



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 01 14 00

WORK RESTRICTIONS

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. This specification is to notify the contractor of construction traffic control and construction sequencing/time constraints that may affect the scheduling and performance of the work by the Contractor.
 - 1. This specification shall not dictate the means, methods, techniques and procedures of the construction by the Contractor.
- B. The construction traffic control and construction sequencing/time constraints indicated herein are not intended to prevent the contractor from completing work concurrently and shall not be construed as a reason of failure for the Contractor to perform the work within the contract times and the time constraints listed herein

1.2 SEQUENCING AND SCHEDULING

- A. Construction Areas:
 - 1. The project is divided into areas for the purpose of grouping construction with the same construction traffic control and sequencing constraints together. Refer to Attachment 1 for a map of the identified construction areas.

B. Restriction 1

- 1. Area 1:
 - a. Requirement a.
 - b. Requirement b.
- 2. Area 2:
 - a. Requirement a.
 - b. Requirement b.

C. Restriction 2

- 1. Area 1:
 - a. Requirement a.
 - b. Requirement b.
- 2. Area 2:
 - a. Requirement a.
 - b. Requirement b.

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION [NOT USED]

END OF SECTION 01 14 00



**SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 21 00
ALLOWANCES**

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Administrative and procedural requirements governing the handling and processing of allowances.

1.2 RELATED SECTIONS

- A. General and Supplemental General Conditions of the Contract and Division 1.

1.3 ALLOWANCES

- A. Allowance- An amount designated by the OWNER for purchase of services, equipment, or goods by the CONTRACTOR for the project. Reimbursement will be based on the suppliers, manufacturers, or service providers invoices.
- B. See the Bid Schedule for costs allotted for each allowance.
- C. All allowances shall be coordinated with the OWNER and ENGINEER prior to any expenditure of allowance funds.

1.4 CONTRACTOR COSTS INCLUDED IN ALLOWANCE

- A. Cost of product or service to Contractor or Subcontractor
- B. The Contractor shall make no claim, nor receive any compensation, for anticipated profits, loss of profit, damages, or any extra payment due to any unexpended portion of the allowances.
- C. The Contractor is to include time for allowance work in the construction schedule. No adjustment of Contract Time shall be allowed for any work performed under allowance items.
- D. Allowance items shall be included in the Schedule of Values.
- E. Unless otherwise indicated in the specific measurement and payment provisions under allowance items, the measurable and allowable costs for work performed under an Allowance item shall be limited to the actual, demonstrable, and direct costs associated with that Allowance item. Shipping and sales taxes are allowable costs.
- F. Differences in cost will be adjusted by Change Order.

1.5 CONTRACTOR COSTS INCLUDED IN CONTRACT PRICE BUT NOT INCLUDED IN ALLOWANCES

- A. See General Terms and Conditions of the Contract.
- B. Costs of incidental labor and facilities required to assist a testing firm.



- C. Costs of testing laboratory services used by CONTRACTOR separate from Contract Document requirements.
- D. Costs of retesting upon failure of previous tests.
- E. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- F. Protection of products from elements and from damage.

PART 2– PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION 01 21 00



**SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 22 00
UNIT PRICES**

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. This section includes specifications for measurement and payment as they apply to the work, and includes provisions applicable to Lump Sum Prices, Unit Prices, and allowances, as included.
- B. The following explanation of the Measurement and Payment for the Bid Schedule items is made for information and guidance. The omission of reference to any item in this description shall not, however, alter the intent of the Bid Schedule or relieve the CONTRACTOR of the necessity of furnishing such as a part of the Contract.
- C. The ENGINEER will be the final judge of all measurements and compute quantities accordingly.
- D. The CONTRACTOR shall assist the ENGINEER by providing necessary equipment, workers and survey personnel as necessary.

1.2 REFERENCED SECTIONS

- A. Allowances
- B. General Conditions
- C. Standard Specifications

1.3 ABBREVIATIONS AND ACRONYMS

- A. Typical units of measurements
 - 1. SF – Square Feet
 - 2. CY – Cubic Yard(s)
 - 3. SY – Square Yard(s)
 - 4. LF – Linear Feet
 - 5. EA – Each
 - 6. LS – Lump Sum
 - 7. TON – U.S. Ton or 2,000 LBS
 - 8. LBS – Pounds
 - 9. LOT – An Asphalt Measurement Equal to 500 SY
 - 10. SUBLLOT – Each Lift Placed Within a Lot



11. ACRE - Acre

1.4 DEFINITIONS

A. Measurement

1. The quantities set forth in the Bid Schedule are approximate and are given to establish a uniform basis for the comparison of bids. The OWNER reserves the right to increase or decrease the quantity of any class or portion of the work during the progress of construction in accordance with the terms of the Contract.
2. The ENGINEER shall be the final judge as to the amount or extent of the work completed. The Engineer's determination of the quantity of work installed will be used as the basis of payment.

B. Payment

1. Payment for the items listed on the Bid Schedule on the basis of the work actually performed and completed, such work including but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, clean up, restoration of disturbed areas, and all other appurtenances to complete the construction and installation of the work as shown on the drawings and described in the specifications.
2. Unit prices are used as a means of computing the final figures for bid and Contract purposes, for periodic payments for work performed and for determining value of additions or deletions.

C. Schedule of Values

1. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Prepare preliminary schedule in accordance with the Supplemental Terms and Conditions. Submit preliminary schedule of values within 10 calendar days after the Effective Date of the Agreement. Submit final schedule of values in accordance with the Supplemental Terms and Conditions.
2. Format: Utilize a format similar to the Table of Contents of the Project Specifications. Identify each line item with number and title of the major specification items. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of CONTRACTOR's overhead profit.
3. Revisions: With each Application for Payment, revise schedule to list approved Change Orders.



PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.1 MEASUREMENT AND PAYMENT

- A. Payment shall be based on work actually performed completing each item in the Bid, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the drawings and described in the specifications. Payment for each item includes compensation for cleanup and restorations.
- B. A general work description is provided for each item. The work description may not include all components required to complete the work required by the contract documents.
- C. Bid Items No.
 - 1. 01 78 39 Project As-Built Documents
 - a. Description: per STS 01 78 39
 - b. Measurement: N/A
 - c. Payment: incidental to the completion of the project
 - 2. 02 82 13.33# Removal and Disposal of Asbestos Cement Pipeline
 - a. Description: per STS 02 82 13.33
 - b. Measurement: Removal and Disposal of Asbestos Cement Pipeline will be measured per linear foot.
 - c. Payment: Payment for Removal and Disposal of Asbestos Cement Pipeline will be made at the Contract Unit Price per linear foot for small diameter pipeline (less than or equal to 12-inch diameter) or large diameter pipeline (greater than 12-inch diameter). Payment includes removal (trenching and backfill, any depth), storage, transport, and disposal.
 - 3. 03 64 23 Grout Annular Space
 - a. Description: Furnish and inject grout into annular space between a host pipeline and a rehabilitation pipeline or liner.
 - b. Measurement: N/A.
 - c. Payment: incidental to the pipeline rehabilitation/installation.
 - 4. 03 64 23.1 Grout Abandoned Gravity Sanitary Sewer Pipeline
 - a. Description: Furnish and inject grout into abandoned pipeline.
 - b. Measurement: Grout abandoned pipeline will be measured per cubic yard to a maximum of 2 decimal place.



- c. Payment: Payment for grout abandoned pipeline will be made at the Contract Unit Price per cubic yard. Payment includes the installation of all required bulkheads, injection ports, and vent ports as determined by the CONTRACTOR and MANUFACTURER.
5. 03 64 23.2 Grout Void in Rehabilitated Gravity Sanitary Sewer Pipeline
 - a. Description: Furnish and inject grout into identified voids in rehabilitated gravity sanitary sewer pipelines due to degraded host pipe.
 - b. Measurement: Grout voids will be measured per cubic yard to a maximum of 2 decimal place.
 - c. Payment: Payment for grout voids will be made at the Contract Unit Price per cubic yard. Payment includes the installation of all required bulkheads, injection ports, and vent ports as determined by the CONTRACTOR and MANUFACTURER.
6. 33 01 30.021# Temporary Odor Control Mobilization and Setup
 - a. Description: per STS 33 01 30.02
 - b. Measurement: Temporary Odor Control Mobilization and Setup will be measured as a lump sum.
 - c. Payment: Payment for Temporary Odor Control Mobilization and Setup will be made at the Contract Unit Price per lump sum for the specific odor control trailer size (1,000 CFM or 5,000 CFM) utilized from the OWNER.
7. 33 01 30.022# Temporary Odor Control Operation and Maintenance
 - a. Description: per STS 33 01 30.02
 - b. Measurement: Temporary Odor Control Operation and Maintenance will be measured by the hour of operation.
 - c. Payment: Payment for Temporary Odor Control Operation and Maintenance will be made at the Contract Unit Price per hour of operation for the specific odor control trailer utilized from the OWNER. Payment includes all maintenance and security of the OWNER's odor control trailer.
8. 33 01 30.11# Pre-Rehabilitation CCTV Inspection of Sanitary Sewer Pipeline
 - a. Description: per STS 33 01 30.11.
 - b. Measurement: Pre-rehabilitation CCTV inspection will be measured by the linear foot from center of manhole to center of manhole.
 - c. Payment: Payment for pre-rehabilitation CCTV inspection will be made at the contract unit price per linear foot for each diameter size of pipeline.
9. 33 01 30.11 Post-Rehabilitation CCTV Inspection of Sanitary Sewer Pipeline
 - a. Description: per STS 33 01 30.11.
 - b. Measurement: N/A



- c. Payment: incidental to the pipeline rehabilitation/installation.
10. 33 01 30.23# Rehabilitate Pipeline by Pipe Bursting
- a. Description: per STS 33 01 30.23
 - b. Measurement: Pipe Bursting will be measured by the linear foot from center of manhole to center of manhole.
 - c. Payment: Payment for pipe bursting will be made at the Contract Unit Price per linear foot for each diameter size of pipeline to be pipe burst, each depth category (0-8 feet, 8-12 feet, 12-16 feet) and each surface restoration type (unpaved, residential pavement, arterial pavement) pending acceptance from OWNER and ENGINEER. Payment includes:
 - 1) Sanitary sewer flow control,
 - 2) Excavation, backfill, and surface replacement of insertion/retrieval/machine pits,
 - 3) Dewatering (if required for the installation of the Pipeline Rehabilitation),
 - 4) End seals and connection to manholes,
 - 5) Post-rehabilitation CCTV inspection and successful upload of the CCTV inspection data to the Owner's repository.
11. 33 01 30.411# Gravity Pipeline Cleaning
- a. Description: Clean gravity pipeline and remove debris per STS 33 01 30.41.
 - b. Measurement: Gravity Pipeline Cleaning will be measured by the linear foot from center of manhole to center of manhole.
 - c. Payment: Payment for Gravity Pipeline Cleaning will be made at the Contract Unit Price per linear foot for each diameter size of pipeline differentiated by NON-METALLIC or METALLIC pipelines. Payment includes:
 - 1) All labor, water and equipment required to clean the pipeline.
 - 2) Removal of any gaskets or roots that would impede the selected trenchless rehabilitation method.
 - 3) Debris disposal (if not listed as a separate Contract Unit Price).
12. 33 01 30.412 Disposal of Debris from Pipeline Cleaning Operations
- a. Description: Dispose of debris from pipeline cleaning operations per STS 33 01 30.41.
 - b. Measurement: Disposal of Debris will be measured per ton to a maximum of 2 decimal places.



- c. Payment for Disposal of Debris will be made at the Contract Unit Price per ton to a maximum of 2 decimal places with the evidence of certified weight tickets generated at the disposal site. Payment includes transport of debris from the site to the disposal facility.
- 13. 33 01 30.413# Pre-Rehabilitation Point Repair
 - a. Description: Repair of gravity pipeline up to 12 linear feet by excavation prior to rehabilitation per STS 33 01 30.41.
 - b. Measurement: Pre-rehabilitation point repair will be measured per each.
 - c. Payment: Payment for pre-rehabilitation point repair will be made at the Contract Unit Price per each for up to 12 linear feet of pipeline replacement for each diameter size of pipeline, each depth category (0-8 feet, 8-12 feet, 12-16 feet) and each surface restoration type (unpaved, residential pavement, arterial pavement). Written approval is required from the OWNER and ENGINEER to perform a pre-rehabilitation point repair not shown on the drawings. Payment includes:
 - 1) Existing surface removal and excavation,
 - 2) Dewatering,
 - 3) Pipe repairs or replacement,
 - 4) Backfilling and surface restoration,
 - 5) Sanitary sewer flow control (if required).
- 14. 33 01 30.414# Pre-Rehabilitation Obstruction Removal
 - a. Description: Removal of an obstruction using a remote device (robot).
 - b. Measurement: Pre-rehabilitation obstruction removal will be measured per each.
 - c. Payment: Payment for pre-rehabilitation obstruction removal will be made at the Contract Unit Price per each for small diameter pipeline (less than or equal to 12-inch diameter) or large diameter pipeline (greater than 12-inch diameter). Written approval is required from the OWNER and ENGINEER to perform a pre-rehabilitation obstruction removal not shown on the drawings. Payment includes:
 - 1) Removal, extraction, and disposal of the obstruction using a remote device,
 - 2) Sanitary sewer flow control (if required).
- 15. 33 01 30.51 Sewage Flow Control
 - a. Description: per STS 33 01 30.51
 - b. Measurement: N/A



- c. Payment: incidental to the pipeline rehabilitation/installation and/or manhole rehabilitation.
16. 33 01 30.70# Rehabilitate Pipeline by Slip-Lining
- a. Description: per STS 33 01 30.70.
 - b. Measurement: Slip-Lining will be measured by the linear foot from center of manhole to center of manhole.
 - c. Payment: Payment for Slip-Lining will be made at the Contract Unit Price per linear foot for each diameter size of pipeline to be slip-lined, each depth category (0-8 feet, 8-12 feet, 12-16 feet) and each surface restoration type (unpaved, residential pavement, arterial pavement) pending acceptance from OWNER and ENGINEER. Payment includes:
 - 1) Sanitary sewer flow control (if required),
 - 2) Excavation, backfill, and surface replacement of insertion/retrieval/machine pits,
 - 3) Dewatering (if required for the installation of the Pipeline Rehabilitation),
 - 4) End seals and connection to manholes,
 - 5) Grouting of annular space,
 - 6) Post-rehabilitation CCTV inspection and successful upload of the CCTV inspection data to the Owner's repository.
17. 33 01 30.23/70# Reinstate Service Lateral Connection by Open Trench
- a. Description: Reinstate service lateral connection on rehabilitated pipe requiring open trench (STS 33 01 30.23: Pipe Bursting, STS 33 01 30.70: Pipe Slip-lining).
 - b. Measurement: Reinstate service lateral connection by open trench will be measured per each.
 - c. Payment: Payment for service lateral connection reinstatement by open trench will be made at the Contract Unit Price per each. Payment includes:
 - 1) Existing surface removal and excavation,
 - 2) Dewatering (if required),
 - 3) Service lateral connection reinstatement,
 - 4) Backfilling and surface restoration,
 - 5) Sanitary sewer flow control (if required).
18. 33 01 30.72/79/80.1# Rehabilitate Pipeline by Trenchless Methodology



- a. Description: Rehabilitate pipeline by applicable trenchless methodology (STS 33 01 30.72: Cured-in-place Pipe Lining, STS 33 01 30.79: Folded and Reformed PVC Pipe Lining, STS 33 01 30.80: Spiral Wound Pipe Lining).
 - b. Measurement: Trenchless Rehabilitation of Pipeline will be measured by the linear foot from center of manhole to center of manhole.
 - c. Payment: Payment for Trenchless Rehabilitation of Pipeline will be made at the Contract Unit Price per linear foot for each diameter size of pipeline to be rehabilitated pending acceptance from OWNER and ENGINEER. Payment includes:
 - 1) Sanitary sewer flow control (if required),
 - 2) Dewatering (if applicable and required for the installation of the trenchless methodology),
 - 3) End seals (if applicable),
 - 4) Grouting of annular space (if applicable),
 - 5) Post-rehabilitation CCTV inspection and successful upload of the CCTV inspection data to the Owner's repository.
19. 33 01 30. 72/79/80.2 Reinstate service lateral connection on pipeline rehabilitated by trenchless methodology
- a. Description: Reinstate service lateral connection on pipeline rehabilitated by trenchless methodology (STS 33 01 30.72: Cured-in-place Pipe Lining, STS 33 01 30.79: Folded and Reformed PVC Pipe Lining, STS 33 01 30.80: Spiral Wound Pipe Lining).
 - b. Measurement: Reinstate service lateral connection will be measured per each.
 - c. Payment: Payment for reinstatement of service lateral connection on pipeline rehabilitated by trenchless methodology will be made at the Contract Unit Price per each regardless of method used (robot or open trench). Payment includes:
 - 1) All personnel and equipment required for robot operation,
 - 2) Existing surface removal and excavation,
 - 3) Dewatering (if required),
 - 4) Service lateral connection reinstatement,
 - 5) Backfilling and surface restoration,
 - 6) Sanitary sewer flow control (if required).
20. 33 01 30. 72/79/80.3# Post-Rehabilitation Trenchless Liner Patch



- a. Description: Furnish and install a trenchless liner patch on a pipe rehabilitated by trenchless methodology. Patch material and adhesive (if applicable) needs to be approved by the manufacturer of the trenchless liner (STS 33 01 30.72: Cured-in-place Pipe Lining, STS 33 01 30.79: Folded and Reformed PVC Pipe Lining, STS 33 01 30.80: Spiral Wound Pipe Lining).
 - b. Measurement: Post-rehabilitation trenchless liner patch will be measured per each.
 - c. Payment: Payment for post-rehabilitation trenchless liner patch will be made at the Contract Unit Price per each pending prior approval is obtained in writing from the OWNER and ENGINEER. Payment includes sanitary sewer flow control (if required).
21. 33 01 30. 72/79/80.4# Post-Rehabilitation Point Repair
- a. Description: Repair of rehabilitated gravity pipeline up to 12 linear feet by excavation.
 - b. Measurement: Post-rehabilitation point repair will be measured per each.
 - c. Payment: Payment for post-rehabilitation point repair will be made at the Contract Unit Price per each for up to 12 linear feet for each diameter size of pipeline, each depth category (0-8 feet, 8-12 feet, 12-16 feet) and each surface restoration type (unpaved, residential pavement, arterial pavement) pending prior approval is obtained in writing from the OWNER and ENGINEER. Payment includes:
 - 1) Existing surface removal and excavation,
 - 2) Dewatering (if required),
 - 3) Pipe repairs or replacement,
 - 4) Backfilling and surface restoration,
 - 5) Sanitary sewer flow control (if required).
22. 33 01 30.811# Rehabilitate existing sanitary sewer manhole
- a. Description: per STS 33 01 30.81, excluding the manhole lining system application.
 - b. Measurement: Sanitary sewer manhole rehabilitation will be measured per each.
 - c. Payment: Payment for sanitary sewer manhole rehabilitation will be made at the Contract Unit Price per each for each diameter size of manhole to be rehabilitated and each depth category (0-6 feet, 6-10 feet, 10-14 feet, 14-18 feet) pending acceptance from OWNER and ENGINEER.
23. 33 01 30.812 Rehabilitate existing sanitary sewer Type A or B manhole



- a. Description: per “Type A & B Manhole Rehabilitation Details”, excluding the manhole lining system application.
 - b. Measurement: Sanitary sewer manhole rehabilitation will be measured per each.
 - c. Payment: Payment for sanitary sewer manhole rehabilitation, Type A or B, will be made at the Contract Unit Price per each pending acceptance from OWNER and ENGINEER. Payment includes:
 - 1) Sanitary sewer flow control (if required)
 - 2) Existing surface removal and excavation,
 - 3) All removals as shown in the detail,
 - 4) Precast top slab and manhole riser,
 - 5) Backfilling and surface restoration,
 - 6) Existing manhole base rehabilitation.
24. 33 01 30.813 Rehabilitate existing sanitary sewer Type D or F manhole
- a. Description: per “Type D Manhole Rehabilitation Details” or “Type F Manhole Rehabilitation Details”, excluding the manhole lining system application.
 - b. Measurement: Sanitary sewer manhole rehabilitation will be measured per each.
 - c. Payment: Payment for sanitary sewer manhole rehabilitation, Type D or F, will be made at the Contract Unit Price per each pending acceptance from OWNER and ENGINEER. Payment includes:
 - 1) Sanitary sewer flow control (if required)
 - 2) Existing surface removal and excavation,
 - 3) All removals as shown in the detail,
 - 4) Precast manhole riser,
 - 5) Bulkhead and filing abandoned vault space with PCC, Lean Fill, or Cellular Grout.
 - 6) Backfilling and surface restoration,
 - 7) Existing manhole base rehabilitation.
25. 33 01 30.814 Rehabilitate existing sanitary sewer Type E manhole
- a. Description: per “Type E Manhole Rehabilitation Details”, excluding the manhole lining system application.
 - b. Measurement: Sanitary sewer manhole rehabilitation will be measured per each.



- c. Payment: Payment for sanitary sewer manhole rehabilitation, Type E, will be made at the Contract Unit Price per each pending acceptance from OWNER and ENGINEER. Payment includes:
 - 1) Sanitary sewer flow control (if required)
 - 2) Existing surface removal and excavation,
 - 3) All removals as shown in the detail,
 - 4) Precast manhole riser,
 - 5) Backfilling and surface restoration,
 - 6) Existing manhole base rehabilitation.
26. 33 01 30.815 Manhole Lining System Application
- a. Description: Furnish and install an Epoxy Lining System or Polyurethane and Epoxy protective lining system per STS 33 01 30.81.
 - b. Measurement: Manhole lining system application will be measured per square foot.
 - c. Payment: Payment for manhole lining system application will be made at the Contract Unit Price per square foot pending acceptance by OWNER and ENGINEER. Payment includes sanitary sewer flow control (if required).
27. 33 05 76.# Fiberglass Manhole Insert
- a. Description: Rehabilitate Type C or E manhole with fiberglass manhole insert per STS 33 05 76 and "Fiberglass Manhole Insert Detail", excluding the manhole lining system application.
 - b. Measurement: Fiberglass manhole insert will be measured per each.
 - c. Payment: Payment for fiberglass manhole insert will be made at the Contract Unit Price per each for each diameter size of manhole to be rehabilitated and each depth category (0-6 feet, 6-10 feet, 10-14 feet, 14-18 feet) pending acceptance from OWNER and ENGINEER. Payment includes:
 - 1) Sanitary sewer flow control (if required)
 - 2) Existing surface removal and excavation,
 - 3) All removals as shown in the detail,
 - 4) Fiberglass manhole insert,
 - 5) Backfilling and surface restoration,
 - 6) Existing manhole base rehabilitation.

END OF SECTION 01 22 00



**SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 31 00
PROJECT MANAGEMENT COORDINATION**

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Section includes procedures for preparing and conducting the project construction meetings:
 - 1. Preconstruction meeting
 - 2. Progress meetings
 - 3. Pre-installation meetings
 - 4. Pre-bypass pumping meetings
 - 5. Closeout meeting

1.2 RELATED SECTIONS

- A. General and Supplemental General Conditions, and Special Conditions of the Contract.

1.3 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

- A. ENGINEER—also referred to as CONSULTANT in the General terms and conditions. An agent or licensed professional with whom OWNER has entered into an agreement, who is responsible for the engineering, surveying, architectural, and/or landscape architectural design or construction contract administration and inspection or both, acting directly or through duly authorized representatives. If OWNER has not contracted with a CONSULTANT, OWNER’S employee(s) will perform the services of the CONSULTANT.
- B. Progress Schedule—A schedule, prepared and maintained by CONTRACTOR, describing the sequence and duration of the activities comprising the CONTRACTOR’S plan to accomplish the Work within the Contract Times.
- C. Resident Project Representative—The authorized representative of ENGINEER assigned to assist ENGINEER at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Meeting Participants: Representatives of entities participating in meetings shall be qualified and authorized to act on behalf of the entity each represents.

1.5 PRECONSTRUCTION MEETING

- A. OWNER or OWNER representative (ENGINEER) will schedule and preside over meeting after issuance of the Notice of Award.
- B. Attendance Required: ENGINEER, OWNER, RPR, major Subcontractors, applicable utility representative, funding agency representatives, and CONTRACTOR.
- C. Minimum Agenda:
 - 1. OWNER-CONTRACTOR Agreement
 - a. Execution.
 - b. Submission of executed bonds and insurance certificates.
 - c. Distribution.
 - 2. Submission Progress Schedule.
 - 3. Submission of Schedule of Submittals.
 - 4. Designation of Contract Authority and channels of communication.
 - 5. Procedures and processing of:
 - a. Field orders
 - b. Submittals
 - c. Change Orders
 - d. Request for Information/Interpretations
 - e. Applications for Payment
 - f. Record Documents
 - g. Contract closeout procedures
 - 6. Scheduling
 - 7. Critical Work sequencing
 - 8. Use of project site:
 - a. Office and storage areas
 - b. Security
 - c. Housekeeping
 - d. OWNER'S requirements
 - 9. Major equipment deliveries and priorities
 - 10. Permits required for construction
 - 11. Utilities required for construction
 - 12. Outline responsibilities for RPR
 - 13. Selection of Materials Testing firm and Special Inspection firm
 - 14. Procedures for testing

15. Use of premises by OWNER and CONTRACTOR
 16. OWNER'S requirements and partial occupancy
 17. Identify coordination items with Owner
 18. Set progress meeting location, interval, day of week, and time.
 19. Construction facilities and controls
 20. Temporary utilities provided by OWNER
 21. Survey and site layout
 22. Procedures for maintaining record documents
 23. Requirements for startup of equipment
 24. Inspection and acceptance of equipment put into service during construction period
- D. ENGINEER: Record minutes and distribute copies to participants after meeting

1.6 PROGRESS MEETING

- A. Attend meetings throughout progress of the Work at periodic intervals.
1. ENGINEER will:
 - a. Schedule and administer meetings throughout progress of the Work
 - b. Make arrangements for meetings, prepare agenda with copies for participants, and preside over meetings
 2. Attendance as appropriate to agenda topics for each meeting:
 - a. Job superintendent
 - b. Major Sub-Contractors
 - c. CONTRACTOR
 - d. ENGINEER
 - e. OWNER
 - f. Additional invitees: OWNER of utility companies when the Work affects their interests, and others necessary to attend.
- B. Minimum Agenda:
1. Review minutes of previous meetings
 2. Review of submittal schedule and status of submittals
 3. Request for information (RFIs) status
 4. Change order management status
 5. Review of Schedule
 6. Planned progress during succeeding work period
 7. Field observations, problems, and decisions

8. Maintenance of quality and work standards
 9. Action items
 10. Next meeting
- C. ENGINEER: Record minutes and distribute to participants and those affected by decisions made within two business days after meeting.

1.7 PREINSTALLATION MEETINGS

- A. When required in individual Specification Sections, convene pre-installation meetings at Project Site before starting Work of specific Section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific Section.
- C. Notify ENGINEER 7 calendar days in advance of meeting date as specified in the specific Section
- D. CONTRACTOR: Prepare agenda and preside over meeting:
 1. Review conditions of installation, preparation, and installation procedures
 2. Review coordination with related Work
- E. CONTRACTOR: Record minutes and distribute to participants within two business days after meeting and those affected by decisions made

1.8 ODOR CONTROL COORDINATION MEETING

- A. Require attendance of parties directly associated with the odor control operation, including ENGINEER, specific CONTRACTOR'S work crews, OWNER'S construction, operations, and maintenance staff.
- B. OWNER and CONTRACTOR shall coordinate an onsite meeting after the odor control trailer has been delivered and setup onsite. notify ENGINEER 3 calendar days in advance of meeting date but prior to operation of the odor control trailer.
- C. CONTRACTOR shall prepare agenda and preside at meeting:
 1. OWNER'S representative will review setup, operation, and maintenance of the Odor Control Trailer.
 2. Review timelines, sequences, and phases.
 3. Review responsibilities.
 4. Review site security measures.
 5. Review coordination with related work.
- D. CONTRACTOR will record minutes and distribute copies within 3 calendar days after meeting and prior to scheduled shutdown to participants, with copies to ENGINEER, OWNER, and those affected by decisions made.

1.9 PRE-BYPASS PUMPING MEETINGS

- A. Require attendance of parties directly affecting, or affected by bypass pumping operation, including ENGINEER, specific work crews, OWNER'S construction, operations, and maintenance staff.
- B. CONTRACTOR shall notify ENGINEER 7 calendar days in advance of meeting date. Meeting date shall take place a minimum of 3 days before the start of bypass pumping and all bypass pumping submittals shall be submitted and reviewed by the ENGINEER.
- C. CONTRACTOR shall prepare agenda and preside at meeting:
 - 1. Review accepted Bypass Pumping Submittals including conditions of bypass pumping setup.
 - 2. Review timelines and sequences.
 - 3. Review responsibilities.
 - 4. Review dry run plan and schedule, as necessary.
 - 5. Review coordination with related work.
- D. CONTRACTOR will record minutes and distribute copies within 3 calendar days after meeting and prior to scheduled shutdown to participants, with copies to ENGINEER, OWNER, and those affected by decisions made.

1.10 FINAL WALK-THROUGH INSPECTION

- A. ENGINEER will schedule on-site walkthrough
- B. Attendance required: OWNER, ENGINEER, CONTRACTOR (Project Manager and Superintendent)
- C. Agenda:
 - 1. Compile punch list of all deficient work or uncompleted work per the contract documents
 - 2. Determine if project is substantially complete
- D. Punch List will be maintained by the ENGINEER

1.11 CLOSE-OUT MEETING

- A. ENGINEER will schedule close-out meeting
- B. ENGINEER will make arrangements for meeting, prepare agenda with copies for participants, and preside at meeting
- C. Attendance required: OWNER, ENGINEER, CONTRACTOR (Project Manager and Superintendent)
- D. Agenda:
 - 1. Review punch list completion
 - 2. Transfer of record documents
 - 3. Finalize payment
- E. ENGINEER will record minutes and distribute copies to participants

1.12 POST CONSTRUCTION MEETING

- A. Meet with and inspect the Work 11 months after date of Substantial Completion with OWNER and ENGINEER.
- B. Arrange meeting at least 7 days before meeting
- C. Meet in OWNER's office or other mutually agreed upon place
- D. Inspect the Work and draft list of items to be completed or corrected
- E. Review service and maintenance contracts and take appropriate corrective action when necessary
- F. Complete or correct defective work and extend correction period accordingly
- G. Require attendance of CONTRACTOR, Project Manager, or Superintendent, appropriate manufacturers and installers of major units of constructions, and affected subcontractor

PART 2– PRODUCTS (NOT USED)

PART 3– EXECUTION (NOT USED)

END OF SECTION 01 31 00



**SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION**

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Section includes general information and execution for construction progress documentation.

1.2 GENERAL REQUIREMENTS

- A. CONTRACTOR shall prepare and submit a detailed progress schedule, to the ENGINEER for approval in accordance with the General Conditions.

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Schedule:
 - 1. The CONTRACTOR shall prepare a fully developed, Critical Path Method (CPM) chart or spreadsheet type bar graph of CONTRACTOR'S construction schedule.
 - 2. The scheduling of construction is the responsibility of the CONTRACTOR and CONTRACTOR management personnel shall actively participate in development of the schedule so that intended sequences and procedures are clearly understood. An orderly progression of work is demonstrated by:
 - a. Provide a separate task for each significant construction activity. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
 - b. Coordinate the CONTRACTOR'S construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.
 - c. The diagram shall show a continuous activity flow from left to right. The activity or event numbers, description, duration, and value shall be shown on the diagram.
 - d. Dates shall be shown on the diagram for start of the project, any milestones required by the contract, and contract completion.
 - e. The critical path shall be clearly identified.

- f. Submittal, review, procurement, fabrication, delivery, installation, start-up, and testing of special or long lead-time materials and equipment shall be included in the schedule.
- g. Other agency activities shall be shown. These include but are not limited to notice to proceed, approvals, inspections, and utility tie in for phasing requirements.

B. Work Stages:

- 1. Indicate important stages of construction for each major portion of the Work, including testing and installation.

C. Schedule Updates:

- 1. Update the schedule prior to weekly progress meeting.
 - a. Identify overall progress of each Major Item of Work in the Summary Schedule.
 - b. If there are significant changes to the schedule, submit a written report at the weekly progress meeting.

END OF SECTION 01 32 00



SUPPLEMENTAL TECHNICAL SPECIFICATION SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1- GENERAL

1.1 SUMMARY

- A. Section includes procedures for preparing and transmitting submittals required by specification sections for a product, material, or construction method:
 - 1. Quality Assurance.
 - 2. Shop drawings.
 - 3. Product data.
 - 4. Design Data and Calculations
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field service reports.
 - 7. Samples.
 - 8. Miscellaneous.
- B. Section also includes requirements and procedures for a substitution requests.
- C. It is the responsibility of the CONTRACTOR to convey the requirements of this Section to their SUB-CONTRACTORS and their suppliers and vendors.

1.2 RELATED SECTIONS

- A. General and Supplemental General Conditions of the Contract and Division 1
- B. STD Specification 1502

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.

1.4 GENERAL SUBMITTAL REQUIREMENTS

- A. Wherever Submittals are required hereunder, all such documents shall be furnished to the ENGINEER.
- B. The CONTRACTOR shall provide a log of submittals provided, the date submitted to the ENGINEER and the date received from the ENGINEER, and other pertinent information. The log shall be updated by the CONTRACTOR for construction meetings. See attachment B.
- C. Schedule submittals with such promptness as to cause no delay in Work. Unless otherwise indicated in this Section, submittals shall be provided in accordance to the accepted submittal schedule.

D. Preparation:

1. Provide separate submittal for each specification section requiring submittals. Where multiple sections relate to the same system or element and are being provided from the same source, a single joint submittal is acceptable.
2. Coordinate submission of related items. Group submittals of related products in a single transmission.
3. Include all submittal material requested for that Section.
4. Identify variations from requirements of Contract Documents. State product and system limitations which may adversely affect Work.
5. Mark or show dimensions and values in same units as specified.
6. CONTRACTOR to include a Cover Transmittal form (Attachment A) with each separate submittal. CONTRACTOR to fill form in its entirety.
7. It is the CONTRACTORS responsibility to note any deviations to the original contract documents and the reason the deviation is requested in the submittal cover transmittal form.

