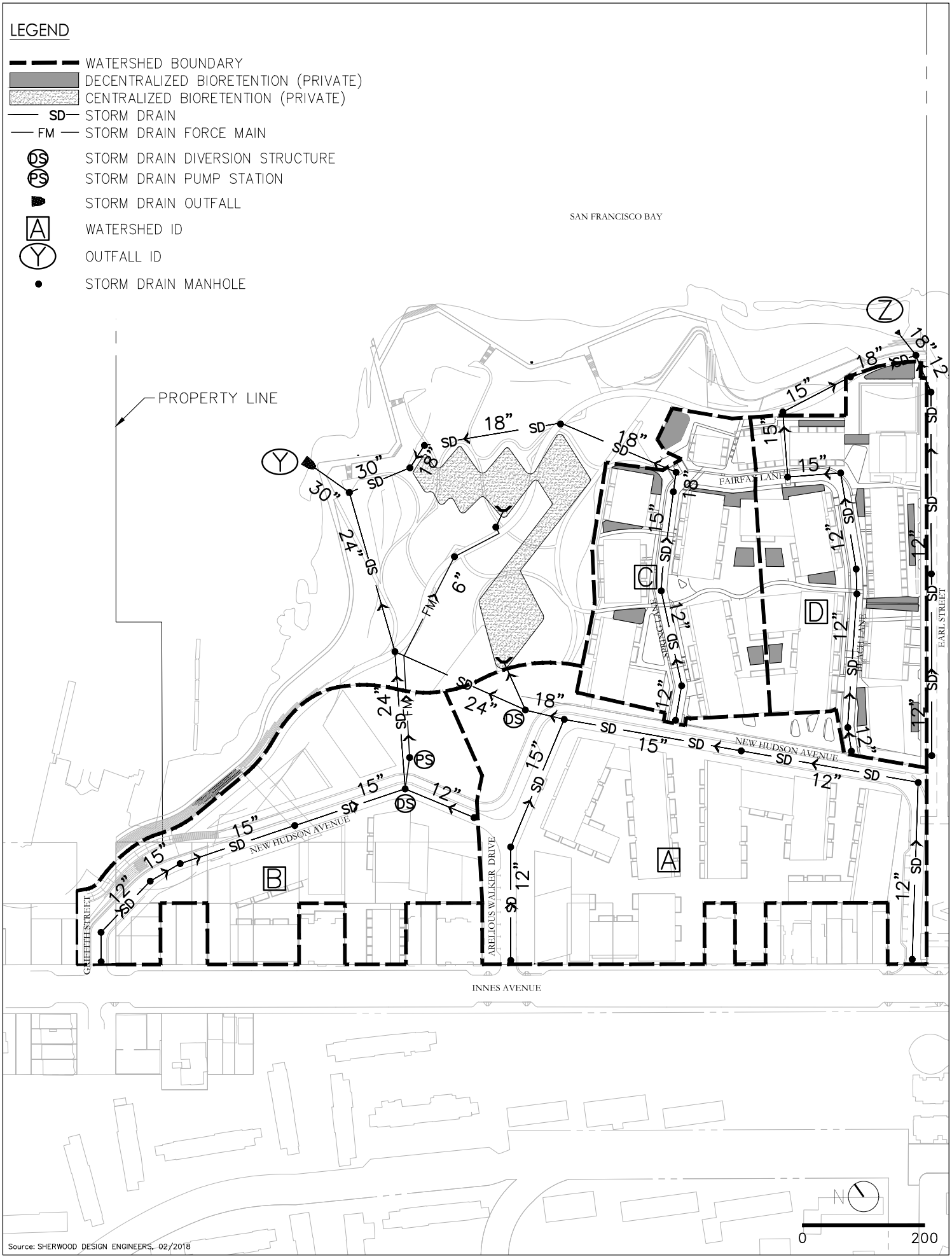
The primary conveyance features of the storm drain system are proposed as publicly owned and maintained utility lines, inclusive of the outfalls to the Bay. Within the public streets in Watersheds A & B, the public storm drain lines will collect all runoff and convey it to water quality treatment facilities located within the Big Green. All stormwater collection infrastructure, including the overflow to the Bay, will be publicly owned and located within public utility easements when not located within a public right of way.

Water quality facilities within the Big Green will be privately owned and maintained by the project subject to an easement to/from - specify. These facilities will provide treatment in accordance with RWQCB standards, using strategies similar to those being implemented on Treasure Island. All storm drain pipes located downstream of the public streets, including the outfalls connecting the treatment facilities to the Bay, will be publicly owned and located in public utility easements.

Within Watersheds C & D, runoff from private parcels will be treated in LID BMPs dispersed throughout the development, and then discharged to public storm drains located in adjacent public right-of-ways. The BMPs and associated storm drain connection laterals will be privately owned and maintained by the project. Runoff from public right-of-ways will be treated in roadside bioretention planters and will be publicly owned and maintained.

