

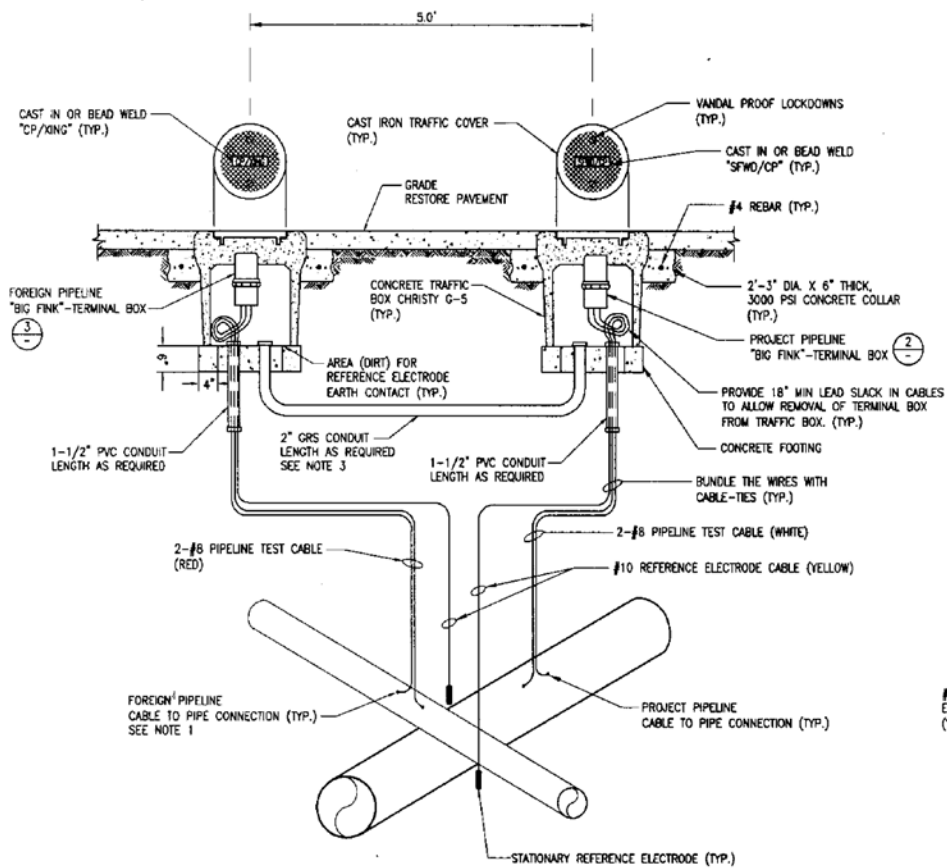
HETCH HETCHY WATER AND POWER
MAINTENANCE ENGINEERING

ENGINEERING REQUIREMENTS FOR UTILITY CROSSINGS

1. Engineering drawings to scale shall be prepared and signed by a professional engineer licensed by the State of California and submitted in 11"x17" paper or pdf. The drawings must include the following: vicinity map, boundaries of the SFPUC rights-of-way (ROW) and pipelines, electrical transmission lines, electrical towers, plan and profile of proposed work within the SFPUC ROW, including detail drawings.
2. Engineering specifications for the project shown on the engineering drawings shall be prepared and signed by a professional engineer licensed by the State of California. Specifications must include materials of construction, reference standards, requirements for field workmanship and quality control during construction. Specifications shall be printed on 8.5"x11" paper or made a part of the drawings or in pdf.
3. All utilities crossing SFPUC pipeline shall be installed in a steel casing. All joints for steel casing shall be butt welded the entire circumference of the joint. Minimum wall thickness of casing shall be 0.25-inches, but calculations shall be submitted to SFPUC providing support of intended casing wall thickness. Pipes crossing under HH SJPL's using HDD method and made of PE may not need to be encased.
4. All utilities crossing SFPUC pipeline (and future planned pipelines) using an open cut method, must have a minimum clearance of 24 inches from the casing. For crossings installed with a tunneling method, the minimum clearance between an SFPUC pipeline and the casing shall be 36 inches. If clearances cannot be adhered to by going over SFPUC pipeline, then new crossing must go under using trenchless methods.
5. All underground utility crossings shall be as close to perpendicular as possible to SFPUC pipelines and no greater than a 45 degree angle. No outside agency pipelines are allowed to run parallel to SFPUC pipelines within the SFPUC ROW.
6. Identification: install marker at each end of the utility crossing at the HHWP ROW property line. Standard marker, fiberglass 4-foot tall with color to match type of utility. Install tracer insulated wire min 10 gage copper, color of insulation to match utility. Install metallic warning tape 1-foot above utility pipe.
7. All sewer or recycled water pipeline crossings must comply with current State Code of Regulations from the State Department of Public Health. Sewer shall be installed encased in pipe.
8. All crossings shall meet all Federal and State requirements for regulated pipelines, at the minimum, with the following additional requirements:
 - a. Provide an engineering narrative report with the required drawings and specifications to describe the basis of design for the regulated pipeline at the crossing and measures take to protect SFPUC pipelines.
 - b. The utility crossing shall be placed within a steel casing pipe across and beyond the entire SFPUC ROW a minimum distance into adjacent easement that allows excavation to access end of casing without disturbing the SFPUC right of way. A general rule is that end of casing shall be placed at a 2H:1V slope from the edge of SFPUC ROW.

