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## IFB 24-74 BATHTUB ROAD RECONSTRUCTION PROJECT



# SECTION 100
# UTILITIES MEASUREMENT AND PAYMENT

## PART 1 - GENERAL

### 1.01 REQUIREMENTS INCLUDED

A. Measurement and payment for Los Alamos County utility bid Items are specified in this Section.

B. Work to be performed under this contract will be paid for on a Unit Price or Per Unit basis under the appropriate Bid Items in this Measure and Payment Section. All costs for Work shown on Drawings or described in Specifications, as incidental to the Contract shall be included in the Contract Price. A claim by the Contractor for extra compensation for an item shown on the Drawings or described in the Specifications will not be considered for any reason, including but not limited to the claim that it does not fall within the scope of one of the Bid Items. All utility work for Facilities owned by Los Alamos County shall comply with the Los Alamos County Utility Standard Specifications and shall be paid as outlined in this Section, NOT as indicated in the NMDOT Standard Specifications.

C. Contractor shall submit a schedule of values for all bid items listed in this section totaling the bid cost of utility work. This schedule of values will be the basis of progress payments.

D. General scope of work under each bid item includes all labor and materials required for construction of completely functional and operational facilities as shown on the Drawings and Specifications.

E. GENERAL. The total base bid price shall cover all work required by the contract documents for construction of a completely functional and operational facility. All costs in connection with the proper and successful completion of the work, including furnishing all materials, equipment, supplies, appurtenances; providing all construction plans, equipment, and tools; and performing all necessary labor and supervision to fully complete the work in accordance with these contract documents shall be included in the unit and lump sum prices bid. All work not specifically set forth as a pay item in the bid proposal shall be considered a subsidiary obligation of Contractor and as such, all cost in connection therewith shall be included in the bid prices.

F. ESTIMATED QUANTITIES. All estimated quantities for unit price items stipulated in the bid proposal are approximate and are to be used only (a) as a basis for estimating the probable cost of the work and (b) for the purpose of comparing the bids submitted for the work. The actual amounts of the work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished at the unit price bid.

G. INSTALLATION OF LINES AND CONNECTION TO LINES. Trench location shown on plans may change based on actual location of existing utilities and structures. All descriptions of connections to existing lines are based on available information. Field verifications of connections are required and changes in fittings and locations for connections may be required. No additional cost will be

allowed for changes in fittings from those designated unless the work is significantly more difficult. No additional costs will be allowed for working near or installing under or over utilities or structures that are accurately located on the ground in accordance with New Mexico Excavation Law.

H. MEASUREMENT AND PAYMENT. All measurements and payments will be based on completed work performed in strict accordance with the Drawings and Specifications and in accordance with the contract-unit prices and schedule values. Incidental work and items not listed in the contract-unit price schedule will not be paid for separately but will be included in the payment for the listed item or items to which the incidental work applies. Measurement and payment for lump sum items shall be full compensation for all labor, equipment, materials, testing, and incidentals necessary to perform the work in accordance with these contract documents and shall include all else incidental thereto for which separate payment is not provided under other items.

Item No. 1 - 14" Ductile Iron Waterline By Trenching
Shall include all labor, materials, equipment, and incidentals required for installation of 14" Ductile Iron water pipe by trenching up to 5' bury, including bedding, backfill, joint restraint, locate wire, warning tape, and fittings as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Linear Foot basis.

Item No. 2 - 14" Ductile Iron Waterline By Trenching 6' to 9'
Shall include all labor, materials, equipment, and incidentals required for installation of 14" Ductile Iron water pipe by trenching between 6' to 9' bury, including bedding, backfill, joint restraint, locate wire, warning tape, and fittings as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Linear Foot basis.

Item No. 3 - Owner Furnished 14" Ductile Iron Waterline By Trenching
Shall include all labor, materials (except pipe), equipment, and incidentals required for installation of 14" Ductile Iron water pipe by trenching up to 5' bury, including bedding, backfill, joint restraint, locate wire, warning tape, and fittings as shown on Drawings and Specifications. The unit price shall include all labor, materials (except pipe), equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Owner shall provide 14" pipe. Payment shall be on a Linear Foot basis.

Item No. 4 - Owner Furnished 14" Ductile Iron Waterline By Trenching 6' to 9'
Shall include all labor, materials (except pipe), equipment, and incidentals required for installation of 14" Ductile Iron water pipe by trenching between 6' to 9' bury, including bedding, backfill, joint restraint, locate wire, warning tape, and fittings as shown on Drawings and Specifications. The unit price shall include all labor, materials (except pipe), equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Owner shall provide 14" pipe. Payment shall be on a Linear Foot basis.

Item No. 5 - 12" C900 PVC Waterline By Trenching
Shall include all labor, materials, equipment, and incidentals required for installation of 12" PVC Iron water pipe by trenching up to 6' bury, including bedding, backfill, joint restraint, locate wire, warning tape, and fittings as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials

and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Linear Foot basis.

Item No. 6 - 8" C900 PVC Waterline By Trenching
Shall include all labor, materials, equipment, and incidentals required for installation of 8" PVC water pipe by trenching up to 6' bury, including bedding, backfill, joint restraint, locate wire, warning tape, and fittings as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Linear Foot basis.

Item No. 7 - 6" C900 PVC Waterline By Trenching
Shall include all labor, materials, equipment, and incidentals required for installation of 6" PVC water pipe by trenching up to 6' bury, including bedding, backfill, joint restraint, locate wire, warning tape, and fittings as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Linear Foot basis.

Item No. 8 - 6" DIP Waterline By Trenching (Fire Hydrant Legs)
Shall include all labor, materials, equipment, and incidentals required for installation of 6" Ductile Iron water pipe by trenching up to 6' bury, including bedding, backfill, joint restraint, locate wire, warning tape, DIP poly wrap and fittings as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Linear Foot basis.

Item No. 9 - 14" Ductile Iron Water Gate Valves with Valve Box
Shall include all labor, materials, equipment, and incidentals required for installation of a new 14" ductile iron gate valve, with valve boxes, covers, concrete collars, locate wire and appurtenances including trenching, bedding, backfill as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Per Unit basis.

Item No. 10 - 12" Ductile Iron Water Gate Valves with Valve Box
Shall include all labor, materials, equipment, and incidentals required for installation of a new 12" ductile iron gate valve, with valve boxes, covers, concrete collars, locate wire and appurtenances including trenching, bedding, backfill as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Per Unit basis.

Item No. 11 - 8" Ductile Iron Water Gate Valves with Valve Box
Shall include all labor, materials, equipment, and incidentals required for installation of a new 8" ductile iron gate valve, with valve boxes, covers, concrete collars, locate wire and appurtenances including trenching, bedding, backfill as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Per Unit basis.

Item No. 12 - 6" Ductile Iron Water Gate Valves with Valve Box
Shall include all labor, materials, equipment, and incidentals required for installation of a new 6" ductile iron gate valve, with valve boxes, covers, concrete collars, locate wire and appurtenances including trenching, bedding, backfill as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Per Unit basis.

Item No. 13 – Connection to Existing 14" Waterline
Shall include all labor, materials, equipment, and incidentals required for connection of new 14" Ductile pipe to existing 14" Ductile/Steel, ductile iron or cast iron pipe, including fittings, reducers, trenching, bedding, backfill, and joint restraint as specified. The unit price shall include all labor, materials, equipment and incidentals for connections to existing waterlines, setting, jointing, furnishing and installing restrained joints and fittings, coupling, reducers, cleaning and testing as specified, written notification to all residents affected by water system shut-downs related to connections, all coordination with Los Alamos County Utilities Department to deactivate and activate lines and valve shut off coordination. Payment shall be on a Per Unit basis.

Item No. 14 – Connection to Existing 12" Waterline
Shall include all labor, materials, equipment, and incidentals required for connection of new 12" PVC pipe to existing 12" Cast Iron, ductile iron or cast iron pipe, including fittings, reducers, trenching, bedding, backfill, and joint restraint as specified. The unit price shall include all labor, materials, equipment and incidentals for connections to existing waterlines, setting, jointing, furnishing and installing restrained joints and fittings, coupling, reducers, cleaning and testing as specified, written notification to all residents affected by water system shut-downs related to connections, all coordination with Los Alamos County Utilities Department to deactivate and activate lines and valve shut off coordination. Payment shall be on a Per Unit basis.

Item No. 15 – Connection to Existing 6" Waterline or 8" Waterline
Shall include all labor, materials, equipment, and incidentals required for connection of new 8" PVC pipe to existing 6" or 8" PVC, steel or cast iron pipe, including fittings, reducers, trenching, bedding, backfill, and joint restraint as specified. The unit price shall include all labor, materials, equipment and incidentals for connections to existing waterlines, setting, jointing, furnishing and installing restrained joints and fittings, coupling, reducers, cleaning and testing as specified, written notification to all residents affected by water system shut downs related to connections, all coordination with Los Alamos County Utilities Department to deactivate and activate lines and valve shut off coordination. Payment shall be on a Per Unit basis.

Item No. 16 – Connection to Existing 6" Waterline
Shall include all labor, materials, equipment, and incidentals required for connection of new 6" PVC pipe to existing 6" PVC, steel or cast iron pipe, including fittings, reducers, trenching, bedding, backfill, and joint restraint as specified. The unit price shall include all labor, materials, equipment and incidentals for connections to existing waterlines, setting, jointing, furnishing and installing restrained joints and fittings, coupling, reducers, cleaning and testing as specified, written notification to all residents affected by water system shut downs related to connections, all coordination with Los Alamos County Utilities Department to deactivate and activate lines and valve shut off coordination. Payment shall be on a Per Unit basis.

Item No. 17 – Install New Fire Hydrant Assembly with Valve and Box
Shall include all labor, materials, equipment, and incidentals required for installation of fire hydrant and fittings, couplings, reducers, trenching, bedding, backfill, and appurtenances and removal of existing fire hydrant as shown on Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for installation, placing screened gravel where required, connections, setting, jointing, furnishing and installing restrained joints and fittings, coupling, reducers, cleaning and testing and removal of as required. Payment shall be on a Per Unit basis.

Item No. 18 – New Single PEX 2" Water Service with Box
Shall include all labor, materials, equipment, and incidentals required for installing new 2" single service per Standard Detail 6006 and transfer existing service line to new meter can. Including service saddle, corporation stop, 2" service line, fittings, warning tape, locate wire, 36" polyethylene meter can, 36" cast iron cover w/single touch read hole, 12" thick insulation pad, 2" service valve, service valve box, single straight-line inlet and outlet meter yoke, abandonment of existing water service line, removal of old water meter can, backfill and compaction at abandoned water meter can. Construct new 2" service pipe from new meter can to intercept existing service

line, connection to existing service line including all labor and fittings. The unit price shall include all labor, materials, equipment and incidentals for service line testing, trenching, bedding, backfill, and compaction. Payment shall be on a Per Unit basis.

Item No. 19 – New Single PEX 2" Water Service
Shall include all labor, materials, equipment, and incidentals required for installing new 2" single service per Standard Detail 6006. Including service saddle, 2" corporation stop, 2" PEX service line, warning tape, locate wire, 2" service valve, service valve box with cast iron lid, connection to existing service line including all labor and fittings. The unit price shall include all labor, materials, equipment and incidentals for service line testing, trenching, bedding, backfill, and compaction. Payment shall be on a Per Unit basis.

Item No. 20 – New Single PEX 1" Water Service with Box
Shall include all labor, materials, equipment, and incidentals required for installing new 1" single service per Standard Detail 6003 and transfer existing service line to new meter can. Including service saddle, corporation stop, 1" service line, fittings, warning tape, locate wire, 36" polyethylene meter can, 36" cast iron cover w/single touch read hole, 12" thick insulation pad, single straight-line inlet and outlet meter yoke, abandonment of existing water service line, removal of old water meter can, backfill and compaction at abandoned water meter can. Construct new 1" service pipe from new meter can to intercept existing service line, connection to existing service line including all labor and fittings. The unit price shall include all labor, materials, equipment and incidentals for service line testing, trenching, bedding, backfill, and compaction. Payment shall be on a Per Unit basis.

Item No. 21 – New Single PEX 1" Water Service
Shall include all labor, materials, equipment, and incidentals required for installing new 1" single service per Standard Detail 6003. Including service saddle, corporation stop, 1" PEX service line, warning tape, locate wire, connection to existing service line including all labor and fittings. The unit price shall include all labor, materials, equipment and incidentals for service line testing, trenching, bedding, backfill, and compaction. Payment shall be on a Per Unit basis.

Item No. 22 – 1" and 2" ARV and Manhole
Shall include all labor, materials, equipment, and incidentals required for installing new 1" and 2" ARVs per Standard Detail 6012. Including fittings, SCH 80 PVC line, pipe support(s), ARV, 4' diameter precast concrete manhole, 1" or 2" steel vent, and manhole cover. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Per Unit basis.

Item No. 23 – Retire Replaced Water Line
Shall include all labor, materials, equipment, and incidentals required for retirement of replaced water lines, meter cans, fire hydrants, valves, valve boxes, capping lines to be abandoned and other accessories as shown on Drawings and Specifications. The price shall include all labor, materials, equipment and incidentals for hauling and disposal of materials and testing of materials and equipment as required by specifications and costs associated with the retirement. Payment shall be on a Lump Sum basis.

Item No. 24 – Install 8" HDPE Sewer Line by Trenching (Drawing **11.35**)
Shall include all labor, materials, equipment, and incidentals required to install new 8" HDPE pipe as shown on drawing **11.35**. The line shall be installed by open trenching. The unit price shall include all labor, materials, equipment and incidentals to replace sewer as shown on Drawings and Specifications. Including excavation, bedding, backfill, warning tape, and site restoration. The unit price shall include sewer flow control required per specification 504 and all incidentals to complete the installation. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire project and costs associated with the installation. Payment shall be on a Linear Foot basis.

Item No. 25 – 4" SCH-40 PVC Sewer Delivery Line
Shall include all labor, materials, equipment, and incidentals required to install new 4" SCH-40 PVC Delivery lines per LACDPU construction standards**.** The unit price shall include excavation, bedding, backfill, compaction, site restoration, and all incidentals to complete the installation. The unit price shall include all labor, materials, equipment and incidentals for connection to sewer lines, including fittings, couplings, and service saddles. Payment shall be on a Per Unit basis.

Item No. 26 – New 4' Sewer Manhole
Shall include all labor, materials, equipment, and incidentals required to install a new 4' diameter manhole. The unit price shall include furnishing and install new manhole as shown on Drawings and Specifications. Include excavation, bedding, backfill, compaction, gravel base, site restoration, cast iron ring/cover, concrete collar and all incidentals to complete the installation. The unit price shall include all labor, materials, equipment and incidentals for hauling of materials and testing of materials and equipment before and/or after installation as required by specifications for entire costs associated with the installation. Payment shall be on a Per Unit Basis.

Item No. 27 – Connection to Existing Manhole
Shall include all labor, materials, equipment, and incidentals required for connection of the new 8" sewer main to the existing manholes at each end as shown on the Drawings and Specifications. The unit price shall include all labor, materials, equipment and incidentals for the disconnection of the existing sewer pipe avoiding damage to the existing manholes. All required repair of damage to existing facilities that remain active, and all coordination with Los Alamos County Utilities Department to deactivate and activate lines coordination, shall be incidental to this pay item. Payment shall be on a Per Unit basis as noted in the Bid Schedule.

Item No. 28 – Retire Existing Sewer Line
Shall include all labor, materials, equipment, and incidentals required for retirement of replaced sewer lines, manholes, cleanouts, capping lines to be abandoned and other accessories as shown on Drawings and Specifications. The price shall include all labor, materials, equipment and incidentals for hauling and disposal of materials and testing of materials and equipment as required by specifications and costs associated with the retirement. Payment shall be on a Lump Sum basis.

Item No. 29 – Sawcut Asphalt & Repairs
Shall include all labor, materials, equipment, and incidentals required for saw cut, repair, and replacement of roadway materials including subgrade, basecourse, and asphalt as defined by General Notes. Work shall meet or exceed NMDOT construction standards per Sheet 2-1, Pavement Detail. The unit price shall include all labor, materials, equipment and incidentals for testing, trenching, bedding, backfill, and compaction. Payment shall be on a Square Yard basis.

Item No. 30 – Rock Excavation
Shall include all labor, materials, equipment, and incidentals required for rock and boulder excavation as defined in the NMDOT Standard Specifications for Highway and Bridge Construction 2019 Edition, Section 203.2.1.1 Rock Excavation. Refer to Subsurface Characterization by BSN Santa Fe / Geolines LLC Dated 9/29/23. Payment for rock is additional to trenching and excavation that is incidental to pipeline and utility infrastructure unit costs. The Department of Public Utilities Project Manager shall confirm rock exists and measure quantities of rock in the field if additional payment for rock will be paid. This unit price also includes all labor, materials, equipment and incidentals for hauling, removal, and disposal of materials not meeting the specified backfill requirements and import of replacement material that meets the backfill specification. Payment shall be on a Cubic Yard basis.

Item No. 31 – Concrete valley gutter replacement
Shall include all labor, materials, equipment, and incidentals required for the replacement of the concrete valley gutters as defined in the NMDOT Standard Specifications for Highway and Bridge Construction 2019 Edition, section 511: concrete structures. Payment shall be on a Square Yard basis.

Item No. 32 – Concrete fillets and laydowns replacements
Shall include all labor, materials, equipment, and incidentals required for the replacement of the concrete fillets and laydowns as defined in the NMDOT Standard Specifications for Highway and Bridge Construction 2019 Edition, section 511: concrete structures. Payment shall be on a Square Yard basis.

END OF SECTION

**SECTION 101**
**GENERAL REQUIREMENTS**

## PART 1 GENERAL

### 1.1 INCLUDED

A. Applicable codes, ordinances, rules and regulations, administrative requirements, coordination with Department of Public Utilities (DPU), easements, approved construction drawings, testing, inspection, contractor qualifications and acceptance of public utility infrastructure.