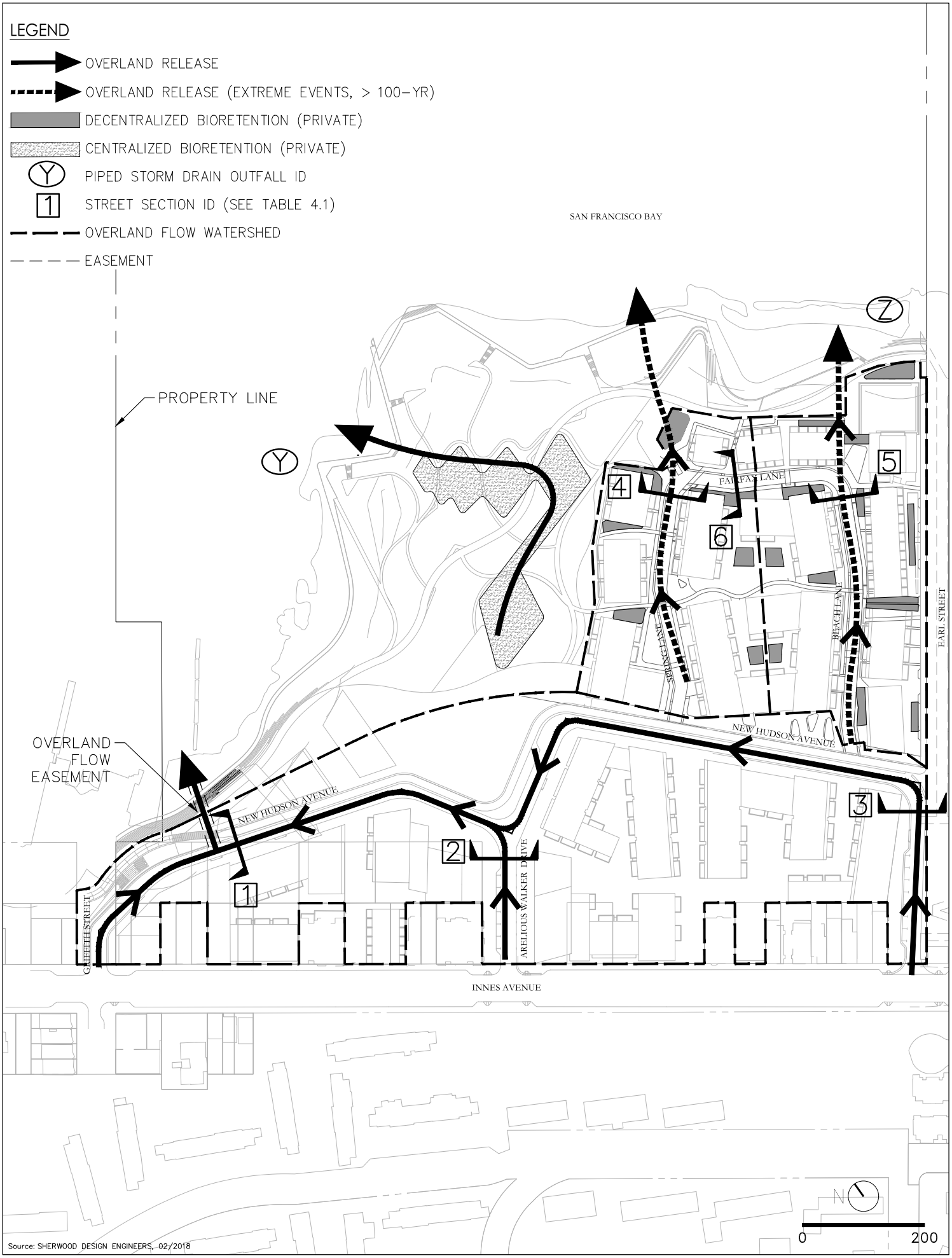
All public utility easements require SFPUC approval on a case-by-case basis.

Ongoing maintenance of all privately owned stormwater infrastructure will be paid for by the maintenance entity (Community Facilities District) set up by the Developer and subject to approval from the City.



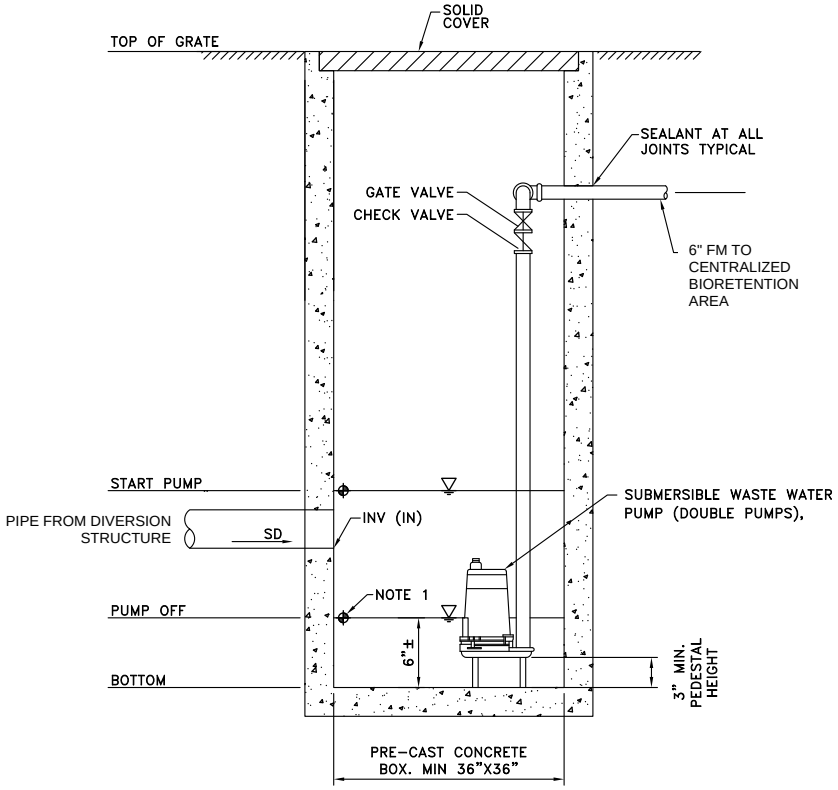
INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 14.0: PROPOSED STORM DRAIN SYSTEM



