MASTER ENCROACHMENT PERMIT AND MAINTENANCE AGREEMENT

1. PARTIES AND BACKGROUND

A. The City and County of San Francisco Public Works (the "**Department**") enters into this Encroachment Permit and Maintenance Agreement ("**Agreement**") with Mission Rock Utilities, Inc. (the "**Permittee**"), on this date, _____, 20__. In this Agreement, the "**Major Encroachment Permit**" or "**Permit**" collectively refers to the Encroachment Permit as referenced or shown on the Department approved plan(s), any associated Improvement (as defined below), and this Agreement, including its Attachments and accompanying documents. In this Agreement, "the **City**" refers to the City and County of San Francisco and all affiliated City agencies including, but not limited to, the Department, the San Francisco Public Utilities Commission ("**SFPUC**") and the San Francisco Municipal Transportation Agency ("**SFMTA**").

B. Permittee intends to provide systems comprised of a blackwater treatment plant, heating and chilled water facilities, non-potable water facilities, gravity and sewer facilities, and conduits for fiber optic cable for purposes of system communication, used for the treatment of wastewater, the distribution of recycled water, and thermal heating and cooling services to and within the buildings ("**District Systems**") within the Mission Rock Project (the "**Project**") as described in that certain Disposition and Development Agreement by and between the City, acting by and through the Port Commission, and Seawall Lot 337 Associates, LLC ("**Master Developer**"), recorded in the Official Records of the city and County of San Francisco on August 17, 2018, as Document No. 2018-K656938. The Mission Rock Owner's Association, a California mutual benefit corporation (the "**Association**"), the Project's commercial master association, has entered into separate commercial agreements with Permittee for the delivery of District Systems services to the Association exclusively. Under separate commercial agreements with the Permittee, the Association, at its sole election, may exercise its option to purchase the District Systems according to its commercial agreements. This Permit accounts for that scenario and designates the Association as a pre-approved successor to the Permit.

C. Permittee's current financing agreements include a bond indenture that entrusts the bond trustee, U.S. Bank Trust Company National Association ("**Bond Trustee**") the responsibility of protecting the interests of bondholders if the issuer defaults, and these agreements give the Bond Trustee the right to take control of Permittee and Permittee's assets if required to ensure that the Permittee continues to make bond interest payments and principal repayments as scheduled. While the bond indenture remains in effect, the Bond Trustee is authorized to exercise control over Permittee and its assets, including but not limited to, the Improvements. The Bond Trustee would be authorized to take possession of the Improvements and the District Systems if the Permittee were to commit a default under the Permit and risk revocation of the Permit. If the Bond Trustee were to take possession of the Improvements, it would hire a professional engineering consultant to ensure proper operation, maintenance, and repair of the District Systems.

D. Permittee intends to maintain Improvements comprising the District Systems that have been installed or will be installed within the dedicated Public Rights-of-Way within the Department's jurisdiction.

E. City has the authority under state law to prescribe terms and conditions for the use of the Public Right-of-Ways, including its use for the construction, installation and maintenance of Improvements used to provide heating and cooling and other services authorized by all applicable federal, state, and City laws, ordinances, codes, rules, regulations, orders, and standard plans and specifications, as the same may be amended or adopted from time to time (the "**Applicable Law**").

F. In addition to other Applicable Law, this Permit shall govern Permittee's right to use the Public Right-of-Ways. This Permit does not supersede Permittee's obligation to obtain Excavation Permits, Personal Wireless Service Facilities Site Permits, Surface-Mounted Facility Site Permits, or any other permits or Approvals required by City, any Agency, or Applicable Law.

G. All applicable provisions of the Mitigation Monitoring and Reporting Program (MMRP) adopted as part of the Final Environmental Impact Report for the Seawall Lot 337 and Pier 48 Mixed-Use Project shall apply to Permittee's activities pursuant to this Permit.

H. The Permit Area described herein is below the surface of the public right-of-way except for limited surface level improvements comprised of manholes, handholes, and meter boxes (collectively, "**MRU Surface Level Improvements**"). Other surface-level improvements within the Public Right-of-Way constructed directly above the Permit Area may be subject to a separate Interdepartmental Master Encroachment Permit (No. _____, the "**IMEP**"). This Agreement is not intended to supersede or otherwise modify the IMEP.

I. Based on the available information known by the Department at the time of the approval of the Permit, it is the intention of the Department to allow MRU to abandon the Improvements in place. However, at the time of Permittee's request for Abandonment in Place, if there are changed physical conditions of the Improvements or the area in which the Improvements are located, or if there is additional technical and/or engineering information available that indicates MRU's abandonment in place would be detrimental to the performance of the LCC, public right-of-way infrastructure, or public utilities, the Director may require removal and full Right-of-Way Conversion.

2. PERMIT INFORMATION

2.1 Master Encroachment Permit No. ("Permit"): _____ under Public Works Code Section 786(b), as originally constructed under SIP _____ and IB _____ (together, the "**SIP**").

2.2 Description/Location of Property Adjoining the Permit Area (See Attachment 1): Refer to Attachment 1.

2.3 Description/Location of Permit Area (See Attachments 2A – 2B): The Proposed Improvements are located in Dr. Maya Angelou Way, portions of Toni Stone Crossing, Terry A. Francois Boulevard between Mission Rock Street and China Basin Park, portions of Long Bridge Street, Bridgeview Way and Third Street.

2.4 General Description of Proposed Improvements (See Attachments 2A- 2B): 8" non-potable water mains; 4"-6" non-potable water laterals; a 10" force main for non-potable water; 14" - 16" hot water mains; 10"-14" hot water laterals; 10"-14" chilled water laterals; and 2" conduits for fiber optic cable for purposes of systems communication. See Attachment 2-A and 2-B attached hereto (collectively, the "**Improvements**").

2.5 Permit Type: Master Encroachment Permit.

2.6 Permittee's Corporate Information:

Name: Mission Rock Utilities, Inc., a Delaware corporation

Mailing Addresses:

Mission Rock Utilities, Inc.
305 St. Peter Street
St. Paul, MN 55102

With a copy to:

Mission Rock Utilities, Inc.
Attn: General Counsel
305 St. Peter Street
St. Paul, MN 55102

2.7 Bond Trustee's Contact Information:

Name: U.S. Bank Trust Company National Association

Mailing Addresses:

One California Street, Suite 1000, San Francisco, CA 94111
Attn: Global Corporate Trust
Michelle Knutson, Vice President-GCT Client Manager

Phone Number: (415) 677-3597

Email Address: michelle.knutson@usbanl.com

2.8 Association's Contact Information:

Name: Mission Rock Owner's Association, a California mutual benefit corporation

Mailing Address:

One Bush Street
Suite 500
San Francisco, CA 94104

Phone Number: (415) 536-1850
Email Address: lng@tishmanspeyer.com

2.9 Permittee's Contact Information.

The Permittee shall provide to Public Works, SFMTA, 311 Service Division, and SFPUC the information below regarding a minimum of two (2) contact persons with direct relation to or association with, or is in charge of or responsible for, the Permit. Permittee shall notify both Public Works and SFMTA within thirty (30) calendar days of any changes in the Permittee's personnel structure that are material to this Permit and submit the required contact information of the current and responsible contacts. If and when the City's 311 Service Division (or successor public complaint system program) allows direct communications with the contact person(s) for the Permit, the Permittee shall participate in this program and shall provide Permittee's preferred contact persons concerning operational matters.

Contact Person For Operational Matters:
Last Name, First Name: Lum, Patrick
Title/Relationship to Owner: Chief Engineer
Phone Numbers: (415) 793-5291
Email Addresses: plum@Tishmanspeyer.com
Mailing Address: 1 Bush Street, Suite 450, San Francisco CA, 94104
Office Address: 1 Bush Street, Suite 450, San Francisco CA, 94104

Contact Person For Operational Matters:
Last Name, First Name: Burns, Michael
Title/Relationship to Owner: SVP Operations
Phone Numbers: (651) 925-8132
Email Addresses: michael.burns@ever-greenenergy.com
Mailing Address: 305 St. Peter St., St. Paul, MN 55102
Office Address: 305 St. Peter St., St. Paul, MN 55102

Agent for Service of Process:
1505 Corporation
CSC – Lawyers Incorporating Service
2710 Gateway Oaks Dr.
Sacramento, CA 95833

2.10 Maintaining Updated Corporate, Bond Trustee, and Association Information.

Permittee shall notify Public Works within thirty (30) calendar days of any changes in the Bond Trustee, including any changes in the Bond Trustee's contact information (to the extent Permittee is made aware of any change in the Bond Trustee's contact information), and/or the

Association's contact information and any changes resulting in the replacement, renaming, or dissolution of the Bond Trustee, or the elimination of Permittee's need for the Bond Trustee.

2.11 List of Attachments. The following additional documents are attached to or accompany this Agreement, which may be amended or further supplemented with the documents identified in Section 5 following annexations of Permit Areas into the Permit.

- Attachment 1: **Property Information**. Written description of the project site and location map (in 11" x 17" format) identifying the property adjoining the Permit Area.

- Attachment 2A-2D: "**Permit Area**" refers to three-dimensional areas that include (i) the Improvements and any real property subject to Permittee's maintenance responsibility; and (ii) the MRU Surface Level Improvements. The Permit Area shall refer to areas for which a Notice of Annexation has been recorded. As described in Section 6, subsequent Notices of Annexation shall establish specific Permit Areas and identify the fronting properties associated with the Permit Areas.

The "**Permit Area Documentation**" shall consist of the following (all in 11" x 17" format):

- Diagram showing the boundary limits of the Permit Area and identifying all Improvements in the Permit Area ("**Precise Diagram**"). The Precise Diagram shall be a separate document from the engineered construction plans for the encroachments submitted to Public Works for review and approval ("**Construction Plans**"). See Attachment 2A (Phase 1) and 2B (Full Buildout).
- Table listing all Improvements in the Permit Area including type of facility, location and description of surface-level appurtenances ("**Maintenance Table**"). See Attachment 2C.
- As-built records of installed facilities including plan and profile plans and related technical specifications ("**Construction Plans**"). See Attachment 2D.

- Attachment 3: **Maintenance Plan**. A written document that contains a detailed description of the means and methods to maintain the Improvements within the Permit Area (the "**Maintenance Plan**"). The Maintenance Plan shall identify the daily, weekly, monthly, and annual routine maintenance, repair and replacement tasks, as applicable, including any tasks associated with the repair or replacement of LCC as described in Section 5 below ("**Permitted Activities**"), and any specialized equipment (in the event that the Improvements incorporate such specialized equipment) necessary for continued operation of the Improvements. For each category of the Permitted Activities (i.e., for each of the District Systems), Permittee shall provide cost estimates for performance of any maintenance described in the plan. Maintenance estimates will correspond with the maintenance intervals described in the plan (e.g., monthly or annually as applicable).

- Attachment 4: **Capital Planning and Financial Reporting**. District System operations and maintenance ("**District Systems O&M**") budget that shows projected expenses and capital cost items for the next twenty-five (25) calendar years that includes projected reserves for capital improvements and routine maintenance and the balance of such cash reserves for the District System. Annually, no later than April 1st, Permittee shall submit an updated District System O&M budget along with the actual District System O&M expenses and capital

improvements costs for the prior calendar year along with a summary report identifying the bond indenture agreement, the Bond Trustee, the principal amount secured, the expected maturity date, and the balance of cash reserves for capital improvements and routine maintenance ("**Financial Report**").

- Attachment 5: **[Omitted]**. As outlined in Attachment 3, Permittee has confirmed no specialized equipment is necessary operation of the Improvements under the scope of this Permit.

- Attachment 6: **Global Diagram**. The Global Diagram (to be provided in 11" x 17" format) generally describes the type and location of Improvements subject to this Permit.

- Attachment 7: **Agreement to Support, Work Around, and Protect Utility Facilities**.

- Attachment 8: **Notice of Special Restrictions**.

- Attachment 9: **Payment Schedule for Removal, Restoration, and Abandonment Account**

- Attachment 10: **Removal, Restoration, and Abandonment Substitute Security Payment Schedule**

The City Engineer shall review and certify the description of the **Permit Area Documentation** (Attachment 2A-2D), **Maintenance Plan** (Attachment 3), and the **Global Diagram** (Attachment 6) and any necessary updates submitted with a Notice of Annexation. The Department shall not issue the permit until the City Engineer has completed his or her review and certified the required attachments.

2.12 Notice of Permit to Association. Within ten (10) business days of the Effective Date, Permittee will deliver documentation to the Director demonstrating that Permittee has provided a copy of the final Permit to the Association. Such documentation shall include a counter-signed letter from an authorized representative of the Association acknowledging receipt of the final Permit. For any subsequent Annexation Area, Permittee shall be required to provide documentation to the Director prior to placing additional District Systems into service documenting that Permittee has provided a copy of the Notice of Annexation pertaining to such additional District Systems to the Association.

3. EFFECTIVE DATE; REVOCABLE, NON-EXCLUSIVE PERMIT;

(a) Following Board of Supervisors approval and confirmation that the Department has received all required permit documents and fees, the Department shall issue the approved Permit. The date this Agreement is executed by all parties shall be the "**Effective Date**" of the Permit.

(b) Subject to the provisions of Sections 5, 16 and 17 below, the privilege given to Permittee under this Agreement with respect to the Improvements located in the Permit Area is revocable, personal, non-exclusive, non-possessory, and effective only insofar as the rights of City

in the public right-of-way ("**PROW**") are concerned. This Agreement includes terms (see Sections 5.11 – 5.14) that are intended to avoid conflicts between the Improvements and other infrastructure. This Permit does not grant any rights to construct or install Improvements in the Permit Area until the Public Works Director issues written authorization for such work.

Commencing on the Effective Date, Permittee shall be authorized to enter upon and use the PROW for the limited purpose of maintaining the Improvements within the Permit Area(s) subject to the terms, conditions, and restrictions set forth herein.

(c) This Agreement shall not become effective until the Notice of Special Restrictions (Attachment 8) is recorded in the official records of the Office of the San Francisco Assessor-Recorder ("Official Records") to provide record notice to owners within the Mission Rock Special Use District that "District Wide Facilities," as defined in the Master Declaration, have been installed to serve multiple parcels within the Mission Rock Development, and that the Permittee is the owner and operator of such District Wide Facilities. Prior to the Agreement taking effect, the Notice of Special Restrictions shall be recorded against Lots 1, 2, 3 and 4 of Final Map No. 9443, recorded June 12, 2020, as Document No. 2020-K940602 of Official Records. For future development phases, the Notice of Special Restrictions shall be recorded concurrently with the recording of the associated phased final map creating a lot for any building to be served by the Improvements.

4. MONITORING AND MAINTENANCE RESPONSIBILITIES; IN-LIEU FEES

Permittee acknowledges its responsibility to maintain and monitor the Permit Area and its Improvements according to a "**Maintenance Monitoring and Reporting Program,**" document performance of the maintenance activities as described herein, and retain documentary evidence of the maintenance activities (the "**Maintenance Report**") for a minimum of three (3) years. Within ten (10) business days from the date of the Director's written request for maintenance information, the Permittee shall provide proof that maintenance activities have been performed according to the requirements and frequency of maintenance described in the Maintenance Plan.

The Permittee shall: 1) on a regular quarterly basis, document the general condition of the entire Permit Area and all elements consistent with the Maintenance Plan, and 2) maintain a written and image log of all maintenance issues, including, but not limited to: defects, damages, defacing, complaints, and repairs performed on Permit elements and the Permit Area. The images for the logged maintenance issues and repairs shall clearly show the location and detail of the damaged or defaced element or area, and its repair and restoration. Permittee shall maintain all files and provide them, when requested by City under this Section 4, in a format and media consistent with current standards for data retention and transfer, such as a USB flash drive with connective capability to a commonly available personal computer.

The Maintenance Report, at a minimum, shall include the following information: date and time of maintenance; description and type of encroachment element requiring repair, resolution, or restoration and method used to repair, resolve, or restore it; time and duration to repair, resolve, or restore such element; company (and contact information for the company) that performed the repair, resolution, or restoration.

5. CONDITIONS OF ENTRY AND USE

By entering into this Agreement, Permittee acknowledges its responsibility to comply with all requirements for maintenance of the Improvements as specified in this Agreement, Public Works Code Section 786 et seq., Article 2.4 of the Public Works Code ("**Excavation in the Public Right-of-Way**"), and Public Works Order No. _____**.** Permittee shall comply and cause its agents to comply, with each of the following requirements in its performance of the Permitted Activities.

5.1 Permits and Approvals

5.1A Requirement to Obtain all Regulatory Permits and Approvals.

The SIP addresses the construction of the Improvements that are the subject of this Agreement and constructed within the Permit Area. Permittee is responsible for obtaining subsequent street improvement permits or other City or Port authorizations to construct additional Improvements in subsequent Project phases.

5.1B Subsequent Excavation within Permit Area.

When maintenance or repair of the Improvements requires excavation as described in Article 2.4 of the Public Works Code, or prevents public access through the Permit Area, or obstructs the movement of vehicles or bicycles where allowed by law, Permittee shall apply for applicable permits from the Department and any other affected City agencies. Permittee or agent of Permittee shall comply with all applicable excavation permit bonding and security requirements when performing or causing to be performed any excavations or occupancies within the Permit Area.

5.1C Additional Approvals.

Further permission from the Department may be required prior to Permittee's performance of work within the Permit Area including, but not limited to, the restoration of a temporarily restored trench, removal and replacement of a tree or other landscaping, or repair of damaged or uplifted sidewalk or other paving material. This Agreement does not limit, prevent, or restrict the Department from approving and issuing permits for the Permit Area including, but not limited to, occupancy, encroachment, and excavation permits. The Department shall include as a condition in all subsequent permits issued in the Permit Area that any subsequent permittee notify and coordinate with the Permittee prior to occupying, encroaching, or excavating within the Permit Area, and that such Permittee bear the cost of restoration of the Permit Area as applicable under Section 5.8.

5.2 Exercise of Due Care

During any entry on the Permit Area to perform any of the Permitted Activities, Permittee shall, at all times and at its sole cost, perform the Permitted Activities in a manner that maintains the Permit Area in a good, clean, safe, secure, sanitary, and attractive condition. Permittee shall use due care at all times to avoid any damage or harm to the Permit Area or any Improvements or property located thereon or adjacent to, and to take such soil and resource conservation and protection measures within the Permit Area as are required by applicable laws and as City may reasonably request in writing. Permittee shall not perform any excavation work without City's prior written approval. Under no circumstances shall Permittee knowingly or intentionally damage, harm, or take any rare, threatened, or endangered species on or about the Permit Area. While on the Permit Area to perform the Permitted Activities, Permittee shall use commercially reasonably efforts to prevent and suppress fires on and adjacent to the Permit Area attributable to such entry.

5.3 Cooperation with City Personnel and Agencies, and Fronting Property Owners

Permittee shall work closely with City personnel to avoid unreasonable disruption (even if temporary) of access to the Improvements and property in, under, on or about the Permit Area and City and public uses of the Permit Area. Permittee shall perform work in accordance with the Permit and this Agreement. Permittee also shall perform work pursuant to one or more Street Improvement Permits or General Excavation Permits and in accordance with Public Improvement Agreements if either or both are applicable.

Permittee shall provide advance notice and work closely with all owners of improvements on adjacent or proximate parcels ("**Fronting Property Owners**") to avoid unreasonable disruption (even if temporary) of use and access to their property during any Permitted Activities or other permitted or unpermitted activity by Permittee that may impact Fronting Property Owners, as determined by the Director.

5.4 Permittee's Maintenance and Liability Responsibilities

5.4A Permittee's Maintenance and Liability.

(a) Permittee acknowledges its maintenance and liability responsibility for the Improvements (including, but not limited to, materials, elements, fixtures, etc.) in accordance with the Permit and this Agreement, and all applicable City permits, ordinary wear and tear excepted. Permittee agrees to maintain said Improvements as described in the Permit and in accordance with any other applicable City permits. Permittee shall reimburse the Department for any work performed by the Department as a result of the Permittee's failure to comply with the maintenance and restoration terms as specified in this Agreement under Section 9. Permittee is wholly responsible for any Improvements installed in the Permit Area that are subject to this Permit's terms and for the quality of the work performed in the Permit Area under this Agreement. Permittee is liable for all claims related to the Improvements and any condition caused by Permittee's performed work. Neither the issuance of any permit nor the inspection, nor the repair, nor the suggestion, nor the approval, nor the acquiescence of any person affiliated with the City shall excuse the Permittee from such responsibility or liability.

(b) In the event that the Director agrees to maintain one or more of the Improvements pursuant to Section 5.9.B of this Agreement, Permittee shall not be responsible for the quality of maintenance or restoration work performed, nor liable for the resulting consequences of City work.

5.4B Abatement of Unsafe, Hazardous, Damaged, or Blighted Conditions.

Permittee acknowledges its maintenance responsibility to abate any unsafe, hazardous, damaged, or blighted conditions that arise from Permittee's ownership and maintenance of the Improvements within the Permit Area. Following receipt of a notice by the Department of an unsafe, damaged, or blighted condition, of the Improvements (or of the Permit Area arising out of the presence of the Improvements therein), Permittee shall immediately respond to the notice and restore the site to the condition specified on the Construction Plans within thirty (30) calendar days, unless the Department specifies a shorter or longer compliance period based on the nature of the condition or the problems associated with it; provided, however, to the extent that such restoration cannot be completed using commercially reasonable efforts within such thirty (30) calendar day period or other period specified by the Department, then such period shall be extended provided that the Permittee has commenced and is diligently pursuing such restoration. In addition, Permittee acknowledges its responsibility to abate any hazardous conditions that result directly or indirectly from Permittee's use of the Permit Area, promptly upon receipt of notice from the Department. For unsafe or hazardous conditions, the Permittee shall immediately place or cause to be placed temporary measures to protect the public. Failure to promptly respond to an unsafe or hazardous condition or to restore the site within the specified time may result in the Department's performing the temporary repair or restoration in order to protect the public health, safety, and welfare. Permittee shall reimburse the Department for any such temporary repair or restoration. Failure to abate the problem also may result in the Department's issuance of a Correction Notice, a Notice of Violation, a citation, and/or request for reimbursement fees to the Department for departmental and other City services necessary to abate the condition in accordance with Section 9.

5.5 Permittee's Responsibility for Coordination with City and Port; Repair of IMEP Improvements Required Due to the Improvements or Performance of Permitted Activities.

The Permittee's maintenance responsibility generally shall be limited to the Improvements in the Permit Area, and its immediate vicinity, including any sidewalk damage directly related to the Improvements or Permitted Activities. Permittee acknowledges its responsibility to coordinate with the Port and its agents or contractors concerning repairs or restoration of any improvements within the Permit Area that are subject to the IMEP. Permittee shall be responsible for the restoration of any improvements (including, e.g., sidewalk, landscaping, or non-standard hardscape) within the Permit Area subject to the IMEP that are disturbed or otherwise damaged by the Improvements or through Permittee's performance of Permitted Activities. Permittee agrees to work expeditiously with the City and the Port to coordinate any such repairs within the required timeframes under the IMEP.

If Permittee is the Fronting Property Owner, Permittee must notify any successor owner(s) of the existence of the Agreement and the successor owner's associated obligations at the time of closing on the subject property.

5.6 Annual Certification of Insurance and Updated O&M Budget and Financial Report

Upon receipt of a written request by the Department, but no more than annually, Permittee shall submit written evidence to the Department indicating that the requirements of Sections 8 (Insurance) and 9 (Violations; City Enforcement of Permit and Agreement) have been satisfied. In addition, annually, Permittee shall submit an updated O&M Budget and an updated Financial Report.

5.7 Damage to and Cleanliness and Restoration of Permit Area and City Owned or Controlled Property

Permittee, at all times, shall maintain the MRU Surface Level Improvements within the Permit Area in a clean and orderly manner to the satisfaction of the Director. Following any construction activities or other activities on the Permit Area, Permittee shall remove all debris and any excess dirt from the Permit Area.

If any portion of the Permit Area, any City-owned or controlled property located adjacent to the Permit Area, including other publicly dedicated PROW or private property in the vicinity of the Permit Area is damaged by any of the activities conducted by Permittee hereunder, Permittee shall immediately, at its sole cost, repair any and all such damage and restore the Permit Area or affected property to its previous condition to the satisfaction of the Director.

5.8 Excavation or Temporary Encroachment within the Permit Area

Permittee acknowledges its maintenance responsibility following any excavation or temporary encroachment of any portion or portions of the Permit Area as described below.

5.8A Excavation by City or UCP Holders.

After providing public notice according to Article 2.4 of the Public Works Code, any City Agency or Public Utility may excavate within the PROW, which may include portions of the Permit Area. A "City Agency" shall include, but not be limited to, the SFPUC, SFMTA, and any City authorized contractor or agent, or their sub-contractor performing excavation for a City project, but shall not include any Public Utility or private third-party excavating pursuant to a City or Port-issued permit. "Public Utility" shall include any company or entity currently holding a valid Utility Conditions Permit ("**UCP**") or a valid franchise with the City or the California Public Utilities Commission. Permittee acknowledges that it will provide and not obstruct access to any utilities and facilities owned and operated by any City Agency or a Public Utility at any time within the Permit Area for maintenance, repair, and/or replacement.

Emergency Work. In the case of an emergency, a City Agency or Public Utility will notify Permittee of the work to the extent it is reasonably possible to provide notice under the circumstances; however, if such notice is not possible, the City Agency or Public Utility need not notify the Permittee of emergency work until after the emergency situation has been abated, at which point the Department will cooperate with affected City department(s) to provide written notice to the Permittee concerning the emergency work.

In the performance of any excavation in the Permit Area by a City Agency or Public Utility, it shall be the responsibility of the Permittee to coordinate with the City Agency or Public Utility and the Port or its agents or assigns under the IMEP, as applicable, to restore the Permit Area to the condition specified on the Construction Plans, provided, however, the excavator shall implement commercially reasonable precautions to protect the Permit Area and any Improvements from injury or damage during the excavation or future work.

In the case where the excavated portion of the Permit Area consists of only City Standard materials, the City Agency or Public Utility shall complete its restoration work (i.e., backfilling and surface restoration) within thirty (30) calendar days following the completion of the excavation or temporary encroachment; provided, however, to the extent that such restoration cannot be completed within such thirty (30) calendar day period due to weather or unforeseen circumstances, then such period shall be extended provided that the excavator has commenced and is diligently pursuing such restoration.

In the case where the excavated portion of the Permit Area consists partially or fully of non-standard materials and such non-standard improvements are not subject to restoration pursuant to the IMEP, Permittee shall restore or cause to be restored the excavated portions of the Permit Area to the condition existing prior to the excavation, as determined by the Director; provided, however, to the extent that such restoration cannot be completed using commercially reasonable efforts within such thirty (30) calendar day period, then the Department shall extend such period provided that the Permittee has commenced and is diligently pursuing such restoration.

The Permittee shall not seek or pursue compensation from a City Agency or a Public Utility for Permittee's coordination of work or the inability to use the Permit Area for the duration of excavation or occupancy.

5.8B Excavation by Private Parties.

Following any excavation of any portion or portions of the Permit Area by a private party not contracted by the City (e.g., Fronting Property Owner, resident, or Fronting Property Owner's or resident's contractor or agent), it shall be the responsibility of the private party and the Permittee to coordinate the restoration of the site and the private party shall bear all the cost of restoration; provided, however, that in all events the private party shall be required to restore the excavated portion or portions of the Permit Area to the condition specified on the design for the Improvements within thirty (30) calendar days after completion of the excavation or temporary encroachment, provided, however, to the extent that such restoration cannot be completed using commercially reasonable efforts within such thirty (30) calendar day period, then the Department shall extend such period provided that the private party has commenced and is diligently pursuing

such restoration. If the private party fails to perform such restoration, then the Permittee should notify the Department of such failure in writing and allow any Departmental corrective procedures to conclude prior to pursuing any and all claims against such private party related thereto should the permittee have such third-party rights. The City, through its separate permit process with that private party, shall require that private party to bear all the costs of restoration and cooperate with the Permittee on how the restoration is performed and how any costs that the Permittee assumes for work performed (time and materials) are reimbursed. The Permittee shall only seek or pursue compensation for work performed (time and materials) and shall not seek or request compensation for coordination or the inability to use the Permit Area for the duration of excavation or occupancy, provided that Permittee is provided with access to Permittee's property. This section 5.8B shall not be construed as a waiver of any rights by Permittee to pursue claims against such private party for damage to the Improvements or otherwise resulting from the negligence or willful misconduct of a private party.

5.8C Temporary Encroachments for Entities Other Than Permittee.

In the case of temporary encroachments, which may include the temporary occupancy of portions of the Permit Area, Permittee shall work collaboratively with the entity that will be temporarily encroaching in the Permit Area ("**Temporary Encroacher**") to coordinate the temporary encroachment and to implement the utility relocation and support and work around requirements set forth in Section 5.8G.

Where the Temporary Encroacher is not a City Agency or a City Agency's agent, the Temporary Encroacher shall be responsible for any costs for restoration of the Permit Area, except for non-standard surface improvements permitted separately under an encroachment permit issued by the City. The obligation to coordinate and restore under this section shall be a condition of the City permit issued to the Temporary Encroacher. If the Temporary Encroacher fails to coordinate with Permittee and compensate the Permittee or restore the Permit Area, then the Permittee should notify the Department of such failure in writing.

5.8D Additional Time To Complete Site Restoration Where Future Work Is Anticipated

Prior to the Permittee's undertaking of any restoration of the applicable portion of the Permit Area to the conditions specified in the Construction Plans, the Permittee and the City shall confer as to whether any party (e.g., any City Agency, Public Utility, or private party) intends to perform any future work (e.g., any excavation or temporary encroachment) that would be likely to damage, disrupt, disturb or interfere with any restoration of the Permit Area. If such future work is anticipated within six (6) months following completion of any then proposed excavation or temporary encroachment, then the Permittee's deadline for restoring the site shall be automatically extended. The Permittee may submit to the Department a written request for an extension to the restoration deadline if future work is anticipated to commence more than six (6) months from the completion of the prior excavation and temporary encroachment. If the restoration deadline is extended as set forth above, then the Permittee shall be obligated to complete the restoration within the timeframes specified in this Agreement.

5.8E Permittee Shall Participate in Public Works Programs.

Permittee shall participate in the Street Utilities Coordination Committee, the Committee for Utility Liaison on Construction and Other Projects, and the Committee for Planning Utility Construction Program, established by Sections 5.60 and 5.63 of the Administrative Code, or any successor organizations established by Public Works, in the manner prescribed by Public Works. Permittee shall take all reasonable precautions to protect all other facilities located under the street.

5.8F Permittee Shall Obtain Membership in a Regional Notification Center.

In accordance with the provisions of Chapter 3.1 of Division 5 of Title I of the California Government Code (Section 4216 *et seq*.), Permittee as an operator of a subsurface installation shall obtain and maintain membership in a regional notification center (e.g., Underground Service Alert - Northern California), and shall otherwise comply with the provisions of the referenced chapter, division and title. Prior to the Effective Date, Permittee shall furnish written proof of such membership to Public Works. Repeal of any Applicable Law requiring such membership shall not negate Permittee's obligation to maintain such membership.

5.8G Support and Work Around.

Permittee shall comply with all Public Works requirements for third-party utilities, including the Agreement to Support, Work Around, and Protect (Attachment 7)**,** City Standard Specifications Section 00 73 20 and 00 73 21 (effective 2021), and all updates to said specifications for utility relocation and support and work around.

5.9 Permit Revocation; Termination; Modification of Agreement

5.9.A Permit Revocation or Termination

Permittee acknowledges and agrees that the obligations of the Permittee, successor owner(s), or Permittee's successor(s) in interest to perform the Permitted Activities shall continue for the term of the Permit. The City reserves the right to revoke the Permit under the procedures set forth in the Public Works Code Sections 786 et seq.

Permittee shall provide the City with 90-days' written notice prior to seeking termination of any portion of the Permit. If the Permit is terminated by Permittee, revoked or terminated by City, or revoked by operation of the events set forth in Section 5.9B (each an "**MEP Termination Event**") with respect to a portion or portions of the Permit Area, Permittee shall Abandon in Place or remove the applicable Improvements therein and complete any necessary backfilling and restoration of hardscape or landscape to City standard or as the Director of Public Works deems appropriate under the circumstances at Permittee's sole cost (with such backfilling and hardscape or landscape restoration pursuant to a street improvement permit or similar authorization referred to as the "**Right-of-Way Restoration**") by (i) applying for, and providing the materials necessary to obtain, a street improvement permit or other authorization from City for the performance of such restoration work; (ii) performing such restoration work pursuant to the terms and conditions of such street improvement permit or other City authorization; and (iii) warrantying that the restoration work that meets the standards required by a Public Works street improvement permit

with a duration not less than one (1) year from the date Public Works confirms that the work is complete subject to any extension that the Director may grant in the Director's discretion. In response to an MEP Termination Event, the Director, in consultation with the City Engineer, may authorize the abandonment of a portion of the Improvements in place subject to industry-standard or other applicable regulatory requirements regarding the safe decommissioning and abandonment of similar facilities and the Permittee's provision of security to cover the costs incurred by City departments to locate and perform construction around abandoned Improvements (hereafter, "**Abandonment in Place**"). Permittee's Abandonment in Place of any shall require Right-of-Way Restoration per this Section 5.9A.

Notwithstanding the foregoing, if the Director determines, based on additional technical or engineering data, that Abandonment in Place would be detrimental to the performance of LCC, public right-of-way infrastructure or public utilities, the Director may require removal of the affected component or segment of the Improvements and related Right-of-Way Restoration.

A termination or revocation of the Permit under the procedures set forth in Public Works Code Sections 786 et seq. shall result in an automatic termination of this Agreement as to the affected portion of the Permit Area, and all of Permittee's responsibilities and obligations hereunder shall terminate, unless otherwise provided for in this Agreement. The City may partially terminate or revoke the Permit as to those portions of the Permit Area subject to default and the City may elect to allow the Permit to remain effective as to all portions of the Permit Area that are not subject to default.

The obligation of Permittee, successor owner, or Permittee's successor in interest to remove the Improvements and restore the PROW to a condition satisfactory to Director of Public Works shall survive the revocation, expiration, or termination of this Permit. Upon completion of the Right-of-Way Restoration, and subject to Section 5.9B, Permittee shall have no further obligations under the Permit for the portion of the Permit area subject to the Right-of-Way Restoration and to the extent the Director has agreed to terminate the Permittee's obligations in regard to all or a portion of the Right-of-Way Restoration, except as to any applicable warranty.

The City and any and all City subdivisions or agencies shall be released from the responsibility to maintain the existence of the Improvements and shall not be required to preserve or maintain the Improvements in any capacity following the termination or revocation of the Permit unless the Department, in its discretion and in accordance with this Agreement, agrees to an alternative procedure.

5.9.B Modification or Termination of the Agreement

(a) Following the recordation of the Notice of Annexation in the Official Records, this Agreement shall continue and remain in full force and effect at all times in perpetuity except if the City elects to terminate Permittee's maintenance obligations pursuant to this Section 5.9B and provides written notice to the address provided in Section 2.7. Under such circumstances, this Agreement shall terminate at the time specified in such written notice with exception to those terms as specified in this Agreement that apply to any remaining Permit obligations. City shall record evidence of any such termination in the Official Records.

(b) At any time during the term of the Permit, Permittee may request to amend the scope of such Permitted Activities through a written amendment to this Agreement. The Director, in his or her sole discretion, may approve, approve with conditions, or deny the requested amendment. If the Director approves an amendment, both parties shall execute and record the approved amendment. Further, Permittee and Director may, but are not required to, execute a written modification of this Agreement to provide for the Department's maintenance of a portion or all of the Improvements as described in the Permit Area (Attachment 2). In the event of such modification of this Agreement, the Department may require Permittee to pay the Department for the cost of maintaining specified Improvements as described in the Maintenance Plan (defined in Section 2.8) and Attachment 3. The Director's written modification shall, among other relevant terms, identify the specific portion of the Improvements that the Department shall maintain and the terms of Permittee's payments.

(c) In addition, Permittee and City may mutually elect to modify Permittee's obligation to perform the Right-of-Way Restoration described in Section 5.9.A including any modification necessary to address any Improvements that cannot be modified or replaced with a PROW improvement built according to the City's standard specifications. Any such modification may include, but not be limited to, Permittee's agreement to convert, at its sole cost, specified Improvements to a PROW built according to the City's standard specifications while leaving other specified Improvements in their as-is condition, with Permittee assuming a continuing obligation to pay for City's costs to maintain and replace such remaining Improvements. In addition, any such modification may address any applicable City requirements for maintenance security payment obligations and City's acquisition of specialized equipment needed to perform the maintenance work, however, no such specialized equipment shall be required for Improvements built to City standards. If City and the Permittee mutually agree to any modification to the Right-of-Way Restoration that results in Permittee assuming such a maintenance payment obligation, Permittee shall execute and acknowledge, and City shall have the right to record in the Official Records of San Francisco County, an amendment to this Agreement that details such payment obligation.

5.10 Green Maintenance Requirements

In performing any Permitted Activities that require cleaning materials or tools, Permittee, to the extent commercially reasonable, shall use cleaning materials or tools selected from the Approved Alternatives List created by City under San Francisco Environment Code, Chapter 2, or any other material or tool approved by the Director. Permittee shall properly dispose of such cleaning materials or tools.

5.11 City's Authority to Require Permittee to Abandon in Place, Remove, Relocate, Adjust, and/or Support the Improvements to Accommodate City Needs

City reserves the right to occupy the PROW, or any part thereof, which is now occupied or is in the future to be occupied by the Improvements. When required to ensure the public health, safety or welfare, or when made necessary by any work to be performed under governmental authority of City by or on behalf of a City Agency, and subsequent to evaluation of a SWAP under Section 5.14 of this Agreement, Permittee shall at its own cost and expense: (a) temporarily or permanently remove or relocate the Improvements, or any part thereof, to such other locations in

the PROW as may be designated and approved in writing and in advance by City; or (b) adjust and/or support the Improvements in such manner as may be designated and approved in writing and in advance by City. City, in its discretion, may withhold approval of any plan for removal, relocation, adjustment and/or support of the Improvements ordered pursuant to this Section. Such removal, relocation, adjustment and/or support shall be completed within the time that the City prescribes. If Permittee fails to remove, relocate, adjust and/or support the Improvements in the manner and time prescribed by City, City may take actions it deems necessary to remedy Permittee's failure to comply and may charge the costs actually incurred, including but not limited to administrative costs, to Permittee. A determination by City that all Improvements must be removed entirely and cannot be reasonably relocated to alternative PROW that allows the delivery of services to the same buildings within the Project shall be considered an MEP Termination Event subject to the revocation procedures in Public Works Code Section 786 et seq.

5.12 City's Authority to Require Permittee to Remove the Improvements Upon the Expiration or Termination of this Permit

Upon the expiration or termination of this Permit, City may require Permittee to Abandon in Place or permanently remove the Improvements, or any part thereof, as described in Section 5.9A, at Permittee's own cost and expense. Such Abandonment in Place or removal shall be completed within the time prescribed by City. If Permittee fails to Abandon in Place or remove the Improvements in the manner and time that the City prescribes, City may take actions it deems necessary to remedy Permittee's failure to comply and may charge the costs actually incurred, including but not limited to administrative costs, to Permittee.

5.13 City's Authority to Determine that Permittee's Improvements are Abandoned

Permittee shall notify City, or City may determine, that the Improvements, or any part thereof, are abandoned. At City's sole option and upon City's providing written notice to Permittee that the City has deemed any portion of the Improvements abandoned, Permittee shall: (a) provide a written response to City within five (5) business days of the date of the written notice; and (b) if requested by the City, convey such abandoned Improvements to City at no cost to City by executing such documents of title as will convey all right, title, and interest in the Improvements, or any part thereof, to City free and clear of liens and/or adverse claims of title within thirty (30) calendar days of the date of the written notice; and/or (c) if requested by the City, Abandon in Place or, if the Director determines that the Improvements must be removed consistent with Section 5.9A, remove all or a portion of the abandoned Improvements, and complete any associated Right-of-Way Conversion within one hundred-eighty (180) calendar days of the date of the written notice. If Permittee fails to Abandon in Place or remove the abandoned Improvements within one hundred-eighty (180) calendar days of the date of the written notice, City may take actions it deems necessary to remedy Permittee's failure to comply and may charge the costs actually incurred, including but not limited to administrative costs, to Permittee. Permittee shall assume all liability for abandoned Improvements unless and until Permittee conveys title to such Improvements to another person or business entity consistent with the requirements of this Permit or other Applicable Law or City takes title to such Improvements pursuant to this Section.

5.14 City's Authority to Require Permittee to Provide Support and Work-Around Plans to Avoid Conflicts with City Projects

Whenever City determines that the Improvements are in conflict with any City project, which shall include water and sewer pipe installation, building construction, or any other work performed by a City Agency or a City contractor, Permittee shall, at Permittee's sole expense: (a) prepare Utility Support and Work-Around Plans ("**SWAP**") estimates and specifications so Permittee's SWAP can be incorporated into any City contract, as further set forth in Appendix A of Attachment 7 hereto incorporated by this reference; and (b) work directly with any City contractor to pay said contractor for all costs, direct and indirect, including for extra work and/or delay, incurred as the result of the existence of the Improvements within a City project limit, as further set forth in Appendix B of Attachment 7 hereto incorporated by this reference. City reserves the right to amend the SWAP requirements contained in Attachment 7, Appendices A and B, upon reasonable notice to Permittee.

5.15 City's Authority to Require Permittee to Restore the Public Right-Of-Way

Whenever the Abandonment in Place, removal, relocation, adjustment and/or support of the Improvements is required under Sections 5.11 – 5.14, Permittee shall, after such work is complete, at its own cost and expense and at no cost to City, promptly repair, restore and return the PROW in which the Improvements are located to a safe and satisfactory condition. If Permittee fails to restore the PROW in accordance with this Permit and Applicable Law, City shall have the option to perform or cause to be performed such restoration in such manner as City deems expedient and appropriate on behalf of Permittee and charge the actual costs incurred, including but not limited to administrative costs, to Permittee.

5.16 Permittee Shall Reimburse City for its Costs

Upon the receipt of a demand for payment by City, Permittee shall reimburse City for any costs the City incurs under Sections 5.11 – 5.15, or the cost of such work may be deducted from the Permittee's deposit under Section 2.4.46(c) of the Public Works Code.

6. ANNEXATION OF PROPERTY AND IMPROVEMENTS INTO PERMIT; ASSIGNMENT OF MAINTENANCE OBLIGATIONS

Pursuant to the Board of Supervisor's authorization in Resolution No. _____, the Permit Area may be expanded or new permit areas may be established according to this Section 6. Real property and associated Improvements (each area an "**Annexation Area**") may be annexed into the Permit or, as delegated by the Board of Supervisors, may constitute separate master encroachment permits or discrete street encroachment permits (each a "**Sub-Permit Area**"), as further described below, upon: i) approval by the Director according to the procedures set forth in this Section 6 and ii) the Department's issuance of a Notice of Completion, Certificate of Conformity, or the equivalent instrument establishing that or the Improvements have been completed according to the Improvement Plans and Specifications for Improvements completed within the proposed Annexation Area.

(a) **Annexation Application Approval Process**. For each Annexation Area or Sub-Permit Area Permittee proposes for annexation into the Permit ("**Annexation Application**"), Permittee shall provide to the Department the materials described below concurrent with City's approval of 100% Improvement Plans for the Permit Area. To be eligible for annexation into the Permit, the Annexation Area or Sub-Permit Area (including street segments and/or encroachment areas) must have been generally shown in the approved Global Diagram initially approved with this Permit.

(1) Annexation Application. Permittee must submit a complete Encroachment Permit application requesting the Director's approval of the annexation of the Annexation Area into the Permit or approval of a master encroachment permit or street encroachment permit comprised of the Annexation Area as part of this Permit. The Annexation Application shall reference this Permit and include a plat or similar diagram illustrating the Permit Area and identifying the location of the Improvements to be annexed into the Permit or the Permit Area for which Permittee seeks a discrete master encroachment permit or street encroachment permit. The Annexation Application shall identify and describe any modifications to any Permit Area compared to the real property or Improvements shown in the approved Global Diagram. The Annexation Application shall identify the Permittee proposed to be responsible for the Annexation Area.

(2) Updated Global Diagram. Permittee must update the Global Diagram previously submitted to the Department to depict the Permit Area at the time of the submittal of the Annexation Application, including all administratively approved Annexation Areas and/or discrete master encroachment permits or street encroachment permits. Permittee must refine the Global Diagram, as needed, to include the type of Improvements and their approximate location within the Annexation Area. The updated Global Diagram shall also identify the Permittee for any previously approved Annexation Area.

(3) Updated Permit Area Documentation. Permittee shall submit updated or supplemental Permit Area Documentation showing all Improvements in the Annexation Area that is the subject of the Annexation Application ("**Precise Diagram**").

(4) Phasing Plan. Permittee shall submit a diagram that shows all improvements in the Annexation Area, and generally shows Improvements that are located adjacent to the Permit Area.

(5) Updated Maintenance Plan (if applicable). Permittee shall submit to the Department a Maintenance Plan with each Annexation Application which shall contain a detailed description of means and methods to maintain the Improvements within the Permit Area that is the subject of the Annexation Application. If the Director approved any changes to the Maintenance Plan subsequent to the issuance of the Permit, Permittee shall include the updated Maintenance Matrix reflecting such change.

(6) Engineering and Improvement Plans and diagrams for the Permit Area.

(7) An estimate of annual maintenance cost for the Improvements associated with the Permit Area in the Annexation Application.

(8) Unless a full set of O&M Manuals was previously submitted and approved by the Department, Permittee shall submit O&M Manuals for the Improvements in the Annexation Area.

(9) Updated Maintenance Monitoring and Reporting Program (if applicable). If the Permittee proposes any changes to the Maintenance Monitoring and Reporting Program or if there are specific maintenance monitoring and reporting obligations exclusive to the Annexation Area, Permittee shall include the updated or specific Maintenance Monitoring and Reporting Program for Public Works to determine compliance with this Permit.

(b) **Review of Annexation Application**. The Department shall review the Annexation Application according to the procedures and requirements of Public Works Code Sections 786 et seq., as provided herein. The Department shall provide the Permittee written notice indicating whether: (a) the Annexation Application is approved; (b) additional information is required to complete the application; and/or (c) in the Director's discretion, the Annexation Application proposes one or more entirely new or significantly modified encroachments (each a "New Encroachment") that were not included as part of the Board of Supervisors approval of the Permit. In the event an Annexation Application involves a New Encroachment, the Annexation Application shall be deemed an application for a new major encroachment permit requiring approval by the Board of Supervisors pursuant to Public Works Code Section 786(b).

(c) **Transmittal of Notice of Annexation**. Upon the Director's approval of an Annexation Application and prior to or concurrently with the Board of Supervisor's acceptance of the future public improvements located within the Permit Area that is the subject of the Annexation Application, the Permittee shall transmit a "**Notice of Annexation**" that has been reviewed and approved by the Director to the Association. The Notice of Annexation shall describe the real property and/or Improvements annexed into the Permit and identify the Permittee responsible for the completed Improvements in the Permit Area. The Notice of Annexation shall include the following documents: (1) Updated Global Diagram showing all the phases of work that have been annexed into the Permit, including the Permit Area; (2) a Precise Diagram; (3) a table identifying the Fronting Property responsible for maintaining each category of Improvement in the Permit

Area; and (4) a copy of the fully-executed Agreement with updated attachments, including the most current, updated versions of the documents set forth in Section 2.9. All Notices of Annexation shall be maintained by the Permittee and the Department and shall be subject to public inspection upon request.

Upon the Permittee's transmittal of the Association's signed acknowledgement of receipt issuance of the Notice of Annexation, the real property and Improvements identified therein shall become subject to the Permit, and the Permittee identified in the Notice of Annexation shall be subject to all terms and provisions set forth in this Agreement.

7. USE RESTRICTIONS

Permittee agrees that the following uses of the PROW by Permittee or any other person claiming by or through Permittee are inconsistent with the limited purpose of this Agreement and are strictly prohibited as provided below. The list of prohibited uses includes, but is not limited to, the following uses.

7.1 Proposed Alterations

Other than the approved Improvements, Permittee shall not make, construct, or place any temporary or permanent alterations, installations, additions, or improvements on or within the PROW, structural or otherwise, nor alter any existing structures or improvements on the PROW (each, a "**Proposed Alteration**"), without the Director's prior written consent in each instance. The in-kind replacement or repair of existing Improvements shall not be deemed a Proposed Alteration.

Permittee may request the Director's approval of a Proposed Alteration as a Permitted Activity or approved Improvement for purposes of this Agreement. The Director shall have a period of twenty (20) business days from receipt of request for approval of a Proposed Alteration to review and approve or deny such request for approval. Should the Director fail to respond to such request within said twenty (20) business day period, Permittee's Proposed Alteration shall be deemed disapproved. Director's approval of a Proposed Alteration is distinct from and in addition to any permit or authorization required to construct, install, or maintain the Proposed Alteration. In requesting the Director's approval of a Proposed Alteration, Permittee acknowledges that the Director's approval of such Proposed Alteration may be conditioned on Permittee's compliance with specific installation requirements and Permittee's performance of specific on-going maintenance thereof or other affected PROW. If Permittee does not agree with the Director's installation or maintenance requirements for any Proposed Alteration, Permittee shall not perform the Proposed Alteration. If Permittee agrees with the Director's installation or maintenance requirements for any Proposed Alteration, prior to Permittee's commencement of such Proposed Alteration, Permittee and the Director shall enter into a written amendment to this Agreement that modifies the Permitted Activities to include such requirements.

If Permittee performs any City-approved Proposed Alteration, Permittee shall comply with all of the applicable terms and conditions of this Agreement, including, but not limited to, any and all conditions of approval of the Proposed Alteration(s).

Permittee shall obtain all necessary permits and authorizations from the Department and other regulatory agencies prior to commencing work for the Proposed Alteration. The Director's decision regarding a Proposed Alteration shall be final and not appealable.

7.2 Dumping

Permittee shall not dump or dispose of refuse or other unsightly materials on, in, under, or about the PROW.

7.3 Hazardous Material

Permittee shall not cause, nor shall Permittee allow any of its agents to cause, any Hazardous Material (as defined below) to be brought upon, kept, used, stored, generated, or disposed of in, on, or about the PROW, or transported to or from the PROW. Permittee shall immediately notify City if Permittee learns or has reason to believe that a release of Hazardous Material has occurred in, on, or about the PROW. In the event Permittee or its agents cause a release of Hazardous Material in, on, or about the PROW, Permittee shall, without cost to City and in accordance with all laws and regulations, (i) comply with all laws requiring notice of such releases or threatened releases to governmental agencies, and shall take all action necessary to mitigate the release or minimize the spread of contamination, and (ii) return the PROW to a condition which complies with applicable law. In connection therewith, Permittee shall afford City a full opportunity to participate in any discussion with governmental agencies regarding any settlement agreement, cleanup or abatement agreement, consent decree or other compromise proceeding involving Hazardous Material. For purposes hereof, "Hazardous Material" means material that, because of its quantity, concentration, or physical or chemical characteristics, is at any time now or hereafter deemed by any federal, state, or local governmental authority to pose a present or potential hazard to public health, welfare, or the environment. Hazardous Material includes, without limitation, any material or substance defined as a "hazardous substance, pollutant or contaminant" pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C. Sections 9601 et seq., or pursuant to Section 25316 of the California Health & Safety Code; a "hazardous waste" listed pursuant to Section 25140 of the California Health & Safety Code; any asbestos and asbestos containing materials whether or not such materials are part of the PROW or are naturally occurring substances in the PROW, and any petroleum, including, without limitation, crude oil or any fraction thereof, natural gas or natural gas liquids. The term "release" or "threatened release" when used with respect to Hazardous Material shall include any actual or imminent spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing in, on, under, or about the PROW.

Notwithstanding anything herein to the contrary, if the Director determines that neither Permittee nor its agents caused the release or threatened release of the Hazardous Material, Permittee shall have no liability whatsoever (including, without limitation, the costs of any investigation, any required or necessary repair, replacement, remediation, cleanup or detoxification, or preparation and implementation of any closure, monitoring, or other required plans) with respect to any release or threatened release of any Hazardous Material on, in, under or about the PROW. If the Director finds that neither Permittee nor its agents was the source and did

not cause the release of such Hazardous Material, Permittee shall not be listed or identified as the generator or responsible party of any waste required to be removed from the PROW, and will not sign any manifests or similar environmental documentation, with respect to any Environmental Condition (as hereinafter defined). "Environmental Condition" shall mean any adverse condition relating to the release or discharge of any Hazardous Materials on, in, under, or about the PROW by any party other than Permittee or its agents.

7.4 Nuisances

Permittee shall not conduct any activities on or about the PROW that constitute waste, nuisance, or unreasonable annoyance (including, without limitation, emission of objectionable odors, noises, or lights) to City, to the owners or occupants of neighboring property, or to the public. The parties hereby acknowledge that customary use of landscaping and similar equipment (such as lawn mowers, clippers, hedge trimmers, leaf blowers, etc.) that would typically be used to perform the Permitted Activities shall not be considered a nuisance under this Section 7.4 if such equipment is used in compliance with all applicable laws.

7.5 Damage

Permittee shall use due care at all times to avoid causing damage to any of the PROW or any of City's property, fixtures, or encroachments thereon. If any of the Permitted Activities or Permittee's other activities at the PROW causes such damage, Permittee shall notify City, and, if directed by City, restore such damaged property or PROW to the condition it was in prior to the commencement of such Permittee activity to the Director's satisfaction; or, if the City chooses to restore the damaged property, Permittee shall reimburse City for its costs of restoration.

8. INSURANCE

8.1 As described below, Permittee shall procure and keep insurance in effect at all times during the term of this Agreement, at Permittee's own expense, and cause its contractors and subcontractors to maintain insurance at all times, during Permittee's or its contractors performance of any of the Permitted Activities on the PROW. If Permittee uses any contractors or subcontractors to perform any of the Permitted Activities on or about the Permit Area, Permittee shall require the contractors or subcontractors to provide all necessary insurance and to name the City and County of San Francisco and its officers, agents, and employees, and the Permittee as additional insureds and to waive subrogation in favor of City, where required. If Permittee fails to maintain the insurance in active status, such failure shall be a Permit default subject to the Department's enforcement remedies. The insurance policy shall be maintained and updated annually to comply with the Department's applicable requirements. The following Sections represent the minimum insurance standard as of the Effective Date of this Permit.

8.1.A An insurance policy or insurance policies issued by insurers with ratings comparable to A-VIII, or higher that are allowed to do business in the State of California, and that are satisfactory to the City. Approval of the insurance by City shall not relieve or decrease Permittee's liability hereunder;

8.1.B Commercial General Liability Insurance written on an Insurance Services Office (ISO) Coverage form CG 00 01 or another form providing equivalent coverage with limits not less than Ten Million Dollars ($10,000,000) each occurrence for bodily injury and property damage, including coverages for contractual liability, personal injury, products and completed operations, independent permittees, and broad form property damage;

8.1.C Commercial Automobile Liability Insurance with limits not less than One Million Dollars ($1,000,000) each occurrence, combined single limit for bodily injury and property damage, including coverages for owned, non-owned, and hired automobiles, as applicable for any vehicles brought onto PROW;

8.1.D Workers' Compensation Insurance, in statutory amounts, with Employer's Liability Coverage with limits of not less than One Million Dollars ($1,000,000) each accident, injury, or illness; and

8.1.E Property Insurance with limits not less than [Ten] Million Dollars ($10,000,000) each occurrence, combined single limit for bodily injury and property damage, including coverages for owned, non-owned, and hired automobiles, as applicable for any vehicles brought onto PROW;

8.1.F Earthquake Insurance with limits not less than Five Million Dollars ($5,000,000). City shall be included as loss payee, as its interest may appear, and subrogation must be waived in favor of City.

8.1.G Flood Insurance with limits not less than Five Million Dollars ($5,000,000). City shall be included as loss payee, as its interest may appear, and subrogation must be waived in favor of City.

8.2 All liability policies required in this Agreement shall provide for the following: (i) name as additional insured the City and County of San Francisco, its officers, agents, and employees, jointly and severally; (ii) specify that such policies are primary insurance to any other insurance available to the additional insureds, with respect to any claims arising out of this Agreement; and (iii) stipulate that no other insurance policy of the City and County of San Francisco will be called on to contribute to a loss covered hereunder.

8.3 Limits may be provided through a combination of primary and excess insurance policies. Such policies shall also provide for severability of interests and that an act or omission of one of the named insureds which would void or otherwise reduce coverage shall not reduce or void the coverage as to any insured, and shall afford coverage for all claims based on acts, omissions, injury, or damage which occurred or arose (or the onset of which occurred or arose) in whole or in part during the policy period.

8.4 All insurance policies shall provide for thirty (30) days' prior written notice of cancellation for any reason, non-renewal or material reduction in coverage, or depletion of insurance limits, except for ten (10) days' notice for cancellation due to non-payment of premium,

to both Permittee and City. Permittee shall provide a copy of any notice of intent to cancel or materially reduce, or cancellation, material reduction, or depletion of, its required coverage to Department within one business day of Permittee's receipt. Permittee also shall take prompt action to prevent cancellation, material reduction, or depletion of coverage, reinstate or replenish the cancelled, reduced or depleted coverage, or obtain the full coverage required by this Section from a different insurer meeting the qualifications of this Section. Notices shall be sent to the ATTN: Infrastructure Task Force (Mission Rock Project), Department of Public Works, 49 South Van Ness Avenue, 9th Floor, San Francisco, CA, 94103, or any future address for the Department. The permission granted by the Permit shall be suspended upon the termination of such insurance. Upon such suspension, the Department and Permittee shall meet and confer to determine the most appropriate way to address the Permit. If the Department and Permittee cannot resolve the matter, the Permittee shall restore the PROW to a condition acceptable to the Department without expense to the Department. As used in this Section, "Personal Injuries" shall include wrongful death.

8.5 Prior to the Effective Date, Permittee shall deliver to the Department certificates of insurance and additional insured policy endorsements from insurers in a form reasonably satisfactory to Department, evidencing the coverages required hereunder. Permittee shall furnish complete copies of the policies upon written request from City. In the event Permittee shall fail to procure such insurance, or to deliver such certificates or policies (following written request), Department shall provide notice to Permittee of such failure and if Permittee has not procured such insurance or delivered such certificates within five (5) days following such notice, City may initiate proceedings to revoke the permit and require restoration of the PROW to a condition that the Director deems appropriate.

8.6 Should any of the required insurance be provided under a form of coverage that includes a general annual aggregate limit or provides that claims investigation or legal defense costs be included in such general annual aggregate limit, such general aggregate limit shall double the occurrence or claims limits specified above.

8.7 Should any of the required insurance be provided under a claims-made form, Permittee shall maintain such coverage continuously throughout the term of this Agreement and, without lapse, for a period of three (3) years beyond the expiration of this Agreement, to the effect that, should any occurrences during the term of this Agreement give rise to claims made after expiration of this Agreement, such claims shall be covered by such claims-made policies.

8.8 Upon City's request, Permittee and City shall periodically review the limits and types of insurance carried pursuant to this Section. If the general commercial practice in the City and County of San Francisco is to carry liability insurance in an amount or coverage materially greater than the amount or coverage then being carried by Permittee for risks comparable to those associated with the PROW, then City in its sole discretion may require Permittee to increase the amounts or coverage carried by Permittee hereunder to conform to such general commercial practice.

8.9 Permittee's compliance with the provisions of this Section shall in no way relieve or decrease Permittee's indemnification obligations under this Agreement or any of Permittee's

other obligations hereunder. Permittee shall be responsible, at its expense, for separately insuring Permittee's personal property.

9. VIOLATIONS; CITY ENFORCEMENT OF PERMIT AND AGREEMENT

Permittee acknowledges that the Department may pursue the remedies described in this Section in order to address a default by Permittee of any obligation under this Permit with respect to any Permit Area for which Permittee is responsible pursuant to the relevant Notice of Assignment, if applicable. In addition to the procedures below and as set forth in Section 5.4B, if Permittee fails to promptly respond to an unsafe or hazardous condition or to restore the site within the time the Department specifies, the Department may perform the temporary repair or restoration in order to protect the public health, safety, and welfare. Permittee shall reimburse the Department for any such temporary repair or restoration.

(a) **Correction Notice (CN)**. The Department may issue a written notice informing Permittee that there is an unsafe, hazardous, damaged, or blighted condition within the Permit Area, or stating that the Permittee has otherwise failed to maintain the Permit Area as required by this Permit or stating that the Permittee has otherwise failed to comply with a term or terms of this Agreement ("**Correction Notice**"). The Correction Notice shall identify the issue, deficiency, or maintenance obligation that is the subject of the notice with reasonable particularity and specify the time for correction, which shall be no less than thirty (30) days; provided, however, to the extent that such correction cannot be completed using reasonable efforts within the initially specified timeframe, then such period shall be extended provided that the Permittee has commenced and is diligently pursuing such correction. In the event of an emergency or other situation presenting a threat to public health, safety, or welfare, the Director may require correction in less than thirty (30) days. The Department may, in the Director's sole discretion, specify in any Correction Notice that Permittee shall immediately inform the Association of the Correction Notice and provide written documentation to the Director evidencing such notice to the Association.

(b) **Notice of Violation (NOV)**.

(i) The Department may issue a written notice of violation to the Permittee for failure to maintain the Improvements within the Permit Area and creating an unsafe, hazardous, damaged, or blighted condition within the Permit Area, failure to comply with the terms of this agreement, or failure to respond to the Correction Notice by abating the identified condition(s) within the time specified therein. The NOV shall identify each violation and any fines imposed per applicable code(s) or Agreement sections and specify the timeframe in which to cure the violation and pay the referenced fines ("**Notice of Violation**") within thirty (30) days if not specified otherwise. The Department may, in the Director's sole discretion, specify in any Notice of Violation that Permittee shall immediately inform the Association of the Notice of Violation and provide written documentation to the Director evidencing such notice to the Association.

(ii) Permittee shall have ten (10) days to submit to the Department, addressed to the Director, via Public Works Permits at 49 South Van Ness Avenue, San Francisco, CA 94103, or future address, a written appeal to the NOV or a written request for administrative review

of specific items. If Permittee submits said appeal or request for review, the Director shall hold a public hearing on the dispute in front of an administrative hearing officer. The Director shall then issue a final written decision on his or her determination to approve, conditionally approve, modify, or deny the appeal based on the recommendation of the hearing officer and the information presented at the time of the hearing.

(c) **Uncured Default**. If the violation described in the Notice of Violation is not cured within ten (10) days after the latter of (1) the expiration of the Notice of Violation appeal period or (2) the written decision by the Director following the hearing to uphold the Notice of Violation or sections thereof, said violation shall be deemed an "**Uncured Default**." In the event of an Uncured Default, the Director may undertake either or both of the following:

(i) Cure the Uncured Default and issue a written notice to Permittee informing Permittee that it has withdrawn from the Removal, Restoration, and Abandonment Account the Department's actual costs to remedy said default in addition to any fines or penalties described in the Notice of Violation ("**Account Withdrawal Notice**"). Permittee shall acknowledge receipt of the Account Withdrawal Notice from City within fifteen (15) days of receipt. Should the Department use any portion of the Removal, Restoration, and Abandonment Account, as defined herein, to cure any Uncured Default, Permittee shall replenish the Removal, Restoration, and Abandonment Account to the original amount within thirty (30) days of receipt of an Account Withdrawal Notice.

(ii) Alternatively, the Director may initiate the procedures under Public Works Code Section 786 to revoke the Permit with respect to the particular portion of the Permit Area that is the subject of the Notice of Violation and require Abandonment in Place and Right-of-Way Restoration (as defined in Section 5.9.A) with respect to that area, in the Director's discretion.

Permittee agrees that the Department may, but shall not be required to, apply the Removal, Restoration, and Abandonment Account in whole or in part to remedy any damage to the PROW caused by Permittee, its agents, or the general public using the Permit Area to the extent that the Director of Public Works required Permittee to perform such remediation under this Agreement and Permittee failed to do so, or Permittee failed to perform any other terms, covenants, or conditions contained herein (including, but not limited to, the payment of any sum due to the Department hereunder either before or after a default). Notwithstanding the preceding, the Department does not waive any of the Department's other rights and remedies hereunder or at law or in equity against the Permittee should Department use all or a portion of the Removal, Restoration, and Abandonment Account. Upon termination of the Permitted Activities after an MEP Termination Event as described herein, the Department shall return any unused portion of the Removal, Restoration, and Abandonment Account to Permittee, less any administrative processing cost.

10 REMOVAL, RESTORATION, AND ABANDONMENT ACCOUNT

Upon recordation of the Notice of Annexation for such Improvements including for Phase 1, Permittee shall contribute payments to a "**Removal, Restoration, and Abandonment Account**" held and managed by the City. Permittee shall remit fifteen (15) annual payments according to the payment schedule included in Attachment 9, which includes an annual adjustment of 5% for inflation which the Director has determined, based on review of an engineer's cost estimate approved by the City Engineer, as adequate to ensure the safe Abandonment in Place and removal of the Improvements and associated Right-of-Way Restoration. The first payment will be due on or before recordation of the Notice of Annexation for Phase 1, and each subsequent payment will be due on or before the anniversary date of the first payment. The Removal, Restoration, and Abandonment Account shall accrue interest and shall not be used for ongoing maintenance obligations. If Permittee fails to respond to a Correction Notice or Notice of Violation described above, the City may withdraw funds from the Removal, Restoration, and Abandonment Account to cover the costs of an Uncured Default associated with the Improvements.

Permittee may request to provide an alternative form of security to ensure its performance of any maintenance, removal or restoration obligations required under the Agreement ("**Substitute Security**") in the amount of Three Hundred Forty-Six Thousand Dollars ($346,000), but which shall be escalated annually by five percent (5%) according to the substitute security payment schedule included in Attachment 10. Substitute Security may be in the form of a surety bond, a letter of credit, a corporate guaranty, or another form of security approved by the Director in the Director's sole discretion. The Director will release the Removal, Restoration and Abandonment Account to Permittee upon Permittee's delivery of Director-approved Substitute Security.

If the Department or the Master Developer determines that a Failure of the LCC Infrastructure, as the terms are defined in Public Works Order No. 203637, has occurred, upon receiving written notice of this determination, the Permittee shall inspect all Improvements to ensure that they continue to function safely and properly within thirty (30) days of the date of the written notice. Permittee shall cooperate with the Department's and/or the Port's request to enter upon the Permit Area and the Improvements to inspect the Improvements.

11. COMPLIANCE WITH LAWS

Permittee shall, at its expense, conduct and cause to be conducted all activities under its control on the PROW allowed hereunder in a safe and prudent manner and in compliance with all laws, regulations, codes, ordinances, and orders of any governmental or other regulatory entity (including, without limitation, the Americans with Disabilities Act and any other disability access laws), whether presently in effect or subsequently adopted and whether or not in the contemplation of the parties. Permittee shall, at its sole expense, procure and maintain in force at all times during its use of the PROW any and all business and other licenses or approvals necessary to conduct the Permitted Activities. Nothing herein shall limit in any way Permittee's obligation to obtain any required regulatory approvals from City departments, boards, or commissions or other governmental regulatory authorities or limit in any way City's exercise of its police powers. At

the Director's written request, Permittee shall deliver written evidence of any such regulatory approvals Permittee is required to obtain for any of the Permitted Activities.

12. SIGNS

Permittee shall not place, erect, or maintain any sign, advertisement, banner, or similar object on or about the PROW without the Director's written prior consent, which the Director may give or withhold in its sole discretion; provided, however, that Permittee may install any temporary sign that is reasonably necessary to protect public health or safety during the performance of a Permitted Activity.

13. UTILITIES

The Permittee shall be responsible for locating and protecting in place all above and below grade utilities from damage, when Permittee, or its authorized agent, elects to perform any work in, on, or adjacent to the Permit Area. If necessary prior to or during the Permittee's execution of any work, including Permitted Activities, a utility requires temporary or permanent relocation, the Permittee shall obtain written approval from the utility owner and shall arrange and pay for all costs for relocation. If Permittee damages any utility during execution of its work, the Permittee shall notify the utility owner and arrange and pay for all costs for repair. Permittee shall be solely responsible for arranging and paying directly to the City or utility company for any utilities or services necessary for its activities hereunder.

Permittee shall be responsible for installing, maintaining, and paying for utility services necessary to support any Improvements, such as light fixtures, water fountains, storm drains, etc. in the Permit Area that are included in the Permit.

14. NO COSTS TO CITY; NO LIENS

Permittee shall bear all costs or expenses of any kind or nature in connection with its use of the PROW pursuant to this Agreement, and shall keep the PROW free and clear of any liens or claims of lien arising out of or in any way connected with its (and not others') use of the PROW pursuant to this Agreement.

15. "AS IS, WHERE IS, WITH ALL FAULTS" CONDITION OF PROW; DISABILITY ACCESS; DISCLAIMER OF REPRESENTATIONS

Permittee acknowledges and agrees that Permittee shall install the Improvements contemplated in the permit application for the Improvements and has full knowledge of the condition of the Improvements and the physical condition of the PROW. Permittee agrees to use the PROW in its "AS IS, WHERE IS, WITH ALL FAULTS" condition, without representation or warranty of any kind by City, its officers, agents, or employees, including, without limitation, the suitability, safety, or duration of availability of the PROW or any facilities on the PROW for Permittee's performance of the Permitted Activities. Without limiting the foregoing, this Agreement is made subject to all applicable laws, rules, and ordinances governing the use of the PROW, and to any and all covenants, conditions, restrictions, encroachments, occupancy, permits,

and other matters affecting the PROW, whether foreseen or unforeseen, and whether such matters are of record or would be disclosed by an accurate inspection or survey. It is Permittee's sole obligation to conduct an independent investigation of the PROW and all matters relating to its use of the PROW hereunder, including, without limitation, the suitability of the PROW for such uses. Permittee, at its own expense, shall obtain such permission or other approvals from any third parties with existing rights as may be necessary for Permittee to make use of the PROW in the manner contemplated hereby.

Under California Civil Code Section 1938, to the extent applicable to this Agreement, Permittee is hereby advised that the PROW has not undergone inspection by a Certified Access Specialist ("CASp") to determine whether it meets all applicable construction-related accessibility requirements.

16. ASSIGNMENT OF AGREEMENT; PERMIT BINDING UPON SUCCESSORS AND ASSIGNEES; NOTICE OF ASSIGNMENT

This Agreement shall be the obligation of Permittee and each future fee owner of the Improvements, and may not be assigned, conveyed, or otherwise transferred to any other party unless approved in writing by the Director. This Agreement shall bind Permittee, its successors and assignees with each successor or assignee being deemed to have assumed the obligations under this Agreement at the time of such acquisition.

Permittee shall initiate a request to assign this Agreement by submitting a "**Notice of Assignment**" to the Department.

The **Notice of Assignment** shall include:

(1) Identification of the Assignee and written acknowledgment of the Assignee's acceptance of the responsibilities under this permit;

(2) The contact person for the Assignee and the contact information as required under Section 2.7;

(3) If the Assignee is the Association, a copy of recorded CC&Rs and written evidence indicating the Association has acquired the Improvements;

(4) A statement identifying whether a Community Facilities District or other Special Tax Entity will expend monetary or staff resources on the Permit area for maintenance or other activities;

(5) A copy of the Assignee's general liability insurance that satisfies Section 7; and

(6) Any other considerations necessary to promote the health, safety, welfare, including demonstration to the Director's satisfaction that the Assignee has the monetary and/or staff resources are available and committed to perform the maintenance obligation.

Permittee shall submit to Public Works a Notice of Assignment in a form acceptable to Public Works. Prior to approval from the Director, the Department shall provide a written determination that the proposed assignee satisfies Section 8 (Insurance) and Section 10 (Removal, Restoration, and Abandonment Account), if applicable. Following such assignment, the obligations of the assigning Permittee shall be deemed released and the assigning Permittee shall have no obligations under this Agreement.

17. TRANSFER AND ACCEPTANCE PROCEDURES

Before any proposed transfer of the Improvements, the Permittee shall provide the City and the Port of San Francisco ("Port") with written notice (the "Transfer Notice") describing fully the proposed transfer, including (a) the name and address of the proposed transferee; and (b) the actual, bona fide cash price or other consideration for which the Permittee proposes to transfer the Improvements, (c) the total fair market value of the Improvements, and (d) the terms of the transfer. The Transfer Notice must be signed by both the Permittee and the proposed transferee, must constitute a bona fide and binding commitment of the Permittee and the proposed transferee for the transfer of the Improvements, and must contain sufficient information to show the bona fide nature of the proposed transfer. If the Port determines that the Transfer Notice is insufficient to establish the bona fide nature of the transfer (or otherwise fails to meet the requirements of this Section), the Permittee shall have no right to transfer the Improvements until the Permittee first provides a compliant Transfer Notice and complies with this Section 17.

Following the written consent of the Director, after consulting with the Port, this Permit and the accompanying benefits and obligations are automatically transferred to any successor owner(s) of the Improvements. If the Permittee is selling the Improvements, the successor owner(s) shall submit contact information to the Department immediately upon closing on the transaction along with an acknowledgement that the successor owner(s) shall accept and assume all Permit responsibilities. The Department may require that such a transfer be evidenced by a new written Agreement with the Director and require evidence of the requisite insurance to be submitted within a specified period of time.

If the Association acquires the Improvements pursuant to separate commercial agreements between the Association and Permittee, the Association will be deemed to be an approved transferee, provided that the Director is promptly notified of the transfer.

18. NO REAL PROPERTY INTEREST CONVEYED

All Facilities installed by Permittee in the PROW are Permittee's personal property and are subject to Abandonment in Place or removal, as described in Section 5.9A, upon notice from City or upon the expiration or termination of this Permit. Nothing in this Permit, nor any use hereunder, shall be deemed to grant, convey, create, or vest in Permittee a real property interest in any portion of the Public Right-Of-Way or City property including, but not limited to, any fee or leasehold interest in land, easement, or franchise, except that nothing herein shall affect any possible liability for possessory interest taxes pursuant to Section 19.

19. POSSESSORY INTEREST TAXES

Permittee recognizes and understands that this Agreement may create a possessory interest subject to property taxation with respect to privately-owned or occupied property in the PROW, and that Permittee may be subject to the payment of property taxes levied on such interest under applicable law. Permittee agrees to pay taxes of any kind, including any possessory interest tax, if any, that may be lawfully assessed on Permittee's interest under this Agreement or use of the PROW pursuant hereto and to pay any other taxes, excises, licenses, permit charges, or assessments based on Permittee's usage of the PROW that may be imposed upon Permittee by applicable law (collectively, a "**Possessory Interest Tax**"). Permittee shall pay all of such charges when they become due and payable and before delinquency. The parties hereto hereby acknowledge that the PROW will be a public open space during the term of this Agreement and Permittee's use of the PROW pursuant to this Agreement is intended to be non-exclusive and non-possessory.

20. PESTICIDE PROHIBITION

Permittee shall comply with the provisions of Section 308 of Chapter 3 of the San Francisco Environment Code (the "Pesticide Ordinance") which (a) prohibit the use of certain pesticides on PROW, (b) require the posting of certain notices and the maintenance of certain records regarding pesticide usage and (c) require Permittee to submit to the Director an integrated pest management ("**IPM**") plan that (i) lists, to the extent reasonably possible, the types and estimated quantities of pesticides that Permittee may need to apply to the PROW during the term of this Agreement, (ii) describes the steps Permittee will take to meet the City's IPM Policy described in Section 300 of the Pesticide Ordinance, and (iii) identifies, by name, title, address and telephone number, an individual to act as the Permittee's primary IPM contact person with the City. In addition, Permittee shall comply with the requirements of Sections 303(a) and 303(b) of the Pesticide Ordinance. Nothing herein shall prevent Permittee, through the Director, from seeking a determination from the Commission on the Environment that it is exempt from complying with certain portions of the Pesticide Ordinance as provided in Section 303 thereof.

21. PROHIBITION OF TOBACCO SALES AND ADVERTISING

Permittee acknowledges and agrees that no sale or advertising of cigarettes or tobacco products is allowed on the PROW. This advertising prohibition includes the placement of the name of a company producing, selling or distributing cigarettes or tobacco products or the name of any cigarette or tobacco product in any promotion of any event or product. This advertising prohibition does not apply to any advertisement sponsored by a state, local, nonprofit, or other entity designed to (a) communicate the health hazards of cigarettes and tobacco products, or (b) encourage people not to smoke or to stop smoking.

22. PROHIBITION OF ALCOHOLIC BEVERAGE ADVERTISING

Permittee acknowledges and agrees that no advertising of alcoholic beverages is allowed on the PROW. For purposes of this Section, "alcoholic beverage" shall be defined as set forth in California Business and Professions Code Section 23004, and shall not include cleaning solutions, medical supplies, and other products and substances not intended for drinking. This advertising

prohibition includes the placement of the name of a company producing, selling, or distributing alcoholic beverages or the name of any alcoholic beverage in any promotion of any event or product. This advertising prohibition does not apply to any advertisement sponsored by a state, local, nonprofit, or other entity designed to (a) communicate the health hazards of alcoholic beverages, (b) encourage people not to drink alcohol or to stop drinking alcohol, or (c) provide or publicize drug or alcohol treatment or rehabilitation services.

23. CONFLICTS OF INTEREST

Through its execution of this Agreement, Permittee acknowledges that it is familiar with the provisions of Section 15.103 of the San Francisco Charter, Article III, Chapter 2 of City's Campaign and Governmental Conduct Code, and Sections 87100 et seq. and Sections 1090 et seq. of the Government Code of the State of California, and certifies that it does not know of any facts which would constitute a violation of said provisions, and agrees that if Permittee becomes aware of any such fact during the term of this Agreement, Permittee shall immediately notify the City.

24. FOOD SERVICE WASTE REDUCTION

If there is a City permit or authorization for the Permit Area that will allow food service, Permittee agrees to comply fully with and be bound by all of the provisions of the Food Service Waste Reduction Ordinance, as set forth in the San Francisco Environment Code, Chapter 16, including the remedies provided therein, and implementing guidelines and rules. The provisions of Chapter 16 are incorporated herein by reference and made a part of this Agreement as though fully set forth herein and the Permittee will be treated as a lessee for purposes of compliance with Chapter 16. This provision is a material term of this Agreement. By entering into this Agreement, Permittee agrees that if it breaches this provision, City will suffer actual damages that will be impractical or extremely difficult to determine. Without limiting City's other rights and remedies, Permittee agrees that the sum of One Hundred Dollars ($100.00) liquidated damages for the first breach, Two Hundred Dollars ($200.00) liquidated damages for the second breach in the same year, and Five Hundred Dollars ($500.00) liquidated damages for subsequent breaches in the same year is a reasonable estimate of the damage that City will incur based on the violation, established in light of the circumstances existing at the time this Agreement was made. Such amounts shall not be considered a penalty, but rather as mutually agreed upon monetary damages sustained by City because of Permittee's failure to comply with this provision.

25. MAINTENANCE OF PLANS AND RECORDATION OF DRAWINGS

Permittee shall maintain current, accurate and complete plans and record drawings showing, in detail, the exact location, depth, and size of any Improvements constructed or installed in the Public Rights-Of-Way. Upon demand from Public Works, such plans and record drawings shall be delivered to Public Works in a form to be determined by Public Works pursuant to the following timeframes: (a) immediately in the event of an emergency; (b) within five City business days for requests of ten or fewer records; or (c) within ten City business days for requests of more than ten records.

26. GENERAL PROVISIONS

Unless this Agreement provides otherwise: (a) This Agreement may be amended or modified only in writing and signed by both the Director and Permittee; provided that the Director shall have the right to terminate or revoke the Permit in accordance with this Agreement. (b) No waiver by any party of any of the provisions of this Agreement shall be effective unless in writing and signed by an officer or other authorized representative, and only to the extent expressly provided in such written waiver. (c) All approvals and determinations of City requested, required, or permitted hereunder may be made in the sole and absolute discretion of the Director or other authorized City official. (d) This Agreement (including its Attachments and associated documents hereto), the Permit, the Board of Supervisors legislation approving the Permit, and any authorization to proceed, discussions, understandings, and agreements are merged herein. (e) The section and other headings of this Agreement are for convenience of reference only and shall be disregarded in the interpretation of this Agreement. Director shall have the sole discretion to interpret and make decisions regarding any and all discrepancies, conflicting statements, and omissions found in the Permit, Agreement, the Agreement's Attachments and associated documents, and Improvement Plans, if applicable. (f) Time is of the essence. (g) This Agreement shall be governed by California law and the City's Charter. (h) If either party commences an action against the other or a dispute arises under this Agreement, the prevailing party shall be entitled to recover from the other reasonable attorneys' fees and costs. For purposes hereof, reasonable attorneys' fees of City shall be based on the fees regularly charged by private attorneys in San Francisco with comparable experience, notwithstanding the City's use of its own attorneys. (i) If Permittee consists of more than one person then the obligations of each person shall be joint and several. (j) This Agreement shall be binding upon and inure to the benefit of the parties and their respective heirs, representatives, successors, and assigns. (k) City is the sole beneficiary of Permittee's obligations under this Agreement. Nothing contained herein shall be deemed to be a gift or dedication to the general public or for any public purposes whatsoever, nor shall it give rights to the parties expressly set forth above. Without limiting the foregoing, nothing herein creates a private right of action by any person or entity other than the City. (l) This Agreement does not create a partnership or joint venture between the City and Permittee as to any activity conducted by Permittee in its performance of its obligations under this Agreement. Permittee shall not be deemed a state actor with respect to any activity conducted by Permittee on, in, around, or under the Improvements pursuant to this Agreement.

27. INDEMNIFICATION

Permittee, on behalf of itself and its successors and assigns ("Indemnitors"), shall indemnify, defend, and hold harmless ("Indemnify") the City including, but not limited to, all of its boards, commissions, departments, agencies, and other subdivisions, including, without limitation, the Department, and all of the heirs, legal representatives, successors, and assigns (individually and collectively, the "Indemnified Parties"), and each of them, for any damages the Indemnified Parties may be required to pay as satisfaction of any judgment or settlement of any claim or legal or administrative action (collectively, "Claims"), incurred in connection with or arising in whole or in part from: (a) any accident, injury to or death of a person, or loss of or damage to property, howsoever or by whomsoever caused, occurring in or about the Permit Area arising from the Permitted Activities, with the exception of Claims to the extent they arise exclusively from the City's failure to maintain one or more Improvements after agreeing to

perform such maintenance and accepting funding from Permittee for that purpose; (b) any default by such Indemnitors in the observation or performance of any of the terms, covenants, or conditions of this Permit to be observed or performed on such Indemnitors' part; and (c) any release or discharge, or threatened release or discharge, of any Hazardous Material caused or allowed by Indemnitors in, under, on, or about the Permit Area arising from the Permitted Activities. Permittee on behalf of the Indemnitors specifically acknowledges and agrees that the Indemnitors have an immediate and independent obligation to defend the City from any claim which actually or potentially falls within this Indemnity even if such allegation is or may be groundless, fraudulent, or false, which obligation arises at the time such Claim is tendered to such Indemnitors by the City and continues at all times thereafter. Permittee agrees that the indemnification obligations assumed under this Permit shall survive expiration of the Permit or completion of work. It is expressly understood and agreed that the applicable Indemnitor shall only be responsible for Claims arising or accruing during its period of ownership of the Improvements.

28. SEVERABILITY

If any provision of this Agreement or the application thereof to any person, entity or circumstance shall be invalid or unenforceable, the remainder of this Agreement, or the application of such provision to persons, entities, or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby, and each other provision of this Agreement shall be valid and enforceable to the fullest extent permitted by law, except to the extent that enforcement of this Agreement without the invalidated provision would be unreasonable or inequitable under all the circumstances or would frustrate a fundamental purpose of this Agreement.

29. FORCE MAJEURE

If Permittee is delayed, interrupted, or prevented from performing any of its obligations under this Agreement, excluding all obligations that may be satisfied by the payment of money or provision of materials within the control of Permittee, and such delay, interruption, or prevention is due to fire, natural disaster, act of God, civil insurrection, federal or state governmental act or failure to act, labor dispute, unavailability of materials, or any cause outside such Party's reasonable control, then, provided written notice of such event and the effect on the Party's performance is given to the other Party within thirty (30) days of the occurrence of the event, the time for performance of the affected obligations of that Party shall be extended for a period equivalent to the period of such delay, interruption, or prevention.

[*Signature Page to Follow*]

In witness whereof the undersigned Permittee(s) have executed this agreement this _____day of _____, 20___.

PERMITTEE:

MISSION ROCK UTILITIES, INC. a Delaware corporation

By: _____

Name:_____

Its: _____

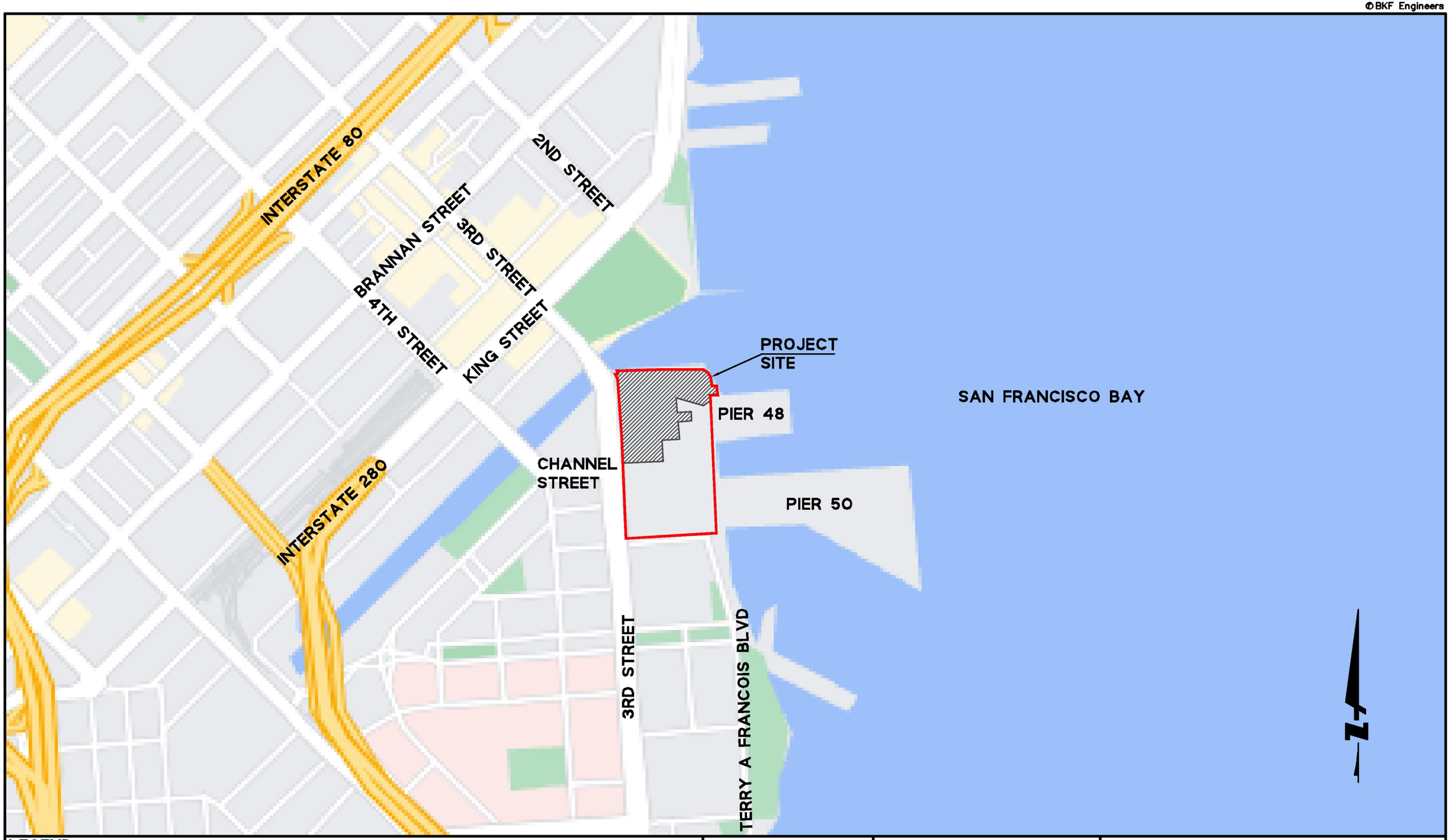
CITY AND COUNTY OF SAN FRANCISCO DEPARTMENT OF PUBLIC WORKS, a municipal corporation

_____
City Engineer of San Francisco

_____
Director of Public Works

Attachment 1:

Property Information – MRU MEP



LEGEND

PHASE 1

SITE BOUNDARY

DATE: 08/22/2022
SCALE: NTS
DESIGN: JW
DRAWN BY: JM/SH
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 600
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

ATTACHMENT 1: PROPERTY INFORMATION

DRAWING NAME \\Bkf-sf\Vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\SITE_MAP.dwg
PLOT DATE 08-24-22
PLOTTED BY arra

Attachment 2A:

Permit Area Precise Diagram (Phase 1) – MRU MEP

SAN FRANCISCO BAY

CHANNEL WHARF

PIER 48

PIER 50

TERRY A FRANCOIS BOULEVARD

PORT-OWNED SS

CHINA BASIN PARK

BRIDGEVIEW WAY

CHINA BASIN

BLOCK G POC

BLOCK G

TONI STONE CROSSING

BLOCK F

BLOCK F POC

PORT-OWNED SS

BLOCK G POC

DR. MAYA ANGELOU LANE

BLOCK A POC

BLOCK A POC

SS PRIVATE/MRU PUMP STATION AND BLACKWATER TREATMENT FACILITY

BLOCK A

BLOCK B

CHANNEL STREET

MISSION ROCK STREET

THIRD STREET

CHANNEL

GRAPHIC SCALE

100 0 100

LEGEND

- PARCEL BOUNDARY
- PARKS AND OPEN SPACE
- PUBLIC ROW
- EXISTING SS
- PRIVATE SS
- PORT-OWNED SS
- SFPUC-OWNED SS
- PERMIT AREA (SFPW ROW)
- EX SSMH
- PR SSMH
- PR SSCO

DATE: 02/20/2025
SCALE: 1"=100'
DESIGN: JW
DRAWN BY: JM/BA
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 600
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

ATTACHMENT 2: PERMIT AREA DOCUMENTATION
PRECISE DIAGRAM
SANITARY SEWER SYSTEM

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\PHASE 1\Figure 1 Sanitary Sewer System Ownership_P1.dwg
PLOT DATE: 02-20-25
PLOTTED BY: barra

SAN FRANCISCO BAY

PIER 48

CHANNEL WHARF

PIER 50

TERRY A FRANCOIS BOULEVARD

CHINA BASIN PARK

BRIDGEVIEW WAY

BLOCK G POC

IRR POC

CHINA BASIN

PORT-OWNED NPW

BLOCK G

TONI STONE CROSSING

BLOCK F

BLOCK F POC

DR. MAYA ANGELOU LANE

BLOCK A POC

NPW SUPPLY LINE

SS PRIVATE/MRU PUMP STATION AND BLACKWATER TREATMENT FACILITY

BLOCK A

BLOCK B

CHANNEL STREET

MISSION ROCK STREET

THIRD STREET

CHANNEL

GRAPHIC SCALE

100 0 100

LEGEND

- PARCEL BOUNDARY
- PARKS AND OPEN SPACE
- PUBLIC ROW
- PRIVATE NPW
- PORT-OWNED NPW
- PERMIT AREA (SFPW ROW)
- GATE VALVE
- AIR RELEASE VALVE
- BLOW OFF VALVE

DATE: 02/20/2025
SCALE: 1"=100'
DESIGN: JW
DRAWN BY: JM/BA
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
24 WILLIE MAYS PLAZA
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BKF ENGINEERS
150 CALIFORNIA STREET, STE 600
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

ATTACHEMENT 2: PERMIT AREA DOCUMENTATION
PRECISE DIAGRAM
NON-POTABLE WATER SYSTEM

DRAWING NAME: \\Bkf-sf\Vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\PHASE 1\Figure 2 Proposed Non-Potable Water System_P1.dwg
PLOT DATE: 02-20-25
PLOTTED BY: barra

SAN FRANCISCO BAY
PIER 48
CHANNEL WHARF
PIER 50
TERRY A FRANCOIS BOULEVARD
CHINA BASIN PARK
FUTURE POC
FUTURE POC
BRIDGEVIEW WAY
BLOCK F POC
CHINA BASIN
BLOCK G
TONI STONE CROSSING
BLOCK F
MISSION ROCK STREET
BLOCK G POC
DR. MAYA ANGELOU LANE
BLOCK B POC
CHANNEL STREET
BLOCK A POC
BLOCK A
BLOCK B
THIRD STREET
CHANNEL
GRAPHIC SCALE
100 0 100

LEGEND

- PARCEL BOUNDARY
- PARKS AND OPEN SPACE
- PUBLIC ROW
- PRIVATE HHW DES
- PRIVATE CHW DES
- PERMIT AREA (SFPW ROW)
- GATE VALVE
- AIR RELEASE VALVE
- BLOW OFF VALVE

DATE: 02/20/2025
SCALE: 1"=100'
DESIGN: JW
DRAWN BY: JM/BA
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
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BKF ENGINEERS
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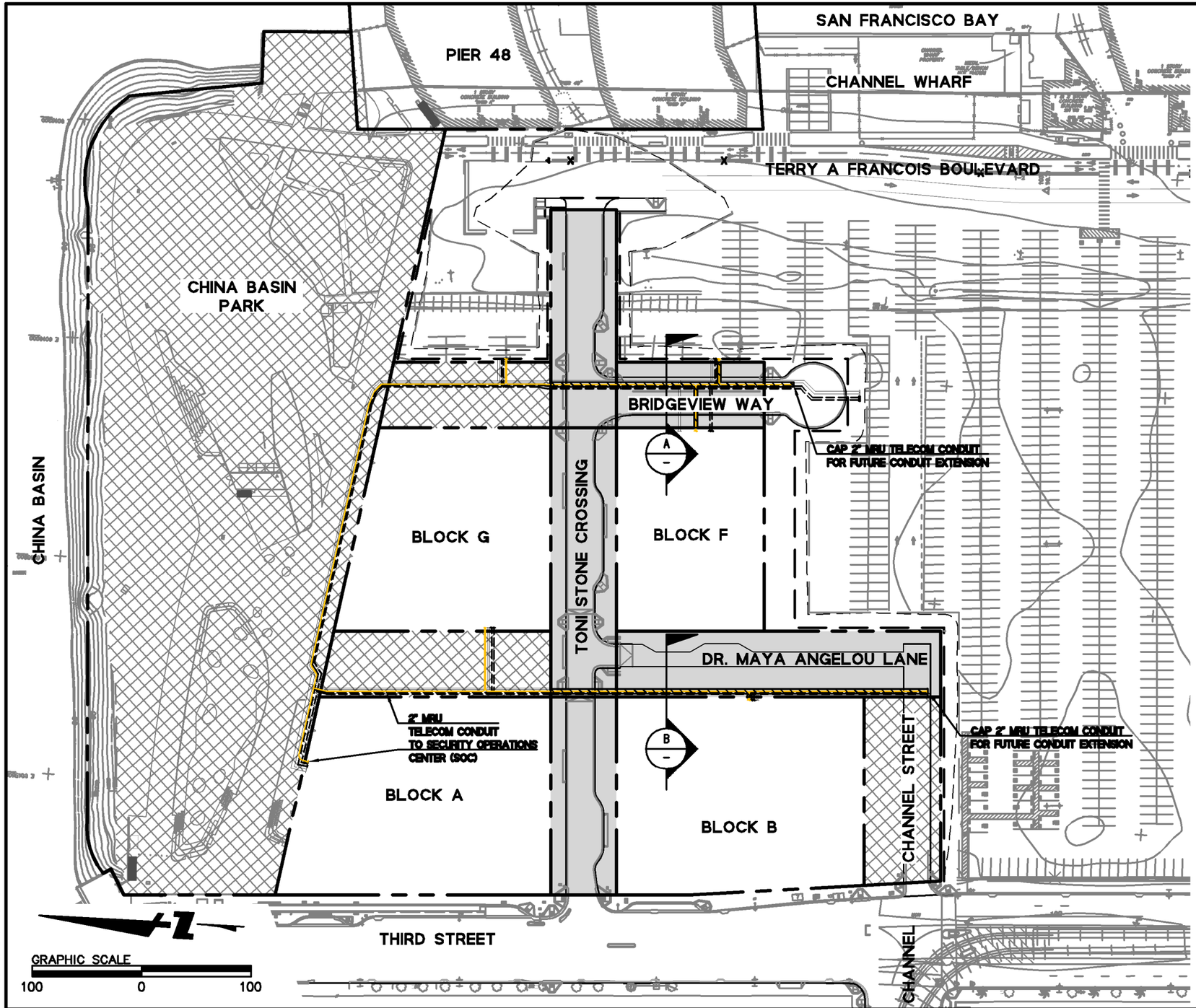
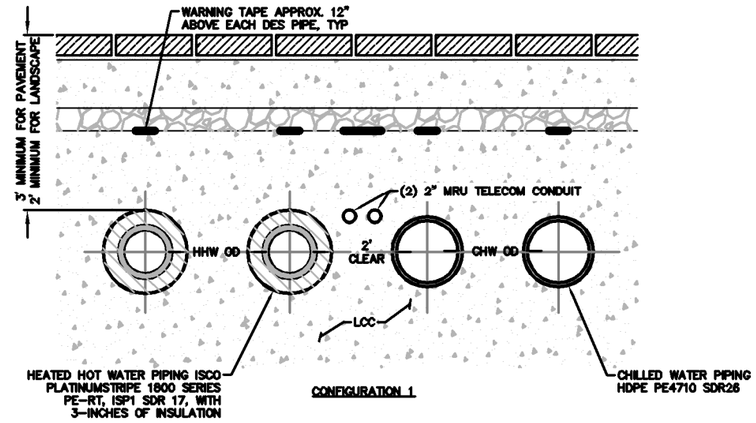
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

ATTACHMENT 2: PERMIT AREA DOCUMENTATION
PRECISE DIAGRAM
DISTRICT ENERGY SYSTEM

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\PHASE 1\Figure 3 District Energy Syatem Ownership_P1.dwg
PLOT DATE: 02-20-25
PLOTTED BY: barra





TYPICAL DISTRIBUTION CROSS SECTION
CONFIGURATION 1

A

NTS

TYPICAL DISTRIBUTION CROSS SECTION
CONFIGURATION 2

B

NTS

LEGEND

- PARCEL BOUNDARY
- PARKS AND OPEN SPACE
- PUBLIC ROW
- 2" MRU TELECOM CONDUIT
- PERMIT AREA (SFPW ROW)
- PRIVATE HHW DES
- PRIVATE CHW DES

DATE: 02/20/2025
SCALE: 1"=100'
DESIGN: JW
DRAWN BY: JM/BA
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
24 WILLIE MAYS PLAZA
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415/468-6676
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BKF ENGINEERS
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415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

ATTACHMENT 2: PERMIT AREA DOCUMENTATION
PRECISE DIAGRAM
MRU TELECOM CONDUIT

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\PHASE 1\Figure 4 MRU Conduit Ownership_P1.dwg
PLOT DATE: 02-20-25
PLOTTED BY: barra

Attachment 2B:

Permit Area Precise Diagram (Full Buildout) – MRU MEP

SAN FRANCISCO BAY

PIER 48

CHANNEL WHARF

PIER 50

TERRY A FRANCOIS BOULEVARD

PORT-OWNED SS

CHINA BASIN PARK

BLOCK K POC

BLOCK J POC

BLOCK K

BLOCK J

1.9'

BLOCK I

BLOCK I POC

BLOCK H

BLOCK H POC

BRIDGEVIEW WAY

BLOCK E POC

BLOCK D POC

CHINA BASIN

BLOCK G POC

BLOCK G

TONI STONE CROSSING

BLOCK F

BLOCK F POC

MISSION ROCK SQUARE

BLOCK E

LONG BRIDGE STREET

MISSION ROCK STREET

PORT-OWNED SS

BLOCK G POC

1.9'

DR. MAYA ANGELOU LANE

BLOCK D

BLOCK A POC

BLOCK A POC

SS PRIVATE/MRU PUMP STATION AND BLACKWATER TREATMENT FACILITY

BLOCK C POC

BLOCK D POC

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

1.9'

SFPUC MH

THIRD STREET

1.9'

2.1'

CHANNEL

GRAPHIC SCALE

100 0 100

LEGEND

- PARCEL BOUNDARY
- PUBLIC ROW
- PARKS AND OPEN SPACE
- PHASE 1 BOUNDARY
- EXISTING SS
- PRIVATE SS
- PORT-OWNED SS
- SFPUC-OWNED SS
- PERMIT AREA (SFPW ROW)
- EX SSMH
- PR SSMH
- PR SSCO

DATE: 02/20/2025
SCALE: 1"=100'
DESIGN: JW
DRAWN BY: JM/BA
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 600
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

ATTACHMENT 2: PERMIT AREA DOCUMENTATION
PRECISE DESIGN
SANITARY SEWER SYSTEM

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\Figure 1 Sanitary Sewer System Ownership.dwg
PLOT DATE: 02-20-25
PLOTTED BY: barra

SAN FRANCISCO BAY

PIER 48

CHANNEL WHARF

PIER 50

IRR POC

18"

TERRY A FRANCOIS BOULEVARD

BLOCK K POC

BLOCK J POC

IRR POC

CHINA BASIN PARK

BLOCK K

BLOCK J

BLOCK I

18"

BLOCK H

BLOCK I POC

BLOCK H POC

BRIDGEVIEW WAY

18"

BLOCK G POC

IRR POC

IRR POC

BLOCK D POC

CHINA BASIN

PORT-OWNED NPW

BLOCK G

TONI STONE CROSSING

BLOCK F

MISSION ROCK SQUARE

BLOCK E

18"

MISSION ROCK STREET

BLOCK F POC

BLOCK E POC

BLOCK D POC

DR. MAYA ANGELOU LANE

18"

BLOCK A POC

NPW SUPPLY LINE

IRR POC

BLOCK C POC

BLOCK D

SS PRIVATE/MRU PUMP STATION AND BLACKWATER TREATMENT FACILITY

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

THIRD STREET

CHANNEL

GRAPHIC SCALE

100 0 100

LEGEND

- PARCEL BOUNDARY
- PUBLIC ROW
- PARKS AND OPEN SPACE
- PHASE 1 BOUNDARY
- PRIVATE NPW
- PORT-OWNED NPW
- PERMIT AREA (SFPW ROW)
- GATE VALVE (PHASE 1)
- AIR RELEASE VALVE (PHASE 1)
- BLOW OFF VALVE (PHASE 1)

DATE: 02/20/2025
SCALE: 1"=100'
DESIGN: JW
DRAWN BY: JM/BA
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
24 WILLIE MAYS PLAZA
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415/468-6678 (FAX)

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415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

ATTACHMENT 2: PERMIT AREA DOCUMENTATION
PRECISE DESIGN
NON-POTABLE WATER SYSTEM

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\Figure 2 Proposed Non-Potable Water System.dwg
PLOT DATE: 02-20-25
PLOTTED BY: barra

SAN FRANCISCO BAY
PIER 48
CHANNEL WHARF
PIER 50
TERRY A FRANCOIS BOULEVARD
CHINA BASIN PARK
BLOCK K
BLOCK J
BLOCK I
BLOCK H
BLOCK K POC
BLOCK J POC
BLOCK I POC
BLOCK H POC
BRIDGEVIEW WAY
10.2'
BLOCK F POC
BLOCK E POC
BLOCK D POC
CHINA BASIN
BLOCK G
TONI STONE CROSSING
BLOCK F
MISSION ROCK SQUARE
BLOCK E
LONG BRIDGE STREET
MISSION ROCK STREET
BLOCK G POC
DR. MAYA ANGELOU LANE
BLOCK B POC
7.6'
BLOCK C POC
BLOCK D
BLOCK A POC
BLOCK A
BLOCK B
CHANNEL STREET
BLOCK C
THIRD STREET
CHANNEL
GRAPHIC SCALE
100 0 100

LEGEND

- PARCEL BOUNDARY
- PUBLIC ROW
- PARKS AND OPEN SPACE
- PHASE 1 BOUNDARY
- PRIVATE HHW DES
- PRIVATE CHW DES
- PERMIT AREA (SFPW ROW)
- GATE VALVE (PHASE 1)
- AIR RELEASE VALVE (PHASE 1)
- BLOW OFF VALVE (PHASE 1)

DATE: 02/20/2025
SCALE: 1"=100'
DESIGN: JW
DRAWN BY: JM/BA
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 600
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

ATTACHMENT 2: PERMIT AREA DOCUMENTATION
PRECISE DIAGRAM
DISTRICT ENERGY SYSTEM

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\Figure 3 District Energy System Ownership.dwg
PLOT DATE: 02-20-25
PLOTTED BY: barra

Attachment 2C:

Maintenance Table – MRU MEP

Facility Type	Location	Diameter	Typ Range of Depth	Material	Surface appurtenances in ROW (manholes, valves etc)	Owner and Entity responsible for maintenance
DES Chilled Water System (CHW)	See Attachment 2A	8-14" (Port 16")	Typ 4-10' to T.O.P. Crossings up to 20' below FG	HDPE DR 11, fused	Handholes	Owner: MRU Maintenance Entity: EG Services/Tishman-Speyer Properties
DES Hot Water System (HHW)	See Attachment 2A	6-10" (Port 12")	Typ 4-10' to T.O.P. Crossings up to 20' below FG	HDPE DR 11, fused	Handholes	Owner: MRU Maintenance Entity: EG Services/Tishman-Speyer Properties
Non Potable Water System	See Attachment 2A	8"	3-7' from T.O.P. to FG	Ductile Iron, Class 53, zinc-coated with V-Bio polyethylene encasement and cement-mortar lined, bell and spigot joints with restraining gaskets.	Handholes	Owner: MRU Maintenance Entity: EG Services/Tishman-Speyer Properties
Sanitary Sewer Gravity	See Attachment 2A	10"	7-13' from T.O.P. to FG	HDPE SDR 17, fused	Manholes	Owner: MRU Maintenance Entity: EG Services/Tishman-Speyer Properties
Sanitary Sewer Forcemain	See Attachment 2A	10"	6-10' from T.O.P. to FG	HDPE SDR 17, fused	Manholes	Owner: MRU Maintenance Entity: EG Services/Tishman-Speyer Properties
Telecommunication Systems for monitoring of facilities	Located along the DES Chilled and Hot Water distribution pipes	2" conduits	Typ 4-10' to T.O.P. Crossings up to 20' below FG	HDPE	None	Owner: MRU Maintenance Entity: EG Services/Tishman-Speyer Properties

Attachment 2D:

Construction Plans and Specifications – MRU MEP

SAN FRANCISCO BAY

PIER 48

CHANNEL WHARF

TERRY A FRANCOIS BLVD

FUTURE R/W

ENVIRONMENTAL RESTRICTION AREA
(2002-H209674)

CHINA BASIN PARK
(PORT OPEN SPACE)

ENVIRONMENTAL RESTRICTION AREA
(2019-K835128-00)

BAE INTERIM TEMP POWER
(FOR REFERENCE ONLY)

BRIDGEVIEW STREET

BRIDGEVIEW STREET

(PORT OPEN SPACE)

CHINA BASIN

STORM DRAIN SYSTEM TO BE DESIGNED WITH CHINA BASIN PARK PLANS AND TO INCLUDE:

- STORMWATER TREATMENT DIVERSION MANHOLE
- STORMWATER TREATMENT PUMP STATION AND ASSOCIATED INFRASTRUCTURE
- LINED BIORETENTION BASINS
- STORMWATER TRASH CAPTURE DEVICE
- STORM DRAIN BACKFLOW PREVENTER VAULT
- CONNECTION TO EXISTING 12" SD
- 12" SD OUTFALL

BLOCK G

BLOCK F

SHARED PUBLIC WAY
(PORT OPEN SPACE)

SHARED PUBLIC WAY

BLOCK A

BLOCK B

EXPOSITION STREET

CHANNEL STREET
(PORT OPEN SPACE)

THIRD STREET

CHANNEL

GRAPHIC SCALE
40 0 40 80

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SAN FRANCISCO, CA 94111
(415) 930-7500
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REGISTERED PROFESSIONAL ENGINEER
JAMES W. DALLOSTA
No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
COMPOSITE UTILITY PLAN

SAN FRANCISCO COUNTY CALIFORNIA

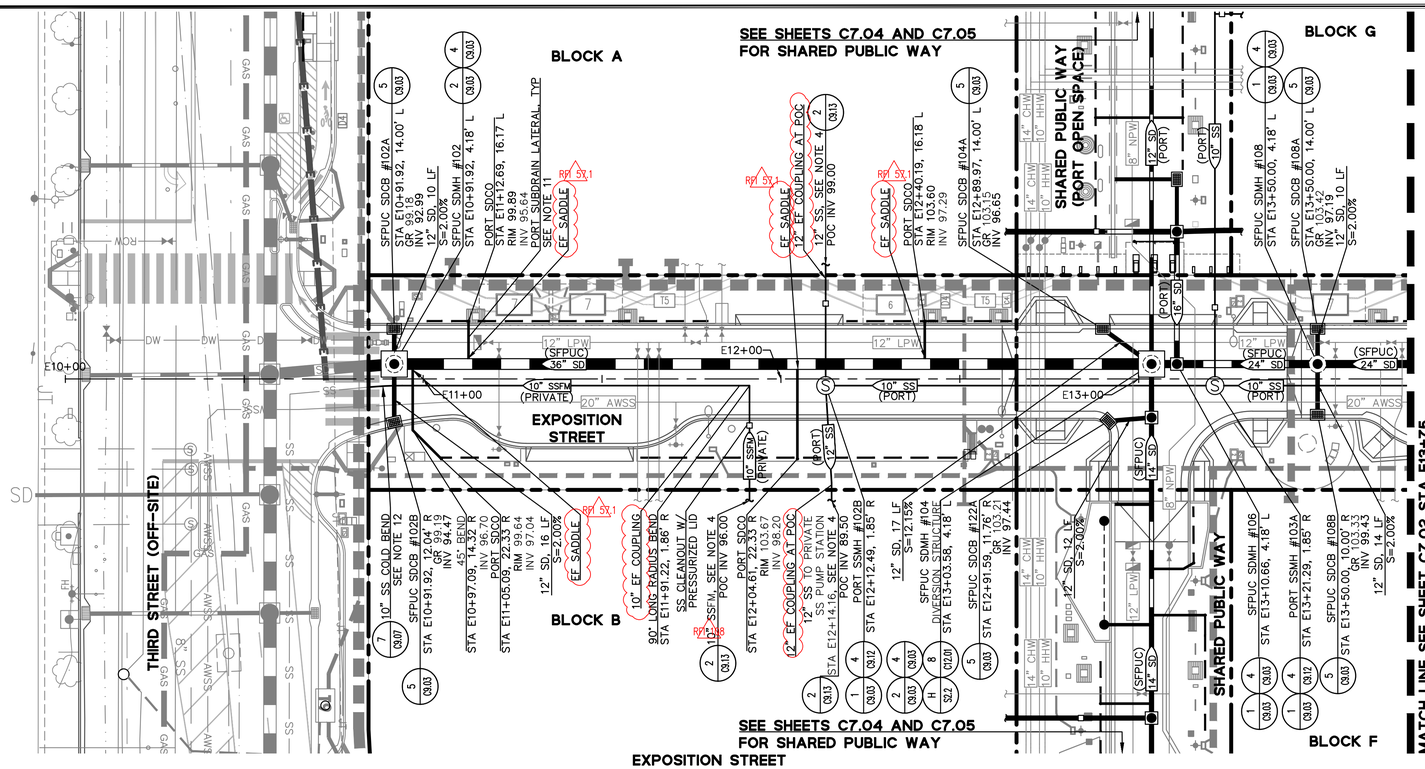
SAN FRANCISCO

No.	Revisions

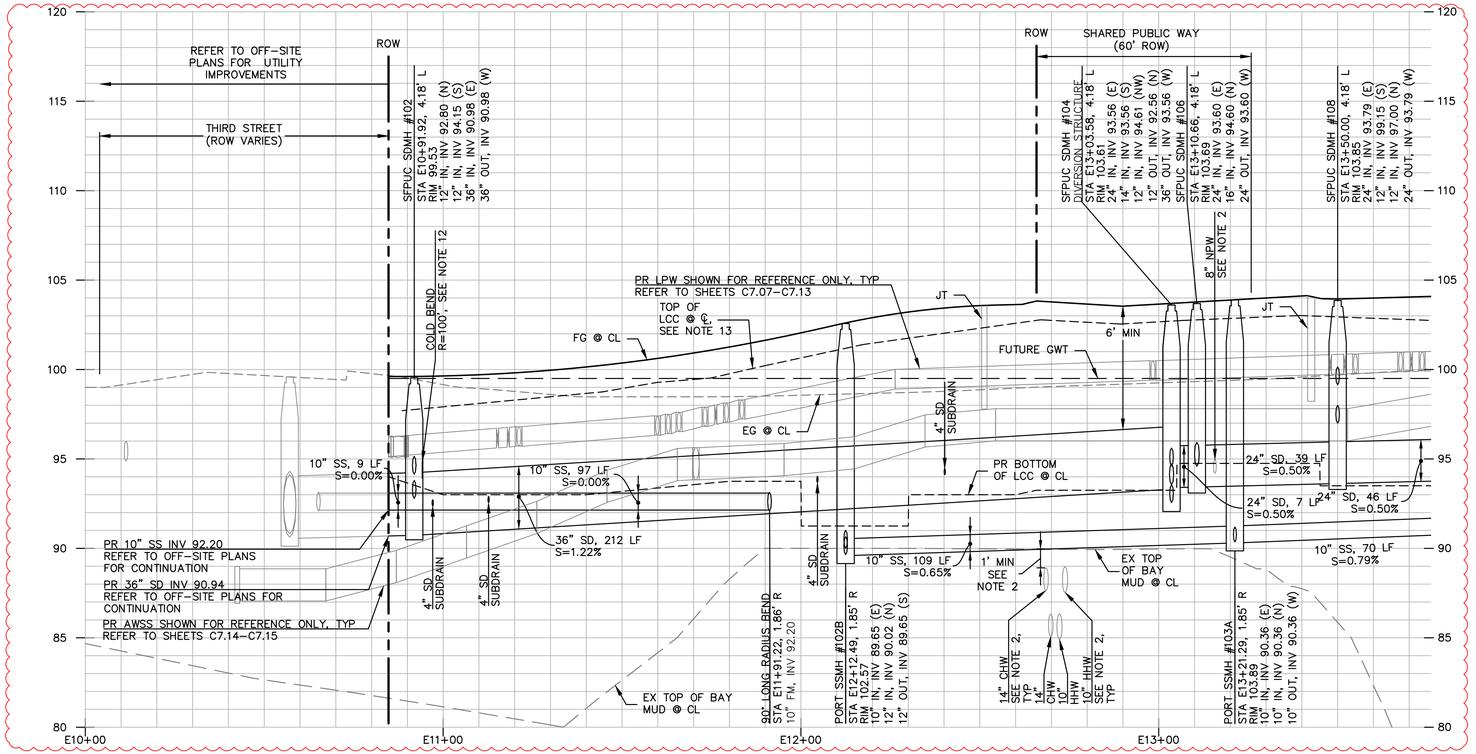
Date 07/30/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.00

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\SIP\PLOTTED SHEETS\C7.00 - COMPOSITE UTILITY PLAN.dwg
PLOT DATE: 08-30-24
PLOTTED BY: arra



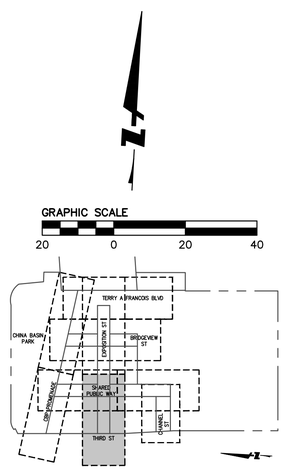
EXPOSITION STREET
STATION: E10+00 TO E13+75
PLAN VIEW
SCALE: 1"=20'



EXPOSITION STREET
STATION: E10+00 TO E13+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
3. STORM AND SEWER MAIN SIZES PROVIDED ARE NOMINAL DIMENSIONS FOR HDPE PIPE, REPRESENTING THE OUTSIDE DIAMETER. UNLESS OTHERWISE NOTED OTHER PIPE MATERIALS ARE NOT ALLOWED.
4. STORM AND SEWER LATERAL SIZES ARE NOMINAL. LATERALS SHALL BE HDPE. INSTALLATION PER DETAILS ON SHEETS C9.03 AND C9.07. REFER TO SHEETS C7.23 THROUGH C7.28 FOR LATERAL PROFILES.
5. REFER TO SHEETS C12.00–C12.03 FOR STORMWATER TREATMENT PLAN AND DETAILS.
6. STORM DRAIN SYSTEM TO BE DESIGNED WITH CHINA BASIN PARK PLANS AND TO INCLUDE:
   - STORMWATER TREATMENT DIVERSION MANHOLE
   - STORMWATER TREATMENT PUMP STATION AND ASSOCIATED INFRASTRUCTURE
   - LINED BIORETENTION BASINS
   - STORMWATER TRASH CAPTURE DEVICE
   - STORM DRAIN BACKFLOW PREVENTER VAULT
   - CONNECTION TO EXISTING 12" SD
7. PORT TO PERMIT IMPROVEMENTS WITHIN PORT OPEN SPACE.
8. JOINT TRENCH SHOWN FOR REFERENCE. REFER TO JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
9. SEWER AND STORM DRAIN SUBSURFACE UTILITIES TO MAINTAIN PROPER MINIMUM HORIZONTAL AND VERTICAL SEPARATION FROM CITY-OWNED SEWER AND STORM DRAIN FACILITIES PER 2015 SUBDIVISION REGULATION AND CITY STANDARDS UNLESS APPROVED OTHERWISE BY THE DIRECTOR OF PUBLIC WORKS WITH THE CONSENT OF THE SFPUC.
10. STORM AND SEWER HDPE PIPES SHALL HAVE A GRAY INTERIOR AND THE APPROPRIATE EXTERIOR COLOR STRIPES FOR IDENTIFICATION PER INDUSTRY STANDARDS.
11. PORT-OWNED SUBDRAIN LATERALS SHALL BE 4" HDPE. REFER TO LANDSCAPE SHEETS L1-4XX SERIES FOR SUBDRAIN LOCATIONS AND L3-150 THRU L3-152 FOR SUBDRAIN DETAILS.
12. HDPE PIPE COLD BEND FROM STA E10+85.40 TO STA E10+94.15 SHALL NOT EXCEED RADIUS OF 100 FEET. REFER TO DETAIL 7 ON SHEET C9.07.
13. TOP OF LCC PROFILE BASED ON EXTRACTED AS-BUILT SURVEY INFORMATION PROVIDED ON C5.00A.