E. CONTRACTOR responsibilities:

1. The CONTRACTOR shall be responsible for the accuracy, completeness, and coordination of all Submittals, including but not limited to, Submittals of or from an item, product, service, person or firm which is specified in the Contract Documents; such specified Submittals shall not be presumed to be acceptable to the OWNER and shall be subject to the same approval process as all other Submittals. The CONTRACTOR shall not delegate this responsibility in whole or in part to any Subcontractor. Submittals may be prepared by the CONTRACTOR, SUBCONTRACTOR, or SUPPLIER, but the CONTRACTOR shall ascertain that each Submittal meets the requirements of the contract and the project. The CONTRACTOR shall ensure that there is no conflict with other Submittals and shall notify the ENGINEER in each case where its Submittals may affect the work of another Contractor or the OWNER. The CONTRACTOR shall ensure coordination of Submittal of related crafts and Subcontractors.
2. Review submittals prior to transmittal. Verify compatibility with field conditions and dimensions, product selections and designations, quantities, and conformance of submittal with requirements of Contract Documents. Return non-conforming submittals to prepare for revision rather than submitting for review.
3. Coordinate submittals to avoid conflicts between items of work.
4. Submittal transmittal form:
 - a. Include with each submittal a transmittal form. Sample copy of an acceptable form is attached to this section as Attachment A.
 - b. Identify Project, CONTRACTOR, subcontractor, supplier, manufacturer, pertinent drawing sheet and detail numbers, and associated Specification Section numbers.

- c. Each Submittal shall be assigned a unique number. Submittals shall be numbered sequentially. The Submittal numbers shall be clearly noted on the transmittal. Original Submittals shall be assigned a numeric Submittal number. Resubmittals shall bear an alpha-numeric system which consists of the number assigned to the original Submittal for that item followed by a letter of the alphabet to represent that it is a subsequent Submittal of the original. For example, if Submittal 25 requires a resubmittal, the first resubmittal will bear the designation "25-A" and the second resubmittal will bear the designation "25-B" and so on.
- 5. Failure to make timely submittals in accordance with the requirements of the specifications shall constitute grounds for the OWNER to withhold compensation for the equipment to which the submittal is related, or, in the case of information lists, record drawings, investigation findings, safety plans, quality plans, and similar items, the Owner may withhold the value of the information in the submittal.
- 6. Incomplete, improperly packaged, and submittals from sources other than CONTRACTOR will not be accepted.
- F. Transmittal: Where possible, transmit all submittals electronically. Where electronic submittal is not possible, submit three (3) paper copies for ENGINEER retention plus as many copies as CONTRACTOR desires returned after review. Exception: Retained quantities for samples, color charts, and manufacturer's equipment manuals shall be as specified elsewhere herein.
- G. Review: ENGINEER will review and return submittals with comments.
- H. Do not fabricate products or begin work which requires submittals until return of reviewed submittal with ENGINEER acceptance.
- I. On return, promptly distribute reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- J. Resubmission:
 - 1. Revise and resubmit submittals as required within 15 days of return from initial review.
 - 2. Make re-submittals under procedures specified for initial submittals.
 - 3. Identify all changes made since previous submittal.

1.5 GENERAL SUBMITTAL TYPES

- A. QUALITY ASSURANCE:
 - 1. Qualification data: Written information demonstrating capabilities and experience of firm or person. Include lists of complete projects with names and contact information for references.
 - 2. Manufacturer's certificates: Submit reference data, affidavits, and certifications on manufacturer's letterhead certifying that products conform to or exceed specified requirements. Certificates may be based on recent or previous test results supplied by manufacturer and accepted by ENGINEER.

3. Installer approval: Certification on manufacturer's letterhead that installer complies with requirements and is approved for installing manufacturer's products.
4. Welding certificates: Written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specifications (WPS) and Procedure Qualification Record (PQR) on American Welding Society (AWS) forms. Include names of firms and personnel certified.
5. Field test reports: Written reports from qualified testing agency indicating and interpreting results of field tests performed either during or after installation for compliance with specified requirements. The CONTRACTOR shall perform field testing as required by specifications.

B. SHOP DRAWINGS

1. Furnish to the ENGINEER for review, three copies of each Shop Drawing Submittal wherever called for in the Contract Documents. The term "Shop Drawings" as used herein shall be understood to include detail design calculations, shop drawings, fabrication, and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and related items. Whenever the CONTRACTOR is required to submit design calculations as part of a Submittal, such calculations shall bear the signature and seal of a professional engineer registered in New Mexico unless otherwise directed.
2. All Shop Drawing Submittals shall be accompanied by a Submittal transmittal form, attachment A. Any Shop Drawing Submittal not accompanied by such a form, or where all applicable items on the form are not completed, will be returned for resubmittal.
3. Organization:
 - a. A single Shop Drawing Submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a Submittal is required. A single Submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components. Example: If a pump section references other sections for the motor, protective coating, anchor bolts, local control panel, and variable frequency drive, a single Submittal would be accepted; a single Submittal covering vertical turbine pumps and horizontal split case pumps would not be acceptable.
 - b. On the transmittal form, index the components of the Submittal and insert tabs in the Submittal to match components. Relate the Submittal components to specification paragraph and subparagraph, drawing number, detail number, schedule title, or room number or building name, as applicable.
 - c. Unless otherwise approved by OWNER, terminology and equipment names and numbers used in Submittal shall match the Contract Documents.
 - d. Present in a clear and thorough manner. Title each drawing with Project name. Identify each element of drawing with reference number.

- e. Indicate field verified dimensions. Show relationship of products to adjacent work. Note coordination requirements.
- f. Schematics and diagrams shall be logically arranged and presented in a clear understandable manner with all items labeled.
- g. Internal wiring diagrams: Provide internal wiring and elementary ladder diagrams for factory pre-wired equipment.
- h. Control diagrams: Show relative positions of each component as a system diagram.

4. Format

- a. Minimum sheet size shall be 8.5 inches by 11 inches. Maximum sheet size shall be 24 inches by 34 inches. Every page in a Submittal shall be numbered in sequence. Each copy of a Submittal shall be collated and stapled or bound, as appropriate. The Owner's Construction Manager will not collate copies.
- b. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with all pertinent data, capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.
- c. Plans, elevations, sections, and detail shop drawings shall be to scale with scale indicated.

5. When construction is complete, prepare and submit red-lined copies of the Contract Drawings showing clearly how construction deviated from the design, along with the authority for the deviation or change. Refer to STS 01 78 39 – Project Record Documents for additional information.

C. PRODUCT DATA

- 1. Provide product data such as manufacturer's brochures, catalog pages, illustrations, diagrams, tables, performance charts, and other material which describe appearance, size, attributes, code and standard compliance, ratings, and other product characteristics.
- 2. Form:
 - a. Provide all critical information such as reference standards, performance characteristics, capacities, power requirements, wiring and piping diagrams, controls, component parts, finishes, dimensions, and required clearances.
 - b. Submit only data which is pertinent. Mark each copy of manufacturer's standard printed data to identify products, models, options, and other data pertinent to project.
 - c. Modify manufacturer's standard schematic drawings and diagrams and supplement standard data to provide specific information applicable to project. Delete information not applicable.

d. Colors and patterns: Unless color and patterns are specified for product, submit accurate color and pattern charts or samples illustrating manufacturer's full range for selection by OWNER. Submit two (2) hard copies only.

3. Provide all passwords and instructions for control panels and PLCs with initial submittal.

D. DESIGN DATA AND CALCULATIONS

1. Where required by specification sections, provide basic calculations, analyses, and data to support design decisions, and demonstrate compliance with specified requirements. State assumptions and define parameters. Give general formulas and references. Provide sketches as required to illustrate design method and application.

2. Arrange calculations and data in a logical manner with suitable text to explain procedures and order.

3. Indicate name, title, and telephone number of individuals performing design and include professional seal of designer where applicable or required.

E. MANUFACTURER'S INSTRUCTIONS

1. Where required by specification sections, provide manufacturer's instructions for activities such as delivery, storage, assembly, installation, wiring, start-up, adjusting, and finishing.

2. Indicate pertinent portions and identify conflicts between manufacturer's instructions and Contract Documents.

3. Where appropriate, include preparation procedures, service connection requirements, critical ambient conditions, foundation requirements, special precautions, adjustment requirements, alignment procedures, leveling, purging, charging, lubrication, and cleaning prior to operation and/or OWNER'S acceptance.

4. Installation (e.g., assembly, mounting, or wiring) and start-up instructions shall be submitted and available for review in the field prior to scheduled material or equipment installation.

F. MANUFACTURER'S FIELD SERVICE REPORTS

1. When an individual specification section requires services of manufacturer's field representative, submit report of observations, site decisions, and instructions given to installers.

2. Form:

a. Present complete information in clear concise manner.

b. Bind with titled cover in folder or binder.

3. Report shall include:

a. Time, location, conditions, and duration of activity.

b. Names of persons performing and witnessing activity.

- c. Equipment used.
- d. Description of activity, data recorded, and results.
- e. Deficiencies found, corrective measures, and results of retesting.
- f. Other pertinent data.

4. Submit report within 30 days of construction site service visit.

G. SAMPLES

- 1. Whenever in the Specifications samples are required, submit not less than three samples of each item or material to the ENGINEER for acceptance at no additional cost to the OWNER.
- 2. Samples, as required herein, shall be submitted for acceptance a minimum of 21 days prior to ordering such material for delivery to the jobsite, and shall be submitted in an orderly sequence so that dependent materials or equipment can be assembled and reviewed without causing delays in the Work.
- 3. All samples shall be individually and indelibly labeled or tagged, indicating thereon all specified physical characteristics and Manufacturer's name for identification. Upon receiving acceptance of the ENGINEER, one set of the samples will be stamped and dated and returned to the CONTRACTOR, and one set of samples will be retained, and one set of samples shall remain at the job site until completion of the Work.
- 4. Unless indicated otherwise, all color and textures of specified items presented in sample Submittals shall be from the manufacturer's standard colors and standard materials, products, or equipment lines. If the samples represent non-standard colors, materials, products, or equipment lines and their selection will require an increase in contract time or price, clearly indicate same on the transmittal page of the Submittal.

H. MISCELLANEOUS

- 1. As-built Data: Refer to STS 01 78 39 – Project Record Documents
- 2. Utility Investigations: The CONTRACTOR shall submit the findings of all utility investigations performed.

1.6 SUBMITTAL REVIEW

- A. Intent of Submittal Review: ENGINEER will review submittals for the sole purpose of verifying general conformance with design intent and general compliance with Contract Documents. Approval of submittal by ENGINEER does not relieve CONTRACTOR of responsibility for correcting errors which may exist in submittal or from meeting requirements of Contract Documents.

- B. Except as may otherwise be indicated herein, the ENGINEER will return each Submittal to the CONTRACTOR, with its comments noted thereon, within 14 calendar days following their receipt by the ENGINEER. For resubmittal of Submittals, the ENGINEER will be allowed the same review period as for the original Submittal. It is considered reasonable that the CONTRACTOR shall make a complete and acceptable Submittal to the ENGINEER by the second submission of a Submittal item. Should the ENGINEER, if applicable, be required to review third and subsequent submittals, OWNER will withhold from CONTRACTOR'S next payment request an amount based on ENGINEER'S current fee schedule, including applicable miscellaneous expenses, so that OWNER may reimburse ENGINEER for such reviews.
- C. If three copies of a Submittal are returned to the CONTRACTOR marked "COMPLIANCE ACKNOWLEDGE", formal revision and resubmission of said Submittal will not be required.
- D. If three copies of a Submittal are returned to the CONTRACTOR marked "COMPLIANCE ACKNOWLEDGE AS NOTED", formal revision and resubmission of said Submittal will not be required.
- E. If a Submittal is returned to the CONTRACTOR marked "COMPLIANCE ACKNOWLEDGE AS NOTED – REVISE AND RESUBMIT FOR RECORDS", the CONTRACTOR shall revise said Submittal and resubmit the required number of copies for ENGINEER'S records. The CONTRACTOR shall submit a full executed submittal addressing all comments for records only.
- F. If a Submittal is returned to the CONTRACTOR marked "REJECTED – REVISE AND RESUBMIT FOR REVIEW," the CONTRACTOR shall revise said Submittal and resubmit the required number of copies. Resubmittal of portions of multi-page or multi- drawing Submittals will not be allowed. For example, if a Shop Drawing Submittal that consists of ten drawings contains only (one) drawing that is rejected and needs to be resubmitted, the Submittal as a whole is deemed as "REJECTED – REVISE AND RESUBMIT FOR REVIEW," and all ten drawings of the Submittal are required to be resubmitted.
- G. Any changes made on a resubmittal, other than those made or requested by the ENGINEER, shall be identified and flagged on the resubmittal.
- H. Fabrication of an item shall commence only after the Engineer has reviewed the pertinent Submittals and has returned copies to the CONTRACTOR marked either "COMPLIANCE ACKNOWLEDGE", "COMPLIANCE ACKNOWLEDGE AS NOTED", or "COMPLIANCE ACKNOWLEDGE AS NOTED – REVISE AND RESUBMIT FOR RECORDS". Corrections indicated on Submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the Contract requirements.
- I. All CONTRACTOR Submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR prior to submission. Each Submittal shall be dated and signed with the following: "I have verified that the equipment or material in this Submittal meets all the requirements specified or shown in the Contract Documents without exceptions." In the case of Shop Drawings, each sheet shall be so dated, signed, and certified. No consideration for review of any submittals will be made for any items which have not been so certified. All non-certified submittals will be returned without action taken, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

- J. The ENGINEER'S review of Submittals shall not relieve the CONTRACTOR of the entire responsibility for the correctness of details and dimensions and for compliance with the Contract Documents. The CONTRACTOR shall assume all responsibility and risk for any problem due to any errors in Submittals. The CONTRACTOR shall be responsible for the dimensions and the design of adequate connections and details.
- K. No changes in the Contract times will be considered for schedule delays resulting from non-complaint Submittals.
- L. Within 30 Days of the Notice to Proceed, the CONTRACTOR shall submit a complete list of anticipated Submittals which includes Specification and Drawing references. The list shall be updated with "early start" Submittal date within 15 Days of Submittal of the CONTRACTOR'S construction schedule. The Submittal dates shall be updated whenever the schedule is updated.
- M. Any additional Submittals identified after the initial Submittal shall be included in the updates.
- N. If the CONTRACTOR submits an incomplete Submittal, the Submittal may be returned without review. A complete Submittal shall contain sufficient data to demonstrate that the items contained therein comply with the Contract Documents, meet the minimum requirements for Submittals as described in the Contract Documents, and include all corrections as required from previous Submittals.

1.7 SUBSTITUTIONS

- A. See Standard General Conditions of the Contract.
- B. A request for a substitution constitutes a representation that the CONTRACTOR:
 - 1. Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.
 - 2. Will provide the same warranties or bonds for the substitution as for the product specified.
 - 3. Will coordinate the installation of an accepted substitution into the Work and make such other changes as may be required to make the Work complete in all respects.
 - 4. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.
- C. CONTRACTOR shall make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use.
- D. The application:
 - 1. will certify that the proposed substitute item will:
 - a. performs adequately the functions and achieve the results called for by the general design,
 - b. be similar in substance to that specified, and
 - c. be suited to the same use as that specified;
 - 2. will state:

- a. the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR'S achievement of Substantial Completion on time;
 - b. whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - c. whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
3. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change,
- E. Substitute Construction Methods or Procedures:
1. If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER.
 2. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER'S sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents.
- F. ENGINEER'S Evaluation:
1. The ENGINEER will determine whether the material or article submitted is equal to the named material or article. The ENGINEER'S decision regarding evaluation of substitutions shall be final and binding. Request for time extensions and additional costs based on rejection of substitutions will not be allowed.
 2. ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item. ENGINEER will be the sole judge of acceptability.
 3. No "or equal" or substitute will be ordered, installed, or utilized until ENGINEER'S review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

1.8 MEASUREMENT AND PAYMENT

- A. All costs associated with the preparation of submittals is considered incidental to the cost of construction. No additional compensation will be rendered for preparation, submission and re-submission of submittals."

PART 2– PRODUCTS – NOT USED

PART 3– EXECUTION – NOT USED

END OF SECTION 01 33 00

ATTACHMENT A
Sample Submittal Transmittal Form

Project Title:	Submittal No.:	
	Date:	
	Sub Nos. & Dates of Previous Subs:	
Contractor Name:	Sub No.:	Date(s):
	Sub No.:	Date (s):
Contractor Street Address:	Sub No.:	Date(s):
Contractor City, State, ZIP:	Sub No.:	Date(s):
Supplier:	Manufacturer:	
Specification No(s).:	Bid Item No.:	
List Deviations to Contract Documents:		
<p>CONTRACTOR COMMENTS</p> <p><input type="checkbox"/> NO EXCEPTIONS TAKEN <input type="checkbox"/> COMMENTS ABOVE <input type="checkbox"/> NOTE MARKING</p> <ul style="list-style-type: none"> Submittal has been reviewed and it is complete and conforms with requirements of Contract Documents except as noted. Required dimensions have been field verified and are acceptable for installation of proposed products and construction of proposed work. Required quantities for products and materials covered by this submittal have been verified as correct. Fabrication processes and construction methods proposed in this submittal are acceptable for this Project and will result in a complete, functional installation. Submittal has been coordinated with other submittals and work and proposed products and construction will properly interface with other construction. <p>BY: _____ DATE: _____</p> <p style="text-align: center;">(Contractor)</p>		
ENGINEER REVIEW		
<p>This submittal has been reviewed for compliance with general requirements of design and arrangement only and is not a contract document. Acknowledgement of compliance does not relieve Contractor of responsibility for performance of the work in compliance with all provisions and requirements of the contract documents. Job measurements and coordination of all dimensions for proper fit of all parts of the work and performance of all equipment supplied to meet specification requirements are and remain specific responsibilities of the Contractor.</p>		
<input type="checkbox"/> Compliance acknowledged subject to the foregoing: Distribute		<input type="checkbox"/> Compliance acknowledged as noted and subject to the foregoing: Distribute
<input type="checkbox"/> Compliance acknowledged as noted and subject to the foregoing: Revise and Resubmit for record: Distribute		<input type="checkbox"/> Rejected – Revise and resubmit for review
Reviewed By:	Date:	
COMMENTS:		



SUPPLEMENTAL TECHNICAL SPECIFICATION SECTION 01 58 13 TEMPORARY PROJECT SIGNAGE

PART 1- GENERAL

1.1 SECTION INCLUDES

- A. The CONTRACTOR shall provide, erect, and maintain for the duration of the construction project, two identification signs at the construction site. The CONTRACTOR shall also provide, erect and maintain the sign as necessary for SWPPP and labor notification.

1.2 RELATED SECTIONS

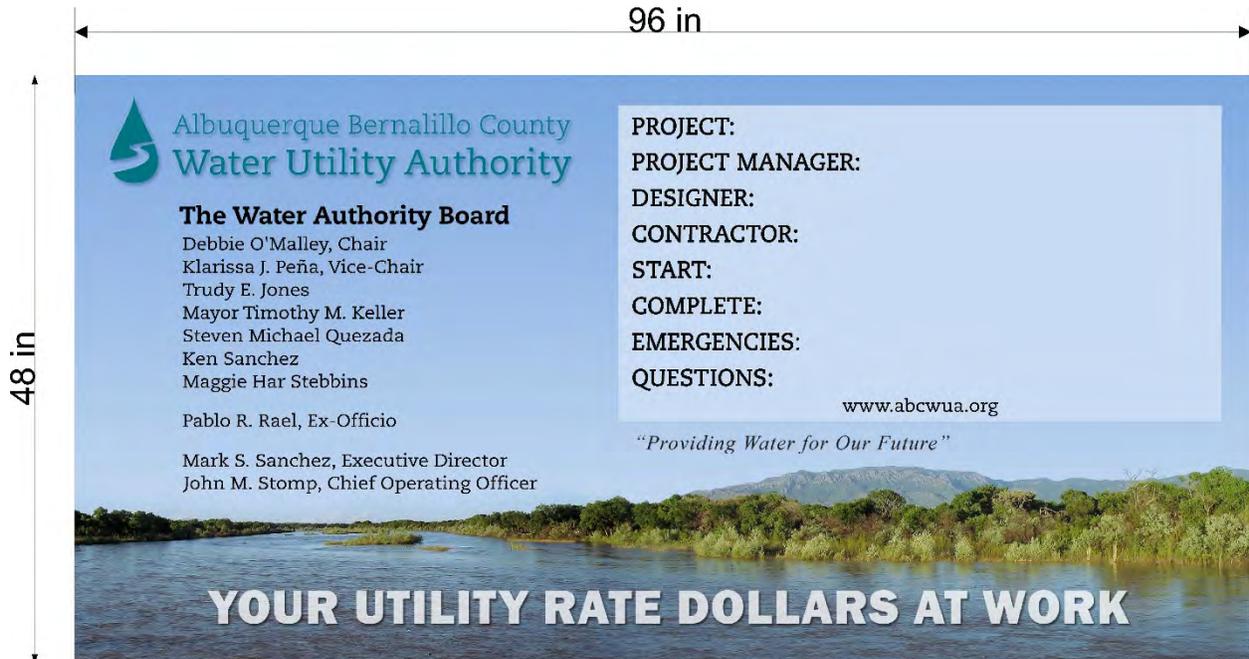
- A. General and Supplemental General Conditions of the Contract.
- B. STS 01 33 00: Submittal Procedures

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 PERFORMANCE REQUIREMENTS

- A. Labor Sign (incidental to construction)
 - 1. A sign shall also include all notification and sign requirements from the following so that they are weather tight.
 - a. Equal employment opportunity poster
 - b. Federal and State wage rate information
 - c. Safety posters
 - d. Official announcements and notices
- B. Project Sign
 - 1. SIGN DIMENSIONS: 1200 mm x 2400 mm x 13 mm (approx. 4' x 8' x 1/2") UV laminated Signgrade Medium Density Overlay (MDO) Plywood Panel
 - 2. All Water Authority Board Members, Directors, and Officers shall be verified before printing.
 - 3. Final information regarding CONTRACTOR will be supplied after the project has been awarded.



1.5 SUBMITTALS

- A. General: Project Sign and Labor notification shall be submitted in accordance with conditions of the Contract and STS 01 33 00.

1.6 QUALITY ASSURANCE

- A. Sign Paint (Primer, Paint and Finishes): The paint used for the sign shall be specifically designated for exterior use. It shall resist weathering and fading for the indicated construction schedule.

1.7 DELIVERY, STORAGE AND HANDLING

- A. The CONTRACTOR is responsible for the safe storage of the equipment until it is incorporated in the completed project.
- B. The material and equipment shall be stored and handled per the manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 PRE-APPROVED SUPPLIER

- A. "The Sign Store", 3600 Osuna Rd NE Ste 101, Albuquerque, NM 87109. Phone: 505-830-2530.



PART 3 - EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITY

- A. The CONTRACTOR is responsible for furnishing and installing the PRODUCT including all site preparation, and other items necessary for the proper installation and operation of the PRODUCT.

3.2 EXAMINATION

- A. Examine all products for compliance with this section.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Immediately correct all deficiencies and conditions which would cause improper execution of Work specified in this Section and subsequent Work.
- C. Verify that the PRODUCT dimensions are correct and project conditions are suitable for installation. Do not proceed with installation until conditions deficiencies have been corrected.
- D. Proceeding with Work specified in this Section shall be interpreted to mean that all conditions were determined to be acceptable prior to start of Work.

3.3 SEMI-PERMANENT INSTALLATION

- A. Semi-permanent installation shall be used when the project location is in one area (All construction is within a ¼ mile of each other)
- B. The sign shall be mounted on two 4" x 4" posts, with the bottom of the sign at least four feet above grade. The sign shall be mounted level and at the location designated by the Architect/ENGINEER or the OWNER'S Project Manager.
- C. Keep sign and supports clean. Repair deterioration and damage.
- D. Remove sign, framing, supports, and foundations to a depth of 2 feet upon completion of the project. Restore the area to a condition equal to or better than before construction.

3.4 TEMPORARY INSTALLATION

- A. Temporary installation shall be used when the project location is in multiple areas.
- B. The sign shall be mounted on two mobile spring-loaded sign stands. The sign shall be mounted level and at the location designated by the Architect/ENGINEER or the OWNER'S Project Manager.
- C. Keep sign and supports clean. Repair deterioration and damage.

END OF SECTION 01 58 13



**SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 78 39
PROJECT AS-BUILT DOCUMENTS**

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. This Section includes administrative and procedural requirements for Project As-Built Data, including the following:
 - 1. As-Built Documents (Drawings, Specifications, Shop Drawings, Field Orders, Change Orders)
 - 2. As-Built Survey

1.2 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. General and Supplemental General Conditions of the Contract and Division 1.

1.3 SUBMITTALS

- A. Submit Final As-Built data set to ENGINEER for review at least five (5) working days prior to inspection for Certification of Substantial Completion. Submittal shall include:
 - 1. One (1) hard copy set of As-Built documents including all Specifications, Full Size Drawings, Addenda, Modifications, and Shop Drawings. The set shall clearly mark any deviations from the construction drawings per section 3.3.
 - 2. One (1) digital point file of final as-built survey. Point file shall be comma delineated PNEZD text format (*.txt). Point descriptions shall clearly describe the point.
 - 3. The full-size hard copy of the as-built plans shall cross-reference the final as-built survey. Each point from the final as-built survey shall be marked with the point number on the full-size hard copy of the as-built plans pointing to the item surveyed. The following survey information shall be listed on the as-built plans:
 - a. Name, address, and phone number of responsible land surveyor.
 - b. Date of completion of Survey
 - c. Equipment used to conduct the survey
 - d. Horizontal and vertical control marks used to tie the survey to the vertical and horizontal datum referenced in Section 3.1. Ground to grid combination scale factor used.
- B. Miscellaneous As-Built Submittals
 - 1. Operation and Maintenance Manuals: Organize the operational and maintenance manual information into suitable sets of manageable size and bind

into individual binders properly identified and indexed. Include pocket folders for folded sheet information.

2. Assemble Certifications, Lab Test Reports, and Field Test Reports required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.4 QUALIFICATIONS

- A. The As-Built Survey shall be performed by a Licensed Professional Surveyor experienced in the State of New Mexico.

PART 2– PRODUCTS – NOT USED

PART 3– EXECUTION

3.1 AS-BUILT DOCUMENTS

- A. As-Built Prints: Maintain one set of all Specifications, Drawings, Addenda, Modifications, and Shop Drawings on site and in good order for marking as-built information.
 1. This set shall be annotated/updated at least once a week and will be reviewed for verification of updates by the construction observer on a regular basis, including before each pay application.
 2. Submit marked-up set to ENGINEER for review at least five (5) working days prior to inspection for Certification of Substantial Completion.
- B. Preparation: Mark prints with as-built information to show the actual installation and removals where installation and removals vary from that shown originally. Actual surveyed points shall be marked, with the point numbers, on the as-built set pointing to item surveyed. Record individual or entity who obtained as-built data, whether individual or entity is Installer, Subcontractor, or similar entity, that marked-up As-Built set.
 1. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 2. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 3. The As-Built drawings shall clearly and neatly show all changes.
 - a. Additions marked in red.
 - b. Deletions marked in green.
 - c. Comments marked in blue.
 - d. Installed systems in yellow.
- C. Mark As-Built set with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 1. Mark each pipe segment rehabilitation and manhole rehabilitation material type used.

2. Identify all new Trap Manhole Locations.
 3. Identify all rehabilitated or new Manholes with a drop inlet and type of drop inlet.
- D. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely, clearly, and accurately. If Shop Drawings are marked, show cross-references on the Contract Drawings.
- E. Mark As-built set with erasable, red-colored pencil/pen. Use other colors to distinguish between changes for distinct categories of the Work at same location.
- F. Note Construction Change Directive numbers (field orders or Request for Information changes), alternate numbers, Change Order numbers, and similar identification, where applicable.
- G. Verification of as-built status will be included in the monthly payment approval process that will be noted in the field reports.

3.2 FINAL AS-BUILT SURVEY

- A. CONTRACTOR shall survey the final installed product using a professional surveyor licensed in the State of New Mexico. Final as-built survey shall obtain coordinates (Northing, Easting, Elevation, and Description) of all new features including but not limited to:
1. new/rehabilitated manhole (north side at rim)
 2. all inverts inside of new/rehabilitated manhole
 3. sanitary sewer cleanout
 4. valve rim
 5. valve operating nut
 6. pipe at centerline of valve (elevation at FG)
 7. all fittings (elevation at FG)
 8. new to existing waterline connection location (elevation at FG)
 9. trace wire test station
 10. fire hydrant flange
- B. The standard horizontal datum and standard projection shall match those referenced in the construction drawings. If no horizontal datum or projection is referenced, the horizontal datum shall be North American Datum 1983 (NAD 83) and the projection shall be New Mexico State Plane Coordinate System (NMSPCS 83). The standard vertical datum shall match the vertical datum referenced in the construction drawings. If no vertical datum is referenced, the vertical datum shall be the North American Vertical Datum 1988 (NAVD 88). The control marks shall match those referenced in the construction drawings. If no control mark is referenced, the location information shall be tied to a legal control mark. A copy of the construction drawings base file is available for reference upon request to the ENGINEER.

END OF SECTION 01 78 39



SUPPLEMENTAL TECHNICAL SPECIFICATION SECTION 02 22 13 MOVEMENT AND VIBRATION ASSESSMENT

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for performing a vibration risk survey and vibration monitoring to determine if potentially damaging vibrations to engineered structures and sensitive features are created as a result of construction activity.
- B. Vibration risk survey and vibration monitoring may be performed in and around all engineered structures, sensitive features, and construction areas. Sensitive features may include archaeological sites, historical features, utilities, and historic structures, watercourses and other areas subject to damage or erosion.

1.2 REFERENCES

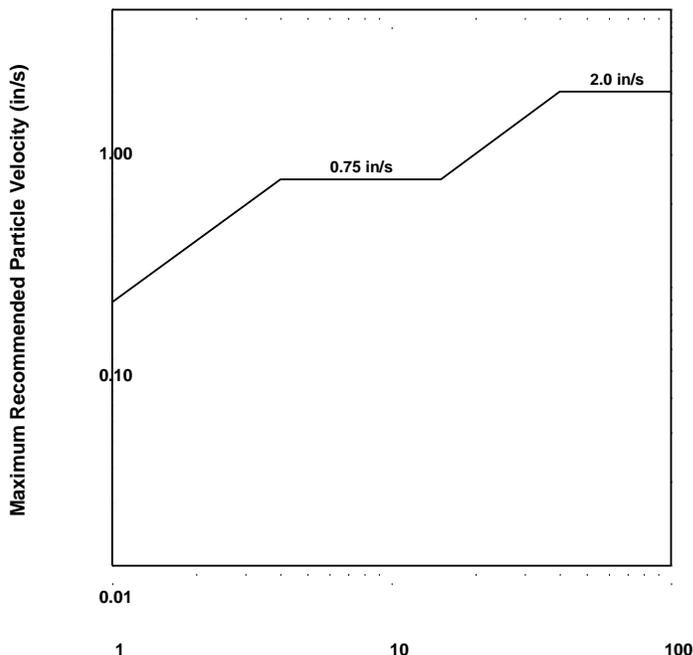
- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.3 SUBMITTALS

- A. Vibration Risk Survey Report: The report shall document existing conditions of all potentially affected engineered structures and/or sensitive features within the survey influence zone or as shown in the Contract. Include the following information from the survey, for each engineered structure and/or sensitive feature:
 - 1. The age, foundation, and above-ground Structure type or sensitive feature;
 - 2. Provisions for water drainage from roof and around foundation exterior;
 - 3. The age, type, and condition of any sensitive utility;
 - 4. Documentation (in the form of drawing, photographs, or digital video recording) of the size and location of all cracks, and the type and location of all structural defects.
- B. Vibration Monitoring Report: The report shall document the vibrations recorded at the engineered structures and/or sensitive features within the survey influence zone or as shown in the Contract during construction activities. Include the following information from the monitoring, for each engineered structure and/or sensitive feature:
 - 1. Site conditions and description, including a site map drawn to scale showing the location of the engineered structure and/or sensitive feature and the location of the construction activity;

2. Field procedures and Equipment used, including the seismograph manufacturer, model, and unit serial number;
3. The name of the seismograph operator;
4. A hard copy of all ground vibration time histories, in units of velocity, including summary of the maximum value of ground vibration in any one of three directions measured (longitudinal, radial, or vertical), the frequency associated with the maximum value, in unit of hertz, and the measured distance between the seismograph and the construction activity;
5. Analysis of results with conclusions and recommendations;
6. In the case of blasting, the report shall also include:
 - a. A hard copy of the air blast time history, in units of decibels and pounds per square inch (psi), the maximum value of air blast, in decibels, and the peak air blast frequency in hertz;
 - b. The maximum charge weight of explosive allowed;
 - c. The scaled distance factor used for design;
 - d. A plot of the ground motion velocity plotted against frequency for the maximum values recorded on a graph similar to that shown in Figure 1.