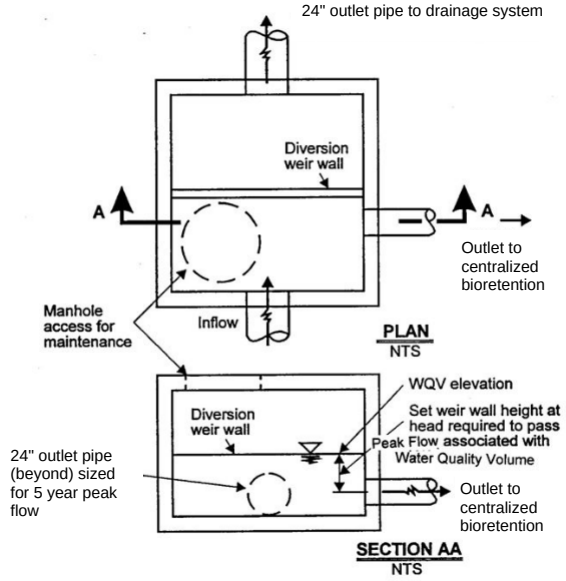
INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 14.1: OVERLAND RELEASE



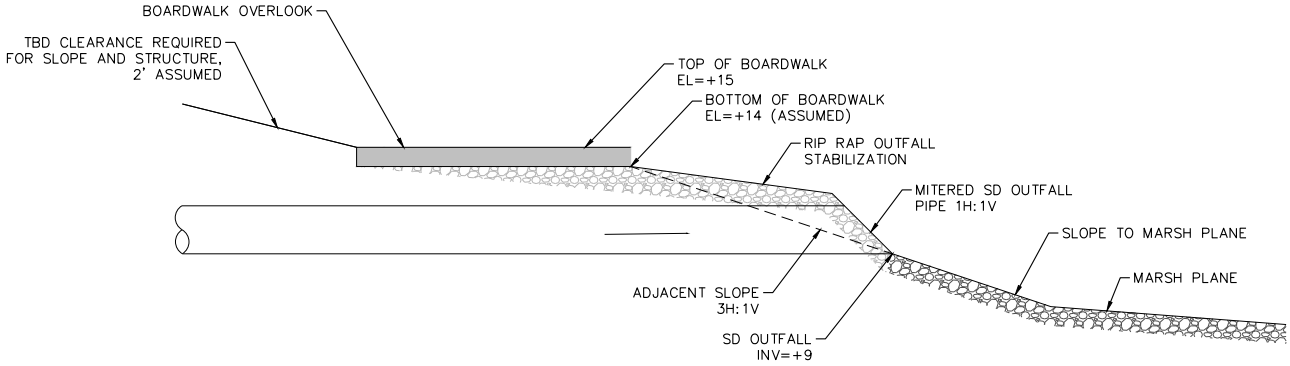
NOTES:
1. MERCURY FLOAT ON-OFF (HIGH OR LOW) SWITCH SENSORS.
2. WATERPROOFING CONCRETE BOX PER MANUFACTURER'S SPECIFICATIONS.
3. INSTALL PUMP PER MANUFACTURER RECOMMENDATION.
4. PUMP SHALL HAVE EITHER BATTERY OR GAS GENERATED BACK UP AND A HIGH LEVEL ALARM.

STORMWATER LIFT STATION
SCALE: NTS

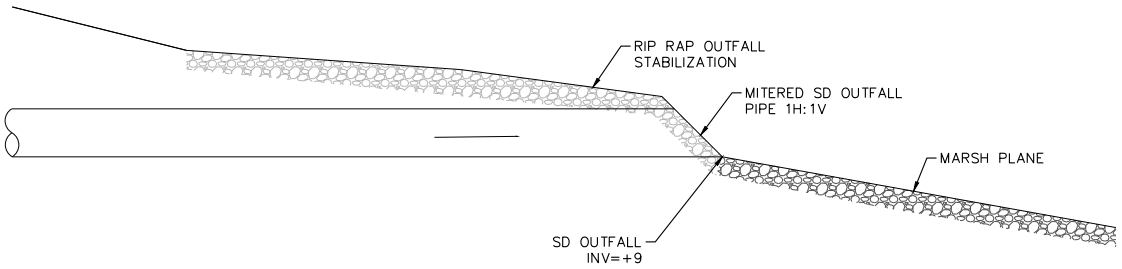


STORM DRAIN DIVERSION STRUCTURE
SCALE: NTS

FIGURE 14.2: LIFT STATION AND DIVERSION STRUCTURE SCHEMATIC DETAILS



OUTFALL Y DETAIL
NTS



OUTFALL Z DETAIL
SCALE: NTS

15. STORMWATER MANAGEMENT STRATEGY

15.1.1 Existing Stormwater Management System

There is no existing Stormwater Management System.

15.1.2 Proposed Stormwater Management System

Stormwater will be treated prior to discharge, primarily through biofiltration, in accordance with SFPUC and Regional Water Quality Control Board requirements. Estimated treatment areas in Table 15.0 are based on planning level calculation to achieve full compliance with the SMO and achieve treatment volume for the 90% percentile 24-hour storm. It is expected the total area needed for biofiltration will be between four and five percent of the total Project Site, or between 1 and 1.2 acres. See Figure 15.0. The piped storm drainage network, described in Section 14, will convey storm water from the watersheds to water quality facilities.

All stormwater treatment facilities are currently designed as lined bioretention basins. Per the Project's geotechnical report, the lower portions of the site, which are all underlain by significant amounts of imported fill, are likely susceptible to liquefaction and lateral spreading. As a result, it is conservatively assumed that concentrated infiltration of stormwater could worsen these conditions. Additionally, there are concerns with stormwater infiltration given the potential of contaminated and/or poorly draining soils in these areas. For these reasons, all bioretention facilities will be lined and include a perforated underdrain to convey treated stormwater to storm drain outfalls permitted through a California State Water Resource Control Board MS4 permit.