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REGISTERED PROFESSIONAL ENGINEER
JAMES A. DALLOSTA JR.
No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – SS AND SD – EXPOSITION STREET
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

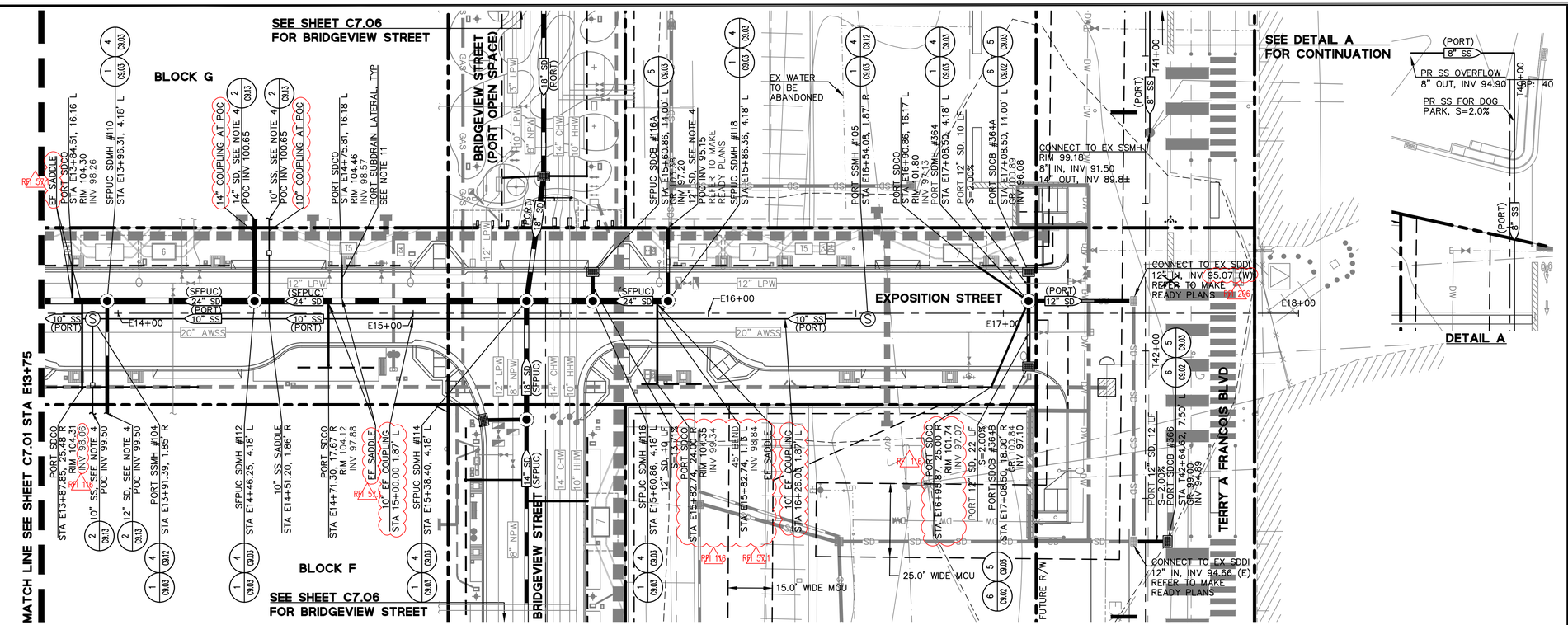
No.	Revisions	Date
	09/13/2024 – RECORD DRAWINGS	09/13/2024

Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

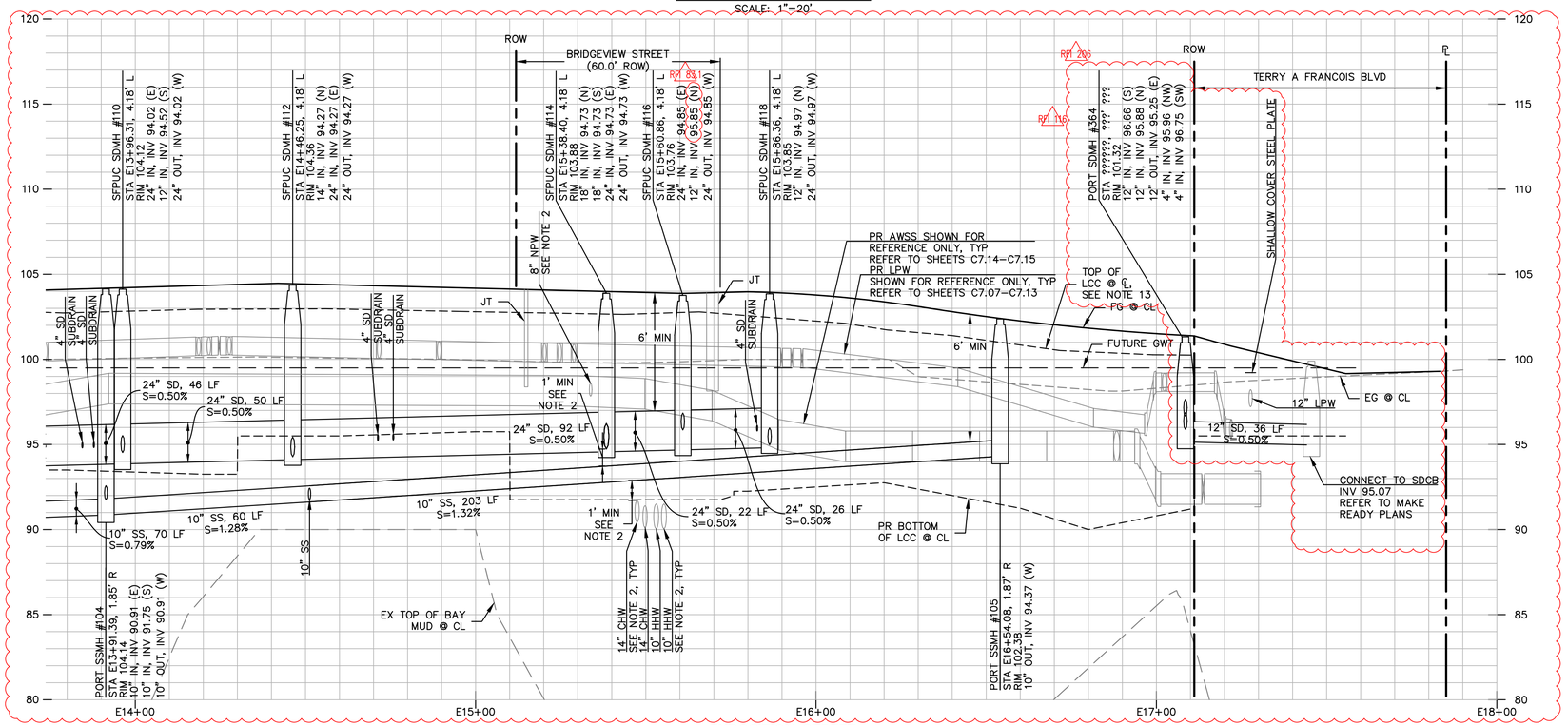
Drawing Number:
C7.01

RECORD DRAWINGS

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\SIP\PLOTTED SHEETS\C7.0A – SS AND SD UTILITY PLAN.dwg
PLOT DATE: 09-06-24
PLOTTED BY: arra



EXPOSITION STREET
STATION: E13+75 TO E18+00
PLAN VIEW
SCALE: 1"=20'



EXPOSITION STREET
STATION: E13+75 TO E18+00
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
3. STORM AND SEWER MAIN SIZES PROVIDED ARE NOMINAL DIMENSIONS FOR HDPE PIPE, REPRESENTING THE OUTSIDE DIAMETER. UNLESS OTHERWISE NOTED OTHER PIPE MATERIALS ARE NOT ALLOWED.
4. STORM AND SEWER LATERAL SIZES ARE NOMINAL. LATERALS SHALL BE HDPE. INSTALLATION PER DETAILS ON SHEETS C9.03 AND C9.07. REFER TO SHEETS C7.23 THROUGH C7.28 FOR LATERAL PROFILES.
5. REFER TO SHEETS C12.00–C12.03 FOR STORMWATER TREATMENT PLAN AND DETAILS.
6. STORM DRAIN SYSTEM TO BE DESIGNED WITH CHINA BASIN PARK PLANS AND TO INCLUDE:
   - STORMWATER TREATMENT DIVERSION MANHOLE
   - STORMWATER TREATMENT PUMP STATION AND ASSOCIATED INFRASTRUCTURE
   - LINED BIORETENTION BASINS
   - STORMWATER TRASH CAPTURE DEVICE
   - STORM DRAIN BACKFLOW PREVENTER VAULT
   - CONNECTION TO EXISTING 12" SD
7. PORT TO PERMIT IMPROVEMENTS WITHIN PORT OPEN SPACE.
8. JOINT TRENCH SHOWN FOR REFERENCE. REFER TO JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
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10. STORM AND SEWER HDPE PIPES SHALL HAVE A GRAY INTERIOR AND THE APPROPRIATE EXTERIOR COLOR STRIPES FOR IDENTIFICATION PER INDUSTRY STANDARDS.
11. PORT–OWNED SUBDRAIN LATERALS SHALL BE 4" HDPE. REFER TO LANDSCAPE SHEETS L1–4XX SERIES FOR SUBDRAIN LOCATIONS AND L3–150 THRU L3–152 FOR SUBDRAIN DETAILS.
12. HDPE PIPE COLD BEND FROM STA E10+85.40 TO STA E10+94.15 SHALL NOT EXCEED RADIUS OF 100 FEET. REFER TO DETAIL 7 ON SHEET C9.07.
13. TOP OF LCC PROFILE BASED ON EXTRACTED AS–BUILT SURVEY INFORMATION PROVIDED ON C5.00A.

GRAPHIC SCALE
20 0 20 40

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No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – SS AND SD – EXPOSITION STREET
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

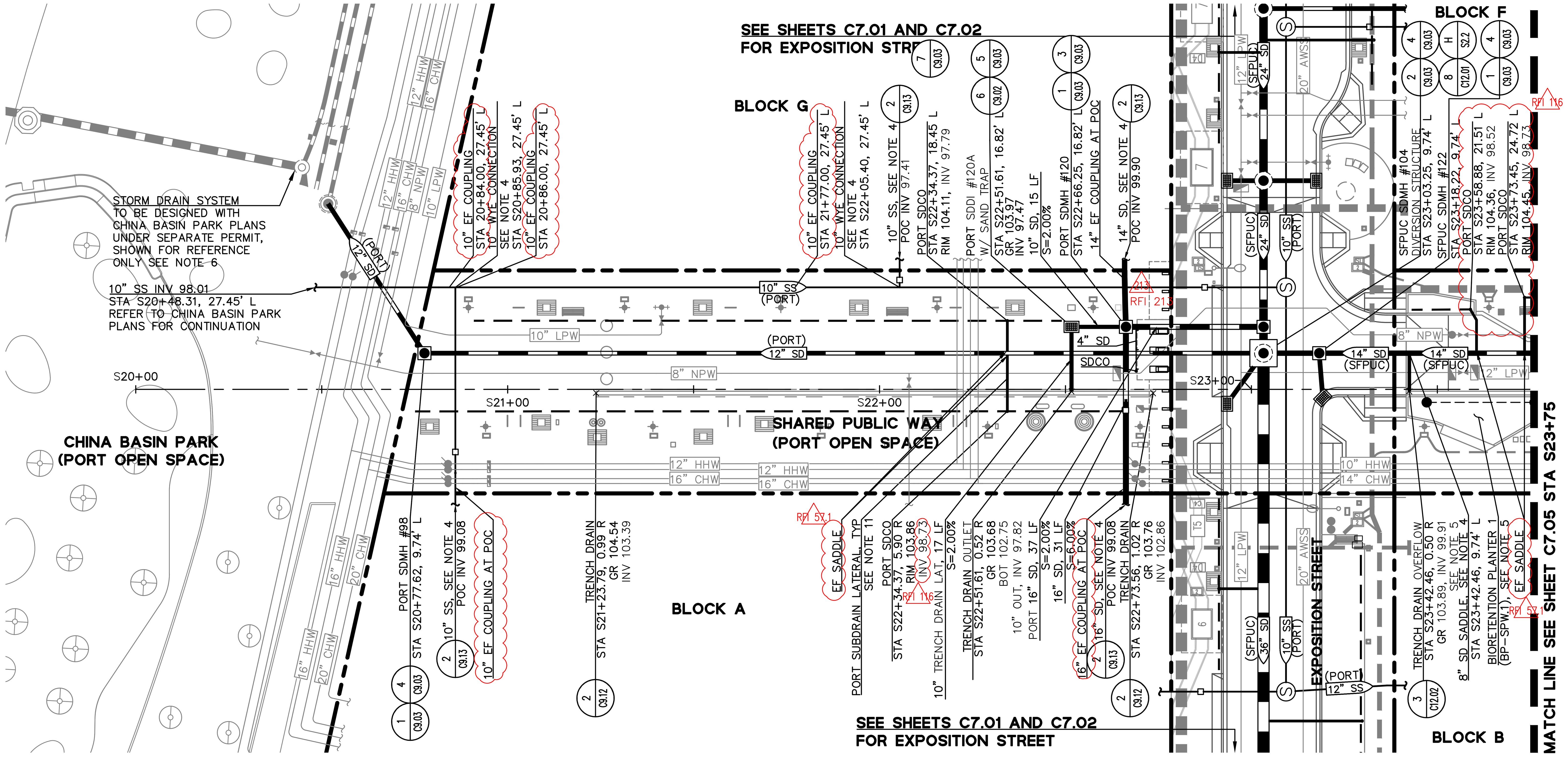
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

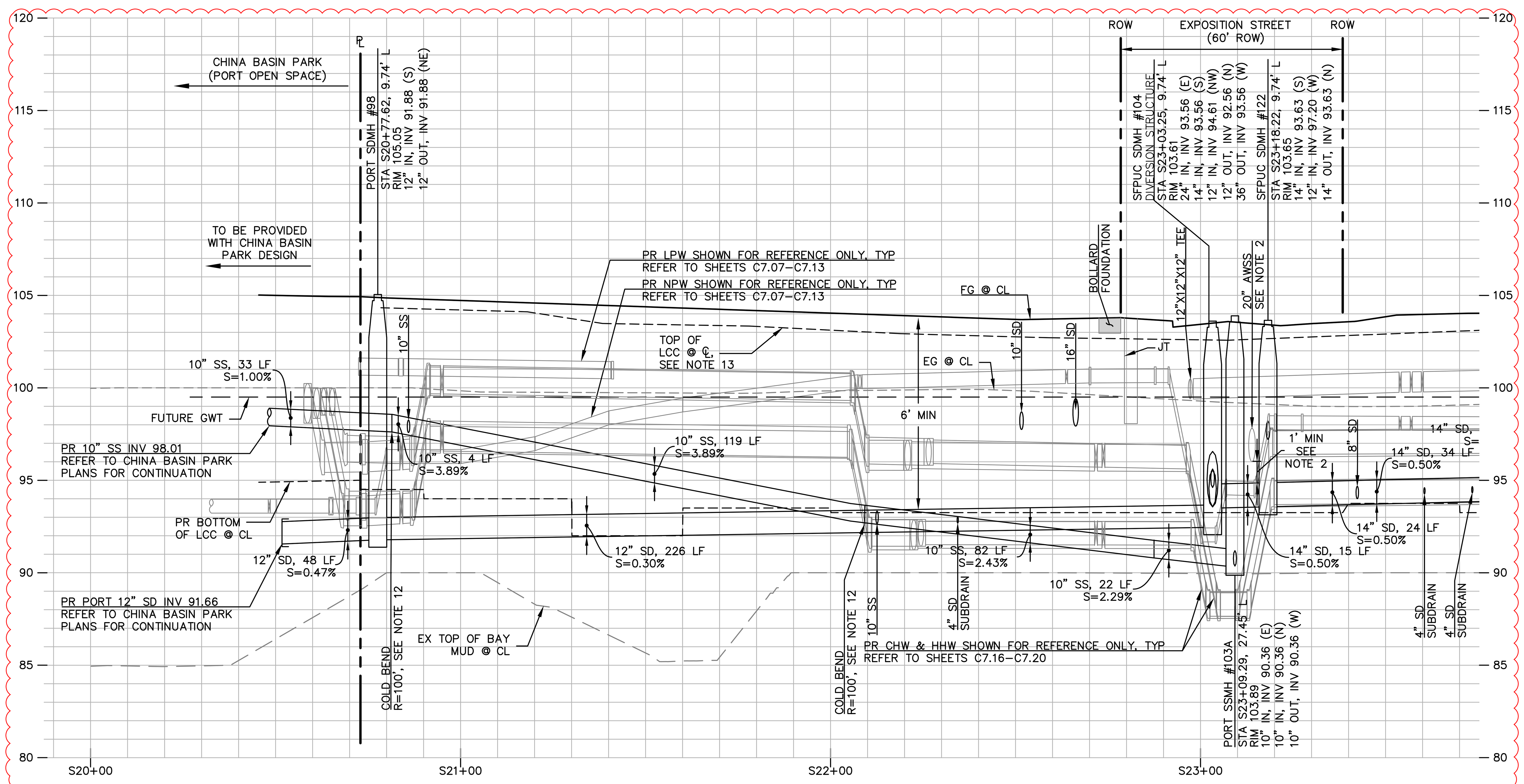
Drawing Number:
C7.02

RECORD DRAWINGS

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\SIP\PLOTTED SHEETS\C7.0A – SS AND SD UTILITY PLAN.dwg
PLOT DATE: 09-06-24
PLOTTED BY: arra



SHARED PUBLIC WAY
STATION: S20+00 TO S23+75
PLAN VIEW
SCALE: 1"=20'

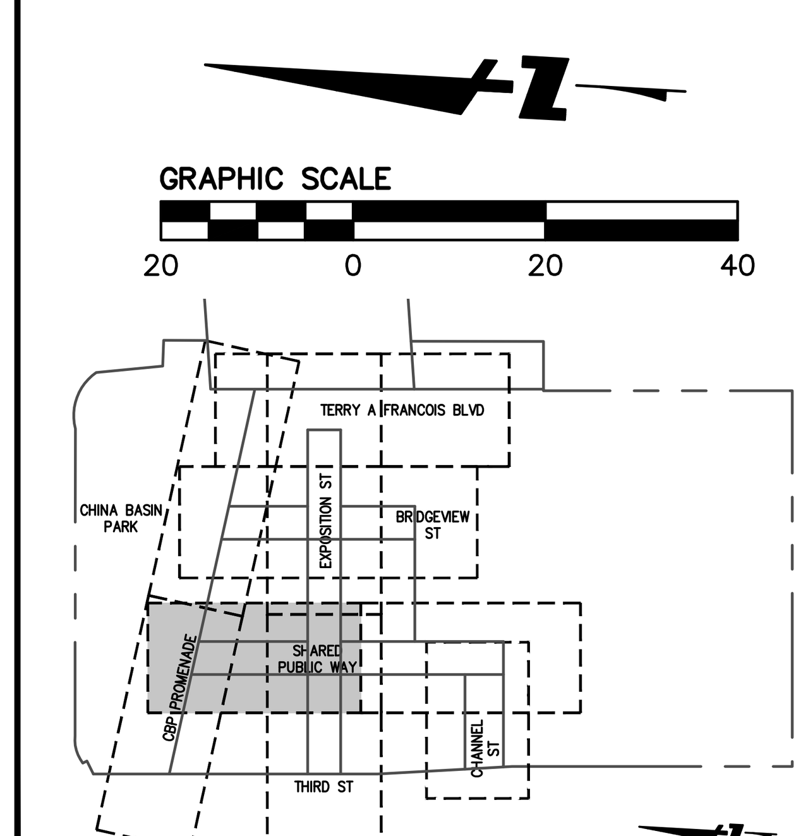


SHARED PUBLIC WAY
STATION: S20+00 TO S23+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
3. STORM AND SEWER MAIN SIZES PROVIDED ARE NOMINAL DIMENSIONS FOR HDPE PIPE, REPRESENTING THE OUTSIDE DIAMETER. UNLESS OTHERWISE NOTED OTHER PIPE MATERIALS ARE NOT ALLOWED.
4. STORM AND SEWER LATERAL SIZES ARE NOMINAL. LATERALS SHALL BE HDPE. INSTALLATION PER DETAILS ON SHEETS C9.03 AND C9.07. REFER TO SHEETS C7.23 THROUGH C7.28 FOR LATERAL PROFILES.
5. REFER TO SHEETS C12.00–C12.03 FOR STORMWATER TREATMENT PLAN AND DETAILS.
6. STORM DRAIN SYSTEM TO BE DESIGNED WITH CHINA BASIN PARK PLANS AND TO INCLUDE:
   - STORMWATER TREATMENT DIVERSION MANHOLE
   - STORMWATER TREATMENT PUMP STATION AND ASSOCIATED INFRASTRUCTURE
   - LINED BIORETENTION BASINS
   - STORMWATER TRASH CAPTURE DEVICE
   - STORM DRAIN BACKFLOW PREVENTER VAULT
   - CONNECTION TO EXISTING 12" SD
7. PORT TO PERMIT IMPROVEMENTS WITHIN PORT OPEN SPACE.
8. JOINT TRENCH SHOWN FOR REFERENCE. REFER TO JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
9. SEWER AND STORM DRAIN SUBSURFACE UTILITIES TO MAINTAIN PROPER MINIMUM HORIZONTAL AND VERTICAL SEPARATION FROM CITY–OWNED SEWER AND STORM DRAIN FACILITIES PER 2015 SUBDIVISION REGULATION AND CITY STANDARDS UNLESS APPROVED OTHERWISE BY THE DIRECTOR OF PUBLIC WORKS WITH THE CONSENT OF THE SFPUC.
10. STORM AND SEWER HDPE PIPES SHALL HAVE A GRAY INTERIOR AND THE APPROPRIATE EXTERIOR COLOR STRIPES FOR IDENTIFICATION PER INDUSTRY STANDARDS.
11. PORT–OWNED SUBDRAIN LATERALS SHALL BE 4" HDPE. REFER TO LANDSCAPE SHEETS L1–4XX SERIES FOR SUBDRAIN LOCATIONS AND L3–150 THRU L3–152 FOR SUBDRAIN DETAILS.
12. HDPE PIPE COLD BEND FROM STA E10+85.40 TO STA E10+94.15 SHALL NOT EXCEED RADIUS OF 100 FEET. REFER TO DETAIL 7 ON SHEET C9.07.
13. TOP OF LCC PROFILE BASED ON EXTRACTED AS–BUILT SURVEY INFORMATION PROVIDED ON C5.00A.

GRAPHIC SCALE
20 0 20 40



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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – SS AND SD – SHARED PUBLIC WAY
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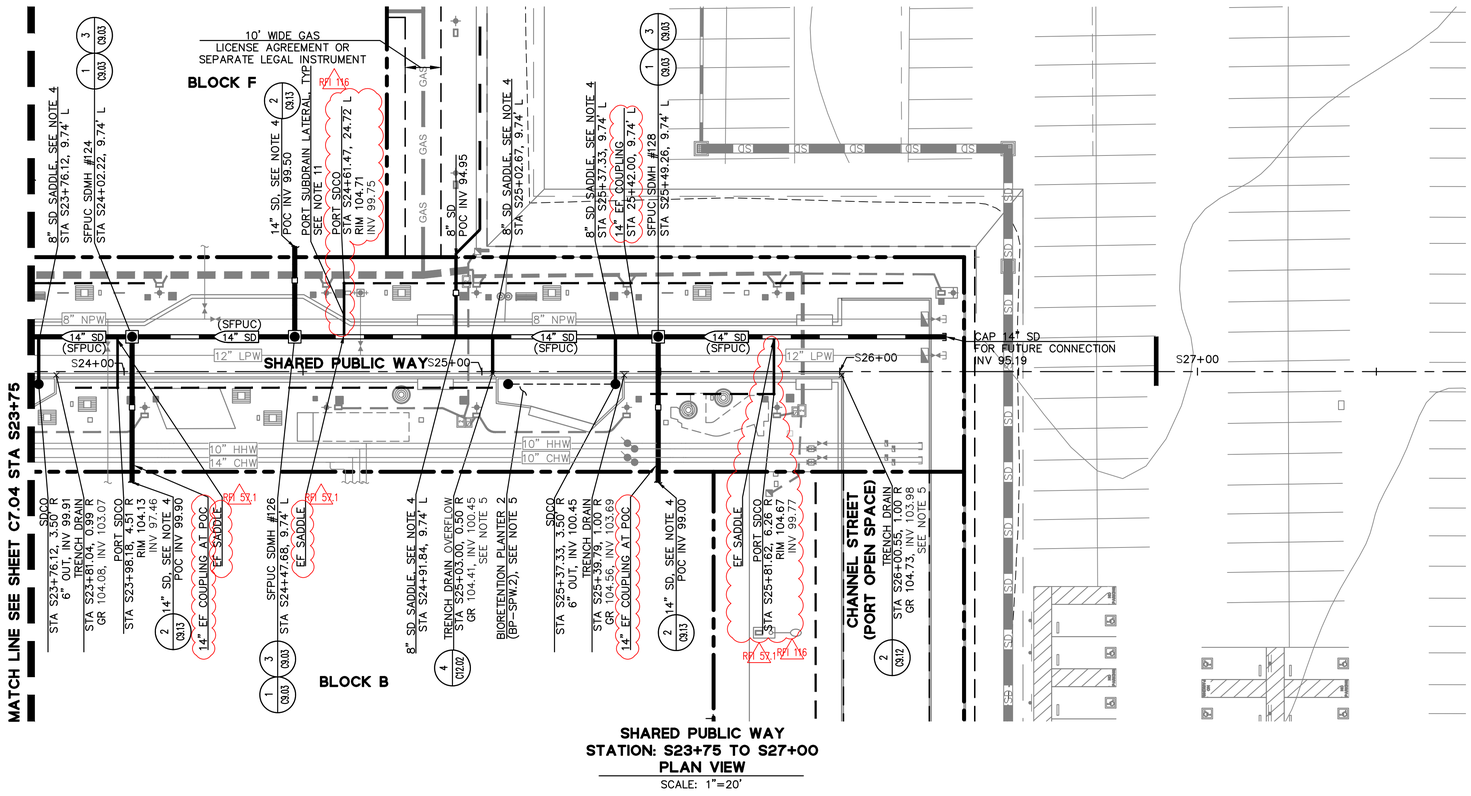
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

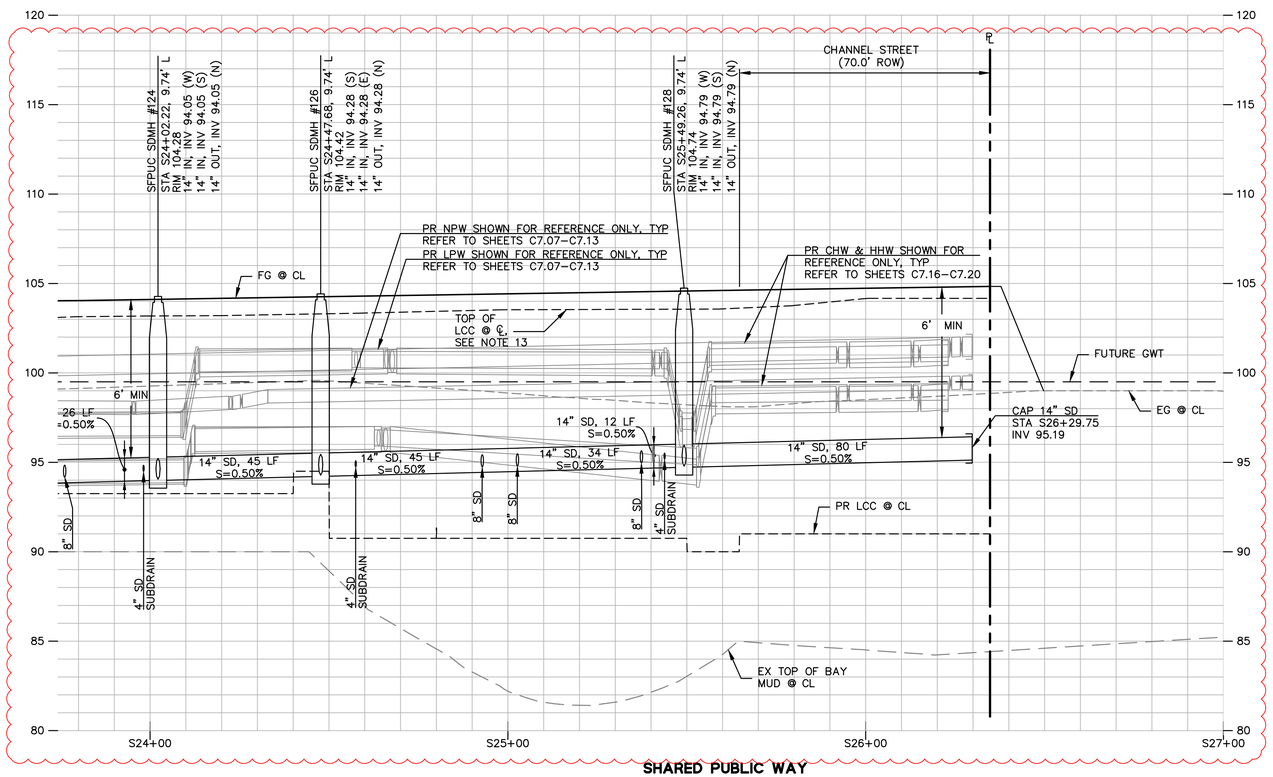
Drawing Number:
C7.04

RECORD DRAWINGS

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\SIP\PLOTTED SHEETS\C7.0A – SS AND SD UTILITY PLAN.dwg
PLOT DATE: 09-06-24 PLOTTED BY: arra



SHARED PUBLIC WAY
STATION: S23+75 TO S27+00
PLAN VIEW
SCALE: 1"=20'



SHARED PUBLIC WAY
STATION: S23+75 TO S27+00
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

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2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
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13. TOP OF LCC PROFILE BASED ON EXTRACTED AS–BUILT SURVEY INFORMATION PROVIDED ON C5.00A.

GRAPHIC SCALE
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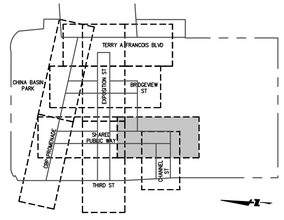

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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – SS AND SD – SHARED PUBLIC WAY
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

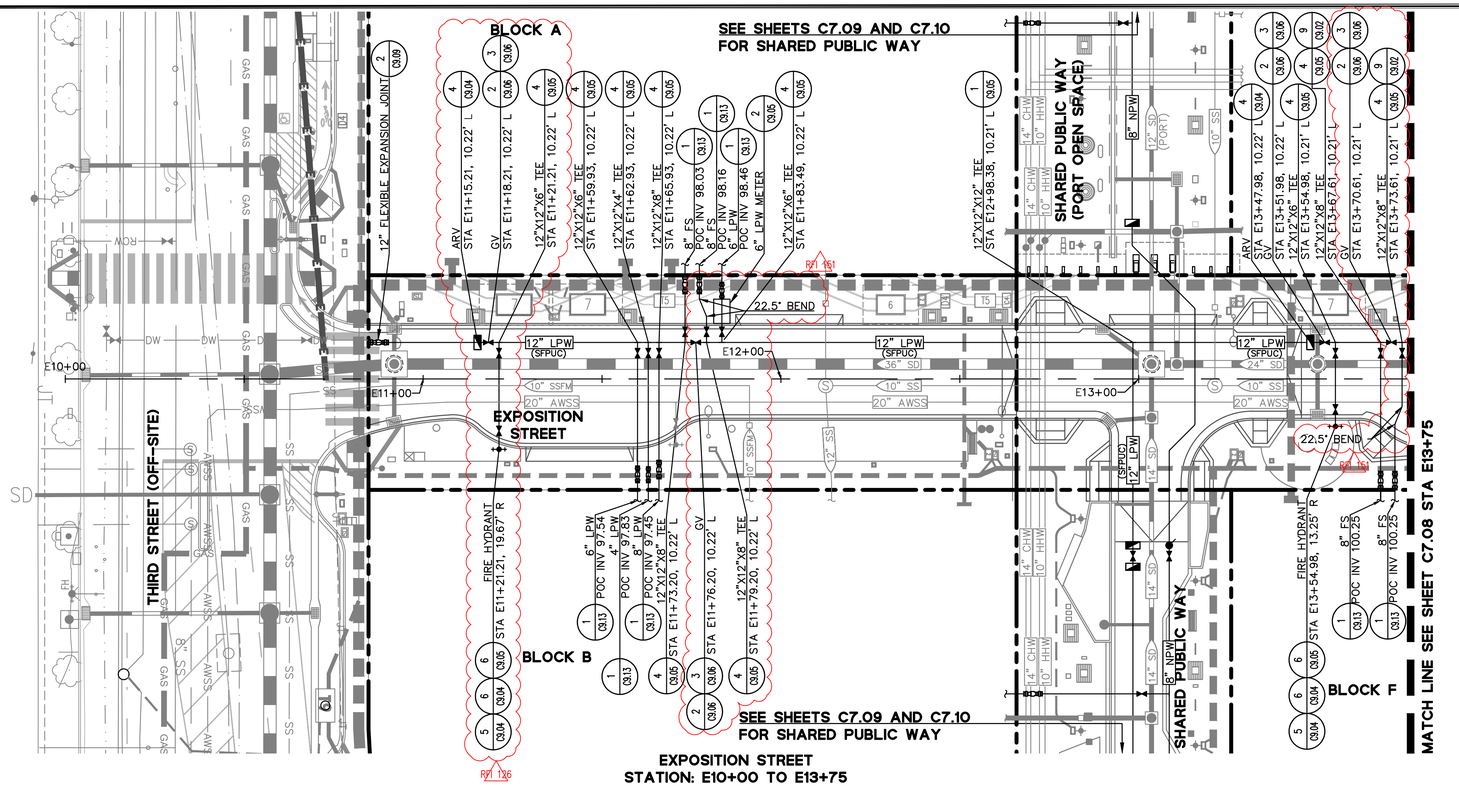
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

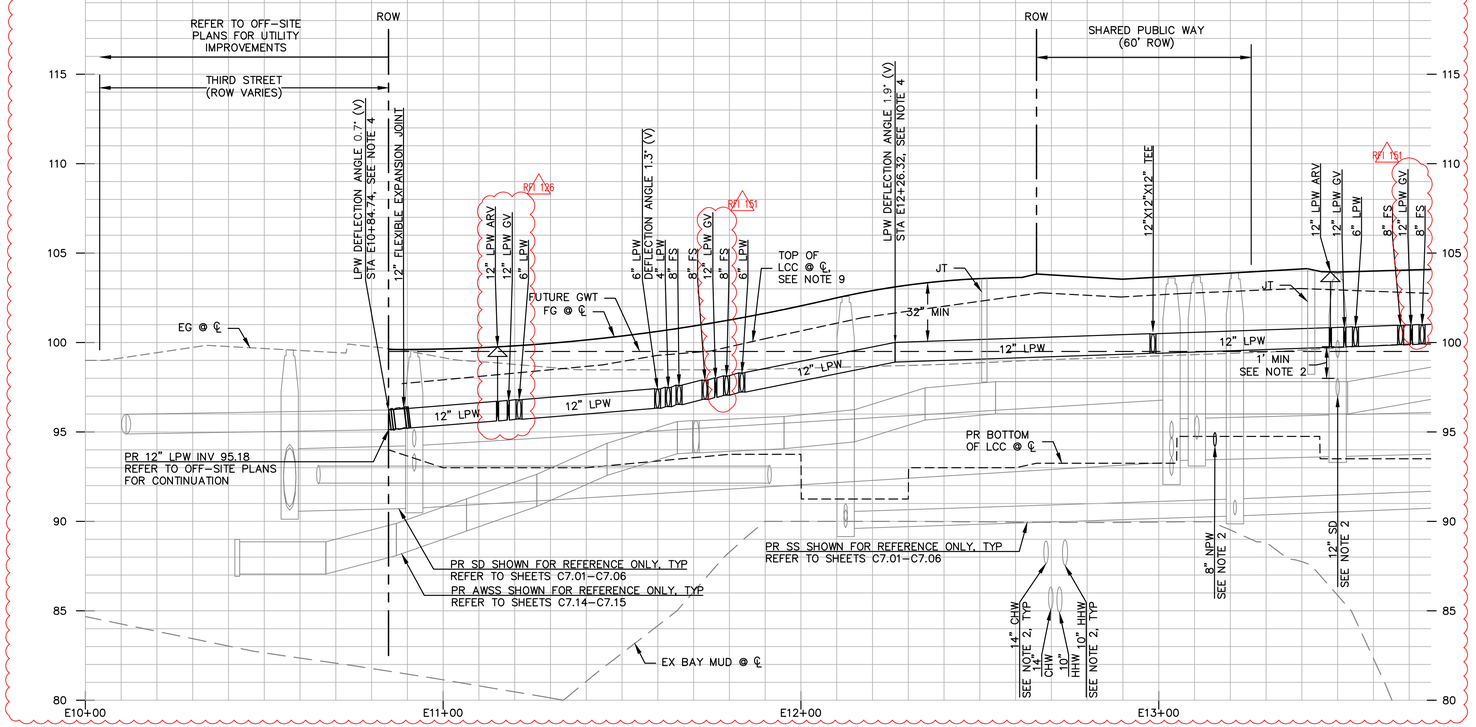
Drawing Number:
C7.05

RECORD DRAWINGS

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\SIP\PLOTTED SHEETS\C7.0A – SS AND SD UTILITY PLAN.dwg
PLOT DATE: 09-06-24
PLOTTED BY: arra



EXPOSITION STREET
STATION: E10+00 TO E13+75
PLAN VIEW
SCALE: 1"=20'



EXPOSITION STREET
STATION: E10+00 TO E13+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

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2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
3. FOR WATER LATERALS WITH LESS THAN 18" COVER, PROVIDE PROTECTION PER DETAIL 1 ON SHEET C9.09.
4. ALL DIP PIPES SHALL HAVE A MAXIMUM 2° OR 40% OF MAXIMUM ALLOWABLE DEFLECTION PERMITTED BY THE MANUFACTURER, WHICHEVER IS LESS, PER SFWD STANDARDS.
5. JOINT TRENCH SHOWN FOR REFERENCE ONLY. SEE JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
6. SIZE, LOCATION, AND TERMINATION POINT OF ALL SERVICE LATERALS MUST BE APPROVED BY SFWD CDD ENGINEER PRIOR TO INSTALLATION.
7. FITTINGS SHOWN IN PROFILE VIEW ARE DISPLAYED LEVEL BY CIVIL 3D DUE TO LIMITATIONS IN THE SOFTWARE. HOWEVER, UNLESS OTHERWISE NOTED, ALL FITTINGS ARE INTENDED TO BE INSTALLED IN LINE WITH THE SLOPE OF THE PIPE.
8. SFPUC–CDD TO PROVIDE CAP DETAIL TO CONTRACTOR IN FIELD FOR FUTURE MAIN EXTENSION.
9. TOP OF LCC PROFILE BASED ON EXTRACTED AS–BUILT SURVEY INFORMATION PROVIDED ON C5.00A.

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MISSION ROCK PHASE 1
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UTILITY PLAN & PROFILE – LPW AND NPW – EXPOSITION STREET
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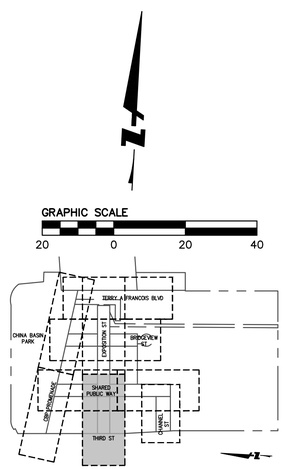


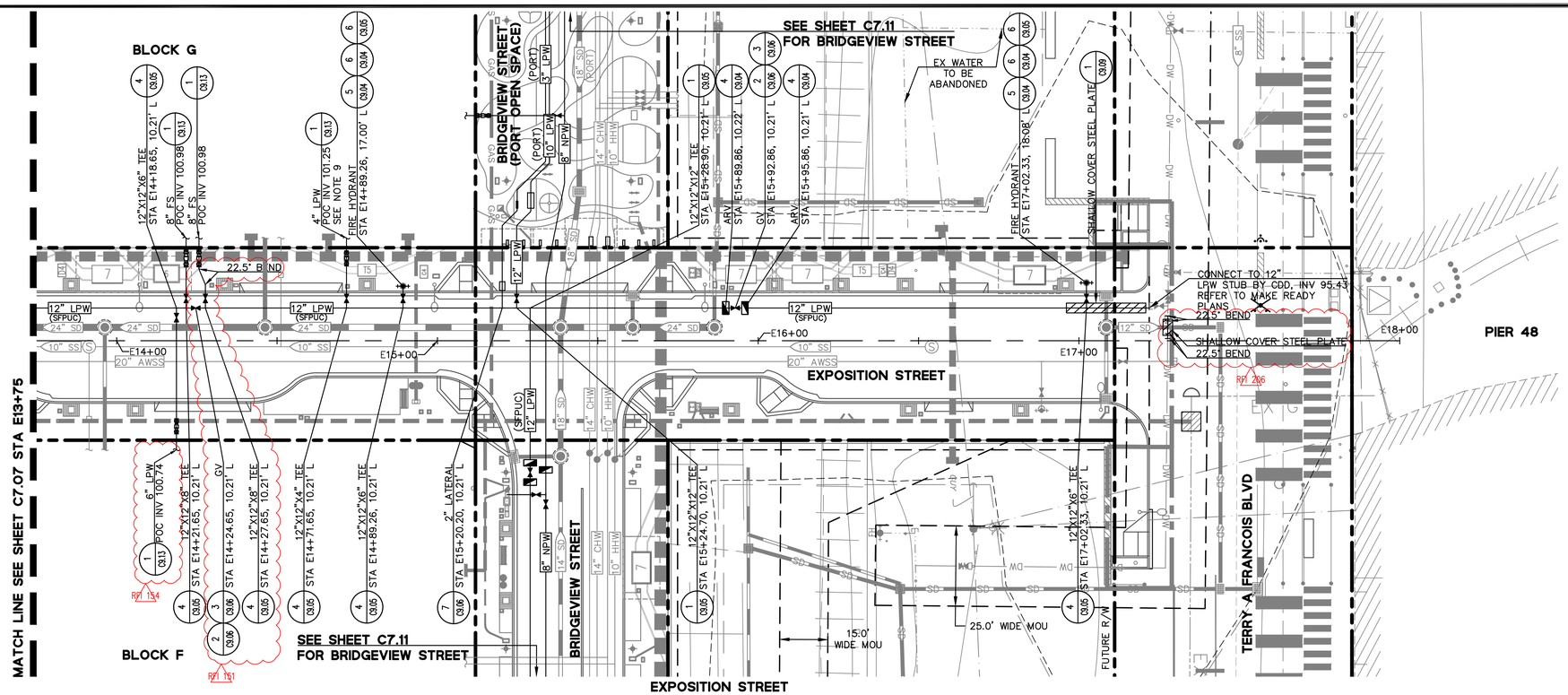
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

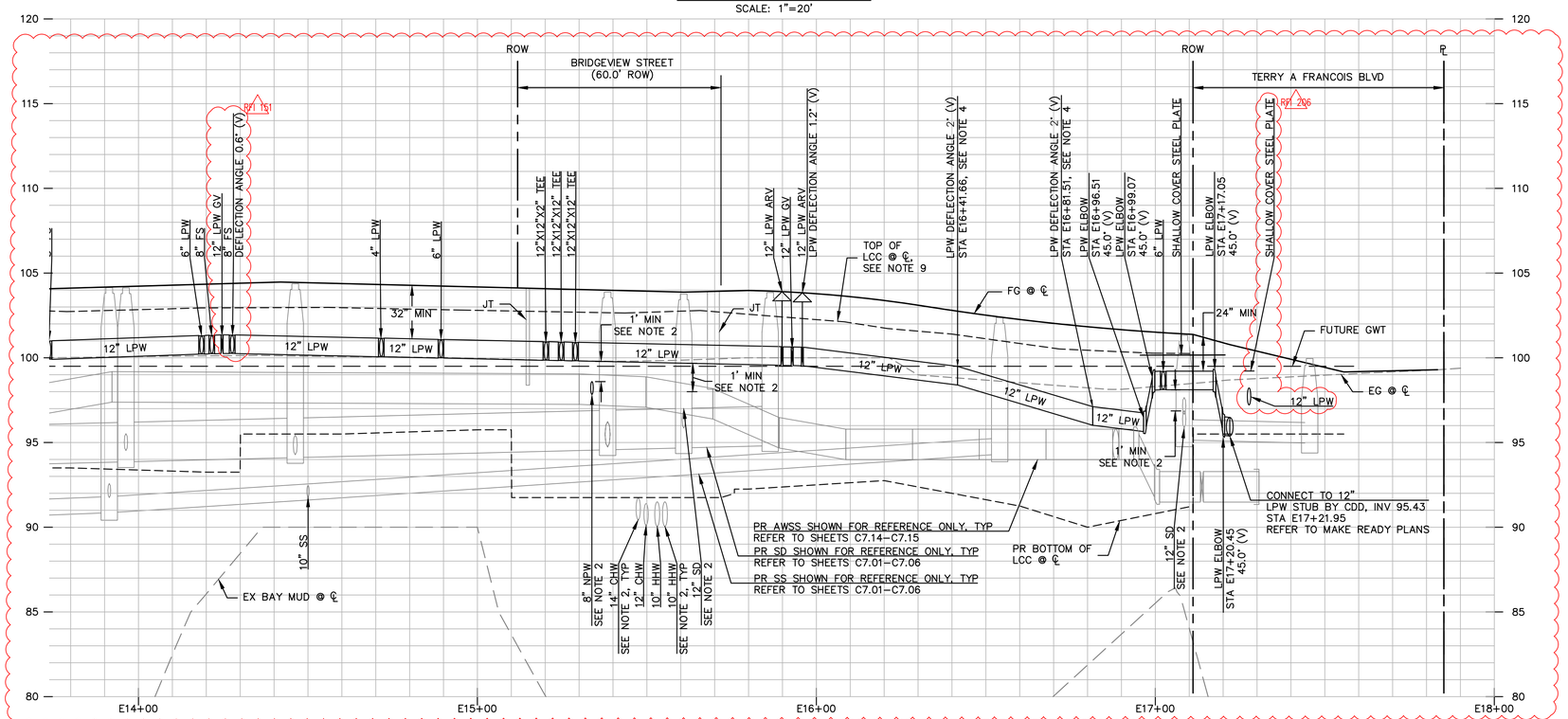
Drawing Number:
C7.07

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0B – WATER UTILITY PLAN.DWG
PLOT DATE: 09-03-24
PLOTTED BY: arra



EXPOSITION STREET
STATION: E13+75 TO E18+00
PLAN VIEW
SCALE: 1"=20'



EXPOSITION STREET
STATION: E13+75 TO E18+00
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

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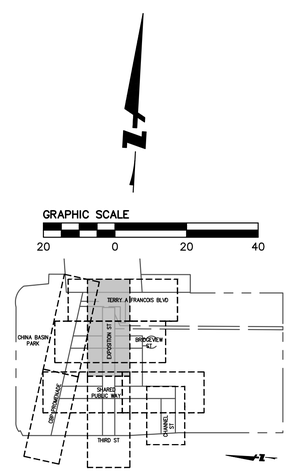
9. TOP OF LCC PROFILE BASED ON EXTRACTED AS-BUILT SURVEY INFORMATION PROVIDED ON C5.00A.
10. 4" LPW LATERAL TO MAINTAIN 5' MINIMUM CLEARANCE FROM TREE.



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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – LPW AND NPW – EXPOSITION STREET
SAN FRANCISCO COUNTY CALIFORNIA

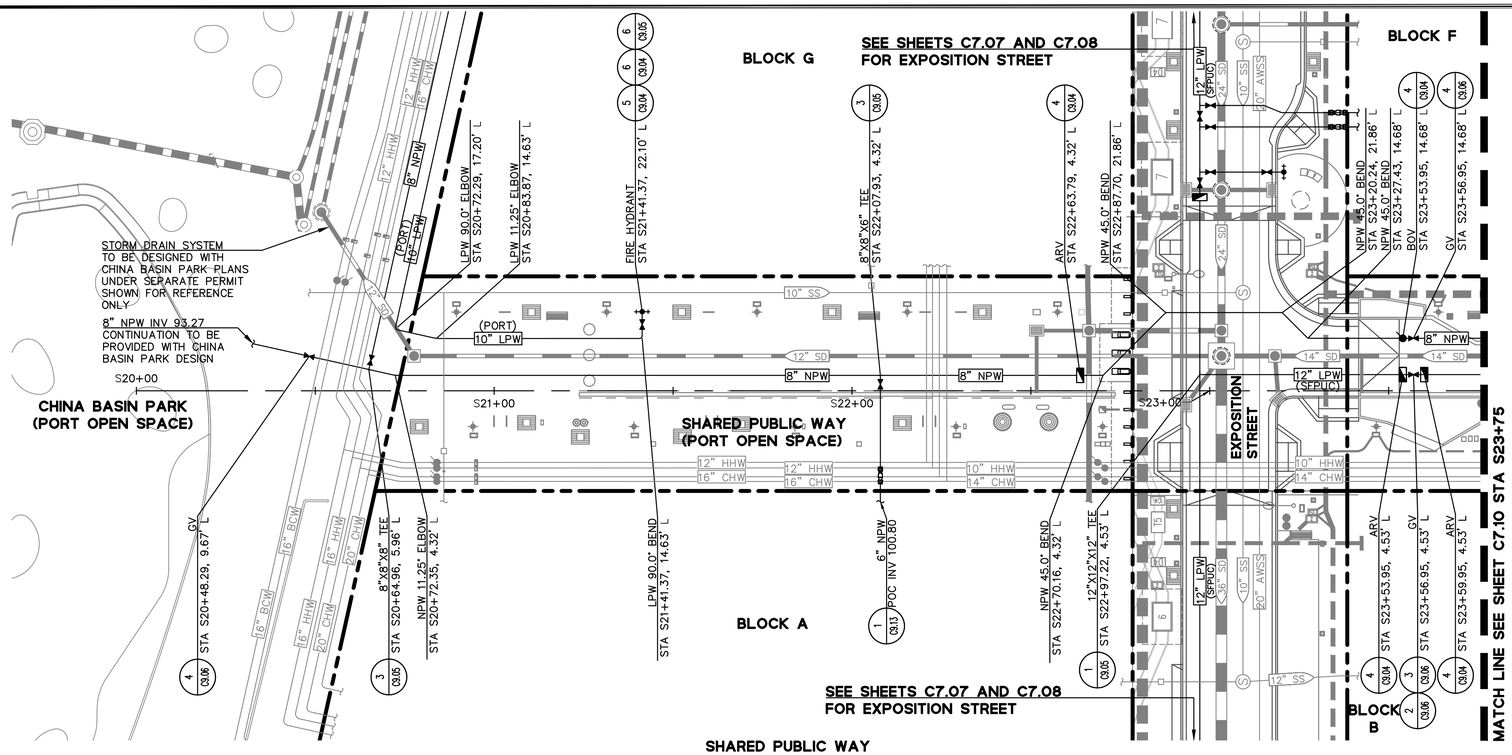
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

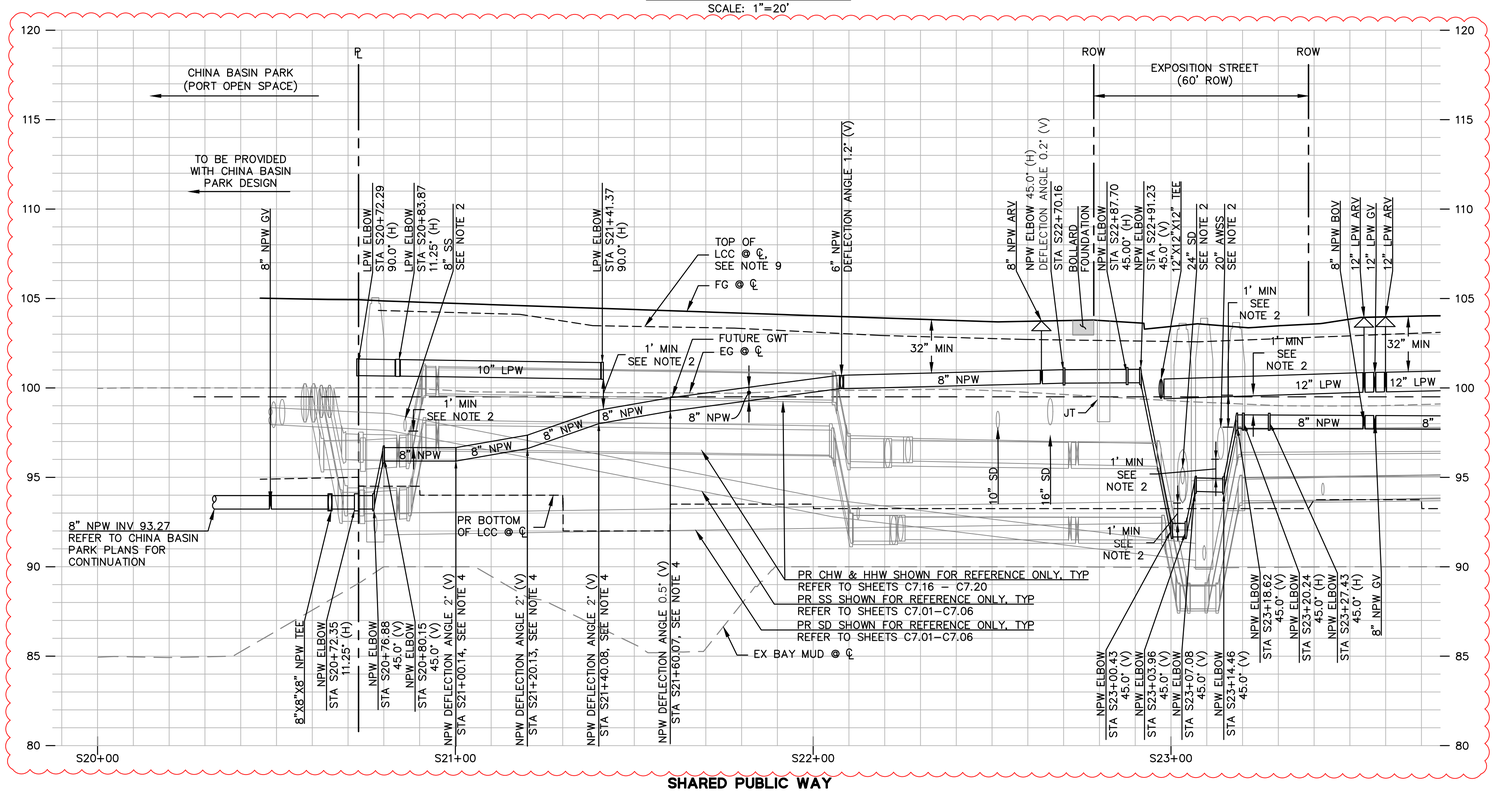
Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.08

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0B - WATER UTILITY PLAN.DWG
PLOT DATE: 09-03-24
PLOTTED BY: arra





NOTES:

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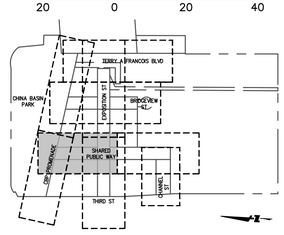
GRAPHIC SCALE
20 0 20 40



Revisions	No.
09/13/2024 – RECORD DRAWINGS	

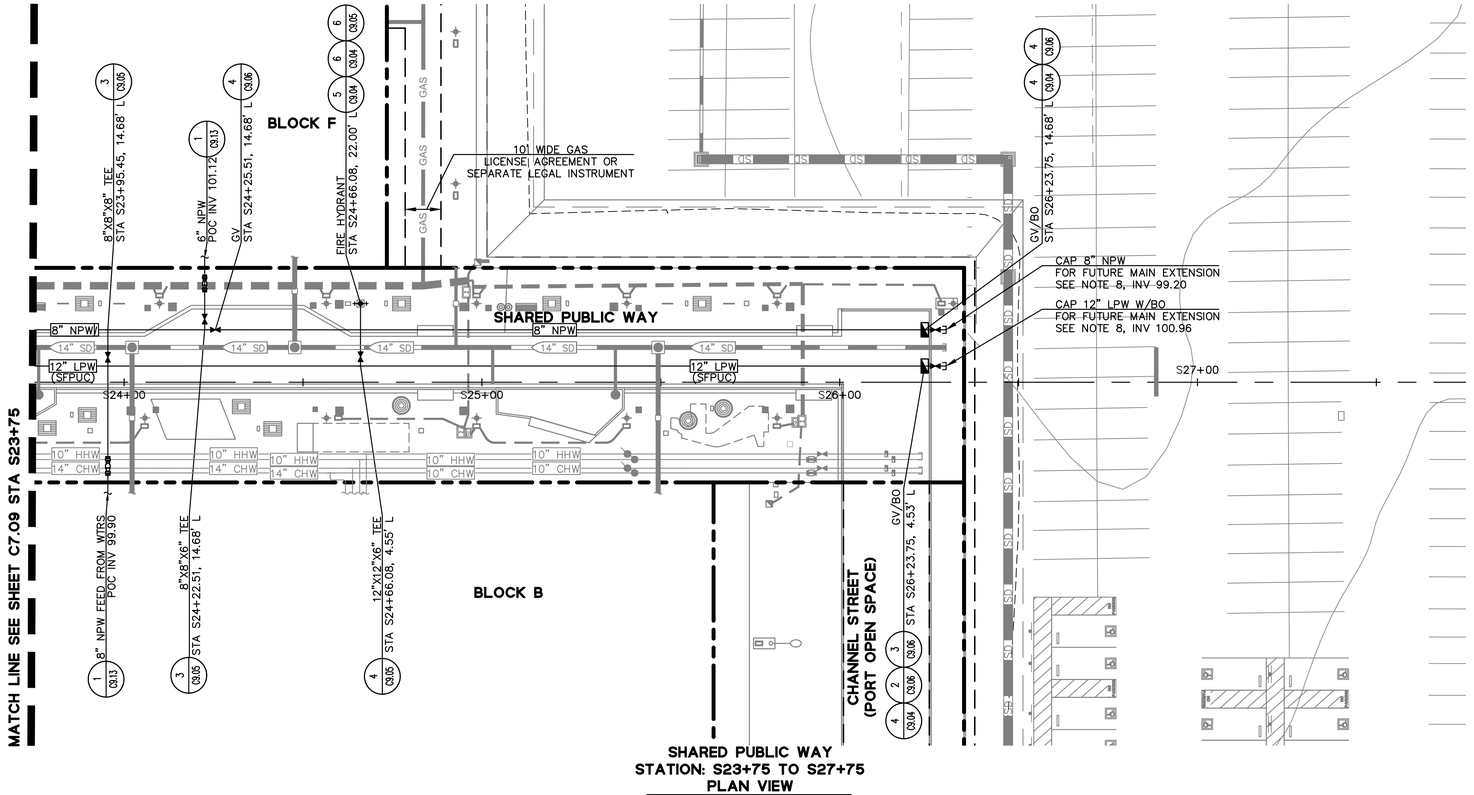
Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

Drawing Number:
C7.09

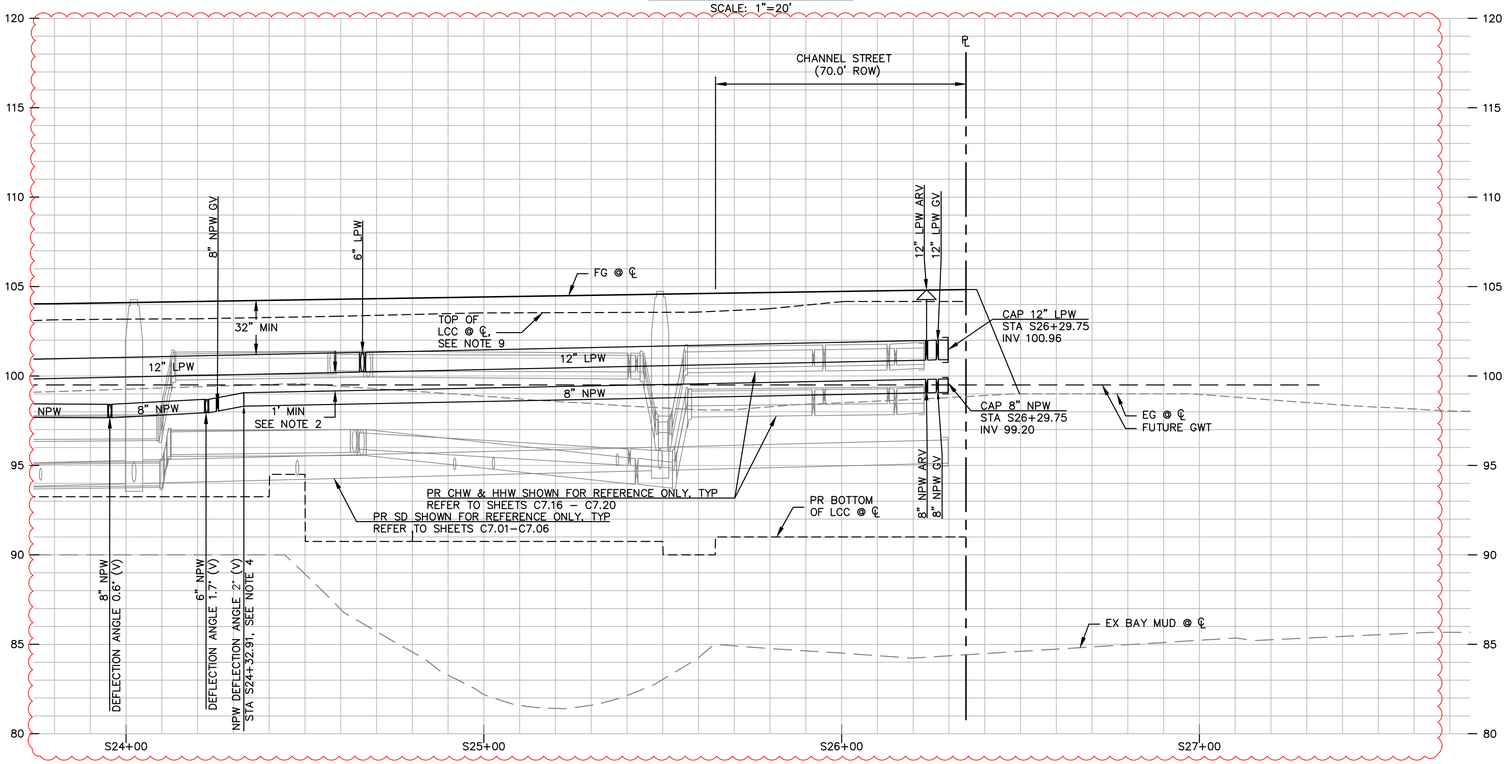
MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – LPW AND NPW – SHARED PUBLIC WAY
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0B – WATER UTILITY PLAN.DWG
PLOT DATE: 09-03-24 PLOTTED BY: arra



SHARED PUBLIC WAY
STATION: S23+75 TO S27+75
PLAN VIEW
SCALE: 1"=20'



SHARED PUBLIC WAY
STATION: S23+75 TO S27+75
PROFILE VIEW
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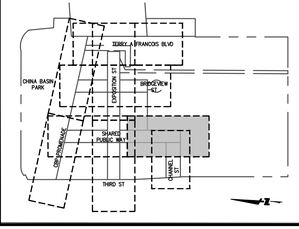
GRAPHIC SCALE
20 0 20 40



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JAMES K. DALLOS JR.
No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – LPW AND NPW – SHARED PUBLIC WAY
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

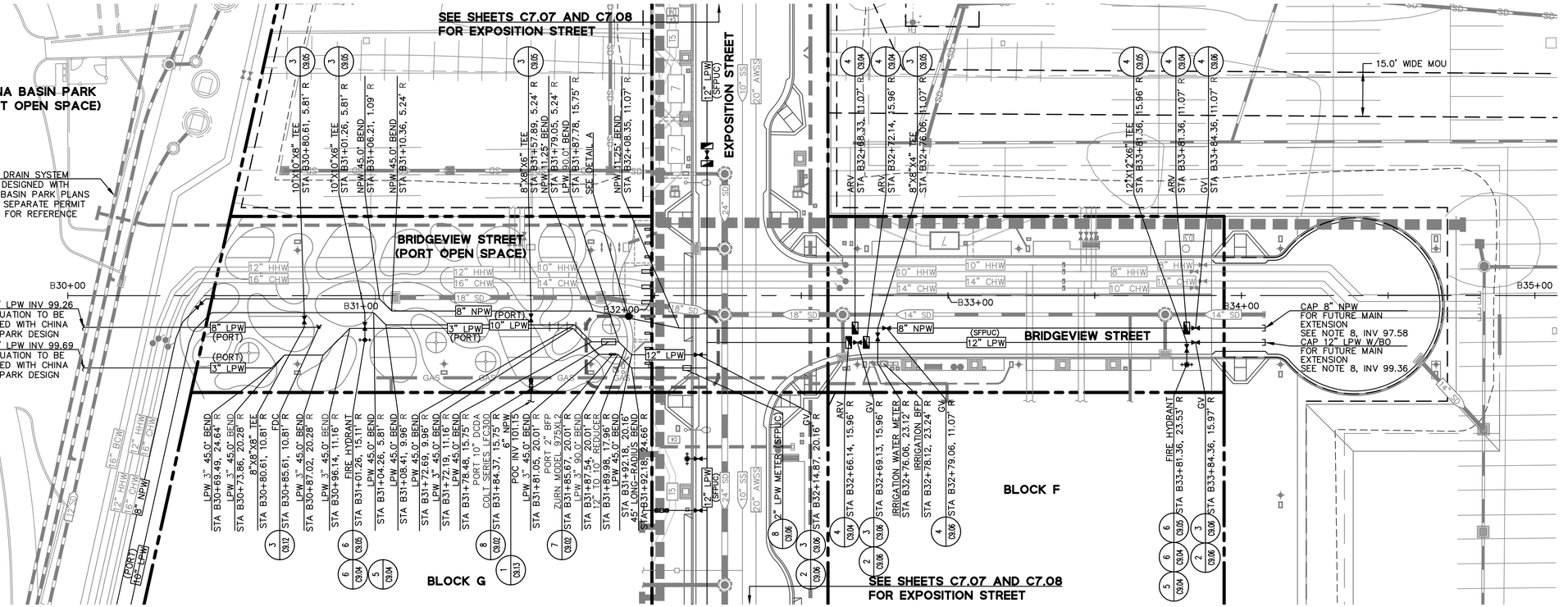
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

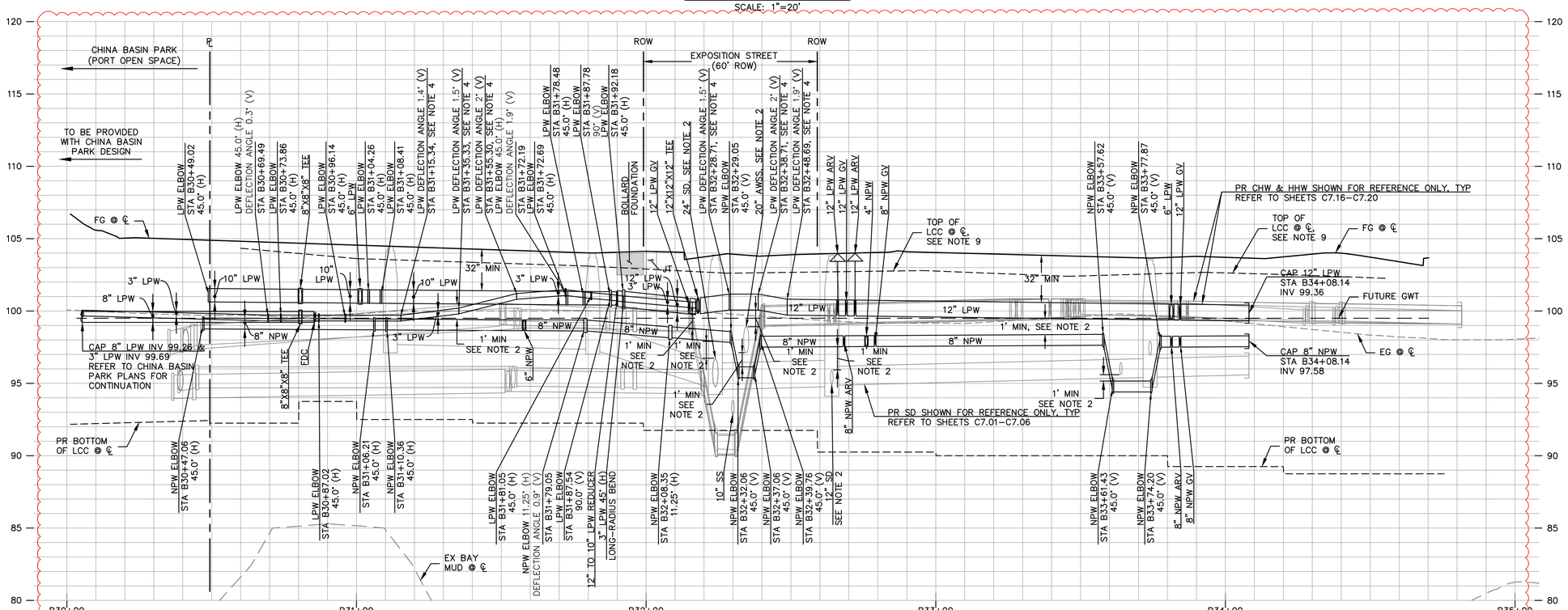
Drawing Number:
C7.10

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0B – WATER UTILITY PLAN.DWG
PLOT DATE: 09-03-24
PLOTTED BY: arra



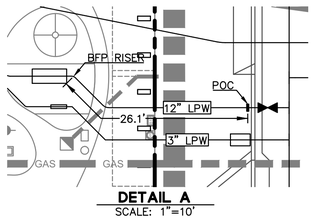
BRIDGEVIEW STREET
STATION: B30+00 TO B35+00
PLAN VIEW
SCALE: 1"=20'

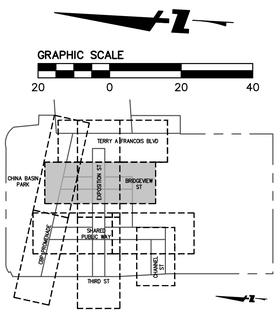


BRIDGEVIEW STREET
STATION: B30+00 TO B35+00
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
3. FOR WATER LATERALS WITH LESS THAN 18" COVER, PROVIDE PROTECTION PER DETAIL 1 ON SHEET C9.09.
4. ALL DIP PIPES SHALL HAVE A MAXIMUM 2° OR 40% OF MAXIMUM ALLOWABLE DEFLECTION PERMITTED BY THE MANUFACTURER, WHICHEVER IS LESS, PER SFWD STANDARDS.
5. JOINT TRENCH SHOWN FOR REFERENCE ONLY. SEE JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
6. SIZE, LOCATION, AND TERMINATION POINT OF ALL SERVICE LATERALS MUST BE APPROVED BY SFWD CDD ENGINEER PRIOR TO INSTALLATION.
7. FITTINGS SHOWN IN PROFILE VIEW ARE DISPLAYED LEVEL BY CIVIL 3D DUE TO LIMITATIONS IN THE SOFTWARE. HOWEVER, UNLESS OTHERWISE NOTED, ALL FITTINGS ARE INTENDED TO BE INSTALLED IN LINE WITH THE SLOPE OF THE PIPE.
8. SFPUC–CDD TO PROVIDE CAP DETAIL TO CONTRACTOR IN FIELD FOR FUTURE MAIN EXTENSION.
9. TOP OF LCC PROFILE BASED ON EXTRACTED AS–BUILT SURVEY INFORMATION PROVIDED ON C5.00A.





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REGISTERED PROFESSIONAL ENGINEER
JAMES W. DALLOSTA JR.
No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – LPW AND NPW – BRIDGEVIEW STREET
SAN FRANCISCO — SAN FRANCISCO COUNTY, CALIFORNIA

No.	Revisions
	09/13/2024 – RECORD DRAWINGS

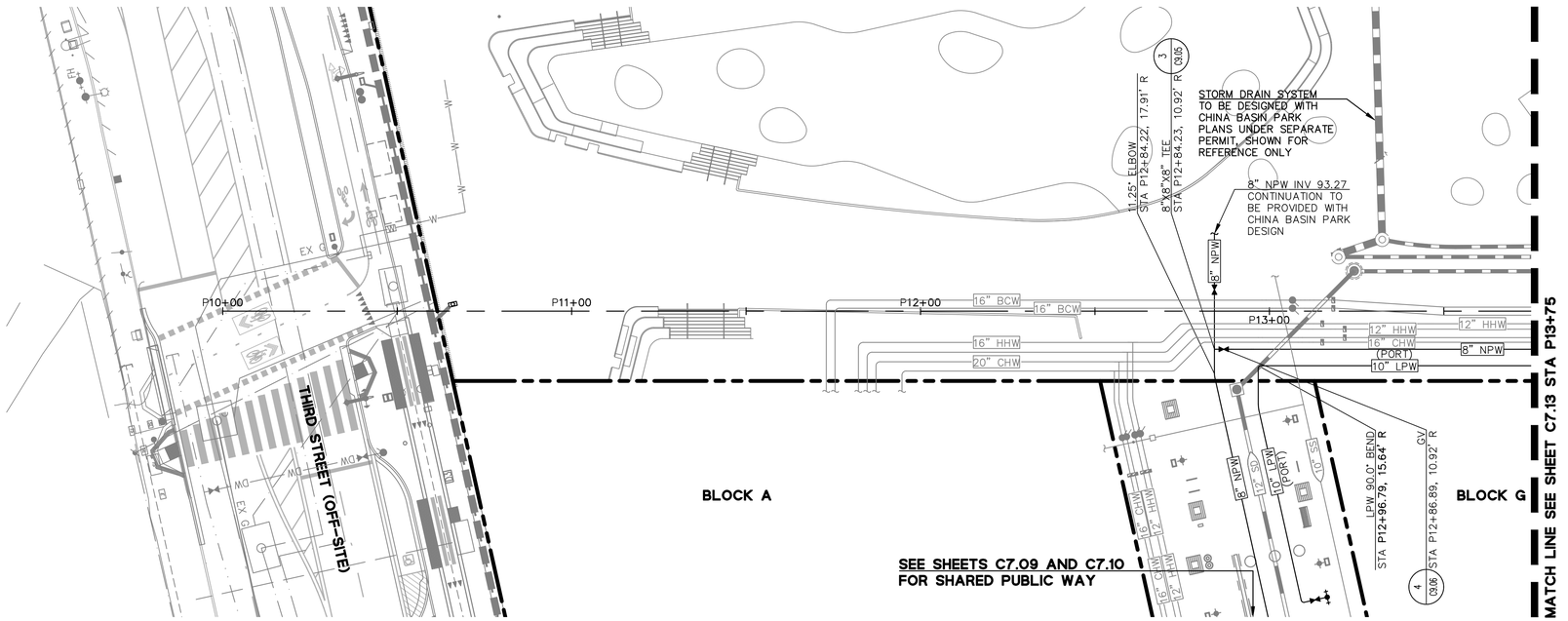
Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.11

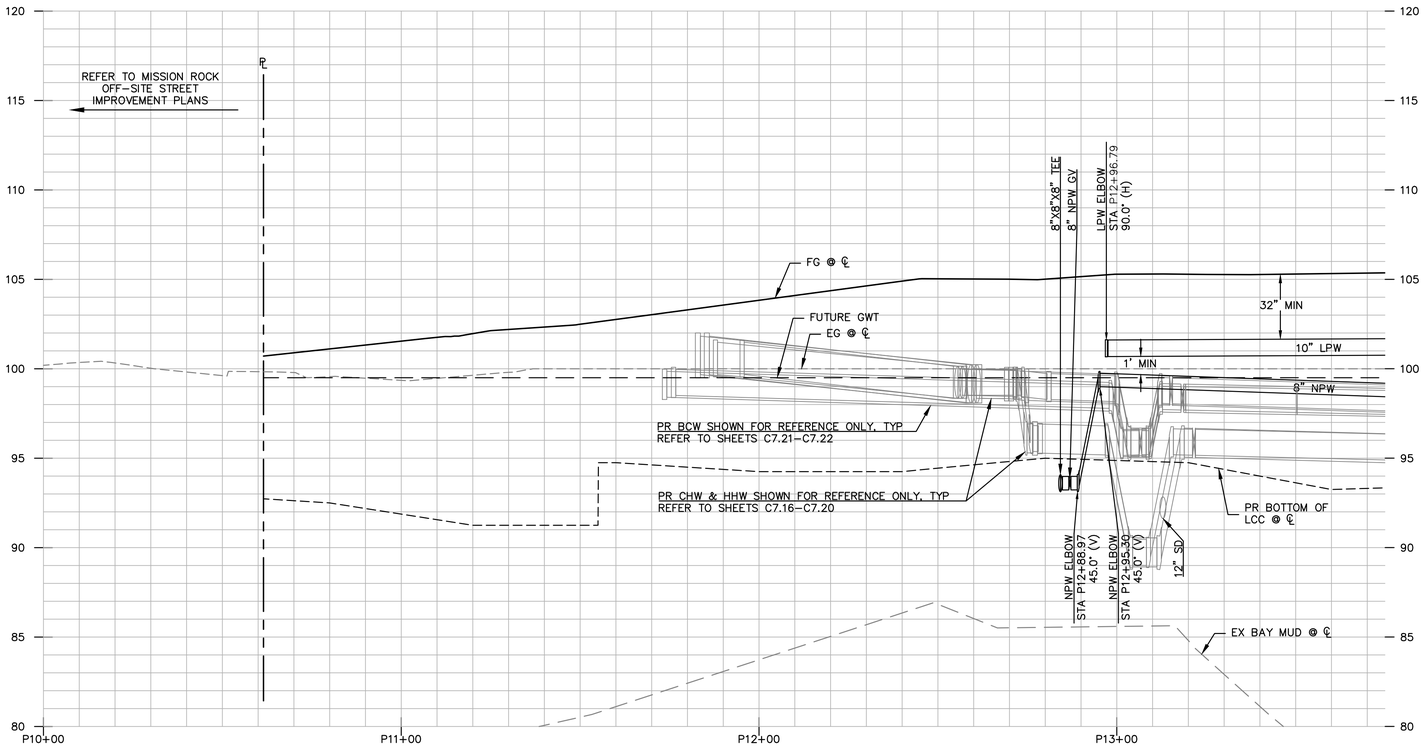
RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0B – WATER UTILITY PLAN.DWG
PLOT DATE: 09-03-24
PLOTTED BY: arra

For Reference Only - Area Excluded from SFPW Master Encroachment Permit



PROMENADE
STATION: P10+00 TO P13+75
PLAN VIEW
SCALE: 1"=20'



PROMENADE
STATION: P10+00 TO P13+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
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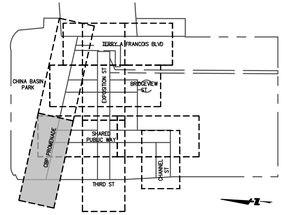
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE - LPW AND NPW - PROMENADE
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

GRAPHIC SCALE
20 0 20 40



No.	Revisions
	09/13/2024 - RECORD DRAWINGS

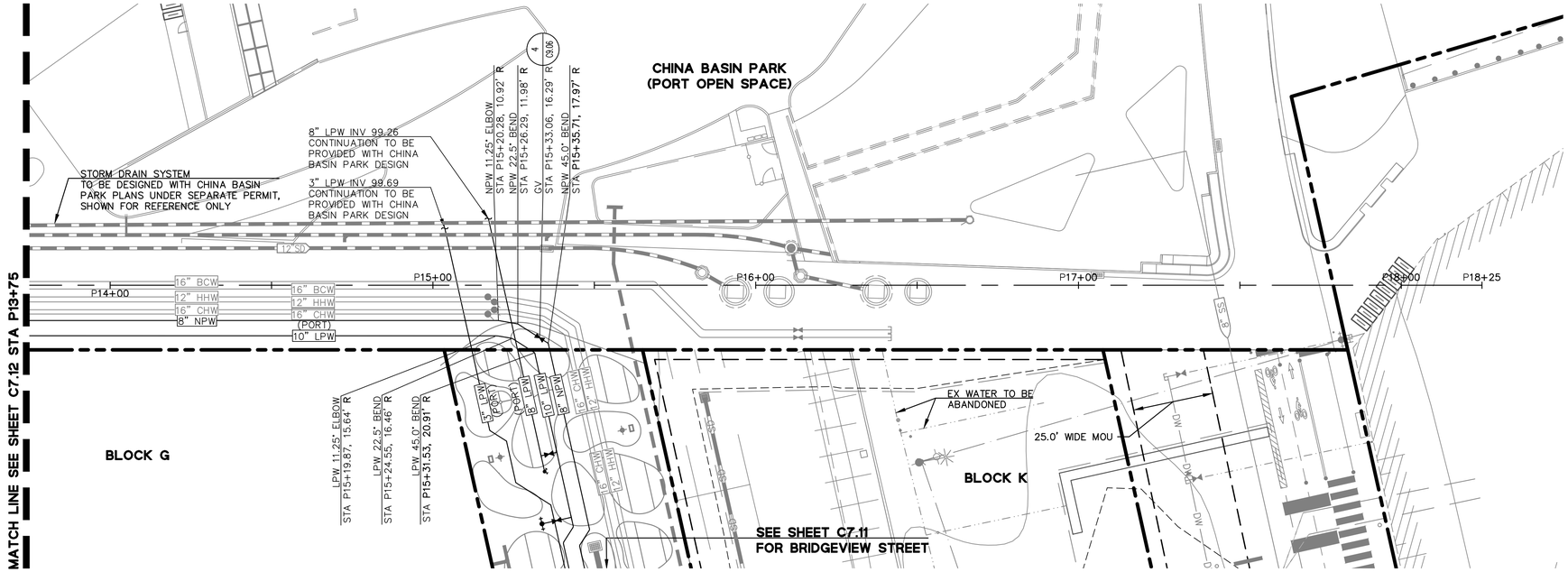
Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

Drawing Number:
C7.12

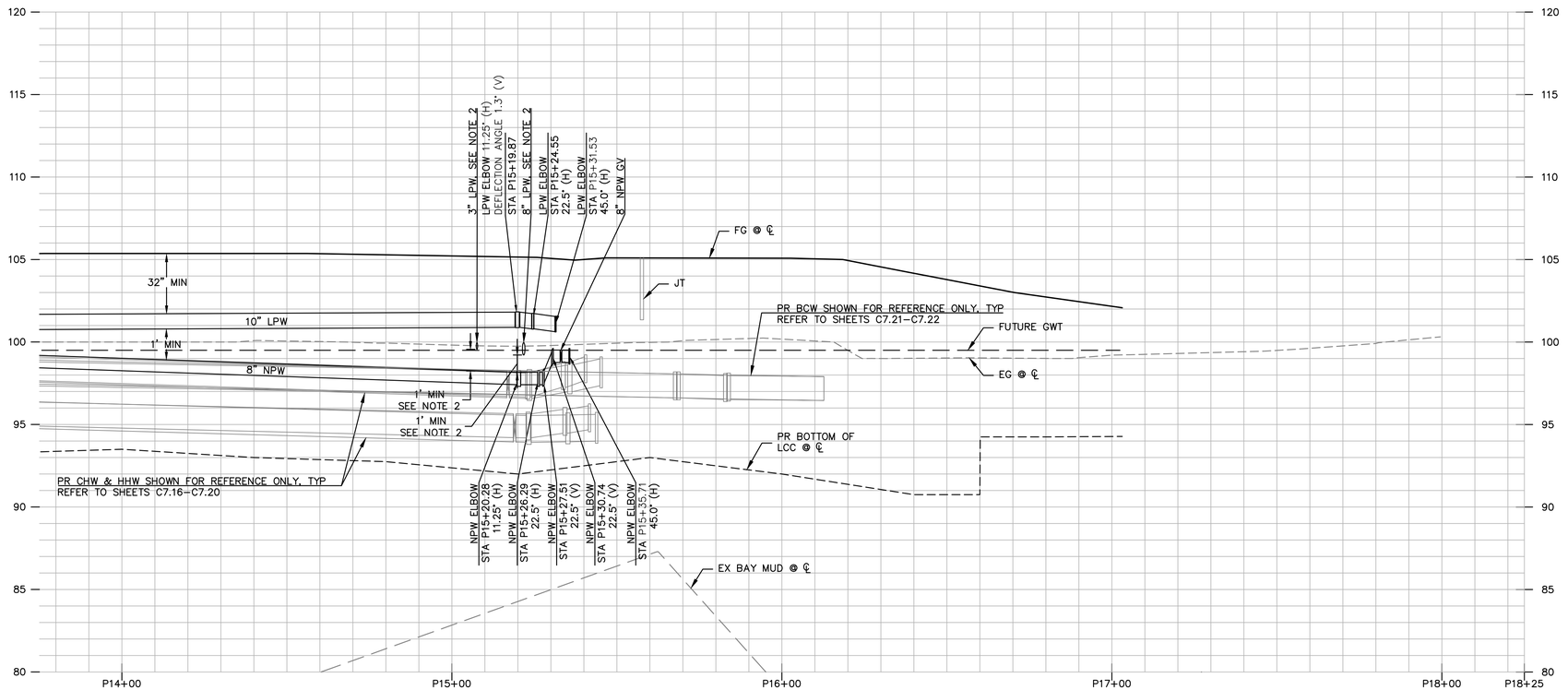
RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0B - WATER UTILITY PLAN.DWG
PLOT DATE: 09-03-24
PLOTTED BY: arra

For Reference Only - Area Excluded from SFPW Master Encroachment Permit



PROMENADE
STATION: P13+75 TO P18+25
PLAN VIEW
SCALE: 1"=20'



PROMENADE
STATION: P13+75 TO P18+25
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

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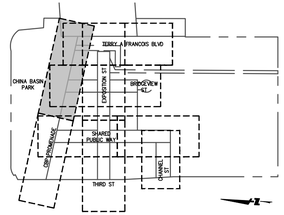
MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – LPW AND NPW – PROMENADE
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

GRAPHIC SCALE
20 0 20 40



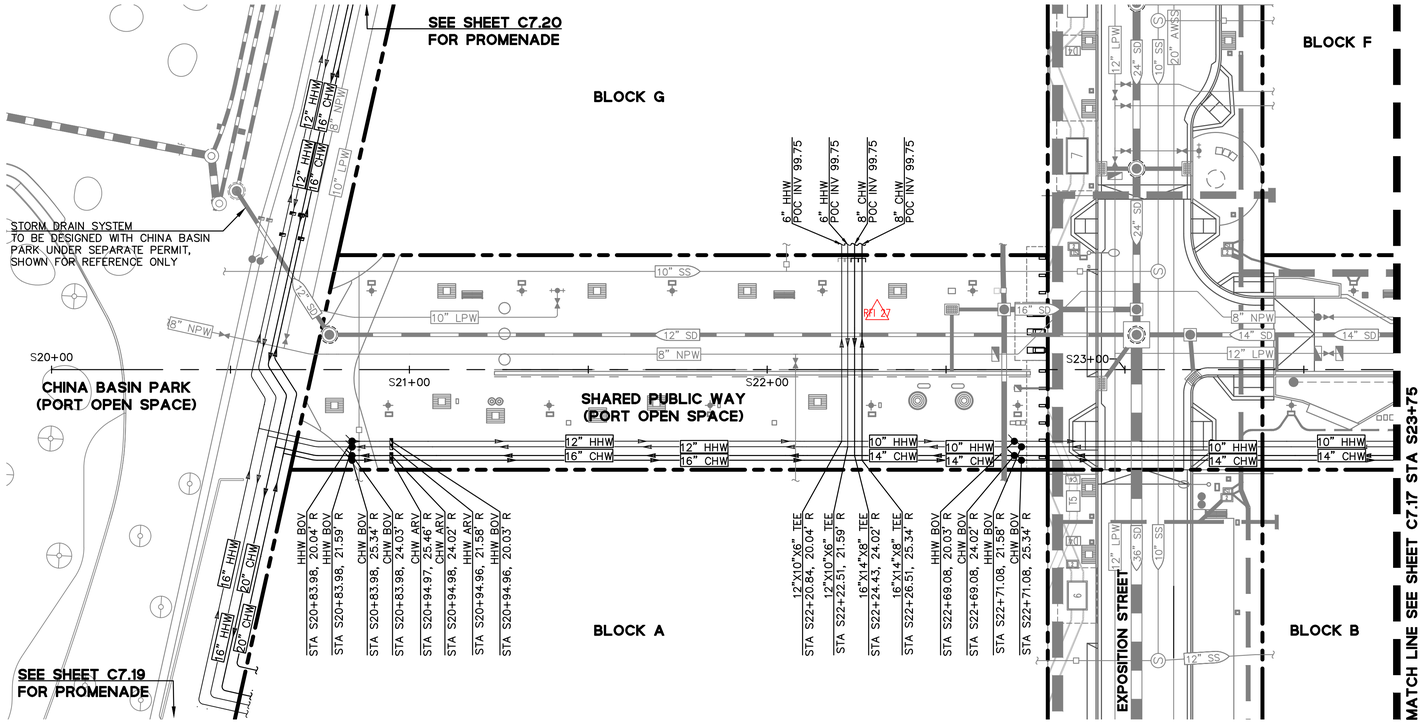
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

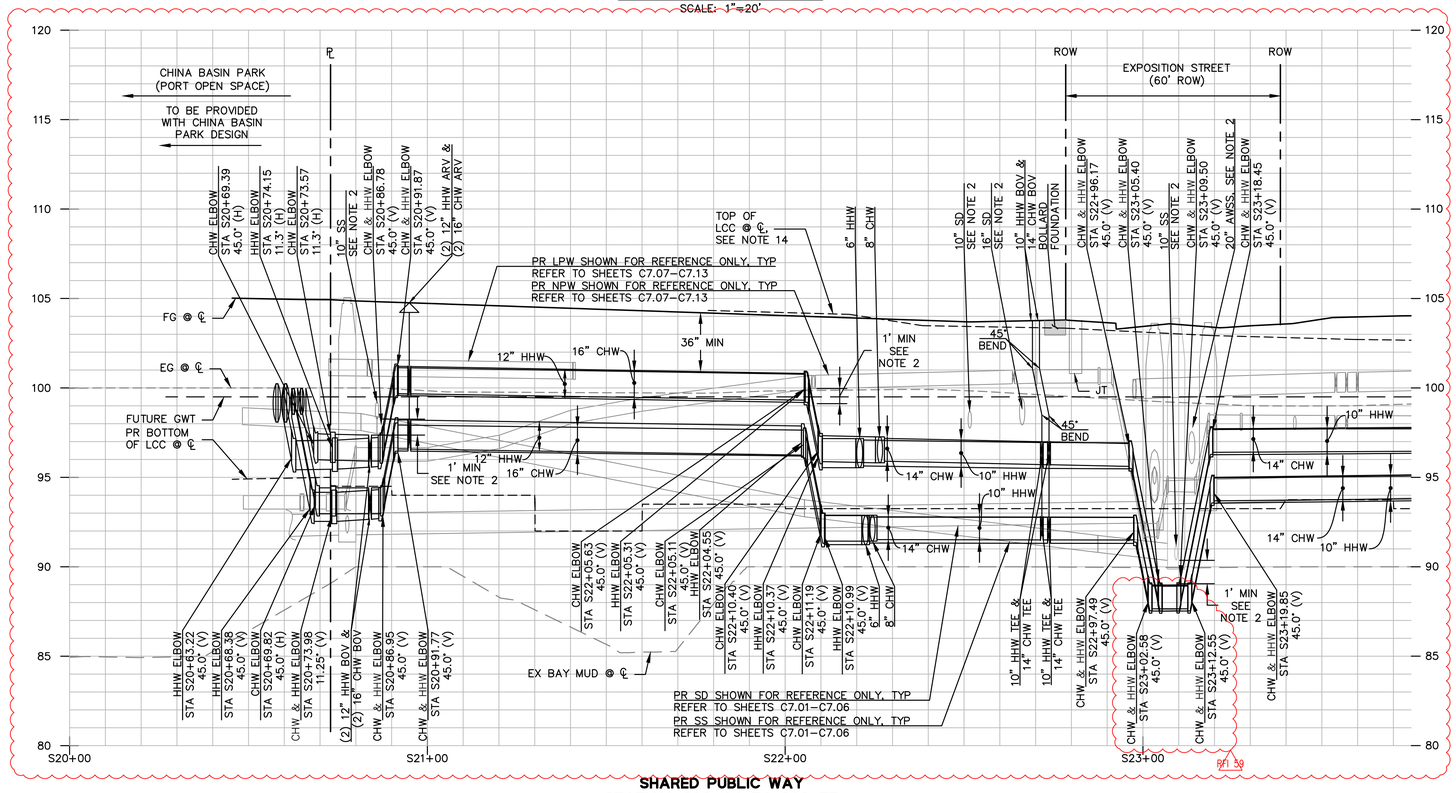
Drawing Number:
C7.13

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0B – WATER UTILITY PLAN.DWG
PLOT DATE: 09-03-24
PLOTTED BY: arra



SHARED PUBLIC WAY
STATION: S20+00 TO S23+75
PLAN VIEW
SCALE: 1"=20'



SHARED PUBLIC WAY
STATION: S20+00 TO S23+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

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3. MAIN AND LATERAL PIPE SIZES ARE NOMINAL.
4. ALL HHW PIPES INCLUDE 3" OF INSULATION.
5. JOINT TRENCH SHOWN FOR REFERENCE ONLY. SEE JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
6. NOT USED
7. REFER TO DETAILS ON C9.09, C9.10 AND C9.14 FOR DISTRICT ENERGY SECTIONS AND DETAILS.
8. ALL PIPING SHALL BE FUSION–WELDED PER MANUFACTURER RECOMMENDATIONS.
9. HHW AND CHW LATERALS TO FUTURE BLOCKS J AND K SHALL BE CAPPED FOR FUTURE CONNECTION WITH RECIRCULATION VALVES.
10. DISTRICT ENERGY DESIGN BASED ON DISTRICT ENERGY BASIS OF DESIGN DATED DECEMBER 17, 2019 BY PAE/EVERGREEN. ALL FIELD ADJUSTMENTS TO BE COORDINATED WITH CLIENT AND DESIGN ENGINEER PRIOR TO INSTALLATION.
11. DISTRICT ENERGY DESIGN PARAMETERS PROVIDED BY PAE ON MARCH 23, 2020:
    - HEATING HOT WATER
      - FLOW: 3,800 GPM
      - OPERATING PRESSURE: 125 PSI
      - OPERATING TEMPERATURE: 105°–125° F
    - CHILLED WATER
      - FLOW: 5,760 GPM
      - OPERATING PRESSURE: 100 PSI
      - OPERATING TEMPERATURE: 42°–57° F
12. REFER TO SECTIONS 33 61 05 DISTRICT COOLING CHILLED WATER PIPE AND 33 61 10 DISTRICT HEATING HOT WATER PIPE FOR SPECIFICATIONS.
13. BLOW OFF COVERS TO BE INSTALLED OUTSIDE OF INTERSECTIONS.
14. TOP OF LCC PROFILE BASED ON EXTRACTED AS–BUILT SURVEY INFORMATION PROVIDED ON C5.00A.

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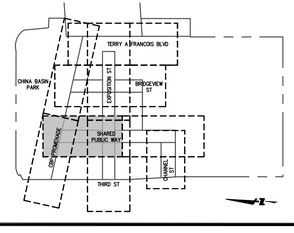
REGISTERED PROFESSIONAL ENGINEER
JAMES W. DALLOSTA JR.
No. 72339
CIVIL
STATE OF CALIFORNIA

GRAPHIC SCALE
20 0 20 40



Revisions	No.
09/13/2024 – RECORD DRAWINGS	

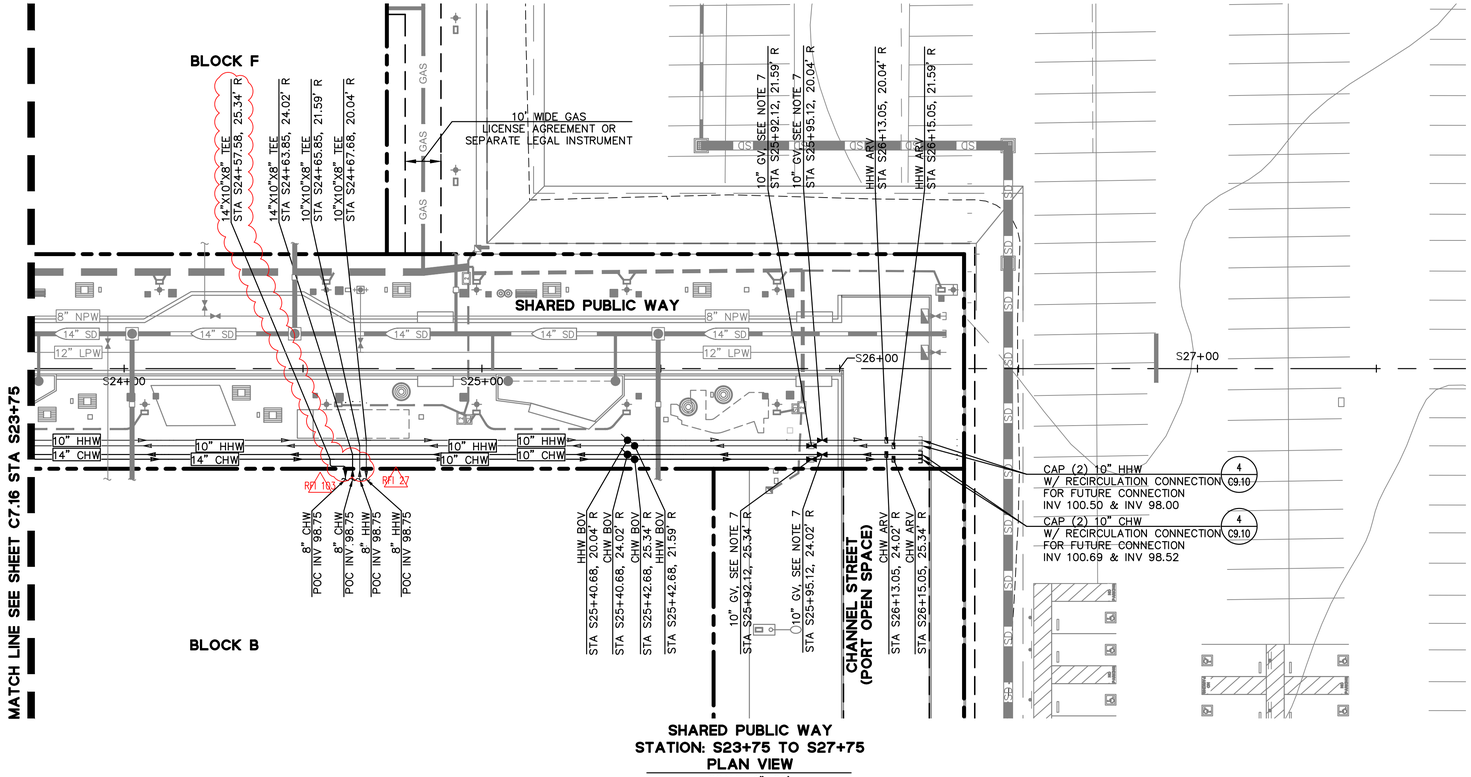
Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

Drawing Number:
C7.16

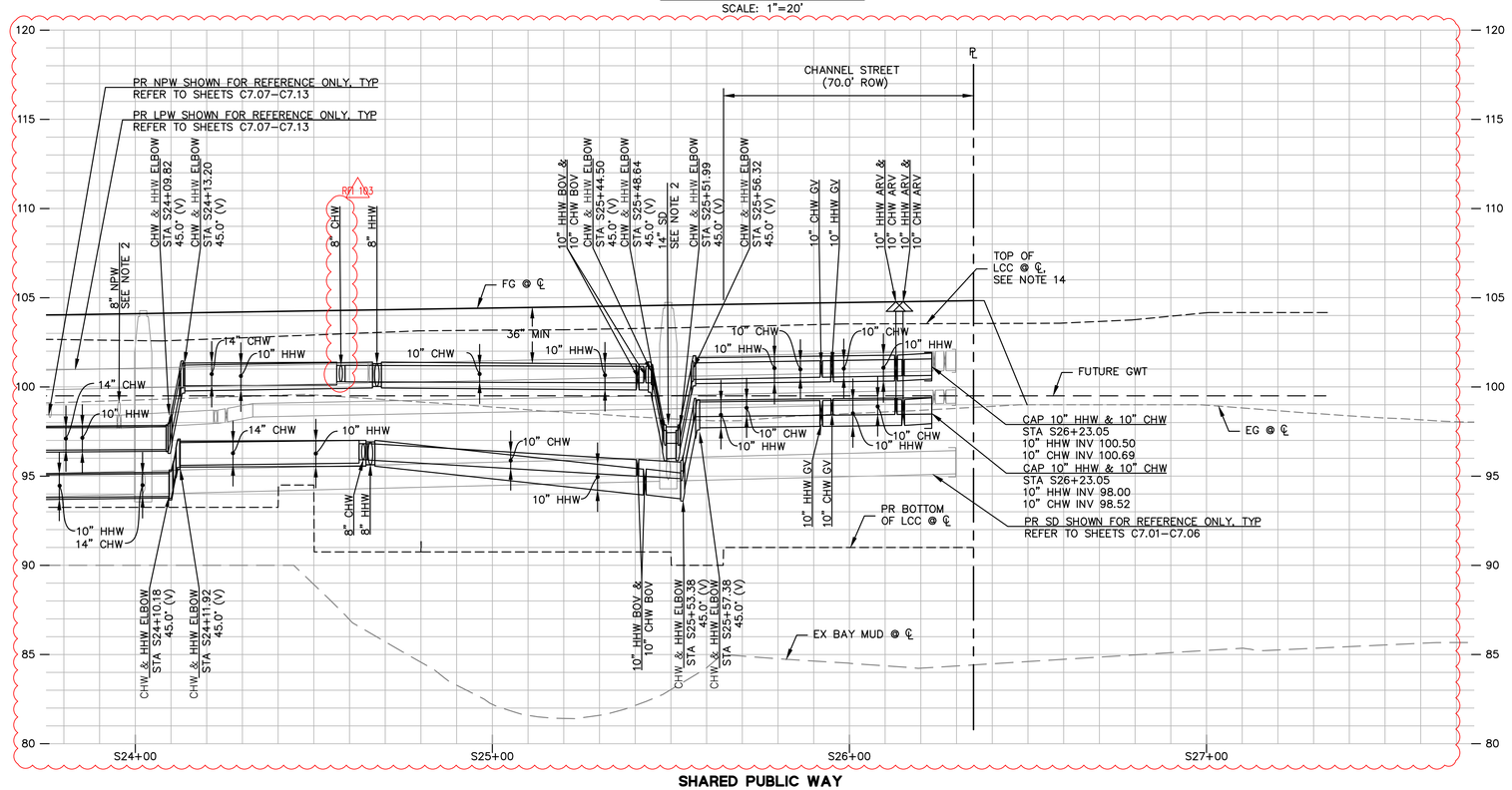
MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – DISTRICT ENERGY – SHARED PUBLIC WAY
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0D – DISTRICT ENERGY PLAN.dwg
PLOT DATE: 09-03-24 PLOTTED BY: arra



SHARED PUBLIC WAY
STATION: S23+75 TO S27+75
PLAN VIEW
SCALE: 1"=20'



SHARED PUBLIC WAY
STATION: S23+75 TO S27+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
3. MAIN AND LATERAL PIPE SIZES ARE NOMINAL.
4. ALL HHW PIPES INCLUDE 3" OF INSULATION.
5. JOINT TRENCH SHOWN FOR REFERENCE ONLY. SEE JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
6. NOT USED
7. REFER TO DETAILS ON C9.09, C9.10 AND C9.14 FOR DISTRICT ENERGY SECTIONS AND DETAILS.
8. ALL PIPING SHALL BE FUSION–WELDED PER MANUFACTURER RECOMMENDATIONS.
9. HHW AND CHW LATERALS TO FUTURE BLOCKS J AND K SHALL BE CAPPED FOR FUTURE CONNECTION WITH RECIRCULATION VALVES.
10. DISTRICT ENERGY DESIGN BASED ON DISTRICT ENERGY BASIS OF DESIGN DATED DECEMBER 17, 2019 BY PAE/EVERGREEN. ALL FIELD ADJUSTMENTS TO BE COORDINATED WITH CLIENT AND DESIGN ENGINEER PRIOR TO INSTALLATION.
11. DISTRICT ENERGY DESIGN PARAMETERS PROVIDED BY PAE ON MARCH 23, 2020:
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      - OPERATING TEMPERATURE: 105°–125° F
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      - FLOW: 5,760 GPM
      - OPERATING PRESSURE: 100 PSI
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12. REFER TO SECTIONS 33 61 05 DISTRICT COOLING CHILLED WATER PIPE AND 33 61 10 DISTRICT HEATING HOT WATER PIPE FOR SPECIFICATIONS.
13. BLOW OFF COVERS TO BE INSTALLED OUTSIDE OF INTERSECTIONS.
14. TOP OF LCC PROFILE BASED ON EXTRACTED AS–BUILT SURVEY INFORMATION PROVIDED ON C5.00A.

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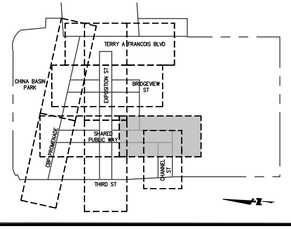
MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – DISTRICT ENERGY – SHARED PUBLIC WAY
SAN FRANCISCO — CALIFORNIA
SAN FRANCISCO COUNTY

GRAPHIC SCALE
20 0 20 40



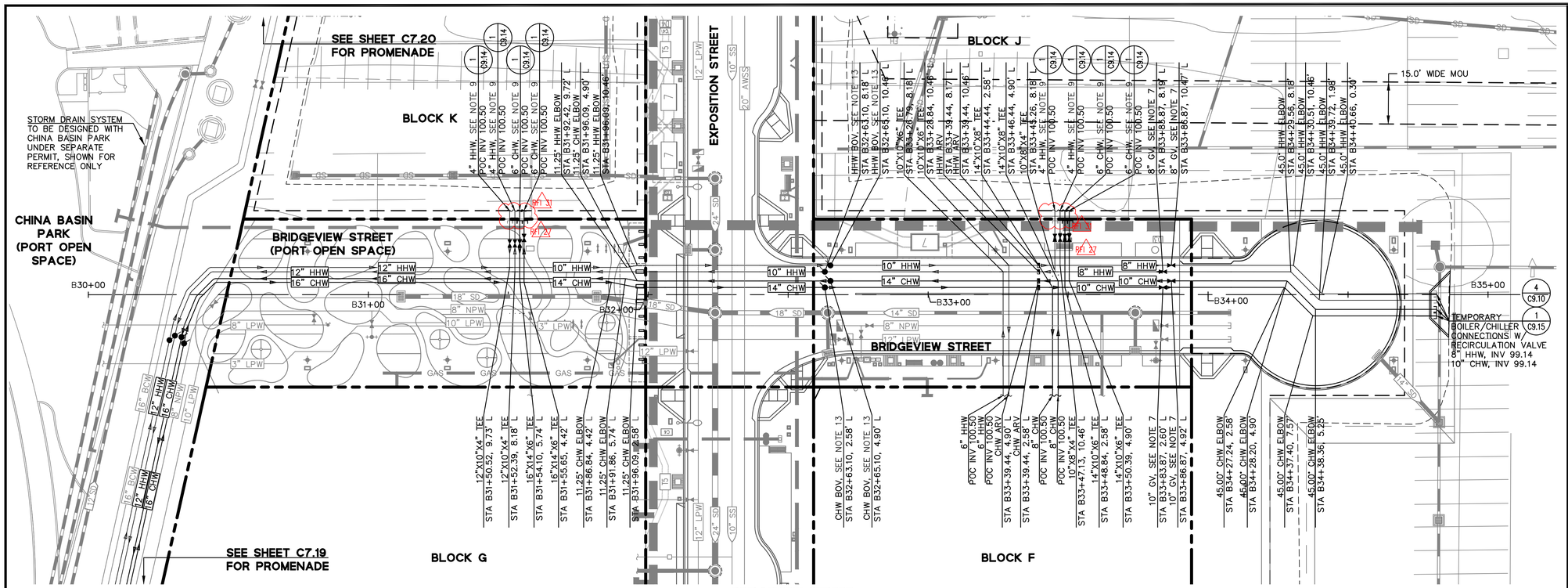
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

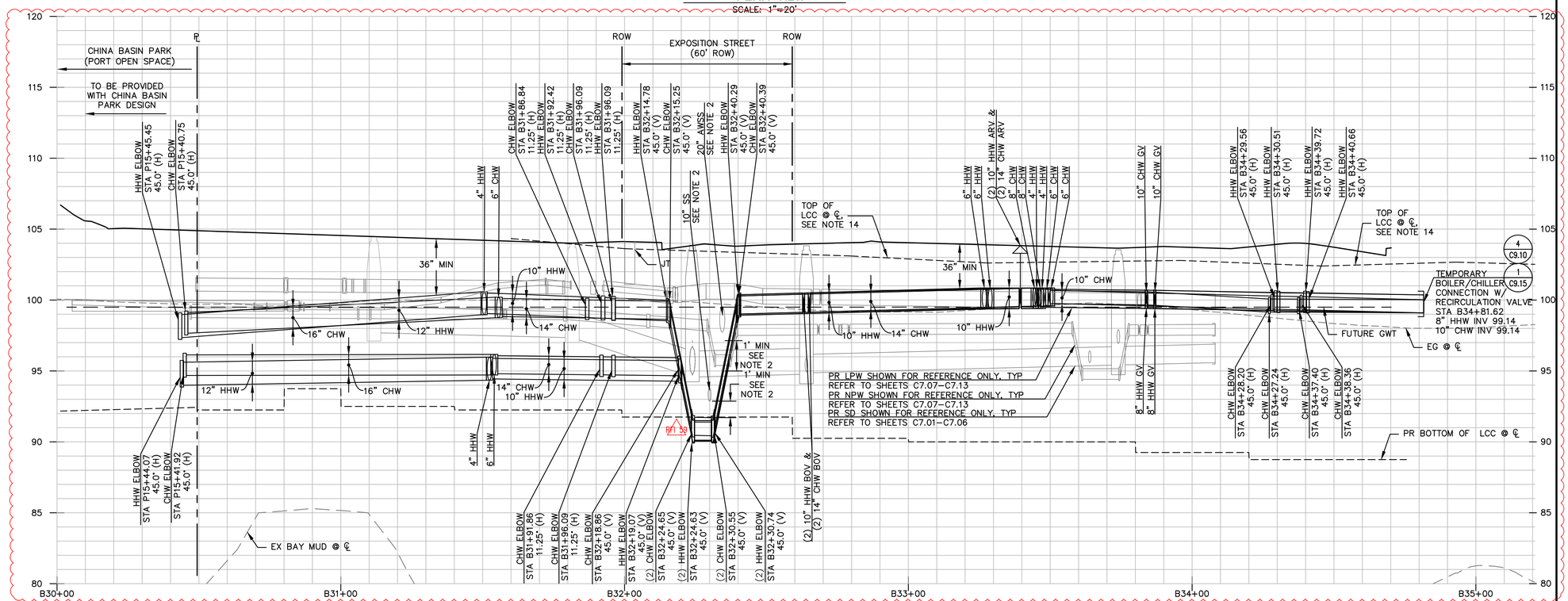
Drawing Number:
C7.17

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0D – DISTRICT ENERGY PLAN.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



BRIDGEVIEW STREET
STATION: B30+00 TO B35+00
PLAN VIEW
SCALE: 1"=20'



BRIDGEVIEW STREET
STATION: B30+00 TO B35+00
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

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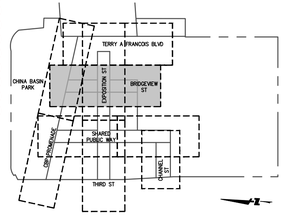
GRAPHIC SCALE
20 0 20 40



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REGISTERED PROFESSIONAL ENGINEER JAMES K. DALLOLIO No. 72339 CIVIL STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – DISTRICT ENERGY – BRIDGEVIEW STREET

SAN FRANCISCO CALIFORNIA
SAN FRANCISCO COUNTY

No.	Revisions
	09/13/2024 – RECORD DRAWINGS

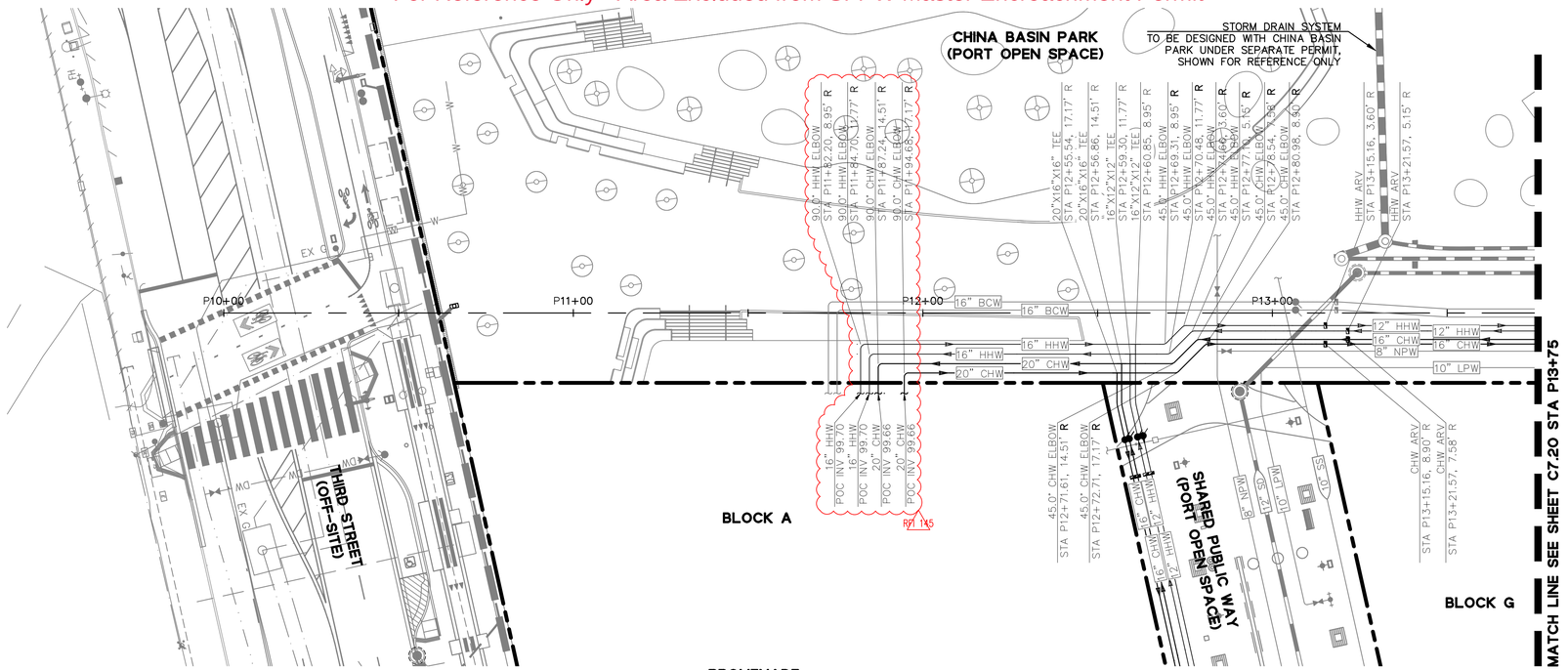
Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.18

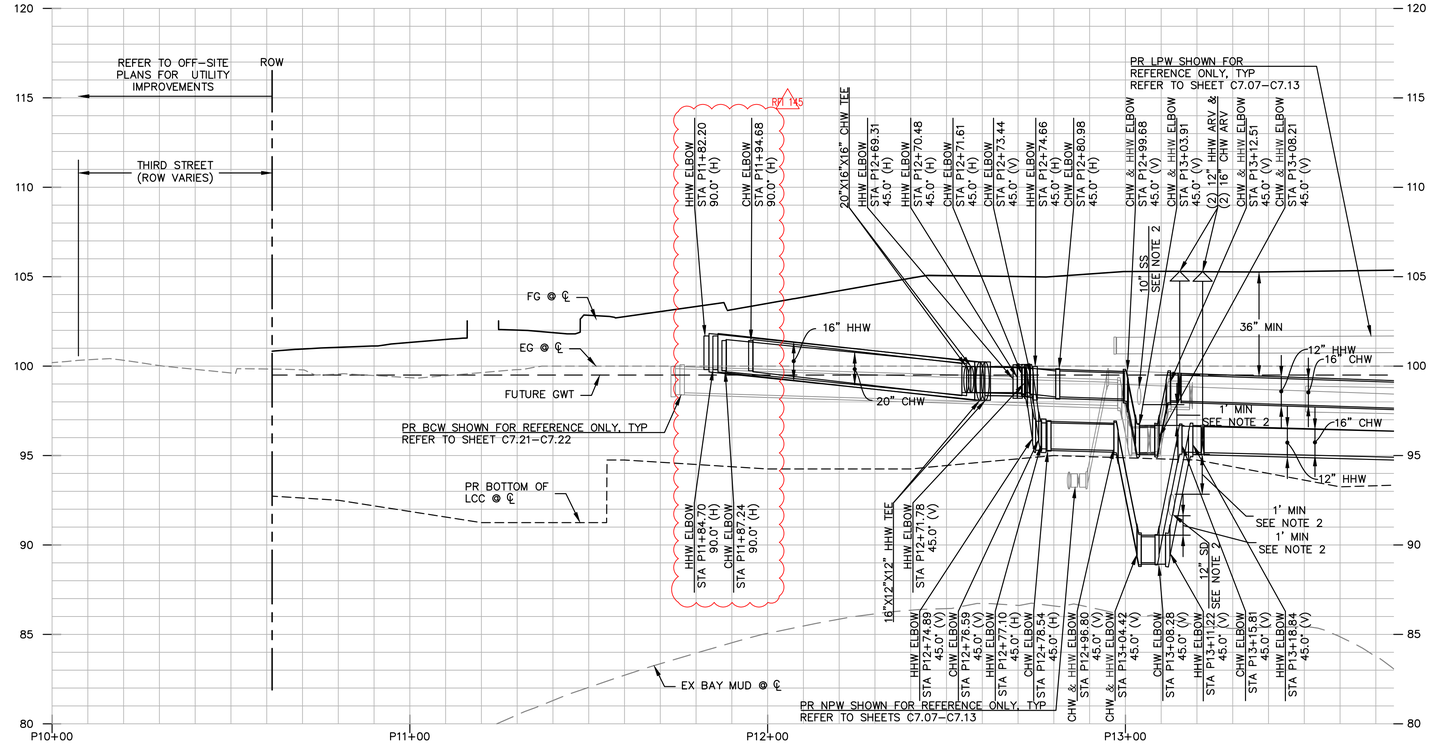
RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_Mission Rock\ENG\SIP\PLOTTED SHEETS\C7.00 – DISTRICT ENERGY PLAN.dwg
PLOT DATE: 09-06-24
PLOTTED BY: arra

For Reference Only - Area Excluded from SFPW Master Encroachment Permit



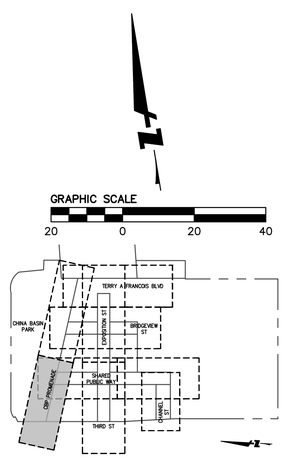
PROMENADE
STATION: P10+00 TO P13+75
PLAN VIEW
SCALE: 1"=20'



PROMENADE
STATION: P10+00 TO P13+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
3. MAIN AND LATERAL PIPE SIZES ARE NOMINAL.
4. ALL HHW PIPES INCLUDE 3" OF INSULATION.
5. JOINT TRENCH SHOWN FOR REFERENCE ONLY. SEE JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
6. NOT USED
7. REFER TO DETAILS ON C9.09, C9.10 AND C9.14 FOR DISTRICT ENERGY SECTIONS AND DETAILS.
8. ALL PIPING SHALL BE FUSION–WELDED PER MANUFACTURER RECOMMENDATIONS.
9. HHW AND CHW LATERALS TO FUTURE BLOCKS J AND K SHALL BE CAPPED FOR FUTURE CONNECTION WITH RECIRCULATION VALVES.
10. DISTRICT ENERGY DESIGN BASED ON DISTRICT ENERGY BASIS OF DESIGN DATED DECEMBER 17, 2019 BY PAE/EVERGREEN. ALL FIELD ADJUSTMENTS TO BE COORDINATED WITH CLIENT AND DESIGN ENGINEER PRIOR TO INSTALLATION.
11. DISTRICT ENERGY DESIGN PARAMETERS PROVIDED BY PAE ON MARCH 23, 2020:
    - HEATING HOT WATER
      - FLOW: 3,800 GPM
      - OPERATING PRESSURE: 125 PSI
      - OPERATING TEMPERATURE: 105°–125° F
    - CHILLED WATER
      - FLOW: 5,760 GPM
      - OPERATING PRESSURE: 100 PSI
      - OPERATING TEMPERATURE: 42°–57° F
12. REFER TO SECTIONS 33 61 05 DISTRICT COOLING CHILLED WATER PIPE AND 33 61 10 DISTRICT HEATING HOT WATER PIPE FOR SPECIFICATIONS.
13. BLOW OFF COVERS TO BE INSTALLED OUTSIDE OF INTERSECTIONS.