Figure 1



7. Submit any additional inclusions to the report(s) at the direction and request of the OWNER or ENGINEER.

1.4 PRE-QUALIFIED VIBRATION MONITORING CONTRACTORS

A. Provide a qualified specialist to perform the Work and analyze the results of vibration monitoring from the following list:

1. Aimone-Martin Associates, LLC
1005 Bullock Ave.
Socorro, NM 87801
(575) 838-2229
2. J R Associates
1886 Emory Street
San Jose, CA 95126
(408) 293-7390
3. Vibra-Tech Engineers, Inc.
4818 E. Ben White Blvd. Suite 202
Austin, TX 78741
(512) 442-6464
4. Western Technologies, Inc.
8305 Washington Place, NE
Albuquerque, NM 87113-1670
(505) 823-4488
5. AMEC Earth and Environmental, Inc.
8519 Jefferson, N. E.
Albuquerque, NM 87113
(505) 821-1801
6. Matheson Mining Consultants
11460 W. 44th Ave., #6
Wheat Ridge, CO 80033
(303) 456-5638 or (303) 884-0136
7. Geo-test, Inc.
8528 Calle Alameda NE
Albuquerque, NM 87113
(505) 857-0933

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

- A. Immediately notify the OWNER and ENGINEER if visual inspection or seismograph readings indicate that damage to any engineered structure and/or sensitive feature is occurring during any construction activity.
- B. Vibration Risk Survey
 1. Conduct a Vibration risk survey of all engineered structures and/or sensitive features within the influence zone of construction activity to determine size and locations of any existing cracks and other defects in any sensitive features.
- C. Vibration monitoring

1. Seismograph Equipment: Use a seismograph, by a qualified vibration specialist, to monitor vibration levels. Provide seismograph(s) with self-triggering unit(s), approved by the Water Authority Project Manager, and capable of recording three mutually perpendicular components of ground motion time histories, in terms of velocity. In the case of monitoring blast vibrations, provide additional capability for recording of air blast levels. Provide unit(s) capable of reporting the frequency as well as the peak values for all vibration time histories.
 2. Seismograph Location and Usage: Place seismographs outside the engineered structure and/or sensitive feature closest to the construction activity as determined by the vibration risk survey or approved by the Water Authority Project Manager. The transducer(s) shall be placed between the construction and the engineered structures, and/or sensitive features and coupled to the ground.
 3. Frequency of Vibration Monitoring. For all construction activity other than blasting, perform monitoring at least two times during peak construction when construction activity is occurring near the engineered structures and/or sensitive features, and at the request of the OWNER or ENGINEER.
- D. Safe Vibration Levels for Blasting.
1. Base safe levels of the maximum ground motions and air blast in accordance with nationally recognized standards specified by the U.S. Bureau of Mines 30 CFR Parts 715 and 817.

END OF SECTION 02 22 13



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 02 82 13.33

ASBESTOS ABATEMENT FOR UTILITIES

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the repair, demolition, and disposal of asbestos cement pipe (ACP) as detailed in the project documents and/or encountered in the field during construction.

1.2 RELATED SECTIONS

- A. General and Supplemental General Conditions of the Contract and Division 1.

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.
- C. American Water Works Association (AWWA): Work Practices for Asbestos-Cement Pipe
- D. 810.2.2 Occupational Safety and Health Administration (OSHA): 29 CFR 1926.1101, Asbestos Standard for Construction; 29 CFR 1910.1001, Occupation Safety and Health Standards, Toxic and Hazardous Substances, Asbestos
- E. 810.2.3 Environmental Protection Agency (EPA): Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subpart M.
- F. New Mexico Administrative Code Title 20, Chapter 9, Part 1 (20 NMAC 9.1)
- G. New Mexico Environment Department, Air Quality Bureau Asbestos in New Mexico Frequently Asked Questions
- H. All asbestos related Federal, State and Local Regulations

1.4 PERFORMANCE REQUIREMENTS

- A. The CONTRACTOR shall comply with all applicable Federal, State, Local regulations pertaining to exposure to and handling, containment, transport, and disposal of asbestos material.
- B. If the CONTRACTOR fails to comply with local, state and federal reporting/notification requirements, fails to excavate and remove the ACP in a careful and prudent manner creating friable material or fails to abide with all asbestos regulatory requirements, the CONTRACTOR will be responsible to handle, transport and dispose of the ACP in accordance with the NESHAPS requirements and will not be reimbursed for any cost incurred. This will include all penalties and associated legal fees born by the CONTRACTOR as well as any penalties assessed against the Owner and any associated legal fees incurred by the Owner

for violation of any of the asbestos regulatory requirements that are caused by the CONTRACTOR.

- C. The CONTRACTOR must be licensed in the State of New Mexico to perform repair, demolition, and disposal of asbestos cement pipe (ACP). The CONTRACTOR / Subcontractor must have a minimum of a GB-98 general CONTRACTOR'S license and a GS-29 special CONTRACTOR'S license for asbestos abatement. The licensing requirements noted above are not intended to be exclusive, other licensing requirements may exist. The CONTRACTOR is responsible for ensuring that it has enough licensing as mandated by local, state, and federal agencies to perform the work defined by this specification.
- D. The CONTRACTOR/sub-CONTRACTOR must utilize the services of a commercial hauler registered to transport asbestos with the New Mexico Environmental Department and/or other local, state, or federal agencies.
- E. The CONTRACTOR/sub-CONTRACTOR, per local, state, federal and OSHA requirements, must train field personnel in the identification of asbestos containing material.

1.5 SUBMITTALS

- A. Name and license number of the Asbestos-Abatement CONTRACTOR that will be responsible for the work described above.
- B. References (including the owner's name, address, and phone number) for at least five comparable projects performed by the Asbestos-Abatement CONTRACTOR.
- C. A work plan describing work procedure, equipment to be used, transportation procedures and final plan disposal facility for asbestos material.
- D. A health and safety plan which includes air-monitoring procedures as required by OSHA.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Asbestos Cement Pipe (ACP) is a mixture of Portland cement and asbestos fibers. It was introduced into North America in 1931 and, by 1953, the American Water Works Association (AWWA) had established standards for ACP.
- B. Subsequent to ACP's introduction into the United States, the Environmental Protection Agency (EPA) determined that asbestos, in an air borne condition, is a hazardous material and established laws/guidelines for the handling and disposal of the material. This Technical Specification seeks to provide guidance regarding proper handling of asbestos cement pipe. However, the CONTRACTOR is responsible for ensuring conformance with current local, state, and federal guidelines.

PART 3 – EXECUTION

3.1 PREPARATION

- A. The CONTRACTOR shall, unless specified otherwise, furnish all labor, materials, equipment, tools, and all other associated appurtenances necessary to do the work required under the contract, including removal, disposal, alteration, modification or abandonment of pipe,

spill/emergency clean-up, transportation, temporary storage, containment and housekeeping activities on the site where construction activities are performed.

- B. Coordination of the Work: The CONTRACTOR shall be responsible for the satisfactory coordination of the pipe removal, disposal, alteration, modification, or abandonment of pipe with other construction and activities in the area. Delays in work resulting from lack of such harmony shall not in any way be a cause for extra compensation by any of the parties. The CONTRACTOR is responsible for filing all required permits, Notice of Intent and related documents with the New Mexico Environment Department and any other local, state, and federal agencies.
1. A Notice of Intent on asbestos NESHAP form is required in advance of the scheduled start date of demolition/removal of more than 260 linear feet of ACP that upon removal may become friable. The NESHAPS form must be filed with the New Mexico Environment Department. The CONTRACTOR must verify with the New Mexico Environment Department when and if a NESHAP form or similar form must be submitted prior to commencing with construction.

3.2 CONSTRUCTION

A. Pipe Removal / Asbestos Containment

1. Wear required Personal Protective Clothing and Equipment (PPCE) before commencing any work that may release asbestos fibers or create AC dust or AC pipe fragments.
2. Prepare asbestos waste bags and/or plastic for the disposal of contaminated PPCE and asbestos waste.
3. Thoroughly wet area to be cut to further reduce the release of dust containing fibers when cutting (i.e., before cutting starts and during cutting ensuring it is wet at all times). Where there is an interruption to normal water supplies, sufficient water may need to be transported to the site.
4. Only use non-powered hand tools, such as Reed cutters, chain cutters and hand saws as these generate a small quantity of predominately coarser dust or waste chips. Power tools and abrasive cutting, or sanding discs must not be used on asbestos cement products. Alternatively, break AC pipe collar with hammer or similar implement.
5. The CONTRACTOR shall take steps to minimize the amount of the friable waste and abide with all the asbestos regulatory requirements. If the ACP is caused to become friable, the CONTRACTOR shall conduct perimeter air monitoring upon the request of the Project Manager. EPA defines friable as material, when dry, which may be crumbled, pulverized, or reduced to powder by hand pressures.
6. Remove section of pipe from trench including all off-cuts, residue, and any collected dust for disposal as asbestos waste. Where practical, plastic drop sheets should be used to collect the asbestos waste, or if not practical, collect any residue AC pipe material that is obvious and bag accordingly.
7. Wrap large quantities of asbestos cement pipe in plastic sheeting and collect small quantities and place into approved plastic bags. Ensure plastic sheeting and bags are fully sealed with duct tape. Generally, asbestos waste must be

double wrapped / double bagged. The New Mexico Environment Department may authorize other proper methods of containment which may include double bagging, leak-proof drums, plastic lined cardboard containers, plastic-lined metal containers, or the use of vacuum trucks for the transport of slurry. All containment methods must satisfy all local, state, and federal requirements.

8. Dispose of disposable clothing, respirators, gloves etc. by wetting down before placing into asbestos waste bags. All disposable PPCE shall be used once only and disposed of after use.
9. Non-disposable PPCE e.g. gumboots shall be cleaned in accordance with local, state, and federal guidelines.
10. All tools and equipment shall be cleaned in accordance with local, state, and federal guidelines.
11. After the AC pipe removal, the water main must be flushed clean regardless of the amount of residue left in it.

B. Temporary Asbestos Storage:

1. Labeling requirements for asbestos containers: All asbestos containers shall be tagged with a warning label. Labels must be approved by the EPA or the Occupational Safety and Health Administration (OSHA) and may be worded, as shown below. The New Mexico Environment Department may authorize the use of other similar labels.
 - a. DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD
2. ACP and other asbestos waste shall be stored at an approved special waste storage area.
3. ACP and other asbestos waste shall not be stored for longer than twenty days, unless otherwise approved by the Owner and/or the New Mexico Environmental Department.

C. Asbestos Transport

1. Transport shall conform to all local, state, and federal requirements. The transporter is encouraged to coordinate with the New Mexico Environment Department regarding any and all transportation requirements.
2. The transporter shall ensure that the asbestos waste containers are loaded into the transport vehicle in a manner which prevents the breaking of the containers. The transporter shall ensure that the asbestos waste containers are transferred at the disposal site in such a manner to avoid fiber release.
3. Public access to asbestos wastes shall be prevented and asbestos wastes shall be transported as soon as possible.

D. Asbestos Disposal Guidelines

1. The transporter must dispose of the asbestos at an approved landfill. The transporter of the asbestos waste shall notify the landfill operator that the load contains asbestos. The New Mexico Solid Waste Bureau, phone (505) 827-0197,

regulates transportation and disposal of asbestos waste in New Mexico. Call to determine if any additional disposal restrictions apply to the removed ACP and appurtenances

END OF SECTION 02 82 13.33



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 03 64 23

INJECTION GROUTING

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the continuous annular space grouting of sliplining systems and, if shown on the plans, of spiral wound pipe lining systems. The annular space (void between the host and liner pipes) shall be completely grouted to support the liner and provide long-term stability. The Contractor shall provide testing of the materials and methods for compliance with the requirements which follow.
- B. Requirements for taking existing pipelines out of service by filling with grout. Pipes to be taken out of service shall be completely grouted to support bearing loads and provide long term stability.
- C. The Contractor shall provide testing of the materials and methods for compliance with the requirements which follow.

1.2 RELATED SECTIONS

- A. STD Specification 207: Lean Fill Construction.

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

- A. The CONTRACTOR shall submit the following to the OWNER at least fifteen (15) days prior to the start of the grouting operation. These requirements shall be submitted as a complete package. The CONTRACTOR shall notify the OWNER of any changes to be made in grouting procedures or materials.
 - 1. Pre-construction CCTV and CCTV log indicating location and size of existing services
 - 2. The proposed grouting mix and all performance data including flow characteristics, viscosity, set time, bleed segregation, shrinkage
 - 3. The proposed densities
 - 4. The proposed grouting method
 - 5. Twenty-four (24) hour and twenty-eight (28) day compressive strengths
 - 6. Proposed/calculated grout stage volumes

7. Bulkhead design(s) and locations
8. Vent design(s) and locations
9. Buoyant force calculations and a detailed plan that will hold the liner pipe on the invert for a period of time long enough to allow the grout to set where buoyant uplift is a factor
10. Flow control including projected slurry injection rate, grout pressure, method of controlling grout pressure
11. Pressure gauge certification
12. MSDS sheets on materials
13. Location of injection points and vents
14. Schedule and sequence of work

PART 2– PRODUCTS

2.1 MATERIALS

- A. The grout materials shall be Elastizell EF Class IV, or approved equal.
 1. Compressive Strength. The grout shall have a minimum compressive strength of 30 psi in 24 hours and 120 psi in 28 days per ASTM C869 when tested in accordance to ASTM C796. The bearing capacity shall be a minimum of 8.6 Tons/sf. Maximum cast density shall be a 42 pcf.
 2. Performance Requirements. The Contractor shall submit the proposed grout mixes, methods, construction drawings, and criteria of the grouting operations. The grouting system shall have sufficient gauges, monitoring devices, and test to determine the effectiveness of the grouting operation and to ensure compliance with the liner pipe specifications and design parameters.
 3. Density. The Contractor shall design a grout mix with a density to meet the equipment requirements (section 2.2) and to prevent floating of the liner pipe. The apparent viscosity shall not exceed 35 seconds in accordance with ASTM C939.

2.2 EQUIPMENT

- A. The materials shall be mixed in equipment of sufficient size and capacity to provide the desired amount of grout material for each stage in a single operation. The equipment shall be capable of mixing the grout at densities required for the approved procedure and shall also be capable of changing density as dictated by field conditions anytime during the grouting operation.
- B. The CONTRACTOR shall supply oil filled gauges with appropriate accuracy to monitor the grout pressure during grouting. Uncalibrated or inaccurate gauges shall be either recalibrated or replaced. The gauges to monitor grout pressure shall be attached immediately adjacent to each injection port.
- C. Pumping equipment shall be of a size sufficient enough to inject grout at velocity and pressure relative to the size, length and diameter of existing pipeline or structure.

- D. The gauge shall conform to an accuracy of no more than one-half percent error over the full range of the gauge. The range of the gauge shall not be more than 100 percent greater than the design grout pressure. Pressure gauges shall be instrument oil filled and attached to a saddle-type diaphragm seal (gauge saver) to prevent clogging with grout. All gauges shall be certified and calibrated in accordance with ANSI B40, Grade 2A

PART 3– EXECUTION

3.1 EXAMINATION

- A. The grouting system shall have sufficient gauges, monitoring devices and tests to determine the effectiveness of the grouting operation and to ensure complete fill (100%) and that no voids exist within the annular space, pipeline or structure.

3.2 GROUTING ANNULAR SPACE

- A. Upon completion of sliplining but prior to grouting, bulkheads and appropriate vent ports shall be installed.
- B. The gauged pumping pressure shall not exceed the liner pipe manufacturer's approved recommendations. Pumping equipment shall be of a size sufficient to inject grout at a velocity and pressure relative to the size of the annular space. Gauges to monitor grout pressure shall be attached immediately adjacent to each injection port.

3.3 GROUTING ABANDONED GRAVITY SEWER LINES

- A. Pre-construction CCTV investigation shall be conducted on all pipes to be taken out of service to verify the locations of all services prior to construction, locate obstructions, and assess condition of the pipe.
- B. Prior to grouting, bulkheads and appropriate vent ports shall be installed.
- C. Clean installation surfaces of pipelines of debris that may hinder fill placement. Remove excessive amounts of tuberculation and other substances that may degrade performance of fill. Debris left in the existing pipe shall not be more than 2 percent of placement volume.
- D. Remove all water prior to starting fill placement. Grouting shall not commence if standing water is left in the pipe.

3.4 GROUTING ABANDONED WATER LINES

- A. Pre-construction CCTV investigation shall be conducted on all pipes to be taken out of service to verify the locations of all services prior to construction, locate obstructions, and assess condition of the pipe.
- B. Prior to grouting, bulkheads and appropriate vent ports shall be installed.
- C. Clean installation surfaces of pipelines of debris that may hinder fill placement. Remove excessive amounts of tuberculation and other substances that may degrade performance of fill. Debris left in the existing pipe shall not be more than 2 percent of placement volume.
- D. Remove all water prior to starting fill placement. Grouting shall not commence if standing water is left in the pipe.

- E. Remove and salvage and return to OWNER existing fire hydrants connected to the pipeline to be taken out of service prior to grouting. Any hydrant taken out of service shall be bagged until it is physically removed.
- F. Demolish, remove, and dispose of existing precast concrete adjustment rings, concrete vault covers, or other pipeline structures, to a minimum depth of 2 feet below finished grade.
- G. Remove and dispose of existing water service surface identifications and appurtenances such as valves and valve boxes, meters, and backflow devices.
- H. All voids shall be backfilled and compacted to finished grade. Existing pavement shall be removed, disposed of, and replaced.
- I. The CONTRACTOR shall be responsible for cutting, capping, and/or plugging water mains as part of the grouting process. The CONTRACTOR may use either mechanical fittings (plugs or caps) or concrete plugs. The CONTRACTOR shall note all such actions on the plans and whether a mechanical fitting (cap or plug) or concrete plug was used. Mechanical joint caps require concrete thrust blocking restraint.
- J. Pipe shall not be taken out of service until replacement water main is constructed and tested, with all service connections installed, and replacement main is approved for use.
- K. If other sources feeding water main to be taken out of service are found, notify Owner immediately. Cut and cap water main to be taken out of service as directed by the Owner.
- L. Service lines shall be cut and capped at the corporation/curb stop.
- M. CONTRACTOR will be responsible for all temporary cuts, caps and plugs necessary to accommodate the construction of a new water main. As part of temporary installations, the CONTRACTOR will be responsible for maintaining service to customers during the construction. These are considered to be incidental to the installation of the new pipe and no additional payment will be made.

3.5 FIELD TESTING

- A. Density shall be verified by ASTM C138 or by other methods as approved by the Engineer.
- B. Viscosities shall be checked with a flowcone provided by the Contractor and tested per ASTM C939.
- C. Four compressive strength test specimens shall be taken at point of placement and tested in accordance with ASTM C495 except the test specimens shall not be oven dried prior to the compressive testing. The specimens shall be 3" by 6" cylinders. Results shall be provided at 24-hours, 3-day, and 28-day.

END OF SECTION 03 64 23



**SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 33 01 30.02
TEMPORARY ODOR CONTROL**

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the CONTRACTOR to mitigate the generation and discharge of objectionable sanitary sewer odors to the surface environment at all times as a result of the work.

1.2 RELATED SECTIONS

- A. General and Supplemental General Conditions of the Contract and Division 1.
- B. STS 33 01 30.70: Pipe Slip-Lining
- C. STS 33 01 30.23: Pipe Bursting
- D. STS 33 01 30.41: Sewer Line Cleaning (Removal of Protruding Service Connection)
- E. STS 33 01 30.51: Sewer Flow Control and Bypass Pumping

1.3 SUBMITTALS

- A. Odor Control Plan consisting of:
 - 1. Material type used to cover or tent open excavation areas that has exposed sewage.
 - 2. Type of anchoring used to secure a cover or tent over open excavation areas that has exposed sewage.
 - 3. Proposed duct work used to connect ABCWUA's Odor Control Trailer inlet to a manhole and method of sealing the connection between the duct work and the manhole.

1.4 PERFORMANCE REQUIREMENTS

- A. Contractor shall cover or tent any open excavation area that has exposed sewage except during active construction at that open excavation. Manholes shall be closed when no active construction is taking place in the manhole.
- B. If included in the Bid Proposal, the Contractor shall mobilize, setup, operate, maintain, and demobilize ABCWUA's odor control trailer. Contractor is responsible for all duct work from the odor control inlet to the manhole. Duct work at manhole shall be completely sealed.



PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.1 MOBILIZATION, SETUP, AND DEMOBILIZATION OF ODOR CONTROL TRAILER

- A. CONTRACTOR shall adhere to ABCWUAs Mobilization/Demobilization Standard Operating Procedure (SOP) for the 1,000 cfm odor control trailer (VBS-5). Available under a separate file.
- B. CONTRACTOR shall adhere to ABCWUAs Mobilization/Demobilization Standard Operating Procedure (SOP) for the 5,000 cfm odor control trailer (VBS-608). Available under a separate file.

3.2 OPERATION AND MAINTENANCE OF ODOR CONTROL TRAILER

- A. CONTRACTOR shall adhere to ABCWUAs Operation and Maintenance Standard Operating Procedure (SOP) for the 1,000 cfm odor control trailer (VBS-5). Available under a separate file.
- B. CONTRACTOR shall adhere to ABCWUAs Operation and Maintenance Standard Operating Procedure (SOP) for the 5,000 cfm odor control trailer (VBS-608). Available under a separate file.

END OF SECTION 33 01 30.02



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 01 30.11

TELEVISION INSPECTION OF SEWERS

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for closed circuit television (CCTV) inspection of gravity pipelines including the identification of all active service laterals. CCTV inspection shall be performed by personnel trained and certified in the use of National Association of Sewer Service Companies (NASSCO's) Pipeline Assessment and Condition Program (PACP®).

1.2 RELATED SECTIONS

- A. Special Condition: Immediate Notification of Sanitary Sewer Overflows
- B. STS 33 01 30.02 Temporary Odor Control
- C. STS 33 01 30.41: Sewer Line Cleaning

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.
- C. National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP®)

1.4 SUBMITTALS

- A. Copy of the personnel's certification for NASSCO's PACP.
- B. Specifications of the CCTV inspection system to be used for the inspections.
- C. Each digital CCTV inspection submittal shall include the following (digital folder naming convention: upstream manhole ID "to" downstream manhole ID "-pre-rehab" or "-post-rehab")
 - 1. PDF of the inspectIT report
 - 2. JPEG photos (snapshots) of each observation identified during the inspection.
 - 3. Digital video (*.wmv) of the inspection using inspectIT software
 - 4. Transmittal of digital CCTV Inspection data to the ENGINEER/OWNER for review shall be one of the following:
 - a. CD or DVD delivered to ENGINEER/OWNER

- b. USB flash drive delivered to ENGINEER/OWNER (flash drive will be given back to CONTRACTOR after data is downloaded)
 - c. Download from Cloud Storage accessible to ENGINEER/OWNER
- D. CONTRACTOR shall upload the Final Post-rehab CCTV data at the South Side Reclamation Plant within 14 days of approval from ENGINEER and OWNER.

1.5 QUALITY ASSURANCE

- A. The camera operator performing the CCTV video inspection shall be certified in the use of National Association of Sewer Service Companies (NASSCO's) Pipeline Assessment and Condition Program (PACP®).
- B. The camera operator performing the CCTV video inspection shall have passed a test administered by Infrastructure Technologies on the use of ITpipes software. If not, the camera operator performing the CCTV video inspection shall attend training from Infrastructure Technologies on the use of ITpipes software. Each CCTV Operator shall be trained and pass a test prior to commencing any inspections. The Contractor shall assume a minimum of one eight-hour day of on-line training and a half day of testing at the Infrastructure Technologies Albuquerque office. All costs associated with this training shall be the responsibility of the Contractor and incidental to the Work

PART 2– PRODUCTS

2.1 CCTV VIDEO FORMAT

- A. The CONTRACTOR is alerted that the OWNER uses MAXIMO as its Computerized Maintenance Management System (CMMS) and inspectIT software by Infrastructure Technologies as the CCTV software.
- B. Videos shall be prepared and submitted in H.264 formatted .mp4 with a resolution of 640 X 480. Data shall be encoded onto video as enabled within ITpipes software. All fields within the custom inspectIT template shall be populated during the pipeline inspection.
- C. Post-rehab CCTV must be performed under/utilizing a MAXIMO Work Order.
 - 1. One work order (number) per sewer line segment (manhole to manhole) is required.
 - 2. CONTRACTOR shall coordinate with the ABCWUA's Collection Section Research Analyst (505-289-3426) to obtain the OWNER'S inspectIT template and to setup/obtain MAXIMO work orders for each Post-rehab CCTV inspection.
 - 3. CONTRACTOR will populate the work order and upload the resulting data to the Maximo CMMS and the ITpipes repository
- D. Audio Requirements: The recording shall include an audio portion describing the condition of the sewer with the video image. The audio portion shall be in English and be sufficiently free of background noise to produce an oral report that is clear and easily discernible. At the beginning of each inspection run, the audio shall identify the Contractor name, date, time, street location, quarter section, pipe size, pipe type/material, direction of inspection (upstream or downstream), and the manhole numbers at the beginning and end of each run. The audio shall note the location and

condition of the pipe defects, including all cracks, breaks, cracked or misaligned joints, root intrusion, infiltration, missing pieces of pipe, corrosion, deposits, obstructions, dips in the pipe which cause the camera to go underwater, and any other items which reflect the condition of the sewer line. The audio shall also note the location of the connections to the nearest foot, clock positions of the connections, condition of connections, and whether the connection is in service.

2.2 DIGITAL RECORDING

- A. Continuous digital recordings of the inspection view as it appears on the monitor shall be stored. Unless directed otherwise by the Project Manager, the recording shall be H.264 formatted .mp4. H.264 video compression is the standard format for streaming video over web browsers. It provides high quality video with reduced file sizes. The inspection image files (pictures) shall have the ability to be exported to Industry Standard Formats, including JPEG, BMP, and TIFF formats, and shall be transferable to an external personal computer, however, the need to transfer is not anticipated. The operator shall pause the digital recording at any time there is a delay in the inspection. The pause shall in no way affect, freeze or interrupt the replay of the video and shall not close the video file during the inspection. The data shall be time coded using the elapsed time from the video file. The naming of the associated picture or video files shall be automated and shall match the Water Authority's inspectIT template settings for video/media file naming.

2.3 CCTV INSPECTION EQUIPMENT

- A. CCTV system equipment shall include television cameras, a television monitor, cables, power sources, and other equipment.
1. The camera lens shall not have less than a 65-degree viewing angle and shall have either automatic or remote focus and iris controls.
 2. The remote-reading footage counter shall be accurate to less than 1 percent error over the length of the section of pipeline being inspected. This distance shall be measured from the centerline of the manhole to the centerline of the next manhole.
 3. The camera and television monitor shall produce a minimum of 400 vertical lines of resolution and 460 horizontal lines of resolution.
 4. Telephones, radios, or other suitable means of communication shall be set up to ensure that adequate communication exists between members of the crew.
- B. The CCTV inspection camera utilized shall be specifically designed and constructed for sewer inspection.
1. The CCTV inspection camera shall be operative in 100 percent humidity conditions.
 2. Lighting for the camera shall minimize reflective glare and be sufficient and bright enough to make clear assessment of the condition of the pipe.
 3. Lighting and picture quality shall be suitable to provide a clear, in-focus picture of the entire periphery of the pipeline for all conditions encountered during the work.

4. The camera itself shall have a minimum of 3-lux illumination sensitivity.
5. The CCTV camera(s) shall be mounted on a skid, floatable raft system, or transporter/crawler, based upon the conditions of the pipe to be televised. The camera and mounting system shall be capable of televising 6-inch through 72-inch sanitary sewer pipe in 100 percent humidity conditions.

PART 3– EXECUTION

3.1 GENERAL

- A. The CCTV camera(s) shall be a pan/tilt and rotating head camera capable of providing a full view of the inside of all connections and any pipe defects. Recording shall be in color and shall have the best quality possible. The image shall be in focus at all times. The recording shall be done with adequate lighting to provide a clear view of the entire periphery of the sewer including any defects while keeping glare to a minimum. The image shall not be obscured by “fog” in the sewer. If any submitted recording has unacceptable focus, lighting, sound, data, imaging, or interferences the sewer shall be re-inspected at the Contractor’s expense.
- B. The CCTV camera(s) shall pause for a sufficient length of time to adequately document and provide accurate distance measurements of all the defects in the pipe and the connections observed in the sewer. The camera shall rotate and look directly at each defect, and look into each connection to thoroughly document the conditions and determine if the connection is in service. In the same manner, the Contractor shall identify all sewer connections at each manhole including the manholes at the beginning and end of setup and all intermediate manholes. The Contractor shall capture photos of all observations noted on the inspection report.
- C. The CCTV camera(s) shall be moved through the sewer, from upstream to downstream, at a uniform rate of not more than 35 feet per minute, achieving no less than 450 feet per hour. Distance of sewer between adjacent manholes shall be measured and recorded. The distance measurements shall be made from the centerline of the manhole that the camera is traveling from and shall be accurate to within 2 feet for every 1,000 feet inspected. If more than one manhole reach is inspected in a single run, the footage counter shall be reset to zero at the center of all the intermediate manholes.
- D. If, during CCTV inspection, the television camera will not pass through the entire sewer main section, the Contractor shall set up his equipment at the downstream manhole and attempt to inspect the section of the pipe from the opposite direction. If the camera fails to pass through the entire section, it shall be assumed that an obstruction exists. Efforts to televise the section of pipeline shall be temporarily suspended and the Contractor shall notify the Water Authority. If the Water Authority agrees the inspection cannot be completed, the Contractor shall submit the completed inspection and payment shall be made for the inspected footage.

- E. The equipment and skill of the operators shall be capable of providing a continuous clear recorded and viewed picture of the entire length of the sewer main under all normally expected pipe atmospheric conditions and flow conditions. The Contractor shall have adequate cabling and wiring equipment to perform CCTV inspection of sewer interceptor mains up to a length of 1,600 feet without causing degradation of recorded and viewed picture quality.
- F. Televising shall provide a clear, definitive recorded and viewed TV picture. The recording shall not contain intervals of more than 20 seconds when the camera is stationary. When the tape is stopped due to obstructions or equipment malfunction and then restarted, the TV operator shall state the length of time or delay and the reason for the delay. The importance of accurate distance measurement is emphasized. The remote reading footage counter shall be accurate to +/- 0.2 percent over the length of the section being inspected. Each pipe segment shall be defined as one manhole to manhole run, and pipe lengths shall be defined as the intervening distance between the centers of manholes along a line parallel to the pipe invert. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device and the accuracy shall be satisfactory to the Water Authority.
- G. The OWNER desires to inspect the entire corroded upper pipe surface along with a portion of the non-corroded sidewall for comparison purposes and to verify that the entire corroded surface has been examined. If the water level is too high to successfully examine the corroded upper surface or for all the CCTV equipment to move within a segment, the Contractor shall move on to the next segment and immediately inform the Water Authority.
- H. All equipment and all Contractor operations shall be conducted at a low noise level suitable for night time CCTV inspection in residential areas.
- I. The Contractor may inspect through existing manholes.

3.2 PRE/POST REHABILITATION

- A. PRE-REHABILITATION: CCTV inspection shall be completed immediately after cleaning to confirm cleaning, location of all service lateral connections, and to identify any additional point repairs or obstruction removals which may impact(s) the rehabilitation of the pipeline. If the CCTV inspection camera will not pass through the entire pipeline section, the CONTRACTOR shall reset the equipment at the downstream manhole and attempt to inspect the section of pipe from the opposite direction. Refer to STS 33 01 30.41 Sewer Line Cleaning, if CCTV inspection cannot be completed due to an obstruction. CONTRACTOR shall complete pre-rehabilitation CCTV inspection of the entire segment prior to rehabilitation after obstruction removal has been completed.
- B. POST-REHABILITATION: CCTV inspection is required and shall be completed after rehabilitation of the pipeline to confirm compliance with the plans and specifications. If a new manhole (not currently recorded in the OWNER'S asset database) has been installed within this project, then the Post-Rehabilitation CCTV inspection shall note the new manhole as an observation and the inspection shall begin and end at existing manholes currently in the OWNER'S asset database.

END OF SECTION 33 01 30.11



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 01 30.23

PIPE BURSTING

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the replacement of gravity sanitary sewer lines by pipe bursting methodology including reinstatement of service lateral connections.

1.2 RELATED SECTIONS

- A. Special Condition: Immediate Notification of Sanitary Sewer Overflows
- B. STS 33 01 30.41: Sewer Line Cleaning
- C. STS 33 01 30.11: Television Inspection of Sewers
- D. STS 33 01 30.51: Sewer Flow Control and Bypass Pumping

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

- A. Pipe Installation Plan: The CONTRACTOR shall prepare and submit a plan with installation procedures and the locations of insertion/access pits for review and approval at a minimum of 30 working days prior to commencing work. This plan may include a dewatering plan if groundwater is identified to be present.
- B. Project specific engineering pipe design calculations for each SAS segment the liner system will be applied. Pipe design shall be calculated and stamped by a professional ENGINEER licensed in the United States and verified by the pipe manufacturer in accordance with ANSI, ASTM, and AWWA standards. Calculations shall include, but not be limited to; soil loads, live loads, hydrostatic loads, pipe stiffness, Standard Dimension Ratio, pipe wall crushing strength, initial and long term (50 years) values of pipe deflection, pipe bonding strain, hydrostatic collapse resistance, constrained buckling strength, and allowable pulling force and length.
- C. Shop drawings, catalog data, MSDS sheets, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings pertinent to this project demonstrating compliance with this specification.
- D. Pipe bursting equipment specifications and methodology

- E. Certification of personnel for the butt fusion of high-density polyethylene pipe and the operation of the pipe bursting equipment.
- F. Identification/notification of any host pipe defects which will impact the pipe bursting operation and a proposed pre-rehabilitation repair method for each defect. Refer to STS 33 01 30.41.

1.5 QUALITY ASSURANCE

- A. Documentation showing that personnel has three (3) years of Pipe Bursting experience with a list of a minimum 50,000 linear feet installed by the company including 3 sewer main projects similar or greater in scope and value to the project specified in the contract documents. Information for each supervisor and the company must include, but not be limited to, date of work, location, pipe information (i.e., length, diameter, depth of installation, pipe material, etc.), project OWNER information, (i.e., name, address, and telephone number, contact person).

1.6 PIPE DESIGN CRITERIA

- A. Pipe design shall be based on the following Design Conditions (Gravity Service):

Height of Water Above Top of Pipe, ft	=	1.0
Fluid Temperature, degrees F	=	80
Soil Density, pcf	=	130
Live Load, psi	=	HS-20 Highway
Dead Load, psi	=	Dead Load/Depth of cover: As indicated on the Drawings. Vertical deflection not to exceed 3-percent in short term (30 days) and 5 percent thereafter
Modulus of Soil Reaction, psi	=	800

PART 2– PRODUCTS

2.1 MANUFACTURERS

- A. Refer to the OWNER’s Approved Product List.

2.2 MATERIALS

- A. High Density Polyethylene Pipe (HDPE)
 - 1. HDPE pipe shall meet the applicable requirements of ASTM F714. Inside color shall be white or an alternative light color suitable for illumination during television inspection. Outside color may be different provided the pipe is a homogeneous material and all colors are integral to the HDPE material (not painted or coated).
 - 2. HDPE pipe and fitting: will be used in accordance with the material specifications. All additional appurtenances (manholes, tees, gaskets, etc.) will meet the material specifications. All pipe installed by pipe bursting will be joined by butt fusion, electro fusion, or full circle repair clamp as detailed in the pipe joining part of this section.

