SUPPLEMENTS TO THE: WYOMING PUBLIC WORKS STANDARD SPECIFICATIONS AND DETAILS

EFFECTIVE NOVEMBER 2025

2025 SUPPLEMENT TO THE

WYOMING PUBLIC WORKS STANDARD SPECIFICATIONS, 2015 EDITION

These Supplements add to, or revise, certain sections of the Wyoming Public Works Standard Specifications, 2015 Edition. Revised paragraphs and additions will correspond to the standard numerical number and title designation. Sections not modified shall remain in full force.

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engineering · environmental

SUPPLEMENT TO
WYOMING PUBLIC WORKS STANDARD SPECIFICATIONS

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SUPPLEMENT TO WYPWSS STANDARD DETAILS

DELETE the Standard Details identified below:

02220-01	Typical Trench Detail
02645-01	Typical Fire Hydrant Detail
02645-02	Water Valve Adjustment Detail
02665-01	Water Service Line
02700-01	Standard Cone Manhole
02700-02	Standard Flattop Manhole
02700-05	Manhole Cover Detail

Revised: November 20, 2025

ADD the following Standard details as included in this Supplement

DETAIL NO.	TITLE
L-02220-01	Typical Trench
L-02220-02	Trench Plug
L-02235-01	Encasement Pipe
L-02512-01	Asphalt Section
L-02645-01	Typical Fire Hydrant
L-02645-02	Water Valve Adjustment
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L-02665-08	Water Main Lowering on a New Water Main
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L-02700-01	Standard Cone Manhole
L-02700-02	Standard Flattop Manhole
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L-02700-05	Manhole Cover
L-02700-07	Dual Siphon Manhole Layout
L-02700-08	Sanitary Sewer Connections

DIVISION 1 – GENERAL REQUIREMENTS

ADD the following new section in its entirety:

SECTION 01001 – MOBILIZATION/DEMOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

A. Mobilization/demobilization shall be preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of all offices, buildings, and other facilities necessary for the work on the project; and for all other work and operations which must be performed, or costs incurred prior to beginning work on the various items on the project, and removal of those items at the completion of the work.

PART 2 PRODUCTS (not used)
PART 3 EXECUTION (not used)

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. Mobilization/demobilization will be measured on the lump sum basis.

4.02 BASIS OF PAYMENT

A. Mobilization/Demobilization will cover the costs of preparatory work and operations, including, but not limited to those necessary for the movement of personnel, equipment, supplies, materials, and incidentals to the project site; for the establishment of all offices, buildings and other facilities necessary for the Work on the project; for Contractor overhead relating to the project; and for all other work and operations which must be performed or cost incurred including project closeout, final cleanup and moving off of project site up completion of Work. Also included is the cost of project and office overhead and project administration costs.

   Also to be included in Mobilization/Demobilization are costs relating to fees, permits, licenses, and taxes which the Contractor is to obtain or pay, to perform work. Also included are all submittals required that are not paid for under other items. Maximum bid amount shall be 10% of the total bid price.

   Payment for mobilization will be made with the monthly estimate. The percentage of the item paid will be equivalent to the percentage of the original contract amount earned for each estimate

END OF SECTION

WYPWSS SECTION 01041 – PROJECT COORDINATION

1.02.C; ADD the following:

Tracking dirt onto streets is not allowed and if it occurs, it must be cleaned immediately. Gravel track-out pads or other approved method shall be used where applicable. Contractors shall provide adequate means for cleaning trucks and/or other equipment of mud prior to entering public streets, and take whatever measures are necessary to ensure that all roads are maintained in a clean, mud and dust free condition at all times.

No separate measurement or payment will be made for dust prevention measures and the cost will considered incidental to the contract.

1.03.A; REPLACE with the following:

The Contractor shall provide all surveying. All work shall be done by or under the direct supervision of a licensed Wyoming Professional Land Surveyor. The Engineer will provide reference points as necessary. The Contractor shall construct all work in accordance with the lines and grades shown on the Drawings, and as designated by the Engineer. These lines and grades may be modified by the Engineer as provided in the General Conditions. All survey information should be transmitted in an agreed upon digital format in Wyoming State Plane West Central Zone and NAD83 vertical datum.

1.03.B; REPLACE with the following:

The Contractor shall provide independent third-party materials testing. The tests shall be performed by a reputable testing firm, as approved by the Engineer, and all testing shall be in accordance with Wyoming Public Works Standard Specifications, this Supplement, and Special Provisions.

1.03; ADD the following paragraph:

C. The Contractor shall request a preliminary final inspection at least 48 hours prior to the date of the inspection. Contractor shall supply personnel to operate water valves and fire hydrants and to open manholes and catch basins to assist with establishing preliminary and final punch lists at no charge to the Contract.

The Engineer shall provide a written punch list of all deficient items identified during the preliminary final inspection. The Contractor shall complete all punch list items prior to requesting a final inspection.

Prior to the request for final payment, Contractor shall provide “As-Built” construction data/mark-ups on plan sheets and/or in a digital format such as survey points to the Engineer. “As-Built” documents shall adequately describe the location and elevation of infrastructure and horizontal site improvements that differ from the final plans with reference to a verified local benchmark. Additionally, all material deviations from the final approved plans shall be noted.

Part 4; ADD the following:

4.01 METHOD OF MEASUREMENT

A. When the contract stipulates, construction surveying will be paid for on the lump sum

basis.

B. When the contract stipulates, quality control materials testing will be paid for on the lump sum basis.

4.02 BASIS OF PAYMENT

A. Construction surveying will be paid at the lump sum unit bid price and shall constitute full compensation for all construction surveying and staking required to construct the project as shown on the plans in accordance with the requirements of the specifications. Payment shall include providing all materials, tools, equipment, labor, and incidentals for doing all work. Also covered under this item is the cost of providing survey notes and as-built survey data to the Engineer for development of as-built drawings. Payment of the first one-half of the lump sum for construction surveying will be paid with the first pay estimate which includes work on site requiring surveying. Payment of the second one-half of the lump sum for construction surveying will be paid with the last pay estimate which includes work on the site requiring surveying.

B. Quality control materials testing will be paid at the lump unit bid price and shall constitute full compensation for all materials testing necessary for quality control based on frequency and types of testing required in the specifications. Payment shall include providing all materials, tools, equipment, labor, certifications, and incidentals for doing all work. Payment also includes providing all materials testing results to the Engineer. Payment of the first one-half of the lump sum for materials testing will be paid with the first pay estimate which includes work on site requiring materials testing. Payment of the second one-half of the lump sum for materials testing will be paid with the last pay estimate which includes work on the site requiring materials testing.

WYPWSS SECTION 01090 – REFERENCES

1.01.A; revise the last sentence of this paragraph as follows:

In case of a discrepancy, the order of precedence listed in descending order shall be as follows:

1. Change Order
2. Addenda
3. Special Provisions
4. Construction Drawings
5. Supplements to Wyoming Public Works Standard Specifications
6. Wyoming Public Works Standard Specifications.

WYPWSS SECTION 01505 – TEMPORARY FACILITIES
Part 3; ADD the following sections:

3.01 WATER

A. Owner will furnish water in reasonable amounts for proper completion of the work at existing fire hydrants without charge to Contractor. Contractor shall furnish necessary pipe, hose, nozzles, and tools and shall perform all necessary labor. Contractor shall make arrangements with the Owner (who will fix the time, rate, and duration of each withdrawal from the distribution system) as to the amount of water required and the time when the water will be needed. Unnecessary waste of water will not be tolerated. In no case shall pipe wrenches be used on the City's fire hydrants.

3.02 POWER

A. Contractor shall provide all power for heating, lighting, operation of Contractor's plant or equipment, or for any other use by Contractor. Temporary heat and lighting shall be maintained until the Work is accepted.

3.03 SANITARY FACILITIES

A. Contractor shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.

B. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 men. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

3.04 FENCES

A. Contractor shall maintain all existing fences affected by the Work until completion of the Work. Fences which interfere with construction operations shall not be relocated or dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

B. Upon completion of the Work across any tract of land, Contractor shall restore all fences to their original or better condition and to their original location.

3.05 PROTECTION AND DAMAGE OF PUBLIC AND PRIVATE PROPERTY

A. Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards and parking,

shall be restored to their original condition, whether within or outside the easement. All replacements shall be made with new materials.

B. Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or men to or from the Work or any part of site thereof, whether by him or his Subcontractors. Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement, or payment of costs incurred in connection with the damage.

C. Contractor shall protect all existing structures and property from damage and shall provide bracing, shoring, or other work necessary for such protection. Contractor will be held responsible for any damage to existing structures, work, materials, or equipment because of his operations and shall repair or replace any damaged structures, work, materials, or equipment to the satisfaction of, and at no additional cost to, the Owner.

D. All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

3.06 SECURITY

A. Contractor shall be responsible for protection of the site and all Work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons.

B. No claim shall be made against the Owner by reason of any act of an employee or trespasser, and the Contractor shall make good all damage to the Owner's property resulting from his failure to provide security measures as specified.

C. Security measures shall be at least equal to those usually provided by the Owner to protect his existing facilities during normal operation, but shall also include such additional security fencing, barricades, lighting, and other measures as required to protect the site.

ADD the following new section in its entirety:

SECTION 01560 – TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. The following specification includes certain features which require special consideration during construction. Among these items are general construction activities.

PART 2 PRODUCTS

2.01 SUMMARY

A. All barricades, warning signs, lights, temporary signals, and other protective devices shall conform to the provisions for Construction Signing as indicated in the "Manual on Uniform Traffic Control Devices for Streets and Highways", current edition, published by the Federal Highway Administration.

2.02 TEMPORARY WATER PIPING

A. The water piping of temporary hoses, piping, etc. shall be a 160-psi rating, NSF approved hose, flexible polyethylene pipe, or PVC pipe. All pipe used for the temporary water system must have a visible NSF approval stamp by the manufacturer. A short section of high-pressure flexible rubber hose may be used for the connection to each residence. The temporary system must be leak proof.
B. The distribution pipe shall have a manual shut-off valve at each service tee. Shutoff valves shall be NSF approved valves.
C. The backflow prevention assembly shall be approved by the Engineer and the Owner during the submittal process. Backflow prevention devices shall be designed in accordance with the current AWWA Standard for Double Check Valve or Reduced Pressure Zone Valve Backflow-Prevention Assembly. Each backflow preventer shall be properly supported to protect the assembly and the attached piping from breakage. The first time a backflow prevention assembly is set up on a project, it shall be tested to verify its integrity. All costs associated with this testing shall be the responsibility of the Contractor.

PART 3 EXECUTION

3.01 TEMPORARY SERVICE

A. Temporary service shall be provided by the Contractor during any period when utility lines are disturbed, unless the Contractor makes other arrangements with the Owner. Service of domestic water lines and sewer lines shall not be interrupted for a period of longer than 4 hours, unless otherwise approved by the Engineer in writing. The interruption of water or sewer service shall not occur on more than two occasions, not occur on the weekend, and not occur before 9:00 am. Forty-eight (48) hour notice (excluding weekends and holidays) to the user is required prior to interruption of service.

B. Contractor shall be solely responsible for notification of those user affected by being out of service and for temporary connections, if needed. Notifications shall be in writing and contain, at a minimum, the following information:

1. Telephone number of the Contractor for inquiries or complaints
2. A summary of the work being completed
3. Date, time, and duration of service interruption

C. If any unscheduled, unannounced, or unapproved water outages occur as a result of Contractor's activities (including if the Contractor damages any existing water line that must remain in service, while installing new water lines), he cannot continue work until water service is restored to the satisfaction of the Engineer.

3.02 BYPASSING SEWAGE FLOWS

A. The Contractor is responsible for maintaining all sewage flows during construction when a manhole or section of line is out of service for lining, repair, inspection, or another reason. Work includes providing bypass pumping and piping whenever needed and for the duration required. The Contractor shall provide all materials, equipment, manpower, maintenance, equipment oversight, backup equipment, auxiliary power, backup plans, barricades and traffic control, temporary plugs, and anything as may be needed to maintain the flows without sewage backing up, as may be required for the duration required. The Contractor shall also periodically move the equipment and modify the set-up so the portion of the sewer system subject to temporary bypassing is not larger than is practical.

B. Sewage will not be allowed to spill into storm drains, street gutters, or open excavations. Any spills or backups that occur must be taken care of properly and immediately. In the event of a sewage spill or backup, the Owner shall be notified immediately, and the Contractor shall bear all costs associated with the spill or backup.

C. No bypassing shall occur until the Contractor has submitted a bypass pumping plan to the Engineer for approval. The plan shall include the following:

1. Expected flows
2. Proposed pump (including maximum flow rate and head)
3. Pipe layout and any associated traffic control
4. Backup equipment
5. Procedures to monitor upstream mains for backup impacts
6. Procedures for setup and breakdown of pumping operations
7. Emergency plan detailing procedures to be followed in the event of pump failures, sewer overflows, service backups, and sewage spills

3.03 TRAFFIC CONTROL

A. Traffic control shall be maintained as an ongoing process throughout the duration of the work. Contractor shall make all the necessary provisions for the maintenance of public traffic and shall conduct his operations so as to offer the least possible obstruction and inconvenience to public traffic.

B. The Contractor shall be responsible for coordinating traffic control with the City of Lander, Fremont County, the Wyoming Department of Transportation, and all emergency services. Traffic control devices and operations dealing with public traffic and roadways shall be accordance with applicable Wyoming laws, applicable WYDOT permits, and the Manual on Uniform Traffic Control Devices for Streets and Highways. The Contractor shall communicate his traffic control plans and closures with all emergency services forty-eight (48) hours prior to closure.

C. The Contractor shall submit his traffic control plan to the Engineer for approval. Construction shall not commence on the project until a Traffic Control Plan has been prepared, submitted, and approved by the Engineer and impacted agencies. Construction shall not commence on the portions of the project requiring traffic control until necessary construction warning signs are in place and approved by the Engineer.

D. Areas closed to traffic shall be protected by barricades and obstructions shall be reflectorized and illuminated during hours of darkness.

3.04 TEMPORARY WATER SERVICE

A. Following the Engineer's and Owner's review and approval of any proposed shutdown request, the Contractor shall issue shutdown notices in accordance with section 3.01. If the notices are not issued or the temporary service is not ready to be put in use, the Owner shall be free to exercise their authority in not closing down the existing valves and water main system.

B. The Contractor must have available all the necessary materials to complete the restoration of water to each of residential service within four (4) hours after the suspension begins or before 5:00 p.m., whichever comes first. House-to-house or building-to-building connections will not be allowed unless approved by the Owner.

C. Special arrangements shall be made by the Contractor to provide temporary water service for all commercial services regardless of the length of time the water main is out of service. The Contractor shall supply all hoses, fittings, etc., for providing temporary water service at his expense. Copper piping or other “non-taste” inducing pipe shall be necessary if the commercial consumer serves food or water products as part of the business.

D. Fire protection is not included unless specifically shown by the Engineer.

E. No component of the temporary distribution system may be in contact with, or at risk of being in contact with, sources of contamination.

F. Temporary Water System shall maintain pressures within a minimum pressure of 35 psi, or within 20 psi of the pressure at the City source (usually a hydrant) prior to installation of the backflow preventer; and maintain said minimum pressure at all times, at all points along the system, including service lines.

G. Where there is a potential for freezing, (and always between October 15 - May 15), temporary water system shall include a plan to provide sufficient movement of water to ensure that freezing does not occur; with Contractor providing mechanisms as required to avoid erosion, dangerous situations, or nuisance as might result from the dripping water; or, Contractor may contact users individually to ensure that each does maintain a drip inside the home, which is the preferred method of freeze protection. In all cases the Contractor shall be responsible for any damage of any private or public property due to freezing.

H. Contractor shall provide air relief valves where necessary to maintain pressure and when necessary to avoid air pockets from moving to residences or businesses, if any complaints are issued by the residence or business owner.

I. The Contractor shall be solely responsible for all activities related to locating, exposing and operating curb stop valves to the individual properties. Existing conditions shall be identified

and noted by the Contractor. Any existing condition that is suspected to indicate a defect of the curb stop valve, box, or service shall be reported immediately to the Engineer.

J. All pipe sizes and the system length shall be adequate to meet ordinary water supply demands of the consumers. The Contractor shall upsize the service at no additional cost if the home or business can show reasonable cause as to service deficiency.

K. Testing, Filling, Flushing, and Disinfecting of all temporary water lines and associated pipe and appurtenances shall be performed in accordance with the provisions of SECTION 02670 HYDROSTATIC TESTING and SECION 02675 DISINFECTION.

L. Once the temporary water system has been assembled, pressure tested and disinfected, the Contractor will make the final connection to the building. The Contractor should expect to find the existing plumbing on some services to have been in service for several years. The Contractor shall use an ordinary degree of care while working on these services. In addition, there may not be any convenient point of temporary connection on some services. In this case, temporary fittings must be provided to achieve the connection. This work will be incidental to the temporary water work. Any damage to the existing residential plumbing shall be repaired at Contractor's expense.

M. The Contractor will be required to protect the pipe at road crossings, alleyways, or residential driveways. The method of pipe protection shall be approved by the Engineer prior to placement.

N. The Engineer may not allow new asphalt to be cut for temporary water trenches in which case the temporary water main is to be relocated or other crossing methods are to be used. Aerial crossings of the temporary water lines at street crossings will not be allowed. Temporary water supply pipes shall not be installed in storm drain pipes. Mounding millings or cold mix over a temporary water pipe that has been trenched into existing asphalt pavement or is cased on the surface will be allowed under the following conditions:
   1. The maximum height shall be 2-1/2 inches.
   2. Provisions are made to avoid impact loads on the temporary water pipe.
   3. Signs are erected indicating a bump ahead at 500 feet and 100 feet from the bump and at the bump in both directions.

O. The asphalt crossings shall be cut straight and vertical shall have uniform width and shall be cut perpendicular to the centerline of the street. Restoration shall match the appropriate surface restoration detail and shall be compacted with a small mechanical compactor. There will be no payment for any street cuts or asphalt restoration under this item, this being incidental to the work. Exceptions to this requirement shall be made only on a case-by-case basis following the Contractor's proposal and subsequent review and approval by the Owner and Engineer.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. TEMPORARY WATER SERVICE

1. When the contract stipulates, payment will be made for temporary water service on a lump sum basis. No measurement of individual items will be required.

B. BYPASSING SEWAGE FLOWS

1. When the contract stipulates, payment will be made for bypassing sewage flows on a lump sum basis. No measurement of individual items will be required.

C. TRAFFIC CONTROL

1. When the contract stipulates, payment will be made for Traffic Control on a lump sum basis. No measurement of individual items will be required.

4.02 BASIS OF PAYMENT

A. TEMPORARY WATER SERVICE

1. Payment for temporary water service is to be full compensation for planning, supplying, setting up, maintaining, and tearing down a temporary water system which provides potable water to users throughout the project area during times when the existing water system must be shut down. The contract lump sum price for this item shall include notifications, shutting off existing service lines, making connections to houses/businesses off of the temporary piping as necessary, and disinfection and testing as required by the specifications. Also included are all materials, tools, equipment, excavation and labor, including providing a Certified Operator, in performing all work necessary or incidental to this item. Partial payment will be made on interim pay requests on a prorated basis as determined by the Engineer based on the quantity of water main installed.

B. BYPASSING SEWAGE FLOWS

1. Payment for bypass sewage flows shall include full compensation for planning, supplying, setting up, maintaining, and tearing down a temporary sewage bypass pumping system which provides bypass sewage flows throughout the project during times when the existing sewer must be shut down. The contract lump sum price for this item shall also include all pipe, pumps, backup pumps, manpower, temporary plugs, barricades, oversight, labor, maintenance, notifications, and incidentals required to provide full, complete and satisfactory bypass pumping of sewage (so sewage flows are uninterrupted) and the handling of sewage flows as required to properly complete all installations. Partial payment will be made on the interim pay requests on a prorated basis as determined by the Engineer based on the quantity of sewer system related work completed.

C. TRAFFIC CONTROL

1. Payment for traffic control will be made based on the unit bid lump sum price which shall constitute full compensation for planning, furnishing a traffic control maintainer and required labor, flagging, traffic control devices, setting up, maintaining the devices, tearing down, and providing all materials, tools, equipment, labor and other work involved with traffic control. Also covered under this item is the cost of maintaining any detours needed around construction sites and maintaining traffic flow and access in compliance with the Specifications. Payment each progress payment will be prorated based on the quantity of traffic control related work completed as determined by the Engineer.

END OF SECTION

DIVISION 2 – SITE WORK

ADD the following new section in its entirety:

SECTION 02010 – APPROVED CONSTRUCTION MATERIALS LIST

PART 1 GENERAL

1.01 SUMMARY

A. The manufacturers and materials listed in this document are to be explicitly used on all potable water, irrigation, and sewer utility construction within the City of Lander boundaries. No exceptions to this list will be made for any individual, developer, contractor, or development without permission of the City and Engineer. The City of Lander may update the document periodically as necessary if any new additions or deletions of materials are decided to be made by the City of Lander.

B. The City of Lander will consider adding water and sewer products or materials to the list upon request by a manufacturer or sales representative. In order for a product or material to be considered, the manufacturer or sales representative must submit a written request to the City of Lander's Distribution and Collection Systems Manager and upon request, may also be required to provide to the City of Lander a sample of the product or material.

C. The City of Lander will review each request to determine if a product or material meets the requirements set forth in the City of Lander design standards and all relevant industry standards. The City of Lander will base its review primarily on previous experience and knowledge and possibly from input of other individuals or entities in the water and sewer industry whose relevant expertise may be sought by the City of Lander.

D. The City of Lander may elect to put a sample into use in its system to help make the determination of whether a product or material functions satisfactorily for its intended purpose.

E. The City of Lander will attempt to review each request in an expeditious fashion to make a determination as quickly as possible. However, it should be expected that the review process may take a considerable amount of time, possibly up to one year or more if a product or material is put into operation in the system for evaluation.

F. Once the City of Lander has made a determination on a product/material request, the Distribution and Collection Systems Manager will send a written response to the manufacturer or sales representative describing the evaluation and presenting the decision of whether or not to add the product/material to the Approved Construction Materials List.

G. All valves and fittings must have grade 304 stainless steel bolts and hardware.

PART 2 PRODUCTS

2.01 APPROVED PRODUCT

A. Ductile Iron Water Pipe
   1. American Cast Iron Pipe Co.- Fastite
   2. Griffin Pipe Products Co.
   3. Pacific States Cast Iron Pipe Co.
   4. United States Pipe and Foundry Co. – Tyton Joint

B. PVC Water Pipe
   1. Diamond Plastic Corp.
   2. IPEX – Blue Brute
   3. JM Eagle
   4. North American Pipe Corp.
   5. Vinyltech
   6. Cresline

C. Ductile Iron Fittings
   1. Griffin Pipe Products Co.
   2. Star Pipe Products.
   3. Tyler Pipe Industries
   4. Union Foundry Co.
   5. United States Pipe and Foundry Co.
   6. SIP Industries (3”-24”)

D. Butterfly Valves
   1. Dezurik BAW Style
   2. Mueller Lineseal III
   3. Pratt Groundhog
   4. Valmatic American BFV

E. Gate Valves
   1. American Cast Iron Pipe Co. – Waterous series 2500
   2. Mueller A-2361 Series
   3. United States Pipe and Foundry Co. MetroSeal 250

F. Combination Air Valves
   1. ARI Model D-040

G. Potable Valve Boxes
   1. Castings, Inc. 6850 Series

2. Star Pipe Products VB-0002-35B
3. Tyler/Union 6850 Series

H. Curb Stop Boxes
1. A.Y. McDonald 5603 Series

I. Fire Hydrants
1. American Flow Control Waterous Pacer WB-67-250

J. Flushing Hydrants
1. Kupferle main guard 77
2. Mueller super centurion-200

K. Manhole and Vault Materials
1. Oldcastle Precast
2. Vaughn Concrete Products
3. Copeland Enterprises, Inc.
4. Rinker Materials

L. Mechanical Joint DIP(Wedge Style)
1. EBAA Iron Megalug 1100 Series
2. Star Pipe Products Stargrip Series 3000
3. Uni-Flange Series 1400
4. EBAA Iron Megalug 1700
5. Star Pipe Products Stargrip 3100p

M. PVC Mechanical Joint Fittings
1. EBAA Iron Megalug 2000PV
2. Star Pipe Products Stargrip 4000
3. EBAA Iron megalug 1500
4. EBAA Iron Megalug 1600
5. Uni-Flange Series 1390
6. Star Pipe Products Stargrip 1100

N. DIP push-on Joint (Boltless)
1. American Cast Iron Pipe Co. Flex Ring and Lok-Ring
2. Griffin Pipe Co. Snap-Lok
3. U.S. Pipe TR Flex

O. Pipe Service Saddles
1. Ford style 202BS
2. Ford style FS202
3. Mueller BR2B

4. Mueller BR2S & BR2W
5. PowerSeal 3409
6. PowerSeal 3417DI & 3417AS
7. A.Y. McDonald Model 3845
8. A.Y. McDonald model 3855
9. JCM 432 All Stainless
10. JCM 406 Coated Double strap
11. JCM 161 All stainless clamp
12. SmithBlair 317
13. JCM 241
14. JCM 502

P. Potable Service Lines
1. IPEX Q-Line-Blue (3/4 “ and 1”)
2. Poly Service Material Class 200 CTS (1 ½” and 2”)
3. J.M. Eagle Core
4. ADS Poly Flex
5. (K) Copper

Q. Meter Setters
1. Ball Valve before Meter
2. Check Valve

R. Manholes and Vaults
1. Oldcastle Precast
2. Vaughn Concrete Products
3. Colorado Precast Concrete
4. Copeland Enterprises, Inc. Multi-Setter Meter Vault
5. Rinker Materials

S. Meter Pits
1. Mueller Thermal-coil meter box
2. Ford Coil Pit setter

T. Manhole Ring and Cover
1. Castings, Inc. MH-400-24FPCI or equivalent
2. D&L Foundry
3. Neenah Foundry

U. Locking Manhole Ring and Cover
1. Castings, Inc. Model DIMH310

V. Tracer Wire

1. Tracer Wire for open trench construction- Copperhead High Strength1230; Reinforced 12 AWG copper-clad steel, 30 mil high density polyethylene coating suitable for direct bury and color coded per APWA standard for the specific utility marked, minimum 450 lb break load.
2. Tracer Wire for horizontal directional drilling – Copperhead SoloShot Extra-High Strength, 12 AWG copper-clad steel with minimum 1,150 lb break load, minimum 45 mill HDPE insulation thickness
3. Splice Kit- DryConn Waterproof Direct Bury Lug
4. Test station –
    a. C.P. Mini Box
    b. Snake Pit Lite Duty with two terminal lid, color coded for appropriate utility.
5. Ground Rod – Copperhead 1.5 pound Magnesium

W. Air Valve Manholes

1. Oldcastle Precast
2. Vaughn Concrete Products
3. Colorado Precast Concrete
4. Copeland Enterprises, Inc. Multi-Setter Meter Vault
5. Rinker Materials

X. Tapping Sleeves

1. Ford FTSS
2. Mueller H304SS
3. PowerSeal 3490
4. Ford FTSC
5. Smith Blair 622

Y. PVC Sewer Pipe

1. JM Eagle
2. North American Pipe
3. Vinyltech/Northern Pipe Products
4. Cresline
5. Diamond Plastics

Z. Sewer Tap Saddles

1. GPK Products
2. Multi Fittings

3. Plastic Trends

AB. Cleanouts

1. GPK Products
2. Multi Fittings
3. Plastic Trends

AC. Miscellaneous Sewer Service Fittings

1. JM Eagle
2. GPK Products
3. Multi Fittings
4. Plastic Trends

AD. Flexible Couplings

1. Fernco
2. Indiana Seal

AE. Manholes

1. Oldcastle Precast
2. Rinker
3. Vaughn Concrete Products
4. Colorado Precast Concrete
5. Lindsay Precast Inc. Firebraugh Division
6. Forterra Precast Concepts, LLC

AD. Ring and Cover

1. Castings, Inc.
2. D&L Foundry
3. Neenah Foundry
4. Locking – Castings, Inc. Model DIMH310

AE. Grease and Sand Oil Interceptors

1. Copeland Enterprises, Inc.
2. Oldcastle Precast, Inc.
3. Amcor Precast, Inc.

AF. Miscellaneous Materials

1. Valve Box Slip type
2. Castings, Inc.
3. East Jordan Ironworks
4. Star Pipe Products
5. Tyler/Union

AG. Corporation Stops, Curb Stops

1. A.Y. McDonald
2. Muellar
3. Ford

AH. Sewer service Backwater Valves

1. Backwater Valve Model 4963
2. Multi Fitting

AI. Grounding Anode

1. Copperhead- ANO-14

AJ. Foster Adapter

1. InFact Corporation
2. Star Pipe Products

AK. Casing Spacer

1. Advanced Products Systems (APS)

AL. Coffer Dam

1. Portadam Rain for Rent
2. Aqua-Barrier
3. Aqua Dam

PART 3 EXECUTION (NOT USED)

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MESUREMENT

A. No separate measurement will be made for items under this section, unless otherwise addressed in the Special Provisions.

4.02 BASIS OF PAYMENT

A. No separate payment will be made for items specified under this section. Full compensation shall be considered as included in the prices paid for various other contract items and no additional compensation will be allowed therefore unless otherwise addressed in the Special Provisions.

END OF SECTION

WYPWSS SECTION 02050 – REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS

4.02.A and 4.02.B; REPLACE with the following:

A. Lump Sum – Payment shall be made at the lump sum quote for this item in the Bid Schedule and shall be for the removal of all obstructions, including pipe, manholes, fire hydrants, structures and all items shown on the plans or encountered within the right-of-way. Payment also includes required excavation, backfill, hauling, disposal, disposal fees, salvage, and all other tools, equipment, and labor necessary to complete the item.

B. Unit Price – Payment for specific obstruction items including; pipe, manholes, fire hydrants, structures and all items shown on the plans shall be paid for as the measured quantities at the unit price called out in the Bid Schedule. Payment also includes required excavation, backfill, hauling, disposal, disposal fees, salvage, and all other tools, equipment, and labor necessary to complete the item.

WYPWSS SECTION 02075 – DEMOLITION OF ASPHALT AND PORTLAND CEMENT CONCRETE

3.01.A; REPLACE the last sentence with the following:

Pavement cuts shall be centered over the trench and at locations specified by the trenching and asphalt pavement standard details.

WYPWSS SECTION 02190 – AGGREGATES

2.03.A; ADD the following to the end of the paragraph:

Before production of any of the following materials, all vegetation and stripping material shall be removed from the pit. Only designated portions of the pit will be used.

2.03.B; REPLACE: "Contract Documents" with "Special Provisions or on the plans"

2.03.B.1; ADD the following to the end of the paragraph:

Of the particles retained on a No. 4 (425µm) sieve, at least 35% by weight shall have one (1) or more fractured faces as determined by ASTM D5821.

2.03.B.3; REPLACE the table with the following:

GRADATION REQUIREMENTS – PERCENT PASSING					
Sieve Size	Grading J	Grading GR	Grading L	Grading K	Grading W
2"	100	-	-	-	-
1-1/2"	90-100	-	100	100	100
1"	-	100	90-100	90-100	90-100
¾"	-	90-100	-	-	-
½"	-	65-85	60-85	-	60-85
#4	35-75	50-78	35-55	40-65	45-65
#8	-	37-67	25-50	30-55	33-53
#30	-	13-3	10-30	-	-
#200	0-15	4-15	3-15	3-15	3-12

2.03.B; ADD the following paragraph:

4. Base material shall have a minimum Resistance (R) value of 70 when tested in accordance with ASTM D2844, and the coarse aggregate shall have a maximum magnesium sulfate (MgSO4) soundness loss of 18% when tested in accordance with ASTM C88.

2.03.C; REPLACE with the following:

Crushed run sub-base and crushed run base shall be crusher run material of the maximum size as called for on the plans or the Special Provisions. If not specified, the maximum size shall not exceed three (3) inches.

2.03.D; REPLACE with the following:

Pit run or screened sub-base and base shall be pit run or screened material of the maximum size as called for on the plans or the Special Provisions. If not specified, the maximum size shall not exceed three (3) inches.

2.03; ADD the following paragraphs:

F. Sub-base shall be crushed or natural stone or gravel meeting the wear, liquid limit, plasticity index and gradation requirements specified for crushed sub-base and shall have a minimum R-Value of 60.

G. Recycled Aggregate Base - Upon approval of the City or their designated representative, recycled aggregate base manufactured from asphalt concrete and/or Portland cement concrete may be used if it conforms to the following gradation requirements and has a minimum Resistance (R) value of 70 when tested in accordance with ASTM D2844.

Sieve Size	**Percent Passing by Weight**	
	Type 1 – Imported	Type 2 – Recycled On-site
2”	100	100
¾”	70-100	-
No. 4	20-70	-
No. 200	0-12	0-12

2.04.B; REPLACE with the following:

COARSE AGGREGATE - Coarse aggregate shall be crushed stone, crushed gravel or natural gravel. Unless otherwise specified, the crushed aggregate shall have a percentage of wear of not more than 40 at 500 revolutions when tested in accordance with ASTM C131 and have a minimum 55% two fractured faces (ASTM D5821). The magnesium sulfate soundness loss shall not exceed 18% in accordance with ASTM C88, and the material shall be non-plastic.

2.04.C; ADD the following to the end of the paragraph:

The sand equivalent shall be a minimum of 40 (ASTM D2419). The fine aggregate angularity shall be a minimum of 40 (ASTM C1252).

2.05; ADD the following to the end of the paragraph:

Unless otherwise specified, the aggregate used for alley surfacing shall be grading GR.

2.06.A; OMIT the last sentence.

2.06.B; REPLACE with the following:

COARSE AGGREGATE - Coarse aggregate shall be crushed stone or crushed gravel of such gradation that when combined with other required aggregate fractions and fillers in proper proportion, the resultant mixture shall meet the gradation required under the composition of mixture for the specific type under contract. The crushed aggregate shall have a percentage of wear of not more than 40 at 500 revolutions when tested in accordance with ASTM C131 and have a minimum 55% two fractured faces (ASTM D5821). The magnesium sulfate soundness loss shall not exceed 18% in accordance with ASTM C88, and the material shall be non-plastic.