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REGISTERED PROFESSIONAL ENGINEER JAMES W. DALLOSTA No. 72339 CIVIL STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – DISTRICT ENERGY – PROMENADE
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

No.	Revisions
	09/13/2024 – RECORD DRAWINGS

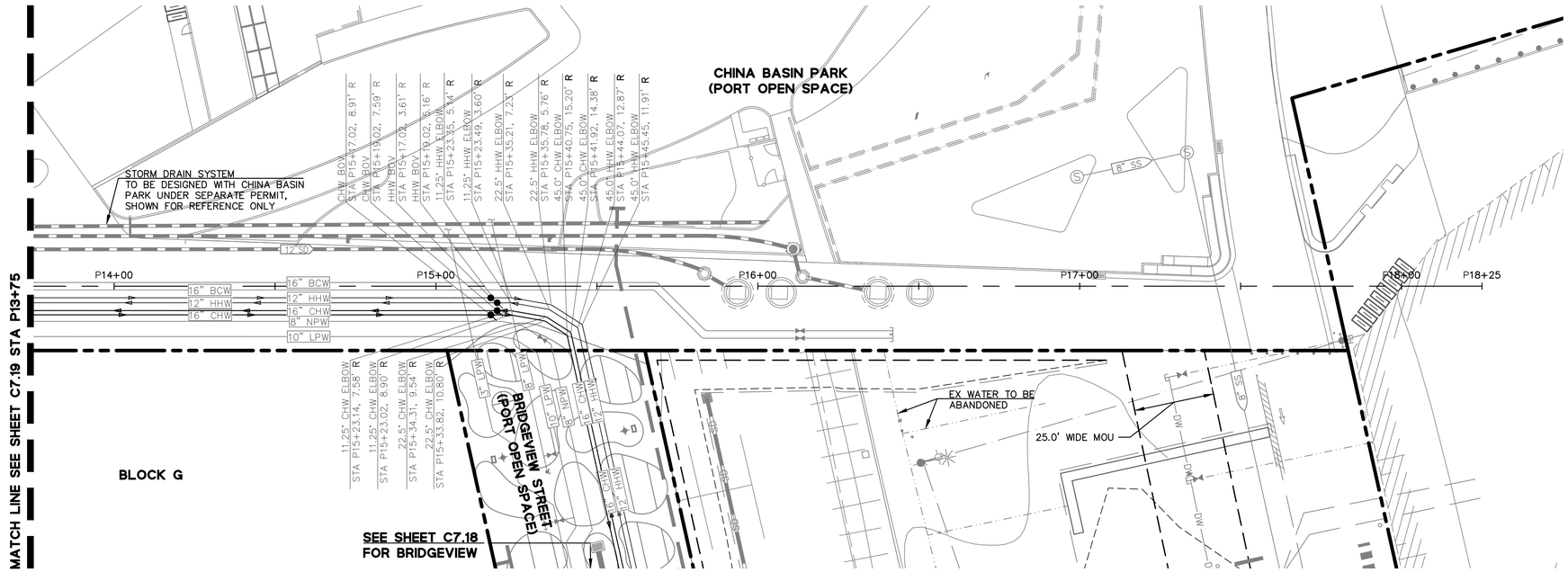
Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.19

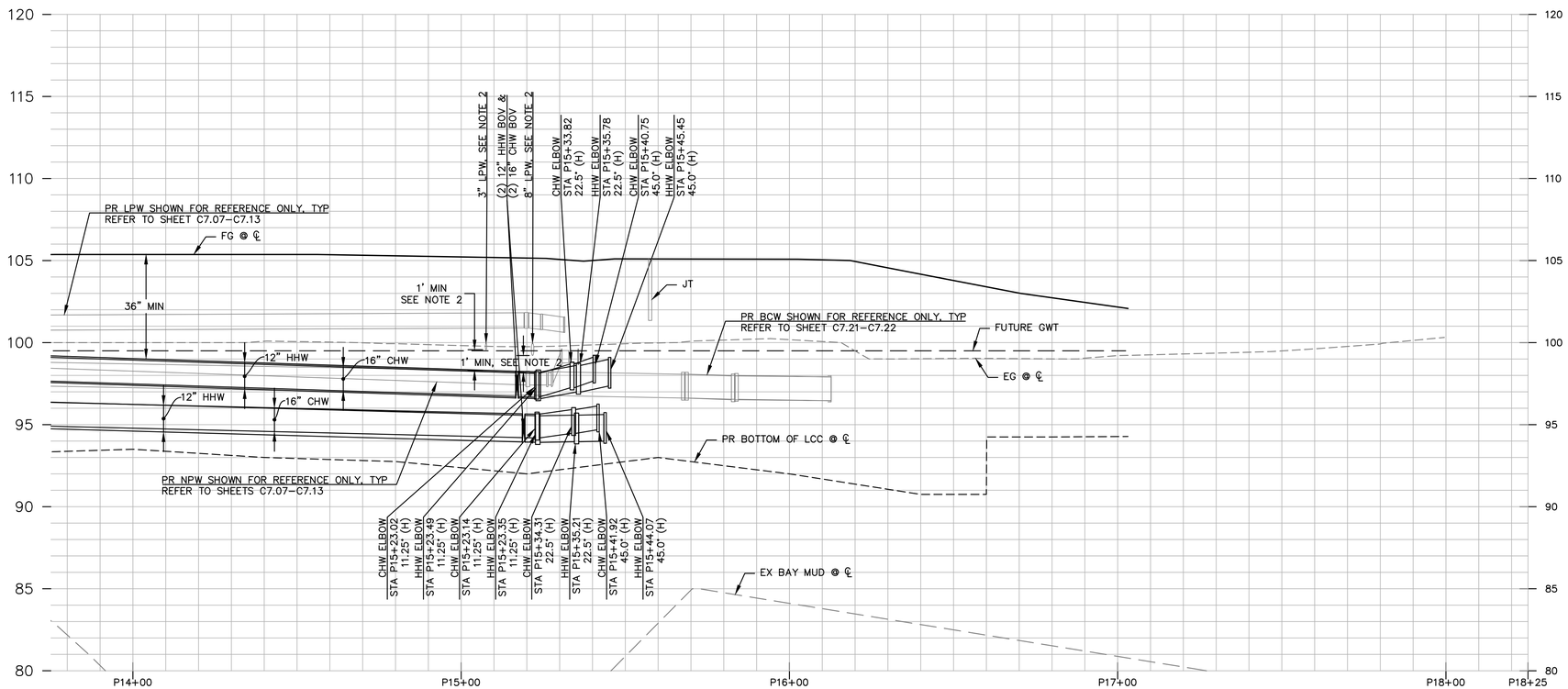
RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0D – DISTRICT ENERGY PLAN.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra

For Reference Only - Area Excluded from SFPW Master Encroachment Permit



PROMENADE
STATION: P13+75 TO P18+25
PLAN VIEW
SCALE: 1"=20'



PROMENADE
STATION: P13+75 TO P18+25
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
2. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
3. MAIN AND LATERAL PIPE SIZES ARE NOMINAL.
4. ALL HHW PIPES INCLUDE 3" OF INSULATION.
5. JOINT TRENCH SHOWN FOR REFERENCE ONLY. SEE JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
6. NOT USED
7. REFER TO DETAILS ON C9.09, C9.10 AND C9.14 FOR DISTRICT ENERGY SECTIONS AND DETAILS.
8. ALL PIPING SHALL BE FUSION–WELDED PER MANUFACTURER RECOMMENDATIONS.
9. HHW AND CHW LATERALS TO FUTURE BLOCKS J AND K SHALL BE CAPPED FOR FUTURE CONNECTION WITH RECIRCULATION VALVES.
10. DISTRICT ENERGY DESIGN BASED ON DISTRICT ENERGY BASIS OF DESIGN DATED DECEMBER 17, 2019 BY PAE/EVERGREEN. ALL FIELD ADJUSTMENTS TO BE COORDINATED WITH CLIENT AND DESIGN ENGINEER PRIOR TO INSTALLATION.
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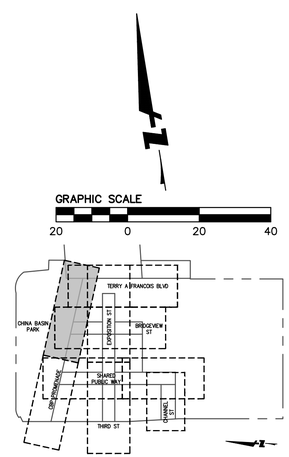
      - FLOW: 3,800 GPM
      - OPERATING PRESSURE: 125 PSI
      - OPERATING TEMPERATURE: 105°–125° F
    - CHILLED WATER
      - FLOW: 5,760 GPM
      - OPERATING PRESSURE: 100 PSI
      - OPERATING TEMPERATURE: 42°–57° F
12. REFER TO SECTIONS 33 61 05 DISTRICT COOLING CHILLED WATER PIPE AND 33 61 10 DISTRICT HEATING HOT WATER PIPE FOR SPECIFICATIONS.
13. BLOW OFF COVERS TO BE INSTALLED OUTSIDE OF INTERSECTIONS.



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JAMES W. DALLOSTA
No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE – DISTRICT ENERGY – PROMENADE

SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

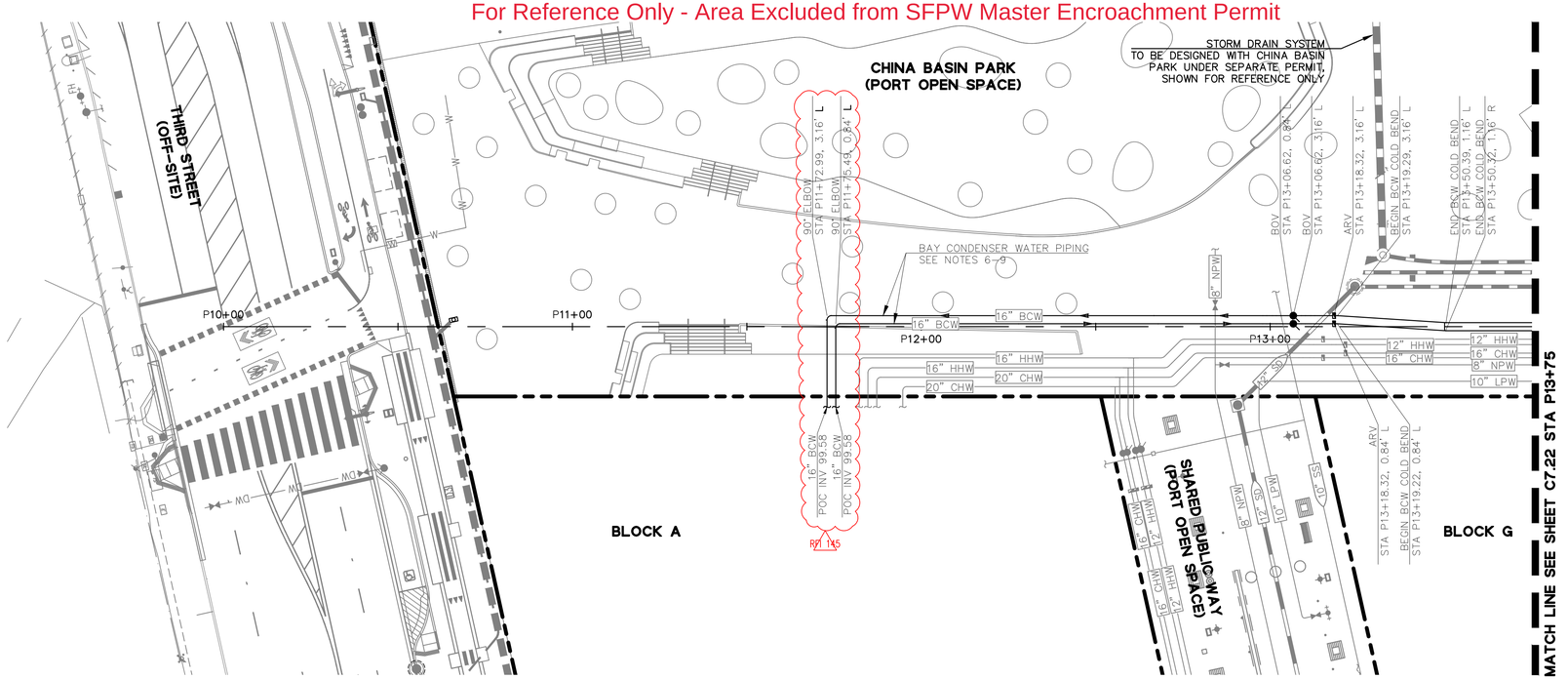
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

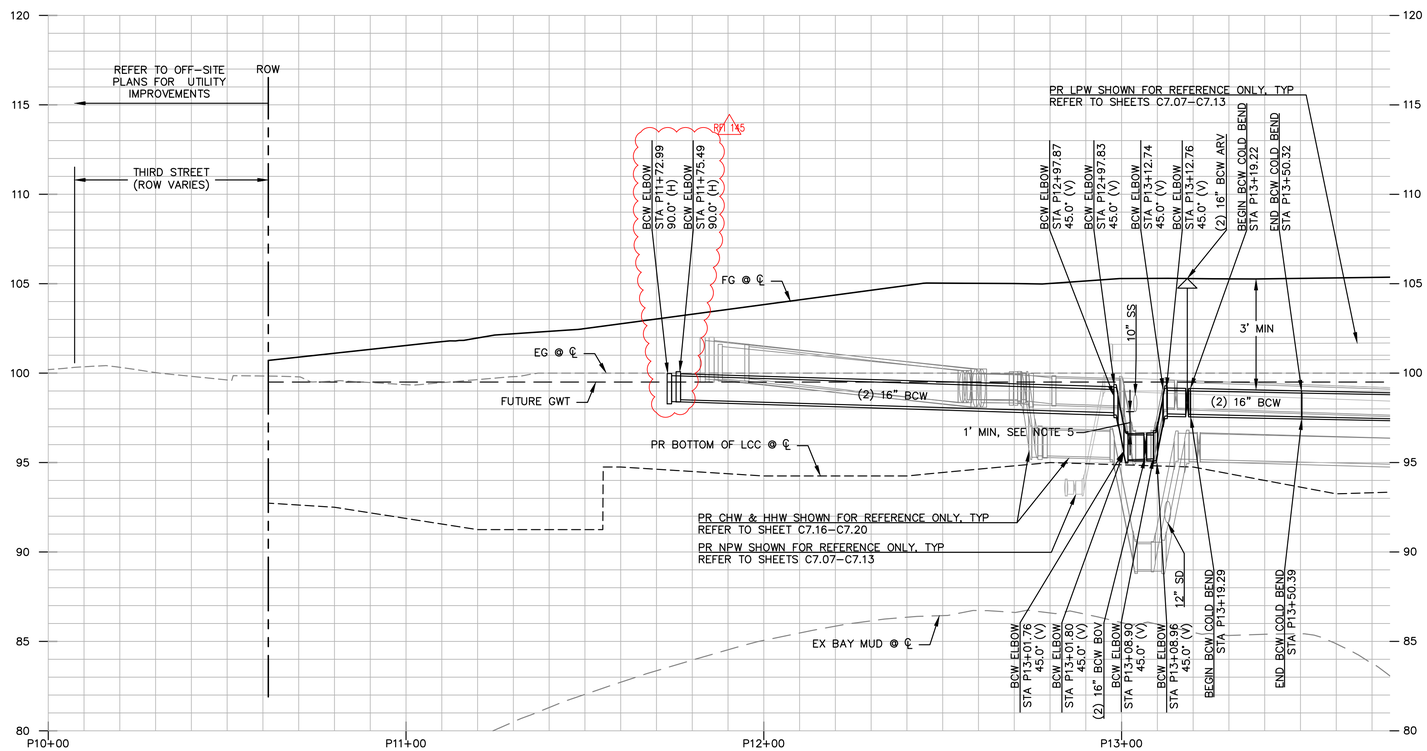
Drawing Number:
C7.20

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0D – DISTRICT ENERGY PLAN.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



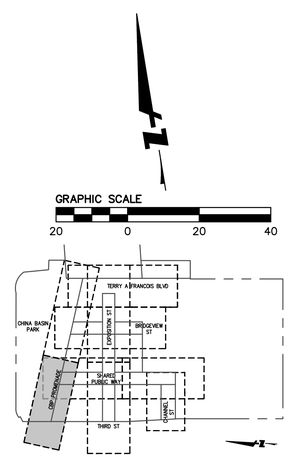
PROMENADE
STATION: P10+00 TO P13+75
PLAN VIEW
SCALE: 1"=20'



PROMENADE
STATION: P10+00 TO P13+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
2. MAIN AND LATERAL PIPE SIZES ARE NOMINAL.
3. JOINT TRENCH SHOWN FOR REFERENCE ONLY. SEE JOINT TRENCH PLANS FOR ADDITIONAL INFORMATION.
4. REFER TO DETAIL 5 ON C9.10 FOR SECTION DETAILS.
5. ALL UTILITY CROSSINGS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE. VERTICAL SEPARATIONS AT CROSSINGS OR WHERE THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN 10' WILL REQUIRE 1' MINIMUM CLEARANCE.
6. BAY CONDENSER WATER PIPING SHALL BE PE4710 DR11 HDPE FUSION-WELDED (ASTM D-3035 AND F2620). INSTALLATION PER MANUFACTURER RECOMMENDATIONS.
7. TO BE INSTALLED AT RISK, DESIGN TO BE CONFIRMED UPON DESIGN OF FUTURE BAY WATER CONDENSER SYSTEM BY OTHERS.
8. BAY CONDENSER WATER DESIGN PARAMETERS PROVIDED BY PAE AND EVERGREEN ON MARCH 23, 2020:
   - FLOW: 4,800 GPM
   - OPERATING PRESSURE: 152 PSI
   - OPERATING TEMPERATURES: 40°-90° F
   - DESIGN PRESSURE: 153 PSIG
   - DESIGN TEMPERATURE: 90° F
   - TEST PRESSURE: 1.3 X DESIGN PRESSURE
9. BAY COOLING WATER TO FOLLOW SAME SPECIFICATIONS AS DISTRICT ENERGY CHILLED WATER. REFER TO SECTION 33 61 05 FOR DISTRICT COOLING CHILLED WATER PIPE SPECIFICATIONS.



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CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE - BAY CONDENSER WATER - PROMENADE
SAN FRANCISCO
SAN FRANCISCO COUNTY
CALIFORNIA

No.	Revisions
	09/13/2024 - RECORD DRAWINGS

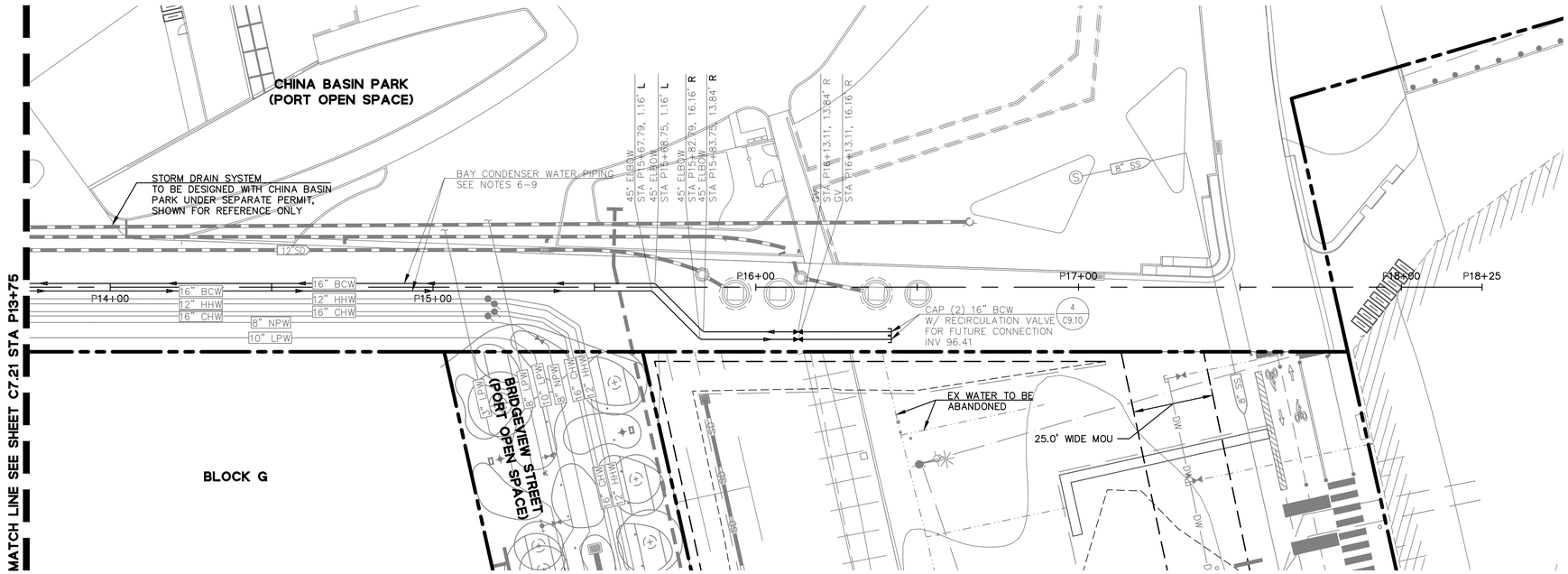
Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.21

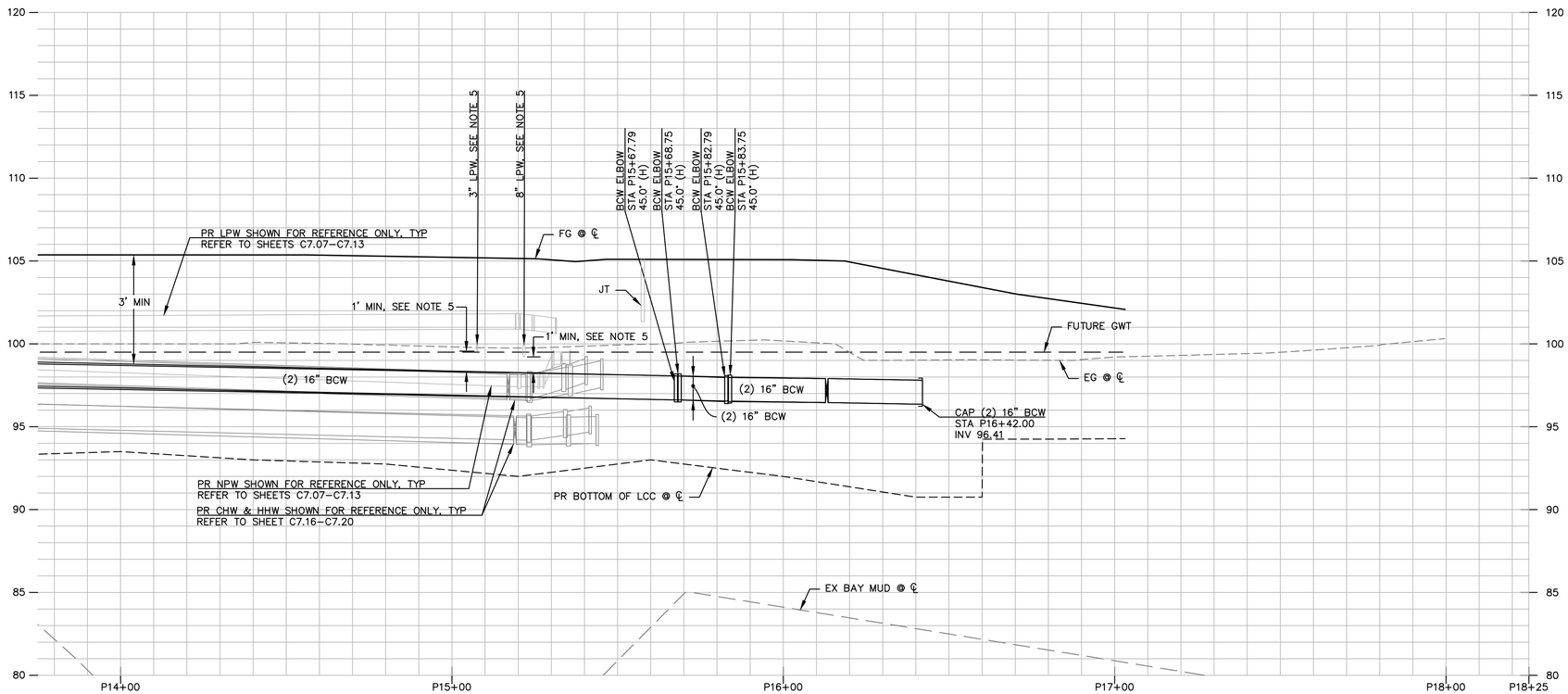
RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0E - BAY CONDENSER WATER PLAN.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra

For Reference Only - Area Excluded from SFPW Master Encroachment Permit



PROMENADE
STATION: P13+75 TO P16+75
PLAN VIEW
SCALE: 1"=20'



PROMENADE
STATION: P13+75 TO P16+75
PROFILE VIEW
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=4'

NOTES:

1. ALL STATIONS AND OFFSETS SHOWN ARE REFERENCED FROM THE STREET CONTROL LINE.
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6. BAY CONDENSER WATER PIPING SHALL BE PE4710 DR11 HDPE FUSION-WELDED (ASTM D-3035 AND F2620). INSTALLATION PER MANUFACTURER RECOMMENDATIONS.
7. TO BE INSTALLED AT RISK, DESIGN TO BE CONFIRMED UPON DESIGN OF FUTURE BAY WATER CONDENSER SYSTEM BY OTHERS.
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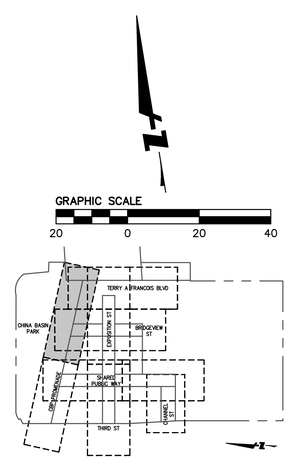
   - OPERATING TEMPERATURES: 40°-90° F
   - DESIGN PRESSURE: 153 PSIG
   - DESIGN TEMPERATURE: 90° F
   - TEST PRESSURE: 1.3 X DESIGN PRESSURE
9. BAY COOLING WATER TO FOLLOW SAME SPECIFICATIONS AS DISTRICT ENERGY CHILLED WATER. REFER TO SECTION 33 61 05 FOR DISTRICT COOLING CHILLED WATER PIPE SPECIFICATIONS.



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REGISTERED PROFESSIONAL ENGINEER
JAMES W. DALLOSTA
No. 72339
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STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
UTILITY PLAN & PROFILE - BAY CONDENSER WATER - PROMENADE
SAN FRANCISCO, CALIFORNIA
SAN FRANCISCO COUNTY

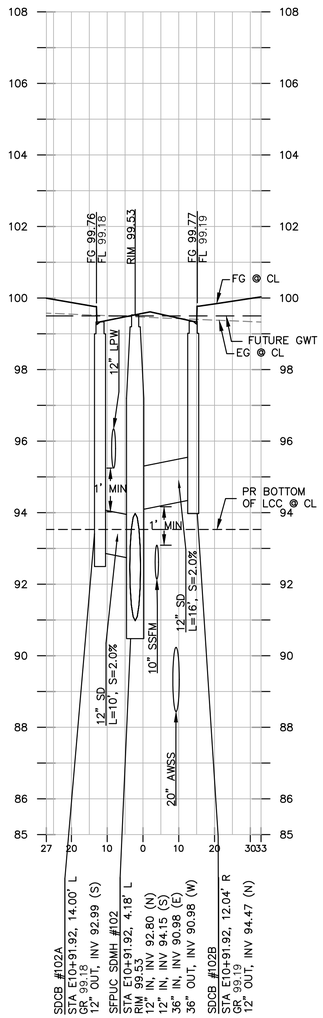
No.	Revisions
	09/13/2024 - RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.22

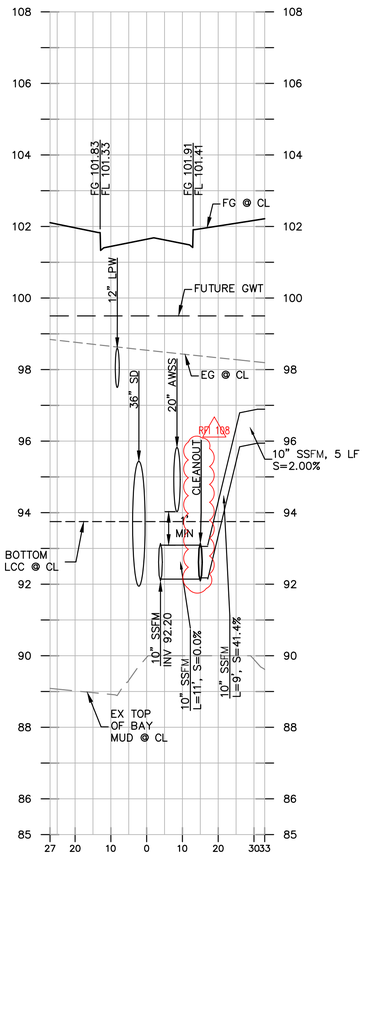
RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0E - BAY CONDENSER WATER PLAN.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



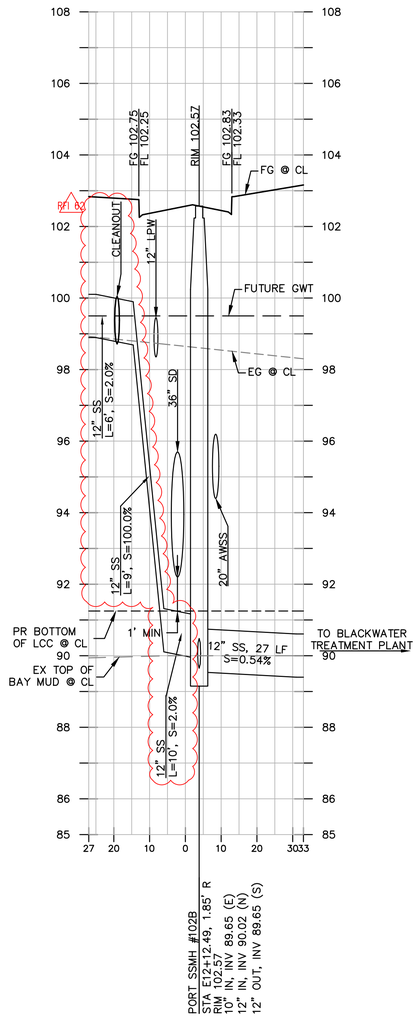
EXPOSITION STREET
STA: E10+91.92

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



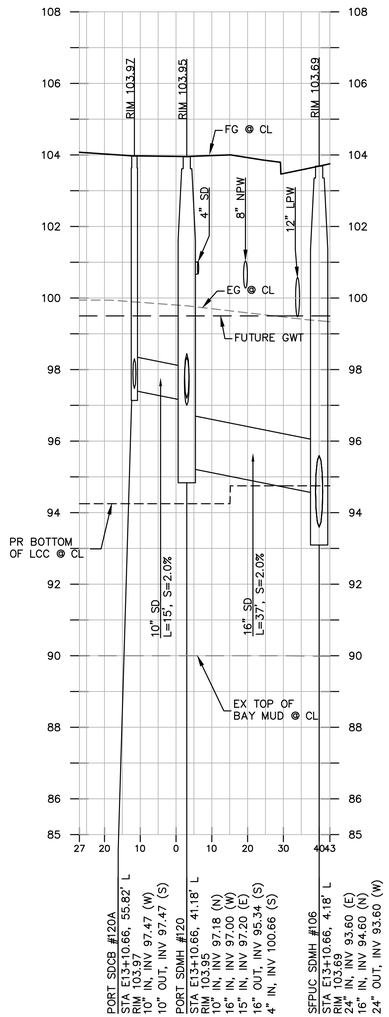
EXPOSITION STREET
STA: E11+91.22

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



EXPOSITION STREET
STA: E12+12.49

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



EXPOSITION STREET
STA: E13+10.66

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'

NOTES:

1. STORM AND SEWER LATERAL SIZES ARE NOMINAL. LATERALS SHALL BE HDPE AND SHALL BE 1 FT MAX FROM THE INVERT OF THE MANHOLE. INSTALLATION PER DETAILS ON SHEET C9.07.
2. ALL STATION AND OFFSETS SHOWN ON THIS SHEET ARE REFERENCED FROM THE CENTERLINE FOR EXPOSITION STREET, SHARED PUBLIC WAY, OR BRIDGEVIEW STREET AS NOTED ON THE SECTION VIEW.
3. VERTICAL SEPARATIONS AT CROSSINGS ARE 1' MINIMUM.
4. SEWER LATERALS SHALL BE INSTALLED WITH WYE CONNECTION PER DETAIL 2 ON C9.07. STORM LATERALS SHALL BE INSTALLED WITH TEE CONNECTION PER DETAIL 9 ON C9.03.
5. SEWER AND STORM DRAIN SUBSURFACE UTILITIES TO MAINTAIN PROPER MINIMUM HORIZONTAL AND VERTICAL SEPARATION FROM CITY-OWNED SEWER AND STORM DRAIN FACILITIES PER 2015 SUBDIVISION REGULATION AND CITY STANDARDS UNLESS APPROVED OTHERWISE BY THE DIRECTOR OF PUBLIC WORKS WITH THE CONSENT OF THE SFPUC.

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REGISTERED PROFESSIONAL ENGINEER
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No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
EXPOSITION STREET LATERAL PROFILES

SAN FRANCISCO COUNTY, CALIFORNIA

SAN FRANCISCO

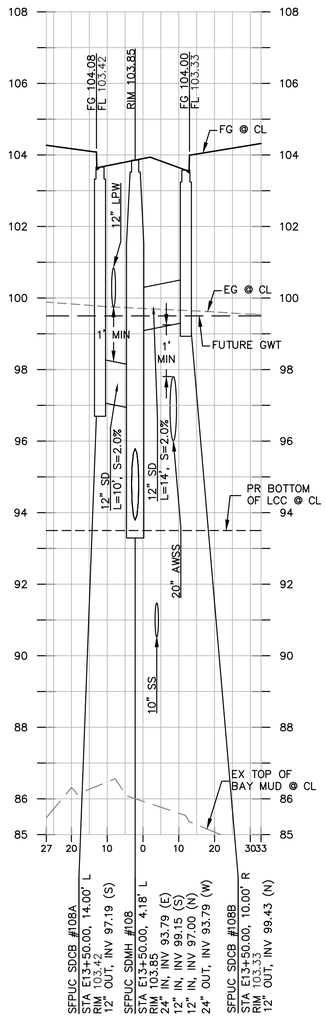
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

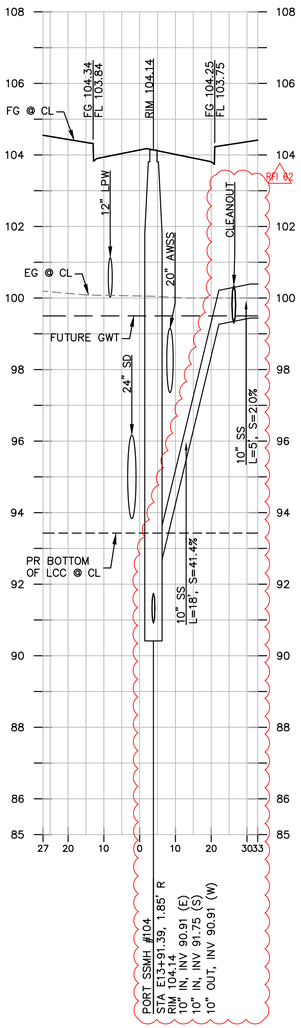
Drawing Number:
C7.23

RECORD DRAWINGS

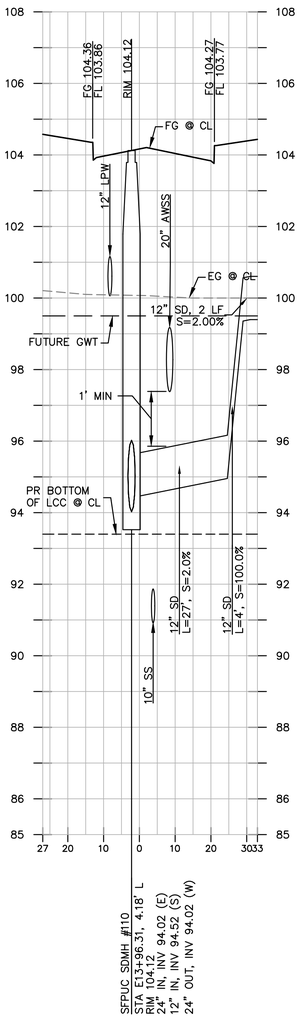
DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0E – LATERAL PROFILES.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



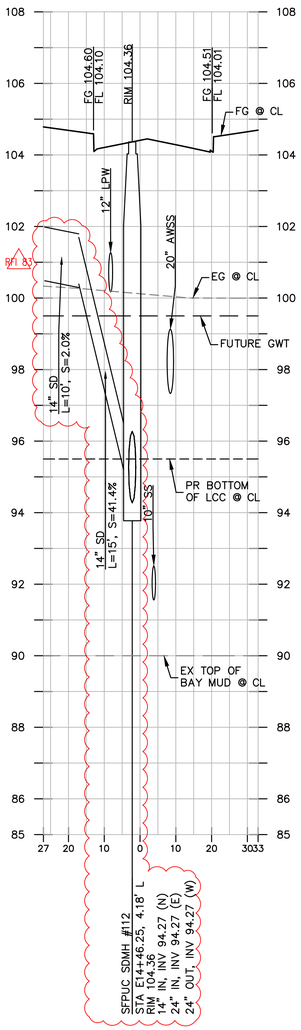
EXPOSITION STREET
STA: E13+50.00
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



EXPOSITION STREET
STA: E13+91.39
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



EXPOSITION STREET
STA: E13+96.31
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



EXPOSITION STREET
STA: E14+46.25
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'

NOTES:

1. STORM AND SEWER LATERAL SIZES ARE NOMINAL. LATERALS SHALL BE HDPE AND SHALL BE 1 FT MAX FROM THE INVERT OF THE MANHOLE. INSTALLATION PER DETAILS ON SHEET C9.07.
2. ALL STATION AND OFFSETS SHOWN ON THIS SHEET ARE REFERENCED FROM THE CENTERLINE FOR EXPOSITION STREET, SHARED PUBLIC WAY, OR BRIDGEVIEW STREET AS NOTED ON THE SECTION VIEW.
3. VERTICAL SEPARATIONS AT CROSSINGS ARE 1' MINIMUM.
4. SEWER LATERALS SHALL BE INSTALLED WITH WYE CONNECTION PER DETAIL 2 ON C9.07. STORM LATERALS SHALL BE INSTALLED WITH TEE CONNECTION PER DETAIL 9 ON C9.03.
5. SEWER AND STORM DRAIN SUBSURFACE UTILITIES TO MAINTAIN PROPER MINIMUM HORIZONTAL AND VERTICAL SEPARATION FROM CITY-OWNED SEWER AND STORM DRAIN FACILITIES PER 2015 SUBDIVISION REGULATION AND CITY STANDARDS UNLESS APPROVED OTHERWISE BY THE DIRECTOR OF PUBLIC WORKS WITH THE CONSENT OF THE SFPUC.

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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
EXPOSITION STREET LATERAL PROFILES

SAN FRANCISCO COUNTY
CALIFORNIA

SAN FRANCISCO

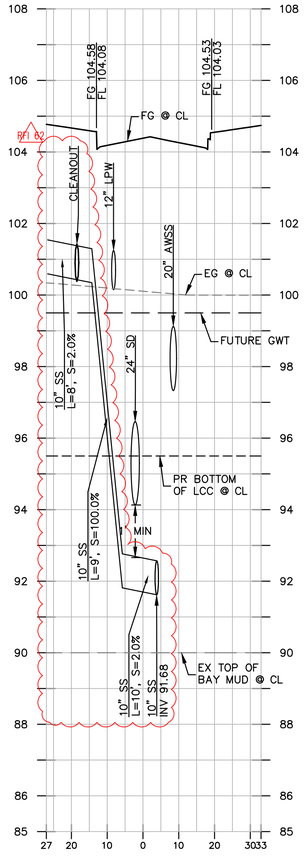
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

Drawing Number:
C7.24

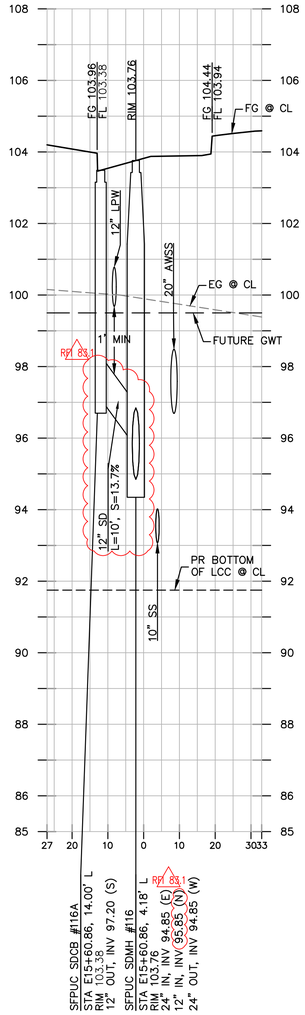
RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0E – LATERAL PROFILES.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



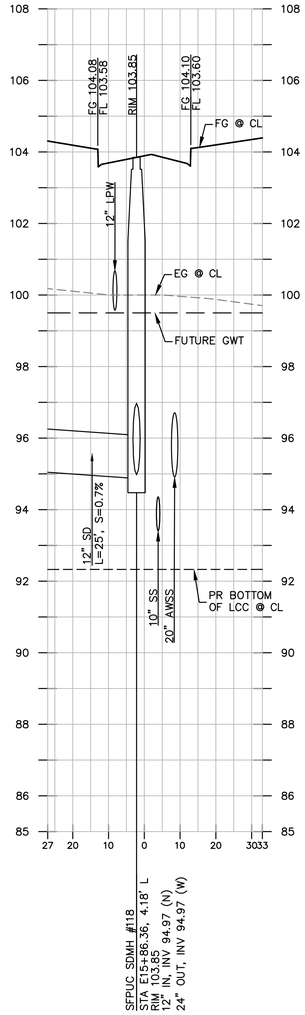
EXPOSITION STREET
STA: E14+51.20

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



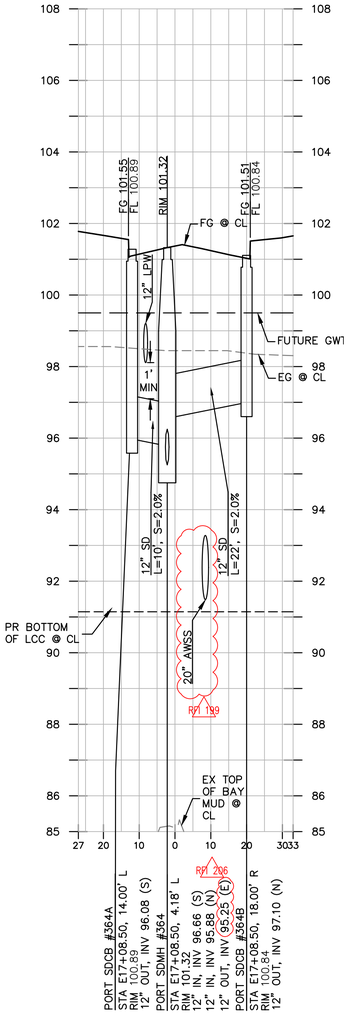
EXPOSITION STREET
STA: E15+60.86

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



EXPOSITION STREET
STA: E15+86.36

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



EXPOSITION STREET
STA: E17+08.50

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'

NOTES:

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JAMES K. DALLOSTA
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STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
EXPOSITION STREET LATERAL PROFILES

SAN FRANCISCO COUNTY, CALIFORNIA
SAN FRANCISCO

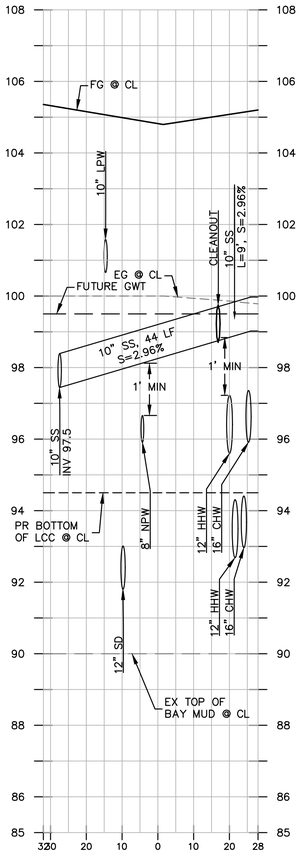
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

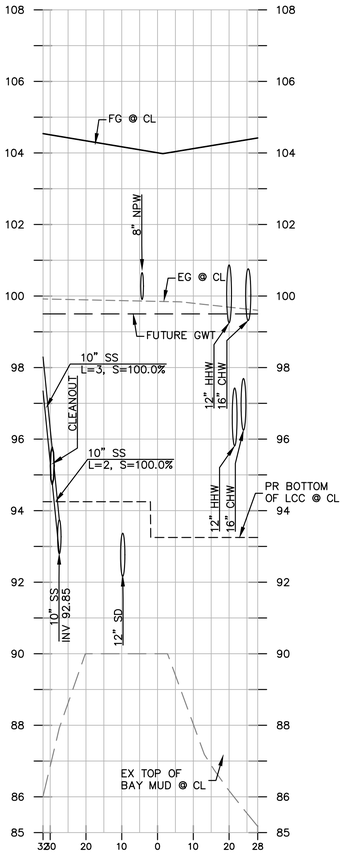
Drawing Number:
C7.25

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0E - LATERAL PROFILES.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



SHARED PUBLIC WAY
STA: S20+85.93
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



SHARED PUBLIC WAY
STA: S22+05.40
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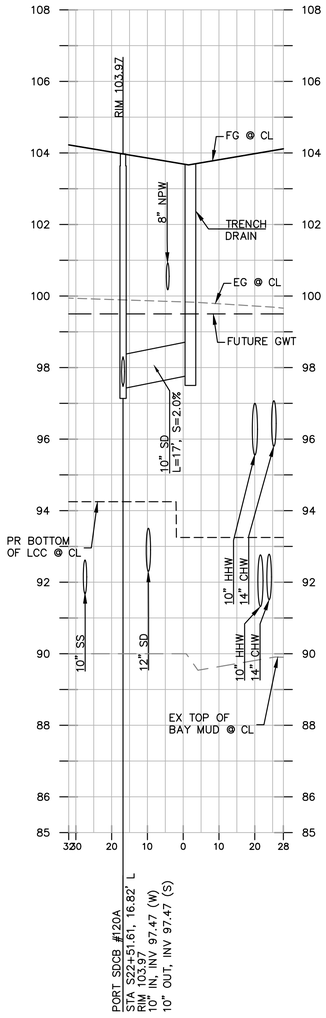
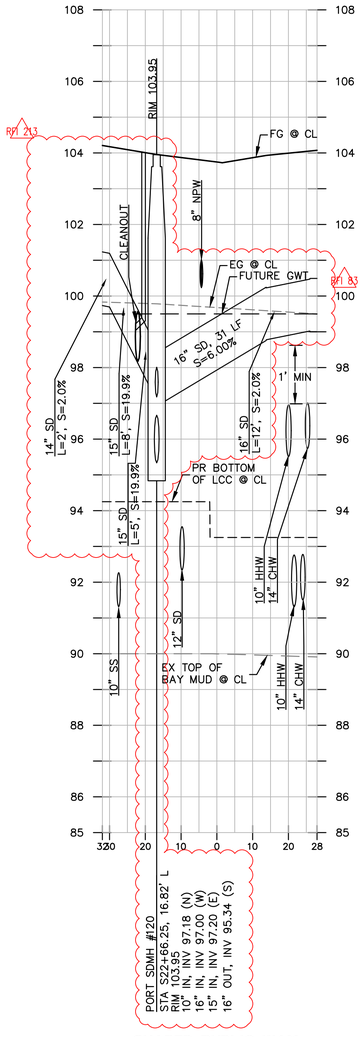
VERTICAL SCALE: 1"=2'



SHARED PUBLIC WAY
STA: S22+51.61
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



SHARED PUBLIC WAY
STA: S22+66.25
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'

NOTES:

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REGISTERED PROFESSIONAL ENGINEER
JAMES W. DALLOSTA
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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
SHARED PUBLIC WAY LATERAL PROFILES
SAN FRANCISCO COUNTY CALIFORNIA
SAN FRANCISCO

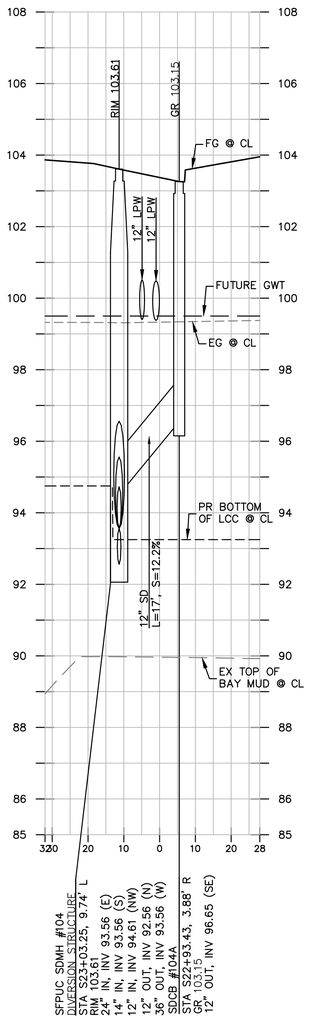
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

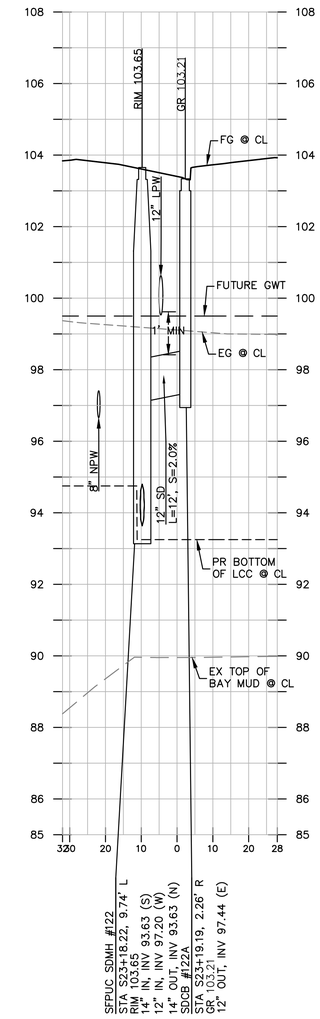
Drawing Number:
C7.26

RECORD DRAWINGS

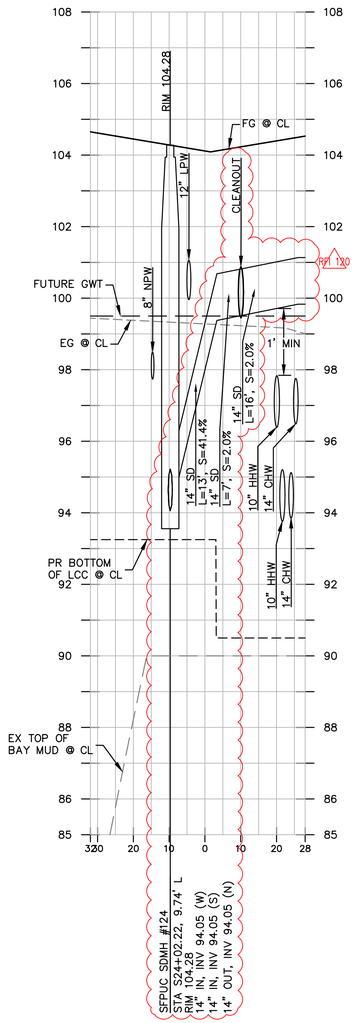
DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0E - LATERAL PROFILES.dwg
PLOT DATE: 09-03-24 PLOTTED BY: arra



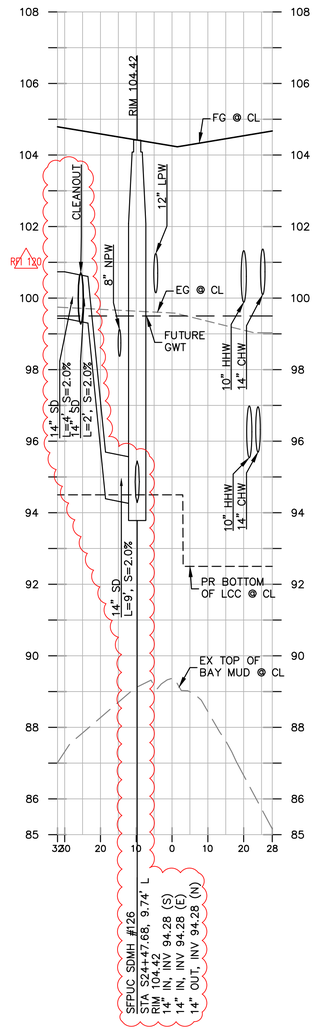
SHARED PUBLIC WAY
STA: S23+03.25
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



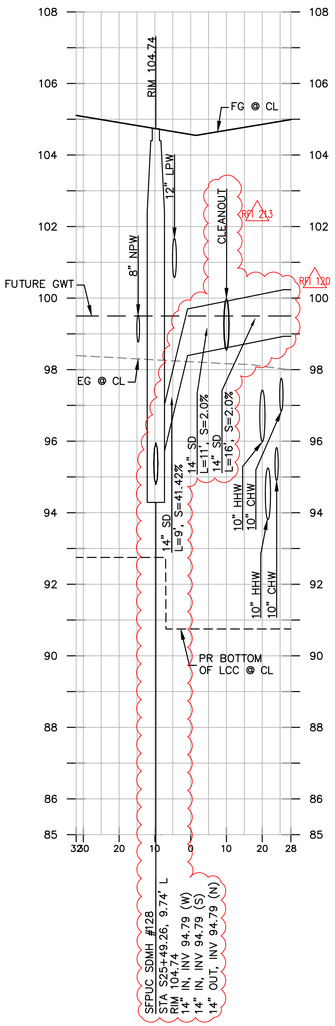
SHARED PUBLIC WAY
STA: S23+18.22
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



SHARED PUBLIC WAY
STA: S24+02.22
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



SHARED PUBLIC WAY
STA: S24+47.68
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



SHARED PUBLIC WAY
STA: S25+49.26
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'

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STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
SHARED PUBLIC WAY LATERAL PROFILES

SAN FRANCISCO COUNTY CALIFORNIA

SAN FRANCISCO

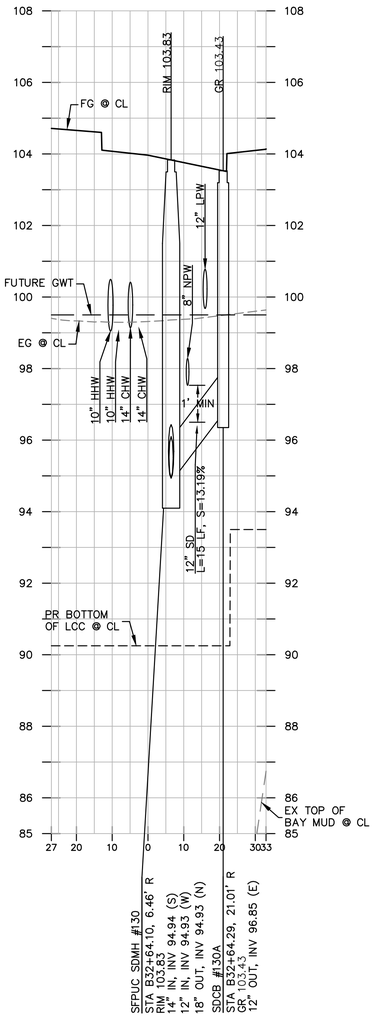
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

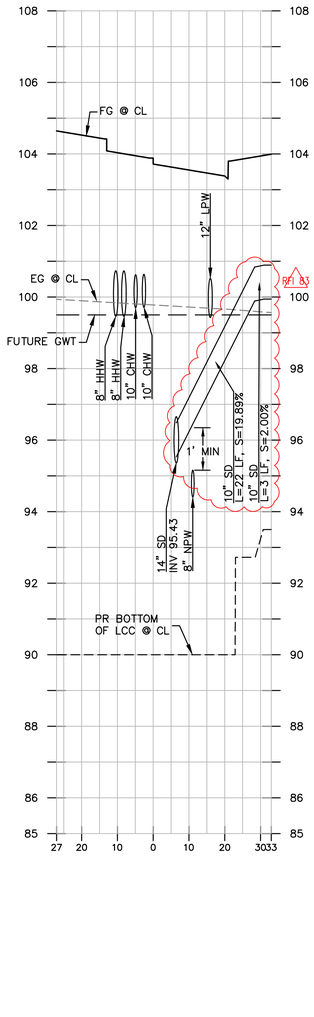
Drawing Number:
C7.27

RECORD DRAWINGS

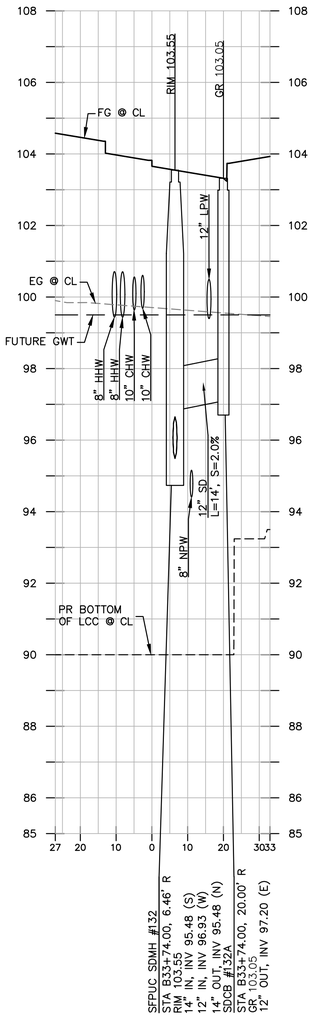
DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0E - LATERAL PROFILES.dwg
PLOT DATE: 09-03-24 PLOTTED BY: arra



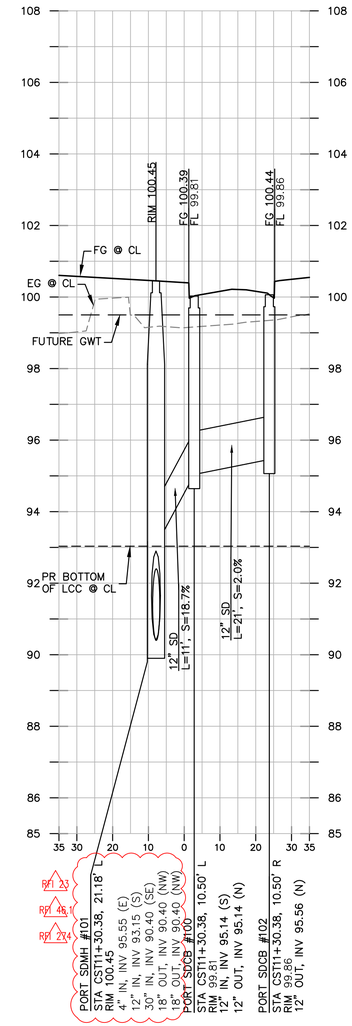
BRIDGEVIEW STREET
STA: B32+64.10
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



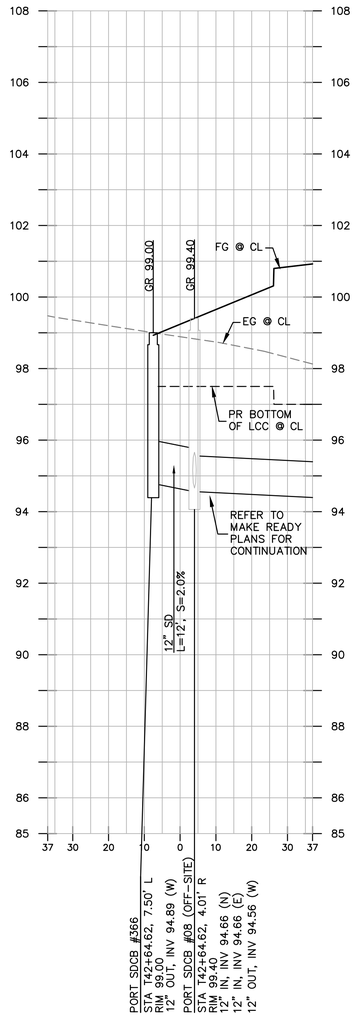
BRIDGEVIEW STREET
STA: B33+62.09
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



BRIDGEVIEW STREET
STA: B33+74.00
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



CHANNEL STREET
STA: CST11+30.38
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'



TERRY A FRANCOIS BLVD
STA: T42+64.62
HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=2'

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JAMES W. DALLOSTA
No. 72339
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STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
BRIDGEVIEW STREET, CHANNEL STREET & TFB LATERAL PROFILES
SAN FRANCISCO COUNTY CALIFORNIA
SAN FRANCISCO

No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.28

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.0E - LATERAL PROFILES.dwg
PLOT DATE: 09-03-24 PLOTTED BY: arra

SAN FRANCISCO BAY
PIER 48
CHANNEL WHARF
TERRY A FRANCOIS BLVD
FUTURE R/W
CHINA BASIN PARK (PORT OPEN SPACE)
FUTURE BLOCK K
FUTURE BLOCK J
BRIDGEVIEW STREET
BRIDGEVIEW STREET
(PORT OPEN SPACE)
CHINA BASIN
BLOCK G
BLOCK F
SHARED PUBLIC WAY (PORT OPEN SPACE)
SHARED PUBLIC WAY
BLOCK A
BLOCK B
CHANNEL STREET (PORT OPEN SPACE)
EXPOSITION STREET
THIRD STREET
CHANNEL

P18+00 P18+25 P17+00 P16+00 P15+00 P14+00 P13+00 P12+00 P11+00 P10+00

B30+00 B31+00 B32+00 B33+00 B34+00 B35+00 B36+00 B37+00 B38+00

S20+00 S21+00 S22+00 S23+00 S24+00 S25+00 S26+00 S27+00 S28+00 S29+00

2 C7.29 FUTURE BLOCK K LATERALS

1 C7.29 BLOCK F LATERALS

2 C7.29 FUTURE BLOCK J LATERALS

2" MRU TELECOM STA B31+68.50
2" MRU TELECOM STA B31+72.66

(4) 2" MRU TELECOM STA B33+29.49
2" MRU TELECOM STA B33+62.83
2" MRU TELECOM STA B33+67.00

CAP (2) 2" MRU TELECOM CONDUIT FOR FUTURE CONDUIT EXTENSION STA B34+20.97

(4) 2" MRU TELECOM STA S22+14.13
STA S22+15.68
STA S22+17.22
STA S22+18.77

1 C7.29 BLOCK G LATERALS

1 C7.29 BLOCK B LATERALS

CAP (2) 2" MRU TELECOM CONDUIT FOR FUTURE CONDUIT EXTENSION STA S26+23.05

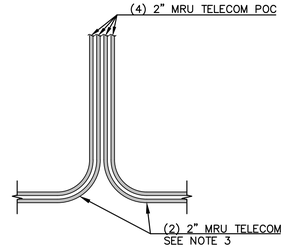
(4) 2" MRU TELECOM STA S24+59.35

1 C7.29 BLOCK A LATERALS

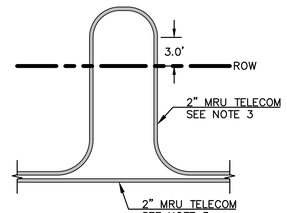
(4) 2" TO SECURITY OPERATIONS CENTER (SOC)
STA P11+57.52
STA P11+58.86
STA P11+60.19
STA P11+61.52

NOTES:

1. ALL STATIONS ARE REFERENCED FROM THE STREET CONTROL LINE.
2. REFER TO DETAIL 1 ON C9.10 FOR TYPICAL DISTRIBUTION CROSS SECTION.
3. ALL CONDUIT SHALL BE DURA-LINE FUTURE PATH 14/10 MM X7 STANDARD HDPE. REFER TO STANDARD SPECIFICATIONS FOR MATERIALS AND INSTALLATION METHODS.



1 TYPICAL BUILDING CONNECTION DETAIL



2 FUTURE BLOCK J & K DETAIL

GRAPHIC SCALE
40 0 40 80

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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
MRU TELECOM CONDUIT PLAN

SAN FRANCISCO COUNTY CALIFORNIA

SAN FRANCISCO

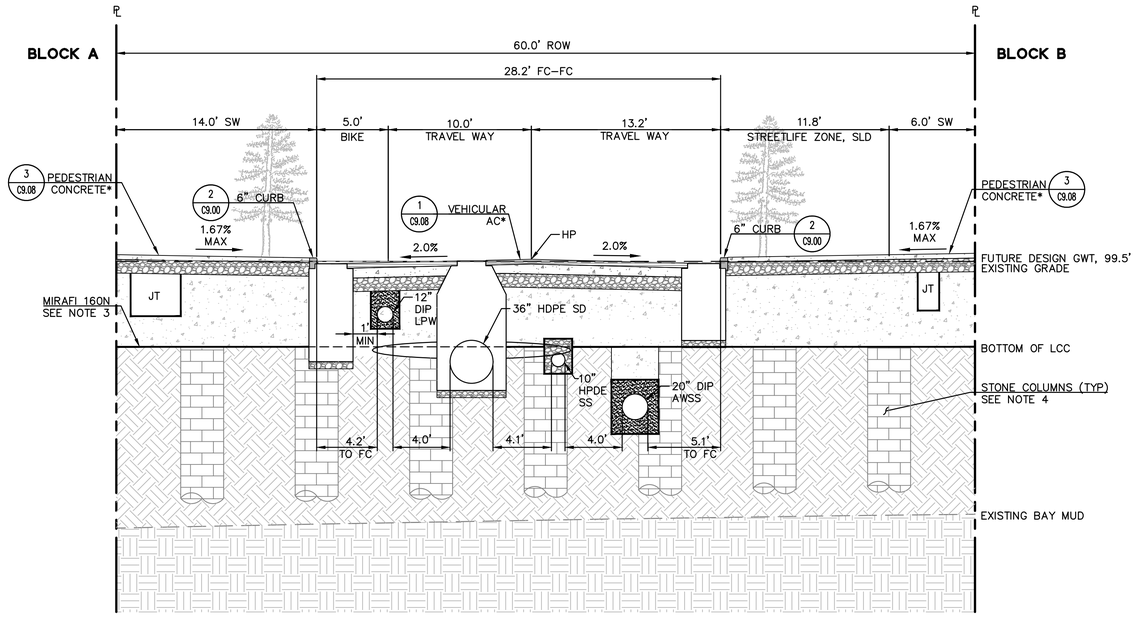
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C7.29

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C7.00 - COMPOSITE UTILITY PLAN.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra

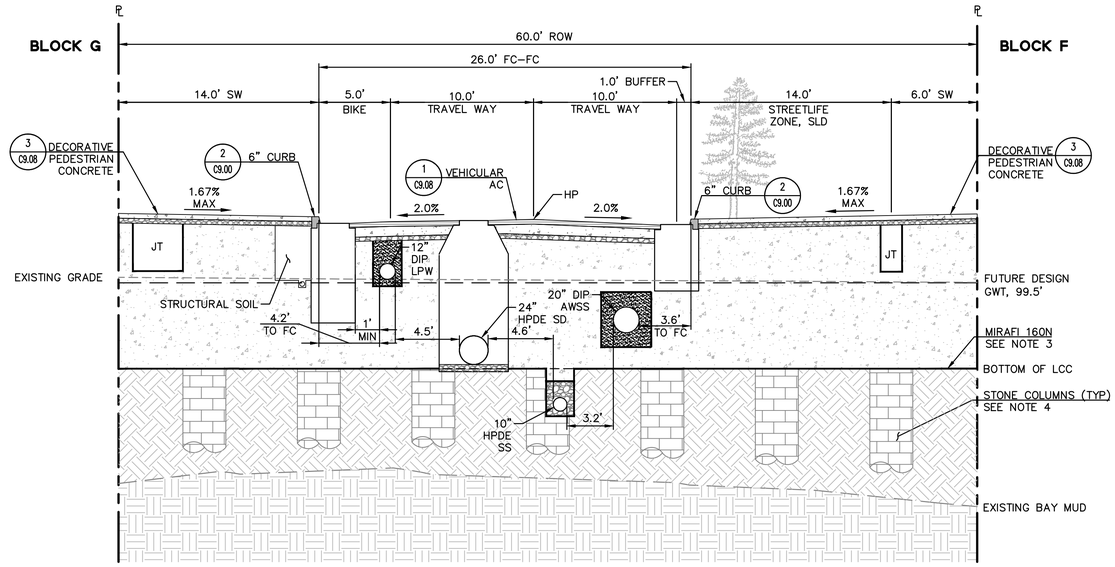


*THICKNESS OF AGGREGATE BASE TRANSITIONS FROM 16" AT STA E10+87 TO 4" AT STA E11+00.

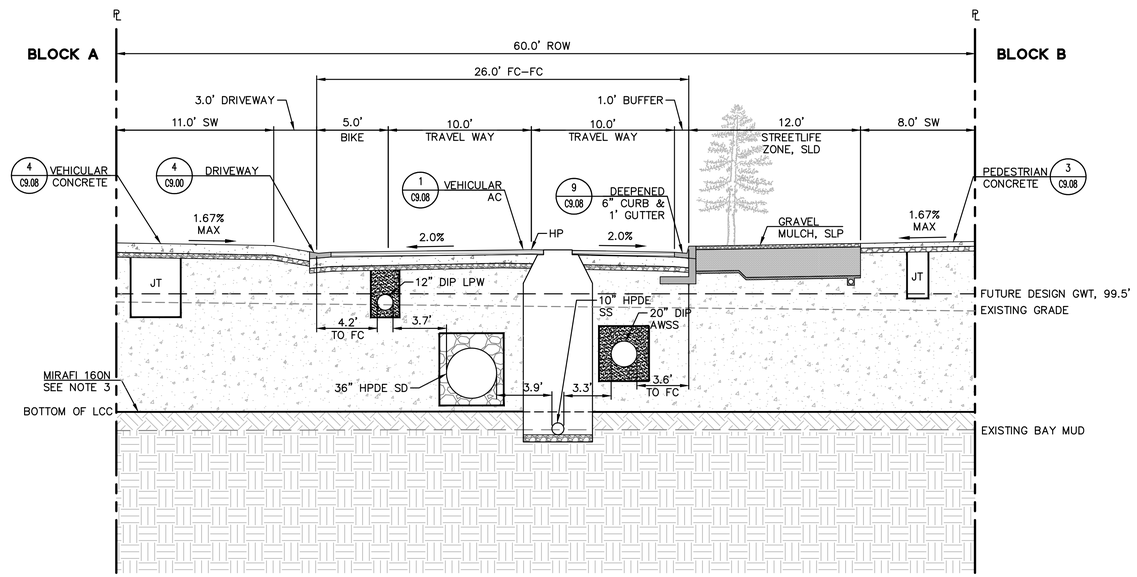
1 / – EXPOSITION STREET
NTS

NOTES:

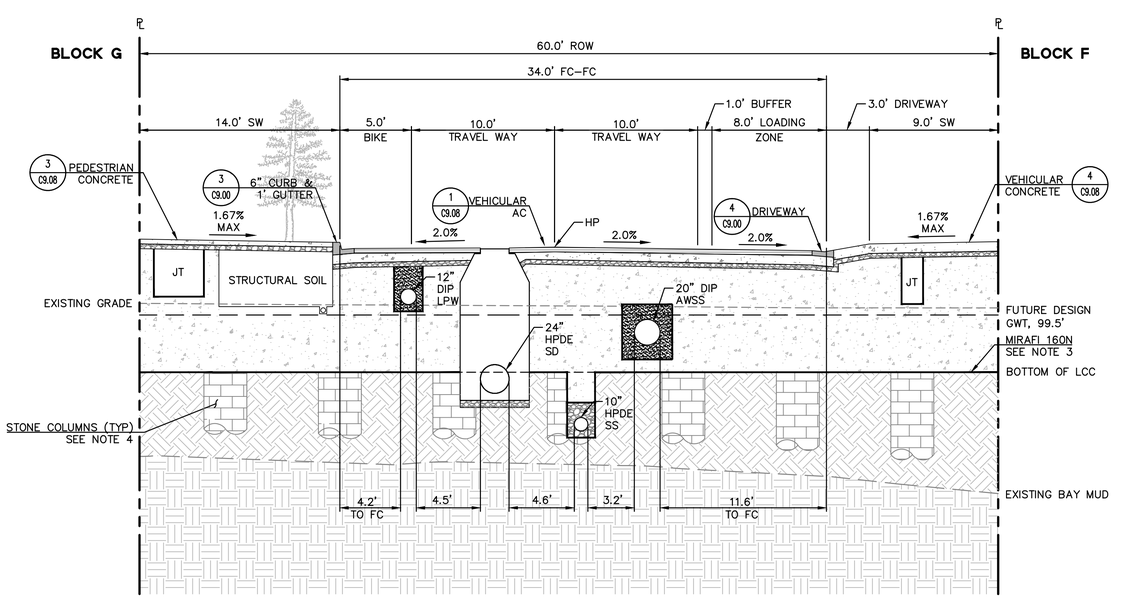
1. TYPICAL TRENCH SECTION FOR UTILITIES SHOWN HERE FOR REFERENCE. REFER TO TRENCH SECTION DETAILS FOR PIPE BEDDING AND BACKFILL REQUIREMENTS, INCLUDING:
   - DETAIL 8 ON C9.03 FOR SD
   - DETAIL 6 ON C9.07 FOR SS
   - DETAIL 4 ON C9.11 FOR LPW
   - DETAIL 2 ON C9.18 FOR AWSS
   - DETAIL 3 ON C9.04 FOR NPW
2. STONE COLUMNS IN CONFLICT WITH UTILITIES SHALL BE REMOVED TO FACILITATE UTILITY INSTALLATION. STONE COLUMNS TO CONSIST OF DENSE GRAVEL AND SHALL BE EXCAVATED THROUGH AS NECESSARY. CARE SHOULD BE TAKEN TO MINIMIZE DISTURBANCE TO STONE COLUMNS THAT ARE TO REMAIN BELOW UTILITY TRENCHES AND MANHOLES.
3. MIRAFI 160N TO BE INSTALLED AT THE BOTTOM OF LCC.
4. STONE COLUMNS SHOWN FOR REFERENCE ONLY AND WILL BE CONSTRUCTED UNDER A SEPARATE PORT PERMIT.



3 / – EXPOSITION STREET
NTS



2 / – EXPOSITION STREET
NTS



4 / – EXPOSITION STREET
NTS

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REGISTERED PROFESSIONAL ENGINEER JAMES W. DALLOSTA No. 72339 CIVIL STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
ROAD AND UTILITY SECTIONS

SAN FRANCISCO COUNTY, CALIFORNIA

SAN FRANCISCO

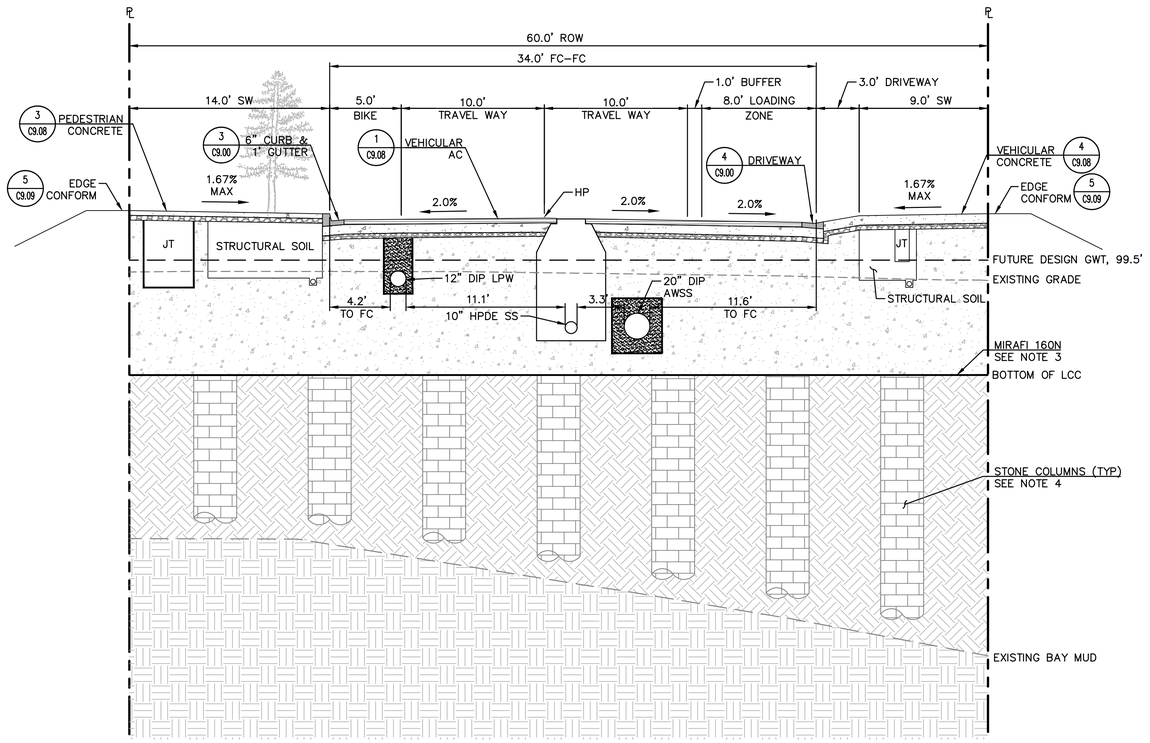
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

Drawing Number:
C8.00

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C8.00 – ROAD AND UTILITY SECTIONS.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



5 – **EXPOSITION STREET**
NTS

NOTES:

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   - DETAIL 8 ON C9.03 FOR SD
   - DETAIL 6 ON C9.07 FOR SS
   - DETAIL 4 ON C9.11 FOR LPW
   - DETAIL 2 ON C9.18 FOR AWSS
   - DETAIL 3 ON C9.04 FOR NPW
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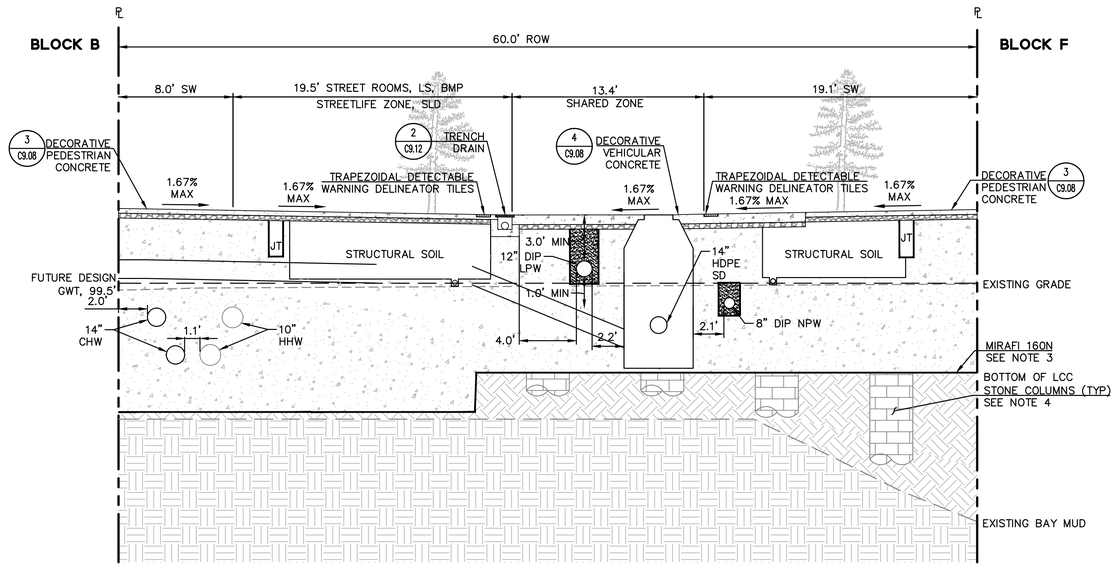
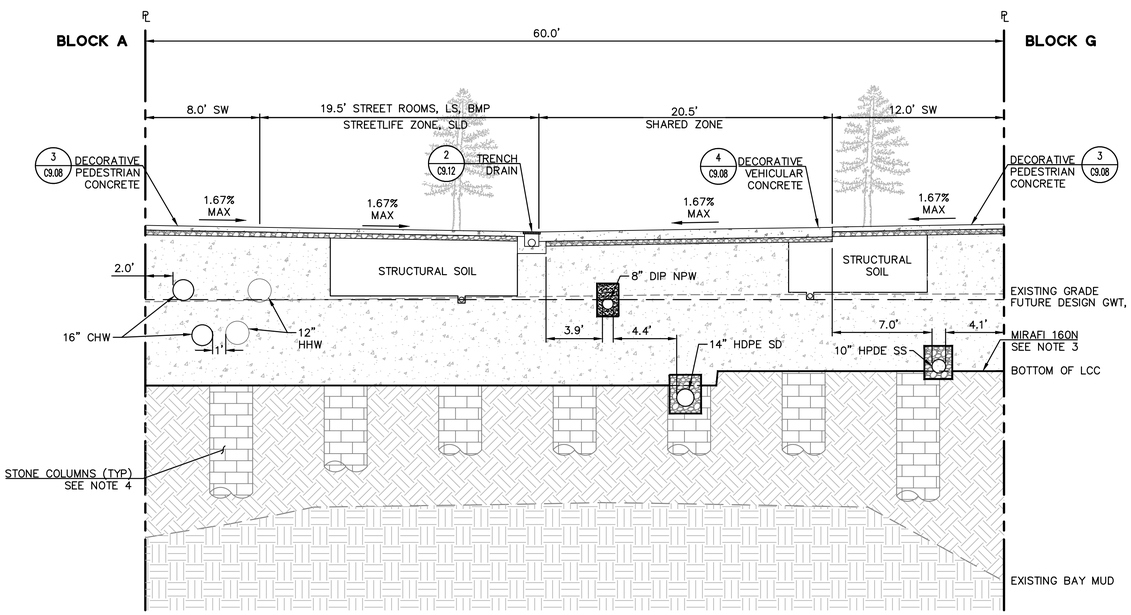
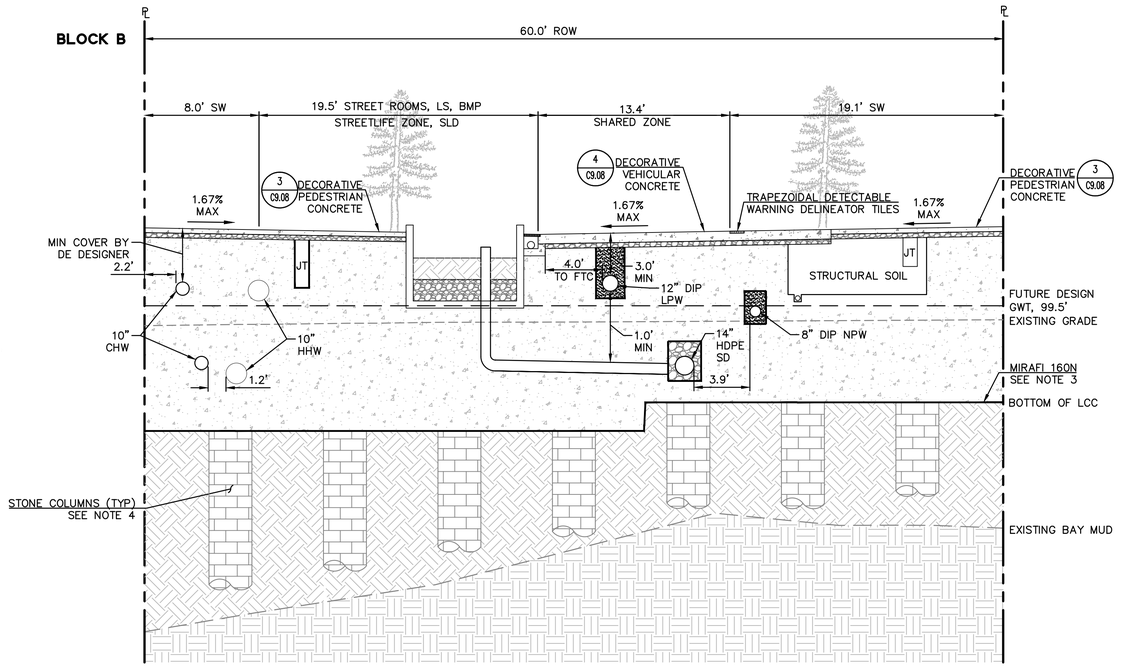
3. MIRAFI 160N TO BE INSTALLED AT THE BOTTOM OF LCC.
4. STONE COLUMNS SHOWN FOR REFERENCE ONLY AND WILL BE CONSTRUCTED UNDER A SEPARATE PORT PERMIT.



7 – **SHARED PUBLIC WAY**
NTS



6 – **SHARED PUBLIC WAY (PORT OPEN SPACE)**
NTS



8 – **SHARED PUBLIC WAY**
NTS

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REGISTERED PROFESSIONAL ENGINEER JAMES W. DALLOSTA No. 72339 CIVIL STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
ROAD AND UTILITY SECTIONS

SAN FRANCISCO COUNTY, CALIFORNIA

SAN FRANCISCO

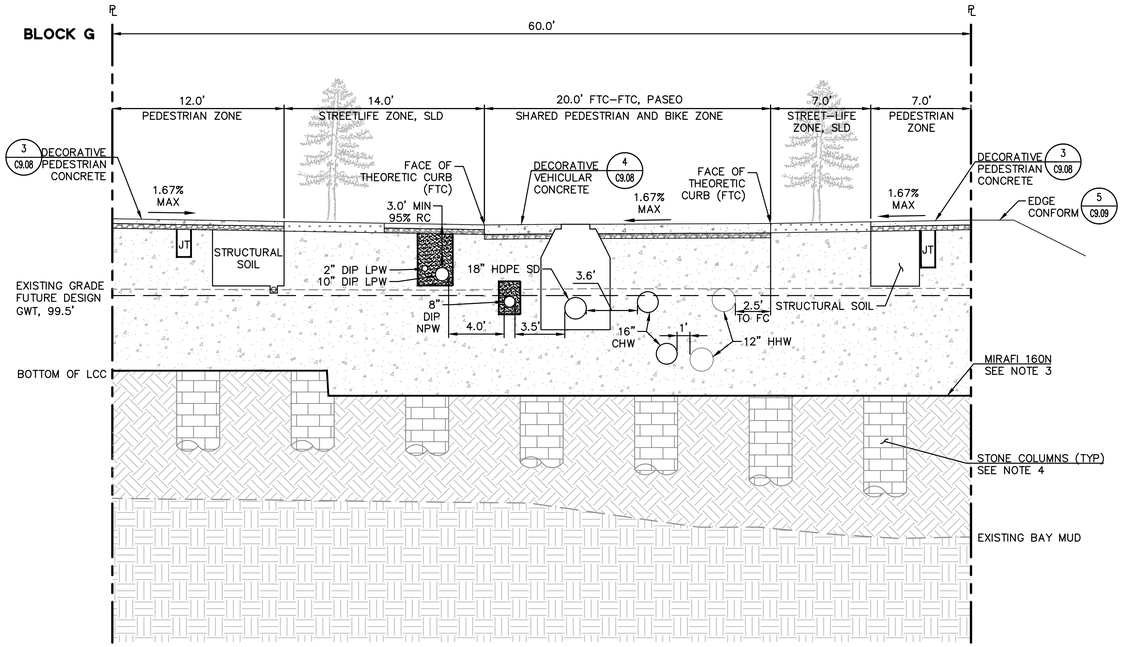
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

Drawing Number:
C8.01

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C8.00 – ROAD AND UTILITY SECTIONS.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



9 – **BRIDGEVIEW STREET (PORT OPEN SPACE)**
NTS

NOTES:

1. TYPICAL TRENCH SECTION FOR UTILITIES SHOWN HERE FOR REFERENCE. REFER TO TRENCH SECTION DETAILS FOR PIPE BEDDING AND BACKFILL REQUIREMENTS, INCLUDING:
   - DETAIL 8 ON C9.03 FOR SD
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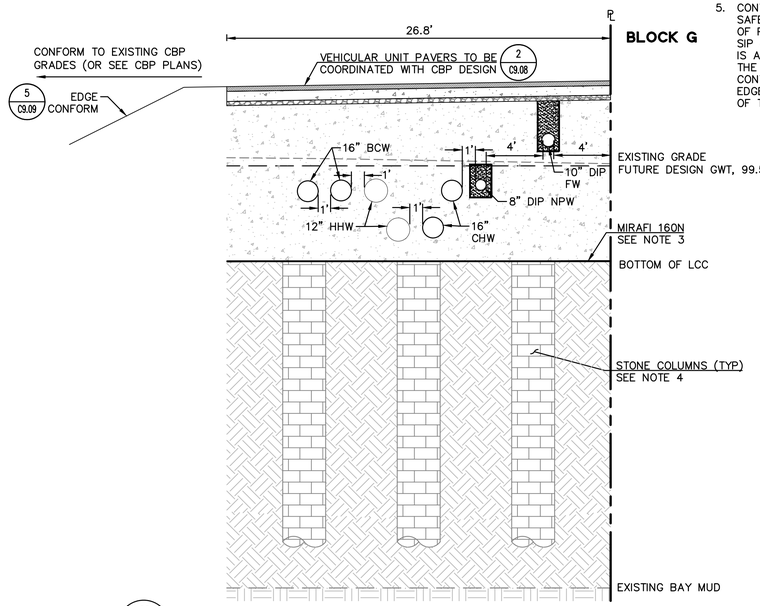
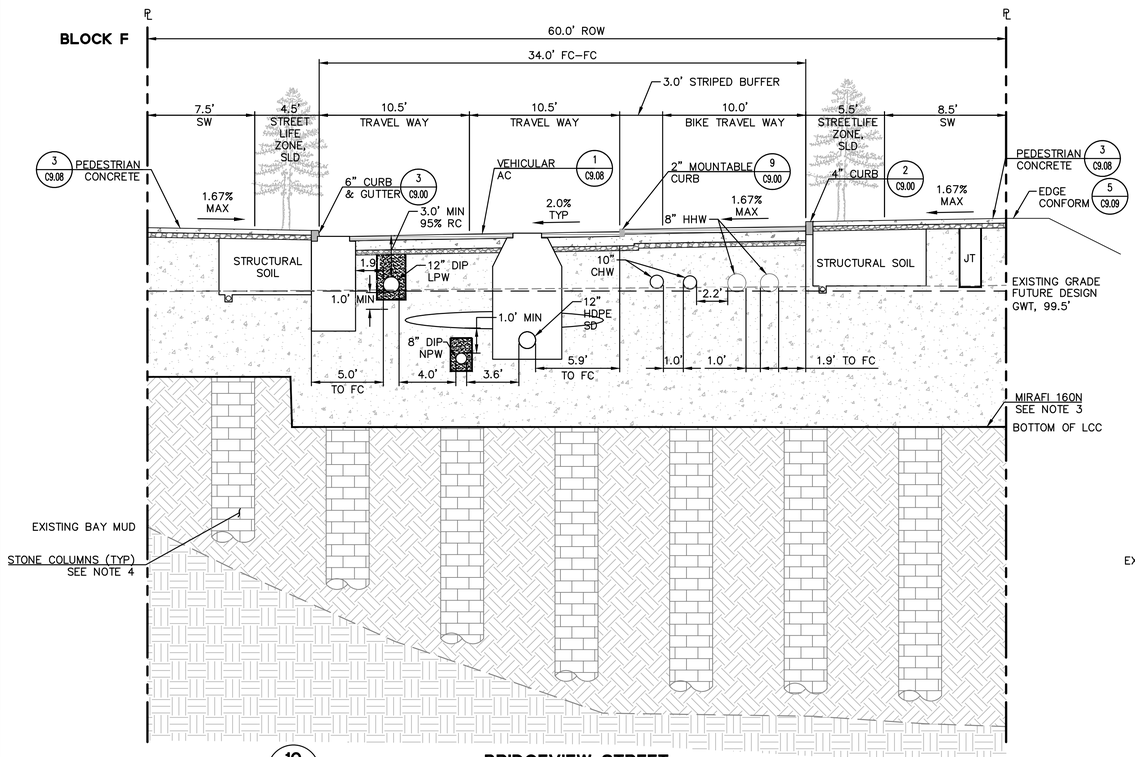
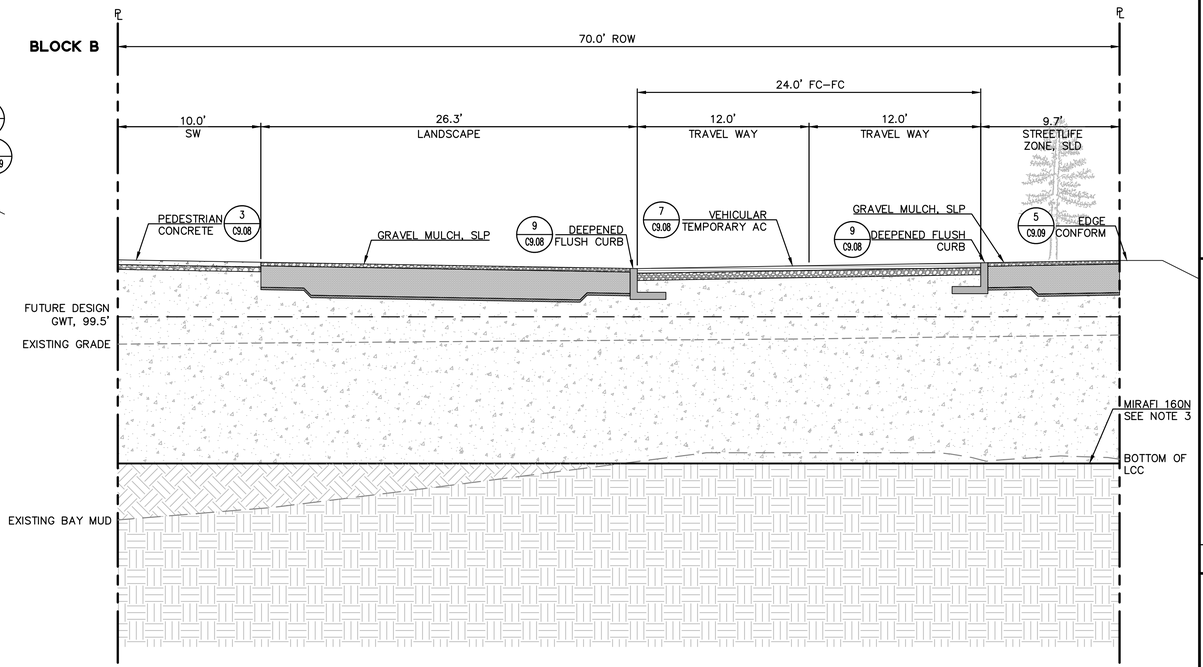


11 – **PROMENADE SECTION**
NTS



10 – **BRIDGEVIEW STREET**
NTS



12 – **CHANNEL STREET (PORT OPEN SPACE)**
NTS

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REGISTERED PROFESSIONAL ENGINEER, JAMES W. DALLOSTA, No. 72339, CIVIL, STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
ROAD AND UTILITY SECTIONS
SAN FRANCISCO COUNTY CALIFORNIA
SAN FRANCISCO

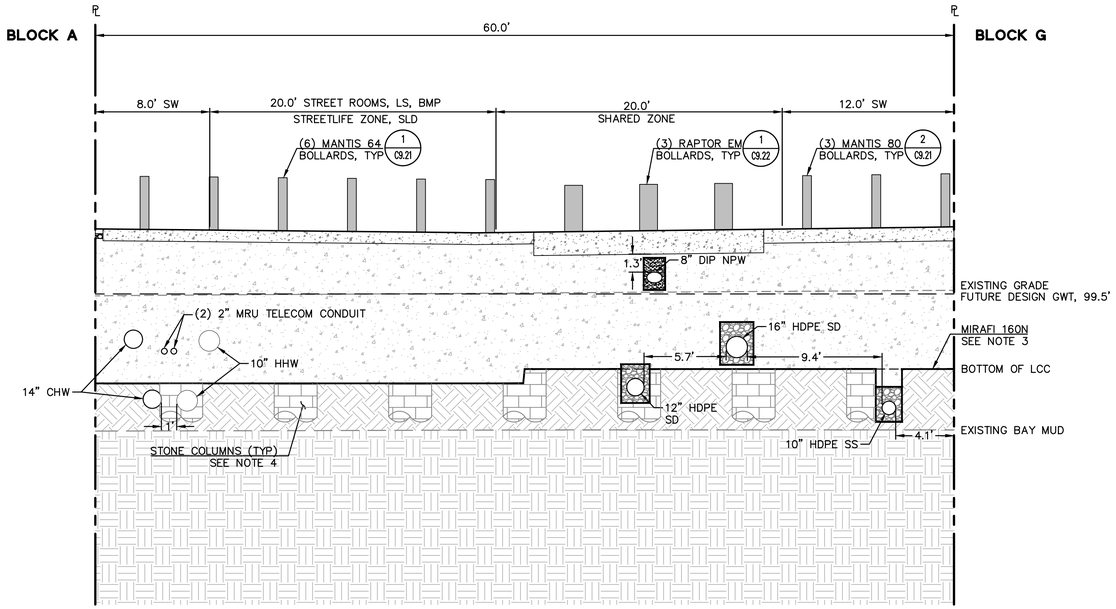
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

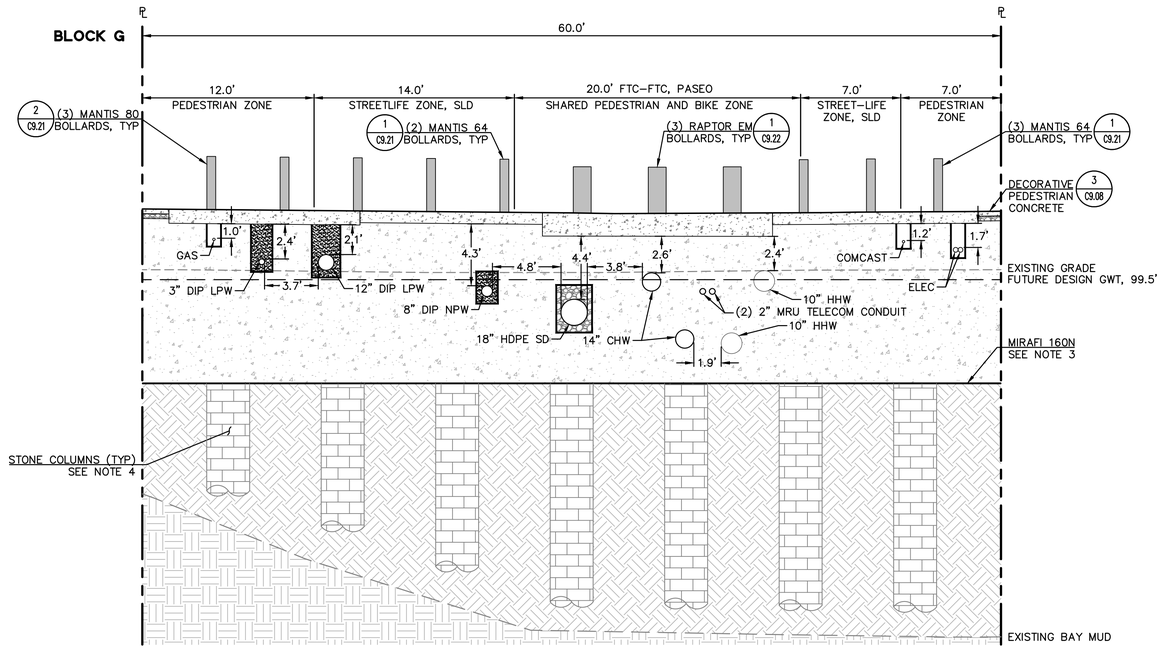
Drawing Number:
C8.02

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C8.00 – ROAD AND UTILITY SECTIONS.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



13 – **SHARED PUBLIC WAY (PORT OPEN SPACE)**
NTS



14 – **BRIDGEVIEW STREET (PORT OPEN SPACE)**
NTS

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REGISTERED PROFESSIONAL ENGINEER, JAMES W. DALLOSTA, No. 72339, CIVIL, STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
ROAD AND UTILITY SECTIONS

SAN FRANCISCO COUNTY, CALIFORNIA

SAN FRANCISCO

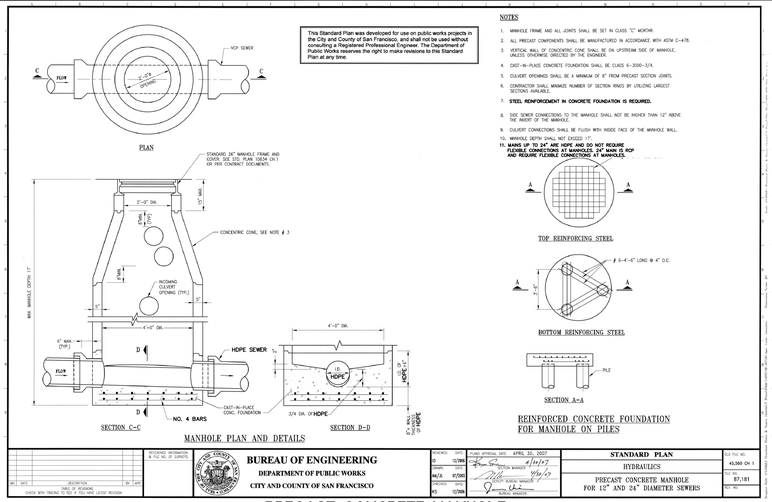
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

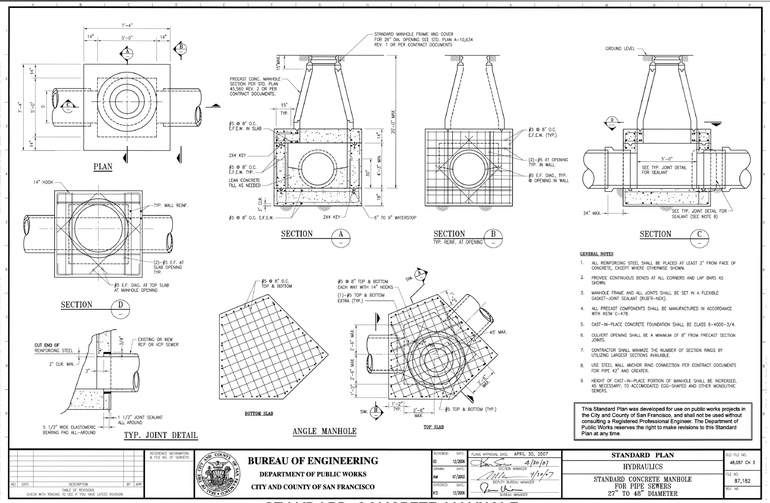
Drawing Number:
C8.03

RECORD DRAWINGS

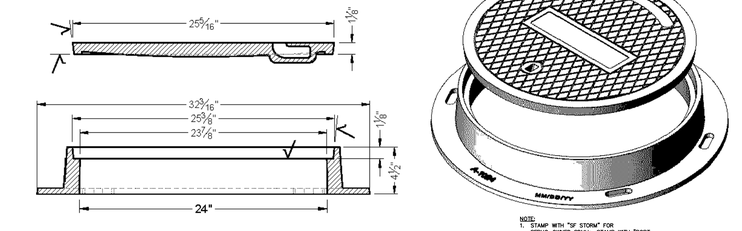
DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C8.00 – ROAD AND UTILITY SECTIONS.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



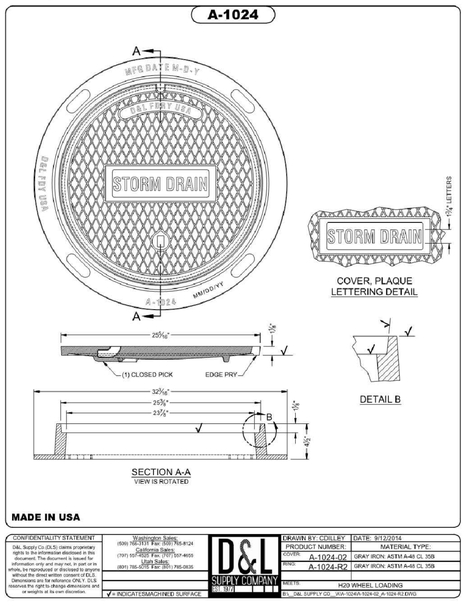
1 PRECAST CONCRETE MANHOLE FOR 12" AND 24" DIAMETER SEWERS
NTS



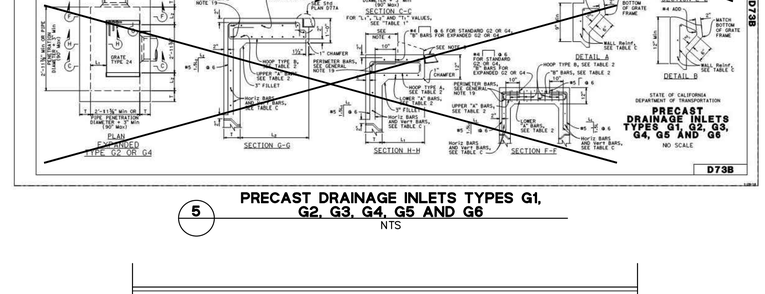
2 STANDARD CONCRETE MANHOLE FOR PIPE SEWERS 27" TO 48" DIAMETER
NTS



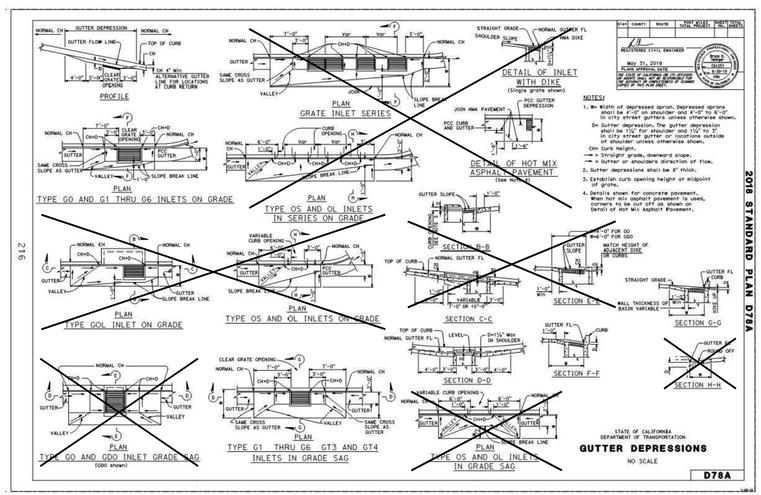
3 CUSTOM MANHOLE COVER
NTS



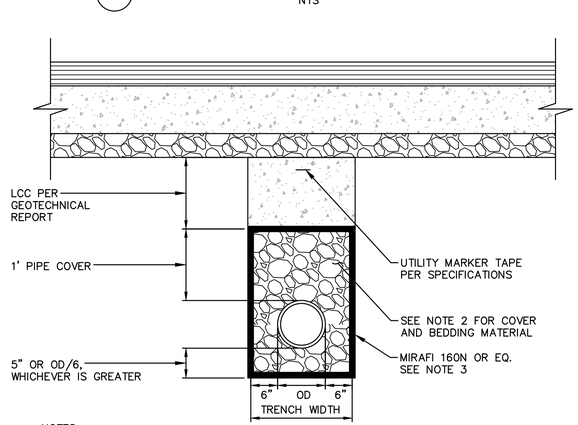
4 STORM DRAIN MANHOLE FRAME & COVER
NTS



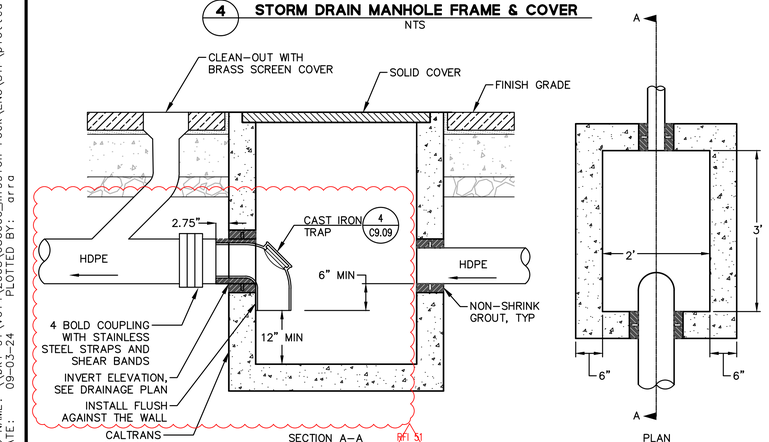
5 PRECAST DRAINAGE INLETS TYPES G1, G2, G3, G4, G5 AND G6
NTS



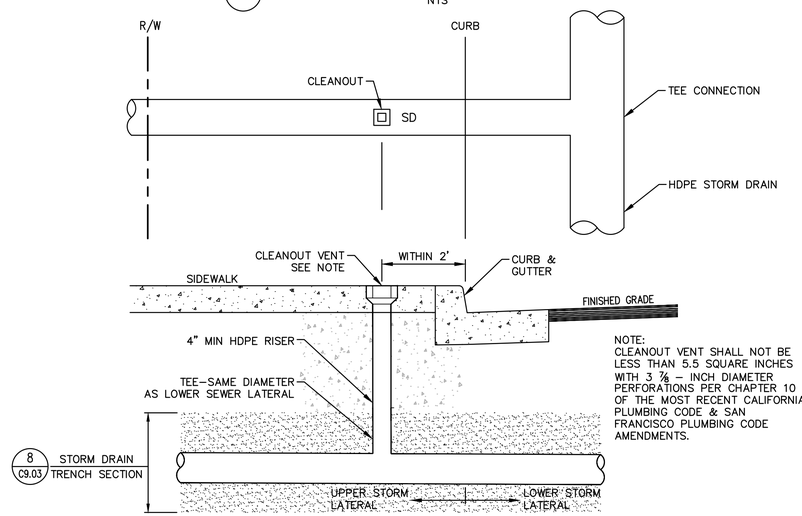
6 GUTTER DEPRESSIONS
NTS



8 STORM DRAIN TRENCH SECTION
NTS



7 CATCH BASIN/SAND TRAP WITH CLEAN–OUT
NTS



8 C9.03 STORM DRAIN TRENCH SECTION

9 STORM DRAIN LATERAL CLEANOUT
NTS

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MISSION ROCK PHASE 1 STREET IMPROVEMENT PLANS CONSTRUCTION DETAILS

SAN FRANCISCO COUNTY CALIFORNIA

SAN FRANCISCO

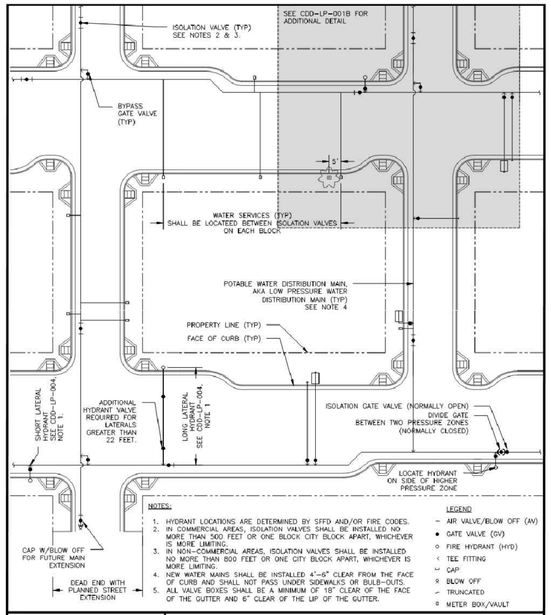
Revisions	No.
09/13/2024 – RECORD DRAWINGS	

Date	09/13/2024
Scale	AS SHOWN
Design	JW
Drawn	KCC/JM
Approved	JD
Job No	20080006

Drawing Number: C9.03

RECORD DRAWINGS

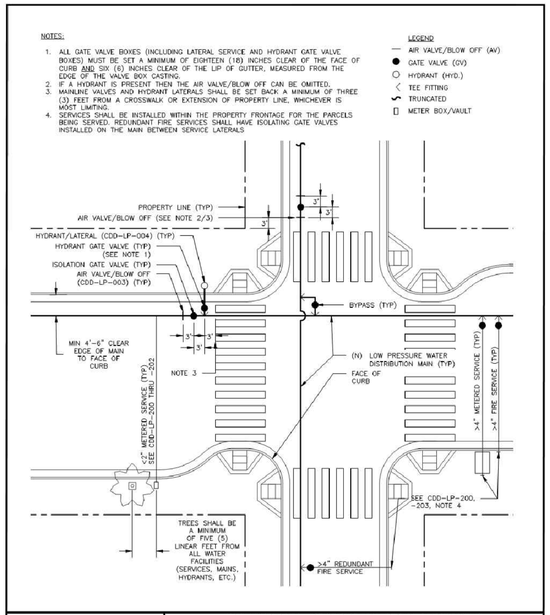
DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C9.00 – DETAILS.dwg
PLOT DATE: 09-03-24 PLOTTED BY: arra



WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
STANDARD PLAN FOR DUCTILE IRON PIPE MAIN INSTALLATION
POTABLE/RECYCLED WATER NEW MAIN
INSTALLATION STANDARD CONFIGURATION OVERVIEW

DATE	REV.	DRAWING NO.	SHEET
12/28/2018	2	CDD-LP-001A	
SCALE N.T.S.			

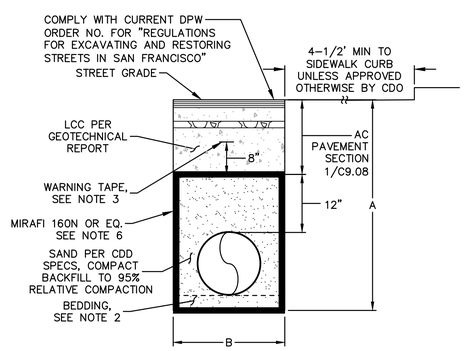
1 DUCTILE IRON PIPE MAIN INSTALLATION POTABLE/RECYCLED WATER NEW MAIN INSTALLATION STANDARD CONFIGURATION OVERVIEW
NTS



WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
STANDARD PLAN FOR DUCTILE IRON PIPE MAIN INSTALLATION
POTABLE/RECYCLED WATER NEW MAIN
INSTALLATION STANDARD CONFIG DETAIL VIEW

DATE	REV.	DRAWING NO.	SHEET
10/1/2017	1	CDD-LP-001B	
SCALE N.T.S.			