All stormwater bioretention facilities will be designed per SFPUC design standards. These features will treat urban runoff through the vertical flow of water from a ponded surface through planting and amended soils at a rate of 5 inches per hour per local regulations.

Centralized Treatment at the "Big Green"

Runoff generated from the water quality storm event generated from both public streets and private parcels between Innes Avenue and New Hudson Avenue (Watersheds A and

B), will be treated in the centralized bioretention basins A and B, located within the private open space in the northwest quadrant of the site (see Figure 15.0). Given the centralized treatment approach, private development within these watersheds will not be required to provide any stormwater treatment measures on their parcels.

Decentralized Treatment:

In Watersheds C and D, treatment for private parcels will occur in decentralized facilities distributed throughout the watersheds (See Figure 15.2 and 15.3). Runoff from private parcels will be treated separately from public ROW runoff.

Private parcels: Runoff from private parcels will be treated in privately owned decentralized stormwater quality BMPs integrated into the site design. Depending on the location, these treatment areas could be designed as either bioretention basins at-grade or bioretention planters on podium (Figure 15.2). Stormwater could be routed to these treatment areas in a number of ways, including direct surface runoff, discharge from downspouts, bubble-ups from private storm drains, or pumped systems if there are no feasible gravity connections. These features will include overflows to bypass storm events larger than the water quality event into the gravity storm drain system, which is sized to convey the 100-year storm.

Figure 15.1 includes typical details for bioretention treatment on private parcels.

Public Right-of-way: Stormwater runoff from the public ROW will be treated in publicly-owned roadside bioretention planters with curb inlets along the gutter. The water quality event will be diverted into these bioretention planters for treatment prior to entering the piped storm drain system. The roadside bioretention planters will be designed as in-line facilities with no overflow structure. Trench drain outlets on the downstream end of the planters will allow stormwater to overflow back into the street once they reach maximum ponding elevation. During storm events exceeding the water quality event, the planters will fill up with stormwater which will bypass additional stormwater along the gutter and

directly into storm drain catch basins and gravity storm drain system sized to collect the 100-year storm.

Figure 15.2 includes typical details for roadside bioretention planters along the shared streets in The Flats. Depending on the width of the roadside bioretention planters, it is anticipated that the planters will be located along approximately 30 to 45% of the total roadway length (Table 15.0).

Table 15.0
Water Quality Summary

Water-shed ID	Water-shed Area sf	Impervious Area sf	Pervious Area sf	Runoff Volume Requiring Treatment cu ft	Required Treatment Area sf	Provided Treatment Area sf
Centralized Treatment						
A	281,900	253,700	28,200	15,997	12,000	-
B	197,200	177,500	19,700	10,793	8,400	
Total	**479,100**	**431,200**	**47,900**	**26,790**	**20,400**	**33,000**
Decentralized Treatment (Private Parcels)						
C	103,200	93,000	10,200	6,264	4,380	7,600
D	131,900	118,900	13,300	7,884	5,580	9,600
Total	**235,100**	**211,900**	**23,500**	**14,148**	**9,960**	**16,000**

Decentralized Treatment (Public Right-Of-Way)

Water-shed ID	Roadway Length ft	Bioretention Planting Width ft	Required Treatment Area sf	% of Road Length %
C	540	3.5	790	42%
		5	850	30%
D	590	3.5	860	42%
		5	890	30%

15.1.3 Sea Level Rise Monitoring and Adaption

Refer to Section 5 of this report.