2.06.C; REPLACE with the following:

FINE AGGREGATE - Fine aggregate shall consist of crushed stone, crushed gravel, or natural sand. The fraction passing the No. 200 (75µm) sieve shall not be greater than two-thirds (2/3) of the fraction passing the No. 40 (425µm) sieve. The fraction passing the No. 40 (425µm) sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than three (3), except that when the plasticity index is non-plastic (NP), the liquid limit shall be not more than 30. The sand equivalent shall be a minimum of 40 (ASTM D2419). The fine aggregate angularity shall be a minimum of 40 (ASTM C1252).

2.07.D; REPLACE with the following:

The several aggregate fractions for the mixture shall be sized, graded and combined in such proportions that the resulting composite blend meets one of the grading requirements in the following table as specified. If not specified in the plans or Special Provisions, the Contractor shall use the 3/4-inch maximum grading specification.

Sieve	% Passing, Nominal Maximum Aggregate Size		
	3/4"	1/2"	3/8"
1 ¼" (31.5 mm)	-	-	-
1" (25 mm)	100	-	-
3/4" (19 mm)	90-100	100	-
1/2" (12.5 mm)	55-90	90-100	100
3/8" (9.5 mm)	45-85	55-90	90-100
No. 4 (4.75 mm)	30-65	35-70	45-85
No. 8 (2.36 mm)	20-50	20-55	30-65
No. 30 (600 µm)	5-30	5-35	10-40
N0. 200 (75 µm)	2-7	2-7	2-10

If Reclaimed Asphalt Pavement (RAP) is allowed and incorporated into the plant mix bituminous pavement, the combined gradations including the aggregates extracted from the RAP, shall conform to the gradation requirements herein.

2.09.B; REPLACE with the following:

Unless otherwise specified, the coarse aggregate shall have a percentage of wear of not more than 40. The magnesium sulfate soundness loss shall not exceed 18% in accordance with ASTM C88 and plasticity index shall not exceed three (3). The combined coarse and fine aggregate shall meet the following gradation requirements:

Sieve Size	Percentage Passing
1"	100
3/4"	95-100
#4	45-65
#8	33-53
#200	3-12

2.10.D - 2.10.H; REPLACE with the following:

D. For Types B and C bituminous surface treatment, provide and use crushed stone or gravel, which before crushing, at least 95 percent retained on ½-inch [12.5 mm] sieve, and of aggregate types that are well graded from coarse to fine in accordance with the following tables: Gradation Requirements: Bituminous Surface Treatment and Aggregate Properties: Bituminous Surface Treatment Types B and C.

Gradation Requirements: Bituminous Surface Treatment

Sieve	% Passing	
	Type	
	B	C
1” (25.0 mm)	-	-
¾” (19.0 mm)	100	-
½” (12.5 mm)	95-100	100
3/8” (9.5 mm)	40-70	80-100
No. 4 (4.75 mm)	0-15	0-10
No. 8 (2.36 mm)	0-7	0-5
No. 200 (75µm)	0-2	0-2

Aggregate Properties: Bituminous Surface Treatment Types B and C

Property	Test Method	Specification
LA Abrasion loss, max, %	AASHTO T96	35
Flat and elongated (1:5 ratio), max[(1)], %	ASTM D4791 (Method A)	10
Fractured Faces, min[(2)], %	AASHTO T335	95/90
Plasticity Index[(3)]	AASHTO T90	NP

[(1)] Flat and elongated is to be tested on coarse aggregate (plus No. 4 (4.75 mm) fraction).

[(2)] Percentage designation of “95/90” denotes 95 percent of the coarse aggregate has one or more fractured faces and 90 percent has two or more fractured faces.

[(3)] Based on minus No. 4 (4.75 mm) fraction of composite blend.

E. For other types of bituminous surface treatment, provide and use materials complying with the following requirements and the following table: Aggregate Properties: Bituminous Surface Treatment Types D, E, K, and S.
    1. For Type D, crushed stone or gravel, or clean pea gravel, with a maximum LA Abrasion loss of 35 percent, and with a plasticity index no greater than 3.
    2. For Type E, crushed sand and gravel, with a plasticity index no greater than 3.
    3. For Type K, a maximum LA Abrasion loss of 35 percent, and with a plasticity index no greater than 3.
    4. For Type S, crushed, screened or pit-run sand, with a plasticity index no greater than 3.

Aggregate Properties: Bituminous Surface Treatment Types D, E, K, and S

Sieve	% Passing			
	Type			
	D	E	K	S
1” (25.0 mm)	-	-	-	-
¾” (19.0 mm)	100	100	-	-
½” (12.5 mm)	95-100	95-100	100	100
3/8” (9.5 mm)	-	-	95-100	95-100
No. 4 (4.75 mm)	0-15	35-70	0-35	85-100
No. 8 (2.36 mm)	-	-	0-20	-
No. 200 (75µm)	0-10	0-10	0-3	0-5

2.13.A; REPLACE with the following:

Bed course material for sidewalks and curbing shall consist of sand, gravel, crushed stone or other approved material of such gradation that all particles will pass through a sieve having ½" square openings.

2.15.D; REVISE: percent passing on the #200 sieve from “0-15” to “3-12”

2.17.A.2; REPLACE with the following:

2. Class 2 Riprap aggregate for river restoration shall be hard, durable, ***angular to subangular***, resistant to weathering and wave action, free from overburden and organic material, and well-graded in accordance with the gradation specified on the plans. The material shall also meet the following durability requirements:

    1. Sodium Sulfate Soundness (ASTM 88): Loss shall be less than 10% after 5 cycles
    2. Resistance to Abrasion (ASTM C535): Loss shall be less than10% after 100 revolutions and less than 40% after 500 revolutions
    3. Resistance to Freeze-Thaw (ASTM D5312): Loss shall be less than 10%

a. The least dimension of an individual rock fragment must not be less than one third the greatest dimension of the fragment.

b. The gradation shall be as shown on the construction drawings. Gradation shall be based on the intermediate (B) axis of the individual rocks in accordance with section 4.2.4 of HEC 23, Publication No. FHWA-NHI-09-1112.

c. Rip Rap shall be taconite (“Mine Rock”) sourced from the area north of Atlantic City, WY. The contractor may submit an alternate material of the same shape, hardness, and specific gravity to the Engineer for approval.

Part 2; ADD the following section:

2.19 AGGREGATE FOR MICROSURFACING

A. Use 100 percent crushed stone or gravel of which 95 percent is retained on a 2-inch [12.5 mm] sieve before crushing. Ensure a sand equivalent of at least 65 percent, a maximum soundness ($MgSO_4$) loss of 20 percent on the coarse aggregate, and an LA abrasion loss of no more than 30 percent; supply the test results. Submit the job mix formula in accordance with Subsection 401.4.1.3, Composition of Plant Mix of the Wyoming Department of Transportation Standard Specifications for Road and Bridge Construction, including any current supplementary specifications and amendments issued prior to the date of advertisement; ensure accordance with following table.

Gradation Requirements: Microsurfacing

Sieve	% Passing
3/8” (9.5 mm)	100
No. 4 (4.75 mm)	70-90
No. 8 (2.36 mm)	45-70
No. 16 (1.18 mm)	28-50
No. 30 (0.60 mm)	19-34
No. 50 (0.30 mm)	12-25
No. 100 (150 µm)	7-18
No. 200 (75µm)	5-15

Part 3; ADD the following section:

3.03 CONTRACTOR QUALITY CONTROL

A. Preconstruction Testing - All testing and sampling shall be done in accordance with latest ASTM methods, unless otherwise specified. At least two (2) weeks in advance (except for Type 2 Recycled Aggregate Base, for which samples and/or certifications shall be submitted within five (5) business days of the start of on-site recycling) of the beginning of base work, the Contractor shall:

   1. Submit representative samples of the aggregate material to the Contractor's materials testing laboratory (Engineer-approved laboratory) for tests to determine the compliance of the proposed subbase material with these Specifications;

   2. Or shall submit certification based on testing performed within the last 12 months by an AASHTO-accredited or otherwise-approved laboratory that the materials to be used are in conformance with these Specifications.

B. Construction Testing - During construction the Contractor shall provide testing to demonstrate compliance with these specifications performed by an AASHTO-accredited or otherwise approved testing laboratory. The results of such tests shall be submitted by the laboratory to the Engineer within three business days.

WYPWSS SECTION 02210 – EXCAVATION AND EMBANKMENT

Part 2; ADD the following section:

2.06 POTHOLE EXCAVATION

A. Pothole excavation shall consist of excavation and replacement of material to identify location, depth, and material type of existing utilities.

3.02; ADD the following paragraph:

C. Replacement of material for pothole excavation shall be in accordance with section 02225 Trench Backfill.

4.01; ADD the following paragraph:

H. Pothole excavation shall be accounted for on a lump sum basis.

4.02; ADD the following paragraph:

H. Pothole excavation shall be paid for by the contract unit price which shall consist of full compensation for all labor, equipment, tools, mobilization, demobilization and incidental necessary to accomplish point excavation to locate an existing utility excavated to a safe and suitable state to measure and document the type and size of the utility. This item also includes all items necessary to backfill and recompact the point excavation.

WYPWSS SECTION 02225 – TRENCH BACKFILL

2.01.A.1; REPLACE the first sentence of the paragraph with the following:

Type 1 bedding material around the pipe in accordance with standard drawing L-02220-01 "Typical Trench". Bedding on the sides shall extend to the trench wall with at least the minimum dimension provided in L-02220-01. The material shall consist of select coarse-grained soils, with less than 5 percent passing a #200 sieve, such as gravel, sand, or silty sand meeting unified soil classification requirements as per ASTM designation D-2487 for type GW, GP, GM, GC, SW, SP, SM & SC, or as specifically approved by the engineer.

2.01.A; ADD the following:

3. Sanitary sewer mains set at minimum grades (as detailed by Wyoming Department of Environmental Quality) shall be bedded with either ¾" washed rock or pea gravel.

3.01.A.2; REPLACE the paragraph with the following:

After the select pipe bedding material has been placed and compacted as specified in subsection 3.02.A, the remainder of the trench backfilling shall be done. All backfill material shall be free from cinders, ashes, refuse, organic and frozen material, boulders, or other materials that are unsuitable as determined by the Engineer. From top of the bedding to two (2) feet above the bedding, material containing stones up to four (4) inches in the greatest dimension may be used. From two (2) feet over the bedding to six (6) inches below ground surface, or to the subgrade elevation for streets or paved areas, materials containing stones up to eight (8) inches in the greatest dimension may be used.

3.01.B.1; REPLACE the paragraph with the following:

Materials used for bedding and backfill shall be carefully deposited in depth layers suitable to the equipment used for compaction, but no greater than 12 inches. The material shall be compacted in accordance with section 3.02.

3.02.B; REPLACE the paragraph with the following:

Backfill material shall be placed in the trench for its full width on each side simultaneously. Compaction of backfill material shall be compacted to a density of not less than ninety-five (95) percent of maximum dry density and plus or minus 2% of optimum moisture as determined in accordance with AASHTO T-99, unless otherwise noted in the Special Provisions.

3.03.A; REPLACE the paragraph with the following:

Field density testing of compacted fill will be run as follows; one (1) test per 100 feet of trench, or fraction thereof, at all levels, one (1) 12" above the pipe, one (1) mid depth, and one (1) 12" below finished subgrade. These tests will be performed by a reputable testing firm at the discretion of the Engineer, hired by the Contractor and approved by the Owner. The Contractor shall provide necessary equipment to dig test holes, if necessary. The Contractor shall be responsible for correction of any areas failing compaction test, and the expense of such correction shall be borne by the Contractor.

3.04.A; REPLACE the paragraph with the following:

The Contractor shall, for a period of two (2) years after completion and final acceptance of

the work, repair any trench settlement which may occur and shall make suitable repairs to any pavement, sidewalks, or other structures which may become damaged as a result of backfill settlement.

ADD the following new section in its entirety:

SECTION 02230 – HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SUMMARY

A. This section covers requirements for installation of underground infrastructure using the trenchless technology method known as Horizontal Directional Drilling (HDD). The HDD method involves first drilling a pilot bore in the location(s) as indicated on the plans, and then next enlarging the drilled pilot bore to facilitate the installation of the required pipe line or bundle, herein referred to as the "product pipe." The pilot bore is enlarged approximately 1.5 times the size of the product pipe and then the product pipe is pulled into the enlarged borehole.

1.02 RELATED WORK

A. Section 02235, Trenchless or Open Cut Installation of Steel Casing
B. Section 02665, Water Distribution and Transmission Systems
C. Section 02700, Sanitary Sewer Systems
D. Section 02731, Pressure Sewer Lines and Force Mains

1.03 QUALITY ASSURANCE

All installations shall be in accordance with the approved HDD Consortium's "Horizontal Directional Drilling Good Practices Guideline, Third Edition" and updates thereof.

1.04 SUBMITTAL

A. Submittal requirements for small and medium bore size classifications are as follows:

1. Personnel Qualifications
2. Drilling Fluid Management Plan
3. Bore Data
4. As-built Data

B. Large bore size classification or more technical small and medium bore classifications may require additional submittals provided in the Special Provisions.

C. The required items contained in items 1 and 2 shall be submitted prior to the authorization to commence field construction. Copies of all documents shall be maintained at the construction site and be available for inspection.

D. Personnel Qualifications: The Contractor shall provide a competent and experienced individual familiar with the equipment and the type of HDD operations to be performed. The individual shall be present onsite while HDD operations are being performed and be in direct charge and control of the HDD operations. Documentation of experience and appropriate training evidenced by a certificate of attendance from a training program shall be provided upon request.

Pipe that requires fusion of the joints, such as HDPE or Fusible-PVC, shall be fused

by a skilled operator. The Contractor is responsible for using qualified personnel to ensure the fusion process follows the pipe manufacturer's recommended procedures. The Contractor shall submit certification from the pipe manufacturer or an accredited training agency documenting personnel qualifications. Untrained personnel shall not be permitted to perform fusion of any pipe on the project. Unless noted otherwise in the Special Provisions, the Contractor is not required to use a data-logger or manually record data about each fused joint in the product pipeline.

E. Drilling Fluid Management Plan: Indicate the type and amount of the drilling fluid planned to be used on the project. Include safety data sheets for the identified drilling fluid components and additives. The drilling fluid plan is developed based upon the anticipated soil conditions, and a sufficient supply of fluid is to be available to enable successful completion of the bore. Indicate the intended method of disposal of spent drilling fluids and include approvals from off-site disposal sources. The Drilling Fluid Management Plan shall identify contingency measures to be employed in case of inadvertent returns. The contingency plan may include containment with sediment control devices, removal with vacuum equipment or other such contingency measures as appropriate. In all cases, the plan shall indicate that if primary control measures fail and inadvertent returns cannot be controlled, work will be suspended until such a time as the plan can be revised and effective control measures can be implemented.

F. Bore Data: Identify the installed location of the bore by writing down each rod and indicating the depth and pitch. Submit a copy of this information when requested.

1. Rod/joint number
2. Depth and pitch of locate reading

G. As-Built: Identify the installed location of the bore on a scaled drawing referencing any benchmark information provided on the original construction drawings. Also indicate the location of all existing utilities as provided on the original construction drawings and verified in the field, as well as any undisclosed utilities as discovered in the field throughout the prosecution of this work. Also submit copies of any drilling fluid logs, pipe fusion logs, and any other such information as it pertains to the work undertaken pursuant to this specification.

1.05 DEFINITIONS

A. Classifications: Installations are classified as small, medium, or large which serves as a general indication of the level of equipment required for the installation. The size of bore is measured in inch-feet and is calculated by multiplying the nominal product pipe diameter in inches by the minimum allowable length of crossing in feet as indicated on the plans or as can reasonably be inferred from the locations of such bends, fittings, service connections, valves and any other equipment requiring excavation and/or connection to the pipe line at a specified location. The bore size refers to each individual bore, not the total footage of the permitted design.

B. Bore Size: Bore size calculation: 200 foot installation of a 4 inch diameter pipe has a bore size of 800 in-ft. (200 ft. × 4 in. = 800 in-ft)

TABLE 02230-1	
CLASSIFICATION OF BORE SIZES	
Classification	**Bore Size**
Small	Up to 6,000 in-ft
Medium	6,001 in-ft to 15,000 in-ft
Large	Above 15,000 in-ft

C. Bore-tracking Equipment: Methods and systems generally defined as a walkover or non-walkover. To be specified by the Contractor and used to measure the actual accuracy of the bore to the specific line and grade. The bore path is monitored during the pilot bore by taking periodic readings of the inclination and azimuth of the probe located within the sonde housing.

D. Bore-tracking Pit: An excavated area for entry, exit, slurry sump, or any other excavation used to manage, control, and track the progress of the bore.

E. Critical Structure: Any pipeline, utility, building, structure, bridge, pier, or similar construction partially or entirely located within a zone of active excavation.

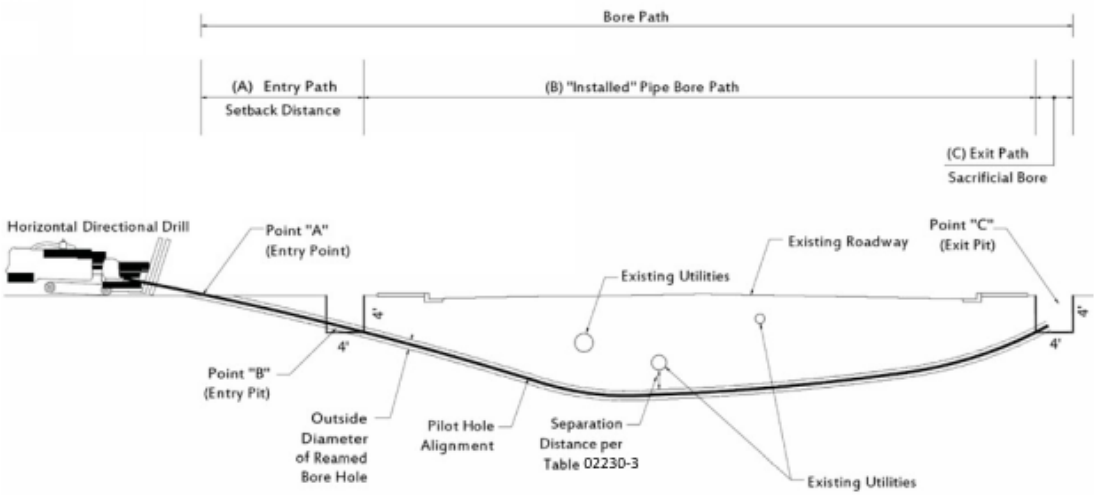
F. Drilling Fluids: Fluids consisting of water, bentonite, and any approved additives such as environmentally safe polymers, lubricants, and viscosifiers.

G. Pilot Hole: The initial controlled drilled horizontal shaft used to guide the enlargement to design size and eventual installation of the product pipe.

H. Pullback: The pipe installation pulled back by a swivel/pulling head connected behind the reamer, which pulls the prepared product pipe into place.

I. Reaming: The back reaming hole opener is attached to the drill pipe and rotated and pulled back through the pilot hole to enlarge the bore in one or more passes to the size needed for product pipe installation.

Figure 02230-1



The setback distance is dependent upon elevation difference from A (surface) to B (desired grade), entry angle of rig, and bending radius of drill rods.

PART 2 PRDOUCTS

2.01 MATERIALS

A. PIPE
All product pipe material shall be of the size, type, and class as shown on the plans. All product pipe shall conform with AWWA C906, Polyethylene (PE) Pressure Pipe and Fittings.

B. TRACER WIRE
Solid copper or copper clad steel tracer wire insulated with high molecular weight polyethylene shall be installed on top of all pressure pipe and secured with industrial grade non-adhesive, waterproof tape at minimum ten (10) foot intervals to prevent movement. The tracer wire shall be looped into a tracer wire test station located at each fire hydrant and/or where shown on the plans, as per the Standard Detail. Sufficient length of slack shall be provided to allow the tracer wire to reach 12 inches above finished grade. All connections shall be kept to a minimum and shall be made with industry approved direct bury splice. The entire system shall be interconnected and shall be tested for continuity prior final pavement. The tracer wire for horizontal directional drilling shall be Copperhead SoloShot Extra-High Strength, 12 AWG copper-clad steel with minimum 1,150 lb break load, minimum 45 mill HDPE insulation thickness or approved equal.

PART 3 EXECUTION

3.01 CONSTRUCTION

A. Horizontal Directional Drilling Equipment: The HDD equipment is to have an electronic “walkover” tracking system or a Magnetic Guidance System (MGS) to accurately guide boring operations; a system to monitor maximum pullback pressure during pull-back operations; a system to detect electrical current from the drill string shall be in place with an audible alarm that automatically sounds when an electrical current is detected; a vacuum unit of sufficient capacity to handle the drilling fluid volume; and trained and competent personnel to operate the systems. All equipment shall be in good, safe condition with sufficient supplies, materials, and spare parts on hand to maintain the system in good working order for the duration of the project.

B. Guidance System: An electronic “walkover” tracking system, or a MGS probe or proven (non-experimental) gyroscopic probe, and interface for continuous and accurate determination of the location of the drill head shall be used during the drilling operation. The locating system shall be capable of determining the in-ground position of the drill head and shall be accurate to ±2% of the distance from the transmitter to the receiver. It shall enable the driller to guide the drill head by providing information on the pitch; roll and clock face orientation of the drill head. The locating system shall be capable of determining the depth of the drill head from the transmitter to the surface at any location along the path of the bore. The locating system shall be calibrated per the manufacturer’s specifications prior to commencing the bore.

C. Drilling Fluid (Mud) System: A self-contained, closed, drilling fluid mixing system of sufficient size to mix and deliver drilling fluid composed of bentonite clay, uncontaminated water, and appropriate additives shall be used. The mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be of sufficient capacity to supply an amount of drilling fluid that is equal to the maximum rated output of the drilling fluid pump over at least a fifteen-minute duration. Ensure the drilling fluid is mixed per drilling fluid manufacturer's recommendations and continually agitate the drilling fluid during drilling operations.

The Contractor shall be responsible to monitor drilling fluid properties and return fluid properties and shall modify the drilling fluid mix as appropriate for the soil conditions encountered. Contractor shall continually monitor and record any necessary drilling fluid properties such as viscosity as determined by a marsh funnel standard test method (ASTM D6910). The drill fluid pumping system shall be capable of delivering drilling fluid at a sufficient output rate and at minimum pressures as necessary to enable successful completion of the bore. Furnish pumping equipment and/or vacuum truck(s) of sufficient size to convey drilling fluid from containment areas, to storage and recycling facilities or disposal.

D. Directional Drilling Operation: Prior to drilling the pilot hole, "walk" the bore path with the locating system, as per the manufacturer's specifications, attempting to identify any areas of potential interference and record the results of such inspections. Verify that all known utilities have been located and there is no conflict with the proposed work. Ensure all utilities that run parallel within 2' of the proposed work are exposed at intervals sufficient to determine there will be no conflict with the proposed work. Comply with surface survey requirements.

Determine the depth of the drill head every 10' or every rod length, whichever distance is greater. Record location information for the entirety of the bore, either manually in a driller's log or automatically via the locating system. Make all recorded readings, and plan and profile information available at all times. Do not allow the deflection radius of the drill pipe exceed the deflection limits of the product pipe at any time throughout the crossing. Use white paint and mark the depth of the pilot bore on the ground at an interval not exceeding 10'.

Stabilize the open bore hole by means of bentonite drilling slurry pumped through the drill rod and through openings in the drill head or reamer. The drilling slurry shall be in a homogenous/flowable state serving as an agent to carry the loose cuttings to the surface through the annulus of the borehole. Calculate the volume of drilling fluid required for each reamer pass based upon hole size and soil conditions. The driller shall not be permitted to "outrun his mud" which is the condition occurring when the drilling penetration or retrieval rate is generating cuttings at a rate faster than the drill fluid pumping system can suspend and convey the cuttings out of the bore hole.

Contain all drilling fluids in pits or holding tanks for recycling or disposal. Monitor drill fluid circulation throughout the duration of the bore activity and immediately take corrective actions to restore fluid circulation should circulation be lost.

Upon completion of the pilot bore, ream the bore hole up to a large enough diameter to accommodate the pullback of the product pipe. The final reamed hole opening shall be 1.5 times the outside diameter of the product pipe for pipe lines 24” or less, or no larger than 12” plus the outside diameter of the product pipe for pipe lines greater than 24”.

Maintain a one foot (1’) minimum separation between the outside of the pilot bore hole and the outside of the utility when no reaming is required to install the product pipe.

When the pilot bore hole is to be reamed, maintain a minimum separation between the outside of the pilot bore hole and the outside of existing utility equal to one foot greater than the largest required reamer diameter.

Minimum separation between the bore and any existing underground utility shall conform to Table 02230-3.

TABLE 02230-3	
MINIMUM SEPARATION FROM EXISTING UNDERGROUND UTILITIES	
Minimum Separation	Type of Underground Utility
2’ vertical	Outside of bore to outside of wet utility (wastewater, storm, flood irrigation, water, etc.)
1’ vertical	Outside of bore to outside of dry utility
6’ horizontal	Running line to outside of wet utility

E. Handling Product Pipe: Care shall be taken during transportation of the product pipe to prevent it from being cut, kinked, or damaged. Use ropes, fabrics, or rubber protected slings and straps when handling pipes. Do not use chains, cables, or hooks inserted into the pipe ends. Use slings spread apart for lifting each length of pipe. Do not drop pipe or fittings onto rocky or unprepared ground.

Store pipe on level ground that is free of sharp objects that could damage the pipe. Limit the stacking of pipes to a height that will not cause excessive deformation of the bottom layers of pipe under anticipated temperature conditions. Where necessary due to ground conditions store the pipe on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

Handle assembled pipe in a manner that avoids damage to the pipe. The pipe is not to be dragged over sharp objects. Position slings to prevent stress on pipe joints. Product pipe that has cuts, gouges, or excessive deformation shall be removed and replaced.

F. Line and Grade:
1. Check and record the survey control for the boring operations against an above ground undisturbed reference as required to accurately guide and monitor the constructed length (+/- 20 feet).
2. At a minimum of every drill rod connection or a maximum of every 10 feet, record the position of the drill bit, then make immediate corrections to alignment position before allowable tolerances are exceeded.
3. When drill is off line or grade, make ongoing alignment corrections to avoid

major changes and keep within specified tolerances. Borings that do not meet tolerances shall be replaced at no additional cost to the Owner. Replacement shall include removal and replacement by open cut or by re-drilling on a parallel alignment as directed by the Engineer.

4. Tolerance in the horizontal and vertical shall be 0.2 feet per 100 feet.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. Measurement of pipe installed by HDD shall be by the lineal foot of pipe installed. Measurement shall be along the centerline of the pipe, through all valves, fittings and manholes, from centerline to centerline of valves, fittings or structures or to the end of pipe.

4.02 BASIS OF PAYMENT

A. Payment will be made at the contract unit price for each type and size of pipe installed and accepted. Payment shall be compensation in full for the pipe, fused transition fittings, and furnishing all labor, material, pipe fusing equipment with qualified personnel, drill mud, tracer wire, tools, and equipment required for the horizontal directional drilled installation of product pipe, complete in place, including all related excavation, shoring and bracing, backfill, compaction, pressure testing, and disinfecting.

END OF SECTION

WYPWSS SECTION 02231 – AGGREGATE SUB-BASE AND BASE COURSES
3.03; ADD the following paragraph:

D. Density Testing Frequency

Portion of Work	Frequency (minimum)
Subgrade	1 per 500 SY or fraction thereof
Crushed Base	1 per 500 SY or fraction thereof

3.03; ADD the following paragraph:

E. Blue tops (subgrade) and red tops (crushed base) will be required for acceptance of finished surfaces prior to placing the next material layer.

ADD the following new section in its entirety:

SECTION 02235 – TRENCHLESS OR OPEN CUT INSTALLATION OF STEEL CASING

PART 1 GENERAL

1.01 SUMMARY

This section covers requirements for installation of steel casing by a) Trenchless operation; using horizontal earth auger boring, hand tunneling or pipe ramming, or b) Open Cut operation; using trenching, placement and backfill for the protection of underground utilities.

1.02 RELATED WORK

A. Section 02230, Horizontal Directional Drilling
B. Section 02665, Water Distribution and Transmission Systems
C. Section 02700, Sanitary Sewer Systems
D. Section 02731, Pressure Sewer Lines and Force mains

1.03 QUALITY ASSURANCE

All installations shall be in accordance with the approved HDD Consortium's "Horizontal Directional Drilling Good Practices Guideline, Third Edition" and updates thereof.

1.04 SUBMITTAL

Submittal requirements are:

A. Detailed shop drawings of the bore pit and receiving pit shoring, bulkheads, carrier pipe installation method,
B. and welder certifications.

Copies of all documents shall be maintained at the construction site and be available for inspection.

PART 2 PRODUCTS

2.01 MATERIALS

A. PIPE
1. Steel casing shall conform to ASTM A283 Grade C, ASTM A252 Gr.2, ASTM A53, ASTM A139, (American Petroleum Institute "API" Specification) API 5L Gr B, API 5L X42 or API 5L X52. Welding shall use matching filler metal requirements as listed in AWS D1.1 Table 3.1. Shop and field joints shall be welded in accordance with AWS D1.1/D1.1M. Welding shall be performed by AWS D1.1 qualified personnel.

2. Steel Casing Wall Thickness: The minimum wall thickness for steel casings shall be in accordance with Table 02235-1.

Table 02235-1	
Casing Diameter (inches)	**Minimum Wall Thickness (inches)**
8	.322
10	.365
12, 16, 18, 20, 24, 30 and 36	.375
42, 48	.500
54, 60	.625
66, 72, 78	.750
84 and up	1.00

3. Steel Casing Diameter for Trenchless Installations: The steel casing for pressurized carrier pipes shall be a minimum of 12-inches larger than the largest outside dimension of the carrier line, (including pipe bells and flanges) or the size indicated on the plans, whichever is greater.

   Unless otherwise directed by the Contracting Agency or by special design, the steel casing for gravity carrier pipes shall be a minimum of 18-inches larger than the largest outside dimension of the carrier line, (including pipe bells and flanges) or the size indicated on the plans, whichever is greater.

4. Steel Casing Diameter for Open Cut Installations: The steel casing for pressurized carrier pipes shall be a minimum of 6-inches larger than the largest outside dimension of the carrier line, (including pipe bells and flanges) or the size indicated on the plans, whichever is greater.

   The steel casing for gravity carrier pipes shall be a minimum of 12-inches larger than the largest outside dimension of the carrier line, (including pipe bells and flanges) or the size indicated on the plans, whichever is greater.

B. CASING SPACERS:

1. Spacers consisting of stainless-steel bands surrounding a PVC liner with polymer plastic risers shall be utilized inside the casing to center the carrier pipe. The bolts, nuts, and washers shall be T-304 Stainless Steel. The casing spacer shall not require special tools to install.

C. END SEALS:

1. End seals shall be pull-on or wrap-around flexible style and made of 1/8” thick synthetic rubber. End seals shall be secured with T-304 stainless steel banding straps.

PART 3 EXECUTION

3.01 CONSTRUCTION

A. DEWATERING:

Any water encountered during the operation shall be disposed of by the Contractor in

a manner that will not damage public or private property or create a nuisance or health problem. The cost of furnishing pumps, pipes, and equipment for dewatering shall be considered incidental to the work and no additional payment shall be made.

B. CARRIER PIPE PLACEMENT:

The tolerances allowed for the alignment and grade of carrier pipe shall comply with requirements of the applicable section of specification for the carrier pipe. The Contractor shall be responsible to obtain the required line and grade for the carrier pipe, the carrier pipe shall not contact or rest on the casing.

Pressurized carrier pipes, (i.e. water, gas, force main) shall be placed using casing spacers. Casing spacers shall be installed 3 per joint minimum with 8-foot maximum spacing. The annular space between the casing and carrier line shall be left empty unless otherwise directed. When the annular space is to be filled, 3/8-inch pea gravel shall be used.

Gravity carrier pipes (i.e. sewer, storm drain, irrigation) shall be placed using grade casing spacers. The annular space between the casing and carrier line shall be left empty unless otherwise directed. When the annular space is to be filled, 3/8-inch pea gravel shall be used.

Alternative casing end closures may be substituted for flexible pull-on or wrap around end seals. Bulkheads consisting of brick and mortar or concrete may be constructed on the ends of the casing if approved by the engineer; bulkheads shall be a minimum of 8-inches thick.

PVC conduits for dry utilities, (i.e. communications, fiber, electric) shall be placed using non-metallic PVC casing spacers.

After completing the carrier pipe installation, the Contractor shall remove all loose and disturbed material in the bore pits and backfill the pits in accordance with Section 02225.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. ENCASEMENT PIPE
Measurement of encasement pipe shall be by the lineal foot of pipe installed. Measurement shall be along the centerline of the encasement pipe, to the end of pipe.

4.02 BASIS OF PAYMENT

A. ENCASEMENT PIPE
Payment will be made at the contract unit price for each type and size of encasement pipe installed and accepted. Payment shall be compensation in full for the encasement pipe and furnishing all labor, material, tools, and equipment required for the installation of encasement pipe, complete in place, including all related excavation, shoring and bracing, welding, casing spacers, annular space fill material (when required), end seals, backfill, and compaction. When specified payment shall also

include testing, restoration, and connections to existing lines or works. Payment for encasement pipe does not include payment for the carrier pipe. A separate payment will be made for the carrier pipe and any required testing of the carrier pipe.

END OF SECTION

WYPWSS SECTION 02273 – RIPRAP

2.01; ADD the following paragraph:

G. Geotextile placed under the riprap shall be a non-woven needle punched geotextile meeting the following requirements, unless specified otherwise on the plans or in the Special Provisions:

Non-woven Geotextile Filter Fabric Minimum Average Roll Values			
Property	**Test Method**	**MARV***	**Units**
Mass Per Unit Area	ASTM D5261	8	oz./yd^2
Tensile Strength Puncture Strength	ASTM D4632 Grab Test ASTM D4833	200 min. 80 min.	lbs. lbs.
Elongation at Failure	ASTM D4632	≥50	%
Ultraviolet Light (% residual tensile strength	ASTM D4355 150-hr exposure	70 min.	%
Permittivity Flow Rate	ASTM D4491 ASTM D4491	1.0 min. 100 min.	sec-1 gal/min/ft^2
Apparent Opening Size	ASTM D4751	#70 max.	U.S. Sieve Size

*MARV = Minimum Average Roll Values

3.02.A; REPLACE the first sentence of the paragraph with the following:

When called for on the Plans or Special Provisions, a layer of geotextile shall be placed on the slope immediately prior to the placement of the riprap stone.