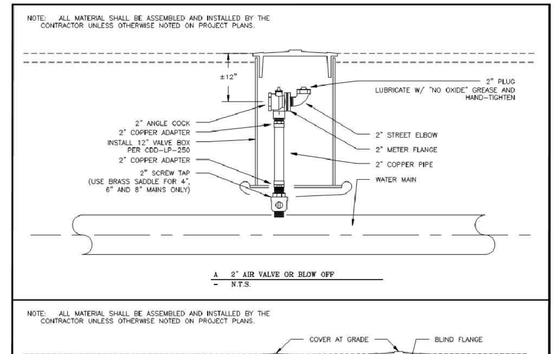
2 DUCTILE IRON PIPE MAIN INSTALLATION POTABLE/RECYCLED WATER NEW MAIN INSTALLATION STANDARD CONFIG DETAIL VIEW
NTS



NOMINAL PIPE DIAMETER	MINIMUM TRENCH DEPTH (A)	MINIMUM TRENCH DEPTH (B)
1", 2"	24"	12"
4", 6", 8"	36"	18"
12"	44"	24"
16"	54"	30"
20"	54"	38"
24"	55"	44"

NOTE:
1. MINIMUM TRENCH DEPTHS AND TRENCH WIDTHS MUST BE ADHERED TO UNLESS APPROVED OTHERWISE BY THE CITY DISTRIBUTION DIVISION
2. BEDDING SHALL BE 6" THICK IN ALL CONDITIONS.
3. WARNING TAPE SHALL BE 6" WIDE, PURPLE COLORED FOR RW, METALLIC FOIL BONDED TO SOLID BLUE PLASTIC FILM. INSCRIPTION MESSAGE, USING 1.5" MINIMUM HEIGHT BLACK TEXT, SPACED AT 3-FT MAXIMUM INTERVALS, SHALL READ "CAUTION: RECYCLED WATER LINE BELOW" FOR RW. WARNING TAPE SHALL OVERLAP 12" MINIMUM AT SPLICES.
4. TRENCH CONSTRUCTION SHALL CONFORM TO OSHA AND CAL OSHA.
5. PIPE MAY BE INSTALLED DEEPER THAN DEPTH SPECIDIED HEREIN ONLY WHEN TO AVOID SUBSURFACE OBSTACLES AND ONLY WHEN APPROVED BY THE CITY REPRESENTATIVE.
6. PROVIDE 18" MINIMUM OVERLAP FOR MIRAFI WRAPPING.

3 DUCTILE IRON PIPE MAIN INSTALLATION NON-POTABLE WATER PIPE TRENCH
NTS

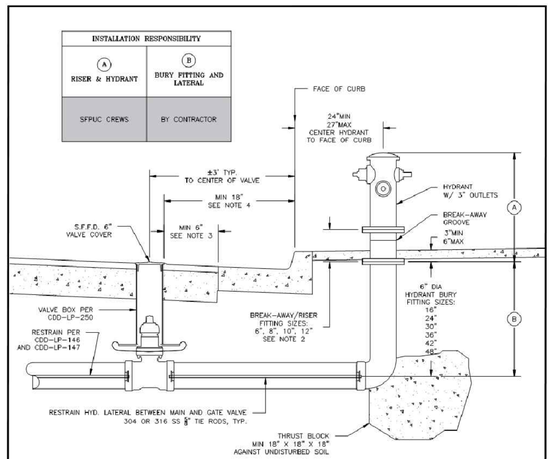


SUPERSEDES E-4969R

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
STANDARD PLAN FOR DUCTILE IRON PIPE MAIN INSTALLATION
AIR VALVES AND BLOW OFFS

DATE	REV.	DRAWING NO.	SHEET
5/16/2017	1	CDD-LP-003	
SCALE N.T.S.			

4 DUCTILE IRON PIPE MAIN INSTALLATION AIR VALVES AND BLOW OFFS
NTS

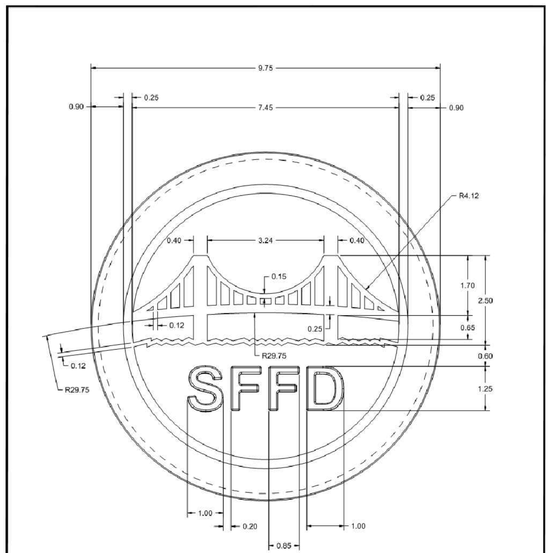


SUPERSEDES E-4969R

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
STANDARD PLAN FOR DUCTILE IRON PIPE MAIN INSTALLATION
FIRE HYDRANT

DATE	REV.	DRAWING NO.	SHEET
12/28/2018	2	CDD-LP-004A	
SCALE N.T.S.			

5 DUCTILE IRON PIPE MAIN INSTALLATION FIRE HYDRANT
NTS

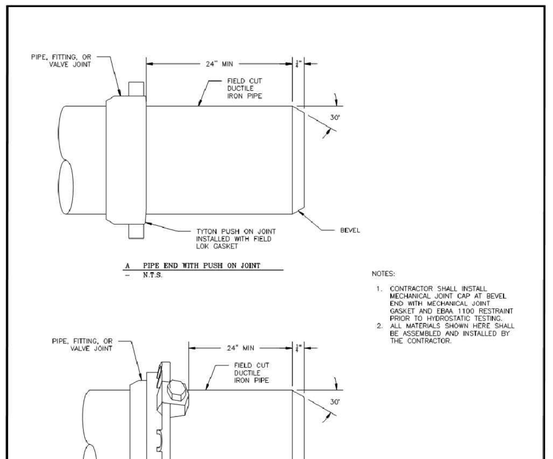


WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
STANDARD PLAN FOR DUCTILE IRON PIPE MAIN INSTALLATION
SFFD DOME FOR LOW PRESSURE FIRE HYDRANT

DATE	REV.	DRAWING NO.	SHEET
3/29/2016	0	CDD-LP-004B	
SCALE N.T.S.			

6 DUCTILE IRON PIPE MAIN INSTALLATION SFFD DOME FOR LOW PRESSURE FIRE HYDRANT
NTS

7 NOT USED
NTS



WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
STANDARD PLAN FOR DUCTILE IRON PIPE MAIN INSTALLATION
INSTALLATION OF PIPE END FOR SFWD CONNECTION

DATE	REV.	DRAWING NO.	SHEET
12/21/2018	0	CDD-LP-008	
SCALE N.T.S.			

8 DUCTILE IRON PIPE MAIN INSTALLATION INSTALLATION OF PIPE END FOR SFWD CONNECTION
NTS

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REGISTERED PROFESSIONAL ENGINEER JAMES W. DALLOSTA No. 72339 CIVIL STATE OF CALIFORNIA

MISSION ROCK PHASE 1 STREET IMPROVEMENT PLANS CONSTRUCTION DETAILS

SAN FRANCISCO COUNTY CALIFORNIA

SAN FRANCISCO

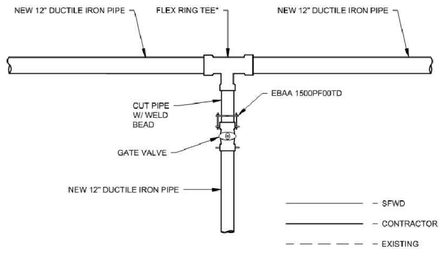
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C9.04

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C9.00 - DETAILS.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



	MATERIALS	LAT-12x12
CONTRACTOR	FLEX RING TEE	12"x12" (1)
	GATE VALVE	12" (1)
	BOX COVER	8" (1)
	STEEL BASE PLATE	8" (1)
	FIELD LOK GASKET	12" (2)
	FASTITE GASKET	12" (3)
	EBAA 15PF00TD	12" (1)

NOTES

* OR TR FLEX WITH TYTON GASKET

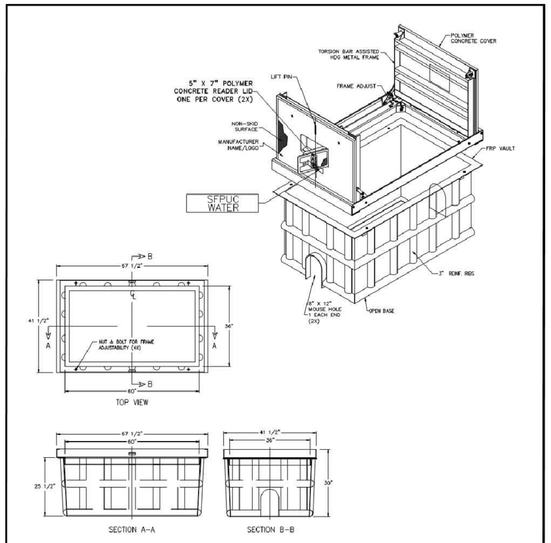
San Francisco Water Power Sewer — Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

NEW LATERAL MAIN CONNECTION FOR 12" BRANCH TO 12" MAIN

DATE	REV.	DRAWING NO.	SHEET
7/6/2017	1	CDD–LP–128	
SCALE N.T.S.			

1 NEW LATERAL MAIN CONNECTION FOR 12" BRANCH TO 12" MAIN
NTS



ARMORCAST AS-1436TAX30MT–SFWD OR APPROVED EQUIVALENT

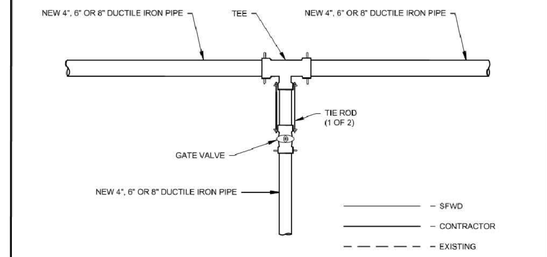
San Francisco Water Power Sewer — Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

WATER SERVICES
36"X60"X30" METER VAULT W/TORSION ASSISTED COVER

DATE	REV.	DRAWING NO.	SHEET
10/1/2016	0	CDD–LP–214	
SCALE N.T.S.			

2 WATER SERVICES 36"X60"X30" METER VAULT W/ TORSION ASSISTED COVER
NTS



	MATERIALS	LAT-4x4	LAT-6x4	LAT-6x6	LAT-8x4	LAT-8x6	LAT-8x8
CONTRACTOR	TEE	4"x4" (1)	6"x4" (1)	6"x6" (1)	8"x4" (1)	8"x6" (1)	8"x8" (1)
	GATE VALVE	4" (1)	4" (1)	6" (1)	4" (1)	6" (1)	8" (1)
	BOX COVER	6" (1)	6" (1)	6" (1)	6" (1)	6" (1)	8" (1)
	STEEL BASE PLATE	6" (1)	6" (1)	6" (1)	6" (1)	6" (1)	8" (1)
	FIELD LOK GASKET	4" (5)	4"(3), 6"(2)	6" (5)	4"(3), 8"(2)	6"(3), 8"(2)	8" (5)
	TIE ROD	5/8" (2)	5/8" (2)	5/8" (2)	5/8" (2)	5/8" (2)	3/4" (2)

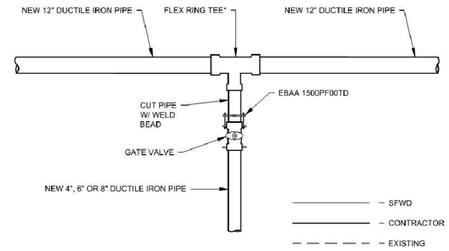
San Francisco Water Power Sewer — Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

NEW LATERAL MAIN CONNECTION FOR 4", 6" AND 8" BRANCH TO 4", 6" AND 8" MAIN

DATE	REV.	DRAWING NO.	SHEET
10/1/2016	0	CDD–LP–126	
SCALE N.T.S.			

3 NEW LATERAL MAIN CONNECTION FOR 4", 6" AND 8" BRANCH TO 4", 6" AND 8" MAIN
NTS



	MATERIALS	LAT-12x4	LAT-12x6	LAT-12x8
CONTRACTOR	FLEX RING TEE	12"x4" (1)	12"x6" (1)	12"x8" (1)
	GATE VALVE	4" (1)	6" (1)	8" (1)
	BOX COVER	6" (1)	6" (1)	8" (1)
	STEEL BASE PLATE	6" (1)	6" (1)	8" (1)
	FASTITE GASKET	12"(2), 4"(1)	12"(2), 6"(1)	12"(2), 8"(1)
	FIELD LOK GASKET	4" (2)	6"(2)	8" (2)
	EBAA 15PF00TD	4" (2)	6" (2)	8" (2)

NOTES

* OR TR FLEX WITH TYTON GASKET

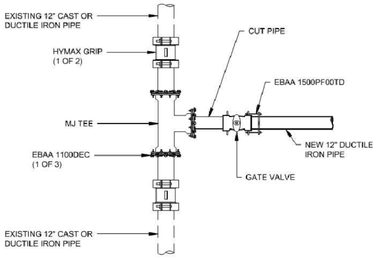
San Francisco Water Power Sewer — Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

NEW LATERAL MAIN CONNECTION FOR 4", 6" AND 8" BRANCH TO 12" MAIN

DATE	REV.	DRAWING NO.	SHEET
7/6/2017	1	CDD–LP–127	
SCALE N.T.S.			

4 NEW LATERAL MAIN CONNECTION FOR 4", 6" AND 8" BRANCH TO 12" MAIN
NTS



	MATERIALS	MC-12x12
CONTRACTOR	GATE VALVE	8" (1)
	BOX COVER	8" (1)
	STEEL BASE PLATE	8" (1)
	EBAA 15PF00TD	12" (1)
SFWD	MJ TEE	12"x12" (1)
	HYMAX GRIP	12" (2)
	FASTITE GASKET	12" (3)
	FIELD LOK GASKET	12" (1)
	EBAA 1100DEC	12" (3)

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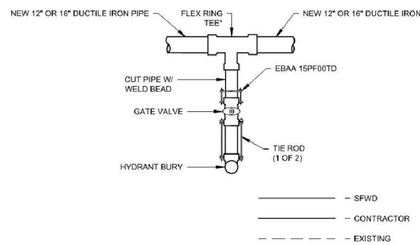
WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

NEW LATERAL BRANCH TO EXISTING MAIN CONNECTION FOR 12" BRANCH TO 12" MAIN

DATE	REV.	DRAWING NO.	SHEET
10/23/2019	2	CDD–LP–133	
SCALE N.T.S.			

5 NEW LATERAL BRANCH TO EXISTING MAIN CONNECTION FOR 12" BRANCH TO 12" MAIN
NTS



	MATERIALS	NH-12	NH-16
CONTRACTOR	FLEX RING TEE	12"x6" (1)	16"x6" (1)
	GATE VALVE	6" (1)	6" (1)
	HYRANT BURY	6" (1)	6" (1)
	BOX COVER	6" (1)	6" (1)
	STEEL BASE PLATE	6" (1)	6" (1)
	FASTITE GASKET	12"(2), 6"(1)	16"(2), 6"(1)
	FIELD LOK GASKET	6" (3)	6"(3)
	EBAA 15PF00TD	6" (1)	6" (1)
	TIE ROD	5/8" (2)	5/8" (2)

NOTES

* OR TR FLEX WITH TYTON GASKET

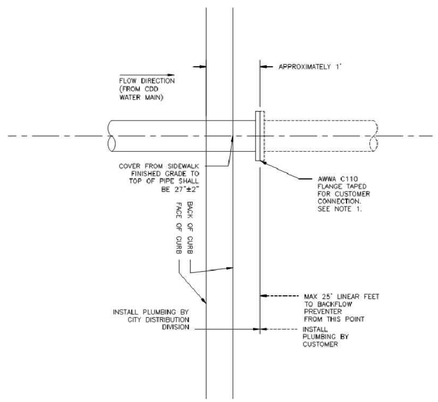
San Francisco Water Power Sewer — Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

NEW HYDRANT CONNECTION FOR 12" AND 16" PIPE

DATE	REV.	DRAWING NO.	SHEET
7/6/2017	1	CDD–LP–147	
SCALE N.T.S.			

6 NEW HYDRANT CONNECTION FOR 12" AND 16" PIPE
NTS



NOTES:

1. CUSTOMERS REQUESTING NEW SERVICE INSTALLATIONS SHALL NOT INSTALL CUSTOMER PORTION OF LATERAL ("HOUSE PIPE") PRIOR TO SFPUC PORTION OF LATERAL AND METER ASSEMBLY BEING INSTALLED.

San Francisco Water Power Sewer — Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

WATER SERVICES
CUSTOMER POINT OF CONNECTION FOR FIRE SERVICE ≥ 4" DIAMETER

DATE	REV.	DRAWING NO.	SHEET
10/1/2016	0	CDD–LP–203G	
SCALE N.T.S.			

7 WATER SERVICES CUSTOMER POINT OF CONNECTION FOR FIRE SERVICE ≥ 4" DIAMETER
NTS

NOTES FOR DRAWING CDD–LP–220B – METER INSTALLATIONS ON PRIVATE PROPERTY:

A. SFPUC SERVICE LATERAL PIPE WILL TERMINATE ONE (1) FOOT INSIDE THE CURB LINE. THE CUSTOMER SHALL BE RESPONSIBLE FOR INSTALLATION, OWNERSHIP AND MAINTENANCE OF ALL HOUSE PIPE FROM THIS POINT, UP TO, AND DOWNSTREAM OF, BUT NOT INCLUDING, THE COMPOUND WATER METER ASSEMBLY. THE CUSTOMER SHALL BE RESPONSIBLE FOR MAKING THE CONNECTION TO THE FLANGE LEFT BY THE DEPARTMENT AT THE CURB. THE DEPARTMENT SHALL NOT BE LIABLE FOR ANY FAILURES THAT OCCUR AT THE POINT OF CONNECTION BETWEEN THE DEPARTMENT–OWNED PIPE AND THE CUSTOMER–OWNED PIPE.

B. DEPARTMENT WILL INSTALL, OWN AND MAINTAIN THE WATER METER ASSEMBLY.

C. THE SIZE OF THE WATER METER ASSEMBLY SHALL MATCH THE SIZE APPROVED BY THE SFPUC NEW INSTALLATIONS GROUP, AS CALCULATED BY BUILDING FIXTURE COUNT. THE SIZE OF THE LATERAL PIPE SHALL NOT BE REDUCED OR SPLIT UPSTREAM OF THE WATER METER ASSEMBLY.

D. THE BOTTOM OF THE PIPE FLANGES AT EITHER SIDE OF THE METER ASSEMBLY MUST BE A MINIMUM OF ONE (1) FOOT AND MAXIMUM OF THREE (3) FEET ABOVE THE FINISHED FLOOR.

E. A MINIMUM OF THREE (3) FEET OF CLEAR SPACE MUST BE PRESENT ABOVE THE METER ASSEMBLY TO ACCOMMODATE INSTALLATION AND MAINTENANCE OF THE METER ASSEMBLY.

F. THE MINIMUM FLOOR–TO–CIELING HEIGHT OF THE ROOM IN WHICH THE DEPARTMENT METER IS INSTALLED SHALL BE NINE (9) FEET.

G. METERS SHALL BE SET BY THE DEPARTMENT IN A HORIZONTAL ORIENTATION ONLY. THE CUSTOMER SHALL BE RESPONSIBLE FOR PROVIDING STRAIGHT SECTIONS OF PIPE A MINIMUM OF TWENTY–FOUR (24) INCHES UPSTREAM AND DOWNSTREAM OF THE METER ASSEMBLY.

H. THE METER ASSEMBLY SHALL BE SET SUCH THAT THERE IS A MINIMUM OF ONE (1) FOOT OF CLEARANCE BETWEEN THE ASSEMBLY AND ANY WALLS OR OTHER OBSTRUCTIONS.

I. COMPOUND METER ASSEMBLY MUST BE ACCESSIBLE TO DEPARTMENT PERSONNEL AT ALL TIMES. METER ROOM MUST BE ACCESSIBLE VIA FREIGHT ELEVATOR OR ADA RAMP THAT CAN ACCOMMODATE A 4–FOOT BY 6–FOOT MAINTENANCE CART. FOUR (4) FEET OF CLEAR, LEVEL FLOOR SPACE SHALL BE PRESENT BETWEEN THE METER ASSEMBLY AND ANY OBSTRUCTIONS TO ALLOW FOR MAINTENANCE ACTIVITIES.

J. ONE (1) ELECTRICAL CONDUIT WITH A MINIMUM DIAMETER OF THREE–QUARTERS (¾) OF AN INCH MUST BE INSTALLED BY THE CUSTOMER TO ACCOMMODATE (4W) AMI TRANSMITTER WIRE(S) FOR EACH METER INSTALLED. THE CONDUIT SHALL NOT RUN FOR MORE THAN FOUR HUNDRED FIFTY (450) FEET FROM THE METER ASSEMBLY TO THE PROPOSED TRANSMITTER LOCATION. THE CONDUIT SHALL NOT BE SHARED WITH ANY OTHER ELECTRICAL WIRING OR COMPONENTS. THE CONDUIT AND TRANSMITTER PLACEMENT SHALL BE APPROVED BY THE DEPARTMENT. THE CONDUIT SHALL TERMINATE WITH A 4–INCH JUNCTION BOX AT EITHER END OF THE CONDUIT. THE CUSTOMER IS RESPONSIBLE FOR MAINTENANCE OF THE CONDUIT AND JUNCTION BOX.

K. THE WIRING FOR THE AMI TRANSMITTER SHALL BE PROVIDED AND PULLED BY THE CUSTOMER. 5–FEET EXCESS WIRING SHALL BE LEFT BY THE CUSTOMER AT EITHER END OF THE CONDUIT TO ALLOW FOR CONNECTION TO THE COMPOUND METER AND AMI TRANSMITTER. WIRING SHALL BE WEST PENN WIRE 230 OR APPROVED EQUAL. WIRE SHALL BE 3 CONDUCTOR, 22 AWG NON–SHIELDED CABLE. WIRE SHALL HAVE A 300V RATING, BE TEMPERATURE RATED FROM –20°C TO +60°C, AND BE UV–RESISTANT. CONDUCTORS SHALL BE SOLID TINNED COPPER WITH 0.008–INCH THICK PVC INSULATION AND BE COLOR CODED RED, BLACK, AND WHITE. TWO SETS OF CONDUCTORS ARE REQUIRED FOR EACH COMPOUND (=>3" IN SIZE) METER ASSEMBLY INSTALLED.

L. THE AMI TRANSMITTER SHALL BE MOUNTED IN AN ABOVE GRADE UTILITY ROOM THAT HAS AN EXTERIOR WALL OR ON THE FACADE OF THE BUILDING. THE TRANSMITTER MUST BE ACCESSIBLE FROM AN 8–FOOT A–FRAME LADDER FOR MAINTENANCE BY THE DEPARTMENT. THE TRANSMITTER SHALL BE PLACED A MINIMUM OF SIX (6) INCHES FROM ANY CONDUIT OR METALLIC PIPING AND A MINIMUM OF THREE (3) FEET FROM ANY LARGE METALLIC OBJECTS (I.E. HVAC DUCTING, STEEL DECKING, ETC.).

M. IN CASES WHERE MULTIPLE AMI TRANSMITTERS WILL BE INSTALLED, THE TRANSMITTERS SHALL HAVE A MINIMUM EDGE–TO–EDGE SPACING OF SIX (6) INCHES.

N. CUSTOMERS REQUESTING INSTALLATION OF A WATER METER ON PRIVATE PROPERTY MUST FORMALLY REQUEST SUCH AN INSTALLATION BY EMAILING CODENGINEERING@SFWATER.ORG. INSTALLATION OF METERS ON PRIVATE PROPERTY WILL ONLY BE ALLOWED WHEN A STANDARD INSTALLATION OF METER IN SIDEWALK IS NOT POSSIBLE DUE TO NO SIDEWALK BEING PRESENT OR DUE TO UTILITY CONFLICTS. INSTALLATIONS OF METERS ON PRIVATE PROPERTY WILL NOT BE APPROVED FOR AESTHETIC REASONS ALONE.

O. FOR ADDITIONAL REQUIREMENTS, PLEASE REFER TO THE DOCUMENT "SFPUC RULES AND REGULATIONS GOVERNING WATER SERVICE TO CUSTOMERS, SECTION A, RULE 2, AND SECTION A, RULE 7.

San Francisco Water Power Sewer — Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

WATER SERVICES
SFPUC NEW METER INSTALLATIONS ON PRIVATE PROPERTY – NOTES

DATE	REV.	DRAWING NO.	SHEET
10/1/2016	0	CDD–LP–220A	
SCALE N.T.S.			

8 WATER SERVICES SFPUC NEW METER INSTALLATIONS ON PRIVATE PROPERTY – NOTES
NTS

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REGISTERED PROFESSIONAL ENGINEER — JAMES W. DALLOSTA — No. 72339 — CIVIL — STATE OF CALIFORNIA

MISSION ROCK PHASE 1 STREET IMPROVEMENT PLANS CONSTRUCTION DETAILS

SAN FRANCISCO COUNTY, CALIFORNIA

SAN FRANCISCO

No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C9.05

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C9.00 – DETAILS.dwg
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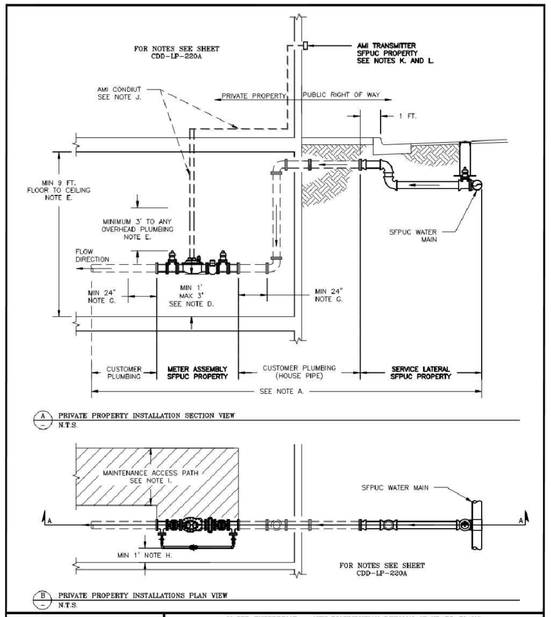
PLOTTED BY: arra

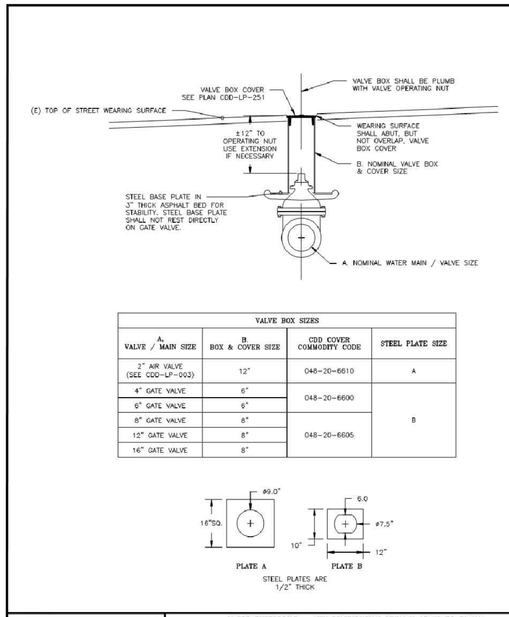


WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

WATER SERVICES
SFPUC NEW METER INSTALLATIONS ON PRIVATE PROPERTY

DATE	10/1/2016	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	0	CDD-LP-220B	

1 WATER SERVICES SFPUC NEW METER INSTALLATIONS ON PRIVATE PROPERTY
NTS



VALVE BOX SIZES

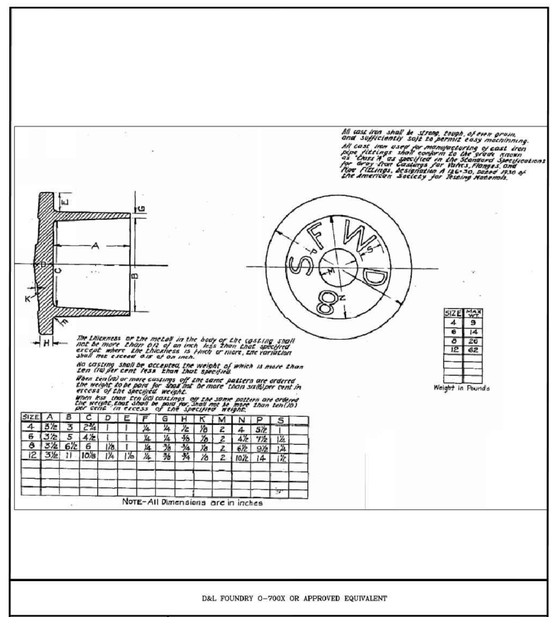
A, VALVE / MAIN SIZE	B, BOX & COVER SIZE	CDD COVER COMMODITY CODE	STEEL PLATE SIZE
2" AIR VALVE (SEE CDD-LP-003)	12"	048-20-6610	A
4" GATE VALVE	6"	048-20-6600	B
6" GATE VALVE	6"		
8" GATE VALVE	8"	048-20-6605	
12" GATE VALVE	8"		
16" GATE VALVE	8"		

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

VALVE BOXES & COVERS
STANDARD POTABLE WATER VALVE BOX INSTALLATION

DATE	3/2/2017	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	0	CDD-LP-250	

2 VALVE BOXES & COVERS STANDARD POTABLE WATER VALVE BOX INSTALLATION
NTS



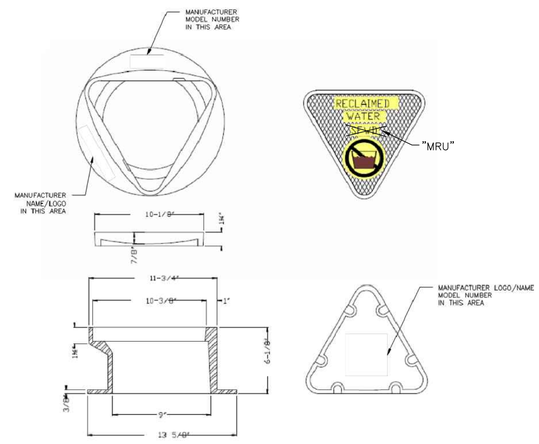
D&L FOUNDRY O-700X OR APPROVED EQUIVALENT

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

VALVE BOXES & COVERS
STANDARD SFWD POTABLE WATER GATE COVER

DATE	10/1/2016	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	0	CDD-LP-251	

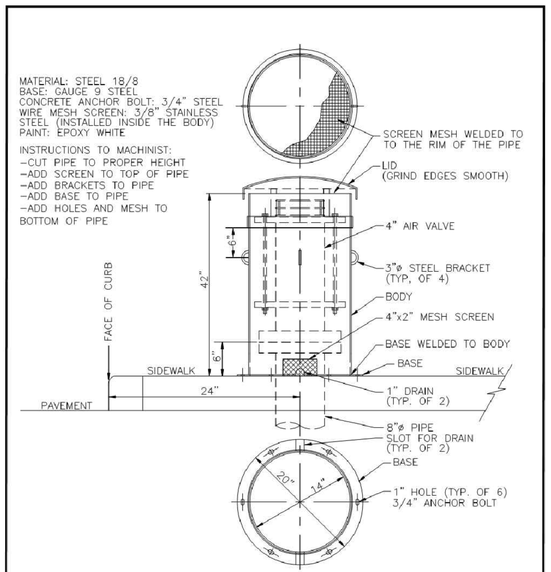
3 VALVE BOXES & COVERS STANDARD SFWD POTABLE WATER GATE COVER
NTS



NOTE:

1. CONTRACTOR TO PROVIDE SUBMITTAL FOR REVIEW BY PORT PRIOR TO PURCHASING AND INSTALLATION OF CUSTOM VALVE COVERS.

4 VALVE BOXES & COVERS STANDARD RECYCLED WATER GATE COVER
NTS

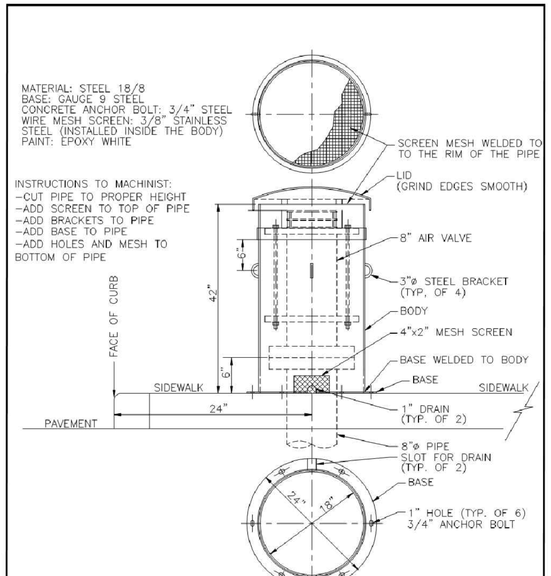


WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

VALVE BOXES & COVERS
4-IN AIR VALVE ENCLOSURE

DATE	3/7/2017	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	1	CDD-LP-255	

5 VALVE BOXES & COVERS 4-IN AIR VALVE ENCLOSURE
NTS

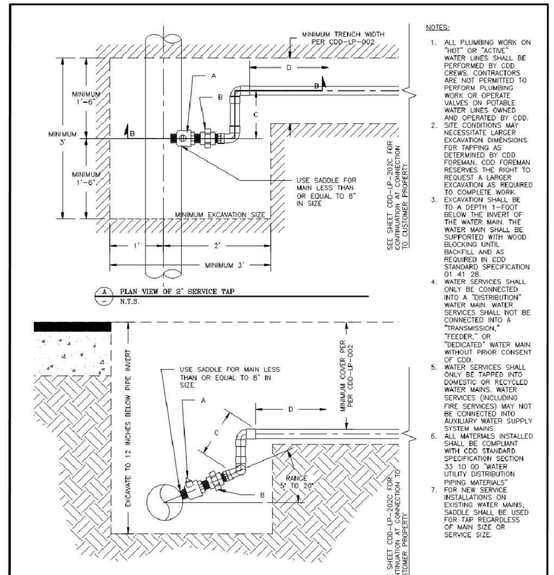


WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

VALVE BOXES & COVERS
AIR VALVE ENCLOSURE MODIFIED FOR 8-IN AIR VALVE

DATE	10/1/2016	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	0	CDD-LP-256	

6 VALVE BOXES & COVERS AIR VALVE ENCLOSURE MODIFIED FOR 8-IN AIR VALVE
NTS



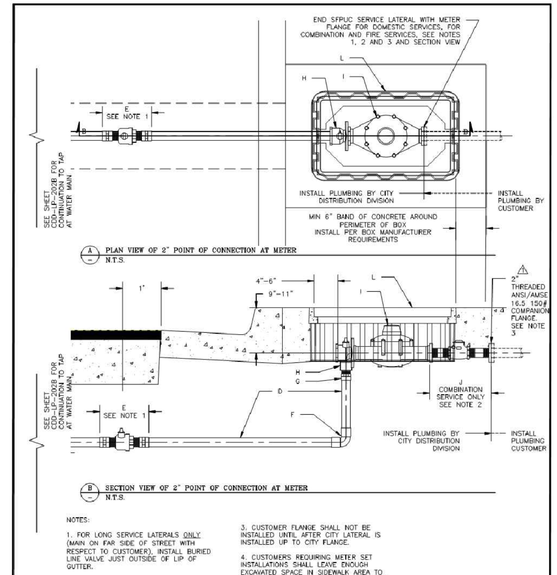
SUPERSEDES A-1240-2B

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

WATER SERVICES
2-INCH SERVICE LATERAL CONNECTION AT MAIN

DATE	10/1/2016	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	0	CDD-LP-202B	

7 WATER SERVICES 2-INCH SERVICE LATERAL CONNECTION AT MAIN
NTS



SUPERSEDES A-1240-2B

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS

WATER SERVICES
2-INCH SERVICE LATERAL CONNECTION AT METER (DOMESTIC AND COMBINATION SERVICE)

DATE	10/1/2016	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	0	CDD-LP-202C	

8 WATER SERVICES 2-INCH SERVICE LATERAL CONNECTION AT METER (DOMESTIC AND COMBINATION SERVICE)
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MISSION ROCK PHASE 1 STREET IMPROVEMENT PLANS CONSTRUCTION DETAILS

SAN FRANCISCO COUNTY CALIFORNIA

SAN FRANCISCO

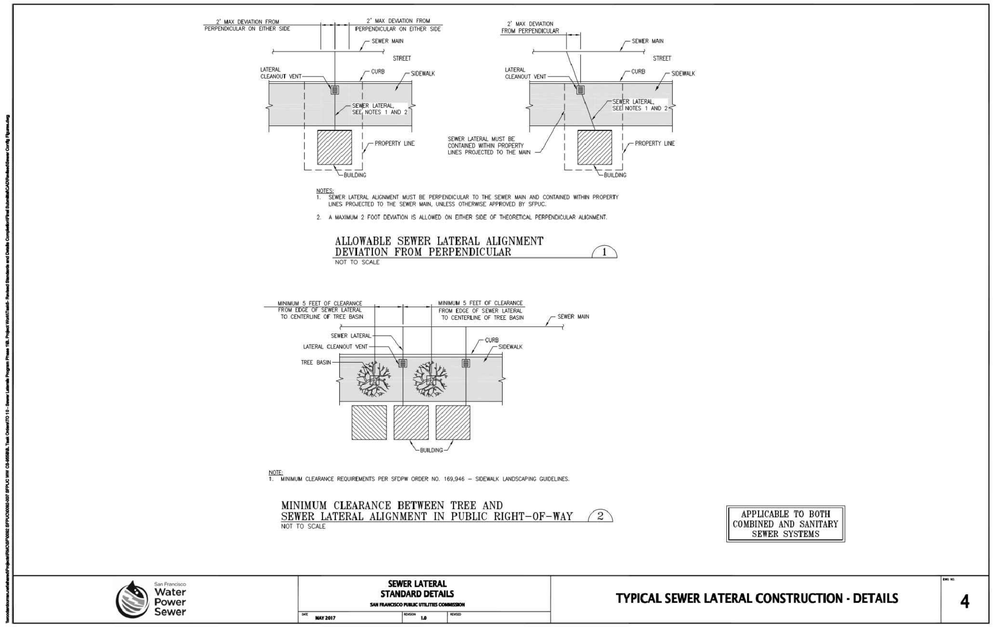
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

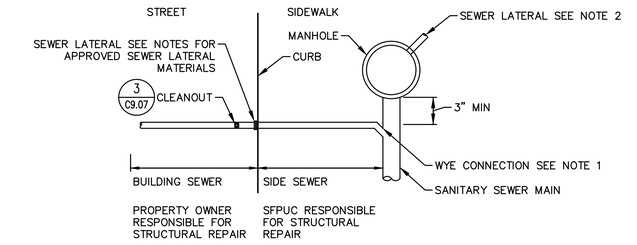
Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

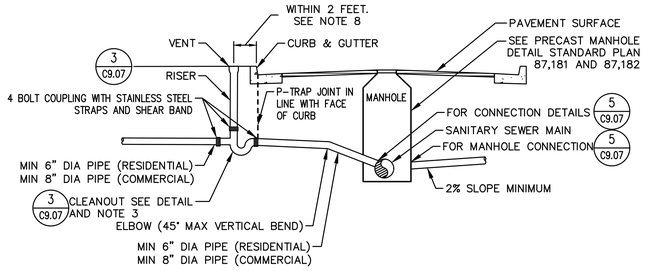
Drawing Number:
C9.06

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C9.00 - DETAILS.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



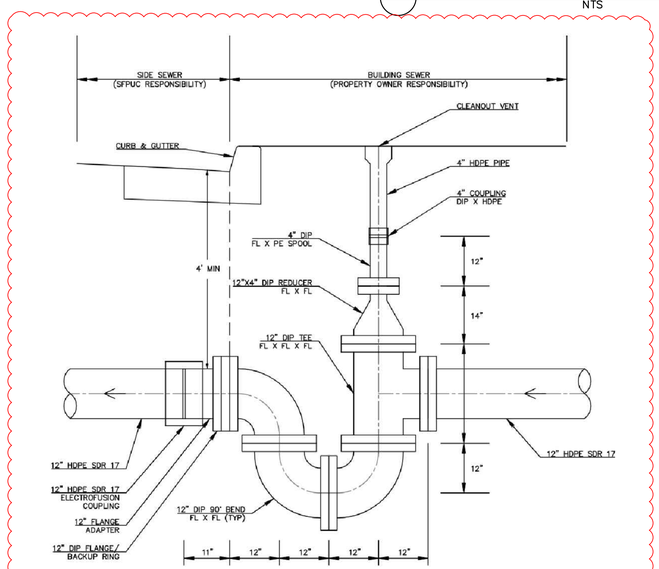




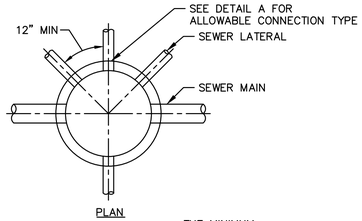
NOTES:
1. MANUFACTURED WYE ARE REQUIRED FOR CONNECTION TO SEWER MAINS LESS THAN 12" DIAMETER.
2. SEWER LATERALS 12" DIAMETER AND GREATER SHALL CONNECT DIRECTLY TO A MANHOLE.
3. THE CLEANOUT SHALL BE THE PROPERTY OWNERS RESPONSIBILITY.
4. SS LATERAL: SFPUC IS RESPONSIBLE FOR SIDE SEWER STRUCTURAL REPAIRS ONLY. OWNER IS RESPONSIBLE FOR CLEANING, INCLUDING ROOT REMOVAL, IN ENTIRE LATERAL.
5. OWNER MUST ACQUIRE ALL NECESSARY PERMITS FROM SFPUC, SFDBI AND SFDPW PRIOR TO CONSTRUCTION.
6. SS SYSTEM: A BACKWATER VALVE IS REQUIRED IF THE ELEVATION OF THE FIXTURE IS LOWER THAN THE ELEVATION OF THE SEWER MAIN. A BACKWATER VALVE IS ALSO REQUIRED IF THE FIXTURE IS LOWER THAN THE OVERFLOW PROTECTION DEVICE COVER AND THE ELEVATION OF THE OVER THE FLOW PROTECTION DEVICE COVER IS LOWER THAN THE ELEVATION OF THE FLOOD RIM ELEVATION. THESE REQUIREMENTS ARE FROM THE MOST RECENT SAN FRANCISCO PLUMBING CODE, CHAPTER 7.
7. CLEANOUT CONSISTS OF THE P-TRAP, RISER AND AIR VENT.
8. FITTING SHALL BE TRIMMED NEAT WITH INTERIOR OF SEWER MAIN.
9. MATERIAL: SEWER LATERAL PIPE SHALL BE SDR 17 CONFORMING TO ASTM D3035

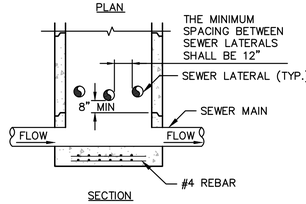
APPROVED SEWER LATERAL JOINTS:
- BUTT FUSION JOINTS MEETING REQUIREMENTS OF ASTM D2657 AND D3261.
- ELECTRO-FUSION JOINTS USING ELECTRO-FUSION COUPLINGS.
- SYNTHETIC RUBBER COUPLING MEETING THE REQUIREMENTS OF ASTM C425 INCLUDING A STAINLESS STEEL SHEAR RING ON OUTSIDE OF COUPLING WITH TYPE 316 STAINLESS STEEL TAKE-UP CLAMPS WITH STAINLESS STEEL NUTS AND BOLTS.
- BELL & SPIGOT JOINTS ARE NOT ACCEPTABLE.
- HDPE PIPE CAN CONNECT TO BELL ON A P-TRAP USING RUBBER COUPLING. USE BUSHING TO COUPLE PIPE OF DIFFERENT OUTSIDE DIAMETERS.
- HDPE PIPE CAN CONNECT TO THE PLAIN END ON A P-TRAP USING A RUBBER OR CALDER COUPLING. USE BUSHING TO COUPLING PIPE OF DIFFERENT OUTSIDE DIAMETERS.

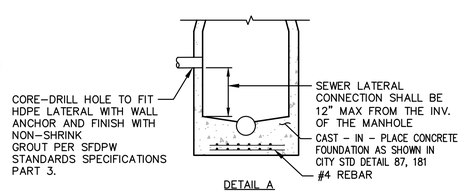
1 TYPICAL SEWER LATERAL CONSTRUCTION - DETAILS
NTS



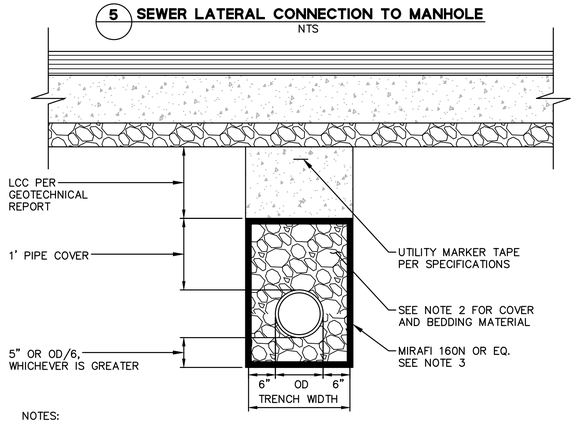
3 CLEANOUT
NTS





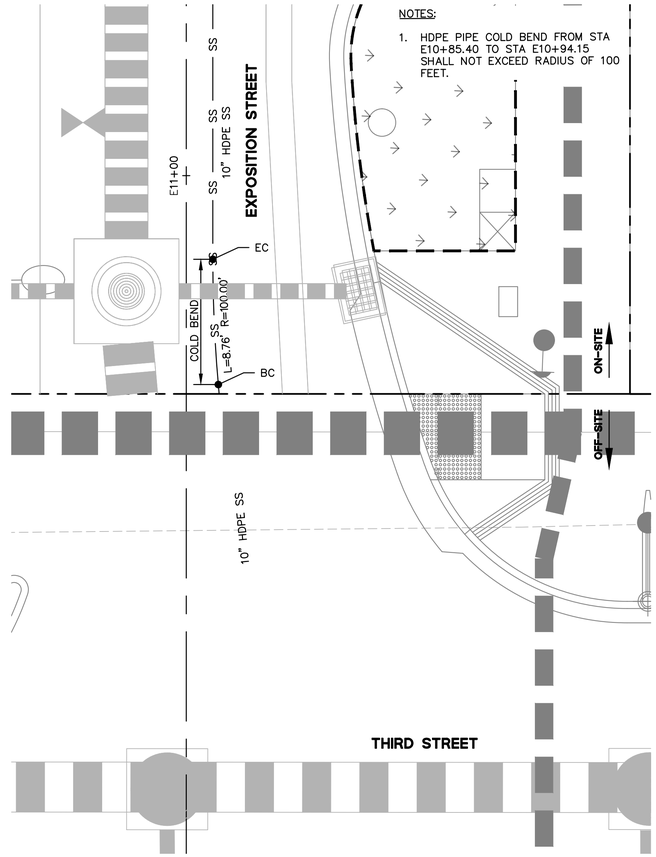


5 SEWER LATERAL CONNECTION TO MANHOLE
NTS



NOTES:
1. ALL WORK SHALL BE DONE PER SECTION 701 "PAVEMENT EXCAVATION," SECTION 702 "TRENCH EXCAVATION," AND SECTION 703 "TRENCH BACKFILL" OF SFDPW STANDARD SPECIFICATIONS AND ALL REFERENCES AND ALL REFERENCES MADE WITHIN, AS WELL AS SECTION 2.4.55 OF THE CITY PUBLIC CODE.
2. PIPE COVER AND BEDDING MATERIALS SHALL BE CRUSHED ROCK PER SPECIFICATIONS.
3. PROVIDE 18" MINIMUM OVERLAP FOR MIRAFI WRAPPING.

2 TYPICAL SEWER LATERAL INSTALLATION
NTS



4 NOT USED
NTS

6 SEWER MAIN & LATERAL TRENCH SECTION
NTS

7 SEWER HDPE COLD BEND DETAIL
NTS

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REGISTERED PROFESSIONAL ENGINEER JAMES W. DALLOSTA No. 72339 CIVIL STATE OF CALIFORNIA

MISSION ROCK PHASE 1 STREET IMPROVEMENT PLANS CONSTRUCTION DETAILS

SAN FRANCISCO, CALIFORNIA

SAN FRANCISCO COUNTY

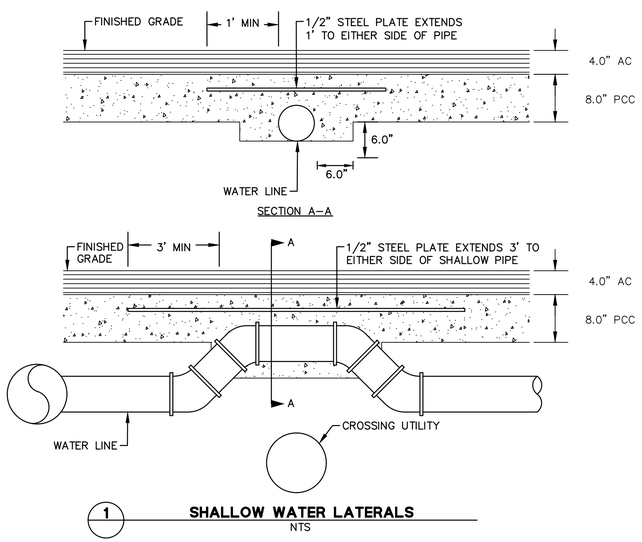
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number: C9.07

RECORD DRAWINGS

DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C9.00 - DETAILS.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



1 SHALLOW WATER LATERALS
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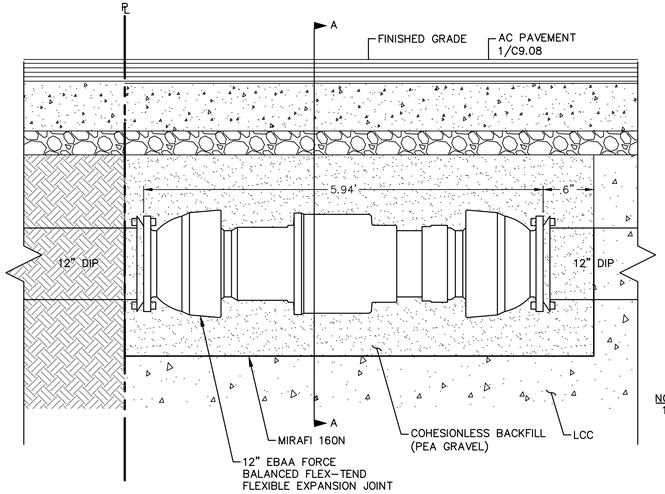
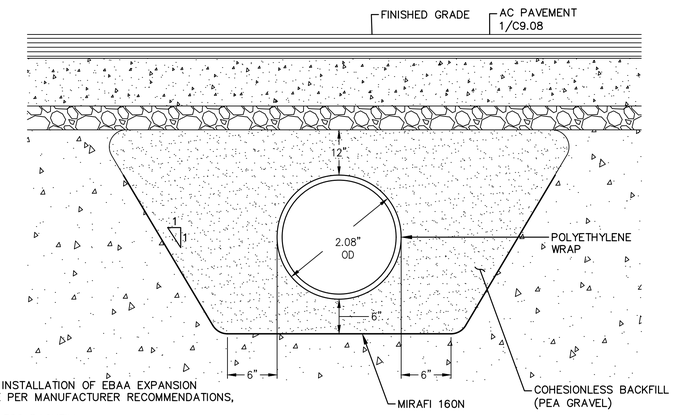
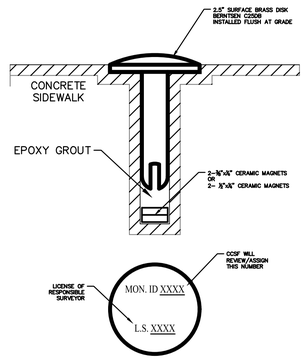




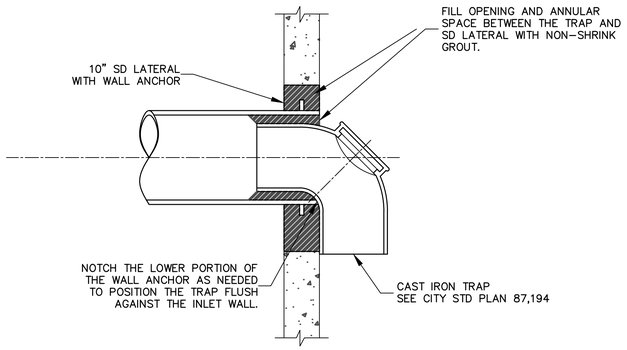
NOTES:
1. UNDERGROUND INSTALLATION OF EBAA EXPANSION JOINTS WILL BE PER MANUFACTURER RECOMMENDATIONS, INCLUDING:
   - COHESIONLESS BACKFILL
     - PEA GRAVEL, UNFRACTURED AND ROUNDED 3/8" OR 1/2" GRADATION
   - SLOPE SIDE TRENCHES
   - POLYETHYLENE WRAP

SECTION A-A

2 12" FLEXIBLE EXPANSION JOINT
NTS



3 MONUMENT SURFACE BRASS DISK
NTS



4 TRAP CONNECTION DETAIL
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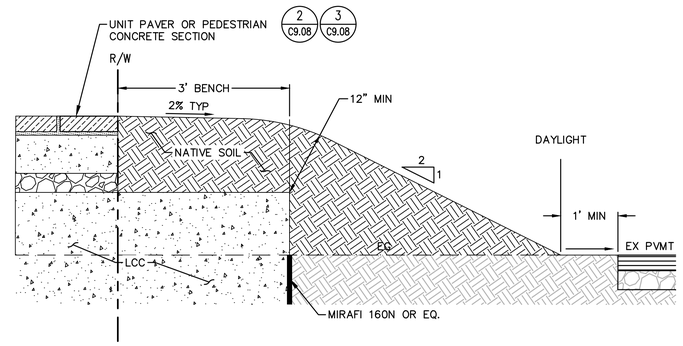

5 EDGE CONFORM
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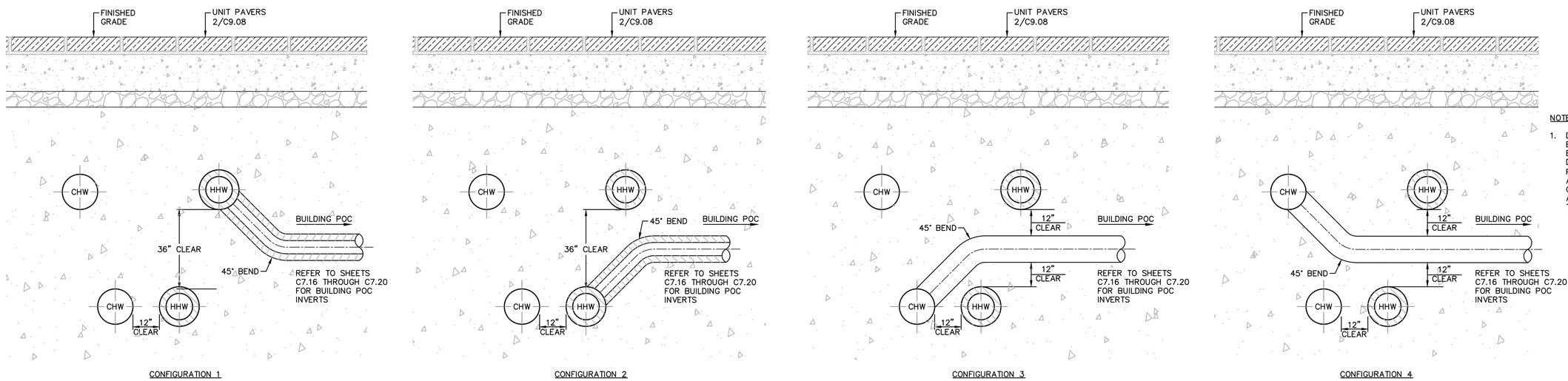

NOTES:
1. DISTRICT ENERGY DESIGN BASED ON DISTRICT ENERGY BASIS OF DESIGN DATED DECEMBER 17, 2019 BY PAE/EVERGREEN. ALL FIELD ADJUSTMENTS TO BE COORDINATED WITH CLIENT AND DESIGN ENGINEER PRIOR TO INSTALLATIONS.

6 DISTRICT ENERGY BUILDING LATERAL
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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CONSTRUCTION DETAILS

SAN FRANCISCO COUNTY, CALIFORNIA
SAN FRANCISCO

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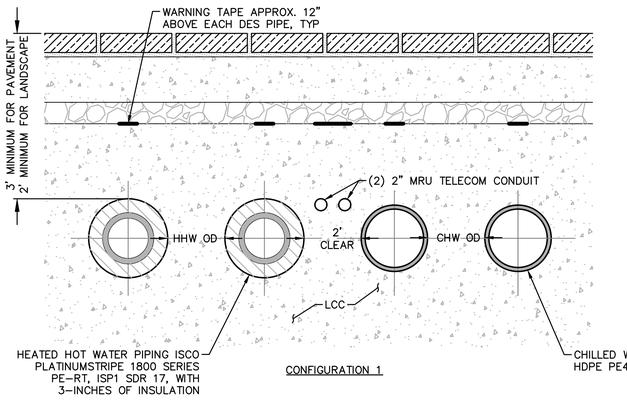
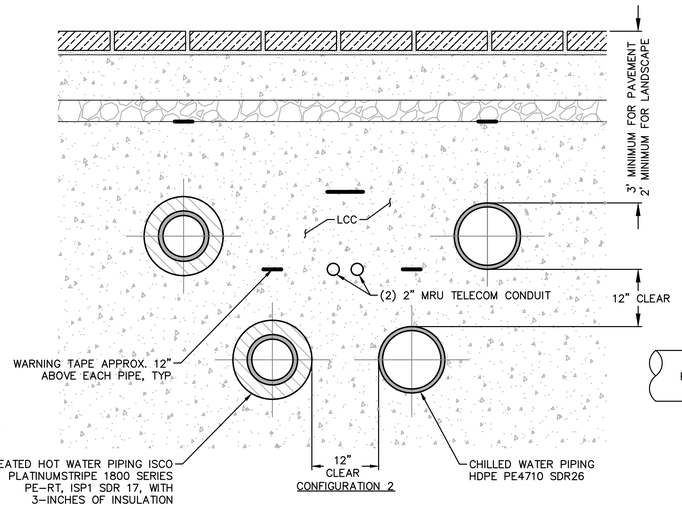


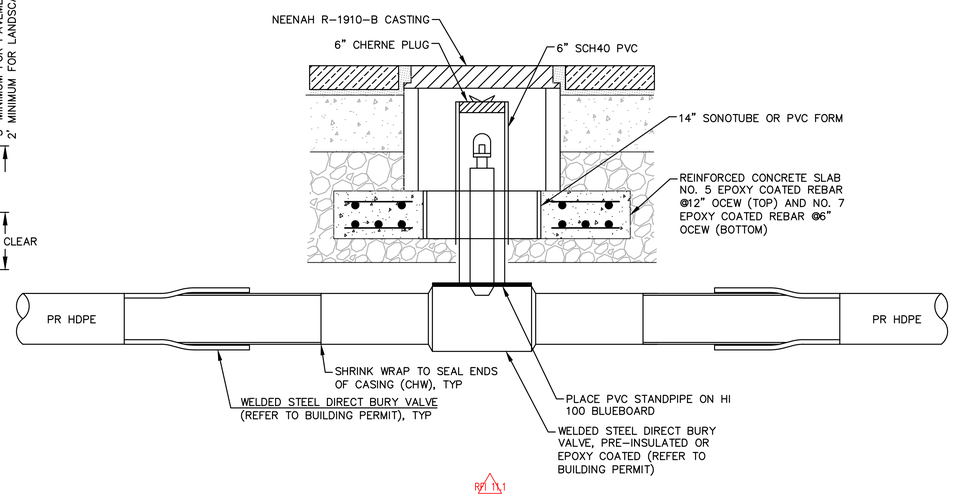
CONFIGURATION 1



CONFIGURATION 2

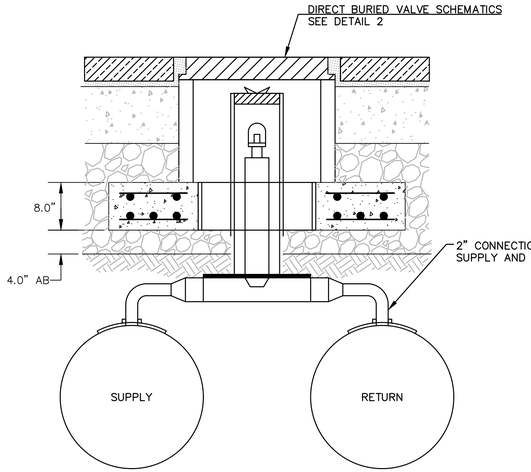
GENERAL SHEET NOTES:

1. DISTRICT ENERGY DESIGN BASED ON DISTRICT ENERGY BASIS OF DESIGN DATED DECEMBER 17, 2019 BY PAE/EVERGREEN. ALL FIELD ADJUSTMENTS TO BE COORDINATED WITH CLIENT AND DESIGN ENGINEER PRIOR TO INSTALLATIONS.



RFI 11.1

1 TYPICAL DISTRIBUTION CROSS SECTION
NTS



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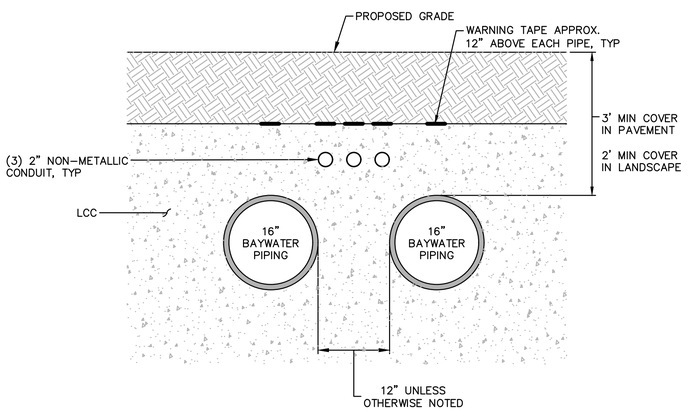
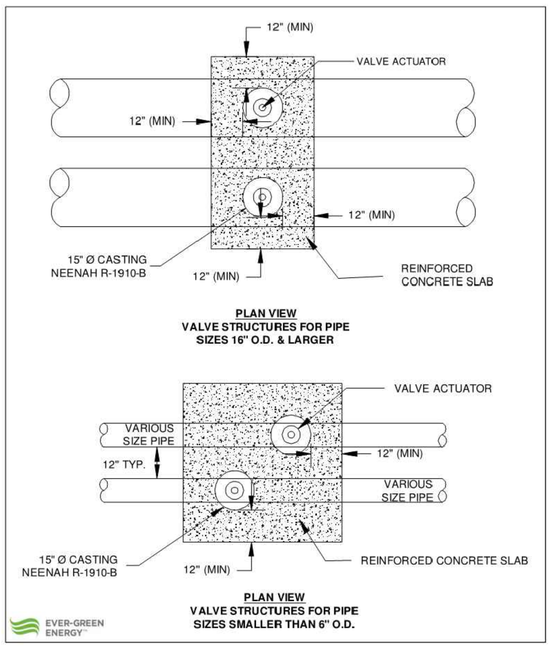
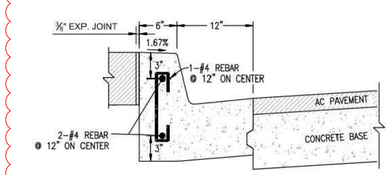




3 DISTRIBUTION DETAILS AND BUILDING INTERFACE
NTS

4 RECIRCULATION DETAIL
NTS

5 BAYWATER SYSTEM PIPING
NTS

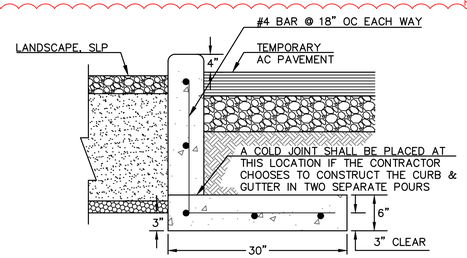


NOTES:

1. FOR DIMENSIONS NOT SHOWN, REFER TO REVISED CITY STANDARD CURB/GUTTER DETAIL.
2. CURB & GUTTER TO BE INSTALLED AT ALL TREE GRATES.

6 CURB AND GUTTER
NTS

RFI 262.2



NOTE:
1. DEEPENED CURB TO BE CONSTRUCTED WHEN CURB IS ADJACENT TO LANDSCAPING AREA ONLY.
2. LONGITUDINAL BAR SPACE AS SHOWN, MAX 18".

7 DEEPENED 4" VERTICAL CURB
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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CONSTRUCTION DETAILS

SAN FRANCISCO COUNTY, CALIFORNIA

SAN FRANCISCO

No.	Revisions
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Drawn KCC/JM
Approved JD
Job No 20080006

Drawing Number:
C9.10

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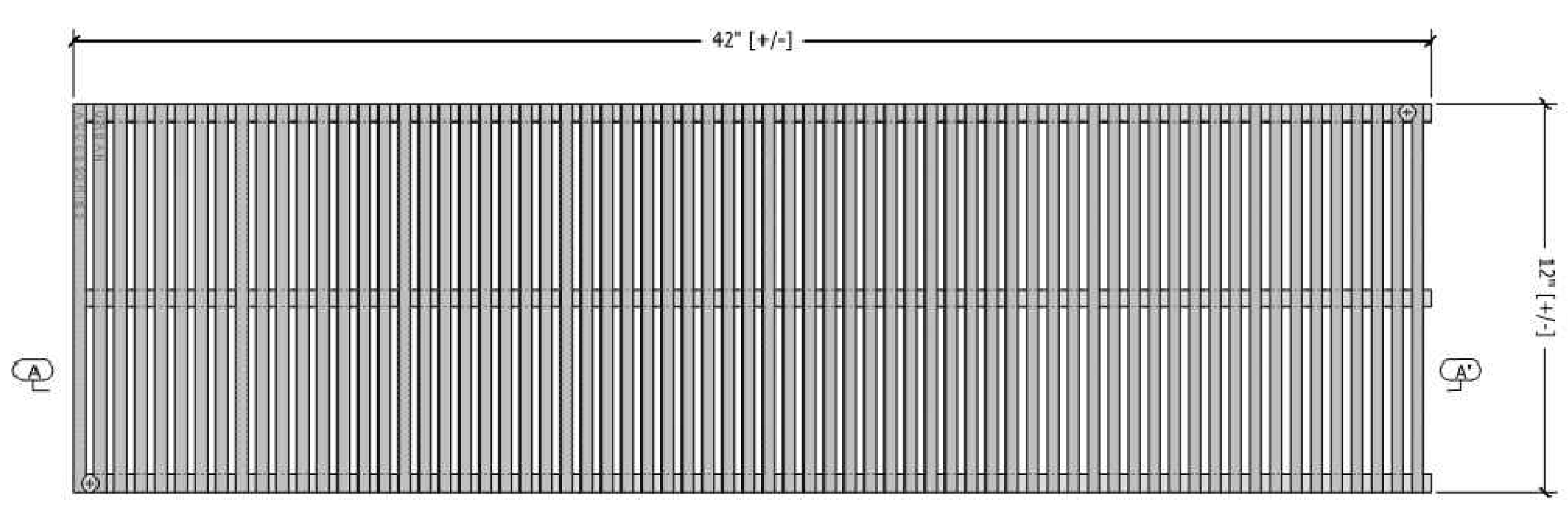
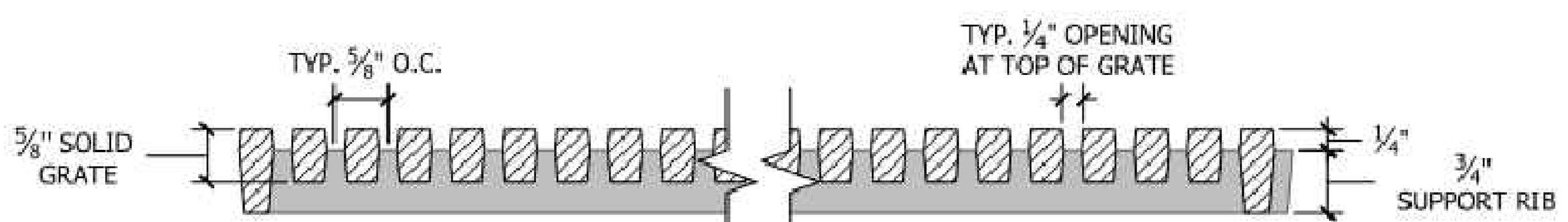
PLOTTED BY: arra



Plan



Section A-A'

SPECIFICATIONS

- Material will be high quality 100% recycled grey iron; ASTM A48 class 35b or better; hardness 170-223 brinnell (unless specified otherwise; see below).

Material:
- □ Grey iron ASTM A48 (standard)
- □ Aluminum, ASTM B26
- □ Ductile iron, (required for all load ratings higher than pedestrian) ASTM A536 class 65-45-12.
- □ Nickel bronze (ASTM B30)
- □ Bronze (ASTM B26)

- Finish will be natural patina of raw iron (unless specified otherwise; see below).

Finish:
- □ Raw (standard)
- □ Rust conditioner
- □ Polyester Powder Coat*
- □ Liquid Coat (wet paint)*
  Color:
  *Please specify standard UA color or mfr. name and color code.
- □ Brush (bronze/nickel/aluminum only)
- □ Polish (bronze/nickel/aluminum only)
- □ Galvanized (grey iron and ductile iron only)
- □ Other:

- Dimensions are nominal.

Notes
1) Grate is 1" thick at edge.
2) No openings greater than 1/4", in conformance with ADA Accessibility Guidelines.
3) By default, the last grate in a trench drain will be sheared to meet a drain length specified at the time of order. Alternately, the trench drain length may be adjusted to the nearest whole grate (tolerances in the grate size WILL compound across the overall run). Please provide instructions in the comments section below.
4) 171.2 sq. in. open area per grate.
5) Grate weighs 65.5 lbs.

Comments:

Trench Grate

12" x 42" Jamison

Page 1 of 1 Date: 2/26/13

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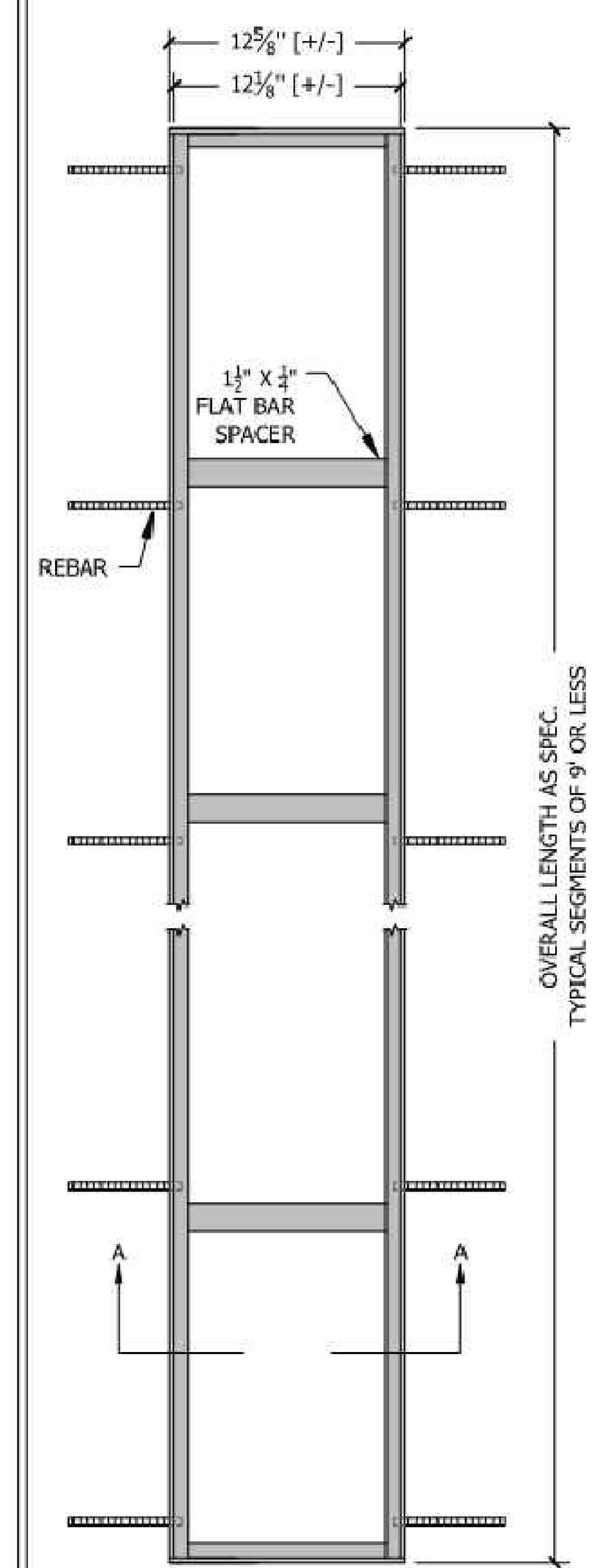
(877) 487-0488



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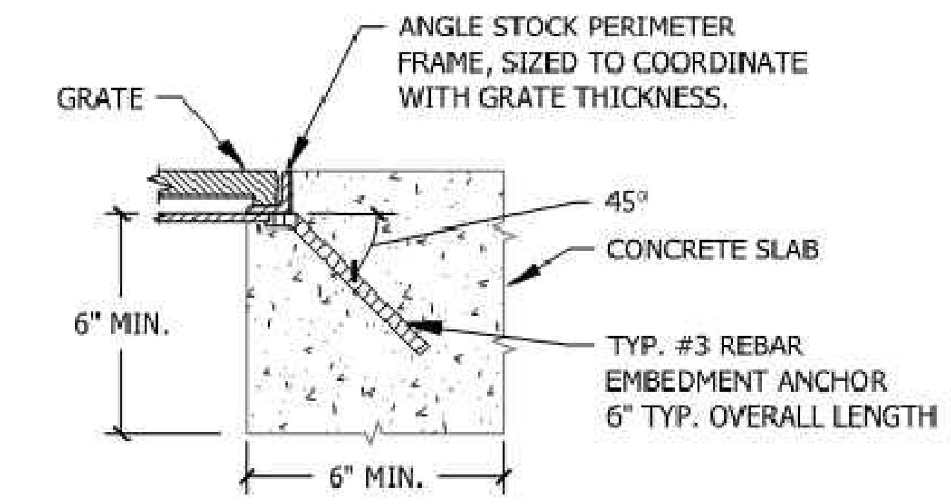
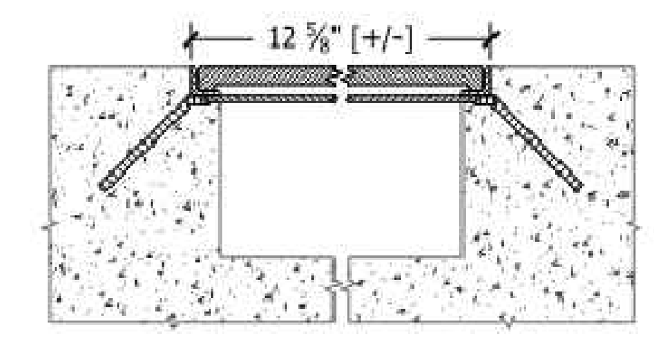
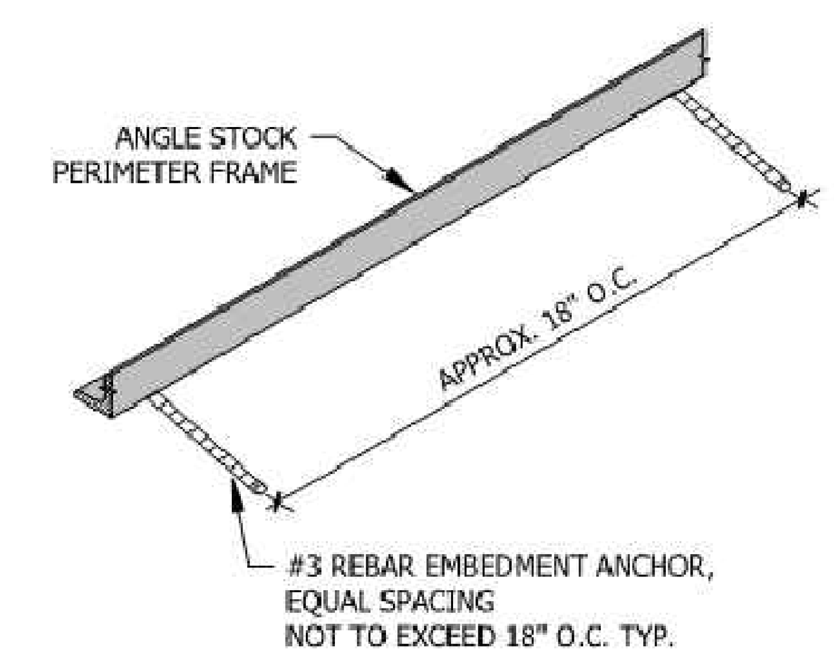


Detail Elevation A-A



Elevation A-A



Isometric

SPECIFICATIONS

- Frames are constructed of mild steel ASTM A36 (unless specified otherwise; see below).

Material:
- □ Mild Steel ASTM A36 (standard)
- □ Stainless Steel grade 304L
- □ Architectural Bronze, ASTM B455
- □ Structural Aluminum, ASTM B221

- Finish will be natural patina of raw steel (unless specified otherwise; see below).

Finish:
- □ Raw (standard)
- □ Polyester Powder Coat*
- □ Liquid Coat (wet paint)*
  Color:
  *Please specify standard UA color or mfr. name and color code.
- □ Galvanized
- □ Other:

- Frame is load rated for pedestrian traffic only (unless specified otherwise; see below).

Load Classifications:
- □ Pedestrian (standard)
- □ Light Vehicular
- □ H20/HS20
  (Additional steel support may be added for optional load classes. Please contact UA for revised cut sheet, as necessary.)

- Typical 1/8" horizontal gap between grate and frame. All visible welds to be ground smooth on outside edges. Frames will be true to square or diameter. Top of grate flush with grade of surrounding topping material (paver, concrete slab, etc.).

- Dimensions are nominal.

Comments:

Trench Grate Frame

12" Wide Type "S"
Pedestrian Duty

Page: 1 of 1 Date: 5/22/12

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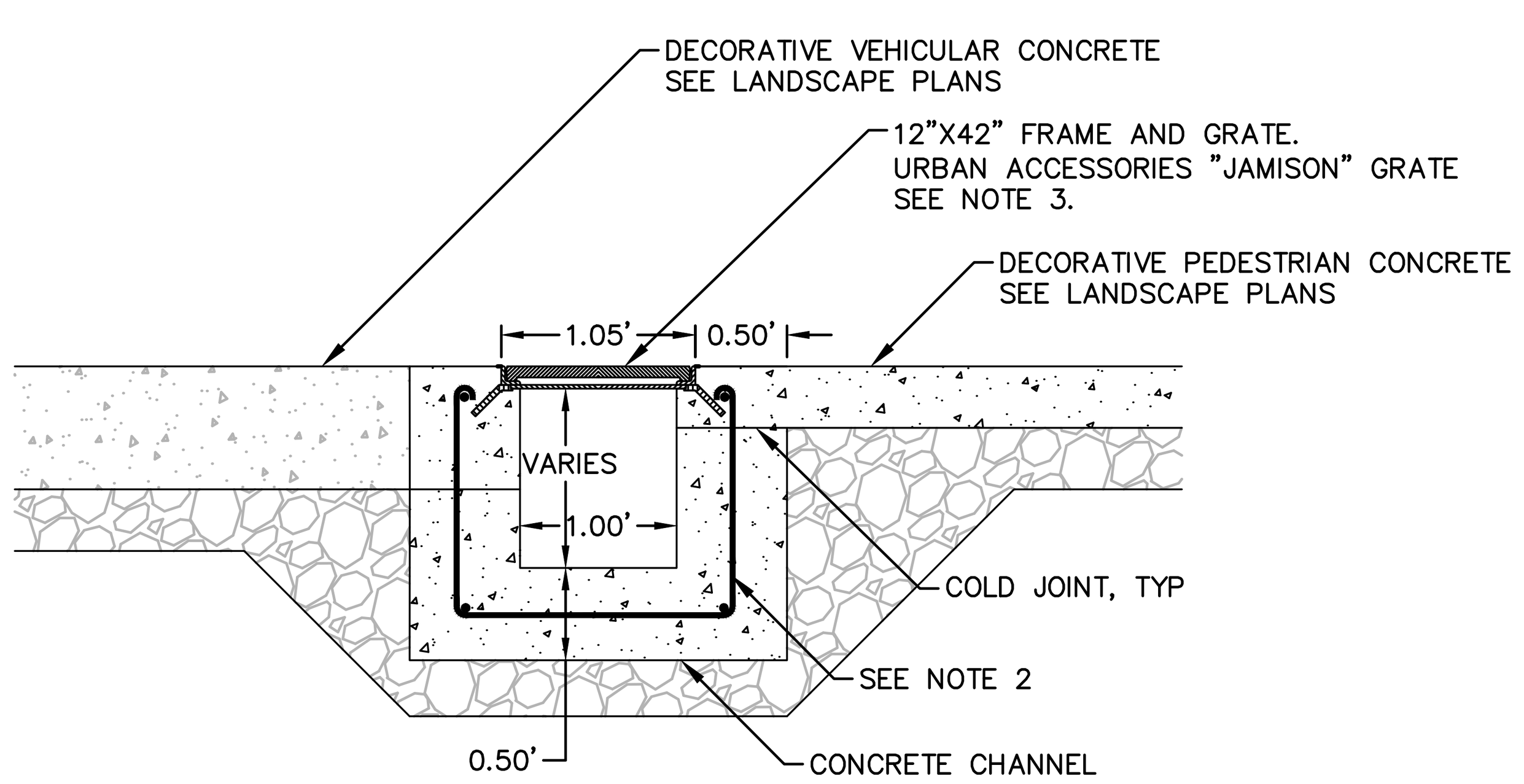
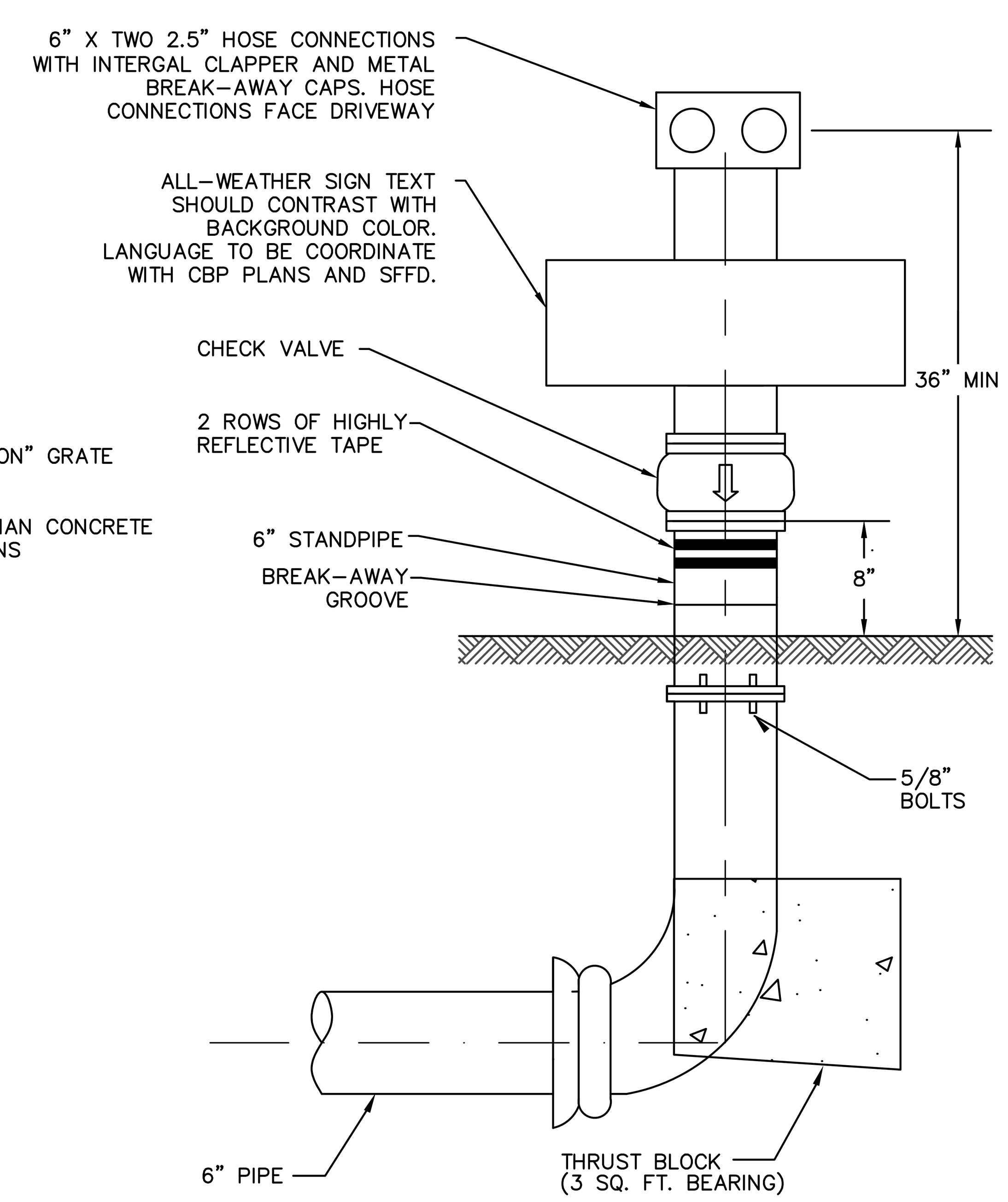
1 **TRENCH DRAIN FRAME AND GRATE**
NTS



1. SLOPE WITHIN TRENCH DRAIN TO PROVIDE AT LEAST 0.5 PERCENT. GRATE SLOPE PER GRADING PLANS ON SHEETS C6.03 AND C6.04.
2. REFER TO DETAIL A/S2.1 FOR STRUCTURAL DESIGN.
3. ALL TRENCH GRATES SHALL BE REMOVABLE, RATED PER THE ANTICIPATED LOADING, AND BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM, FLUSH OR RECESSED IN GRATE.

2 **TRENCH DRAIN SECTION**
NTS



3 **2-WAY FDC ASSEMBLY DETAIL**
NTS

BKF ENGINEERS / SURVEYORS / PLANNERS

Project: Mission Rock Phase 1
Project No: 20080006
Prepared By : Y.Tilden
Date: June 17, 2020

Thrust Block Design (Horizontal)

Input:	
Pressure (P) =	150 psi
Pipe Dia (D) =	6 in
LCC Passive Resistance	2,500 lb/sq.ft
Calculations:	
Pipe Area (A) =	28 sq.in
Thrust Force (T) = 2PAsin Δ/2	
@ Tee or Dead-end =	4,241 lb
@ Elbow (22.5°) =	1,655 lb
@ Elbow (45°) =	3,246 lb
@ Elbow (90°) =	5,998 lb
Area of Thrust Block	
@ Tee or Dead-end =	1.7 sq.ft
@ Elbow (22.5°) =	0.7 sq.ft
@ Elbow (45°) =	1.3 sq.ft
@ Elbow (90°) =	**2.4 sq.ft**

Reference:
AWWA M11 - Manual of Water Supply Practices

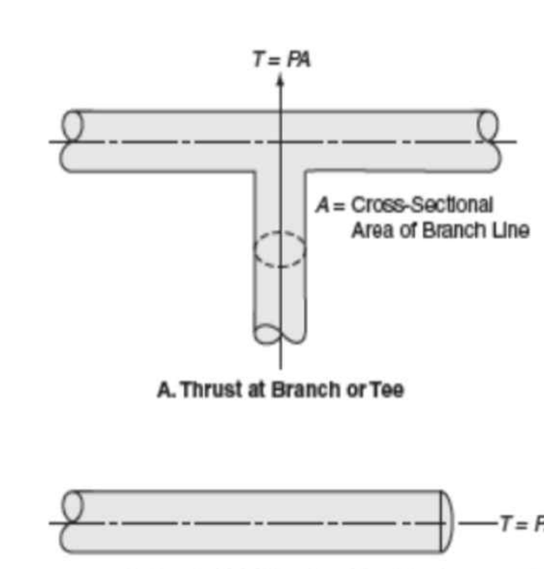


Figure 13-12 Thrust at branch or tee (top), thrust at bulkhead or dead end (bottom)

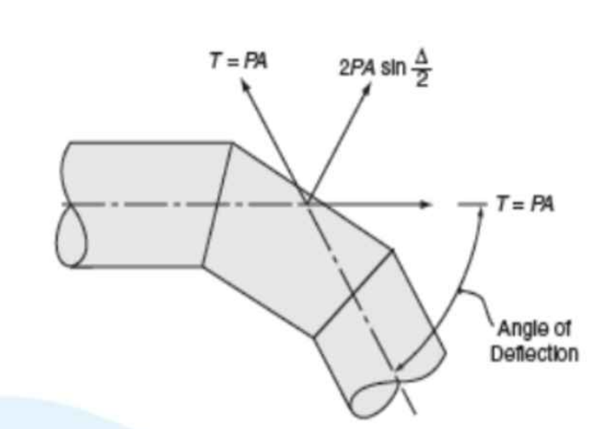
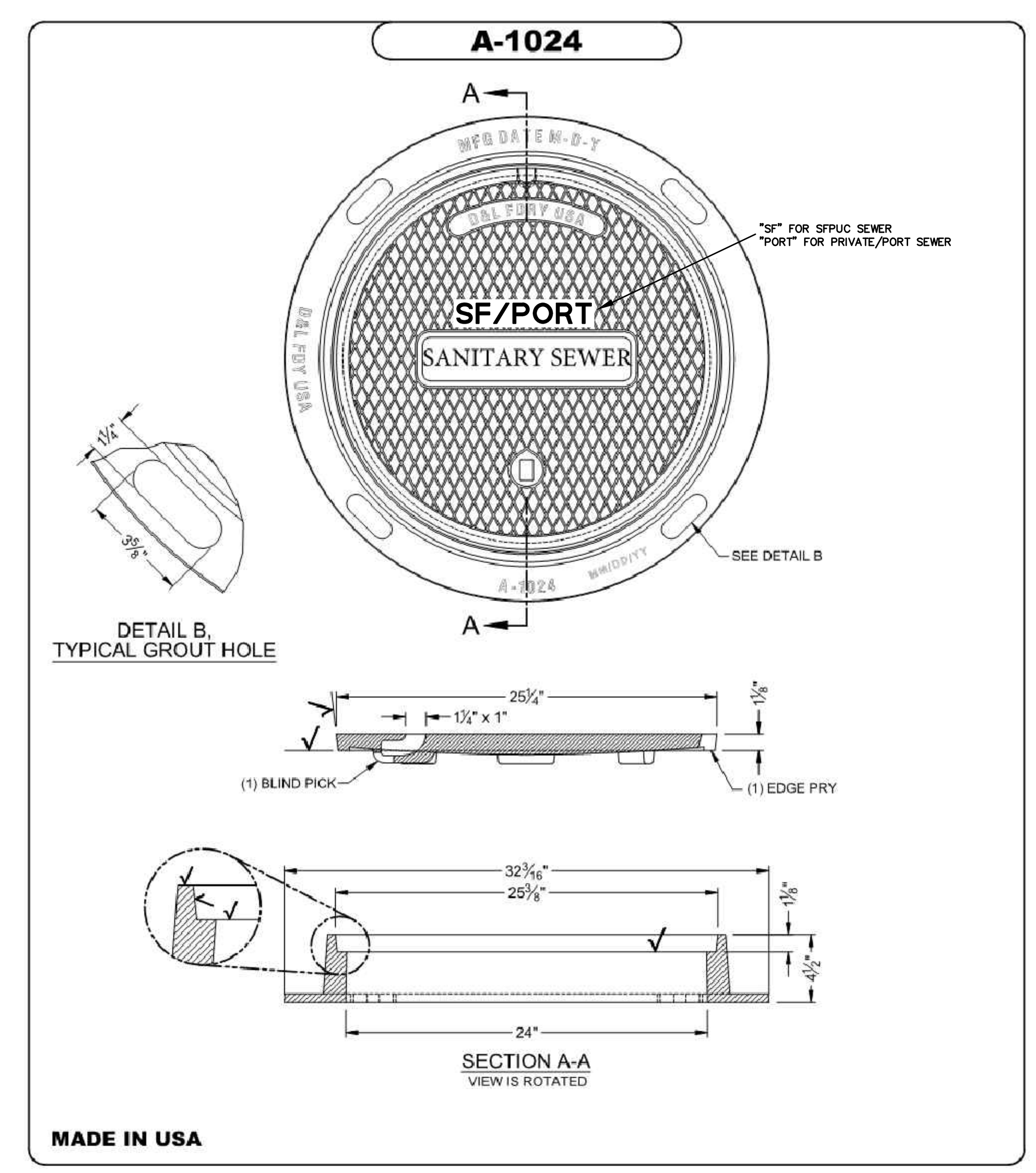


Figure 13-13 Resultant thrust at pipe elbow



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			COVER: A-1024	GRAY IRON: ASTM A-48 CL 35B
			RING: A-1024-R2	GRAY IRON: ASTM A-48 CL 35B
			MEETS: H20 / HS20-44 LOADING	
			B:__D&L SUPPLY CO__\A\A-1024\A-1024_A-1024-R2_SEWER.DWG	

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JAMES W. DALLOSTA JR.
No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
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SAN FRANCISCO COUNTY CALIFORNIA
SAN FRANCISCO

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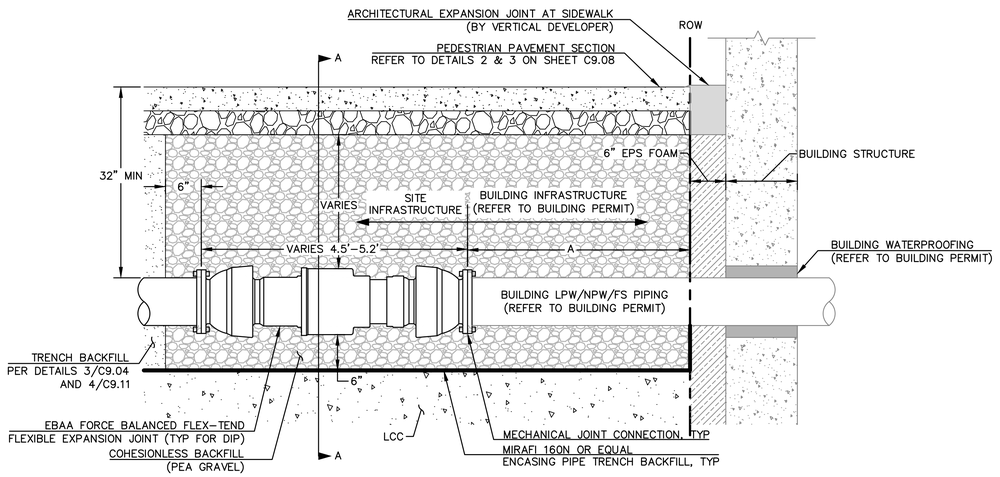
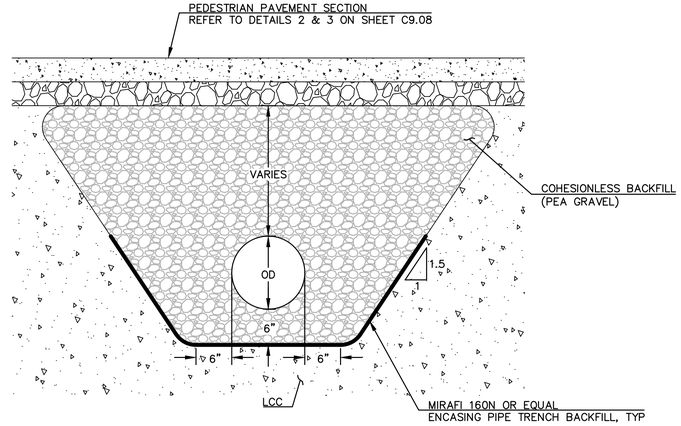




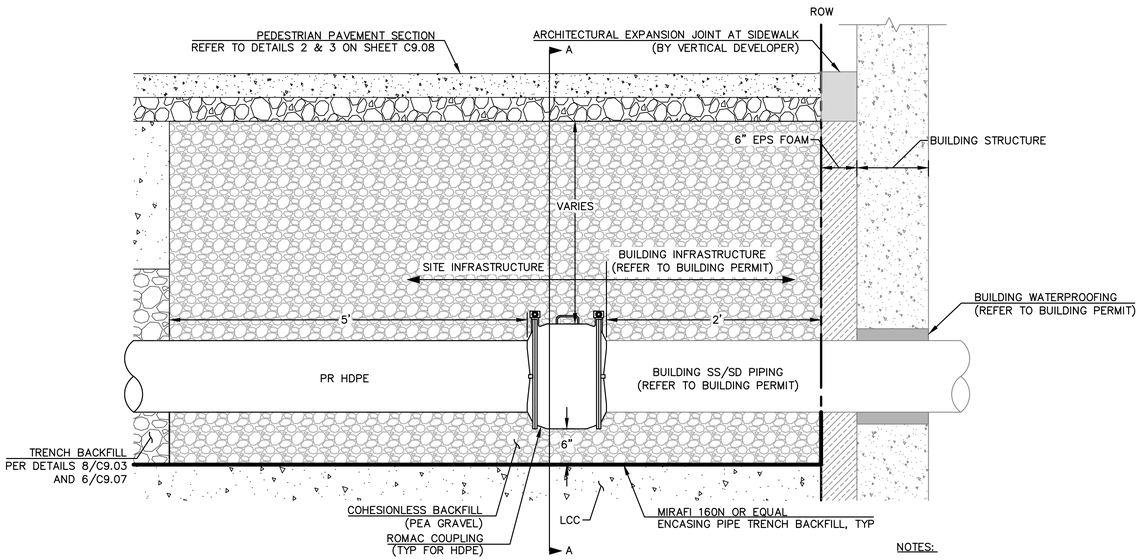
SECTION A-A

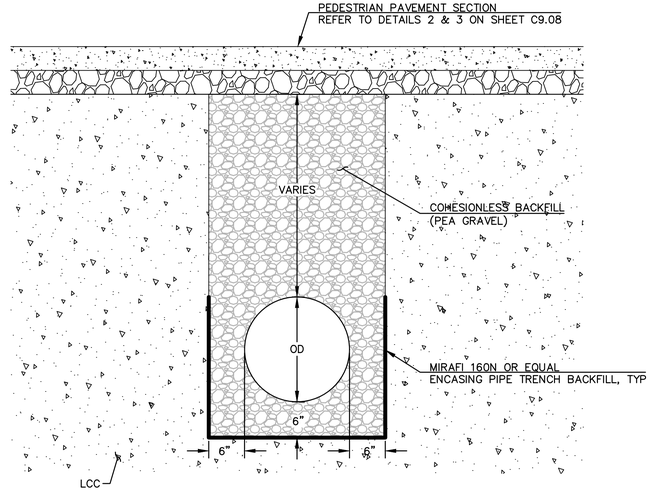
FLEX-TEND SETBACK DISTANCE

	FS	LPW	NPW
		A	
BLOCK A	0	2'-0"	2'-0"
BLOCK B	3'-1"	2'-0"	2'-0"
BLOCK F	0	2'-0"	2'-0"
BLOCK G	0.73'	0.95'	0

NOTES:
1. UNDERGROUND INSTALLATION OF EBAA EXPANSION JOINTS WILL BE PER MANUFACTURER RECOMMENDATIONS, INCLUDING:
   - COHESIONLESS BACKFILL
   - SLOPE SIDE TRENCHES
   - POLYETHYLENE WRAP
2. WATERPROOFER/MEP/STRUCTURAL ENGINEER TO COORDINATE AND SPCIFY WALL PENETRATION MATERIAL, WATERPROOFING DETAIL, ETC.

1 DIP LPW/NPW/FS WALL POINT OF CONNECTION DETAIL
NTS





SECTION A-A

NOTES:
1. WATERPROOFER/MEP/STRUCTURAL ENGINEER TO COORDINATE AND SPCIFY WALL PENETRATION MATERIAL, WATERPROOFING DETAIL, ETC.

2 HDPE SS/SD WALL POINT OF CONNECTION DETAIL
NTS

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REGISTERED PROFESSIONAL ENGINEER, JAMES W. DALLOSTA, No. 72339, CIVIL, STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CONSTRUCTION DETAILS
SAN FRANCISCO COUNTY, CALIFORNIA
SAN FRANCISCO

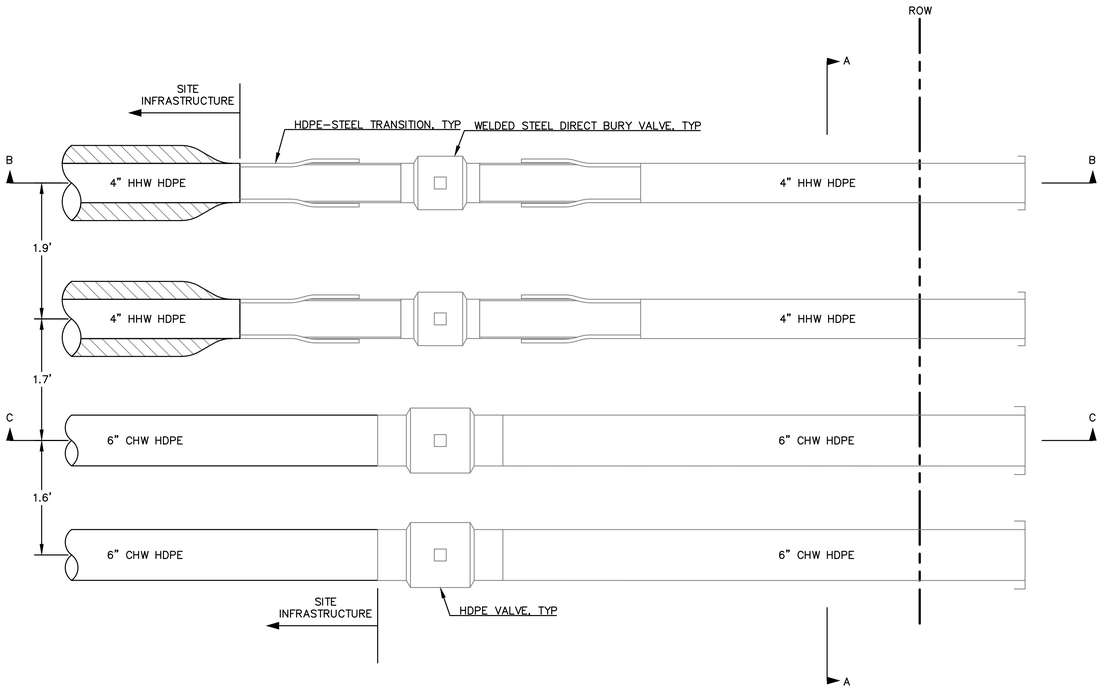
No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
Scale AS SHOWN
Design JW
Drawn KCC/JM
Approved JD
Job No 20080006

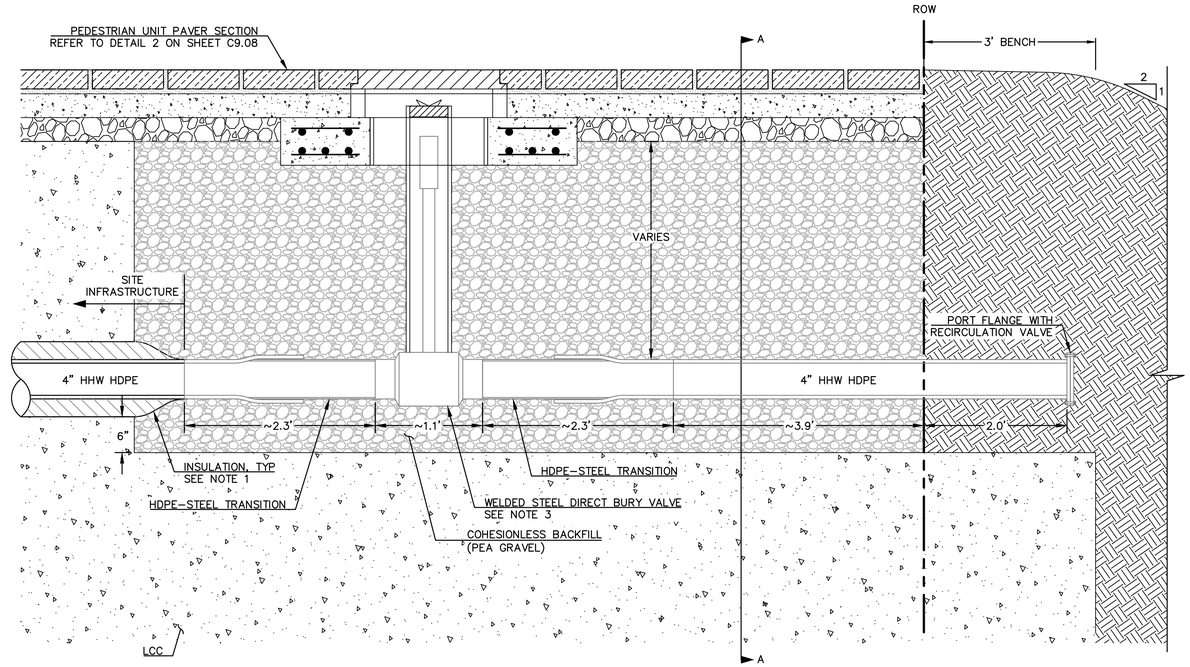
Drawing Number:
C9.13

RECORD DRAWINGS

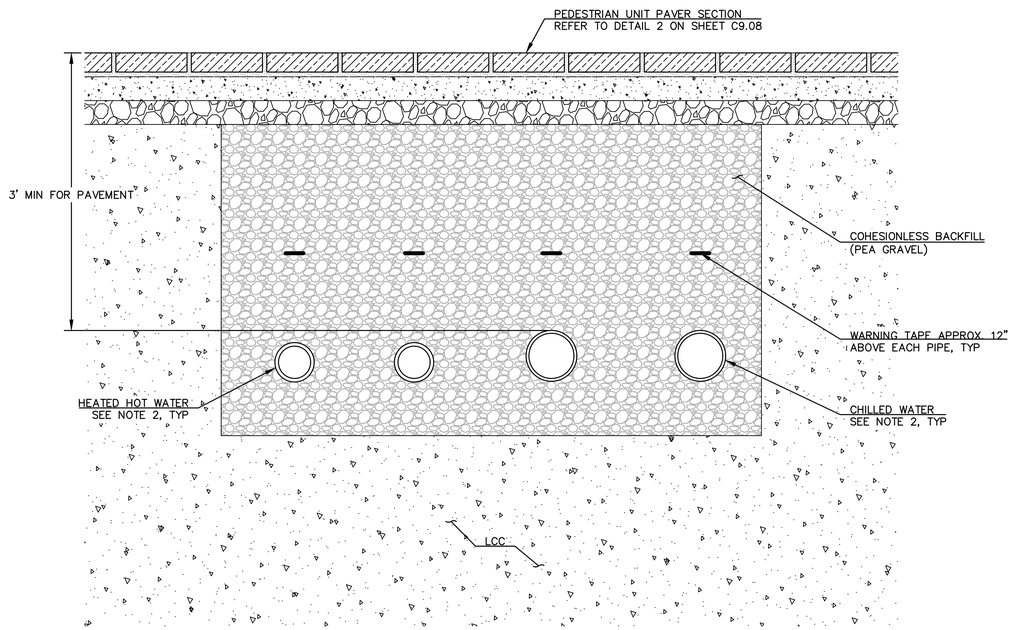
DRAWING NAME: \\bkf-sf\vol4\2008\080006_mission rock\ENG\SIP\plotted sheets\C9.00 - DETAILS.dwg
PLOT DATE: 09-03-24
PLOTTED BY: arra



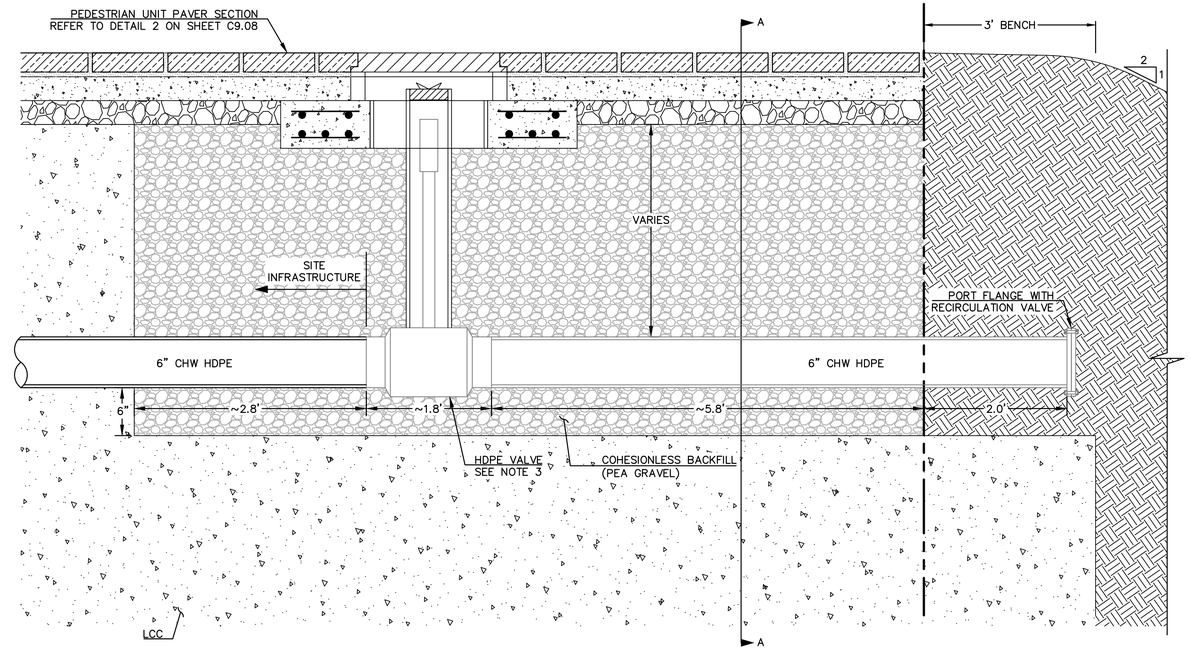
PLAN VIEW



SECTION B-B



SECTION A-A



SECTION C-C

NOTES:

1. INSULATION FOR HEATED HOT WATER PIPING ONLY.
2. REFER TO DETAIL 1 ON SHEET C9.10 FOR TYPICAL DISTRIBUTION PIPE CONFIGURATIONS.
3. WELDED STEEL DIRECT BURY VALVES ONLY WITHIN PORT OPEN SPACE IN BRIDGEVIEW STREET FOR BLOCKS J & K. REFER TO BUILDING PERMIT FOR INTERIOR LOCATION OF VALVES FOR BLOCK A, B, F & G LATERALS.