### 1.2 APPLICABLE CODES, ORDINANCES AND RULES AND REGULATIONS

A. Department of Public Utilities Rules and Regulation, Revised May 17, 2006

B. Los Alamos County Code of Ordinances, Chapter 16 Development Code

C. Los Alamos County Code of Ordinances, Chapter 40 Utilities

D. New Mexico Administrative Code, Title 14 Housing and Construction

E. 49 Code of Federal Regulations, Part 191

F. 49 Code of Federal Regulations, Part 192

### 1.3 CONTRACTOR QUALIFICATIONS

A. Licenses: Contractors performing work on new or existing public utility infrastructure shall be licensed by the State New Mexico Construction Industries Department.

1. GF-9 or GF-98: Required for gas, water and sewer work. Electric ductbank, vaults and pull boxes only (no installation or handling of wire, terminating, grounding etc.).

2. EL-1J: Required for electric overhead and underground distribution and transmission lines.
3. Pre approved Operator Qualification Plan and Drug and Alcohol program as applicable.

B. Specific training, certifications, qualifications, manufacturer certifications listed in the individual specifications required to perform work.

### 1.4 COORDINATION WITH DEPARTMENT OF PUBLIC UTILITIES (DPU)

A. Notification: The contractor shall notify all customers and the Department of Public Utilities 4 calendar days in advance of any service disruption due to work performed by the contractor. Contractor shall notify affected customers with a door hanger approved by the DPU.

B. Permits: A penetration permit issued by the DPU is required for all connections to an existing gas, water and sewer main. The contractor shall complete the permit and coordinate the work with the Engineering Department and the Gas/Water/Sewer

Department at least 48 hours before performing the work. The permit must be signed by the contractor, a representative of the Engineering Department and Gas/Water/Sewer Department 48 hours prior to performing work. If the work will impact or take place on a water transmission line, a representative of the Water Production department must sign the permit.

C. Functions performed by Department of Public Utilities (DPU).

1. Gas

a. Gas valves shall only be operated by DPU.

b. Connections to existing gas mains shall be performed by DPU or contractor personnel with applicable Operator Qualifications (OQ) and who are a member of an approved Drug and Alcohol Program in accordance with U.S. Department of Transportation Pipeline Safety Regulations. If approved prior to connection, DPU may directly supervise, with OQ qualified personnel, the contractor personnel making the connections.

c. DPU will provide materials and install residential service lines upon completion of service request form, approval of plans and payment of applicable fees.

d. DPU will connect service and install meter only after New Mexico Construction Industries Division inspection and approval is obtained.

2. Water

a. Water system valves shall only be operated by DPU staff.

b. Water utility meters will be provided and installed by DPU.

3. Sewer

a. Service connections to existing sewer mains shall be performed by DPU.

4. Electric

a. All primary terminations in the distribution system shall be completed by DPU unless otherwise stated in DPU approved plans.

b. DPU will provide and install electric meters.

c. DPU will provide materials and install residential service lines upon completion of service request form, approval of plans and payment of applicable fees unless otherwise stated in DPU approved plans.

d. DPU will connect service only after New Mexico Construction Industries Division inspection and approval is obtained.

## 1.5 APPROVED CONSTRUCTION DOCUMENTS

A. Construction drawings must be prepared by a Professional Engineer licensed in the state of New Mexico.

B. Construction drawings must be approved for construction by the DPU Engineering Department.

## 1.6 EASEMENTS

A. All public utility infrastructure shall be constructed in utility easements or right-of-way.

B. Easements and right-of-way shall be granted and filed in the office of the Los Alamos County Clerk prior to beginning construction.

C. Prior to construction all easements and right-of-way in which public utility infrastructure will be constructed must be staked by a Professional Surveyor licensed in the state of New Mexico.

## 1.7 TESTING, INSPECTION AND ACCEPTANCE OF INFRASTRUCTURE

A. All tests required in the individual sections of these specifications shall be completed by the contractor and at the expense of the contractor. Any infrastructure that fails a test must be corrected and retested until a passing test is achieved. All cost associated with correcting infrastructure that fails testing and all cost of re-testing is the responsibility of the contractor. Documentation of test shall be submitted to DPU.

B. DPU shall inspect all new public infrastructure. Contractor is responsible for coordinating the inspections with DPU. Improvements that are buried before DPU has inspected shall be exposed for inspection by the contractor and at the expense of the contractor.

C. Locate wire installed on new public infrastructure shall be verified for continuity as follows:

1. Contractor shall verify continuity with own equipment.

2. When contractor has verified all of tracing wire is continuous, contractor shall make arrangements through Project Manager to have Gas/Water/Sewer Department (GWS) staff verify the continuity of the locate wire.

3. Contractor shall demonstrate continuity, in the presence of DPU staff, by locating all newly installed facilities at all location points (test boxes, valves, hydrants, services, etc.) with own equipment while GWS staff verifies continuity with own equipment and verifies accuracy of as-built drawings.

4. Locations identified where no continuity is found shall be repaired by contractor.

D. Inspection fees as required by DPU and Regulations Fee Schedule, current version, shall be paid prior to beginning construction.

E. Acceptance of public infrastructure shall occur as follows:

1. Public utility infrastructure constructed as part of a new development shall be accepted in accordance with Los Alamos County Code of Ordinances, Chapter 16 Development Code, Section 16-238 Acceptance.

2. Public utility infrastructure constructed by a DPU capital improvement project by means of competitive bid shall be accepted when the terms of the construction contract associated with the work have been satisfied.

END OF SECTION

**SECTION 102**
**SUBMITTAL PROCEDURES**

PART 1 GENERAL

1.1 WORK INCLUDED

A. Required submittals.

B. Submittal procedure.

C. Definition of submittal types for construction.

1.2 REQUIRED SUBMITTALS

A. Provide submittals as indicated in each specific specification section.

1.3 SUBMITTAL PROCEDURE

A. Review submittals prior to transmittal to determine and verify field measurements, field construction criteria, manufacturers' catalog numbers, and conformance of submittals with Contract Documents. To certify compliance with these specifications:

1. Routing Sheet provided in this section shall be attached to all submittals. Form must be completed in its entirety, signed and dated.

B. For any proposed deviation from the Contract Documents, submit a written request to the Project Manager.

C. Submit for review to Project Manager the following number of copies of submittals:

1. 2 Copies for Department of Public Utilities use.
2. Additional number of copies for Engineer and or Contractor use as determined by the Engineer/Contractor.
3. A digital file (Adobe PDF) may be submitted if the Engineer and County agree. Separate or non-affiliated items shall be submitted as separate digital files.

D. Submittal Clarity:

1. Contractors Submittal No. on the routing sheet shall be a successive numbering system.
2. Drawings shall be clear and legible.
3. Manufacturer's Literature: Submit a minimum of one original of all manufacturers' printed material. Remaining number of submittals may be reproductions. Reproductions of original material shall be clear and legible.

E. A partial submittal consists of only a portion of the total required for a project. This is acceptable when it is prudent to submit for review certain submittals before the remaining submittals are available. Submit all items concurrently for which,

due to coordination concerns, a simultaneous review is required. Include a separate Routing Sheet indicating the submittals transmitted with each numbered submittal package.

F. After review of the submittal package the "Action Code" will be indicated on the Routing Sheet and returned to the Contractor. Review of submittals will be indicated on each Routing Sheet by appropriate signature, stamp, and date. The number of copies of each submittal noted above for Los Alamos County use will be retained and the balance will be returned to the Contractor. The Contractor shall allow a minimum of 10 calendar days for return of submittals.

G. The Department of Public Utilities will utilize the following "Action Codes" to indicate the status of submittals resulting from the review, and the action required of the Contractor.

1. A - Reviewed. No comments.
2. B – Reviewed And Noted. Make corrections noted. Resubmission not required.
3. C – Reviewed And Not Accepted. Revise and resubmit.

H. Use a Routing Sheet with all resubmittals indicating each item's submittal number and type suffixed "R1" for the first resubmittal, "R2" for the second resubmittal, and so forth.

I. Do not fabricate products or begin Work that requires submittals before such submittals are approved.

## 1.4 DEFINITIONS OF SUBMITTAL TYPES FOR CONSTRUCTION

A. Calculations: The methods and results of calculations in documented form where specified.

B. Catalog Data: Standard printed information on materials, products and systems, which shows performance characteristics, dimensions, material of fabrication, and other characteristics necessary to assure conformity with the design requirements. Where other items or information not related to the work of this project are included in the literature submitted, the item(s) and/or information applicable to this project shall be clearly marked.

C. Certifications: A written statement, signed by a qualified party, attesting that items or services are in accordance with specified requirements. Typically, this written statement is accompanied by additional information to substantiate the statement.

D. Installation Instructions: Manufacturer's instructions, step-by-step if necessary, showing the field installation of parts, components, equipment, and other similar items.

E. Material List/Parts List/Design Mixes: A list of system or material components.

F. Performance Data/Curves: Performance data and/or curves for the proposed equipment to show compliance with contract documents.

G. Samples/Colors: Samples, including colors, of proposed materials.

H. Shop Drawings: Drawings necessary to show fabrication details to ensure compliance with contract documents.

I. Test Reports: Results of specified test requirements.

J. Wiring Diagrams: Drawings showing the point-to-point wiring of a piece of equipment or between pieces of equipment in a system.

## PART 2 PRODUCTS

Not used.

## PART 3 EXECUTION

Not used.

END OF SECTION

**CONTRACTOR SUBMITTAL ROUTING SHEET**
**DEPARTMENT OF PUBLIC UTILITIES**

| | |
|---|---|
| **PROJECT:** | Contractor's Submittal No.:<br>Date:<br>Product Description: |
| CONTRACTOR: | Dates of any previous submissions: |
| Supplier: | Manufacturer: |
| Specification No.: | Drawing Nos.: |
| Are there any deviations to the contract documents? ☐ No ☐ Yes (explain and identify) | |
| CONTRACTOR'S CERTIFICATION: This submittal has been reviewed by the Contractor in compliance with the CONTRACT DOCUMENTS. Any deviations to the CONTRACT DOCUMENTS are identified above. If this is a resubmittal, any changes other than those specifically called for by the PROJECT MANAGER on previous submittals are specifically identified on the sheet(s) directly following this form.<br>**Signed:** **Date:** | |
| **LOS ALAMOS COUNTY ACTION** | |
| Date Received: | No. Copies Received: |
| Date Returned: | No. Copies Returned: |
| A — REVIEWED for general conformity with DRAWINGS and SPECIFICATIONS. No comments, approved for construction.<br>**By:** **Date:** | |
| B — REVIEWED AND NOTED for general conformity with DRAWINGS and SPECIFICATIONS. Make corrections as noted, resubmittal not required.<br>**By:** **Date:** | |
| C — REVIEWED AND NOT ACCEPTED. Not in conformity with DRAWINGS and SPECIFICATIONS. Revise and resubmit.<br>**By:** **Date:** | |
| PROJECT MANAGER'S COMMENTS, IF ANY: | |

**SECTION 103**
**COMPLIANCE REQUIREMENTS**

PART 1 GENERAL

1.1 WORK INCLUDED

A. Erosion and Sediment Control

B. Site Stabilization

C. Spill Control and Response

D. Debris Control

E. Dust Suppression

F. Traffic Control

1.2 QUALITY ASSURANCE

A. Submit per Section 102 Submittal Procedures, manufacturer's data, materials certifications, certified seed mix, Storm Water Pollution Prevention Plan (SWPPP), erosion and sediment control best management practices, traffic control plans and applicable appurtenances to complete work in this section.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EROSION AND SEDIMENT CONTROL

A. General Requirements

1. Contractor shall supply, install and maintain all erosion and sediment control measures, stabilization and structural controls, and other protective measures through the use of Best Management Practices (BMPs) including silt fences, straw bales, compost socks, or other approved methods, prior to any earth disturbing activity. Standard Details, Section 7000 contains drawings for installation of BMPs.

2. Maintain BMPs in accordance with manufacturer's recommendations.

3. Disturb only the minimum amount of soil necessary. Contractor shall take suitable precautions to protect existing trees, shrubs and other natural vegetation during construction. Project Manager must approve any trees to be removed.

B. Projects Where Soil Disturbance Is Greater Than One Acre (SWPPP Required)

1. All provisions in subsection 3.1, A. General Requirements stated above apply.

2. Contractor shall prepare for review and acceptance by Project Manager a Storm Water Pollution Prevention Plan (SWPPP) in compliance with all requirements set by Environmental Protection Agency (EPA) National Pollution Discharge Elimination System for projects where soil disturbance is greater than one acre.

3. Contractor and County, as co-operators, shall each submit a Notice of Intent to the EPA Storm Water Notice Processing Center (http://cfpub.epa.gov/npdes/stormwater/enoi.cfm).

4. Contractor shall manage the SWPPP by supplying and installing all erosion and sediment control measures, stabilization and structural controls, and other protective measures through the use of Best Management Practices (BMPs) including silt fences, straw bales, compost socks, or other approved methods, prior to any earth disturbing activity.

5. Contractor shall conduct and document storm water inspections, maintain a soil disturbance log during construction and maintain records as required by EPA. Inspections shall be documented on the attached form provided on pages 5 and 6 of this section.

6. Contractor shall amend the SWPPP as required by EPA.

7. Contractor shall submit a Notice of Termination (NOT) following project completion and final stabilization, as defined by the EPA, is achieved.

3.2 SITE STABILIZATION

A. Contractor shall stabilize all disturbed areas with native perennial vegetation. Do not leave any disturbed areas as barren soil. After reseeding contractor shall provide and install degradable rolled erosion control product perpendicular to slope to provide long term erosion control without active maintenance.

B. Final stabilization shall be accepted by Project Manager.

C. Seeding application shall be per New Mexico State Highway and Transportation Standard Specifications for Highway and Bridge Construction 2000 Edition, Section 632 or latest. Seeding class shall be Class B.

D. Seed mix shall be from commercial supplier and be certified to be free of invasive species. Seed mix shall be delivered to site in a sealed packaging labeled with mix design from supplier. Seed mix as follows:

**SEED MIX FOR ELEVATIONS 6,900 TO 7,500 FEET**

| SPECIES SCIENTIFIC NAME | SPECIES COMMON NAME | LBS SEED/ ACRE |
|---|---|---|
| Bouteloua Gracilis | Blue Gramma | 3.0 |
| Bromus Carinatus Var. Polyanthus | Foothills Brome | 3.0 |
| Elymus Trachycauldus | Slender Wheatgrass | 4.5 |
| Anropogon Gerardii | Big Bluestem | 4.5 |
| | | Total 15.0 |

**SEED MIX FOR ELEVATIONS 6,000 TO 6,900 FEET**

| SPECIES SCIENTIFIC NAME | SPECIES COMMON NAME | LBS SEED/ ACRE |
|---|---|---|
| Bouteloua Gracilis | Blue Gramma | 4.5 |
| Bouteloua Curtipendula | Sideoats Gramma | 3.0 |
| Pleuraphis Jamesii | Galleta | 3.0 |
| Schizachyrium Scoparium | Little Bluestem | 4.5 |

| | | |
|---|---|---|
| | | Total 15.0 |

3.3 SPILL CONTROL AND RESPONSE

A. In the event of a spill, contractor shall immediately notify all regulatory agencies having authority and the Los Alamos Project Manager. The Contractor shall be responsible for remediation of any spill and notifying all required agencies in compliance with all local, state and federal laws.

B. Store all fuels, lubricants, chemical storage, material stockpiles, and other potential pollutants in a designated area on-site. Provide secondary containment and controls including berming lined with an impervious material, covering, or other appropriate BMPs.

3.4 DEBRIS CONTROL & DISPOSAL

A. Use good housekeeping practices to keep sites free of construction debris and trash. Provide containers for deposit of debris and trash. Contractor is responsible for disposing of all waste materials generated from the construction including materials demolished, unsuitable excavated debris and construction debris. All materials shall be disposed in a lawful manner.

B. Do not drive or move any vehicle on any public road unless the vehicle is constructed, loaded, secured or covered in a manner that will prevent any of its load from dropping, shifting, leaking, or otherwise escaping.

C. Securely fasten all load covers to vehicles prior to driving on public roads so that the covering does not come loose or become a hazard to others.

D. Do not bury construction waste, sanitary waste, or trash on-site.

E. Concrete truck washout area shall be approved by Project Manager. If necessary, special provisions shall made by contractor if needed to protect property and the environment.

3.5 DUST SUPPRESSION

A. Contractor is responsible for supplying and applying potable water as needed for dust control throughout the project. Apply all liquids in a manner that does not result in runoff.

B. Commercial dust control products may be approved in a case by case basis.

C. Use means necessary to control dust on and near the work, and on and near off-site areas, if such dust is caused by the contractor’s operations during performance of the work, or if resulting from the condition in which the contractor leaves the site.

D. Thoroughly moisten surfaces as required to prevent dust being a nuisance to the public, neighbors, and personnel performing other work on the site.

3.6 TRAFFIC CONTROL

A. A temporary traffic control plan shall be prepared by the contractor for any work that will impact vehicular or pedestrian traffic. Contractor shall submit all traffic plans to the County Traffic Engineering Department for approval. Allow 10 working days for traffic plan approval. The County Traffic Engineering Department shall approve any proposed changes in the temporary traffic control plan.

B. Consider and address the safety of pedestrians in the Traffic Control Plan, and if altering pedestrian traffic, provide an alternate pedestrian route.

C. Traffic control devices shall be properly maintained and inspected daily during the project.

D. A Traffic Control Supervisor shall be designated and be available for call out 24 hours per day.

E. The Traffic Control Supervisor shall be certified in Work-zone Traffic Control.

F. Traffic Control Supervisor shall perform on site inspections of work zone twice daily and once nightly if traffic control devices will be in place during night hours.

G. Contractor is responsible for providing construction coordination to include a weekly log of daily inspections of barricade and maintenance schedules on projects that are over one week duration.

H. Traffic plans shall conform to the latest edition of the Manual of Uniform Traffic Control Devices (latest edition) and may be required to follow AASHTO safety recommendations.

I. Temporary Concrete Barriers must be used where open trenches are within 6 feet of driving lanes. End sections of the temporary concrete barrier must be angled away from the traveled way.