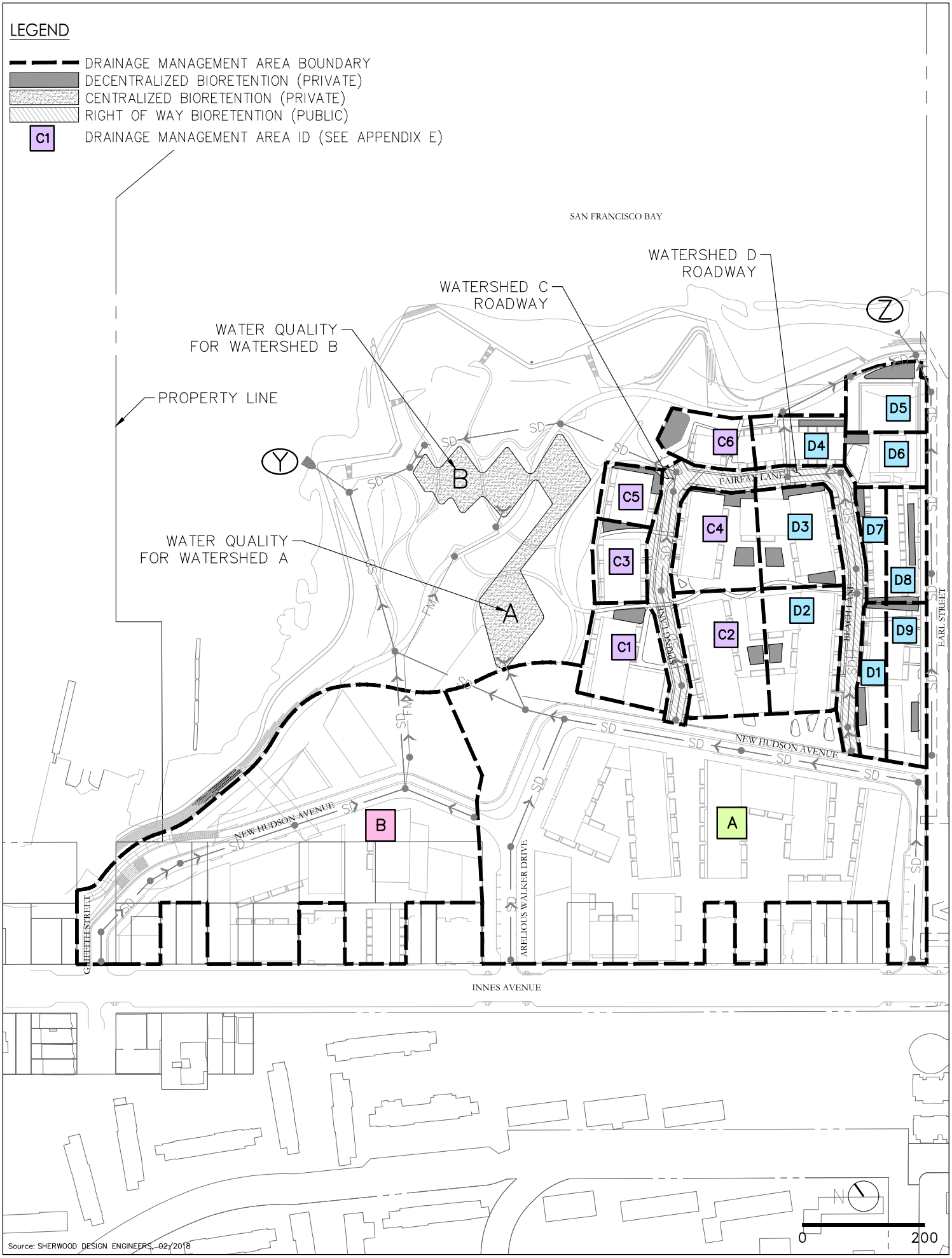
15.1.4 Stormwater Management Phasing

The Developer will design and install stormwater management facilities in accordance with the SMO for each Phase. The phasing will be based on the principle of adjacency and as-needed to facilitate a specific proposed Development Phase and consistent with the requirements of the Project DA. 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 Project shall ensure that all treatment facilities must be fully operational prior to completion of private parcel developments (vertical and horizontal) and acceptance of public ROW improvements by City. The outfall associated with the storm drain conveyance system must be constructed in the same phase. Repairs and/or replacement of the existing facilities necessary to support the proposed Development Phase will be designed and constructed by the Developer. Temporary SD connections may be constructed and maintained by the Developer as necessary to maintain service to existing buildings subject to City approval.

15.1.5 Ownership & Maintenance

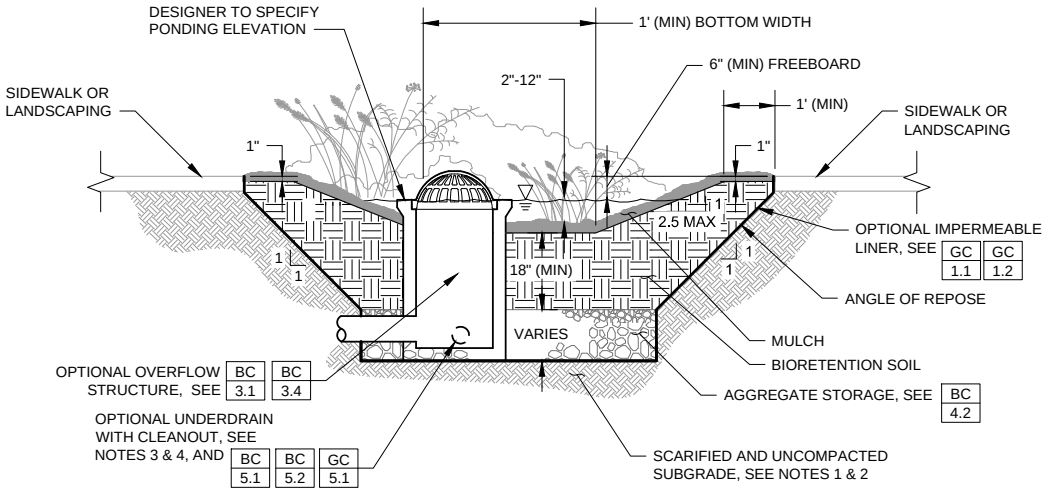
The centralized water quality facility in the Big Green will be privately owned and operated. Decentralized bioretention facilities on private parcels within watersheds C&D (The Flats) will also be privately owned and operated. Roadside bioretention planters in The Flats will be publicly owned and operated. These planters are located within, and treat stormwater runoff from the public right-of-way only.

See Section 14.5 for further information on ownership and maintenance of the storm drain system.