3. HDPE pipe will be produced from resins meeting the requirements of ASTM D1248, designation PE3408, ASTM D3350 cell classification PE345444C, and will meet the requirements of AWWA C901 and C906. HDPE pipe will meet the minimum stability requirements of ASTM D3350. Pipe will be legibly marked at intervals of no more than five feet with the manufacturer's name, trademark, pipe size, HDPE cell classification, SDR rating, ASTM D3035, AWWA C901 or C906, date of manufacture and point of origin.
 4. HDPE pipe shall be made of virgin material. No rework material except that obtained from the manufacturers own production of the same formulation shall be used.
 5. HDPE pipe shall be homogeneous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
 6. HDPE Pipe shall be Iron Pipe Size (IPS).
 7. Dimension Ratios: The minimum wall thickness of the HDPE pipe is DR 17.
 8. Pipe Joining for Terminal Sections of HDPE Pipe
 - a. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment. ENGINEER may require CONTRACTOR to use a data logger to store butt-fusion joint data.
 - b. Terminal sections may also be joined by electro fusion couplings as approved by the ENGINEER.
 - c. Terminal sections may also be joined by Stainless Steel Full Circle Repair Clamps as approved by the ENGINEER.
- B. Materials for Sealing Pipe at Manholes
1. A quick setting grout, non-shrink grout or a quick setting epoxy used for sewer applications that is chemical resistant.

2.3 PIPE BURSTING EQUIPMENT:

- A. The pipe bursting unit shall be designed and manufactured to force its way through the existing line by fracturing the pipe and compressing the broken pieces into the surrounding soil as the equipment progresses. The bursting unit shall generate sufficient force to burst and compact the existing pipeline. In each case the pipe bursting unit shall pull the polyethylene pipe with it as it moves forward.

PART 3– EXECUTION

3.1 EXAMINATION

- A. Proceeding with Work specified in this Section shall be interpreted to mean that all conditions, including site conditions, were determined to be acceptable prior to start of Work.
- B. Pipes shall be inspected by the OWNER or ENGINEER for damage prior to installation.
- C. If pipe is found to be superficially damaged by cracks, holes, de-laminations, foreign inclusions, blisters, or other defects that would, due to their nature, degree, or extent, have a deleterious effect on the pipe performance as determined by the ENGINEER; the ENGINEER may reject the pipe or may allow the pipe to be repaired. Rejected pipe shall be replaced with a new section of pipe at no additional cost to the OWNER.

3.2 PREPARATION

- A. Complete all pre-approved obstruction removals, pipe cleaning, and point repairs per STS 33 01 30.41. Complete the pre-rehab CCTV inspection including submittal and approval by ENGINEER and OWNER per STS 33 01 30.11. All sewer service connections shall be identified and located prior to pipe bursting. All sanitary sewer flow control shall be approved by ENGINEER and OWNER and in-place and operational prior to pipe bursting.

3.3 INSTALLATION

- A. Rehabilitation of sewer pipe by pipe bursting shall be full compensation for all subsurface investigations, materials, labor, equipment, cost of insertion and retrieval pits, machine pits, removing and replacing gravel base course, pavement, curb and sidewalk, and incidentals required to complete the pipe bursting process. Connection to the manholes is incidental to the pipe bursting process.
- B. MACHINE PITS AND PIPE INSERTION PITS
 - 1. The location and number of machine pits and pipe insertion pits shall be planned by the CONTRACTOR and submitted in writing for approval by the ENGINEER at least 10 days prior to excavation.
 - 2. Before any excavation is done for any purposes, the CONTRACTOR shall contact the appropriate One Call agency for determining field locations of existing utilities near the work area. Temporary construction easement and/or right-of-way areas, if required, will be arranged by the CONTRACTOR at no cost to the OWNER.
 - 3. Machine and insertion pits shall be excavated and backfilled in accordance with the appropriate specifications. Remove and replace existing asphalt in accordance with the applicable standard details and specifications.
 - 4. All excavations shall be properly sheeted and shored in accordance with relevant specifications for trench safety systems. Any damage resulting from improperly shored excavations shall be corrected to the satisfaction of the OWNER or ENGINEER with no additional compensation due to the CONTRACTOR.

5. All open excavations shall be kept secure at all times by the use of barricades with appropriate lights and signs, construction tape, covering the steel plates, etc., or as directed by the ENGINEER.
6. Insertion pits shall be of sufficient length to allow the bursting head and new HDPE pipe to enter the host pipe at an angle that will maintain the grade of the existing sanitary sewer.
7. One or more machine pits shall be excavated at the end(s) of the sewer pipe to be replaced or at appropriate points within length of the existing pipe. Pits shall be centered over the existing pipe.
8. The number of pits for machine and pipe insertion shall be the minimum necessary to efficiently accomplish the work. The CONTRACTOR shall consider the use of excavations required for other purposes such as for sanitary sewer services reconnection and manhole replacement.
9. Where manholes are used as machine or new pipe insertion pits, the CONTRACTOR shall identify such manholes and replace them at no additional cost to the OWNER if damaged. Any manhole modification or replacement required shall be considered incidental to the installation of the new pipe unless the manhole requires rehabilitation/replacement as indicated on the plans.

C. PIPE FUSION

1. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall comply with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of HDPE pipe and/or fusing equipment.
2. Fused pipe shall be laid along (parallel) streets, not across streets, so as not to block traffic. The CONTRACTOR shall lay the pipe around corners or provide a ramp/bridge to allow traffic to safely cross the pipe with no damage to the pipe at street crossings. Private property, including landscaping, shall be protected.
3. The butt-fused joint shall be in true alignment and shall have uniform rollback beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All defective joints shall be cut out and replaced at the expense of the CONTRACTOR.

D. PIPE INSTALLATION

1. CONTRACTOR shall expose all interfering and crossing utilities by (vacuum) excavation prior to construction. The minimum clearance from other utilities shall be two feet in any direction.
2. The minimum depth of cover over the installed pipe shall be 3 feet from the top of the existing pipe, or ten times the amount of displacement from the diameter of the existing pipe, whichever is greater.

3. CONTRACTOR shall locate and expose all service connections prior to pipe installation to expedite reconnection. Upon commencement of the bursting process, pipe insertion shall be continuous and without interruption from one entry point to another, except as approved by the ENGINEER.
4. For the pipe bursting process, the pipe-bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe section into the surrounding soils as it progresses. The bursting unit shall generate sufficient force to burst and compact the existing pipeline.
5. Equipment used to perform the work shall be located away from the buildings so as not to create noise or vibration impact. Provide a silent engine compartment with the winch to reduce machine noise as required to meet local requirements.
6. The CONTRACTOR shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the pipe from damage during installation. Lubrication may be used as recommended by the MANUFACTURER. CONTRACTOR shall take necessary measures to ensure that the new pipe is never stressed beyond its elastic limit.
7. The installed pipe shall be allowed the MANUFACTURER'S recommended amount of time, but not less than four (4) hour, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit. Sufficient excess length of new pipe but not less than four (4) inches shall be allowed to protrude into the manhole to provide for reoccurrence.
8. Following the relaxation period, the void between new pipe and manhole wall shall be sealed. The approved sealant shall extend a minimum of eight (8) inches into the manhole wall in such a manner as to form a smooth, uniform, watertight joint.

3.4 END SEALS

- A. The finished liner shall be cut smooth and parallel with the manhole wall. The interface between the host pipe and the pipe liner shall be sealed 360 degrees.

3.5 REINSTATE SERVICE LATERAL CONNECTION BY OPEN CUT

- A. The CONTRACTOR shall notify the occupants of the buildings with service connections when the service will be interrupted. The CONTRACTOR shall give the OWNER of the service the opportunity to remove and replace the service line within private property at the property OWNER'S expense. The CONTRACTOR shall maintain sewer service throughout the construction period, without any spills or discharges to unapproved systems
- B. All live services shall be immediately reinstated after the pipe bursting (pipeline rehabilitation) is complete. Inactive service lines to a vacant lot, vacant building, or to an occupied residence with more than one service line serving the property, shall be defined as a "live" service, and shall be reinstated. It is the CONTRACTOR'S responsibility to locate all live services prior to rehabilitation activities.

- C. Service lateral reinstatement by open cut includes locating all interfering utilities, existing surface removal, excavation, dewatering, reinstatement of service lateral connection, backfilling, surface restoration, temporary flow bypassing, and sewer dewatering. Reinstatement of service lateral connection by open cut includes the removal and replacement of the first five (5) feet of service lateral, cutting of liner for the service opening, and installing a pre-fabricated fitting (Inserta-Tee® or equivalent) with the manufacturer's specifications so that a complete water-tight seal is achieved. The new service line shall be connected to the existing service line with a flexible coupling and stainless-steel bands, as approved by OWNER. The service lateral connection at the pipeline shall be encased in lean fill, a minimum of six inches (6") below and twelve inches (12") above and on the sides of the pipe. The lean fill construction shall be inspected and approved by the OWNER prior to completing the trench backfilling.

3.6 ACCEPTANCE OF WORK:

- A. After completion of the pipe bursting, reconnection of sewer service laterals, and rehabilitation of the manholes, the CONTRACTOR shall perform a CCTV inspection in accordance with STS 33 01 30.11.

END OF SECTION 33 01 30.23



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 01 30.41

SEWER LINE CLEANING

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for pipeline cleaning including pre-rehabilitation point repairs and/or removal of protruding service connections to be performed prior to closed circuit television (CCTV) inspection and pipeline rehabilitation/replacement.
- B. Requirements for the removal and disposal of debris from the pipeline.

1.2 RELATED SECTIONS

- A. Special Condition: Immediate Notification of Sanitary Sewer Overflows
- B. STS 33 01 30.02 Temporary Odor Control
- C. STS 33 01 30.11 Television Inspection of Sewers
- D. STS 33 01 30.81 Manhole Rehabilitation

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

- A. Contractor shall submit a written Debris Control Plan. The plan shall contain:
 - 1. Sewerline and manhole cleaning plan describing methodology to be used from manhole to manhole.
 - 2. Describe what measures will be implemented to remove the debris generated during the sewerline cleaning operation from continuing downstream in the active sewer.
 - 3. Describe what measures will be implemented during the manhole interior cleaning process to prevent debris from entering the sanitary sewer flow and flowing downstream. Examples are temporary planks spanning the manhole benches or installation of a sturdy net.
 - 4. Describe what measures will be implemented to prevent debris from entering the open manhole. Examples are a steel plate covering the open manhole or installation of a sturdy net.
 - 5. Communication plan. Identify who is responsible for enforcing the Plan to all parties, including sub-contractors, working at the project site.

6. The Debris Control Plan from STS 33 01 30.81:Manhole Rehabilitation and this STS may be the same plan.
- B. Noise mitigation plan during cleaning operations.
- C. Pre-rehabilitation host pipe condition analysis report pre section 1.5.

1.5 PRE-REHABILITATION HOST PIPE CONDITION ANALYSIS

- A. The CONTRACTOR shall review all the post-cleaning digital videos and identify any additional host pipe deficiencies which impact the rehabilitation of the pipeline. CONTRACTOR shall submit a pre-rehabilitation host pipe condition analysis in writing to the ENGINEER and OWNER. The analysis shall describe the following:
 1. Any anticipated defects in the trenchless pipeline rehabilitation system due to the current host pipe condition for each pipe segment (List specific locations along the pipe segment);
 2. Specific locations along the pipe segment where additional point repairs/obstruction removals are requested;
 3. Any modifications to the installation procedures due to the current host pipe condition for each pipe segment;
 4. Any concerns pertaining to a specific pipe segment due to host pipe condition.
 5. No point repair or obstruction removal shall be performed without written approval from the ENGINEER and OWNER.
- B. If ENGINEER and OWNER rejects a request to perform a point repair or obstruction removal, the CONTRACTOR shall perform the pipeline rehabilitation with the host pipe deficiency. The OWNER will reimburse the CONTRACTOR for a post-rehabilitation point repair/trenchless liner patch (method to be determined) if the liner pipe is found to be unacceptable.

PART 2– PRODUCTS

2.1 CLEANING METHODS/EQUIPMENT:

- A. HIGH VELOCITY JET-CLEANING: Cleaning equipment that uses a high velocity water jet for moving debris shall be capable of producing a minimum volume of 50-gpm with a pressure of 1500 psi at the pump. Any variations to this pumping must be approved in advance, by the ENGINEER. A working pressure gauge shall be used on the discharge of all high-pressure water pumps. A minimum of 2 or more high-velocity nozzles capable of producing a scouring action from 15 to 45 degrees. The CONTRACTOR shall operate the equipment so that the pressurized nozzle continues to move at all times. The pressure nozzle shall be turned off or reduced anytime the hose is held or delayed preventing damage to the line. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.
- B. MECHANICAL CLEANING: Mechanical cleaning, in addition to normal cleaning when required by the ENGINEER, shall be performed with approved equipment and accessories driven by power winching devices. The CONTRACTOR shall submit the equipment manufacturer's operational manual and guidelines to the ENGINEER, which shall be followed strictly, unless

modified by the ENGINEER. Experienced operators shall operate all equipment and devices so that they do not damage the pipe in the process of cleaning. Cleaning devices and other debris removing equipment/accessories shall be used as appropriate and necessary in the field, in conjunction with the approved power machine(s). Bucket machines shall operate in pairs with sufficient power to perform the work in an efficient manner. Machines shall be belt operated or have an overload device. Machines with direct drive that could cause damage to the pipe, will not be allowed. The use of cleaning devices such as rods, metal pigs, porcupines, root cutters, snakes, scooters, sewer balls, kite and other approved equipment, in conjunction with hand winching device, and/or, gas, electric rod propelled devices, shall be considered normal cleaning equipment.

PART 3– EXECUTION

3.1 WATER USAGE

- A. The CONTRACTOR shall be responsible for obtaining a water meter(s) from OWNER'S Customer Service, that shall be installed at the fire hydrant(s). The CONTRACTOR is responsible for installing the water meter and an approved reduced pressure backflow preventer on any and all fire hydrant connections along with obtaining all required permits. All related charges for the set-up and the water bill shall be considered incidental to the cleaning of the existing sewer lines. No fire hydrant shall be obstructed or used when there is a fire in the area. The CONTRACTOR shall remove the water meter(s)/piping etc., from all fire hydrants at the end of each working day. Water shall not be wasted on streets.

3.2 CLEANING

- A. All cleaning activities shall be performed by experienced personnel. All cleaning shall be done from the downstream manhole unless otherwise authorized by the OWNER.
- B. The CONTRACTOR shall close or cover all open sanitary manholes or access openings in the lines when operations have been suspended for a period of two hours or more to minimize the dispersal of sewer odors. No cleaning shall be done prior to checking both upstream and downstream manholes for flow monitors or other mechanical devices. When utilizing high-velocity hydraulic cleaning equipment independently or in combination with other cleaning methods, a minimum of 2 passes with the hydraulic nozzle shall be done unless otherwise approved by the ENGINEER. If cleaning cannot be completed from one manhole, the equipment shall be moved and set up on the other manhole and cleaning shall be re-attempted. If successful cleaning still cannot be performed or the equipment fails to traverse the entire pipeline section, it shall be assumed that a blockage exists. Efforts to clean the lines shall be temporarily suspended and the CONTRACTOR shall notify the ENGINEER. Upon removal of the obstruction, the CONTRACTOR shall complete the cleaning operation.
- C. The CONTRACTOR shall remove all foreign materials from the interior of pipelines and manholes including but not limited to debris, roots, solids, sand, grease, and grit thus improving pipe flow as well as facilitating television inspection. Manhole cleaning shall include all surfaces between the pipe invert and a point 12 inches above the pipe crown and all manhole benches. Experienced personnel shall operate all cleaning equipment and devices. Satisfactory precautions shall be taken to protect the sanitary sewer mains and manholes from damage that might be inflicted by the improper use of the cleaning process or equipment. Any manhole and/or frame and cover that is dismantled or damaged during

the cleaning process (excluding those manholes for which new rings and covers are to be installed where shown on the Drawings), shall be repaired at no additional cost and shall be incidental to cleaning. Any damage done to a sewer by the CONTRACTOR shall be repaired by the CONTRACTOR at no additional cost to the OWNER and to the satisfaction of the ENGINEER and OWNER. Cleaning shall also include the manhole wall washing by high pressure water jet. The CONTRACTOR shall ensure manholes are not damaged due to the forces generated by equipment, water pressure, and air pressure.

- D. The CONTRACTOR, when instructed by the ENGINEER, shall demonstrate the performance capabilities of the cleaning equipment proposed for use on the project. If the results obtained by the proposed sanitary sewer cleaning equipment are not satisfactory, the CONTRACTOR shall use different equipment and/or attachments, as required to meet specifications. More than one type of equipment/attachments may be required at a location. When hydraulic or high velocity cleaning equipment is used, a suitable sand trap, weir, dam, or suction shall be constructed in the downstream manhole in such a manner that all the solids and debris are trapped for removal.
- E. When hydraulic or high-velocity cleaning equipment is used, it is required that the vacuum chute be in the downstream manhole to remove all debris loosened in the pipe cleaning operation. Additionally, the Contractor may install a suitable sand trap, weir, dam or suction device in the downstream manhole so that debris is trapped for removal.
- F. The Contractor shall take precautions to protect sanitary sewer manholes and pipelines from damage that might occur by improper selection and use of cleaning equipment. When using hydraulically-propelled devices, take precautions to ensure that the water pressure created does not cause damage to or flooding of public or private property. Do not surcharge any sanitary sewer to an elevation that could cause overflow of sewage including backup into laterals.
- G. Where possible, use the flow of wastewater present in the sanitary sewer pipeline to provide the fluid for hydraulic cleaning.
- H. The Contractor shall operate high-velocity cleaning equipment so that the pressurized nozzle moves continuously. Turn-off or reduce the flow to the nozzle to prevent damage to the pipeline any time the nozzle becomes stationary.

3.3 REMOVAL AND DISPOSAL OF DEBRIS

- A. All sludge, dirt, sand, rocks, grease, and other solid or semi-solid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing of debris from upstream manhole section to downstream manhole section will not be allowed. All debris from the manholes shall be loaded into an enclosed container that is approved by the New Mexico Environment Department for liquid waste hauling.
- B. The CONTRACTOR is not allowed to accumulate debris, and/or liquid waste, sludge, etc. on the site except in enclosed containers approved by the New Mexico Environment Department. All waste shall be disposed of at a legally permitted disposal site.
- C. Debris may be disposed at the OWNER'S Soils Amendment Facility (SAF) located near Double Eagle Airport if it passes a paint filter test and the OWNER determines that the debris is suitable for disposal at the SAF. CONTRACTOR shall be responsible for all debris loading, unloading, intermediate handling, reloading, and transportation to the point of disposal. There will be no charges by the OWNER for disposal of accepted debris at the SAF.

The OWNER will be responsible for spreading dried debris disposed at the SAF after it is dumped. The CONTRACTOR is notified that the SAF may have limited hours in which material may be hauled to the site. Should the material not pass the paint filter test, or is unsuitable for disposal at the SAF, the CONTRACTOR shall find a disposal location that is acceptable to the ENGINEER and OWNER.

3.4 PRE-REHABILITATION POINT REPAIR/OBSTRUCTION REMOVAL

- A. This subsection specifies the point repair/replacement of host pipelines and/or obstruction removal from host pipelines due to host pipe deficiencies which impact the rehabilitation of the pipeline. The CONTRACTOR shall repair the pipeline where point repairs or obstruction removals are shown on the Plans and/or are approved by the OWNER (as identified in section 1.5) prior to any rehabilitation.
- B. PRE-REHABILITATION POINT REPAIR: A Point Repair shall include up to 12 linear feet of pipeline replacement by excavation. Remove only that amount of sanitary sewer pipe or sewer service connection which will impact the pipeline rehabilitation. New sewer pipe shall be per STS 33 31 11 Public Sanitary Sewerage Gravity Piping. Transitions shall be flexible couplings with stainless-steel bands. The new sewer pipe and flexible couplings shall be backfilled with lean fill or concrete to a thickness of at least 12 inches from the pipe exterior, from the pipe spring line and down.
- C. PRE-REHABILITATION OBSTRUCTION REMOVAL: An Obstruction Removal shall be performed with a remote device (robot) which can remove the obstruction by entering the pipeline from a manhole. An obstruction shall be defined as a) a protruding service more than 1-inch into the main.; b) a miscellaneous obstruction that cannot be removed by one of the cleaning methods or equipment identified in this Section, as demonstrated by the CONTRACTOR.

END OF SECTION 33 01 30.41



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 01 30.51

SEWAGE FLOW CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. The work specified in this section of the specifications provides the requirements for sanitary sewer flow control during sewer line rehabilitation/replacement including bypass pumping and/or temporary flow control.
- B. The purpose of sanitary sewer flow control is to maintain reliable sewer service to the users during rehabilitation/replacement, and to prevent backup to services and/or overflow outside of the designated pipes and manholes during cleaning, television inspection, and/or rehabilitation/replacement of the sewer line.

1.2 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.3 PERFORMANCE REQUIREMENTS

- A. CONTRACTOR shall maintain on site, sufficient equipment, materials, and personnel to ensure continuous and successful operation of the bypass pumping system.
- B. CONTRACTOR shall provide all necessary means to safely convey the existing flows past the work area. Flow data, if available, for sizing the bypass pumping systems required for this project is provided in the plans. The CONTRACTOR is responsible for the design, construction, and operation of adequate and properly functioning bypass systems even if flow data is unavailable. The collection of any additional flow monitoring data that CONTRACTOR believes is necessary to design bypass pumping facilities shall be performed at CONTRACTOR's expense and is considered incidental to the work. CONTRACTOR is further advised that during major rain events, the flows may increase by 35 percent or more, beyond the provided flow data or measured flow data collected by the CONTRACTOR; CONTRACTOR's design, construction and operation of the bypass system shall account for this contingency.
- C. Temporary bypass pumps:
 - 1. Primary pump(s) shall be a complete unit sized to handle the peak flow of the section of sewer line to be bypassed and pumped.
 - 2. Standby pump(s) shall be a complete unit able to provide 100 percent redundancy and be fully operational at all times including all equipment and piping being in-place. Standby pumps shall have a valve and manifolded for fast changeover during emergency situations.

3. All pumps shall be non-clog pumps designed for wastewater service in the presence of sewage solids.
4. The CONTRACTOR shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping, and other parts or system hardware to ensure immediate repair or modification of any part of the system as necessary.
5. Pumping operations shall be enclosed by an approved sound suppression system.

D. Temporary piping:

1. Discharge piping: Designed to withstand at least twice the maximum system pressure or a maximum of 50 psi, whichever is greater. Pipe shall be sized to limit velocities to less than 8 feet per second during peak flow. Discharge piping that extends into a manhole shall be rigid hose or hard pipe. Lay-flat hose is not allowed to extend into manholes. All discharge piping must be anchored at the discharge point.
2. Suction piping: Designed according to pump size, flow calculations, and suction depth. Suction piping that extends into a manhole shall be rigid hose or hard pipe.

E. Temporary Pipeline Plugs and Test Balls:

1. Specifically designed for host pipe diameter and application.
2. Maximum pressure rating shall be 17 psi up to 12" diameter line. Plug or test-ball for pipe sizes larger than 12" require approval from Engineer prior to use.

1.4 SUBMITTALS

- A. General: Submit listed submittals in accordance with conditions specified in the Contract and STS 01 33 00 – Submittal Procedure.
- B. Planned sequence of construction with specific dates and times of Temporary Flow Control (without bypass pumping) and Bypass Pumping.
- C. Bypass Pumping Plan: The plan shall indicate the locations and capacities of all pumps, sumps, plugs, suction, discharge lines, frequency of maintenance, hourly inspections with inspection log showing personnel and observations.
- D. Temporary Flow Control Plan (without bypass pumping): The plan shall indicate the locations and durations of all test-balls and plugs, plus a monitoring plan of upstream storage.
- E. Noise Control Plan per the applicable ordinance.
- F. Spill Prevention and Emergency Response Plan: The plan shall address implementation of measures to prevent sewage spills, procedures for spill control and containment, emergency response, cleanup, and spill and damage reporting. The plan shall account for all storm drain systems and water courses within the vicinity of the work which could be affected by a sewage spill. Catch basins that could receive spilled sewage shall be identified. Notification shall be per the Special Conditions of the contract.

PART 2– PRODUCTS – NOT USED

PART 3 – EXECUTION

3.1 SETUP

- A. The bypass pumping system or the installation of the bypass pumping system shall not impede or prevent access to private residences, public facilities, or businesses, except by prior agreement with impacted owners and renters.
- B. Temporary piping shall not completely impede a traveled roadway in either direction or completely block access to any resident or business. Temporary piping may need to be constructed in trenches with adequate cover and otherwise protected from damage due to traffic.
- C. The discharge location (manhole and downstream pipeline) shall be protected against any scour, erosion, or damage due to the bypass pumping operations.
- D. CONTRACTOR shall host a Pre-Bypass Pumping Meeting a minimum of 3 days before the start of bypass pumping. Refer to STS 01 31 00 PROJECT MANAGEMENT COORDINATION for additional information.

3.2 EXAMINATION

- A. Contractor shall inspect the bypass pumping operation.
 - 1. In areas where flows are bypassed, all bypass flows shall be discharged as approved by the Engineer.
 - 2. The Contractor shall inspect the entire bypass pumping and piping system for leaks or spills on an hourly basis.
 - 3. The Contractor shall also create an inspection log and shall enter the time of the inspections, the condition of the piping, the fuel level for the power source (if applicable), and the name of the inspector into the log for review by the Engineer.
 - 4. No bypassing to the ground surface, receiving waters, storm drains, or bypassing which results in soil or groundwater contamination or any potential health hazards shall be permitted.
 - 5. In the event of any sewage spill the Contractor will be responsible for the prompt cleanup and disinfecting of the spill as called for in his spillage cleanup plan.
 - 6. The Contractor shall compensate the Owner for the cost of any fines levied as the result of a spill or unauthorized discharge.
- B. The CONTRACTOR shall maintain a test-ball insertion/removal log to track the date and time the test-ball is inserted and the date and time the test-ball is removed. The log shall be available for review by the owner, engineer, or inspector.

3.3 CLEANING

- A. When bypass pumping operations are complete all piping shall be drained into the sanitary sewer prior to disassembly.

END OF SECTION 33 01 30.51



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 01 30.70

PIPE SLIP LINING

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the rehabilitation of gravity sanitary sewer lines by pipe slip lining methodology including reinstatement of service lateral connections.

1.2 RELATED SECTIONS

- A. Special Condition: Immediate Notification of Sanitary Sewer Overflows
- B. STS 03 64 23: Injection Grouting
- C. STS 33 01 30.41: Sewer Line Cleaning
- D. STS 33 01 30.11: Television Inspection of Sewers
- E. STS 33 01 30.51: Sewer Flow Control and Bypass Pumping

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. The Greenbook Standard Specifications for Public Works Construction, Latest Edition.
- C. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

- A. Pipe Installation Plan: The CONTRACTOR shall prepare and submit a plan with installation procedures and the locations of insertion/access pits for review and approval at a minimum of 30 working days prior to commencing work. This plan may include a dewatering plan if groundwater is identified to be present.
- B. Project specific engineering pipe design calculations for each SAS segment the liner system will be applied. Pipe design shall be calculated and stamped by a professional ENGINEER licensed in the USA and verified by the pipe manufacturer in accordance with ANSI, ASTM, and AWWA standards. Calculations shall include, but not be limited to; soil loads, live loads, hydrostatic loads, pipe stiffness, Standard Dimension Ratio, pipe wall crushing strength, initial and long term (50 years) values of pipe deflection including grout load deflection, pipe bonding strain, hydrostatic collapse resistance, constrained buckling strength, and allowable jacking force and length.

- C. Certifications from the manufacturer demonstrating the pipe meets or exceeds the requirement of this specification. Certifications of the materials shall include the cell classification, grades, type of resins, glass fibers, and all other materials used in the manufacturing of the pipe. Certifications shall include drawings showing the cross-sectional profile of the pipe wall and pipe joint details.
- D. Details from the pipe manufacturer of the pushing or pulling heads to be used.
- E. Manufacturers' shipping, storage, and handling recommendations for all components of the pipe system.
- F. Shop drawings of the Closure Couplings.
- G. Material data sheets and bulkhead design for sealing the liner at manholes.
- H. Identification/notification of any host pipe defects which will impact the pipe bursting operation and a proposed pre-rehabilitation repair method for each defect. Refer to STS 33 01 30.41.

1.5 QUALITY ASSURANCE

- A. Qualifications: The manufacturer of pipe and fittings must demonstrate a ten-year minimum history of successful installations in the United States for direct-bury and slip line rehabilitation of sanitary sewers.

1.6 PIPE DESIGN CRITERIA

- A. Pipe design shall be based on the following Design Conditions (Gravity Service):

Height of Water Above Top of Pipe, ft	=	1.0
Fluid Temperature, degrees F	=	80
Soil Density, pcf	=	130
Live Load, psi	=	HS-20 Highway
Dead Load, psi	=	Dead Load/Depth of cover: As indicated on the Drawings. Vertical deflection not to exceed 3-percent in short term (30 days) and 5 percent thereafter
Modulus of Soil Reaction, psi	=	800

PART 2– PRODUCTS

2.1 MANUFACTURERS

- A. Refer to the OWNER’s Approved Product List.
- B. Pre-approved manufacturers not included in the OWNER’s approved product list is:
 - 1. Contech Engineered Solutions LLC

2.2 MATERIAL

- A. Fiberglass Reinforced Polymer Mortar Pipe (FRPMP)

1. All FRPMP shall be per ASTM D3262, Type 1, Liner 1 or 2, Grade 1 or 3. The pipe shall also meet the strain corrosion resistance requirements of ASTM D 3681 and joint requirements of ASTM D 4161.
2. The interior surface of the FRPMP shall be a resin rich finish, 40 mils thick minimum, of epoxy, polyester or vinylester resin with no fillers and shall be free of cracks and crazing when placed under the design loading.
3. The interior and exterior layers of the FRPMP shall be composed of resin impregnated glass fibers and silica sand fillers in layers.
4. The FRPM pipe produced shall have a minimum pipe stiffness of 46 psi at 5% deflection as set forth in ASTM D 2412.
5. Resin Systems: The manufacturer shall use a thermosetting polyester resin system with a minimum tensile elongation of 2 percent.
6. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be commercial grade of E-type glass filaments with binder and sizing compatible with impregnating resins.
7. Fillers: Sand shall be in accordance with ASTM C 33 and shall be a minimum 98% silica, kiln-dried and graded, with a maximum moisture content of 0.2%.
8. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally impact the performance of the product.
9. Chemical resistance: The FRPMP shall meet or exceed the requirement for the 50-year strain value as outlined in ASTM D 3262-Table 4 when tested in accordance with ASTM D 3681.
10. FRPMP Joining System:
 - a. The FRPMP shall be field connected with flush bell-spigot joints meeting the performance requirements of ASTM D4161.
 - b. An elastomeric gasket meeting the requirements of ASTM F477 shall be used to provide a positive leak proof sealing system at each pipe joint.
 - c. Maximum allowable joint angular deflection shall be 1.0 degrees.
11. Closure Couplings for FRPMP
 - a. Casing and fasteners shall be constructed of 316 Stainless Steel.
 - b. Sealing Sleeve shall be constructed of EPDM rubber.

B. Steel Reinforced Polyethylene (SRPE) Pipe

1. SRPE pipe is a reinforced polyethylene pipe with a smooth waterway wall and exterior profile that is reinforced with high strength galvanized steel ribs. The continuous reinforcing ribs shall be completely encased within the polyethylene profile.

2. Refer to the plans or special provisions of the contract regarding color requirements inside the SRPE pipe. Inside color of the SRPE pipe may be required to be white or an alternative light color suitable for illumination during television inspection. Outside color may be different provided the pipe is a homogeneous material and all colors are integral to the HDPE material (not painted or coated)
3. SRPE pipe shall be manufactured using a helical winding process that results in a continuously fusion welded lap seam.
4. SRPE pipe profile shall be manufactured using a high quality stress-rated thermoplastic meeting the requirements of ASTM F2562 "Standard Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage" or AASHTO Designation MP-20.
5. SRPE pipe shall be manufactured from virgin high density polyethylene stress-rated resins. Resins shall conform to the minimum requirements of cell classification 345464C as defined and described in the latest version of ASTM D3350 "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials".
6. SRPE pipe joining system shall be gasketed, bell and spigot joints where both the bell and spigot are reinforced with steel that is fully encased in stress-rated high density polyethylene (meeting the requirements set forth in the above section) and that have been laboratory tested to 15 psi when tested in accordance with ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals".

C. PVC Corrugated Sewer Pipe with a smooth interior

1. The actual outside diameters of the PVC Corrugated Sewer pipe barrel for 12"-36" nominal diameters shall be in accordance with ASTM F949. Pipe shall be supplied in nominal lengths of 10 or 20 feet. When required by radius curves, pit size or sewer misalignment, etc., pipe shall be supplied in special lengths that are even division of 20 feet. The minimum laying length shall be 2.5 feet.
2. PVC Corrugated Sewer Pipe shall be manufactured and tested in accordance with ASTM F949.
3. PVC Corrugated Sewer pipe shall be made of PVC compound having a minimum cell classification of 12454 in accordance with ASTM D1784.
4. PVC Corrugated Sewer pipe shall be manufactured as a single extrusion of the smooth inner and the corrugated outer walls. The corrugated exterior profile shall be annular and seamless.
5. PVC Corrugated Sewer Pipe shall have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412.
6. The PVC Corrugated Sewer pipe minimum wall thickness shall be stated in Table 1 of ASTM F949 when measured in accordance with ASTM D2122

7. PVC Corrugated Sewer Pipe shall be field connected with molded or fabricated PVC couplings. Couplings shall not increase the outside diameter or reduce the inside diameter when assembled. The joint shall utilize elastomeric sealing gaskets as the sole means to maintain joint water tightness and shall meet the requirements of ASTM D3212. Joints shall remain watertight at 5 degrees angularity. Gaskets shall meet the requirements of ASTM F477 and be suitable for the service intended. All socket (bell) dimensions shall be sufficiently deep to allow for maximum joint angularity without joint separation. The minimum socket depth shall be 4.25 inches. The outside diameter of sockets shall be equal to the pipe outside diameter.