3.02.B; DELETE this paragraph.

3.02.D; REPLACE with the following:

1. Unless noted otherwise in the Special Provisions, prior to placement of the riprap, a non-woven geotextile (engineered fabric in accordance with 2.01 Materials Paragraph G) shall be installed on the slope to prevent piping. Rock riprap shall then be placed on the geotextile in such a way to ensure it is not punctured during placement. Prior to the placement of the geotextile, the ground surface shall be graded smooth. No rocks, lumps of dirt, or other material, which may damage the geotextile, shall remain. Rock riprap or geotextile shall not be placed until the subgrade preparation is completed and the subgrade surface has been inspected and approved. Geotextile shall be laid smooth without folds or wrinkles. Adjacent rolls shall be overlapped a minimum of 24-inches.

2. The primary stone as identified in Section 02190, shall be mechanically placed to the depth and area as shown on the drawings and adjusted to maximize the interlocking between the stones. Adjustments shall be made by equipment similar to an excavator with a thumb attachment.

WYPWSS SECTION 02512 – PLANT MIX PAVEMENTS

1.01; ADD the following:

C. Plant mix pavements shall be constructed in accordance with engineering plans prepared under the direction of a professional engineer and approved by the City Engineer. Plans shall conform with the City of Lander minimum design standards.

2.01.A; ADD the following paragraph:

4. For full-depth new construction, PG 64-28 binder shall be required unless otherwise specified in the contract. For construction of overlays over existing asphaltic concrete pavement, the binder shall be the Contractor's option of PG 64-22 or PG 64-28 unless otherwise specified in the Special Provisions. Performance-Graded binders with higher upper specification temperatures, decreased lower specification temperatures, or both, may be substituted upon written notice to the City or their designated representative. The bituminous material shall meet the applicable requirements of Section 2545, Bituminous Materials.

2.01.C.1.b; REPLACE with the following:

HYDRATED LIME - When necessary to meet the tensile strength ratio requirements herein, or when specified in the contract, hydrated lime analyzed in accordance with ASTM C25 and conforming to the following requirements shall be used. Provide a Certificate of Compliance for every delivery of hydrated lime used wholly or in part in the project.

Chemical Composition for Hydrated Lime

Component	Percent (Non-volatile Basis)
Calcium Oxide ((CaO)	7.0, max.
Active Lime Content, Calcium Hydroxide ($CaOH_2$) + Calcium Oxide (CaO)	90.0, min.
Carbon Dioxide (CO_2)	2.5, max.
Magnesium Oxide (MgO)	2.5, max.
Combined Iron and Aluminum Oxides (Fe_2O_3 and Al_2O_3)	1.5, max.
Silica (SiO_2) and Insoluble Matter	3.0, max.
Free Water Content	3.0, max.

2.01.D; REPLACE with the following:

1. The asphaltic pavement shall be hot mixed at a central plant. It shall consist of mineral aggregates and hydrated lime if required, uniformly mixed with bituminous material and laid upon the prepared base to the finished thickness shown on the typical cross-section on the plans or as directed by the Engineer.

2. The contractor shall submit for the engineer's approval a job-mix formula for each mixture to be supplied for the project. The job-mix formula with the allowable tolerances shall be within the master range specified. The job-mix formula for each mixture shall establish a single percentage of aggregate passing each required sieve size and a single mixing temperature.

   a. Asphaltic Pavement Mixture Design Criteria. The proposed mixture may be designed using either the Marshall or Superpave method in accordance with the criteria listed below. Should a change in sources of material be made, a new job-mix formula shall

be established before the new material is used.

Property	Marshall	Superpave
Number of blows	50	-
Marshall Stability (lbs (N)) – minimum	1500 (6700)	1500 (6700)[1]
Marshall Flow (0.01 in (0.25 mm))	8-16 (8-16)	8-16 (8-16)[1]
Number of gyrations	-	50
Air Voids – mix design target (%)	4.0	4.0
Air Voids – production target (%)[2]	3.0	3.0
Air Voids – at $N_{initial}$ = 6 gyrations - minimum (%)	-	8.0
Air Voids – at N_{max} = 75 gyrations - minimum (%)	-	2.0
Tensile Strength Ratio (TSR-ASTM D1075) – min[2]	75	75
Voids Filled with Asphalt Binder	65-78	65-78

[1] - Marshall Stability and Flow shall be determined for Superpave mixes. Either gyratory or Marshall compaction may be used to compact the Marshall Stability specimens.

[2] - Production air void target for 3/8" nominal maximum aggregate size (NMAS) mixes shall be 4.0 percent.

[3] - if an antistrip agent is used, the agent and rate of application shall be noted in the mix design.

Percent Voids in Mineral Aggregate (VMA)

Nominal Maximum Aggregate Size and Range of Required VMA		
3/4" (19 mm)	1/2" (12.5 mm)	3/8" (9.5 mm)
13.0-16.0	14.0-17.0	15.0-18.0

b. Uniformity. The plant shall be so designed and operated as to produce a job mixture whose permissible variance from the mix design shall be as follows:

Amount passing on the No. 4 sieve and larger	+/- 7%
Amount passing on the No. 8 to No. 100 sieves	+/- 5%
Amount passing on the No. 200 sieve	+/- 2.0%
Asphalt Cement	+/- 0.5%
Laboratory air void content	+/- 1.5%

2.01; ADD the following paragraphs:

E. RECLAIMED ASPHALT PAVEMENT (RAP)

1. Unless otherwise specified, RAP in an amount not to exceed 10% by weight of dry aggregate may be used. RAP shall be crushed and screened such that 100% of the RAP used passes a 2" (50 mm) sieve and the combined grading including the aggregates extracted from the RAP meets the requirements herein. The RAP shall be stockpiled separately. The source of RAP shall be identified in the mix design submittal and shall not be changed without written authorization from the City or their designated representative. Mix designs including RAP shall note the amount of virgin binder to be added. *The addition of RAP in excess of 10% shall constitute sufficient grounds for removal and replacement of all asphalt concrete placed on the project and prohibition of the use of RAP for the remainder of the project.*

F. WARM MIX ASPHALT (WMA)

1. The use of Warm Mix Asphalt technology is allowed, subject to the submittal requirements herein. When warm mix additives are proposed, provide the following information in addition to the mix design information at least two (2) weeks prior to

start of paving:

a. WMA technology and/or WMA additives information;
b. WMA technology manufacturer's established recommendations for usage;
c. WMA technology manufacturer's established target rate for water and additives and the acceptable variation for production; and
d. WMA technology material safety data sheets (MSDS) or safety data sheets (SDS).

2. For mixtures to be produced with plant foaming equipment, provide the equipment manufacturer and model, the manufacturer's recommendations for rate of water addition and recommended operation parameters, and calibration information. For all WMA technology, provide:

a. Temperature range for field mixing;
b. Temperature range for field compacting;
c. Allowable ambient temperatures; and
d. Any necessary adjustments to curing or aging times for QC/QA testing.

3. Use equipment and WMA technologies capable of producing an asphalt mixture to meet the requirements specified herein and in the Special Provisions that is workable at the proposed mixing and compaction temperatures. The use of WMA technology in no way relieves the Contractor of the responsibility for meeting all other requirements.

3.01.A; ADD the following:

3. Prior to placement of plant mix pavement upon existing asphalt concrete, including new plant mix pavements, place a tack coat in conformance with Section 02551, TACK COAT, of these specifications.

4. In order to obtain a good bond between existing and new asphalt pavements, all areas where the existing pavement is cut for the installation of an appurtenance or structure the Contractor shall saw cut, cold mill, or otherwise remove to a neat line the full depth of the existing asphalt pavement a minimum of twelve inches (12") (300mm) beyond the excavation. This entire edge shall be thoroughly cleaned and properly coated with bituminous tack coat prior to the installation of the new asphalt pavement.

5. Prior to the placing of any hard surfacing material upon the subgrade/subbase/base, such subgrade/subbase/base shall pass density tests based on nuclear densometer or proof rolling, as determined by these specifications. Notice of proof rolling shall be provided to the Engineer sufficiently in advance of the operation to allow the Engineer to observe the proof rolling. The proof rolling shall be done by a pneumatic-tired roller with tires having a ground contact pressure of 85-90 psi. (585-621 kPa) or a fully-loaded 4,000-gallon, three-axle water truck. The entire area upon which hard surfacing is to be placed must be rolled. When an unstable area is identified, such area shall be brought to satisfactory stability by additional compaction, reworking, or removal of unsuitable material and replacement with acceptable material. Such area shall show acceptable density test(s) or pass additional proof rolling after improvements are complete. If paving operations have not begun within twenty-four (24) hours after approval, a repeat of the proof rolling may be required.

3.01.E; ADD the following:

4. For verification of weights or proportions, including RAP content, and character of materials, and

determination of temperatures used in the preparation of mixture, the City or their designated representative(s), shall have access at any time to all parts of the paving plant and shall, upon request, receive copies of production records including the proportions and/or quantities of materials used.

5. Mixing temperatures for bituminous mixes shall be determined by the submitted and approved mix design and recommendations of the binder supplier.

3.01.F.1; ADD the following to the end of the paragraph:

Scales shall be checked as often as deemed necessary to assure their continued accuracy. The contractor shall have on hand not less than ten (10) 50-pound weights for checking of the scales.

3.01.F.9.a; ADD the following to the end of the paragraph:

The plant shall also be equipped with such additional means to monitor and control the temperature of the mixture as it is discharged from the mixer.

3.01.F.10; REPLACE with the following:

Dust Collector - The plant shall be equipped with a dust collector constructed to return uniformly all or any part of the material collected as necessary to comply with the job mix formula and the requirements herein.

3.01.F; ADD the following paragraph:

12. Calibration – Maintain records of all calibrations of plant equipment performed within the last calendar year and provide them to the City or their designated representative upon request. The City or their designated representative reserves the right to observe plant calibration and operation.

3.01.H.1; ADD the following paragraph:

d. The bins shall be equipped with feeder belt speed and no-flow indicators.

3.02.C; REPLACE the table with the following:

Temperature Limitations

Compacted Thickness (Nominal)	**Atmospheric Temperature (Minimum)**	**Surface Temperature (Minimum)**
Less than 1”	60° F	60° F
1” to and including 2”	40° F	50° F
More than 2”	35° F	45° F

3.02.E.1; REPLACE the first two sentences with the following:

Trucks used for hauling bituminous mixtures shall have tight, clean, smooth, metal beds previously cleaned of all foreign materials. The inside surface must be lightly lubricated with an asphalt (load-bed) release agent from the WYDOT Materials Acceptance – Manufactured Products Qualified Products list just before loading, but excessive release agent will not be permitted.

3.02.F.1; ADD the following to the end of the paragraph:

Bituminous pavers shall be mechanical self-powered pavers, capable of spreading the mixture true to the line, grade, and crown shown on plans.

3.02.F.4; REPLACE with the following:

The placing of the mixture shall be as continuous as possible.

3.02.I.1; REPLACE with the following:

Immediately after the bituminous mixture has been spread and struck off and the surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. Rolling shall be continued while the mixture is in a workable condition until all roller marks are eliminated. Plant mix pavements in excess of one inch (1") nominal or planned thickness shall be compacted to a minimum of 93% of the theoretical maximum (Rice) specific gravity, unless noted otherwise on the plans or Special Provisions. Plant mix pavements of one inch (1") or less nominal or planned thickness shall be compacted as specified herein but shall not be subject to a density requirement. Samples will be taken in accordance with AASHTO T 230, or density will be determined by the use of a properly calibrated Nuclear Density Gauge. Density testing frequency shall be 1 per 500 SY or fraction thereof.

3.02.I.2; ADD the following:

a. For plant mix pavements in excess of one inch (1") nominal or planned thickness, final rolling and density of the bituminous surface, subsurface, or leveling courses must be obtained prior to the mixture reaching a minimum temperature of 180° F.

b. For plant mix pavements of one inch (1") or less nominal or planned thickness, the paver must be followed by at least one of each of the following three types of rollers completing at least the minimum coverages and passes described below:

    1. Three complete coverages with a vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the application of vibratory rolling results in damage to the surface or aggregate, the roller may be used in static mode. The first coverage of breakdown compaction must be completed before the surface temperature drops below 250° F and breakdown rolling must be completed before the surface temperature drops below 190° F.

    2. Three complete coverages with an intermediate pneumatic-tired roller at least 4 feet wide at a speed not to exceed five mph. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi. Pneumatic-tired rollers shall be equipped with covers or skirting to maintain tire temperature. Intermediate rolling must be completed before the surface temperature drops below 190° F.

    3. One complete coverage with a steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons. Finish rolling must be completed before the surface temperature drops below 150° F.

4. If warm mix asphalt (WMA) technology is employed, the following temperature limitations may be used, unless otherwise recommended by the WMA supplier:

    i. The first coverage of breakdown compaction must be completed before the surface temperature drops below 230° F and breakdown rolling must be completed before the surface temperature drops below 170° F.
    ii. Intermediate rolling must be completed before the surface temperature drops below 170° F.
    iii. Finish rolling must be completed before the surface temperature drops below 130° F.

5. Each roller must have a separate operator. Rollers must be self-propelled and reversible.

3.02.I.6; ADD the following to the end of the paragraph:

Asphalt (load-bed) release agents from the WYDOT Materials Acceptance – Manufactured Products Qualified Products list may also be used.

3.02.J; ADD the following paragraphs:

2. Longitudinal joints against both hot and cold material shall be made with equal care. Mixtures spread and compacted (or partially compacted) by the machine shall not be disturbed by a rake in dressing the joint, unless one side is too high, nor shall surplus mixture be spread or scattered back of the machine when not needed to build up low spots. When spreading next to a warm or cold edge of a previously laid section of surfacing, the machine shall be adjusted to leave a "bead" of material, roughly one inch (1") (25mm) by one inch (1") (25mm), which shall be rolled in to compensate for uneven density at the joint. If one side of the joint is cold, the "bead" shall be moved back of the rake to the warm side of the joint but otherwise the machine-laid mixture shall not be disturbed.

3. In making the joint along any adjoining edge such as curb, gutter, or an adjoining pavement, and after the hot mixture is placed by the finishing machine, just enough of the hot material shall be carried back to fill any space left open and provide a small "bead" of extra material. This joint shall be properly "set-up" with the back of the rake at proper height and bevel to receive the maximum compression under rolling. The work of "setting-up" this joint shall always be performed by competent workmen, who are capable of making a correct, clean, and neat joint.

3.04; REPLACE with the following:

A. The surface shall be smooth and true to the established crown and grade. With the exception of leveling courses, it shall have the average thickness specified and shall at no point be more than one-fourth inch (1/4")(6.25mm) less than the thickness shown on the typical cross-sections on the plans. Any low or defective places shall immediately be remedied to the satisfaction of the City or their designated representative by overlay or cutting out the course at such spots and replacing it with fresh, hot mixture which shall be immediately compacted to conform to the surrounding areas and shall be thoroughly bonded to it. The surface of the finished pavement shall be free from depressions exceeding one-fourth inch (1/4")(6.25mm) as measured with a ten foot (10') (3m) straight edge in any direction, and shall be free of puddles, “bird baths,” or areas that do not drain.

B. Areas that meet the thickness requirements but fail the smoothness requirements shall be corrected to the satisfaction of the City or their designated representative by overlay,

removal and replacement, or diamond grinding. The grinder, if used, shall be a power-driven, self-propelled machine with a minimum 3-foot (1 m) wide cutting head and effective wheelbase of not less than 12 feet (3.5 m). The grinding equipment shall not cause excessive raveling, aggregate fracturing, or spalling. Bush hammers or other impact devices will not be allowed. Areas corrected by diamond grinding shall be extended such that the completed correction appears workmanlike, neat, and is approximately rectilinear. Tack coat shall be applied to all areas that have been diamond ground.

C. Areas that fail to meet the thickness requirements shall be corrected by removal and replacement, overlay, reduced compensation, or through other remedy acceptable to the City or their designated representative. Upon approval of the City or their designated representative, additional coring may be performed to assess the severity and extent of any thickness deficiency. Additional coring shall be at the expense of the Contractor.

D. Unless the nominal or planned thickness is one inch (1") or less, at no point shall the density be less than 93% of the theoretical maximum (Rice) specific gravity. Longitudinal joints shall be at least 91% of the theoretical maximum (Rice) specific gravity, measured within six (6) inches of the joint. Plant mix pavements one inch or less nominal or planned thickness are not subject to density requirements.

Part 3; ADD the following section:

3.05 CONSTRUCTION SAMPLING AND TESTING

A. All testing and sampling shall be done in accordance with the latest ASTM methods unless otherwise specified. Test results shall be forwarded immediately by the testing lab or Contractor to the Engineer. The following tests shall be required during construction:

1. Asphalt Content and Gradation. One asphalt content and gradation test shall be completed each day of paving until no changes are needed as approved by the Engineer. After initial testing is completed and approved, retain one sample per five hundred tons (500 t) or fraction thereof. The retained samples will be tested at the direction of the Engineer if issues are suspected. These tests shall be performed on samples taken prior to screeding. The percentage of asphalt content may be determined by Ignition Oven or by Extraction Method (ASTM D 2172, D 6307, or AASHTO T164).

2. Mixture Properties: A sample shall be collected the first day of paving and then every five hundred tons (500 t) or fraction thereof after the first day. The samples shall be retained and a complete test series, as described below, shall be performed on any sample suspecting to have issues as determined by the Engineer.

a. Marshall Mix Verification: Laboratory-compacted bulk specific gravity (Gmb), theoretical maximum (Rice) specific gravity (Gmm), air voids, voids in mineral aggregate, voids filled with asphalt, Marshall stability, Marshall flow.

b. Superpave Mix Verification: Laboratory-compacted bulk specific gravity (Gmb), theoretical maximum (Rice) specific gravity (Gmm), air voids, voids in mineral aggregate, voids filled with asphalt.

3. Density Tests: At least six (6) mat density tests for each five hundred tons (500 t) or fraction thereof shall be performed at locations marked by the Engineer in the field, no closer than two (2) feet from a seam. Density testing shall be completed using a nuclear density gauge observed by the Engineer. Cores will not be required unless issues are suspected as determined by the Engineer. Cores will be the responsibility of the Contractor, if needed. The theoretical maximum (Rice) specific gravity values for each lot shall be used for computation of density of the same lot. Plant mix pavements one inch or less in thickness are not subject to density requirements.

4. Preconstruction Test and Sampling: All sampling and testing of materials shall be done in accordance with the latest ASTM methods unless otherwise specified. The Contractor shall:

    a. Submit suitable samples of all materials including asphalt cement to an Engineer-approved AASHTO-accredited materials testing laboratory for mixture design, and to determine compliance of materials to these specifications, with results provided to the City or their designated representative at least two (2) weeks prior to paving;

    b. Or shall submit certification that the materials to be used are in conformance with these specifications and that the mixture design for use with these materials is approved and on file with the City Engineer. The Engineer reserves the right to require confirmation testing, provided by the Contractor, of material properties for mix designs more than one year old.

5. The Contractor shall be responsible for all tests and sampling, mixture property testing, and all asphalt content and gradation testing. The Contractor shall select and pay for an AASHTO-accredited testing firm, acceptable to the Engineer. If the initial test fails to meet minimum requirements, the Contractor shall pay for any and all additional tests until the requirements herein are met.

6. The City reserves the right to perform such additional testing, using an AASHTO-accredited laboratory, deemed necessary to verify the testing provided by the Contractor. In case of dispute, the City's results shall govern.

3.06 WARRANTY OF WORK

A. The contractor shall warrant all work to be free of defects in workmanship or materials for a period of two years from the date of final acceptance of all work performed. The determination of the necessity during the warranty period for the contractor to repair or replace the work in whole or in part shall rest entirely with the City Engineer.

B. After completion of the asphalt and concrete work and prior to the end of the specified two-year warranty period, the City or their designated representative will inspect all asphalt and concrete areas installed on this project. At the time of the inspection, all areas of asphalt where there exists a one quarter inch (1/4") (6 mm) separation between the new asphalt and the existing asphalt or the new asphalt and the new concrete, the Contractor will be required to crack seal these locations following City specifications. The sealant shall conform to ASSHTO M 301 or modified ASTM D 3405. Any pavement found to have settled more than one-quarter inch (1/4") (6mm) shall be repaired in a manner acceptable to the City or their designated representative.

ADD the following new section in its entirety:

SECTION 02515 – COLD MILLING

PART 1 GENERAL

1.01 SUMMARY

A. This work includes complete or partial removal of existing plant mix bituminous pavement by cold milling.

PART 2 PRODUCTS

2.01 MATERIALS

A. Unless otherwise specified in the Special Provisions or plans, all material removed by cold milling shall become the property of the City and shall be hauled to and stockpiled at one or more locations specified by the City.

PART 3 EXECUTION

3.01 EQUIPMENT

A. Provide a machine equipped to perform the following:

1. Remove a strip of material at least 6 feet (1.8 m) wide and 2 inches (50 mm) thick during a single pass.

2. Prevent the escape of dust from the operation into the atmosphere.

3. Establish a profile grade by referencing from either the existing pavement or from an independent grade control, with a positive means of controlling cross slope elevations.

4. Unless otherwise approved by the Engineer, ensure the machine is equipped with a 25-foot (7.6 m) mobile reference (ski).

B. Other equipment providing the same or better results may be used with the approval of the Engineer. The above-noted requirements do not apply to cold milling associated with plant mix bituminous pavement patching unless the patch exceeds 6 feet (1.8 m) in width and 50 feet (15.2 m) in length.

3.02 MILLING

A. Remove the plant mix to the grade and width and at the locations specified.

B. When cold milling using a ski, milling depths will vary across the roadway's length, width, or both.

C. Work may include transition milling into structures, into project tie-ins, at box culverts, and at the beginning and end of project transitions.

D. Conduct milling operations parallel to the travel lanes, unless otherwise approved by the engineer.

E. Correct vertical differences greater than 3/8 inch (10 mm) between adjacent peaks and valleys of the milled surface. Correct surface irregularities resulting from milling activities using cold milling or other operations, at no additional cost to the department.

F. Stockpile removed material not designated for recycling or incorporation into reused base or surfacing at a specified site. Place the material without operating equipment on the stockpiles.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. Cold milling will be measured on the square yards of asphalt milled based on the type and depth of milling as determined on the plans or Special Provisions.

4.02 BASIS OF PAYMENT

A. Cold milling will be paid based on the square yards of asphalt milled as measured by the Engineer in the field and shall constitute full compensation for milling, loading, and hauling the millings, stockpiling millings, providing all necessary equipment, and all other tools and labor necessary to complete the work.

END OF SECTION

WYPWSS SECTION 02545 – BITUMINOUS MATERIALS

2.03.A; REPLACE with the following:

Liquid cut-back asphalts shall conform to the requirements of Section 804.2, Liquid Cut-Back Asphalt, of the current version of the Wyoming Department of Transportation Standard Specifications for Road and Bridge Construction, including any current supplementary specifications and amendments issued prior to the date of advertisement.

2.04; REPLACE with the following:

A. Unless shown in the table below, emulsified asphalts shall conform to the requirements of Section 804.3, Emulsified Asphalt, of the current version of the Wyoming Department of Transportation Standard Specifications for Road and Bridge Construction, including any current supplementary specifications and amendments issued prior to the date of advertisement.

Applicable Requirements: Emulsified Asphalt

Property	Test Method	CHFRS-2P	Quickseal[1]
Viscosity at 122° F, sec.	AASHTO T59	100-400	-
Sieve, %	AASHTO T59	0.1 max.	0.3 max.
Settlement, 5 days, %	AASHTO T59	5 max.	-
Demulsibility, %	AASHTO T59	60 min.	25 min.
Storage stability test, 1 day, %	AASHTO T59	1 max.	-
Particle charge	AASHTO T59	Positive	Positive
Polymer content by mass		3% min.	-
Tests on residue by evaporation:			
% residue	AASHTO T59	65 min.	-
Oil distillate	AASHTO T59	0.2 max.	-
Penetration, 100 g, 5 sec. at 77° F, dmm	AASHTO T49	90-160	-
Ductility at 77° F, 5 cm/min cm	AASHTO T51	75 min.	-
Elastic recovery, %	AASHTO T301	55 min.	-
Softening point, °F	AASHTO T53	130 min.	-
Float value @ 140° F, sec	AASHTO T50	1800 min.	-
Viscosity @ 140° F, Poise	AASHTO T202	1300 min.	-
Solubility in Trichloroethylene, %	AASHTO T44	95 min.	-
Tests of residue by distillation at 500° F			
% residue	AASHTO T59	-	60 min.
Penetration at 77° F	AASHTO T49	-	30 min., 100 max.

[1] – Specifications for Quickseal concentrate prior to dilution. Dilution by supplier is required to ensure product consistency. Residual asphalt in diluted material 40% - 45%. Quickseal must be stable for use at 50% dilution rate.

B. Bituminous material may be conditionally accepted at the source based on test reports furnished by the contractor for each 40 tons or 10,000 gallons loaded. The sample of each load of bituminous material is to be obtained at the time of conveyance loading and the Certificate of Compliance, together with this sample, shall be provided to the City or their authorized representative.

C. Tank trucks delivering bituminous material to the project shall be equipped with a sampling cock on the discharge pipe.

D. Bituminous material used on the project which do not meet the specification requirements

for the type and grade specified may, at the direction of the Engineer, be rejected and the Contractor required to remove and replace all material affected by the out-of-specification material at his expense.

Part 2; ADD the following paragraphs:

2.05 PERFORMANCE-GRADED ASPHALT BINDER (PGAB)

A. PGAB shall meet the requirements of Section 804.1, Performance Graded Asphalt Binder, of the current version of the Wyoming Department of Transportation Standard Specifications for Road and Bridge Construction, including any current supplementary specifications and amendments issued prior to the date of advertisement. If the estimated quantity of PGAB is less than 100 tons of liquid PGAB, the source of PGAB does not have to be authorized. Submit a written certification verifying the PGAB meets all applicable requirements of AASHTO M320 and provide representative test report(s) for applicable properties in accordance with Subsection 804.1.1, Binder Properties, of the WYDOT Standard Specifications.

2.06 ANTI-STRIPPING AGENTS

A. Unless otherwise noted in the contract documents or approved by the City or their authorized representative, anti-stripping agents for plant mix pavements will be limited to hydrated lime in accordance with the requirements of Section 820.3, Anti-Stripping Additive for Plant Mix Pavement, of the current version of the Wyoming Department of Transportation Standard Specifications for Road and Bridge Construction, including any current supplementary specifications and amendments issued prior to the date of advertisement.

B. Any proposed alternate anti-stripping agents for plant mix pavement shall be accompanied by the results of tensile strength ratio testing demonstrating compliance with the requirements of Section 2512, Plant Mix Pavements.

3.02.C; REPLACE with the following:

The emulsified asphalt used for tack and fog seal may be diluted in the field at a rate not to exceed 50% emulsified asphalt and 50% additional water unless otherwise approved.

3.02.D; REPLACE with the following:

The water used for the dilution shall be free of sediment and other deleterious matter. Unless otherwise directed by the emulsion manufacturer, the dilution water and emulsion shall both be heated to approximately 100° F prior to mixing and this approximate temperature shall be maintained during the application. Dilution shall be made by introducing the water into the emulsified asphalt.

3.02; ADD the following paragraphs:

G. Quantities of original emulsion and added water shall be reported to the City or their designated representative prior to placement of the diluted emulsion.

H. Bituminous materials for the various types of application shall be handled, stored, and applied within the temperature ranges recommended by the manufacturer and in

conformance with the requirements of these Specifications, whichever is more stringent. Provide the City or their authorized representative with the manufacturer's recommended temperatures prior to placement of the bituminous material. Emulsified asphalts which have been allowed to cool below 40° F shall not be used.

WYPWSS SECTION 02551 – TACK COAT

2.01; ADD the following paragraph:

C. At the option of the Contractor, tack coat materials may be a slow-setting emulsion, a rapid-setting emulsion, a quick-setting emulsion, or a Performance Graded asphalt cement with a high temperature grade equal or higher than the highest temperature grade required for the asphaltic concrete pavement. Emulsions shall conform to the requirements of AASHTO M 140, M 208, ASTM D 977, D 2397, WYDOT Standard Specification Table 804.3-1, or AASHTO M 320, as appropriate for the selected material.

3.01.A; ADD the following to the end of the paragraph:

The existing surface shall be clean, dry, and free of all loose and foreign material. All existing surfaces are subject to approval by the City or their Representative before the tack coat is placed.

3.02.A.1; REPLACE with the following:

A. The tack coat shall be placed by means of an approved pressure distributor. The distributor shall be in good mechanical condition and shall be capable of uniformly distributing the tack coat throughout a reasonable range of widths, pressures, temperatures, and application rates. Unless otherwise approved by the City, distributor equipment shall include a tachometer, pressure gauges, accurate volume measuring devices, and an accurate thermometer for reading temperatures of tank contents. Prior to placement the material shall be handled and heated in accordance with manufacturer's recommendations. Dilution of emulsions shall not exceed a one-to-one ratio of added water to original emulsion. The volumes or weights of original emulsion and any added water shall be reported to the City or their designated representative prior to application of the emulsion.

Tack Coat Residual Asphalt Application Rates[1]

Nominal Compacted Lift Thickness	**Cold milled surface**	**Non-cold-milled surface**
Less than or equal to 1.5"	0.06-0.09 gal. / sq. yard	0.06-0.08 gal. / sq. yard
Greater than 1.5"	0.04-0.08 gal. / sq. yard	0.04-0.07 gal. / sq. yard

[1] – unless otherwise approved by the City or their representative.

3.02.A.3; ADD the following:

Unless otherwise specifically directed by the Engineer, no tack coat shall be placed when the ambient air is below 40° F. (4.4° C), or when, in the opinion of the Engineer, excessive wind or other atmospheric conditions will not permit satisfactory placement of the tack coat.

3.02.A; ADD the following paragraphs:

4. The tack coat shall be carefully and uniformly applied, particularly on all vertical surfaces against which asphaltic pavement is to be placed, including concrete gutters, manholes, drainage structures, curbs, and other structures. If excessive amounts of bituminous oil are sprayed on the curbs, sidewalks, and other structures, they shall be cleaned as directed by the Engineer at the expense of the Contractor. Excessive lapping of abutting applications will not be permitted. Should excessive lapping occur, the tack coat in the lapped portion shall be removed and replaced as directed by the Engineer at the Contractor's expense.

5. All spots missed by the distributor or areas which are inaccessible to the distributor shall be

hand sprayed. Particular attention shall be given to hand spraying operations to provide complete, uniform coverage approximating the required application rate and to avoid the application of excessive amounts of bituminous oil.

6. The tacked surface shall be allowed to cure before placing any asphaltic concrete. The tacked surface shall be maintained by the Contractor until the asphaltic concrete is placed. Any damaged areas shall be repaired as directed by the Engineer and at the Contractor's expense.

7. When the first course of asphaltic concrete is to be immediately covered by the second course of asphaltic concrete, the tack coat may not be required. When the first coat of asphaltic concrete is subjected to traffic, rain, blowing dust, and/or other unfavorable conditions, the tack coat shall be applied.

3.02; ADD the following:

C. TEST REPORTS

1. Certificates of compliance for the bituminous tack coat material shall be supplied by the Contractor and furnished to the City or their designated representative for each consignment of asphaltic material.

ADD the following new section in its entirety:

SECTION 02554 – THERMOPLASTIC PAVEMENT MARKINGS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section consists of standards for thermoplastic pavement markings.

1.02 REFERENCES

A. WYDOT Traffic Program – Pavement Marking Manual.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use a resilient, no preheat thermoplastic marking material with uniformly distributed glass beads throughout the cross sectional area. Ensure the material is capable of being affixed to bituminous pavements and portland cement concrete pavements by the use of heat from a normal propane torch. Ensure the material has a nominal thickness of 125 mils [0.318 cm].

B. Provide marking materials that are resistant to the damaging effects of motor fuels, lubricants, and hydraulic fluids, etc. The material is to be resistant to deterioration from exposure to sunlight, water, salt or adverse weather conditions.

C. Supply material with an indicator system on the top surface of the markings (the same side as the factory applied surface beads) that properly gauges the correct amount of heat to apply during installation. The indicator system must have a positive visual indication, such as beads changing color or indents closing together, when the material has reached the correct installation temperature. The indicator system must also provide a positive visual indication if the material has not reached the correct installation temperature.

D. Provide marking material capable of conforming to pavement contours, breaks, and faults, etc. The thermoplastic material must have resealing characteristics such that it is capable of fusing with itself and previously applied thermoplastic pavement markings when heated with a torch.

E. Marking material must be capable of being applied at ambient and surface temperatures down to 32°F [0°C] without any preheating of the pavement, special storage, preheating or treatment of the material before application.

F. Provide the engineer with a printed copy of the approved material manufacturer's recommendations for use a minimum of seven calendar days prior to starting operations.

2.02 EQUIPMENT

A. Use equipment designed for grooving/grinding asphalt and/or concrete pavement and for applying the thermoplastic pavement marking. Ensure the machine is equipped with a dust collection system so the discharge will meet current Department of Environmental Quality (DEQ) requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Layout markings prior to grinding. The Engineer will verify the placement and dimensions of the layout. Use a chalkline or other means to ensure markings are straight and close to the intended alignment without abrupt changes that result in an unacceptable appearance. Remove existing markings outside of the new layout; grind just enough to remove the existing markings.