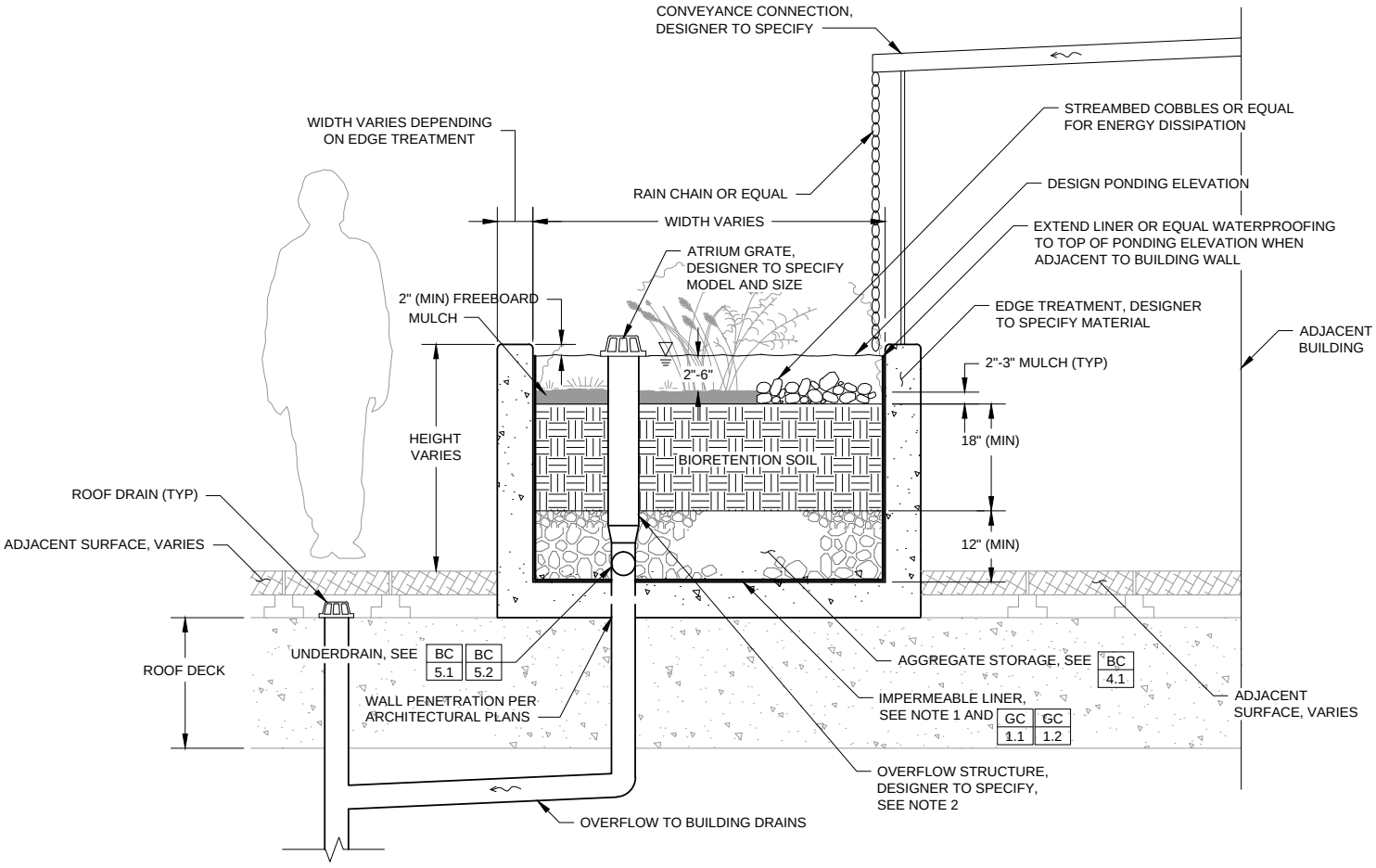


INDIA BASIN INFRASTRUCTURE PLAN

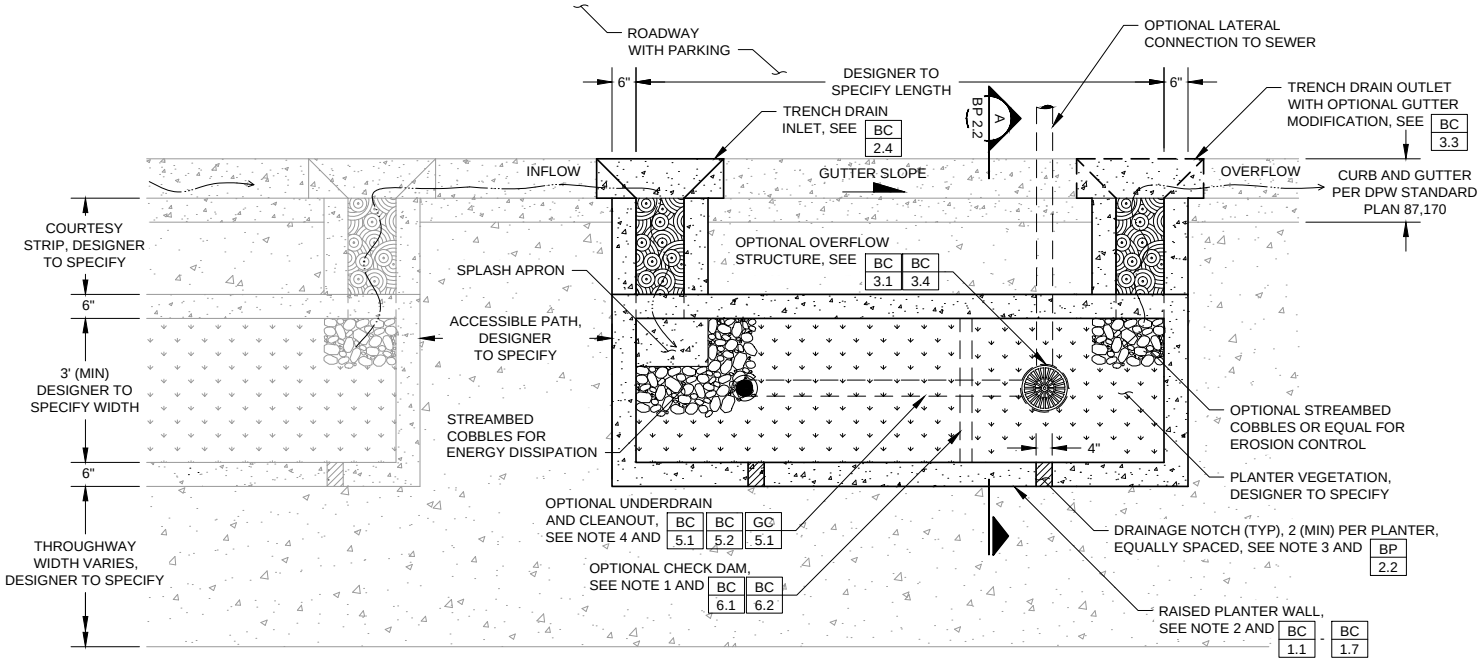
FIGURE 15.0: PROPOSED WATER QUALITY FACILITIES