D. Materials for Sealing Pipe at Manholes

1. The annular space between host pipe and liner pipe at each manhole may be sealed with Oakum saturated with Avanti 202 covered with a quick setting grout, an approved non-shrink grout or an approved quick setting epoxy.
2. The annular space between host pipe and liner pipe at each manhole may also be sealed with a water stop gasket by Fernco Company or approved equal and finished with a quick setting grout.
3. The quick setting grout, non-shrink grout or a quick setting epoxy shall be used for sewer applications that is chemical resistant.

PART 3– EXECUTION

3.1 EXAMINATION

- A. Proceeding with Work specified in this Section shall be interpreted to mean that all conditions, including site conditions, were determined to be acceptable prior to start of Work.
- B. Pipes shall be inspected by the OWNER or ENGINEER for damage prior to installation.
- C. If pipe is found to be superficially damaged by cracks, holes, de-laminations, foreign inclusions, blisters, or other defects that would, due to their nature, degree, or extent, have a deleterious effect on the pipe performance as determined by the ENGINEER; the ENGINEER may reject the pipe or may allow the pipe to be repaired. Rejected pipe shall be replaced with a new section of pipe at no additional cost to the OWNER.

3.2 PREPARATION

- A. Complete all pre-approved obstruction removals, pipe cleaning, and point repairs per STS 33 01 30.41. Complete the pre-rehab CCTV inspection including submittal and approval by ENGINEER and OWNER per STS 33 01 30.11. All sewer service connections shall be identified and located prior to slip-lining. All sanitary sewer flow control shall be approved by ENGINEER and OWNER and in-place and operational prior to slip lining.
- B. CONTRACTOR is responsible for determining the internal diameter, ovality, and any obstructions within the existing pipe that may impede the slip-lining process.
- C. Protection: Before any excavation is done for any purposes, the CONTRACTOR shall contact the appropriate One Call agency for determining field locations of existing utilities near the

work area. Temporary construction easement and/or right-of-way areas, if required, will be arranged by the CONTRACTOR at no cost to the OWNER.

3.3 INSTALLATION

- A. Rehabilitation of sewer pipe by slip-line shall be full compensation for all subsurface investigations, materials, labor, equipment, cost of insertion pits, removing and replacing gravel base course, pavement, curb and sidewalk, and incidentals required to complete the slip-line process. Connection to the manholes is incidental to the pipe slip-line process.
- B. CONTRACTOR is responsible for any point repairs or point insertion pits required to advance the slip-lining process due to the liner pipe becoming immovable before reaching the end of the pre-determined segment.
- C. Pipe Insertion Pits
 - 1. Insertion pits shall be excavated and backfilled in accordance with the appropriate specifications. Remove and replace existing asphalt in accordance with the applicable standard details and specifications.
 - 2. All excavations shall be properly sheeted and shored in accordance with relevant specifications for trench safety systems. Any damage resulting from improperly shored excavations shall be corrected to the satisfaction of the OWNER or ENGINEER with no additional compensation due to the CONTRACTOR.
 - 3. All open excavations shall be kept secure at all times by the use of barricades with appropriate lights and signs, construction tape, covering the steel plates, etc., or as directed by the ENGINEER.
 - 4. Insertion pits shall be of sufficient length to allow the pushing mechanism and new liner pipe to enter the host pipe and maintain the grade of the existing sanitary sewer.
 - 5. CONTRACTOR to install insertion pits to eliminate the use of closure couplings. Refer to section D if closure couplings are required.
 - 6. The pits shall be located such that their total number shall be minimized, and the footage of liner pipe installed in a single push shall be maximized.
 - 7. As directed by the OWNER, insertion pits shall be located where obstructions or damaged pipe are planned to be removed.
- D. Pipe Insertion/Slip lining
 - 1. The existing sewer shall remain in operation during the relining process.
 - 2. Any Obstruction that would prevent passage or damage to the liner sections shall be removed or repaired prior to installing the liner. Slip-line work shall begin within 12 hours of the pipe being cleaned.
 - 3. After completing the insertion pit excavation, the top of the existing sanitary sewer pipe shall be removed, where required, down to the spring line. Bumpers shall be provided in the insertion pit in order to prevent the edges of the existing pipe from damaging the outside of the liner as it is inserted into the existing sewer.

4. The liner shall be inserted into the existing sewer spigot end first with the bell end trailing. The pushing force shall be applied to the pipe wall end inside of the bell in accordance with the manufacturer's instructions. A jacking or pulling ring shall be used to distribute the push/pull forces uniformly against the bell end perimeter of the liner pipe. Once the slip-line work has begun for a segment of existing sewer line, work shall be completed without interruption to next manhole or insertion pit. No jacking load shall be applied to the end of the bell.
5. The installation heads or mechanism shall incorporate a gauging system which shall provide a continuous monitor of the force being applied during liner insertion operations.
 - a. If the gauging system does not provide a direct reading of the force being applied to the pipe in pounds, the system shall be calibrated and such calibrated data shall be tabulated in written form to allow the ENGINEER to readily determine the force in pounds being applied to the pipe during the insertion operation.
 - b. The insertion force used by the CONTRACTOR shall not exceed the liner pipe manufacturer's recommended maximum allowable pulling or pushing force that can be exerted on the pipe without damaging integrity of the liner pipe or pipe joints.
6. For manholes where no point of intersection occurs in the manhole, the pipe liner shall be inserted through the manholes with no pipe joints in the manhole and the pipe liner shall be terminated with an end seal.

E. CLOSURE COUPLING

1. CONTRACTOR shall follow the following installation requirements along with the manufactures installation procedures to create a watertight connection. The ends of the liner to be joined shall be cut smooth and square to the axis of the liner.
 - a. Use the distance between the marks on each pipe to establish any pipe gaps, but not beyond the sealing capability of the coupling. Center the coupling about the marks. The recommended maximum gaps shall be per manufactures recommendations.
 - b. To aid fitting, the screws may be loosened but not disconnected form the nut or bar.
 - c. Make sure that the two pipes are straight and not misaligned. Adjust if necessary. Check that any ovality in the pipes is in the same direction. The maximum step between the pipe outside diameters at any point around the pipe circumference should not be greater than 0.1" (size up to 24" ND) or 0.2" (size over 24" ND). Adjust or jack out if necessary.
 - d. The sealing of the rubber sleeve will be improved by tapping all-round the casting with a soft nosed mallet during the tightening procedure for all diameters over 24" ND and/or on rough or out of round pipes.

- e. Any gap between the pipe surface and the rubber sleeve suggests poor compression. Check the pipe surface for deformation and pipe alignment and carefully refit the couplings.
- f. The amount of movement which a coupling can accommodate shall be per manufactures recommendations.
- g. The maximum amount of angular deflection which the couplings can accommodate shall be per manufactures recommendations.

3.4 REINSTATE SERVICE LATERAL CONNECTION BY OPEN CUT

- A. The CONTRACTOR shall notify the occupants of the buildings with service connections when the service will be interrupted. The CONTRACTOR shall give the OWNER of the service the opportunity to remove and replace the service line within private property at the property OWNER'S expense. The CONTRACTOR shall maintain sewer service throughout the construction period, without any spills or discharges to unapproved systems
- B. All live services shall be immediately reinstated after the pipe slip lining (pipeline rehabilitation) is complete. Inactive service lines to a vacant lot, vacant building, or to an occupied residence with more than one service line serving the property, shall be defined as a "live" service, and shall be reinstated. It is the CONTRACTOR'S responsibility to locate all live services prior to rehabilitation activities.
- C. Service lateral reinstatement by open cut includes locating all interfering utilities, existing surface removal, excavation, dewatering, reinstatement of service lateral connection, backfilling, surface restoration, temporary flow bypassing, and sewer dewatering. Reinstatement of service lateral connection by open cut includes the removal and replacement of the first five (5) feet of service lateral, cutting of liner for the service opening, and installing a pre-fabricated fitting (Inserta-Tee® or equivalent) with the manufacturer's specifications so that a complete water-tight seal is achieved. The new service line shall be connected to the existing service line with a flexible coupling and stainless-steel bands, as approved by OWNER. The service lateral connection at the pipeline shall be encased in lean fill, a minimum of six inches (6") below and twelve inches (12") above and on the sides of the pipe. The lean fill construction shall be inspected and approved by the OWNER prior to completing the trench backfilling.

3.5 END SEALS

- A. The finished linear shall be cut smooth and parallel with the manhole wall. The interface between the host pipe and the pipe liner shall be sealed 360 degrees. End seals shall be completed prior to the start of annular space grouting. When the pipe liner extends through a manhole it shall be sealed at all seams between liner and manhole. End seals shall be completed prior to the start of the annular space grouting.

3.6 ANNULAR SPACE GROUTING

- A. The annular space (void between the host and liner pipes) shall be completely filled with grout to support the liner and provide long-term stability. Refer to STS 03 64 23 (injection grouting).

3.7 ACCEPTANCE OF WORK:

- A. After completion of the pipe slip lining, reconnection of sewer service lateral, and rehabilitation of the manholes, the CONTRACTOR shall perform a CCTV inspection in accordance with STS 33 01 30.11.

END OF SECTION 33 01 30.70



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 01 30.72

CURED-IN PLACE PIPE LINING

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the rehabilitation of gravity sanitary sewer lines by installation of a Cured - In-Place Pipe Lining system including reinstatement of service lateral connections. The liner system shall be entirely trenchless excluding pre-approved point repairs. The liner system shall be continuous from manhole to manhole.

1.2 RELATED SECTIONS

- A. Special Condition: Immediate Notification of Sanitary Sewer Overflows
- B. STS 33 30 41: Sewer Line Cleaning
- C. STS 33 30 11: Television Inspection of Sewers
- D. STS 33 30 51: Sewer Flow Control and Bypass Pumping

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. The Greenbook Standard Specifications for Public Works Construction, Latest Edition.
- C. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

- A. Pre-Installation
 - 1. Pipe Installation Plan: The CONTRACTOR shall prepare and submit a plan with trenchless pipeline rehabilitation installation procedures for review and approval at a minimum of 30 working days prior to commencing work. This plan may include a dewatering plan if groundwater is identified to be present.
 - 2. Project specific engineering pipe design calculations (Liner Wall Thickness) for each SAS segment the liner system will be applied. Pipe design shall be calculated and stamped by a professional ENGINEER licensed in the USA and verified by the pipe manufacturer in accordance with ANSI, ASTM, and AWWA standards. Calculations shall include, but not be limited to; soil loads, live loads, hydrostatic loads, pipe stiffness, Standard Dimension Ratio, pipe wall crushing strength, initial and long term (50 years) values of pipe deflection, pipe bonding strain, hydrostatic collapse resistance, constrained buckling strength, and allowable pulling force and length.

3. Shop drawings, catalog data, MSDS sheets, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings pertinent to this project demonstrating compliance with this specification.
4. Liner repair materials, methods, and manufacturer's recommendations (Repair Specification).
5. Manufacturers' shipping, storage, and handling recommendations for all components of the liner system
6. List of critical equipment needed for the installation of the liner system, List of redundant equipment that will be onsite during each installation.
7. Material data sheets for sealing the liner at manholes.
8. Pressure gauge, recorder, and field equipment certifications (e.g., calibration by an approved certified lab).
9. Identification/notification of any host pipe defects which will impact the cured-in-place pipe installation and a proposed pre-rehabilitation repair method for each defect. Refer to STS 33 01 30.41.

B. Post-Installation

1. An evaluation of all defects witnessed through a review of the post-rehabilitation inspection with repair recommendations for liner pipe found to be unacceptable, per the Section.

1.5 QUALITY ASSURANCE

- A. Documentation showing that personnel has three (3) years of Cured-in-place pipe lining experience with a list of a minimum 50,000 linear feet installed by the company including 3 sewer main projects similar or greater in scope and value to the project specified in the contract documents. Information for each supervisor and the company must include, but not be limited to, date of work, location, pipe information (i.e., length, diameter, depth of installation, pipe material, etc.), project OWNER information, (i.e., name, address, and telephone number, contact person).

1.6 LINER DESIGN CRITERIA

- A. The proposed liner or pipe shall be capable of withstanding a minimum fifty-year (50-yr) continuous loading condition.
- B. Thickness design of the liner system and pipes shall be for a fully deteriorated host pipe condition. Pipes shall have a minimum wall thickness in accordance with the manufacturer's recommendations. The minimum wall thickness shall be determined using the following design parameters, unless other design parameters are shown on the plans:

Factor of Safety	=	2.0
Long-Term Modulus of Elasticity, psi	=	50% of Flexural Modulus
Height of Water Above Top of Pipe, ft	=	1.0
Fluid Temperature, degrees F	=	80
Soil Density, pcf	=	130

Live Load, psi	=	HS-20 Highway
Ovality Factor, %	=	3.0
Modulus of Soil Reaction, psi	=	800

C. Refer to plans for minimum rehabilitated/replaced internal diameter of each segment.

PART 2– PRODUCTS

2.1 MANUFACTURERS

A. Pre-approved structural liner systems.

1. Cured-in-place pipe (CIPP) liner marketed under the trade name “Insituform.”
2. Cured-in-place pipe (CIPP) liner marketed under the trade name “InLiner Technologies.”
3. Cured-in-place pipe (CIPP) liner marketed under the trade name “Applied Felts.”
4. Cured-in-place pipe (CIPP) liner marketed under the trade name "IPR"
5. Ultra-Violet glass reinforced Cured-in-place pipe (UV CIPP) liner marketed under the trade name “ALPHALINER”

2.2 MATERIALS

A. Water or Steam Cured-In-Place Pipe (CIPP) Liner

1. CIPP Liner shall either be the Type A – inversion process conforming to ASTM F 1216 or the Type B – pull in place process conforming to ASTM F 1743 for installation using heated water cure or steam cure. The CIPP liner shall use an approved epoxy , epoxy polyester resin or epoxy vinyl ester resin-impregnated flexible fabric tube. The tube shall be installed by an inversion method using a hydrostatic head or by pulling it through an existing pipe and inflating by inverting a membrane using a hydrostatic head.
2. The fabric tube shall consist of one or more layers of flexible, needled felt or an equivalent non-woven material and have plastic coating(s). The material shall be compatible with and capable of carrying epoxy, epoxy polyester resin, or epoxy vinyl ester resin, capable of withstanding installation pressures and curing temperatures, and be compatible with the approved resins used. The approved epoxy, epoxy polyester resin or epoxy-vinyl-ester resin shall be compatible with the application and pipeline environment and be able to cure in the presence of water. The initiation temperature for cure shall be as recommended by the resin manufacturer and approved by the ENGINEER. The CIPP liner shall comply with ASTM D 5813 and shall have, as a minimum, the initial structural properties shown in the table below:

Epoxy Resin Properties	ASTM Test Method	Initial Values psi (Mpa)
Flexural Strength	D 790	5,000 (34.5)
Flexural Modulus	D 790	300,000 (2050)
Tensile Strength	D 638	4,000 (27.5)
Tensile Modulus	D 638	250,000 (1710)
Epoxy-Vinyl-Ester Resin Properties	ASTM Test Method	Initial Values psi (Mpa)
Flexural Strength	D 790	4,500 (31)
Flexural Modulus	D 790	250,000 (1710)
Tensile Strength	D 638	3,000 (20.5)
Tensile Modulus	D 638	250,000 (1710)

The CONTRACTOR shall provide field-cured samples as directed by the ENGINEER. The physical properties of the finished CIPP shall be verified through a field sampling procedure in accordance with ASTM F 1216 or ASTM F 1743 and in accordance with ASTM D 5813.

3. Resin and Tube Acceptance: At the time of resin impregnation, the entire fabric tube shall be inspected for defects. The resin shall not contain fillers, except those required for viscosity control, fire retardance, or extension of pot life. Thixotropic agents that do not interfere with visual inspection may be added for viscosity control. The opacity of the plastic coating shall not interfere with visual inspection. Resins may contain pigments, dyes, or colors that do not interfere with visual inspection of the CIPP liner or its required properties. Additives may be incorporated that enhance the physical and/or chemical resistance.

B. Ultra-Violet Glass Reinforced Cured-In-Place Pipe (UV CIPP) Liner

1. UV CIPP Liner shall be the pull in place process conforming to ASTM F2019 Fiberglass, cured in place using ultraviolet light and corrosion resistant polyester Npg, orthophthalic or vinyl ester resins shall be used. The tube shall be installed by pulling it through the existing pipe.
2. An inner liner and outer liner film must be used for resin control, to prevent resin migration and contamination. The inner film and out film are certified styrene gas barriers. A pull in place slip sheet is used to cut down friction of the UV CIPP liner as it is pulled in place. The inner film must be removed after the curing and removal of light train. The material shall be manufactured in such a manner as to result in a tight fitting, continuous liner after installation. There shall be no measurable annular space. The liner shall have a snug fit at manhole terminations as shall be evidence by flares.
3. The UV CIPP liner shall be manufactured and wet out with a resin bath to allow for the lowest possible amount of air entrapment, in an ISO 9000 certified and quality-controlled manufacturing plant. There will be not on site wet out. The fiberglass tube shall be seamless and spirally wound including an exterior and interior film that protects and contains the resins used in the liner. The exterior film shall provide a UV light blocker. The UV CIPP liner shall be shipped in wooden crates that protect the liner from UV Light.

4. The wall color of the interior of the pipe surface of the UV CIPP after installation shall be a light reflective color so as not to interfere with visual and/or closed-circuit television (CCTV) inspection of the liner or its required properties.
5. Resin: The resin system shall meet the requirements of ASTM F2019. The resin shall be a chemically resistant UV cured isophthalic polyester or vinyl ester thermoset resin. When cured the UV CIPP shall meet the structural and chemical resistance requirements of ASTM F2019.
6. The UV CIPP liner shall have, as a minimum, the initial structural properties shown in the table below:

UV CIPP Resin Properties	ASTM Test Method	Initial Values psi (Mpa)
Flexural Strength	D 790	6,500 (45)
Flexural Modulus	D 790	725,000 (5000)

7. The UV CIPP liner shall have, as a minimum, a long-term flexural modulus of 363,500 psi defined as fifty years as determined by ASTM D2990 Test Method.
- C. Materials for Sealing Pipe at Manholes
1. A quick setting grout, non-shrink grout or a quick setting epoxy used for sewer applications that is chemical resistant.

PART 3– EXECUTION

3.1 EXAMINATION

- A. Proceeding with Work specified in this Section shall be interpreted to mean that all conditions, including site conditions, were determined to be acceptable prior to start of Work.

3.2 PREPARATION

- A. Complete all pre-approved obstruction removals, pipe cleaning, and point repairs per STS 33 01 30.41. Complete the pre-rehab CCTV inspection including submittal and approval by ENGINEER and OWNER per STS 33 01 30.11. All sewer service connections shall be identified and located prior to liner installation. All sanitary sewer flow control shall be approved by ENGINEER and OWNER and in-place and operational prior to liner installation.

3.3 INSTALLATION:

- A. All CIPP installations shall be per manufacture’s written recommendations. Precautions shall be taken to protect the new liner and the existing pipe and manholes from any damage that might result during the insertion process.
- B. Water or Steam Cured-In-Place Pipe (CIPP) Liner
1. The outside diameter of the tube being installed shall be sized to allow for expansion so that the CIPP can fit tightly against the existing pipe. CIPP shall be installed in accordance with ASTM F1216 or ASTM F1743 and the CONTRACTOR'S

recommendations as approved by the ENGINEER. Immediately prior to installation, the CIPP liner tube shall be saturated with resin (on or off the work site) and stored/transported at a cool temperature as recommended by the resin manufacturer.

2. Curing: After tube placement is completed, the CONTRACTOR shall provide a suitable heat source and distribution equipment to distribute or recirculate hot water or steam throughout the installed CIPP liner tube. Temperature shall be maintained during the curing period as recommended by the resin manufacturer and approved by the ENGINEER. After the tube is cured, a cool-down period shall be used prior to opening the downstream end, reinstate service lateral connections, and returning normal flow back into the system. Heat curing of the resin shall occur within the manufacturer's approved recommended period (pot life). The water in the CIPP shall be cooled to below 100°F (38°C) before discharge.

C. Ultra-Violet Glass Reinforced Cured-In-Place Pipe (UV CIPP) Liner

1. Liner installation shall be in accordance with ASTM F2019, Section 6.
2. Resin Impregnation: The liner tube shall be impregnated with resin in accordance with ASTM F2019, Section 6.3.1, with the following requirements: The fabric tube shall be totally impregnated with resin (wet out) in the manufacturer's plant under quality-controlled conditions. The impregnation equipment shall contain devices to secure the proper distribution of the resin (resin bath). Certification documentation concerning date, type of resin, resin volume, mixing ratio, liner thickness, temperature, type of glass fiber, manufacturing date shall be stamped and/or marked on the finished uncured fiberglass liner by the UV CIPP manufacturer
3. Tube Insertion: A plastic slip-sheet shall be installed in the bottom half of the pipe prior to liner insertion. The slip-sheet is used to protect the outer film from damage during insertion from offset joints, broken pipe, or slightly protruding taps. In addition, it will increase flow characteristics and reduce friction during the pull-in process. Once the slip-sheet is in place, the shipping crate is opened, and the pre-impregnated spiral wound fiberglass liner is prepared for insertion into the host pipe following manufacturer procedures. Care should be taken to protect the ends of the liner from contaminants within the sewer such as moisture. A double capstan, constant tension winch shall be used to pull the spiral wound fiberglass liner into position. The double capstan, constant tension winch must be capable of documenting the amount of tension used to pull the liner into the pipe. Maximum pulling forces established by the manufacturer will not be exceeded. The tube shall be pulled-in through an existing manhole or approved access point and fully extend to the next designated manhole or termination point. During the pull-in process, the liner is manually fed into the pipe by the install technician. Care should be taken during this process not to tear or damage the outer film, thus exposing the liner to contaminants within the pipe. Lubricants used for tube insertion shall be subject to the approval of the OWNER.

4. Curing: Once the liner has been inserted into the host pipe, an end plug or packer is used to cap one end of the liner to prepare for initial pressurizing. The packer should be secured with a strap to prevent it from being expelled due to pressure. The other end of the liner is held closed manually by the technician. The liner is then pressurized using forced air to the initial pressure of one 1 psi. The spiral wound fiberglass liner shall be cured with a UV light source (i.e. light train). The UV light train should be assembled according to the manufacturer's specifications for the liner diameter. Once initial air pressure is achieved, the technician shall insert the light train into the open end of the liner. When inserting the light train, care should be taken not to damage the inner film material or the light train. After the light train is inside the liner, a packer is secure, fill liner inflation may begin. The air pressure will be raised at one 1 psi increments and held for approximately ten 10 minutes before increasing the pressure to the next level. Typical optimum inner air pressure is between 6 psi and 8 psi. However, the CONTRACTOR shall follow the manufacturer's recommendation for inner liner pressure according to the actual liner design used for the specific installation. Once optimum inner air pressure is achieved, a visual "pre-curing inspection of the liner will be done using CCTV. Once the "pre-cure" inspection is completed and the OWNER'S representative gives approval, the actual curing of the liner can begin. Curing of the spiral wound fiberglass liner is achieved through exposure to UV lights. The lights are energized in sequence according to the manufacturer specifications. The UV light train shall be capable of curing the fiberglass liner at a curing rate of up to 10-lf (linear feet) per minute
5. Record of Curing: For the liner to achieve the required water tightness and specified mechanical properties, the following parameters must be controlled during the entire curing process, giving the OWNER a record of the curing process over every segment of the entire length of the liner. This demonstrates that the entire liner is cured properly and completely. The recording will include:
 - a. Curing speed.
 - b. Light source working and wattage.
 - c. Inner air pressure.
 - d. Exothermic (curing) temperatures.
 - e. Date and time.
 - f. Length of liner.
6. Record of the curing parameters will be accomplished using a computer and database that are tamper proof. During the curing process, infrared sensors will be used to record exothermic curing temperature data. The parameters for curing speed, inner air pressure and wattage are defined in the Quality Tracker UV curing protocol issued by the manufacturer. The optimal curing speed, or travel speed of the energized UV light train, is determined for each length of liner based on liner diameter, liner thickness, and exothermic reaction temperature. A video will be recorded using CCTV during the curing process. The

liner is cured once the energized light train has traveled the entire length of the liner.

7. Post Curing: The outer film that has been manufactured to control resin loss, liner thickness, and contamination of the resin by water or other contaminants as well as a styrene barrier, shall remain in-place after UV curing of the liner has been completed. The inner film will be removed no sooner than 30 minutes after the curing of the liner is complete. Ensure the curing method provides uniform temperature application for effective curing throughout the liner

3.4 END SEALS

- A. The finished linear shall be cut smooth and parallel with the manhole wall. The interface between the host pipe and the pipe liner shall be sealed 360 degrees.

3.5 REINSTATE SERVICE LATERAL CONNECTION

- A. All live services shall be immediately reinstated after the liner installation (pipeline rehabilitation) is complete. Inactive service lines to a vacant lot, vacant building, or to an occupied residence with more than one service line serving the property, shall be defined as a "live" service, and shall be reinstated. It is the CONTRACTOR'S responsibility to locate all live services prior to rehabilitation activities. Each service lateral connection shall be noted by its size, position from a reference manhole, and orientation with respect to the circumference of the pipe. Reinstatement shall be accomplished from the interior of the sewer line by means of a television camera and a remote-controlled cutting device. Holes cut through the rehabilitation liner shall be neat and smooth and shall match the bottom of the reinstated service line. The service opening shall be reinstated to a minimum of 95 percent and a maximum of 100 percent of the service lateral pipe area. Service lateral openings that expand in diameter between the exterior and interior of the pipe wall shall be reinstated by cutting a hole in the liner that is 95 percent to 100 percent of the expanded diameter. The new edge shall be crack free with no loose or abraded material. Reinstated services that do not conform to this section shall be repaired and CCTV video confirmation. The repair method shall be compatible with the lining system per the lining system manufacturer and as approved by OWNER. No extra payment shall be made for the repair and CCTV video confirmation.
- B. The CONTRACTOR shall have a fully operational backup device for reinstating service laterals. If for any reason the remote cutting device fails during the reinstatement of a service lateral, the standby device shall be immediately deployed to complete the work. The backup device shall be fully functional without requiring removal of parts from the primary device. The backup equipment shall be onsite throughout the reinstatement process and will be periodically tested upon request of the ENGINEER. If for any reason the CONTRACTOR is unable to remotely reinstate a service lateral connection, the CONTRACTOR shall reinstate the service lateral connection by open cut.
- C. Service lateral reinstatement by open cut includes locating all interfering utilities, existing surface removal, excavation, dewatering, reinstatement of service lateral connection, backfilling, surface restoration, temporary flow bypassing, and sewer dewatering. Reinstatement of service lateral connection by open cut includes the removal and replacement of the first five (5) feet of service lateral, cutting of liner for the service opening, and installing a pre-fabricated fitting (Inserta-Tee® or equivalent) with the manufacturer's specifications so that a complete water-tight seal is achieved. The new

service line shall be connected to the existing service line with a flexible coupling and stainless-steel bands, as approved by OWNER. The service lateral connection at the pipeline shall be encased in lean fill, a minimum of six inches (6") below and twelve inches (12") above and on the sides of the pipe. The lean fill construction shall be inspected and approved by the OWNER prior to completing the trench backfilling.

3.6 ACCEPTANCE OF WORK

- A. After completion of the lining, reinstatement of service lateral connections, and rehabilitation of the manholes, the CONTRACTOR shall perform a CCTV inspection in accordance with STS 33 01 30.11.
- B. The CONTRACTOR shall review each post-rehabilitation CCTV inspection and provide an evaluation of liner defects and repair specifications for unacceptable defects to the ENGINEER. Level 1 Defects may be repaired by the CONTRACTOR or a pay adjustment will be applied to the unit price for Pipeline Rehabilitation within the pipeline segment (manhole to manhole). All Level 2 Defects are unacceptable and must be repaired by the CONTRACTOR.
- C. Evaluation criteria of liner defects:
 - 1. A defect is identified that disrupts or impedes the normal flow characteristics of the pipe consisting of liner wrinkles or lumps/bulges:
 - Level 1 Defect = Defect size is <15% of Internal Diameter;
 - Level 2 Defect = Defect size is >15% of Internal Diameter
 - 2. A defect is identified that impedes any future inspection or cleaning of the pipe (Level 2 Defect);
 - 3. A defect is identified that compromises the structural integrity of the liner system. (Level 2 Defect)
 - 4. A defect is identified that penetrates through the liner system not including an accepted service re-instatement;
 - Level 1 Defect = Penetration is between the 10 and 2 position and the penetration is less than 3 inches in diameter
 - Level 2 Defect = Penetration is between the 3 and 9 position OR the penetration is greater than 3 inches in diameter.
 - 5. Service re-instatement does not meet requirements of this specification. (level 1 Defect)
- D. A defect that is identified due to a host pipe deficiency including a partially or fully degraded section shall be repaired by the CONTRACTOR but paid for by the OWNER if:
 - 1. The location of the host pipe deficiency was identified in writing to the ENGINEER under STS 33 01 30.41.
 - 2. A CCTV inspection video of the pipe is provided that was performed not more than 12 hours before the pipe liner was installed during no flow or low flow (less than 25% full) conditions showing no existing loose debris.

3. OWNER and ENGINEER recognize that due to the severe degradation of some host pipes, defects caused by host pipe deficiency versus CONTRACTOR error/negligence will be decided on a case by case basis.

3.7 POST-REHABILITATION POINT REPAIR/LINER PATCH

- A. This subsection specifies the trenchless liner patch installation or point repair of rehabilitated pipelines to repair a liner defect.
 1. TRENCHLESS LINER PATCH: A trenchless liner patch shall be up to 4 linear feet long and be approved by the liner manufacturer. The removal, extraction, and disposal of debris/obstruction in between the host pipe and pipe liner using a remote device shall be completed prior to patch installation. The CONTRACTOR is responsible for installing the patch in the correct location to completely cover the liner defect.
 2. POST-REHABILITATION POINT REPAIR: A Point Repair shall include up to 12 linear feet of rehabilitated pipeline replacement by excavation. Remove only that amount of rehabilitated pipeline or sewer service connection that is identified as exhibiting an unacceptable defect. New sewer pipe shall be per 33 31 11 Public Sanitary Sewerage Gravity Piping. Transitions shall be flexible couplings with stainless-steel bands and a trenchless liner patch extending a minimum of 1 foot upstream and downstream of the transition. The flexible coupling shall be backfilled with lean fill to a thickness of at least 12 inches from the pipe exterior in all lateral and vertical directions. The trenchless liner patch shall be approved by the liner manufacturer and compatible with the replacement pipe. Reinstatement of service lateral connection (if patch covered a service lateral) is incidental to the point repair.

END OF SECTION 33 01 30.72



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 01 30.79

FOLDED AND REFORMED PIPE LINING

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the rehabilitation of gravity sanitary sewer lines by installation of a Folded and Reformed PVC Pipe Lining system including reinstatement of service lateral connections. The liner system shall be entirely trenchless excluding pre-approved point repairs. The liner system shall be continuous from manhole to manhole.

1.2 RELATED SECTIONS

- A. Special Condition: Immediate Notification of Sanitary Sewer Overflows
- B. STS 33 30 41: Sewer Line Cleaning
- C. STS 33 30 11: Television Inspection of Sewers
- D. STS 33 30 51: Sewer Flow Control and Bypass Pumping

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. The Greenbook Standard Specifications for Public Works Construction, Latest Edition.
- C. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

- A. Pre-Installation
 - 1. Pipe Installation Plan: The CONTRACTOR shall prepare and submit a plan with trenchless pipeline rehabilitation installation procedures for review and approval at a minimum of 30 working days prior to commencing work. This plan may include a dewatering plan if groundwater is identified to be present.
 - 2. Project specific engineering pipe design calculations (Liner Wall Thickness) for each SAS segment the liner system will be applied. Pipe design shall be calculated and stamped by a professional ENGINEER licensed in the USA and verified by the pipe manufacturer in accordance with ANSI, ASTM, and AWWA standards. Calculations shall include, but not be limited to; soil loads, live loads, hydrostatic loads, pipe stiffness, Standard Dimension Ratio, pipe wall crushing strength, initial and long term (50 years) values of pipe deflection, pipe bonding strain, hydrostatic collapse resistance, constrained buckling strength, and allowable pulling force and length.

3. Shop drawings, catalog data, MSDS sheets, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings pertinent to this project demonstrating compliance with this specification.
4. Liner repair materials, methods, and manufacturer's recommendations (Repair Specification).
5. Manufacturers' shipping, storage, and handling recommendations for all components of the liner system
6. List of critical equipment needed for the installation of the liner system, List of redundant equipment that will be onsite during each installation.
7. Material data sheets to be used sealing the pipe at manholes.
8. Pressure gauge, recorder, and field equipment certifications (e.g., calibration by an approved certified lab).
9. Identification/notification of any host pipe defects which will impact the cured-in-place pipe installation and a proposed pre-rehabilitation repair method for each defect. Refer to STS 33 01 30.41.

B. Post-Installation

1. An evaluation of all defects witnessed through a review of the post-rehabilitation inspection with repair recommendations for liner pipe found to be unacceptable, per this Section.

1.5 QUALITY ASSURANCE

- A. Documentation showing that personnel has three (3) years of Folded and Reformed PVC lining experience with a list of a minimum 50,000 linear feet installed by the company including 3 sewer main projects similar or greater in scope and value to the project specified in the contract documents. Information for each supervisor and the company must include, but not be limited to, date of work, location, pipe information (i.e., length, diameter, depth of installation, pipe material, etc.), project OWNER information, (i.e., name, address, and telephone number, contact person).