B. Cut grooves into the concrete/asphalt pavement surface prior to the application of all pavement markings. Cut the depth of the groove to +/- 125 mils [0.318 cm] and ensure a textured pattern (corduroy or ribbed). Ensure depth of grinding removes any existing pavement markings. Ensure that the cut and grooved surface is flat and textured. Do not apply markings to surface areas that are not flat and untextured. If multiple passes are needed to achieve the proper groove width, ensure that the groove bottom is as even as if made with one pass and there are no uneven joints or ridges. Ensure that the width and length of the groove is 1.5 inches [3.81 mm] greater than the dimensions of the pavement marking. If the existing pavement already has grooves cut at the proper depth and in the correct place, grind just enough to remove any existing markings and to even the surface prior to application.

C. Use forced air or a vacuum system to remove loose particles, dirt, tar, grease, residue of prior pavement markings, and other deleterious material from the grooves. If water is used to cool the blades or clean the grooves, remove all water and residue from the groove using forced air and allow the groove to dry for a minimum of 24 hours.

D. Ensure that the pavement is clean and dry with a surface temperature of at least 32°F [0°C] without preheating of the pavement. The ambient air temperature must be at least 32°F [0°C] and rising. Ensure that no precipitation has occurred in the 24 hours prior to application.

3.02 INSTALLATION

A. Apply thermoplastic material on concrete or bituminous plant mix pavements where indicated in the on the plans. Ensure an onsite manufacturer's representative provides training to both the installers and Engineer. Ensure the manufacturer's representative includes training for concrete and bituminous asphalt pavements.

B. Apply the pavement markings as recommended by the manufacturer. Apply a compatible primer/sealer on all concrete pavements prior to application of the markings to ensure proper adhesion. Apply a compatible primer/sealer on bituminous plant mix pavements as needed to ensure proper adhesion as directed by the manufacturer.

C. Apply pavement markings so that they are straight and close to the intended alignment without abrupt changes that result in an unacceptable appearance. Ensure crosswalk bars are parallel to each other. Ensure words and symbols are square with respect to their lane being placed.

3.03 DEFECTIVE MARKINGS

A. Remove and replace pavement markings that have not been embedded or adequately adhered to the road surface.

B. Remove and replace markings that have not been heated adequately during initial installation.

C. Re-heating after initial thermoset will not be allowed.

D. Remove and replace all unsatisfactory pavement markings at no additional cost to the department.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. The Engineer will measure the thermoplastic pavement markings by the foot, square foot, or per each marking as determined by the individual bid item. If required, the black contrast border will not be paid for separately and is considered incidental to the white thermoplastic markings.

4.02 BASIS OF PAYMENT

A. Payment for thermoplastic markings shall be based on the unit price per lineal foot (LF), price per square foot (SF), or price per each marking (EA) for each individual marking type multiplied by the quantity of units installed. Payment shall include full compensation for providing all materials, equipment, labor, and all other incidental items necessary to complete the work.

END OF SECTION

WYPWSS SECTION 02645 – FIRE HYDRANTS
4.01; ADD the following paragraph:

B. Measurement of bollards shall be made by numerical count each.

4.02; ADD the following paragraph:

B. Payment for this item will be made at the contract unit bid price each, which price shall include furnishing and installing the steel pipe in concrete, filling the pipe with concrete, painting the pipe, and all other equipment, tools, and labor necessary to complete the work.

WYPWSS SECTION 02665 – WATER DISTRIBUTION AND TRANSMISSION SYSTEMS

2.01.A.7.a; REPLACE with the following paragraph:

Pipe used for encasement in trenchless or open cut for water line and sewer line crossings shall be steel pipe in accordance with Section 02235 with a minimum inside diameter of 1.25 times outside diameter of carrier pipe.

2.01.B; REPLACE with the following:

1. Ductile iron fittings used for water mains shall be class 250 conforming to AWWA C-153, Ductile-Iron Compact Fittings for Water Service. Joints shall be mechanical joint conforming to AWWA C-111. Ductile iron fittings shall be fusion-bonded epoxy coated and lined conforming to AWWA C-116. Couplings for making connections to existing pipelines shall be in accordance with Section 2010 Approved Construction Materials List, mechanical-joint connecting pieces and mechanical-joint sleeves, or an approved equal conforming to AWWA C-219, Bolted, Sleeve-Type Couplings for Plain-End Pipe.
2. All bolt packs for fittings, couplings, valves, hydrants, etc. shall be stainless steel, type 304 including nuts, bolts, studs, and washers.

2.01.C.1; REVISE this section as follows:

Combination air valves shall be a single body type with all stainless-steel internal parts conforming to AWWA C-512, latest edition. The inlet is to be threaded and the valve shall connect to the water main with all threaded fittings, including the ball valve, nipple, and saddle. All fittings shall be bronze, brass, or copper (except the saddle, which may be stainless-steel), rated for 250 psi service, and equal in size to the combination air valve. Combination air valves with iron bodies or shells shall have factory-applied fusion bonded epoxy coating and lining. Combination air valves shall be ARI D-040 or approved equal.

2.01.D.3; REPLACE with the following:

Double disc gate valves shall not be used for underground installation.

2.01.L.1; REPLACE with the following:

Curb stops shall be bronze inverted key stops or ball-valves types. Curb stops shall be sized for the full diameter of the service line. Curb boxes shall be sized for the full depth of cover. Curb boxes shall include an arch pattern base to transmit loads into the ground beneath the curb valve. The boxes shall include the stationary rod to provide operation from within 18-inches of the surface.

2.01; ADD the following:

N. CATHODIC PROTECTION
   1. All bolts used to field assemble water main components with mechanical joints shall have a sacrificial anode attached to the ends of the threads. The sacrificial anode shall be a large “Mars Cap” or Engineer-approved equal.

O. POLYETHYLENE CORROSION PROTECTION
   1. Polywrap shall be of virgin polyethylene, not less than 8 mils in thickness, formed into tubes or sheets as may be required. Naturally pigmented material may be used where exposure to ultraviolet light will be less than 48 hours.

Otherwise, the material shall be pigmented with 2 to 2 1/2 percent of well dispersed carbon black with stabilizers.

The polywrap shall be secured as specified below with 2-inch wide pressure sensitive tape not less than 10 mils thick. This flexible tape shall consist of a polyethylene or polyvinyl chloride backing with a synthetic elastomeric adhesive film comprised of butyl rubber. Tape shall remain flexible over a wide range of temperatures, with tensile strength and elongation properties in conformance with ASTM D1000.

P. Pipe marking tape shall be a minimum 4 mil thick, 3-inches wide, inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil. Marking tape shall be the APWA color code and utility legend printed with: “POTABLE WATER LINE”.

Q. Tracer Wire for open trench construction shall be Copperhead High Strength1230; Reinforced 12 AWG copper-clad steel, 30 mil high density polyethylene coating suitable for direct bury and color coded per APWA standard for the specific utility marked, minimum 450 lb break load, or approved equal.

3.01.E.2; REVISE as follows:

All pipe (main and services), fittings, and appurtenances shall be laid and maintained with a minimum of 6.0 feet of cover, unless approved otherwise by the City Engineer, and at the required locations shown on the plans.

3.01.E.10; ADD the following new sentence at the end of the paragraph:

Pre-cast thrust blocks may be used in lieu of formed thrust blocking. They shall have a compressive strength of not less than 2,000 pounds per square inch at twenty-eight (28) days and shall be equal to or greater than the minimum dimensions (volume) provided in the details. The block shall be placed to have sufficient contact with the fitting at the middle of the thrust block. Backfill must be adequately compacted between the thrust block and undisturbed soil.

3.01.E; ADD the following paragraphs:

12. Tracer wire shall be installed to the top half of all water mains including fire lines secured with 2-inch-wide pressure sensitive tape not less than 10 mils thick at minimum ten (10) foot intervals to prevent movement during backfill. This flexible tape shall consist of a polyethylene or polyvinyl chloride backing with a synthetic elastomeric adhesive film comprised of butyl rubber.

    a. The tracer wire located on the main shall be looped into a tracer wire test station located at each fire hydrant, as per the Standard Detail or as directed by the plans. Sufficient length of slack shall be provided to allow the tracer wire to reach 12 inches above finished grade.
    b. All connections shall be kept to a minimum and shall be made with manufacturer approved connector.
    c. The entire system shall be interconnected and shall be tested for continuity by the Contractor prior to placing fabric (if required) and base material.
    d. At all mainline dead-ends, tracer wire shall be sufficiently grounded. The wire should

be grounded in virgin soil directly in line with the utility.

e. Tracer wire shall be the APWA color code for the appropriate utility

13. Water line marking tape shall be installed over all water lines and water services. Marking tape shall be buried 12” to 24” below the subgrade and over the center of the pipe. The backfill shall be sufficiently leveled so that the tape is installed on a flat surface. The tape shall be centered in the trench with printed side up.

14. Contractor shall lay the pipe so that the markings (size, SDR, Water Pipe, and Code Number) are facing up, and legible from the top of the trench.

3.01; ADD the following new section:

G. POLYETHYLENE CORROSION PROTECTION

1. General: All metallic valves and fittings including ductile, gray iron, steel, etc. shall be protected from corrosion by encasement in a polyethylene protective wrapping referred to hereafter as polywrap. Although not intended to be a completely air and watertight enclosure the polywrap shall provide a continuous barrier between the fittings and surrounding bedding and backfill.

2. Installation**:** Valves, tees, crosses, bends, and reducers shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice, and secured with the adhesive tape. The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the fittings.

3.03.A.2; REPLACE with the following:

Contractor shall furnish and install the service pipe from the main to the property line, or to where designated on the plans, with a curb stop and extension service box installed at the property line, unless designated otherwise on the plans. The service line, regardless of material type, shall be a continuous piece from the corporation stop to the curb stop.

3.03.A; ADD the following paragraph:

4. All service laterals shall have tracer wire that is a single standalone wire, starting at the tap/corporation stop, but not spliced into the main tracer wire, and installed along the service line to the curb stop box where it shall be taped to and ran up the outside and a 1-foot tail buried at ground surface. A tracer wire access box is not required at services unless specified otherwise on the plans. The wire shall be sufficiently grounded at the main.

3.05.C; ADD the following paragraph:

3. Only City of Lander Public Works personnel shall operate existing and newly incorporated valves. The Public Works personnel will close existing valves but will not guarantee a bone-dry shutdown. A “newly” incorporated valve is considered as any valve put into service through the project and operating within the City’s system regardless of what stage the project is at.

3.05; ADD the following paragraph:

D. POLYETHYLENE PIPE JOINTS

1. All HDPE pipe will be joined by an approved butt fusion or electrofusion method according to the manufacturer's specifications.

2. Contractors' personnel employed to join HDPE shall be experienced and certified in accordance with 49 CFR 192.285 or shall have been certified as having training in the Manufacturer's recommended procedure.

3.06.A.3; REPLACE with the following:

Pipe insulation shall be installed where the waterline is installed with less than 5 feet of cover. If the depth of cover is less than 3.5 feet insulation board shall be 4-inches in thickness and extend a minimum of four feet on either side of the center of the pipe. If the depth of cover is between 3.5 and 5.0 feet, the insulation board shall extend a minimum of three feet either side of the center of pipe.

Part 3 Execution; ADD the following:

3.07 ABANDONING LINES IN-PLACE

A. PLUGGING ABANDONED LINES
1. Existing lines to be abandoned in place as designated on the plans shall be plugged in a manner to not allow flow of water through the line. This work is considered incidental to water line installation.

4.01.D.1; REPLACE with the following:

No measurement and payment will be made for thrust blocks and the cost of this work shall be included in the price bid for valves, fittings, or other appurtenances.

4.01.E; REPLACE with the following:

E. WATER SERVICES

1. Water Service Connections shall be measured by numerical count of water services of the various sizes listed on the plans.

2. Water Service Lines shall be measured by the lineal feet of the various sizes listed on the plans.

3. No measurement and payment will be made for Trench Excavation and Backfill for water service lines and the cost of this work shall be included in the bid for service lines.

4.01; ADD the following paragraphs:

G. Tracer Wire Test Station
1. Measurement of the tracer wire test station shall be for each station installed in accordance with the plans or as directed by the Engineer.

H. Combination Air Valve
   1. Measurement of combination air valves will be made by numerical count of each.

I. Water Meter Pit
   1. Measurement of water meter pits will be made by numerical count each.

4.02.A.1; REPLACE with the following:

Payment for water main will be made at the contract unit price bid per lineal foot, measured horizontally, of various sizes called for, which price shall include trench excavation, dewatering, backfill, disposal of spoil material, furnishing and installing pipe; all fused connections, furnishing and installing polywrap, furnishing and installing tracer wire; furnishing and installing marker tape; furnishing, placing, and compacting the bedding, placing and compacting backfill; cleaning, testing and disinfecting the water main and all other work necessary or incidental for completion of the item. No additional payment will be made for bedding extending beyond the specified dimension to the trench wall in excessively wide excavations.

4.02.D.1; REPLACE with the following:

No separate payment will be made under this section. Full compensation shall be considered as included in the prices paid for valves, fittings, or other appurtenances.

4.02.E; REPLACE with the following:

1. Payment for Water Service Connections will be made at the contract unit bid price each, which price shall include furnishing and installing the water service saddle, tapping the main, tapping saddles if required, furnishing and installing all fittings, corporation stops, curb stops, curb boxes, prepping and connecting to an existing service line, concrete block, backfill, pipe bedding, shoring, dewater, cleanup, and all other work necessary or incidental for completion of the item. Payment for this item shall be full compensation for providing all materials, tools, labor, and equipment necessary to complete the item and all incidental work related thereto, whether specifically mentioned herein or not.

2. Payment for Water Service Line will be made at the contract unit price bid lineal feet along the centerline of the pipe through fittings, which price shall include furnishing and installing the water service line from the connection at the main to the property boundary or where designated on the plans, all trench excavation, backfill, pipe bedding, shoring, dewater, cleanup, and all other work necessary or incidental for completion of the item. Payment for this item shall be full compensation for providing all materials, tools, labor, and equipment necessary to complete the item and all incidental work related thereto, whether specifically mentioned herein or not.

4.02; ADD the following paragraph:

G. Tracer Wire Test Station
   1. Payment for Tracer Wire Test Station will be made at the contract unit price for each test station actually installed at each location shown on the plans or at the locations identified by the Engineer. The price shall include excavation, backfill, furnishing and installing all materials including test station, properly grounding, connections, and all other work necessary or incidentals for a complete and operating system as evidence by a successful continuity test. The test station shall be considered

complete pending the successful results of continuity test as witnessed by the Engineer's Resident Project Representative. No separate measurement or payment shall be made for tracer wire installation.

H. CATHODIC PROTECTION
   1. No separate payment will be made for cathodic protection. The cost for this shall be included in the unit bid price for each hydrant, valve, fitting, or other metallic appurtenance.

I. COMBINATION AIR VALVE
   1. Payment will be made for these items at the contract unit price for each; which shall constitute full compensation for all trench excavation, shoring, bracing, trench dewatering, imported pipe bedding, native backfill, compaction, temporary controls, furnishing and installing combination air valve, air release meter pit with frame and cover, insulation, curb stop, saddle tap, bedding, gravel, concrete blocks, connecting to new line, placement and finishing of concrete collar, providing all testing and repairs, and all materials, tools, equipment, labor, and other work incidental with completion of this item.

J. WATER METER PIT
   1. Payment will be made for this item at the contract unit price for each; which shall constitute full compensation for all trench excavation, shoring, bracing, trench dewatering, imported pipe bedding, native backfill, compaction, temporary controls, furnishing and installing water meter pit, installing water meter, water service line, connecting to new service line, providing all testing and repairs, and all materials, tools, equipment, labor, and other work incidental with completion of this item. Water meters will be provided by the City.

WYPWSS SECTION 02670 – HYDROSTATIC TESTING

3.01.A; REPLACE with the following:

A hydrostatic testing and coinciding disinfection plan shall be submitted to the Engineer at least 24 hours prior to commencement of the tests. The plan should clearly detail the process and sequencing of flushing, disinfecting, and pressure testing. Under no circumstances shall the line be pressurized with a chlorine level higher than 50 mg/L.

1. Only one (1) connection to an existing main will be allowed. It is the responsibility of the Contractor to provide temporary fittings and thrust blocks as necessary. It is also the responsibility of the Contractor to provide temporary blow off assemblies, pressure testing assemblies, pressure testing equipment, and sacrificial pressure-testing and disinfection ports as necessary to complete the tests.

2. The length of any one non-pressure tested/disinfected section for a tie-in to existing shall not exceed 15 feet.

3. The maximum allowable length of pipe subject to a pressure test is 1000 feet.

4. If the tablet disinfection method is used, the line may be subjected to hydrostatic testing immediately following initial filling/purging of the line under supervision of the Engineer and Owner before the tablets have time to dissolve. If the pressure test is unable to be completed in less than four (4) hours after the initial filling, the Contractor will be required to stop the pressure test, complete disinfection, and re-commence the pressure test with City water through a potable pump after the line has been flushed to a reasonable residual chlorine level.

5. If the continuous feed or slug method of disinfection is used, the line shall be pressure tested using City water through a potable water pump prior to disinfection.

3.02.A; REPLACE with the following:

A hydrostatic testing and coinciding disinfection plan shall be submitted to the Engineer at least 24 hours prior to commencement of the tests. The plan should clearly detail the process and sequencing of flushing, disinfecting, and pressure testing. Under no circumstances shall the line be pressurized with a chlorine level higher than 50 mg/L.

1. Only one (1) connection to an existing main will be allowed. It is the responsibility of the Contractor to provide temporary fittings and thrust blocks as necessary. It is also the responsibility of the Contractor to provide temporary blow off assemblies, pressure testing assemblies, pressure testing equipment, and sacrificial pressure-testing and disinfection ports as necessary to complete the tests.

2. The length of any one non-pressure tested/disinfected section for a tie-in to existing shall not exceed 15 feet.

3. The maximum allowable length of pipe subject to a pressure test is 1000 feet.

4. Due to the amount of time required to complete a pressure test for HDPE, if the tablet disinfection method is used, the test must be completed prior to hydrostatic testing. The Contractor will be required to complete the pressure test with City water through a potable water pump after the line has been flushed to a reasonable

residual chlorine level.

5. If the continuous feed or slug method of disinfection is used, the line shall be pressure tested using City water through a potable water pump prior to disinfection.

WYPWSS SECTION 02675 – DISINFECTION

3.01.B; REPLACE with the following:

B. A disinfection and coinciding hydrostatic testing plan shall be submitted to the Engineer at least 24 hours prior to commencement of the tests. The plan should clearly detail the process and sequencing of flushing, disinfecting, and pressure testing. The plan should contain the following pertaining to disinfection:

1. Places where flushing will be done and location of drainage facilities.

2. Form of chlorine to be used and method of application.

3. Number/location of samples for bacteriological tests.

4. Method of taking samples.

5. Disposal of chlorinated water shall meet requirements of the Water Quality Division of the Wyoming Department of Environmental Quality.

3.01.D; OMIT the following sentence from the first paragraph:

The sites and velocities of flushing shall be as specified in the supplemental specifications.

3.01.H; REPLACE with the following:

1. After final flushing, and before the water main is placed in service, a sample or samples shall be collected from the end of the line and tested for bacteriologic quality and shall show the absence of coliform organisms. At least one sample shall be collected from chlorinated supplies where a chlorine residual is maintained throughout the new main. From un-chlorinated supplies, at least two samples shall be collected at least twenty-four (24) hours apart. A bacteriologic sample shall be collected every 1000 feet of main installed and one from each branch greater than 200 feet, or fraction thereof for both. If the disinfection length exceeds 1000 feet, a test shall be taken at the end as well as additional samples taken along the length of the line. It is the responsibility of the Contractor to provide and install all fittings and parts necessary to complete disinfection and bacteriologic testing.

2. Samples for bacteriologic analysis shall be collected in sterile bottles treated with sodium thiosulfate. The Owner will collect bacteriologic samples at locations provided by the Contractor. The Contractor shall coordinate with the Owner to collect the samples at least 24 hours in advance.

1.03.E; REVISE as follows:

Pipe that has been damaged during shipment or handling, even if previously approved before shipment, shall be rejected and removed from the site.

2.01.A; ADD the following paragraph:

4. Couplings used to make connections where sections of pipe are replaced shall be shielded style with all stainless-steel components. Couplings shall be Fernco RC series, Mission Flex-Seal ARC, or approved equal.

2.01.G; ADD the following:

3. Five-foot diameter manholes are required wherever the sewer main diameter is 12 inches or greater, whenever there are two or more inlets, whenever the manhole depth is 12 feet or greater or whenever the manhole is designed with a drop sewer connection.

   48-inch Dia. manholes shall have a 24-inch Dia. frame and cover and 60-inch diameter. manholes shall have a 30-inch diameter frame and cover.

   Pipe entering a four-foot Dia. manhole shall be 21-inches from center of manhole and pipe entering a five-foot Dia. manhole shall be 27-inches from center of manhole.

4. All manholes including the bench, bench to pipe transition, upper adjusting rings and all other exposed internal concrete and mortar surfaces, shall be coated per the requirements contained in this section and per the manufacturer's recommendations.

   A. Materials and supplies provided shall be the standard products of manufacturers. The standard products of manufacturers other than those specified will be accepted when it is demonstrated to the Engineer that they are equal in composition, durability, and usefulness for the purpose intended. Requests for submission shall include directions for the application, descriptive literature, safe storage, handling, and disposal of the product.

   B. A written warranty against coating failure shall be provided for the entire coating system, including all repair material, defect fillers, primers, intermediate, and finish coats. The minimum duration of the warranty shall be two (2) years. The product and the installation may be both covered by the manufacturer's warranty, or separate warranties may be issued by the manufacturer and installer.

      This warranty shall state that the coating will not fail for a minimum period of two years. Coating failure is defined as blistering, cracking, embrittlement, or softening, or failure to adhere to the substrate. The warranty shall also apply to any repair materials, primers, or other products used in the application. If any repair or replacement is necessary within the warranty period, a new 2-year warranty period shall start at the date that the manhole is placed back into service.

C. Contractor shall submit manufacturer's data and a description of installation method including:

1. Product safety data sheets (SDS).
2. Maximum storage life and storage requirements.
3. Mixing and proportioning requirements (as applicable).
4. Environmental requirements for application and worker safety, including ventilation, humidity and temperature ranges.
5. Application film thickness PM coat of primer and finish coat.
6. Curing time required.
7. Sample of finished product showing final color.

D. Polymer protective coating and lining materials shall be specifically designed for protecting manholes and other related wastewater structures from severe hydrogen sulfide environments. Liner shall be 100% solids epoxy containing no VOC's or isocyanates. Lining materials shall meet the following ASTM standards or an approved material equal:

ASTM		Value
Tensile Strength	D638	>5,000 psi
Flexural Strength	D790	>10,000 psi
Compressive Strength	D695	>10,000 psi
Shore D Hardness	D2240	>80
Adhesion to Concrete	D4541 or D7234	Substrate Failure
Water Vapor Transmission	D1651 or D1653	<3 grams/m2
Water Absorption	D570	<0.20%

2.01.K; REPLACE with the following:

1. Pour-in-place manhole base shall shell be poured on 8-inches of compacted 3/4-inch minus clean rock.

2. Pre-cast manhole base shell be placed on 8-inches of compacted 3/4-inch minus clean rock.

3. Base thickness (depth) shall be 8-inches if manhole is 12 feet or less. If the manhole is over 12 feet than then base shall be 12-inches thick.

4. Bases shall be reinforced when the distance from invert to top of cover exceeds 15 feet. Reinforcement to be approved by Engineer.

2.01; ADD the following paragraphs:

M. Polyethylene (HDPE) Pipe

1. HDPE pipe and fittings shall meet the requirements of ANSI/AWWA C906-90

Polyethylene (PE) Pressure Pipe and Fittings, 4 in through 63 in.

2. Pipe Jointing
   a. HDPE pipe will be joined by an approved butt-fusion or electrofusion method according to the manufacturer's specifications.

   b. Contractors' personnel employed to join HDPE shall be experienced and certified in accordance with 49 CFR 192.285 or shall have been certified as having training in the Manufacturer's recommended procedure.

3. Fittings
   a. HDPE Fittings shall be the material and dimensions as the pipe and shall be fused in accordance with Section 2700.2.01.M.2.

   b. Ductile Iron Fittings: Where required by the design drawings, ductile iron fittings in accordance with AWWA C-110.

N. Pipe marking tape shall be a minimum 4 mil thick, 3-inches wide, inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil. Marking tape shall be the APWA color code and utility legend printed with: "SEWER LINE".

3.01.C; ADD the following paragraphs:

6. Contractor shall lay the pipe so that the markings (size, SDR, Sewer Pipe, and Code Number) are facing up, and legible from the top of the trench.

7. Sewer pipe marking tape shall be installed over all sewer lines and sewer services. Marking tape shall be buried 12" to 24" below the subgrade and over the center of the pipe. The backfill shall be sufficiently leveled so that the tape is installed on a flat surface. The tape shall be centered in the trench with printed side up.

8. Sanitary sewer shall be installed at a minimum depth of 6 feet to top of pipe from finished ground surface unless approved otherwise by the City of Lander Engineer.

3.02; ADD the following paragraph:

F. The Contractor shall remove all sediment, rocks, debris, roots, grease accumulations, and obstructions from the manholes. Cleaning of the manhole walls, bench, and channel shall remove all grease, scale encrustation and loose mortar so that no foreign intrusion shall cause imperfections in the coating. Cleaning methods shall include washing with high-pressure water, mechanical removal or other as approved by the Engineer.
   1. The Contractor shall use water blasting with a minimum water pressure of 3,000 PSI to clean the manhole prior to applying the coating. The Contractor shall also be responsible for any additional surface preparation beyond water blasting as required by the coating system manufacturer. Where additional preparation is required, the Contractor shall provide all labor materials and equipment as necessary at no additional cost to the contract.
   2. Before installation of the coating system, the surface must be clean. Excess water shall be blown from the surface using compressed air equipment with oil-trapping

filters. Suitable heaters shall be used as needed to produce a surface-dry condition. The surface shall be vacuumed to make sure that loose particles are not present.

3. Any sediment or debris from cleaning operations larger than U.S. #8 sieve shall not be deposited downstream in the sewer. Sedimentation deposited downstream, as determined by the Owner, shall be removed at no cost to the Owner.

3.04.B.1; REPLACE with the following:

The Contractor shall provide the Engineer with an annotated video inspection record (in digital format) of the interior of all gravity sewer lines 8-inch in diameter and larger. The video shall be completed by a remotely controlled closed-circuit television (CCTV) device. The video shall clearly show all joint, seal, service wyes and manholes. The video shall be approved by the Engineer prior to final acceptance.

3.04.B.1 and 3.04.B.2; REPLACE the word “television” and/or “T.V.” with “video”.

3.04.G; REVISE as follows:

All tests shall be made after backfilling is completed, but prior to any surface restoration or street surfacing. Contractor shall be responsible for finding and repairing all breaks and leaks revealed by tests.

3.04; ADD the following paragraphs:

H. MANHOLE COATING

1. The Contractor shall give the Engineer a minimum of forty-eight (48) hours advance notice on start of field surface preparation work or coating application work, and a minimum of seven (7) days advance notice start on any shop surface preparation work.
2. All active leaks shall be sealed prior to coating.
3. All active flows shall be plugged or diverted away from all surfaces to be coated.
4. Inspection by Engineer or waiver of inspection in any particular portion of work shall not relieve the Contractor of the responsibility to perform work in accordance with the specifications and the manufactures’ recommendations.
5. During application, a wet film thickness gauge, meeting ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used. Measurements shall be taken and documented for submission to Engineer.
6. The coating shall be visually inspected by the Engineer for pinholes, cracks, delamination, bug holes, and unfinished surfaces.
7. If deficiencies are identified, the Engineer can request further third-party holiday testing. The Contractor shall furnish services of trained operator in holiday detection devices until final acceptance of coatings. Holiday detection devices shall be operated in presence of the Engineer’s representative. Cost of the third-party testing will be the responsibility of the Contractor at no cost to the Owner.

4.01; ADD the following paragraphs:

D. Video Inspection
Measurement of video inspections shall be made in lineal feet as measured along the centerline of pipe from center to center of manholes. Video inspection shall be considered complete when the DVD of the inspections is approved by the Engineer.

E. Manhole Coating
Measurement of manhole coating shall be made in vertical feet of various diameter of manholes, from the top of the adjustment ring to the invert and shall include all portions of the interior of the manhole including the base and shelf.

F. Sewer Fittings
Measurement of fittings shall be made by the numerical count each.

4.02.A.1; OMIT the last sentence of this paragraph.

4.02.C; REPLACE with the following:

C. Service Lines
Payment for service lines will made at the contract unit price bid per lineal for of the various sizes and classes called for which price shall include furnishing and installing pipe; potholing, dewatering, trench excavation and backfill, furnishing and placing Type 1 Pipe Bedding; connections to sewer main, tees, wyes and all other fittings; marking tape; testing; and all other work necessary or incidental for completion of the item.

4.02; ADD the following paragraphs:

D. Video Inspection
Payment for video inspection will be made at the contract unit price bid per lineal foot which shall include all tools, equipment, and labor necessary to complete this item. This shall include mobilization to, and from, the site; traffic control as required; accessing the pipe; conducting the video inspection, providing the DVD and all other work necessary or incidental for completion of the item.

E. Manhole Coating
Payment for manhole coating will be made at the contract unit price bid per vertical feet for various manhole diameters called for, which price shall include mobilization to, and from, the site, all tools, equipment, materials, and labor necessary to complete this item, traffic control as required, accessing the manhole, preparation of the surfaces, application for the coating, quality control testing and reports to verify conformance to the specifications and all other work necessary or incidental for completion of the item.

F. Sewer Fittings
Payment for sewer fittings will be made for each fitting installed at the specified size and shall be payment in full for furnishing and installing fittings, excavation, cutting and preparing the existing pipe, and all labor, materials, tools, and other items necessary for or incidental to completion of the work.

ADD the following new section in its entirety:

SECTION 02710 – CURED IN-PLACE PIPE

PART 1 GENERAL

1.01 SUMMARY

This section outlines the guidelines and requirements for the trenchless rehabilitation of pipelines using Cured-In-Place Pipe (CIPP). CIPP is the installation of a resin-impregnated, flexible, textile tube which is inserted into an existing pipeline then cured to create a continuous, tight-fitting, structurally-sound, water-tight new pipe within a pipe.

1.02 REFERENCE STANDARDS

ASTM D638 Standard Test Method for Tensile Properties of Plastics

ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

ASTM D3567 Standard Practice for Determining Dimensions of “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings

ASTM D5813 Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems

ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube

ASTM F1743 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

ASTM F2019 Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic Cured-in-Place (GRP-CIPP) Using the UV-Light Curing Method

These standards are made part of this specification by reference. All standards shall be latest edition and revision.

1.03 PRODUCT QUALIFICATIONS

Products shall meet the following criteria: A minimum of 250,000 linear feet of successful wastewater collection system installations in the U.S. must be documented to the satisfaction of the Owner and Engineer. Additionally, a minimum of five successful wastewater collection system projects of similar or greater size and scope of work shall have been performed in the U.S. and documented to the satisfaction of the Owner and Engineer to assure commercial viability.

1.04 INSTALLER QUALIFICATIONS

The installer shall be certified and/or licensed by the CIPP manufacturer. They shall

have at least five years and 50,000 lineal feet of documented experience installing their proposed CIPP technology in pipe and projects similar in size to the current project. If the Contractor does not meet these experience requirements, then a manufacturer's onsite representative must be present during installations of the CIPP system until such time the owner is confident in the Contractor's ability.

1.04.1 LEAD PERSONNEL

The project superintendent, foremen, CCTV crew lead, and robotic service reconnection operator shall each have a minimum of one year of experience with the proposed CIPP technology as supported by verifiable references that demonstrate competency and successful completion of past projects.

1.05 INSTALLATION SCHEDULE

The Contractor shall submit a detailed installation schedule, at least 10 days in advance of the Work, which contains the following information:

A. The date and timeframe of each installation. Night and weekend work must be approved by the Engineer and Owner at least 10 days prior to the proposed installation date. Sewer service shall not be disrupted for more than an 8-hour period.
B. Designate each segment to be lined using the manhole identification system used on the contract drawings (e.g. *Manhole N9-7 to Manhole N9-8*).
C. The line length, line diameter, and service connection count as determined by the pre-installation inspection.
D. The method of installation planned for each line.

1.06 SUBMITTALS

Submittals shall be made in accordance with the procedures set forth in the General Requirements of these Specifications.

A. Product Data
    1. Detailed information describing all CIPP materials including resin, tube, and catalysts
    2. Sufficient data to verify compliance with the specifications (including reference standards), including lab accreditations and testing reports
    3. Design calculations supporting the proposed liner thickness/strength
B. Installation Procedures
C. Product and Installer Qualifications
D. Sample Service Outage Notifications
E. Minimum and maximum allowable pulling force
F. Pre-Installation CCTV digital inspection videos and logs
G. Post-Installation CCTV digital inspection videos and logs showing cured liners and reestablished service connections
H. Post-Installation curing logs showing temperature and pressure readings
I. Field sample testing results
J. Installation schedule

PART 2 PRODUCTS

2.01 TEXTILE TUBE

A. The tube shall meet the requirements of ASTM F1216, F1743, or F2019 and ASTM D5813.The finished CIPP shall be fabricated from materials which, when cured, will be chemically resistant to withstand internal exposure to all types of sewage being conveyed. The tube shall be compatible with the resin system being used.
B. The tube shall be fabricated to a size that, when installed, will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during insertion. The minimum length shall be that deemed necessary by the Contractor to effectively span the distance between respective access points unless otherwise specified. The Contractor shall verify the lengths and diameters in the field before fabricating the tube.
    1. Individual insertion runs can be made over one or more manhole sections as determined in the field by the Contractor, as long as traffic control restrictions are adhered to and the longer stretch will not compromise the integrity of the installation or cause services to be out of service beyond the allowable time.
C. The outside layer of the tube (before insertion) shall be coated with an impermeable, flexible membrane.
D. The tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers.
E. The wall color of the interior pipe surface of the CIPP after installation shall be a light reflective color so that a clear detail examination with closed circuit television inspection equipment may be made.
F. The stube shall be strong enough to bridge missing sections of pipe and shall stretch to fit irregular pipe sections.
G. If the CIPP fails to make a tight seal at each manhole, hydrophilic gasket end seals (LMK or approved equal) or epoxy grout shall be installed.