SFPUC GREEN STORMWATER INFRASTRUCTURE TYPICAL DETAIL BB 2.1
BIORETENTION BASIN (PARCEL SECTION)
SCALE: NTS



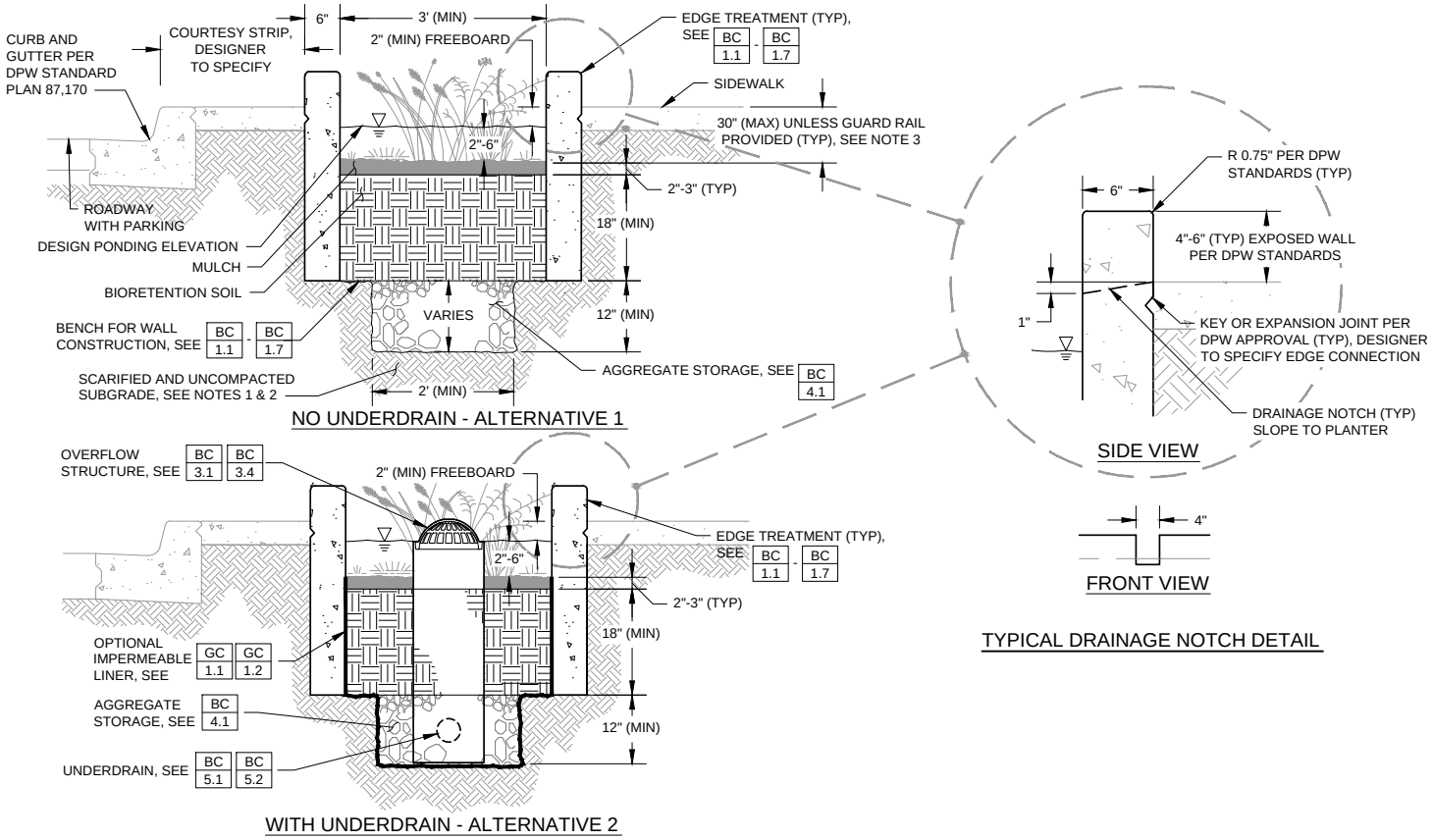
SFPUC GREEN STORMWATER INFRASTRUCTURE TYPICAL DETAIL BP 5.7
BIORETENTION PLANTER (PLANTER ON STRUCTURE SECTION)
SCALE: NTS



SFPUC GREEN STORMWATER INFRASTRUCTURE TYPICAL DETAIL BP 2.1

ROADSIDE PLANTER WITH PARKING (PLAN)

SCALE: NTS



SFPUC GREEN STORMWATER INFRASTRUCTURE TYPICAL DETAIL BP 2.2

ROADSIDE PLANTER WITH PARKING (SECTIONS)

SCALE: NTS

NOTES:

1. ROADSIDE BIORETENTION WILL BE LOCATED AT BACK-OF-SIDEWALK. TRENCH DRAIN INLET LENGTH WILL BE EXTENDED TO ACCOMODATE THE LOCATION AND 2" CURB SHARED STREET DESIGN (SEE SECTION 8 FOR SHARED STREET DESIGN).
2. ALL ROADSIDE BIORTENTION PLANTERS WILL BE LINED WITH AN UNDERDRAIN (PER ALTERNATIVE 2, ABOVE).
3. ALL ROADSIDE BIORETENTION PLANTERS WILL BE DESIGNED AS INLINE FACILITIES WITH TRENCH DRAIN OUTLETS ON THE DOWNSTREAM END. THE FACILITIES WILL NOT INCLUDE THE OPTIONAL OVERFLOW STRUCTURE SHOWN IN THE TYPICAL DETAIL ABOVE.