1.6 DESIGN CRITERIA

- A. The proposed liner or pipe shall be capable of withstanding a minimum fifty-year (50-yr) continuous loading condition.
- B. Thickness design of the liner system and pipes shall be for a fully deteriorated host pipe condition. Pipes shall have a minimum wall thickness in accordance with the manufacturer's recommendations. The minimum wall thickness shall be determined using the following design parameters, unless other design parameters are shown on the plans:

Factor of Safety	=	2.0
Long-Term Modulus of Elasticity, psi	=	50% of Flexural Modulus
Height of Water Above Top of Pipe, ft	=	1.0
Fluid Temperature, degrees F	=	80

Soil Density, pcf	=	130
Live Load, psi	=	H-20 Highway
Ovality Factor, %	=	3.0
Modulus of Soil Reaction, psi	=	800

C. Refer to plans for minimum rehabilitated/replaced internal diameter of each segment.

PART 2– PRODUCTS

2.1 MANUFACTURERS

- A. Pre-approved structural liner systems.
1. Folded and Reformed PVC pipe liner (Type B) marketed under the trade name “Warrior Thermoform”

2.2 MATERIALS

- A. Folded and Re-formed PVC Pipe Liner (Type B)
1. The Folded and Re-formed PVC Pipe Liner shall exhibit a standard dimension ratio of 35 or less for 4-inch through 15-inch diameter pipe. Refer to the plans for required standard dimension ratios for the rehabilitation of 18 through 30-inch diameter pipe.
 2. This rehabilitation system may be capable of expanding up to 10 percent. The PVC shall have minimum physical properties as defined in specification ASTM F1504-14 and shall conform to the requirements shown in Table below.

PVC Pipe Properties	ASTM Test Method	Initial Values psi (Mpa)
Tensile Strength	D 638	5,000 (35)
Tensile Modulus	D 638	280,000 (1930)
Flexural Modulus	D 790	280,000 (1930)

3. The folded pipe shall be made from PVC compounds having a cell classification of 12111, as defined in ASTM DI 784. At the time of manufacture, the extruded material shall be inspected for defects and physical properties in accordance with ASTM D7901, D2122, D2152, D2412, and F1057 to verify compliance with the cell classification listed above. Testing shall be performed once per shift, change in material batch, or coil. A Certificate of Compliance shall be submitted to the ENGINEER. At the time of installation, the material shall be homogeneous and free of defects, cracks, holes, blisters, foreign materials, or other deleterious faults. Liner pipe shall be clearly marked at intervals not to exceed 5 feet with the following markings: nominal pipe diameter, PVC cell classification, company, plant, SDR designation, manufactured date, and service designation.

- B. Materials for Sealing Pipe at Manholes
1. A quick setting grout, non-shrink grout or a quick setting epoxy used for sewer applications that is chemical resistant.

PART 3– EXECUTION

3.1 EXAMINATION

- A. Proceeding with Work specified in this Section shall be interpreted to mean that all conditions, including site conditions, were determined to be acceptable prior to start of Work.

3.2 PREPARATION

- A. Complete all pre-approved obstruction removals, pipe cleaning, and point repairs per STS 33 01 30.41. Complete the pre-rehab CCTV inspection including submittal and approval by ENGINEER and OWNER per STS 33 01 30.11. All sewer service connections shall be identified and located prior to liner installation. All sanitary sewer flow control shall be approved by ENGINEER and OWNER and in-place and operational prior to liner installation.

3.3 INSTALLATION:

- A. All Folded and Reformed PVC installations shall be per manufacture’s written recommendations. Precautions shall be taken to protect the new liner and the existing pipe and manholes from any damage that might result during the insertion process.
- B. The liner shall be inserted into the sewer through existing structures, without modification of the structures. The liner shall have been wrapped on a coil, in a reduced cross section of either a “C” or an “H” at the time of manufacture, to facilitate insertion into the host pipe. The liner shall be brought to the work site in an apparatus suitable for applying heat to the PVC liner. The coil of liner shall be heated to a temperature (as determined by the manufacturer) to make the liner pliable enough to be easily removed from the coil and to remove any “reel set”.
- C. The heated liner shall be pulled into the host pipe using a cable from a winch located at a downstream manhole connected through the lumen of the host pipe and attached to the end of the liner. The coiled liner shall be unreeled from the upstream manhole to reduce the amount of tension placed on the liner by the winch cable. The CONTRACTOR shall insert enough liner material so that sufficient material is available to allow for insertion of flow-through plugs at both upstream and downstream stations.
- D. After the liner pipe has been inserted, allow the material to relax for several minutes to recover from any stretching that may have occurred during the insertion process. Continue to heat and relax the liner until movement has stopped.
- E. After insertion is completed, the CONTRACTOR shall supply suitable heat source equipment and flow through plugs. The equipment shall be capable of delivering steam through the lining section to uniformly raise the temperature and pressure to effect forming of the PVC liner pipe. This temperature and pressure shall be determined by the system employed and per the manufacturers recommendations. The heat source shall be fitted with suitable monitors to gauge the steam temperature and pressure at the input and exhaust ends of the liner. Steam monitoring methods and forming period shall be per the manufacturer’s recommendations. The liner pipe shall be plugged with flow-through plugs and expanded until it is pressed tightly against the existing host pipe walls.

3.4 END SEALS

- A. The finished linear shall be cut smooth and parallel with the manhole wall. The interface between the host pipe and the pipe liner shall be sealed 360 degrees.

3.5 REINSTATE SERVICE LATERAL CONNECTION

- A. All live services shall be immediately reinstated after the liner installation (pipeline rehabilitation) is complete. Inactive service lines to a vacant lot, vacant building, or to an occupied residence with more than one service line serving the property, shall be defined as a "live" service, and shall be reinstated. It is the CONTRACTOR'S responsibility to locate all live services prior to rehabilitation activities. Each service lateral connection shall be noted by its size, position from a reference manhole, and orientation with respect to the circumference of the pipe. Reinstatement shall be accomplished from the interior of the sewer line by means of a television camera and a remote-controlled cutting device. Holes cut through the rehabilitation liner shall be neat and smooth and shall match the bottom of the reinstated service line. The service opening shall be reinstated to a minimum of 95 percent and a maximum of 100 percent of the service lateral pipe area. Service lateral openings that expand in diameter between the exterior and interior of the pipe wall shall be reinstated by cutting a hole in the liner that is 95 percent to 100 percent of the expanded diameter. The new edge shall be crack free with no loose or abraded material. Reinstated services that do not conform to this section shall be repaired and CCTV video confirmation. The repair method shall be compatible with the lining system per the lining system manufacturer and as approved by OWNER. No extra payment shall be made for the repair and CCTV video confirmation.
- B. The CONTRACTOR shall have a fully operational backup device for reinstating service laterals. If for any reason the remote cutting device fails during the reinstatement of a service lateral, the standby device shall be immediately deployed to complete the work. The backup device shall be fully functional without requiring removal of parts from the primary device. The backup equipment shall be onsite throughout the reinstatement process and will be periodically tested upon request of the ENGINEER. If for any reason the CONTRACTOR is unable to remotely reinstate a service lateral connection, the CONTRACTOR shall reinstate the service lateral connection by open cut.
- C. Service lateral reinstatement by open cut includes locating all interfering utilities, existing surface removal, excavation, dewatering, reinstatement of service lateral connection, backfilling, surface restoration, temporary flow bypassing, and sewer dewatering. Reinstatement of service lateral connection by open cut includes the removal and replacement of the first five (5) feet of service lateral, cutting of liner for the service opening, and installing a pre-fabricated fitting (Inserta-Tee® or equivalent) with the manufacturer's specifications so that a complete water-tight seal is achieved. The new service line shall be connected to the existing service line with a flexible coupling and stainless-steel bands, as approved by OWNER. The service lateral connection at the pipeline shall be encased in lean fill, a minimum of six inches (6") below and twelve inches (12") above and on the sides of the pipe. The lean fill construction shall be inspected and approved by the OWNER prior to completing the trench backfilling.

3.6 ACCEPTANCE OF WORK

- A. After completion of the lining, reinstatement of service lateral connections, and rehabilitation of the manholes, the CONTRACTOR shall perform a CCTV inspection in accordance with STS 33 01 30.11.
- B. The CONTRACTOR shall review each post-rehabilitation CCTV inspection and provide an evaluation of liner defects and repair specifications for unacceptable defects to the ENGINEER. Level 1 Defects may be repaired by the CONTRACTOR or a pay adjustment will be applied to the unit price for Pipeline Rehabilitation within the pipeline segment (manhole to manhole). All Level 2 Defects are unacceptable and must be repaired by the CONTRACTOR.
- C. Evaluation criteria of liner defects:
 - 1. A defect is identified that disrupts or impedes the normal flow characteristics of the pipe consisting of liner wrinkles or lumps/bulges:
Level 1 Defect = Defect size is <15% of Internal Diameter;
Level 2 Defect = Defect size is >15% of Internal Diameter
 - 2. A defect is identified that impedes any future inspection or cleaning of the pipe (Level 2 Defect);
 - 3. A defect is identified that compromises the structural integrity of the liner system. (Level 2 Defect)
 - 4. A defect is identified that penetrates through the liner system not including an accepted service re-instatement;
Level 1 Defect = Penetration is between the 10 and 2 position and the penetration is less than 3 inches in diameter
Level 2 Defect = Penetration is between the 3 and 9 position OR the penetration is greater than 3 inches in diameter.
 - 5. Service re-instatement does not meet requirements of this specification. (level 1 Defect)
- D. A defect that is identified due to a host pipe deficiency including a partially or fully degraded section shall be repaired by the CONTRACTOR but paid for by the OWNER if:
 - 1. The location of the host pipe deficiency was identified in writing to the ENGINEER under STS 33 01 30.41.
 - 2. A CCTV inspection video of the pipe is provided that was performed not more than 12 hours before the pipe liner was installed during no flow or low flow (less than 25% full) conditions showing no existing loose debris.
 - 3. OWNER and ENGINEER recognize that due to the severe degradation of some host pipes, defects caused by host pipe deficiency versus CONTRACTOR error/negligence will be decided on a case by case basis.

3.7 POST-REHABILITATION POINT REPAIR/LINER PATCH

- A. This subsection specifies the trenchless liner patch installation or point repair of rehabilitated pipelines to repair a liner defect.

1. TRENCHLESS LINER PATCH: A trenchless liner patch shall be up to 4 linear feet long and be approved by the liner manufacturer. The removal, extraction, and disposal of debris/obstruction in between the host pipe and pipe liner using a remote device shall be completed prior to patch installation. The CONTRACTOR is responsible for installing the patch in the correct location to completely cover the liner defect.
2. POST-REHABILITATION POINT REPAIR: A Point Repair shall include up to 12 linear feet of rehabilitated pipeline replacement by excavation. Remove only that amount of rehabilitated pipeline or sewer service connection that is identified as exhibiting an unacceptable defect. New sewer pipe shall be per 33 31 11 Public Sanitary Sewerage Gravity Piping. Transitions shall be flexible couplings with stainless-steel bands and a trenchless liner patch extending a minimum of 1 foot upstream and downstream of the transition. The flexible coupling shall be backfilled with lean fill to a thickness of at least 12 inches from the pipe exterior in all lateral and vertical directions. The trenchless liner patch shall be approved by the liner manufacturer and compatible with the replacement pipe. Reinstatement of service lateral connection (if patch covered a service lateral) is incidental to the point repair.

END OF SECTION 33 01 30.79



SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 33 01 30.80
SPIRAL WOUND POLYVINYL CHLORIDE (PVC) PIPE LINER

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Requirements for the rehabilitation of gravity sanitary sewer lines by installation of a Spiral Wound Polyvinyl Chloride (PVC) Pipe Lining system including reinstatement of service lateral connections. The liner system shall be entirely trenchless excluding pre-approved point repairs. The liner system shall be continuous from manhole to manhole.

1.2 RELATED SECTIONS

- A. Special Condition: Immediate Notification of Sanitary Sewer Overflows
- B. STS 03 64 23: Injection Grouting
- C. STS 33 30 41: Sewer Line Cleaning
- D. STS 33 30 11: Television Inspection of Sewers
- E. STS 33 30 51: Sewer Flow Control and Bypass Pumping

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. The Greenbook Standard Specifications for Public Works Construction, Latest Edition.
- C. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

- A. Pre-Installation
 - 1. Pipe Installation Plan: The CONTRACTOR shall prepare and submit a plan with trenchless pipeline rehabilitation installation procedures for review and approval at a minimum of 30 working days prior to commencing work. This plan may include a dewatering plan if groundwater is identified to be present.
 - 2. Project specific engineering pipe design calculations (Liner Wall Thickness) for each SAS segment the liner system will be applied. Pipe design shall be calculated and stamped by a professional ENGINEER licensed in the USA and verified by the pipe manufacturer in accordance with ANSI, ASTM, and AWWA standards. Calculations shall include, but not be limited to; soil loads, live loads, hydrostatic loads, pipe stiffness, Standard Dimension Ratio, pipe wall crushing strength, initial and long term (50 years) values of pipe deflection, pipe bonding strain, hydrostatic collapse resistance, constrained buckling strength, and allowable pulling force and length.

3. Shop drawings, catalog data, MSDS sheets, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings pertinent to this project demonstrating compliance with this specification.
4. Liner repair materials, methods, and manufacturer's recommendations (Repair Specification).
5. Manufacturers' shipping, storage, and handling recommendations for all components of the liner system
6. List of critical equipment needed for the installation of the liner system, List of redundant equipment that will be onsite during each installation.
7. Material data sheets and bulk head design for sealing the liner at manholes.
8. Pressure gauge, recorder, and field equipment certifications (e.g., calibration by an approved certified lab).
9. Identification/notification of any host pipe defects which will impact the cured-in-place pipe installation and a proposed pre-rehabilitation repair method for each defect. Refer to STS 33 01 30.41.

B. Post-Installation

1. An evaluation of all defects witnessed through a review of the post-rehabilitation inspection with repair recommendations for liner pipe found to be unacceptable, per the Section.

1.5 QUALITY ASSURANCE

- A. Documentation showing that personnel has three (3) years of Spiral Wound Polyvinyl Chloride (PVC) Pipe lining experience with a list of a minimum 50,000 linear feet installed by the company including 3 sewer main projects similar or greater in scope and value to the project specified in the contract documents. Information for each supervisor and the company must include, but not be limited to, date of work, location, pipe information (i.e., length, diameter, depth of installation, pipe material, etc.), project OWNER information, (i.e., name, address, and telephone number, contact person).

1.6 LINER DESIGN CRITERIA

- A. The proposed liner or pipe shall be capable of withstanding a minimum fifty-year (50-yr) continuous loading condition.
- B. Thickness design of the liner system and pipes shall be for a fully deteriorated host pipe condition. Pipes shall have a minimum wall thickness in accordance with the manufacturer's recommendations. The external and buckling pressures shall be determined in accordance with ASTM F1741 Appendix X1.2.3. The minimum wall thickness shall be determined using the following design parameters, unless other design parameters are shown on the plans:

Factor of Safety	=	2.0
Long-Term Modulus of Elasticity, psi	=	50% of Flexural Modulus
Height of Water Above Top of Pipe, ft	=	1.0

Fluid Temperature, degrees F	=	80
Soil Density, pcf	=	130
Live Load, psi	=	HS-20 Highway
Ovality Factor, %	=	3.0
Modulus of Soil Reaction, psi	=	800

- C. Refer to plans for minimum rehabilitated/replaced internal diameter of each segment.

PART 2– PRODUCTS

2.1 MANUFACTURERS

- A. Pre-approved structural liner systems.
1. Spiral Wound Polyvinyl Chloride (PVC) Pipe Liner marketed under the trade name “Sekisui SPR”.

2.2 MATERIALS

- A. Spiral Wound Polyvinyl Chloride (PVC) Pipe Liner
1. Spiral wound PVC pipe liner for use in the rehabilitation of circular pipelines shall be a PVC profiled strip with a continuously sealed spiral joint. The profile may include steel reinforcing if shown on the plans. The profiled strip shall be made from PVC compounds conforming to ASTM F1697, Section 5. The gasket and/or sealing material shall be as recommended by the manufacturer and shall be submitted in accordance with 1502. When shown on the plans, the steel reinforcing strip shall be fabricated from steel conforming to ASTM F1697, Section 5.2. The pipe liner material shall consist of a ribbed PVC profiled strip with interlocking, sealed edges, gasket material and steel reinforcing strip, if required. The edges lock together as the strip is wound into a pipe. The profiled strip shall have shaped ribs which vary in height and width as specified in ASTM F1697.
 2. Each PVC profiled strip shall be distinctively marked on its inside surface at intervals not to exceed 30 feet measured longitudinally along the profiled strip with a coded number which identifies the manufacturer, plant, date of manufacture and shift, cell classification and profile type. This information shall also appear on each reel.
- B. Materials for Sealing Pipe at Manholes
1. A quick setting grout, non-shrink grout or a quick setting epoxy used for sewer applications that is chemical resistant.

PART 3– EXECUTION

3.1 EXAMINATION

- A. Proceeding with Work specified in this Section shall be interpreted to mean that all conditions, including site conditions, were determined to be acceptable prior to start of Work.

3.2 PREPARATION

- A. Complete all pre-approved obstruction removals, pipe cleaning, and point repairs per STS 33 01 30.41. Complete the pre-rehab CCTV inspection including submittal and approval by ENGINEER and OWNER per STS 33 01 30.11. All sewer service connections shall be identified and located prior to liner installation. All sanitary sewer flow control shall be approved by ENGINEER and OWNER and in-place and operational prior to liner installation.

3.3 INSTALLATION:

- A. All rehabilitation installations shall be per manufacture's written recommendations. Precautions shall be taken to protect the new liner and the existing pipe and manholes from any damage that might result during the insertion process.
- B. Spiral Wound Polyvinyl Chloride (PVC) Pipe Liner shall be of uniform appearance, undamaged, free of cracks, holes, unsealed joints, and shall be installed in accordance with the manufacturer's recommendations and ASTM F1741. At the time of installation, the profiled strip material shall be homogeneous and free of defects, cracks, holes, blisters, or foreign materials. The finished spiral wound PVC pipe liner shall be of uniform appearance, undamaged, free of cracks, holes, unsealed joints, and shall be installed in accordance with ASTM F1741

3.4 REINSTATE SERVICE LATERAL CONNECTION

- A. All live services shall be immediately reinstated after the liner installation (pipeline rehabilitation) is complete. Inactive service lines to a vacant lot, vacant building, or to an occupied residence with more than one service line serving the property, shall be defined as a "live" service, and shall be reinstated. It is the CONTRACTOR'S responsibility to locate all live services prior to rehabilitation activities. Each service lateral connection shall be noted by its size, position from a reference manhole, and orientation with respect to the circumference of the pipe. Reinstatement shall be accomplished from the interior of the sewer line by means of a television camera and a remote-controlled cutting device. Holes cut through the rehabilitation liner shall be neat and smooth and shall match the bottom of the reinstated service line. The service opening shall be reinstated to a minimum of 95 percent and a maximum of 100 percent of the service lateral pipe area. Service lateral openings that expand in diameter between the exterior and interior of the pipe wall shall be reinstated by cutting a hole in the liner that is 95 percent to 100 percent of the expanded diameter. The new edge shall be crack free with no loose or abraded material. Reinstated services that do not conform to this section shall be repaired and CCTV video confirmation. The repair method shall be compatible with the lining system per the lining system manufacturer and as approved by OWNER. No extra payment shall be made for the repair and CCTV video confirmation.
- B. The CONTRACTOR shall have a fully operational backup device for reinstating service laterals. If for any reason the remote cutting device fails during the reinstatement of a service lateral, the standby device shall be immediately deployed to complete the work. The backup device shall be fully functional without requiring removal of parts from the primary device. The backup equipment shall be onsite throughout the reinstatement process and will be periodically tested upon request of the ENGINEER. If for any reason the CONTRACTOR is unable to remotely reinstate a service lateral connection, the CONTRACTOR shall reinstate the service lateral connection by open cut.

- C. Service lateral reinstatement by open cut includes locating all interfering utilities, existing surface removal, excavation, dewatering, reinstatement of service lateral connection, backfilling, surface restoration, temporary flow bypassing, and sewer dewatering. Reinstatement of service lateral connection by open cut includes the removal and replacement of the first five (5) feet of service lateral, cutting of liner for the service opening, and installing a pre-fabricated fitting (Inserta-Tee® or equivalent) with the manufacturer's specifications so that a complete water-tight seal is achieved. The new service line shall be connected to the existing service line with a flexible coupling and stainless-steel bands, as approved by OWNER. The service lateral connection at the pipeline shall be encased in lean fill, a minimum of six inches (6") below and twelve inches (12") above and on the sides of the pipe. The lean fill construction shall be inspected and approved by the OWNER prior to completing the trench backfilling.
- D. All service laterals reinstatements shall be by open cut if the plans require the annular space to be grouted per the section below.

3.5 END SEALS

- A. The beginning and end of the new pipe liner shall be sealed to the host pipe with an epoxy or other material. The approved epoxy or other material shall be compatible with the lining material and host pipe and shall provide a watertight seal. The finished liner shall protrude a minimum of 1 inch and a maximum of 2 inches into a manhole unless otherwise shown on the plans. Liner material shall be cut smooth and parallel with a manhole wall. The interface between the host pipe and the pipe liner shall be sealed 360 degrees. When the pipe liner extends through a manhole it shall be sealed at all seams between liner and manhole. End seals shall be completed prior to the start of the annular space grouting.

3.6 ANNULAR SPACE GROUTING

- A. Refer to plans for annular space grouting requirements due to excessive ovality of the host pipe or existing voids in the host pipe.
- B. If required in the plans, the annular space (void between the host and liner pipes) shall be completely filled with grout to support the liner and provide long-term stability. Refer to STS 03 64 23 (injection grouting). The spiral wound material profile shall be installed as a tight fit to the existing host pipe. All annular space shall be grouted. Grout shall be injected at each end of each segment to allow for the greatest possible grout penetration into the annular space. Grouting at each end of a segment can only be waived if it can be shown that the grout from the other end penetrated the full length and circumference of the segment.

3.7 ACCEPTANCE OF WORK

- A. After completion of the lining, reinstatement of service lateral connections, and rehabilitation of the manholes, the CONTRACTOR shall perform a CCTV inspection in accordance with STS 33 01 30.11.
- B. The CONTRACTOR shall review each post-rehabilitation CCTV inspection and provide an evaluation of liner defects and repair specifications for unacceptable defects to the ENGINEER. Level 1 Defects may be repaired by the CONTRACTOR or a pay adjustment will be

applied to the unit price for Pipeline Rehabilitation within the pipeline segment (manhole to manhole). All Level 2 Defects are unacceptable and must be repaired by the CONTRACTOR.

C. Evaluation criteria of liner defects:

1. A defect is identified that disrupts or impedes the normal flow characteristics of the pipe consisting of liner wrinkles or lumps/bulges:
Level 1 Defect = Defect size is <15% of Internal Diameter;
Level 2 Defect = Defect size is >15% of Internal Diameter
2. A defect is identified that impedes any future inspection or cleaning of the pipe (Level 2 Defect);
3. A defect is identified that compromises the structural integrity of the liner system. (Level 2 Defect)
4. A defect is identified that penetrates through the liner system not including an accepted service re-instatement;
Level 1 Defect = Penetration is between the 10 and 2 position and the penetration is less than 3 inches in diameter
Level 2 Defect = Penetration is between the 3 and 9 position OR the penetration is greater than 3 inches in diameter.
5. Service re-instatement does not meet requirements of this specification. (level 1 Defect)

D. A defect that is identified due to a host pipe deficiency including a partially or fully degraded section shall be repaired by the CONTRACTOR but paid for by the OWNER if:

1. The location of the host pipe deficiency was identified in writing to the ENGINEER under STS 33 01 30.41.
2. A CCTV inspection video of the pipe is provided that was performed not more than 12 hours before the pipe liner was installed during no flow or low flow (less than 25% full) conditions showing no existing loose debris.
3. OWNER and ENGINEER recognize that due to the severe degradation of some host pipes, defects caused by host pipe deficiency versus CONTRACTOR error/negligence will be decided on a case by case basis.

3.8 POST-REHABILITATION POINT REPAIR/LINER PATCH

A. This subsection specifies the trenchless liner patch installation or point repair of rehabilitated pipelines to repair a liner defect.

1. **TRENCHLESS LINER PATCH:** A trenchless liner patch shall be up to 4 linear feet long and be approved by the liner manufacturer. The removal, extraction, and disposal of debris/obstruction in between the host pipe and pipe liner using a remote device shall be completed prior to patch installation. The CONTRACTOR is responsible for installing the patch in the correct location to completely cover the liner defect.

2. POST-REHABILITATION POINT REPAIR: A Point Repair shall include up to 12 linear feet of rehabilitated pipeline replacement by excavation. Remove only that amount of rehabilitated pipeline or sewer service connection that is identified as exhibiting an unacceptable defect. New sewer pipe shall be per 33 31 11 Public Sanitary Sewerage Gravity Piping. Transitions shall be flexible couplings with stainless-steel bands and a trenchless liner patch extending a minimum of 1 foot upstream and downstream of the transition. The flexible coupling shall be backfilled with lean fill to a thickness of at least 12 inches from the pipe exterior in all lateral and vertical directions. The trenchless liner patch shall be approved by the liner manufacturer and compatible with the replacement pipe. Reinstatement of service lateral connection (if patch covered a service lateral) is incidental to the point repair.

END OF SECTION 33 01 30.80



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 01 30.81

MANHOLE REHABILITATION

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Sanitary Sewer Manhole Rehabilitation
 - 1. The work specified in this section includes all labor, materials, accessories, equipment, and tools necessary for the repair and rehabilitation of sanitary sewer manholes for the purpose of eliminating infiltration, providing corrosion protection, repair of voids, and restoration of the structural integrity of the manhole. Sanitary sewer manhole rehabilitation shall include the following:
 - a. Repair and coating of manholes with specified cementitious materials or the installation of a fiberglass or polymer manhole insert where specified in the construction plans;
 - b. Rebuilding of manhole invert and benches to the profile shown on Standard Drawings 2101 and 2102 or to the specific profiles provided on the construction plans;
 - c. Installation of an Epoxy Lining System or Polyurethane and Epoxy Protective Lining System where shown on the construction plans

1.2 RELATED SECTIONS

- A. STS Section 33 01 30.41: Sewer Line Cleaning.
- B. STS Section 33 01 30.51: Sewage Flow Control.
- C. STS Section 33 05 76: Fiberglass Manholes.
- D. STS Section 33 05 61: Concrete Manholes.

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

- A. Comply with STS 01 33 00 – Submittal Procedures.
- B. Before commencing work, the CONTRACTOR shall submit the following for Approval:
 - 1. Submit Technical Data Sheets and Material Safety Data Sheets (MSDS) for all materials used for manhole rehabilitation.

2. Submit the manufacturer's product data, installation instructions, applicable referenced work standards (ASTM, ACI, etc.), approved laboratory test reports that verify strength requirements of this specification, and materials certification for each product used.
 3. Installation procedures as recommended by the manufacturer.
 4. Product testing results.
 5. Design calculations.
 6. Application Methods and Equipment: Submit a written description of the material application methods including the equipment that will be used. Applicator qualifications and proof of manufacturer training.
 7. Contractor shall submit a written Debris Control Plan. The plan shall contain:
 - a. Sewerline and manhole cleaning plan describing methodology to be used from manhole to manhole.
 - b. Describe what measures will be implemented to remove the debris generated during the sewerline cleaning operation from continuing downstream in the active sewer.
 - c. Describe what measures will be implemented during the manhole interior cleaning process to prevent debris from entering the sanitary sewer flow and flowing downstream. Examples are temporary planks spanning the manhole benches or installation of a sturdy net.
 - d. Describe what measures will be implemented to prevent debris from entering the open manhole. Examples are a steel plate covering the open manhole or installation of a sturdy net.
 - e. Communication plan. Identify who is responsible for enforcing the Plan to all parties, including sub-contractors, working at the project site.
 - f. The Debris Control Plan from STS 33 01 30.41:Sewer Line Cleaning and this STS may be the same plan.
- C. Post Manhole Rehabilitation:
1. Field Quality-Control Test reports.
- D. CONTRACTOR Qualifications:
1. Submit a copy of manufacturer's licensee certificate. If the CONTRACTOR is not licensed by the manufacturer, then a manufacturer's representative shall be on-site for the duration of the work.
 2. Submit qualification of each nozzleman: Each nozzleman is required to be ACI certified through the Nozzleman Certification Program.
 3. Submit a list of ten (10) similar regional projects completed within the last three (3) years including information such as number of manholes on project, type of rehabilitation, date of completion, and project cost.

1.5 QUALITY ASSURANCE

- A. The manhole rehabilitation CONTRACTOR shall be a firm having a minimum of three (3) years continuous successful experience in the rehabilitation of manholes similar to that required of this Project.
- B. The manhole lining CONTRACTOR shall be certified and trained by the lining material manufacturer to install the manhole liner if the material requires a certified applicator. Furnish an on-site manufacturer's representative for a minimum of four (4) working hours for each supplied material.

PART 2– PRODUCTS

2.1 MANUFACTURERS

- A. All materials used shall be listed on the Water Authority Approved Product list.

2.2 MATERIALS

- A. Rust inhibitors for exposed steel reinforcing shall be Ospho as manufactured by Skybryte or Corroseal Rust Converter as manufactured by Rodda Paint.
- B. Patching Mix: a quick setting fiber reinforced, calcium aluminate, corrosion resistant cementitious material shall be used as patching material to fill large voids.
- C. Infiltration Control: a rapid setting cementitious product specifically formulated for leak control shall be used to stop minor water infiltration of water into the manhole.
- D. Grouting Mix: a cementitious grout shall be used for stopping active infiltration into the manhole and filling voids in the manhole wall. Chemical grouts may be used to stop excessively active infiltration.
- E. Cementitious Liner Mix: A Calcium Aluminate Cement or Geopolymer Mortar Structural Liner Mix shall be used to form a monolithic liner covering all interior manhole surfaces. The Calcium Aluminate Cement or Geopolymer Mortar shall meet or exceed the following requirements:
 - 1. Compressive Strength (ASTM C 109) (min): 9,000 psi @ 28 days
 - 2. Flexural Strength (ASTM C 293) (min): 900 psi @ 28 days
 - 3. Bond Strength (ASTM C882) (min): 2,000 psi
 - 4. Sulfide Resistance (ASTM C 267): No Attack
- F. Epoxy Lining System or Polyurethane and Epoxy Protective Lining System:
 - 1. Epoxy Lining System. Lining material shall consist of solvent free, high-build epoxy resin capable of spray application to 125 mils (3 mm) minimum thickness in one continuous coat. The Epoxy Liner shall conform to the following requirements:
 - a. Tensile Strength ASTM D638, Type IV (min): 3,000 psi
 - b. Elongation at Break, % ASTM D638, Type IV: 0.9
 - c. Wear Resistance, mg. wt. Loss Taber abrasion, ASTM D4060 (Abrasive wheel No. CS -17, maximum value): 115
 - d. Hardness, Shore D, Durometer ASTM D2240: 80

2. Polyurethane and Epoxy Protective Lining System. Lining material shall consist of 100 percent solid polyurethane and moisture tolerant epoxy. Polyurethane shall be capable of spray application to 125 mils (3 mm) minimum thickness in one continuous coat. Epoxy shall be capable of spray application to 5 mils (125 μ m) thickness in one continuous coat.
 - a. The Epoxy Primer shall meet or exceed the following requirements:
 - 1) Tensile Strength ASTM D638, Type IV (min): 6,000 psi
 - 2) Elongation at Break, % ASTM D638, Type IV: 5
 - 3) Wear Resistance, mg. wt. Loss Taber abrasion, ASTM D4060 (Abrasive wheel No. CS -17, maximum value): 100
 - 4) Hardness, Shore D, Durometer ASTM D2240: 75
 - b. The Polyurethane shall meet or exceed the following requirements:
 - 1) Tensile Strength ASTM D638, Type IV (min): 2,000 psi
 - 2) Elongation at Break, % ASTM D638, Type IV: 40
 - 3) Wear Resistance, mg. wt. Loss Taber abrasion, ASTM D4060 (Abrasive wheel No. CS -17, maximum value): 60
 - 4) Hardness, Shore D, Durometer ASTM D2240: 55
 - 5) Tear Resistance, ASTM D624: 150 ppi

PART 3– EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

- A. Delivery, Storage, and Handling shall be no less than that of the Manufacturer's written recommendations. Cementitious materials shall be stored in weather tight, original packaging to protect against moisture and contamination.

3.2 PREPARATION

- A. Active wastewater flows may need to be plugged or diverted to ensure that the wastewater does not come into contact with surfaces while rehabilitation work is in progress. Use of flow-thru plugs is permitted. All extraneous flows into the manhole or vaults at or above the area coated shall be plugged and/or diverted until the protective coating has adequately set in accordance with manufacturer recommendations.
- B. Manhole inverts shall be lined. Flow-thru plugs or bypass pumping shall be utilized, unless otherwise directed by ENGINEER.
- C. Establish sewage bypass or flow-through plugs as necessary if the invert of the channel needs to be rehabilitated. Sewer flow control shall be per STS 33 01 30.51: Sewer Flow Control if required.
- D. The manhole cover shall remain in place except when necessary, .e.g. replacement or adjustment of the ring and cover, active work rehabilitating the manhole.

- E. If reinforced steel is exposed, either before or after removing deteriorated concrete, it shall be thoroughly inspected and accepted by the OWNER. The CONTRACTOR shall place a protective coating/rust inhibitor on the exposed reinforcing steel. The protective coating shall be applied in accordance with the manufacturer's specification.

3.3 SURFACE PREPARATION

- A. CONTRACTOR shall inspect all surfaces specified to receive a protective coating/lining prior to surface preparation. CONTRACTOR shall notify OWNER of any noticeable disparity in the surfaces which may interfere with the proper preparation or application of the repair mortar/ resurfacing material and protective coating/ lining.
- B. CONTRACTOR shall implement measures as approved in the Debris Control Plan to prevent debris from entering active sewer line. Dispose of captured debris in accordance with local regulations.
- C. All contaminants including: corroded material, debris, oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed. All contaminants from the surface preparation shall not be allowed to enter the sewer system per the Debris Control Plan.
- D. Existing manhole steps or ladders shall be removed by cutting off flush to the manhole wall prior to application of any rehabilitation coatings.
- E. All concrete or mortar that is not sound or that has been damaged by chemical exposure shall be removed down to a sound concrete surface or replaced. All microbial contamination shall be removed.
- F. Surface preparation method(s) shall be performed in accordance with NACE No. 6/ SSPC SP-13, Surface Preparation of Concrete guidelines.
- G. All active infiltration shall be stopped and the substrate surfaces shall have no free water visible prior to rehabilitation product application.
- H. All interior manhole surfaces shall be cleaned using high pressure water blasting and abrasive blasting methods to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating/lining and the substrate. Generally, this can be achieved with a high-pressure water blasting using equipment capable of 5,000 psi at 4 gpm (minimum) followed by abrasive blasting using copper slag or nickel slag blast media. After abrasive blasting is complete, clean substrate again using high pressure water blasting. Other methods such as high-pressure water jetting (refer to NACE Standard No. 5/SSPC-SP12), grinding, scarifying or acid etching may also be used in conjunction with high pressure water blasting and abrasive blasting. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound clean neutralized surface that is not excessively damaged. Abrasive blasting may be needed.
- I. Surfaces shall be prepared to a minimum degree of roughness designated as CSP 4 by the ICRI Guideline No 03732. Overhead surfaces shall be prepared to a minimum designation of CSP 5.