J. Traffic Control Devices shall be kept in a clean condition. Washing of equipment is incidental to its placement and maintenance.

K. Contractor is responsible for the obliteration of any conflicting striping and for any temporary striping.

## 3.7 DEMOLITION

A. Any person or contractor performing demolition on structures or appurtenance which have utility in the vicinity must contact and make arrangement with DPU to assess the impact on DPU infrastructure.

B. Upon review by the DPU, the person or contractor must pay by means of a back charge any cost associated with demolition that impacts any DPU infrastructure – either temporary or permanent - including but not limited to electric, gas, water or wastewater.

C. Person or contractor excavating as part of the demolition process shall contract NM811 in accordance with NM State Statues.

END OF SECTION

**National Pollutant Discharge Elimination System (NPDES)**
**Storm Water Pollution Prevention Plan (SWPPP) Inspection Checklist**
**Los Alamos County Department of Public Utilities**

**Project Title:** _____

**Project Location:** _____

**Inspector/Inspection Date:** _____

**Weather**

Current: _____

Last 24 Hours: _____

Date of Last Rainfall _____

Amount of Last Rainfall _____

**Chemicals Stored On Site:** _____

**Method of Chemical Containment:** _____

**Soil Disturbance Log Status:** _____

## Assessment of Best Management Practices (BMPs)

**Part A. Erosion Prevention** - Note condition and corrective actions for deficiently applied BMPs

| | |
|---|---|
| **1. Construction Access** – Trackout, Street Clean | ☐ OK ☐ Deficient |
| **2. Soil Stabilization** - Signs of Erosion, Gullies, Slope Failures, Rills | ☐ OK ☐ Deficient |
| **3. Slope Protection** – Plastic Condition, Grass Growing, Hydroseed Condition, Matting | ☐ OK ☐ Deficient |
| **4. Perimeter Control** - Clearing Limits Marked, Silt Fences, Swales | ☐ OK ☐ Deficient |
| **5. Conveyances Stable** – Ditches, Check Dams Intact, Sand Bags, Slope Drains | ☐ OK ☐ Deficient |

| | |
|---|---|
| **6. Temporary Erosion and Sediment Control Management** - Revisions Required | ☐ OK ☐ Deficient |
| **7. Water Management** - Infiltration, Clean/Dirty Water Separated, Offsite Water Bypassed | ☐ OK ☐ Deficient |
| **8. Outlet Protection** – Stabilized | ☐ OK ☐ Deficient |

**Part B. Sediment Control** - Note condition and corrective actions for deficiently applied BMPs

| | |
|---|---|
| **1. Storm water Detention and Monitoring** | ☐ OK ☐ Deficient |
| **2. BMP Maintenance** | ☐ OK ☐ Deficient |
| **3. Inlet Protection** | ☐ OK ☐ Deficient |
| **4. Dust Control** | ☐ OK ☐ Deficient |
| **5. Spill Prevention** | ☐ OK ☐ Deficient |
| **6. Condition of Discharge Water** | ☐ OK ☐ Deficient |

**Other/Continued Comments, Conditions, Corrective Actions, and Observations:**

**SECTION 104**
**UNDERGROUND FACILITIES STAKING REQUIREMENTS**

PART 1 GENERAL

1.1 WORK INCLUDED

This standard provides the requirements for the construction staking of public utility infrastructure.

1.2 QUALITY ASSURANCE

Utility staking is contingent upon the completion of the following by the owner/developer:

A. Right-of-way and easements establishing legal access for new utility infrastructure shall be granted and filed in the office of the Los Alamos County Clerk prior to beginning construction.

B. Right-of way, easements, lot corners and lot boundaries shall be staked by a New Mexico Licensed Professional Surveyor when utility infrastructure will be constructed within or adjacent to an established legal boundary to prevent encroachments and ensure legal access to facilities is maintained.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. The contractor is responsible for completion and maintenance of all construction staking necessary to complete the work, consistent with standard survey practices.

B. Clearing and grubbing shall be completed prior to staking.

C. Staking utility infrastructure when grading has not been completed to final grades or final subgrade, stakes indicating grade cut or fills shall be place as necessary to ensure utility infrastructure will be constructed at the proper depth when final grading is complete. All infrastructure not installed to the proper burial depth due to lack of staking or incorrect staking shall be removed and replaced at the proper depth at the expense of the contractor.

D. Subgrade stakes: subgrade stakes are generally correct to within 0.2' which is sufficient precision to stake subgrade. However, care must be exercised when staking a utility location in that a greater degree of precision may be necessary.

E. The burial depths and tolerances specified or drawn elsewhere in these construction standards for each specific utility shall be met.

F. It is the contractor's responsibility to stake location and finished grade in all pertinent features, including but not limited to, roadways, curb and gutter, sidewalks, drainage structures, signage, retaining walls that are necessary for placement of utility components as specified.

G. Offset distance: a distance shall be selected which will ensure the protection of stakes during trenching. This distance is generally 10' to 15' to centerline of trench but may depend on site conditions. The stakes may be placed adjacent to the contractor's sub grade stakes if the offset distance is adequate, or may, in fact, be the same if so marked.

H. Stake interval: stakes will be placed as required in order to ensure that the trench will be properly aligned and at all utility components such as vaults, pedestals, transformers,

manholes, clean-outs, meter sets, fire hydrants, changes in direction, fitting location, valve location and other utility components that require to be placed at a specified location and depth. In no case shall staking intervals be less than 50'. The interval may have to be decreased to 25' or less on curves or where site conditions otherwise dictate.

I. Although the center location on small electric boxes and property line structures are normally adequate, in most cases, it will be necessary to stake two corners on the larger boxes. When a box is to be placed against the back face of a sidewalk or any other critical location, care must be exercised to ensure adequate precision in staking.

END OF SECTION

**SECTION 202**
**EXCAVATION, TRENCHING AND BACKFILL**

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section covers trenching and backfill requirements for buried gas, water and sewer piping systems, as well as electric and communication conduits.

B. This section also covers requirements for excavation and for compaction of succeeding layers after backfill has been placed around pipe, electric conduits, communication conduits, under manholes, surrounding manholes, under vaults, surrounding vaults, beneath equipment bases where detailed in drawings, as well as backfill associated with structures to be abandoned in place.

1.2 RELATED WORK

A. Section 301 Gas Systems

B. Section 401 Underground Ductbank Systems

C. Section 501 Sewer Systems

D. Section 502 Sewer Manholes

E. Section 601 Water Systems

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the general designation only.

B. American Society for Testing and Materials (ASTM) Publications:

D - 1557 Moisture-Density Relations of Soils and Soil Aggregate Mixtures

D - 2419 Sand Equivalent Value of Soils and Fine Aggregate

D - 2487 Classification of Soils for Engineering Purposes

C. State of New Mexico Excavation Law: Chapter 62, Article 14 NMSA 1978, 2001 Amendment, and all amendments in place at the time of construction.

1.4 QUALITY ASSURANCE

A. Percentage of compaction specified shall be the minimum acceptable. The percentage represents the ratio of the dry density of the compacted backfill material to the maximum dry density of the material as determined by the procedure set forth in ASTM Designation D1557 (Modified Proctor).

1.5 GENERAL REQUIREMENTS

A. EXISTING UTILITIES

1. The protection of active utility lines shown on the Plans or otherwise made known to the Contractor shall be the responsibility of the Contractor, prior to and during excavation. Active utility lines shown to be removed, retired, or abandoned in place shall be protected until the replacement utility lines are in place and ready to begin service or be otherwise activated. Any damaged utility shall be repaired or replaced

at the Contractor's expense. Potholing, as may be required to verify utility locations, shall also be the responsibility of the Contractor. Hand digging shall be performed at any time the excavation is within 18 inches of a live utility line per New Mexico Excavation Law. Contractor shall be responsible for contacting all utility companies and coordinating any work that requires relocation or abandonment of existing utilities.

2. Abandoned utility lines shall be cut and capped on both ends of the abandoned section.

3. If active utility lines are encountered and are not shown on the Plans or otherwise made known to the Contractor, promptly take necessary steps to assure no utility services are interrupted.

4. If any utility service is interrupted as a result of work under this section, immediately contact The Department of Public Utilities at 662-8333, or Police Dispatch at 662-8222, to restore service by repairing the damaged utility at Contractor's expense.

5. Existing utilities, whether or not shown on the drawings, and believed to interfere with the installation of permanent facilities being constructed under this contract, Contractor shall immediately send written notification to the Project Manager for direction.

6. Contractor shall not proceed with permanent repair or relocation of any existing utilities until written instructions are received from the Department of Public Utilities.

B. PROTECTION OF PERSONS & PROPERTY

1. Contractor shall install all necessary underpinning, shoring, lagging, cribbing, and bracing of ample strength to support adjoining soils, paving and structures. All such items shall be so constructed that they will not interfere with the building of any structural elements, and shall be removed upon completion of the work.

2. Contractor shall barricade open depressions and holes occurring as part of this work, and post warning lights on property adjacent to or with public access, all in compliance with County-approved traffic control plan.

3. Contractor shall protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by operations of Contractor.

4. Contractor shall install fences and barricades to secure the area from the public.

5. Contractor shall maintain access to areas adjacent to the project site(s) at all times.

6. Contractor shall maintain and/or replace all bench marks, monuments, construction stakes and other reference points. Any property boundary pins, survey monuments or survey benchmarks disturbed or damaged by the contractor shall be replaced at the expense of the contractor, by a surveyor licensed in the state of New Mexico.

7. Contractor shall repair or restore damage to any portion of the work resulting from movement of the sides or bottom of trenches or other excavation which is

attributable to the Contractor's acts or omissions, whether sides are braced or not.

C. SHORING

1. The Contractor shall be solely responsible for all bracing and shoring in compliance with all local, state and federal laws.

D. DEWATERING

1. Contractor shall remove all water, including rain water, encountered during trenching and substructure work to an approved location by pumps, drains, and other approved methods.

2. Contractor shall keep excavations and site construction area free from extraneous water.

E. DUST CONTROL:

1. Contractor shall use any and all means necessary to control dust on and near the work, and on and near off-site areas, if such dust is caused by the Contractor's operations during performance of the Work, or if resulting from the condition in which the Contractor leaves the site.

2. Thoroughly moistening surfaces as required to prevent dust from becoming a nuisance to the public, neighbors, and personnel performing other work on the site shall be the responsibility of the Contractor, throughout the construction period.

F. TRENCHING IN ROCK

Unless Trenching in Rock is specifically listed as a bid item, all trenching to be performed under this contract will be considered incidental to pipe, conduit, or ductbank installation. Excavation in Rock, as may be defined elsewhere in this contract, shall apply only to excavation other than trenching.

The Owner shall provide pertinent information to the contractor, following all appropriate subsoil investigations conducted on the project site, prior to project bidding. Contractor may, at contractor's expense, expand on the scope of such subsoil investigations.

Payment for trenching in rock shall be made in accordance with the specific bid item, and shall be adjusted only if quantities vary from those originally bid.

## PART 2 PRODUCTS

### 2.1 BACKFILL MATERIALS

A. Backfill Materials are those materials placed in the trench between the bedding material to the top of the trench or to below specified base course under roadways or those material used to fill excavations for subsurface structures. On-site native material used as backfill shall be select material free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, frozen, deleterious, or objectionable materials, free of stones or lumps exceeding 3 inches in greatest dimension satisfactory to the Project Manager.

B. Soft, wet, plastic soils which may be expansive, clay soils having a natural in place water content in excess of 30%, soils containing more than 5% (by weight) fibrous organic materials, and soils having a plasticity index greater than 30 shall be considered unsuitable for use as backfill.

C. In the event that native materials not meet the requirements specified for bedding material or backfill, or if the specified field compaction cannot be obtained, contractor shall import suitable material at no additional cost to the owner.

D. The removal, hauling, and disposal of unsuitable material, such as rocks, pavement, concrete, demolished structures, debris, or other extraneous items shall be the responsibility of the Contractor, and shall be performed at no additional cost to the owner. Securing the site and coordinating with the respective agencies or disposal site owners shall also be the responsibility of the Contractor to do at no additional cost to the owner and in accordance with applicable environmental regulations.

## 2.2 PIPE BEDDING MATERIAL

A. Pipe bedding, a minimum 4 inches below bottom of pipe and six inches above the top of the pipe shall be permeable material with a maximum particle size of 0.5 inches in any dimension, with no sharp rocks. Portion passing No. 200 sieve shall be 50% maximum. Contractor shall provide a submittal for bedding material for approval by the Project Manager, prior to installing such bedding material.

## 2.3 TRENCHES ON PAVED SURFACES

A. Existing pavement surfaces shall be neatly saw-cut, removed and disposed of by Contractor in a lawful manner and at the Contractor's expense, as necessary for trenching operations to take place. Removed pavement or asphalt shall never be used as backfill. Paved surfaces shall be replaced upon backfilling the trench, in compliance with Los Alamos County Public Works Department Construction Standards. Asphalt and base course thickness shall be as detailed in plans, or at a minimum match existing concrete pavement or asphalt and base course section.

# PART 3 EXECUTION

## 3.1 GENERAL TRENCHING AND EXCAVATING

A. Trenches may be excavated either by hand, or by machine. Trenches shall be cut with vertical sides, and shall be of sufficient width to provide adequate space for working therein. When applicable such space shall have adequate clear distance when shoring is used, so that pipe can be properly placed and aligned in conformity with the plans. Trench sides shall be parallel to and at equal distance from the center-line of the pipe, when aligned as shown on drawings.

B. Pipe trenches shall be excavated to a depth below the bottom of the pipe sufficient to provide for pipe bedding materials as required by Section 2.2.

C. Where a trench has been excavated below the designed grade, the bottom of the trench shall be refilled to proper subgrade with approved material well compacted in place, in an approved manner.

D. No more than 150 feet of trench shall be opened at any one time unless approved by the Project Manager.

E. If practical, no trench or holes shall be left open overnight. Use steel plating to protect open trenches overnight.

F. Excavation for thrust blocks shall be neat to the line and dimensions shown or called for on the plans.

G. Provide for dewatering trenches and excavations and subsequent control of ground water, utilizing such pumps or other equipment as may be necessary to control ground water and seepage until backfilling is completed.

H. The contractor shall remove and legally dispose of all excess excavated material and demolition debris.

3.2 GENERAL BEDDING

A. Utilities shall be laid on a layer of firm bedding material, per section 2.2 A, not less than four (4) inches in depth as shown or as noted on the plans and detail drawings. Compact as specified herein.

B. Upon completion of bedding operations and, prior to the installation of pipe or appurtenances, notify the Project Manager who will then inspect the bedding layer. Pipe laying shall not commence until the bedding has been approved. Upon completion of placement of 6" of bedding above pipe or conduit notify the Project Manager who will then inspect.

3.3 GENERAL BACKFILLING

A. Backfill shall be as shown on the plans. Place in 8-inch maximum lifts. Bring up evenly on each side, and for the full length of the structure. Ensure that no damage is done to structures or protective coatings thereon. Compact each loose lift as specified in Paragraph "General Compaction" before placing the next lift. Where unacceptable settlements occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation.

B. No backfill shall be placed until the line has been inspected and bedding approved.

3.4 GENERAL COMPACTION

A. Use hand-operated plate type vibratory or other suitable hand tampers in areas not accessible to larger rollers or compactors. Contractor shall avoid damaging structures, pipes and protective pipe coatings. Compaction shall be in accordance with the following unless otherwise specified. If necessary, the Contractor's selected equipment and construction procedure shall be altered, changed or modified in order to meet the specified compaction requirements.

B. Initial bedding shall be carefully packed under the haunches of the pipe and brought up simultaneously on both sides so as to prevent any displacement of the pipe from its true alignment. Backfill shall be compacted in layers not more than eight (8) inches in thickness in a manner that will preclude moving the pipe, to not less than 90%, and 95% within road right of ways, and as specified. Base course shall be compacted as required by roadway authority.

C. Backfill above the bedding shall be placed in loose lifts not exceeding eight (8) inches in thickness before compaction, and compacted by the use of pneumatic tampers or other mechanical means approved. Water or dry, as required, to bring the soils as close as

practicable to the optimum moisture content for proper compaction. Compaction equipment or methods that produce horizontal or vertical earth pressures that may cause excessive displacement or may damage the pipeline will not be permitted.

D. Backfill will be inspected during placement. Backfill not compacted in accordance with these specifications shall be recompacted, or removed as necessary and replaced to meet specified requirements prior to proceeding with the work.

E. Contractor is responsible for protection and maintenance of work during construction and until the project is accepted. The contractor will not be paid an additional amount for such work.

F. Open excavations and backfilled trenches that have not been paved shall be protected from moisture that may sacrifice compaction or backfill quality. Base course or asphalt shall not be placed on subgrade or backfill that is visibly saturated. Saturated subgrade and backfill shall be removed, replaced, recompacted per these specifications and demonstrated to be in conformance with these specifications by testing performed by an approved testing laboratory at the expense of the contractor. Frequency and location of this testing will be determined by the Project Manager.

## 3.5 GENERAL BRACING AND SHORING

A. The Contractor shall furnish, place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection of workmen; to facilitate the work; and to prevent damage to or adversely affect adjacent structures, facilities, landscaping, or pavement.

B. Upon completion of the work, all bracing and shoring shall be removed.

## 3.6 FIELD QUALITY CONTROL

A. Compaction test are required to be performed by a qualified material testing Laboratory provided by the Contractor and at the expense of the Contractor, and test results shall be provided to the engineer directly from the laboratory.

B. Definition of road prism in these specifications is all subsurface material directly below paving, sidewalk, curb, valley gutter, roadway islands, landscaping and bar ditches within a road right of way.

C. Compaction requirements and test schedule:

1. Trenches under road prism 95% compaction required for bedding and backfill. Minimum of one field density test for each compacted 12” layer of trench backfill for each 400 linear feet of trench.

2. Trenches crossings under road prism 95% compaction required. Minimum of one field density test for each 12” compacted layer of trench backfill at each trench road crossing.