1 DES WALL POINT OF CONNECTION DETAIL
NTS

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JAMES W. DALLOSTA
No. 72339
CIVIL
STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CONSTRUCTION DETAILS

SAN FRANCISCO COUNTY, CALIFORNIA

SAN FRANCISCO

No.	Revisions
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Job No 20080006

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C9.14

RECORD DRAWINGS

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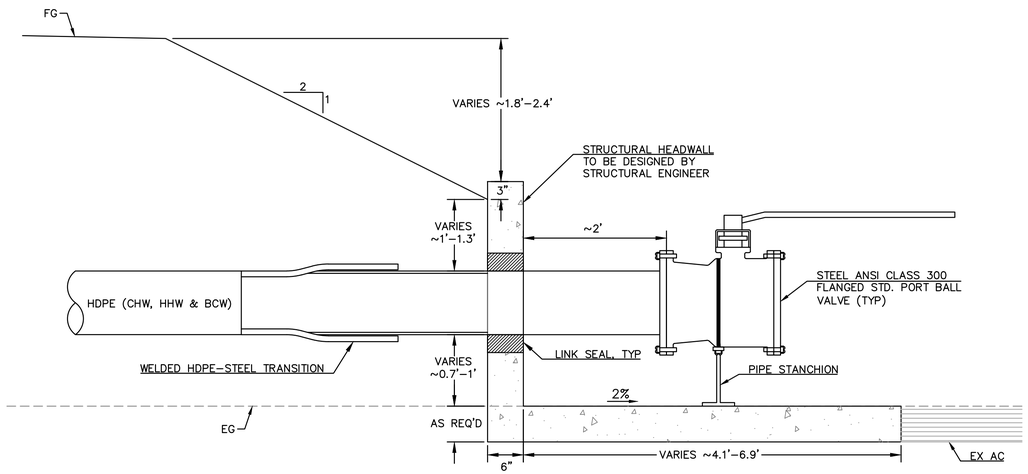
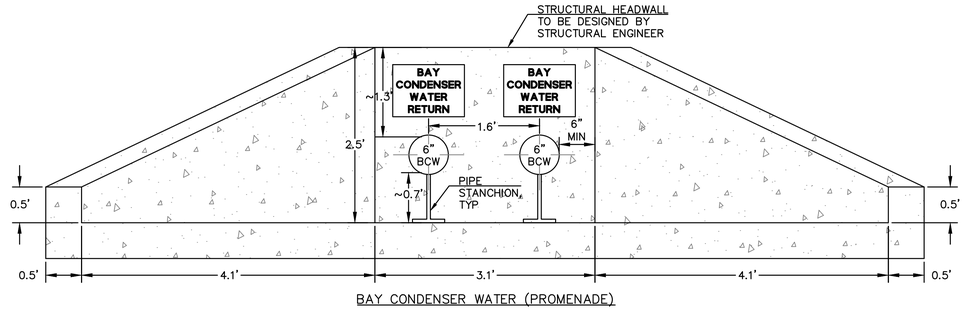
PLOTTED BY: arra

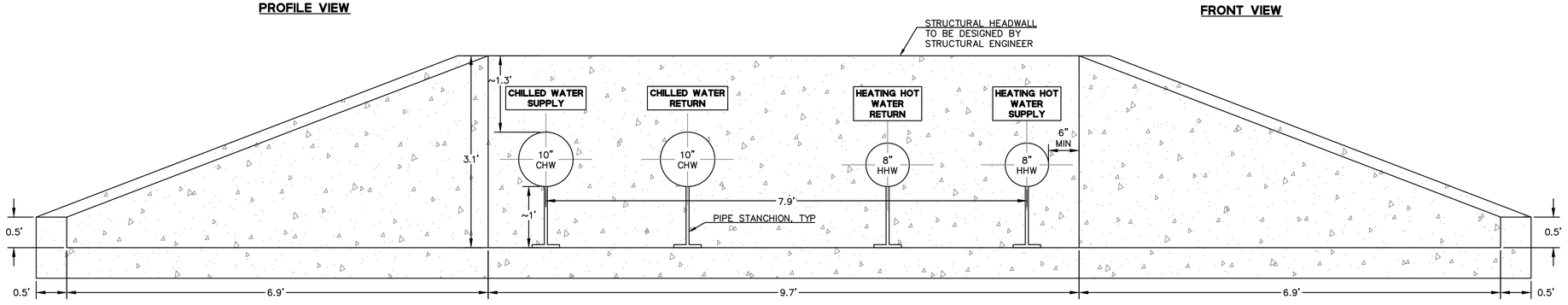


PROFILE VIEW



BAY CONDENSER WATER (PROMENADE)

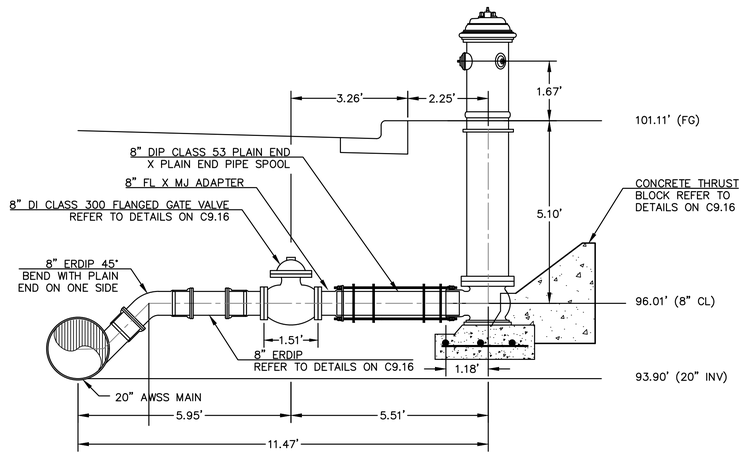
FRONT VIEW



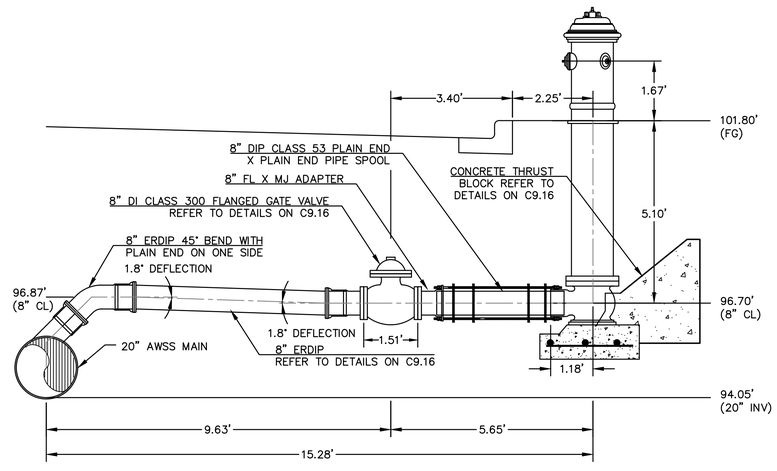
DISTRICT ENERGY (BRIDGEVIEW)

FRONT VIEW

1 TEMPORARY BOILER/CHILLER CONNECTIONS
NTS



2 EXPOSITION STREET AWSS LATERAL – STA E11+70.65
NTS



3 EXPOSITION STREET AWSS LATERAL – STA E16+88.33
NTS

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REGISTERED PROFESSIONAL ENGINEER, JAMES K. DALLOSTA, No. 72339, CIVIL, STATE OF CALIFORNIA

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CONSTRUCTION DETAILS
SAN FRANCISCO COUNTY, CALIFORNIA
SAN FRANCISCO

No.	Revisions
	09/13/2024 – RECORD DRAWINGS

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Job No 20080006

Drawing Number:
C9.15

RECORD DRAWINGS

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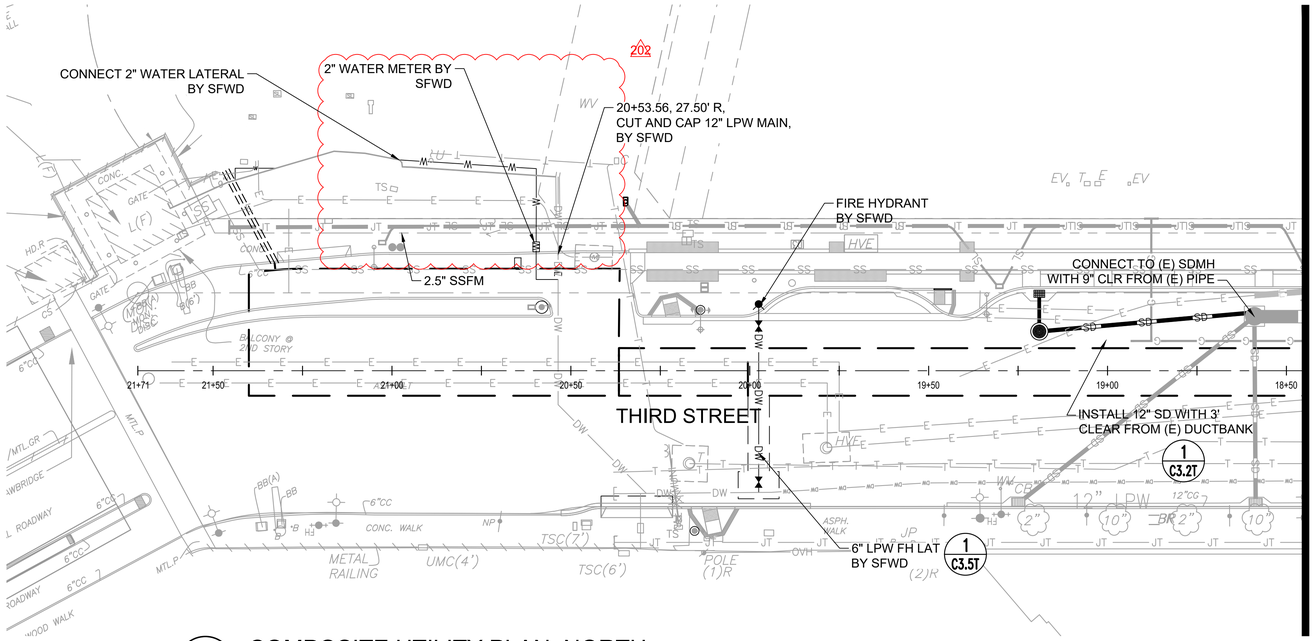
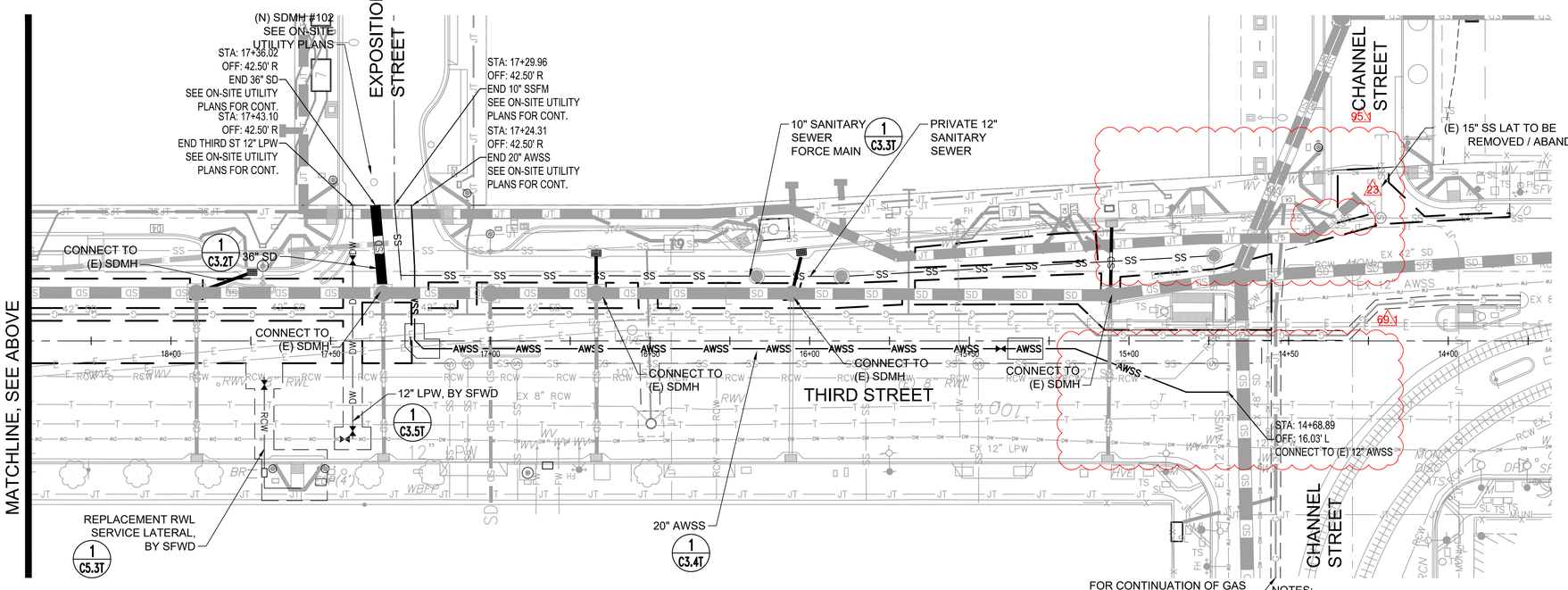
PLOTTED BY: arra



1 C3.1T COMPOSITE UTILITY PLAN, NORTH

SCALE: 1" = 20'



2 C3.1T COMPOSITE UTILITY PLAN, SOUTH

SCALE: 1" = 20'

NOTES:

1. FOR LPW MAIN AND FIRE HYDRANT LATERAL INSTALLATION, SEE DETAILS ON SHEETS C9.04, C9.05 & C9.06.
2. FOR SS AND SD MANHOLE DETAILS, SEE DETAILS 1, 2 & 4 OF SHEET C9.03.
3. FOR FOR CATCH BASIN DETAILS, SEE SHEET C5.2T.
4. FOR AWSS DETAIL, SEE SHEET C5.3T AND C5.4T.
5. LPW AND RWL MAIN LINES: SEE SHEET C0.4T, NOTES 51 A - 51 E.
6. PROJECT WILL COORDINATE WITH SFMTA DURING CONSTRUCTION OF WORK ADJACENT TO SFMTA LIGHT RAIL VEHICLE FACILITIES.
7. LPW LATERAL POC'S ARE APPROXIMATE. RETAIN EXISTING LATERAL WHERE NOT IN CONFLICT WITH PROPOSED BOLLARD FOUNDATION. CONNECT TO EXISTING LATERAL USING HYMAX MECHANICAL JOINT FITTINGS.

RECORD DRAWING

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

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REGISTERED PROFESSIONAL ENGINEER JASON J. LING C60493 EXP. 6/30/24 CIVIL STATE OF CALIFORNIA
4/18/2024

MISSION ROCK PHASE 1
THIRD STREET IMPROVEMENTS
COMPOSITE UTILITY PLAN
SAN FRANCISCO COUNTY CALIFORNIA

No.	Revisions
23	EXISTING SD PIPES
69.1	07/28/2021 – AWSS REROUTE
95.1	07/16/2021 – SS CONNECTION TO EXISTING
202	05/12/2022 – LPW REROUTE
547	02/07/2024 – ST GRADES & PCC REPLACEMENT

Date 04/18/2024
Scale AS SHOWN
Design PP
Drawn PP
Approved FR
Job No 20080006

Drawing Number: C3.1T

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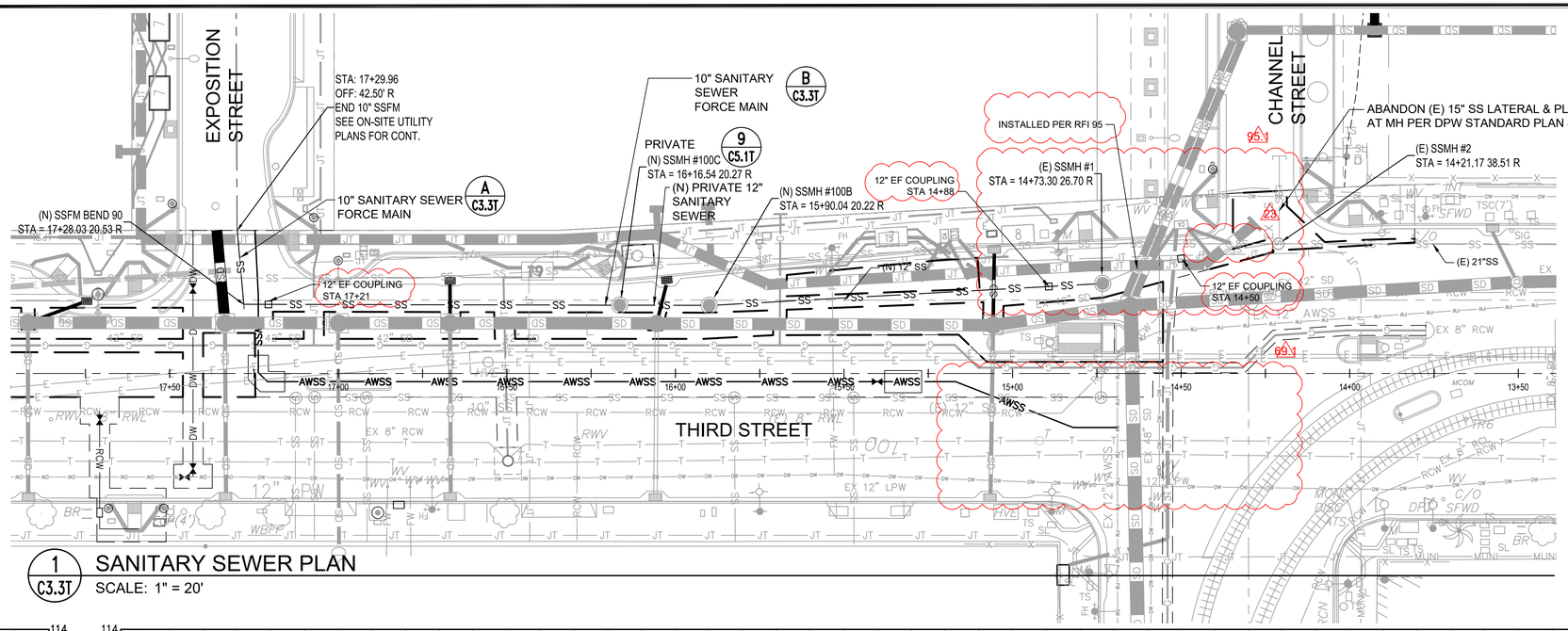
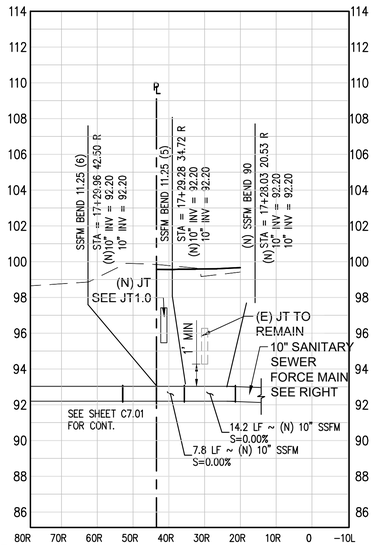
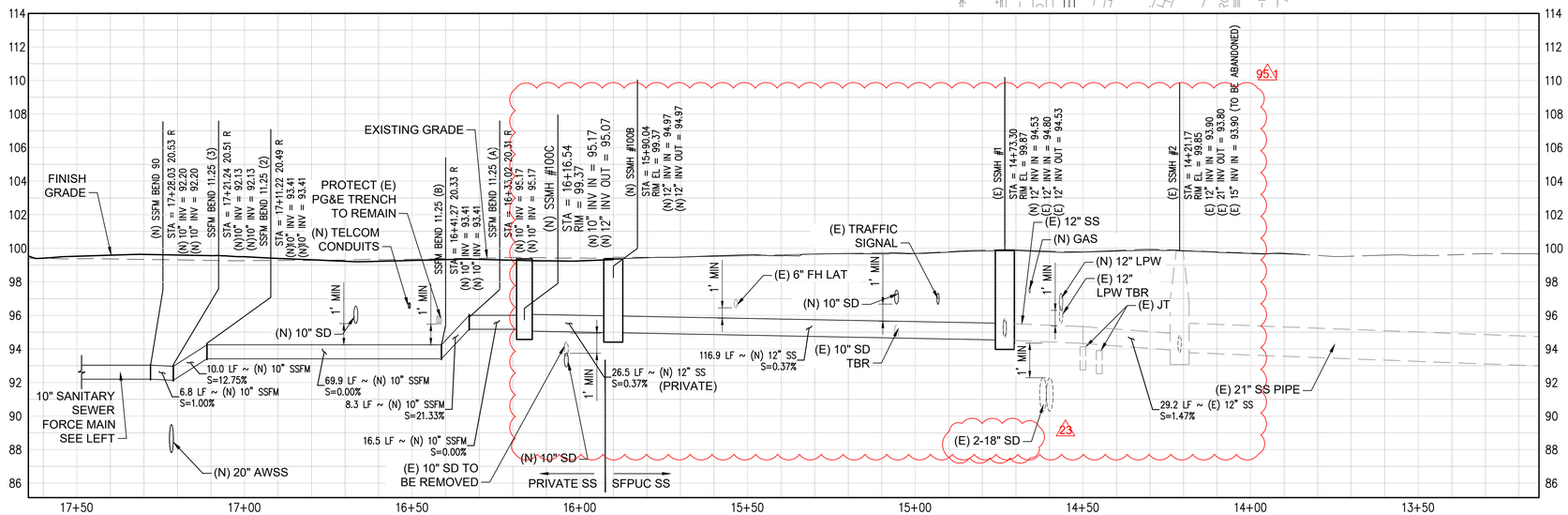
DRAWING NAME: U:\Projects\190225 Mission Rock\D-Drawings\01 Sheets - Third St\C3.1T-C3.5T Utilities.dwg
PLOT DATE: 04-18-24 PLOTTED BY: ppoon



1 C3.3T **SANITARY SEWER PLAN**
SCALE: 1" = 20'



A C3.3T **SANITARY SEWER PROFILE**
SCALE: 1" = 20' H; 1" = 4' V



B C3.3T **SANITARY SEWER PROFILE**
SCALE: 1" = 20' H; 1" = 4' V

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95.1

NOTES:
1. NOT USED
2. SEE SHEET C3.1T FOR UTILITY NOTES.
3. NOT USED
4. AT SSFM BENDS, PROVIDE SWEEP WITH MIN RADIUS 25xO.D.

1"=4' 4' 0 4' 8' VERT
1"=20' 20' 0 20' 40' HORIZ

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REGISTERED PROFESSIONAL ENGINEER JASON J. LING C60493 CIVIL STATE OF CALIFORNIA
9/13/2024

MISSION ROCK PHASE 1
THIRD STREET IMPROVEMENTS
SANITARY SEWER PLAN AND PROFILE

SAN FRANCISCO CALIFORNIA
SAN FRANCISCO COUNTY

No.	Revisions
	09/13/2024 – RECORD DRAWINGS

Date 09/13/2024
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Design PP
Drawn PP
Approved FR
Job No 20080006

Drawing Number: C3.3T

RECORD DRAWINGS

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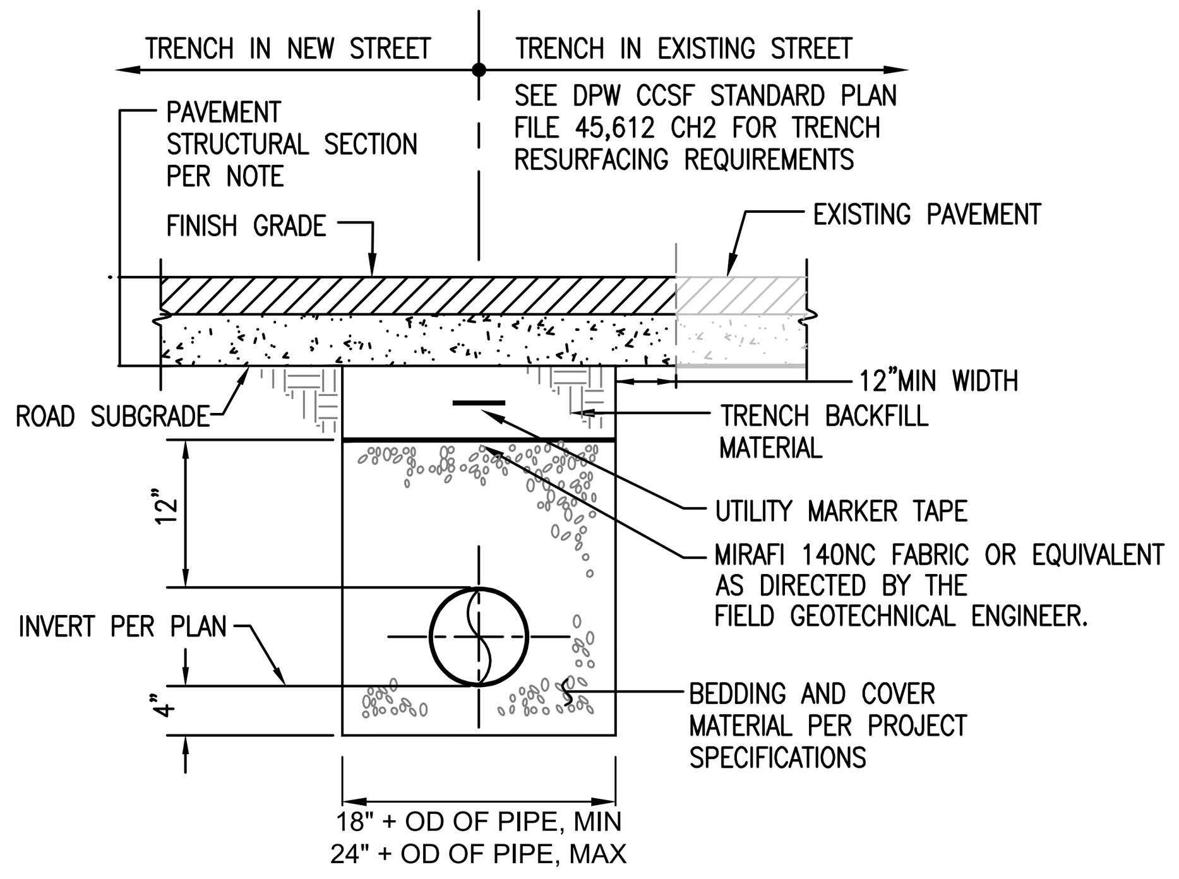
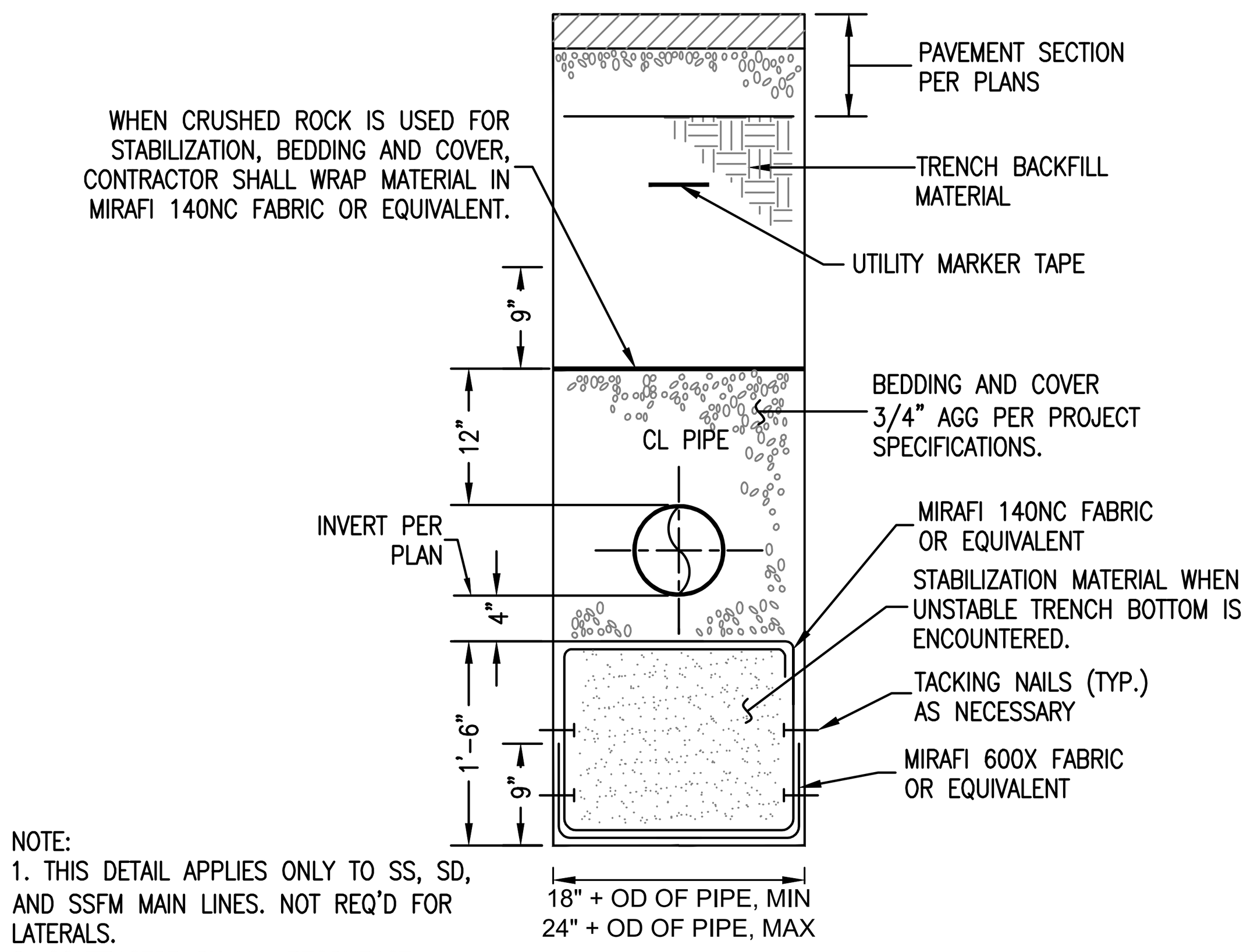
DRAWING NAME: U:\Projects\190225 Mission Rock\D-Drawings\01 Sheets - Third St\C3.1T-C3.5T Utilities.dwg
PLOT DATE: 09-13-24
PLOTTED BY: ppoon



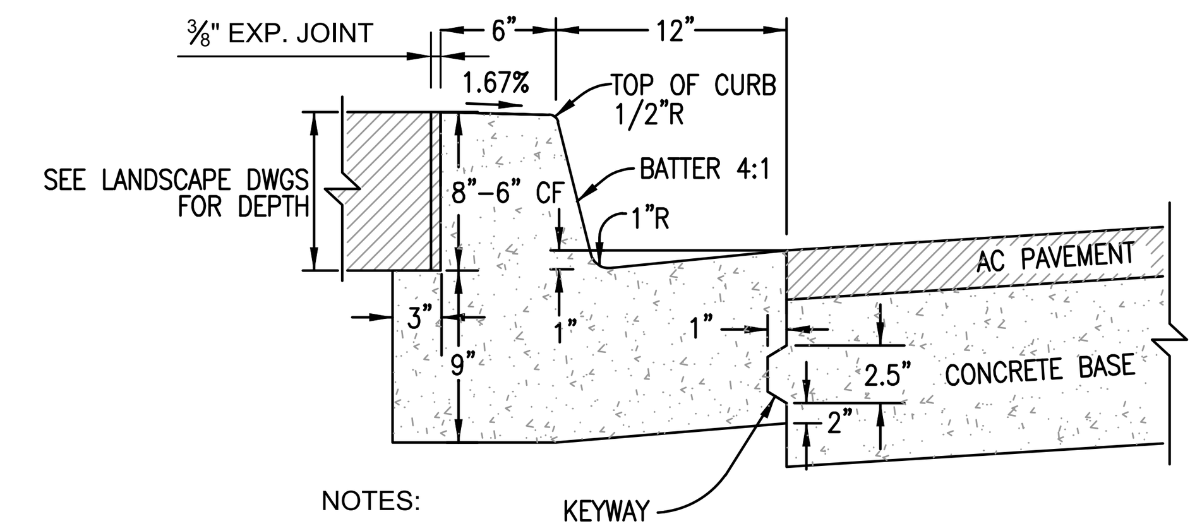
NOTE:
1. BEDDING AND COVER MATERIAL SHALL BE SAND FOR LPW AND RCW.
2. CONTRACTOR SHALL RECOMPACT SUBGRADE AS APPROVED BY THE GEOTECHNICAL ENGINEER.

1 / C5.1T
TYPICAL TRENCH SECTION
SCALE: NO SCALE



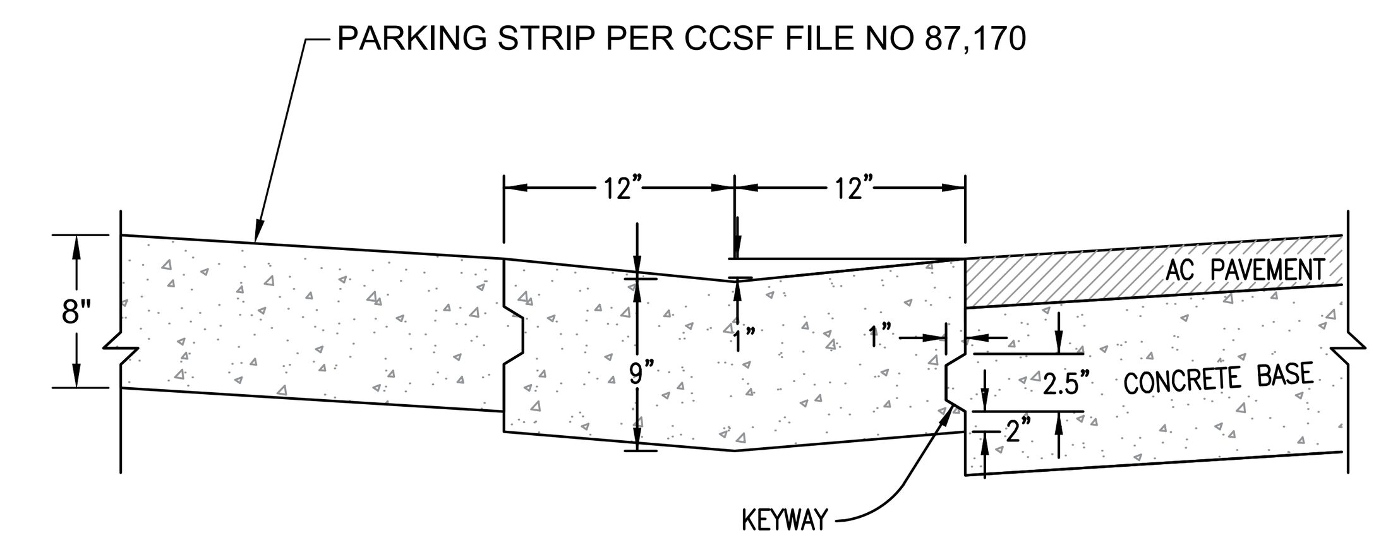
NOTE:
1. THIS DETAIL APPLIES ONLY TO SS, SD, AND SSFM MAIN LINES. NOT REQ'D FOR LATERALS.
2. CONTRACTOR SHALL RECOMPACT SUBGRADE AS APPROVED BY THE GEOTECHNICAL ENGINEER.

2 / C5.1T
UTILITY MAIN TRENCH SECTION W / STABILIZATION
SCALE: NO SCALE



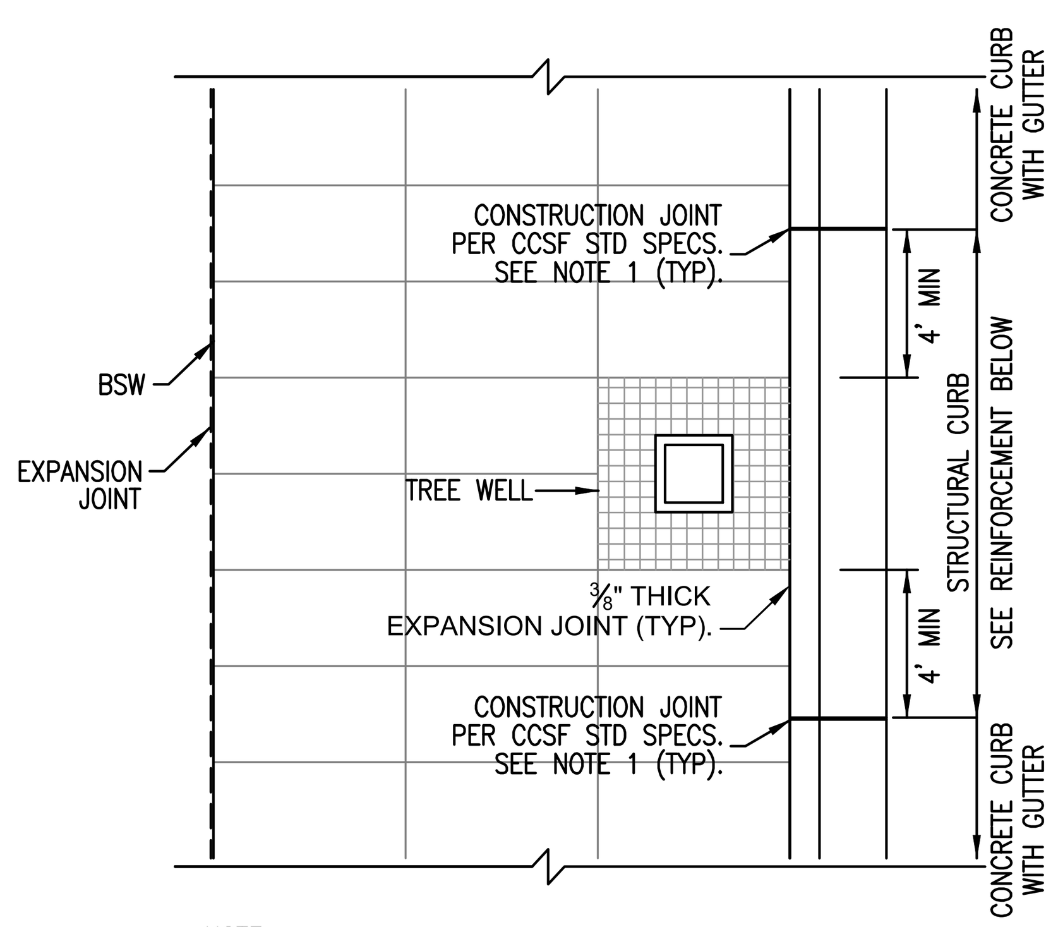
NOTES:
1. CURB/GUTTER DETAIL VARIES AT TREE WELL LOCATIONS. REFER TO STRUCTURAL CURB DETAIL FOR INSTALLATION OF REINFORCEMENT.
2. CONSTRUCTION JOINTS SHALL BE INSTALLED THROUGH CONCRETE CURB.GUTTER, PER CCSF STANDARDS, AT INTERVALS NOT TO EXCEED 7.5 FEET.
3. WHERE THERE IS EXISTING CURB.GUTTER TO MATCH, CONTRACTOR SHALL MATCH EXISTING DIMENSIONS OF LONGITUDINAL JOINTS.
4. REFER TO GRADING PLAN FOR CURB FACE TRANSITION FROM 8" TO 6" CURB FACE (CF).
5. EXPANSION JOINTS TO MATCH THOSE PROVIDED IN SIDEWALK.

3 / C5.1T
REVISED CITY STANDARD CURB/GUTTER DETAIL
SCALE: NO SCALE

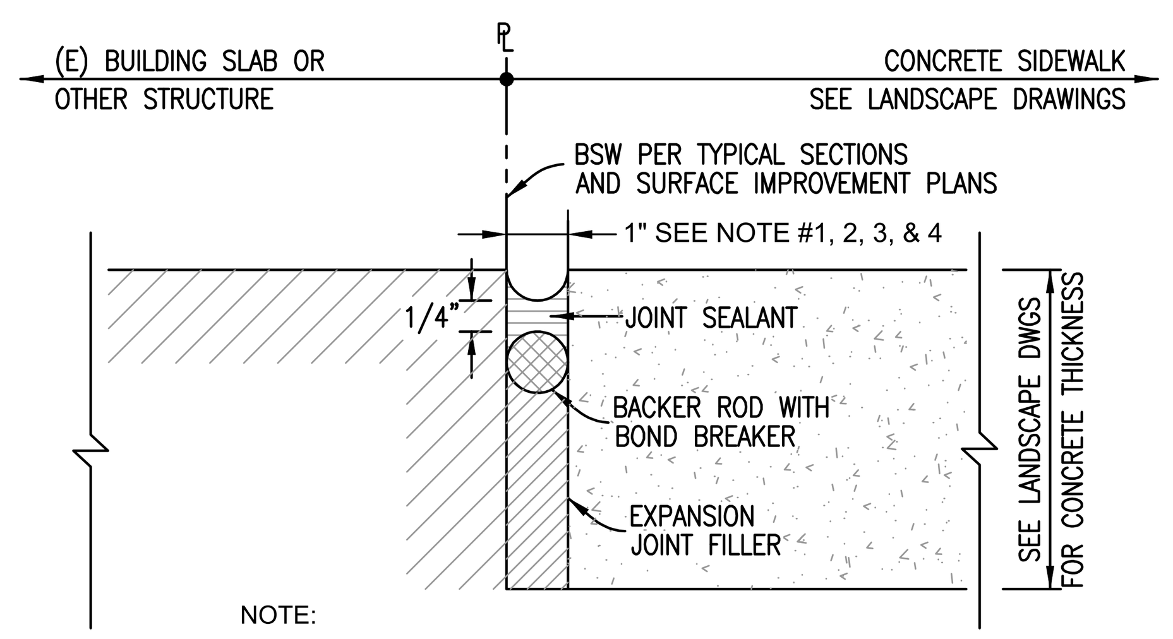


NOTES:
1. CONSTRUCTION JOINTS SHALL BE INSTALLED THROUGH CONCRETE VALLEY GUTTER PER CCSF STANDARDS, AT INTERVALS NOT TO EXCEED 7.5 FEET.

4 / C5.1T
REVISED CITY STANDARD VALLEY GUTTER DETAIL
SCALE: NO SCALE

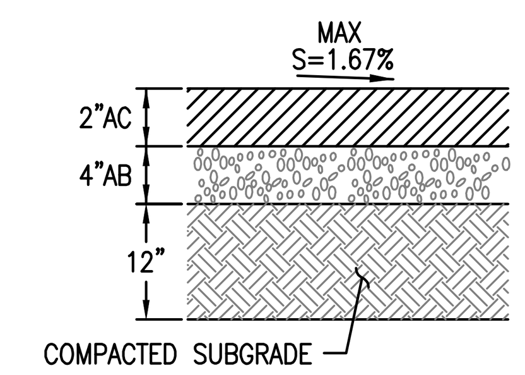


NOTE:
1. CONSTRUCTION JOINTS SHALL BE INSTALLED THROUGH CONCRETE CURB AND GUTTER, PER CCSF STANDARDS, AT INTERVALS NOT TO EXCEED 7.5 FEET.



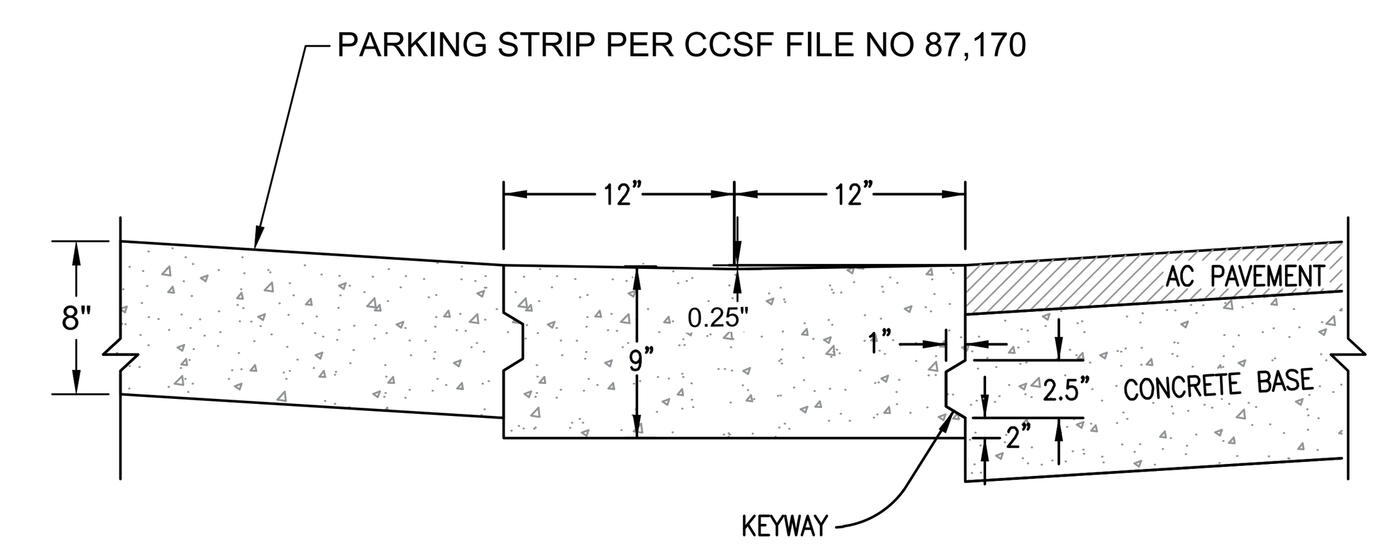
NOTE:
1. ⅜" THICK EXPANSION JOINT SHALL BE INSTALLED AT BOC (BACK OF CURB) PER DETAILS 3 & 5 OF THIS PLAN SHEET.
2. 1" THICK EXPANSION JOINT SHALL BE INSTALLED BETWEEN BSW AND EXISTING STRUCTURES.
3. WHERE NO BUILDING EXISTS AT THE PROPERTY LINE BUT MAY BE BUILT AT THE BSW IN THE FUTURE, LEAVE A 1' GAP FROM BSW TO THE PROPERTY LINE.
4. WHERE JOINT IS ACROSS PEDESTRIAN ACCESS ROUTE, REDUCE EXPANSION JOINT THICKNESS TO ⅜" PER ADA REQUIREMENTS.

6 / C5.1T
EXPANSION JOINT
SCALE: NO SCALE



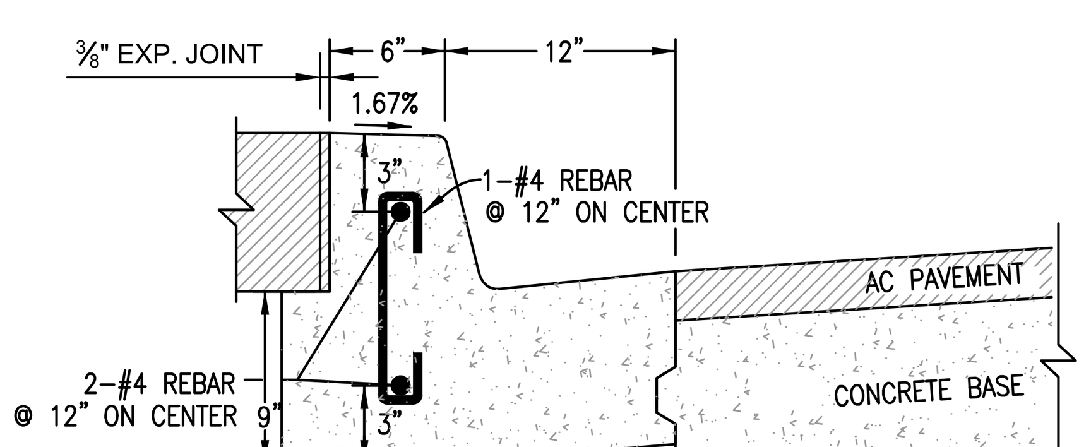
NOTES:
1. AGGREGATE BASE SHALL BE CLASS 2 PER THE PROVISIONS IN SECTION 26, "AGGREGATE BASES", OF THE CALTRANS STANDARD SPECIFICATIONS AND COMPACTED TO A RELATIVE COMPACTION OF 95%.
2. ASPHALT CONCRETE WALK SHALL BE TYPE "B" 1/2" MAX MEDIUM PER THE PROVISIONS IN SECTION 39, "ASPHALT CONCRETE".
3. ALL WALKS SHALL BE CROSS SLOPED S=1.67% (TYP) TOWARDS THE STREET.

7 / C5.1T
TEMPORARY ASPHALT CONCRETE SIDEWALK
SCALE: NO SCALE



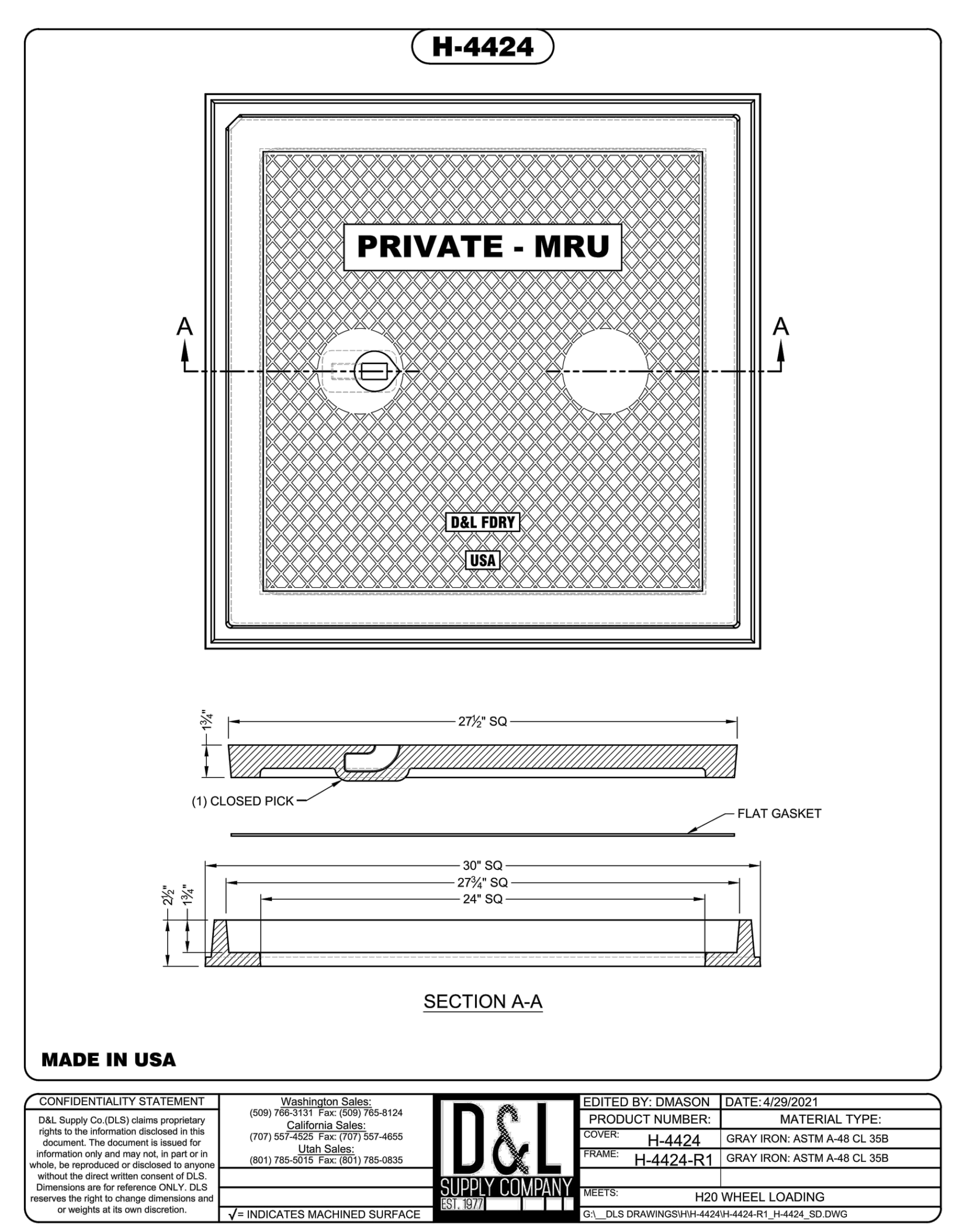
NOTES:
1. CONSTRUCTION JOINTS SHALL BE INSTALLED THROUGH CONCRETE VALLEY GUTTER PER CCSF STANDARDS, AT INTERVALS NOT TO EXCEED 7.5 FEET.

8 / C5.1T
REVISED CITY STANDARD VALLEY GUTTER DETAIL (ADA ACCESS)
SCALE: NO SCALE



NOTES:
1. FOR DIMENSIONS NOT SHOW, REFER TO REVISED CITY STANDARD CURB/GUTTER DETAIL

5 / C5.1T
STRUCTURAL CURB/GUTTER AT TREE WELL LOCATIONS
SCALE: NO SCALE



9 / C5.1T
PRIVATE SSMH#100C MANHOLE COVER
SCALE: NO SCALE

NOTE:
1. SEE 8 / C9.00 FOR SIDEWALK CONCRETE REINFORCEMENT REQUIREMENTS.

RECORD DRAWING

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4/18/2024

MISSION ROCK PHASE 1
THIRD STREET IMPROVEMENTS
DETAILS
SAN FRANCISCO SAN FRANCISCO COUNTY CALIFORNIA

No.	Revisions
23	EXISTING SD PIPES
69.1	07/28/2021 – AWSS REROUTE
95.1	07/16/2021 – SS CONNECTION TO EXISTING
202	05/12/2022 – LPW REROUTE
547	02/07/2024 – ST GRADES & PCC REPLACEMENT

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Scale	AS SHOWN
Design	PP
Drawn	PP
Approved	FR
Job No	20080006

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Drawing Number: C5.1T

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DRAWING NAME: U:\Projects\190225 Mission Rock\D-Drawings\01 Sheets - Third St\C5.1T-C5.2T Details.dwg
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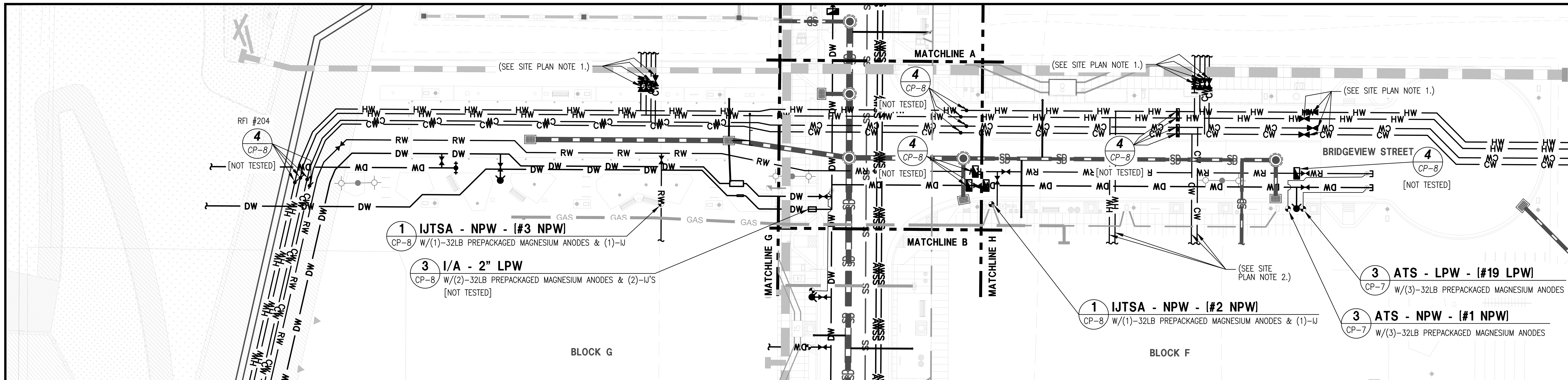
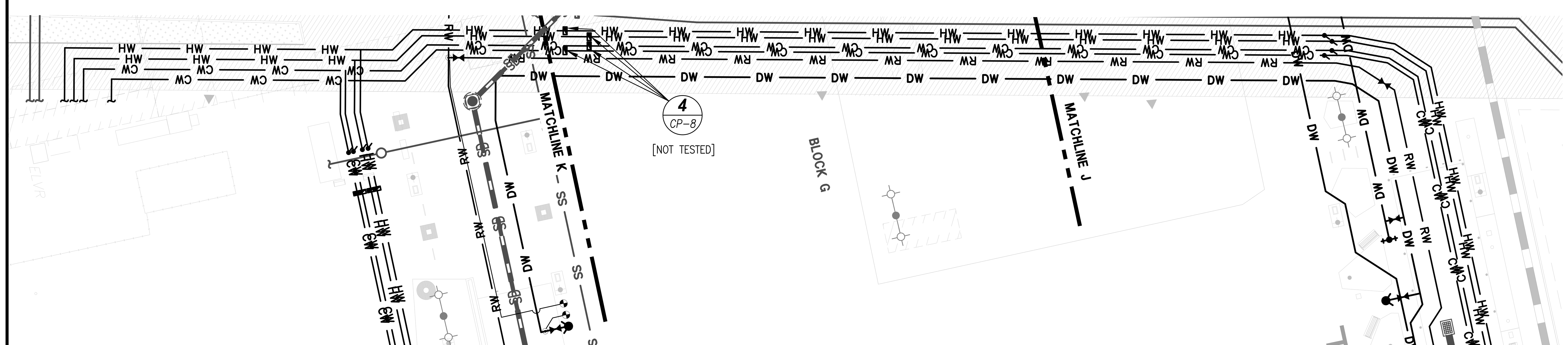


SITE PLAN NOTES:
1. COAT THE VALVES OF THE CW & HW PIPELINES WITH WAX TAPE COATING, SIMILAR TO DETAIL 5/CP-9. FOR HOT WATER PIPE USE TRENTON TEMCOAT PRIMER 3000, WAX-TAPE HT-3000, & GUARD-WRAP.
2. COAT THE STEEL STUB OUTS OF THE CW & HW PIPELINES WITH WAX TAPE COATING, SIMILAR TO DETAIL 5/CP-9. FOR HOT WATER PIPE USE TRENTON TEMCOAT PRIMER 3000, WAX-TAPE HT-3000, & GUARD-WRAP.

1 / CP-6 — *CATHODIC PROTECTION SITE PLAN 1 - BRIDGEVIEW STREET*
NOT TO SCALE



2 / CP-6 — *CATHODIC PROTECTION SITE PLAN 2 - CHINA BASIN PARK*
NOT TO SCALE

KEY

- LOCATION OF TEST STATION (NOT TO SCALE)
- CONDUIT WITH ANODE HEADER CABLES AND PIPE CABLES
- APPROXIMATE LOCATION OF CABLE-TO-PIPE CONNECTIONS (NOT TO SCALE)

RECORD DRAWING

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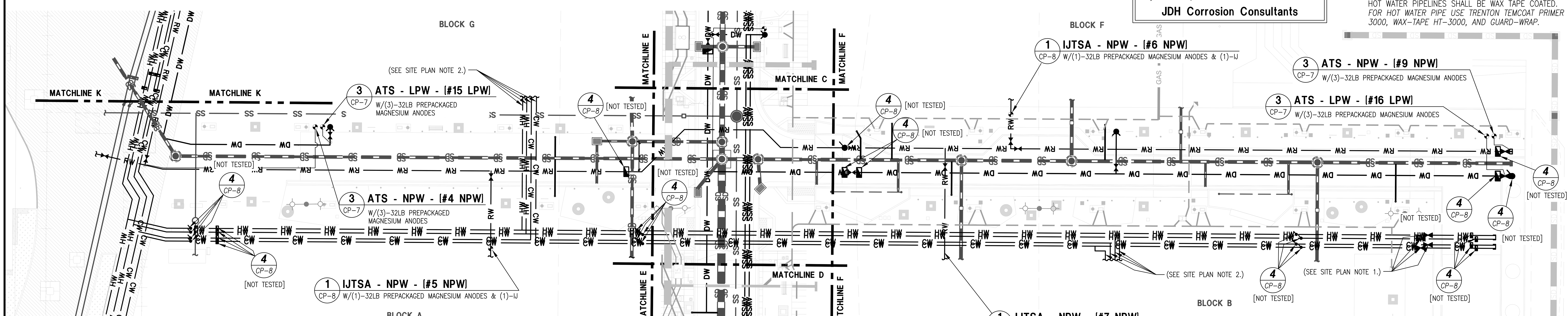
JDH Corrosion Consultants



SITE PLAN NOTES:
1. COAT THE VALVES OF THE CW & HW PIPELINES WITH WAX TAPE COATING, SIMILAR TO DETAIL 5/CP-9. FOR HOT WATER PIPE USE TRENTON TEMCOAT PRIMER 3000, WAX-TAPE HT-3000, & GUARD-WRAP.
2. COAT THE STEEL STUB OUTS OF THE CW & HW PIPELINES WITH WAX TAPE COATING, SIMILAR TO DETAIL 5/CP-9. FOR HOT WATER PIPE USE TRENTON TEMCOAT PRIMER 3000, WAX-TAPE HT-3000, & GUARD-WRAP.

3 / CP-6 — *CATHODIC PROTECTION SITE PLAN 3 - SHARED PUBLIC WAY*
NOT TO SCALE

CATHODIC PROTECTION GENERAL NOTES:

1. A CATHODIC PROTECTION SYSTEM USING PREPACKAGED HIGH POTENTIAL MAGNESIUM ANODES SHALL BE INSTALLED ON ALL NEW DUCTILE IRON PIPELINES. CORROSION PROTECTION FOR THE WATER PIPELINES SHALL CONSIST OF PREPACKAGED MAGNESIUM ANODES INSTALLED AT THE TEST STATION LOCATIONS SHOWN ON THE CATHODIC PROTECTION SITE PLANS.
2. THE NUMBER OF ANODES PER INSULATING JOINT TEST STATION W/ANODES (IJTSA) AND ANODE TEST STATION (ATS) SHALL BE AS INDICATED ON THE CATHODIC PROTECTION SITE PLAN ON SHEET CP-6.
3. THE AWSS PIPELINE SHALL IN ADDITION BE CATHODICALLY PROTECTED BY A ZINC RIBBON ANODE FOR THE FULL LENGTH OF THE PIPELINE.
4. THE NEW PIPELINES SHALL BE ELECTRICALLY ISOLATED FROM BUILDINGS USING DIELECTRIC INSULATING FLANGES.
5. ALL NON-WELDED, NON-INSULATING PIPE JOINTS FOR THE NEW 12 TO 20 INCH DIAMETER PIPELINES SHALL BE BONDED WITH TWO (2) #4 AWG/HMWPE INSULATED BOND CABLES PER JOINT; NEW 10 INCH DIAMETER PIPELINES AND SMALLER SHALL BE BONDED WITH ONE, #4 AWG/HMWPE INSULATED BOND CABLE PER JOINT, FOR ELECTRICAL CONTINUITY OF THE ENTIRE BURIED LENGTH OF THE NEW PIPELINES. FOR FIRE HYDRANTS AND OTHER LATERALS TO BUILDINGS USE ONE #8 AWG/HMWPE BOND CABLE PER JOINT.
6. THE ATS – ANODE TEST STATION, AND THE IJTSA – INSULATING JOINT TEST STATION W/ANODES FOR THE LPW LINES AND AWSS LINE SHALL BE INSTALLED IN THE LOCATIONS SHOWN IN THE SITE PLAN. THE CABLES FROM THE ANODES AS WELL AS THE PIPE SHALL BE INSTALLED IN 1" DIAMETER, SCH. 40 PVC CONDUIT WHICH SHALL BE RUN 1" OFF THE PIPE OR FIRE HYDRANT LATERAL. THE TEST STATIONS SHALL BE INSTALLED IN THE SIDEWALK OR PLANTER AREA.
7. ALL FUTURE CONNECTIONS TO THE CAPPED UTILITIES INSTALLED DURING THIS PROJECT SHALL BE ELECTRICALLY ISOLATED FROM THE PIPELINES FOR THIS PROJECT PER DETAIL 2/CP-2.
8. ALL LATERALS FOR AWSS, LPW & RW LINES SHALL BE ELECTRICALLY ISOLATED AT THE METER CONNECTION OR IF THERE IS NO METER THE LATERALS SHALL BE ELECTRICALLY ISOLATED AT THE PROPERTY LINE AND AT THE RISER.
9. ALL DUCTILE IRON MAIN LINES AND LATERALS SHALL BE ENCASED IN 8-MIL POLYETHYLENE SHEETING PER AWWA C105. COAT ALL BURIED NUTS & BOLTS WITH BITUMASTIC. POLYETHYLENE ENCASEMENT MAY BE OMITTED FROM EPOXY COATED VALVES AND FITTINGS. OMIT BITUMASTIC FOR STAINLESS STEEL BOLTS & NUTS.
10. ALL OFFSITE COPPER LATERALS SHALL BE PRIMED AND TAPE COATED WITH A MINIMUM OF 35MIL HALF-LAPPED PIPELINE TAPE SUCH AS POLYKEN 930 WITH 1027 PRIMER OR EQUAL. ALL ONSITE COPPER LATERALS SHALL BE ENCASED IN 6-MIL POLYETHYLENE SLEEVING.
11. ALL COPPER LATERALS SHALL BE CATHODICALLY PROTECTED PER DETAIL 3/CP-8 & 4/CP-8 WITH THE SIZE OF THE MAGNESIUM ANODE INDICATED ON THE CATHODIC PROTECTION SITE PLANS.
12. THE STORM DRAIN AND SANITARY SEWER FORCE MAIN STUB OUTS, AND THE VALVES ON THE COLD WATER & HOT WATER PIPELINES SHALL BE WAX TAPE COATED. *FOR HOT WATER PIPE USE TRENTON TEMCOAT PRIMER 3000, WAX-TAPE HT-3000, AND GUARD-WRAP.*

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STATE OF CALIFORNIA
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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CATHODIC PROTECTION SITE PLANS 1-3, KEY & NOTES

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No.	Revisions
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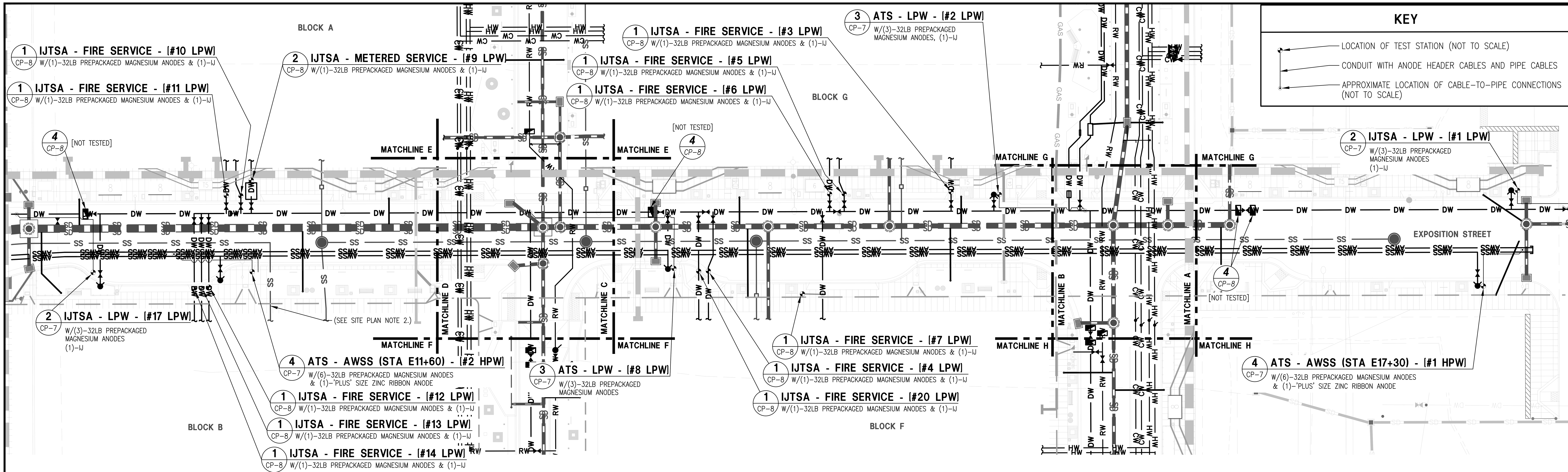
RECORD DRAWINGS

DRAWING NAME: H:\Project Folders\2021 Contracts\2021066 – BKF – Mission Rock, Phase 1, SIP, SF\Design\CP Mission Rock Phase1, SIP Rev2.0R Plans.dwg
PLOT DATE: 07-31-24 PLOTTED BY: therink



KEY

- LOCATION OF TEST STATION (NOT TO SCALE)
- CONDUIT WITH ANODE HEADER CABLES AND PIPE CABLES
- APPROXIMATE LOCATION OF CABLE-TO-PIPE CONNECTIONS (NOT TO SCALE)

SITE PLAN NOTE:
1. PROVIDE ONE ZINC RIBBON ANODE EXTENDING FROM AWSS ATS AT STA E11+60 TO AWSS ATS AT STA E17+30. FOR RIBBON ANODE SPLICE TO RIBBON ANODE SPLICE CONNECTION SEE DETAIL 6/CP-10.
2. COAT THE FERROUS METALL STUB OUTS OF THE SS FORCEMAN WITH WAX TAPE COATING, SIMILAR TO DETAIL 5/CP-9.

1 CP-7 CATHODIC PROTECTION SITE PLAN 4 - EXPOSITION STREET
NOT TO SCALE

RECORD DRAWING

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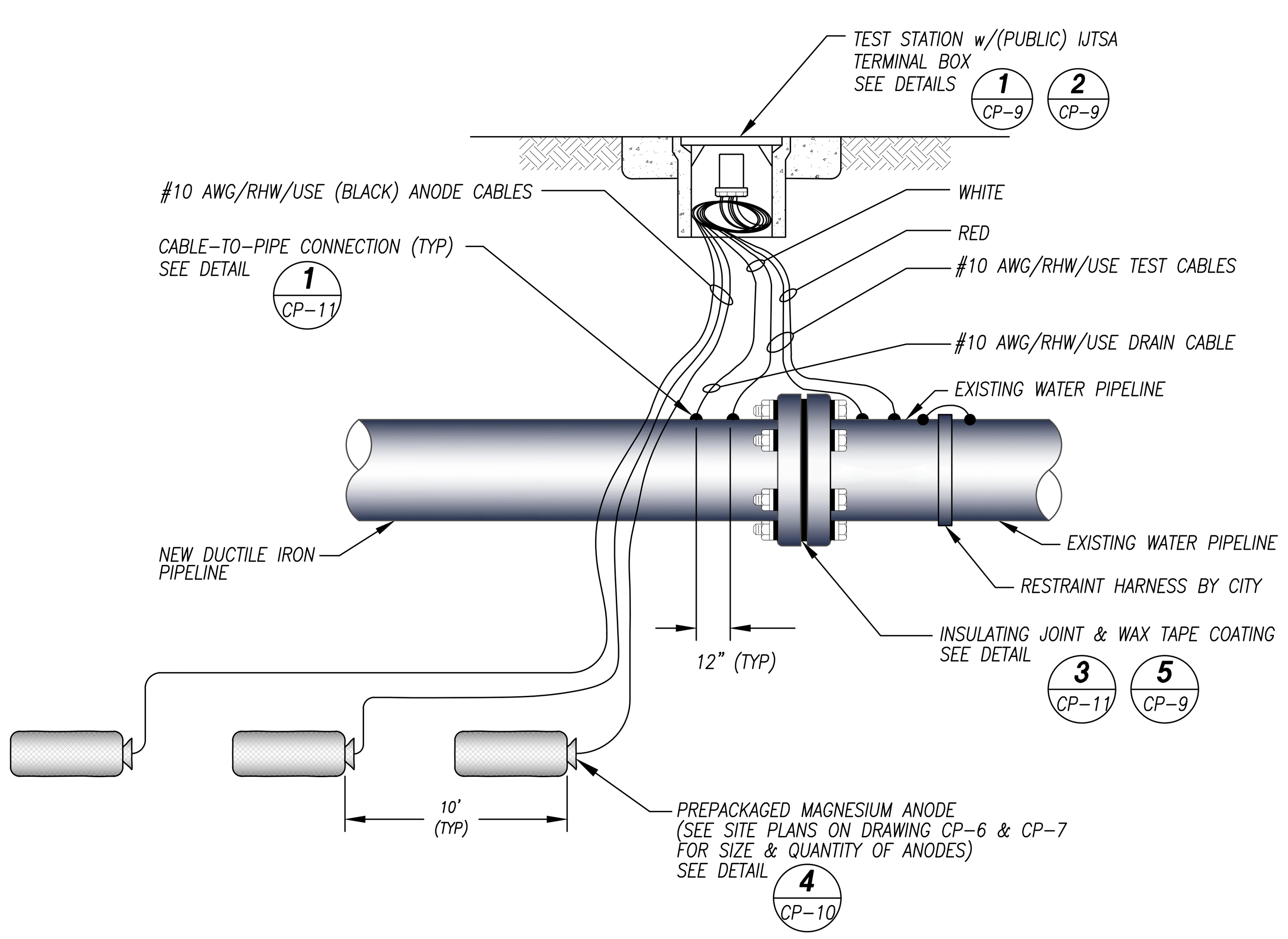
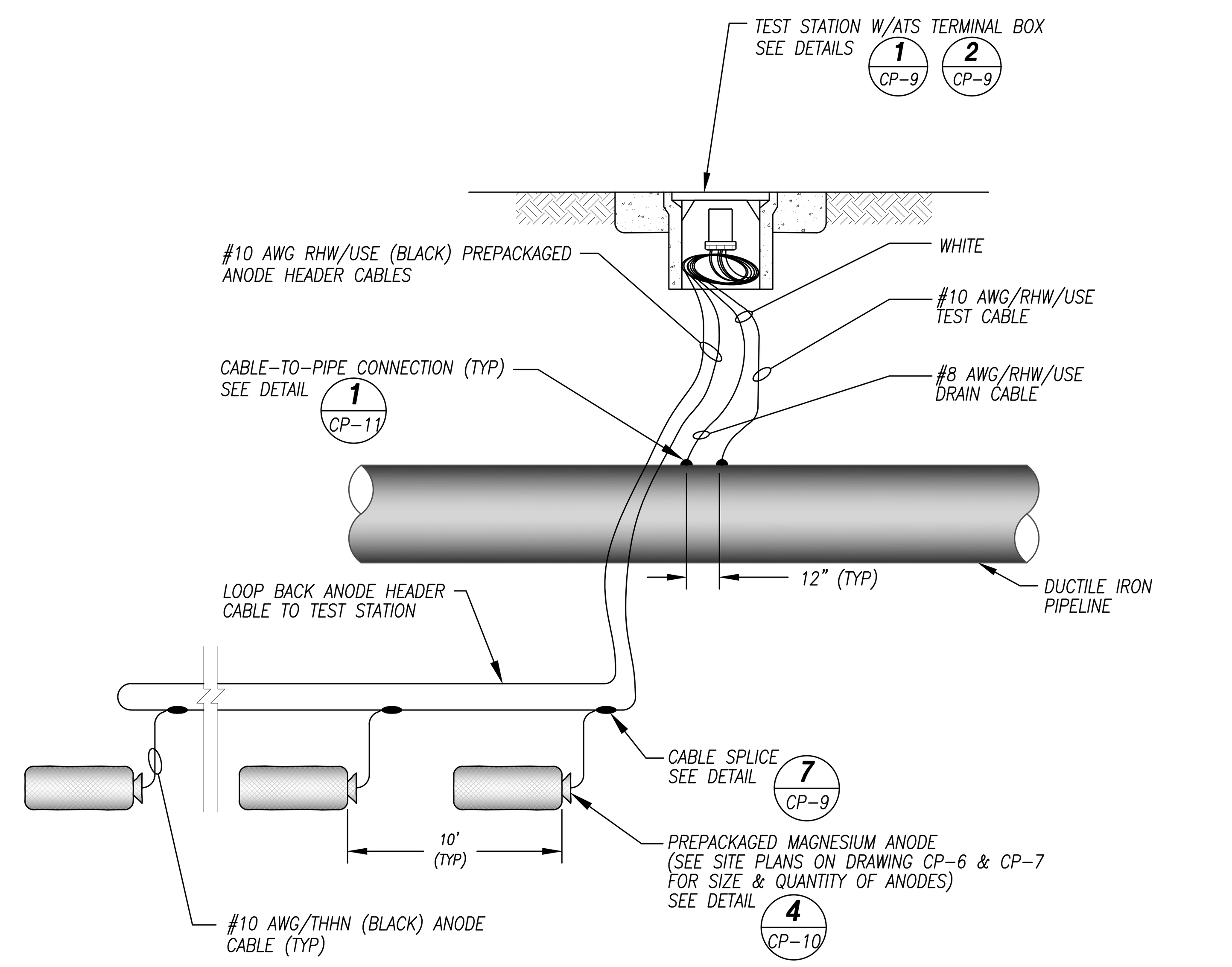
JDH Corrosion Consultants



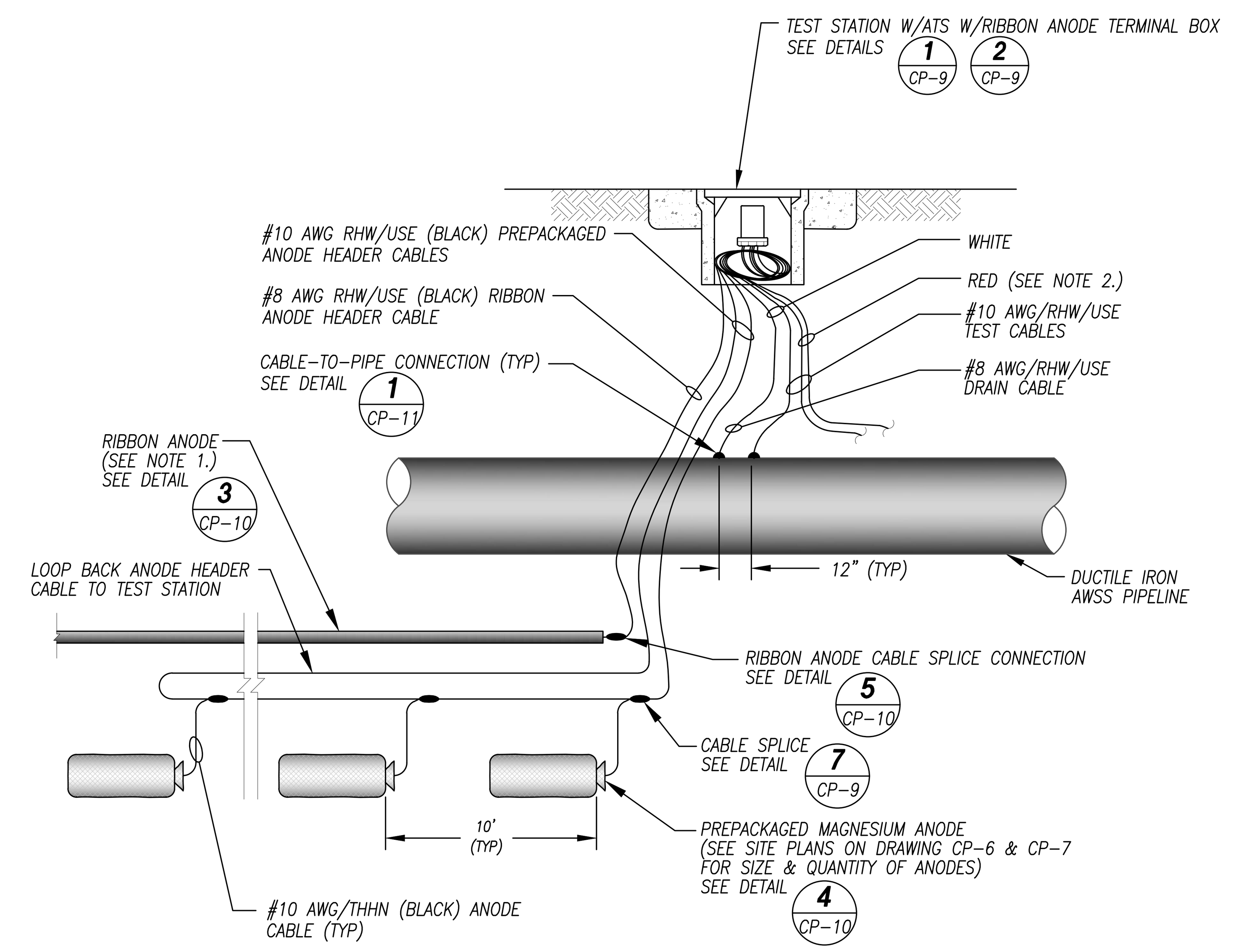
NOTES:
1. INSTALL BOND CABLES ON ALL BURIED JOINTS (EXCEPT INSULATING JOINTS) PER TO DETAIL 5/CP-9. COAT ALL BURIED BOLTS & NUTS WITH BITUMASTIC, AND ENCASE ALL DUCTILE IRON PIPE AND FITTINGS IN POLYETHYLENE PER CATHODIC PROTECTION GENERAL NOTE 1. ON SHEET CP-6.
2. BELOW GRADE INSULATING JOINT COATING NOT SHOWN FOR CLARITY. SEE DETAIL 4/CP-9.

2 CP-7 IJTSA - PIPELINE - INSULATING JOINT TEST STATION W/ANODES
NOT TO SCALE



NOTE:
1. INSTALL ONE (1) 'PLUS' SIZE ZINC RIBBON ANODE (5/8" X 7/8") OR TWO (2) 'STANDARD' SIZE ZINC RIBBON ANODES (1/2" X 9/16") IN THE BOTTOM CORNER(S) OF THE TRENCH.
2. INSTALL BOND CABLES ON ALL BURIED JOINTS (EXCEPT INSULATING JOINTS) PER TO DETAIL 6/CP-9. COAT ALL BURIED BOLTS & NUTS WITH BITUMASTIC, AND ENCASE ALL DUCTILE IRON PIPE AND FITTINGS IN POLYETHYLENE PER CATHODIC PROTECTION GENERAL NOTE 1. ON SHEET CP-6.

3 CP-7 ATS - PIPELINE - ANODE TEST STATION
NOT TO SCALE



NOTE:
1. INSTALL ONE (1) 'PLUS' SIZE ZINC RIBBON ANODE (5/8" X 7/8") OR TWO (2) 'STANDARD' SIZE ZINC RIBBON ANODES (1/2" X 9/16") IN THE BOTTOM CORNER(S) OF THE TRENCH.
2. INSTALL BOND CABLES ON ALL BURIED JOINTS (EXCEPT INSULATING JOINTS) PER TO DETAIL 6/CP-9. COAT ALL BURIED BOLTS & NUTS WITH BITUMASTIC, AND ENCASE ALL DUCTILE IRON PIPE AND FITTINGS IN POLYETHYLENE PER CATHODIC PROTECTION GENERAL NOTE 1. ON SHEET CP-6.

4 CP-7 ATS - ANODE TEST STATION W/PREPACKAGED ANODES & RIBBON ANODES
NOT TO SCALE

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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CATHODIC PROTECTION SITE PLAN 4, KEY & DETAILS 1

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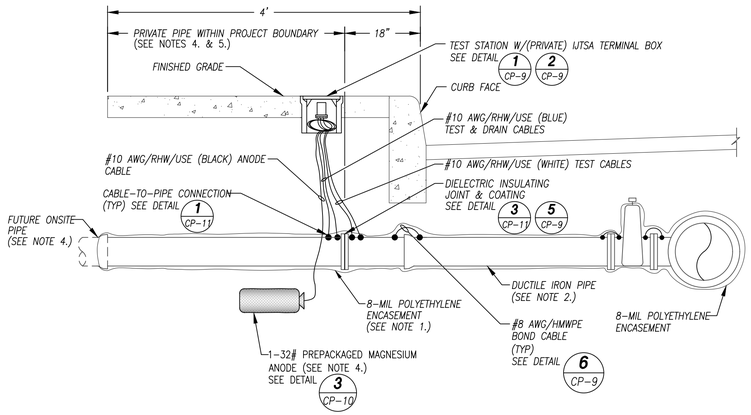
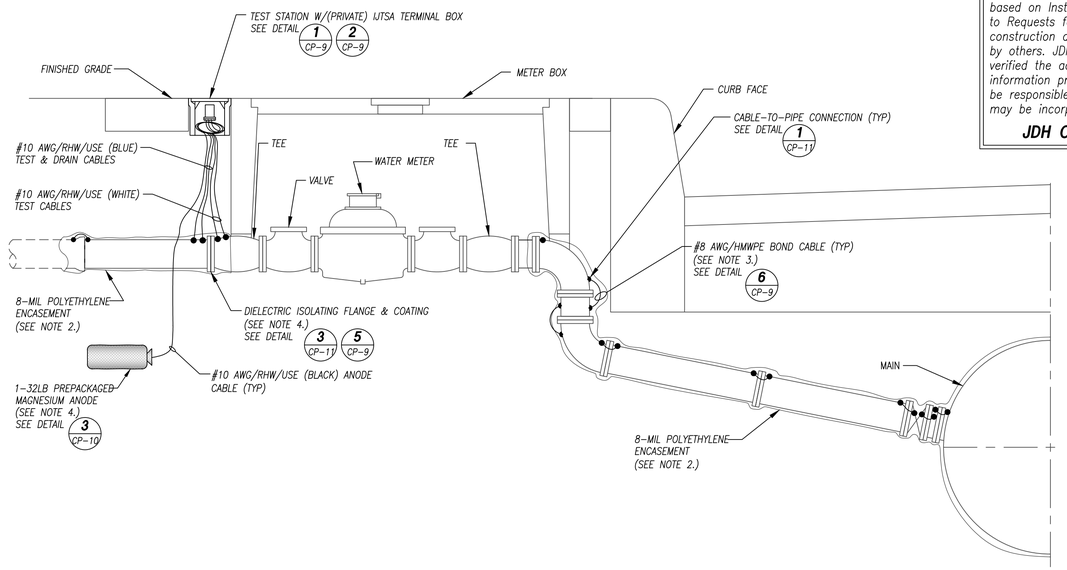
PLOT DATE: 07-31-24 PLOTTED BY: therink



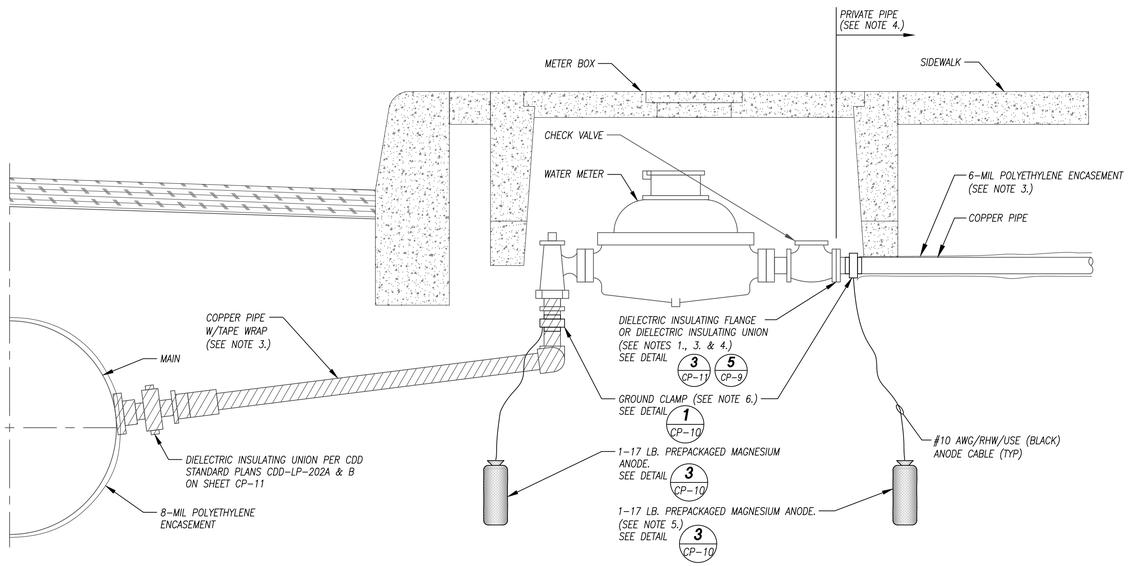
NOTES:
1. COAT ALL BURIED BOLTS & NUTS WITH BITUMASTIC AND ENCASE ALL BURIED DUCTILE IRON PIPE AND FITTINGS IN POLYETHYLENE PER CATHODIC PROTECTION GENERAL NOTE 9 ON SHEET CP-6.
2. INSTALL BOND CABLES PER CATHODIC PROTECTION GENERAL NOTE 5. ON SHEET CP-6. THE LENGTH OF THE BOND CABLES BETWEEN FITTINGS SHALL BE OF SUFFICIENT LENGTH TO ALLOW FOR SIGNIFICANT SOIL SUBSIDENCE AND PIPE MOVEMENT.
3. ENSURE ELECTRICAL ISOLATION OF ALL METER BYPASS PIPING BY INSTALLING AN INSULATING TYPE FLANGE, INSULATING UNION, OR CORPORATION STOP AT THE DOWNSTREAM CONNECTION TO THE SERVICE.
4. CONTRACTOR SHALL INSTALL CATHODIC PROTECTION FOR BOTH THE PRIVATE PIPING OF THE SERVICES. (SEE ALSO NOTE 5.)
5. THE PROPERTY OWNER IS RESPONSIBLE FOR THE CATHODIC PROTECTION OF THE PRIVATE SERVICE LATERAL.

1 CP-8 IJTSA - NPW OR FIRE SERVICE - INSULATING JOINT TEST STATION W/ANODE
NOT TO SCALE



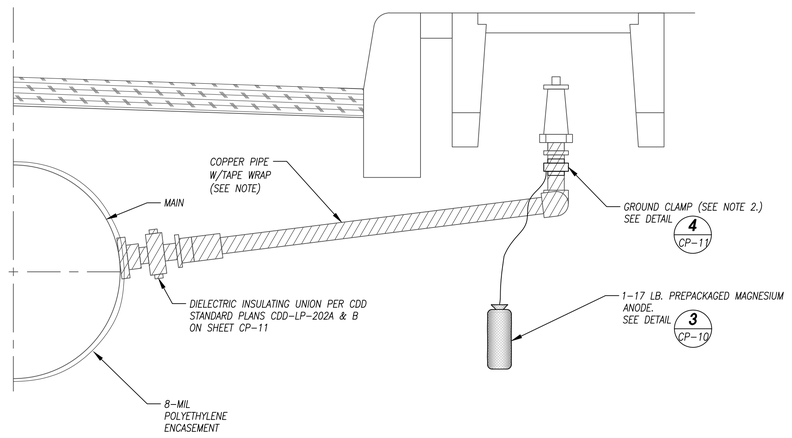
NOTES:
1. COAT ALL BURIED BOLTS & NUTS WITH BITUMASTIC AND ENCASE THE TEE & VALVE OF THE WATER MAIN IN POLYETHYLENE PER CATHODIC PROTECTION GENERAL NOTE 9 ON SHEET CP-6.
2. COAT ALL BURIED BOLTS & NUTS WITH BITUMASTIC AND ENCASE THE DUCTILE IRON LATERAL IN POLYETHYLENE PER CATHODIC PROTECTION GENERAL NOTE 9 ON SHEET CP-6.
3. CONTRACTOR SHALL ELECTRICALLY ISOLATE PRIVATE PIPE OF ONSITE PIPE PER CATHODIC PROTECTION GENERAL NOTE 8 ON SHEET CP-6 BY INSTALLING AN INSULATING JOINT ON THE DOWNSTREAM SIDE OF THE METER BYPASS PIPING PER CITY STANDARD CDD-LP-203F AND PROVIDING AN IJTSA FOR THE PRIVATE PIPING. IF THE ISOLATING JOINT IS NOT BURIED, OMIT IJTSA AND CONNECT ANODE CABLE DIRECTLY TO THE PRIVATE PIPE. (SEE ALSO NOTE 4.)
4. CONTRACTOR SHALL INSTALL CATHODIC PROTECTION FOR BOTH THE PRIVATE PIPING OF THE SERVICES. (SEE ALSO NOTE 5.)
5. THE PROPERTY OWNER IS RESPONSIBLE FOR THE CATHODIC PROTECTION OF THE PRIVATE SERVICE LATERAL.

2 CP-8 IJTSA - METERED WATER SERVICE - INSULATING JOINT TEST STATION W/ANODE
NOT TO SCALE



NOTES:
1. USE ALL BRASS BODY INSULATING UNION OR WATER METER WITH INSULATING ADAPTERS ON COPPER PIPE.
2. USE INSULATING FLANGE KIT FOR METER WITH FLANGE CONNECTION. USE DIELECTRIC UNION FOR SCREW-IN METER CONNECTION.
3. THE BURIED COPPER PIPE FROM THE MAIN TO THE METER SHALL BE TAPE COATED WITH A LAYER OF PRIMED HALF-LAPPED TAPE COATING; THE MINIMUM 35MIL THICK TAPE COATING SHALL POLYKEN 930 WITH 1027 PRIMER OR EQUAL. FOR IRRIGATION BACKFLOW PREVENTER TAPE WRAP BOTH BURIED RISERS. THE BURIED COPPER PIPE FROM DOWNSTREAM OF THE METER SHALL BE ENCASED IN 6-MIL THICK POLYETHYLENE SLEEVING.
4. ENSURE ELECTRICAL ISOLATION OF ANY METER BYPASS PIPING BY INSTALLING AN INSULATING TYPE FLANGE, INSULATING UNION, OR CORPORATION STOP AT THE DOWNSTREAM CONNECTION TO THE SERVICE. IF INSULATING JOINT AT THE POINT OF CONNECTION IS BURIED INSTALL WAX TAPE COATING PER DETAIL 5/CP-10.
5. THE PROPERTY OWNER IS RESPONSIBLE FOR THE FUTURE MAINTENANCE CATHODIC PROTECTION OF THE PRIVATE SERVICE LATERAL.
6. IF GROUND CLAMP IS BURIED, INSTALL WAX TAPE COATING PER DETAIL 5/CP-9.

3 CP-8 I/A - ELECTRICAL ISOLATION OF MAIN, METER, & COPPER SERVICE LATERAL AND ANODE INSTALLATION
NOT TO SCALE



AIR VALVE OR BLOW OFF W/COPPER PIPE

NOTES:
1. THE BURIED COPPER PIPE FROM THE MAIN TO THE AIR VALVE SHALL BE TAPE COATED WITH A LAYER OF PRIMED HALF-LAPPED TAPE COATING; THE MINIMUM 35MIL THICK TAPE COATING SHALL POLYKEN 930 WITH 1027 PRIMER OR EQUAL.
2. IF GROUND CLAMP IS BURIED, INSTALL WAX TAPE COATING PER DETAIL 5/CP-9.

4 CP-8 I/A - ELECTRICAL ISOLATION OF MAIN, METER, & COPPER PIPE AND ANODE INSTALLATION
NOT TO SCALE

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MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CATHODIC PROTECTION DETAILS 2
SAN FRANCISCO COUNTY, CALIFORNIA
SAN FRANCISCO

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Approved MA
Job No 20080006

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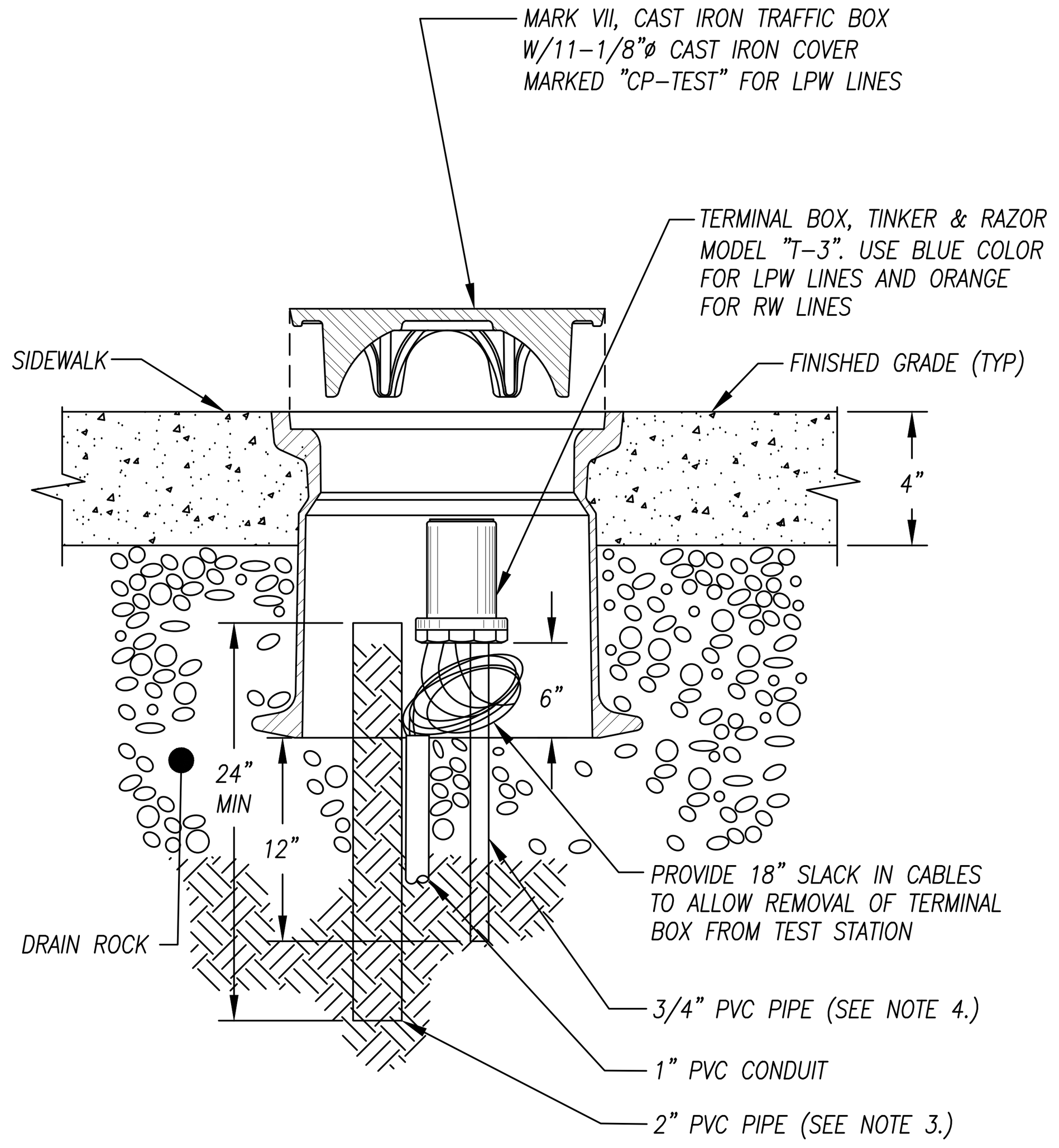
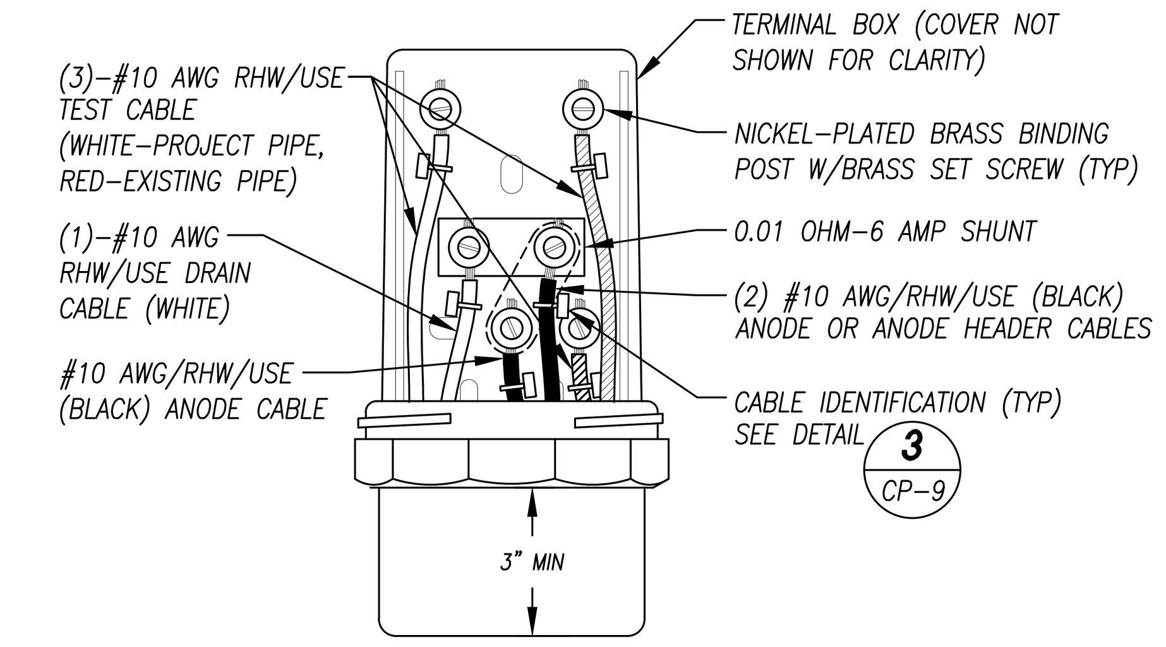
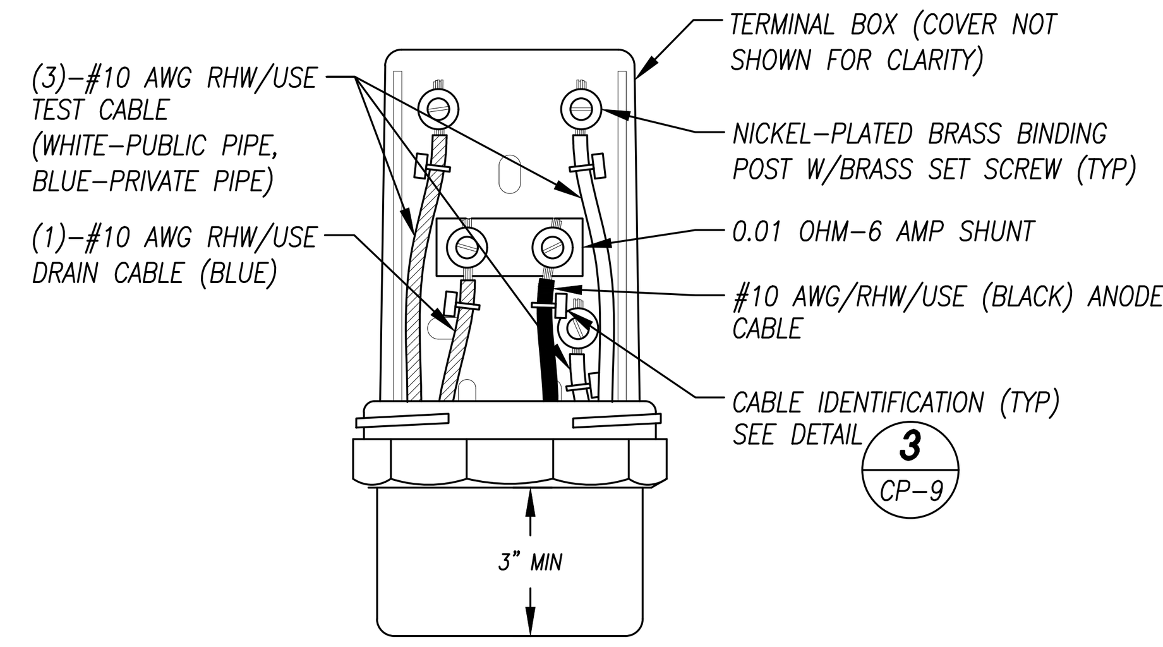


NOTES:
1. IDENTIFY ALL CABLES PER DETAIL 3/CP-9.
2. INSTALL TEST STATION IN SIDEWALK.
3. INSTALL 2" PVC PIPE IN CLEAN NATIVE SOIL. FILL PIPE WITH CLEAN SOIL, FREE FROM ROCKS & DEBRIS.
4. INSTALL 18" LENGTH OF 3/4" PVC PIPE TO ENSURE THAT THE TERMINAL BOX WILL REMAIN IN THE UPRIGHT POSITION. POSITION THE PIPE SO THAT THE TERMINAL BOX WILL BE AS HIGH AS POSSIBLE WITH THE CAST IRON LID STILL CLOSING PROPERLY.

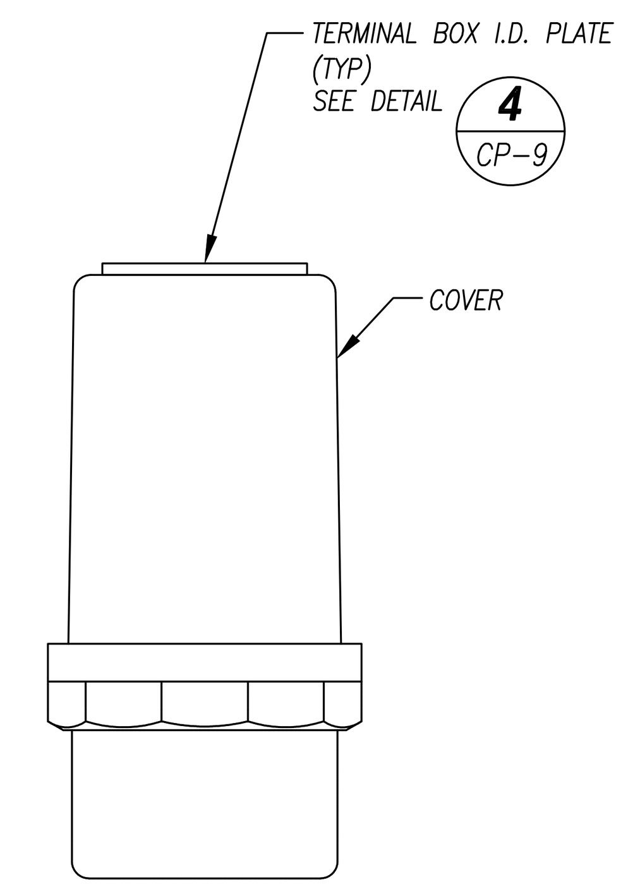
1 FLUSH MOUNTED TEST STATION BOX
CP-9 NOT TO SCALE FINISHED GRADE



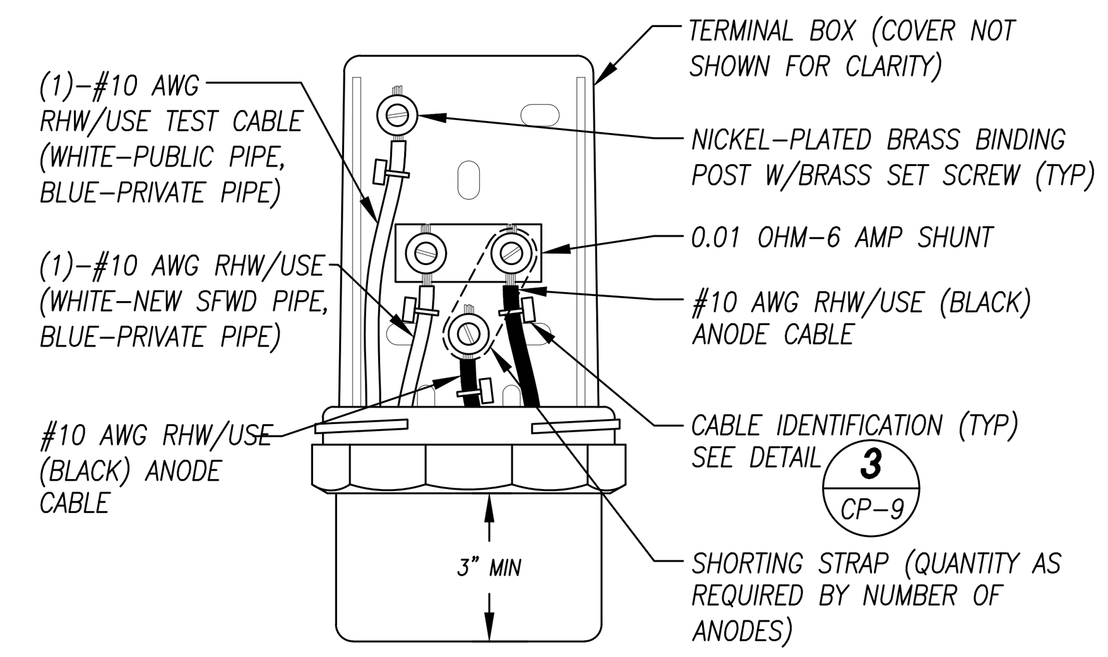
(PUBLIC) IJTSA TERMINAL BOX



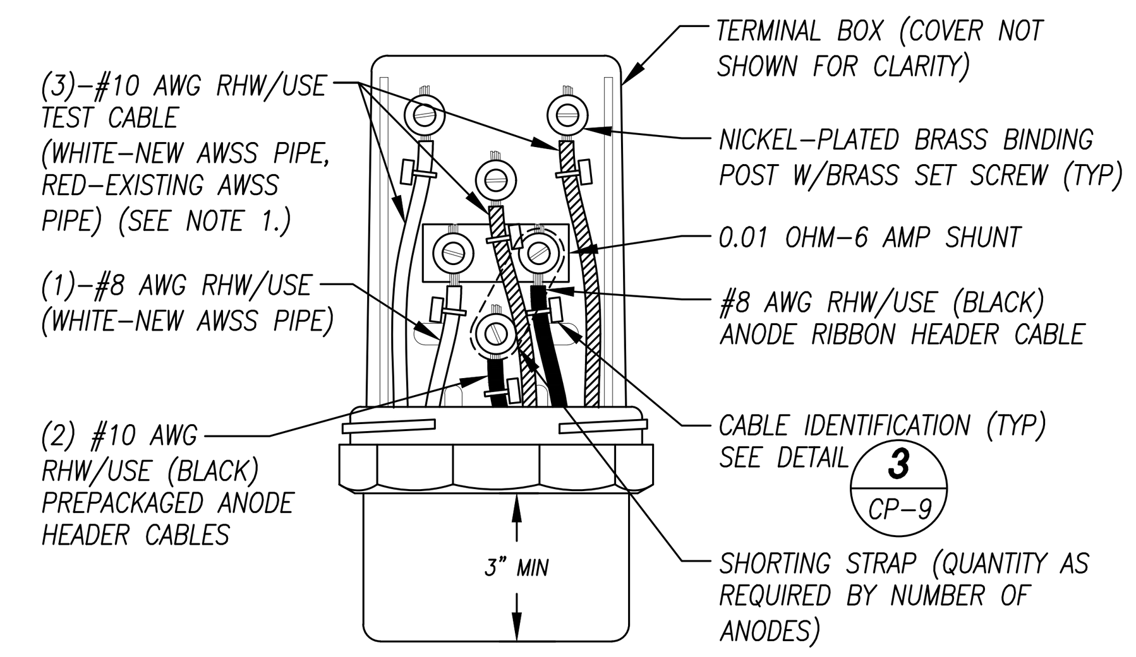
(PRIVATE) IJTSA TERMINAL BOX



TERMINAL BOX COVER



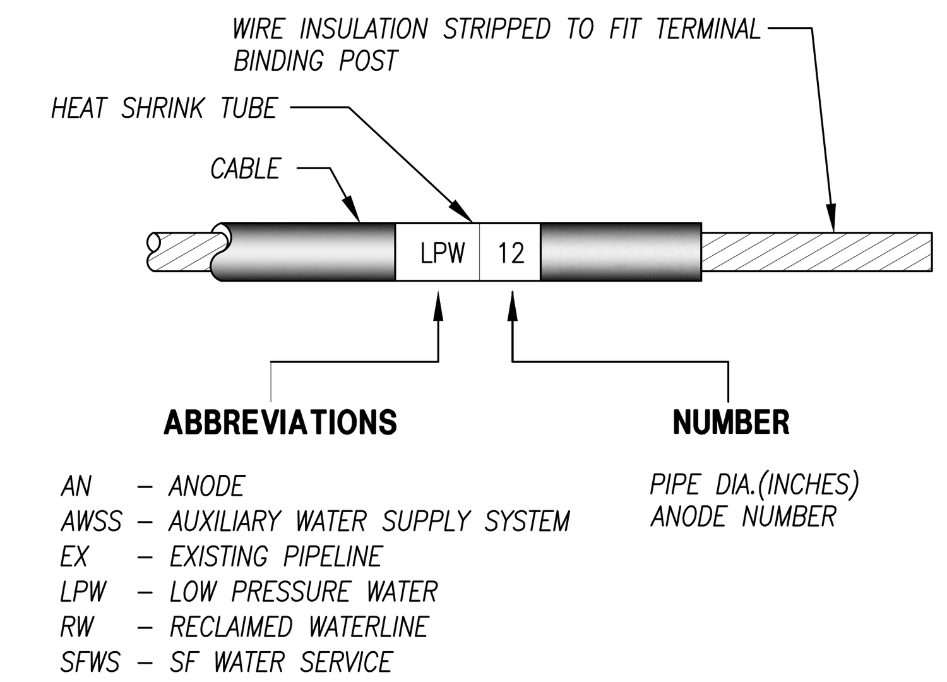
ATS TERMINAL BOX



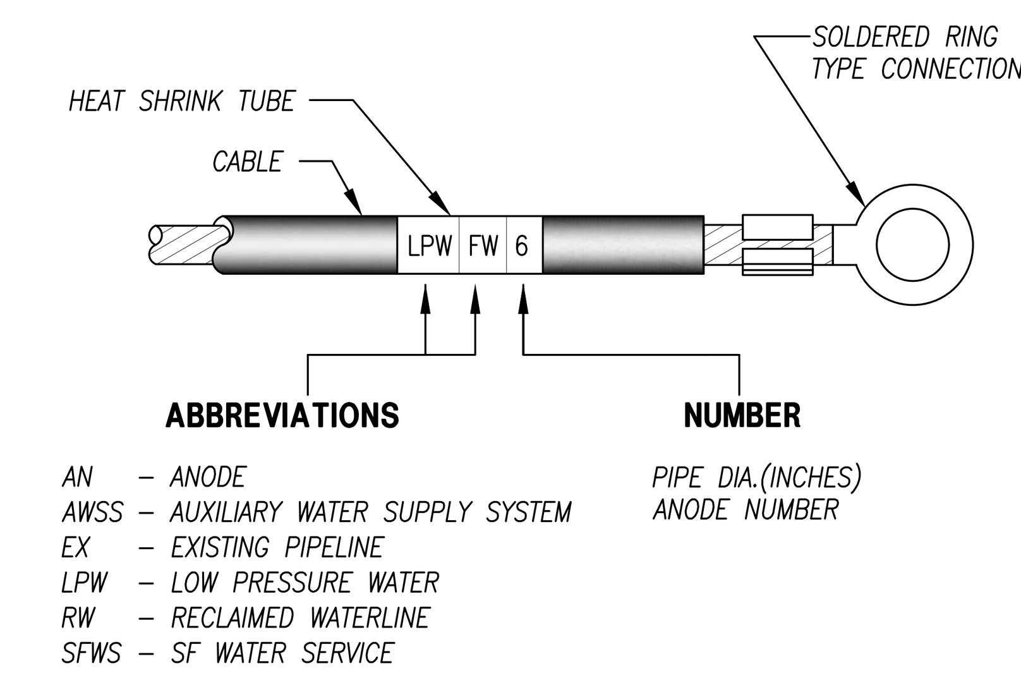
ATS W/RIBBON ANODE TERMINAL BOX

NOTE:
1. FOR THE 'ATS W/RIBBON ANODE' INSTALLED AT EXPOSITION STREET OMIT THE RED TEST CABLES.

2 TERMINAL BOX
CP-9 NOT TO SCALE

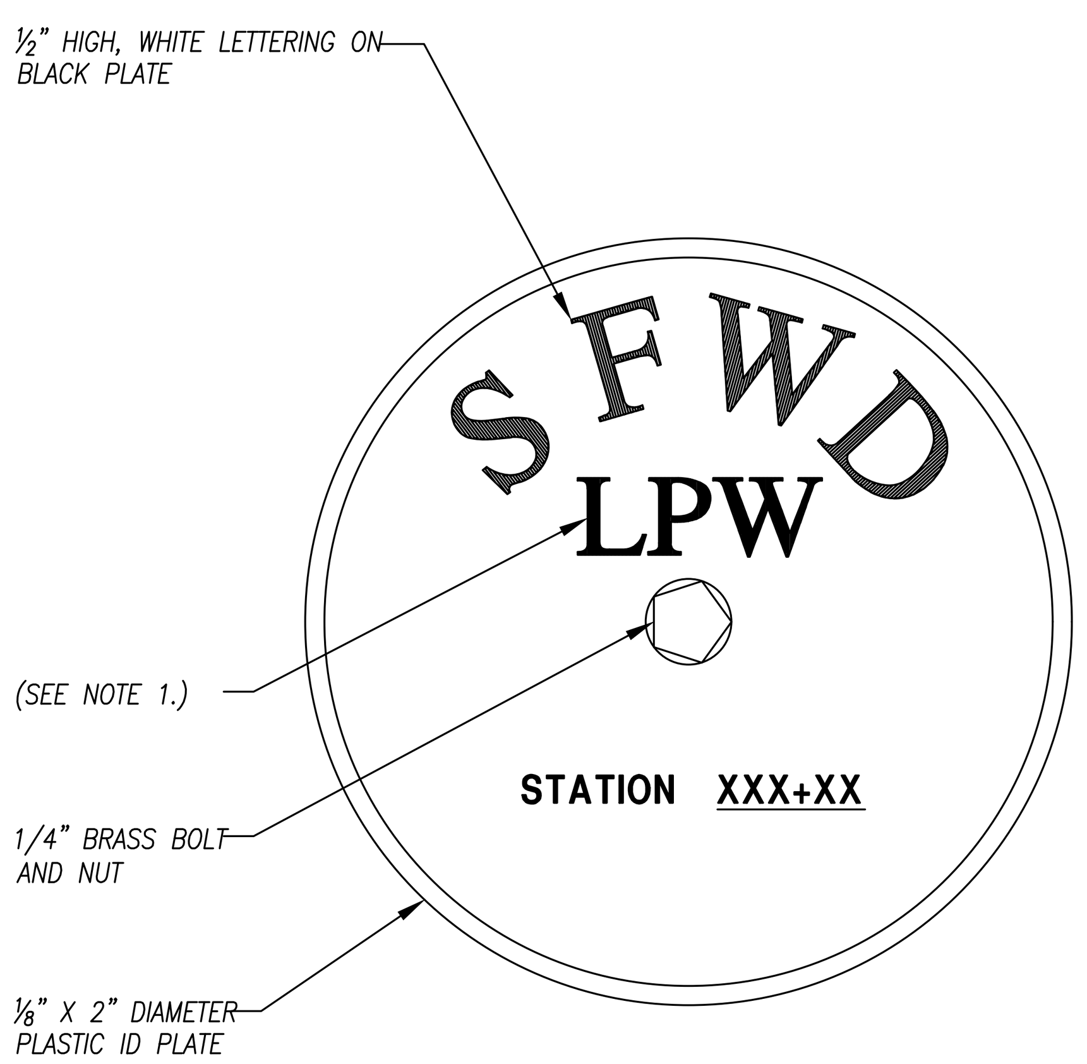


PREPARED CABLE FOR BINDING POST



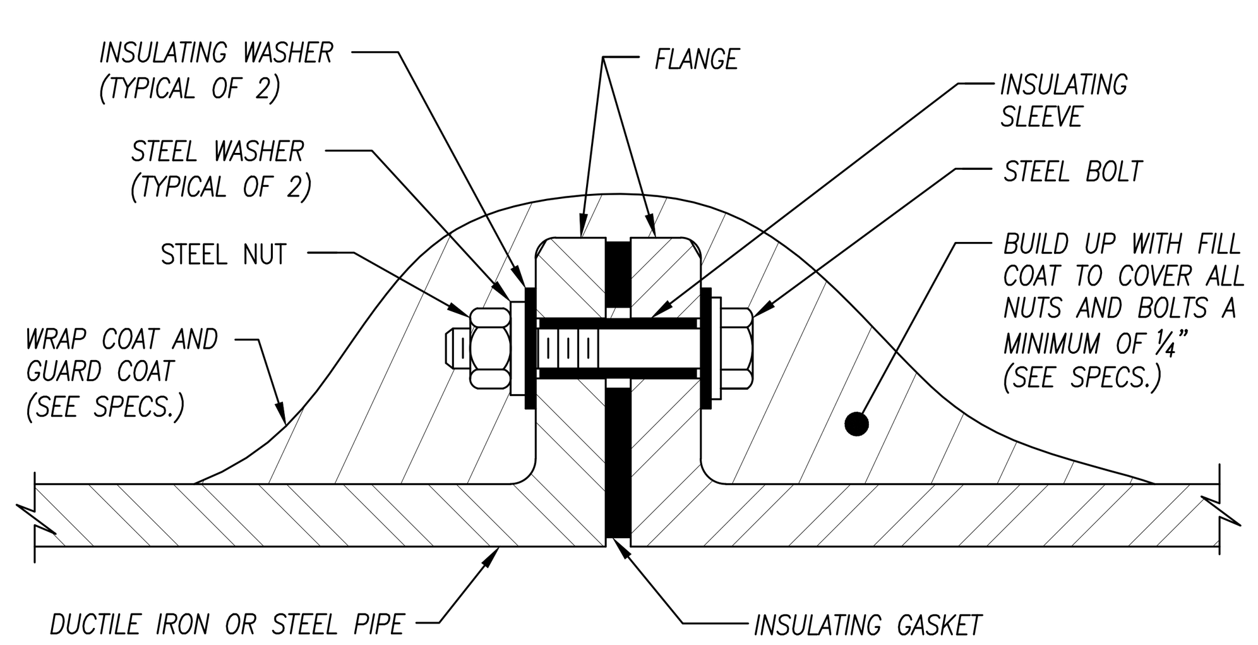
RING CONNECTOR FOR TERMINAL POST

3 CABLE IDENTIFICATION
CP-9 NOT TO SCALE



NOTE:
1. INSTALL ONLY ON PIPELINE ANODE TEST STATIONS. OMIT ON LATERALS.
2. USE LPW FOR TEST STATIONS ON LOW PRESSURE WATER LINES AND RW FOR TEST STATIONS ON RECLAIMED WATER LINES.
3. INCLUDE PIPE STATION FOR FUTURE IDENTIFICATION.

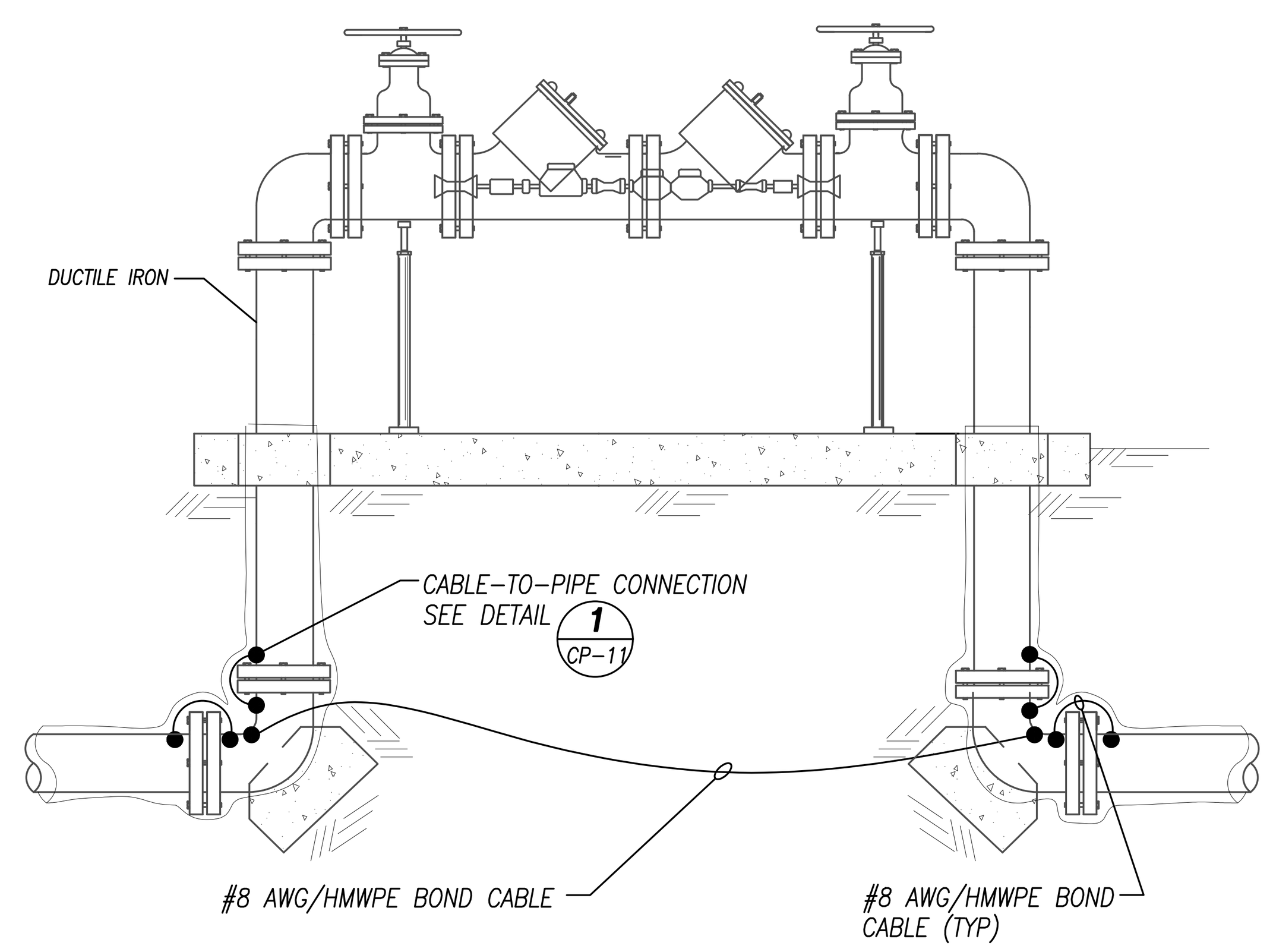
4 TERMINAL BOX ID PLATE
CP-9 NOT TO SCALE



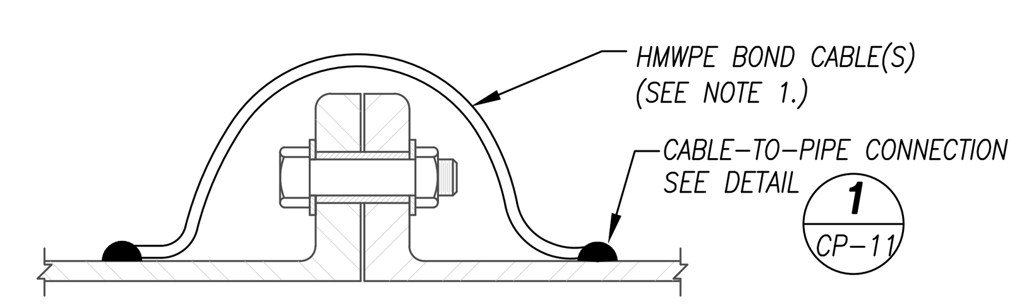
ISOLATING JOINT COATING

NOTES:
1. THIS DETAIL IS TYPICAL FOR COATING BURIED VALVES, SHORT LENGTHS OF FERROUS METAL PIPE, AND GROUND CLAMPS.
2. FOR HOT WATER PIPE USE TRENTON TEMCOAT PRIMER 3000, WAX-TAPE HT-3000, AND GUARD-WRAP.