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- c. The casing shall be insulated from the carrier pipe, sealed, and sloped to drain away from SFPUC pipelines. Carrier pipes containing flammable liquids shall include vents on the casing.
 - d. Submittals shall be provided that identify the tunneling method to be used for casing installation. Submittals should include calculations that show soils information, location and shoring of jacking and receiving pits, settlement calculations, and other pertinent information.
 - e. Regulated pipelines installed by trenching shall have robust protective coatings and dielectric shields installed across the SFPUC ROW.
 - f. The SFPUC shall be notified promptly in writing in the event that future pipeline integrity evaluations indicate any deficiency or deterioration in the pipeline within or adjacent to the SFPUC ROW.
9. Any metallic pipeline with cathodic protection crossing SFPUC pipelines are required to install test stations as shown on Attachment A at a minimum. Applicants are advised that SFPUC pipelines may have impressed current cathodic protection and it is the applicant's responsibility to provide suitable test and mitigation facilities for its pipeline. Future cooperative testing of cathodic protection at the crossing will be required.
10. Grade Changes, for crossings requiring grade changes due to fill or cut, approach slopes may not exceed 20H:1V. Drainage patterns for existing and final grades must be shown on permit drawings.
11. Maximum external loading over SFPUC pipelines is AASHTO H-10 loading and a minimum of 3 feet of cover over any SFPUC pipeline (and future planned pipelines). Calculations to show existing and new imposed loads on SFPUC pipe shall be submitted for review and approval. In no case shall the crossing impose a greater load on SFPUC pipeline than current conditions. AASHTO H-20 loading requires 4-feet of cover.
12. No mechanical excavation or grading is allowed within 2 feet vertical and 4 feet horizontal of SFPUC pipelines. Any necessary digging necessary within these limits of the SFPUC pipelines must be done with hand tools and only with approval of SFPUC. No vibratory compaction equipment is allowed within SFPUC ROW without written approval. Compaction equipment must be sized to not impose a significant load or vibration to the SFPUC pipelines.
13. Applicant shall submit final construction documents (drawings, specifications,...) to SFPUC for approval prior to issuance of this permit. Upon completion of construction, applicant shall submit final as-built drawings to SFPUC in .pdf and CAD format.
14. Design assumptions subject to verification. Potholing, and surveying of adjacent manholes may be necessary to verify actual vertical and horizontal location of SFPUC pipelines. Follow permit procedures for requesting potholing and surveying. If site conditions vary from permit drawings then revise and resubmit drawings showing actual conditions before starting any work.

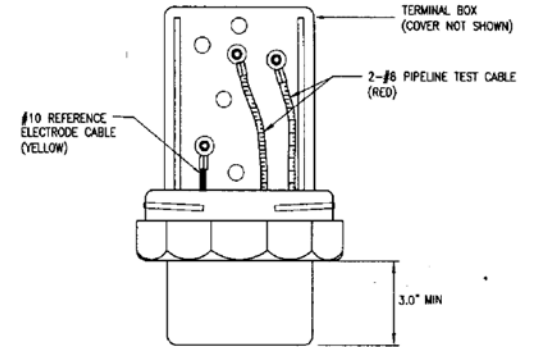


NOTES:

1. COORDINATE WITH FOREIGN UTILITY OWNER PRIOR TO CADWELDING TEST LEADS TO THE FOREIGN PIPELINE.
2. ALL CONDUITS SHALL HAVE BUSHING AT EACH END.
3. THIS CONDUIT IS FOR FUTURE CATHODIC PROTECTION INTERFERENCE MITIGATION OF THE TWO PIPELINES AT THE CROSSING. INSTALL 4-#10 AWG WIRES WITH COLORS AS FOLLOWS: WHITE, BLACK, RED AND BLUE. WIRE SHALL EXTEND 2' BEYOND EACH END OF THE CONDUIT.

**FOREIGN PIPELINE CROSSING
TEST STATION DIAGRAM**

DETAIL 1
NOT TO SCALE

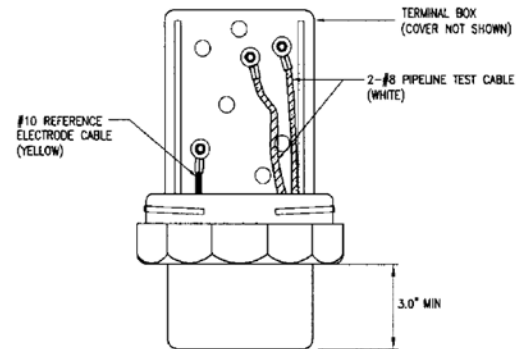


NOTES:

1. COVER OF THE TERMINAL BOX IS NOT SHOWN FOR CLARITY.
2. SEAL THE END OF THE LOWER PIECE OF THE TERMINAL BOX WITH DUXSEAL SEALING PUTTY.

**FOREIGN PIPELINE
"BIG FINK"-TERMINAL BOX**

DETAIL 3
NOT TO SCALE



NOTES:

1. COVER OF THE TERMINAL BOX IS NOT SHOWN FOR CLARITY.
2. SEAL THE END OF THE LOWER PIECE OF THE TERMINAL BOX WITH DUXSEAL SEALING PUTTY.

**PROJECT PIPELINE
"BIG FINK"-TERMINAL BOX**

DETAIL 2
NOT TO SCALE

ATTACHMENT A