16. DRY UTILITY SYSTEMS

16.1.1 Existing Dry Utility Systems

16.1.2 Electric

Existing 12kV distribution utilities in the greater subject project area are served from Pacific Gas and Electric (PG&E) Substation P. Within the Project area there are overhead and underground PG&E 12kV distribution systems and overhead and underground secondary distribution and service systems for various voltages below 600V.

16.1.3 Natural Gas

The site is currently served from an existing 4-inch PG&E gas main on Innes Avenue.

16.1.4 Communication

Existing AT&T and Comcast facilities exist on Innes Avenue in underground duct banks. Existing City of San Francisco Communication Department of Technology Information Services (DTIS) facilities consist of overhead lines and cables in underground conduits.

16.1.5 Proposed Dry Utility Systems

The Developer's Infrastructure obligations include the design and construction of the proposed dry utility systems to serve the development, as shown on Figure 16.0.

16.1.6 Electric

Energy delivery for the Project will be served fromSFPUC PE 12kV local distribution systems. Off-site electric distribution improvements for SFPUC utilities may be necessary when existing system thermal limitations, reliability criteria, and economical capacities are exceeded. This is subject to utility perceived limitations. Off-site improvements for PG&E provided WDT capacity may include additional substation transformer capacity, distribution feeder additions, larger conductors and or new local circuits as required. Off-site improvements for SFPUC PE may include application to PG&E for an increase of WDT capacity at their Innes Avenue and Earl Street WDT switchgear location, as well as some or all of the improvements mentioned above.

Noteworthy is the communication of realistic anticipated loads to the SFPUC early in the development process, so that any system improvement work may be identified, designed and constructed to meet occupancy dates as required. PG&E overhead 12kV facilities exist on the Innes Avenue project frontage. Undergrounding these facilities may be required as a condition of project approval, and would be done so per the applicable CPUC Rule 20 tariff.

Advanced planning of the SFPUC electric distribution system should include PG&E undergrounding on Innes Avenue, and integration or separation/demarcation of facilities owned by separate utilities, to avoid conflicts in service.

SFPUC PE on-site project distribution system interconnection points shall be provided on the periphery of the Project Site; per the SFPUC PE Rules and Regulations Governing Electric Service, Distribution Line Extensions and Service Line Extensions. Electric distribution facilities of adequate capacity that provide interconnection on the periphery or limits of the project should be provided by the SFPUC at no cost to the developer. This includes design, construction and land rights procurement for any electric utility distribution improvements off-site. Please note that SFPUC is sensitive to the investment of capital to provide service where load is speculative. Some negotiation or cost sharing may be necessary for atypical load forecasts.

The total cumulative peak coincident power demand (design) for the subject project at full build out is about out is about 5.4 MVA (design) for the residential variant; and 7.2MVA (design) for the commercial variant. This value is based on interpretation of general use data provided and historical PG&E load data for the project specific climate zone. Two SFPUC PE 12kV distribution interconnections (feeders) are suggested for reliability if the projected peak demand is realized. These loads will be phased in over a period of approximately 6 years as the Project builds out.

16.1.7 Natural Gas

The gas distribution system is planned to be an element of a joint or common trench system which would include electric, phone, cable TV and streetlight facilities. The joint trench distribution system is shown on Figure 16.0. On some streets, in order to provide 10 feet between proposed building structures and gas piping systems, gas mains may require separation from the joint trench into a gas-only trench. The Developer will be responsible for construction of gas mains within the proposed roadway network.

16.1.8 Communication

The communications systems are planned to be an element of a joint trench or common trench system which would include electric, gas and streetlight facilities.

AT&T, Comcast and DTIS will provide new service for proposed improvements as participants in the joint trench system. Facilities will be placed in franchised areas. The Project will be responsible for trench cost to accommodate AT&T, Comcast and DTIS as well as AT&T and DTIS substructures. Some of the Project AT&T costs may be reimbursable based on applied tariffs. Comcast will provide the placement of their facilities at their own expense.

16.1.9 District Microgrid and Renewable Energy Variants

Solar photovoltaic arrays could be located on various project rooftops and interconnected with a proposed Project microgrid system to serve as a site-side (demand side) distribution system capable of balancing captive supply and demand resources. The Project microgrid would reduce energy losses in transmission and distribution, increasing efficiency of the electric delivery system. The Project microgrid can be backed up by the Project electric system and would not necessarily supply all Project demand. If the Project proceeds with this variant, Developer shall comply with all additional legislative and regulatory requirements.

16.2 Dry Utility Phasing

The Project will design and install the new Joint Trench (JT) 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 DA. 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. Temporary JT may be constructed and maintained by the Developer as necessary to maintain service to existing buildings subject to City approval.

DRAWING NAME: K:\Eng14\140069\DWG\Exhibits\Infrastructure Plan\PLOTTED SHEETS\Figure 16.0 JT.dwg
PLOT DATE: 05-17-18
PLOTTED BY: sade

Source: BKF ENGINEERS, 11/2016

INDIA BASIN INFRASTRUCTURE PLAN

FIGURE 16.0: JOINT TRENCH LOCATION