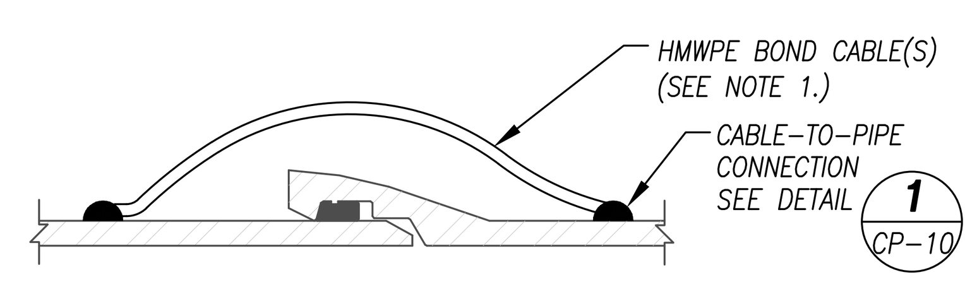
5 WAX TAPE COATING
CP-9 NOT TO SCALE



BFP



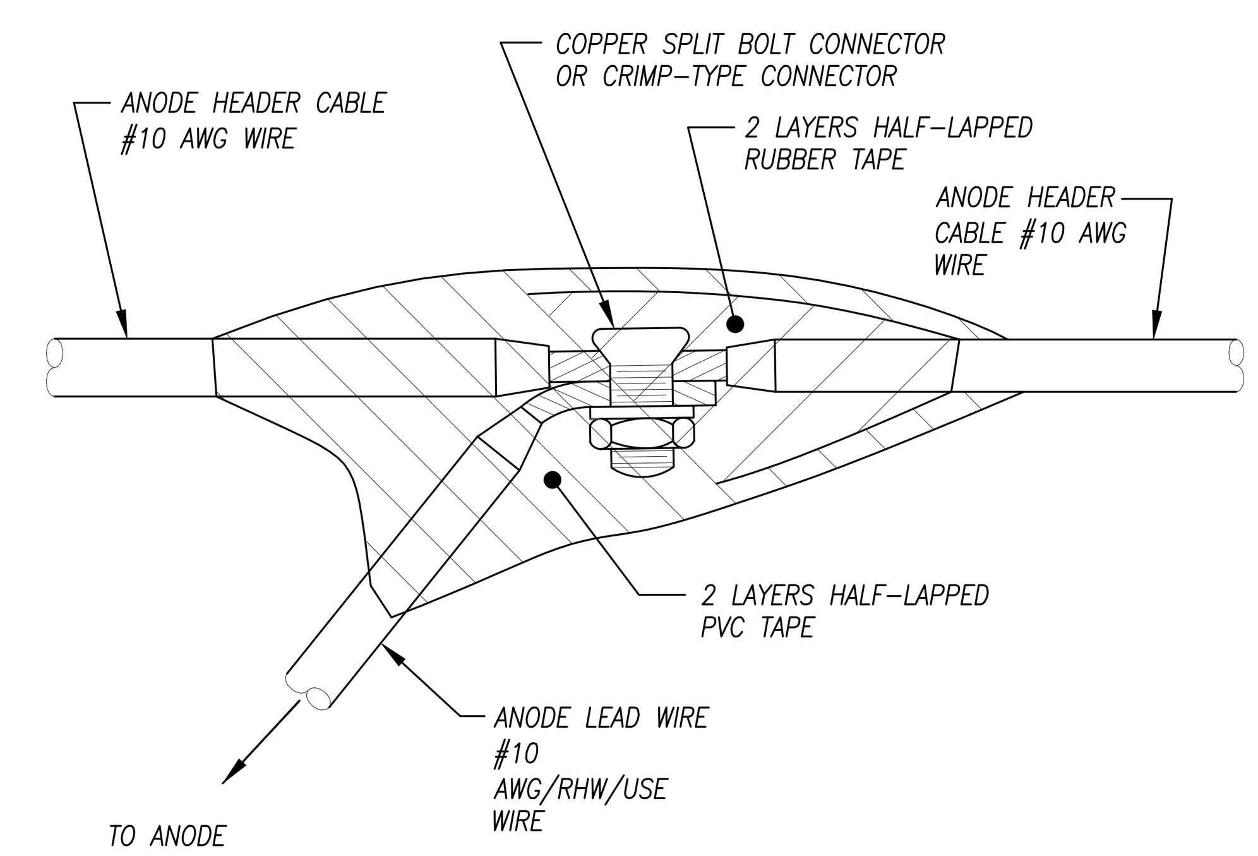
FLANGED JOINT



PUSH-ON JOINT

NOTES:
1. SEE CATHODIC PROTECTION GENERAL NOTE 5 ON SHEET CP-6 FOR JOINT BOND CABLE SIZES.
2. PROVIDE ENOUGH SLACK IN THE BOND CABLES FOR JOINT MOVEMENT.

6 BOND CABLES - METALLIC PIPE JOINTS
CP-9 NOT TO SCALE



7 SPLICE CONNECTION
CP-9 NOT TO SCALE

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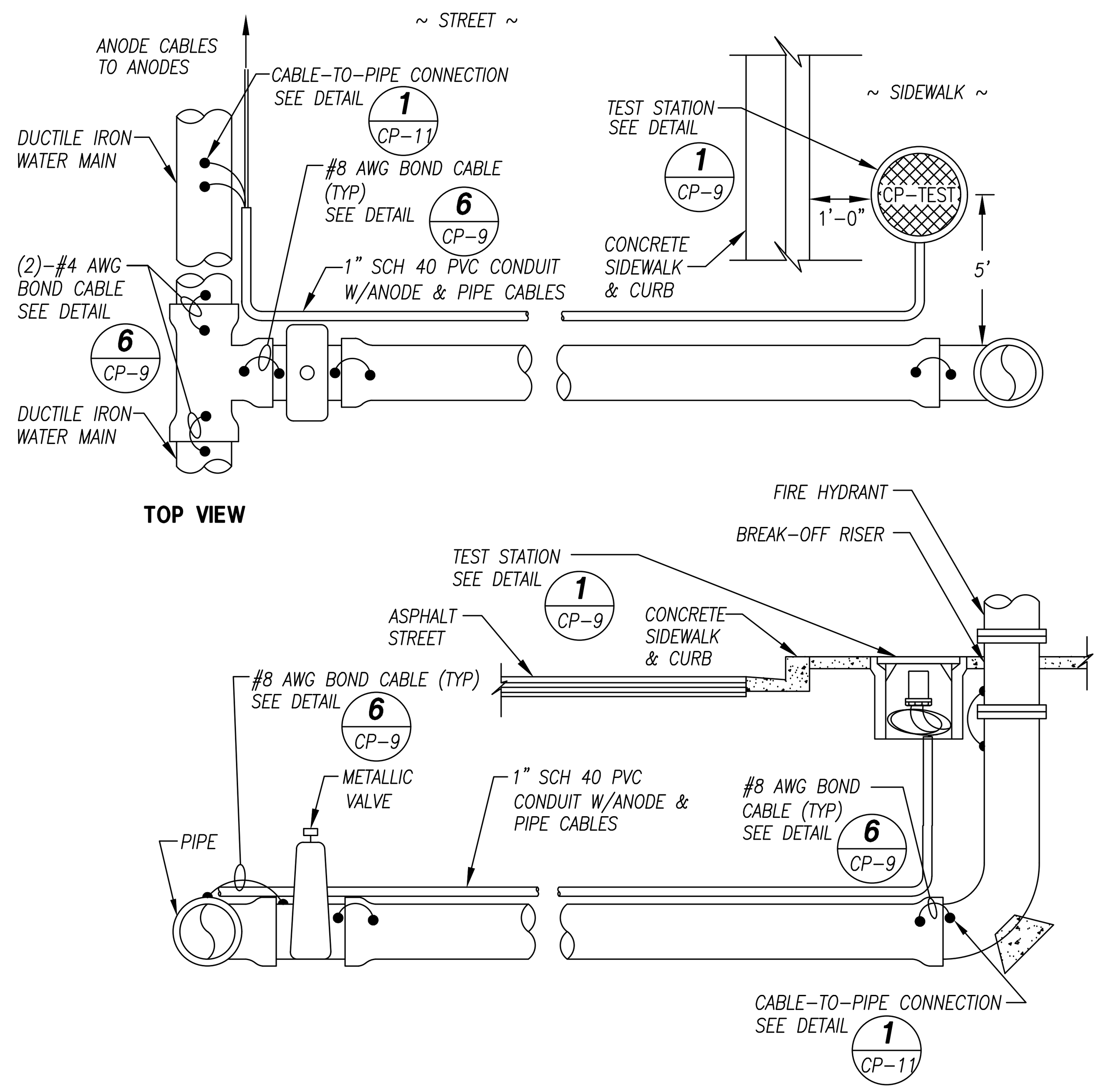
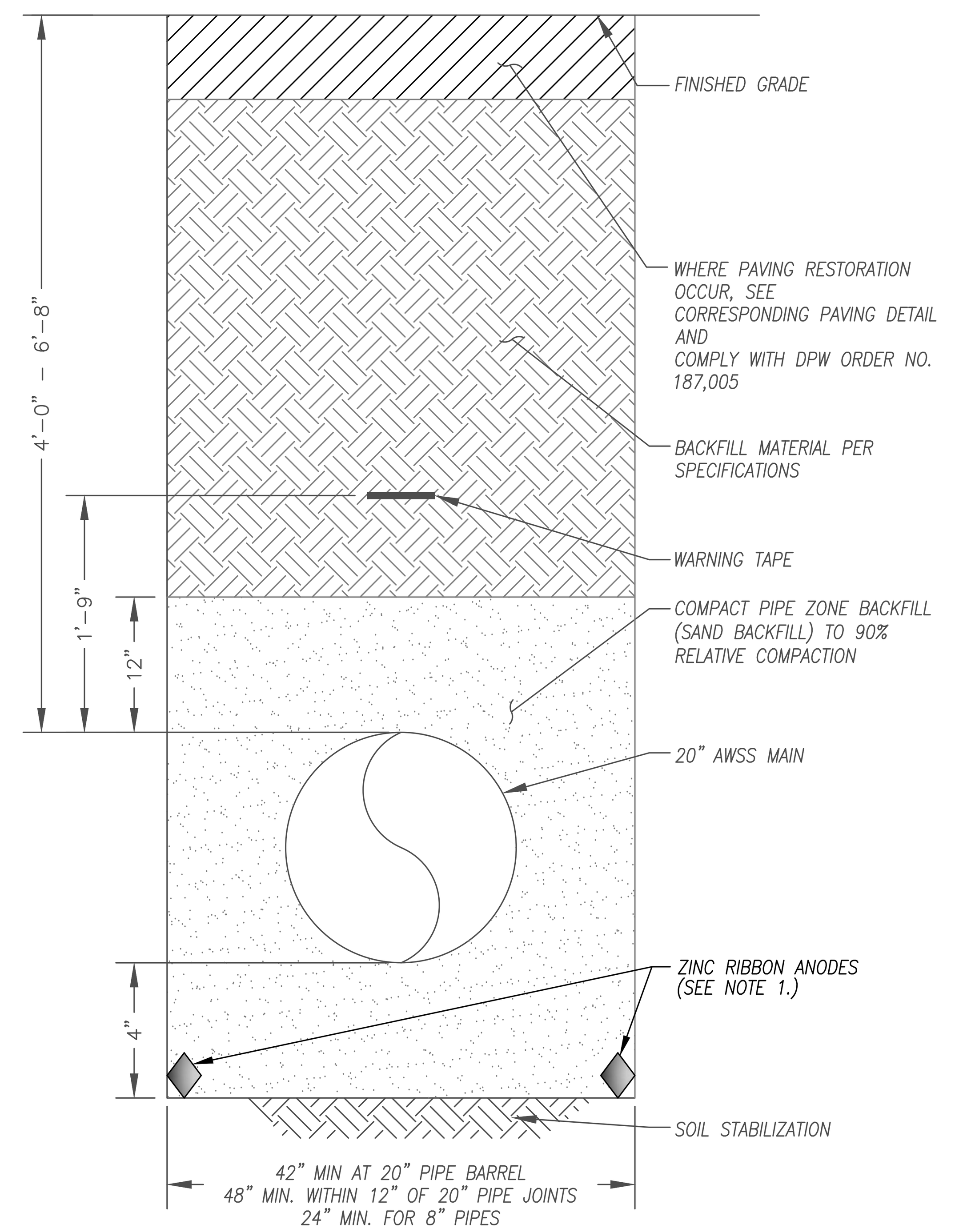


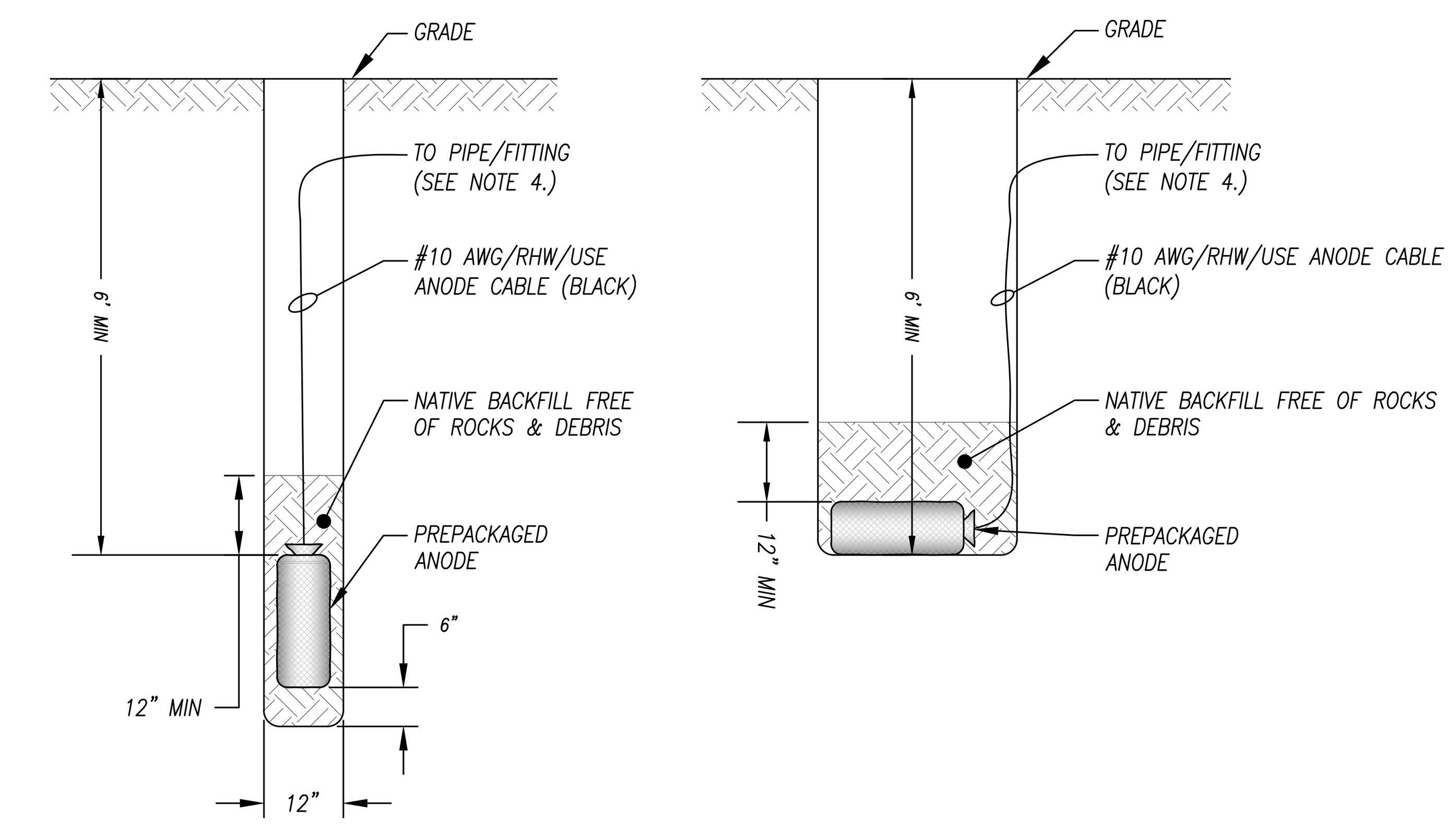
NOTES:
1. FOR LPW LINES INSTALL ALL TEST STATIONS ADJACENT TO FIRE HYDRANTS.
2. FOR RW LINES WITH NO FIRE HYDRANTS INSTALL TEST STATIONS IN SIDEWALK ABOVE SERVICE LATERALS.
3. COAT ALL BURIED BOLTS & NUTS WITH BITUMASTIC AND ENCASE THE DUCTILE IRON LATERAL IN 8–MIL POLYETHYLENE PER CATHODIC PROTECTION GENERAL NOTE 9. ON SHEET CP–6.

1 CP–10 ATS INSTALLATION ADJACENT TO FIRE HYDRANT
NOT TO SCALE



NOTE:
1. INSTALL ONE (1) 'PLUS' SIZE ZINC RIBBON ANODE (5/8" X 7/8") OR TWO (2) 'STANDARD' SIZE ZINC RIBBON ANODES (1/2" X 9/16") IN THE BOTTOM CORNERS OF THE TRENCH.

2 CP–10 ZINC RIBBON ANODE INSTALLATION
NOT TO SCALE

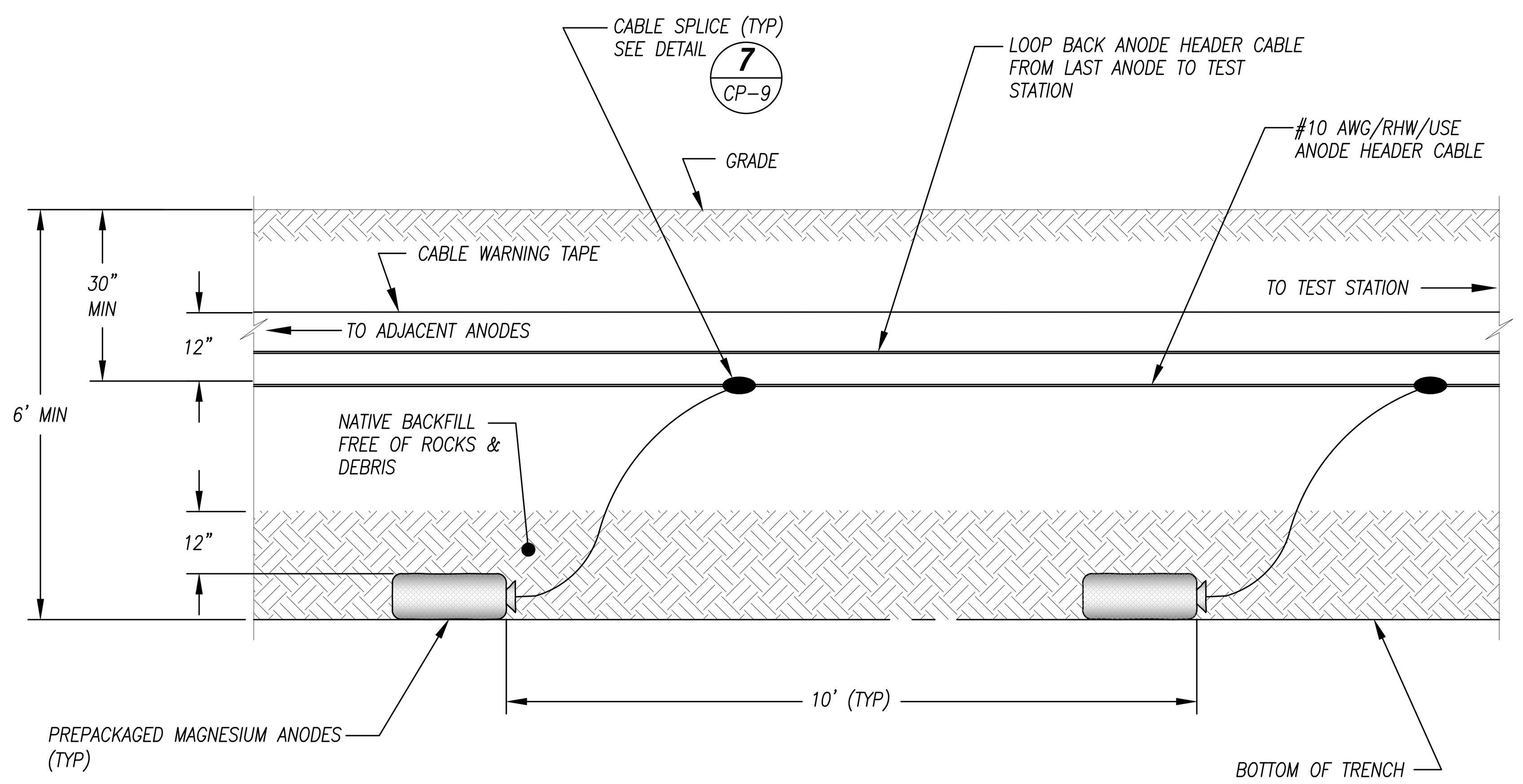


VERTICAL INSTALLATION

HORIZONTAL INSTALLATION

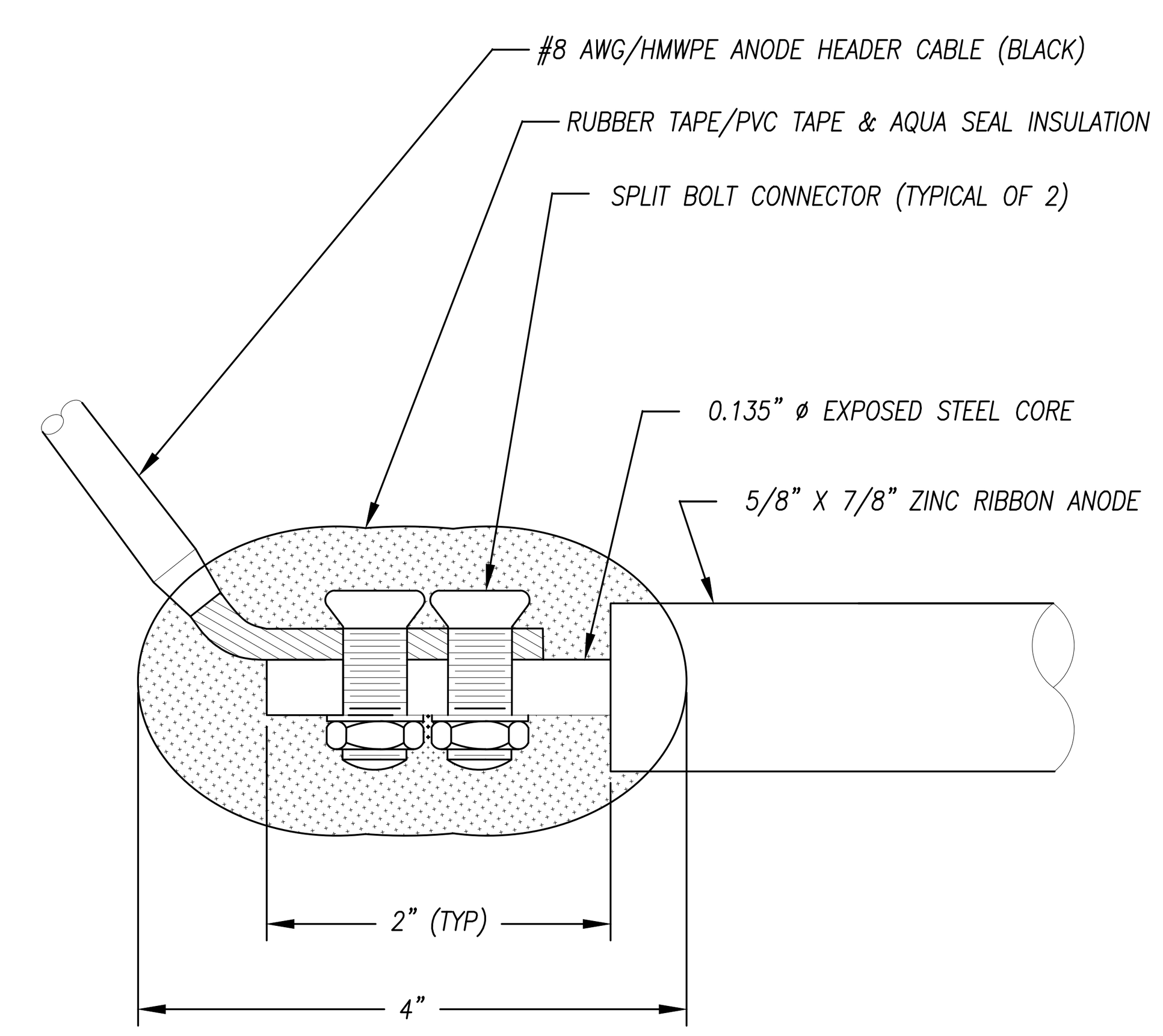
NOTES:
1. INSTALL ANODES 3 FEET OFF THE PIPE/FITTING IN NATIVE SOIL.
2. THE ANODES MAY BE INSTALLED HORIZONTALLY OR VERTICALLY UPON DISCRETION OF THE CONTRACTOR.
3. MAINTAIN A MIN. DISTANCE OF 10 FEET BETWEEN ANODES IF MULTIPLE ANODES ARE INSTALLED.
4. CONNECT ANODE CABLE TO TEST STATION OR DIRECTLY TO PIPE OR FITTING AS SHOWN IN THE DRAWINGS.

3 CP–10 PROFILE - ANODE INSTALLATION
NOT TO SCALE



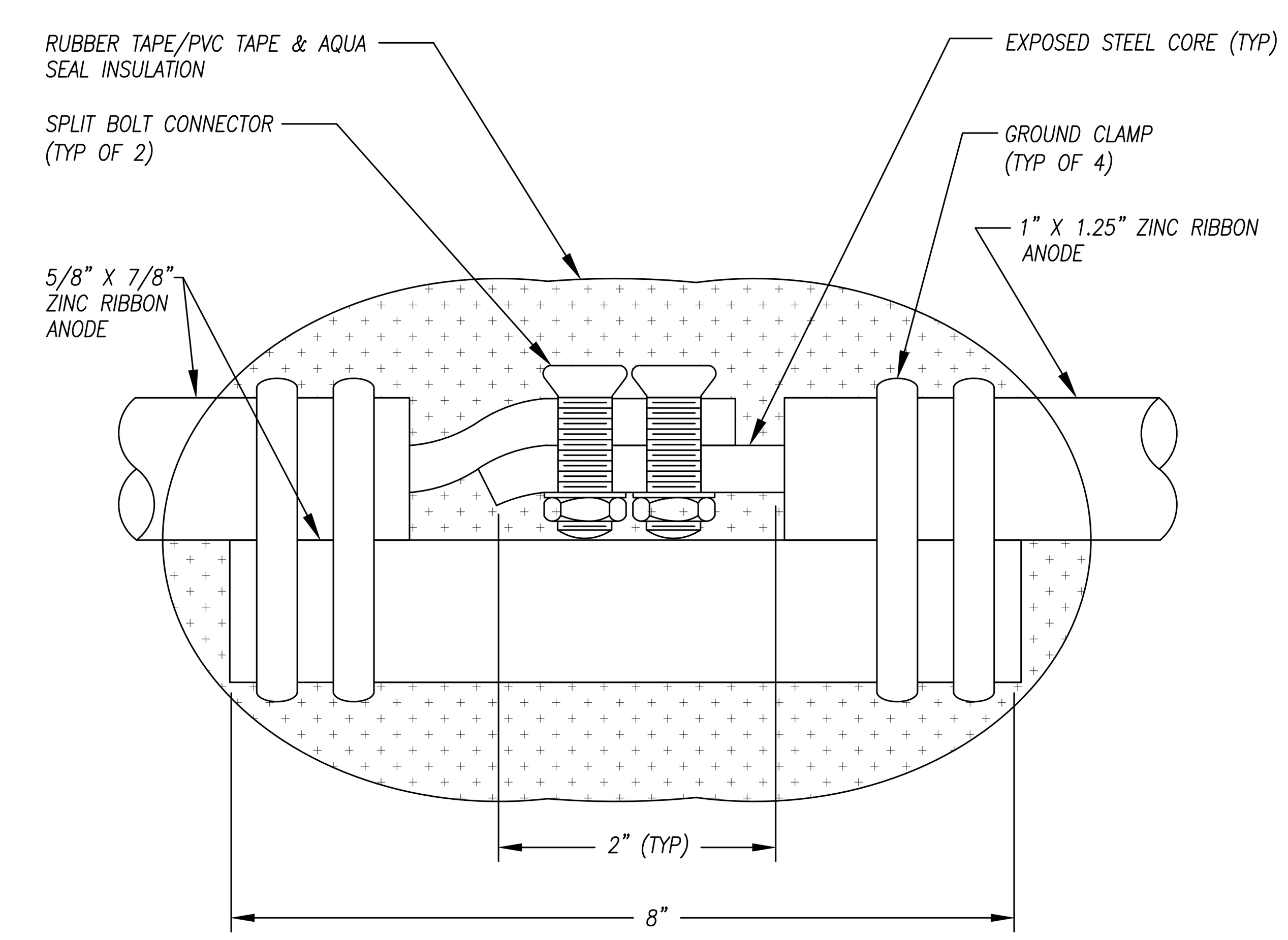
NOTE:
INSTALL ANODES PARALLEL TO THE PIPELINE AND 5 FT. OFF THE PIPE.

4 CP–10 PROFILE - MULTIPLE HORIZONTAL ANODE INSTALLATION
NOT TO SCALE



NOTES:
1. EXPOSE THE 0.135" DIA STEEL CORE IN THE 'PLUS' ZINC RIBBON OR THE 0.130" DIA STEEL CORE IN THE 'STANDARD' ZINC RIBBON AND SPLICE THE ANODE TO THE ANODE HEADER CABLE.
2. CLEAN ALL METAL PARTS OF THE SPLICE USING SANCHEM'S NO–OX–ID OR EQUAL
3. COAT COMPLETED SPLICE CONNECTION WITH TWO HALF–LAPPED LAYERS OF SCOTCH 130C OR EQUAL RUBBER TAPE, FOLLOWED BY TWO HALF LAPPED LAYERS OF SCOTCH 33+ OR EQUAL PVC TAPE.
4. ENCAPSULATE THE COMPLETED COATED SPLICE CONNECTION WITH COOPER POWER SYSTEMS 1" WIDE AQUA SEAL TAPE OR EQUAL.

5 CP–10 RIBBON ANODE CABLE SPLICE CONNECTION
NOT TO SCALE



NOTES:
1. CLEAN ALL METAL PARTS USING SANCHEM'S NO–OX–ID OR EQUAL
2. COAT COMPLETED CONNECTION WITH TWO HALF–LAPPED LAYERSOF SCOTCH 130C OR EQUAL RUBBER TAPE, FOLLOWED BY TWO HALF LAPPED LAYERS OF SCOTCH 33+ OR EQUAL PVC TAPE.
3. ENCAPSULATE THE COMPLETED COATED CONNECTION WITH COOPER POWER SYSTEMS 3–3/4" WIDE AQUA SEAL TAPE OR EQUAL.

6 CP–10 RIBBON ANODE TO RIBBON ANODE SPLICE CONNECTION
NOT TO SCALE

RECORD DRAWING

These Record Drawings have been prepared based on Instructional Bulletins and responses to Requests for Information prepared during construction and as–built information provided by others. JDH Corrosion Consultants has not verified the accuracy and/or completeness of information provided by others and shall not be responsible for errors or omissions that may be incorporated herein as a result

JDH Corrosion Consultants

jdh corrosion consultants, inc.
1100 Willow Pass Court, Concord CA 94520
(925) 927–6634 www.jdhcorrosion.com

MISSION ROCK PHASE 1
STREET IMPROVEMENT PLANS
CATHODIC PROTECTION DETAILS 4

SAN FRANCISCO SAN FRANCISCO COUNTY CALIFORNIA

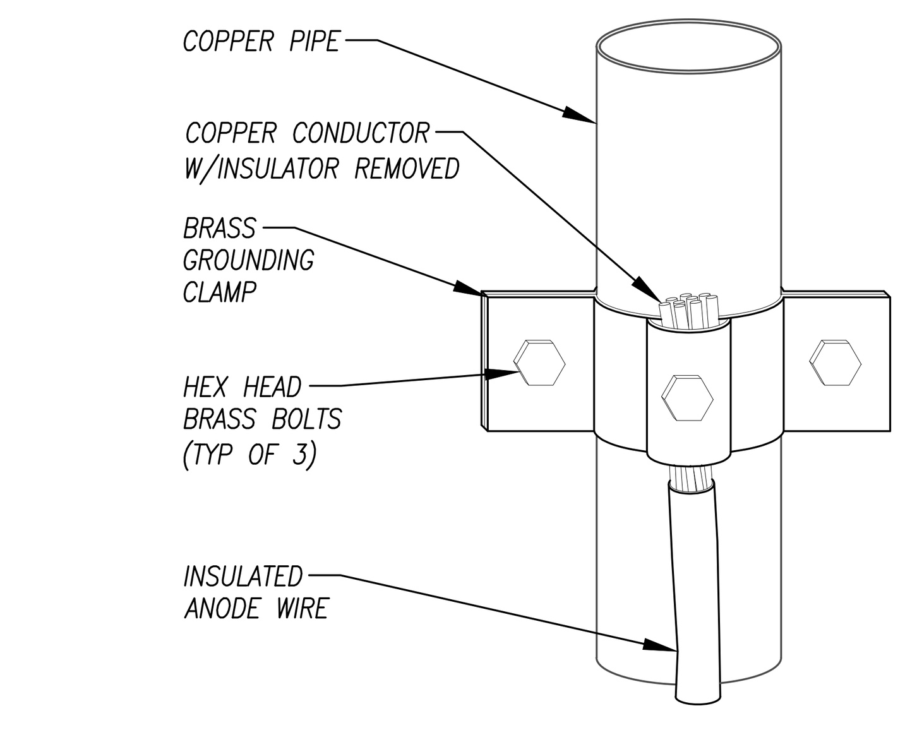
No.	Revisions
	07/31/2024 – RECORD DRAWINGS

Date 04/30/2024
Scale AS SHOWN
Design TDH
Drawn TDH/DJA
Approved MA
Job No 20080006

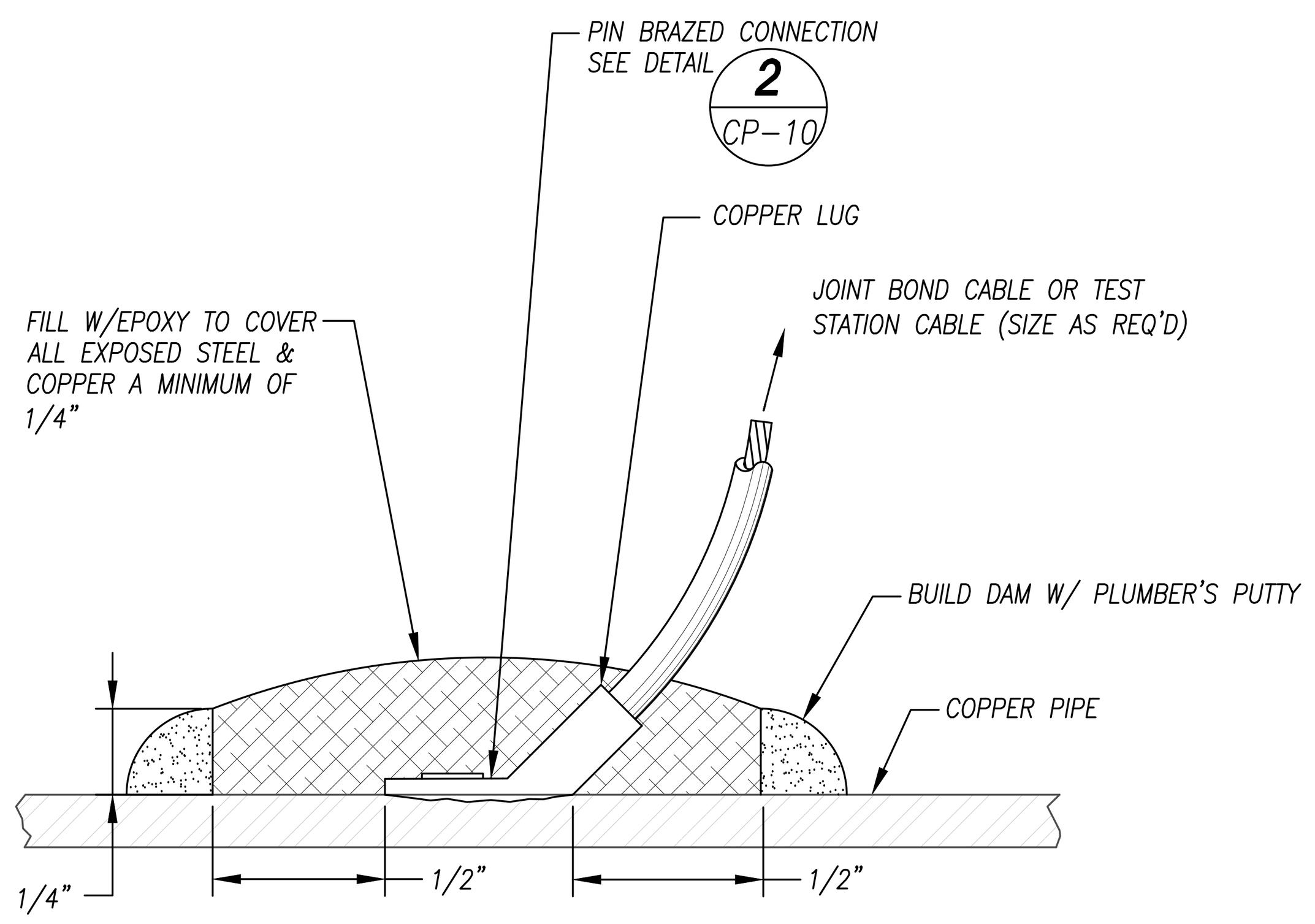
Drawing Number: CP-10

RECORD DRAWINGS

DRAWING NAME: H:\Project Folders\2021 Contracts\2021066 – BKF – Mission Rock, Phase 1, SIP, SF\Design\CP Mission Rock Phase1, SIP Rev2.OR Details.dwg
PLOT DATE: 07–31–24 PLOTTED BY: therink



COPPER PIPE



DUCTILE IRON PIPE

1 CABLE-TO-PIPE CONNECTIONS
CP-11 NOT TO SCALE

STEP 1. FILE STRUCTURE CONNECTION AREA TO BARE SHINY METAL AND CLEAN.

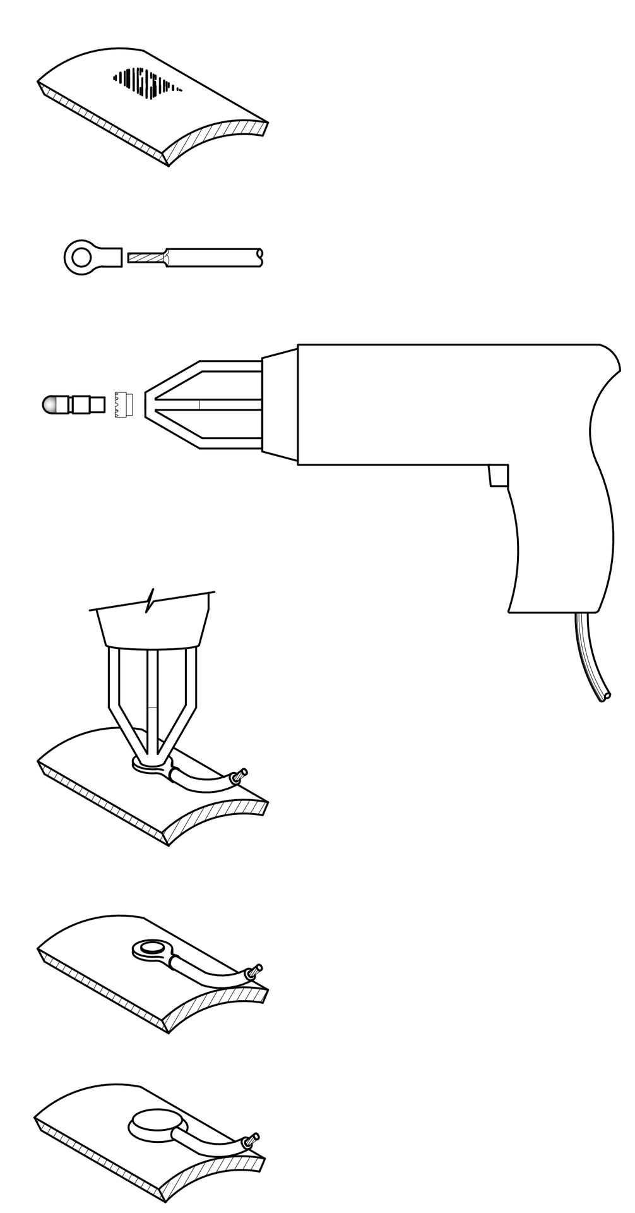
STEP 2. STRIP INSULATION FROM WIRE. ATTACH LUG TO CABLE BY CRIMPING.

STEP 3. LOAD GUN WITH THE BRAZING PIN AND FERRULE.

STEP 4. ADJUST AS NECESSARY. BRAZE THE CABLE & LUG TO THE PIPE.

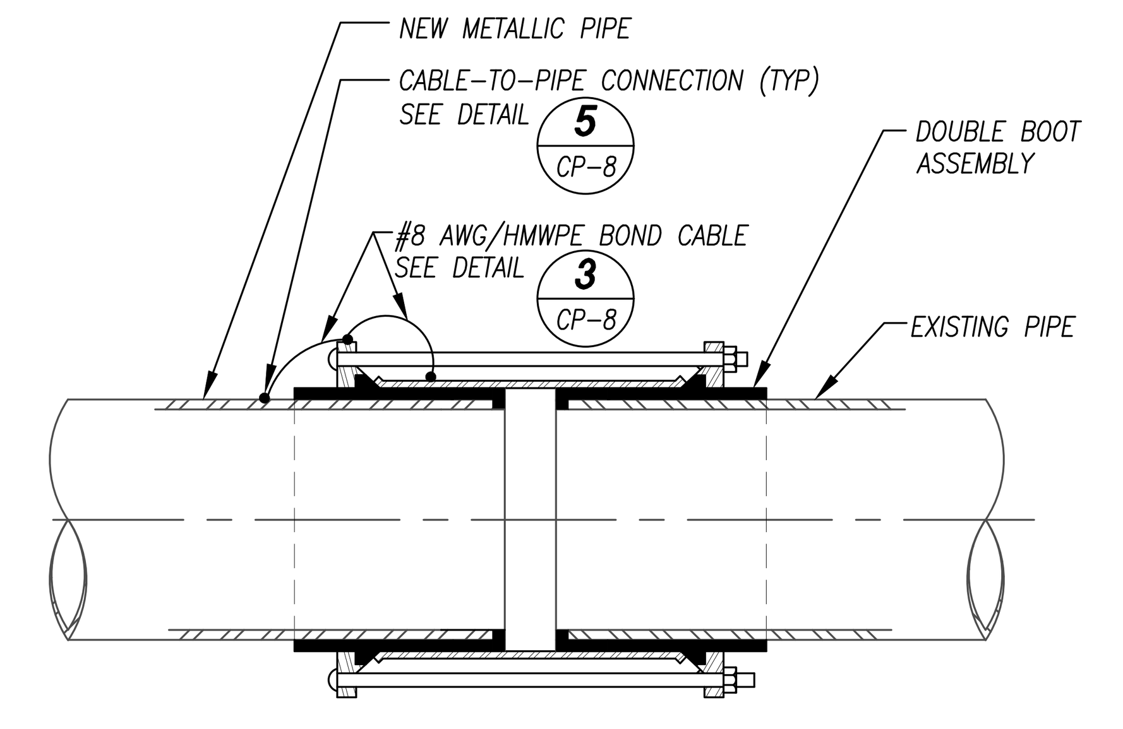
STEP 5. PEEN CONNECTION WITH A HAMMER TO TEST CONNECTION FOR SOUNDNESS.

STEP 6. COVER CONNECTION AND EXPOSED STRUCTURE SURFACE WITH EPOXY COATING COMPOUND PER DETAIL 1, SHEET CP-10.

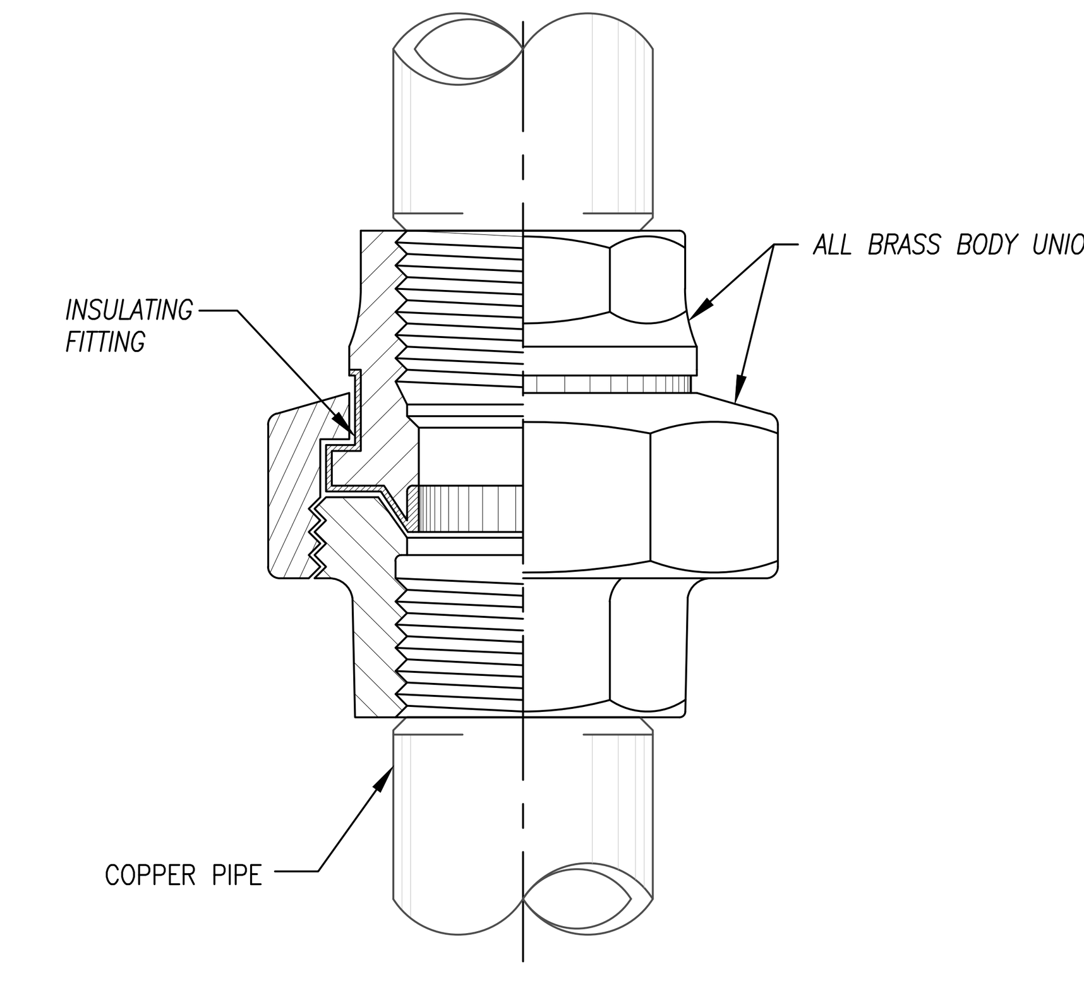


NOTE:
PROCEDURE SHOWN ABOVE IS TO BE USED AS A GENERAL GUIDE ONLY. CONSULT MANUFACTURER'S LITERATURE FOR SPECIFIC INSTALLATION INSTRUCTIONS.

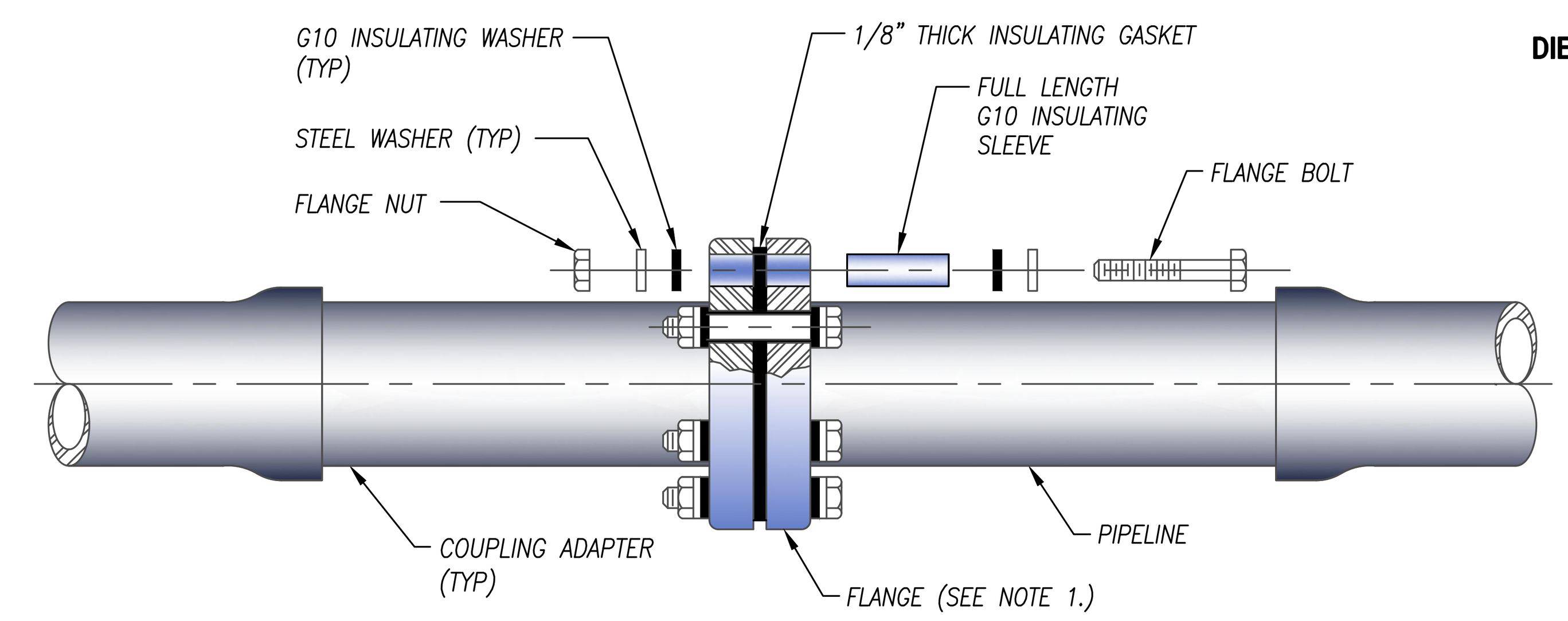
2 PIN-BRAZED CONNECTION
CP-11 NOT TO SCALE



ISOLATING FLEXIBLE COUPLING



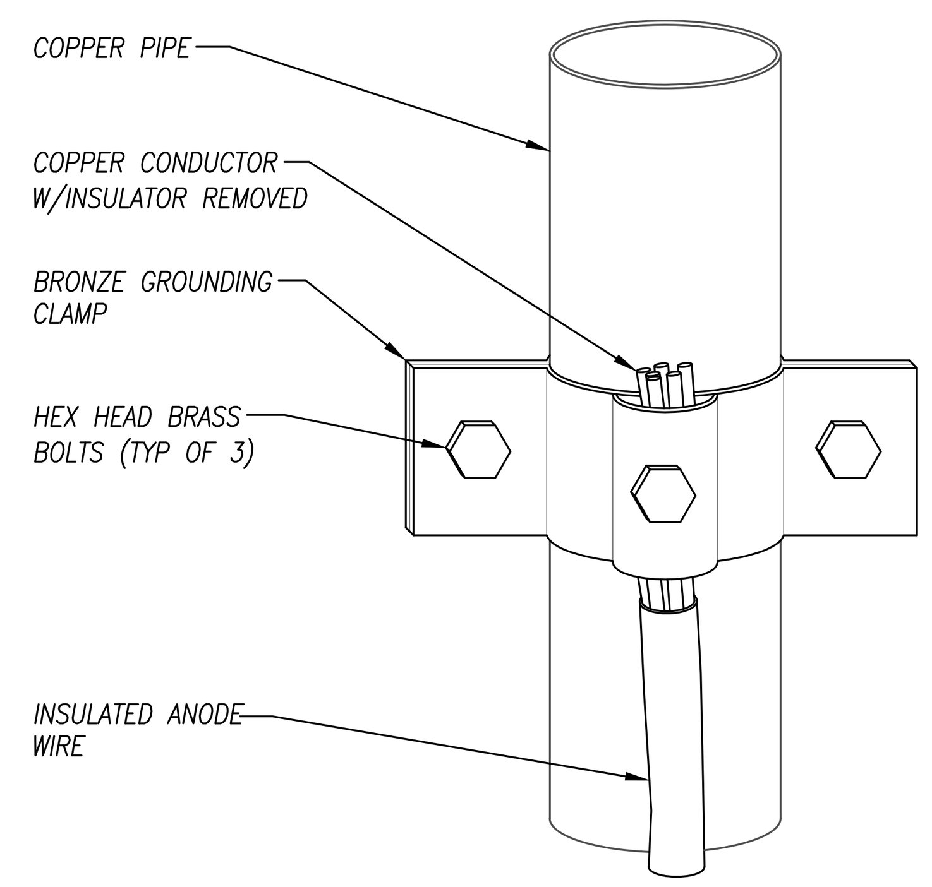
DIELECTRIC ISOLATING UNION



ISOLATING FLANGE

NOTES:
1. THE INSULATING FLANGE KIT SHALL BE FOR WATER SERVICE, SUITABLE FOR WET & DRY LOCATIONS, AND BE OF SAME PRESSURE RATING AS THE FLANGE.
2. THE ALLOY OF THE STEEL WASHERS SHALL BE THE SAME AS IS SPECIFIED FOR THE FLANGE BOLTS.
3. FOR BURIED INSULATING JOINTS APPLY THE COATING SYSTEM AS SHOWN ABOVE.
4. ALL INSULATING JOINTS SHALL BE TESTED AND APPROVED PRIOR TO BACKFILL.

3 DIELECTRIC INSOLATING JOINT
CP-11 NOT TO SCALE



NOTES:
1. STRIP WIRE INSULATION AT THE GROUNDING CLAMP TO ENSURE ELECTRICAL CONTINUITY.
2. ALL BOLTS SHALL BE BRASS WITH HEX HEADS.
3. GROUND CLAMP SHALL MAKE DIRECT CONTACT WITH THE COPPER PIPE. DO NOT ALLOW TAPE WRAP OR POLYETHYLENE ENCASEMENT TO COME BETWEEN CLAMP AND PIPE.
4. IF THE GROUND CLAMP IS BURIED, INSTALL WAX TAPE COATING PER DETAIL 5/CP-9.

4 BRONZE GROUND CLAMP
CP-11 NOT TO SCALE

RECORD DRAWING

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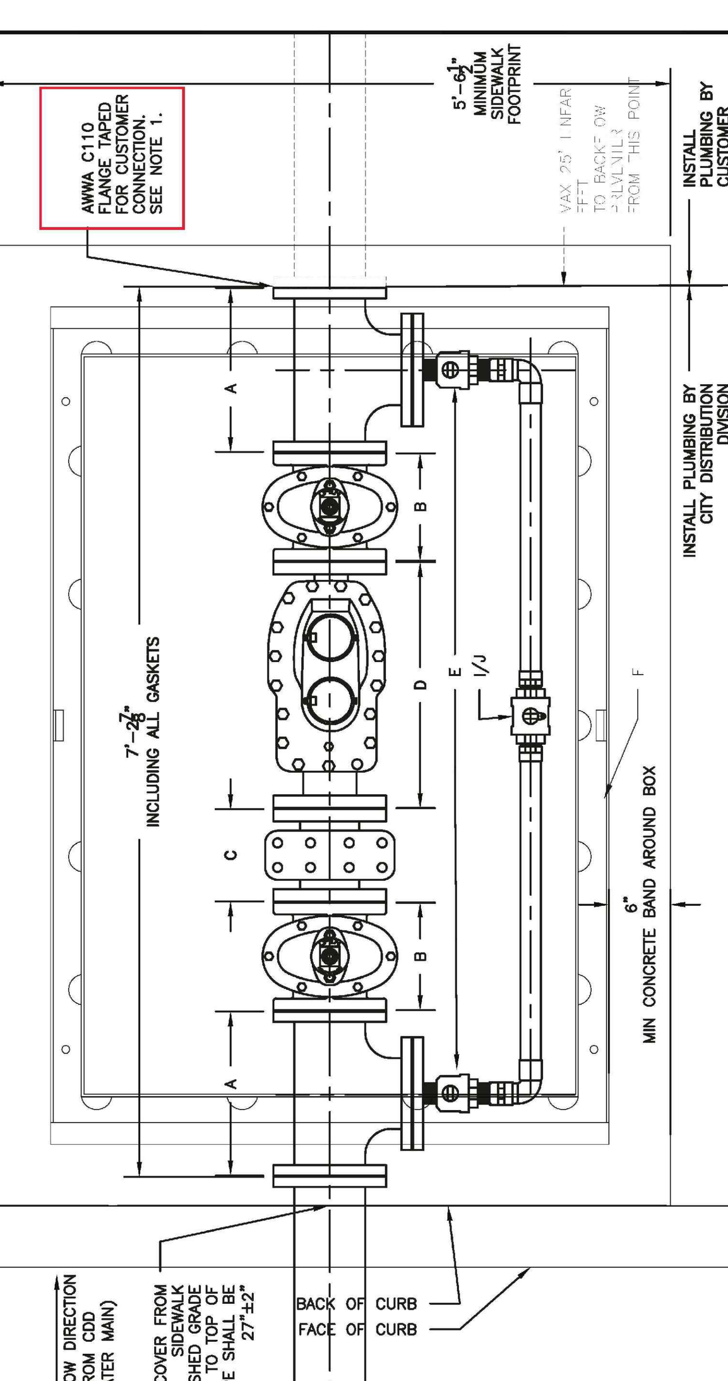
JDH Corrosion Consultants



6" COMPOUND METER MAJOR COMPONENTS

PART	DESC	LAY LENGTH	COMM. CODE
A	6" X 4" FLG TEE	16"	047-34-6456
B	6" FLG GATE VALVE	10 ½"	048-22-9706
C	6" FLG STRAINER	9"	066-81-7431
D	6" COMPOUND MTR (NEPTUNE TRU/FLO)	24"	066-81-1627
E	2" SCREW TAP	N/A	048-20-4304
F	NOMINAL 48"W X 72"L MTR VAULT	SEE CDD-LP-215	056-25-4415
J	2" LINE VALVE WITH LOCK RING	N/A	048-20-4804
K	SERVICE LOCK	N/A	053-43-2465

NOTES:
1. CUSTOMERS REQUESTING NEW SERVICE INSTALLATIONS SHALL NOT INSTALL CUSTOMER PORTION OF LATERAL ("HOUSE PIPE") PRIOR TO SFPUC PORTION OF LATERAL AND METER ASSEMBLY BEING INSTALLED.

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
WATER SERVICES
6-INCH COMPOUND METER ASSEMBLY
(STANDARD INSTALLATION)

DATE	3/7/2017	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	1	CDD-LP-203F	73

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ANSI FULL BLEED A (8.50 X 11.00 INCHES)

2" SERVICE COMPONENTS

LABEL*	CDD COMMODITY CODE	DESC	APPROVED PART(S)**
A	048-20-4304	2" SCREW TAP VALVE, MIP X MIP	MUELLER B2969N-10-2"
	047-34-0502; 047-34-0504; 047-34-0506	2" SADDLE, BRONZE STRAPS (USE ONLY FOR WATER MAINS LESS THAN OR EQUAL TO 8-INCHES IN DIAMETER)	
B	047-35-2612	2" DIELECTRIC UNION, FIP X FIP	GL INDUSTRIES GL-3000NL-FIPT
C	2" COPPER SWING JOINT ASSEMBLY USE PARTS AS FIELD CONDITIONS WARRANT – THREE (3) ELBOWS ARE REQUIRED		
	047-30-0170	2" COPPER ADAPTER X FIP	
	047-30-0172	2" COPPER ADAPTER X MIP	
	047-31-1917	2" 90° BRASS ELBOW	MERIT XNL101-32
	047-31-1920	2" 90° BRASS STREET ELBOW	MERIT XNL160-32
	047-32-4010 THRU 047-32-4019	2" BRASS PIPE NIPPLE, MIP X MIP; CLOSE THROUGH 6" LENGTH	
D	047-10-9102	2" HARD COPPER (TYPE K)	
E	BURIED LINE VALVE AT LIP OF GUTTER REQUIRED ONLY WHEN MAIN IS ON FAR SIDE OF STREET WITH RESPECT TO METER		
	047-30-0170	2" COPPER ADAPTER X FIP	
	048-20-4304	2" LINE VALVE, MIP X MIP	MUELLER B2969N-10-2"
F	047-31-2080	2" 90° BRASS ELBOW	MERIT XNL101-32
G	047-30-0172	2" COPPER ADAPTER X MIP	
H	048-20-4275	2" ANGLE COCK, FIP X FLG	MUELLER B-24286N-2"
I	WATER METER TO BE SIZED BY SFPUC – CUSTOMER SERVICE BUREAU INSTALLED FOR DOMESTIC, IRRIGATION, AND RECYCLED WATER SERVICES		
	066-81-1818	WATER METER, 1 ½"	BADGER RECORDALL DISC, M120
	066-81-1820	WATER METER, 2"	BADGER RECORDALL DISC, M170
J	CHECK VALVE INSTALLED FOR COMBINATION WATER SERVICES ONLY		
	047-31-8232	2" ANSI/ASME 16.5 150# FLANGE X FIP THREADS	JONES E-129-2"
	047-32-4010 THRU 047-32-4019	2" BRASS PIPE NIPPLE, MIP X MIP; CLOSE THROUGH 6" LENGTH	
	048-22-1904	2" CHECK VALVE, FIP X FIP	MILWAUKEE 509 – 2"
K	DEDICATED FIRE SERVICE VALVE		
	047-31-8232	2" ANSI/ASME 16.5 150# FLANGE X FIP THREADS	
	047-32-4010 THRU 047-32-4019	2" BRASS PIPE NIPPLE, MIP X MIP; CLOSE THROUGH 6" LENGTH	
	048-20-4304	2" LINE VALVE, MIP X MIP	MUELLER B-2969-10-2"
L	056-25-0930	2" METER BOX & COVER	SEE PLAN CDD-LP-210 AND CDD-LP-212 ARMORCAST P6-1534X12-SFWD

* SEE PLAN CDD-LP-202B AND CDD-LP-202C FOR PLAN AND PROFILE OF WATER SERVICE LATERAL
** APPROVED PART(S) AS LISTED IN THE CURRENT CITY AND COUNTY OF SAN FRANCISCO MATERIAL PROCUREMENT CONTRACTS

SUPERSEDES A-1240-2B

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
WATER SERVICES
MATERIALS FOR 2-INCH SERVICE CONNECTIONS

DATE	7/21/2017	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	1	CDD-LP-202A	62

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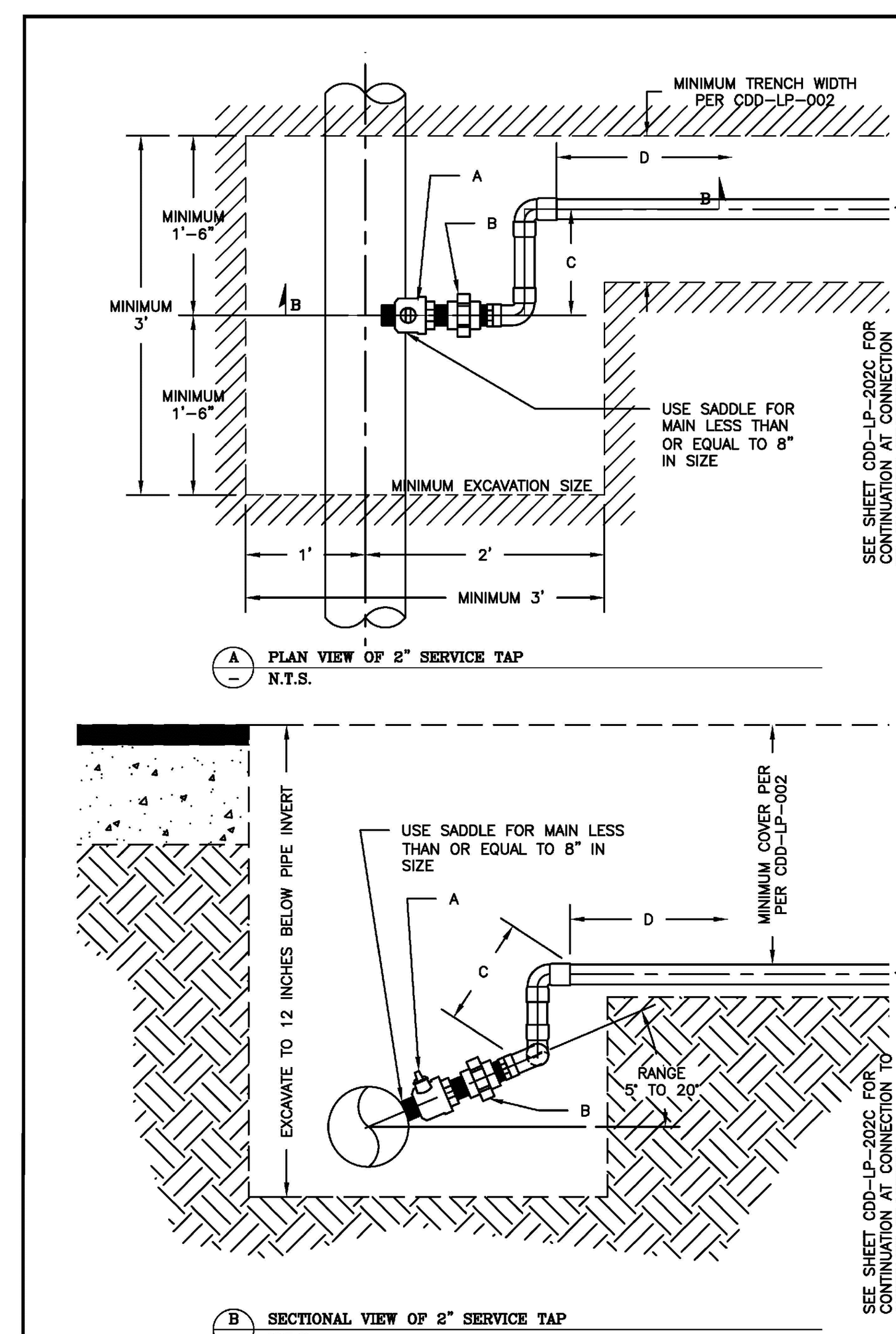

NOTES:
1. ALL PLUMBING WORK ON "HOT" OR "ACTIVE" WATER LINES SHALL BE PERFORMED BY CDD CREWS. CONTRACTORS ARE NOT PERMITTED TO PERFORM PLUMBING WORK OR OPERATE VALVES ON POTABLE WATER LINES OWNED AND OPERATED BY CDD.
2. SITE CONDITIONS MAY NECESSITATE LARGER EXCAVATION DIMENSIONS FOR TAPPING AS DETERMINED BY CDD FOREMAN. CDD FOREMAN RESERVES THE RIGHT TO REQUEST A LARGER EXCAVATION AS REQUIRED TO COMPLETE WORK.
3. EXCAVATION SHALL BE TO A DEPTH 1-FOOT BELOW THE INVERT OF THE WATER MAIN. THE WATER MAIN SHALL BE SUPPORTED WITH WOOD BLOCKING UNTIL BACKFILL AND AS REQUIRED IN CDD STANDARD SPECIFICATION 01 41 28.
4. WATER SERVICES SHALL ONLY BE CONNECTED INTO A "DISTRIBUTION" WATER MAIN. WATER SERVICES SHALL NOT BE CONNECTED INTO A "TRANSMISSION," "FEEDER," OR "DEDICATED" WATER MAIN WITHOUT PRIOR CONSENT OF CDD.
5. WATER SERVICES SHALL ONLY BE TAPPED INTO DOMESTIC OR RECYCLED WATER MAINS. WATER SERVICES (INCLUDING FIRE SERVICES) MAY NOT BE CONNECTED INTO AUXILIARY WATER SUPPLY SYSTEM MAINS.
6. ALL MATERIALS INSTALLED SHALL BE COMPLIANT WITH CDD STANDARD SPECIFICATION SECTION 33 10 00 "WATER UTILITY DISTRIBUTION PIPING MATERIALS"
7. FOR NEW SERVICE INSTALLATIONS ON EXISTING WATER MAINS, SADDLE SHALL BE USED FOR TAP REGARDLESS OF MAIN SIZE OR SERVICE SIZE.

SUPERSEDES A-1240-2B

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

WATER ENTERPRISE – CITY DISTRIBUTION DIVISION STANDARD PLANS
WATER SERVICES
2-INCH SERVICE LATERAL CONNECTION AT MAIN

DATE	10/1/2016	REV.	DRAWING NO.	SHEET
SCALE	N.T.S.	0	CDD-LP-202B	63

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ANSI FULL BLEED A (8.50 X 11.00 INCHES)

jdh corrosion consultants, inc.
1100 Willow Pass Court, Concord CA 94520
(925) 927-6634 www.jdhcorrosion.com

REGISTERED PROFESSIONAL ENGINEER MOHAMMED ALI No. CR 1035 CORROSION STATE OF CALIFORNIA

MISSION ROCK PHASE 1 STREET IMPROVEMENT PLANS CATHODIC PROTECTION DETAILS 5

SAN FRANCISCO SAN FRANCISCO COUNTY CALIFORNIA

No.	Revisions
	07/31/2024 – RECORD DRAWINGS

Date 04/30/2024
Scale AS SHOWN
Design TDH
Drawn TDH/DJA
Approved MA
Job No 20080006

Drawing Number: CP-11

RECORD DRAWINGS

DRAWING NAME: H:\Project Folders\2021 Contracts\2021066 – BKF – Mission Rock, Phase 1, SIP, SF\Design\CP Mission Rock Phase1, SIP Rev2.OR Details.dwg
PLOT DATE: 07-31-24 PLOTTED BY: therink

Mayor ED 17-02 Priority Permit

MISSION ROCK PHASE 1

STREET IMPROVEMENT PLANS

SPECIFICATIONS

Prepared by:

BKF Engineers
150 California Street, Suite 600
San Francisco, CA 94111

June 1, 2023

Project Number 20080006

Mayor ED 17-02 Priority Permit

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TECHNICAL SPECIFICATIONS

FOR

SEAWALL LOT 337 / MISSION ROCK PROJECT PHASE 1
STREET IMPROVEMENT PLANS

CITY OF SAN FRANCISCO, SAN FRANCISCO COUNTY
CALIFORNIA

Engineer's Attest:

The following Technical Specifications have been prepared under the supervision of the undersigned, who hereby certifies that he/she is registered in the State of California.

Civil Specifications Prepared by:

September 25, 2020

James Dallosta, P.E., NO. 72339 Date
Senior Associate / Vice President
BKF Engineers
150 California Street, Suite 650
San Francisco, CA 94111

Geotechnical Specifications Prepared by:

September 25, 2020

Scott Walker, P.E., NO. 63241 Date
Senior Associate / Vice President
Langan Engineering & Environmental Services, Ins.
135 Main Street, Suite 1500
San Francisco, CA 94105

Landscaping Specifications Prepared by:

September 25, 2020

Willett Moss, P.L.A., NO. 4705 Date
Principal
CMG Landscape Architecture
444 Bryant Street
San Francisco, CA 94107

Mechanical Specifications Prepared by:

September 25, 2020

Robert E. LaShells Jr., P.E., NO. 56684 Date
Operations Manager
Mackay & Somps Civil Engineers
5142 Franklin Drive Suite B
Pleasanton, CA 94588

Private Electrical Specifications Prepared by:

September 25, 2020

Hamid R. Arbabaraghi, P.E., NO. E16904 Date
Project Manager
HRA Consulting Engineers
582 Market Street, Suite 1113
San Francisco, CA 94104

Third Street Civil Specifications Prepared by:

September 25, 2020

Jason Ling, P.E., PMP, QSD, NO. 60493 Date
Principal
Urban Design Consulting Engineers
350 Townsend Street, Suite 409
San Francisco, CA 94107

Third Street Cathodic Protection Specifications Prepared by:

September 25, 2020

J Darby Howard, Jr., P.E., NO. 1055 Date
Principal/President
JDH Corrosion Consultants, Inc.
1100 Willow Pass Court
Concord CA 94520

District Energy Telecommunications Specifications Prepared by:

March 10, 2021

Robert Stevens, PE NO. C58660
President
CSW|ST2
303 Twin Dolphin Drive
Redwood City, CA 94065

Date

TABLE OF CONTENTS

SECTION 31 21 00

UTILITY TRENCHING AND BACKFILL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Excavation, bedding, and backfill for underground storm drain, sanitary sewer, and water piping, District Energy Systems and associated structures.

B. Provide labor, material, equipment, and services necessary to complete the backfilling and compacting as necessary for this project. Section includes, but is not limited to:
1. Select Backfill Material
2. Aggregate Base
3. Detectable Tape
4. Trench Excavation
5. Pipe Bedding
6. Trench Backfill
7. Trench Surfacing
8. Filter Fabrics

C. This section excludes drainage fill material and placement around subdrains.

1.2 RELATED SECTIONS

A. Section 31 10 00 – Site Clearing

B. Section 31 20 00 – Earthwork Moving

C. Section 31 23 19 – Dewatering

D. Section 31 23 23.33 – Closed-Cell Lightweight Cellular Concrete (LCC)

E. Section 31 32 19 – Trench Subgrade Stabilization in Bay Mud / Soft Soil

F. Section 33 10 00 – Water System

G. Section 33 10 10 – Auxiliary Water Supply System

H. Section 33 20 00 – Recycled Water System

I. Section 33 30 00 – Sanitary Sewer System

J. Section 33 34 00 – Sanitary Sewer Force Main

1.3 RELATED DOCUMENTS

A. Geotechnical Report: "Geotechnical Investigation Mission Rock Development Streets", Langan Engineering and Environmental Services, Inc. (dated October 31, 2019).

B. ASTM
   1. D1557, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
   2. D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity-Flow Applications.

C. California Administrative Code, Title 24, Part 2 - Basic Building Regulations, Chapter 24, Excavations, Foundations, and Retaining Walls.

D. Caltrans Standard Specifications, 2015
   1. Section 19, Earthwork
   2. Section 26, Aggregate Bases
   3. Section 68, Subsurface Drains
   4. Section 96, Geosynthetics

E. CAL/OSHA, Title 8

F. AASHTO M288., Standard specification for Geosynthetic Specification for Highway Applications

G. Land Use Covenants (LUC):
   1. "Amended Covenant to Restrict Use of Property: Environmental Restrictions." Document Number: 2019-K835128-00 Recorded on September 24, 2019.
   2. "Covenant to Restrict Use of Property: Environmental Restrictions." Document Number: 2002-H209674 Recorded on July 25, 2002.

H. Soil Management Plan: "Soil Management Plan, Mission Rock Development, San Francisco California." Prepared by Ramboll, dated October 18, 2019.

I. Asbestos Dust Mitigation Plan: "Asbestos Dust Mitigation Plan, Mission Rock Development, San Francisco California." Prepared by Ramboll, dated November 15, 2019.

J. Dust Control Plan: "Dust Control Plan, Mission Rock Development, San Francisco California." Prepared by Ramboll, dated November 1, 2019.

1.4 DEFINITIONS

A. AC: Asphalt Concrete

B. ASTM: American Society for Testing and Materials

C. Base: The layer placed between the subgrade and surface pavement in a paving system.

D. Bedding: Material from bottom of trench to bottom of pipe

E. CDF: Controlled Density Fill

F. DIP: Ductile Iron Pipe

G. Engineered Fill:
   1. Soil or soil-rock material approved by the Developer and transported to the site by the Contractor in order to raise grades or to backfill excavations.
   2. Contractor shall provide sufficient tests, and a written statement that all materials brought onto the project site comply with specification requirements.

H. Excavation: Consists of the removal of material encountered to subgrade elevations

I. Initial Backfill: Material from bottom of pipe to 12 inches above top of pipe

J. LCC: Closed-Cell Lightweight Cellular Concrete

K. PCC: Portland Cement Concrete

L. Relative Compaction: In-place dry density of soil expressed as percentage of maximum dry density of same materials, as determined by laboratory test procedure ASTM D1557.

M. Springline of Pipe: Imaginary line on surface of pipe at a vertical distance of ½ the outside diameter measured from the top or bottom of the pipe.

N. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below base.

O. Subsequent Backfill: Material from 12 inches above top of pipe to subgrade of surface material or subgrade of surface facility or to finish grade.

P. Trench Excavation: Removal of material encountered above subgrade elevations and within horizontal trench dimensions.
   1. Authorized Trench Over-Excavation: Excavation below trench subgrade elevations or beyond indicated horizontal trench dimensions as shown on plans or authorized by the Geotechnical Engineer.
   2. Unauthorized Trench Over-Excavation: Excavation below trench subgrade elevations or beyond indicated horizontal trench dimensions without

authorization by the Geotechnical Engineer. Unauthorized excavation shall be without additional compensation.

Q. Utility Structures:
1. Storm drainage manholes, catch basins, drop inlets, curb inlets, vaults, etc.
2. Sanitary sewer manholes, vaults, etc.
3. Water vaults, etc.

1.5 SUBMITTALS

A. Follow submittal procedures outlined in Section 01 10 00 – Supplemental General Requirements.

B. Test Reports: Submit the following report for import material directly to the Developer from the Contractor's testing services:
1. Compaction test reports for aggregate base.

C. Samples:
1. If required by the Geotechnical Engineer, provide 20-pound samples of all imported trench bedding and backfill material sealed in airtight containers, tagged with source locations and suppliers of each proposed material. Do not import materials to Project without written approval of the Geotechnical Engineer and the Developer.
2. Provide materials from same source throughout work. Change of source requires approval of the Geotechnical Engineer and the Developer.

1.6 QUALITY ASSURANCE

A. Contractor shall verify shrinkage characteristics of all soils to be used on the site as engineered fill. The Developer will not be responsible for additional costs associated with variations in shrinkage or bulking factors and related earthwork quantities.

B. Samples of proposed fill shall be provided to the Geotechnical Engineer at least 72 hours prior to its use. It shall not be used as fill or backfill until it is approved.

C. All testing required by this Section and other Sections of these Specifications shall be performed by an independent, qualified Testing Company as approved by the Developer. Retesting required as a result of failed tests shall be at the Contractor's expense.

D. Codes and Standards: Perform earthwork complying with requirements of Design Geotechnical Report: "Geotechnical Investigation Mission Rock Development Streets", Langan Engineering and Environmental Services, Inc. (dated October 31, 2019).

E. Testing and Inspection Service: The Developer will employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.

F. Contractor shall employ surveyor to confirm dimensions, locations, and elevations.

1.7 PROJECT CONDITIONS

A. The Contractor shall visit the site to determine if the existing conditions, nature of materials to be encountered, and all other facts concerning or affecting the work.

B. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Port of San Francisco or others except when permitted in writing by the Owner and then only after acceptable temporary utility services have been provided.

C. Provide a minimum 72-hours' notice to the Owner and receive written notice to proceed before interrupting any utility.

D. Any water and debris, which would interfere with construction shall be removed from excavated areas. During rainy weather, maintain excavations free of water by pumping and other appropriate means. Excavations shall be free from loose material and free water while forms are being set and concrete is being placed. Pumping from excavations shall be performed in manner as to preclude the possibility of any portion of the concrete being carried away. All water resulting from dewatering operations shall be disposed of in accordance with the requirements of the City and County of San Francisco and/or the San Francisco Bay Regional Water Quality Control Board.

E. Throughout the entire construction period, keep dust down within the working area along roads used in the operations and all involved portions of site by intermittent watering and sprinkling. In accordance with Bay Area Air Quality Management District (BAAQMD) guidelines, unpaved access roads should be watered three times daily and other active construction areas twice daily. If necessary, all areas should be watered more frequently to prevent visible dust plumes from migrating outside of the development parcel.

F. Contractor shall keep his work area clean, and in a safe and workmanlike condition so that rubbish, waste and debris do not interfere with the work of other trades.

1.8 EXISTING UTILITIES

A. Locate existing underground utilities in the areas of work. For utilities that are to remain in place, provide adequate means of protection during excavation operations.
   1. Locating of existing underground utilities shall include but not be limited to pot-holing prior to the start of construction.

B. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Developer, utility agency, and owner immediately for directions.
   1. Cooperate with the Developer and public and private utility companies in keeping their respective services and facilities in operation.
   2. Repair damaged utilities to the satisfaction of the agency with jurisdiction.

C. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by the Owner, and then only after acceptable temporary utility services have been provided.

PART 2 - PRODUCTS

2.1 GENERAL

A. Import materials will be subject to approval of the Geotechnical Engineer.

B. For approval of imported fill material, notify the Developer at least 7 days in advance of intention to import material.

2.2 PIPE BEDDING AND INITIAL BACKFILL

A. Bedding and Cover Material: Where not specified in these specifications, bedding and cover material shall conform to SSDPWSF, Section 703 Trench Backfill of City Standard Specifications.
   1. Storm Drain and Sanitary Sewer Pipelines:
      a. HDPE: shall be evenly graded mixture of 3/4" crushed stone or crushed gravel with 100% passing the 1-inch sieve, 90% to 100% passing a 3/4-inch sieve, and not more than 5% passing the No. 4 sieve. Recycled material shall not be allowed.
      b. Trenches will be entirely wrapped by a filter fabric (Mirafi 160N or equivalent), with minimum 18 inches overlap. 8.2
   2. Low Pressure Water and Reclaimed Water Pipelines
      a. Backfill shall consist of dune sand or equivalent, free from rock, concrete, organic material and other objectionable material and shall have 100% passing the 3/8" sieve, 93% to 100% passing the No. 4 sieve and 0% to 10% passing the No. 200 sieve.
      b. Reclaimed water trenches will be entirely wrapped by a filter fabric (Mirafi 160N or equivalent), with minimum 18 inches overlap. Low Pressure Water trenches will be lined by a filter fabric (Mirafi 160N or equivalent) to the base of roadway section. 8.2
   3. District Energy System Pipelines: shall consist of select backfill material.
   4. Auxiliary Water Supply System
      a. Refer to Section 33 10 10 Auxiliary Water Supply System.
      b. Trenches will be entirely wrapped by a filter fabric (Mirafi 160N or equivalent), with minimum 18 inches overlap. 8.2

B. Pea gravel has been specified for placement around Flex-tend connections (low pressure water and reclaimed water), Romac couplings (storm and sewer), and HDPE-Steel transition couplings (DES) at locations of settlement and/or heave occur as shown on the plans.
   1. Pea gravel shall be as follows:
      a. Clean (less than 5 percent passing the 200 sieve)
      b. 1/4 or 3/8-inch gradation
      c. Rounded
      d. Non-cohesive
      e. Uniformly-graded
      f. Virgin gravel material
      g. Not compacted

2.3 SELECT BACKFILL

A. Select backfill material shall be per Section 31 23 23.33 and Geotechnical recommendation.

2.4 WARNING TAPE

A. Polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 6 inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Color and printing shall be permanent, unaffected by moisture or soil.
   1. Warning Tape Color Codes
      a. Red: Electric
      b. Yellow: Gas, Oil; Dangerous Materials, AWSS
      c. Orange: Telephone and Other Communications
      d. Blue: Water Systems
      e. Green: Sewer Systems
      f. White: Steam Systems
      g. Gray: Compressed Air
      h. Purple: Non Potable Water
   2. Warning Tape for Metallic Piping: Acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of tape shall be 0.003 inch. Tape shall have a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.
   3. Detectable Warning Tape for Non-Metallic Piping: Polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Minimum thickness of the tape shall be 0.004 inch. Tape shall have a minimum

strength of 1500 psi lengthwise and 1250 psi crosswise. Tape shall be manufactured with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.5 DETECTION WIRE FOR NON-METALLIC PIPING

A. Detection wire shall be insulated single strand, solid copper with a minimum of 12 AWG.

2.6 SUBSEQUENT BACKFILL

A. Conform to on-site or imported backfill in Section 31 20 00, Earth Moving and Section 31 23 23.33 Closed-Cell Lightweight Cellular Concrete. Low Pressure Water subsequent backfill will be the same as initial backfill.

2.7 CONCRETE STRUCTURE BEDDING AND BACKFILL

A. Precast Structures: Same materials to the same heights as specified for pipe bedding and backfill, or other material approved by the Geotechnical Engineer.

B. Poured-in-Place Structures:
   1. Bedding: Bedding shall meet the approval of the Geotechnical Engineer. In general, bedding is not required, pour bases against undisturbed native earth in cut areas and against engineered fill compacted to 90% relative compaction in embankment areas.
   2. Side Backfill: On-site or imported fill meeting the requirements given in Section 31 20 00, Earth Moving and Section 31 23 23.33 Closed-Cell Lightweight Cellular Concrete.

2.8 FILTER FABRIC

A. Filter fabric shall be meet the requirements for AASHTO M288 Geosynthetic Class 2 fabric.

B. Filter fabric shall be Mirafi 160N or equivalent.

PART 3 - EXECUTION

3.1 GENERAL

A. Comply with the recommendations of the Geotechnical Engineer.

B. Protect existing trees to remain. No grading is permitted under the drip line of protected trees.

C. Excavations for appurtenant structures, such as, but not limited to, manholes, transition structures, junction structure, vaults, valve boxes, catch basins, thrust blocks, and boring pits, shall be deemed to be in the category of trench excavation.

D. Unless otherwise indicated in the Plans, all excavation for pipelines shall be open cut.

E. Prior to commencement of work, become thoroughly familiar with site conditions.

F. In the event discrepancies are found, immediately notify the Developer in writing, indicating the nature and extent of differing conditions.

G. Backfill excavations as promptly as work permits.

H. Do not place engineered fill or backfill until rubbish and deleterious materials have been removed and areas have been approved by the Developer or Developer's Representative.

I. Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

J. In excavations, use satisfactory excavated or borrow material.

K. Under grassed areas, use satisfactory excavated or borrow material.

3.2 SITE PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, which are to remain, from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect existing storm drainage system from silt and debris resulting from construction activities. If contamination occurs, remove contamination at no cost to the Developer.

3.3 EXISTING UTILITIES

A. Identity the location of existing utilities.
   1. Prior to trenching, the Contractor shall excavate at locations specifically indicated on the Plans, if any, and where new lines cross other utilities of uncertain depth and determine the elevation of the utility in question to ensure that the new line will clear the potential obstruction.
   2. The Contractor shall contact Underground Service Alert (USA) at 1-800-227-2600 for assistance in locating existing utilities.

3. If, after the excavation, a crossing utility does present an obstruction, then the line and grade of the new line will be adjusted as directed by the Developer to clear the utility.

B. Protect all existing utilities that are to remain in operation.

C. Movement of construction machinery and equipment over existing pipes and utilities during construction shall be at Contractor's risk.

D. Excavation made with power-driven equipment is not permitted within 2 feet of any known utility or subsurface structure.
1. Use hand or light equipment for excavating immediately adjacent to known utilities or for excavations exposing a utility or buried structure.
2. Start hand or light equipment excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured.
3. Support uncovered lines or other existing work affected by excavation until approval for backfill is obtained.
4. Report damage of utility line or subsurface structures immediately to the Developer.

E. Backfill trenches resulting from utility removal in lifts of 8 inches maximum for non-LCC backfill.

F. Contractor shall verify elevation and location of AWSS lines prior to the start of any construction affecting said lines. Excavation around AWSS lines will be per Section 3.3D and be monitored by the contractor.

3.4 TRENCH EXCAVATION

A. All Trench Excavation shall be performed in accordance with Section 702 'Trench Excavation' of the City Standard Specifications, DPW Order No. 178,940, unless otherwise specified herein.

B. In accordance with rules and regulations adopted by DPW, the trench length of all street openings shall not exceed the length of one block in any three-block section without special permission from the SFMTA. The amount of excavated trench in excess of pipe laid therein shall not exceed 200 linear feet at the end of each working day.
1. The depth of the trench cited shall be from a point below the gutter grade. The gutter grade shall be defined as the existing gutter grade or six inches below the official grade (grade at top of curb as established by the San Francisco Board of Supervisors) whichever is lower. The section of trench above the gutter grade shall be included in the cost of the excavation per linear foot of trench and no additional payment will be allowed for that section of trench cut from the present ground surface to the gutter grade. Where the existing

pavement elevation is below the gutter grade, the depth of the trench shall be measured from the existing pavement grade.

2. The trench shall be excavated in a manner to avoid existing structures, property, and other obstructions encountered during the progress of the work. The Contractor shall support, protect, maintain, and provide for the safe operation and use of all such structures and property so encountered. Should the Contractor damage any structure or property during the progress of the work, he shall immediately notify the proper owners or authorities and shall arrange repair of the same at his expense.

C. All excavations in Bay Mud shall be shored.

D. When Bay Mud or soft, wet soil is encountered at the trench bottom, contractor shall follow the requirements set forth in Section 31 32 19, Trench subgrade stabilization in Bay Mud / Soft Soil.

E. Explosives: Do not use explosives.

F. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.

G. Comply with the geotechnical report, local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

H. Excavations shall be sloped, or supported and braced to prevent movement of the adjacent soil. Shoring and bracing systems shall be designed by a Civil Engineer registered in the State of California. Drawings and Calculations for shoring shall be submitted for review by the Developer's Agent.

I. Submittals should include plans and calculations for a shoring system to be submitted for review and approval prior to trench excavation.

3.5 CONTROL OF WATER AND DEWATERING

A. Contractor attention is directed to Section 31 23 19, Dewatering.

B. Be solely responsible for dewatering trenches and excavations and subsequent control of ground and surface water. Provide and maintain such pumps or other equipment as may be necessary to control ground water and seepage to the satisfaction of the Geotechnical Engineer and the Developer until backfilling is completed.

C. Dewater during backfilling operation so that groundwater is maintained a least one foot below level of compaction effort.

D. Obtain the Geotechnical Engineer's approval for proposed control of water and dewatering methods.

E. Reroute surface water runoff away from open trenches and excavations. Do not allow water to accumulate in trenches and excavations.

F. Maintain dewatering system in place until dewatering is no longer required.

3.6 PIPE BEDDING

A. Obtain approval of bedding material from the Geotechnical Engineer.

B. Accurately shape bedding material to the line and grade called for on the Plans. Carefully place and compact bedding material to the elevation of the bottom of the pipe in layers not exceeding 8 inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction unless specified otherwise on the Plans or by the Geotechnical Engineer. Compact by pneumatic tampers or other mechanical means approved by the Geotechnical Engineer. Jetting or ponding of bedding material will not be permitted.

C. Stabilization of Trench Bottom: When the trench bottom is unstable due to wet or spongy foundation, contractor shall follow the requirements set forth in Section 31 32 19, Trench subgrade stabilization in Bay Mud / Soft Soil.

D. Placement of Bedding Material: The trench bottom shall be cleaned to remove all loose native material prior to placing select backfill material. Sufficient backfill material shall be placed in trench. Granular backfill is to be tamped to bring trench bottom up to grade of the bottom of pipe. The relative compaction of tamped material shall be not less than 90 percent. It is the intention of these requirements to provide uniform bearing under the full length of pipe to a minimum width of 60 percent of the external diameter.

E. Pipe bedding shall be wrapped in filter fabric.

3.7 BACKFILLING

A. Initial Backfill:
   1. Obtain approval of backfill material from Geotechnical Engineer.
   2. Bring initial backfill up simultaneously on both sides of the pipe, so as to prevent any displacement of the pipe from its true alignment. For granular backfill carefully place and compact initial backfill material to an elevation of 12 inches above the top of the pipe in layers not exceeding 8 inches in loose thickness. Compact bedding material at optimum water content to 90% relative compaction unless specified otherwise on the Plans or by the Geotechnical Engineer. Compact by pneumatic tampers or other mechanical

means approved by the Geotechnical Engineer. Jetting or ponding of initial backfill material will not be permitted.

B. Pipe Detection: In trenches containing pressurized plastic pipes, tracer wire shall be placed directly above the pipe and shall be connected to all valves, existing exposed tracer wires, and other appurtenances as appropriate.

C. Subsequent Backfill:
1. Above the level of initial backfill, the trench shall be backfilled with LCC per Section 31 23 23.33 and Geotechnical recommendation.
2. Low Pressure Water subsequent backfill will be the same as initial backfill.

D. Jetting of trench backfill is not permitted.

E. Utility backfill shall be inspected and tested by the Geotechnical Engineer during placement. Cooperate with the Geotechnical Engineer and provide working space for such tests in operations. Backfill not compacted in accordance with these specifications shall be removed as necessary and replaced to meet the specified requirements, to the satisfaction of the Geotechnical Engineer and the Developer prior to proceeding with the Project.

F. Compaction testing shall be in accordance with California Test Method ASTM D1556 or D1557.

3.8 CLEANUP

A. Upon completion of utility earthwork all lines, manholes catch basins, inlets, water meter boxes and other structures shall be thoroughly cleaned of dirt, rubbish, debris and obstructions of any kind to the satisfaction of the Developer.

END OF SECTION

SECTION 33 20 00

NON-POTABLE WATER SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Site water distribution system for recycled services up to 5 feet of any on-site building being served.

B. Recycled water transmission or distribution system within a roadway or street right-of-way.

1.2 RELATED SECTIONS

A. Section 31 21 00, Utility Trenching and Backfill

1.3 RELATED DOCUMENTS

A. ASME
1. ASME A112.1.2: Air Gaps in Plumbing Systems (for Plumbing Fixtures and Water Connect Receptors
2. ASME B1.20.1: Pipe Threads, General Purpose, Inch
3. ASME B16.1: Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250
4. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings
5. ASME B16.22: Wrought Copper and Copper Alloy Solder – Joint Pressure fittings
6. ASME B16.26: Cast Copper Alloy Fittings for Flared Copper Tubes

B. ASTM
1. ASTM A536: Standard Specification for Ductile Iron Castings
2. ASTM A674: Standard Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids
3. ASTM B61: Standard Specification for Steam or Valve Bronze Castings
4. ASTM B62: Standard Specification for Composition Bronze or Ounce Metal Castings
5. ASTM B88: Standard Specification for Seamless Copper Water Tube
6. ASTM C94: Standard Specification for Ready-Mixed Concrete
7. ASTM F1056: Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing and Fittings

C. AWWA
1. C104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings

2. C105: Polyethylene Encasement for Ductile-Iron Pipe Systems
3. C110: Ductile-Iron and Gray-Iron Fittings
4. C111: Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
5. C115: Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
6. C116: Protective Fusion-Bonded Epoxy Coatings for the Interior & Exterior Surfaces for Ductile-Iron and Gray-Iron Fittings
7. C150: Thickness Design of Ductile-Iron Pipe
8. C151: Ductile-Iron Pipe, Centrifugally Cast
9. C153: Ductile-Iron Compact Fittings
10. C205: Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 inch and Larger-Shop Applied
11. C208: Dimensions for Fabricated Steel Water Pipe Fittings
12. C209: Cold Applied Tape Coatings for Steel Water Pipe, Special Sections, Connections, and Fittings
13. C210: Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings
14. C213: Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings
15. C214: Tape Coatings for Steel Water Pipelines
16. C218: Liquid Coatings for Aboveground Steel Water Pipe and Fittings
17. C219: Bolted, Sleeve-type Couplings for Plain-End Pipe
18. C500: Metal-Seated Gate Valves for Water Supply Service
19. C502: Dry-Barrel Fire Hydrants
20. C503: Wet Barrel Fire Hydrants
21. C504: Rubber Seated Butterfly Valves.
22. C507: Ball Valves, 6 inch through 60 inch.
23. C508: Swing-check Valves for Waterworks Service, 2 inch through 48 inch NPS.
24. C509: Resilient-Seated Gate Valves for Water Supply Service
25. C510: Double Check Valve Backflow Prevention Assembly
26. C511: Reduced-Pressure Principle Backflow Prevention Assembly
27. C512: Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service
28. C550: Protective Interior Coatings for Valves and Hydrants
29. C600: Installation of Ductile-Iron Water Mains and Their Appurtenances
30. C606: Grooved and Shouldered Joints
31. C651: Disinfecting Water Mains
32. C800: Underground Service Line Valves and Fittings
33. C906: Polyethylene (PE) Pressure Pipe and Fittings, 4 inch through 65 inch, for Waterworks
34. ISO 8179-1: Ductile Iron Pipes – External Zinc-Based Coating
35. M41: Ductile-Iron Pipe and Fittings

D. Factory Mutual Insurance Company (FM)
1. FM 1530: Fire Department Connections

E. National Fire Protection Association (NFPA)

1. NFPA 24: Installation of Private Fire Service Mains and Their Appurtenances
2. NFPA 70: National Electric Code
3. NFPA 1963: Fire Hose Connection

F. National Sanitation Foundation (NSF)
1. NSF 61: Drinking Water System Components-Health Effects

G. Underwriters Laboratory(UL)
1. UL 262: Safety Gate Valves for Fire-Protection Service
2. UL 405: Safety Fire Department Connection Devices
3. UL 789: Indicator Posts for Fire-Protection Service

H. Standard Specifications of the City and County of San Francisco, Department of Public Works, Bureau of Engineering (SSDPWSF), Latest Edition. Also referred to as "City Standard Specifications."

I. Standard Plans of the City and County of San Francisco, Department of Public Works, Bureau of Engineering (SPDPWSF), Latest Edition. Also referred to as "City Standard Plans."

J. Standard Plans and Specifications of San Francisco Public Utilities Commission - City Distribution Division (SFPUC - CDD), Latest Edition.

K. Department of Public Works (DPW) Order No. 176,707 "Regulations for Excavating and Restoring Streets in San Francisco", approved March 26, 2007.

L. AWWA Standards, Latest Revision.

M. California Administrative Code, Title 22, §64572, Water Main Separation

N. SFWD standard drawings, SFWD Rules and Regulations governing Water Services to customers, Latest Editions.

O. SFPUC Asset Protection Standards, May 2017 or Latest Edition.

1.4 DEFINITIONS

A. AASHTO: American Association of State Highway and Transportation Officials

B. ASTM: American Society for Testing Materials

C. AWWA: American Waterworks Association

D. DI: Ductile iron

E. DIP: Ductile iron pipe

F. FM: Factory Mutual

G. ISO: International Organization for Standardization

H. NFPA: National Fire Protection Association

I. NSF: National Sanitation Foundation

J. PCC: Portland cement concrete

K. UL: Underwriters Laboratory

1.5 SYSTEM PERFORMANCE REQUIREMENTS

A. External Load: Earth load indicated by depth of cover plus AASHTO H20 live load unless indicated otherwise.

1.6 SUBMITTALS

A. Follow submittal procedure outlined in Section 01 10 00, Supplemental General Requirements.

B. Product Data: Manufacturer's literature and data, including, where applicable, sizes, pressure rating, rated capacity, listing/approval stamps, labels, or other marking on equipment made to the specified standards for materials, and settings of selected models, for the following:

1. Piping materials and fittings
2. Gaskets, couplings, sleeves, and assembly bolts and nuts
3. Flexible pipe fittings
4. Restrained pipe fittings
5. Flexible Connectors
6. Expansion joints
7. Flexible expansion joints
8. High deflection fittings/ball joints
9. Gate valves
10. Air release, air/ vacuum and combination air valves
11. Blow-off valves
12. Service connections and water meters
13. Valve boxes, meter boxes, frames and covers
14. Backflow preventers
15. Fire hydrants
16. Post indicator valves
17. Fire department connections
18. Thrust block concrete mix
19. Tapping sleeves and tapping valves
20. Service saddles and corporation stops
21. Identification materials and devices

C. Water Pressure Report: At the conclusion of work, the Contractor shall engage a qualified testing service to conduct a flow test of the existing system (providing flow test data for all mains and at least six (6) hydrants). Provide date and location of test, type and method of test performed, static pressure and residual pressure in psig, observed flow in gpm, and orifice size.

D. Shop drawings: Include plans, elevations, details and attachments.
   1. Precast and cast in-place vaults and covers

E. Field test reports: Indicate and interpret test results for compliance with the Project requirements.

1.7 QUALITY ASSURANCE

A. All testing required by this Section and other Sections of these Specifications shall be witnessed by the Developer's Agent. Retesting required as a result of failed tests shall be at the expense of the Contractor.

1.8 MATERIAL DELIVERY, STORAGE AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
   1. Ensure that valves are dry and internally protected against rust and corrosion.
   2. Protect valves against damage to threaded ends and flange faces.
   3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage and handling to prevent pipe end damage and to prevent entrance of dirt, debris and moisture.

C. Handling: Use slings to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. During Storage: Use precautions for valves, including fire hydrants according to the following.
   1. Do not remove end protectors, unless necessary for inspection, then reinstall for storage.
   2. Protection from Weather: Store indoors and maintain temperature higher than ambient dew-point temperature. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

E. Do not store plastic pipe and fittings in direct sunlight.

F. Protect pipe, fittings, flanges, seals and specialties from moisture, dirt and damage.

G. Protect linings and coatings from damage.

H. Handle precast boxes, vaults and other precast structures according to manufacturer's written instructions.

I. Protect imported bedding and backfill material from contamination by other materials.

1.9 COORDINATION

A. Coordinate connection to existing water mains with water utility supplying water.

B. Coordinate piping materials, sizes, entry locations, and pressure requirements with building domestic water distribution piping and fire protection piping.

PART 2 - PRODUCTS

2.1 PIPE

A. Piping Materials Less Than 4"
1. Pipe shall be copper tubing, type K and shall conform to CCR Title 22, Section c64570. Soft or hard type K copper tubing shall be per service size as shown in SFWD Standard Drawings.
2. Bronze Valves and Fittings shall conform to AWWA C800 and be the same as awarded under the current City Procurement Contract for such materials.
3. Angle cocks shall be Ford Angle Ball Meter Valve with stainless steel bolts and nuts.

B. Piping Materials 4" to 8"
1. Pipe shall be ductile iron, Class 53 and conforming to the latest revision of ANSI/AWWA C151/A21.51 and shall conform to CCR Title 22, Section 64570.
2. Pipe shall be bell and spigot, push-on type, tyton joint that is designed to accommodate "Field-Lok™" gaskets.
3. The ductile iron pipe shall be cement-mortar lined conforming to ANSI/AWWA C110/A21.10 or ANSI/AWA C153/A21.53. The cement mortar lining shall be double the standard thickness.
4. Pipe shall be the same as awarded under the current City Procurement Contract for such materials.

C. Piping Materials Larger Than 8"
1. Pipe shall be ductile iron, Class 53 and conforming to the latest revision of ANSI/AWWA C151/A21.51 and shall conform to CCR Title 22, Section 64570.
2. Pipe shall be bell and spigot with TR FLEX joint and Tyton gaskets.
3. The ductile iron pipe shall be cement-mortar lined conforming to ANSI/AWWA C110/A21.10 or ANSI/AWA C153/A21.53. The cement mortar lining shall be double the standard thickness.
4. Pipe shall be the same as awarded under the current City Procurement Contract for such materials.

D. For Service Lateral pipe incorporating flanged fittings:
   1. Flanges shall match the type used by SFWD for meters and appurtenances.
   2. All flange bolts and nuts shall be in accordance with ANSI B-16.42, 1979 Class 150 except material for the bolts shall be stainless steel, ANSI Type 304 ASTM A 193 B8, Class II and material for the nuts shall be stainless steel, ANSI Type 304 ASTM A 194 B8, Class I.55. The flanges shall be rated for at least 250 psi working pressure.
   3. All gaskets shall conform to ANSI/AWWA C111/A21.11 standard. Flange joint gaskets shall be full face, non-asbestos with nitrite NBR binder, 1/8" thick. Gaskets shall be constructed of EPDM and meet ANSI/NSF-61.

2.2 VALVES

A. Corporation stops shall be used for service laterals 2" diameter and smaller. Corporation stops shall be tapped into the main as shown in the SFWD Standard Drawings.

B. 12-inch and smaller gate valves shall conform to ANSI/AWWA C509. 16-inch gate valves shall conform to ANSI/AWWA C515. 12-inch and 16-inch gate valves shall have mechanical joint ends restrained with EBAA Megalug glands. Flanged end gate valves shall be full-face flange by flange manufactured in accordance with ASA B16.1, 125 lb. Class or ASA B16.2, 250 lb. Class. Operation nut shall be painted red. Refer to CDD's latest valve contract for approved make and model.

2.3 FITTINGS

A. Fittings shall be Tyton by Tyton ends with U.S. Pipe "Field-Lok" type gaskets for 8-inch and smaller mains, and TR Flex with Tyton gaskets for larger than 8-inch mains.

2.4 V-BIO POLYETHYLENE ENCASEMENT

A. Polyethylene encasement for ductile iron pipe and fittings shall be purple in color, 8 mils in thickness, low density, and shall conform to AWWA C105.

B. The inside surface of the polyethylene wrap to be in contact with the pipe exterior shall be infused with a blend of anti-microbial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion.

2.5 METER BOX AND COVER

A. Meter boxes and covers for standard 1- and 2-inch (recycled) services shall be made of polyethylene and polymer concrete. Meter vaults for services larger than 2-inch shall be fiberglass vaults with torsion assisted frame and cover. Meter boxes, vaults and covers shall be manufactured by Armorcast or approved equivalent. Refer to SFWD standard drawings. Meter boxes and covers shall be the same as awarded under the current City Procurement Contract for such materials.

2.6 MARKING TAPE

A. Refer to Section 33 10 10 Auxiliary Water Supply System

2.7 VALVE BOX AND COVER

A. Valve box and cover shall be for reclaimed water. Valve boxes shall have a special, heavy-duty, triangular cover, with the following inscription cast on the top surface: "RECLAIMED WATER", plus a universal icon for non-potable water.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION

A. Construction staking for RWL shall include reference points indicating offset and elevation to pipe at 50-foot station maximum.

B. The trench shall be excavated so that a 4-inch thick layer of sand bedding can be installed beneath the pipe bottom such that the barrel of the pipe will have an even bearing along its entire length, and with sufficient clearance provided for any necessary operations in connection with the laying of the pipe. Bell holes shall be excavated for each pipe bell or joint.

C. Before any pipe may be installed, the grade of the trench bottom shall be to the satisfaction of the Developer's Agent. Immediately prior to installing the pipe, the contractor shall remove all loose rocks and other objectionable material from the bottom of the trench and bell holes. When the trench is properly prepared, the pipe shall be lowered therein, singly, without jar or strain and assembled by piece inside the trench.

D. Joints for pipe, fittings, and valves shall be fastened by use of "Field-Lok™" Gaskets unless otherwise directed by the Developer's Agent. Field-Lok gaskets are only for 8" and smaller DIP joints.

E. The pipe shall be joined in strict adherence to the pipe manufacturer's printed installation instructions.

F. When the pipe is cut in the field, the outside of the cut end shall be beveled about one-quarter inch at an angle of about 30 degrees and the leading edge rounded. The prepared cut end shall be marked at 3-1/4" for an 8" water line.

G. If the joint assembly is not accomplished with the application of reasonable force, the plain end of the pipe shall be removed to check the proper position of the gasket. At the end of each day, the contractor shall plug the end of the laid pipe.

H. No pipe shall be placed within the trench closer than 75 feet from the end of said trench as excavated, or from any obstruction visible in said trench area. The purpose of this

stipulation is to permit the Developer's Agent to adjust said trench line and grade as conditions require.

I. Thrust blocks shall be installed at all fittings or angular bends of 11-1/4 degrees or larger, and greater than 12" in diameter. No thrust blocks required for lines 12" in diameter and smaller.

J. All connections to existing reclaimed water mains will be made by the SFWD. Dead ends of pipes shall be fitted with bell-flange adapters and blind flange. Connections of new pipe to existing dead ends shall incorporate a bell-flange adapter connected to the existing bell-flange adapter on the existing dead end pipe.

K. Provide locating/marking tape in the trench, continuously over the centerline of the pipe. Color-coded identification tape differentiating the reclaimed water piping from other utility lines shall be consistent throughout the project. Reclaimed water pipes shall be installed with a purple identification tape or polyethylene vinyl wrap (Pantone 512). The identification tape shall be locator-type marking tape. The tape and wrap shall be at least six inches in width, and shall have white or black printing on a purple field (Pantone 512), with the following inscription:

"RECLAIMED WATER -- DO NOT DRINK"

Plus a universal icon for nonpotable water.

Text shall not be separated by gaps of more than 6 inches. If the tape is wrapped around the pipe, there shall be two parallel rows of text so that the warning is readable after overlapping. Identification tape shall be continuous in coverage. If tape is attached to sections of pipe before they are placed in the trench, there shall be extra lengths of flaps to provide continuous coverage when the section is installed.

During pipeline installation, a 6-inch wide identification tape shall be placed in the trench 12 inches above the top of the pipe. Tape shall be oriented longitudinally, and centered along the top of the distribution line, with the printed side facing up. Necessary precautions shall be taken to insure the tape is not distorted or otherwise misplaced during backfilling operations. The intent of this tape is to provide warning during future excavation activities that reclaimed water pipeline is located below, and thus avoid damage and interruption of service.

L. Valves shall be purple. Valves shall be identified with a stamped brass or engraved plastic disc not less than 1.5 inches in diameter permanently affixed to the valve, with the inscription:

"RECLAIMED WATER"

Plus a universal icon for nonpotable water.

M. Reclaimed water pipelines shall maintain minimum separation distances from potable water pipelines in conformance with The Waterworks Standards, Title 22, Chapter 16, Section 64572. In addition, reclaimed water pipelines shall maintain the same minimum DOHS separation distances from sanitary sewer lines to prevent recontamination. Installation of pipelines in common trenches shall be prohibited.

N. The entire pipe system shall be encased with purple polyethylene tubes or sheets in accordance with AWWA C105.

O. All rubber gasket joints, fusion epoxy coated flanges and flexible couplings on ductile iron pipelines shall be bonded with insulated copper cable to insure electrical continuity of pipeline and fittings.

P. Insulating flanges and/or couplings shall be installed to electrically isolate the buried portion of pipeline from other metallic pipelines, reinforced concrete structures and above grade buildings or structures.

Q. All joints on Service Laterals shall be restrained per SFWD Standards.

3.2 IDENTIFICATION OF "FIELD-LOK™" GASKET JOINTS

A. The Contractor shall identify all joints with "Field-Lok™" gaskets by spraying white marking paint on top of each bell and also by taping a direct burial tape around the spigot end of each pipe, just in front of the bell.

3.3 FLEXIBLE JOINT INSTALLATION

A. Flexible Expansion Joints shall be installed where located on the Project Drawings pursuant to the Manufactures installation recommendations.

3.4 HYDROSTATIC TEST IN THE FIELD

A. When the pipeline or a portion of the pipeline laid under this contract is completed, the Contractor shall test the line to a hydrostatic pressure of 225 pounds per square inch. The actual pressure test of 225 psi shall be maintained for not less than 2 hours during which time no additional water shall be added to the line under test. Contractor shall provide a minimum of 72 hours' notice to the City Representative in advance of the pressure test. Unless otherwise directed by the Developer's Agent, the pipe joints shall be exposed during the test. All service lines to be incorporated in the pipeline shall be installed before the pipeline may be tested and shall be included in the test. All tests shall be witnessed by the Developer's Agent.

B. For testing of new pipe connected to existing pipe, the connecting bell-flange adapters shall have an 1/8" blind flange inserted between. Upon completion of the test, the blind flange shall be removed, a gasket inserted, and the flange bolts retightened, all in the presence of the City inspector.

C. The Contractor shall furnish all necessary labor, material and equipment, such as pumps, piping, connections, pressure gauges, etc., for the test. The Contractor shall submit for approval and also furnish and install necessary temporary restraints such as anchorage and blocking to prevent movement of the pipe under test.

D. Contractor may backfill the new installation (except open ends) prior to hydrostatic test. If any section of the pipe under test develops a leak visible to the eye in the rubber gasket joints or in the pipe itself, the Contractor shall repair or replace the defective portion of the pipe as directed by the Developer's Agent at no additional cost. This work shall include removal of the polyethylene encasement, allowing all water to escape; and retaping of polyethylene encasement per the approved repair procedures. After all repairs are made, the pipe shall be retested.

E. No external restraint shall be used to prevent possible axial pipe movement at any end cap or blind flange (such as lumber between the cap or blind flange and end of trench).

3.5 DISINFECTION

A. Upon completion of satisfactory hydrostatic test, the Water Department will disinfect the main. The Water Department will supply and install all piping, fittings and other materials necessary to disinfect the main, except screw taps, flushing assemblies, and risers, which shall be installed by the Contractor. The Contractor shall not backfill the site of such work until the satisfactory disinfection of the main is verified by the Developer's Agent.

3.6 INSTALLING PIPE FITTINGS

A. The Contractor shall include the procurement, placing, restraining, and protecting of all fittings, valves, joint restraints, and all other appurtenances to be incorporated in the work, all as indicated in the Contract Documents or as directed by the Developer's Agent.

B. Installation:

1. All fittings shall be installed in the manner specified for installing pipe under Item 3.1 unless otherwise specified herein, and as directed by the Developer's Agent.
2. All fittings, bends, tees, and gates of 4, 6, 8-inches in diameter shall be fastened to the pipe or to each other by use of "Field-Lok™" gaskets. All fittings, bends, tees, and gates 12-inchs and larger shall use TR FLEX joints and Tyton gaskets. Caps shall be fastened to the pipe by use of tie rods and lugs or restrainers as shown per SFWD Standards. All joints within 26 feet upstream from an end cap, blind flange, hydrant, or blow-off valve outlet shall be restrained with tie-rods and/or restraining devices. Additional joint restraints shall be installed at locations directed by the Developer's Agent. Contractor is not allowed to restrain joints by welding on lugs to pipe.

3. All bends, tees, and gates 12-inchs and larger shall use TR FLEX joints and Tyton gaskets
4. Joints on all laterals to the main shall be restrained as required and directed by the Developer's Agent.

C. The Contractor shall paint all tie rods, restraining ring assembly, bands and other miscellaneous metal attached to the pipeline, installed by the Contractor during main connections, or large service connections with two (2) coats Kopper Bitumastic No. 505 or two (2) coats Protecto Wrap CA160 or approved equal, applied in accordance with the manufacturer's directions.

D. Installation of securing devices for fittings, such as restraining ring assembly, bands, tie rods, and other miscellaneous metal, and furnishing and application of protective painting to devices will be considered as incidental work, and no direct payment will be made therefore.

E. Valve Boxes:
1. Over each valve, blow-off or other similar appurtenance, a piece of ductile iron pipe of such size as may be required by the Water Department shall be place vertically to form a valve box. A cover (D&L Foundry M-9009 or M-9014, as applicable), shall be placed on top of the pipe or box. The bottom of the box shall rest on a steel plate required by the Water Department so placed as to prevent the box from bearing on the gate. Steel plates supporting boxes, over blow-offs or air valves shall be set on an asphalt bed. Contractor shall cut the box to such lengths that the top of the gate cover will be flush with the surface of the finished pavement.

3.7 INSTALLING SHORING

A. Work Included:
1. Under this item, the Contractor shall install an approved shoring system for all excavations 5 feet or more in depth.
2. All shoring shall be installed in accordance with standards established by the California Division of Industrial Safety and in conformance with all other applicable rules and requirements.
3. If the Contractor intends to use a shoring plan which varies from the Standards established by the California Division of Industrial Safety, the plan shall be prepared and signed by a Registered Civil Engineer and submitted to the Developer's Agent for approval at least five (5) working days before the Contractor intends to begin excavating. The Contractor shall not start excavation prior to approval of the shoring plan by the Developer's Agent.
4. In locations where the City crews will install service lines or connections to other lines, regardless of depth, the Contractor shall install a solid sheeting type shoring system, approved by the Developer’s Agent, which is capable of protecting all excavations from excessive water that may be present and give

ample access to the crews to perform the installation. This shoring system is more stringent than CAL/OSHA Standards.

5. All shoring materials and equipment shall be removed from the excavation prior to completion of work.

3.8 INSTALLATION OF SCREW TAPS

A. The Contractor shall drill, tap and install all screw taps and risers as indicated in the Contract Documents or as required by the Developer's Agent.

B. Installation:

1. Any screw taps not satisfactorily installed in the opinion of the Developer's Agent shall be removed and replaced at the expense of the Contractor. Where the screw tap installation is unsatisfactory, it shall be removed and replaced with a solid cast iron plug. The Contractor shall relocate screw taps to locations as directed by the Developer's Agent.
2. Contractor shall install a screw tap for 1" services on all size mains and use service saddles for 2" services on 4", 6" and 8" size mains. 2" services on mains larger than 8" shall use screw taps.