2.02 RESIN

A. The proper resin system shall be used for the proposed CIPP technology (photoinitiated or thermosetting). The resin shall be polyester and catalyst, vinyl ester and catalyst, or epoxy resin and hardener complying with the requirements of ASTM F1216, F1743, or F2019. The tube material and resin shall be completely compatible.
B. The finished CIPP shall withstand internal exposure to domestic sewage having a pH range of 5 to 11 and temperatures up to 150 F.

2.03 STRUCTURAL REQUIREMENTS

The CIPP shall be designed per ASTM F1216. The CIPP shall be structurally designed using the following criteria:

A. Minimum service life: 50 years
B. Fully deteriorated host pipe / direct bury condition
C. Line depth: As measured in the field or calculated from depth of adjacent manholes
D. Prism loading: 120 PCF soil
E. Factor of safety: 2
F. Existing pipe ovality: 2%
G. Maximum deflection: 5%

H. Soil modulus: 1000 psi
I. Maximum lining enhancement factor: 5
J. Live loads: Assume all pipes carry HS 20 live loads
K. Groundwater: Assume groundwater elevation is at the existing ground surface
L. CIPP Physical Properties

Property	Test Method	Minimum Per ASTM F1216 or F1743 (psi)	Minimum per ASTM F2019 (psi)
Flexural Modulus of Elasticity	ASTM D790	250,000	725,000
Flexural Strength	ASTM D790	4,500	15,000

PART 3 EXECUTION

3.01 PUBLIC NOTIFICATION

All written notices shall be issued on current Owner or Contractor letterhead templates, prepared in a professional manner and must be approved by the Engineer prior to distribution. All contact with the Public shall be executed in a business professional manner, including adhering to professional standards regarding courtesy, grooming and maintaining visible/legible company identification. The public notification program shall, at a minimum, require the Contractor to be responsible for contacting each home or business affected by the project and informing them of the work to be done in all of the following ways:

A. Written notice shall be delivered a minimum of 48 hours in advance of the Preclean and Video; and again 48 hours in advance of installation, to each home or business describing the work, schedule, how the construction affects them, and a local telephone number of the Contractor they can call to discuss the project or any problems that may arise.
B. Personally contact each home and business owner on the day of pre-installation inspection of the sewer and coordinate with that owner the verification of their existing service connection. If the owner is unavailable, other arrangements shall be made for existing service connection verification.
C. If a written notice cannot be left at a home or business, the Contractor shall personally contact each home or business owner the day prior to beginning work on the section of sewer to which they are connected.
D. Personally contact any home or business owner which cannot be reconnected within the time stated in the written notice. Anticipated service tap reconnection time shall be noted within another notice.
E. Provide written notice with the time of reactivation posted on the front door of a residence or business.
F. Businesses which require special accommodations, such as night or weekend work, must be identified at least 10 days prior to the proposed scheduled work. The Engineer shall be notified and kept apprised of the coordination to meet these special accommodations.

3.02 INSTALLATION PREPARATION

A. The Contractor shall remove all existing internal debris, mineral deposits, and loose foreign material from the sewer line with the use of water jet and/or cutting/grinding equipment or other appropriate means. The cleaning operation shall remove any and

all existing debris so that each pipe segment can be thoroughly inspected and successfully reconstructed or rehabilitated. All sludge, dirt, sand, rocks, grease, and all other solid or semi-solid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing material from one manhole section to another shall not be permitted.

B. All pipelines to be lined shall be inspected using closed circuit television (CCTV) by experienced personnel trained in locating and identifying defects, breaks, obstacles, and service connections.
    1. The pre-installation inspection shall determine active service connections, the addresses served (visible on the digital recording), as well as which service connections are opened, capped or misaligned. Only active service connections and laterals shall be re-established unless directed otherwise by the Engineer.
    2. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the CIPP. It is the Contractor's responsibility to notify the Engineer of any conditions which may prevent proper installation of the CIPP. These types of conditions shall be accurately recorded and submitted digitally, as described elsewhere in these specifications, to the Engineer.
    3. The manhole identification system used on the contract drawings shall be utilized in all project documentation.
C. All service connections protruding into the sewer to be lined shall be internally cut or ground down with a robotic cutter to be flush with the host pipe to be lined, prior to liner installation. The robotic cutter shall be monitored by closed circuit television equipment to verify proper cutting and shall be capable of cutting VCP, PVC, DIP, or CIP pipe. Equipment specifically designed for cutting roots from sewers (such as a chain cutter) shall not be allowed for trimming services.
D. Obstructions such as solids and roots that can be removed using appropriate robotic equipment shall be cleared from the line to allow inspection and installation of CIPP.

3.03 LINE OBSTRUCTIONS

If the pre-installation cleaning and inspection reveals an obstruction that cannot be removed by conventional sewer cleaning, grinding, or cutting equipment (such as an protruding tap that cannot be trimmed, a severely offset joint, a collapse, etc.), or a damaged service connection, then a point repair shall be made by the Contractor with the prior approval of the Engineer. These conditions shall be recorded and a digital video file and log sheet must be submitted to the Engineer so that the existing conditions are documented and may be reviewed to determine the extent of repair required prior to CIPP installation.

3.04 BYPASSING SEWAGE FLOWS

The Contractor shall maintain mainline sewage flows during CIPP installation by bypass pumping as required by Specification Section 01560 – Temporary Controls. Sewer service connections within the section to be lined shall be temporarily taken out of service by the Contractor to permit lining. Maintain bypass pumping until lining is completely cured, service connections are reestablished, and post-installation CCTV inspection has been completed.

3.05 INSTALLATION

The method of installation shall be compatible with the manufacturer's recommended

practices and in accordance with ASTM F1216, F1743, or F2019. The Contractor shall, in his submittals, provide detailed information on the procedure and the steps to be followed for the installation of the CIPP. All such instructions and procedures shall be carefully followed.

A. The Contractor shall designate a location where the felt tube shall be impregnated ("wetted out") with resin to thoroughly saturate the tube prior to its dispatch for installation. Wet out may be performed in the manufacturing facility. If wet out is performed in the field, the Contractor shall inform the Engineer a minimum of twenty-four hours in advance of each wet out process so that the Engineer may observe. Resin impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall.
B. The Contractor shall transport and store the wetted out tube in an appropriate manner until it is installed. The transport and storage time shall comply with submittals received.
C. The Contractor will not be allowed to use water to float the inserted flexible tube into the existing sewer line. The liner should be pulled in or inverted. If the liner is pulled in, the pulling force shall be monitored with a gauge available for viewing by the Engineer or Owner. The tube shall be rejected and removed if the allowable pulling force, as specified by the manufacturer, is exceeded.
D. If GRP CIPP is being used, a slip sheet shall be installed on the bottom one third to one half of the host pipe prior to liner insertion (if it is not already part of the manufactured outer film of the liner), for the purpose of protecting the liner during insertion and reduce the drag, or as recommend by the liner manufacturer.
E. After inversion or initial inflation, pressure shall be maintained between the minimum and maximum pressures recommended by the manufacturer, as required to hold the tube tight against the host pipe, until curing has been completed. Should the pressure deviate outside the planned range at either end of the section, the Owner may request the installed tube to be removed from the host conduit and the line reinspected at the Contractor's expense. The Contractor shall provide the Engineer with a continuous log of pressure during cure.
F. Segments of liner that have been resin impregnated and placed in the host conduit and then are found to be too short shall be removed without curing and discarded at the Contractor's expense. Removal of the uncured, resin impregnated liner shall be accomplished in such a way as to minimize the amount of resin allowed to escape. The Contractor shall be responsible for cleanup of all escaped resin. The Contractor’s installation plan shall include a process to remove resin impregnated, uncured line from the host conduit, including protection of the host system from escaping resin.
G. Curing shall begin immediately after insertion of the wetted out tube is complete. The method of curing (hot water recirculation system, steam, or light train) shall be in accordance with the manufacturer’s recommendations.
H. If hot water or steam are used as the curing medium, remote temperature gauges or sensors shall be placed inside the host pipe to monitor temperatures during the curing cycle.
I. The curing source shall be continuously monitored with data logged for the entire cure cycle. The data logged shall included the following:
    a. For hot water or steam cure: Location of the temperature gauges/sensors, maximum temperature, sustained temperature time, and minimum cooldown temperature.
    b. For UV or LED light cure: Time, rate of travel of the curing assembly,

temperature in the liner, and the power output of the light assembly.

J. After curing, cool down the hardened CIPP to a temperature below 100° F, or as recommended by the manufacturer, before relieving the pressure. Care shall be taken in the release of the water column so that a vacuum will not be developed that could damage the newly installed CIPP.

3.06 FINISH

A. The finished CIPP shall be continuous over the entire length from manhole to manhole and be free from visual defects such as foreign inclusions, dry spots, delamination, wrinkles or lifts exceeding 5% of the host pipe diameter, pinholes, and other deformities. It shall be free of leakage through the CIPP wall.
B. Any defects which will affect the integrity or strength of the CIPP, in the opinion of the Engineer, shall be repaired or replaced at no additional cost to the Owner. Methods of repair shall be proposed by the Contractor and submitted to the Engineer for approval.
C. If the CIPP fails to make a tight seal at each manhole, hydrophilic gasket end seals or epoxy grout shall be installed.

3.07 SERVICE REINSTATEMENT

A. The Contractor shall determine if a service connection is active prior to rehabilitation of the sewer. Only active service connections and laterals shall be re-established. All costs incurred to verify active service connections are included within the “Cured-In-Place-Pipe” bid item within the contract. No additional payment for verification shall be considered.
B. After the CIPP has been cured, active service laterals shall be reinstated to not less than 95% and not more than 100% of the size and configuration of the existing service. The finished surface shall be smooth or brushed and configured in a way that will not cause debris of solids to accumulate. If an opening is greater than 100% of the service connection opening, the Contractor shall install a CIPP-type repair at no additional cost to the Owner.
C. It is the intent of these specifications that branch connections be reopened without excavation, utilizing a remote-controlled cutting device, monitored by video TV.
D. Debris and coupons from cutting open service connections shall be removed at the adjacent downstream manhole.
E. The Contractor shall be responsible for restoring/correcting, without any delay, all missed or faulty reconnections, as well as for any damage to property owners for not reconnecting the services.
F. The Contractor shall maintain on the jobsite a minimum of two (2) complete working cutters plus key spare components.
G. No additional payment will be made for excavations for the purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.
H. If a service connection remains out of service for more than 12 hours at a time, the Contractor shall provide some means of temporary facilities or hotel accommodations for the affected residents or property owners.

3.08 TESTING

A. The Contractor shall collect sample coupons from the cured CIPP for testing as described herein. Coupons shall be taken from approximately 20% of the project’s

installations or as directed by the Engineer. There shall be at least one sample for each liner diameter and thickness. The Contractor shall stamp or mark the test pieces with the date of installation and manhole number.

B. For each sample location, the Contractor shall provide one CIPP sample in accordance with the methods outlined in the applicable ASTM standards.
C. The Contractor shall provide the following certified laboratory test results:
    1. Short-Term Flexural Properties. The flexural properties must meet or exceed the values listed in this specification or the values submitted to the Engineer by the Contractor for this project's CIPP wall design, whichever is greater.
    2. Wall thickness of the samples. The minimum wall thickness at any point shall not be less than 87½ % of the submitted minimum design wall thickness
D. The cost of the sampling and testing is incidental to the Work.

3.09 FINAL ACCEPTANCE

A. The Contractor shall perform a CCTV inspection of each CIPP installation after service line reconnection has been completed. The inspection shall be recorded and completed in accordance with ASTM F1216, F1743, or F2019.
    1. The pipe shall be clean and no water shall be present during the inspection so that the entire pipe can be clearly viewed.
    2. Final CCTV inspection should be performed using water jets to eliminate standing water in sags and bellies while the line is being televised.
    3. The video must clearly show any visual defects and the condition of each active service that has been reinstated.
    4. Digital copies of the unedited videos shall be provided to the Engineer for review.
    5. The manhole identification system used on the contract drawings shall be utilized to name each segment of sewer main in the videos.
B. Acceptance of CIPP lining shall be based on the Engineer’s evaluation of the installation and curing data, review of the certified test data of the installed liner, and review of the CCTV videos.
C. Any necessary repairs shall be completed before final acceptance.

3.10 CLEANUP

After the installation has been completed, the Contractor shall clean up the entire project area and return the area affected by the operation to a condition at least equal to that existing prior to the work. All excess material and debris shall be disposed of by the Contractor.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. Pre-Installation Cleaning and CCTV Inspection
    1. The measurement for payment of this item will be the actual number of lineal feet of sewer line cleaned and CCTV inspected and documented on the log sheet as measured along the centerline of the pipe from center of manhole to center of manhole with deductions made for the diameter of structures and appurtenances.
B. Trim Protruding Tap
    1. The measurement for payment of this item will be the actual number of taps that need to be trimmed to allow CCTV inspection and/or CIPP installation as approved by the Engineer.

C. Cured-In-Place Pipe
   1. The measurement for payment of this item will be the actual number of linear feet of cured-in-place pipe installed as measured and documented by pre-installation CCTV inspection along the centerline of the pipe from center of manhole to center of manhole with deductions made for the diameter of structures and appurtenances.

D. Reinstate Service
   1. The measurement and payment for this item will be the actual number of services required to be reactivated. If these specifications require the Contactor to determine and only reinstate active services, no measurement for payment will be made for reinstating services that are not active.

4.02 BASIS OF PAYMENT

A. Pre-Installation Cleaning and CCTV Inspection
   1. The unit price bid for Pre-Installation Cleaning and CCTV Inspection shall include: providing public notification, furnishing and setting up of all equipment, labor, and materials necessary to clean and perform pre-installation CCTV inspection of the sewer, including an intrinsically safe camera, as necessary; recording all information on USB storage drive for review by Owner and Engineer; submittal of video in MP4 format and logs in .pdf format; identification and locating of all active and inactive (capped) sewer taps, to include linear footage from center upstream manhole, by dye testing, electronic sensing, smoke tracing or use of any other means necessary to verify the active taps; determination of taps requiring trimming; locating, identifying and reporting structurally deficient pipe sections for replacement or point repair; completion of additional pre-installation inspections and sewer cleaning as necessary prior to CIPP installation; removal of line obstructions; supplying energy for all equipment; obtaining permits for the inspection and covering any related fees; furnishing and setting up all equipment and labor necessary to clean the sewer; furnishing of water for jetting; removal of all foreign material from the sewer line that will prevent installation of cured in place products; storage of cleaning sediment on the job site in containers or other approved methods; disposal of sediment according to Local, Federal, and State environmental requirements; removal and disposal of unsuitable material and construction debris; and all other related and necessary equipment, work, and materials required to accomplish this item in accordance with the Contract Documents.

B. Trim Protruding Tap
   1. The unit price bid for Trim Protruding Tap shall include: furnishing of all equipment and labor required to cut the protruding tap; cutting of the tap to a smooth and hydraulically functional opening; furnishing of power for all equipment; video-inspection and locating of the protruding tap; removal and disposal of materials; and all other related and necessary materials, work and equipment required to complete this item.

C. Cured-In-Place Pipe
   1. The unit price bid for Cured-In-Place Pipe shall include but is not limited to: compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all work including public notification; supplying energy for all equipment; obtaining all required permits for CIPP installation; access to the sewer; preparatory cleaning; installation of liner; curing; end seals or epoxy grout as needed to prevent infiltration between the CIPP liner and host pipe at each manhole; dealing with groundwater during the lining process; removal and

disposal of any waste materials; removal of any roots or debris; protection and repair or replacement of existing structures, pipelines and utilities; odor and noise mitigation; post-installation inspection video of all installed CIPP; use of intrinsically safe equipment as necessary; recording all information on a USB storage drive for review by Owner and Engineer; submittal of video in MP4 format and logs in .pdf format; completion and submittal of written logs and digital as-constructed drawings; and all other work incidental to and necessary for a complete CIPP installation in accordance with the Contract Documents.

D. Reinstate Service
   1. The unit price bid for Reinstate Service shall include: furnishing and setting up of all equipment and labor necessary to locate and reactivate services; cutting and brushing of CIPP material and linings, coatings and/or coverings required to open sewer services; removal and disposal of waste material generated by the process; public notification in advance of the work and notifying residents and business upon reactivation; and all other related and necessary materials, work, equipment, and incidentals required to complete this item in accordance with the Contract Documents.

END OF SECTION

ADD the following new section in its entirety:

SECTION 02711 – MANHOLE REHABILITATION

PART 1 GENERAL

1.01 SUMMARY

This section covers the repair and rehabilitation of manholes using various processes and products to make them structurally sound, prevent infiltration and inflow, provide corrosion protection, and improve flow.

1.02 PRODUCT QUALIFICATIONS

For a product to be considered commercially proven, a minimum of 1,000 vertical linear feet of manhole rehabilitation, or rehabilitation of at least 100 manholes, must have been completed over a period of at least three years with the material proposed, by the Contractor or by other contractors. Document compliance to the satisfaction of the Owner and Engineer.

1.03 INSTALLER QUALIFICATIONS

The Contactor's personnel must be certified by manufacturers as having been trained and approved in the handling, mixing and application of the products they are installing. Submit letters from the manufacturers verifying certification. The Contractor must also submit the manufacturer's approved equipment list, by name and model number, for application of product and the Contractor's equipment list showing approved equipment available for use in product application.

1.04 SUBMITTALS

Submittals shall be made in accordance with the procedures set forth in the General Requirements of these Specifications.

A. Product Data from the manufacturer including a detailed description of equipment, materials, and operational procedures including technical information, surface preparation instructions, application instructions, ASTM standards and test data, safety data sheets, and instructions for shipping, storage, and handling.
B. A sample of the product showing the final color.
C. Environmental requirements for application and worker safety, including ventilation, humidity, and temperature ranges.
D. Product and Installer Qualifications
E. Warranty certificates
F. Sample public notifications (if any customers will have service disruptions)

1.05 FIELD LOCATION OF MANHOLES

A. Contractor is responsible for locating and uncovering all manholes and cleanouts in lines being rehabilitated. If difficulty is encountered in locating a manhole or cleanout covered by ground or pavement, notify the Owner or Engineer and await instructions.
B. Manholes may be located within project limits which are not part of the system being rehabilitated. Properly identify manholes before starting cleaning and sealing

operations.

PART 2 PRODUCTS

2.01 GENERAL

A. The materials used shall be designed, manufactured, and intended for sewer manhole rehabilitation and the specific application in which they are used. The materials shall have a proven history of performance in sewer manhole rehabilitation. The materials shall be delivered to the job site in original unopened packages and clearly labeled with the manufacturer's identification and printed instructions. All materials shall be mixed and applied in accordance with the manufacturer's written instructions.
B. Each lining system shall be designed for application over wet (but not active running water) surfaces without degradation of the final product and the bond between the product and the manhole surfaces.
C. All materials shall be compatible with one another.

2.02 INFILTRATION CONTROL

A. For minor infiltration: Rapid-setting cementitious product specifically formulated for leak control.
B. For very active water infiltration: Chemical grout specifically designed to stop active water leaks. Product selection is to be based on manufacturer’s recommendations for the project at hand.

2.03 PATCHING MATERIAL

A. For filling voids, patching missing bricks or steps, repairing inverts, or other similar repairs: Rapid-setting, fiber-reinforced, high-early-strength, corrosion-resistant calcium aluminate cementitious product intended for the stated purpose.

2.04 CEMENTITIOUS LINER

A. A quick-setting, fiber-reinforced, high-strength, corrosion-resistant, calcium aluminate cementitious liner shall be used to form a structural monolithic liner covering all interior substrate surfaces and meet the following performance specifications:

Property	ASTM Test Method	Minimum Value
Compressive Strength	C109	7000 psi @ 28 days
Tensile Strength	C496	685 psi @ 28 days
Flexural Strength	C293	1000 psi @ 28 days
Drying Shrinkage	C596	0% at 90% RH
Bond Strength	C882	2000 psi @ 28 days
Freeze/Thaw Resistance	C666	300 cycles no damage
Wet Unit Weight	C138	127 ± 5 lb/ft^3

B. The product must have the ability to be applied to overhead surfaces.
C. The product shall be single component only requiring the addition of water.

2.05 EPOXY COATING

A. Hydrogen sulfide resistant, rapid-curing, 100% solids epoxy capable of application to damp concrete that will cure at low temperatures. It shall have the following minimum properties:

Property	ASTM Test Method	Minimum Value
Bond Strength	D7234	Substrate failure
Compressive Strength	D695	8,500 psi
Flexural Strength	C580 or D790	4,300 psi
Tensile Strength	C307 or D638	2,500 psi
Moisture Absorption	C413	0.2%

PART 3 EXECUTION

3.01 PUBLIC NOTIFICATION

All written notices shall be issued on current Owner or Contractor letterhead templates, prepared in a professional manner and must be approved by the Engineer prior to distribution. All contact with the Public shall be executed in a business professional manner, including adhering to professional standards regarding courtesy, grooming and maintaining visible/legible company identification. The public notification program shall, at a minimum, require the Contractor to be responsible for contacting each home or business affected by the project and informing them of the work to be done in all of the following ways:

A. Written notice shall be delivered a minimum of 48 hours in advance of any service disruption to each affected home or business describing the work, schedule, and a local telephone number of the Contractor they can call to discuss the project or any problems that may arise.
B. If a written notice cannot be left at a home or business, the Contractor shall personally contact each home or business owner the day prior to the service disruption.
C. Personally contact any home or business owner which cannot be reconnected within the time stated in the written notice. Anticipated service restoration time shall be noted within another notice.
D. Provide written notice with the time of reactivation posted on the front door of a residence or business.
E. Businesses which require special accommodations, such as night or weekend work, must be identified at least 10 days prior to the proposed scheduled work. The Engineer shall be notified and kept apprised of the coordination to meet these special accommodations.

3.02 BYPASSING SEWAGE FLOWS

The Contractor shall maintain mainline sewage flows during manhole rehabilitation by bypass pumping as required by Specification Section 01560 – Temporary Controls, or by using flow-through plugs. Sewer service connections within the section to be bypassed may be temporarily taken out of service by the Contractor if necessary. Maintain bypass pumping until any products that will come into contact with flows are completely cured.

3.03 MANHOLE PREPARATION

A. Where indicated on the plans, replace and/or reset the adjusting rings, frame, and cover in accordance with the manhole specification contained elsewhere in these specifications.
B. Covers shall be placed over inverts to prevent extraneous materials from entering the sewer lines.
C. Cleaning: All grease, oil, laitance, coatings, loose bricks, mortar, unsound concrete, and other foreign materials shall be completely removed from the manhole walls and bench. The primary cleaning method will be high-pressure water spray with a minimum pressure of 5000 psi, but other methods such as wet or dry sandblasting, acid wash, concrete cleaners, degreasers, or mechanical means may be required to properly clean the surface to meet manufacturer's requirements. All surfaces on which these methods are used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their reactant products. The Contractor shall dispose of debris in a location approved by the Owner and in accordance with all Federal, State and Local regulations.
    1. Loose or protruding brick, mortar and concrete shall be removed using a mason's hammer, chisel, or scraper.
D. Stopping Infiltration: After surface preparation and prior to the application of linings and coatings, infiltration shall be eliminated with the materials specified herein and in accordance with the manufacturers' recommendations. Remove existing roots prior to application by cutting them flush with the manhole wall.
E. Patching: Prepare surfaces with any necessary patching in accordance with manufacturer's instructions. All holes, voids, cracks, and disintegrated material shall be patched or repointed, providing a subbase that meets the manufacturer's recommendations.
F. Invert & Bench Repairs (Where Indicated on the Plans): Remove all loose concrete and rubble from existing channels and inverts. Remove upper half of pipe that sticks above the bench in manholes where channels were created from broken-in pipe. Rebuild channels if required by reshaping. Repair the slopes of benches to have a slope of 1 inch per foot toward the channel.
    1. Align inflow and outflow ports and provide a configuration that prevents the deposition of solids or turbulent flows.
    2. All inverts shall follow a constant grade between influent and effluent lines.
    3. Changes in direction of flow, including entering branches, shall be accomplished with smooth curves, and will be shaped to allow easy entrance of maintenance equipment including cleaning equipment, CCTV camera, etc.
    4. Channel depth shall be at least one-half the diameter of the largest connecting line. Channel diameter to match the connecting lines.
    5. Install patching material on the channels and inverts no less than ½ inch thick and extend onto the bench to provide a seamless transition. Provide a finished surface that is smooth and transitions to connected pipes without any ridges.
G. Manhole steps: Existing manhole steps shall be cut and removed and not replaced after rehabilitation.

3.04 CEMENTITIOUS LINER APPLICATION

A. Check the forecast and monitor ambient, surface, and mix water temperatures to ensure application and curing occur within temperatures deemed acceptable by manufacturer. In no cases should the material be placed when the ambient temperature is 37 degrees Fahrenheit and falling or when the temperature is

anticipated to fall below 32 degrees Fahrenheit during a 24-hour period.

B. Material shall be applied only when manhole is in a saturated surface dry (SSD) state, with no visible water dripping or running over the manhole walls.
C. Mix the material with the amount of water recommended by the manufacturer. Water shall be metered into the mixing equipment to ensure a proper consistency. Hand mixing is not allowed.
D. If recommended by the manufacturer, apply a bonding agent that is compatible with the liner to the existing surface to provide firm adhesion of the liner.
E. Apply the liner following manufacturer's instructions by spraying the material onto the interior surface of the sewer structure from the base(including the overhead portion of flat-top manholes) by rotary spray equipment or spray gun. Hand application is not acceptable.
F. Unless stated otherwise in the plans, apply cementitious lining material to a minimum thickness of ½-inch for manholes 0-5 feet in depth, ¾-inch for manholes greater than 5-feet but less than 15-feet in depth, and 1-inch for manholes between 15-feet and 30-feet in depth. Thickness shall be checked during application with a thickness gauge such as a calibrated screwdriver or awl. Cementitious lining shall be applied to fresh mortar before new bacterial growth or debris can contaminate underlying mortar.
G. The bench shall be sprayed such that a gradual slope is produced from the walls to the invert with the thickness at the edge of the invert being no less than ½-inch. The wall-bench intersection shall be rounded to a uniform radius the full circumference of the intersection.
H. Seal around pipe connections.
I. The Contractor shall take precautions to keep overspray or excess material from entering any pipes in the manhole.
J. Troweling of materials shall begin immediately following the spray application. Initial troweling shall be in an upward motion, to compress the material into voids and solidify manhole wall. A brush or broom finish shall be applied if the liner is to be top coated.
K. The material shall be cured according to the manufacturer's instructions and recommendations.
L. Manhole covers shall be replaced no more than 10-20 minutes after troweling is completed to avoid moisture loss in the material due to sunlight and winds.

3.05 EPOXY COATING APPLICATION

A. Temperature of the surface to be coated should be maintained between 40 degrees Fahrenheit and 120 degrees Fahrenheit or as recommended manufacturer.
B. Epoxy topcoat shall be applied over the cementitious liner after the liner has cured for the minimum length of time recommended by the manufacturers of the cementitious liner or the epoxy coating- whichever time is greater. The Contractor shall inspect the liner to ensure it has properly cured.
C. The material shall be handled, mixed, and applied per manufacturer's instructions to a minimum uniform dry film thickness of 125 mils. Prevent material run or sag. After the epoxy liner has set, repair any visible pinholes or defects per the manufacturer's recommendations.

3.06 TESTING

A. For cementitious liner, a minimum of four 2 X 2-inch mortar cube test samples shall be taken from the material used each day. The samples shall be properly packaged,

labeled, and sent to an independent test laboratory for compression strength testing as described in ASTM C-109. All testing shall be performed at the expense of the Contractor. Copies of all certified test reports shall be submitted to the Engineer.

B. All linings and coatings shall be visually inspected for infiltration, blisters, pinholes and consistent coverage. Deficiencies shall be repaired in accordance with the manufacturer's recommendations at no additional cost to the Owner.
C. Wet film thickness measurement shall be supplemented by a report submitted by the Contractor. The report shall be presented after completion of underlayment, top coating operations, and shall state number of manufacturer's product units used and total square footage of surface area covered. The Engineer shall have the option of requiring the Contractor to document the number of units (coating materials) on hand before and after coating operations to verify actual minimum dry film thickness applied. All film thicknesses not meeting required minimums will be re-coated per manufacturer's recommendations.
D. Discontinuity (Holiday) testing shall be performed in accordance with NACE SPO 188 on all epoxy-coated surfaces at the Contractor's expense. All detected holidays shall be marked and repaired in accordance with the epoxy manufacturer's recommendations.

3.07 WARRANTY

A. A written warranty against coating failure shall be provided for the entire coating system, including all repair material, defect fillers, primers, intermediate, and finish coats. The minimum duration of the warranty shall be five (5) years. The product and the installation maybe both covered by the manufacturer's warranty, or separate warranties may be issued by the manufacturer and installer.
B. This warranty shall state that the coating will not fail for a minimum period of five years. Coating failure is defined as blistering, cracking, embrittlement, or softening, or failure to adhere to the substrate. The warranty shall also apply to any repair materials, primers, or other products used in the application. If any repair or replacement is necessary within the warranty period, a new 5-year warranty period shall start at the date that the manhole is placed back into service.
C. If the Owner or their representative performs inspections during the warranty period and observes infiltration in any of the manholes, the Contractor shall accompany the Owner to inspect all manholes rehabilitated as part of the Contract at no additional cost to the Owner.

PART 4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. Replace Frame, Cover, and Rings
   1. The measurement for payment of this item will be for each frame and cover replaced.
B. Cementitious Lining with Epoxy Top Coat
   1. The measurement for payment of this item will be the actual number of vertical feet of liner and coating installed, as measured from the bottom of the invert in the center of the manhole to the top of the cover.
C. Repair Bench, Inverts, and Channels
   1. The measurement for payment of this item will be for each manhole where the bench, inverts, and channels are repaired.
D. New Manhole Site Investigation

1. The measurement for payment for this item will be lump sum.

4.02 BASIS OF PAYMENT

A. Replace Frame, Cover, and Rings
   1. The unit price bid for Replace Frame, Cover, and Rings shall include: removal and disposal of the existing frame, cover, grade rings, and concrete collar; furnishing and installing new frame and cover; furnishing and installing the materials necessary to adjust the manhole to grade; installing a new concrete collar; and all other related and necessary equipment, work, and materials required to accomplish this item in accordance with the Contract Documents.

B. Cementitious Lining with Epoxy Top Coat
   1. The unit price bid for Cementitious Lining with Epoxy Top Coat shall include: locating manholes; public notification; cleaning, stopping infiltration, patching, and any other necessary repairs or preparation; removing steps; lining and coating; sealing pipe connections; testing; and all necessary and related equipment, work, materials, and incidentals required to accomplish this item in accordance with manufacturers requirements and the Contract Documents.

C. Repair Bench, Inverts, and Channels
   1. The unit price bid for Repair Bench, Inverts, and Channels shall include: locating manholes; public notification; demolition, cleaning, and removal and disposal of debris and pipe material from the manhole; stopping infiltration; reforming and rebuilding benches, channels, and inverts; and all necessary and related equipment, work, materials, and incidentals required to accomplish this item in accordance with manufacturers requirements and the Contract Documents.

D. New Manhole Site Investigation
   1. The unit price bid for New Manhole Site Investigation shall include: locating the bend in the existing sewer line, excavating the bend to determine the depth and size of the main, determining the clearance from other existing utilities in the area, measuring dimensions to order a new manhole to be installed at the location of the bend, surface restoration, and all necessary and related equipment, work, materials, and incidentals required to accomplish this item in accordance with the Contract Documents.

END OF SECTION

WYPWSS SECTION 02731 – PRESSURE SEWER LINES AND FORCE MAINS

2.01.A, 2.01.B, and 2.01.C; ADD the following paragraph to each section.

All bolt packs for fittings, couplings, valves, etc. shall be stainless steel, type 304 including nuts, bolts, studs, and washers.

2.01.B.5, 2.01.C.5, 2.01.D.4, and 2.01.F.4 ; REPLACE with the following:

Warning pipe marking tape shall be a minimum 4 mil thick, 3-inches wide, inert polyethylene plastic that is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil. Marking tape shall be the APWA color code and utility legend printed with: “SEWER LINE”.

2.01.B.4, 2.01.C.4, 2.01.D.3, 2.01.E.3, and 2.01.F.3; REPLACE with the following:

Tracer Wire for open trench construction shall be Copperhead High Strength1230; Reinforced 12 AWG copper-clad steel, 30 mil high density polyethylene coating suitable for direct bury and color coded per APWA standard for the specific utility marked, minimum 450 lb break load, or approved equal.

2.01; ADD the following:

2.15 POLYETHYLENE CORROSION PROTECTION

A. The polywrap shall be of virgin polyethylene, not less than 8 *mils* in thickness, formed into tubes or sheets as may be required. Naturally pigmented material may be used where exposure to ultraviolet light will be less than 48 hours.

   Otherwise, the material shall be pigmented with 2 to 2 1/2 percent of well dispersed carbon black with stabilizers.

   The polywrap shall be secured as specified below with 2-inch wide pressure sensitive tape not less than 10 mils thick. This flexible tape shall consist of a polyethylene or polyvinyl chloride backing with a synthetic elastomeric adhesive film comprised of butyl rubber. Tape shall remain flexible over a wide range of temperatures, with tensile strength and elongation properties in conformance with ASTM D1000.

2.16 CATHODIC PROTECTION

A. All bolts used to field assemble water main components with mechanical joints shall have a sacrificial anode attached to the ends of the threads. The sacrificial anode shall be a large “Mars Cap” or Engineer-approved equal.

3.05; REPLACE with the following:

3.05 CONSTRUCTION

A. GENERAL

   1. Pipe shall be installed in accordance with the manufacturer’s recommendations for installing the type of pipe used unless otherwise noted in the Special

Provisions. Contractor shall provide all tools and equipment including any special tools designed for installing each particular type of pipe used.

B. RESPONSIBILITY FOR MATERIAL

1. Contractor shall be responsible for all material furnished by him and shall replace at his own expense all such material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all materials and labor required for the placement of installed material discovered damaged or defective prior to the final acceptance of the work, or during the guarantee period.