- J. After abrasive blast and infiltration repair is performed, all surfaces shall be inspected for remaining laitance, debris, microbial residue, or corroded concrete prior to build-back and/or protective coating/lining material application. Any evidence of remaining contamination or laitance shall be removed by additional abrasive blast or other approved method.
- K. All surfaces shall be inspected by the OWNER's representative or the ENGINEER's representative during and after preparation and before the repair/ resurfacing material is applied.

3.4 PATCHING HOLES OR VOIDS

- A. Holes or voids around steps, joints or pipes, spalled areas, and cavities caused by missing or broken brick or mortar shall be repaired using patching material conforming to the requirements of this Specification.
- B. The patching material shall be mixed and applied in accordance with the manufacturer's requirements.

3.5 STOPPING ACTIVE LEAKS AND INFILTRATION

- A. Active leaks shall be stopped using quick setting specially formulated mixes according to the manufacturer's recommendations. Any areas that show evidence of leakage either active or non-active during inspection shall be injected. All mixes shall be compatible with the specified repair/ resurfacing material and is suitable for top coating with the specified build back material and protective coating/lining. All grouting and water stop materials utilized shall be compatible with specified protective coating/lining system
- B. At each point of leakage within the manhole structure, a hole shall be carefully drilled through the wall to the exterior of the manhole. Grout ports or sealant injection devices shall be placed in these holes in a way as to provide a watertight seal between the holes and the injection device.
- C. Cementitious or hydraulic cement shall be pumped through the hole until material refusal is recorded on a pressure gauge mounted on the pumping unit. Care shall be taken during the pumping operation to ensure that excessive pressures do not develop and cause damage to the manhole structure.
- D. Dewater the exterior of the manhole with a well-point system if necessary, to facilitate the repair work. The dewatering shall continue for a minimum of 8 hours following completion of the repair work.
- E. Upon completion of the injection, the ports shall be removed, and the remaining holes filled with mortar and troweled flush with the surface of the manhole wall.
- F. Manhole joints, pipe connections, holes, or seams shall be sealed with patching material conforming to the requirements of this Specification and smoothed flush with the surface of the manhole wall. In order to prevent the migration of infiltration leaks, comply with the following requirements for points of injection:
 - 1. For Pre-cast Section Joint Leaks, furnish and install a minimum of four (4) injection points which shall be evenly spaced around the circumference of the manhole joint.

2. For Pipe Connection Leaks, injection points shall be furnished and installed around pipe connection by CONTRACTOR'S means and methods.
 3. For Pipe Invert Leaks, furnish and install a minimum of two (2) injection points, one on each side of trough.
 4. For Lift Holes and Voids furnish and install a minimum of one (1) injection point below the center of the lift hole or void.
 5. Reform/repair existing bench and invert
- G. Invert Repair shall be performed on all inverts with visible damage or infiltration is present.
1. After Flow-thru plugs or bypass pumping is setup and thoroughly cleaning the invert, the quick setting patch material shall be applied to the invert and bench. The material shall be troweled uniformly onto the damaged invert at a minimum thickness of ½-inch at the invert extending out onto the bench of the manhole sufficiently to tie into the structurally enhanced monolithic liner.
 2. The finished invert and bench shall be troweled to a smooth finish free of any ridges.

3.6 MANHOLE BENCH AND CHANNEL

- A. Manhole channels and benches shall be repaired and field formed from concrete.
- B. Modify the inverts to provide a smooth flow line through the manhole.
- C. Raise the bench to the top of the pipe, forming a "U" channel through the manhole. All benches shall be raised to the pipe crown and shall slope 1-inch per foot from the pipe crown. Refer to Standard Drawings 2101 and 2102 or to the specific profiles provided on the construction plans for bench rehabilitation requirements

3.7 CEMENTITIOUS LINER APPLICATION

- A. No application shall be made to frozen surfaces or if freezing is expected to occur inside the manhole within 24 hours after application. If ambient temperatures exceed 90 degrees, precautions shall be taken to keep the mix temperature below 90 degrees.
- B. For each bag of product, use the amount of water specified by the manufacturer and mix for 30 seconds to one (1) minute using equipment per manufacturer's recommendation.
- C. First Application:
 1. The surface prior to spraying shall be damp without noticeable free water, but saturated.
 2. Materials shall be applied using low-pressure spray equipment from the bottom of the wall (including the bench but not invert) to the top (terminating at the frame/cone connection), to a minimum uniform thickness to ensure that all cracks, crevices, and voids are filled and a relatively smooth surface remains after light troweling.
 3. Light troweling shall be performed to compact the material into voids and to set the bond.

- D. Second Application:
1. A second application is applied after the first application has begun to take an initial set (disappearance of surface sheen which could be 15 minutes to one (1) hour depending upon ambient conditions) to assure a minimum total finished thickness of one (1) inch.
 2. Application shall be from the bottom up using low-pressure spray equipment.
 3. The surface shall then be troweled to a smooth finish being careful not to over trowel to bring additional water to the surface and weaken it.
- E. Curing:
1. Caution shall be taken to minimize exposure of applied product to sunlight and air movement.
 2. If application of second coat is to be longer than 15 minutes after completion of first coat, the manhole cover shall be set back in place.
 3. At no time should the finished product be exposed to sunlight or air movement for longer than 15 minutes before replacing the manhole cover.
 4. Ambient manhole conditions are adequate for curing so long as the manhole is covered. It is imperative that the manhole be covered as soon as possible after the application has been completed.
 5. Contractor shall protect surfaces from contamination of any type between coats and through curing periods.
 6. The final application shall have a minimum of four (4) hours cure time before being subjected to active flow.
 7. Traffic shall not be allowed over manholes for 12 hours after application is complete.

3.8 EPOXY LINING SYSTEM OR POLYURETHANE AND EPOXY PROTECTIVE LINING SYSTEM APPLICATION

- A. Surface Preparation:
1. Any holes or voids shall be filled in accordance with this Specification. The surface to be repaired shall be clean and free of any loose materials.
 2. Active leaks and infiltration shall be stopped in accordance with this Specification.
 3. The lining system shall be applied over a back-build of cementitious liner. The lining system shall take place only after the cementitious liner has cured the appropriate length of time as recommended by the manufacturer.
- B. Application Extents:
1. Lining material shall be applied to all prepared surfaces from 1 inch (25 mm) above the low-flow water level to the base of the ring and cover unless otherwise specified. All termination points of the lining material to the existing subsurface shall be keyed into the subsurface by mechanically scoring a minimum 1/4 inch x 1/4 inch (6 mm x 6 mm) keyway.

2. Contractor is responsible for mitigating any turbulence and/or splashing through the manhole that may impede the application extents required.
- C. Epoxy Lining System Installation:
1. Epoxy shall be applied to a thickness of 125 mils (3 mm). Lining material shall be uniform in color fully cured free of holidays, surface imperfections, blisters and sags and adequately adhered to the subsurface.
- D. Polyurethane and Epoxy Protective Lining System Installation:
1. Prior to application of the polyurethane, the subsurface shall be primed with the epoxy primer to a thickness of 3 mils (75 μ m) minimum to 5 mils (125 μ m) maximum. Polyurethane shall be applied to a thickness of 125 mils (3 mm) immediately prior to the epoxy primer becoming tack-free. Lining material shall be uniform in color, fully cured, free of holidays, surface imperfections, blisters and sags and adequately adhered to the subsurface.

3.9 ACCEPTANCE

- A. Performance Testing:
1. After the manhole rehabilitation and repair has been completed, the work shall be visually inspected in the presence of the OWNER and/or ENGINEER for compliance with these specifications and the manufacturer's recommendations.
 2. If required, a qualified independent testing and inspecting agency shall be contracted by the CONTRACTOR or by the OWNER as designated in the Contract Documents.
 3. Spark Testing:
 - a. All manholes that received an Epoxy Lining System or Polyurethane and Epoxy Protective Lining System in the project shall be have a High Voltage Spark test performed to ensure that there is a full monolithic lining and to ensure that there are no pinholes in the coating. High voltage spark testing shall be conducted in accordance with NACE SP0188.
 - b. If the manhole fails the initial test, necessary repairs shall be made in accordance to this Section. Retesting shall continue until the manhole satisfactorily passes the test.
 - c. All tests shall be performed in the presence of the OWNER and/or ENGINEER.
 - d. Furnish all personnel, facilities, and equipment necessary to conduct the testing.
 - e. The voltage shall be set at a minimum of 15,000 volts. For thicknesses greater than 150 mils (4 mm), the voltage shall be set at 100 volts per 1 mil (25 μ m) of thickness of the applied lining material. Identified holidays shall be marked without contaminating the lining surface and repaired.
 4. Mil Gauge Test: During installation, a mil gauge shall be used to verify that the minimum thickness of the lining meets and/or exceeds the minimum thickness specified.

5. Adhesion Testing:
- a. Adhesion testing shall be performed on a minimum of 1 structure or 33 percent of all rehabilitated structures that received an Epoxy Lining System or Polyurethane and Epoxy Protective Lining System, whichever is greater unless otherwise shown on the Plans or specified in the Special Conditions.
 - b. Adhesion testing shall be conducted after the liner system has cured in accordance with the manufacturer's specifications.
 - c. Adhesion testing shall be conducted in accordance with ASTM D7234 as modified herein.
 - d. OWNER or ENGINEER shall select locations within the manhole where adhesion test will be performed. The adhesive used to attach the dollies to the coating/ liner shall be rapid setting with tensile strength in excess of the coating/ liner material and permitted to cure in accordance with manufacturer recommendations (typically 24 hours). The coating/ lining material and dollies shall be adequately prepared to receive the adhesive.
 - e. Prior to pull test, the CONTRACTOR shall utilize a scoring device to cut through the coating until the substrate is reached, in accordance with ASTM D7234. Extreme care shall be taken while scoring to prevent micro cracking in the coating/lining, or scoring too deep into the substrate since cracks may cause failures at diminished strengths.
 - f. The pull tests in each area shall meet or exceed 250 psi. and shall include subbase adhered to the back of the dolly or no visual signs of coating material in the test hole. A glue failure exceeding 300 psi may be acceptable at the discretion of the ENGINEER.
 - g. If any test fails, a minimum of 3 additional locations in the section of the failure shall be tested, as directed by the ENGINEER. If any of the retests fail, all loosely adhered or unadhered liner in the failed area, as determined by the ENGINEER, shall be removed and replaced.
 - h. If a host structure fails the adhesion test, one additional host structure or 10 percent of the initial number of host structures selected for testing shall be tested as directed by the ENGINEER or as specified in the Special Condition.

B. Liner Repairs:

- 1. Holidays, uncured lining material, blisters: surface imperfections and damage to the liner resulting from the adhesion test shall be repaired to a point 1 inch (25 mm) minimum beyond the limits of the damaged area. The repair shall be 125 mils (3 mm) thick or the minimum thickness specified in the Special Provisions.
- 2. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating/lining material can be hand applied to the repair area to a minimum additional thickness of 30 mils (750 μ m) unless otherwise specified by the liner manufacturer or approved by the ENGINEER. All touch-up/repair procedures shall follow the protective coating/lining manufacturer's recommendations.

3. Blisters, uncured lining and surface imperfections shall be completely removed and the areas recoated with appropriate lining material to 1 inch (25 mm) minimum beyond the repair areas at a minimum thickness of 100 mils (2540 μm).
 4. Additional spark testing shall be performed after repairs are completed.
- C. Cementitious Liner Material Testing:
1. Cementitious liner shall be tested for 24-hour and 28-day compressive strength in accordance with ASTM C109.
 2. Two samples shall be taken for every 50 bags of material used.
 3. Samples shall be sprayed from the nozzle.
 4. Cubes shall be labeled with date, project, manhole number, and product batch number.
 5. Samples shall be sent to an independent testing agency for laboratory verification, results shall be provided to the OWNER.
 6. A written log shall be maintained referencing the specific bags of cement (product batch numbers) used per manhole, for all manholes.
- D. Photographs:
1. Provide digital photographs of the finished manhole upon completion of repair and rehabilitation work.
 2. The photograph shall be taken looking down into the manhole, oriented so that the effluent pipe is at the bottom of the photograph.
 3. Photographs shall be named by the corresponding manhole number. When duplicate numbers occur, the photograph name shall also contain an approximate address or street location. These photographs shall be submitted to the OWNER digitally on a USB flash drive, periodically to accompany pay applications.
 4. Final project acceptance is contingent upon receiving all manhole photographs.

3.10 CLEANUP

- A. After the work has been completed and accepted by the OWNER, clean-up the entire project area and return the ground cover to its original condition.
- B. All excess material and debris not incorporated into the permanent installation shall be legally disposed of off-site.

END OF SECTION 33 01 30.81



SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 33 05 07
TRENCHLESS INSTALLATION OF UTILITY PIPING (BORING, DRILLING, AND JACKING)

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. Boring, drilling or jacking operations defined in this section are related to the installation of sanitary sewer pipe in areas where trenching is not feasible.
- B. Section Includes:
 - 1. Casing and jacking pipe.
 - 2. Carrier pipe.
 - 3. Excavation for approach trenches and pits.

1.2 RELATED SECTIONS

- A. STD 701 – Trenching, Excavation, and Backfill
- B. STS 33 31 11 - Public Sanitary Sewerage Gravity Piping.

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.
- C. ASTM A36 - Standard Specification for Carbon Structural Steel.
- D. ASTM A139 - Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over).
- E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.
- F. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
- G. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- H. ASTM C33 - Standard Specification for Concrete Aggregates.
- I. ASTM C150 - Standard Specification for Portland Cement.
- J. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).

- K. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
- L. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

- A. Casing Pipe: Pipe or casing through which the carrier pipe is installed.
- B. Carrier Pipe: Conveyance pipe that will be placed within the casing pipe.
- C. Jacking Pit: Excavation from which the digger shield or boring machine and casing is launched, which incorporates a thrust block to spread reaction loads to the ground. A jacking pit is also referred to as launching shaft or jacking shaft.
- D. Receiving Pit: Excavation to which the digger shield or boring machine is launched towards. A receiving pit is also referred to as a receiving shaft.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's written information regarding casing, showing sizes, shapes, methods of attachment, connection details, and details of grout holes.
- B. Shop Drawings:
 - 1. Trenchless Installation Plan: Provide drawings, narratives, cut sheets, and other supporting information for:
 - a. Digger shield or auger boring machine.
 - b. Guidance systems.
 - c. Jacking systems.
 - d. Installation methods for placing the carrier piping inside the casing pipe at the required line and grade.
 - e. Grouting work plan.
 - 2. Indicate types of initial support systems proposed. Boring pit bracing plan.
 - 3. Indicate details of casing, jacking head, sheeting, and other falsework for trenches and pits, field sketches, and other details to complete Work.
 - 4. Indicate relationship of proposed installation to facility or natural features over installation, angle of installation, right-of-way lines, and general layout of built facilities.
 - 5. Indicate cross-section(s) from field survey, showing installation in relation to actual profile of ground or facility.
 - 6. Submit description of proposed construction plan, dewatering plan, and plan to establish and maintain vertical and horizontal alignments.
- C. Design Data:
 - 1. Submit signed and sealed Shop Drawings with design calculations and assumptions for casing

2. Field Reports:
 - a. Submit written report results of visual check of entire length of casing or liner prior to installation of carrier pipe to verify that there are no voids or defective joints.
 - b. Field Quality-Control Submittals: Indicate results of CONTRACTOR-furnished tests and inspections
3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
4. Welder Certificates: Submit Weld Procedure Specifications (WPS) and Procedure Qualification Records (PQR) for each welding process. Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 1. Submit qualifications for installer and licensed professional(s)
 2. Welders: Qualify procedures and personnel according to AWS D1.1
 3. Installer: Company specializing in performing Work of this Section with minimum five years documented experience.
- B. Regulatory Requirements
 1. Air Quality:
 - a. Deal with noxious, flammable, or other hazardous gases or atmospheric conditions as may be encountered. Provide air quality monitoring and use of certified permissible equipment, in accordance with regulatory requirements, and other measures as required for safety.
 2. Ventilation and Fire Safety:
 - a. Design the ventilation systems to force fresh air to and from the tunnel heading and base of the shaft during excavation. Design and orient the fresh air intake or exhaust air discharge at the surface to prevent the recirculation of exhaust air from the tunnel or shaft and to avoid the introduction into the tunnel or shaft of air contaminated from other sources. Provide auxiliary ventilators to properly ventilate areas not adequately served by the main system.
 - b. Operate the ventilation systems whenever personnel are in the tunnel or shaft. After a shutdown, operate the ventilation system(s) for a sufficient length of time before personnel enter to assure the presence of air having satisfactory quality. Test the quality of the air and verify that it is satisfactory before permitting personnel to enter any excavation.
 - c. No internal combustion engines, except those fueled with diesel fuel shall be permitted in the tunnel or shaft.

- d. Mechanized equipment operated in the tunnel, including the tunnel boring machine or shield, excavators, and trains shall be equipped with fire suppression systems or hand-operated fire extinguishers.

1.7 CONTRACTOR DESIGN RESPONSIBILITIES

- A. Comply with the applicable regulations of OSHA 29 CFR 1926, Subpart S, “Underground Construction, Caisson, Cofferdams, and Compressed Air” as amended.
- B. Design all trenches and pits required for the operation, including design, and detailing of any excavation support systems that are necessary, for the protection of workers and the support of adjacent utilities and structures.
- C. Design all equipment, methods, and other systems required to perform the operation.
- D. Casing Pipe: Design casing pipe for anticipated jacking loads, ground loads, hydrostatic loads, surcharge loads, railroad impact loads, and any other temporary construction loads. Unless shown otherwise on the Drawings, casing pipe shall be sized adequately for installation of carrier pipe to the line and grade tolerances specified herein, to provide enough room for grade control device and casing spacers for backfill grouting purpose, as well as to accommodate any line and grade correction necessary due to casing pipe misalignment.
- E. Design support of carrier pipe during installation.

1.8 PROJECT CONDITIONS

- A. Field Measurements and Conditions:
 - 1. In addition to provisions of the Conditions of the Contract, verify dimensions and obtain field measurements prior to producing shop drawings and ordering products. Verify field conditions and condition of substrate and adjoining Work before proceeding with Work specified in this Section.

PART 2– PRODUCTS

2.1 MATERIALS

- A. General
 - 1. The CONTRACTOR shall submit the manufacturer’s data on materials to be furnished that indicate compliance with the specifications regarding materials used.
 - 2. Only products or materials listed on the OWNER Approved Product List shall be used
- B. CASING AND JACKING PIPE
 - 1. Steel Casing Pipe:
 - a. Tubing shall be A-106, Grade B with beveled ends.
 - b. Minimum Yield Strength: 35,000 psi.
 - c. Minimum Wall Thickness: 0.375 inch or 1/200 the diameter, whichever is thicker.

- d. Welded Joints:
 - 1) Comply with AWS D1.1.
 - 2) Full circumference.
- 2. Performance and Design Criteria:
 - a. Pipe shall be Leakproof.
 - b. Loading:
 - 1) Highways: Earth cover, H-20 live loading, according to AASHTO HB-17, Impact loading according to AASHTO HB-17.
 - 2) Railways: Earth cover, Cooper E-80.
 - c. Bracing, Backstops, and Jacks: Of sufficient rating for continuous jacking without stopping except to add pipe sections, and to minimize tendency of ground material to freeze around casing pipe.
- C. CARRIER PIPE
 - 1. Public Sanitary Sewerage Gravity Piping: Comply with STS 33 31 11 – Public Sanitary Sewerage Gravity Piping.

2.2 ACCESSORIES

- A. Timber Supports and Insulators:
 - 1. Description:
 - a. Furnish notches to accommodate fastening.
 - b. Treat notches at time of pipe installation with wood preservative.
 - 2. Wood Preservative or Pressure Treatment: Creosote.
 - 3. Species: Redwood.
- B. Steel and Plastic Supports and Insulators:
 - 1. Bands: 14-gage stainless steel.
 - 2. Flange Bolts: 5/16-inch stainless steel.
 - 3. Liner: Heavy-duty PVC.
 - 4. Skids: Polyethylene or phenolic.
- C. Steel Strapping: Comply with ASTM A36.
- D. Casing Spacers:
 - 1. Casing spacers shall be bolt-on style with a shell made in two sections of Type 304 stainless steel.
 - 2. Connecting flanges shall be ribbed.
 - 3. The shell shall be lined with a PVC liner 0.090-inch thick with 85-90 durometer.
 - 4. Nuts and bolts shall be 18-8 stainless steel.
 - 5. Construct runners of ultra-high molecular weight polymer.

6. Support runners by risers made of Type 304 stainless steel.
 7. Weld the supports to the shell and passivate the welds.
 8. Casing spacers shall be Cascade Waterworks Mfg. Co., PSI, APS, or equal.
- E. Casing End Seals:
1. Casing seals shall be 1/8-inch-thick synthetic rubber, designed to fit snugly around pipe and casing.
 2. Casing seals shall be one piece with no field seams.
 3. Bands and hardware for attachment to pipe and casing outside diameter shall be stainless steel.

PART 3– EXECUTION

3.1 EXAMINATION

- A. Examine Project conditions and completed Work and verify that that connection to existing piping system, sizes, locations, and invert elevations are as indicated on Drawings.
- B. Immediately correct all deficiencies and conditions which would cause improper execution of Work specified in this Section and subsequent Work.
- C. Proceeding with Work specified in this Section shall be interpreted to mean that all conditions, including site conditions, were determined to be acceptable prior to start of Work.

3.2 PREPARATION

- A. Protection:
 1. The CONTRACTOR shall be responsible for locating any underground utilities and for any damage resulting thereto.
 2. Maintain access to existing facilities and other active installations requiring access.
 3. Construct elevations of casing with not less than the minimum cover indicated on the Drawings.

3.3 BORING

- A. Boring shall be performed to alignment and grade as shown on the construction drawings.
 1. The earth and/or rock augers shall not exceed the O.D. (outside diameter) of the steel casing by more than 1/4 of an inch.
 2. The boring and insertion of the steel casing shall be performed with equipment capable of simultaneous operation.
 3. The feed rate of augers and hydraulic pushing of the casing shall be the same.
 4. Under no circumstances will boring be allowed unless operations are simultaneous.

5. Every effort shall be made to avoid loss of earth.
 6. Excavated material shall be removed from the casing as excavation progresses and no accumulation of such material within the casing shall be permitted.
 7. Upon completion of the boring operations, all voids around the outside face of the casing shall be filled by grouting.
 8. Grouting equipment and material shall be on the job site before boring operations are started in order that grouting around the bored casing may be started immediately after the boring operations have finished.
 9. The allowable tolerance as to grade and alignment of the installed casing shall not exceed 1/10 of a foot per hundred feet of casing length.
- B. The CONTRACTOR shall be fully responsible for producing a sound, tight installation, true to line and grade.
- C. Carrier pipe shall be skidded through the casing on redwood, stainless-steel tied skids. A suggested method is shown in the Standard Detail Drawings. Other methods shall be approved in writing by the ENGINEER.

3.4 STEEL CASING

- A. The steel casing shall be seamless or electric resistance-welded tubing for sizes under 24-inch O.D. and standard double-submerged arc-weld for sizes over 24".
- B. Table 1 shows the steel casing size and thickness as related to the ductile iron carrier pipe.

Table 1: Casing size vs. Carrier Size

Steel Casing Diameter and Wall Thickness (Inches)	Ductile Iron Carrier Pipe Inside Diameter (Inches)
14 Schedule 30	6
16 Schedule 30	8
18 Standard Class	10
22 Standard Class	12
24 Schedule 20	14
26 Schedule 20	16
30 0.375" Wall	18
36 0.375" Wall	24

3.5 INSTALLATION DETAILS

A. General Installation Requirements:

1. The use of water or other liquids to facilitate casing emplacement and soil removal is prohibited.
2. Blasting is not permitted.
3. Control of Line and Grade:
 - a. The ENGINEER will establish the baselines and benchmarks indicated on the plans.
 - 1) Check these baselines and benchmarks at the beginning of the contract period and report any error or discrepancies to the ENGINEER.
 - 2) Use these baselines and benchmarks to furnish and maintain all reference lines and grades for installation.
 - 3) Use these lines and grades to establish the starting location of the installation.
4. Mount guidance laser system in a manner than isolates it from effects of movement by the digger shield or boring machine.

B. Drilling and Jacking for Electrical Conduit

1. Metallic conduit shall be installed under existing pavement by approved jacking or drilling methods.
2. Non-metallic conduit shall not be installed by jacking.
3. Non-metallic conduit may be installed by drilling if a hole larger than the conduit is pre-drilled and the conduit is hand-installed.
4. Jacking or drilling pits shall be at least 2 feet from the edge of any type of any pavement, measured from the side of the pit nearest to the pavement

3.6 FIELD QUALITY CONTROL

A. Compaction Testing:

1. Comply with ASTM D1557 or ASTM D698 unless otherwise indicated on the Drawings.
2. If tests indicate that the Work does not meet specified requirements, remove Work, replace, and retest.
3. Testing Frequency: as indicated in STD 701 – Trenching, Excavation, and Backfill.

3.7 ADJUSTMENT AND CLEANING

- #### **A. Remove temporary facilities for casing installation and jacking operations**

END OF SECTION 33 05 07



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 05 61

CONCRETE MANHOLES

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. This section contains items which are relative to the installation of sanitary sewer manholes

1.2 RELATED SECTIONS

- A. STD Specification 101 PORTLAND CEMENT CONCRETE)
- B. STD Specification 102 STEEL REINFORCING
- C. STD Specification 105 CONCRETE CURING COMPOUND
- D. STD Specification 106 CEMENT MORTAR AND GROUT
- E. STD Specification 108 BRICK
- F. STD Specification 163 Ductile Iron Castings
- G. STD Specification 170 ELECTRONIC MARKER DEVICES
- H. STS 33 01 30.81: MANHOLE REHABILITATION

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.
- C. ASTM C 32 Sewer and Manhole Brick (Made from Clay or Shale)
- D. ASTM C 139 Concrete Masonry Units for Construction of Catch Basins and Manholes
- E. ASTM C 478 Precast Reinforced Concrete Manhole Sections
- F. ASTM C 497 Methods for Concrete Pipe, Manhole Sections, or Tile
- G. ASTM D 1557 Laboratory Compaction Characteristics of Soil Using Modified

1.4 SUBMITTALS

- A. All Submittals shall comply with STS 01 33 00 - Submittal Procedures.
- B. Before commencing work, the CONTRACTOR shall submit the following for Approval:
 - 1. Technical Data Sheets for proposed materials.
 - 2. Certifications that the proposed materials meet or exceed the requirements listed in the Specifications.
 - 3. Installation procedures as recommended by the manufacturer.

4. Product testing results.
 5. Design calculations.
 6. Applicator qualifications and proof of manufacturer training.
- C. Product Data: Submit manufacturer's catalog information for manhole sections, manhole frames and covers, joint sealing compounds component construction, features, configuration, and dimensions. Show dimensions and materials of construction by ASTM reference and grade. Show lettering on manhole covers.
- D. Shop Drawings:
1. Indicate structure locations and elevations.
 2. Indicate sizes and elevations of piping, penetrations, step locations, cones, grade rings, and casting dimensions.
 3. Indicate wall thickness, strength of concrete, type, and steel reinforcement.
 4. Provide proposed concrete mix design for manhole sections.
 5. Furnish certified test reports for each type.
 6. Proposed precast base and concentric cone or top slab.
 7. Proposed FORMED-IN-PLACE REINFORCED CONCRETE manholes.
 8. Proposed CONCRETE BLOCK manhole.

1.5 PROJECT CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2– PRODUCTS

2.1 PORTLAND CEMENT CONCRETE

- A. All cement used for poured foundations, mortar, fillets, grout, and concrete shelf construction shall be Type II or approved equal.
- B. All concrete for formed in place foundations or bases, concrete shelves, and pipe supports shall conform to STD Specification 101.

2.2 PRECAST CONCRETE MANHOLES:

- A. The vertical sections of the manhole may be of different dimensions in order that manholes of various depths can be readily assembled.
- B. Concrete, used for precast bases, vertical sections, and concentric cones, shall conform to STD Section 101.
- C. Vertical sections of the manhole shall conform to the requirements of ASTM C478.
- D. Circular precast manhole sections shall be provided with mastic gasket to seal joints between sections. Material used shall conform to the OWNER Approved Product List.

- E. All lifting holes, except Type "C" manhole covers, and gaps at joints shall be filled with a non-shrink grout.
- F. Precast concrete manhole bases may be used when approved by the ENGINEER. If approved, it shall be with the understanding that the CONTRACTOR shall be responsible for placing the bases at the specified elevation, location, and alignment.

2.3 FORMED-IN-PLACE REINFORCED CONCRETE MANHOLE:

- A. Concrete used for this type of manhole construction shall conform to STD Section 101.
- B. A precast concentric cone or a flat top cover can be used.

2.4 CONCRETE BLOCK MANHOLE:

- A. Concrete masonry units for the construction of this type of manhole shall conform to ASTM C 139 and the Standard Detail Drawings. All blocks shall be mortared into place.
- B. A precast concentric cone or a flat top cover can be used.

2.5 COATING OF MANHOLES:

- A. Exterior of Manholes: The coating shall be a waterproofing type of bitumastic or asphaltic material, as approved by the ENGINEER.
- B. Interior of Manholes: The coating shall conform to STS 33 01 30.81 MANHOLE REHABILITATION and be listed on the OWNER'S Approved Product List
- C. Plastering of Manholes: The work shall include the coating of the surface of existing block manholes with plaster as required on the construction plans.

2.6 ADJUSTMENT BRICKS:

- A. Manhole adjustment bricks shall conform to the requirements for manhole bricks, per ASTM C 32 for Grade MS.
- B. Mortar shall be used to lay the bricks, as well as coating the interior and exterior surfaces of the laid brick. Thickness of the mortar coating shall be ½-inch.

2.7 MANHOLE FRAME AND COVER:

- A. The manhole frame and cover for the sanitary sewer shall conform to the specifications contained in STD Specification 163 Ductile Iron Castings.

PART 3– EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

- A. Inspection: Accept materials on-site in manufacturer's original packaging and inspect for damage.
- B. Handling: Comply with precast concrete manufacturer instructions and ASTM C913 for unloading and moving precast manholes and drainage structures.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.

2. Store precast concrete manholes and drainage structures to prevent damage to OWNER'S property or other public or private property.
 3. Repair property damaged from materials storage.
- D. Protection:
1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 2. Provide additional protection according to manufacturer instructions.

3.2 GENERAL

- A. Soil Foundations for manhole base shall be compacted to a density of 95 percent of the maximum density per ASTM D 1557. Compaction limits shall be one foot beyond the perimeter of the concrete base and shall be a minimum of one foot in depth.
- B. Manholes shall be constructed in accordance with the Standard Detail Drawings and as shown on the construction plans. Precast reinforced concrete units, concrete blocks or formed in-place, reinforced concrete may be used to construct manhole.
- C. Invert elevation of the pipes entering or exiting the manhole and interior inverts shall not vary more than 0.05 feet from the elevation indicated on the construction plans. In order to ensure compliance with the design drawings, the CONTRACTOR shall provide the ENGINEER with coordinates, obtained by a Professional Surveyor licensed in the state of New Mexico. The vertical precision of the coordinates shall be, at a minimum, accurate to within 0.05 feet. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate.
- D. Depending on the size of the pipe, connections to existing and new manholes shall be made by:
 1. Core drilling through the manhole wall, preformed for new precast units.
 2. If core drilling is not practical, the CONTRACTOR shall request the ENGINEER to authorize the chipping operation. Upon approval the manhole wall may be removed by carefully chipping the wall segment which will permit entry of the pipe. Exposed manhole reinforcement should be bent and tied to the reinforcement of the pipe tied to the reinforcement of the pipe collar.
 3. During either operation, the CONTRACTOR shall take care to avoid unnecessary damage to the manhole surfaces or walls.
- E. Electronic marker devices shall be installed at all sanitary sewer manholes, one foot upstream of the manhole over the centerline of the main line.

3.3 COATING OF MANHOLES:

- A. Exterior of Manholes:
 1. Exterior coating of manholes shall be required in areas where ground water is present.
 2. Application shall be in accordance with the manufacturer's published recommendations.
- B. Interior of Manholes:

1. Interior coating of manholes shall be required only when specified on the construction plans.
2. Refer to STS 33 01 30.81 MANHOLE REHABILITATION. Application shall be in accordance with the manufacturer's published recommendations.

C. Plastering of Manholes:

1. The work shall include the coating of the surface of existing block manholes with plaster as required on the construction plans.