3.9 INSTALLATION OF SERVICE PIPE

A. The Contractor shall remove pavement; excavate service trench; provide and install service pipe and fittings; complete in place and ready for connections with service meter or existing service pipe; furnish and place backfill material in the trench; and clean the site of the work together with all other work necessary or incidental thereto

B. The locations for services indicated on the drawings are subject to change as directed by the Developer's Agent. Service pipe larger than two inches nominal diameter shall be ductile iron. Size, location, and termination points of all service laterals must be approved by SFWD CDD Engineer prior to installation.

C. Service Trench Excavation and Backfill:

1. All work and materials included in this Item shall be in accordance with the provisions of Section 31 21 00, "Utility Trenching and Backfill" The service trench shall be of sufficient width to properly install the service pipe and have a flat bottom of at least two feet below the gutter grade, as indicated on the Project Drawings.
2. The bottom of the trench shall slope uniformly to the main from a point approximately ten feet from the main.

D. Service Fittings:

1. Service fittings shall be flare type fittings, soldered joint type fittings, or other type fittings currently in use by Water Department. Contractor shall make cold flares by use of flaring tools approved by the Water Department whenever a flare-type fitting is furnished. Heat shall not be applied to flare tubing. Joints

for other types of fittings shall be in accordance with the method recommended by the manufacturer and approved by the Water Department.

2. Provide insulating type joints to electrically separate dissimilar pipe materials where dissimilar pipes are joined.

E. Installing Service Pipe and Fittings:

1. The Water Department shall install service pipe connections to existing mains prior to service pipe installation. The Contractor shall install service pipe connections to all new mains. The Contractor shall install service pipe and fittings to a point inside the meter box, and thence from the meter box to one foot beyond the back of sidewalk, or as otherwise directed by the Developer's Agent. The Contractor shall coordinate with the Water Department to confirm the flange to flange dimension for each meter installation prior to service pipe installation. The service meter will be installed and connected to the service line by the Water Department. Size, location, and termination points of all service laterals must be approved by SFWD CDD Engineer prior to installation.
2. The Contractor shall use jacking methods to install service pipe across existing traffic lanes wherever possible. Approval of the Developer's Agent shall be obtained before any excavation for service line is permitted in the existing traffic lanes.

F. Meter Boxes:

1. Contractor shall procure, purchase and install meter boxes. Contractor shall purchase, procure, and install meter box covers per SFWD Standards. Contractor shall accurately locate the meter box installation in the field and confirm piping arrangement so that box and cover is integrated into the streetscape in accordance with the project drawings, landscape details. Contractor shall adjust meter box to appropriate grade and install cover. Contractor to provide excavation, stabilization material under box, and backfill. Materials shall be the same as awarded under the current City Procurement Contract for such materials.

END OF SECTION

SECTION 33 30 00

SEPARATED SANITARY SEWER

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

A. Standard Specifications of the City and County of San Francisco, Department of Public Works, Bureau of Engineering (SSDPWSF), Latest Edition. Also referred to as "City Standard Specifications."

B. Standard Plans of the City and County of San Francisco, Department of Public Works, Bureau of Engineering (SPDPWSF), Latest Edition. Also referred to as "City Standard Plans."

C. Department of Public Works (DPW) Order No. 187,005 "Regulations for Excavating and Restoring Streets in San Francisco", approved February 6, 2018.

D. City and County of San Francisco Plumbing Code.

E. SFPUC Video Survey Requirements for Sewer Assets dated May 8th, 2018.

F. Standard Specifications of the City of San Francisco, Public Utilities Commission, Latest Edition. Also referred to as "City Standard Specifications."

1.2 WORK INCLUDED

A. Section includes (but is not necessarily limited to):
   1. Installation of sanitary sewer main.
   2. Installation of sanitary sewer lateral, building sewer and building drain to the property line.
   3. Testing

B. Comply with all other provisions of the Contract Documents.

1.3 RELATED SECTIONS

A. Section 31 21 00, "Utility Trenching and Backfill"

1.4 QUALITY ASSURANCE

A. All testing required shall be performed by the contractor and to be witnessed by the Owner's Agent and the City. Retesting required as a result of failed tests shall be at the contractor's expense.

1.5 EQUIPMENT

A. Contractor shall ensure that all equipment used on this site is operated, inspected and maintained in accordance with applicable Cal/OSHA standards.

1.6 SUBMITTALS

A. Submit complete specifications, catalog information and cuts, descriptive drawings, and literature for each equipment item to be furnished under this Section, with all exceptions to the Specifications noted. Provide submittals for:
1. Pipe, Structures, and Fittings
2. Manhole frames and covers
3. Settlement monument ring and cover

B. Submit construction work plan in writing for approval from the SFPUC-WWE. Work plan shall consist of, at minimum, a detailed construction schedule and decommissioning sequence for existing sewer main in easements.

C. Television Inspections per Section 3.2.

D. Submit a copy of HDPE heat fusion operator's certification for review.

PART 2 - PRODUCTS

2.1 GENERAL

A. Sanitary sewer structures, pipes, fittings, and materials shall be per requirements of Part 3, 'Sewerage and Drainage', of the City Standard Specifications and the City Standard Plans, except as modified herein.

2.2 PIPE MATERIAL

A. Sanitary sewer mains:
1. Sanitary sewers 10" to 24" inside diameter shall be High Density Polyethylene (HDPE), ASTM D3035, with SDR of 17.
2. HDPE pipe shall have colored stripes to identify application. HDPE pipe exterior shall be gray for sanitary sewer.
3. HDPE pipe interior shall be light gray for video inspection.

B. Sanitary sewer laterals: Sanitary sewer laterals shall be HDPE with SDR equal to main sewers, from main or manhole to P-trap. P-trap shall be cast iron pipe. Vent riser shall be HDPE with SDR equal to main sewers. Provide calder, with stainless steel shear band type coupling before trap to connect dissimilar pipes. Sanitary Sewer vents shall be 4" diameter minimum, and cover shall be 6"x6" cast iron sidewalk vent box with perforated steel plate lid, as available from CalSteam, San Francisco, CA.

C. Connections of HDPE to HDPE shall be made by heat fusion in accordance with ASTM F2620 or electrofusion of the pipe ends.

D. HDPE heat fusion operator shall be trained and certified per ASTM. A copy of the operator's certification shall be provided to the SFPUC for review as a submittal.

E. Use of electrofusion couplings shall be approved by the City on a case-by-case basis. A joint layout exhibit shall be provided to the SFPUC for review and approval for all locations with electrofusion couplers.

F. Service laterals shall connect to new mains with standard factory made tee fittings.

G. HDPE pipe cold bends shall not exceed radius of 100 feet. If a cold bend is proposed, a submittal is required prior to installation illustrating the plan to achieve the pipe bend to a radius of 100 feet or more, without deflections in the joints.

H. Submittals for type of pipe and fittings to be reviewed and approved by Owner's Agent and submitted to DPW/ITF for City review and approval.

2.3 MANHOLES AND CLEANOUTS

A. Manholes and cleanouts shall conform to the City Standard Plans and Specifications.

B. Manhole lid frame and cover shall be D&L Foundry Model A-1024 or South Bay Foundry Model SBF 1900 and H20 rated loading Cover shall be marked "SF Sanitary Sewer".

C. Elastomeric bearing pads used at pipe-to-manhole connections per CCSF Standard Plans 87,181 may be substituted with Hydrotite DSS-0420, or approved equal.

D. All exterior concrete surfaces shall be coated with "Xypex Crystalline" or approved equivalent. Use of a water-resistant admix is acceptable, at Contractor option. The concrete protective coating shall be applied a minimum of 28 days after the concrete casting in order for new concrete to cure.

2.4 SERVICE SADDLE & SETTLEMENT MONUMENT

A. Service saddles shall be fusible to PE3408, PE3608, and PE4710 HDPE systems, and manufactured in accordance to ASTM F-714, ASTM F-1055, ASTM D-3035, ASTM D-3261, and ASTM D-3350.

B. Settlement monument ring and cover shall be D&L Foundry & Supply Model Number K-6001-2 or equal. Identify settlement monument with "SANITARY SEWER".

2.5 FLEXIBLE JOINTS AND COUPLINGS:

A. Couplings shall consist of a fabricated steel coupling joining two ends of pipe meeting provisions of ANSI/AWWA C219-97 and having the following characteristics:
1. Middle ring of ASTM A36, min. yield 36k psi
2. Follower rings of ASTM A576/ASTM A36
3. Gaskets of NSF-61 Buna-S/SBR/Gr. 30/Gr. 27 per ASTM D2000/AWWA C-111/C-219
4. Bolts of Type 316 SST w/ heavy hex nuts
5. Lining and Coating of NSF 61 Fusion Bonded Epoxy, 12 mils min. dft applied per AWWA C-213
6. Baker Coupling Series 200/212, Romac Series 400, or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation of sanitary sewers and structures shall conform to requirements of Part 3, 'Sewerage and Drainage', of the City Standard Specifications.

B. Installation of sewer lateral connection shall be per section 316 of City Standard Specifications and Standard Plan File No. 87,196. Refer to SFPUC's Standard Specifications and Plans for Sewer Lateral Installation (https://www.sfwater.org/index.aspx?page=1252).

C. Where the street is to be paved before lot improvements are made, sewer lateral must be constructed beyond the curb and to the back of sidewalk before the paving is started. The upper end of each side sewer not in service when the work is backfilled shall be closed with a stopper, marked with a redwood post, and marked with the letter "S" on the curb.

D. Openings in the existing sanitary sewer main shall be made with a sharp cutting tool, and an approved saddle of appropriate size shall be attached by electrofusion to the sewer main.

E. Contractor shall provide bypass plan for review and approval by CCSF for connection to any existing Separated Sanitary Sewer main.

F. All new work including manholes shall be tested at no additional cost to Owner or City.

G. Testing shall be in conformance with City Standard Specifications, Section 319, with 72 hours advance notice to Owners Agent and the City. HDPE pipe shall be tested in conformance with ASTM F 1417-92 "Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air."

H. All manholes shall be vacuum tested and shall meet the requirements of ASTM C1244 prior to acceptance. Manholes shall be tested prior to backfill. The contractor may propose, in writing, to test manholes after backfill. If approved by the Owner's Agent, in writing, manholes may be tested after backfill is complete. However, should the manholes fail the vacuum test after backfill has occurred, the contractor shall be responsible for any and all costs associated with the re-excavation of the manholes in order to perform repairs or warranty work and the cost of retesting.

I. No repairs shall be undertaken without prior written notice and repair proposal to Owner's Agent and the City.

J. All HDPE pipe 12" or greater shall be deflection tested. Maximum installed deflections of HDPE pipe shall be five percent (5%) of mean internal diameter. Contractor shall provide mandrel deflection testing equipment and labor. Pipe exceeding deflection limits shall be replaced or re-compacted at contractor's expense. Mandrel shall be no less than 95% of the pipe diameter. Pipe deflection shall be determined by pulling an approved go/no go mandrel through the pipe by hand. No reduction in mandrel diameter shall be allowed for toe-in or welding beads. Deflection testing is a standard test and required for HDPE pipes, at no cost to Owner or City.

K. Any main that appears to be not installed at line and grade shall be mandrel tested at no additional cost to the City. Mandrel shall be submitted for review and approval by the City prior to use. Mandrel shall be rigid.

L. For installation using HDPE pipe, the bead formed when sections of pipe are joined shall be immediately removed from the interior of the pipe per Manufacturers' recommendations.

M. Supply one additional manhole cover for each sub-phase or 10% of the total manhole covers in each sub-phase, whichever is greater.

N. All labor, materials, and equipment necessary for cleaning the pipe and performing the deflection testing shall be furnished by the Contractor. However, prior to the test, the Contractor's mandrel must pass a ring gauge test, performed by the City Inspector at the site using the City's ring gauge to verify that the mandrel is properly sized. The Contractor shall provide a submittal for the ring gauge made of steel and supply the City with the approved ring gauge.

O. Ponding tolerances during video inspection shall be determined by attaching a one-inch gauge in front of the camera during inspection. Allowable water ponding shall be:
1. ½" for 10" HDPE Pipe
2. ¾" for 14" HDPE Pipe
3. 1" for HDPE Pipes larger than 14"

3.2 GRAVITY PIPELINE AIR TESTING AND FLUSHING

A. All new sections of sanitary sewer shall be tested using the following procedures:

1. Test is conducted between two consecutive manholes, or as directed by the Project Manager.
2. The test section of the sewer shall be plugged at each end. One of the plugs used at the manhole shall be tapped and equipped for the air inlet connection for filling the line from an air compressor.
3. All service laterals, stubs, and fittings into the sewer test section shall be properly capped or plugged and carefully braced against the internal pressure to prevent air leakage by slippage and blowout.
4. Connect air hose to tapped plug selected for the air inlet. Connect the other end of the air hose to the portable air control equipment, which consists of valves and pressure gauges used to control the air entry rate into the sewer test section, and to monitor the air pressure in the pipeline. More specifically, the air control equipment includes a shut-off valve, pressure regulating valve, pressure reduction valve, and a monitoring pressure gauge having a pressure range from 0-5 psi. The gauge shall have minimum divisions of 0.10 psi and an accuracy of 0.40 psi.
5. Connect another air hose between the air compressor (or other source of compressed air) and the air control equipment. This completes the test equipment set-up. Test operations may commence.
6. Supply air to the test section slowly, filling the pipeline until a constant pressure of 3.5 psig is maintained. The air pressure must be regulated to prevent the pressure inside the pipe from exceeding 5.0 psig.
7. When constant pressure of 3.5 psig is reached, throttle the air supply to maintain the internal pressure above 3.0 psig for at least 5 minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall. During this stabilization period, it is advisable to check all capped and plugged fittings with a soap solution to detect any leakage at these connections. If leakage is detected at any cap plug, release the pressure in the line and tighten all leaky caps and plugs. Start the test operation again by supplying air. When it is necessary to bleed off the air to tighten or repair a faulty plug, a new 5-minute interval must be allowed after the pipeline has been refilled.
8. After the stabilization period, adjust the air pressure to 3.5 psig and shut-off or disconnect the air supply. Observe the gauge until the air pressure reached 3.0 psig. At 3.0 psig, commence timing with a stopwatch until the pressure drops to 2.5 psig, at which time the stop watch is stopped. The time required, as shown on the stopwatch, for a pressure loss of 0.5 psig is used to compute the air loss.
9. If the time, in minutes and seconds, for the air pressure drop from 3.0 to 2.5 psi is greater than that shown in the following table for the designated pipe size, the section undergoing test shall have passed and shall be presumed to be free of defects. The test may be discontinued at any time.

10. If the time, in minutes and seconds, for the 0.5 psig drop is less than that shown in the following table for the designated pipe size, the section of the pipe shall not have passed the test; therefore, adequate repairs must be made and the line retested.

    Requirements for Air Testing

Pipe Size (in inches)	Time Minutes	Seconds
4	2	32
6	3	50
8	5	6
10	6	22
12	7	39
14	8	56
15	9	35
16	10	12

11. For 8 inch and smaller pipe, only: if, during the 5 minute saturation period, pressure drops less than 0.5 psig after the initial pressurization and air is not added, the pipe section undergoing test shall have passed.
12. Multi-pipe sizes: when the sewer line undergoing test is 8 inch or larger diameter pipe and includes 4 inch or 6 inch laterals, the figures in the table for uniform sewer main sizes will not give reliable or accurate criteria for the test. Where multi-pipe sizes are to undergo the air test, the Project Manager can compute the "average" size in inches which is then multiplied by 38.2 seconds. The results will give the minimum time in seconds acceptable for a pressure drop of 0.5 psig for the "averaged" diameter pipe.
13. Adjustment Required for Groundwater:
    a. An air pressure correction is required when the ground water table is above the sewer line being tested. Under this condition, the air test pressure must be increased .433 psi for each foot the ground water level is above the invert of the pipe.
    b. Where ground water is encountered or is anticipated to be above the sewer pipe before the air testing will be conducted, the following procedure shall be implemented at the time the sewer main and manholes are constructed.
        1. Install a ½ inch diameter pipe nipple (threaded one or both ends, approximately 10 inch long) through the manhole wall directly on top of one of the sewer pipes entering the manhole with threaded end of nipple extending inside the manhole.
        2. Seal pipe nipple with a threaded ½ inch cap.
        3. Immediately before air testing, determine the ground water level by removing the threaded cap from the nipple, blowing

air through the pipe nipple to remove any obstruction, and then connecting a clear plastic tube to the pipe nipple.

4. Hold plastic tube vertically permitting water to rise in it to the groundwater level.
5. After water level has stabilized in plastic tube, measure vertical height of water, in feet, above invert of sewer pipe.
6. Determine air pressure correction, which must be added to the 3.0 psig normal starting pressure of test, by dividing the vertical height in feet by 2.31. The result gives the air pressure correction in pounds per square inch to be added.

B. After the line has passed the air test, it shall be balled and flushed with water to clean. A metal screen shall be used downstream at the point of connection to the existing system to collect and remove any rock or other debris that is flushed out during cleaning.

3.3 TESTING OF MANHOLES ON GRAVITY LINES

A. At the option of the Contractor, either the following hydrostatic or vacuum test shall be performed.

1. Insert inflatable plugs in all sewer inlets and outlets.
2. Fill the manhole with water to a point six inches below the base of the manhole frame.
3. Maintain the water at this point for one hour to allow time for absorption.
4. Begin one-hour test period. Measure the amount of water added in one-hour period to maintain the water level at six inches below the base of the manhole frame. Do not allow water level to drop more than 25% of the manhole depth.
5. Determine the allowable leakage by the following formula.

   $L = 0.0002 \times D \times H1/2$

   L = Allowable leakage, gallons per minute.
   D = Depth of manhole from top to bottom, feet.
   H = Head of water in feet as measured from the surface of the water in the manhole to the sewer line invert or to the prevailing ground water surface outside the manhole. The lesser height governs.

6. If the leakage exceeds the allowable, determine the cause, take remedial action and re-test the manhole. If the leakage is less than the allowable and leaks are observed, repair the leaks.

B. Vacuum Test:

1. General: Test in accordance with ASTM C1244.
2. Test prior to backfilling around the manhole.
3. Test Preparation: Plug all lift holes and pipes entering or exiting the manhole.

4. Place test head inside the top section of the manhole's cone section and inflate in accordance with the manufacturer's instructions.
5. Draw a vacuum of 10 inches of mercury and shut the pump off.
6. With the valve closed, the time for the vacuum to drop 9 inches shall be measured.
7. The manhole shall pass the test if the time is greater than 60 seconds for a 48 inch diameter manhole, 75 seconds for a 60 inch diameter manhole and 90 seconds for a 72 inch diameter manhole.
8. If the manhole fails the initial test, make necessary repairs with a non-shrink grout. Once the repair material has cured according to the manufacturer's recommendations the vacuum test shall be repeated. This process shall continue until a satisfactory test is obtained.
9. All temporary plugs and braces shall be removed after each test.

3.4 TELEVISION INSPECTION

A. Submit pre- and post-construction video inspection of existing laterals and existing connecting mains that will be connected to or potentially impacted by the project in accordance with SFPUC Video Survey Requirements for Sewer Assets. Video inspection will inspect from vents or drain inlets to the mains within the public right-of-way.

B. After completion of the pipe installation, service connections, flushing and cleaning and prior to placement of pavement, new and impacted sewer lines shall be televised with a color closed-circuit television in accordance with the SFPUC Video Survey Requirement for Sewer Assets per the following Post-construction Video Inspection timeline:
   1. Pre-paving Video Inspection – At the Developer and Contractor's discretion, a pre-paving video inspection will be conducted to determine baseline condition at the completion of sewer line installation.
   2. Post-paving Video Inspection – The Developer shall perform post-paving video inspection and submit to the project's Engineer of Record for review and comment. Thereafter, the Engineer of Record shall submit their comments and/or recommendations to the SFPUC for record. Note the Contractor is responsible for obtaining asset numbers prior to any video inspection process.
   3. Within 30-days before Acceptance package is submitted – This re-video inspection submittal will be submitted to the SFPUC Collection System Division (CSD) for review as part of the acceptance package. CSD will determine whether any construction activities have negatively impacted the wastewater asssets and the Subdivier shall be responsible for all damage to the wastewater assets caused by the construction of the Project. This video inspection package will be reviewed for acceptance by the SFPUC with recommendation of Engineer of Record.

C. Inspection videos shall be in NASSCO PACP format or the current CSD standard at the time of submittal for the SFPUC WWE review. Contractor shall notify Owner's Agent and City 72 hours prior to video inspection so that appropriate CSD personnel can field witness CCTV and testing.

D. The Contractor is responsible for obtaining asset numbers for all new and existing manholes and pipes in advance from SFPUC Wastewater Collection System Division by submitting a written request to Owner's Agent and City. Contractor shall submit their written request for asset numbers at least 4 weeks prior commencing video inspection work. Additionally, the Contractor shall provide a video inspection workplan for review and approval by SFPUC prior to commencing vide inspection work.

E. Refer the SFPUC Video Survey Requirements for Sewer Assets dated May 8, 2018.

END OF SECTION

SFPUC Video Survey Requirements for Sewer Assets
Effective January 2014

Video surveys of SFPUC sewer assets that are performed by outside entities must comply with the following requirements in order for them to be considered for review and/or use by the SFPUC.

All video surveys of sewer assets, including, but not limited to gravity sewer pipe, force mains, laterals, manholes, boxes, tunnels, etc., must comply with and be produced in accordance with the latest version of NASSCO standards in effect at the time. This includes NASSCO PACP, LACP, and MACP.

All assets shall be thoroughly cleaned prior to inspection and generation of the condition assessment video survey.

All video surveys shall be NASSCO compliant and shall be submitted in NASSCO Standard format. Files in NASSCO standard format can then be imported into any brand of software, including PIPELOGIX, WinCan VX, etc.

All video survey must have the SFPUC asset number correctly identified.

Only one asset shall be inspected per video survey.

Contractor shall obtain the following files before contract start from Mr. Alan Liu, SFPUC Sewer Operations, aliu@sfwater.org / 415-641-2707, 1603 Griffith Street, by advance appointment between the hours of 6:30 AM and 3:00 PM Monday through Friday:

- PIPES_ONLY_LATEST.mdb : Pipelogix database "seed file" includes all PUC pipes (but no inspections)
- Sewer GIS files (ESRI Shape files):
    - SEW_MAIN.shp : main sewers
    - SIDESEWERS.shp : laterals
    - CULVERTS.shp : drain leads / from drain to main
    - MH_JUNC.shp : all manhole and NON manhole junction points
- City Base map GIS files, Optional (ESRI Shape files)
    - sfBlocks.shp : ROW blocks
    - SFB_ADD.shp : Addresses
    - activestreets.shp : street centerlines with names
- UnMappedMH-New-IDs.xlxs : ID numbers for MH not in GIS/seed file; paved over, not mapped, etc.

Inspection Procedure:

1. Contractor shall use Sewer GIS files (using ArcMap, ArcExplorer, or hard copy with manhole IDs) in field to confirm ID and location of inspection start manhole

2. Using Inspection Start and Finish MH from mapping files, Contractor shall select corresponding pipe record from the Pipelogix pipe dropdown list. The contractor MUST insert "Start manhole" and "Finish manhole" from the Pipe drop down list, unless a manhole not on GIS is found.

3. In the case an intermediate manhole not shown in GIS map is encountered: Contractor shall
    a. start a new survey;
    b. use the next unused value from UnMappedMH-New-IDs.xlxs, noting value as used on UnMappedMH-New-IDs.xlxs.
    c. hand populate the following PIPELOGIX pipe header fields:
        i. Start Manhole
        ii. Finish Manhole
        iii. Street
        iv. Start MH
        v. Finish MH
        vi. Height
        vii. Shape
        viii. Material
        ix. Further Location Details with from Street, To Street
        x. PLR (using Maximo Asset ID from targeted pipe list)

Pre-inspection meetings with Collection Systems Division can be arranged through your SFPUC contact.

All completed video surveys shall delivered to Mr. Alan Liu of Sewer Operations with the database (.mdb), videos (360 or DVS), notes (rtf), pictures (snap) files and a CCTV surveys MS Word report/ index to the files being delivered. The contractor should make sure that all CCTV jobs come with the corresponding video files.

Pre-cleaning and production of condition assessment video surveys shall be borne by the developer/contractor and not the SFPUC.

Coding of the video surveys is to be performed by the NASSCO certified inspector who performed the inspection. SFPUC will review the coded video survey as part of our normal QAQC function prior to use in decision making.

SECTION 33 31 23

SANITARY SEWERAGE FORCE MAIN PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Groundwater control.

B. Pipe bedding.

C. Installation of pipes and appurtenances for sewer drainage systems.

D. Connection to site piping and drainage system.

E. Backfilling and compaction of backfill.

F. Cleanup and restoration of surface.

G. The work shall include the provision of all materials, labors, equipment and apparatus not specifically mentioned herein or noted on the plans, but which are necessary to complete the work specified.

1.2 QUALITY ASSURANCE

A. All work shall be done to the satisfaction of the designated representative of the Geotechnical Consultant, and shall meet the approval of the Design Engineer.

1.3 JOB CONDITIONS

A. Contractor shall conduct operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, and any adjacent property owners, or tenants.

B. Contractor shall protect open excavations, trenches and such with covers, railings and fences as required together with signs, lights, and other warning devices sufficient to protect and maintain safe pedestrian, bicycle, or vehicular traffic through the work to the satisfaction of the Engineer.

C. Contractor shall conduct operations in such a manner that existing facilities and utilities which are to remain in place will not be damaged. Excavation, trenching and other work under or adjacent to existing pipelines, conduit runs, or structures of any kind, shall be prosecuted in such a manner as not to interfere with the safe operation and use of such installations. Contractor, at his expense, shall furnish and install sheet piling, cribbing, shoring, or whatever means may be necessary to adequately

support material carrying such facilities or to support the facilities themselves and shall maintain such supports until they are no longer needed. The installation and removal of such supports shall be performed in a manner which does not disturb the line, grade or operation of the facilities or utilities being installed or adjacent to the installation. Should any damage to existing facilities or structures be incurred during the operations of the Contractor, he shall immediately notify the proper owners or authorities, and shall arrange for the immediate repair of the facilities at his own expense. Temporary pavements, facilities, utilities, and other installations shall also be protected until they are no longer required. When temporary supports and other protective means are no longer required, they shall be removed and disposed of as directed by the Engineer.

D. Locations of existing underground utilities and structures, insofar as they are known from information available from records and from the respective public utility companies, have been shown on the plans. The Engineer assumes no responsibility for the accuracy or completeness of said data, which is offered solely for the convenience of the Contractor. It shall be the Contractor's responsibility to verify the location of these obstructions, and to locate any other underground utilities and structures which might necessitate a change in the location, line or grade of the new work prior to commencement of the new work.

E. During trenching operations, the Contractor shall furnish, install, and operate adequate pumps or other devices as may be necessary to remove any seepage, storm water, or sewage that may be encountered during the progress of the work. All excavations shall be kept free from water during bedding, pipe laying, initial backfilling and when concrete is being placed, and thereafter until such water will do no damage to the work.

F. Damage resulting from movement of the sides or bottom of trenches or other excavation which is attributable to the Contractor's acts or omissions, whether sides are braced or not, and any portions of the area and work affected by such movement, shall be repaired or restored by the Contractor at his expense to the satisfaction of the Geotechnical Consultant and the Engineer.

PART 2 - PRODUCTS

2.1 PIPELINE AND ACCESSORIES

A. Materials used in construction of the sanitary sewer force mains shall be as herein specified. When material is not listed specifically herein, or on the plans, material shall be as approved by the Engineer. Engineer shall be the sole judge as to the acceptability of any and all materials to be used and of the acceptability of manufacturer’s specifications, methods and products. Valves, fittings, coupling, flange coupling adapters shall be fusion epoxy coated and shall be provided with stainless steel assembly bolts.

B. HDPE Pipe.

1. HDPE pipe and fittings shall be PE 3408 piping material. Piping material shall be high density, extra-high molecular weight meeting ASTM D 3350 as Grade PE 34 with Cell Classifications 345464C. Pipe shall be co-extruded using a melt homogenizing/plasticating extruders and appropriate die. Pipe shall be Driscoplex manufactured by Chevron Phillips Chemical Company or approved equal.
2. Dimensions of HDPE pipe and fittings with shall be in accordance with ASTM D2122. Minimum DR 17 pipe and fittings shall be used, with a minimum pressure rating of 125 psi.
3. Pipe and fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other injurious defects. They shall be uniform in color, opacity, density, and other physical properties. Any pipe and fittings not meeting these criteria shall be rejected.
4. Pipe fittings shall be pressure rated for the same internal pressure rating as the mating pipe.
5. Connections of HDPE to HDPE shall be made by heat fusion in accordance with ASTM F2620.
6. HDPE heat fusion operator shall be trained and certified per ASTM. A copy of the operator's certification shall be provided to the Port for review as a submittal. Heat fusion connections shall immediately remove the bead formed on the interior of the pipe per Manufacturer's recommendation.

C. Pipe Supports.

1. Piping shall be supported properly by approved anchors, brackets or hangers.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION

A. Installation: Pipe and appurtenances shall be installed in accordance with the best practice, and recommendation of manufacturer.

B. Handling: Pipe shall be carefully handled during hauling, unloading, and placing operations, so as to avoid breakage or damage. Strap ¬type slings shall be used for lifting and placing; no chains or hooks will be permitted. Broken or damaged pipe or appurtenances will be rejected and shall be replaced by the Contractor at no additional expense to the Contract.

C. Alignment: All pipes shall be accurately laid in conformity with the prescribed lines and grades as established by the Engineer in the field. Each length shall be jointed to the preceding section as specified, and after said jointing has been completed, there shall be no movement of the pipe in subsequent operations.

D. Cleaning: Before each new length of pipe or culvert is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. When pipe laying is

not in progress, all open pipe ends shall be closed with watertight plugs in a manner satisfactory to the Engineer.

3.2 HDPE PIPE INSTALLATION AND JOINING

A. Installation of new High Density Polyethylene Pipe (HDPE) shall be done by open-cut construction. Pressure pipes should be installed in accordance with ASTM D 2774 "Standard Practice for Underground Installation of Thermoplastic Pressure Piping".

B. Joining
1. All joints shall be heat fused.
2. The pipe shall be butt welded in accordance with ASTM D2657-67. The joints shall be leaking proof, thermal, butt joints. All fusing shall be done using tools recommended by the pipe supplier and approved by the Engineer. Operators shall be certified by the pipe manufacturer and have a minimum of two (2) years' experience operating the same equipment used on this project. The fusing machine shall have hydraulic pressure control for fusing two pipe ends together. The ends of pipe shall be trimmed to form perpendicular faces prior to fusing. The heating plate on the fusing machine shall be electrically heated and thermostatically controlled and shall contain a temperature gauge for monitoring temperature. The heating plate shall be subject to periodic inspection, using a temperature stick, to assure even heating.
3. The tensile strength of yield of the butt fusion joints shall not be less than the pipe. A specimen of pipe cut across the butt fusion joints shall be tested in accordance with ASTM D 638.
4. Joints between pipe sections shall be smooth on the inside and internal projection beads reminder after removal shall not be greater than 3/16 of an inch.

C. Fittings
1. Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings. Fabricated fittings shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe. Fittings shall be butt-fusion welded.

D. Restraining
1. Concrete thrust block shall be used at fittings where piping changes direction.
2. Determine thrust forces by multiplying the nominal cross sectional area of the piping by design test pressure of the piping.
3. Provide restraints with ample size to withstand thrust forces resulting from test pressures.

4. Place concrete thrust blocks against undisturbed soil. Place concrete so piping joints, fittings, and other appurtenances are accessible for assembly and disassembly.

3.3 TESTING

A. Fusion Quality

B. The Contractor shall ensure the field set-up and operation of the fusion equipment, and the fusion procedure used by the Contractor's fusion operator while on site. Upon request by the Owner, the Contractor shall verify field fusion quality by making and testing a trial fusion. The trial fusion shall be allowed to cool completely; then test straps shall be cut out and bent strap tested in accordance with ASTM D 2657. If the bent strap test of the trial fusion fails at the joint, the field fusions represented by the trial fusion shall be rejected. The Contractor at his or her expense shall make all necessary corrections to equipment, set-up, operation and fusion procedure, and shall re-make the rejected fusions.

C. Leak Testing for Sanitary Sewer Force Mains

1. Submittals
   a. A testing schedule, including proposed plans for test water conveyance, control, and disposal shall be submitted in writing for approval a minimum of seventy-two (72) hours before testing is to start.
   b. A written procedure identifying the equipment to be used, and describing all procedures shall be submitted prior to testing operations.
   c. The Contractor shall submit all testing results, indicating whether the results represent a successful or unsuccessful test, within twenty-four (24) hours of each test.
2. Hydrostatic leak testing shall be conducted in accordance with ASTM F2164, "Standard Practice for Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure" and as recommended by the manufacturer. Tests shall be made in the presence of the Contractor and the Engineer. Testing pressure shall be 115 psi.
3. Before applying pressure, all piping and all components in the test section must be restrained. This means that if piping or parts move or separate during the test, it will not result in damage or injury. Never conduct leak tests on unrestrained piping.
4. If the pipe fails the leak test, the Contractor shall locate the source(s) of the leak and repair the defect(s). The pipe shall then be retested at the Contractor's expense until a satisfactory result is obtained.
5. After successful testing, pipes shall be drained and leave clean. Testing and/or cleaning water shall be disposed into the sanitary sewer system at a rate that does not cause backups, overflows, or spills.

6. Despite any previous testing, any leaks developed before the end of the 2-year guarantee period shall be expeditiously repaired by the Contractor at no expense to the City.

END OF SECTION

SECTION 01 25 00

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Related Work

B. Part 2 - Products
   1. Materials
   2. Base Bid
   3. Pre-bid Substitutions
   4. Post-bid Substitutions

1.2 RELATED WORK

A. Section 01 43 00 – Quality Assurance

PART 2 - PRODUCTS

2.1 MATERIALS

A. Standard of Quality: The specified manufacturers, materials, products, and equipment have been used in preparing the Contract Documents and thus establish minimum qualities for performance and appropriateness. Comply with specifications and reference standards as minimum requirements.

B. All bidders, contractors, suppliers, and manufacturers herein agree that, where a particular product or manufacturer is indicated, followed by a description of materials, special features, or performance criteria, the bidder, contractor, supplier, or manufacturer shall make all necessary modifications to their "Standard or Custom Products" to fully comply with the description of materials, special features, or performance criteria specified.

C. Submit to the OWNER a complete list of all subcontractors, suppliers, and products proposed to be used, with the name of the manufacturer and the installing subcontractor.

D. Reference Standard Specifications: Where products or materials are specified only by reference standard, provide any product meeting that standard. If the reference standard is followed by a description of materials, special features, or performance criteria: make all necessary modifications to "Standard or Custom Products" to fully

comply with the description of materials, special features, or performance criteria specified.

E. Descriptive Specifications: Where products, materials, or pieces of equipment are specified by indicating a detailed description of the required properties, minimum attributes, special features, or performance criteria required, provide any product meeting that description. If descriptive specification is followed by a list of specified manufacturers and/or specified products, select product from only those manufacturers and specified products.
   1. If manufacturer's standard product is listed in the specification and does not comply with the minimum description indicated, make all necessary modifications to "Standard or Custom Products" to fully comply with the description of materials, special features, or performance criteria specified.
   2. If a list of specified manufacturers includes the following statement "Comparable products of other specified manufacturers", then select product only from manufacturers listed in the Project Manual or addenda complying with the minimum attributes, special features, or performance criteria.
   3. If list of specified manufacturers includes the following statement, "Comparable products of other manufacturers", then select product from any manufacturer and product complying with the minimum attributes, special features, or performance criteria.

F. Proprietary Specifications: Where the desired products, materials, or equipment are indicated by specific manufacturer's name, brand name, model number, type designation, or other unique characteristics, provide only products listed in the original Project Manual or addenda.
   1. Where indicated in the Project Manual as "No Substitution", bids must be based on the specific named products only.
   2. Other manufacturers, even if listed as acceptable, must comply with the minimum levels of material, detailing, and dimensional restrictions established for the proprietary product.

2.2 BASE BID

A. All requests for substitutions and product options shall be made in accordance with the procedures outlined within the INSTRUCTIONS TO BIDDERS.

B. It is understood and agreed by all BIDDERS, CONTRACTORS, material suppliers and all tier subcontractors, that all bids and contracts shall be based on materials, equipment, and processes as specified herein, with exceptions only as specified.

C. Base Bid Condition: Bids shall be based upon materials, products, and equipment described in the original Bidding Documents plus applicable Addenda. Where additional products or manufacturers are added by Addenda, the CONTRACTOR is responsible for coordinating and paying for any necessary changes required to incorporate said products.

2.3 PRE-BID SUBSTITUTIONS

A. The OWNER will not consider pre-bid substitutions for materials used on its facilities.

2.4 POST BID SUBSTITUTIONS

A. Post-bid substitutions shall be subject to the requirements set forth in the General Conditions.

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Related Work
   2. List of General Submittals

1.2 RELATED WORK

A. Section 01 35 00 – Special Procedures (Material Handling)

B. Section 01 41 00 – Regulatory Requirements

C. Section 01 43 00 – Quality Assurance

D. Section 01 73 23 – Field Engineering

E. Section 01 77 00 – Closeout Procedures

F. Section 26 01 00 – Site Electrical

G. Section 31 21 00 – Utility Trenching and Backfill

H. Section 31 50 00 – Excavation Support Systems

I. Section 32 01 00 – Surface Restoration

J. Section 33 05 16 – Concrete & Utility Structures

K. Section 33 61 05 – District Cooling Chilled Water Pipe

L. Section 33 61 10 – District Heating Hot Water Pipe

M. Appendix A – Welding and Testing Requirements

1.3 LIST OF GENERAL SUBMITTALS

A. Submittals are noted in each section of these Specifications. The CONTRACTOR is responsible for verifying that all necessary submittals are provided to the OWNER in accordance with these procedures. General project submittals include, but are not limited to, the following:

1. Manufacturers Instruction for items as noted in Section 01 35 00 – Special Procedures (Material & Equipment), Part 1.03.
2. Copies of all permits obtained by the CONTRACTOR for the Work as detailed in Section 01 41 00 – Regulatory Requirements, Part 1.03.
3. Quality Control/Quality Assurance procedures for all welding, fusion welding, and pipe backfilling in accordance with Section 01 43 00 – Quality Assurance.
4. Record of all survey and control information for the installation of the Work as detailed in Section 01 71 23 – Field Engineering, Part 1.04.
5. Project Record Documentation in accordance with Section 01 77 00 – Closeout Procedures, Part 1.04 and Part 1.05.
6. Handholes as detailed in Section 26 01 00 – Site Electrical, Part 1.04
7. 2" Non-Metallic (PVC or HDPE) Conduit as detailed in Section 26 01 00 – Site Electrical, Part 1.05
8. Nylon pull-string as detailed in Section 26 01 00 – Site Electrical, Part 1.05
9. Conduit jointing cement/bonding agent as detailed in Section 26 01 00 – Site Electrical, Part 1.05
10. Submittals noted in Section 31 21 00 – Utility Trenching and Backfill.
11. Submittals noted in Section 32 01 00 – Surface Restoration, Part 1.04.
12. Submittals noted in Section 33 05 16 – Concrete & Utility Structures, Part 1.04.
13. Chilled water pipe, valves, fittings, and other materials provided by the CONTRACTOR and noted in Section 33 61 05 – District Cooling Chilled Water Pipe, Part 1.05
14. Hot water pipe, valves, fittings, and other materials provided by the CONTRACTOR and noted in Section 33 61 10 – District Heating Hot Water Pipe, Part 1.05
15. Progress Schedules for performance of the work.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 35 00

SPECIAL PROCEDURES (MATERIAL HANDLING)

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Related Work
   2. Manufacturer's Instructions
   3. Transportation and Handling
   4. Storage and Protection

1.2 RELATED WORK

A. Section 01 33 00 – Submittals

1.3 MANUFACTURERS INSTRUCTIONS

A. Where Contract Documents require that installation of Work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation. Submit two (2) copies to the OWNER. Maintain one (1) set of complete instructions at the Project Site during installation and until Final Completion.
   1. Copies of manufactures printed instructions, where provided, will accompany material being used for construction. The CONTRACTOR shall verify that the necessary manufacturer's documents are received at the time material is transferred from the OWNER'S storage facility.

B. Handle, install, connect, clean, condition, and adjust products in accordance with such instructions and in conformity with Specifications. If Project conditions or Specifications conflict with manufacturer's instructions, consult with the OWNER for direction. Do not proceed with Work without clear instructions.

C. Perform Work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless expressly modified or exempted by Contract Documents.

D. Should a conflict exist between the Contract Documents and the Manufacturer's instructions, consult with the OWNER for direction.

1.4 TRANSPORTATION AND HANDLING

A. The CONTRACTOR shall be responsible for providing all equipment and sufficient personnel to handle products at time of pickup, delivery, and onsite storage.

B. The CONTRACTOR shall handle, haul, and distribute all materials and all surplus materials on the different portions of the Work, as necessary or required and shall be responsible for the protection, loss of, or damage to materials and equipment furnished by the CONTRACTOR or others until Final Completion and acceptance of the Work. CONTRACTOR and all subcontractors are responsible for all damaged items caused by their respective employees and agents (including subcontractors) and shall replace all such damaged items without additional cost to the OWNER.

C. The CONTRACTOR shall deliver all surplus materials to the OWNER at a location designated by the OWNER at no additional cost at the completion of the Work.

D. The CONTRACTOR shall arrange with material suppliers and manufacturers for delivery and entry of equipment to the site at a suitable time. Inform appropriate parties of the size of access available for equipment so assembly of large units of equipment on site may be considered when they are being manufactured.

1.5 STORAGE AND PROTECTION

A. The CONTRACTOR is responsible for all costs of onsite storage and demurrage. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.

B. Store products subject to damage by the elements in weather-tight enclosures. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

C. Exterior Storage: Store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

D. Provide substantial coverings to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

E. The CONTRACTOR is responsible for damaged items and shall replace such damaged items at no expense to the OWNER.

1. Spare Materials for uncommonly used items may not readily available from local vendors. The CONTRACTOR shall order materials well in advance of project commencement, and manufacture and delivery of such materials in order to meet the schedule requirements of the project. It is imperative that the CONTRACTOR handle such materials in a manner to prevent damage.
2. For material damaged by the CONTRACTOR during the course of transport or installation that requires replacement, the CONTRACTOR will be required to purchase material from product vendors with no additional compensation from the OWNER.

F. All materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the Work. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 43 00

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Related Work
   2. Contractor's Responsibilities
   3. References
   4. Quality Assurance
   5. Material Testing Duties

1.2 RELATED WORK

A. Section 01 33 00 – Submittals

B. Section 31 21 00 – Utility Trenching and Backfill

C. Section 33 61 05 – District Cooling Chilled Water Pipe

D. Section 33 61 10 – District Heating Hot Water Pipe

E. Appendix A - Welding and Testing Requirements

F. Appendix B – Quality Assurance Documents

1.3 CONTRACTOR'S RESPONSIBILITIES

A. The CONTRACTOR is responsible for providing all other project quality control not specified elsewhere within the Project Documents, and will be responsible for performing and documenting all remaining material testing using an independent testing laboratory.

B. Design preliminary mixes required by Contract Documents for field-placed concrete (H-20/HS-25 Loading Slabs, Footings, Concrete Structures, etc.).

C. Establishment of an inspection and testing plan for both CHWP and HWP. This plan shall include all items requiring testing and inspection in accordance with Section 33 61 05 and Section 33 61 15 (for CHWP), Section 33 61 10 and Section 33 61 20 (for HWP)

D. Tests required establishing conformance of soils including optimum moisture content, material analysis and compaction requirements.

E. The CONTRACTOR shall arrange and pay for all tests and inspections required for performance of the Work, including the following:
   1. Tests and inspections associated with hydrostatic testing in accordance with the applicable industry standards.
   2. Tests and inspections of materials, products, or equipment to certify compliance with Contract Documents, before incorporation into the Work.
   3. Tests, inspections, or laboratory services necessary with respect to substitutions.
   4. Tests and inspections required by public authorities as part of permits or inspection fees.
   5. Other tests and inspections indicated to be "by CONTRACTOR".

F. Additional tests and inspections when initial tests or inspections indicate Work does not comply with Contract Documents will be completed at the CONTRACTOR'S expense.

G. Secure and deliver to laboratory adequate quantities of representational samples of materials proposed to be used and required testing.

H. Cooperate with laboratory personnel. Provide access to Work and manufacturer's facilities.

I. Secure and deliver to laboratory adequate quantities of representational samples of materials proposed to be used and required testing.

J. Notify laboratory sufficiently in advance to allow laboratory to assign personnel and schedule testing.

K. The CONTRACTOR shall maintain an adequate inspection system and perform such inspections to insure that the Work performed is in conformance with contract requirements. The CONTRACTOR is to make available to the OWNER adequate records of such inspections.

L. If any Work to be done away from the construction site is to be inspected on behalf of the OWNER during its fabrication, manufacture, or testing, or before shipment, the CONTRACTOR shall provide a minimum of 48 hours (2 working days) notice to the OWNER to arrange for personnel to inspect the Work.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM D3740: Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
   2. ASTM E329: Standard Specification for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.

B. American National Standard Institute (ANSI)/American Society of Mechanical Engineers (ASME):
   1. ANSI/ASME B31.1: Power Piping.
   2. ANSI/ASME BPV: Section IX - Qualification Standard for Welding and Brazing Procedures; Boiler and Pressure Vessel Code.

C. Refer to all other Quality Assurance references in the Specifications and associated Appendices.

1.5 QUALITY ASSURANCE

A. Conform to "Recommended Requirements for Independent Laboratory Qualification", published by American Council of Independent Laboratories.

B. Conform to basic requirements of the following standards:
   1. ASTM D3740
   2. ASTM E329

1.6 MATERIAL TESTING DUTIES

A. Where the CONTRACTOR is required to perform or submit material tests, they shall:
   1. Cooperate with parties requiring material or weld tests
   2. Provide qualified personnel after due notice
   3. Perform tests according to schedule
   4. Promptly submit a copy of each test report to the OWNER

B. Perform specified inspections, sampling, and testing.

C. For tests and inspections performed at the Site, promptly notify parties performing the Work and the OWNER of observed irregularities or deficiencies of Work or materials to prevent proceeding with Work which may subsequently be determined to be defective.

D. Include the following in each report as applicable.
   1. Date report issued.
   2. Project title and number.
   3. Testing laboratory name, address, and telephone number.
   4. Name and signature of laboratory inspector.
   5. Date and time of sampling, testing, or inspection.
   6. Temperature and weather conditions.
   7. Identification of product and Specification Section.
   8. Location of sample or test in the Project.
   9. Type of inspection or test.
   10. Results of tests and compliance with Contract Documents.
   11. Interpretation of test results when requested by the OWNER.

E. Refer to Section 31 21 00 – Utility Trenching and Backfill for further backfill testing requirements.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1- General
   1. Related Work
   2. Contractor's Responsibilities

1.2 RELATED WORK

A. Section 01 33 00 – Submittals

B. Section 01 77 00 – Closeout Procedures

1.3 CONTRACTOR'S RESPONSIBILITIES

The CONTRACTOR shall provide field engineering and layout services for completion of the Work including, but not limited to:

A. Establishing and maintaining all controls, lines, and levels for the Work.

B. Employ a Registered Professional Land Surveyor to replace any monuments, property corners, or reference points moved or destroyed in the course of performing the Work.

C. Designing shoring, forms, and similar items that are supplied by the CONTRACTOR as part of the means and methods for construction of the Work. Where required by jurisdiction, local authorities, or required as part the Contract Documents, provide certified drawings to the authority requesting said drawings.

D. Verify existing conditions and dimensions indicated in the plan drawings are correct. The CONTRACTOR shall notify OWNER in writing of any discrepancies in the existing conditions that may impact the construction of the Work.

E. Lay out building foundations, column locations, and floor elevations for all building service entries. CONTRACTOR shall verify the elevations as proposed in the plan drawings are correct through non-destructive means.

F. Provide and maintain onsite for OWNER's review a complete and accurate log of control and survey information for the Work. This log shall contain benchmark information and control points utilized for laying out the Work, and shall be submitted in accordance with Section 01 33 00 – Submittals.

G. Provided record documentation and as-built documentation as detailed in Section 01 77 00 – Closeout Procedures.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Related Work
   2. Final Cleaning of the Work Site
   3. CONTRACTOR'S Close-Out Submittals
   4. Project Record Documents

1.2 RELATED WORK

A. Section 01 33 00 – Submittals

B. Section 01 71 23 – Field Engineering

C. Appendix E – Sample of Survey Data

1.3 FINAL CLEANING OF THE WORK SITE

A. In addition to removal of debris and cleaning specified in other Sections, clean interior and exterior work areas.

B. Remove temporary protective coating, barriers, and labels not required to remain.

C. Clean finishes free of dust, stains, films, and other foreign material or substances.

D. If applicable, clean and polish transparent materials, including mirrors, polished metal, and glass (interior and exterior).

E. Clean resilient and hard surface floors, including exposed concrete floors, by sweeping and damp mopping.

F. Broom clean exterior paving, including streets and sidewalks in and about the work areas. Remove waste, debris, surface stains, spills, and foreign substances.

G. Where material or debris has washed or flowed into existing watercourses, ditches, gutters, drains, pipes, or structures during the Work, or elsewhere during the course of the Work, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the Work. Upon completion of the Work, the ditches, channels, drains, pipes, structures, and other areas shall be left in a clean and neat condition.

H. Wipe surfaces of mechanical and electrical equipment clean; remove excess lubrication and other substances.

I. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, areaways, and similar spaces.

J. Clean light fixtures and lamps so the same will function with full efficiency.

K. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction. Clean ducts, blowers, and coils when units have been operated without filters during construction.

L. Restore fire protection devices or control systems temporarily disabled for welding work.

1.4 CONTRACTOR'S CLOSE-OUT SUBMITTALS

When OWNER has determined that the Work is acceptable under the Contract Documents and the Contract fully performed, CONTRACTOR shall prepare and submit his final Application for Payment to the OWNER, together with the following:

A. Project Record Documents.

B. Quality Control Documents.

C. Final Contract Submittals (as required by the General Conditions and Project Documents).

1.5 PROJECT RECORD DOCUMENTS

A. Maintain at Project Site for the OWNER one (1) copy of Record Documents including Plans, Specifications, Addenda, Bulletins, Change Orders, and other Modifications to the Contract, plus Field Directives or other written instructions, reviewed submittals, and test reports to record actual construction conditions.

B. Format for Record Documents
   1. Record documents shall be submitted to the OWNER electronically in pdf format, and shall include, but is not limited to, the following.
      a. Legibly mark to record actual construction including manufacturers and catalog numbers used; suppliers of each product; and revisions to execution procedures.
      b. Include Addenda, Bulletins, Change Orders, and other modifications.

C. Availability of As-Bid Project Data
   1. The OWNER will provide the CONTRACTOR with copies of construction plans in Autodesk Civil3D format at this size and scale to facilitate the surveying process as required in Section 01 71 23. The CONTRACTOR shall be

responsible for maintaining all line types, styles, scales, and other drawing features as they are provided by the OWNER in laying out survey for the project.

D. As Built Survey and Record Documents

1. Unless specifically noted otherwise all Project Work requiring the installation of the OWNER'S facilities (including hot or chilled water piping, communication system equipment, heating or cooling connection interfaces) shall have as-built survey points and red-line drawings provided.
2. As-built red-lines shall be submitted on 8 ½" x 11" or 11" x 17" plan sheets (as provided in the Contract Documents), and shall include notes on both plan and profile views.
3. Data submitted as part of the survey points files shall consist of the following:
   a. Data points shall be submitted in a points file (*.txt, *.csv, or other approved points file that is compatible with Autodesk Civil3D formatting), and shall include survey point numbers, northings, eastings, elevations, and a description of what is being surveyed (top of pipe, weld, bend, valve, handhole, etc.).
   b. The survey should be conducted using northing and easting in the coordinate system determined by the OWNER on all pipes at tie-in, bends, tees, valves, weld caps, service entries, etc.
   c. The survey shall be conducted along the centerline of the piping at all pipe joints.
   d. On all valves, it needs to be noted whether the northing and easting were taken on the center of the valve (body), or the top nut of the valve operator (which can be offset from the valve on larger pipe sizes).
   e. Survey accuracy shall be to the nearest 0.01' for elevations, and to the nearest 0.1' for horizontal locations.
   f. Survey points for the following appurtenances shall be included as part of this project records documentation:
      1) Valves (including mainline valves, vent valves, drain valves, bypass fill valves, recirculation valves, and hot-tap valves);
      2) Piping (including mainline, service line, piping leading to or from valves previously listed, and piping leading from vent standpipes or flash chambers);
      3) Fittings (bends, tees, weld caps, startup compensators, steel/HDPE transition fittings, flanges, etc.);
      4) Casing Pipes (beginning and end);
      5) Protective sleeves;
      6) Vent standpipes;
      7) Flash chambers;
      8) H-20 and HS-25 Slabs for shallow piping;
      9) Cad weldments on piping for cathodic protection test stations and anodes;
      10) Communication conduit (outside the external limits of parallel piping); and

11) Handhole boxes

g. Survey points shall be taken at the location of every joint and depict the elevation and horizontal location of each weld.
   1) Survey of joint locations for hot water pipe should be taken at the top of pipe above the weld at the height of the HDPE Jacket or Sleeve.
   2) Survey of joint locations for cooling facilities should be taken directly on the weld, fusion weld, or other joint.

h. Survey points shall be taken of the surface adjacent to the excavation at a maximum of 25' intervals. Specific survey shots shall be taken at any surface grade changes (curbs, driveways, etc.) and specifically noted.

i. Survey points shall be taken of all building corners (one shot at the corner, and one shot on each perpendicular wall) within or adjacent to the work site for record drawing use.

j. All facilities installed as part of the CONTRACT that cross existing District Energy facilities within a three (3) foot vertical clearance, and facilities that run parallel to existing District Energy facilities within a 5' horizontal clearance shall be surveyed (minimum of two locations for pipes to show all horizontal and vertical alignments), and included on the survey point data.

k. For existing subsurface facilities, utilities, or obstructions, all horizontal and vertical locations of such items that cross or run parallel with proposed facilities that are exposed due to the excavation shall be surveyed (minimum of two locations for pipes to show all horizontal and vertical alignments). This includes showing the location of:
   1) Structural foundations or footings
   2) Grade beams
   3) Storm sewer
   4) Water main
   5) Sanitary sewer
   6) Utility Manholes and Vaults
   7) Valve stems
   8) Light, signal, and overhead catenary pole bases
   9) Electrical, fiber optic, telephone cables

l. The excavating CONTRACTOR will need to identify to the surveyor the utilities that have been exposed below proposed facilities that may be in the trench bedding or hidden from sight.

m. Survey any changes to surface features such as adjacent curbs, sidewalks, buildings, and other physical construction that is modified from the as-bid construction documents.

4. In addition to the survey points file, the following supplemental information shall be provided in the form of red-line drawings to identify survey points and deviations from the Plans:
   a. Approximate location of survey points.

b. Isometric sketches of all pipe installations (may be combined with radiography/weld location sketch).
c. Notation of modifications to the Conduit and Handhole layout.

5. The CONTRACTOR shall obtain verification of survey being performed from the OWNER through signature or initials on an approved HWP and/or CHWP Inspection and Testing Plan. The OWNER may halt pipe backfilling work around its facilities at any time if it is known that the requisite survey has not taken place.
6. Submission and Approval Process
   a. The CONTRACTOR shall provide to the OWNER the red-lined plan within one month of the substantial completion of each portion of the OWNER'S facilities as separated out in the Bid Form. Following submittal, the OWNER will provide a response to the CONTRACTOR within one month that shall include either an approval of the submittal or a request for correction and/or additional information with respect to the data required from Part 1.05, D-1 through D-5. Upon request of correction, the CONTRACTOR shall have two weeks (14 days) to make corrections and return to the OWNER for review.
   b. The CONTRACTOR shall provide all survey point data in the form of a CD, e-mail attachment, or other electronic media device to the OWNER within 10 days of the survey being completed for each segment of pipe as separated out in the Bid Form.
   c. The OWNER'S receipt of Project Record Documents, including drawings, shall not be a waiver of any deviations from the Contract.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 26 01 00

SITE ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Related Work
   2. References
   3. Definitions
   4. Submittals
   5. Regulatory Requirements
   6. Delivery, Storage, and Handling

B. Part 2- Products
   1. Unspecified Materials and Products
   2. Materials

C. Part 3- Execution
   1. Examination
   2. Preparation
   3. Alignment and Grade
   4. Conduit Laying and Jointing
   5. Handhole Placement
   6. Backfilling and Identifications Requirements

1.2 RELATED WORK

A. Section 01 33 00 – Submittals

B. Section 01 77 00 – Closeout Procedures

C. Section 31 21 00 – Utility Trenching and Backfill

D. Section 31 50 00 – Excavation Support Systems

E. Section 33 05 16 – Concrete & Utility Structures

F. Section 33 61 05 – District Cooling Chilled Water Pipe

G. Section 33 61 10 – District Heating Hot Water Pipe

1.3 REFERENCES

A. Other than by reference, list references, standards and specifications are not contained in this Specification. Unless otherwise noted, the most current version of the standard or reference at the time of bid is applicable. Obtain, become familiar with and, where indicated or inferred, conform to the listed references and standards. References and standards are considered minimum requirements unless indicated otherwise. Any references to methods of measurement or payment in references and standards are not applicable. Tolerances in references and standards are applicable only if not indicated otherwise in this Specification. In event of conflict between the references or standards and this Specification, this Specification applies.

B. American Society for Testing and Materials (ASTM):
   1. ASTM D2321: Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
   2. ASTM D3034: Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

C. Underwriters Laboratories Inc. (UL):
   1. UL 651 and 651A: Rigid PVC Conduit.

D. National Electrical Manufacturers Association (NEMA):
   1. NEMA TC-2: Electrical Plastic Conduit
   2. NEMA TC-250: Electrical Enclosures.

E. National Electric Code (NEC)
   1. NEC 346

1.4 DEFINITIONS

A. Certain words and phrases, used throughout this Section, shall be understood to mean:

"Reviewed" - Any product or method of installation, applied in conformance with its manufacturer's recommendations submitted and returned by OWNER.

B. "Listed" - Methods and materials, listed by Underwriters Laboratories, for the specific application and bearing the “UL” label.

1.5 SUBMITTALS

A. Comply with requirements of Section 01 33 00 – Submittals and this Specification.

B. The following submittals are required for portions of the Work specified in this Section.
   1. Product Data & Drawings: Provide manufacturer's data and technical specifications on the following products. Marketing/sales literature is not acceptable.
      a. Conduit and Fittings

b. Conduit Jointing Cement/Bonding Agent
c. Handholes
d. Nylon Cord

1.6 REGULATORY REQUIREMENTS

A. Comply with local/regional rules governing earthwork operations, including those outlined in Section 31 21 00 – Utility Trenching and Backfill and Section 31 50 00 – Excavation Support Systems.

B. Comply with OSHA Excavation Rules.

1.7 DELIVERY, STORAGE AND HANDLING

A. Store conduit and fittings to prevent damage by heat, sunlight, weight deflection, or other environmental conditions.

B. Protect ends of conduit materials, including fittings from damage prior to jointing.

PART 2 - PRODUCTS

2.1 UNSPECIFIED MATERIALS AND PRODUCTS

A. Any materials or products required or implied to accomplish the Work indicated or inferred by the Plans and not specified in this Project Specification or on the Plans shall be furnished in conformance with the applicable local municipal utility practice or specifications.

2.2 MATERIALS

A. Buried Conduit
1. Rigid non-metallic conduit shall be PVC or HDPE, Schedule 80 pipe.
   a. Pipe shall be capable of being installed by direct bury, stitching, plowing, or trenching methods.
   b. Pipe shall be GREY in color.
   c. Pipe shall be marked on the outside surface indicating the manufacturer's name, size of conduit, type of material, UL Listing, and any additional markings required by NEC requirements.
   d. All connection to existing pipe shall consist of PVC pipe of the same diameter of the pipe being connected to. Conduit from existing pipe connection points shall remain PVC into the nearest handhole.
2. Fittings shall be from the same manufacturer as the PVC or HDPE conduit, and be approved by the manufacture for use on PVC or HDPE pipe as a leak-free connections. Butt Fusion joining process is an approved method of connection in lieu of fittings for HDPE pipe.
3. All bends along hot water pipe and chilled water pipe alignments shall consist of long-radius sweeps. Sweeps shall be shop or field-fabricated using heat

and a forming method determined by the CONTRACTOR. All sweeps shall have a minimum bend radius of 60" (5'), regardless of conduit pipe size.

4. Factory bends may be used in lieu of sweeps to bring conduit vertically up into handholes. The total measurement of all factory bends on a segment of conduit pipe between handholes shall not exceed 360-degrees. If the total measurement of all factory bends exceed 360-degrees, the CONTRACTOR shall utilize long-radius sweeps in place of factory bends as summarized in Part 2.02 (C) of this Section.
5. Factory bends shall have a minimum radius of 18".
6. Non-metallic bell ends shall be installed on all ends of conduit pipe. Bell ends shall be sized appropriately for the non-metallic conduit being used for installation.
7. Upon completion of installation, the CONTRACTOR shall install nylon pull string for each conduit run. The pull string shall be of sufficient strength to handle up to 1250 lbs of pull force.

B. Handholes

1. Fiber Optic handholes as shown in the plans are nominal 24" W x 36" L x 24" D, open bottom, molded, glass fiber reinforced gray polymer concrete service box with matching bolted cover rated for not less than 22,500/33,750 pounds design/test load.

   a. Cover to read DISTRICT ENERGY
2. Acceptable Manufacturer:

   b. Quazite, PG2436BA24 box w/ PG2436HH00 Cover

C. Sealants and Waterproofing

1. Sealants shall be gun grade, silicone type, similar to GE type RTV.
2. On existing foundation walls, waterproofing shall be membrane type or brushed-on, bituminous base product equal to, and compatible with existing waterproofing system.
3. Waterproofing of new foundation walls is described in Section 33 05 16 – Concrete & Utility Structures, Part 2.03.
4. Firestop sealants shall be used wherever required by applicable codes and shall be intumescent style sealants.
5. Approved Products
   a. Hilti, FS-ONE Intumescent Firestop Sealant
   b. SpecSeal, Series LCI Intumescent Sealant
   c. Tremco, TREMstop 1A+ Intumescent Sealant
   d. Or equal as approved by OWNER.

D. UTILITY/CONDUIT IDENTIFICATION

1. The CONTRACTOR shall supply Buried Warning Tape: 6" wide polyethylene underground utility warning tape with legend and color as follows:
   a. "Caution Fiber Optic Cable Below" Orange

E. Acceptable Manufacturers and Products:
   1. "Warnoline" tape by Safety Sign Company, Cleveland, Ohio, 216-238-7721.
   2. "Shieldtec" tape by Empire Level, Inc., Mukwonago, WI. www.empirelevel.com, 1-800-872-8425.
   3. Or equal as approved by OWNER.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions under which electrical construction and associated work is to be performed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate all electrical work operations to protect existing and/or new concurrent construction.

3.3 ALIGNMENT AND GRADE

A. In general, communication conduits are placed above the hot and chilled water pipe lines, as indicated on the Plans. Where placed over separate routes, maintain alignment and grade as described in Section 36 61 05 – District Cooling Chilled Water Pipes, Part 3.02 and Section 36 61 10 – District Energy Hot Water Pipes, Part 3.02. Any deviations from the location of the conduit above the hot or chilled water lines shall be noted and included in the As-Built Documentation in accordance with Section 01 77 00 – Closeout Procedures, Part 1.05.

3.4 CONDUIT LAYING AND JOINTING

A. Conduit Laying:
   1. Remove all foreign matter or dirt from inside of conduit before it is lowered into its position in trench.
   2. Keep conduit interior and joints clean during and after laying.
   3. Replace any defective or damaged conduit, or conduit with grade or alignment disturbed after laying.
   4. At suspension of work, place suitable closures to prevent earth or water from entering conduit.
   5. Lay no conduit in water.
   6. Construct deflections from a straight line or grade as required by vertical or horizontal bends with radii not less than 60" (5') as noted in Part 2.02 (C). Riser stubs shall be made with manufactured bends.
   7. Lay conduit per ASTM D2321 and manufacturer's recommendations.
   8. Permanently label all handholes and conduits in handholes. . Permanent labeling shall be visibly seen on inside of handhole cover, and conduits.

Conduits identify what location each conduit runs (building name or handhole), and whether it is conduit No. 1, No. 2, No. 3, etc. for that direction or alignment.

9. The conduits shall be installed within the limits of the hot and chilled water pipes and centered above the pipes, including bends and offset areas.
10. Conduits shall be capped at each terminus point identified in the Plans.
11. Conduits shall be routed into the proposed Legislative Office Building above the Hot Water and Chilled Water service pipes.

B. Conduit Jointing Requirements:
1. Make all joints with specified or approved materials in accordance with recommendations of manufacturer.
2. Contractor shall test all conduit joints for bonding and strength prior to backfill by attempting to pull the joint apart manually without mechanical assistance.

C. Building/Structure Penetrations:
1. Make penetrations in strict accordance with indicated details.
2. Restore damaged waterproofing with products equal to and compatible with the existing systems.
3. Where required by applicable codes, construct fireproof barrier around penetrations by use of an intumescent firestop sealant, constructed to manufacturer's instructions.

3.5 HANDHOLE PLACEMENT

A. Handhole box shall be installed flush with proposed and adjacent surfaces.

B. Handhole box location:
1. The proposed location shall be verified by the CONTRACTOR and approved by the OWNER.
2. Handhole boxes shall not be placed within or directly adjacent to pedestrian curb ramps.
3. Handhole boxes shall be square with adjacent structures, buildings, sidewalks, etc.
4. Location of handhole boxes shall be surveyed and included in As-Built Documents in accordance with Section 01 77 00 – Closeout Procedures, Part 1.05.

C. Document all changes that deviate from the detail sheets.

3.6 BACKFILLING AND IDENTIFICATION REQUIREMENTS

A. Backfilling shall be completed with the Pipe Backfill Material as described in Section 31 21 00 – Utility Trenching and Backfill.

B. Buried conduit warning tape is described in Part 2.05 of this Specification.

C. Location of conduit where it deviates from that shown in the plans shall be included in the conduit drawing on the As-Built Documentation in accordance with Section 01 77 00 – Closeout Procedures, Part 1.05.

END OF SECTION

SECTION 33 05 16

CONCRETE & UTILITY STRUCTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Summary
   2. Related Work
   3. References
   4. Submittals

B. Part 2 – Products
   1. Structures
   2. Structural Slabs
   3. Building Wall Penetrations
   4. Sleeves

C. Part 3 – Execution
   1. Utility Structure Construction Requirements
   2. Material Testing
   3. Installation of Sleeves

1.2 SUMMARY

A. The CONTRACTOR, and/or a manufacturer selected by the CONTRACTOR and approved by OWNER, shall furnish all labor, materials, equipment, and incidentals required to construct concrete structures, structural slabs, and concrete wall penetrations in accordance with the Plans and these Specifications.

1.3 RELATED WORK

A. Section 01 25 00 – Product Options & Substitutions

B. Section 01 33 00 – Submittals

C. Section 01 43 00 – Quality Assurance

D. Section 31 21 00 – Utility Trenching and Backfill

E. Section 33 61 05 – District Cooling Chilled Water Pipe

F. Section 33 61 10 – District Heating Hot Water Pipe

1.4 REFERENCES

A. Other than by reference, listed references, standards and specifications are not contained in this Specification. Unless otherwise noted, the most current version of the standard or reference is applicable. Obtain, become familiar with and, where indicated or inferred, conform to the listed references and standards. References and standards are considered minimum requirements unless indicated otherwise. Any references to methods of measurement or payment in references and standards are not applicable. Tolerances in references and standards are applicable only if not indicated otherwise in this Specification. In event of conflict between the references or standards and this Specification, this Specification applies.

B. American Society for Testing and Materials (ASTM):
1. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
3. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
4. ASTM C150 – Standard Specification for Portland Cement
5. ASTM C270 – Standard Specification for Mortar for Unit Masonry
6. ASTM C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
7. ASTM C476 – Standard Specification for Grout for Masonry
8. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections
9. ASTM C857 – Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
10. ASTM C858 – Standard Specification for Underground Precast Concrete Utility Structures
11. ASTM C990 – Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
12. ASTM C1384 – Standard Specification for Admixtures for Masonry Mortars
13. ASTM C1677 – Standard Specification for Joints for Concrete Box, Using Rubber Gaskets
14. ASTM D7088 – Standard Practice for Resistance to Hydrostatic Pressure for Coatings Used in Below Grade Applications Applied to Masonry

1.5 SUBMITTALS

A. The CONTRACTOR shall be required to provide the following shop drawings to the OWNER for review and acceptance prior to constructing any precast or cast-in-place concrete utility structure. Shop drawings will be required for the following types of structures, where applicable:
1. Flash Chambers

B. The CONTRACTOR shall anticipate up to 10 working days upon receipt of a submittal for the OWNER to review shop drawings. Shop drawings will be reviewed, redlined, and returned to the CONTRACTOR with one of the following notes:
   1. Reviewed → Reviewed for general conformance with the Contract Documents. No resubmittal is necessary.
   2. Reviewed as Noted → Reviewed for general conformance with the Contract Documents. Notes are included for the CONTRACTOR'S benefit. No resubmittal is necessary.
   3. Revise and Resubmit → Reviewed for general conformance and found to be outside the provisions of the Contract Documents. Resubmittal is necessary.
   4. Rejected → Reviewed for general conformance and found to be outside the provisions of the Contract Documents. A "Rejected" item does not meet multiple portions of the Contract Documents, and will generally be accompanied with an explanation of why a rejection was provided.

C. Any precast or cast-in-place concrete utility structures constructed partially or in its entirety prior to the submittal and subsequent review of shop drawings may be rejected at the discretion of the OWNER, and shall be replaced by the CONTRACTOR with no additional compensation.

D. The CONTRACTOR shall submit all concrete mix designs used for cast-in-place structures to the OWNER for approval.

PART 2 - PRODUCTS

2.1 STRUCTURES

A. The CONTRACTOR shall be responsible for furnishing and installing all concrete structures.

B. The CONTRACTOR shall furnish and install all necessary materials required to construct sub-base, footings, install filter fabric, drain rock, and drain pipes to the storm sewer as specified in the plans. Structures shall be assembled in accordance with the structure manufacturer's recommendations.

C. Precast and cast-in-place structures shall conform to the dimension requirements as outlined in the Plans and the following
   1. Be designed by a Professional Engineer to have wall, floor, and top slabs able to sustain an HS-25 loading.
   2. Precast sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C990.
   3. Cement used for concrete utility structures shall be Type IIA (air-entrained), Type III (high-early strength), or Type IIIA (air-entrained high-early strength) Portland cement conforming to ASTM C150 or equal as approved by OWNER.

4. All sections shall be cured by an approved method. Precast sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi or until 5 days after fabrication and/or repair, whichever is longer.
5. Concrete used in precast structures shall meet or exceed the following criteria:
   a. Water/cement ratio: between 0.30 and 0.45
   b. Cementitious content: between 660 and 850 lbs/cubic yard
   c. Substitute cementitious content:
      1) Fly ash: less than 30%
      2) Slag: less than 35%
      3) Ternary: less than 40%
   d. Slump range (before water reducing admixtures): between 2" and 5"
   e. 28-day compressive strength: greater than 4000 psi

1. Brick or masonry used to build any walls or provided for infill of pipe openings shall conform to ASTM C150.

D. Standpipes: Furnish and install standpipes to final roadway grade. All standpipes shall be Schedule 80 PVC or equal as approved by the OWNER.

E. Castings & Adjusting Rings: Furnish and install all castings and adjustment rings necessary to bring the castings to final roadway grade. Casting types are noted in the Plan details. All adjusting rings shall be constructed of reinforced concrete and sized appropriately for the castings specified. No concrete brick or block shall be allowed for the purpose of casting adjustment.

F. Sealing & Waterproofing: For all structures, the CONTRACTOR shall be required to complete sealing of the structure, pipe "knockouts", and any joints using the following approved materials:
   1. Mortar Mix: One part Type 1, ASTM C150, cement by volume and three (3) parts clean, sharp sand by volume.
   2. Non-Shrink Grout: Pour Rok®, Embeco® 636, or approved equal.
   3. Water Sealing Material: SikaSet® Plug, or approved equal.
   4. Joint Sealing Material: All precast concrete joints shall be sealed with a butyl rubber joint seal, "O-ring", or ram neck installed to ensure a waterproof seal along the entire length of a joint.

2.2 STRUCTURAL SLABS

A. The CONTRACTOR shall be responsible for furnishing and installing all structural slabs (HS-25 and H20).

B. The CONTRACTOR shall furnish and install all necessary materials required to construct the HS-25 or H20 slabs as shown in the Plan details. Structures shall be assembled in accordance with the structure manufacturer's recommendations.

C. HS-25 Slabs: When applicable, the location and approximate size of HS-25 slabs are noted in the Plans. If the CONTRACTOR chooses to sequence the work in a manner that would place either construction haul roads or traffic above the OWNER'S facilities with less than two (2) feet of cover for any amount of time, the CONTRACTOR shall be responsible for installing an H20 slab above the facility as a method of protecting the facility with no additional compensation. The exception to this cover requirement would be for the explicit installation of roadway subgrade, curb, gutter, and pavement installation directly above the OWNER'S facilities. The CONTRACTOR may chose an alternative method for "bridging" over existing facilities (steel plates, precast concrete slabs, etc.), and may submit any proposed method to bridge the pipe in lieu of an HS-25 slab to the OWNER for review and approval.

D. Modified HS-25 Slabs for Valve Stems: Where applicable the Plan details show modified HS-25 slabs to be installed above valve locations where castings are to be installed. These slabs may vary in size and depth below grade per the details. Standpipes, castings and adjustment rings shall be supplied and installed per the requirements of Part 2.01(D) of this Section.

E. Cement used for concrete structural slabs shall be Type IIA (air-entrained) or Type IIIA (air-entrained high-early strength) Portland cement conforming to ASTM C150 or equal as approved by the OWNER.

F. Concrete used in precast structures shall meet or exceed the following criteria:
1. Water/cement ratio: between 0.30 and 0.45
2. Cementitious content: less than 750 lbs/cubic yard
3. Substitute cementitious content:
   a. Fly ash: less than 30%
   b. Slag: less than 35%
   c. Ternary: less than 40%
4. Slump range (before water reducing admixtures): between 2" and 5"
5. 28-day compressive strength: greater than 4500 psi

G. Traffic shall not be allowed onto HS-25 slabs until the compressive strength of the concrete reaches a minimum of 3,000 psi.

2.3 BUILDING WALL PENETRATIONS

A. All concrete wall openings for hot water pipe, chilled water pipe, sleeves, or conduit pipe shall be sealed with the following:
1. Non-Shrink Grout: Pour Rok®, Embeco® 636, or approved equal.
2. Water Sealing Material: SikaSet® Plug, or approved equal.
3. Exterior Waterproofing: All building wall penetrations shall be sealed with a bitumastic sealant approved by the OWNER for use on foundation walls. : Approved sealants are:
   a. RoofWorks Fibered Roof and Foundation Coating
   b. SealMaster Fibered Roof and Foundation Coating

c. Gardner 0405-GA Fibered Roof & Foundation Coating
d. APOC 202 Fibered Roof & Foundation Coating
e. Or approved equal

2.4 SLEEVES

A. Openings for the passage of pipes through floors and walls of concrete structures shall be formed of sleeves of standard-weight steel pipe. The sleeves shall be of ample diameter to pass the pipe and its insulation, if any, and to permit such expansion as may occur. Sleeves shall be of sufficient length to be flush at the walls and the bottom of slabs and to project 2 in. above the finished floor surface. Threaded nipples shall not be used as sleeves.

B. Sleeves in exterior walls below ground or in walls below the groundwater level shall have a 1/2-inch (1/2") annular fin of 1/8-inch (1/8") plate welded with a continuous weld completely around the sleeve at about mid-length.

C. All sleeves shall be set accurately before the concrete is placed or shall be built in accurately as the masonry is being built.

D. Schedule 40 steel pipe (minimum wall thickness) shall be used for the following applications:
1. Exterior Roof and Walls
2. Masonry, Stone, and Concrete Walls
3. Floor Sleeves (exposed areas)

E. Galvanized steel, 22-gauge (minimum thickness) sleeves shall be used for the following applications:
1. Gypsum wallboard
2. Roof and Floors in Concealed Locations and in Chases

PART 3 - EXECUTION

3.1 UTILITY STRUCTURE CONSTRUCTION REQUIREMENTS

A. General Requirements
1. Conform with the requirements of Section 31 21 00 – Utility Trenching and Backfill for subgrade preparation. Placement on natural grade is preferred, if stable.
2. Allow poured-in-place concrete footings and floor slabs to reach a strength of 3,500 psi before continuing structure construction.
3. Provide continuous performed butyl rubber joint seal as specified in all horizontal joints of precast structures.

a. Install in accordance with manufacturer's recommendations.
b. Butt ends together and do not overlap material.

c. Leave protective paper in place during application and handling; remove just prior to coupling.

4. Modular Link Type Seals and Sleeves: Conform with manufacturer's installation procedures.

B. Storm Sewer Connections: Where required, the CONTRACTOR shall core drill into storm sewer to make the final drain connection, and in all instances close and seal all openings around the outside of the pipe in precast structures with non-shrink grout.

C. Wall Penetrations and Exterior Waterproofing Systems:

1. Prior to backfilling structures and wall penetrations, install all exterior waterproofing seals and membranes.
2. Waterproofing membrane shall extend from the pipe penetration to the following limits on the existing wall:
   a. Poured Concrete Wall: waterproofing shall extend a minimum of 24" onto solid concrete of existing foundation wall
3. Waterproofing must be left visible for the Project Representative to inspect prior to backfilling.
4. Backfilling around membranes prior to the Project Representative's inspection may be grounds for rejection of work and re-excavation for inspection at the CONTRACTOR'S expense.

3.2 MATERIAL TESTING

A. All concrete structures poured in-place shall be tested for compressive strength in accordance with Section 01 43 00 – Quality Assurance.

B. The CONTRACTOR is responsible for all testing required for construction and installation of concrete structural items.

C. The CONTRACTOR shall provide record of Material Testing results (i.e., concrete compressive strength) to the OWNER in accordance with the provisions of Section 01 33 00 – Submittals.

3.3 INSTALLATION OF SLEEVES

A. Fabricate all sleeves from new materials.

B. Pipe sleeve inside diameter shall be a minimum of one-inch (1") larger than the outside diameter of the carrier pipe (including insulation jacket, where applicable). The pipe sleeve thickness must be great enough to include requisite support saddles for the carrier pipe.

C. Wall sleeves shall be installed flush with both sides of the wall penetration, unless noted otherwise in the Plans.

D. Floor sleeves shall extend two inches (2") above the floor, unless noted otherwise in the Plans.

E. All sleeves shall be sealed between the wall and the sleeve, as well as between the sleeve and carrier pipe as shown in the Plans.

F. Exterior wall penetrations shall be sealed in accordance with the provisions above.

END OF SECTION

SECTION 33 61 05

DISTRICT COOLING CHILLED WATER PIPE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Description
   2. Related Work
   3. References
   4. Submittals
   5. Joining and Testing Procedures
   6. Testing of Piping System
   7. Delivery, Storage, and Handling
   8. Quality Assurance

B. Part 2 – Products
   1. Unspecified Materials and Products
   2. Aggregate Materials
   3. Filler Metals
   4. Chilled Water Piping Products
   5. Concrete & Utility Structures
   6. Ancillary Products

C. Part 3 – Execution
   1. Handling of Pipe
   2. Preparation of Work Site
   3. Pipe Laying & Jointing
   4. Chilled Water System Construction Requirements
   5. Field Quality Control
   6. Re-examination of Repairs
   7. Backfilling and Identification Requirements
   8. Pipe Cleaning

1.2 DESCRIPTION

A. Install PE4710 DR11 HDPE chilled water pipes as indicated in the Plans and as herein specified. The chilled water pipes will carry chilled water under pressure in a district cooling network.

1.3 RELATED WORK

A. Section 01 33 00 – Submittals

B. Section 01 43 00 – Quality Assurance

C. Section 26 01 00 – Site Electrical

D. Section 31 21 00 – Utility Trenching and Backfill

E. Section 33 05 16 – Concrete & Utility Structures

F. Section 33 61 10 – District Heating Hot Water Pipe

1.4 REFERENCES

A. Other than by reference, listed references, standards and specifications are not contained in this Specification. Unless otherwise noted, the most current version of the standard or reference is applicable. Obtain, become familiar with and, where indicated or inferred, conform to the listed references and standards. References and standards are considered minimum requirements unless indicated otherwise. Any references to methods of measurement or payment in references and standards are not applicable. Tolerances in references and standards are applicable only if not indicated otherwise in this Specification. In event of conflict between the references or standards and this Specification, this Specification applies.

B. American Society for Testing and Materials (ASTM):
1. ASTM A36: Specification for Structural Steel;
2. ASTM A53: Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless;
3. ASTM D3034: Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
4. ASTM D3350: Standard Specification for Polyethylene Plastic Pipe and Fittings Materials
5. ASTM F2164: Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure
6. ASTM F2206: Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Black Stock
7. ASTM F2620: Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

C. American Society of Mechanical Engineers (ASME) / American National Standards Institute (ANSI) 2007 Edition of the following:
1. ASME B31.1 - Power Piping (including Nonmandatory Appendix III)
2. ASME BPV Section II: Material Specifications
3. ASME BPV Section IX: Welding and Brazing Qualifications
4. ANSI 16.3
5. ANSI 16.4

D. American Welding Society (AWS) 2007 Edition of the following:

1. AWS D10.12: Recommended Practices and Procedures for Welding Low Carbon Steel Pipe
2. A2.4: Symbols for Welding and Non-destructive Testing
3. A3.0: Welding Terms and Definitions

E. National Association of Corrosion Engineers (NACE):
1. NACE RP0169: Recommended Practice for Control of External corrosion on Underground or Submerged Metallic Piping Systems.
2. NACE RP0274: Recommended Practice for High Voltage Electrical Inspection of Pipeline Coatings Prior to Installation.

F. Plastics Pipe Institute (PPI)
1. Handbook of PE Pipe

G. Governing state, city, municipality, or agency standard specifications and requirements.

H. Governing state, city, or municipality standard plans or details.

1.5 SUBMITTALS

A. Comply with the requirements of Section 01 33 00 – Submittals and this Section. Responsibility for arranging, supervising and payment for any required tests listed below are indicated in Section 01 43 00 – Quality Assurance. Submit material qualification tests, field density test reports and other noted items directly from a testing laboratory. The following submittals are required for portions of the Work specified in this Section.

B. Certificate of Compliance: A Submittal in letter form to indicate a product or portion of the Work complies with the Contract Documents.
1. Provide certificate of compliance for the following items. Certificate must be generated by the manufacturer or supplier and must be notarized.
a. Chilled water pipe and fittings

C. Certification of Qualification: A submittal required to document and certify experience or other evidence of qualification as specified.
1. Provide Certification of Qualification for the following entities/people:
a. Piping Welders
b. HDPE Joining Equipment and Personnel

D. Mill Certifications: Provide heat and lot numbers and chemical composition data for all materials used in the manufacturing of piping and fittings (for piping materials not provided by the OWNER).

E. Product Data: Provide manufacturer's data and technical specifications on the following CONTRACTOR furnished products, where applicable. Marketing or sales literature is not acceptable.

1. Chilled Water Piping
   a. SCH40 Steel Pipe
   b. DR11 HDPE Pipe
2. Isolation Valves
3. External Pipe Coating - Chilled Water
4. Service Entry Valves
5. Cathodic Protection Materials:
   a. Sacrificial anodes
   b. Test stations
   c. Permanent reference electrodes
   d. Test station lead wire
   e. Exothermic weld equipment
   f. Exothermic weld coating
   g. Dielectric isolation flange kits

F. Special Reports: Submittal of special reports as required defined in this Section for the following items:
   1. Alignment and Grade Report (Survey Points File)
   2. Report on Electrical Inspection (Holiday Testing) of Chilled Water Piping Coating
   3. Record Drawing/Isometric Sketch

G. Testing Report: A Submittal which reports the result of the following required tests:
   1. Field Density Tests
   2. Manufacturer's Test Reports for Piping and Fittings (for non-OWNER supplied materials).
   3. Hydrostatic Test or Dye Penetrant Test Reports
   4. Service Entry Valve Hydrostatic Pressure Test

1.6 JOINING AND TESTING PROCEDURES

A. All shop and field joining shall be in conformity with the requirements of ANSI B31.1, including Nonmandatory Appendix III, and the supplementary requirements specified herein and shall be performed only by fully qualified personnel and certified methods.

B. Joining and Testing procedures shall be in accordance with ANSI B31.1, including Nonmandatory Appendix III, and the following supplementary requirements, Welding and Testing Procedures All repair and testing of defective welds or joints shall be performed by the CONTRACTOR at no additional cost to the OWNER.

C. All individuals involved in the joining PE pipe systems, whether it be using the typical heat fusion methods or employing mechanical connections, should be fully trained and qualified in accordance with applicable codes and standards and/or as recommended by the pipe or fitting manufacturer.

D. During hydrostatic pressure testing, the pipeline test section must be restrained against movement due to pressurization and in the event of catastrophic failure. Joints must be exposed for leakage examination, and restraint must be maintained.

1.7 TESTING OF PIPING SYSTEM

A. Design pressure of the chilled water system is 100 psi. Hydrostatic test pressure shall be performed at 1.5 times the design pressure (150 psi).

B. Hydrostatic testing shall be performed in accordance with Appendix A, Section V – Leak Testing of Piping Welds of these specifications, the requirements of ANSI B31.1, Section 137, and the governing inspection entity.

C. Dye-penetrant testing on every carbon steel weld may be performed, in accordance with ASME standard specifications, at the discretion of the Project Representative, in lieu of the hydrostatic testing.

D. The CONTRACTOR shall notify OWNER 48 hours in advance of any testing operations, with the procedures subject to OWNER'S approval.

E. Acceptance Standard: There shall be no leakage in the pipelines.

F. Radiography of carbon steel welds shall be performed by an independent testing firm, contracted by the OWNER, through the Project Representative, and shall occur in accordance with Section 01 43 00 – Quality Assurance. A minimum of 15% of every individual welder's welds shall be radiographically tested.

G. Under certain special conditions, such as during overnight connection sequences, the CONTRACTOR may request welds receive visual inspection by the Project Representative in lieu of the testing required above. The decision to accept visual inspection under special conditions shall be at the sole discretion of the Project Representative.

1.8 DELIVERY, STORAGE AND HANDLING

A. Pipe Storage and Handling:
   1. Store pipe and fittings to prevent damage by heat, sunlight, weight deflection, or other environmental conditions.
   2. Protect ends of all piping materials, including fittings from damage prior to jointing.
   3. If a specific pipe material is subject to deformation from specific environmental conditions, store and deliver pipe to trench in enclosed or shaded transport with controlled environment as necessary to protect pipe.
   4. Take extreme care in the handling of pipe with interior and/or exterior coatings and wraps to prevent damage prior to installation.

PART 2 - PRODUCTS

2.1 UNSPECIFIED MATERIALS AND PRODUCTS

A. Any materials or products required or implied to accomplish the Work indicated or inferred by the Plans and not specified in this Specification or on the Plans shall be furnished by the CONTRACTOR in conformance with the applicable specifications, with no additional compensation thereto.

2.2 AGGREGATE MATERIALS

A. Unless otherwise indicated, all aggregate materials are assumed to be imported. Comply with Section 31 21 00 for all aggregate material.

2.3 FILLER METALS

A. Mild Steel Covered Arc Welding Electrodes, ASME Section II, Part C, SFA-5.1.

2.4 CHILLED WATER PIPING PRODUCTS

A. Except as identified above, the CONTRACTOR shall purchase all other materials to install the pipe, and perform his/her work in accordance with the following:

B. Chilled Water Piping, Casing, and Fittings:
   1. High Density Polyethylene (HDPE) Pipe and Fittings:
      a. Pipe:
         1) Pipe shall be manufactured from a PE 4710 resin which meets ASTM D 3350 with a minimum cell classification of 445574C, manufactured to the dimensions of ASTM F 714.
         2) The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.
         3) Pipe shall have a minimum pressure rating 200 psi (DR 11).
      b. Fittings:
         1) Butt fusion fittings shall be made from HDPE pipe resin meeting ASTM D 3350 with a minimum cell classification of 445574C.
         2) Molded butt fusion fittings shall have a manufacturing standard of ASTM D 3261.
         3) Electrofusion fittings are not acceptable.
      c. Flanged and Mechanical Joint Adapters: Flanged and Mechanical Joint Adapters shall be made from materials containing resin that meets ASTM D 3350 with a minimum cell classification of 445574C.
   2. Steel Pipe to HDPE Transition Fittings:
      a. Transition fittings shall be internal diameter (ID) controlled providing a smooth interior transition between steel pipe and HDPE pipe.

1) Steel Material
   i. Epoxy coated, SCH40 A53B steel.
2) HDPE Material
   i. DR11 PE 4710 grade
3) Epoxy Coating
   i. Color HB, Red Oxide, IF1947T

3. Valves:
   a. HDPE Valves:
      1) DR11 rated, fused body valve made from PE4710 HDPE with elastomeric seats and stem seals, butt fusion connections, and 2' square nut adaptor for operation. Valves shall meet ASTM D 2513, and be stamped and labeled with a unique serial number.
      2) Stem extensions shall be installed to bring the stem operating nut to within 2 feet of finish grade where the depth from finish grade to the stem operating nut exceeds 4 feet.
   b. Gate Valves:
      1) Provide valves conforming to AWWA C500 or AWWA C509 that have HDPE pipe stubs complying with AWWA C906, resilient seated, non-rising stem, and nut operated.
      2) Valves shall be gray or ductile-iron body and bonnet, with bronze or gray or ductile-iron gate, bronze stem and square stem operating nut unless noted otherwise.
      3) All bolts, nuts and washers, except operating nut, shall be stainless steel.
      4) Stem operating nut to be 2 inches square and open counter-clockwise.
      5) Stem extensions shall be installed to bring the stem operating nut to within 2 feet of finish grade where the depth from finish grade to the stem operating nut exceeds 4 feet.
      6) Provide protective epoxy exterior coating according to AWWA C550 and manufacturer's recommendations.
      7) Service line valves and fittings, 2 inch and smaller shall be in accordance with AWWA C800
      8) Where a post indicator is shown, provide valve with an indicator post flange.
      9) Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the project include, but are not limited to, the following:
         i. AVK Series 66 or approved equal
   c. Ball Valves & Transition Pieces
      1) Design
         i. Valve construction design and tested to EN488 or ASME B31.1 specification

ii. Valve design to be fully welded
iii. Design to be suitable for above and below ground service
iv. Minimum rating ANSI 150 to allow for testing at 1.5 times system design pressure.
v. Reduced bore
vi. Weld ends schedule 40
vii. If flanged ends are required, flanges to be to ANSI
viii. Above ground valves should have a 60 mm extension to allow for insulation
ix. Provide top of stem position indication with a visible groove
x. Operator – Lever operated up to 6", gearbox for 8" and up

2) Materials
   i. Body, only forged materials are accepted, ASTM A106 or A352LF2
   ii. Cold pressed steel is not acceptable
   iii. Ball, stainless steel
   iv. Seat, PTFE with minimum 25% glass reinforcement
   v. Seat to be spring supported, individual coil springs are preferred
   vi. Stem, stainless steel
   vii. O-rings, EPDM
3) Buried service
   i. Valves for buried service to be coated with Protegol® UR Coating 32-55 RR or approved equal exterior corrosion protection
   ii. Valve should have an integral welded stem extension to bring the stem operating nut to within 2 feet of finish grade where the depth from finish grade to the stem operating nut exceeds 4 feet.
   iii. A minimum of 2 O-rings at the bottom and 2 O-rings at the top of the stem are required to prevent water ingress into the stem assembly
   iv. The assembly should provide an internal mechanical travel stop in the stem extension
   v. A 2" parallel square nut is to be provided
   vi. Gear operator required for valves size 8" and up (portable or fixed). If a fixed gearbox is required; provide a suitable gearbox for buried service, there should be no external moving parts; mechanical travel stop located in the gearbox, IP67 rated for water ingress, PUR Coating where the valve is coated
4) Approved Manufacturers:

i. Bohmer Valves or approved equal

d. Valve testing
1) All valves shall be tested at 1.5 times the rated pressure
2) All valves to be seat tested; both seats to be tested at max. 1.1 times the rated pressure
3) Acceptable leakage rates for seat tests are to API 598 or rate A of EN12266

C. Service Entry Assembly Piping and Fittings
1. Steel Piping and Fittings:
a. Pipe and Casing: Steel pipe per ASTM A53; seamless, Grade A, or electric resistance welded, Grade B. Schedule 40 wall thickness.
b. Welding:
1) Welders to be currently certified for pipeline welding in accordance with AWS standards.
2) Welding and weld quality per AWS D10.12.
3) Weld all pipe joints 3" in diameter and larger, including fittings with full penetration butt welds except where flanges are required.
4) On piping smaller than 3" diameter, socket weld components may be used.
5) Prepare pipe ends in tees, laterals and reducers for weld penetration in accordance with ANSI B31.1 Standards.
c. Reducers: ANSI 150 pound rated forged steel fitting, concentric.
d. Flanges: ANSI 150 pound raised faced with rated gaskets suitable for intended service. Slip-on flanges are not permitted on the primary piping system.
e. Caps: Use butt weld caps in accordance with ANSI B31.1 Standards.
f. Elbows and Bends: Use long radius butt welding elbows where a 90 degree or 45 degree bend is shown on the Plans. Trim elbows to degree of bend required for all other bends.
2. Mitered Joints: Deflections in piping that require less than 11.25 degrees to complete piping alignment may be mitered pipe connections if carefully cut to ensure proper alignment of pipe ends to allow for proper welded joint.
3. Service Entry Valves: ANSI 150 pound rated forged carbon steel
a. Ball Valves: unibody ball valves with gear operators
b. Butterfly Valves: triple offset butterfly valves with gear operators
4. Shunt Assembly Valves: ANSI 300 pound minimum rated forged carbon steel
a. Globe Valves: 2" weld-end, welded forged steel bonnet globe valves manufactured by Bonney Forge
b. Ball Valves: 2" weld-end, steel ball valves manufactured by Bohmer Valves with handle extension
5. Shunt Assembly Piping Insulation:
a. Insulation: 1.5" thick molded closed-cell polyisocyanurate insulation
1) Material: 1 or 2 piece Polyisocyanurate molded to the given pipe size, valve body size, and fitting size, conforming to ASTM

C591, with factory applied Saran 560 CX film vapor barrier sealed joints with all service jacket (ASJ) insulation tape.

2) Characteristics: Maximum water vapor transmission rate of 4 perm/in. (ASTM E96); K-value of 0.20 or lower at 75o F (ASTM C518); Maximum water absorption value of 0.7% by volume (ASTM C272).

b. Acceptable Manufacturers and Products:

1) Trymer 2000XP manufactured by ITW Insulation Systems

6. Shunt Assembly Corrosion Protection:

a. RG-CHW gel manufactured by Polyguard

2.5 CONCRETE & UTILITY STRUCTURES

A. Refer to Section 33 05 16 – Concrete & Utility Structures, Part 2.03 for information regarding work in and around new and existing utility structures, including knockout, sealing, and waterproofing requirements.

2.6 ANCILLARY PRODUCTS

A. Miscellaneous Metals: Steel shapes, plate, bars, ASTM A36, hot dipped galvanized in accordance with ASTM A123 after complete fabrication

B. Modular Link Type Seals and Sleeves:

1. Seals by Thunderline Corp. or equal;
2. Sleeves - 0.25" thick steel with diameter as required to accommodate seal device;
3. Provide minimum 1/2" water stop ring welded to outside of sleeve where indicated;
4. Hot dip galvanize after fabrication.

C. Utility Identification

1. Buried Warning Tape: 6" wide polyethylene underground utility warning tape with legend and color as follows:

CHWP	*"Caution Water Line Below"*	Blue
Fiber Optic	*"Caution Buried Fiber Optic Cable Below"*	*Orange*

2. Acceptable Manufacturers and Products:

a. "Warnoline" tape by Safety Sign Company, Cleveland, Ohio. www.safetysignco.com, 1-800-992-1177.

b. "Shieldtec" tape by Empire Level, Inc., Mukwonago, WI. www.empirelevel.com, 1-800-872-8425.

c. Or equal as approved by OWNER.

D. Polyvinyl Chloride (PVC) Drain Pipes

1. All drain pipes between air release and drain standpipes shall consist of Schedule 40 PVC pipe at the size and location noted in the Plans.

E. Polyvinyl Chloride (PVC) Standpipes
1. All PVC valve standpipes and reducers shall consist of Schedule 80 pipe.

F. Polystyrene Insulation Board:
1. High -load 100 psi compressive strength (used in horizontal applications in roadway areas) and 60 psi compressive strength (used on edge/vertical applications and horizontal areas out of roadway or heavy load locations) shall be supplied by the CONTRACTOR.
2. Insulation board shall be as Manufactured by Dow Chemical Company specifically for buried utility's insulation within traffic-loaded conditions.

G. Tracer Wire:
1. Wire Size or Gauge: 12 AWG
2. Jacket color: Blue
3. Jacket coating type: 30 mil. thick HDPE or High Molecular Weight Polyethylene (HMWPE)
4. Wire Type: Stranded, Copper Clad Steel or Copper with minimum break load of 302 lbs.
5. Compression Crimp Splice Connectors
   a. All underground spliced connections used within the DC cathodic protection circuit shall be made through the use of copper compression crimp connectors.
   b. The proper size connectors shall be used in accordance with the manufacturer's recommendations.
   c. Connectors shall be crimped with a hand tool capable of delivering a minimum of 12 tons of compressive force.
6. Splice Encapsulation
   a. All spliced connections used within the DC cathodic protection circuit shall be sealed with a waterproof direct burial splice kit manufactured for tap or branch splice connections. Acceptable manufacturers:
7. 3M™ ScotchcastTM Power Cable Tap Splice Kit 90-B1. Follow manufacturers recommended installation requirements.
8. Grounding rod: 1.5 lb. magnesium grounding anode with a minimum of 20 feet of lead wire.
9. Terminal Access Box:
   a. Quazite PC1118BA12 w/ PC1118CA0012 cover
   b. Cover to read “TRACER WIRE”

PART 3 - EXECUTION

3.1 HANDLING OF PIPE

A. Protect all pipe from damage during shipping, hauling and handling.

B. During storage, transportation, and lying, carefully protect pipes so that the pipe and pipe coating is not damaged in any manner. Cushion all saddles or bearings with

burlap or other soft material. In handling the pipe, use a cushioned sling will or other devices and methods, as approved by the Project Representative. No un-cushioned ropes, chains, wedges or levers are to be used in handling the pipe.

C. The pipe shall not be dropped, walked on, rolled, or handled in any manner that might damage the pipe or pipe coating. In lowering the pipe into the trench, care shall be taken to prevent impact with trench walls or scuffing of the pipe.

D. When pipe is placed in trenches with exposed rock cut, used padded wooden guides as necessary to prevent the pipe from swinging against exposed rock and damaging the pipe.

E. Place pipe along the side of the trench on cushioned blocks as close to the location where it will be laid. If the pipe is to be moved longitudinally along the trench, it shall be walked by crane, loaded on a truck and moved, or moved by other acceptable means.

F. Both ends of the pipe shall be securely capped at all times to keep out foreign matter.

3.2 PREPARATION OF WORK SITE

A. Coordination: Coordinate all utility work operations to protect existing and/or new concurrent construction.

B. Alignment and Grade:
1. Provide and maintain all necessary stakes, bench marks, and batter boards (where used) for installing the pipe to the alignment and grade as shown in the Plans.
2. Verify all pipe connection pipes and service entry locations prior to installing pipe. Report any discrepancies in location or elevation of connection points to the Project Representative. Failure to report discrepancies in locations and elevations of connection points prior to beginning pipe installation may result in re-work with no additional compensation to the CONTRACTOR.
3. Grade and Alignment Staking: Set grade and alignment stakes or survey offsets at 50' minimum intervals and at all structures, tees, beds, connections, and other locations when requested by the Project Representative.
4. Set minimum of 3 batter boards at any one time to carry line and grade into trench. If laser level equipment is used in lieu of batter boards, check equipment with grade stakes at 50’ minimum intervals.
5. The CONTRACTOR shall make no deviation from required alignment and grade without written approval from OWNER. Unapproved deviations may be cause for rejection and correction with no additional compensation to the CONTRACTOR.

3.3 PIPE LAYING & JOINTING

A. The CONTRACTOR'S attention is directed to Section 31 21 00 – Utility Trenching and Backfill for specific requirements as they pertain to bedding and backfill materials.

B. Carefully inspect each pipe unit. Remove all foreign matter and dirt from inside the pipe. Damaged units will be rejected or repaired to the satisfaction of the Project Representative.

C. Install the piping to the alignment and grades indicated on the Plans or as required by the Project Representative. Support each pipe on bedding material as indicated on the Plans and have firm bearing along its entire length. Temporary supports may be used to raise the piping or to allow rotating the pipe to facilitate welding joints. Bedding material may be excavated at pipe joints to provide clearance for welding.

D. HDPE Pipe Fusion
   1. The CONTRACTOR shall provide all equipment required to complete butt fusions in accordance with pipe manufacturer's recommendations.
   2. Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground whenever possible. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedure should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400-450 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint with weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records provide to the OWNER.
   3. Mechanical joining will be used within building interior spaces only. Mechanical joining will be accomplished by either using a HDPE flange adapter with a ductile iron back-up ring or HDPE Mechanical Joint adapter with a ductile iron back-up ring.
   4. Electro-fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.

3.4 CHILLED WATER SYSTEM CONSTRUCTION REQUIREMENTS

A. General Requirements
   1. Install chilled water piping and all associated components in accordance with the Plans, this Specification and reviewed submittals.
   2. No mechanical joints shall be buried in chilled water piping.

B. Tracer Wire Installation

1. Connections are not allowed in areas where there will be direct burial of the pipe.
2. Wire shall be placed top center of each pipe between 2"-6" above the pipe.
3. Tracer wire shall be routed through a separate 2" capped conduit penetration through the wall (holes drilled for wire) and sealed with silicone sealant on both sides of the conduit prior to backfill.
4. Install tracer wire as a single continuous wire. Splicing of wire, if necessary, shall be done in a manner that produces an electrically and mechanically sound connection using an approved lockable connector specifically designed for direct burial.
5. Wire shall be terminated at the service take off within a communications handhole, valve standpipe, or a 12"x18" handhole when the previous two are not available, and within a 12" x 12" Hoffman enclosure within the building. A 5' coil of each wire shall be left in the enclosure.
6. Damage to the wire occurring during installation shall be immediately repaired by removing the damaged wire and installing a new section of wire with approved connectors.
7. Grounding
    a. Tracer wire must be properly grounded at all dead ends/stubs.
    b. Grounding shall be achieved by use of a 1.5 pound, drive-in magnesium grounding anode rod with a minimum of 20 feet of lead wire.
    c. If grounding the tracer wire at the meter, 2 Terminal access boxes are required to allow for locates to be done from the meter or toward the meter.
    d. When anode wire will be connected to a tracer wire access box, a minimum of 2 feet of slack wire is required after meeting final elevation.
8. No bare tracer wire shall be exposed either below or above ground. Exposed ends such as at meter risers are not allowed and shall be protected from exposure.
9. Inspection and testing.
    a. Verify tracer wire installation by using low frequency (512 Hz or similar) line locating equipment.
    b. Verification shall be witnessed by the OWNER's Representative.
    c. Verify tracer wire installation upon completion of rough grading and again prior to final completion.
    d. Continuity testing of the tracer wire system, in lieu of using locating equipment, shall not be accepted.

C. Shunt Assembly Insulation and Corrosion Protection
1. Apply RG-CHW® gel 25-30 mils thick to all steel shunt piping prior to installation of insulation according to the manufacturer's instructions.
2. Seal tabs and joints with vapor barrier adhesive or self-sealing system without using staples or puncturing the vapor barrier.

3. Seal exposed insulation ends at valves, fittings, and flanges with vapor barrier adhesive.
4. Shunt assembly piping shall be insulated from the service piping to the open air side of the ball valves.

3.5 FIELD QUALITY CONTROL

A. Unless specifically noted otherwise in this Section, responsibilities for arranging and supervising for the following required field tests are specified in Section 01 43 00.

B. Field Tests for Leakage - Chilled Water Systems Documented testing of all chilled water piping systems for leakage is required.
1. Conform to the requirements of ASME B31.1, Para. 137.3.4
2. There shall be NO failed leakage tests allowed in the piping system.
3. Hydrostatic testing shall be performed in accordance with these specifications, the requirements of ANSI B31.1, Section 137, and the governing inspection entity.
4. Design pressure of the chilled water system is 100 psi. Hydrostatic test pressure shall be performed at 1.5 times the design pressure (150 psi).
5. The CONTRACTOR shall develop a procedure for hydrostatic testing and submit it to the ENGINEER for review and release prior to any hydrostatic testing occurring.
6. The CONTRACTOR shall notify the OWNER 48 hours in advance of any testing operations, with the procedures subject to the OWNER'S approval.
7. Hydrostatic pressure testing shall be conducted in accordance with the ASTM F 2164, Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure. This testing procedure is as follows.
8. For safety reasons, hydrostatic testing only, clean water will be the testing medium.
9. The maximum test duration shall be 8 hours.
10. The maximum test pressure shall be 150 psi, the pressure at any point in the system be shall not be greater than this pressure through the duration of the testing procedure.
11. Visually inspect the connections for signs of proper fusion.
12. Remove all fusion equipment from the system before starting the pressure test.
13. Set pressure gauge near the bottom of the system, where the pressure will be highest. This reduces the risk of over- pressurizing the system.
14. Restrain pipeline against movement due to pressurization and in the event of catastrophic failure. Restraint must be maintained while joints are exposed for leakage examination.
15. The testing equipment capacity and the pipeline test section should be such that the test section can be pressurized and examined for leaks within test duration time limits. Lower capacity testing and pressurizing equipment may require a shorter test section.
16. Examine test equipment and the pipeline test section before pressure is applied to ensure that connections are tight, necessary restraints are in place

and secure, and components that should be isolated or disconnected are isolated or disconnected.

17. Disconnect or isolate all low pressure filling lines and other items not subject to the test pressure.
18. The test section should be completely filled with the test liquid, taking care to bleed off any trapped air.
19. Vent at high points to purge air pockets while the test section is filling. Venting may be provided by bleed valves or equipment vents.
20. Observe the system during the test for any indications of leaks. If a leak is found, relieve all test pressure and repair the leak before continuing.
21. The test procedure consists of initial expansion, and test phases.
    a. Initial Expansion Phase
        1) Pressurize test section to maximum test pressure and add make-up test liquid as required to maintain maximum test pressure for four (4) hours.
    b. Test Phase
        1) Reduce the test pressure to 140 psi. This is the target test pressure.
22. If the pressure remains steady (within 10.75 psi of the target test pressure) for an hour, leakage is not indicated, and pipe section passes.
23. If leaks are discovered, depressurize the test section before repairing leaks. Correctly made fusion joints do not leak. Leakage at a butt fusion joint may indicate imminent catastrophic rupture. Depressurize the test section immediately if butt fusion leakage is discovered.
24. Leaks at fusion joints require the fusion joint to be cut out and redone.
25. If the pressure leak test is not completed due to leakage, equipment failure, etc., the test section should be de-pressurized and repairs made. Allow the test section to remain depressurized for at least eight (8) hours before retesting.
26. For safety reasons, only hydrostatic testing will be allowed.

3.6 RE-EXAMINATION OF REPAIRS

A. If a metal weld should fail to pass a Liquid Penetration Examination, or any section of piping fails the Hydrostatic Pressure Test the repair must be made in accordance with approved repair procedures.

B. The section shall then be retested be the above procedure except that welded joints previously accepted need not be re-examined.

C. If in the judgment of the Project Representative, it is impractical to follow the repair procedure for any reason, required modifications in the procedure shall be subject to OWNER'S written approval.

D. The CONTRACTOR shall be responsible for the ultimate leak tightness of the line subject to the Project Representative's approval. All repair and testing of defective joints shall be performed by the CONTRACTOR at no cost to OWNER.

3.7 BACKFILLING AND IDENTIFICATION REQUIREMENTS

A. Pipe/Structure Backfilling
   1. Backfill as soon as practical after pipe has been placed and in accordance with the As-Built Documentation requirements of Section 20 77 00, Part 1.05.
   2. Pipe Zone: Backfill with granular material of the type indicated or specified, simultaneously on both sides of pipe in maximum 6" lifts.
      a. Shovel-place and mechanically tamp to completely fill all spaces under and adjacent to pipe.
      b. Conform to ASTM D2321 when backfilling plastic pipe.
   3. Above Pipe Zone: Deposit specified material in maximum 12" lifts to required final subgrade elevation and compact in accordance with requirements of Section 31 21 00.
      a. Buried Utility Identification
   4. During utility backfilling place warning tape approximately 1' (or less if appropriate) above all on-site main line piping, service line piping, electrical conduits for communications, sensor, cathodic protection, etc.; if lines are placed by other utility disturbed, furnish tape and arrange placement by utility.

3.8 PIPE CLEANING

A. After installation but before backfilling, and sequencing the work such that all piping will be cleaned from a low point without cleaning through valves, the CONTRACTOR will thoroughly clean the interior of all pipes of all scale, dirt, and debris by pigging or water power jetting of the pipes. All scale and debris shall be flushed and removed from the pipeline.

B. For pipes smaller than 4 inch, after installation and before final in service test, a full flow pressurized flush may be performed in lieu of power jetting where the piping configuration will not allow power jetting to be properly performed.

C. To establish that pipe and fittings of smaller diameter can be successfully cleaned, submit for OWNER'S approval a method and procedure proposed to satisfy the cleaning requirements.

D. The cleaning procedure may be repeated at the discretion of the Project Representative. CONTRACTOR shall notify the Project Representative 48 hours in advance of flushing operations.

E. Take all precautions necessary to prevent damage to the pipe, insulation, or structures from the cleaning operation and remove the water from the excavations.

F. Take all necessary precautions to ensure that no oil or other lubricant comes in contact with either the inside or outside walls of the pipe.

G. Each segment shall be flushed in a manner to allow water to drain out of the pipe at low points.

H. At the conclusion of pipe flushing for a given segment of pipe, the CONTRACTOR shall obtain verification from the OWNER Project Representative through signature or initials on the CHWP Inspection and Testing Plan.

END OF SECTION

SECTION 33 61 10

DISTRICT HEATING HOT WATER PIPE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Part 1 – General
   1. Description
   2. Related Work
   3. References
   4. Submittals
   5. Joining and Testing Procedures
   6. Testing of Piping System
   7. Material Delivery, Storage, and Handling

B. Part 2- Products
   1. Unspecified Materials and Products
   2. Aggregate Materials
   3. Filler Metals
   4. Hot Water Piping Products
   5. Concrete & Utility Structures
   6. Ancillary Products

C. Part 3 – Execution
   1. Handling of Pipe
   2. Preparation of Work Site
   3. Pipe Laying & Jointing
   4. General Requirements
   5. Field Quality Control
   6. Testing of Piping System
   7. Re-examination of Repairs
   8. Backfilling and Identification Requirements
   9. Pipe Cleaning
   10. Insulation of Shunt Assembly

1.2 DESCRIPTION

A. Furnish and Install a complete system of factory pre-insulated high temperature high density polyethylene (PE-RT) piping for the specified service. All pre-insulated pipe, fittings, insulating materials, and technical support shall be provided by the Pre-insulated Piping System manufacturer.

B. This specification covers the material (pipe and fittings), joining methods and general installation practice for high temperature high density polyethylene pipe (PE-RT) piping systems for the hot water pipes will carry heated hot water under pressure in a district heating network.

1.3 RELATED WORK

A. Section 01 33 00 – Submittals

B. Section 01 43 00 – Quality Assurance

C. Section 26 01 00 – Site Electrical

D. Section 31 21 00 – Utility Trenching and Backfill

E. Section 33 05 16 – Concrete & Utility Structures

F. Section 33 61 05 – District Cooling Chilled Water Pipe

1.4 REFERENCES

A. Other than by reference, listed references, standards and specifications are not contained in this Specification. Unless otherwise noted, the most current version of the standard or reference is applicable. Obtain, become familiar with and, where indicated or inferred, conform to the listed references and standards. References and standards are considered minimum requirements unless indicated otherwise. Any references to methods of measurement or payment in references and standards are not applicable. Tolerances in references and standards are applicable only if not indicated otherwise in this Specification. In event of conflict between the references or standards and this Specification, this Specification applies.

B. American Society for Testing and Materials (ASTM):
1. ASTM A36: Specification for Structural Steel;
2. ASTM A53: Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless;
3. ASTM D2737: Standard Specification for Polyethylene (PE) Plastic Tubing
4. ASTM D2774: Standard Practice for Underground Installation of Thermoplastic Pressure Piping
5. ASTM F2880: Standard Specification for Lap-Joint Type Flange Adapters for Polyethylene Pressure Pipe in Nominal Pipe Sizes 3⁄4 in. to 65 in.
6. ASTM D3035: Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
7. ASTM D3261: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
8. ASTM D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

9. ASTM F714: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
10. ASTM F905: Standard Practice for Qualification of Polyethylene Saddle-Fused Joints
11. ASTM F1055: Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe
12. ASTM F1962: Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings
13. ASTM F2164: Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure
14. ASTM F2206: Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock
15. ASTM F2620: Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
16. ASTM F3124: Standard Practice for Data Recording the Procedure Used to Produce Heat Butt Fusion
17. Joints
18. ASTM F3183: Standard Practice for Guided Side Bend Evaluation of Polyethylene Pipe Butt Fusion Joint
19. ASTM F3190: Standard Practice for Heat Fusion Equipment (HFE) Operator Qualification on Polyethylene (PE) and Polyamide (PA) Pipe and Fittings

C. American Society of Mechanical Engineers (ASME) / American National Standards Institute (ANSI) 2007 Edition of the following:
1. ASME B31.1 - Power Piping (including Non-mandatory Appendix III)
2. ASME BPV Section II: Material Specifications
3. ASME BPV Section IX: Welding and Brazing Qualifications

D. Plastics Pipe Institute, PPI
1. PPI Handbook of Polyethylene Pipe – 2009 (2nd Edition)
2. PPI Municipal Advisory Board (MAB) Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe
3. PPI Material Handling Guide for HDPE Pipe and Fittings
4. PPI TR-33: Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe
5. PPI TR-34: Disinfection of Newly Constructed Polyethylene Water Mains
6. PPI TR-38: Bolt Torque for Polyethylene Flanged Joints
7. PPI TR-41: Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping
8. PPI TN-42: Recommended Minimum Training Guidelines for PE Pipe Butt Fusion Joining Operators for Municipal and Industrial Projects
9. PPI TR-46: Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe

E. American Welding Society (AWS) 2007 Edition of the following:

1. AWS D10.12: Recommended Practices and Procedures for Welding Low Carbon Steel Pipe
2. A2.4: Symbols for Welding and Non-destructive Testing
3. A3.0: Welding Terms and Definitions

F. Governing state, city, municipality, or agency standard specifications and requirements.

G. Governing state, city, or municipality standard plans or details.

1.5 SUBMITTALS

A. Comply with the requirements of Section 01 33 00 – Submittals and this Section. Responsibility for arranging, supervising and payment for any required tests listed below are indicated in Section 01 43 00 – Quality Assurance. Submit material qualification tests, field density test reports and other noted items directly from a testing laboratory. The following submittals are required for portions of the Work specified in this Section.

B. Certificate of Compliance: A Submittal in letter form to indicate a product or portion of the Work complies with the Contract Documents.
1. Provide certificate of compliance for the following items. Certificate must be generated by the manufacturer or supplier and must be notarized.
   a. Welding electrode

C. Certification of Qualification: A submittal required to document and certify experience or other evidence of qualification as specified.
1. Provide Certification of Qualification for the following entities/people:
   a. HDPE Joining Equipment and personnel
   b. Insulation Joint Kit installing personnel (provided through manufacturer training)

D. Product Data: Provide manufacturer's data and technical specifications on the following CONTRACTOR furnished products, where applicable. Marketing or sales literature is not acceptable.
1. Piping materials and fittings
2. Gaskets, couplings, sleeves, and assembly bolts and nuts
3. Isolation valves
4. Identification materials and devices

E. Special Reports: Submittal of special reports as required defined in this Section for the following items:
1. Alignment and Grade Report (Survey Points File)
2. Record Drawing/Isometric Sketch

F. Testing Report: A Submittal which reports the result of the following required tests:
1. Field Density Tests

2. Hydrostatic or Dye Penetrant Tests

1.6 JOINING AND TESTING PROCEDURES

A. All shop and field joining shall be in conformity with the requirements of ANSI B31.1, including Non-mandatory Appendix III, and the supplementary requirements specified herein and shall be performed only by fully qualified personnel and certified methods.

B. Joining and Testing procedures shall be in accordance with ANSI B31.1, including Non-mandatory Appendix III, and the following supplementary requirements, Welding and Testing Procedures, which by reference constitute an integral part of this specification. All repair and testing of defective welds or joints shall be performed by the CONTRACTOR at no additional cost to the OWNER.

C. All individuals involved in the joining PE-RT pipe systems, whether it be using the typical heat fusion methods or employing mechanical connections, should be fully trained and qualified in accordance with applicable codes and standards and/or as recommended by the pipe or fitting manufacturer.

D. During hydrostatic pressure testing, the pipeline test section must be restrained against movement due to pressurization and in the event of catastrophic failure. Joints must be exposed for leakage examination, and restraint must be maintained.

1.7 TESTING OF PIPING SYSTEM

A. Design pressure of the hot water system is 125 psi. Hydrostatic test pressure shall be performed at 1.5 times the design pressure (187.5 psi).

B. Hydrostatic testing shall be performed in accordance, the requirements of ANSI B31.1, Section 137, and the governing inspection entity.

C. The CONTRACTOR shall notify OWNER 48 hours in advance of any testing operations, with the procedures subject to OWNER'S approval.