2. Contractor shall be responsible for the safe and proper storage of material furnished by him or to him and accepted by him, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe and other accessories shall be kept free from dirt and foreign matter at all times.

C. HANDLING OF PIPE

1. All pipe furnished by Contractor shall be delivered and distributed at the site by Contractor. Pipe, fittings, specials, valves, and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

2. In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

3. Pipe shall be so handled that the coating and lining will not be damaged. If, however, any part of the coating or lining is damaged, the repair shall be made by Contractor at his expense in a manner satisfactory to Engineer.

D. LAYING OF PIPE

1. Before installation, the pipe and pipe coating shall be inspected for defects. Any damage to pipe coatings shall be repaired AS RECOMMENDED BY THE PIPE MANUFACTURER before laying the pipe.

2. All pipe, valves, and fittings shall be laid and maintained with a minimum of 6.0 feet within the road ROW and 5 feet in fields and unsurfaced locations of cover or to the required lines and grades shown on the drawings with the fittings and valves at the required locations.

3. Pipe shall be installed at the grade and alignment shown on the plans.

4. Wherever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that an alteration in the plan

is required, Engineer shall have the authority to change the plans and order a deviation from the line and grade or arrange with the owners of the structures for the removal, relocation and reconstruction of the obstructions. If the change in plans results in a change in the amount of work by Contractor, such altered work shall be done on the basis of payment to Contractor for extra work or credit to the Owner for less work.

5. Proper implements, tools, and facilities satisfactory to Engineer shall be provided and used by Contractor for the safe and convenient prosecution of the work. All pipe, fittings, and valves shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to pipe materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trench.

6. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or other means approved by Engineer.

7. Long radius curves, either horizontal or vertical, may be laid with standard pipe by deflections at the joints, as allowed by the pipe manufacturer's installation instructions. If the pipe is shown curved on the plans and no special fittings are shown, Contractor can assume that the curves can be made by deflection of the joints with standard lengths of pipe. If shorter lengths are required, the plan will indicate maximum lengths that can be used.

8. Where field conditions require deflection or curves not anticipated by the plans, Engineer will determine the fittings to be used and additional payment will be made for specified fittings. No additional payment will be made for laying pipe on curves as shown on the plans, nor for field changes involving standard lengths of pipe deflected at the joints. Upon approval of the Engineer, the Contractor may choose to install additional or substitute fittings during completion of the work, at no additional cost to the project.

9. Maximum deflections at pipe joints for various types of pipe shall not exceed the applicable material and joint specifications of AWWA nor shall they exceed the recommendations of the pipe manufacturer. When rubber-gasketed pipe is laid on a curve, the pipe shall be jointed in a straight alignment and then deflected to the curved alignment. Trenches shall be made wide on curves for this purpose.

10. The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or coating and so as to leave a smooth end at right angles to the axis of the pipe. The flame

cutting of pipe by means of an oxyacetylene torch shall not be allowed.

11. Tracer wire shall be installed on top of all force and secured with 2-inch wide pressure sensitive tape not less than 10 mils thick at minimum ten (10) foot intervals to prevent movement during backfill. This flexible tape shall consist of a polyethylene or polyvinyl chloride backing with a synthetic elastomeric adhesive film comprised of butyl rubber. The tracer wire shall be looped into a tracer wire test station where shown on the plans and should not exceed 500-foot spacing. Sufficient length of slack shall be provided to allow the tracer wire to reach 12 inches above finished grade. All connections shall be kept to a minimum and shall be made with direct bury wire nuts. The entire system shall be interconnected and shall be tested for continuity prior to placing sub-base material and final pavement. At all mainline dead-ends, tracer wire shall be sufficiently grounded. The wire should be grounded in virgin soil directly in line with the utility. Tracer wire shall be the APWA color code for the appropriate utility.

12. Sewer force main line marking tape shall be installed over all sewer lines. Marking tape shall be buried 12” to 24” below the subgrade and over the center of the pipe. The backfill shall be sufficiently leveled so that the tape is installed on a flat surface. The tape shall be centered in the trench with printed side up.

13. Contractor shall lay the pipe so that the markings (size, SDR, Sewer Pipe, and Code Number) are facing up, and legible from the top of the trench.

3.06 and 3.07; OMIT these sections.

3.09.B; REPLACE with the following:

B. POLYETHYLENE CORROSION PROTECTION

1. General: All metallic valves and fittings including ductile, gray iron, steel, etc. shall be protected from corrosion by encasement in a polyethylene protective wrapping referred to hereafter as polywrap. Although not intended to be a completely air and watertight enclosure the polywrap shall provide a continuous barrier between the fittings and surrounding bedding and backfill.

2. Installation: Valves, tees, crosses, bends, and reducers shall be wrapped with flat sheets of the same material. The sheets shall be passed under valves and brought up around the body to the stem. Edges shall be brought together, folded twice, and secured with the adhesive tape. The polyethylene tubing shall be cut into lengths approximately 2 feet longer than the fittings.

3.09; ADD the following paragraphs:

D. All bolt packs for fittings, couplings, valves, etc. shall be stainless steel, type 304 including nuts, bolts, studs, and washers.

3.10; REPLACE with the following in its entirety:

A. Reaction or thrust blocking shall be applied at all tees, plugs, caps and at bends deflecting 11-1/4 degrees or more, or movement shall be prevented by attaching suitable metal rods or straps as approved by Engineer. Reaction blocking shall be concrete having a compressive strength of not less than 2,000 pounds per square inch at twenty-eight (28) days. Blocking shall be placed between undisturbed soil and the fitting to be anchored; the area of bearing on the pipe and on the ground shall be as shown on Standard Drawing 02665-03. The blocking shall be so placed that the pipe and fitting joints will be accessible for repair. Pre-cast thrust blocks may be used in lieu of formed thrust blocking. They shall have a compressive strength of not less than 2,000 pounds per square inch at twenty-eight (28) days and shall be equal to or greater than the minimum dimensions (volume) provided in the details. The block shall be placed to have sufficient contact with the fitting at the middle of the thrust block. Backfill must be adequately compacted between the thrust block and undisturbed soil.

4.01.D; OMIT this paragraph.

4.02.A; REPLACE with the following:

Payment for force main will be made at the contract unit price bid per lineal foot of various sizes and classes called for, which price shall include furnishing and installing pipe, trench excavation, dewatering, polywrap, tracer wire; and marker tape; furnishing, placing and compaction of bedding and backfill; testing and all work necessary or incidental for completion of this item.

The measurement of the lineal feet of new force main shall be measured horizontally from the centerline of the fitting to the centerline of fitting.

4.02.D; OMIT this paragraph.

WYPWSS SECTION 02776 – CONCRETE SIDEWALKS, DRIVEWAY APPROACHES, CURB TURN FILLETS, VALLEY GUTTERS AND MISCELLANEOUS NEW CONCRETE CONSTRUCTION

3.01.A; REVISE as follows:

Sidewalks and driveway approaches, either new or replacement, valley gutters, ADA ramps and curb turn fillets shall be constructed at the locations shown on the plans and where directed by the ENGINEER, and shall be in accordance with these specifications and plans.

4.01; ADD the following:

E. ADA RAMPS – This item shall be measured by each ADA ramp installed. The ramp, landing (if present), flares (if present), curb wall (if present), and detectable warning devise are all part of the ADA ramp.

4.02; ADD the following:

G. ADA RAMPS – Payment shall constitute full compensation for all material (including cast iron detectable warning device), excavation, backfill, curing of concrete, pre-molded mastic material, installation of the detectable warning device, equipment, tools, and labor for the performance of all work and incidentals necessary to complete this item.

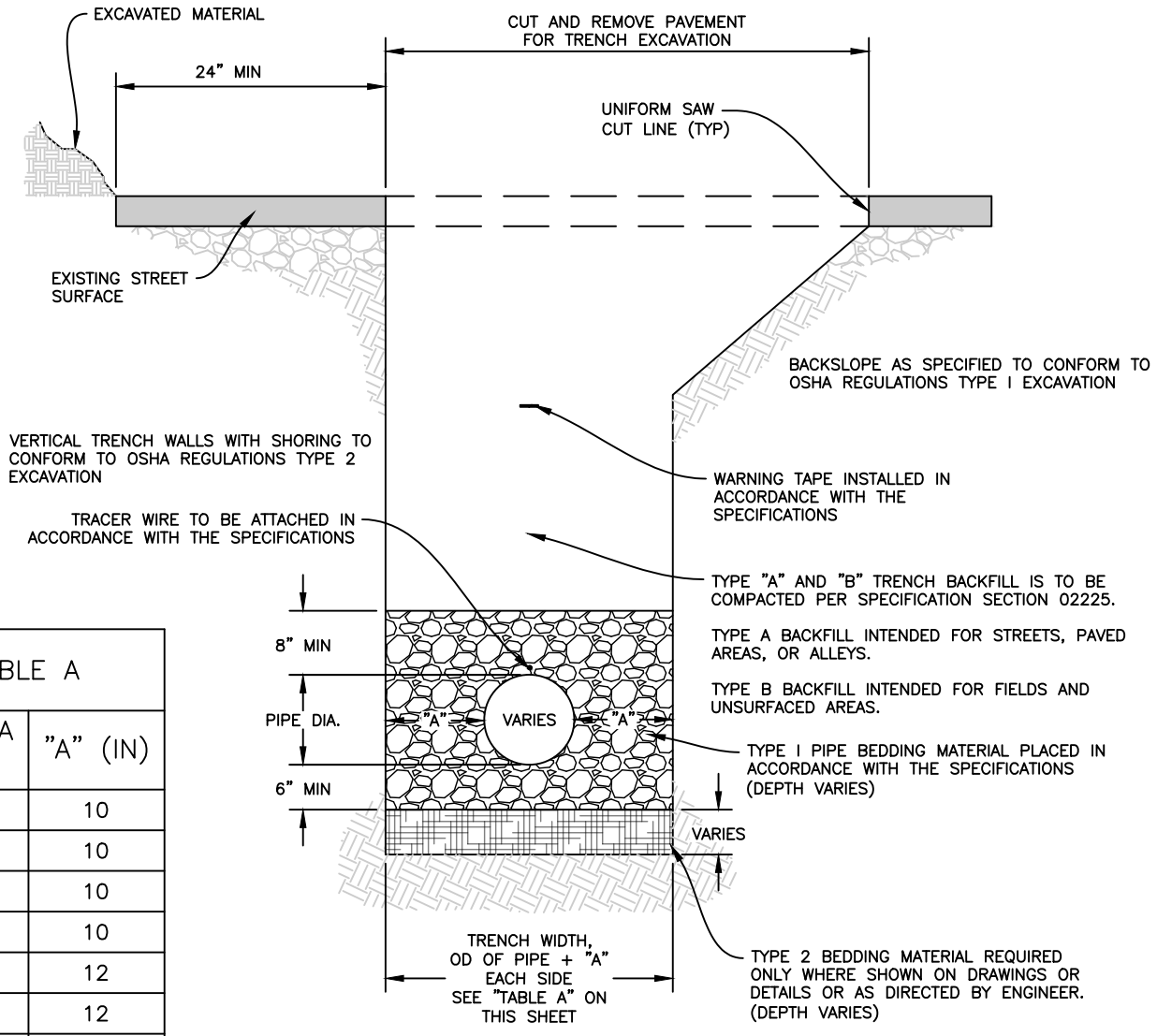
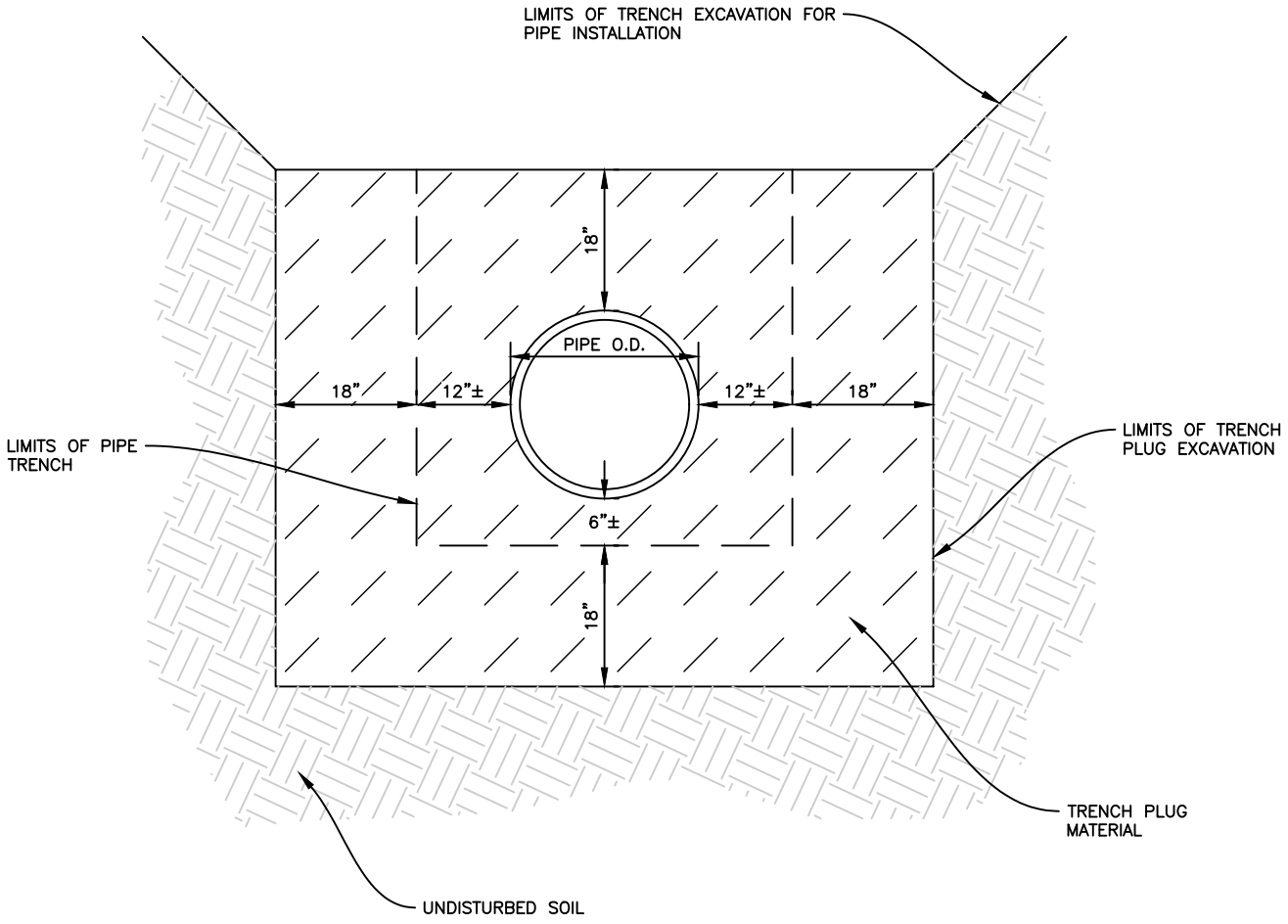


TABLE A	
PIPE DIA (IN)	"A" (IN)
4	10
6	10
8	10
10	10
12	12
15	12
18	16
21	16
24	18
30	18
36	24

NOTES:

1. WHERE TRENCH PASSES THROUGH EXISTING PAVEMENT, THE PAVEMENT SHALL BE CUT IN ACCORDANCE WITH WYPWSS SECTION 02075-3.01.
2. THE DETAIL DEPICTS TWO ALTERNATIVES FOR TRENCHING, VERTICAL AND SLOPED, IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE WHICH METHOD IS BEST AND BE IN COMPLIANCE WITH ALL APPLICABLE SAFETY RULES AND REGULATIONS.

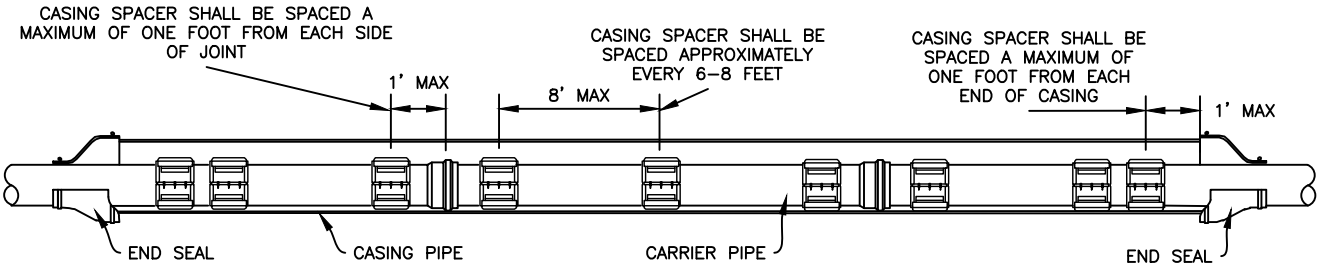
REVISED: SEPT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	TYPICAL TRENCH	STANDARD DRAWING L-02220-01



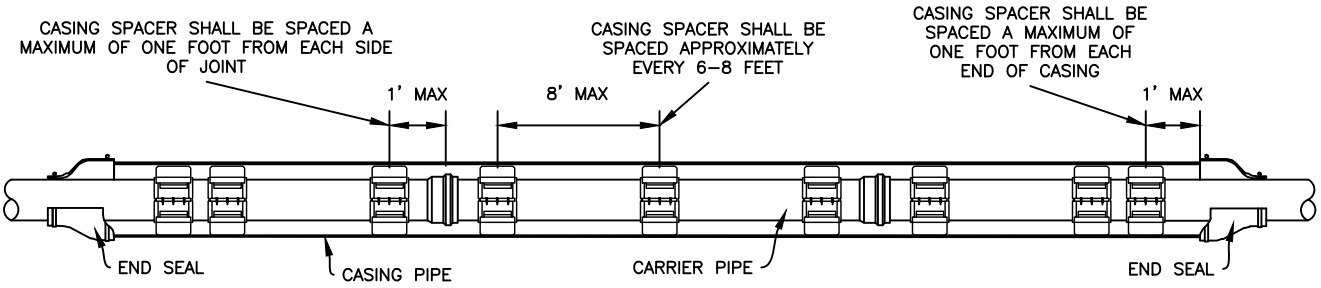
NOTES:

1. TRENCH PLUG SHALL BE 4 FT. LONG (MINIMUM).
2. TRENCH PLUG MATERIAL IS TO COMPLY WITH SPECIFICATIONS.
3. TRENCH PLUG MATERIAL IS TO BE PLACED WITH A MIN. OF 95% MAX. DRY DENSITY (ASTM D698) AT 1%–3% ABOVE OPTIMUM MOISTURE.
4. INSTALL AT 500 FOOT INTERVALS, UNLESS NATIVE BEDDING IS USED OR SPACING AS DIRECTED BY ENGINEER. SEE SPECIFICATIONS.

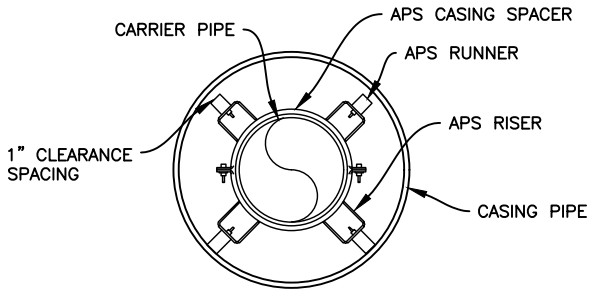
REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	TRENCH PLUG	STANDARD DRAWING L-02220-02



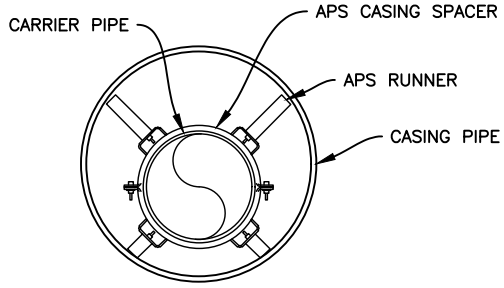
TYPICAL SEWER LINE CASING SPACER CONFIGURATION



TYPICAL WATER LINE CASING SPACER CONFIGURATION



TYPICAL WATER LINE END VIEW



TYPICAL SEWER LINE END VIEW

ENCASEMENT DETAILS

N.T.S.

PRESSURIZED CARRIER PIPE ENCASEMENT/CARRIER PIPE SIZING CHART

THE BELOW TABLE USES CARRIER PIPE DIMENSIONS FOR C900/C905 PVC. OTHER MATERIAL SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.

CARRIER NOM. SIZE	CARRIER PIPE O.D.	CARRIER BELL O.D.	CASING NOM. SIZE*
6"	6.90	9.00	12"
8"	9.05	11.50	16"
10"	11.10	14.00	20"
12"	13.20	16.50	20"
14"	15.30	18.25	24"
16"	17.40	20.50	24"
18"	19.50	23.25	30"
20"	21.60	25.60	30"
24"	25.80	30.25	36"

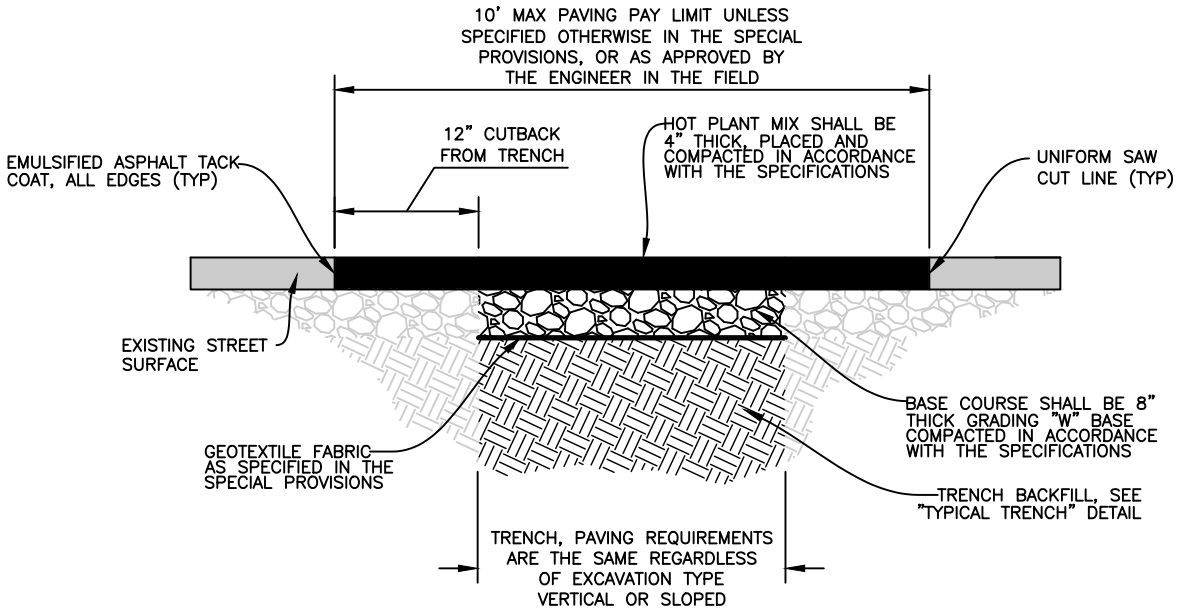
* ALL ENCASEMENT PIPE SHALL BE NEW AND AVE A MINIMUM WALL THICKNESS OF 0.25 INCHES.

* ENCASEMENT FOR GRAVITY CARRIER PIPES SHALL BE ONE CASING SIZE LARGER THAN SHOWN IN THE ABOVE TABLE.

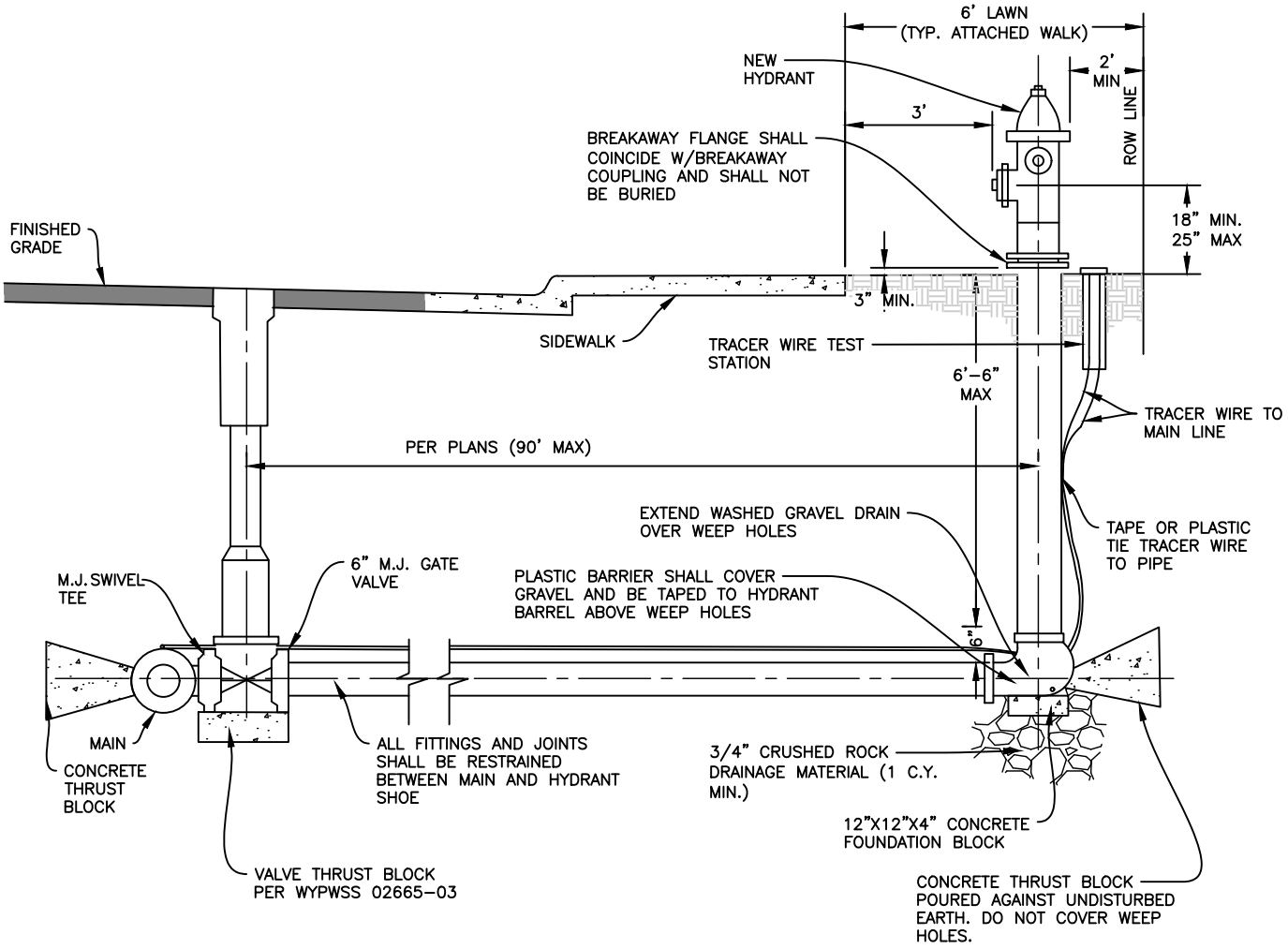
NOTES:

1. SPACERS SHALL BE ODEL SSI AS MANUFACTURED BY ADVANCE PRODUCTS & SYSTEMS (APS) AS SPECIFIED.
2. QUANTITY OF RUNNERS SHALL BE IN ACCORDANCE WITH CARRIER PIPE SIZE AS FOLLOWS
   TO 14" DIAMETER – 4 RUNNERS
   16" TO 36" DIAMETER – 6 RUNNERS
   38" TO 48" DIAMETER – 8 RUNNERS
3. DIMENSIONS BETWEEN SPACERS SHALL BE AS FOLLOWS:
   STAINLESS STEEL – 6 TO 8 FEET.
4. WIDTH OF SPACERS SHALL BE IN ACCORDANCE WITH CARRIER PIPE SIZE AS FOLLOWS:
   TO 14" DIAMETER – 8" WIDTH
   16" AND LARGER DIAMETER – 12" WIDTH
5. A MINIMUM OF THREE SPACERS PER FULL JOINT OF PIPE.
6. WATER LINES SHALL BE "CENTERED" IN CASING.
7. SEWER LINES SHALL BE HELD TO SPECIFIC SLOPE.
8. ALL D.I. CARRIER PIPE MUST HAVE FIELD LOCK GASKETS INSTALLED WITHIN THE CASING PIPE.
9. ENCASEMENT INSTALLED BY OPEN CUT SHALL BE BACKFILLED WITH FLOW-ABLE FILL/CEMENT SLURRY TO A DEPTH OF 6-INCHES ABOVE THE ENCASEMENT PIPE.
10. END SEALS SHALL BE MODEL AW OR AC AS MANUFACATURED ADVANCE PRODUCTS & SYSTEMS (APS).

REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	ENCASEMENT PIPE	STANDARD DRAWING L-02235-01



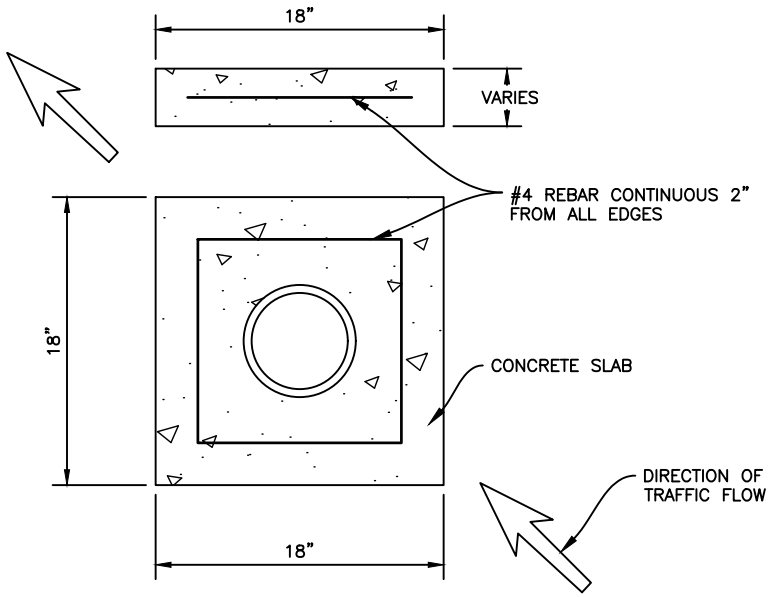
REVISED: SEPT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	ASPHALT SECTION	STANDARD DRAWING L-02512-01



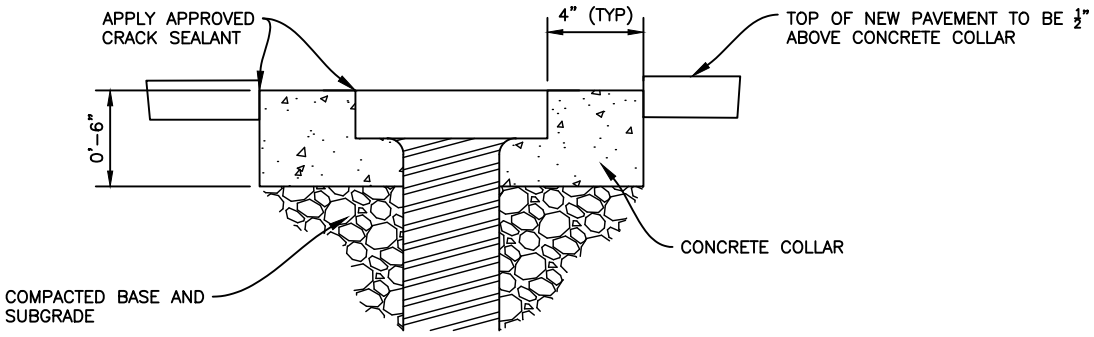
NOTES:

1. IN AREAS WHERE SIDEWALKS MEANDER OR DO NOT EXIST, FIRE HYDRANT LOCATIONS SHALL BE APPROVED BY THE CITY. IN ALL CASES, FIRE HYDRANTS SHALL BE A MINIMUM OF 2 FEET INSIDE THE RIGHT-OF-WAY LINE.
2. FIRE HYDRANTS SHALL BE PAINTED FIRE HYDRANT RED.
3. SUPPORT/THRUST BLOCKS SHALL BE INSTALLED UNDER GATE VALVES IN ACCORDANCE WITH WYPWSS DETAIL 2665-03.
4. VALVES, TEES, AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYWRAP AND SECURED WITH 2-INCH WIDE PRESSURE SENSITIVE TAPE NOT LESS THAN 10 MIL THICK.

REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	TYPICAL FIRE HYDRANT	STANDARD DRAWING L-02645-01



WATER VALVE COVER

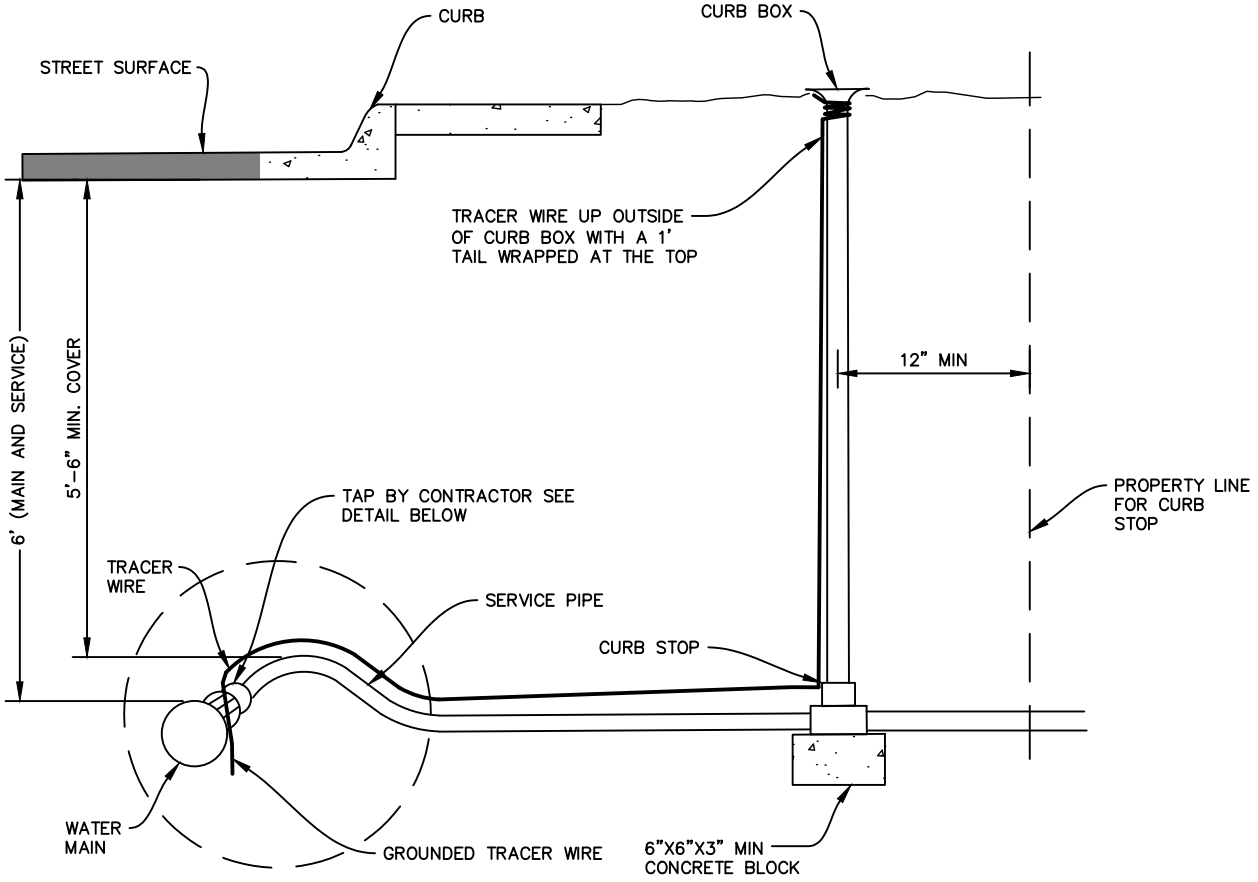


WATER VALVE ADJUSTMENT

NOTES:

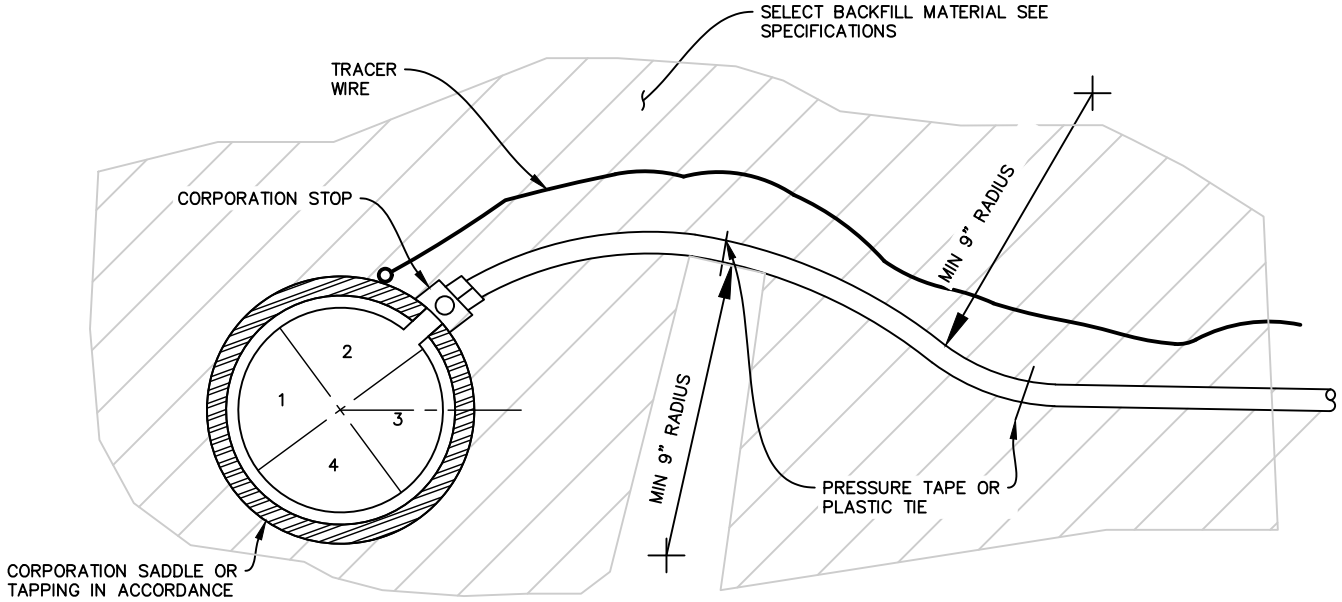
1. ADJUST WATER VALVES UPWARD OR DOWNWARD AS REQUIRED. FINAL ADJUSTMENT SHALL BE MADE AFTER PAVING AND BEFORE SEAL COATING. NO PAYMENT SHALL BE MADE FOR ADJUSTMENT OF NEW VALVES TO FINAL GRADE.
2. WHEN CONCRETE COLLAR IS PLACED ABUTTING CONCRETE PAVEMENT, COLLAR THICKNESS SHOULD BE EQUAL THAT OF PAVEMENT SECTION IF GREATER THAN 6".
3. THE JOINT BETWEEN CONCRETE COLLAR AND VALVE BOX AND PAVEMENT AND CONCRETE COLLAR SHALL BE SEALED WITH AN APPROVED CRACK SEALANT.

REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	WATER VALVE ADJUSTMENT	STANDARD DRAWING L-02645-02



NOTES:

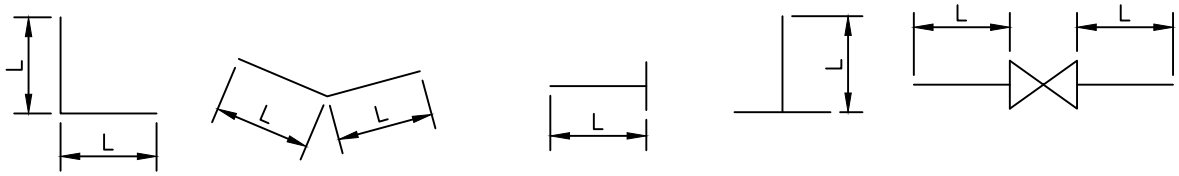
1. SERVICE LINE SHALL BE 1" (EXPECT AS NOTED) DR9 AWWA C901 CTS HDPE, MIN 6" BEDDING..
2. SERVICE TAPS SHALL BE MADE PRIOR TO ANY TESTS.



DETAIL OF PROPERLY INSTALLED CORPORATION STOP, SHOWING GOOSENECK IN SERVICE PIPE.

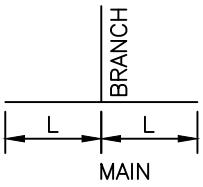
REVISED: SEPT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	WATER SERVICE LINE	STANDARD DRAWING L-02665-01

LINE SIZE	4–INCH		6–INCH		8–INCH		12–INCH		16–INCH		20–INCH		24–INCH	
	D (IN)	L (IN)	D (IN)	L (IN)	D (IN)	L (IN)	D (IN)	L (IN)	D (IN)	L (IN)	D (IN)	L (IN)	D (IN)	L(IN)
TEE (BRANCH)	3/4	30	3/4	45	3/4	60	3/4	86	1	106	1.25	132	–	155
PLUG OR 90° HORZ. BEND	3/4	30	3/4	45	3/4	60	3/4	86	1	106	1.25	132	–	155
45° HORZ. BEND	3/4	9	3/4	13	3/4	18	3/4	25	1	32	3/4	39	–	45
22.5° HORZ. BEND	3/4	1	3/4	4	3/4	5	3/4	7	3/4	8	3/4	10	–	12
11.25° HORZ. BEND	–	–	–	–	–	–	3/4	2	3/4	2	3/4	3	–	3
PUSH–ON JOINT PVC IN–LINE VALVE	–	–	–	–	–	–	–	–	1	106	1.25	132	–	155



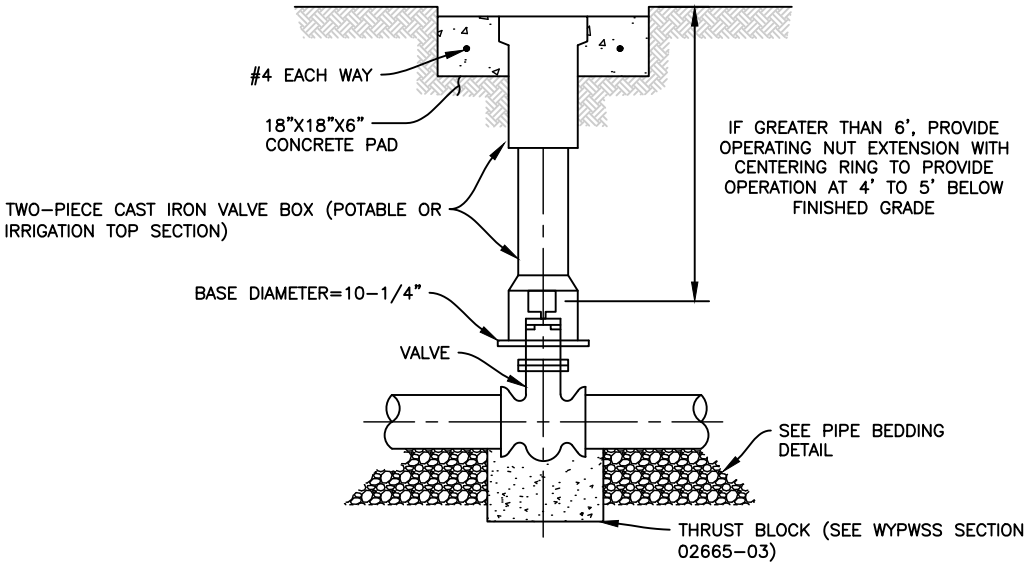
NOTES:

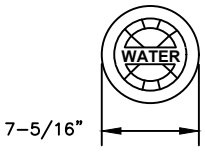
1. CLAMPS AND RODS ARE NOT ALLOWED FOR 24" AND LARGER MAINS.
2. D=ROD OR BOLT DIAMETER, L=LENGTH OF MAIN WHICH MUST BE TIED TOGETHER AND IS NOT NECESSARILY THE LENGTH OF THE RODS.
3. LENGTH OF TIED MAIN ALSO APPLIES TO THE LENGTH OF MAIN RESTRAINED BY MEGALUGS
4. LENGTHS OF RESTRAINT ARE MEASURED EACH WAY FROM BENDS
5. ALL BOLTS, NUTS, AND RODS SHALL BE STAINLESS STEEL
6. TEES AND CROSSES MUST BE RESTRAINED IN ALL APPLICABLE DIRECTIONS
7. ALL REDUCERS/INCREASERS SHALL HAVE MECHANICAL RESTRAINT DEVICES ON EACH SIDE OF THE FITTING
8. PIPE JOINT RESTRAINT MAY BE ACCOMPLISHED USING HARNESS RODS, MECHANICAL JOINT RESTRAINT OR RESTRAINED JOINT PIPE AND FITTINGS
9. USE 2 RODS ON 12" AND SMALL MAINS, 4 RODS ON 16" MAINS, AND 6 RODS ON 20" MAINS
10. AN ANALYSIS OF THE NECESSARY RESTRAINT LENGTH FOR PIPE LARGER THAN 24" SHALL BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL ON A CASE BY CASE BASIS
11. MIN. 6' COVER (POTABLE)
12. TABLE BASED ON 150 PSI INTERNAL PRESSURE
13. AS AN ALTERNATIVE TO BRANCH RESTRAINT ON A TEE USING THE ABOVE TABLE, THE MAIN MAY BE RESTRAINED INSTEAD FOR THE FOLLOWING DISTANCES IN EACH DIRECTION FROM THE TEE, PROVIDED THAT THE BRANCH IS RESTRAINED AT THE CONNECTION WITH THE TEE AND THE BRANCH SIZE DOES NOT EXCEED THE MAIN SIZE.



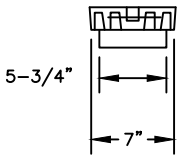
SIZE OF MAIN	4–INCH	6–INCH	8–INCH	12–INCH	16–INCH	20–INCH	24–INCH
RESTRAINT LENGTH (EACH DIRECTION)	5.0 FT	6.0 FT	8.0 FT	11.0 FT	14.0 FT	17.0 FT	19.0 FT

REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	RESTRAINED JOINT PIPE LENGTHS	STANDARD DRAWING L-02665-05





POTABLE VALVE BOX COVER PLAN
N.T.S.



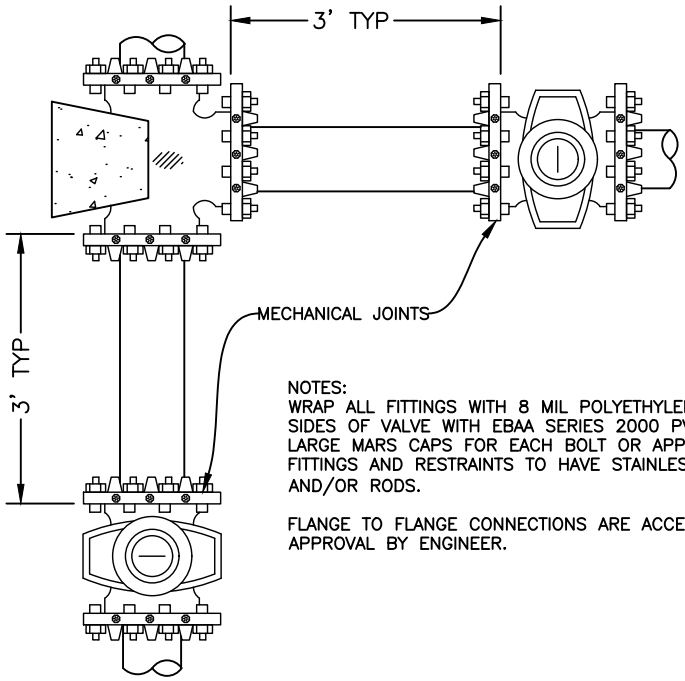
POTABLE VALVE BOX COVER ELEVATION
N.T.S.

NOTE:
1. POTABLE VALVE BOX LID RESTS INSIDE THE UPPER VALVE BOX SECTION WITH WORD "WATER" CAST INTO THE TOP.

NOTES:

1. CARE SHALL BE TAKEN WHEN INSTALLING VALVES TO INSURE PROPER SUPPORT OF THE VALVE. CONCRETE BLOCKS SHALL BE INSTALLED UNDER THE VALVE, PER WYPWSS DETAIL 02665-03, TO PROVIDE PROPER SUPPORT WHERE REQUIRED BY THE CITY.
2. TRACER WIRE SHALL NOT BE BROUGHT UP VALVE BOXES.
3. VALVES, TEES AND FITTINGS SHALL BE WRAPPED WITH 8 MIL POLYWRAP AND SECURED WITH 2-INCH WIDE PRESSURE SENSITIVE TAPE, NOT LESS THAN 10 MIL THICK.

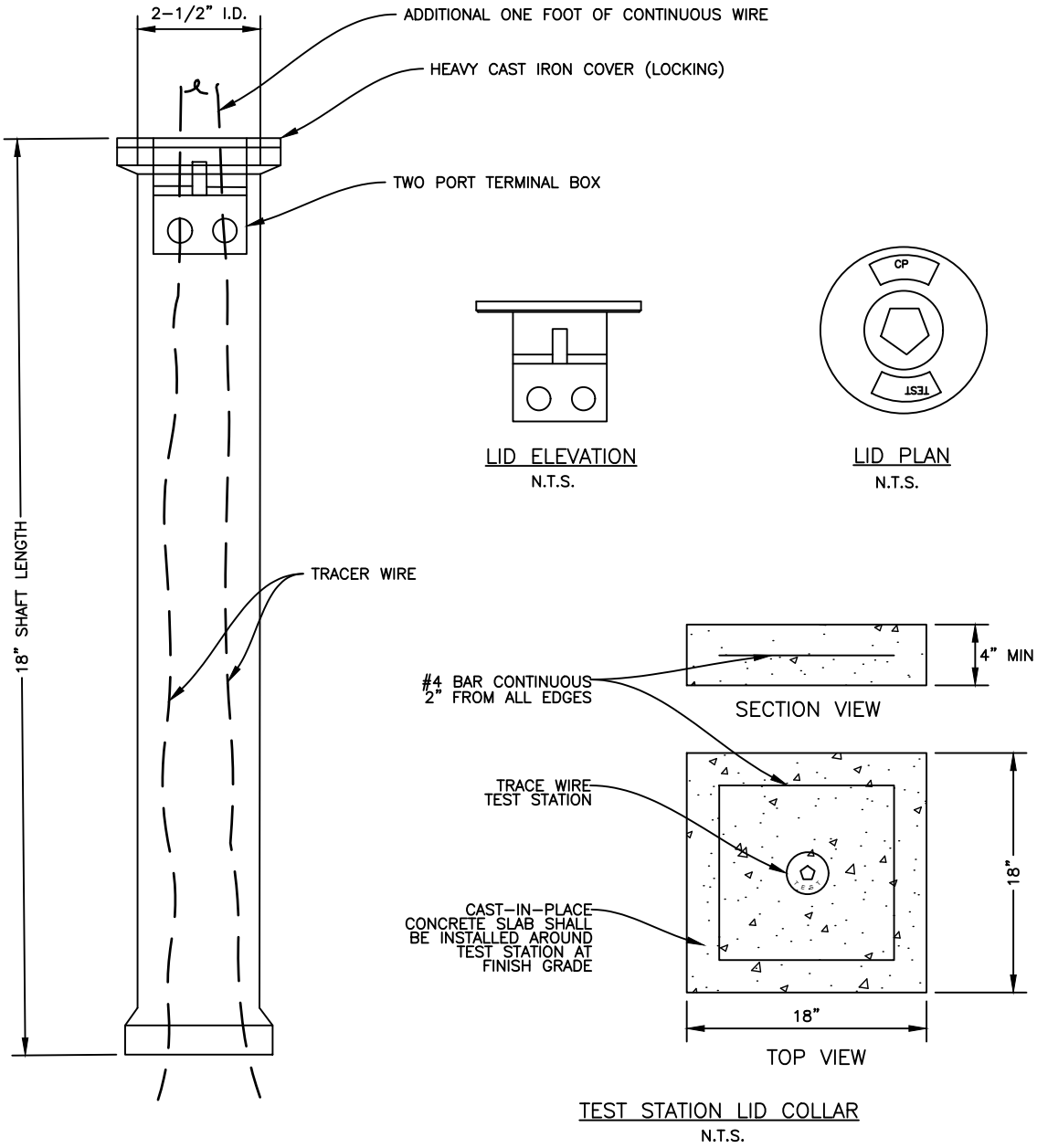
REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	VALVE BOX AND COVERS	STANDARD DRAWING L-02665-06



NOTES:
WRAP ALL FITTINGS WITH 8 MIL POLYETHYLENE. RESTRAIN BOTH SIDES OF VALVE WITH EBAA SERIES 2000 PVC MEGALUG. PROVIDE LARGE MARS CAPS FOR EACH BOLT OR APPROVED EQUAL. ALL FITTINGS AND RESTRAINTS TO HAVE STAINLESS STEEL BOLTS AND/OR RODS.

FLANGE TO FLANGE CONNECTIONS ARE ACCEPTABLE UPON APPROVAL BY ENGINEER.

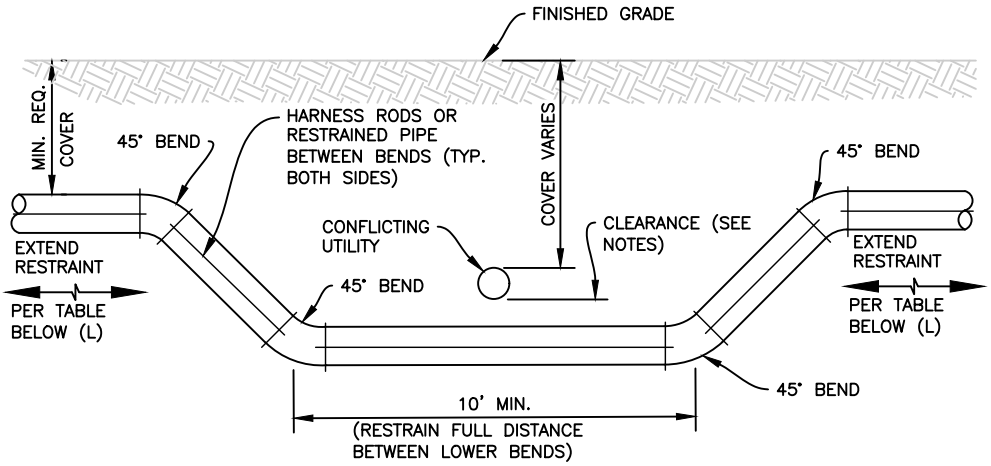
REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	TYPICAL VALVE OR TEE CONNECTION	STANDARD DRAWING L-02665-06A



NOTES:

1. LOCATE TEST STATIONS BEHIND ALL FIRE HYDRANTS OR AS DIRECTED ON THE PLANS.
2. AN ADDITIONAL 1 FOOT CONTINUOUS LOOP OF TRACER WIRE SHALL BE KEPT INSIDE THE TEST STATION FOR CONNECTION PURPOSES.
3. TRACER WIRE SHALL BE COLOR CODED PER APWA.
4. TRACER WIRE SHALL BE GROUNDED AT ALL DEAD ENDS.
5. TEST STATION LID COLLAR REQUIRED WHEN INSTALLED IN TRAFFIC AREA.

REVISED: OCT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	TRACER WIRE TEST STATION	STANDARD DRAWING L-02665-07

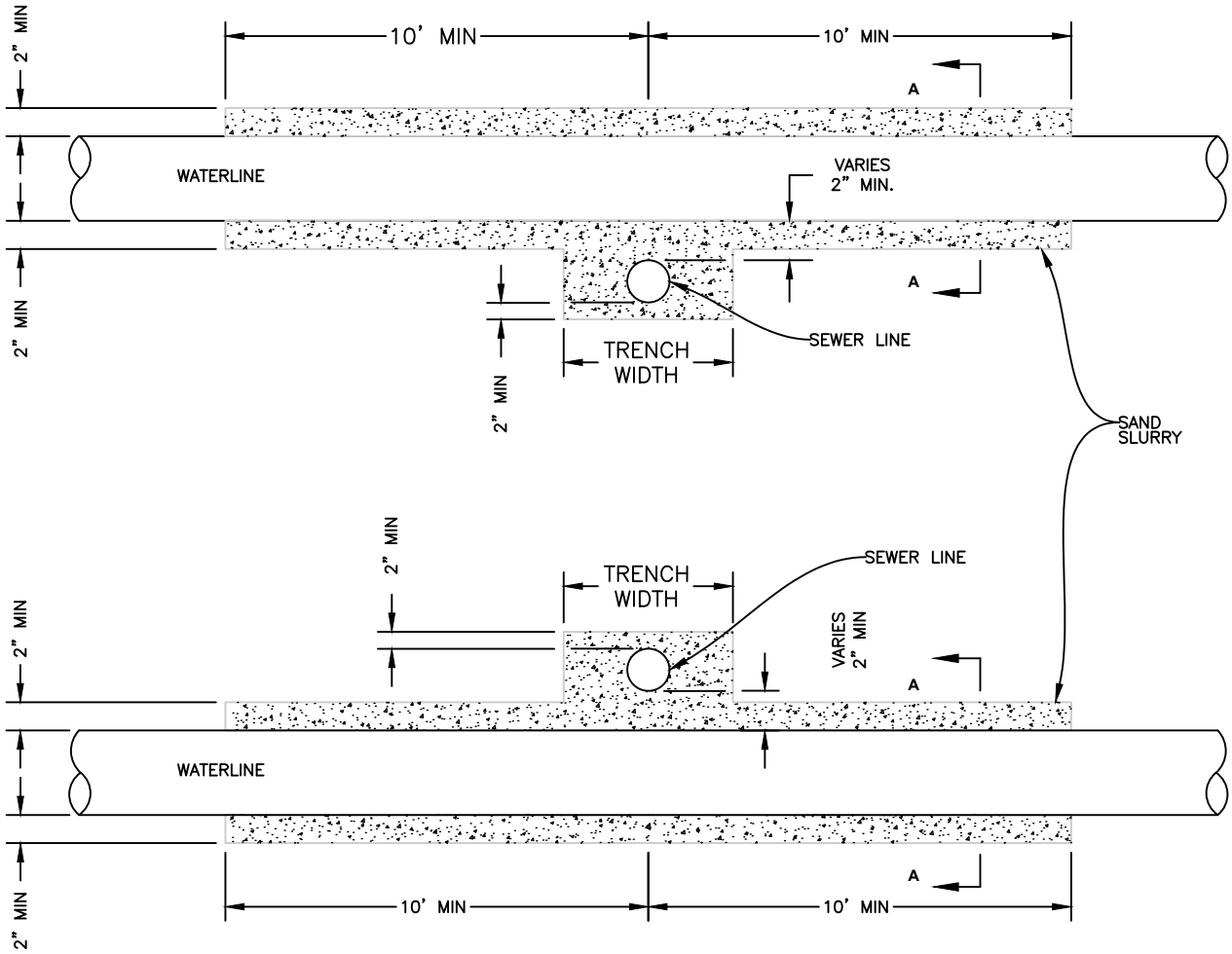


RESTRAINT LENGTH IN EACH DIRECTION FROM UPPER BENDS SHALL BE AS FOLLOWS:							
SIZE OF PIPE (IN)	4"	6"	8"	12"	16"	20"	24"
L (FEET)	16.0'	23.0'	30.0'	43.0'	56.0'	68.0'	80.0'

NOTES:

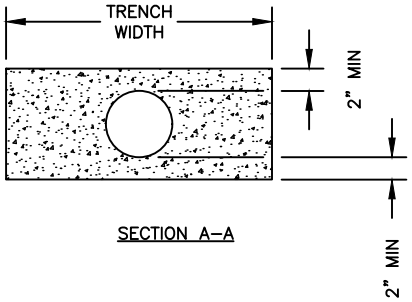
1. VALVES SHALL NOT BE INSTALLED ON POTABLE WATER MAINS BETWEEN THE UPPER TWO VERTICAL BENDS OF THE LOWERED SECTION.
2. CLEARANCE FROM IRRIGATION WATER MAINS TO SANITARY OR STORM SEWERS SHALL BE 12"
3. CLEARANCE FROM POTABLE WATER MAINS TO SANITARY SEWERS, STORM SEWERS, OR IRRIGATION WATER MAINS SHALL BE 18".
4. CONFIGURATIONS UTILIZING BENDS OTHER THAN 45° MAY BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL ON A CASE BY CASE BASIS.

REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	WATER MAIN LOWERING ON A NEW MAIN	STANDARD DRAWING L-02665-08



SAND SLURRY MIX DESIGN

130 LB.	CEMENT
600 LB.	WATER
2000 LB.	FINE AGGREGATE



SECTION A–A

NOTES:
1. JOINTS IN SEWERS AT CROSSING SHALL BE LOCATED AT LEAST TEN FEET FROM WATER MAINS.

REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	SLURRY SADDLE	STANDARD DRAWING L-02665-08A

L:\Private\CLIENT FOLDERS\City Of Lander\Lander Standard Details\CAD\L-02665-09 Air-Vacuum Release Valve.dwg PLOT DATE:3/31/25 USER:BCRAIG

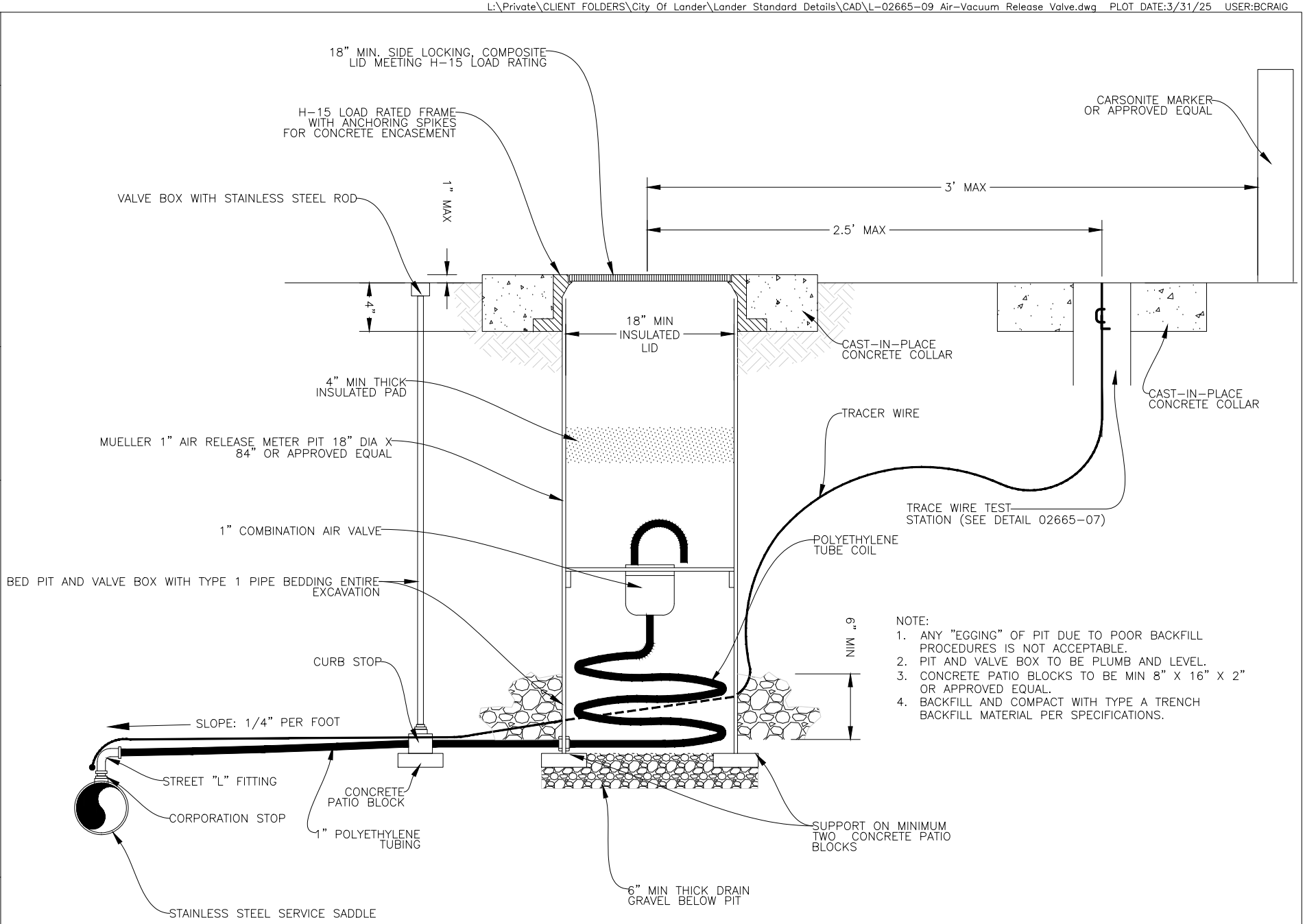
REVISED: March 2025

LANDER PUBLIC WORKS
STANDARD SPECIFICATIONS

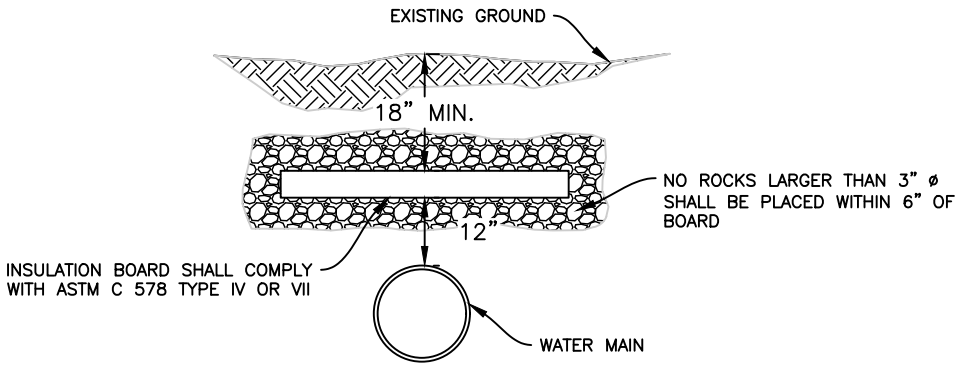
NOT TO SCALE

AIR/VACUUM RELEASE VALVE

STANDARD DRAWING
L-02665-09



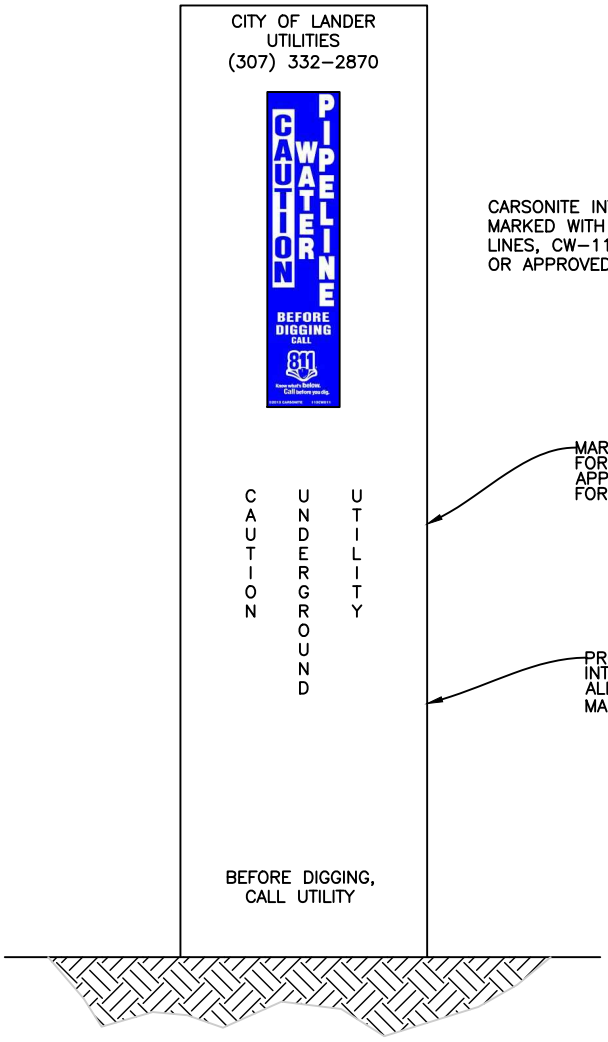
NOTE:
1. ANY "EGGING" OF PIT DUE TO POOR BACKFILL PROCEDURES IS NOT ACCEPTABLE.
2. PIT AND VALVE BOX TO BE PLUMB AND LEVEL.
3. CONCRETE PATIO BLOCKS TO BE MIN 8" X 16" X 2" OR APPROVED EQUAL.
4. BACKFILL AND COMPACT WITH TYPE A TRENCH BACKFILL MATERIAL PER SPECIFICATIONS.