3. Trenches not under road prism 90% compaction required. Minimum of one field density test for each 12” compacted layer of trench backfill for each trench less than 400 linear feet.

4. New manholes, pull boxes or vaults, 95% compaction required. Minimum of one field density test for each 12” compacted layer of backfill for each structure.

5. Manhole bases, pull box bases, transformer pads, vault bases and switch pads 95% compaction required. Minimum of one field density test of prepared subgrade.

D. If backfill has been placed, that is below the specified density, provide additional compaction with subsequent retesting until successful compaction is achieved at no cost to the owner.

3.7 DUST ALLEVIATION AND CONTROL

A. Contractor shall be responsible for and shall provide pollution and dust abatement and control measures satisfactorily during the course of the work. Water trucks shall be equipped with a directional spray nozzle.

3.8 FINISH OPERATIONS

A. Pipes shall be laid to finished grades indicated on the plans.

B. Contractor shall dispose of all surplus material or material unsuitable for filling or grading off the site in a legal manner at no additional cost to the owner.

C. Satisfactorily restore any existing improvements, paving, landscaping, and other utilities disturbed during the course of constructing the improvements.

D. Existing traffic markings and control devices damaged or disturbed during construction shall be replaced or repaired to the satisfaction of the Project Manager.

END OF SECTION

**SECTION 401**
**UNDERGROUND DUCTBANK SYSTEMS**

## PART 1 GENERAL

### 1.1 WORK INCLUDED

A. Underground conduit system for electric power.

B. Underground conduit system for communications.

C. Pull boxes and vaults for electric power.

D. Pull boxes and vaults for communications.

### 1.2 DEFINITION

A. “Duct” as used herein, is a single enclosed raceway for conductors or cable.

B. “Conduit” is a structure containing one or more ducts.

C. “Conduit System” is the combination of conduit, conduits, manholes, handholes, and/or vaults joined to form an integrated whole.

### 1.3 REFERENCE STANDARDS

A. Publications noted in these specifications form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

B. Where reference is made to publications and standards, the revision in effect at the time of bid opening shall apply.

### 1.4 WORK PERFORMED BY THE DEPARTMENT OF PUBLIC UTILITIES (DPU)

A. The Department of Public Utilities shall terminate all primary conductors necessary to energize new distribution circuits. The Contractor shall install and terminate secondary or service conductors when specified and approved by Department of Public Utilities. Contractor will provide and install connectors on secondary lines as specified by Department of Public Utilities.

### 1.5 SUBMITTALS

Submit the following in accordance with Section 102 Submittal Procedures.

1. Catalog Data: Contractor shall submit catalog data describing cable, pull boxes, pre-cast concrete vaults, manhole frames and lids, ladders, and cable

racks. Data substantiating that materials comply with specified requirements shall be included in submittal.

2. Catalog Data: Contractor shall submit catalog data describing all PVC duct, fittings, couplings, terminations, associated conduit system materials and galvanized 90-degree bends.

3. Test Reports: Contractor shall submit a report of duct blockage and cable tests.

4. As-Built drawings with details including burial depth, ductbank configuration, materials, lengths and stub up locations shall be submitted. The original design drawings are not to be submitted in the place of As-Built drawings.

1.6 QUALITY ASSURANCE

A. Contractor shall comply with the National Electrical Code (NEC) and National Electrical Safety Code (NESC) for components and installation.

B. Contractor shall provide products that are listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) for the application, installation condition, and the environment in which installed.

C. Contractor shall provide products that are accepted by Rural Utility Service (RUS)

1.7 RECEIVING, STORING AND PROTECTING

A. Contractor shall receive, store, protect, and handle products according to NECA 1 – Standard Practices for Good Workmanship in Electrical Construction.

1.8 SEQUENCING AND SCHEDULING

A. Installation of conduit or medium voltage cable must be coordinated with the Department of Public Utilities at least two working days prior to beginning work.

B. Contractor shall schedule the inspection of each trench segment before bedding is placed.

C. Contractor shall notify the Project Manager at least two days prior to duct tests.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. All submittals shall be approved by the Department of Public Utilities engineer prior to installation. No substitutions will be made on previously approved items without new submittal approval.

## 2.2 RIGID GALVANIZED STEEL CONDUIT AND FITTINGS

A. Contractor shall furnish rigid galvanized steel conduit (RGS) that meets the requirements of UL6 – *Rigid Metal Electrical Conduit* and ANSI C80.1 – *Rigid Steel Conduit, Zinc Coated*.

B. For rigid galvanized steel conduit and 90-degree elbows, the contractor shall furnish zinc-plated, threaded, malleable iron fittings and conduit bodies that meet the requirements of UL514B and ANSI/NEMA FB1.

## 2.3 RIGID NON-METALLIC CONDUIT AND FITTINGS

A. Rigid, non-metallic duct (PVC) that meets the requirements of UL651 – Schedule 40 and 80 PVC duct and NEMA TC 2 – Electrical Plastic Tubing and Conduit, ANSI C80.3 shall be furnished by the contractor.

B. For rigid non-metallic duct, Contractor shall furnish non-metallic, solvent-welded socket fittings that meet the requirements of UL514C – Non-Metallic Fittings for Conduit and Outlet Boxes, and NEMA TC 3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing.

C. All non-metallic ducts shall be solvent welded.

## 2.4 USE THE FOLLOWING DUCT MATERIALS:

1. Electrical grade Schedule 40 PVC rigid non-metallic duct is required for electric conduit systems.

2. Electrical grade Schedule 40 PVC rigid non-metallic duct is required for communication conduit systems.

3. Long sweep tape-wrapped galvanized rigid steel 90 and 45-degree elbows shall be used in electric conduit systems and for elbow and riser where ducts turn up to the surface as indicated in drawings.

4. Long sweep Schedule 40 PVC rigid non-metallic elbows shall be used in communication conduit systems.

## 2.5 DUCT SPACING

A. Ducts shall be lain so that they remain in sequence and each layer remains distinct. Contractor will provide and install spacers if specified by Department of Public Utilities

## 2.6 CORROSION PROTECTION TAPE

A. Contractor shall furnish pressure-sensitive, 10 mil thick. PVC based tape for corrosion protection of metal duct and fittings. Manufacturer: 3M, Type 50 or approved equivalent.

## 2.7 UNDERGROUND WARNING TAPE

A. Underground warning tape shall be placed in areas where an underground conduit system is installed.

B. Contractor shall use 6-inch wide, 0.004-inch thick, polyethylene underground warning tape with the following background colors:

1. Electric: Red

2. Communication: Orange

C. Lettering shall be black and indicate the type service buried below.

1. Electric: "CAUTION ELECTRIC LINE BURIED BELOW"

2. Communications: "CAUTION COMMUNICATION LINE BURIED BELOW"

Manufacturer: Electromark, Utility Safeguard, LLC or approved equivalent.

## 2.8 DUCT CAPS

A. Duct caps are required on all unused ducts. The caps shall be designed to hold the pull string and seal the duct completely to prevent moisture intrusion.

B. Contractor shall provide PVC end caps, which are glued securely on the end of the duct that will produce a positive seal in unused ducts against water and gas. Caps shall be made of schedule 40 PVC. Manufacturer: Carlon, Condux, Jackmoon USA, Inc or approved equivalent.

## 2.9 PRE-CAST PULL BOXES

A. Contractor shall provide pre-cast polymer concrete pull boxes outside of the perimeters of roads in areas subject to light traffic.

1. Electrical pull boxes shall be in compliance with the Department of Public Utilities Standards.

2. County Communication pull boxes shall have minimum outside dimensions: 48”H x 48”D x 48”W.

3. Heavy Duty Covers shall be designed to H-10 or H-20; ASTM C 857-95 for incidental or non-deliberate traffic areas and are not intended to be installed in roadways.

4. Manufacturer: Carson Industries, Quazite, New Basis, New Line

## 2.10 PRE-CAST CONCRETE VAULTS

A. Contractor shall provide pre-cast concrete vaults inside and outside of the perimeters of roads in areas subject to specified traffic ratings.

1. Manholes shall be ordered to comply with specified dimensions.

2. Contactor shall provide grounding lugs attached to ½-inch grounding inserts.

3. Heavy Duty Covers shall have be designed in compliance with H-20; ASTM C 857-95.

4. Contractor shall construct manholes using 4000 psi concrete.

5. Contractor shall provide watertight seal between all manhole components.

6. Contractor shall provide pulling eyes within the vault as detailed in drawings.

7. Contractor shall provide lifting eyes and hardware on all manhole components.

8. Contractor shall provide PVC duct terminations as specified in project detail drawings.

## 2.11 VAULT ACCESSORIES

1. Contractor shall provide removable ladder with all associated ladder hardware.

2. Contractor shall provide Risers as specified with appropriate lifting hardware.

3. Contractor shall provide a 36-inch steel lid with “Electric” stamped finish.

4. Contractor shall provide Unistrut rails cast into vault walls, two on each face, separated by 48 inches.

## PART 3 EXECUTION

### 3.1 PREPARATION

A. Contractor shall install underground conduit systems according to the Department of Public Utilities Standards

B. Conduit system routing shown on Drawings shall be considered an approximation of location unless specifically dimensioned. Contractor shall route system conduit as required to complete the system.

1. Contractor shall coordinate all underground conduit system work in a manner which avoids interference with other projects and existing utilities.

2. Routing and termination locations of conduit system shall be verified prior to excavation for rough-in.

3. Contractor shall verify that field measurements are as shown on Drawings and convey actual measurements to the as-built drawing set.

C. Contractor shall position trench so envelope of conduit will have 12-inch minimum horizontal and vertical separations from parallel or perpendicular runs of other existing utility pipes or ducts.

D. Separations from existing utilities may be greater than 12 inches.

### 3.2 EXCAVATION AND BACKFILL

A. Excavation shall be performed in accordance with Section 202 Excavation, Trench and Backfill.

B. Contractor shall perform excavation for pull boxes, vaults, and duct to the depth specified by Drawings in a manner that provides solid bearing.

C. When excavating for trenches, Contractor shall provide sufficient width within the trench to receive work to be installed while providing specified bedding coverage on sides.

### 3.3 UNDERGROUND CONDUIT INSTALLATION

A. Contractor shall install the number and size of ducts as indicated on the Drawings.

B. Contractor shall abide by the following duct material specifications:

1. Electrical grade Schedule 40 PVC rigid non-metallic duct shall be used for electric conduit systems.

2. Electrical grade Schedule 40 PVC rigid non-metallic duct shall be used for communication conduit systems.

3. Contractor shall use long sweep, tape-wrapped, galvanized rigid steel for 90-degree and 45-degree elbows for electric conduit systems.

4. Contractor shall use long sweep Schedule 40 PVC rigid non-metallic elbows in communication conduit systems.

C. Where ducts turn up into the surface, Contractor shall use RGS, IMC or PVC coated rigid steel elbows with minimum 36-inch radius and terminate in a coupling 6 inches above the inner surface in a pull box or 4 inches above the surface of equipment pad. Contractor shall install zinc-plated malleable iron pipe plug in each unused duct stub-up.

D. For ducts installed through holes in existing vault or manhole walls, Contractor shall pack opening with non-shrink grout and feather the edge of the grout around each bell in a manner that conforms to the curvature of the bell end. Contractor shall remove sharp edges and projections and fill voids within 6 inches of bell ends.

E. Contractor shall ground metallic risers exposed to contact according to the requirements of the Department of Public Utilities. Exothermic welded connections for concealed grounding connections shall be used.

F. In underground ducts, make-up joints shall be tight, driven home from both sides and made thoroughly waterproofed. On non-metallic ducts, Contractor shall use manufacturer's recommended primer and solvent-cement. On metallic conduits, Contractor shall coat male threads with red colored, alkyd base, tank and structural primer that is suitable for galvanized steel; make-up fittings wrench-tight.

G. Where metallic ducts are below grade, Contractor shall use plastic coated rigid steel conduit or tape-wrap with corrosion protection tape, half-lapped.

H. Contractor shall schedule inspection of each ductbank or ductbank segment before covering. Failure to obtain inspection by the Department of Public Utilities prior to backfill will result in re-excavation of segments not previously inspected.

I. Each duct shall be tested for blockage or deformation as follows:

1. Contractor shall clean duct using a flexible mandrel/scraper/brush not less than 12 inches long with a diameter approximately 1/4 inch smaller than the inside diameter of the duct.

2. If a blockage is found within the duct, the blocked section shall be replaced.

3. The Project Manager shall be notified at least two days prior to duct tests; Contractor shall submit written reports of tests to Project Manager.

J. Contractor shall place underground warning tape in backfill 12 inches below finish grade.

K. Contractor shall install measuring and pulling rope in each duct and leave not less than 12 inches of rope slack at each end. Each end of the rope shall be secured with approved restraint method and the PVC cap shall be glued to seal non-metallic ducts.

L. Stub-Up Connections:

1. Contractor shall use rigid steel duct or IMC for outdoor stub-up connections. Non-metallic duct may be used for those indoor stub-up connections which are not subject to physical damage.

2. Ducts shall extend through concrete pad or floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs which shall be set flush with the finished floor or equipment pad.

3. Where equipment connections are not made under this Contract, threaded insert plugs shall be installed and set flush with the floor.

M. Contractor shall install corrosion protection tape on metal conduits and fittings in contact with soil using half-lapped wrappings.

## 3.4 PULL BOX AND VAULT INSTALLATION

A. Pull boxes and vaults shall be installed at locations specified on Drawings.

B. Contractor shall perform excavation of suitable dimensions so that ducts enter pull box or vault at proper elevation per project detail drawing dimensions.

## 3.5 DUCT PLUGGING AND SEALING

A. Contractor shall install solvent welded caps in both ends of all unused ducts.

END OF SECTION

**SECTION 501**
**SANITARY SEWERAGE SYSTEMS**

PART 1 GENERAL

WORK INCLUDED

A. Conventional gravity-flow and pressure sanitary wastewater pipelines, service lines, fittings, and accessories.

1.1 SUBMITTALS

A. Product data for pipe, fittings and accessories per Section 102 Submittal Procedures.

PART 2 PRODUCTS

2.1 MATERIALS

A. Ductile Iron Gravity and Force Mains.

1. Pipe and Fittings.

a. Pipe AWWA C-151 ceramic-epoxy lined bell and spigot push-on joint type pipe.

b. Fittings AWWA 153 Fittings shall be mechanical joint ductile iron per AWWA C110 full body or AWWA C153 Short body. Fittings shall be ceramic-epoxy lined and coated per AWWA C116.

c. On force mains all fitting joints shall be mechanically restrained. Accepted mechanical restraints: Megalug by EBBA Iron Inc. or UNI-FLANGE by the Ford Meter Box CO., Inc., or DPU-approved equal.

d. In vaults and where indicated in drawings, Contractor shall use supported flanged pipe, and fittings.

e. Accepted manufacturers: U.S. Pipe, Griffin Pipe or American Pipe, or approved equal.

B. Non-Pressure Gravity-flow Mains.

1. Pipe and Fittings.

a. For 15-inch diameter and smaller sewers, under normal conditions of gravity flow, SDR 35 PVC pipe, per ASTM D3034 shall be used, unless otherwise indicated in the drawings.

b. Pressure-rated pipe may be specified for gravity-flow sewers, under some conditions, such as arroyo/stream crossings and shallow-bury installations. In such cases, pipe shall be

manufactured in accordance with AWWA C-900, with bell and spigot push-on type pipe, or mechanically restrained joints.

c. For deeper installations and for sewer sizes 18-inch diameter and larger, pipeline shall be AWWA C-900 PVC pipe in order to provide sufficient structural performance. Mechanically restrained joints may also be specified under these conditions.

2. Joints.

a. Internally cast bell with one rubber sealing ring per ASTM D3212 and F477. Lubricant shall be per Manufacturer's recommendations.
b. As required by the design, where necessary for structural reasons, pressure pipe may be assembled with mechanically restrained joints.

C. High Pressure Sewer Force Mains

1. Pipe and Fittings:

a. Class 150 C-900 PVC push-on joint type pipe or mechanically restrained joints as may be specified.

b. All fittings shall also have mechanically restrained ductile iron joints per AWWA C110 full body or AWWA C153 Short body. Fittings shall be ceramic-epoxy lined and coated per AWWA C116.

2. High Density Polyethylene Pipe (HDPE).

a. Refer to specification Section 503 Polyethylene Pipe for Sewer and Non-Potable Water.

D. Low Pressure Sewers

1. Pipe and fittings
a. 2" to 6" diameter: Schedule 40 PVC per ASTM 1785, with thermally fused or solvent-welded bell and spigot joints ASTM 2855 and 2564.
b. 2" to 6" diameter: DR 17 HDPE, per ASTM F714, with thermally fused joints

E. Sewer Service Lines.

1. Pipe and Fittings: Schedule 40 PVC per ASTM D1785, Solvent welded bell and spigot joints ASTM D2855 and ASTM D2564.

2. On existing mains: Service saddles for installation on existing SDR 35 PVC or clay sewer mains shall be a cast iron or ductile iron body with

shop applied coating, stainless steel strap, and bolts, nuts and washers, with rubber gasket per ASTM D2000 as detailed in drawing 5001. Saddle shall be approved by manufacturer for use on type of pipe being fastened to. Saddles shall be manufacturer by; The General Engineering Company; or approved equal.

3. On new mains: Service laterals shall be installed on new PVC gravity sewer mains by installing a SDR-35 gasketed directional tee with run sized to fit main and branch sized to fit sewer lateral. Service line shall transition to schedule 40 PVC pipe as detailed in drawing 5002.

4. Refer to specification Section 503 Polyethylene Pipe for Sewer and Non-Potable Water for HDPE gravity sewer service saddles.

5. All sewer service connection on low-pressure sewer mains shall be connected into directional tees.

F. Valves.

1. Valves in high pressure sewers shall be plug type, with hand lever actuator in vault applications, manufactured by DeZurick, or approved equivalent.