D. Acceptance Standard: There shall be no leakage in the pipelines.

E. Non-destructive testing of fusion welds shall be performed by an independent testing firm, contracted by the OWNER, through the Project Representative, and shall occur in accordance with the schedule set forth in Section 01 43 00 – Quality Assurance.

1.8 MATERIAL DELIVERY, STORAGE AND HANDLING

A. Pipe Storage and Handling:
1. Store pipe and fittings to prevent damage by heat, sunlight, weight deflection, or other environmental conditions.
2. Protect ends of all piping materials, including fittings from damage prior to jointing.

3. If a specific pipe material is subject to deformation from specific environmental conditions, store and deliver pipe to trench in enclosed or shaded transport with controlled environment as necessary to protect pipe.
4. Take extreme care in the handling of pipe with interior and/or exterior coatings and wraps to prevent damage prior to installation.
5. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are installed or lowered into the trench. Defective, damaged, or unsound pipe will be rejected. Cuts, punctures, or gouges that penetrate or reduce the wall thickness by 10% or more are not acceptable and must be removed and discarded. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.

B. Protect pipe, fittings, flanges, seals and specialties from moisture, dirt and damage.

C. Protect linings and coatings from damage.

D. Handle precast boxes, vaults and other precast structures according to manufacturer's written instructions.

E. Protect imported bedding and backfill material from contamination by other materials.

PART 2 - PRODUCTS

2.1 UNSPECIFIED MATERIALS AND PRODUCTS

A. Any materials or products required or implied to accomplish the Work indicated or inferred by the Plans and not specified in this Project Specification or on the Plans shall be furnished by the CONTRACTOR in conformance with the applicable specifications, with no additional compensation thereto.

2.2 AGGREGATE MATERIALS

A. Unless otherwise indicated, all aggregate materials are assumed to be imported. Comply with Section 31 21 00 for all aggregate material.

2.3 FILLER METALS

A. Mild Steel Covered Arc Welding Electrodes, ASME Section II, Part C, SFA-5.1.

2.4 HOT WATER PIPING PRODUCTS

A. Where required, the CONTRACTOR shall purchase materials to install the pipe, and perform his/her work in accordance with the following:

B. Pre-Insulated Piping
1. Carrier Pipe (PE-RT):

a. PE-RT material used for the manufacture of polyethylene pipe, tube and fittings shall be PE 4710 high density polyethylene meeting ASTM D3350 cell classification of 445574C and shall be listed in the name of the pipe and fitting manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F and 800 psi at 180°F per ASTM D2837. The material shall contain a stabilizer system for high oxidative environments with a CC3 rating per ASTM D3350.
b. Pipe and fittings are manufactured from extra high molecular weight polyethylene compound and fabricated to SDR 11 wall thickness in standard IPS sizes. Operating temperature up to 140°F at 125 psi.
c. Polyethylene pipe shall be manufactured in accordance with ASTM F2619, API 15LE and ASTM F714.
d. The pipe shall be protected against UV degradation with 2-3% carbon black.
e. Approved Pipe: PlatinumStripe® 1800 Series PE-RT Pipe
f. Identification Stripes. IPS pipes shall have four, equally spaced, platinum color stripes co-extruded into the pipe outside surface. Stripes printed or painted on the pipe outside surface shall not be acceptable.
g. Marking: Pipe shall be marked in accordance with ASTM F2619, API 15LE, and ASTM F714.

C. Steel Pipe to HDPE Transition Fittings:
1. Transition fittings shall be internal diameter (ID) controlled providing a smooth interior transition between steel pipe and HDPE pipe.
a. Steel Material
1) Epoxy coated, SCH40 A53B steel.
b. HDPE Material
1) DR11 PE 4710 grade PE-RT
c. Epoxy Coating
1) Color HB, Red Oxide, IF1947T

D. Valves
1. Ball Valves & Transition Pieces
a. Design
1) Valve construction design and tested to EN488 or ASME B31.1 specification
2) Valve design to be fully welded
3) Design to be suitable for above and below ground service
4) Minimum rating ANSI 150 to allow for testing at 1.5 times system design pressure.
5) Reduced bore
6) Weld ends schedule 40
7) If flanged ends are required, flanges to be to ANSI
8) Above ground valves should have a 60 mm extension to allow for insulation

9) Provide top of stem position indication with a visible groove
10) Operator – Lever operated up to 6", gearbox for 8" and up

b. Materials
1) Body, only forged materials are accepted, ASTM A106 or A352LF2
2) Cold pressed steel is not acceptable
3) Ball, stainless steel
4) Seat, PTFE with minimum 25% glass reinforcement
5) Seat to be spring supported, individual coil springs are preferred
6) Stem, stainless steel
7) O-rings, EPDM

c. Buried service
1) Valves for hot water buried service to be pre-insulated with polyurethane foam and PE outer protection as per EN253. Pre-insulation to have leak detection wiring
2) Valve should have an integral welded stem extension installed to bring the stem operating nut to within 2 feet of finish grade where the depth from finish grade to the stem operating nut exceeds 4 feet.
3) A minimum of 2 O-rings at the bottom and 2 O-rings at the top of the stem are required to prevent water ingress into the stem assembly
4) The assembly should provide an internal mechanical travel stop in the stem extension
5) A 2" parallel square nut is to be provided
6) Gear operator required for valves size 8" and up (portable or fixed)
If a fixed gearbox is required; provide a suitable gearbox for buried service, there should be no external moving parts; mechanical travel stop located in the gearbox, IP67 rated for water ingress, PUR Coating where the valve is coated

d. Approved Manufacturers:
1) Bohmer Valves or approved equal

2. Gate Valves
a. Provide valves conforming to AWWA C500 or AWWA C509 that have PE-RT pipe stubs complying with AWWA C906, resilient seated, non-rising stem, and nut operated.
b. Valves shall be, gray or ductile-iron body and bonnet, with bronze or gray or ductile-iron gate, bronze stem and square stem operating nut unless noted otherwise.
c. All bolts, nuts and washers, except operating nut, shall be stainless steel.
d. Stem operating nut to be 2 inches square and open counter-clockwise.

e. Stem extensions shall be installed to bring the stem operating nut to within 2 feet of finish grade where the depth from finish grade to the stem operating nut exceeds 4 feet.
f. Provide protective epoxy exterior coating according to AWWA C550 and manufacturer's recommendations.
g. Service line valves and fittings, 2 inch and smaller shall be in accordance with AWWA C800
h. Where a post indicator is shown, provide valve with an indicator post flange.
i. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the project include, but are not limited to, the following:
1) AVK Series 66 or approved equal

3. Valve testing
a. All valves shall be tested at 1.5 times the rated pressure
b. All valves to be seat tested; both seats to be tested at max. 1.1 times the rated pressure
c. Acceptable leakage rates for seat tests are to API 598 or rate A of EN12266

E. PE-RT Fittings & Custom Fabrications
1. All fittings and custom fabrications shall be pressure rated for the same internal pressure and temperature rating as the mating pipe.
2. Fittings shall be factory insulated and jacketed to the same specifications as the straight pipes. Manufacturer shall leave 18" minimum un-insulated legs on each end for fusion welding.
3. Polyethylene fittings and custom fabrications shall be supplied by: Performance Pipe, a division of Chevron Phillips Chemical Company LP
4. Molded fittings shall be manufactured and tested in accordance with ASTM D3261 and D2513 and shall be so marked.
5. The manufacturer shall submit samples from each molded fittings production lot to x-ray inspection.
6. Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock or molded fittings. Fabricated fittings shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe.
7. Polyethylene flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves (serrations).
8. Back-up rings, flange adapters, & flange bolts shall be fitted with back-up rings that are pressure rated equal to or greater than the mating pipe. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius.
9. Flange bolts shall be SAE J429 Grade 2, or Grade 5 and used with corresponding heavy-hex nuts.

10. MJ Adapters 4" thru 16" may be provided with optional Stainless Steel Stiffener upon request. MJ Adapters 14" and above shall be provided with Heavy Duty Back-up Ring Kits. All MJ adapters 18" and above must be provided with Stainless Steel stiffeners.
11. In case of conflict with manufacturer's certifications, the contractor, project engineer, or OWNER may request retesting by the manufacturer or have retests performed by an outside testing service. All retesting shall be at the requestor's expense, and shall be performed in accordance with these specifications.

F. Insulation
1. Insulation shall be polyurethane foam either spray applied or injected with one shot into the annular space between carrier pipe and jacket with a minimum thickness of three inch.
2. The insulation foam shall be homogenous with the following properties:
   a. Insulation shall be rigid
   b. 90-95% closed cell polyurethane
   c. Coefficient of thermal conductivity (K- Factor) < 0.16.
   d. Average foam cell size ≤ 0.02 in.
   e. Density ≥ 2.5 pounds per cubic foot
   f. Water absorption if boiled < 10% (Vol)
   g. Compressive strength, At 10 % deformation > 43.5 psi
3. Insulation thickness shall be specified by calling out appropriate carrier pipe and jacket size combinations, and shall not result in less than 3" thickness.

G. HDPE Jacket
1. Jacketing material shall be extruded, black, high density polyethylene (HDPE), having a minimum wall thickness of 100 mils for pipe sizes equal to or less than 12", 125 mils for jacket sizes greater than 12" to 24", and 150 mils for jacket sizes greater than 24".
2. The inner surface of the HDPE jacket shall be oxidized by means of corona treatment, flame treatment, or other approved methods. This will ensure a secure bond between the jacket and foam insulation preventing any ingression of water at the jacket/ foam interface.

H. Joint Kits
1. The joint kits installed shall be power transmitting, double water sealed system with 100% cross linked PE thermally shrinkable material with two layers of bitumastic sealing or electrofusion welded connections to the HDPE jacket.
2. Joints to be installed using piping system manufacturer approved equipment and method.
3. Installation contractor shall be trained by the manufacturer on the proper use of the joint system.
4. Insulation foam shall have the same properties as the straight pipe insulation, and may be installed in rigid foam halves or pourable

I. Service Entry Assembly Piping and Fittings:
1. Steel Piping, Casing, and Fittings:
a. Pipe and Casing: Steel pipe per ASTM A53; seamless, Grade A, or electric resistance welded, Grade B. Schedule 40 through 10" diameter; Standard Weight for 12" diameter and larger.
2. Welding:
a. Welders to be currently certified for pipeline welding in accordance with AWS standards.
b. Welding and weld quality per AWS D10.12.
c. Weld all pipe joints 3" in diameter and larger, including fittings with full penetration butt welds except where flanges are required.
d. On piping smaller than 3" diameter, socket weld components may be used.
e. Prepare pipe ends in tees, laterals and reducers for weld penetration in accordance with ANSI B31.1 Standards.
3. Reducers: ANSI 150 pound rated forged steel fitting, concentric.
4. Flanges: ANSI 150 pound raised faced with rated gaskets suitable for intended service. Slip-on flanges are not permitted on the primary piping system.
5. Caps: Use butt weld caps in accordance with ANSI B31.1 Standards.
6. Elbows and Bends: Use long radius butt welding elbows where a 90 degree or 45 degree bend is shown on the Plans. Trim elbows to degree of bend required for all other bends.
7. Service Isolation Valves:
a. ANSI 150 pound minimum rated forged carbon steel
b. Ball Valves: unibody ball valves with gear operators
c. Butterfly Valves: triple offset butterfly valves with gear operators
8. Shunt Assembly Valves:
a. ANSI 300 pound minimum rated forged carbon steel
b. Globe Valves: 2" weld-end, welded forged steel bonnet globe valves manufactured by Bonney Forge
c. Ball Valves: 2" weld-end, forged steel ball valves manufactured by Bohmer Valves with handle extension
9. Shunt Assembly Piping Insulation:
a. Insulation: 1.5" thick molded closed-cell polyisocyanurate insulation
b. Material: 1 or 2 piece Polyisocyanurate molded to the given pipe size, valve body size, and fitting size, conforming to ASTM C591, with factory applied Saran 560 CX film vapor barrier sealed joints with all service jacket (ASJ) insulation tape.
c. Characteristics: Maximum water vapor transmission rate of 4 perm/in. (ASTM E96); K-value of 0.20 or lower at 75o F (ASTM C518); Maximum water absorption value of 0.7% by volume (ASTM C272).
d. Acceptable Manufacturers and Products:
e. Trymer 2000XP manufactured by ITW Insulation Systems
10. Shunt Assembly Corrosion Protection:
a. RG-CHW gel manufactured by Polyguard

2.5 CONCRETE & UTILITY STRUCTURES

A. Refer to Section 33 05 16 – Concrete & Utility Structures, Part 2.03 for information regarding work in and around new and existing utility structures, including knockout, sealing, and waterproofing requirements.

2.6 ANCILLARY PRODUCTS

A. Miscellaneous Metals: Steel shapes, plate, bars, ASTM A36, hot dipped galvanized in accordance with ASTM A123 after complete fabrication

B. Modular Link Type Seals and Sleeves:
1. Seals by Thunderline Corp. or equal;
2. Sleeves - 0.25" thick steel with diameter as required to accommodate seal device;
3. Provide minimum 1/2" water stop ring welded to outside of sleeve where indicated;

C. Utility Identification
1. Buried Warning Tape: 6" wide polyethylene underground utility warning tape with legend and color as follows:

HWP	*"Caution Water Line Below"*	Blue
Fiber Optic	*"Caution Buried Fiber Optic Cable Below"*	Orange

2. Acceptable Manufacturers and Products:
   a. "Warnoline" tape by Safety Sign Company, Cleveland, Ohio. www.safetysignco.com, 1-800-992-1177.
   b. "Shieldtec" tape by Empire Level, Inc., Mukwonago, WI. www.empirelevel.com, 1-800-872-8425
   c. Or equal as approved by OWNER.

D. Polystyrene Insulation Board
1. High -load 100 psi compressive strength (used in horizontal applications in roadway areas) and 60 psi compressive strength (used on edge/vertical applications and horizontal areas out of roadway or heavy load locations).
2. Manufactured by Dow Chemical Company specifically for buried utility's insulation within traffic-loaded conditions.

E. Tracer Wire:
1. Wire Size or Gauge: 12 AWG
2. Jacket color: Blue
3. Jacket coating type: 30 mil. thick HDPE or High Molecular Weight Polyethylene (HMWPE)
4. Wire Type: Stranded, Copper Clad Steel or Copper with minimum break load of 302 lbs.
5. Compression Crimp Splice Connectors

a. All underground spliced connections used within the DC cathodic protection circuit shall be made through the use of copper compression crimp connectors.
b. The proper size connectors shall be used in accordance with the manufacturer's recommendations.
c. Connectors shall be crimped with a hand tool capable of delivering a minimum of 12 tons of compressive force.

6. Splice Encapsulation
   a. All spliced connections used within the DC cathodic protection circuit shall be sealed with a waterproof direct burial splice kit manufactured for tap or branch splice connections. Acceptable manufacturers:
7. 3M™ ScotchcastTM Power Cable Tap Splice Kit 90-B1. Follow manufacturers recommended installation requirements.
8. Grounding rod: 1.5 lb. magnesium grounding anode with a minimum of 20 feet of lead wire.
9. Terminal Access Box:
   a. Quazite PC1118BA12 w/ PC1118CA0012 cover
   b. Cover to read "TRACER WIRE"

PART 3 - EXECUTION

3.1 HANDLING OF PIPE

A. Protect all pipe from damage during shipping, hauling and handling.

B. During storage, transportation, and lying, carefully protect pipes so that the pipe and pipe coating is not damaged in any manner. Cushion all saddles or bearings with burlap or other soft material. In handling the pipe, use a cushioned sling will or other devices and methods, as approved by the Project Representative. No un-cushioned ropes, chains, wedges or levers are to be used in handling the pipe.

C. The pipe shall not be dropped, rolled, or handled in any manner that might damage the pipe or pipe coating. In lowering the pipe into the trench, care shall be taken to prevent impact with trench walls or scuffing of the pipe.

D. When pipe is placed in trenches with exposed rock cut, used padded wooden guides as necessary to prevent the pipe from swinging against exposed rock and damaging the pipe.

E. Place pipe along the side of the trench on cushioned blocks as close to the location where it will be laid. If the pipe is to be moved longitudinally along the trench, it shall be walked by crane, loaded on a truck and moved, or moved by other acceptable means.

F. Both ends of the pipe shall be securely capped at all times to keep out foreign matter.

3.2 PREPARATION OF WORK SITE

A. Coordination: Coordinate all utility work operations to protect existing and/or new concurrent construction.

B. Alignment and Grade:
1. Provide and maintain all necessary stakes, bench marks, and batter boards (where used) for installing the pipe to the alignment and grade as shown in the Plans.
2. Verify all pipe connection pipes and service entry locations prior to installing pipe. Report any discrepancies in location or elevation of connection points to the Project Representative. Failure to report discrepancies in locations and elevations of connection points prior to beginning pipe installation may result in re-work with no additional compensation to the CONTRACTOR.
3. Grade and Alignment Staking: Set grade and alignment stakes or survey offsets at 50' minimum intervals and at all structures, tees, beds, connections, and other locations when requested by the Project Representative.
4. Set minimum of 3 batter boards at any one time to carry line and grade into trench. If laser level equipment is used in lieu of batter boards, check equipment with grade stakes at 50’ minimum intervals.
5. The CONTRACTOR shall make no deviation from required alignment and grade without written approval from OWNER. Unapproved deviations may be cause for rejection and correction with no additional compensation to the CONTRACTOR.

3.3 PIPE LAYING & JOINTING

A. Excavate the pipe trench according to the grade and alignment shown in the Plans, Details, and Section 31 21 00.

B. Carefully inspect each pipe unit. Remove all foreign matter and dirt from inside the pipe. Damaged units will be rejected or repaired to the satisfaction of the Project Representative.

C. Install the piping to the alignment and grades indicated on the Plans or as required by the Project Representative. Support each pipe on bedding material as indicated on the Plans and have firm bearing along its entire length. Temporary supports may be used to raise the piping or to allow rotating the pipe to facilitate welding joints. Bedding material may be excavated at pipe joints to provide clearance for welding.

D. HDPE Pipe Fusion
1. The CONTRACTOR shall provide all equipment required to complete butt fusions in accordance with pipe manufacturer's recommendations.
2. Sections of PE-RT pipe should be joined into continuous lengths on the jobsite above ground whenever possible. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe

manufacturer's recommendations. The butt fusion equipment used in the joining procedure should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400-450 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint with weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records provide to the OWNER.

3. Improperly accomplished, uneven, or joints with questionable appearance shall be cut out and re-accomplished. Transitions to other piping materials shall be accomplished using suitable flanged or mechanical adapters.
4. Mechanical joining will be used within building interior spaces only. Mechanical joining will be accomplished by either using a HDPE flange adapter with a ductile iron back-up ring or HDPE Mechanical Joint adapter with a ductile iron back-up ring.
5. Electro-fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join PE-RT pipe.

E. Steel Pipe Welding

1. Pipe ends shall have flat ends or be properly beveled and aligned and spaced for welding or joining. All welding and joining on pipes, fittings, and valves to be done by personnel who have passed an approved competence test and have been certified. Gas welding or electric arc welding may be used and the type of rods and filler used shall be selected to match the base metal alloy analysis.
2. Removal of a portion of pipe to facilitate welding of the joint and then replacing the cut out section, sometimes referred to as “fish mouth” or “window” welding, will not be permitted.
3. The ends of the pipe in the trench not being fitted or welded shall be securely capped at all times to prevent the entrance of foreign matter.
4. Pipe shall not, under any circumstances, be placed in water or allowed to become submerged in a flooded trench.

F. Insulation Joint Kit Installation

1. Joint kits to insulate pipe joints shall be installed according to the manufacturer’s written and verbal instructions.
2. Joint kit instructions relevant to the joint kits being installed shall be present on site during installation, and shall be provided to the OWNER’s representative upon request.
3. The Contractor shall obtain verification from the OWNER’s Project Representative through signature or initials that all insulation installation is completed in accordance with the instructions and is acceptable.

G. Insulation Joint Kit Damage & Replacement

1. Damage to all insulation joints, including, but not limited to jacket water penetration, trench flooding prior to insulation jointing, and mud and debris deposits on the interior of jacket sleeves will require TOTAL REPLACEMENT of the insulation and joint sleeve. The replacement shall be with same type of joint sleeve originally installed.
2. The CONTRACTOR, at no cost to the OWNER, may be required to slide new sleeves over long lengths of pipe, or cut out and re-weld sections of pipe to replace the damaged joint kit in-kind. Refer to Section 31 21 00 – Utility Trenching and Backfill for information regarding trench dewatering.

3.4 GENERAL REQUIREMENTS

A. Install hot water piping and all associated components in accordance with the Plans, this Specification and reviewed submittals.

B. No mechanical joints shall be buried in hot water piping.

C. Tracer Wire Installation
1. Connections are not allowed in areas where there will be direct burial of the pipe.
2. Wire shall be placed top center of each pipe between 2”-6” above the pipe.
3. Tracer wire shall be routed through a separate 2" capped conduit penetration through the wall (holes drilled for wire) and sealed with silicone sealant on both sides of the conduit prior to backfill.
4. Install tracer wire as a single continuous wire. Splicing of wire, if necessary, shall be done in a manner that produces an electrically and mechanically sound connection using an approved lockable connector specifically designed for direct burial.
5. Wire shall be terminated at the service take off within a communications handhole, valve standpipe, or a 12”x18” handhole when the previous two are not available, and within a 12" x 12" Hoffman enclosure within the building. A 5' coil of each wire shall be left in the enclosure.
6. Damage to the wire occurring during installation shall be immediately repaired by removing the damaged wire and installing a new section of wire with approved connectors.
7. Grounding
   a. Tracer wire must be properly grounded at all dead ends/stubs.
   b. Grounding shall be achieved by use of a 1.5 pound, drive-in magnesium grounding anode rod with a minimum of 20 feet of lead wire.
   c. If grounding the tracer wire at the meter, 2 Terminal access boxes are required to allow for locates to be done from the meter or toward the meter.
   d. When anode wire will be connected to a tracer wire access box, a minimum of 2 feet of slack wire is required after meeting final elevation.

8. No bare tracer wire shall be exposed either below or above ground. Exposed ends such as at meter risers are not allowed and shall be protected from exposure.
9. Inspection and testing.
    a. Verify tracer wire installation by using low frequency (512 Hz or similar) line locating equipment.
    b. Verification shall be witnessed by the OWNER's Representative.
    c. Verify tracer wire installation upon completion of rough grading and again prior to final completion.
    d. Continuity testing of the tracer wire system, in lieu of using locating equipment, shall not be accepted.

3.5 FIELD QUALITY CONTROL

A. All shop and field welding, brazing, and fusing shall be in conformity with the requirements of ANSI B31.1, the supplementary requirements specified herein, and the applicable manufacturer's instructions. Welding, brazing, and fusing shall be performed only by fully qualified and certified personnel and certified methods.

B. Unless specifically noted otherwise in this Section, responsibilities for arranging and supervising for the following required field tests are the Contractor's.

C. Field Tests for Leakage - Hot Water Systems
    1. Documented testing of all hot water piping systems for leakage is required.
    2. All hot water piping, fittings, and valves shall be hydrostatically tested to a minimum 187.5 psi.

D. There shall be NO failed weld tests allowed in the piping system.

E. All repair and testing of defective joints shall be performed by the CONTRACTOR at no additional cost to the OWNER.

3.6 TESTING OF PIPING SYSTEM

A. Hydrostatic testing shall be performed in accordance with these specifications, the requirements of ANSI B31.1, Section 137, and the governing inspection entities.

B. Design pressure of the hot water system is 125 psi. Hydrostatic test pressure shall be performed at 1.5 times the design pressure (187.5 psi).

C. The CONTRACTOR shall develop a procedure for hydrostatic testing and submit it to the ENGINEER for review and release prior to any hydrostatic testing occurring.

D. The CONTRACTOR shall notify the OWNER 48 hours in advance of any testing operations, with the procedures subject to the OWNER'S approval.

E. Hydrostatic pressure testing shall be conducted in accordance with the ASTM F 2164, Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure. This testing procedure is as follows.

F. For safety reasons, hydrostatic testing only, clean water will be the testing medium.

G. The maximum test duration shall be 8 hours.

H. The maximum test pressure shall be 187.5 psi, the pressure at any point in the system be shall not be greater than this pressure through the duration of the testing procedure.

I. Visually inspect the connections for signs of proper fusion.

J. Remove all fusion equipment from the system before starting the pressure test.

K. Set pressure gauge near the bottom of the system, where the pressure will be highest. This reduces the risk of over- pressurizing the system.

L. Restrain pipeline against movement due to pressurization and in the event of catastrophic failure. Restraint must be maintained while joints are exposed for leakage examination.

M. The testing equipment capacity and the pipeline test section should be such that the test section can be pressurized and examined for leaks within test duration time limits. Lower capacity testing and pressurizing equipment may require a shorter test section.

N. Examine test equipment and the pipeline test section before pressure is applied to ensure that connections are tight, necessary restraints are in place and secure, and components that should be isolated or disconnected are isolated or disconnected.

O. Disconnect or isolate all low pressure filling lines and other items not subject to the test pressure.

P. The test section should be completely filled with the test liquid, taking care to bleed off any trapped air.

Q. Vent at high points to purge air pockets while the test section is filling. Venting may be provided by bleed valves or equipment vents.

R. Observe the system during the test for any indications of leaks. If a leak is found, relieve all test pressure and repair the leak before continuing.

S. The test procedure consists of initial expansion, and test phases.
   1. Initial Expansion Phase

a. Pressurize test section to maximum test pressure and add make-up test liquid as required to maintain maximum test pressure for four (4) hours.

2. Test Phase

a. Reduce the test pressure to 175 psi. This is the target test pressure.

T. If the pressure remains steady (within 10.75 psi of the target test pressure) for an hour, leakage is not indicated, and pipe section passes.

U. If leaks are discovered, depressurize the test section before repairing leaks. Correctly made fusion joints do not leak. Leakage at a butt fusion joint may indicate imminent catastrophic rupture. Depressurize the test section immediately if butt fusion leakage is discovered.

V. Leaks at fusion joints require the fusion joint to be cut out and redone.

W. If the pressure leak test is not completed due to leakage, equipment failure, etc., the test section should be de-pressurized and repairs made. Allow the test section to remain depressurized for at least eight (8) hours before retesting.

3.7 RE-EXAMINATION OF REPAIRS

A. If a weld should fail to pass leakage testing, the repair must be made in accordance with approved repair procedures.

B. The section shall then be retested according the above procedure.

C. If in the judgment of the OWNER's Representative, it is impractical to follow the repair procedure for any reason, required modifications in the procedure shall be subject to the OWNER'S written approval.

D. The CONTRACTOR shall be responsible for the ultimate leak tightness of the line subject to the Resident Project Representative's (RPR) approval. All repair and testing of failing tests shall be performed by the CONTRACTOR at no cost to the OWNER.

3.8 BACKFILLING AND IDENTIFICATION REQUIREMENTS

A. Pipe/Structure Backfilling

1. Backfill as soon as practical after pipe has been placed and in accordance with the As-Built Documentation requirements of Section 01 77 00, Part 1.05.

B. Pipe Zone: Backfill with granular material of the type indicated or specified, simultaneously on both sides of pipe in maximum 6" lifts.

1. Shovel-place and mechanically tamp to completely fill all spaces under and adjacent to pipe.
2. Conform to ASTM D2321 when backfilling plastic pipe.

C. Above Pipe Zone: Deposit specified material in maximum 12" lifts to required final subgrade elevation and compact in accordance with requirements of Section 31 21 00.

D. Buried Utility Identification

1. During utility backfilling place warning tape approximately 1' (or less if appropriate) above all on-site main line piping, service line piping, electrical conduits for communications, sensor, cathodic protection, etc. If warning tape locating another utility's facilities is disturbed, furnish warning tape and arrange placement in accordance with other utility's requirements.

3.9 PIPE CLEANING

A. After installation but before backfilling, and sequencing the work such that all piping will be cleaned from a low point without cleaning through valves, the CONTRACTOR will thoroughly clean the interior of all pipes of all scale, dirt, and debris by pigging or water power jetting of the pipes. All scale and debris shall be flushed and removed from the pipeline.

B. For pipes smaller than 4 inch, after installation and before final in service test, a full flow pressurized flush may be performed in lieu of power jetting where the piping configuration will not allow power jetting to be properly performed.

C. To establish that pipe and fittings of smaller diameter can be successfully cleaned, submit for the OWNER'S approval a method and procedure proposed to satisfy the cleaning requirements.

D. The cleaning procedure may be repeated at the discretion of the RPR. CONTRACTOR shall notify the RPR 48 hours in advance of flushing operations.

E. Take all precautions necessary to prevent damage to the pipe, insulation, or structures from the cleaning operation and remove the water from the excavations.

F. Take all necessary precautions to ensure that no oil or other lubricant comes in contact with either the inside or outside walls of the pipe.

G. Each segment shall be flushed in a manner to allow water to drain out of the pipe at low points.

H. At the conclusion of pipe flushing for a given segment of pipe, the CONTRACTOR shall obtain verification from the RPR through signature or initials on the HWP Inspection and Testing Plan.

3.10 INSULATION OF SHUNT ASSEMBLY

A. Seal tabs and joints with vapor barrier adhesive or self-sealing system without using staples or puncturing the vapor barrier.

B. Seal exposed insulation ends at valves, fittings, and flanges with vapor barrier adhesive.

C. Shunt piping shall be insulated from the service pipe up to the recirculation tees.

END OF SECTION

Attachment 3:

Maintenance Plan – MRU MEP

MISSION ROCK UTILITIES

Distribution Piping Operations, Maintenance, and Repair Plan

February, 2025

Table of Contents

General

Mission Rock Utilities, Inc. (MRU) will own and operate the systems providing district heating and cooling, along with non-potable water (NPW) for the Mission Rock development. MRU will also own and operate the part of the sanitary sewer system providing blackwater to the black water recycling system (BWRS) for NPW production.

MRU is established as a non-stock corporation formed for purposes of serving exclusively the Mission Rock site. The business has entered into long-term utility service agreements to secure financing. Utility rates will be cost-based, and will include provisions for recovery of all capital and operational costs.

MRU has a board of directors that will approve annual budgets and each system's rates.

MRU is managed by EG Services, LLC (EGS) with Tishman-Speyer Properties (TSP) providing the daily operation and maintenance of the systems.

TSP is an active owner, developer, operator and fund manager across the United States, Europe, Latin America, and Asia. Tishman Speyer has developed approximately 2,100 homes (524 affordable) in San Francisco and owns and operates over 2.4 million square feet of commercial space in the Bay Area. For more information, visit tishmanspeyer.com.

EGS is a subsidiary of Ever-Green Energy (EGE) located in Saint Paul, Minnesota. EGE operates and manages district energy systems (DES) across the United States, including District Energy St. Paul, Energy Park Utility Company, Duluth Energy Systems, CoolCo LLC, Oberlin College, Illinois Institute of Technology, and the Milwaukee Regional Medical Center Thermal. For more information, visit ever-greenenergy.com.

Technical Specification

This OMR Plan only outlines the operations, maintenance, and repair planning of the subsurface installations at Mission Rock by MRU. Operations, maintenance, and repair planning for thermal energy and non-potable water production and customer interfaces is described in separate documents.

The materials and equipment used in MRU's subsurface installations follow industry standards for district energy, potable water, and sewer. No specialized materials or equipment are used.

For further information, refer to specifications and shop drawings.

District Heating and Cooling Distribution

Piping

High Density Poly Ethylene (HDPE) pipes are used for all systems.

Heating: DR11 PE4710 high temperature Platinum-Stripe 1800 PE-RT HDPE rated for 126 psig at 140 F. Manufacturer: Performance Pipe.
Min 3 inch polyurethane insulation with HDPE jacket. Manufacturer: Thermacor Process.
Pressure testable electrofusion jacket joints. Manufacturer: Thermacor Process.

Cooling: DR11 PE4710 HDPE rated for 200 psig at 73 F. Manufacturer: Performance Pipe or WL Plastics.

Bay/condenser: DR11 PE4710 HDPE rated for 200 psig at 73 F. Manufacturer: Performance Pipe or WL Plastics.

Fittings

Heating: DR11 PE4710 high temperature Platinum-Stripe 1800 PE-RT HDPE rated for the same pressure and temperature as the mating pipes. Manufacturer: Performance Pipe.
Insulated equal to mating pipes. Manufacturer: Thermacor Process.

Cooling: DR11 PE4710 HDPE molded or segmented fittings rated for min 160 psig at 73 F. Manufacturer: Wolseley, Integrity Fusion Products or Strongbridge.

Bay/condenser: DR11 PE4710 HDPE molded or segmented fittings rated for min 160 psig at 73 F. Manufacturer: Wolseley, Integrity Fusion Products or Strongbridge.

Valves

Heating: Shutoff valves: Direct buried, pre-insulated steel ball valves with stem operating nut within 2 feet of finished grade (see Figure 1). Manufacturer: Vexve with Thermacor Process insulation.
Air release (ARV) and drain valves: Uninsulated steel ball valves (see Figure 2). 316 SS ARV and epoxy-coated drain valves. Manufacturer: Vexve.

Cooling: Shutoff valves: Direct buried, DR11 PE4710 HDPE ball valves with stem operating nut within 2 feet of finished grade. 10 inch valves gate valves with HDPE stubs. Manufacturer: Polyvalve ball valves and AVK gate valves.
ARV and drain valves: Uninsulated steel ball valves (see Figure 2). 316 SS ARV and epoxy-coated drain valves. Manufacturer: Vexve.

Bay/condenser: Shutoff valves: Direct buried, DR11 PE4710 HDPE ball valves with stem operating nut within 2 feet of finished grade. Manufacturer: Polyvalve.
ARV and drain valves: Uninsulated steel ball valves (see Figure 2). 316 SS ARV and epoxy-coated drain valves. Manufacturer: Vexve.

Valve boxes: H/20 rated valve boxes with bolt down cast iron lids marked “MRU DH” for district heating, “MRU DC” for district cooling and “MRU BW” for bay/condenser water. Manufacturer: Oldcastle Infrastructure.

Electrofusion Couplings

Heating: PE-RT HDPE. Manufacturer: Plasson.

Cooling: PE4710 HDPE. Manufacturer: Integrity Fusion Products.

Bay/condenser: PE4710 HDPE. Manufacturer: Integrity Fusion Products.

Steel to HDPE Transitions

Heating: PE-RT HDPE/epoxy coated carbon steel. Manufacturer: Plasson.

Cooling: PE4710 HDPE/epoxy coated carbon steel. Manufacturer: Poly-Cam.

Bay/condenser: PE4710 HDPE/epoxy coated carbon steel. Manufacturer: Poly-Cam.

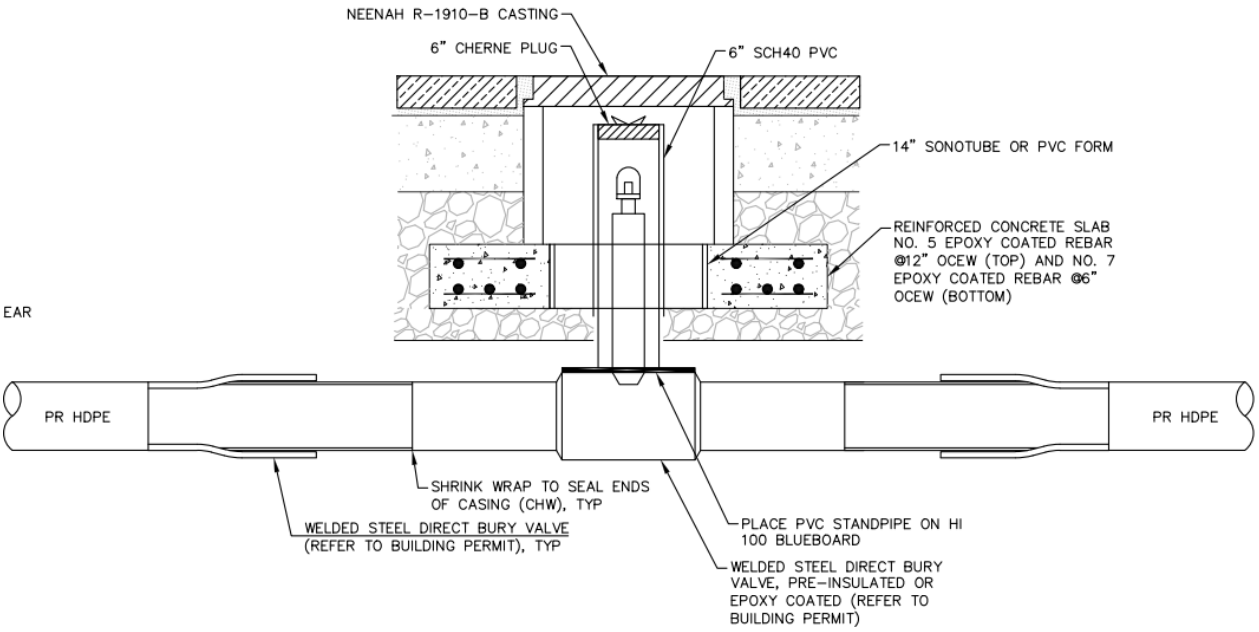

Figure 1: Direct buried DES shutoff valve schematics

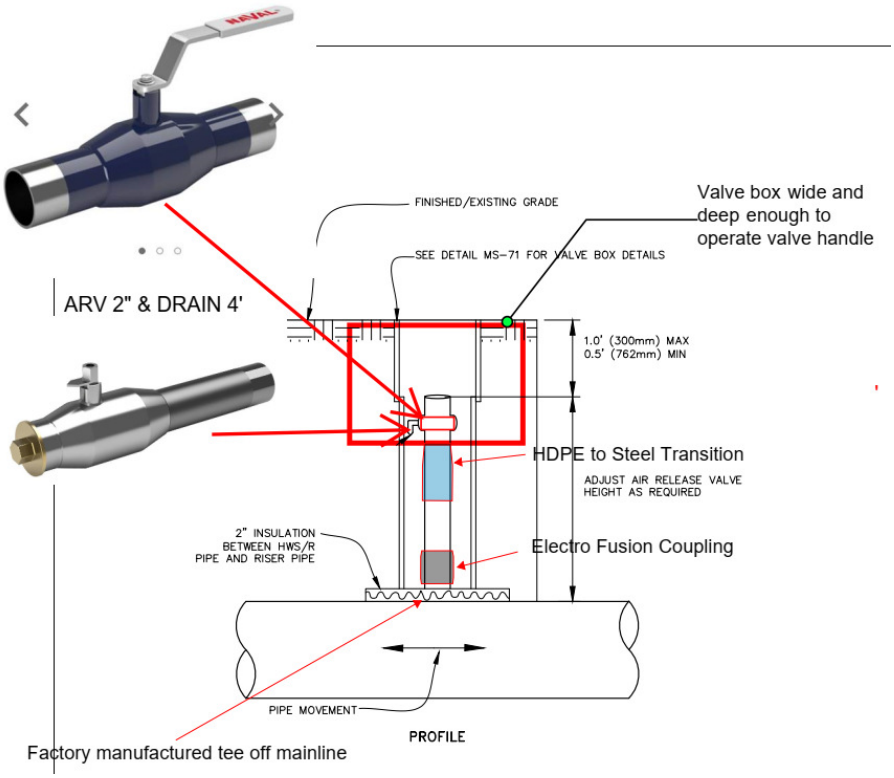

Figure 2: ARV and drain valve schematics

Piping System

- The DES piping consists of supply and return piping connected in a closed loop with a configuration per Figure 3.

- The district cooling pipes and the bay/condenser water pipes are generally installed with the supply pipes to the right when facing away from the plant, and the district heating pipes with the supply pipe to the left. The reason for the configuration is to allow for maximum distance between the supply pipes, thereby reducing temperature losses between the systems.
- Building service laterals are generally configured with a 45-degree takeoff from the main pipes (see Figure 4). Bottom takeoffs are avoided to minimize buildup of residues in the service laterals.
- The DES piping systems are fully fused/welded systems, thereby not requiring any thrust blocks.
- The HDPE pipes are generally heat-fused together. In locations where heat fusing is not possible due to configuration constraints, PE 4710 or PE-RT electrofusion couplings are used.
- No buried flanges are used in the systems. Direct-buried steel valves are welded and fused to the HDPE pipes via steel to HDPE transitions (see Figure 5).

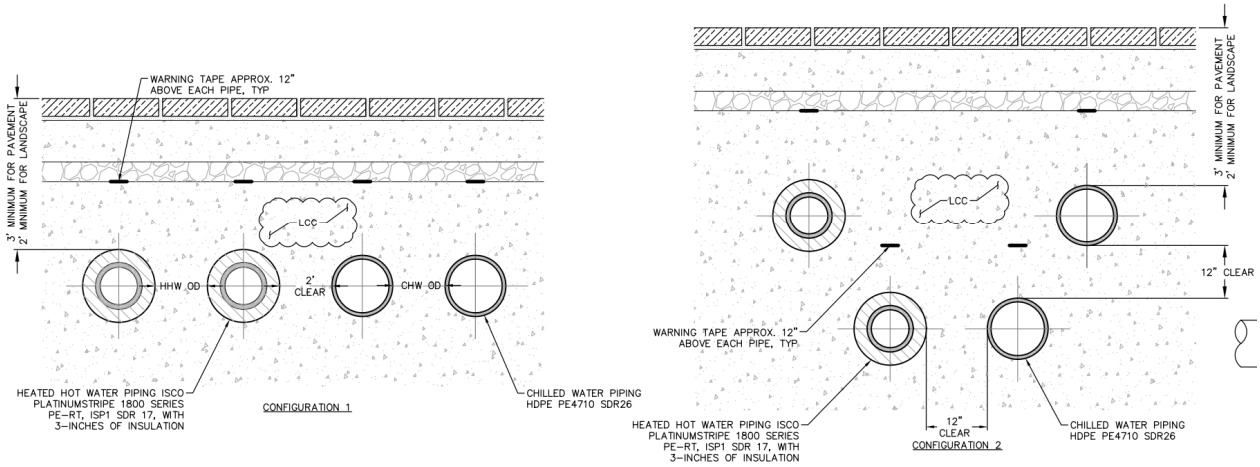

Figure 3: Typical DES main piping configuration

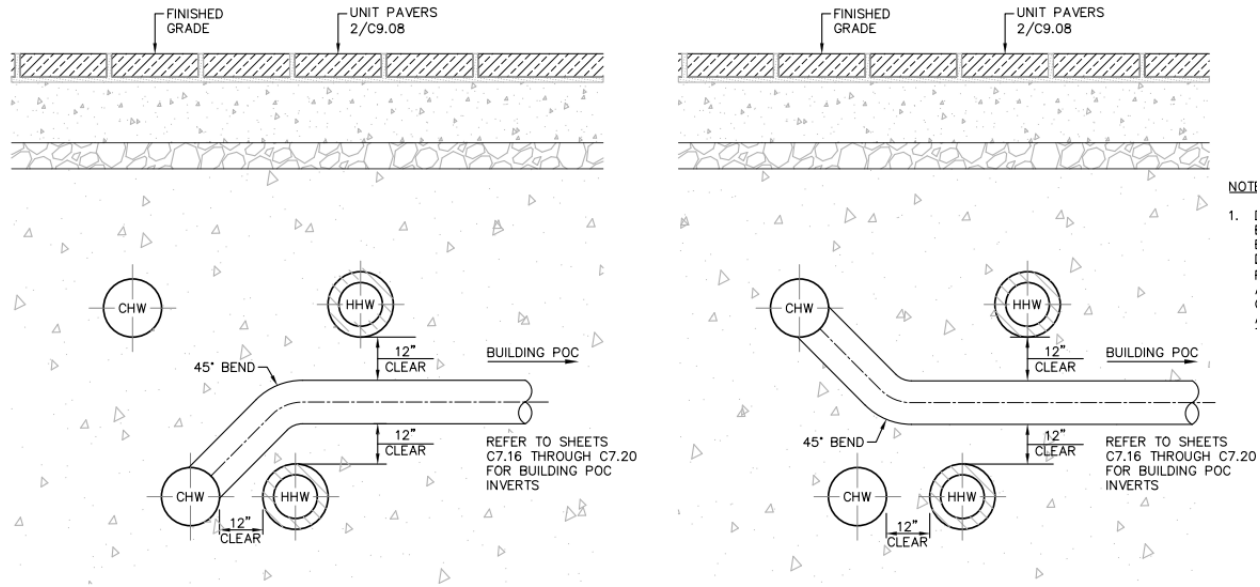

Figure 4: Typical DES service lateral piping configuration

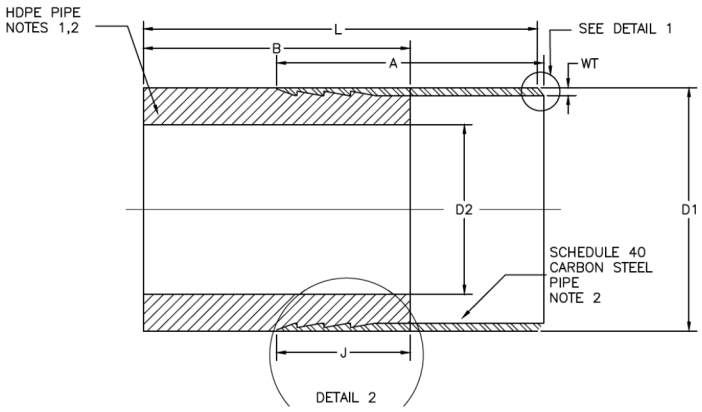

Figure 5: Steel to HDPE transition fitting

Design Parameters

Heating:	125 psig design pressure at 140 F with a test pressure of 187.5 psig at ambient temperature.
Cooling:	100 psig at less than 73 F with a test pressure of 150 psig at ambient temperature.
Bay/condenser:	150 psig at less than 93 F with a test pressure of 160 psig at ambient temperature.

Non-Potable Water Distribution

MRU will own, operate, and maintain the NPW distribution system, as well as the gravity sewer collection mains from the north buildings and forced sewer main from the BWRS in building B to the second manhole in 3rd Street (see Figure 6).

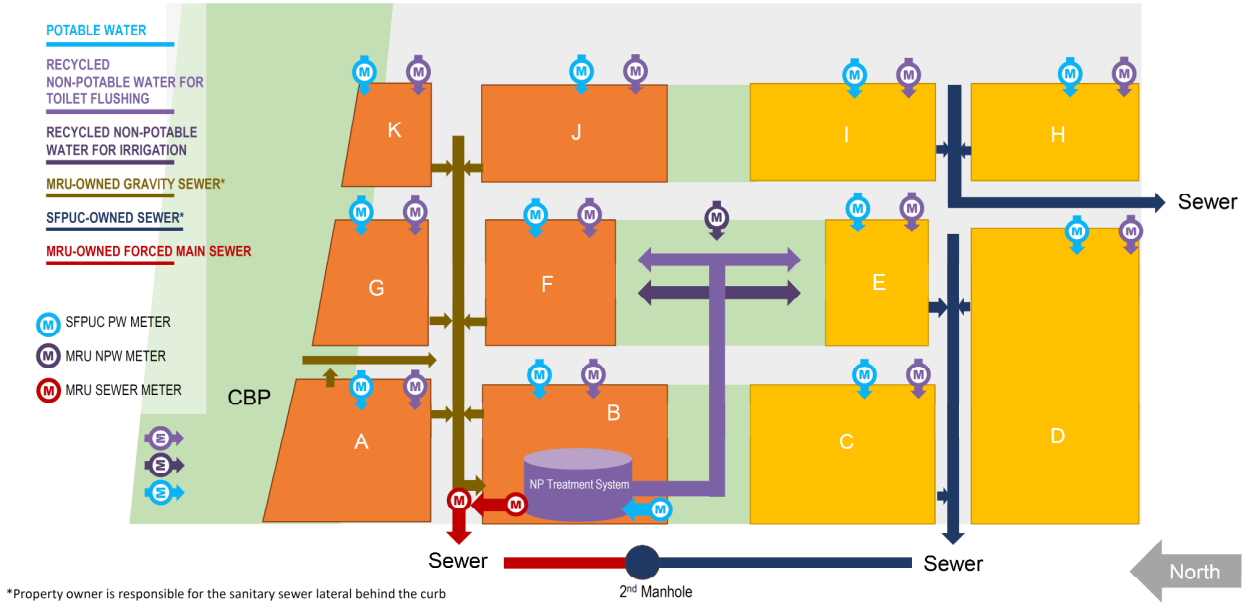

Figure 6: Mission Rock NPW and sewer ownership

Piping

- Ductile Iron Pipe (DIP) recycled water piping is used, according to San Francisco Public Utility Commission (SFPUC) Water standards.
- DIP class 53, zinc-coated with V-Bio polyethylene encasement and cement-mortar lined double the standard thickness. Manufacturer: American Ductile Iron Pipe with Fastite® bell and spigot joint with Fast-Grip® restraining gaskets.

Fittings

- DIP bell and spigot push-on Tyton joint with Field-Lok™ restraining gasket. Manufacturer: Tyler/Union, Sigma or Star Pipe.

Valves

- Gate valves with slip-on ends and Field-Lok™ restraining gasket. Epoxy-coated inner and outer surfaces. Manufacturer: Mueller.
- H/20 rated valve boxes with bolt down cast iron lids marked “MRU RECLAIMED WATER”.

Piping System

- The NPW piping system is using fully restrained joints, thereby not requiring any thrust blocks.

Design Parameters

- Operating pressure of 65 psi with a max pressure of 90 psig and a test pressure of 225 psig.

Gravity and Forced Sanitary Sewer Mains

Piping

- HDPE sewer piping according to SFPUC Water and San Francisco Department of Public Works (SFDPW) standards.
- DR17 HDPE with light gray interior for video inspection for gravity sewer.
- DR17 PE3408 HDPE with a minimum pressure rating of 125 psig for forced sewer.

Fittings

- Rated for the same pressure as the mating pipes.

Valves

- Not applicable.

Piping System

- The forced sewer piping system is using fully restrained joints, thereby not requiring any thrust blocks.
- All joints are heat fused. In locations where heat fusing is not possible due to configuration constraints, electrofusion couplings are used.

Design Parameters

- Air pressure test to min 3.5 psig and max 5 psig for gravity sewer piping.
- Operating pressure 13 psi with a max pressure of 16 psig and a hydrostatic test pressure of 60 psig for forced sewer piping.
- Manholes vacuum tested to 10 psig.

Operations

District Heating and Cooling Distribution

The closed-loop district heating and cooling systems will ultimately be looped around the development and configured as shown in Figure 7. The following operational functions will be monitored and documented for the district heating, cooling, and bay/condenser water systems:

Water Treatment

The district heating loop will ultimately contain approximately 15,000 gallons of water and the chilled water loop approximately 20,000 gallons. The water in the closed loop systems will be treated to minimize corrosion and microbial activity. The specific water treatment can vary depending on the water treatment contractor, but will generally be as follows:

- A pH of approximately 10 will be maintained by dosing sodium hydroxide.
- Small concentrations of molybdate, target of approximately 65 ppm MO, will be used for corrosion protection of steel.
- Benzo- or tolytriazole, target of approximately 5 ppm, for corrosion protection of copper/brass.
- A biocide to control microbial activity will also be added. The biocide (bromine, chlorine/bleach, or a non-oxidizing biocide) would be selected based on what is determined to be compatible with the HDPE pipes and most effective at the time with some variation in type and dose in order to stay ahead of the microbes' ability to become resistant to the effects of any one of the products.
- To avoid stagnant untreated water, especially during the build-out of the systems, recirculation valves between supply and return pipes are installed in certain locations (see Figure 8).

Leakage Monitoring

Makeup water will be trended to track any leakage in the distribution systems.

Air Release

During initial fill and otherwise as required.

Backup/Redundancy

The main DES plant will be located in building A with additional capacity available in building B. However, in case of unavailability at the plant or in the distribution system, provisions for temporary boiler and chiller connections will be available in Bridgeview Way for Phase 1 (see Figure 9).

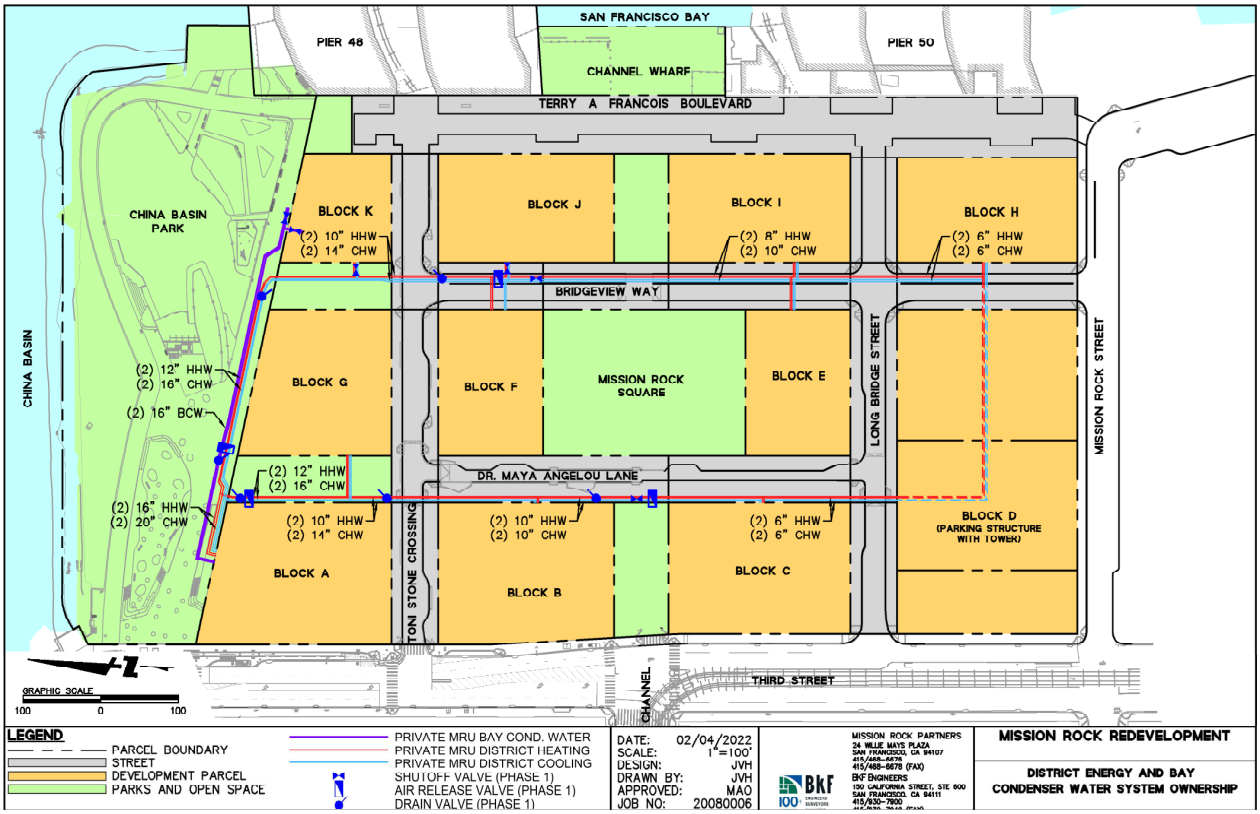

Figure 7: DES distribution piping

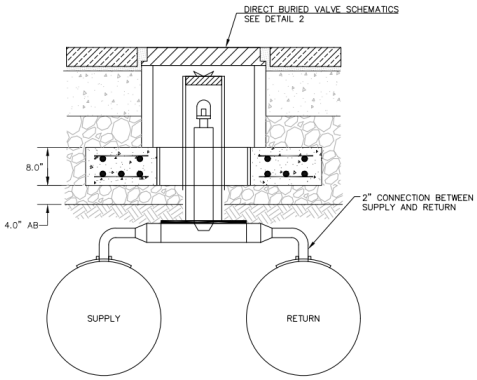

Figure 8: DES recirculation schematics

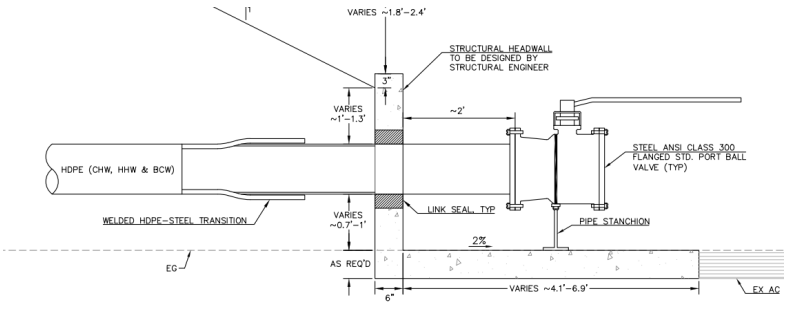

Figure 9: DES temporary boiler/chiller connection schematics

Non-Potable Water Distribution

The NPW system will ultimately be looped around the development and configured as shown in Figure 10. The following operational functions will be monitored and documented for the NPW system:

Leakage Monitoring

NPW sendout versus NPW billing meters will be trended to track any leakage in the distribution system.

Air Release/Blow Down

Air release during initial fill and otherwise as required.

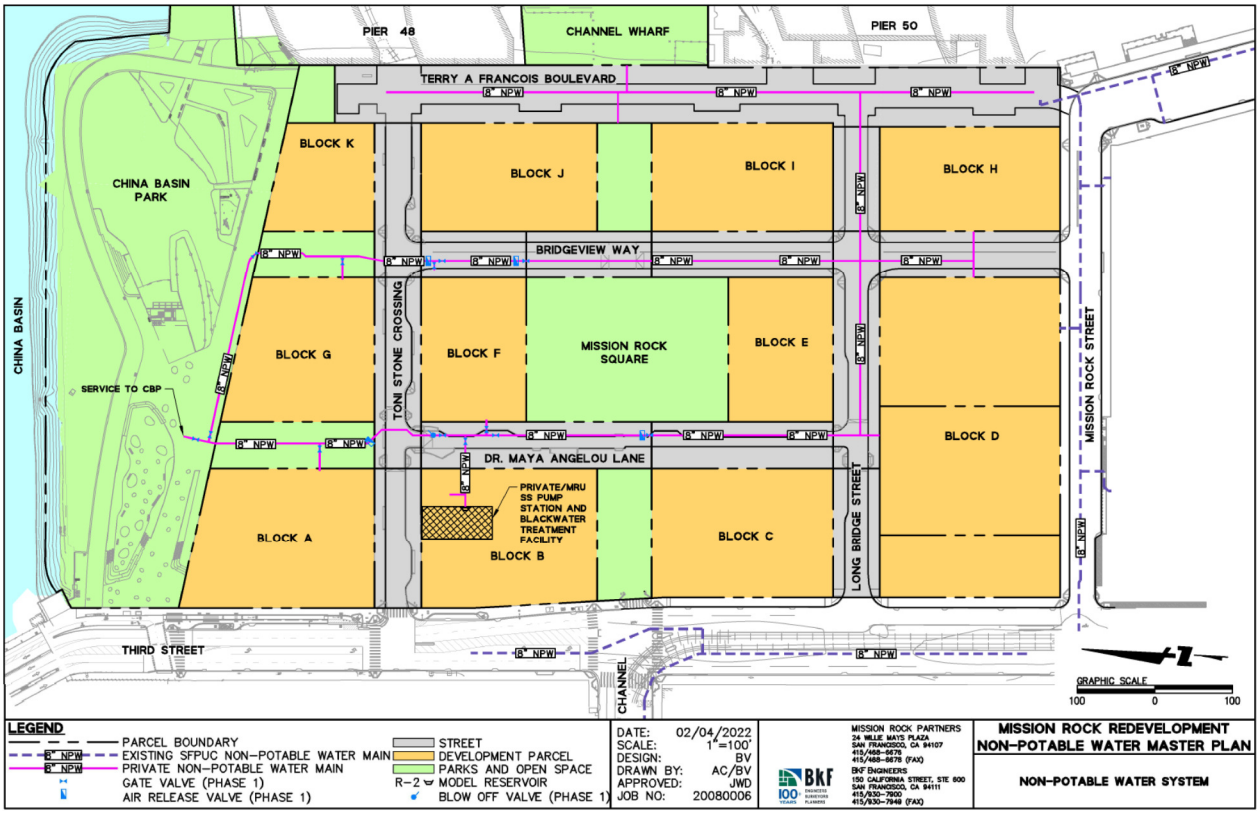

Figure 10: NPW distribution piping

Gravity and Forced Sanitary Sewer Mains

The MRU owned gravity and forced sewer piping, as well as gravity sewer piping owned by others is shown in Figure 11.

No specific operational measures are foreseen. However, the ideal method of reducing and controlling the materials found in sewer lines is education and pollution prevention. The users should be informed that common household substances such as grease and oil should be disposed in the garbage in closed containers, and not into the sewer lines.

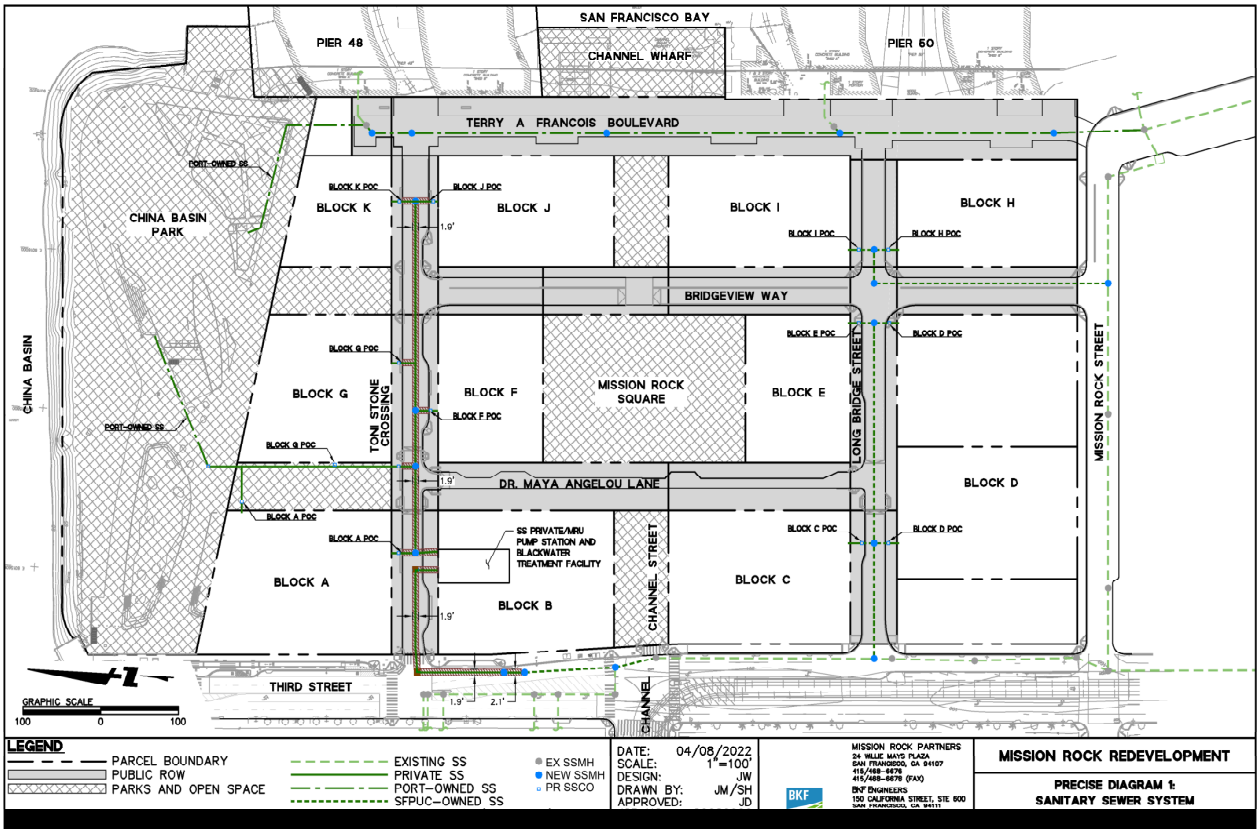

Figure 11: Gravity and forced sanitary sewer

Maintenance and Repair

As an owner of subsurface installations, MRU is a member of the regional notification center, USA North 811, per California Government Code 4216.1. Requests for locate and marking through 811 are handled by onsite TSP personnel.

MRU will also register with San Francisco 311 Customer Service Center for nonemergency issues.

District Heating and Cooling Distribution

The following maintenance and repair activities are projected for the district heating and cooling systems:

Scheduled Valve Exercising

All valves will be exercised once a year.

Leak Detection

If a leak is indicated by increased makeup water according to above, three main measures will be used to locate the leak:

- Acoustic leak detection (may be less applicable due to the HDPE piping).
- Sectionalizing the distribution system.

- Infrared camera (mainly for the district heating pipes).

Repair

When the leak has been located:

- Contact USA North 811 for utility location. As the Mission Rock development will have newly installed subsurface utilities, as-built drawings will also be a significant resource.
- Necessary permits, such as street usage permit, will normally be pulled by the contractor.
- Make provisions for temporary service to affected buildings as necessary. This may be through connecting temporary chillers and boilers to the system.
- Drain the section where the leak is located.
- Temporary repairs, if necessary, can be done with electrofusion repair saddles.
- Permanent repairs entail cutting out the damaged section and connect the new pipe by using electrofusion couplings.
- Fill the repaired pipe and remove air as necessary.
- Hydrostatic pressure test of the pipe segment to confirm the integrity of the repair.
- Remove temporary service equipment and restore permanent service to affected buildings.
- Restore excavated area.

Non-Potable Water Distribution

The following maintenance and repair activities are projected for the NPW system:

Scheduled Valve Exercising

All valves will be exercised once a year.

Leak Detection

If a leak is indicated by increased difference between NPW send-out and building billing meters according to above, two main measures will be used to locate the leak:

- Acoustic leak detection.
- Sectionalizing the distribution system.

Repair

When the leak has been located:

- Contact USA North 811 for utility location. As the Mission Rock development will have newly installed subsurface utilities, as-built drawings will also be a significant resource.
- Necessary permits, such as street usage permit, will normally be pulled by the contractor.
- Make provisions for temporary service to affected buildings as necessary. This may be through temporary connections to the potable water system.
- Drain the section where the leak is located.
- Temporary repairs, if necessary, can be done with universal clamp couplings.
- Permanent repairs entail cutting out the damaged section and connect the new pipe by using bolted couplings.

- Fill the repaired pipe and remove air as necessary.
- Hydrostatic pressure test of the pipe segment to confirm the integrity of the repair.
- Remove temporary service equipment and restore permanent service to affected buildings.
- Restore excavated area.

Gravity and Forced Sanitary Sewer Mains

The following maintenance and repair activities are projected for the forced sewer main:

General

As both the gravity and forced sewer mains will be new and using corrosion resistant smooth-bore HDPE piping the maintenance and repair is envisioned to be limited.

Specifically for the forced sewer main – before start of any maintenance or repair:

- Pump down the influent and bypass storage tanks to allow for sewage storage during the maintenance or repair period (about 6 hours), or
- Arrange pumped sewage bypass to manhole in 3rd Street.

Maintenance

CCTV inspection of the gravity sewer mains every fifth year and jetting or pigging of the pipe as necessary based on the CCTV inspection.

With the profile of the forced sewer main similar to a large p-trap (see Figure 12), there may be a risk of residue buildup in the lower part of the pipe:

- CCTV inspection, if possible due to the pipe configuration, every second year or at an interval as decided based on operational feedback.
- Jetting or pigging of the pipe as necessary based on the CCTV inspection or at a maximum two-year interval if CCTV inspection is not available.

Repair

- Contact USA North 811 for utility location. As the Mission Rock development will have newly installed subsurface utilities, as-built drawings will also be a significant resource.
- Necessary permits, such as street usage permit, will normally be pulled by the contractor.
- Make provisions for temporary service to affected buildings as necessary. This may be through temporary connections to a sewer manhole.
- Pump out the section where the leak is located.
- Temporary repairs, if necessary, can be done with electrofusion repair saddles.
- Permanent repairs entail cutting out the damaged section and connect the new pipe by using electrofusion couplings.
- Remove temporary service equipment and restore permanent service to affected buildings.
- Restore excavated area.

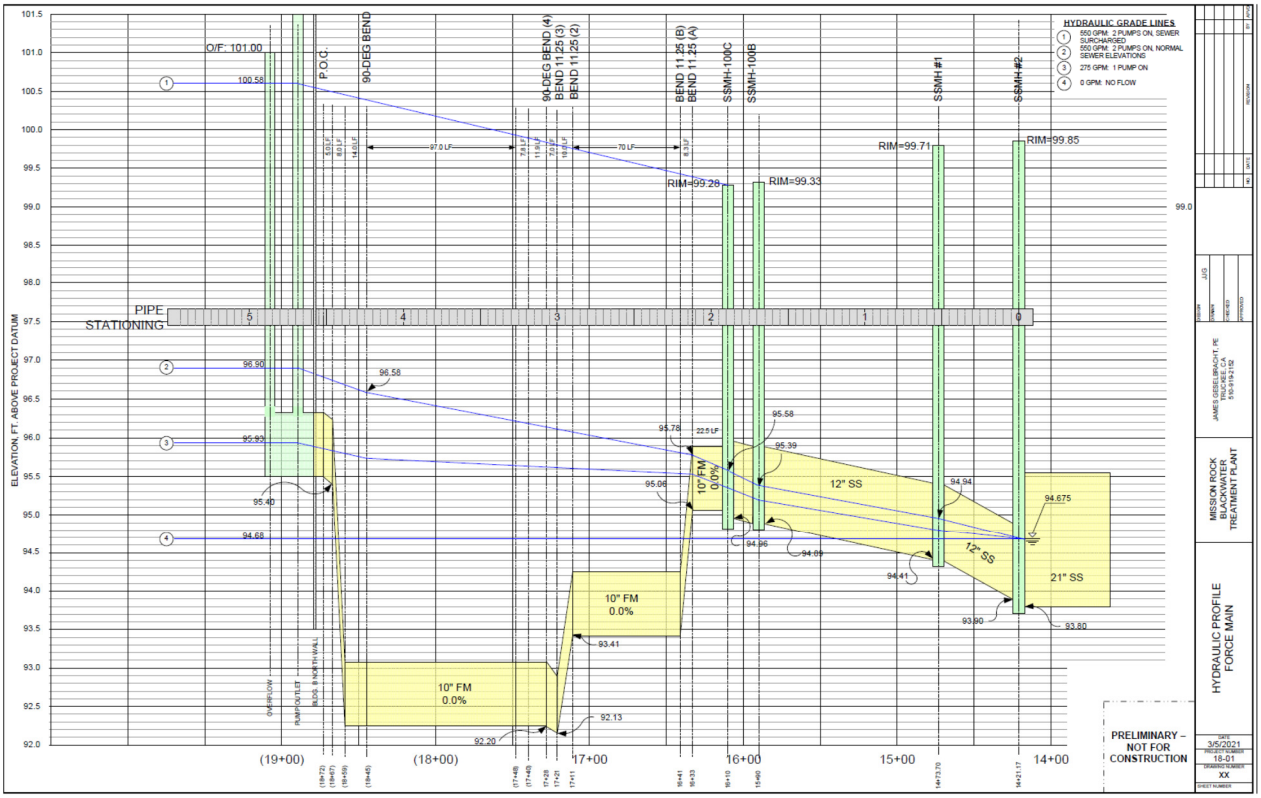

Figure 12: Forced sewer main profile

Emergency Response Plan

The HW and CHW services are monitored for makeup water to the systems such that a leak would be readily detected within a matter of days. Sendout flow versus customer metered flow is monitored for the NPW system to detect leaks. Should there be a leak in the system, a process of ultrasonic testing or systematic isolation of portions of the system to identify the location would be undertaken. When the location is identified, provisions would be made for repair following notification of those affected by any interruption of service that results from the isolation boundary for the repair.

The repair would consist of an excavation of the suspect area (removal of hardscape, trenching with a backhoe or vacuum truck, installation of trench boxes for worker safety in the trench). A typical excavation scope would be six (6) ft wide by twelve (12) feet long to allow worker access to the affected piping infrastructure. Any fill material that is unsuitable for reuse would be hauled away. The repair to the piping would be either a cut out of the damaged section and installation of a new section of piping or installation of a clamp onto the pipe to restore the pressure integrity of the pipe. Upon confirmatory hydrostatic test under system pressure, the pipeline is restored to normal service, and the restoration of the excavation site is initiated. Backfill material meeting specifications would be used to fill the excavation up to grade with compaction/cure per specification with restoration of the hardscape per the requirements for the site.

District Heating and Cooling Distribution

Leak Detection

If a leak is indicated by increased makeup water according to above, three main measures will be used to locate the leak:

- Acoustic leak detection (may be less applicable due to the HDPE piping).
- Sectionalizing the distribution system.
- Infrared camera (mainly for the district heating pipes).

Repair

When the leak has been located:

- Shut off makeup water and stop distribution pumps if larger leak.
- Notify affected customers.
- Valve off the section of the distribution system where leak is located.
- Turn makeup water and distribution pumps back on if turned off previously.
- Contact USA North 811 for utility location. As the Mission Rock development will have newly installed subsurface utilities, as-built drawings will also be a significant resource.
- Necessary permits, such as street usage permit, will normally be pulled by the contractor.
- Make provisions for temporary service to affected buildings as necessary. This may be through connecting temporary chillers and boilers to the system.
- Drain the section where the leak is located.
- Temporary repairs, if necessary, can be done with electrofusion repair saddles.
- Permanent repairs entail cutting out the damaged section and connect the new pipe by using electrofusion couplings.
- Fill the repaired pipe and remove air as necessary.
- Hydrostatic pressure test of the pipe segment to confirm the integrity of the repair.
- Remove temporary service equipment and restore permanent service to affected buildings.
- Restore excavated area.

Non-Potable Water Distribution

Leak Detection

If a leak is indicated by increased difference between NPW send-out and building billing meters according to above, two main measures will be used to locate the leak:

- Acoustic leak detection.
- Sectionalizing the distribution system.

Repair

When the leak has been located:

- Temporarily shut off distribution pumps if larger leak.

- Notify affected customers.
- Valve off the section of the distribution system where leak is located.
- Restart the distribution pumps if they have been turned off previously.
- Contact USA North 811 for utility location. As the Mission Rock development will have newly installed subsurface utilities, as-built drawings will also be a significant resource.
- Necessary permits, such as street usage permit, will normally be pulled by the contractor.
- Make provisions for temporary service to affected buildings as necessary. This may be through temporary connections to the potable water system.
- Drain the section where the leak is located.
- Temporary repairs, if necessary, can be done with universal clamp couplings.
- Permanent repairs entail cutting out the damaged section and connect the new pipe by using bolted couplings.
- Fill the repaired pipe and remove air as necessary.
- Hydrostatic pressure test of the pipe segment to confirm the integrity of the repair.
- Remove temporary service equipment and restore permanent service to affected buildings.
- Restore excavated area.

Gravity and Forced Sanitary Sewer Mains

Leak Detection

Leaks will be detected through CCTV inspections or odor.

Leak Repair

- Notify affected customers.
- Contact USA North 811 for utility location. As the Mission Rock development will have newly installed subsurface utilities, as-built drawings will also be a significant resource.
- Necessary permits, such as street usage permit, will normally be pulled by the contractor.
- Make provisions for temporary service to affected buildings as necessary. This may be through temporary connections to a sewer manhole.
- Specifically for the forced sewer main – before start of any repair:
    - Pump down the influent and bypass storage tanks to allow for sewage storage during the maintenance or repair period (about 6 hours), or
    - Arrange pumped sewage bypass to manhole in 3rd Street.
- Pump out the section where the leak is located.
- Temporary repairs, if necessary, can be done with electrofusion repair saddles.
- Permanent repairs entail cutting out the damaged section and connect the new pipe by using electrofusion couplings.
- Remove temporary service equipment and restore permanent service to affected buildings.
- Restore excavated area.

Attachment 4:

Capital Planning and Financial Reporting – MRU MEP

Mission Rock Utilities, Inc.
Maintenance Reserve 2025-54

Example Projections ($ in Thousands)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
	2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**
Operating Revenues	$ 7,078	$ 7,290	$ 7,509	$ 7,734	$ 7,889	$ 8,047	$ 8,208	$ 8,372	$ 8,539	$ 8,710	$ 8,884	$ 9,062	$ 9,243	$ 9,428	$ 9,617
Operating Expenses:															
Commodity Costs	1,289	1,328	1,368	1,409	1,451	1,495	1,540	1,586	1,634	1,683	1,733	1,785	1,839	1,894	1,951
Operating Costs	1,006	1,036	1,067	1,099	1,132	1,166	1,201	1,237	1,274	1,312	1,351	1,392	1,434	1,477	1,521
Plant Maintenance & Repairs	366	377	388	400	412	424	437	450	464	478	497	517	538	560	582
Distribution Systems Maint. & Repairs	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
G&A Items	488	503	518	534	550	567	584	602	620	639	658	678	698	719	741
Total Operating Expenses	3,166	3,262	3,360	3,462	3,566	3,674	3,785	3,899	4,017	4,138	4,266	4,400	4,538	4,680	4,826
Operating Inc. Before Depreciation	3,912	4,028	4,149	4,272	4,323	4,373	4,423	4,473	4,522	4,572	4,618	4,662	4,705	4,748	4,791
Non-Operating Cash Costs-															
Financial Charges	250	258	266	274	282	290	299	308	317	327	337	347	357	368	379
Debt Service	3,047	3,047	3,872	3,957	4,007	4,007	4,007	4,007	4,007	4,007	4,007	4,007	4,008	4,007	4,008
Capital Maintenance	**10**	**10**	**11**	**11**	**11**	**192**	**12**	**12**	**13**	**188**	**14**	**15**	**16**	**117**	**118**
Non-Operating Cash Costs	3,307	3,315	4,149	4,242	4,300	4,489	4,318	4,327	4,337	4,522	4,358	4,369	4,381	4,492	4,505
Capital Maintenance Funding:															
Operating Revenues	$10	$10	$11	$11	$11	$12	$12	$12	$13	$13	$14	$15	$16	$17	$18
Maintenance Reserve	0	0	0	0	0	180	0	0	0	175	0	0	0	100	100
Total Capital Maintenance Funding	$10	$10	$11	$11	$11	$192	$12	$12	$13	$188	$14	$15	$16	$117	$118
Maintenance Reserve:															
Beginning Balance	$400	$412	$424	$437	$450	$464	$298	$478	$492	$507	$347	$543	$559	$588	$506
Additions to Fund	12	12	13	13	14	14	180	14	15	15	196	16	29	18	130
Uses of Funds	0	0	0	0	0	(180)	0	0	0	(175)	0	0	0	(100)	(100)
Maintenance Reserve Balance	$412	$424	$437	$450	$464	$298	$478	$492	$507	$347	$543	$559	$588	$506	$536

Mission Rock Utilities, Inc.
Maintenance Reserve 2025-54

Example Projections ($ in Thousands)	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
	2040	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**
Operating Revenues	$ 9,809	$ 10,005	$ 10,205	$ 10,409	$ 10,617	$ 10,829	$ 11,046	$ 11,267	$ 11,492	$ 11,722	$ 11,956	$ 12,195	$ 12,439	$ 12,688	$ 12,942
Operating Expenses:															
Commodity Costs	2,010	2,070	2,132	2,196	2,262	2,330	2,400	2,472	2,546	2,622	2,701	2,782	2,865	2,951	3,040
Operating Costs	1,567	1,614	1,662	1,712	1,763	1,816	1,870	1,926	1,984	2,044	2,105	2,168	2,233	2,300	2,369
Plant Maintenance & Repairs	611	642	674	708	743	788	835	885	938	994	1,054	1,117	1,184	1,255	1,330
Distribution Systems Maint. & Repairs	33	35	37	39	41	43	46	49	52	55	58	61	65	69	73
G&A Items	763	786	810	834	859	885	912	939	967	996	1,026	1,057	1,089	1,122	1,156
Total Operating Expenses	4,984	5,147	5,315	5,489	5,668	5,862	6,063	6,271	6,487	6,711	6,944	7,185	7,436	7,697	7,968
Operating Inc. Before Depreciation	4,825	4,858	4,890	4,920	4,949	4,967	4,983	4,996	5,005	5,011	5,012	5,010	5,003	4,991	4,974
Non-Operating Cash Costs-															
Financial Charges	390	402	414	426	439	452	466	480	494	509	524	540	556	573	590
Debt Service	4,007	4,008	4,007	4,008	4,007	4,008	4,007	4,008	4,007	4,007	988	988	988	988	988
Capital Maintenance	**119**	**20**	**21**	**72**	**23**	**24**	**25**	**27**	**29**	**31**	**3,033**	**3,035**	**3,037**	**39**	**41**
Non-Operating Cash Costs	4,516	4,430	4,442	4,506	4,469	4,484	4,498	4,515	4,530	4,547	4,545	4,563	4,581	1,600	1,619
Capital Maintenance Funding:															
Operating Revenues	$119	$20	$21	$72	$23	$24	$25	$27	$29	$31	$33	$35	$37	$39	$41
Maintenance Reserve	0	0	0	0	0	0	0	0	0	0	3,000	3,000	3,000	0	0
Total Capital Maintenance Funding	$119	$20	$21	$72	$23	$24	$25	$27	$29	$31	$3,033	$3,035	$3,037	$39	$41
Maintenance Reserve:															
Beginning Balance	$536	$668	$688	$736	$758	$812	$836	$913	$940	$1,026	$1,057	$7,153	$4,368	$1,499	$1,544
Additions to Fund	132	20	48	22	54	24	77	27	86	31	9,096	215	131	45	46
Uses of Funds	0	0	0	0	0	0	0	0	0	0	(3,000)	(3,000)	(3,000)	0	0
Maintenance Reserve Balance	$668	$688	$736	$758	$812	$836	$913	$940	$1,026	$1,057	$7,153	$4,368	$1,499	$1,544	$1,590

Attachment 5:

[Omitted] – MRU MEP

Attachment 6:

Global Diagram – MRU MEP

PIER 48

CHANNEL WHARF

PIER 50

TERRY A FRANCOIS BOULEVARD

CHINA BASIN PARK

BLOCK K

BLOCK J

BLOCK I

BLOCK H

BRIDGEVIEW WAY

CHINA BASIN

BLOCK G

TONI STONE CROSSING

BLOCK F

MISSION ROCK SQUARE

BLOCK E

MISSION ROCK STREET

DR. MAYA ANGELOU LANE

SS PRIVATE/MRU PUMP STATION AND BLACKWATER TREATMENT FACILITY

BLOCK A

BLOCK B

CHANNEL STREET

BLOCK C

BLOCK D

THIRD STREET

CHANNEL

GRAPHIC SCALE

100 0 100

LEGEND

- PARCEL BOUNDARY
- PUBLIC ROW
- PARKS AND OPEN SPACE
- PRIVATE HHW DES
- PRIVATE CHW DES
- EXISTING SS
- PRIVATE SS
- PORT-OWNED SS
- SFPUC-OWNED SS
- PRIVATE NPW
- PORT-OWNED NPW
- 2" MRU TELECOM CONDUIT

DATE: 02/20/2025
SCALE: 1"=100'
DESIGN: JW
DRAWN BY: JM/BA
APPROVED: JD
JOB NO: 20080006

MISSION ROCK PARTNERS
24 WILLIE MAYS PLAZA
SAN FRANCISCO, CA 94107
415/468-6676
415/468-6678 (FAX)

BKF ENGINEERS
150 CALIFORNIA STREET, STE 600
SAN FRANCISCO, CA 94111
415/930-7900
415/930-7949 (FAX)

MISSION ROCK REDEVELOPMENT

GLOBAL DIAGRAM

DRAWING NAME: \\Bkf-sf\vol4\2008\080006_Mission Rock\ENG\Exhibits\22_0330 MRU Encroachment Permit\CAD\Figure 4 Global Diagram.dwg
PLOT DATE: 02-20-25
PLOTTED BY: barra

Attachment 7:

Agreement to Support, Work Around, and Protect Utility Facilities – MRU MEP

AGREEMENT TO SUPPORT, WORK AROUND, AND PROTECT UTILITY FACILITIES

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AGREEMENT

THIS AGREEMENT, MADE AND ENTERED INTO THIS ____ day of _____, ____ by and between _____, hereinafter called "Company," and the City and County of San Francisco, hereinafter called the "City," in accordance with San Francisco Public Works Code Section 909.

RECITALS

WHEREAS, Public utility companies own or control utility facilities located in City Streets that City Contractors encounter during City Projects; and

WHEREAS, San Francisco Public Works Code Sections 906 – 908 (for other public utility companies), obligate public utility companies to remove or relocate their utility facilities as described therein; and

WHEREAS, San Francisco Board of Supervisors Resolution No. 176-70, dated April 6, 1970 ("Resolution No. 176-70" attached hereto as Exhibit B), recognized that utility encounters can cause significant delays to City Projects while utility companies make arrangements to relocate or adjust their facilities; and

WHEREAS, Resolution No. 176-70 directed the Director of Public Works to adopt a procedure to mitigate construction delays and to negotiate and execute an agreement with public utility companies to pay the cost of such mitigation; and

WHEREAS, in September 1970, the Director of Public Works developed a process for City contractors to support, work around and protect public utility facilities (Document 810) and concurrently entered into an agreement with public utility companies to pay for such work ("Support and Work Around Agreement"); and

WHEREAS, The Support and Work Around Agreement applies to both public utilities and privately owned utilities that operate under an encroachment permit; and

WHEREAS, The Company has requested permission to install and maintain private facilities in the Public Right of Way through a Major Encroachment Permit; and

WHEREAS, The City has determined that the same provisions and requirement to Support, Work Around, and Protect Utility Facilities as required for Utility Conditions Permit Holders and Franchisees should apply to Mission Rock Utilities; and

WHEREAS, The City requires Company to enter into this Support and Work Around Agreement, to comply with current construction practices and to coordinate and share information as set forth herein; and

WHEREAS, Company agrees to pay City Contractors directly for Company Reimbursed Work as and to the extent set forth herein;

NOW THEREFORE it is mutually understood and agreed as follows:

DEFINITIONS

1. **Abandoned Facilities:** Facilities that the Company has stopped using with the intent of never using again.

2. **City Contract**: A City construction contract.

3. **City Contractor**: The City's construction contractor for a City Project.

4. **City Project**: A City construction project.

5. **City Streets:** The public streets, ways, alleys and places as the same may now exist or hereafter exist within the City and County of San Francisco.

6. **Company Reimbursed Work**: Work performed by a City Contractor to support, work around and/or protect Facilities, and/or to remove Abandoned Facilities or Inactive Facilities (when specifically agreed) within a City Project's limits.

7. **Conflict**: Any Facilities that must be removed, relocated, adjusted, or abandoned to enable the City Contractor to perform City Project work.

8. **Coordination Schedule**: The time for the City to notify the Company of a City Project; for the Company to provide as built drawings of Facilities and SWAPP to the City; and for the City to incorporate SWAPP in a City Contract.

9. **Effective Date**: The effective date of the encroachment permit authorizing Company to occupy the public right-of-way.

10. **Facilities**: Any Company-owned subsurface facility installed, used and maintained, including Inactive Facilities, within the City Project limits.

11. **Inactive/Deactivated Facilities:** Facilities that the Company has stopped using temporarily with the intent of possibly using again.

12. **NTP**: The notice to proceed issued by the City to the City Contractor for a City Project.

13. **Payment Agreement**: An agreement between the Company and the City Contractor pursuant to which the Company will pay the City Contractor directly for Company Reimbursed Work in accordance with the Contract Procedure attached as Exhibit A.

14. **SWAPP**: The Company's support, work around, and protection plans for Facilities, including estimates and specifications.

15. **Time for City to Provide FPP and Form X-FPP**: As defined in Section II.A.

16. **Time for Company Transmittal of Completed Form X-FPP and SWAPP**: As defined in Section II.A.

TERMS

I. SUPPORT, WORK AROUND AND PROTECTION PROCEDURES

The document entitled "Contract Procedure for Support, Work Around and Protection of Utility Facilities" marked as Exhibit A and attached to this Agreement is hereby made a part hereof.

II. COORDINATION SCHEDULES

A. Planned City Projects

For City Projects not covered by Sections II.B, C, D, E, or F, the Parties agree to use the following Coordination Schedule:

1. No later than 150 (one hundred fifty) calendar days before advertisement	City will provide to Company the Preliminary Notice of Intention ("NOI") and Request for Information (Form X-NOI).
2. Within 45 (forty-five) calendar days of the transmittal date of the Preliminary NOI and Form X-NOI	Company will: (1) return completed Form X-NOI; (2) provide as-built drawings reflecting size and locations of Facilities; and (3) provide plans and schedules, if any, for Company's proposed construction within the City Project limits in the next five years.
3. No later than X** calendar days before advertisement - **NOTE, Please see ** Table below**	City will provide to Company (1) scanned copies of the Final Preliminary Plans ("FPP") and (2) Form X-FPP requesting SWAPP. If the Company has Facilities within the City Project limits, upon request, and subject to execution of a Confidentiality Agreement as appropriate, City may also provide information from the City's AUTOCAD files to be used as a base for Company to prepare its SWAPP. City will include the deadline for the Company to return the completed Form X-FPP in the Form X-FPP and in Envista or other programs used by City for coordination purposes.
4. Within Y**calendar days of the transmittal date of the Final Preliminary Plans and Form X-FPP - **NOTE, Please see ** Table below**	Company will return the completed Form X-FPP to City. If Company has Facilities, Company will provide: (1) SWAPP in conformance with Exhibit A (Contract Procedure), Section II.A and B; and (2) plans and schedules, if any, for Company's proposed construction within the City Project limits.
5. Prior to Advertisement	City shall incorporate into the City Contract all SWAPP that is received 15 (fifteen) calendar days before advertisement.
6. Within 15 calendar days of the award of City Contract	City will notify Company of the award of the City Contract and make available the advertised set of contract documents and provide contact information of the City Contractor to which it was awarded.

**** Table**

Total LF of Main Line Trench	"X"	"Y"
Less than 3,000 LF	60 (sixty)	45 (forty Five)
3,001 LF to 10,000 LF	75 (seventy-five)	60 (sixty)
Greater than 10,000 LF	105 (one hundred-five)	90 (ninety)

B. Emergency Work Contracts

For emergency work covered by Section 6.60 of the S.F. Administrative Code, the Parties agree to use the following Coordination Schedule:

The City will provide Company with an NOI and Request for Information (X-NOI) as soon as practical, designating the City Project as involving emergency work. The Company will provide the City with (1) completed Form X-NOI; (2) as-built drawings reflecting size and locations of Facilities; and (3) plans and schedules, if any, for scheduled Company construction within the City Project limits as soon as that information can reasonably be gathered.

C. Spot Sewer Work

For spot sewer work, the Parties agree to use the following Coordination Schedule:

The City will provide Company with NOIs as soon as practical for each work order issued to the City Contractor, designating the City Project involving Spot Sewer Repair Work and identifying the Work Order Number. The Company will utilize this information in processing of the invoices received from the City Contractor. Both parties realize that since the nature of work to be done under these contracts are localized spot repairs, sometimes the actual quantity of work performed on the sewer facility is more than originally stated in the work order as the City Contractor needs to connect new section of pipe(s) to an existing pipe section that is in fair condition.

D. As Needed City Contracts or Job Order Contracts

For As Needed City Contracts or Job Order Contracts covered by Chapter 6 of the S.F. Administrative Code, the Parties agree to use the following Coordination Schedule:

The City will provide Company with an NOI and Request for Information (X-NOI) as soon as practical, designating the work as being done as part of an As Needed City Contract. The Company will provide the City with (1) completed Form X-NOI; (2) as-built drawings reflecting size and locations of Facilities; and (3) plans and schedules, if any, for scheduled Company construction within the City Project limits as soon as that information can reasonably be gathered.

E. Unforeseen Schedule Acceleration

For some unforeseen urgent City Projects, it may be impossible for the City to comply with the Coordination Schedule set forth in Section II.A above. In such event, the Parties agree to use the following Coordination Schedule:

The City will immediately notify the Company of the unforeseen schedule acceleration by designating the City Project as an "Accelerated Project" in utility coordination communications, and Company and City agree to voluntarily reduce the time periods in Section II.A above.

F. Additional Work under Revised NOI and FPP

In case of a revision to the scope listed in original NOI or FPP and/or revision that expands the boundaries of the original scope, the City shall issue revised NOI and FPP to the Company identifying changes to the scope. The City and Company agree to follow the Coordination Schedule listed in Section II-A for additional scope unless the added scope is an "Accelerated Project" as explained in Section II-E.

The City will provide Company with a revised NOI and Request for Information (X-NOI) as soon as it is practical designating the work being done as an added scope to the original NOI. The Company will provide the City with (1) completed X-NOI; (2) as built drawings reflecting size and locations of Facilities; and (3) plans and schedules, if any, for scheduled

Company construction within the expanded City Project limits as soon as that information can reasonably be gathered.

If a City revision is not provided to Company or FPP is issued less than minimum number of days listed in table II-A prior to the advertisement, then the City, and not Company, shall be responsible for added costs, if any per Exhibit A part I.D, for Overlooked/Unexpected Utility Crossings related to additional scope.

G. Sixty-Five Percent Designs

When a City Project involves trenching, trenchless installation, and/or City substructure alignment then in addition to the information discussed above, the City will provide Company an approximately sixty-five percent (65%) design, if available, or as soon as it becomes available.

III. POTHOLING

During the design phase and prior to the award of the City Contract, the Company will pothole at locations identified by City or by Company where it is reasonably necessary to provide the City with more precise information about the horizontal and vertical locations of Facilities or where Facilities may be in close proximity to and potentially in conflict with City Project work. The parties shall cooperate in selecting the appropriate locations for the Company to pothole.

Nothing in this section or in this Agreement is intended to release or relieve Company, City Contractor or City from any of their obligations under Government Code § 4216 *et. seq*.

Nothing in this section or in this Agreement is intended to require Company to pothole, to locate, or provide information regarding Facilities that do not belong to Company or that are not Facilities as defined above.

Nothing in this section or in this Agreement is intended in any way to alter, amend or change the parties' responsibilities with respect to performing positive location of utility Facilities (i.e., potholing) within a state highway.

If a Conflict is discovered during construction that was not identified previously either by the Company or by City due to inadequate utility information, the Company will cooperate with City and City Contractor to expeditiously resolve the Conflict so as not to unreasonably delay the City Contract. Should a City Contractor comply with its obligations under Government Code § 4216 *et. seq* and discover a Conflict during construction that Company had failed to identify in a SWAPP provided under Section II.A. Company shall be responsible for all incremental design and/or construction costs caused by the newly discovered Conflict. Company will have the option to pay the City Contractor directly for such work or to reimburse the City under a separate agreement.

City agrees that any potholes performed under this Agreement shall be exempt from the requirements to install curb ramp upgrades or replacements.

IV. COMPANY'S RESPONSIBILITY TO ENTER INTO PAYMENT AGREEMENTS

Company shall enter into a Payment Agreement with City Contractor within 45 calendar days after City notifies Company of the award of the Contract provided that Company has Facilities that will require the City Contractor to perform Company Reimbursed Work. The City Contractor shall submit invoices and related supporting documentations listed in Exhibit A to the

Company. The Company is not required to accept or pay invoices submitted to Company by a subcontractor.

Notwithstanding the paragraph above, Company shall have the right to support, protect, remove or relocate its Facilities itself or by using Company contractors, provided that doing so shall not delay the City's Project.

V. CITY ADMINISTRATIVE COSTS

Pursuant to Section 910 of the S.F. Public Works Code, the City may be entitled to compensation from Company for the City's administrative costs associated with incorporating SWAPP into the construction documents. Should Company comply with the Coordination Schedule, City will waive collection of such administrative costs.

VI. COST BASIS

As of the Effective Date, SWAPP costs shall be in accordance with Exhibit A – Contract Procedure. The Fixed Price Schedule in Section III of Exhibit A (Contract Procedure) shall be adjusted annually on January 1 of each year in accordance with the Construction Cost Index for the San Francisco Bay Area or closest geographical area, published by the Engineering News Record for the third quarter of the previous year. Such adjusted costs shall be used for City Projects advertised for bids after each January 1 or as soon thereafter as is practicable.

VII. UNIFORM CONTRACT

The City agrees that the provisions of this Agreement shall be substantially the same for each utility Company.

VIII. DESIGNATED REPRESENTATIVES FROM COMPANY AND THE CITY; REGULAR MEETINGS

Within 30 calendar days of execution of this Agreement, the Company and the City each shall designate one primary representative and two alternate representatives. Such designees may be changed only by written notification to the other Party's primary designee.

The primary representatives or their alternate representatives will confer, either by phone, email or face to face, at least once every month unless otherwise agreed to review the status of ongoing activities and a forecast of future activity. The primary representatives or their alternate representatives will also meet periodically to discuss issues that arise with respect to the implementation of this Agreement. The primary representatives for each Party shall meet no less frequently than quarterly to exchange information and discuss implementation issues.

IX. TERM OF AGREEMENT

This Agreement shall be in full force and effect for an initial term of three years from the Effective Date. Thereafter, this Agreement shall continue in full force and effect indefinitely, provided that after the initial three-year term either party may provide a written request to renegotiate any term or terms of this Agreement. Upon such written request, the parties agree to negotiate proposed contract modifications in good faith. If the parties do not agree on a proposed contract modification within six months after the date of the written request to renegotiate, then the party that sought renegotiation may terminate this Agreement by providing three months' written notice to the other party. If terminated, this Agreement shall continue to apply to all City Contracts for which an NOI was issued during the term of this Agreement.

X. COMPANY'S OBLIGATION TO COMPENSATE, DEFEND, INDEMNIFY, AND HOLD CITY HARMLESS

Company shall compensate and/or defend, indemnify and save harmless City, its officers, employees, boards, and commissions, from all claims, loss, damage, or liabilities, for personal injury or property damage arising from defects in SWAPP incorporated in any City Contract, and/or the Company's failure to provide SWAPP in accordance with the terms of this Agreement.

XI. INSURANCE REQUIREMENTS OF CITY CONTRACTOR

If the Company has Company Reimbursed Work within the scope of a City Project, the City agrees to require the City Contractor to include the Company as an additionally named insured on the City Contractor's commercial general liability and automobile liability insurance policies. The City may require the City Contractor to name other companies having facilities within the City Project limits as appropriate.

XII. LIMITATION OF CITY LIABILITY

The City shall not be liable to Company for any loss of or damage to property of the Company or injury to employees of Company caused by any City Contractor while performing Company Reimbursed Work, provided, however, that nothing herein limits the liability of any City Contractor for such loss, damage or injury.

XIII. GENERAL PROVISIONS

A. Severability

In case any part, term, portion or provision of this Agreement is or shall be invalid, illegal or unenforceable, the remaining parts, terms, portions and provisions shall be deemed severable and the validity, legality and enforceability of the remaining parts, terms, portions and provisions shall not be affected or impaired.

B. Headings

The headings in this Agreement are for convenience only and do not limit or alter the meaning or interpretation of this Agreement in any manner.

C. Amendment of Agreement

This Agreement may only be amended by written agreement.

D. Counterpart

This Agreement may be executed in multiple counterparts and signatures may be exchanged by facsimile or electronically, each of which shall be deemed to be an original document, and all of which together shall constitute one and the same document.

E. Governing Law

This Agreement shall be construed in accordance with the laws of the State of California.

XIV. DISPUTE RESOLUTION

In the event of a dispute, the parties shall notify the primary representatives and the alternates in writing of the disputed issue. Within thirty business day of receipt of a dispute notice, the primary representatives or alternates shall meet in an effort to resolve the matter. If the primary representatives and/or alternates agree upon a resolution, that decision shall be final.

The intent of the parties is for all disputes to be resolved by the primary representatives and/or alternates to the greatest extent possible.

If the primary representatives and/or alternates do not agree upon a resolution after good faith efforts to do so, either party may refer the dispute to mediation, with a mediator mutually acceptable to both Parties.

The City and Company each shall bear its own dispute resolution expenses and shall share equally the cost of any mediator. Unless otherwise agreed in writing, the Parties shall continue to perform their obligations under the provisions of this Agreement during the course of dispute resolution efforts. If the parties are unable to agree upon a mediator, or if the mediation is unsuccessful, then either party may file suit.

XV. EXCEPTIONS

There may at times be conditions which, in the opinion of the City and Company, do not fit the average conditions intended by this Agreement and Contract Procedure. The primary representatives may mutually agree to deviations from this Agreement or the Contract Procedure for a particular City Project or City Projects.

XVI. EFFECTIVE DATE AND TERMINATION OF PRIOR AGREEMENTS

This Agreement will apply to all City Contracts advertised after the Effective Date. City Contracts advertised prior to the effective date of this agreement shall be covered by the terms of the previous agreements or arrangements, unless the parties otherwise mutually agree.

Any prior Support and Work Around Agreements or Support, Work Around and Protect Agreements between Company and City are terminated as of the Effective Date.

XVII. SAFETY

City Contractors are chosen by the City, not by Company, and will work under the supervision and control of the City. The City Contractors are merely to be reimbursed by Company for Company Reimbursed Work. Notwithstanding the above, Company shall have the right to order the City Contractor to stop work if Company is concerned about a safety issue involving its Facilities. In addition, the City Contractor shall arrange for a Company inspector to be present during execution of all support, work around and protection work involving Company electric or gas transmission Facilities. Nothing in this Section or in this Agreement is intended to release or relieve Company, City or City Contractor from following safe practices when working on or around Facilities or from complying with Government Code § 4216 *et. seq*.

XVIII. RELOCATION PROJECTS NOT COVERED BY THIS AGREEMENT

If the City determines that an actual relocation of Facilities may be necessary to accommodate a City Project, the City will make best efforts to apply for the relocation through the Company application process. Only one application is required per City Project.

CITY AND COUNTY OF SAN FRANCISCO,	_____
a California municipal corporation	_____ **,** a _____ [Corporation]
By: _____	By: _____
Carla Short	
Director of Public Works	

Date: _____, 2024

APPROVED AS TO FORM:
David Chiu, City Attorney

By: _____
_____
Deputy City Attorney
Attorneys for the City and County
of San Francisco

Date: _____, 2024

APPROVED AS TO FORM:

By: _____

EXHIBIT A:

CONTRACT PROCEDURE, SUPPORT, WORK AROUND AND PROTECTION OF UTILITY FACILITIES

I. INTRODUCTION, DEFINITIONS AND KEY PRINCIPLES

A. Direct Company/City Contractor Payment

This Contract Procedure covers SWAPP content and format, supporting documentation required from City Contractors and payment by Company to a City Contractor directly for all costs incurred as the result of the performance of Company Reimbursed Work.

B. Utility Crossing Defined

A "Utility Crossing" is defined as any Facility located within the excavation area of a City Project, which Facility will remain in place and will not be relocated, abandoned in place, or removed. The length of a Utility Crossing is the centerline distance in feet of the portion of the Facility within the excavation area for the City Project.

C. Fixed Price Schedule

Utility Crossings where the length of the Facility is not more than 3 times the width of the excavation for excavation widths less than 18 feet, shall be priced pursuant to the Price Schedule established in Section III of this Exhibit A. The Company will make payments to City Contractor in accordance with the Fixed Price Schedule.

D. Added Costs for Overlooked/Unexpected Utility Crossings

The fixed price for Utility Crossings where the length of the Facility is not more than 3 times the width of the excavation for excavation widths less than 18 feet, and that have been overlooked, unexpected and/or not shown on the SWAPP, including those instances where Company failed to submit SWAPP following proper notice by City, will be paid for in accordance with the Fixed Price Schedule established in Section III of this Exhibit A, plus an additional 15% percent markup for City Contractor's profit and overhead.

E. No Mark-Up for Certain Work

The additional 15% markup in Section I.D above of this Exhibit A does not apply to work that falls within the Agreement's Sections II.B (Emergency Work Contracts), II.C (Spot Sewer Work), II.D (As Needed City Contracts Or Job Order Contracts), II.E (Unforeseen Schedule Acceleration), II.F (Additional Work under Revised NOI and FPP) if revised FPP is issued less than minimum number of days listed in Section II.A of the Agreement prior to the advertisement or where City failed to provide Company with the notice required in Section II.A, Row 1 or Section II.A, Row 3 of the Agreement.

F. Negotiated Payment

Notwithstanding the Fixed Price Schedule established in Section III of this Exhibit A , the Company and the City Contractor shall directly negotiate the SWAPP costs for Utility Crossings or encroachments for (1) "parallel" Utility Crossings; (2) Utility Crossings with lengths more than three times the width of the excavation, and/or (3) where the computed cost of any Utility Crossing exceeds $9,784.

If a utility facility is located longitudinally and directly on top of the city trench or multiple utility facilities crossing the City trench are located too close to each other leaving no space in between for the City Contractor to excavate and shore the trench, and there is a need to change the construction method to install City facilities, the increased cost shall be shared by various utility agencies and City departments based on the number and size of each agency or department facilities.

G. Abandoned Facilities or Inactive Facilities

1. Inactive Facilities

Company will specify on its SWAPP Inactive Facilities. The City Contractor will perform Company Reimbursed Work around Inactive Facilities unless otherwise instructed by the Company on the SWAPP documents.

2. Abandoned Facilities

Company may, but is not required to, specify Abandoned Facilities on its SWAPP. If City Contractor encounters unidentified company facility during construction, Contractor shall notify the Company in accordance with Section II.D.7 of this Exhibit A. The Company Inspector shall visit the site within the time allotted in Section II.D.7 of this Exhibit A to confirm that the facility is abandoned. If the Company fails to confirm that line is abandoned, the contractor will receive full payment per Section III of this Exhibit A.

3. Flushing

Within 48 hours of Company's receipt of notice pursuant to Section II.D.7 of this Exhibit A, Company will either flush or inform City Contractor that Company has already flushed all Abandoned gas Facilities or Inactive/deactivated gas Facilities prior to removal by City Contractor.

4. Removal of Abandoned Facilities or Inactive Facilities Designated to Be Abandoned

If necessary to construct City Project, Company shall reimburse the City Contractor for the removal or supporting in place of Abandoned Facilities or Inactive Facilities that the Company specifies on its SWAPP. Company and City Contractor will negotiate the cost for removal of such duct banks and conduits or pipes. At Company's option if decided during the design phase, Company may remove Facilities itself without unreasonably delaying the City Contractor.

H. Payment Only for Work Performed by City Contractor

Company will not pay and is not expected to pay City Contractor unless City Contractor actually supports, works around or protects Company's Facilities. No payment shall be due to the City Contractor if Company crews respond and are the ones supporting, working around, and/or protecting the Company's Facilities, such as in an emergency, or if the City Contractor does not actually perform any work or undertake any action to support, work around or protect the Company's Facilities.

II. METHOD OF ADMINISTRATION

A. SWAPP Content

SWAPP must contain the following:

1. Location and Size of Facilities

a. The horizontal location of Company's existing Facilities, including Inactive/deactivated Facilities, and those Facilities planned to be installed within five years, located within the City Project limits. Company is not obligated to update the SWAPP or its list of Facilities planned or scheduled to be installed within five years if the Company's plans or schedules change after the SWAPP has been provided.

b. The size [outside dimensions] and approximate depth of cover of any Utility Crossing in the City trench or located in the close proximity to a City trench shall also be reflected if Company's records contain this information.

2. Utility Crossing Cost:

All Utility Crossings and associated authorized costs, including a tabulation of the identity, size, type, material, length and SWAPP cost of each Utility Crossing, and the following instruction: PAYMENT FOR SUPPORT, WORK AROUND AND PROTECTION WORK WILL BE MADE BY COMPANY UNDER DIRECT CONTRACT WITH THE CITY CONTRACTOR.

a. **Actual Number and Size of Utility Crossing:** The number of Utility Crossings reflected on the SWAPP will be based on the information known at that time. Company shall pay City Contractor based on the actual number, size, and length of Utility Crossings per schedule of prices effective for the year during which the City Contract is advertised.

b. **Negotiated Costs:** Utility Crossings that the Company intends to negotiate directly with a City Contractor must be identified.

3. Utility Conflicts

All Utility Conflicts that Company intends to remove or relocate, or that Company intends to abandon shall be identified.

B. SWAPP Format

Company must provide SWAPP in the following format:

1. AUTOCAD

Company must use City AUTOCAD drawings, or such other software or format that is mutually acceptable to City and Company, as a base for the SWAPP so that SWAPP will reflect the City Project limits and locations of each Utility Crossing to scale.

2. Size

Drawing size must be 22 inches by 34 inches, or such other size as is mutually acceptable to City and Company.

3. Title Block

Drawings must have the Company's title block with complete signatures.

4. Contact Information

Drawings must include phone numbers or email addresses that the City Contractor can use to contact Company for negotiations regarding negotiated costs or to notify Company of field conditions that deviate from the SWAPP information.

5. Disclaimer

Drawings must include the following disclaimer: THE UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PREPARED BY [NAME OF COMPANY]. THE CITY AND [NAME OF COMPANY] MAKE NO REPRESENTATION AS TO THE ACCURACY OR COMPLETENESS THEREOF.

Nothing herein shall be construed to prohibit Company from adding such other disclaimers to the drawings as Company deems appropriate.

C. Specifications

City shall incorporate standard SWAPP specifications into all City Contracts. Company may revise said specifications for any particular Contract. Such changes must be submitted with the SWAPP or at least fourteen (14) days prior to advertisement. Company shall prepare its standard specifications in a form satisfactory to the City.

D. Contract Activities

1. City Contractor Measurement

The City Contractor will measure the outside diameter or width of Utility Crossings to the nearest inch (outside diameter ***excluding*** any fittings, bells, or gate valves) and length of the Utility Crossings to the nearest foot to determine the cost of each Utility Crossing according to the Fixed Price Schedule in Section III of this Exhibit A.

2. Variations and Cost Adjustments

The City Contractor will notify Company immediately of any variation of Utility Crossings from the SWAPP and/or estimate that requires cost adjustment and such cost adjustments shall be settled within no more than two business days without delay to the City Project.

3. Supporting Documentation for City Projects other than Spot Sewer Repair Contracts

Unless otherwise agreed by the Primary Representatives, the City Contractor shall, at a minimum, submit the following documentation with each invoice submitted to the Company for payment:

a. Utility Facility Crossing Support and Work Around Summary.

b. "Drawing for Support and Work Around Invoice for Utility Facilities" identifying Company reimbursed work by block, type of facility, and shall include following:

   i. Identification of all Utility Crossings by alpha-numerical numbering system (e.g., E1, E2, G1, G2);

   ii. Location and size of all Utility Crossings

   iii. Length of all Utility Crossings

iv. Invoice and as-built templates should be utilized and all information filled out its entirety (e.g. As-built stamp, Date, City Contractor's Full Name, Signature, etc.)

c. Photos of following Utility Crossings:

i. Utility Crossings where the size of the Facility varies from that shown on Company's SWAPP drawings; any change of measurement requires one photo per block per size variation.

ii. Utility Crossings not shown on Company's SWAPP drawings.

iii. Parallel Utility Crossings showing measurements and potential facilities support

iv. Utility Crossings 6 feet or longer unless:

- Shown on SWAPP and no variance.
- Facility is a lateral that is crossing the City main facility trench having 6 feet or greater trench width and crossing length does not exceed the trench width.

4. Supporting Documentation for Spot Sewer Repair Contracts

Unless otherwise agreed by the Primary Representatives, the City Contractor shall, submit following documentation with each invoice submitted to the Company for payment for Spot Sewer Repair Contracts:

a. Utility Facility Crossing Support and Work Around Summary.

b. "Drawing for Support and Work Around Invoice for Utility Facilities" identifying company reimbursed work by block, type of facility and shall include following:

i. Identification of all Utility Crossings by alpha-numerical numbering system (e.g., E1, E2, G1, G2);

ii. Location and size of all Utility Crossings

iii. Length of all Utility Crossings.

iv. Invoice and as-built templates should be utilized and all information filled out in its entirety (e.g. City Representative's Name and Signature, Date, City Contractor's Full Name, Signature, etc.)

c. Photos of following Utility Crossings:

i. All Duct Bank Structures and measurements

ii. All Utility Crossings 6 feet or greater in length

iii. All unmarked active Utility Crossings

iv. Each utility that varies in size and/or location from USA street marking(s).

d. Underground Service Alert ticket number

5. Photos

All photos must include:

i. Label w/Utility Crossing Reference Number

ii. Name of Street or Intersection

iii. Above-ground picture that includes a landmark street sign, or house that helps identify location of the crossing.

6. Company's Right of Confirmation

The Company shall have the right to confirm measurements with the City Contractor but all disagreements shall be resolved without delay to the City Project.

7. Unidentified Facilities

Unidentified Facilities not reflected on the SWAPP discovered by a City Contractor shall be called to the attention of the Company immediately by the City Contractor. Company shall have 48 hours from receipt of such notification to determine ownership and provide direction to the City Contractor for disposition of the facility which are not in direct conflict with City Project work and can be supported, worked around and protected in the trench. However, if the unidentified facility is in direct conflict with the City Project work and City Contractor cannot proceed further without resolution, the Company will visit the site as soon as possible within the 24 hours from receipt of such notification to determine ownership and provide direction to the City Contractor. The time allowance shall include at least 8 working hours. If the ownership of the unidentified facility is unknown, the City Contractor shall call Underground Service Alert (USA) requesting Utility Agencies to visit the site to identify the ownership. If no determination can be made after the aforementioned procedure is followed, the City Contractor will follow the direction of the City's primary representative or authorized designee.

8. Verification and City Contractor Itemization

During the course of a City Contract, the City Contractor shall keep an itemized record of support and work around costs for each Utility Crossing, noting any variation from Company's SWAPP and/or Estimates. The itemized record shall be maintained and copies submitted monthly to Company and the City as the City Contract work progresses, or as otherwise agreed by Company and City Contractor.

9. Progress Payments

Progress payment for SWAPP costs shall be made by Company within ninety (90) days of receipt of an invoice from the City Contractor submitted in accordance with the Company's then-current requirements and standards for submitting invoices.

III. METHOD OF DETERMINING UTILITY CROSSING COSTS

A. Fixed Price Schedule

The cost of support, work around and protection of utility mains, duct structures and services shall be based on the outside diameter (***excluding*** any fittings, bells, or gate valves) or width of said Facilities and the length of the Utility Crossing. Utility Crossings and length of Utility Crossing are defined in Section I.B of this Exhibit A.

B. Measurement of Maximum Outside Diameter

The following schedule of prices shall be used in computing the cost of each Utility Crossing. In the following schedules, the maximum outside diameter shall mean outside diameter of pipe, conduit, service, duct or main ***excluding*** any fittings, bells, or gate valves, and width shall mean the distance measured horizontally across the duct structure:

The schedule of prices as shown in this section reflects the Cost of Utility Crossing Schedules, effective January 2017.

FIXED PRICE SCHEDULE

Cost of Utility Crossing = Fixed Cost + Support Cost

Group I: Length of Crossing less than Six Feet

Maximum Outside Diameter Of Main And Service Or Width Of Duct Structure	Fixed Cost	Support Cost Per Foot of Length of Crossing
4 inches or less	$550	0
Over 4 inches to 20 inches	$550 + $92 per inch over 4 inches	0
Over 20 inches	$2,017 + $153 per inch over 20 inches	0

Group II: Length of Crossing Six Feet to Twelve Feet

Maximum Outside Diameter Of Main And Service Or Width Of Duct Structure	Fixed Cost	Support Cost Per Foot of Length of Crossing Over Six Feet
4 inches or less	$703	$92
Over 4 inches to 20 inches	$703 + $98 per inch over 4 inches	$92
Over 20 inches	$2,268 + $165 per inch over 20 inches	$92

Group III: Length of Crossing greater than Twelve Feet

Maximum Outside Diameter Of Main And Service Or Width Of Duct Structure	Fixed Cost	Support Cost Per Foot of Length of Crossing Over Twelve Feet
4 inches or less	$1,253	$122
Over 4 inches to 20 inches	$1,253+ $110 per inch over 4 inches	$122
Over 20 inches	$3,013 + $183 per inch over 20 inches	$153

C. Duct Bank Structure

Duct Structure is one or more ducts, conduits or pipes, of any size, or a combination of such ducts, conduits or pipes, which are grouped together but which may or may not be banded, encased in concrete, or otherwise incorporated into a solid unit.

D. Nested Utility Facilities

Nested Facilities are Facilities 6 inches or less in outside diameter or width and are less than 3 feet clear distance of each other regardless of ownership. In the case of nested Facilities, the calculated cost of each Utility Crossing shall be reduced by 33-1/3%.

Attachment 8:

Notice of Special Restrictions – MRU MEP

Attachment 9:

Removal, Restoration, and Abandonment Fund Payment Schedule – MRU MEP

Payment No.	Year	Fund Payment Amount including Escalation
1	2025	$ 23,066.67
2	2026	$ 24,220.00
3	2027	$ 25,431.00
4	2028	$ 26,702.55
5	2029	$ 28,037.68
6	2030	$ 29,439.56
7	2031	$ 30,911.54
8	2032	$ 32,457.12
9	2033	$ 34,079.97
10	2034	$ 35,783.97
11	2035	$ 37,573.17
12	2036	$ 39,451.83
13	2037	$ 41,424.42
14	2038	$ 43,495.64
15	2039	$ 45,670.42
Total:		**$ 497,745.53**

Attachment 10:

Removal, Restoration, and Abandonment Substitute Security Payment Schedule – MRU MEP

Years from start	Year	Replacement Security Amount
1	2025	$ 346,000.00
2	2026	$ 363,300.00
3	2027	$ 381,465.00
4	2028	$ 400,538.25
5	2029	$ 420,565.16
6	2030	$ 441,593.42
7	2031	$ 463,673.09
8	2032	$ 486,856.75
9	2033	$ 511,199.58
10	2034	$ 536,759.56
11	2035	$ 563,597.54
12	2036	$ 591,777.42
13	2037	$ 621,366.29
14	2038	$ 652,434.60
15	2039	$ 685,056.33
16	2040	$ 719,309.15
17	2041	$ 755,274.61
18	2042	$ 793,038.34
19	2043	$ 832,690.25
20	2044	$ 874,324.77
21	2045	$ 918,041.01
22	2046	$ 963,943.06
23	2047	$ 1,012,140.21
24	2048	$ 1,062,747.22
25	2049	$ 1,115,884.58
26	2050	$ 1,171,678.81
27	2051	$ 1,230,262.75
28	2052	$ 1,291,775.89
29	2053	$ 1,356,364.68
30	2054	$ 1,424,182.92
31	2055	$ 1,495,392.06
32	2056	$ 1,570,161.66
33	2057	$ 1,648,669.75
34	2058	$ 1,731,103.24
35*	2059	$ 1,817,658.40

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