NOTES:

1. IF DEPTH OF COVER IS LESS THAN 3.5 FEET, BOARD SHALL BE 4-INCHES IN THICKNESS AND EXTEND A MINIMUM OF FOUR FEET ON EITHER SIDE OF CENTER OF PIPE.
2. IF DEPTH OF COVER IS BETWEEN 3.5 AND 5.0 FEET, BOARD SHALL BE 2-INCHES IN THICKNESS AND EXTEND A MINIMUM OF THREE FEET EITHER SIDE OF CENTER OF PIPE.

REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	INSULATION BOARD INSTALLATION	STANDARD DRAWING L-02665-10

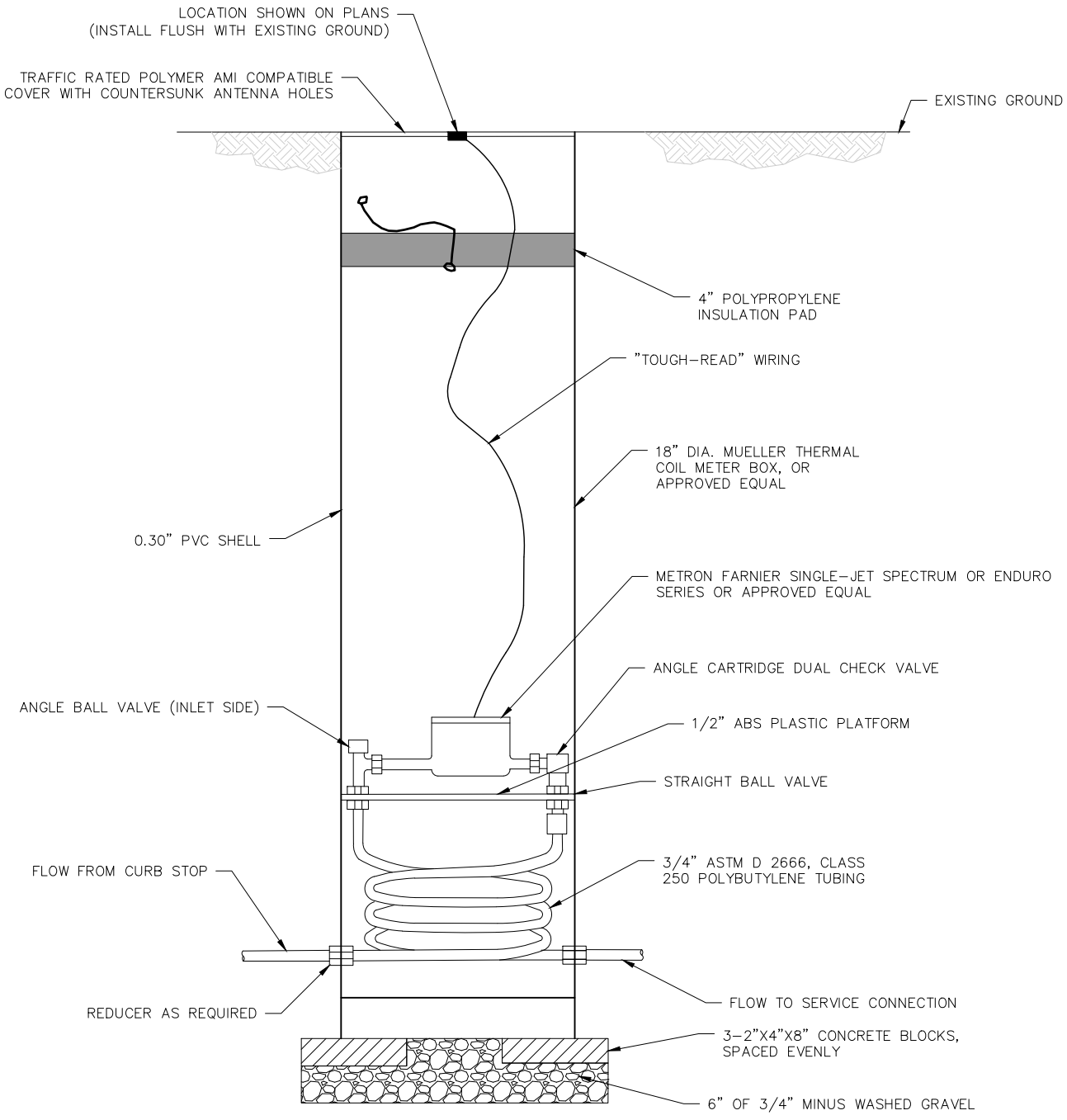


CARSONITE INTERNATIONAL CRM 307208 MARKED WITH CW-112 DECAL FOR WATER LINES, CW-116 DECAL FOR WATER VALVES OR APPROVED EQUAL.

MARKERS SHALL BE BLUE FOR WATER LINES AND APPURTENANCES AND GREEN FOR SEWER FORCEMAINS.

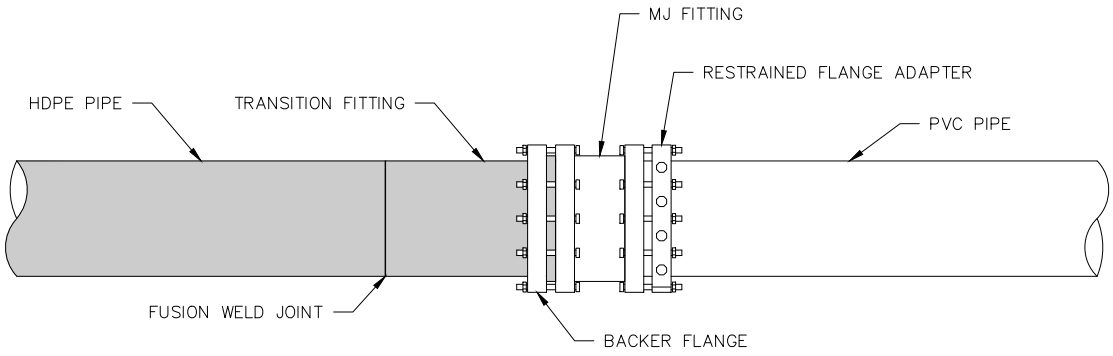
PROVIDE CARSONITE MARKER AT 500' INTERVALS ALONG PIPELINE AND AT ALL VALVE BOXES, BENDS, TEES, MANHOLES, AND AIR/VAC RELEASES.

REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	CARSONITE MARKER	STANDARD DRAWING L-02665-11

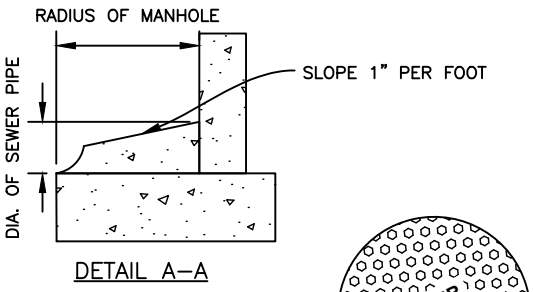


NOTES:
1. INSIDE NUT SHALL BE HELD WITH A WRENCH WHEN CONNECTING SERVICE LINES.

REVISED: SEPT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	WATER METER PIT	STANDARD DRAWING L-02665-12

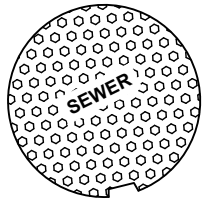


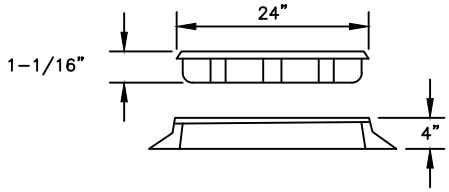
REVISED: SEPT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	HDPE TO PVC CONNECTION	STANDARD DRAWING L-02665-13

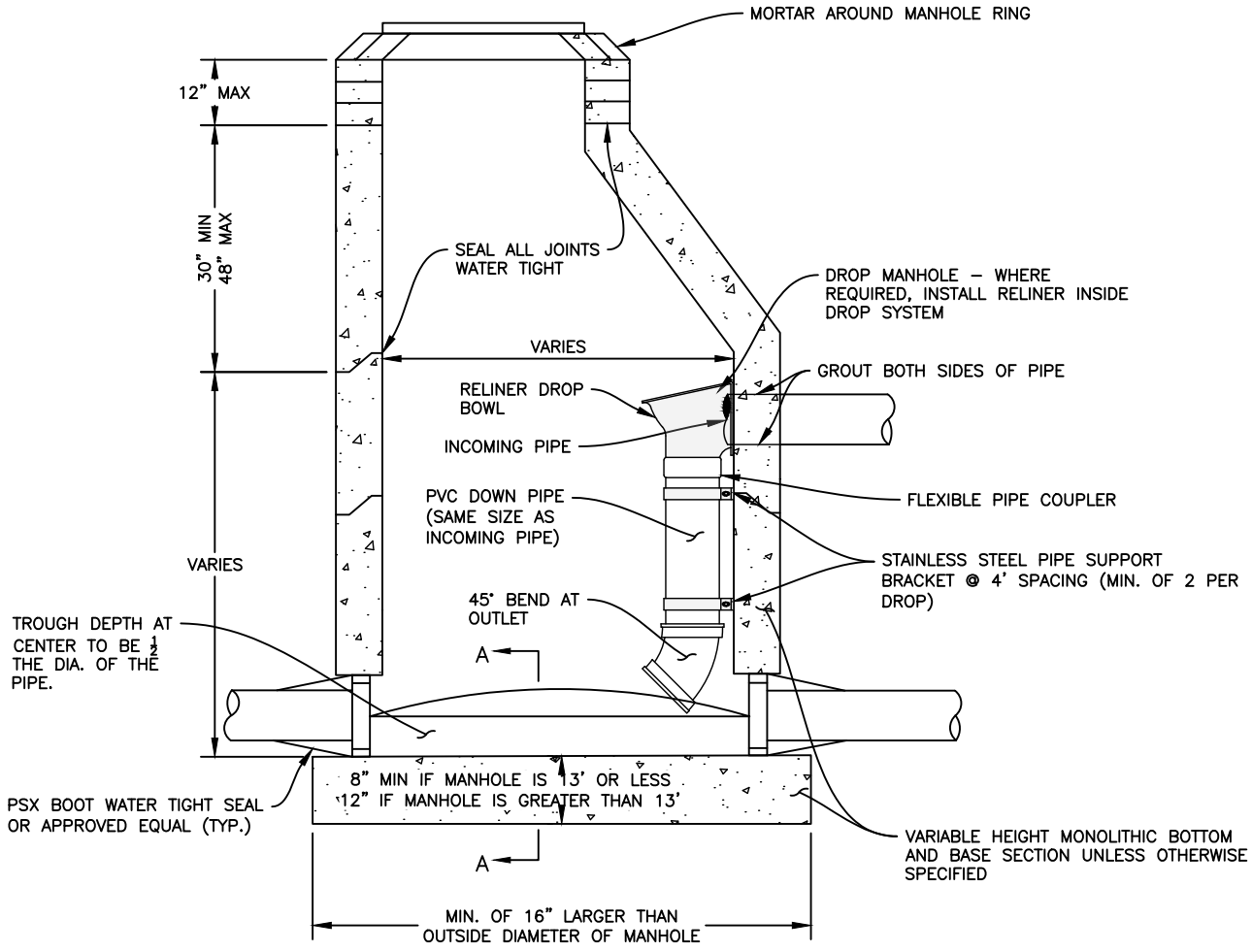


NOTES:

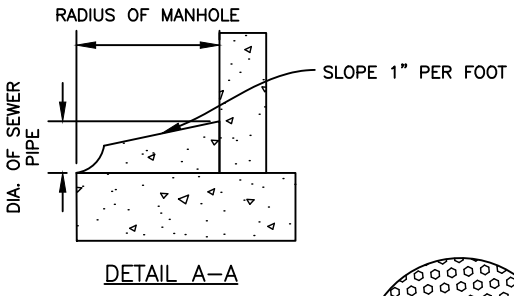
1. DROP ACROSS INVERT SHALL BE 0.10'.
2. BASES SHALL BE REINFORCED WHEN THE DISTANCE FROM INVERT TO TOP OF COVER EXCEEDS 15'. REINFORCEMENT TO BE APPROVED BY ENGINEER.
3. REINFORCEMENT FOR PRECAST SECTIONS SHALL BE AS PER ASTM C–478.
4. C.I. RING AND COVER SHALL BE HS–20–44.
5. ALL LIFTING HOLES SHALL BE GROUTED WITH NON–SHRINK GROUT.
6. ALL JOINTS BETWEEN MANHOLE SECTION, RINGS AND FRAME SHALL BE SEALED WITH RUBBER–NEX OR APPROVED EQUAL.



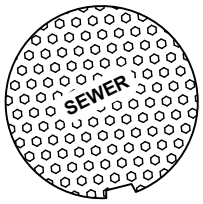




REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	STANDARD CONE MANHOLE	STANDARD DRAWING L-02700-01

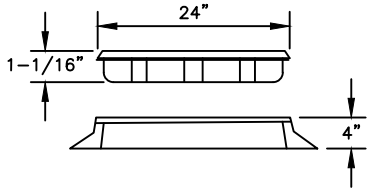


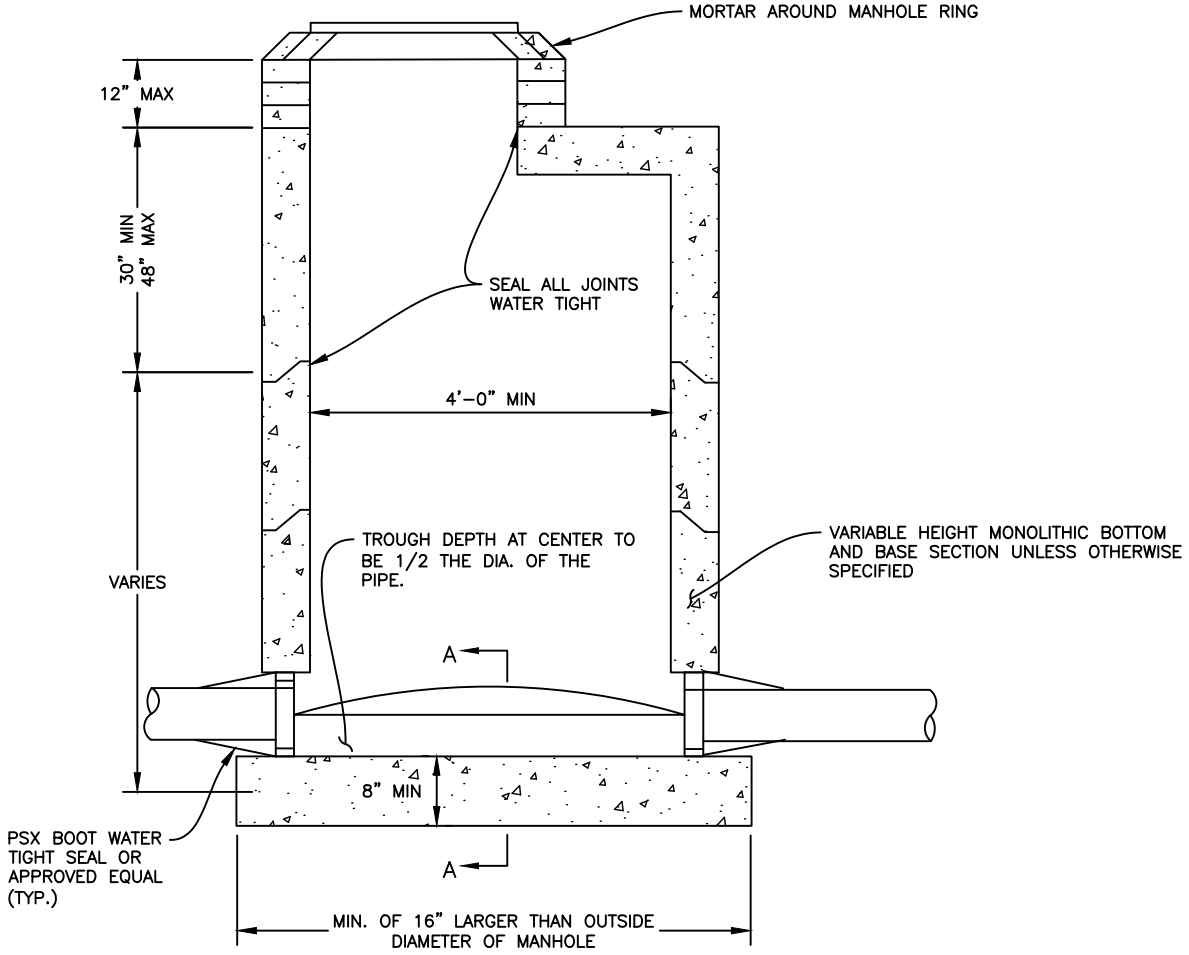
DETAIL A–A



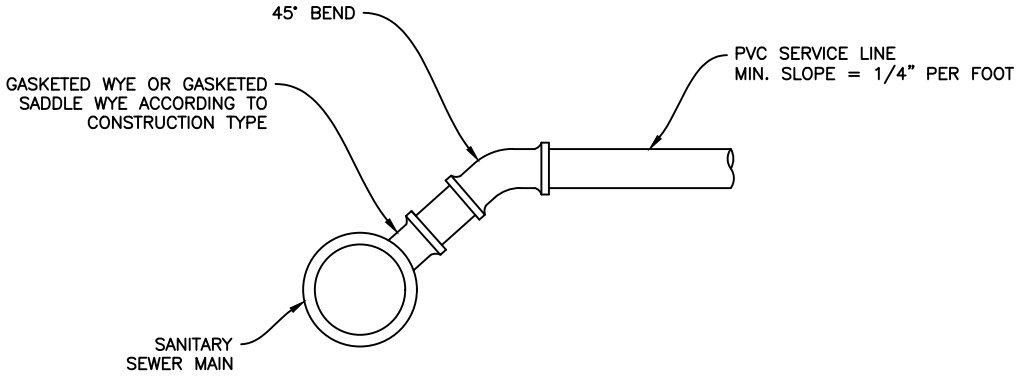
NOTES:

1. DROP ACROSS INVERT SHALL BE 0.10'.
2. BASES SHALL BE REINFORCED WHEN THE DISTANCE FROM INVERT TO TOP OF COVER EXCEEDS 15'. REINFORCEMENT TO BE APPROVED BY ENGINEER.
3. REINFORCEMENT FOR PRECAST SECTIONS SHALL BE AS PER ASTM C–478.
4. C.I. RING AND COVER SHALL BE HS–20–44
5. FLAT TOP MANHOLES SHALL BE INSTALLED WHEN MANHOLES ARE 5' OR LESS, OR AS REQUIRED ON THE PLANS.

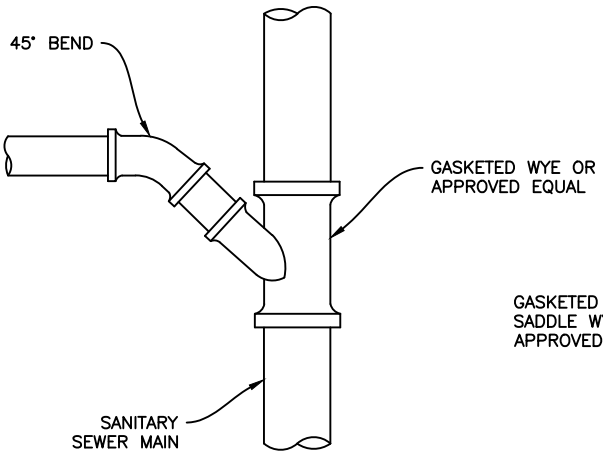




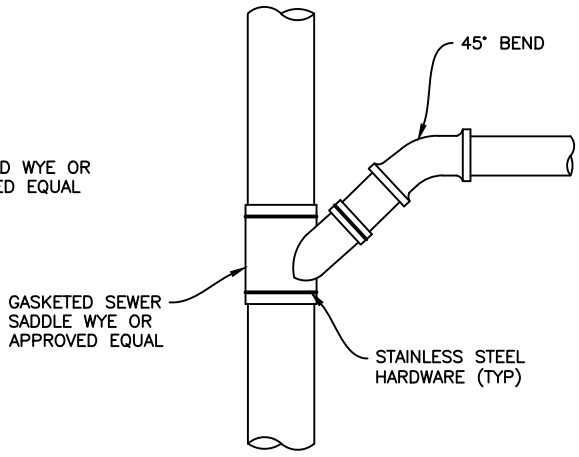
REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	STANDARD FLATTOP MANHOLE	STANDARD DRAWING L-02700-02



STANDARD SERVICE

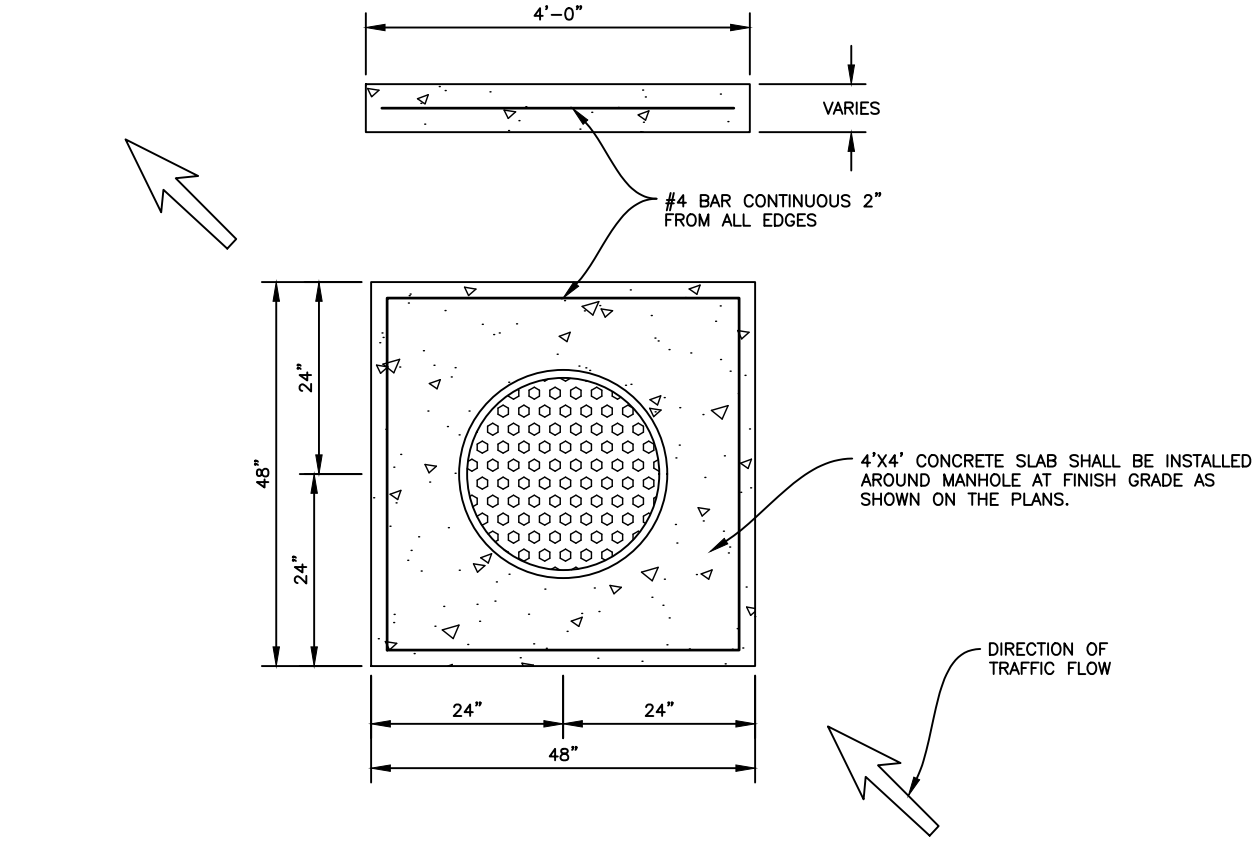


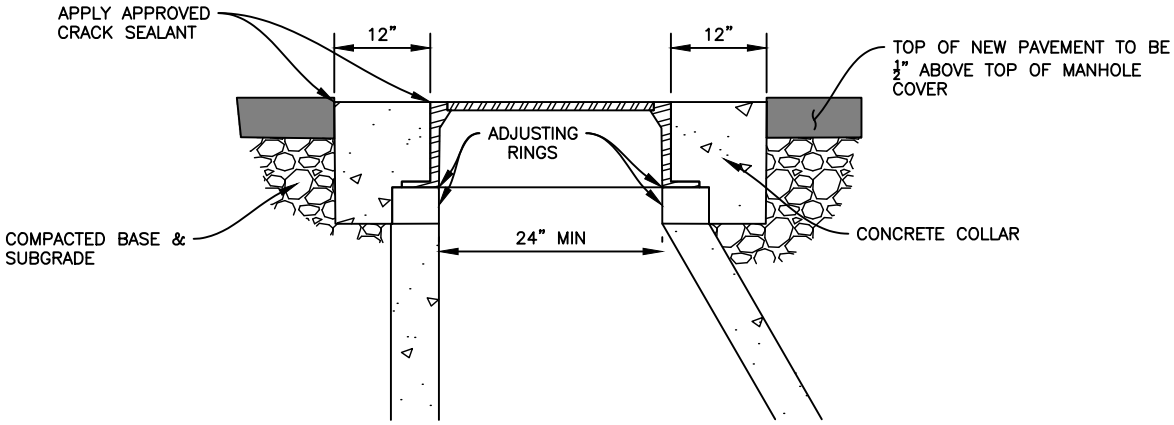
NEW CONSTRUCTION
WYE SERVICE CONNECTION



RECONSTRUCTION
SADDLE WYE
SERVICE CONNECTION

REVISED: SEPT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	SANITARY SEWER SERVICE LINE	STANDARD DRAWING L-02700-04

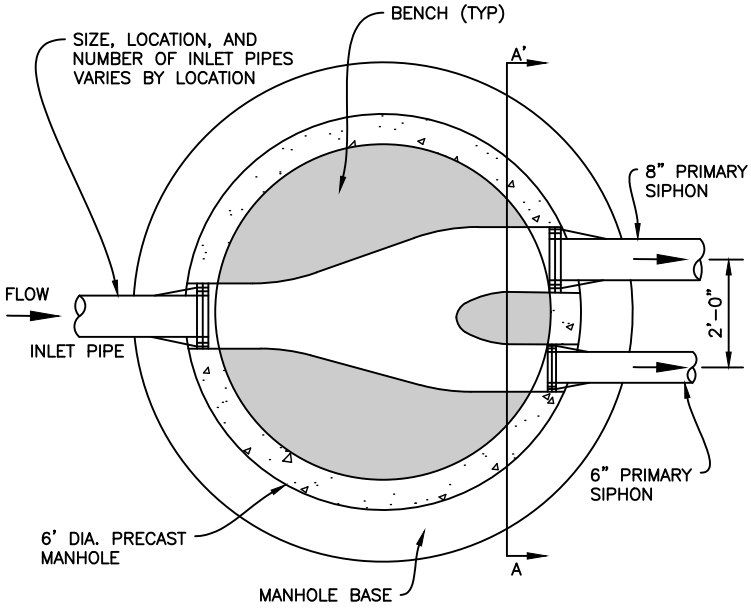


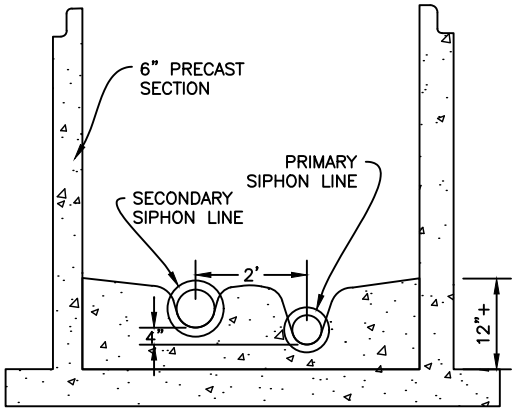


NOTES:

1. ADJUST MANHOLES UPWARD WITH ADJUSTING RINGS UNDER FRAME. ADJUST MANHOLE DOWNWARD BY REMOVING A PORTION OF THE MANHOLE RISER AND REBUILDING TO PROPER DIAMETER. SLOPE MANHOLE RING AS REQUIRED TO MATCH STREET GRADE AND CROSSLOPE. FINAL MANHOLE ADJUSTMENT WILL BE MADE AFTER PAVING AND BEFORE SEAL COATING.
2. THE JOINT BETWEEN PAVEMENT, RING, AND CONCRETE COLLAR SHALL BE SEALED WITH AN APPROVED CRACK SEALANT.

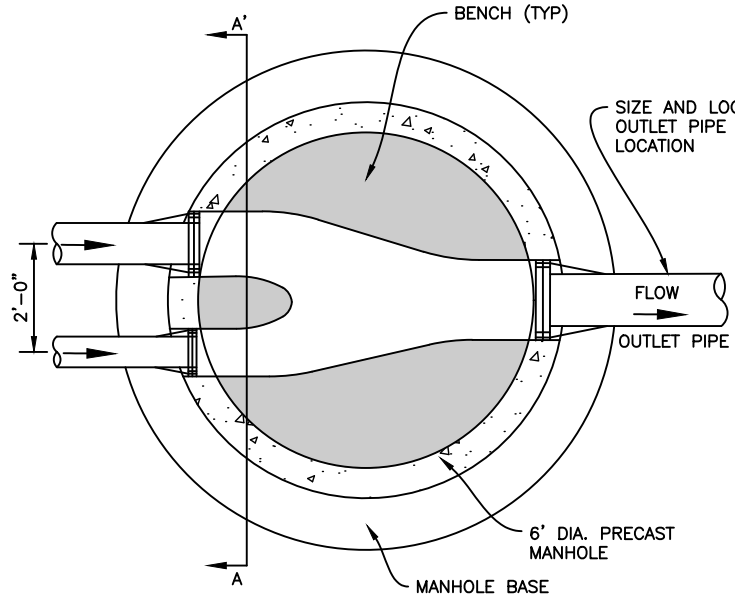
REVISED: FEB 2019	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	MANHOLE COVER	STANDARD DRAWING L-02700-05

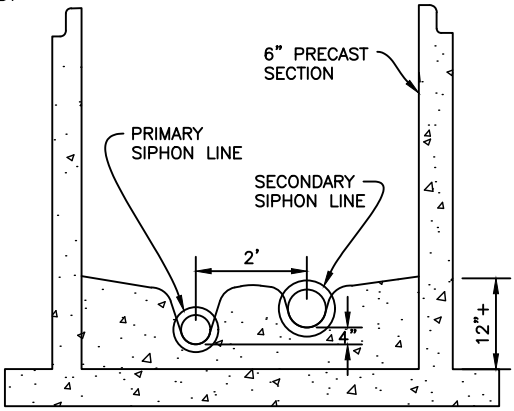




SECTION A'–A

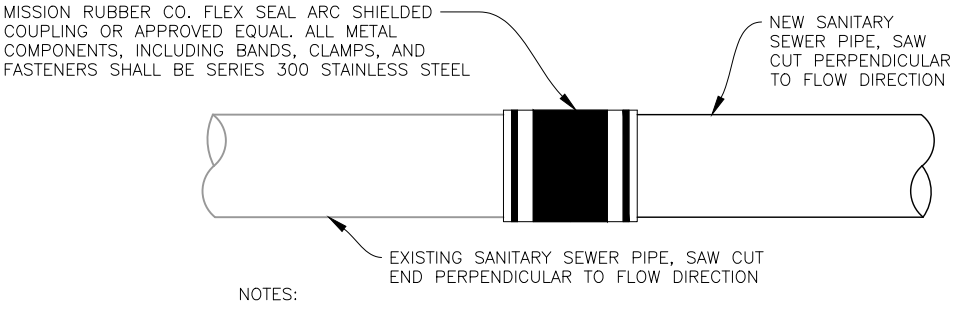
NOTE:
1. MINIMUM OF TWO 6–INCH SIPHONS. SIPHON DESIGN SHALL BE IN ACCORDANCE WITH WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY.
2. INVERT OF SECONDARY SIPHON LINE IS TO BE INSTALLED 4" HIGHER THAN PRIMARY SIPHON LINE.





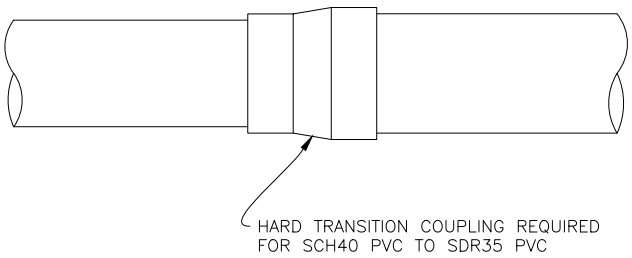
SECTION A–A'

REVISED: SEPT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	DUAL SIPHON MANHOLE LAYOUT	STANDARD DRAWING L-02700-07



NOTES:

1. ECCENTRIC FITTINGS SHALL BE USED IF SEWER LINES ARE DIFFERENT SIZES TO MAINTAIN THE FLOW LINE.



REVISED: SEPT 2025	LANDER PUBLIC WORKS STANDARD SPECIFICATIONS	NOT TO SCALE	SANITARY SEWER CONNECTIONS	STANDARD DRAWING L-02700-08