2. Combination air and vacuum release valves shall be installed where indicated on Contract Documents, at high points on force mains. Contractor shall avoid creating high point not indicated on contract documents. Combination air release and vacuum valves shall meet the requirements of AWWA C-512 and be approved by the manufacturer for use on pressure sewer systems. The valves shall have a minimum operation pressure of 250 (psi), all stainless steel trim, cast iron single housing type body. Manufactured by APCO, VAL-MATIC, Crespin or approved equal.

3. Valves in low-pressure sewer lines shall be installed where indicated in the relevant drawings, and shall be ball type, per ASTM F1970 for PVC pipe and ASTM D3350 for HDPE pipe.

G. Service Pipe Adapter.

1. Rigid coupling, Romac 501 or Fermco Strong Back with stainless steel backing sized specifically for the pipes to be joined.

## PART 3 EXECUTION

### 3.1 INSTALLATION OF PIPE

A. Per Section 202 Excavation, Trenching and Backfill. Curvature in sewer lines is prohibited.

B. Contractor shall use rigid rubber gasket on exterior of pipe to seal pipe into grout at manholes.

C. Clean sewer lines of all sand, gravel, dirt, and other foreign materials after installation.

D. Service Lines shall be as indicated on contract documents. Minimum 2% slope is required.

E. Warning tape shall be installed above all gravity sewer mains, sewer force mains and sewer service lines. The warning tape shall be installed 12 inches below grade directly above the sewer pipeline. The warning tape should be green in color and have permanently printed in black letters, “Caution: Buried Sewer Line Below”. The warning tape should be 6 inches in width and 5 millimeters in thickness.

F. Locate wire shall be installed on all sewer force mains. Locate wire shall be accessible at each sewer valve vault, cleanout, and manhole receiving force main discharge.

G. Locating wire shall be solid copper, ten (10) gauge type electrical wire with solid green jacket. All locate wire splices shall be connected with epoxy capsule connectors, or other approved mechanical connectors, waterproofed with a sealing compound and wrapped in electric tape. Locate wire must be raised in a test box every 500 feet, at a minimum, and in all locations where sewer force mains end.

H. In accordance with ASTM D 2774, pipe connections shall be protected where an underground PVC branch or service pipe is joined to a branch fitting such as a service saddle, branch saddle or tapping tee on a main pipe, and where pipes enter or exit casings or walls. The area surrounding the connection shall be embedded in properly placed, compacted backfill, preferably in combination with a protective sleeve or other mechanical structural support to protect the PVC pipe against shear and bending loads.

I. Repairs

1. Should an area be damaged and it be determined by the Project Manager that pipe replacement is not required, pipe repairs shall be permitted. Any repairs to damaged pipe sections shall be performed using a clamp (Muller 230 or equivalent) or wrap (Metalclad DuraWrap or equivalent) at no additional cost to Owner. Should the Project Manager find that a section of pipe is damaged to a point that may be detrimental to the pipe’s performance, Contractor shall completely remove damaged pipe sections and replace with undamaged pipe at no additional cost to Owner.

## 3.2 FIELD QUALITY CONTROL

A. Contractor shall provide all labor, equipment and materials required to perform all specified tests. Contractor shall coordinate for all tests to be observed by a representative of the Department of Public Utilities.

B. Air Testing for Installed PVC Sewer Pipe shall be per Uni-Bell Standard UNI-B-6.

1. Contractor shall block off all manhole and line openings.

2. Low pressure air shall be introduced into the plugged line until the internal line pressure is raised to approximately 4.0 pounds per square inch (psi). After a constant pressure of 4.0 (psi) is reached, the air supply shall be throttled to maintain that internal pressure for at least 2 minutes to permit the temperature of the entering air to equalize with the temperature of the pipe wall.

3. After the internal line pressure has stabilized at or above 3.5 (psi), testing shall begin.

4. If the time shown in Table I, for the designated pipe size and length, elapses before the air pressure drops 1.0 (psi) the pipe section undergoing the test has passed. Alternatively, if there has been no leakage after one hour of testing, the tested pipe section has passed.

5. Should a section of pipe fail testing, Contractor shall, at own expense, determine the source(s) of leakage and repair or replace all defective materials and/or workmanship to the satisfaction of the Project Manager. The repaired line shall then be retested until the pipe section has passed all testing requirements.

C. Mandrel Test

1. The mandrel test shall be performed on all PVC and HDPE gravity mains.

2. The mandrel test shall be performed no sooner than 30 days after placement and compaction of backfill, but prior to placement of permanent surface materials.

3. Contractor shall use a rigid mandrel with diameter of at least 95% of the pipe's specified average inside diameter and a length of the mandrel circular portion at least equal to the nominal pipe diameter.

4. The mandrel shall be pulled through the pipe by hand.

5. All pipe exceeding the 5% deflection shall be re-laid or replaced by the Contractor at no additional cost to the Owner.

D. Grade Tolerances

1. Pipe shall be free from noticeable depressions or humps.

2. Invert elevations shall not exceed plus or minus 0.2 inches from elevations shown on Drawings or which can be computed from Drawings.

E. Contractor shall perform a video inspection of all PVC, HDPE, and ductile iron sewer pipe installed from manhole to manhole. The video and a video log documenting the inspection shall be submitted to the Department of Public Utilities for review prior to acceptance of public sewer lines. Video must be performed while introducing water into the pipe being viewed.

END OF SECTION

**TABLE 1**
**MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP**
**FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015**

| 1 | 2 | 3 | 4 | Specification Time for Length (L) Shown (min:sec) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe Diameter (in.) | Minimum Time (min:sec) | Length for Minimum Time (ft.) | Time for Longer Length (sec.) | 100 ft | 150 ft | 200 ft | 250 ft | 300 ft | 350 ft | 400 ft | 450 ft |
| 4 | 3:46 | 597 | .380 L | 3:46 | 3:46 | 3:46 | 3:46 | 3:46 | 3:46 | 3:46 | 3:46 |
| 6 | 5:40 | 398 | .854 L | 5:40 | 5:40 | 5:40 | 5:40 | 5:40 | 5:40 | 5:42 | 6:24 |
| 8 | 7:34 | 298 | 1.520 L | 7:34 | 7:34 | 7:34 | 7:34 | 7:36 | 8:52 | 10:08 | 11:24 |
| 10 | 9:26 | 239 | 2.374 L | 9:26 | 9:26 | 9:26 | 9:53 | 11:52 | 13:51 | 15:49 | 17:48 |
| 12 | 11:20 | 199 | 3.418 L | 11:20 | 11:20 | 11:24 | 14:15 | 17:05 | 19:56 | 22:47 | 25:38 |
| 15 | 14:10 | 159 | 5.342 L | 14:10 | 14:10 | 17:48 | 22:15 | 26:42 | 31:09 | 35:36 | 40:04 |
| 18 | 17:00 | 133 | 7.692 L | 17:00 | 19:13 | 25:38 | 32:03 | 38:27 | 44:52 | 51:16 | 57:41 |
| 21 | 19:50 | 114 | 10.470 L | 19:50 | 26:10 | 34:54 | 43:37 | 52:21 | 61:00 | 69:48 | 78:31 |
| 24 | 22:40 | 99 | 13.674 L | 22:47 | 34:11 | 45:34 | 56:58 | 68:22 | 79:46 | 91:10 | 102:33 |
| 27 | 25:30 | 88 | 17.306 L | 28:51 | 43:16 | 57:41 | 72:07 | 86:32 | 100:57 | 115:22 | 129:48 |
| 30 | 28:20 | 80 | 21.366 L | 35:37 | 53:25 | 71:13 | 89:02 | 106:50 | 124:38 | 142:26 | 160:15 |
| 33 | 31:10 | 72 | 25.852 L | 43:05 | 64:38 | 86:10 | 107:43 | 129:16 | 150:43 | 172:21 | 193:53 |
| 36 | 34:00 | 66 | 30.768 L | 51:17 | 76:55 | 102:34 | 128:12 | 153:50 | 179:29 | 205:07 | 230:46 |
| 42 | 39:48 | 57 | 41.883 L | 69:48 | 104:42 | 139:37 | 174:30 | 209:24 | 244:19 | 279:13 | 314:07 |
| 48 | 45:34 | 50 | 54.705 L | 91:10 | 136:45 | 182:21 | 227:55 | 273:31 | 319:06 | 364:42 | 410:17 |
| 54 | 51:02 | 44 | 69.236 L | 115:24 | 173:05 | 230:47 | 288:29 | 346:11 | 403:53 | 461:34 | 519:16 |
| 60 | 56:40 | 40 | 85.476 L | 142:28 | 213:41 | 284:55 | 356:09 | 427:23 | 498:37 | 569:50 | 641:04 |

Note: If there has been no leakage (zero psig drop) after one hour of testing, the test section shall be accepted and the test complete

**LOS ALAMOS COUNTY DEPARTMENT OF PUBLIC UTILITIES**
**SEWER AIR TEST DATA SHEET**

Identification of Pipe Installation (Job name, location, contract number, etc.)

_____

_____

Field Test Data: (To be filled in by the Inspector)

Date: _____

Specified Maximum Pressure Drop: **1 (psig)**

Identification of Pipe Material Installed _____

| **Pipe Under Test** | | | | **Spec. Time** | **Field Test Operations Data** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Upstream MH Sta # | Downstream MH Sta # | Dia. (in.) | Length (ft.) | Refer to Table (min:sec) | Pressure Initially Raised to (psig) | Time Allowed for Pressure to Stabilize (min) | Start Test Pressure (psig) | Stop Test Pressure (psig) | Elapsed Time (min:sec) | Pass or Fail |
| | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |

**Inspector's Name and Title:** _____

**Signature of Inspector:** _____

If a section fails, the following items should be completed:

Identify section(s) that failed _____

Leak (was) (was not) located. Method used: _____

Description of leakage found: _____

Description of corrective action taken: _____

_____

For test results after repair refer to Test No. _____ Inspector _____

**SECTION 502**
**SEWER STRUCTURES**

PART 1 GENERAL

1.1 WORK INCLUDED

A. Manholes, vaults and wet wells installed for the maintenance of gravity flow sewers, energy dissipaters, lift station wet wells, and lift station valve vaults, supplied and installed complete with frames, covers and doors, as well as other associated components.

1.2 RELATED WORK

A. Section 701 Cast-In-Place Concrete

B. Section 702 Grout

C. Section 501 Sanitary Sewer Systems

D. Section 503 Polyethylene Pipe for Sewer and Non-potable Water

E. Section 504 Sewer Flow Control

F. Section 505 Lift Station Equipment

1.3 REFERENCED STANDARDS

A. The publications listed below form a part of this specification. The publications are referenced in the text by their general designation only.

B. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections

C. ASTM A48-07 – Standard Specification for Gray Iron Castings

D. ASTM C923-07 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

E. ASTM D4101-07 - Standard Specification for Polypropylene Injection and Extrusion Materials

1.4 SUBMITTALS

A. Submit shop drawings and product data for manhole sections, mastic sealants, pipe to manhole/wet well/vault connections, steps and castings per Section 102 Submittal Procedures.

## PART 2 PRODUCTS

### 2.1 MATERIALS

A. Precast Manhole, Wet Well, and Valve Vault Sections

1. Precast manhole sections shall be constructed with concrete having a minimum 4,000 (psi) 28-day compressive strength and have a minimum wall thickness of 4 inches. Precast sections shall meet the requirements of ASTM C478. Pre-fabricated materials other than concrete, may be acceptable, upon written approval, by the Owner, as being equivalent. Contractor shall submit complete information, including costs, on any proposed material substitution for approval by the Engineer.

2. Lift station wet wells and valve vaults shall be constructed with concrete having a minimum 4,000 (psi) 28-day compressive strength. Minimum wall thickness shall be as indicated in drawings. Precast sections shall meet the requirements of ASTM C478.

B. Gaskets

1. Mastic sealing compound per FS SS-S-210. Approved products; Kent Seal No. 2 by Hamilton Kent; CONSEAL CS 102 by Concrete Sealants Inc.; Butyl-Nek by CRETECO; BUTYL-LOK by ALOK Products, Inc., or approved equal.

2. Flexible pipe to manhole/wet well/vault connectors per ASTM C923 with hardness of 40 plus or minus 5 per ASTM D2240 (shore A durometer). Approved products; Kor-N-Seal by NPC; Z-LOK by A-LOK Products, Inc.; PSX or Cast-A Seal by Press-Seal Gasket Corp.; TYLOX by Hamilton Kent; or approved equal.

C. Castings

1. Standard manhole cast iron frame and cover per ASTM A48. Minimum combined weight of frame and cover 325 pounds. Cover shall have vent hole, monolithic lifting rod and “SEWER” cast in cover, with letters 1 inch in height minimum. Approved products by Deeter Foundry, Inc.; Neenah Foundry Company; East Jordan Iron Works, Inc.; or approved equal.

3. Entry feature (door) for wet well or vault shall be as indicated in drawings.

## PART 3 EXECUTION

### 3.1 FABRICATION

A. Manhole/Wet Well/Vault Section

1. Precast barrels, cone sections, base and cover.

2. Minimum inside diameter as indicated in drawings.

3. Manholes 6 feet deep and greater shall be provided with eccentric cones.

4. Manholes less than 6 feet deep shall be provided with flat concrete top slabs, unless specified otherwise elsewhere.

5. Step openings for co-polymer coated steel step placement cast in sidewall.

6. Keylock-type shall have pre-formed gaskets or mastic seal.

7. Manholes clear opening shall be 30 inches minimum unless otherwise shown in drawings. Wet well and vault clear opening shall be as indicated in drawings.

8. Drop, energy dissipating, or any other specialty manholes shall be as indicated on drawings.

B. Manhole/Wet Well/Vault Height Adjustment

1. Contractor shall use precast grade adjustment rings, 12 inches maximum total adjustment height above cone or flat top to top of casting.

C. Placing Precast Manhole/Wet Well/Vault Sections

1. Section joints shall be cleaned before applying mastic or gasket seal, completed structure shall be rigid and watertight.

2. Sections with chipped or cracked joints shall not be accepted.

D. Preformed Gaskets and Flexible Pipe to Manhole/Wet Well/Vault Seals

1. Shall be installed in conformance with manufacturer’s recommendations.

E. Interior Manhole/Wet Well/Vault Finish

1. Contractor shall remove excess mastic flush with precast sections, mortar in joints and penetrations flush with precast sections, and fill in any chipped areas with non-shrink grout.

2. Lift Station Wet Wells, Dissipating Manholes, and Manholes as indicated in drawings: Contractor shall complete surface preparation and apply finish in accordance with manufacturer’s recommendations. Preparation shall include concrete walls and floor and the interior surfaces of any non-aluminum or non-stainless steel entry feature such as manhole rings and covers, entry hatches, exposed pipe and conduit, etc. Testing for full coverage (spark test) is required per manufacturer’s recommendations.

3.

Approved Manufacturers:

a. ZEBRON 386, 100% solids polyurethane, 125 mils dry film thickness (DFT). ZEBRON Low Temperature poxy primer, 4-8 mils DFT. Color shall be Cream.

b. Sauereisen SewerGard No. 210, aggregate-filled epoxy, 1/8 inch thick DFT.

c. Polibrod 705 by Carboline, 125 mils DFT.

F. Manhole Invert

1. Construction shall conform to engineering drawings, with particular attention paid to elevations shown on drawings.

2. Concrete shall be placed in manhole's invert, to form a smooth transition.

3. Contractor shall invert shape to conform to radius of pipe it connects.

4. Contractor shall remove all rough sections or sharp edges which tend to obstruct flow or impede or cause material to snag.

G. Wet Well and Vault Invert/Floor

1. Construction shall conform to engineering drawings, with particular attention paid to elevations shown on drawings.

2. Concrete shall be placed in wet well and vault inverts, to form a smooth surface, and to accommodate sewage or drainage flows in accordance with engineering drawings.

3. Contractor shall remove all rough sections or sharp edges which tend to obstruct flow or impede or cause material to snag.

H. Drop Assemblies

1. Shall be constructed as shown on drawings with C-900 PVC or ductile iron pipe, both with gasketed fittings.

I. Pipe Stubouts for Future Connections

1. Where indicated in drawings stubouts shall be constructed from manholes/wet wells/vaults. They should connect to these structures, allowing a ell formed transition either at the inverts or walls, as shown on drawings.

2. Length and slope of stub-out shall be as shown on drawings.

3. Watertight temporary plug shall be laced in all stub-outs brace plug against blow-off.

J. Manholes over existing sewers

1. Base shall be built on site, around existing pipe, using 4,000 psi Portland cement concrete, per Section 701 - Cast-in-Place Concrete. Form tongue joint to match barrels for water tightness.

2. Wastewater flow shall be maintained in the affected lines at all times. Contractor shall obtain prior approval from Project manager, on the proposed method for maintaining continuous wastewater flow. Refer to section 504 Sewer Flow Control.

3. When breaking into an existing sewer manhole, its invert shall be reshaped, to provide for a smooth transition for the new flows. Care shall be taken to keep debris from entering the existing sewer.

4. Annular space between the new perforations and the new pipe shall be filled with non-shrink grout to ensure watertight conditions.

3.2 FIELD TESTING

A. Contractor shall coordinate the project manager's inspection of manhole/wet well/vault grout, invert, pipe penetrations, walls, steps, and coatings to verify their conformance with drawings and specifications.

B. Infiltration and Hydrostatic Testing

1. Structure shall be thoroughly hosed, from either the inside or the outside, with potable water.

2. No visible signs of water exfiltration (running or dripping) shall occur anywhere in or around the new structure.

3. Hydrostatic Testing shall be performed from an upstream manhole, for gravity flow lines, wet wells and vaults, when directed by the Project Manager, following the steps listed below:

a. Contractor shall plug all inlets and outlets.

b. Structure shall be filled with potable water, to ¾ height, or six inches above the highest joint.

c. Water shall be allowed to stand for a minimum of 24 hours.

4. Maximum leakage allowable shall be less than 0.2 gallons per hour for each foot of depth, in the 24-hour period following the beginning of the test.
5. Any structure that fails to pass the hydrostatic test shall be repaired by the Contractor at no additional cost to Owner.

END OF SECTION

**SECTION 503**
**POLYETHYLENE PIPE FOR NON-POTABLE WATER SYSTEMS**

PART 1 GENERAL

1.1 WORK INCLUDED

A. This specification covers requirements for PE 4710 high-density polyethylene (HDPE) piping for non-potable water and includes gravity sewer systems, pressure sewer systems and pressure treated-effluent water systems. Supplying all labor, materials, equipment, and incidentals is required, as well as installation, flushing, and testing new mains, fittings, and parts as shown on the drawings and specified herein.

1.2 QUALITY ASSURANCE

A. Submit manufacturer's data on the pipe material, fittings, valves and service material in accordance with Section 102 Submittal Procedures.

B. Owner's Project Manager may require manufacturer's certificates showing conformance with this specification for any of the pipe materials, fittings, valves and appurtenances delivered to the job site.

1.3 REFERENCED STANDARDS

A. The publications listed below form a part of this specification. The publications are referenced in the text only by their general designation only.

B. American Water Works Association (AWWA) Standards, latest publications.

C. ASTM D2683 – Socket-Type Polyethylene Fittings for Outside Diameter controlled Polyethylene Pipe and Tubing.

D. ASTM D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

E. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

F. PPI TR-3 – Policies and Procedures for Developing Recommended Hydro Static design Stresses for Thermoplastic Pipe Materials

G. PPI TR-4 – Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fittings Compounds

PART 2 PRODUCTS

## 2.2 POLYETHYLENE PIPE AND FITTINGS

A. Qualification of Manufacturers: The Manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings required by these Specifications. The Manufacturer's production facilities shall be open for inspection by the Project Manager.

B. Materials: Black PE materials used for the manufacture of polyethylene pipe and fittings shall be PE 4710 high density polyethylene, meet ASTM D3350 cell classification 445574C, and shall be listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. Color material, when used, shall be the same except for meeting ASTM D 3350 cell classification 445574E. The Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.

C. Polyethylene Pipe:

1. Gravity sewer polyethylene pipe shall be IPS DR 17 or unless otherwise specified. Sizes 4" and above shall be manufactured to the requirements of ASTM F714 and AWWA C906-99 (IPS). Gravity sewer pipe shall have the interior portion of the joint extrusion removed to provide a smooth interior surface across joints. Gravity sewer pipe shall have a white or beige interior color.

2. Pressure sewer and non-potable water pipe shall be IPS DR-9. sizes 4" and above shall be manufactured to the requirements of ASTM F714 and AWWA C906-99 (IPS).

3. Approved manufacturers:

a. Performance Pipe
Division of Chevron Phillips Chemical Company
5085 W. Park Blvd., Suite 500
Plano, TX 75093

b. Duraline, Inc.
2406 N. I-35
Gainesville, TX 76241

c. WL Plastics
3575 Lone Star Circle, Suite 300
Fort Worth, TX 76177

D. Service Identification Stripes for Polyethylene Pipe:

1. Sewer pipe shall be black with green color stripes co-extruded into the outside surface of the pipe.

2. Non-potable pipe shall be black with purple color stripes co-extruded into

the outside surface of the pipe.

E. Polyethylene Fittings & Custom Fabrications: All fittings and custom fabrications shall be pressure rated for an internal pressure rating equal to the mating pipe.

F. Molded Fittings: Molded fittings shall be manufactured and tested in accordance with ASTM D 3261 and shall be so marked. Molded fittings shall be tested in accordance with AWWA C906.

G. Polyethylene Flange Adapters: Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder. All fasteners shall be torque-rated steel bolts with stainless steel coating. All fasteners shall be torque-rated steel bolts with stainless steel coating.

H. Back-up Rings & Flange Bolts: Flange adapters shall be fitted with ductile iron back-up rings that are pressure rated equal to or greater than the mating pipe. The back-up ring bore shall be chamfered or rounded to provide clearance to the flange adapter radius. Flange bolts and nuts shall be torque-rate Grade 3 or higher of stainless steel construction.

2.2 LOCATE WIRE AND WARNING TAPE

A. Locate wire shall be installed on all pressure sewer mains or force mains, and non-potable water mains and service lines. Locate wire must be electrically continuous along mains and service lines. Locate wire in service cans shall extend to and be fastened to the meter can cover; leaving adequate slack to allow removal of the meter can lid without disturbing the locate wire connectivity. Locate wire shall be raised in a test box at a minimum of every 500 feet and at all locations where pressure sewer mains and non-potable water mains end. Locate wire must be accessible in a test box and at all valve boxes and meter cans.

B. Locating wire shall be solid copper, ten (10) gauge type electrical wire. All locate wire splices shall be connected with epoxy capsule connector or other approved connection type, and wrapped in electric tape.

1. Sewer pressure mains: locate wire shall have a solid green jacket.

2. Non-potable water mains: locates wire shall have a solid purple jacket.

C. Warning tape shall be installed 12” below grade above all sewer mains and non-potable water mains and service lines.

1. Sewer: Warning tape shall be 6” wide, green in color, with lettering reading “CAUTION BURIED SEWER BELOW”.

2. Non-potable water: Warning tape shall be 6” wide, purple in color, with lettering reading “CAUTION BURIED NON-POTABLE WATER BELOW.

PART 3 EXECUTION

3.1 JOINING

A. Heat Fusion Joining: Joints between plain end pipes and fittings shall be made by butt fusion. Joints between the main and saddle branch fittings shall be made using saddle fusion. The butt fusion and saddle fusion procedures used shall be procedures that are recommended by the pipe and fitting Manufacturer. The Contractor shall ensure that persons making heat fusion joints have received training in the ASTM F-2620 and shall have current certification and submit proof to DPU prior to performing the work. Contractor shall demonstrate his procedure to the Department of Public Utilities (DPU) and perform a sample weld, witnessed by the DPU, for testing. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction. Neither external, nor internal beads shall be removed, except for gravity sewer mains.

B. Joining by Other Means: Where indicated in the plans polyethylene pipe and fittings are to be joined together or to other materials by means of flanged connections (flange adapters and back-up rings) or electro-fusion. When joining by other means, the installation instructions of the joining device manufacturer shall be observed.

3.2 INSTALLATION

A. General: When delivered, a receiving inspection shall be performed and any shipping damage shall be reported to the manufacturer within 7 days. Installation shall be in accordance with Manufacturer's recommendations and this specification. All necessary precautions shall be taken to ensure a safe working environment in accordance with all applicable safety codes and standards.

B. Excavation, Trenching and Backfill: Comply and conform with the conditions and requirements indicated and specified under Section 202 Excavation, Trenching and Backfill.

C. Flange Installation: Flange connections shall be installed in accordance with the Manufacturer's recommended procedure. Flanges shall be centered and aligned to the mating component before assembling and tightening bolts. In no case shall flange bolts be used to draw the connection into alignment. Bolt threads shall be lubricated, and flat washers shall be used under the nuts. Bolts shall be evenly tightened according to the tightening pattern and torque step recommendations of the Manufacturer. At least 1 hour after initial assembly, flange connections shall be re-tightened following the tightening pattern and torque step recommendations of the Manufacturer. The final tightening torque shall be as recommended by the Manufacturer.

D. Handling: Pipe, valves, and fittings shall be carefully handled during hauling, unloading, and placing operations, so as to avoid breakage or damage. Strap type slings shall be used for lifting and placing; no chains or hooks will be permitted. Broken or damaged pipe or appurtenances will be rejected by the Project Manager and shall thereupon be removed from the work and replaced. Avoid pushing or pulling around sharp objects. Any scratch deeper than 10 percent of the minimum pipe wall thickness of polyethylene pipe shall be cut out. Any area kinked or

buckled shall be removed. Pipe should be dragged so that it is not touching the concrete or hard surface and must be supported with soft, non-abrasive material such as wood or sandbags, etc. Pipe shall not be stored in the sunlight more than six months.

A. Protection against shear and bending loads. In accordance with ASTM D 2774, connections shall be protected where an underground polyethylene branch or service pipe is joined to a branch fitting such as a service saddle, branch saddle or tapping tee on a main pipe and where HDPE pipe is joined to a different pipe material and where pipes enter or exit casings or walls. The area surrounding the connection shall be embedded in properly placed, compacted backfill, preferably (delete preferably) in combination with a protective sleeve or other mechanical structural support to protect the polyethylene pipe against shear and bending loads or utilizing other mechanical joint restraint fittings; as approved by DPU.

3.3 FUSION QUALITY TESTING

A. Fusion Quality: The Contractor shall ensure the field set-up and operation of the fusion equipment, and the fusion procedure used by the Contractor's fusion operator while on site. Upon request by the Owner, the Contractor shall verify field fusion quality by making and testing a trial fusion. The trial fusion shall be allowed to cool completely; then test straps shall be cut out and bent strap tested in accordance with ASTM D 2657. If the bent strap test of the trial fusion fails at the joint, the field fusions represented by the trial fusion shall be rejected. The Contractor shall make all necessary corrections to equipment, set-up, operation and fusion procedure, and shall re-make the rejected fusions, all at own expense.

3.4 PRESSURE AND LEAK TESTING

A. General Requirements:

1. The Contractor shall provide all necessary materials, labor and equipment, and shall perform all work required in connection with the testing of the system in accordance with manufacturer's recommendations and as specified herein.

2. Hydrostatic pressure tests shall be made only after the trenches have been backfilled sufficiently to hold the pipe firmly in position.

3. Any flaw disclosed by any of the tests shall be repaired and satisfactorily re-tested.

4. Pressure Tests: Each section being tested shall be slowly filled with water with care being taken on hydrostatic tests to expel all air from the pipe by such means as are necessary.

B. Hydrostatic Test Procedure:

1. Test Pressure: Shall be 1.5 times the operating pressure specified by the County.

2. Hydrostatic leak test consists of filling pipe, an initial expansion phase, a test phase and depressurizing.

   a. Fill the restrained test section completely with water and expel all air from the pipe.

   b. Initial Expansion Phase: gradually pressurize the test section to a pressure that is 10% greater than the test pressure and maintain that pressure for three (3) hours. During the initial expansion phase, pipe will expand slightly. Additional water will be required to maintain pressure. It is not necessary to monitor the amount of water added during the initial expansion phase.

   c. Test Phase: Immediately following the initial expansion phase, reduce test pressure by 10% and stop adding water. If test pressure remains within 5% of the test pressure for one (1) hour, no leakage is indicated.

   d. At the conclusion of the test, carefully depressurize the test section by controlled release of the water.

3. Tests for PE pipe at 150% of design pressure shall be in accordance with the pipe manufacturer's recommendations.

END OF SECTION

**LOS ALAMOS COUNTY DEPARTMENT OF PUBLIC UTILITIES**
**HDPE SEWER AND EFFLUENT PIPE HYDROSTATIC TEST REPORT**

**PROJECT NAME:** _____

**CONTRACTOR:** _____

**LOCATION:** _____

## PIPE DESCRIPTION

| | DIMENSION RATIO (DR) | NOMINAL PIPE SIZE (INCHES) | INSIDE DIAMETER (INCHES) | LENGTH (FEET) |
|---|---|---|---|---|
| TEST SEGMENT | | | | |

## TEST PRESSURE

PRESSURE*: _____

- The greater of 150 psig or 1.5 times the operating pressure at the lowest elevation of the test section.

## HYDROSTATIC TEST

**1. EXPANSION PHASE (3 HOURS)**

BEGIN: _____ PRESSURE: _____

END: _____

**2. TEST PHASE (1 HOUR)**

BEGIN: _____ PRESSURE (LESS 10 PSI): _____

END: _____ PRESSURE : _____

| | |
|---|---|
| If test pressure remains within 5% of the TEST PHASE pressure for one (1) hour, no leakage is indicated. | **PASSED:** _____ |
| | **FAILED:** _____ |

**OBSERVER**_____ **DATE:**_____

**SECTION 504**
**SEWER FLOW CONTROL**

PART 1 GENERAL

1.1 WORK INCLUDED

A. Section includes the requirements for by-passing sewer flow as required during work that affects existing wastewater collection system operations.

1.2 SUBMITTALS

A. Submit Drawings and complete design data showing methods and equipment to be utilized in sewer bypassing and dewatering per Section 102 Submittal Procedures. Include the following information:

1. Indicate location of temporary sewer plugs and bypass discharge lines on Drawings.

2. Capacities of pumps, prime movers, and standby equipment.

3. Standby power source.

4. Traffic control plan.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Provide temporary pumping and power generation equipment and controls, conduits, and other equipment to allow uninterrupted wastewater flow during project execution.

1. Equip engines with mufflers and/or enclose to keep noise level less than or equal to the LAC Noise Ordinance.

2. Provide pumps and by-pass lines of adequate capacity and to handle flows.

B. Maintain sufficient equipment and materials on-site to ensure continuous and successful flow by-pass and de-watering operations, as necessary to complete the project, and:

1. Keep standby pumps energized and operational at all times.

2. Maintain on-site sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping, and other parts or system hardware to ensure immediate repair or modifications of any part of system as necessary.

C. All joints and accessories shall be sized and designed to withstand at least twice the maximum system pressure, or 60 psi, whichever is greater.

## PART 3 EXECUTION

### 3.1 PROTECTION

A. Submit a by-pass plan, including the point of discharge, to be approved by the Project Manager at least 48 hours in advance of by-pass/de-watering operations. No bypassing to ground surface, waters of the United States, storm drains, or bypassing which results in ground water contamination or potential health hazards shall be permitted.

B. In the event that sewage accidentally drains into drainage system or street, immediately stop overflow, notify Project Manager, and take any necessary action(s) to cleanup and disinfect the spillage in compliance with applicable laws and regulations, and to the satisfaction of Department of Public Utilities.

1. If sewage is spilled onto public or private property, wash down, clean up and disinfect spillage to satisfaction of Department of Public Utilities.

2. Immediately report overflows to the Department of Public Utilities at (505) 662-8333 or, after hours at (505) 662-8222, and appropriate state, federal and local agencies.

### 3.2 APPLICATION

A. Plugging or Blocking: Insert sewer line plug into line upstream of section being worked. Design plug so that all or any of portion of sewage can be released.

1. After cleaning, inspection, or rehabilitation work has been completed, restore flow to normal.

B. Pumping and Flow By-Passing: When pumping and by-passing is provide pumps, conduits, and other equipment necessary to divert flow of sewage around manhole or system section in which work is to be performed.

1. By-pass system shall have sufficient capacity to handle existing flows plus additional flow that may occur during peak flow periods or from precipitation.

2. Construct bypass systems with materials and fixtures that will prevent any leakage or accidental overflows during pumping operation.

### 3.3 CLEANING

A. Keep premises free from accumulations of waste materials, rubbish, and other debris resulting from work.

B. Remove waste materials, rubbish, and debris from and about premises.

C. Remove tools, construction equipment and machinery, and surplus materials.

D. Restore to original conditions portions of the site not designated for alterations by Contract Documents.

E. When by-pass pumping operations are complete, piping shall be drained into sanitary sewer prior to disassembly.

END OF SECTION

**SECTION 601**
**WATER SYSTEMS**

PART 1 GENERAL

1.1 WORK INCLUDED

A. Supplying all labor, materials, equipment and incidentals required, install, flush, disinfect, and test new water mains, fittings, and apparatus as shown on the Drawings and specified herein.

1.2 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification. The publications are referenced in the text by their general designation only.

B. American Water Works Association (AWWA) Standards, latest publications.

1.3 QUALITY ASSURANCE

A. Water mains and appurtenances shall be subject to hydrostatic tests.

B. Water mains and appurtenances shall be properly disinfected prior to connection to existing system.

C. Submit manufacturer's data on the pipe material, fittings, valves and service material in accordance with Section 102 Submittal Procedures.

D. As-built drawings with details including burial depth, pipe and fitting configuration, materials, and lengths. The original design drawings are not to be submitted in the place of As-built drawings.

E. The Project Manager may require manufacturer's certificates showing conformance with this specification for any of the pipe materials, fittings, valves and appurtenances delivered to the job site.

PART 2 PRODUCTS

2.1 PIPE AND FITTING MATERIALS

A. Water mains 4" to12" in diameter shall be Ductile Iron or PVC pressure pipe.

1. PVC, AWWA C900, DR-18 Class 150 pipe, push on bell end pipe. All gaskets of neoprene or other synthetic rubber per ASTM D412 and D395.

2. Ductile iron pipe, AWWA C151, Class 350 pipe, cement mortar lined per ANSI/AWWA C104 /A21.4-03. All gaskets of neoprene or other synthetic rubber per ASTM D412 and D395. All pipe shall be installed with polyethylene encasement per AWWA C105, minimum 8 mil thickness.

3. Fittings shall be mechanical joint ductile iron per AWWA C110 full body or C153 Short body.

4. In vaults where indicated in drawings ductile iron pipe and fittings shall meet the requirements above, and shall be flanged end pipe per AWWA C115.

B. Water mains 14” and Larger in diameter shall be Ductile Iron pipe.

1. Ductile iron pipe, AWWA C151, Class 250 pipe, cement mortar lined per ANSI/AWWA C104 /A21.4-03. All gaskets of neoprene or other synthetic rubber per ASTM D412 and D395. All pipe shall be installed with polyethylene encasement per AWWA C105, minimum 8 mil thickness.

2. Fittings shall be mechanical joint ductile iron per AWWA C110 full body or C153 Short body.

3. In vaults where indicated in drawings ductile iron pipe and fittings shall meet the requirements above, and shall be flanged end pipe per AWWA C115.

## 2.2 VALVES AND VALVE BOXES

A. Gate valves 4” to 12” shall conform to the requirements of AWWA C509 for resilient-seated valves. Stems shall be, fitted with a 2” x 2” square wrench nut and shall be manufactured to open counter-clockwise. Rated operating pressure of 250 (psi). Stem extensions shall be installed to bring the operating nut to within one (1) foot of finish grade where the depth from finished grade to operating nut exceeds four (4) feet. All exposed bolts and nuts shall be stainless steel and installed by the manufacturer. Gate valves shall be used for all valves and shall be fusion-epoxy lined and coated in conformance with the requirements AWWA Standard C-550. Manufactured by Mueller, AVK or approved equal.

B. Gate valves 14” to 24” shall conform to the requirements of AWWA C515 for resilient-seated valves. Stems shall be fitted with a 2” x 2” square wrench nut and shall be manufactured to open counter-clockwise. Rated operating pressure of 250 (psi). Stem extensions shall be installed to bring the operating nut to within one (1) foot of finish grade where the depth from finished grade to operating nut exceeds four (4) feet. All exposed bolts and nuts shall be stainless steel and installed by the manufacturer. Gate valves shall be used for all valves and shall be fusion-epoxy lined and coated in conformance with the requirements AWWA Standard C-550. Manufactured by Mueller, AVK or approved equal.

C. Valve boxes shall be 5 ¼" to 6” plastic body adjustable slip type with heavy duty cast iron lid and cover with “water” cast thereon. Cast iron lid set in a concrete collar as shown in drawings. Manufactured by ARMOUR Access boxes, Handley Industries, Inc., Bingham & Taylor Corp., or approved equal.

D. In vaults and where indicated in drawings, valves shall meet the requirements of A and B above, and shall be flanged end pipe per AWWA C115 with hand wheel operator.

## 2.3 WATER SERVICES UP TO TWO (2) INCHES

A. Water service piping two (2) inches in diameter or less per AWWA C800-05, shall be Engle Method Cross Linked Polyethylene (PEX) or Type K copper. All copper fittings shall be flare or compression type. All PEX fittings shall be brass insertion fittings and approved for use by the pipe manufacturer. PEX piping by WIRSBO AQUAPEX or approved equal.

B. Water service valves and fittings two (2) inches in diameter or less per AWWA C800-05, shall be brass, of the size and type called for in the drawings, and rated at 150 psi working pressure.

C. Meter boxes for 5/8” through 2” services shall be pre-fabricated as shown in the Drawings. Meter can construction shall be per materials and size detailed in the Drawings. When a new meter box is located in an existing driveway or sidewalk, the meter box shall be

constructed with a concrete collar as detailed in Drawings. Manufactured by Mueller, The Ford Meter Box Company, or approved equal.

D. Curb valves and curb boxes shall be constructed where shown on the Drawings. Manufactured by Mueller, Ford Meter Box Company, A.Y. McDonald or approved equal. Curb boxes shall be 2" plastic body extension type with locking lid and plug, and be manufactured by Mueller, Handley Industries, Inc., Bingham & Taylor Corp., or approved equal.

E. Service saddles two (2) inches in diameter or less shall be a double strap design with shop coated ductile iron body. Manufactured by Mueller, Ford Meter Box Company, A.Y. McDonald, JCM Industries or approved equal.

1. Saddles on C-900 PVC shall have wide stainless steel straps.

2. Saddles on ductile or cast iron pipe shall have two zinc plated, or equivalent, steel straps.

2.4 WATER SERVICES THREE (3) INCHES AND LARGER

A. All piping in meter vault shall be flanged ductile iron in accordance with section 2.1 of this specification.

B. All valves in meter vault shall be flanged in accordance with section 2.2 of this specification.

C. Meter vaults and construction shall be per materials and size detailed in the drawings.

D. All fasteners shall be torque rated steel bolts with stainless steel coating.

2.5 FIRE HYDRANTS

A. Fire Hydrants conforming to AWWA C502; post type dry barrel design fusion epoxy lined and coated; 5 ¼" main valve opening; provided with two 2-1/2" and one 4-1/2" outlets with national standard threads; national standard 1-½" pentagon operating nut; breakaway stem and flange traffic feature; all fire hydrant heads, buries and extension spools shall be bolted with stainless steel bolts and washers. Mueller Centurion A-423; Kennedy K81D; or American B-84-B-5.

B. All fire hydrant legs shall be six (6) inches in diameter ductile iron and shall be fully restrained with mechanical restraints.

C. All exterior metal parts of the hydrant from the ground up shall be factory painted with two coats of paint, or one coat of primer and one coat of paint. Paint shall be yellow in color.

2.6 LOCATE WIRE & WARNING TAPE

A. Locate wire shall be installed on all water mains and service lines. Locate wire must be electrically continuous along mains and service lines. Locate wire in service cans shall extend to, and be fastened to, the meter can cover. Locate wire must be raised in a test box at a minimum of every 500 feet and at all locations where water mains end. Locate wire must be raised and accessible in test boxes, all valve boxes, and at each fire hydrant. Text boxes manufactured by Handley Industries, Inc., Bingham & Taylor Corp., or approved equal.

B. Locating wire shall be solid copper, ten (10) gauge type electrical wire with solid blue jacket for potable water or with solid purple jacket for non-potable water. All locate wire splices

shall be connected with epoxy capsule connector or other approved connection type, and wrapped in electric tape.

C. Warning tape shall be installed 12" below grade above all water mains and water service lines. Warning tape shall be a minimum of 6" wide, locatable, blue in color for potable or purple in color for non-potable, with lettering reading "CAUTION BURIED WATERLINE BELOW".

2.7 JOINT RESTRAINT

A. All joints will be mechanically restrained per schedule in drawings. Mechanical joint retainer glands and bell joint harnesses by EBBA Iron or The Ford Meter Box Company.

B. Concrete blocking will only be used where indicated in the drawings and when approved by the Project Manager.

2.8 AIR RELIEF AND VACUUM VALVES

A. Combination air release and vacuum valves shall meet the requirements of AWWA C-512 and shall have a minimum operation pressure of 250 (psi), all stainless steel trim, cast iron single housing type body. Manufactured by APCO, VAL-MATIC, Crespin or approved equal.

2.9 PRESSURE REDUCING VALVES

A. Pressure reducing valves shall be CLA-VAL 90-01, CLA-VAL 690-01 or approved equal, unless otherwise shown on these contract documents.

B. All fasteners shall be torque rated steel bolts with stainless steel coating.

PART 3 – EXECUTION

3.1 EXCAVATION, TRENCHING AND BACKFILL

A. Shall conform to Section 202 Excavation, Trenching and Backfill of these Specifications.

3.2 PIPE INSTALLATION

A. Installation: Water mains shall have 4 feet minimum of cover to the top of pipe and water service lines shall have 3 feet minimum of cover to top of pipe. Pipe, valves, fittings and appurtenances shall be installed in accordance with the best practice, and in conformance with the applicable requirements of the AWWA Standards.

B. Handling: Pipe, valves, and fittings shall be carefully handled during hauling, unloading, and placing operations, so as to avoid breakage or damage. Straptype slings shall be used for lifting and placing; no chains or hooks will be permitted. Broken or damaged pipe or appurtenances will be rejected by the the Project Manager and shall thereupon be removed from the work and replaced.

C. Alignment: All pipe shall be accurately laid in conformity with the prescribed lines and grades as established by the Project Manager. Each length shall be jointed to the preceding section as specified, and after said jointing has been completed, there shall be no movement of the pipe in subsequent operations.

D. Pipe Deflections: The laying of pipe on curved alignment will be permitted up to one-half the deflection as recommended by the respective pipe manufacturer.

E. Cleaning: Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. When pipe laying is not in progress, all open pipe ends shall be closed with watertight plugs in a satisfactory manner.

F. Bearing: Pipe in the trench shall have continuous uniform bearing along its bottom, except at bell holes. Blocking used to support the pipe during laying shall be placed at the end of the section and shall be removed before laying the next section. Before lowering pipe into the trench, the Contractor shall remove all stakes, debris, loose rock and other hard material from the bottom of the trench.

G. Positioning: After the final positioning, the pipe shall be held in place in the trench with backfill material placed equally on both sides of the pipe at as many locations as are required to hold the pipe section in place. After joints are completed, the backfill material shall be redistributed and compacted as herein required.

H. Closure: At the end of each day and when work is not in progress, the open ends of pipe installed in the line shall be closed with watertight plugs or caps.

I. Thrust Blocking: Where indicated on Drawings as approved by the Project Manager, concrete thrust blocks of the form and dimensions shown or noted on the plans shall be provided. Thrust blocks shall be installed in strict conformance with the details shown or noted on the plans.

## 3.3 GATE VALVE INSTALLATION

A. Installation: Gate valves shall be installed level and vertically plumb so that the operating nut shall be easily accessible through a level and vertically plumb gate valve box. Gate valves shall fully bear, with no holes or loose material, on undisturbed soil or fully compacted to 95% soil material meeting backfill requirements for the associated pipeline material to which the gate valve is attached.

B. Restraint: Gate valves shall be fully restrained using mechanical joint restraint equipment per DPU standards equivalent to that for “Dead Ends or Valves”.

C. Cleaning and Coating: Gate valves shall be thoroughly cleaned of all loose dirt, rust, grease or other contaminants from halfway up the valve body to the top of the operating nut (or handwheel). All exposed and visible parts of all fasteners (nuts & bolts) holding the valve bonnet to the valve body and the stuffing box to the bonnet shall be thoroughly coated to a minimum 1.5 mils dry film thickness using a spray coating of Royston Roybond 747 or approved equivalent spray coating material per the manufacturer’s instructions. The valve stem shall be masked off or otherwise protected from the spray coating. Placement of the valve box and/or backfilling operations may begin 5 minutes after application of the spray coating. NOTE: Cleaning and Coating may occur in the field after installation of the gate valve or may be completed prior to field installation of the gate valve. If cleaning and coating is completed prior to field installation then coating shall be checked for damage after field installation and a touch up coating shall be applied, if necessary, prior to valve box installation of backfilling begins.

## 3.4 CONNECTIONS TO EXISTING SYSTEMS

A. Connections to existing systems shall not be made until the new mains have been satisfactorily disinfected and have passed all tests herein specified.

B. A penetration permit, per Section 101 General Requirements of these specifications, shall be obtained from the DPU's Project Manager, no less than 48 hours in advance of planned connection.

C. Locate wire shall be verified electrically continuous per Section 101 General Requirements of these specifications.

D. All water valves on existing systems shall be operated by DPU staff only.

## 3.5 HYDROSTATIC TEST OF PVC AND DUCTILE IRON PIPE

A. Preparation:

1. The Contractor shall provide all necessary materials and equipment, and shall perform all work required in connection with the testing of the water system, as specified herein.

2. Hydrostatic and leakage tests shall be made only after the trenches have been backfilled sufficiently to hold the pipe firmly in position.

3. The Contractor shall provide all water necessary for filling, flushing, disinfection, and any required tests including all labor and equipment required.

B. Procedure:

1. Hydrostatic test of all new PVC waterlines shall be completed by the contractor in conformance with AWWA C 605-5.

2. Hydrostatic test of all new Ductile Iron waterlines shall be completed by the contractor in conformance with AWWA C 600-5.

C. Test Pressure and Duration:

1. Test pressure shall be the greater of 150 (psi) or 1.5 times the operating pressure specified by the County.

2. Hydrostatic test duration shall be 2 hours minimum.

D. Allowable Leakage:

a. When test results indicate leakage beyond what is allowed in AWWA C605-5 (PVC pipe) Contractor shall conduct a survey of the line and repair any leaks found. Hydrostatic tests shall be repeated until satisfactory compliance with this specification is demonstrated. Contractor is responsible for any costs associated with the repair and re-test of pipelines.

b. When test results indicate leakage beyond that allowed in AWWA C600-5 (Ductile iron pipe), Contractor shall conduct a survey of the line and any leaks found shall be repaired, after which the hydrostatic test shall be repeated until satisfactory compliance with this specification is demonstrated. Contractor is responsible for any costs associated with the repair and re-test of pipelines.

c. Hydrostatic test shall be documented on form provided in this section.

## 3.6 DISINFECTION AND BACTERIOLOGICAL TEST

A. Disinfection:

1. Following the Hydrostatic Test and before being placed in service, all new water lines shall be chlorinated in accordance with the requirements of AWWA Standard C651-05. During disinfection, water shall have a minimum 25 mg/L free chlorine concentration demonstrated by testing method approved by the Project Manager. The chlorinated water shall be retained in the main for 24 hours.

2. After chlorination has been satisfactorily completed, the lines shall be thoroughly flushed until the chlorine content in all parts of the system has been proven by test to have a chlorine concentration less than or equal to 1.0 mg/L.

3. It shall be the responsibility of the Contractor to de-chlorinate and lawfully dispose of the chlorinated water and flushing water, and avoid flooding or damage to adjacent properties or facilities.

B. Bacteriological Test:

1. After flushing the chlorine from the water system and prior to placing line in service, the Contractor shall engage the services of an approved commercial testing laboratory, to gather an approved number of representative water samples, the location and number of which shall be determined by the Project Manager. Bacteriological testing shall be completed in accordance with AWWA Standard C651-05.

2. No section of water systems will be allowed to be connected to the Department of Public Utilities existing water system when any sample of water tests indicates presence of coliform bacteria. Should the laboratory report show that any sample taken was not acceptable, Contractor shall re-chlorinate and test the water again as described herein. This process shall be repeated until satisfactory disinfection has been accomplished.

3. Contractor shall direct the laboratory to send the original report of Bacteriological Examination to the Project Manager.

END OF SECTION

**DEPARTMENT OF PUBLIC UTILITIES**
**PVC AND DUCTILE IRON PIPE HYDROSTATIC TEST REPORT**

**PROJECT NAME:** _____

**CONTRACTOR:** _____

**LOCATION:** _____

**DATE:** _____

**OBSERVER:** _____

## PIPE DESCRIPTION

| | MATERIAL | DIAMETER (INCHES) | LENGTH (FEET) |
|---|---|---|---|
| SEGMENT NO. 1 | | | |
| SEGMENT NO. 2* | | | |
| SEGMENT NO. 3* | | | |

* Only applies when there are segments of different size pipes being tested.

## TEST PRESSURE

PRESSURE: _____

## LEAKAGE

ALLOWABLE LEAKAGE FORMULA**: _____

ALLOWABLE LEAKAGE**: _____

ACTUAL LEAKAGE: _____

** PVC pipe from AWWA C605-05 / Ductile iron pipe from AWWA C600-05.

## TIME (2 HOUR TEST)

BEGIN TEST: _____ PASSED: _____

END TEST: _____ FAILED: _____

| NOTES: |
|---|
| |

**SECTION 701**
**CAST IN PLACE CONCRETE**

GENERAL

1.1 WORK INCLUDED

A. Formwork, shoring, bracing, anchorage, reinforcing, and accessories for cast in place vaults and manholes.

B. Concrete sidewalks, drive pads, curb and gutter, and median pavement.

C. Concrete utility pads, thrust blocks, valve box collars, manhole cover collars, and fence posts.

D. Control, expansion, and contraction joint devices associated with concrete work.

1.2 RELATED WORK IN OTHER SECTIONS

A. Section 401 Underground Ductbank Systems

B. Section 502 Sewer Manholes

C. Section 601 Water Systems

D. Section 702 Grout

1.3 DEFINITIONS

A. Reinforced concrete is structural concrete reinforced with no less than the minimum amounts of steel reinforcement specified in ACI 318.

B. Plain concrete is structural concrete with no reinforcement or with less reinforcement than the minimum amount specified for reinforced concrete.

1.4 REFERENCES

A. Publications noted in these specifications shall form a part of these specifications to the extent referenced. The publications are referred to in the text by the basic designation only.

B. New Mexico Department of Transportation (NMDOT) Standard Specifications for Highway and Bridge Construction including any Supplemental or Interim Specifications.

C. All concrete work, products, and materials conform to ACI 301 and other specific referenced publications and standards except where otherwise specified herein.

D. Where reference is made to publications and standards, the revision in effect at the time of bid opening shall apply.

1.5 SUBMITTALS

A. The contractor shall submit the following to the Project Manager, in accordance with Section 102 Submittal Procedures:

- Design mix of concrete: A request for approval of the concrete mix design shall be submitted to the Project Manager thirty (30) days minimum prior to concrete placement. Submit a mix design for each strength and type of concrete for approval. Each request shall be made in writing with a cover letter exhibiting the company name of the testing laboratory, company address and telephone number, and the signature and stamp of the New Mexico Professional Engineer responsible for work.
- Laboratory test reports for each design mix.
- Batch Tickets.
- Shop Drawings: Indicate bar sizes, spacing, locations and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, supporting and spacing devices, spacing and location of dowels, and spacing and location of water stops.
- Product Data: Provide data on joint devices (sealer and filler), attachment accessories, admixtures, rebar doweling anchorage, epoxy bonding compound, and water stops.
- Test reports of concrete field testing per Section 3.10, Field Quality Control.

1.6 QUALITY ASSURANCE

A. Contractor shall perform Work in accordance with ACI 301, 318, and 347, CRSI 63 and Manual of Practice, ANSI/ASTM A184.

B. The work shall be subject to inspection at all times by the Owner for the purpose of determining that the work is properly executed in accordance with this specification. Failure to detect defective workmanship or material during any interim inspection shall not constitute acceptance of workmanship and materials.

C. Work shall conform to ACI 305R when concreting during hot weather, as well as ACI 306R when concreting during cold weather.

D. Independent Testing Agency Qualifications shall be approved by the Department of Public Utilities, qualified according to ACI 301, ASTM C 1077 and ASTM E 329 for testing indicated.

1.7 DELIVERY, STORAGE AND HANDLING

A. Contractor shall not deliver concrete until vapor barrier, forms, reinforcement and embedded items are in place and ready for concrete placement. Job site storage of materials shall be in accordance with ACI 301, and contractor shall protect materials from contaminants such as grease, oil, and dirt.

B. Reinforcement: Contractor shall store reinforcement of different sizes and shapes in separate piles on racks raised above the ground in order to avoid excessive rusting. Reinforcement material shall be protected from contaminants such as grease, oil, and dirt. Contractor shall ensure bar sizes can be accurately identified after bundles are broken and tags removed.

PRODUCTS AND MATERIALS

1.1 FORM MATERIALS AND ACCESSORIES

A. Smooth-Formed Finished Concrete shall be constructed using form-facing panels that provide continuous, true, and smooth concrete surfaces. Forms shall be furnished in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

a. Metal form surfaces shall not contain irregularities, dents, or sags.

2. Prefabricated forms.

a. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Form Ties: Contractor shall use snap off type, galvanized metal cone type with waterproofing washer free of defects that could leave holes or gaps larger than 1 inch in concrete surface.

C. Form Release Agent: Colorless mineral oil, which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

D. Corners: Chamfered, wood strip type; ¾ x ¾ in. size where indicated in drawings.

E. Nails, Spikes, Lag Bolts, Through Bolts, and Anchorages: Sized as required and of sufficient strength and character to maintain formwork in place while placing concrete.

1.2 REINFORCING AND ACCESSORIES

A. Reinforcing Steel: ASTM A 615, grade 60 deformed bars and stirrups; ties grade 40.

B. Welded Steel Wire Fabric: ASTM A 185 Plain type in flat sheets.

C. Concrete reinforcing shall be fabricated in accordance with CRSI Manual of Practice.

D. Welding of reinforcing bars is not permitted.

E. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions, including load bearing pad on bottom to prevent vapor barrier puncture. Special chairs, bolsters, bar supports, and spacers adjacent to weather exposed concrete surfaces shall be plastic coated steel type of required size and shape.

F. Tie Wire shall be minimum 16 gage annealed type.

1.3 CONCRETE MATERIALS

A. Cement: ASTM C 150, Type I or Type II.

B. Fine and Coarse Aggregates: Shall conform to ASTM C 33.

C. Water: Clean, potable water that is not detrimental to concrete.

D. Fly Ash: Shall conform to ASTM C 618, type F. Fly ash.

1.4 ADMIXTURES

A. Air Entrainment: Shall conform to ASTM C260.

B. Chemical: Shall conform to ASTM C494.

1.5 ACCESSORIES

A. Bonding Agent: Polymer resin emulsion.

B. Vapor Barrier: 6 mil clear polyethylene film of type recommended for below grade application.

C. Joint Filler: ASTM D 1751; asphalt impregnated fiberboard or felt, 1/4 in. thick.

1.6 CONCRETE MIX

A. STANDARD MIX DESIGN

1. The standard mix design for the Department of Public Utilities shall contain from 20% to 30% by dry weight of total cementitious material Type F fly ash conforming to ASTM C 618 for mitigating the deleterious effects of alkali-silica reaction in concrete that is common with the silicious nature of aggregates found in northern New Mexico.

B. The compressive strength required for the various applications is indicated on the standard detail for the work. Contractor shall provide concrete that meets the following criteria:

1. 4,000 psi exterior concrete exposed to freezing and thawing.

a. Compressive strength, $f'_c$: 4,000 psi @ 28 days.

b. Maximum nominal aggregate size: 0.75 inch.

c. Maximum water / cement ratio: 0.44.

d. Slump: 3 inches plus or minus 1 inch tolerance.

e. Air content: 4 to 6 percent.

2. 3,000 psi exterior concrete exposed to freezing and thawing.

a. Compressive strength, $f'_c$: 3,000 psi @ 28 days.

b. Maximum nominal aggregate size: 0.75 inch.

c. Maximum water / cement ratio: 0.44.

d. Slump: 3 inches plus or minus 1 inch tolerance.

e. Air content: 4 to 6 percent.

C. Contractor shall use accelerating admixtures in cold weather only when approved by the Project Manager. Use of admixtures will not relax cold weather placement requirements.

D. Contractor shall use set retarding admixtures during hot weather only when approved by the Project Manager.

## EXECUTION

### 3.1 GENERAL

E. All concrete construction shall conform to applicable provision of ACI 301 unless otherwise specified herein.

### 3.2 EXAMINATION

A. Contractor shall verify the following:

a. Lines, levels, block-outs, and centers before proceeding with formwork. Contractor shall ensure that dimensions agree with the Drawings.

b. Anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

c. Erected formwork, shoring, and bracing is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

d. Concrete cover for reinforcement conforms to the drawings and to Section 3.4.B herein.

### 3.3 FORMWORK ERECTION

A. Formwork, shoring and bracing shall be erected to achieve design requirements and maintain tolerances in accordance with requirements of ACI 301 and ACI 347.

B. Bracing shall be installed to ensure stability of formwork. Contractor shall shore or strengthen formwork subject to overstressing by construction loads.

C. Form joints shall be properly aligned, made watertight and kept to a minimum.

D. Installation shall provide formed openings where required for items to be embedded in or passing through concrete work.

E. Contractor shall locate and set in place items that cast directly into concrete.

F. All accessories shall be installed in accordance with manufacturer’s instructions, straight, level, and plumb. Items shall not be disturbed during concrete placement.

G. Where required, water stops shall be continuous without displacing reinforcement.

H. Forms or bracing shall not be removed until concrete has gained sufficient strength to carry its own weight and other imposed loads without excessive deflection or creep. Shoring under elevated slabs shall remain in place for at least 7 days after concrete is placed.

I. Forms shall be carefully loosened without the use of pry bars, hammers, or tools against finish concrete surfaces that are scheduled to be exposed.

3.4 REINFORCING PLACEMENT

A. Contractor shall place, support, and secure reinforcement against displacement and shall not deviate from required position

B. Minimum concrete cover around reinforcing shall be as follows:

| Item | Minimum Cover, inches |
|---|---|
| **Formed Concrete Surfaces Exposed to Earth, Water, and/or Weather**: | |
| No. 5 bars and smaller, W31 or D31 wire and smaller | 2 |
| No. 6 through No. 18 bars, W45 or D45 wire | 2 |
| **Footings and Base Slabs**: | |
| At formed surfaces | 2 |
| At unformed surfaces and bottoms in contact with earth | 3 |
| Top of footings | 2 |

C. PREPARATION

1. Previously placed concrete shall be prepared by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

3.6 PLACING CONCRETE

A. Concrete shall be placed in accordance with ACI 301.

B. Contractor shall notify the Project Manager a minimum of 24 hours prior to commencement of concreting operations.

C. Reinforcement, inserts, embedded parts, formed joint fillers, joint devices, water stops, and formwork shall not be disturbed during concrete placement.

D. Joint fillers, primer, and sealant shall be installed in accordance with manufacturer’s instructions.

E. Joint filler shall extend from bottom of slab to within 0.25 inch of finished slab surface.

F. Joint devices shall be installed in accordance with manufacturer’s instructions.

G. Concrete shall be placed continuously between predetermined expansion, control, and construction joints.

H. Screed floors on grade level, maintaining surface flatness with maximum level variations of 0.25 inch in 10 feet.

I. …

3.7 CONCRETE FINISHING

A. Formed concrete surfaces shall be left exposed with smooth rubbed finish.

B. Broom finish shall be performed on exterior sidewalks, vault tops, valve collars or other areas subject to pedestrian or vehicular traffic.

C. Concrete floor surfaces shall be finished in accordance with ACI 301.

D. New concrete finish shall match existing concrete unless otherwise approved by the Project Manager.

E. Contractor shall avoid excessive float. Floating shall not be performed until concrete has stopped bleeding and the water sheen has left the surface. No water or cement shall be applied to the concrete surface while finishing.

1.7 CURING AND PROTECTION

A. General.

1. Immediately after placement, concrete shall be protected from premature drying and excessively hot or cold temperatures.

2. Contractor shall comply with applicable practices and recommendations for hot weather concrete application from ACI 305R; for cold weather concrete applications from ACI 306R; for curing from ACI 308.

1.8 CONTROL/CONTRACTION JOINTS

A. Where shown on drawings, joints shall be provided while concrete is still plastic.

1.9 FIELD QUALITY CONTROL

A. A certified testing agency shall be retained by the Contractor to perform all required field-testing in accordance with ACI 301. Testing laboratory certification may be provided by Cement and Concrete Reference Lab (CCRL). All testing costs shall be incidental to the cost of the project.

1. Testing agencies performing testing services on concrete materials shall meet the requirements of ASTM C 1077.

2. Field-testing of concrete shall be performed by an ACI Certified Concrete Field Testing Technician – Grade I.

B. Contractor shall submit proposed mix design of each class of concrete to the Project Manager for approval prior to commencement of work.

C. Contractor shall inform the Project Manager 48 hours in advance of field-testing to allow for witnessing of testing.

D. The Testing Agency shall collect strength cylinders from one batch in every 20 cubic yards of concrete placed, or once a day when less than 20 cubic yards is placed, and perform the tests specified herin. Samples for Acceptance Testing are to be taken at the discharge from the transit mixer, except when using concrete pumps or conveyors to transport concrete to its final placement location. When pumps or

conveyors are used, the samples for acceptance tests shall be taken at the end of the pipe or last conveyor belt.

1. Concrete shall be sampled in accordance with ASTM C-172.
2. Temperature of concrete shall be recorded in accordance with ASTM C 1064.
3. Slump test shall be performed in accordance with ASTM C 143.
4. Air content test shall be performed in accordance with ASTM C 231, pressure method.
5. Six (6) concrete strength test cylinders shall be taken in accordance with ASTM C 31.

E. The Testing Agency shall test the strength test cylinders in accordance with ASTM C 39 at 7 days and 28 days.

1.10 CONCRETE ACCEPTANCE CRITERIA

A. Fresh Concrete

1. Temperature - Less than 90 degrees F.
2. Slump - per Section 2.6.
3. Air content - per Section 2.6.
4. Drum revolution counter - 100 to 300 revolutions within 1-1/2 hours after initial mixing.

B. Strength

1. Concrete strength is satisfactory if the average of all sets of 3 consecutive strength test results equal or exceed the specified 28 day strength $f'_c$ and no individual strength test result falls below the specified 28 day strength $f'_c$ by more than 500 psi.

C. Appearance

1. Free from honeycombs and embedded debris.

D. Construction requirements

1. Conforming to required lines, details, dimensions and tolerances specified for construction.

1.11 DEFECTIVE CONCRETE

A. Defective concrete is concrete not conforming to acceptance criteria in Section 3.10.

B. Contractor shall replace defective concrete not meeting strength criteria at Contractor's expense. The concrete's in-place strength may be evaluated by testing 3 core samples for each strength test, wherever LAC-cured cylinders were more than 500 psi below $f'_c$, all in accordance with ACI 301 and ASTM C42. Core

holes shall be filled in accordance with ACI 301. Testing shall be completed at no additional cost to the Owner.

C. Defective concrete not meeting appearance criteria shall be replaced or, where approved by the Project Manager, repaired at Contractor's expense.

D. Concrete not in conformance with details, tolerances, and other construction requirements shall also be replaced at Contractor's expense.

END OF SECTION

**SECTION 702**
**GROUT**

PART 1 GENERAL

1.1 WORK INCLUDED

A. Furnish all labor, materials, equipment, and incidentals required, and install grout complete as shown on the Drawings and as specified herein.

1.2 RELATED WORK IN OTHER SECTIONS

A. Section 401 Underground Ductbank Systems

B. Section 502 Sewer Manholes

C. Section 601 Water Systems

D. Section 701 Reinforced Concrete

1.3 SUBMITTALS

A. Contractor shall submit, in accordance with Section 102 Submittals Procedures, shop drawings and product data showing materials of construction and details of installation for:

1 Commercially manufactured non-shrink cementitious grout: The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, and conformity to required ASTM standards and Material Safety Data Sheet.

2 Commercially manufactured non-shrink epoxy grout: The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, and conformity to required ASTM standards and Material Safety Data Sheet.

3 Cement grout: The submittal shall include the type and brand of the cement, the gradation of the fine aggregate, and product data on any proposed admixtures and the proposed mix of the grout.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

2. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings and Polymer Concretes

3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures

4. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non shrink)

B. U.S. Army Corps of Engineers Standard (CRD)

1. CRD C-621 - Corps of Engineers Specification for Non-shrink Grout

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

## 1.5 QUALITY ASSURANCE

A. Qualifications

1. Grout manufacturer shall have a minimum of 10 years experience in the production and use of the type of grout proposed for the work.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery of materials to the jobsite shall be made in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers, and printed instructions.

B. Materials shall be stored in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

C. Material that becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Department of Public Utilities.

D. Non-shrink cement-based grouts shall be delivered as pre-blended, pre-packaged mixes that require only the addition of water to be applied.

E. Non-shrink epoxy grouts shall be delivered as pre-measured, pre-packaged, three component systems that require only blending as directed by the manufacturer before application.

## 1.7 DEFINITIONS

A. Non-shrink Grout: A commercially manufactured product that does not shrink in either the plastic or hardened state, is dimensionally stable in the hardened state and bonds to clean prepared surfaces.

PART 2 PRODUCTS

2.1 GENERAL

A. Like materials shall be the products of one manufacturer or supplier in order to provide standardization of appearance.

2.2 MATERIALS

A. Non-Shrink Cementitious Grout

1. Non-shrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be portland cement based, contain a pre-proportioned blend of selected aggregates and shrinkage compensating agents, and shall require only the addition of water. Non-shrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827. General purpose non-shrink cementitious grout shall be: SikaGrout 212 by Sika Corp.; Euco NS Grout by The Euclid Chemical Co.; FX-228 by Fox Industries; UNIGROUT by Universal Building Products; Five Star Grout by Five Star Products; or equal.

B. Non-Shrink Epoxy Grout

1. Non-shrink epoxy-based grout shall be a pre-proportioned, three-component, 100 percent solids system consisting of epoxy resin, hardener, and blended aggregate. It shall have a compressive strength of 13,600 psi in 7 days when tested in conformity with ASTM C579 and have a maximum thermal expansion of 18 x $10^{-6}$ when tested in conformity with ASTM C531. The grout shall be Five Star HP Epoxy Grout by U.S. Grout Corp.; Sikadur 42 Grout-Pak by Sika Corp.; High Strength Epoxy Grout by the Euclid Chemical Co.; or equal.

C. Cement Grout

1. Cement grouts shall be a mixture of one-part portland cement (conforming to ASTM C 150, Types I, II, or III) and one- to two-parts sand (conforming to ASTM C33) with sufficient water to place the grout. The water content shall be sufficient to impart workability to the grout but not to the degree that it will allow the grout to flow.

D. Water

1. Only potable water shall be used in the preparation of grouts for application.

PART 3 EXECUTION

3.1 PREPARATION

A. Grout shall be placed over cured concrete that has attained its full design

strength unless otherwise approved by the Department of Public Utilities engineer.

B. Concrete surfaces to receive grout shall be clean and sound; free of ice, frost, dirt, grease, oil, curing compounds, laitance, and paints; free of all loose material or foreign matter, all of which may affect the bond or performance of the grout.

C. Concrete surfaces shall be roughened by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Loose or broken concrete shall be removed. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of laitance, and firmly embedded into the parent concrete.

D. Air compressors used to clean surfaces in contact with grout shall be the oil-less type or equipped with an oil trap in the airline to prevent oil from being blown onto the surface.

E. Concrete surfaces shall be washed clean and then kept moist for at least 24 hours prior to the placement of cementitious or cement grout. Saturation may be achieved by covering the concrete with saturated burlap bags, use of a soaker hose, flooding the surface, or other method acceptable to the Project Manager. Upon completion of the 24-hour period, visible water shall be removed from the surface prior to grouting. The use of an adhesive bonding agent in lieu of surface saturation shall only be used when approved by the Project Manager for each specific location of grout installation.

F. Epoxy-based grouts do not require the saturation of the concrete substrate. Surfaces in contact with epoxy grout shall be completely dry before grouting.

G. Grout forms or other leak proof containment shall be constructed as required. Forms shall be lined or coated with release agents recommended by the grout manufacturer.

H. Grout forms shall be of adequate strength, securely anchored in place, and shored to resist the forces imposed by the grout and its placement.

I. Equipment shall be supported during alignment and installation of grout by shims, wedges, blocks, or other approved means. The shims, wedges, and blocking devices shall be prevented from bonding to the grout by appropriate bond breaking coatings and removed after grouting unless otherwise approved by the Project Manager.

## 3.2 INSTALLATION - GENERAL

A. Mix, apply, and cure products in strict compliance with the manufacturer's recommendations and this section.

B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperature of the grout during and after grouting as recommended by the grout manufacturer.

D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees Fahrenheit range.

E. Install grout in a manner that will preserve the isolation between the elements on either side of the joint where grout is placed in the vicinity of an expansion or control joint.

3.3 INSTALLATION - CEMENT GROUTS AND NON-SHRINK CEMENTITIOUS GROUTS

A. Mix in accordance with manufacturer's recommendations.

B. Avoid mixing by hand. Mixing in a mortar mixer (with moving blades) is recommended. Before mixing, wet the mixer and empty excess water. Add pre-measured amount of water for mixing, followed by the grout. Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain workability. Do not exceed the manufacturer's maximum recommended water content.

C. Placements greater than 3” in depth shall include the addition of clean washed pea gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.

D. Place grout into the designated areas in a manner that will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement should proceed in a manner that will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces.

E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to the mix after initial stiffening.

F. Begin curing immediately after form removal, cutback, and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding, or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

3.4 INSTALLATION - NONSHRINK EPOXY GROUTS

A. Mix in accordance with the procedures recommended by the manufacturer. Do not vary the ratio of components or add solvent to change the consistency of the grout

mix. Do not overmix. Mix full batches only to maintain proper proportions of resin, hardener, and aggregate.

B. Monitor ambient weather conditions and contact the grout manufacturer for special placement procedures to be used for temperatures below 60 or above 90 degrees F.

C. Place grout into the designated areas in a manner that will avoid trapping air. Placement methods shall ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces.

D. Finish grout by puddling to cover all aggregate and provide a smooth finish. Break bubbles and smooth the top surface of the grout in conformity with the manufacturer's recommendations.

E. Epoxy grouts are self-curing and do not require the application of water. Maintain the formed grout within its recommended placement temperature range for at least 24 hours after placing, or longer if recommended by the manufacturer.

3.5 SCHEDULE

A. The following list indicates where the particular types of grout are to be used:

1. General purpose non-shrink cementitious grout: Use at all locations where non-shrink grout is called for on the Drawings.

2. Non-shrink epoxy grout: Use for the setting of anchor rods, anchor bolts and reinforcing steel in concrete and for all locations specifically indicated to receive epoxy grout.

3. Cement grout: Only use where cement grout is called for on the Drawings. It shall not be used when non-shrink grout is specifically called for on the Drawings.

END OF SECTION