3.4 FIELD QUALITY CONTROL

A. Tests: Leakage Testing of Sewer Manholes:

1. All sanitary sewer manholes shall be tested for leakage by either a water exfiltration test or a vacuum test.
 - a. Whichever leakage test is utilized the test should be performed prior to backfilling around the manhole and prior to placement of the manhole frame and cover.
 - b. All inlet and outlet lines shall be properly plugged, and the lift holes and barrel joints filled and sealed as specified.
 - c. The CONTRACTOR shall be responsible for all materials and equipment necessary to perform the test and shall conduct the test in the presence of the ENGINEER or his representative.
 - d. The CONTRACTOR has the option of performing a manhole test in increments appropriate to the depth of the manhole.
2. Under all circumstances, the CONTRACTOR shall be required to remove all plugs immediately after testing and prior to acceptance of the work.
 - a. The OWNER assumes no liability for damages caused by plugs inadvertently left in the line by the CONTRACTOR.
 - b. The CONTRACTOR shall certify in writing to the OWNER the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal.
3. The water exfiltration test shall consist of filling the entire manhole with water to the bottom of the frame elevation.
 - a. A stabilization period of one hour will be allowed for absorption, after which the manhole shall be refilled as necessary before starting the test.
 - b. The test period shall be two (2) hours, after which the manhole shall be refilled, measuring the necessary quantity of water.
 - c. The allowable leakage shall be 0.25 gallons per foot diameter per vertical foot per day and is represented by the following formula:

$$V = 0.25 \text{ DHT} / 24$$

Where: V = Allowable loss in gallons

D = Manhole diameter in feet

H = Initial depth of water to invert in feet

T = Duration of test in hours

4. The vacuum test shall consist of utilizing an inflatable compression band, vacuum pump, gauges, and appurtenances specifically designed for vacuum testing.
 - a. Test procedures shall be in accordance with the manufacturer's printed recommendations.
 - b. The ENGINEER shall be the sole judge as to the adequacy of the equipment.
 - c. A vacuum of 10" Hg shall be placed in the manhole and the time measured for a drop to 8.5" Hg.
 - d. The test shall be considered successful if the measured time exceeds the test period.
 - e. Should the test fail, the manhole shall be repaired as necessary and the test rerun.
 - f. The test periods are:
 - 1) Sixty (60) seconds for four (4) foot diameter manholes
 - 2) Seventy-five (75) seconds for five (5) foot diameter manholes
 - 3) Ninety (90) seconds for six (6) foot diameter manholes
 - 4) One hundred and twenty (120) seconds for eight (8) foot diameter manholes

3.5 VERTICAL ADJUSTMENTS

- A. Adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
- B. Vertical Adjustment of Existing Manholes less than 2-inches:
 1. Remove frame, cover, and PCC collar (if applicable).
 2. Reset to required elevation using metal rings according to requirements specified for installation of castings.
 3. As required, the following items are included per appropriate adjustment: pavement removal and replacement, excavation, compacted backfilling, reinforced concrete collar or pad, metal rings, new frame, new cover, and EMD placement..
- C. Vertical Adjustment of Existing Manholes greater than 2-inches:
 1. Remove frame, cover, and PCC collar (if applicable).
 2. Reset to required elevation using leveling bricks according to requirements specified for installation of castings.

3. As required, the following items are included per appropriate adjustment: pavement removal and replacement, excavation, compacted backfilling, reinforced concrete collar or pad, leveling bricks, new frame, new cover, and EMD placement.
- D. Vertical Adjustment of Existing Manholes requiring adjustment of concrete or block barrel:
1. Remove frame, cover, and PCC collar (if applicable).
 2. Remove precast reinforced concrete cone or precast reinforced concrete top slab.
 3. Furnish and install required manhole (precast concrete, concrete block, or poured concrete) barrel to obtain the required adjustment.
 4. Reset the existing precast reinforced concrete cone or precast reinforced concrete top slab.
 5. As required, the following items are included per appropriate adjustment: pavement removal and replacement, excavation, compacted backfilling, reinforced concrete collar or pad, concrete or block barrels, new frame, new cover, and EMD placement.

3.6 ABANDONMENT OF MANHOLES

- A. Abandonment of manhole, which is part of a sewer line being abandoned, shall require the following work and materials:
1. Manhole will not be removed but will be abandoned in place.
 2. All manhole inlet and outlet lines shall be plugged with a 12-inch –thick concrete or concrete mortar plug.
 3. The concrete collar, ring, and cover shall be removed and disposed of by the CONTRACTOR.
 4. **Manhole bottom will be pulverized.**
 5. The manhole shall be filled with **cement treated base (CTB)** material to the bottom elevation of the asphalt base course of the pavement or to the ground surface level.
 6. All labor, materials, and equipment necessary to complete this work shall be furnished by the CONTRACTOR.
 7. For historical information, **the ENGINEER** shall provide coordinates accurate to within 0.3 feet, obtained by a Professional Surveyor licensed in the state of New Mexico, on the record drawings. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate.

END OF SECTION 33 05 61



SUPPLEMENTAL TECHNICAL SPECIFICATION

SECTION 33 05 76

FIBERGLASS MANHOLES

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. This specification shall govern for the furnishing of all work necessary to accomplish and complete the installation of Fiberglass Reinforced Polyester (FRP) manholes (and manhole liners). FRP Manholes shall be a one-piece monolithic designed unit constructed of fiberglass reinforcements, unsaturated commercial grade polyester resin. The resin system shall be suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems. FRP manholes shall be manufactured in strict accordance with ASTM D-3753.

1.2 RELATED SECTIONS

- A. STS Section 33 01 30.41: Sewer Line Cleaning.
- B. STS Section 33 01 30.81: Manhole Rehabilitation.

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.
- C. AASHTO H-20 - Axle Loading.
- D. ASTM D3753 - Standard Specification for Glass-Fiber Reinforced Polyester Manholes.
- E. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.

1.4 SUBMITTALS

- A. Product Data: Submit
 - 1. Design and fabrication details for fiberglass manhole components.
 - 2. Manufacturer's installation instructions.
 - 3. Provide dimensional drawings specific to this project.
 - 4. Manufacturer's data and details for materials to be used for grout and pipe connections.
 - 5. Manufacturer's certification that FRP manhole comply with the requirements of this Section, including the chemical resistance criterion.
- B. QUALITY CONTROL SUBMITTALS

1. Test Reports:
 - a. Submit test reports from an independent testing laboratory confirming chemical resistance, and AASHTO H-20 loading.

PART 2– PRODUCTS

2.1 MANUFACTURERS

- A. Pre-approved FRP manhole manufacturers are:
 1. Containment Solutions, Inc.
 2. L.F. Manufacturing, Inc.

2.2 MATERIALS

- A. FRP Manholes shall be manufactured in accordance with the following:
 1. FRP Manholes shall be single piece barrel and concentric reducer construction OR multiple barrels with top barrel having concentric reducer construction, joints between barrels manufactured to fit snugly together.
 2. The minimum wall thickness for all FRP Rehabilitation manholes at all depths shall be 0.50 inch. Wall thickness shall provide for an AASHTO H-20 load rating.
 3. Interior and exterior surfaces shall be relatively smooth and be free of sharp projections and protruding glass fibers. No blisters or delamination shall be visible.
 4. FRP manhole liners shall be sized to fit inside existing manholes and allow grade rings and frame between the top and finish grade.
 5. Manway reducers will be concentric with respect to the larger portion of the manhole liner diameters. Manway reducer opening size shall be per Standard Drawings 2101 and 2102.
 6. Cover and Ring Support: The manhole liner shall provide an area for which grade rings or brick can be installed to accept a typical metal ring and cover and have the strength to support a traffic load without damage to the manhole liner.
 7. Resin:
 - a. The resins used shall be a commercial grade unsaturated polyester resin or other suitable polyester or vinyl ester resin.
 - b. Non-pigmented resin is required to allow for light or "sand" color of manhole surface in order to facilitate easy viewing from grade interior inspection.
 8. Reinforcing Materials: The reinforcing materials shall be commercial Grade “E” type glass in the form of continuous roving and chop roving, having a coupling agent that will provide a suitable bond between the glass reinforcement and the resin.

9. Filler and Additives: Fillers, when used, shall be inert to the environment and manhole construction. Sand shall not be accepted as an approved filler. Additives, such as thixotropic agents, catalysts, promoters, etc., may be added as required by the specific manufacturing process to be used to meet the requirements of this standard. The resulting reinforced-plastic material must meet the requirements of this specification.
 10. Chemical Resistance: The fiberglass manhole and all related components shall be fabricated from corrosion proof material suitable for atmospheres containing hydrogen sulfide and dilute sulfuric acid as well as other gases associated with the wastewater collection systems.
- B. Sealants: Sealant between FRP manhole liner and the surfaces of the existing manhole base shall be a quick-setting grout as specified in STS 33 01 30.81 Manhole Rehabilitation.
 - C. Grout: Grout between the FRP manhole liner and the existing manhole wall shall be as specified in STS 33 01 30.81 Manhole Rehabilitation.

PART 3– EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

- A. Do not drop or impact the FRP manhole. Lift the FRP manhole with two slings on spreader bar in horizontal position or by use of an appropriately sized timber or steel beam, 8 inches longer than the cone top opening, inserted crosswise inside the FRP manhole to the underside of the collar with a rope or chain attached to backhoe or other lifting device. FRP MANHOLE may be rolled over the ground provided that it is smooth and free of rocks, debris, etc. Use of chains or cables in contact with FRP manhole surface is prohibited.
- B. Onsite Inspection
 1. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the ENGINEER, or other representative of the OWNER. Such inspections shall be made at the place of manufacture, or at site of delivery, and the sections shall be subject to rejection on account of failure to meet any of the specification requirements.
 2. At the time of inspection, the material will be examined for compliance with the requirements of this Section and the approved drawings.
- C. Corrective Actions:
 1. Sections rejected after delivery to the job site shall be marked for identification and shall be removed from the job at once. All sections, which have been damaged after delivery will be rejected, and if already installed, shall be acceptable if repaired or removed and replaced at the CONTRACTOR'S expense
 2. Replace or repair Work to eliminate defects, deficiencies, and irregularities.

3.2 PREPARATION

- A. Sewer flow control shall be per STS 33 01 30.51: Sewer Flow Control if required. Clean the manhole per STS 33 01 30.41: Sewer Line Cleaning.

3.3 INSTALLATION

- A. FRP manhole installation shall be per manufacturers written recommendations.
- B. FRP manhole liner installation:
 - 1. Remove pavement if present as specified in Contract Documents.
 - a. Excavate around the manhole as necessary to prevent soil and debris from falling into manhole while frame and grade rings are removed.
 - 2. Remove and dispose the upper segment of the existing manhole as determined by the ENGINEER.
 - 3. Rehabilitate the bench BEFORE installation of the FRP manhole liner per STS 33 01 30.81 Manhole Rehabilitation.
 - 4. Cut the FRP manhole liner or prepare the concrete bench so that the FRP manhole liner will be evenly supported when lowered into place.
 - a. Accurately locate incoming and outgoing sewer lines and cut the FRP manhole liner for a close fit within 1 inch to both.
 - b. Seal the cut edges with resin.
 - 5. Lower the FRP manhole liner into a 4-inch deep layer of quick-setting grout mixture or concrete, making sure that the sewer lines and insert openings align.
 - 6. Place a 6-inch deep layer of quick-setting grout at the bottom of the annular space between the FRP manhole liner and the wall.
 - 7. Seal the sewer openings with Oakum soaked in sealing gel, or other material approved by the ENGINEER.
 - 8. Fill the remaining annular space with grout. Consolidate the grout without damage to the FRP manhole liner.
 - 9. Install the manhole grade rings, frame, and cover per STS 33 05 61 Concrete Manholes.
 - 10. Furnish and install PCC collar per fiberglass manufacturers recommendations in order to meet HS-20 loading.
 - 11. Refer to the construction plans for requirements to install an Epoxy Lining System or Polyurethane and Epoxy Protective Lining System per STS 33 01 30.81 Manhole Rehabilitation on the remaining existing manhole base.

3.4 ACCEPTANCE

A. Performance Testing:

1. After the FRP manhole liner and bench rehabilitation has been completed, the work shall be visually inspected in the presence of the OWNER and/or ENGINEER for compliance with these specifications and the manufacturer's recommendations.

B. Photographs:

1. Provide digital photographs of the finished manhole upon completion of repair and rehabilitation work.
2. The photograph shall be taken looking down into the manhole, oriented so that the effluent pipe is at the bottom of the photograph.
3. Photographs shall be named by the corresponding manhole number. When duplicate numbers occur, the photograph name shall also contain an approximate address or street location. These photographs shall be submitted to the OWNER digitally on a USB flash drive, periodically to accompany pay applications.
4. Final project acceptance is contingent upon receiving all manhole photographs.

END OF SECTION 33 05 76



**SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 33 31 11
PUBLIC SANITARY SEWERAGE GRAVITY PIPING**

PART 1– GENERAL

1.1 SECTION INCLUDES

- A. The construction items, specified in this section, are common to sanitary sewer collector and interceptor facilities.

1.2 RELATED SECTIONS

- A. STD Specification 701: Trenching, Excavation and Backfill
- B. STS 33 05 07: Trenchless Installation of Utility Piping (Boring, Drilling, and Jacking)

1.3 REFERENCES

- A. City of Albuquerque Standard Specifications for Public Works Construction, as updated.
- B. Where all or part of a Federal, ASTM, ANSI, AWWA, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.
- C. ASTM D2321: Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- D. ASTM D3034: Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- E. ASTM F679: Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
- F. ASTM F794: Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer information indicating proposed materials, accessories and details prior to the ordering or manufacture of the materials.
- B. QUALITY CONTROL SUBMITTALS
 - 1. Test Reports:
 - a. A television report log, completed on the OWNER’S log form, shall be maintained during the television inspection.
 - 1) This log shall be completed to the OWNER’S satisfaction noting: the location, project title, name of OWNER, date, type of pipe material, line size, location of services (live or stub-outs), manhole or station numbers, and any abnormal or line defects within the line segment.
 - 2. Certificates:

- a. The CONTRACTOR shall certify in writing to the OWNER the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal. Thoroughly clean the Work specified in this Section and adjoining surfaces and areas affected by [application] [installation].

1.5 QUALITY ASSURANCE

A. Certifications:

1. The OWNER / ENGINEER will be supplied with a certification on each item or type of material required in the sewer line, as to that item meeting the specifications and / or the reference specifications before that item is installed.

1.6 DELIVERY, STORAGE AND HANDLING

A. Packaging and Shipping:

1. Pipe and appurtenances shall be handled in such a manner as to ensure delivery to the trench in sound, undamaged condition.

B. Storage and Protection:

1. Particular care shall be taken to prevent damage to any pipe coating.

PART 2– PRODUCTS

2.1 MATERIALS

A. General

1. The CONTRACTOR shall submit the manufacturer's data on materials to be furnished that indicate compliance with the specifications regarding materials used.
2. Only products or materials listed on the OWNER Approved Product List shall be used

B. Polyvinyl Chloride (PVC) Gravity Flow Pipe:

1. The material in PVC pipe shall be in accordance with ASTM D 1784.
2. PVC gravity flow pipe may be used for sanitary sewer applications for sizes 8-inch and greater, except for installation resulting in a depth of cover (to subgrade elevation) less than 3.1 feet or when the Contract documents specifically prohibit its use.
3. Lateral line connections shall be made at manholes or at factory manufactured saddles or tees only, unless specifically authorized by the ENGINEER.
4. PVC gravity flow pipe in sizes 8-inches through 15-inches shall meet the requirements of ASTM D 3034. Only solid wall pipe shall be used. Minimum wall classification shall be SDR 35.
5. PVC gravity flow pipe in sizes 18-inch and larger shall meet the requirements of ASTM F 679 or ASTM F 794. Minimum pipe stiffness shall be 46 psi.

6. Sanitary sewer service line connections to 15-inch and larger pipe diameter is not permitted, unless authorized by the Water Authority.
7. All plastic pipe which is connected to a manhole, junction box, inlet or similar structure shall be installed with an approved manhole connection adapter or water-stop such that each connection is leak-free and that there is no detrimental affect resulting from the material property characteristic differences between the plastic pipe and the structure.
8. BELL AND SPIGOT JOINTS: Pipe with gasket joints shall be manufactured with a socket configuration, which will prevent improper installation of the gasket and will ensure that the gasket remains in place during joining operations. The gasket shall be manufactured from a synthetic elastomer material and shall conform to the requirements of ASTM F 477. The spigot end of each joint of pipe shall be marked circumferentially to indicate the proper home mark. Pipe, which is field-cut, shall be chamfered and the home mark identified in accordance with the applicable criteria.

C. Fiberglass Reinforced Polymer Mortar Pipe (FRPMP)

1. All FRPMP shall be per ASTM D3262, Type 1, Liner 1 or 2, Grade 1 or 3. The pipe shall also meet the strain corrosion resistance requirements of ASTM D 3681 and joint requirements of ASTM D 4161.
2. The interior surface of the FRPMP shall be a resin rich finish, 40 mils thick minimum, of epoxy, polyester or vinylester resin with no fillers and shall be free of cracks and crazing when placed under the design loading.
3. The interior and exterior layers of the FRPMP shall be composed of resin impregnated glass fibers and silica sand fillers in layers.
4. The FRPM pipe produced shall have a minimum pipe stiffness of 46 psi at 5% deflection as set forth in ASTM D 2412.
5. Resin Systems: The manufacturer shall use a thermosetting polyester resin system with a minimum tensile elongation of 2 percent.
6. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be commercial grade of E-type glass filaments with binder and sizing compatible with impregnating resins.
7. Fillers: Sand shall be in accordance with ASTM C 33 and shall be a minimum 98% silica, kiln-dried and graded, with a maximum moisture content of 0.2%.
8. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally impact the performance of the product.
9. Chemical resistance: The FRPMP shall meet or exceed the requirement for the 50-year strain value as outlined in ASTM D 3262-Table 4 when tested in accordance with ASTM D 3681.

10. FRPMP Joining System shall be field connected with glass reinforced plastic sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint water-tightness. Coupling joints shall meet the performance requirements in accordance with ASTM D4161 and ASTM F477 and shall have a deflection no greater than 75 percent of manufacturer's recommendations.
11. Closure Couplings for FRPMP
 - a. Casing and fasteners shall be constructed of 316 Stainless Steel.
 - b. Sealing Sleeve shall be constructed of EPDM rubber.

D. Steel Reinforced Polyethylene (SRPE) Pipe

1. SRPE pipe is a reinforced polyethylene pipe with a smooth waterway wall and exterior profile that is reinforced with high strength galvanized steel ribs. The continuous reinforcing ribs shall be completely encased within the polyethylene profile.
2. Inside color of the SRPE pipe shall be white or an alternative light color suitable for illumination during television inspection. Outside color may be different provided the pipe is a homogeneous material and all colors are integral to the HDPE material (not painted or coated)
3. SRPE pipe shall be manufactured using a helical winding process that results in a continuously fusion welded lap seam.
4. SRPE pipe profile shall be manufactured using a high quality stress-rated thermoplastic meeting the requirements of ASTM F2562 "Standard Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage" or AASHTO Designation MP-20.
5. SRPE pipe shall be manufactured from virgin high density polyethylene stress-rated resins. Resins shall conform to the minimum requirements of cell classification 345464C as defined and described in the latest version of ASTM D3350 "Standard Specification for Polyethylene Plastics Pipe and Fittings Materials".
6. SRPE pipe joining system shall be gasketed, bell and spigot joints where both the bell and spigot are reinforced with steel that is fully encased in stress-rated high density polyethylene (meeting the requirements set forth in the above section) and that have been laboratory tested to 15 psi when tested in accordance with ASTM D3212 "Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals".

E. PVC Corrugated Sewer Pipe with a smooth interior

1. The actual outside diameters of the PVC Corrugated Sewer pipe barrel for 12"-36" nominal diameters shall be in accordance with ASTM F949. Pipe shall be supplied in nominal lengths of 10 or 20 feet. When required by radius curves, pit size or sewer misalignment, etc., pipe shall be supplied in special lengths that are even division of 20 feet. The minimum laying length shall be 2.5 feet.
2. PVC Corrugated Sewer Pipe shall be manufactured and tested in accordance with ASTM F949.

3. PVC Corrugated Sewer pipe shall be made of PVC compound having a minimum cell classification of 12454 in accordance with ASTM D1784.
4. PVC Corrugated Sewer pipe shall be manufactured as a single extrusion of the smooth inner and the corrugated outer walls. The corrugated exterior profile shall be annular and seamless.
5. PVC Corrugated Sewer Pipe shall have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412.
6. The PVC Corrugated Sewer pipe minimum wall thickness shall be stated in Table 1 of ASTM F949 when measured in accordance with ASTM D2122
7. PVC Corrugated Sewer Pipe shall be field connected with molded or fabricated PVC couplings. Couplings shall not increase the outside diameter or reduce the inside diameter when assembled. The joint shall utilize elastomeric sealing gaskets as the sole means to maintain joint water tightness and shall meet the requirements of ASTM D3212. Joints shall remain watertight at 5 degrees angularity. Gaskets shall meet the requirements of ASTM F477 and be suitable for the service intended. All socket (bell) dimensions shall be sufficiently deep to allow for maximum joint angularity without joint separation. The minimum socket depth shall be 4.25 inches. The outside diameter of sockets shall be equal to the pipe outside diameter.

F. High Density Polyethylene Pipe (HDPE)

1. HDPE pipe shall meet the applicable requirements of ASTM F714. Inside color shall be white or an alternative light color suitable for illumination during television inspection. Outside color may be different provided the pipe is a homogeneous material and all colors are integral to the HDPE material (not painted or coated).
2. HDPE pipe and fitting: will be used in accordance with the material specifications. All additional appurtenances (manholes, tees, gaskets, etc.) will meet the material specifications. All pipe installed by pipe bursting will be joined by butt fusion, electro fusion, or full circle repair clamp as detailed in the pipe joining part of this section.
3. HDPE pipe will be produced from resins meeting the requirements of ASTM D1248, designation PE3408, ASTM D3350 cell classification PE345444C, and will meet the requirements of AWWA C901 and C906. HDPE pipe will meet the minimum stability requirements of ASTM D3350. Pipe will be legibly marked at intervals of no more than five feet with the manufacturer's name, trademark, pipe size, HDPE cell classification, SDR rating, ASTM D3035, AWWA C901 or C906, date of manufacture and point of origin.
4. HDPE pipe shall be made of virgin material. No rework material except that obtained from the manufacturers own production of the same formulation shall be used.
5. HDPE pipe shall be homogeneous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
6. HDPE Pipe shall be Iron Pipe Size (IPS).

7. Dimension Ratios: The minimum wall thickness of the HDPE pipe is DR 17.
 8. Pipe Joining for Terminal Sections of HDPE Pipe
 - a. The polyethylene pipe shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment. ENGINEER may require CONTRACTOR to use a data logger to store butt-fusion joint data.
 - b. Terminal sections may also be joined by electro fusion couplings as approved by the ENGINEER.
 - c. Terminal sections may also be joined by Stainless Steel Full Circle Repair Clamps as approved by the ENGINEER.
- G. Trace Wire System:
1. Trace Wire:
 - a. For open trench installation, #12 AWG high strength copper clad steel wire with a minimum 450-pound break load and minimum 30 mil HDPE insulation thickness shall be used.
 - b. For directional drilling/boring installation, #12 AWG high strength copper clad steel wire with a minimum 1,150-pound break load minimum 45 mil HDPE insulation thickness shall be used.
 - c. For pipe bursting installation, high strength 7x7 stranded copper clad steel wire with 4,700-pound break load and minimum 50 mil HDPE insulation thickness shall be used.
 - d. The insulation of the trace wire shall be Green.
 2. Trace Wire Connectors:
 - a. Connectors and Connections shall be approved by the manufacturer for direct burial.
 - b. Tee Connections: Single 3-way locking waterproof connector for 12 AWG.
 - c. Cross Connectors: Two 3-way locking waterproof connectors for 12 AWG with a short jumper wire.
 - d. Necessary Splice Connections: Single 3-way direct bury lug locking connector rated up to 50 volts filled with dielectric silicone sealant to seal out moisture and corrosion and prevent uninsulated wire exposure.
 - e. Non-locking friction fit, twist on or taped connectors are prohibited.
 3. Trace Wire Test Stations:

- a. All trace wire test stations shall be made of corrosion-resistant materials and shall be equipped with two terminals, a roadway-rated flange to prevent the test station from sinking, and a locking cast iron cap with an encapsulated magnet for ease of locating the test station.
 - b. The test station shall be specifically manufactured for trace wire access/testing.
 - c. All test stations shall be appropriately identified with "Test Station" and with "Sewer" cast into the cap.
 - d. All trace wire test stations must include a manually interruptible conducting/connection link (terminal jumper) between the terminal for the trace wire connection and terminal for the grounding anode wire connection.
 - e. The color of the test station caps shall be Green.
4. Trace Wire Grounding Anode:
- a. All grounding anodes shall be made of magnesium, with a pointed end to enable direct driving into the ground, specifically manufactured for this purpose.
 - b. The grounding anode shall come factory equipped with an HDPE cap and 20 feet of factory installed #12 AWG copper clad steel wire with 30 mil HDPE coating rated for direct burial at 30 volts with 21% conductivity. The wire shall have a minimum 450-pound break load.

PART 3– EXECUTION

3.1 INSTALLATION

- A. Pipe and appurtenances shall be new and unused. The type of pipe to be installed shall be as approved by these specifications or unless otherwise shown on the project construction drawings.
- B. The interior of the pipe shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations.
 - 1. When work is not in progress, the open ends of pipe shall be securely closed so that no foreign materials will enter the pipe.
 - 2. Any section of pipe found to be defective before or after installation, shall be replaced with sound pipe, or repaired in a manner satisfactory to the ENGINEER, without additional expense to the OWNER.
- C. The CONTRACTOR shall not flush or otherwise discharge any flow into an existing system unless approved in writing by the ENGINEER and OWNER.
- D. The CONTRACTOR shall install a plug in the new sewer at any point of connection to an existing system.
 - 1. The plug shall remain in place until the ENGINEER or OWNER authorizes its removal.

2. Under all circumstances, the CONTRACTOR shall be required to remove all plugs prior to acceptance of the work.
 - a. The CONTRACTOR shall certify in writing the completion of the plug removal task.
 - 1) The certification shall include the locations of removed plugs and corresponding date of removal.
 - 2) The OWNER assumes no liability for damages caused by plugs inadvertently left in the line by the CONTRACTOR.
- E. Pipe shall be laid to line and grade as shown on the project construction plans.
 1. The bedding of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.
 2. Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench.
 3. All adjustment to the line and grade shall be made by scraping away or filling in with pipe zone material under the body of the pipe, and not by wedging or blocking.
 4. When connections are to be made to any existing manhole, pipe, or other improvement, the actual elevation or position of which cannot be determined without excavation, the CONTRACTOR shall excavate for and expose the existing improvement before laying the connecting pipe or conduit.
 5. When existing underground improvements may reasonably be expected to conflict with the line or grade established for the new sewer line, the ENGINEER shall request the CONTRACTOR to excavate as necessary to expose and locate such potentially conflicting underground improvements prior to laying the new pipe.
 6. Any adjustment in line or grade which may be necessary to accomplish the intent of the construction plans will be made, and the CONTRACTOR will be paid for any additional work resulting from such change in line or grade in the manner provided for in the General Conditions.
- F. Connections to existing sanitary sewer manholes shall be made by core drilling through the manhole wall. The CONTRACTOR shall take care to avoid unnecessary damage to the existing manhole.
- G. Pipe shall be laid upgrade in a continuous operation from structure to structure, with the bell end of the pipe upgrade unless otherwise permitted by the ENGINEER.
- H. Sanitary sewer mains shall not be constructed under walkways, sidewalks, curbs and gutters, drive pads, or similar concrete structures by tunneling underneath them.
 1. The CONTRACTOR will remove the section of the concrete structure to the nearest full expansion joint or edge.
- I. Prior to completely backfilling the sewer excavation, install a green metalized detectable warning tape 12" to 18" below finished grade.
 1. The tape shall be detectable with a standard metal pipe locator.

2. The tape shall be a minimum of 2 inches wide and inscribed at 10-foot intervals with the words, "CAUTION BURIED SEWER LINE BELOW".
3. The tape shall be constructed of material that is impervious to alkalis, acids, chemical reagents, and solvents found in the soils.

J. Trace Wire

1. Trace wire shall be installed on all public sanitary sewer interceptor, collector, and any other lines considered public infrastructure that will be owned and maintained by the OWNER.
2. Trace wire shall be installed in such a manner as to be able to properly trace all pipelines as applicable, without loss or deterioration of the signal.
3. The trace wire shall be installed in the same trench and inside bored holes and casing with pipe during pipe installation.
4. The trace wire shall be securely bonded together at all wire joints with a locking waterproof connector that complies with this specification to provide electrical continuity.
5. Trace wire connectors shall be installed in a manner that prevents any uninsulated wire exposure.
6. Trace wire shall be continuous and without splices between each trace wire access point, except for spliced-in repair or replacement connections
 - a. For required splices, use splice connectors per this specification.
 - 1) Spliced wires must be knotted prior to being inserted in the connector.
7. Trace wire systems must be installed as a single continuous wire. No looping or coiling of wire is allowed.
8. No breaks or cuts in the trace wire or trace wire insulation is permitted.
9. Trace wire installation shall be performed in such a manner that allows:
 - a. Proper access for connection of line tracing equipment,
 - b. Proper locating of wire without loss or deterioration of low frequency (512 Hz) signal for distances in excess of 1,500 linear feet and without distortion of signal caused by multiple wires being installed in close proximity to one another.
10. Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire and installing a new section of wire with connectors that comply with this specification.
11. Taping and/or spray coating to repair trace wire or trace wire insulation shall not be allowed.
12. Trace wire shall be laid flat on top of the pipe and securely affixed in 6-foot intervals with tape or plastic ties to prevent shifting or damage during backfilling and excavation operations.

13. In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using splice connectors that comply with this specification.
14. Trace wire shall be attached to all manholes, vaults, and other appurtenances on the north or east side.
15. At service saddles, the trace wire shall not be placed between the saddle and the main.
16. Lay the mainline trace wire continuously by-passing around the outside of manholes, vaults, and other structures on the north or east side.
17. For main line intersections, the main line trace wire shall not be cut.
18. All main line trace wires must be interconnected at:
 - a. Intersections
 - b. Main line tees
 - 1) At tees, the three wires shall be joined using a single 3-way locking connector
 - c. Main line crosses.
 - 1) At crosses, the four wires shall be joined using two 3-way connectors with a short jumper wire between them.
19. All trace wire termination points shall be terminated with a grounding anode.
20. For repairs and rehabilitations, trace wire shall be installed on the new line per this specification. The ends of rehabilitated/replaced pipeline segments shall be connected if existing trace wire exists or shall be terminated with a grounding anode.
21. If repairs are made to a line with a trace wire:
 - a. CONTRACTOR must ensure trace wire is connected with an approved splice connector
 - b. CONTRACTOR must test the trace to the next existing test station.
22. Connectors:
 - a. Connectors shall be approved by the manufacturer for direct burial.
 - b. Splices shall only be used on the main line at the end of a trace wire spool or when a Tee Connection cannot be used.
 - c. The CONTRACTOR shall not cut the main line trace wire.
23. Test Stations
 - a. All grade level/in-ground test stations shall be appropriately identified with "Test Station" and with "Sewer" cast into the cap and color-coded Green.

- b. All trace wire test stations must include a manually interruptible conducting/connection link (terminal jumper) between the terminal for the trace wire connection and terminal for the grounding anode wire connection.
- c. Test stations shall be installed at the following locations as outlined in the Standard Detail Drawings:
 - 1) At sanitary sewer manholes and sanitary sewer wet wells;
 - 2) At sanitary sewer force main valves;
 - 3) At sanitary sewer vacuum valves;
- d. A minimum of 2 feet of excess/slack wire is required in all trace wire test stations after meeting final elevation. Group and zip-tie excess wire. Do not coil.
- e. Test stations shall be spaced approximately every 1,000 feet and shall not be spaced greater than 1,500 feet apart. Test stations do not need to be installed at each location identified above provided that the spacing between test stations does not exceed 1,500 feet.

24. Grounding

- a. Trace wire must be properly grounded at all termination points.
- b. Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod buried at the same depth as the trace wire.
- c. Where the grounding anode wire will be connected to a trace wire test station, a minimum of 2 feet of excess/slack wire is required after meeting final elevation.
- d. When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire nor the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire.
- e. Do not coil excess wire from grounding anode.
 - 1) The grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a splice connector.
 - 2) The splice shall be made in the test station.

K. Plastic Pipe Installation:

- 1. Plastic sewer pipe shall be connected and placed in the trench in accordance with the manufacturer's recommendations.
 - a. Where a conflict arises with this Specification, this Specification shall control.
 - b. Trenching, embedment, and backfill shall be as specified in STD Specification 701.

2. The reference mark (a distinct circumferential line) is placed on the pipe's spigot end by the manufacturer to indicate the correct depth of spigot penetration into the pipe gasket joint.
 - a. If the pipe is seated too deep or too shallow, the pipe may buckle or separate due to thermal expansion / contraction.
 - b. Spigot penetration shall be within ¼-inch of the manufacturer's recommended mark.
3. For plastic or fiberglass pipe connection to manholes the CONTRACTOR shall install an appropriately sized and approved press seal gasket.
 - a. The gasket shall be installed per manufacturer's directions.
 - b. No direct payment shall be made for this item. This cost shall be incidental to the pipe's bid item.
4. Acceptance of plastic pipe or fiberglass pipe sewers will be made only after these deflection test requirements have been met.
5. Minimum Diameters of Mandrels:

Nominal Pipe Size Diameter	Min. Mandrel
8 inches	7.2 inches
10 inches	9.0 inches
12 inches	10.8 inches
15 inches	13.5 inches
18 inches	16.2 inches
21 inches	18.9 inches
24 inches	21.6 inches
27 inches	24.3 inches

- L. Joint for Plastic Sewer Pipe (PVC):
 1. Refer to ASTM D2321 and ASTM F794 for pipe laying and joining of pipe guidelines.
 2. Prior to the laying of pipe, each pipe component shall be inspected for damage and cleaned. Damaged components shall be rejected or repaired.
 3. All joints will be assembled in accordance with manufacturer's published recommendations.
 - a. If a lubricant is required to facilitate assembly, it shall have no detrimental effect on the gasket or on the pipe when subjected to prolonged exposure.
 - b. Proper jointing may be verified by rotation of the spigot by hand or with a strap wrench.

- 1) If unusual joining resistance is encountered or if the insertion mark does not reach the flush position, disassemble the joint components, and repeat the assembly steps.
 - c. Note that fitting bells may permit less insertion depth than pipe bells.
 - d. When mechanical equipment is used to assemble joints, care should be taken to prevent over-insertion.
- M. Joint for FRPM
1. Refer to ASTM D4161 and ASTM F477 for pipe laying and joining of pipe guidelines.
 2. Prior to the laying of pipe, each pipe component shall be inspected for damage and cleaned. Damaged components shall be rejected or repaired.
 3. All joints will be assembled in accordance with manufacturer's published recommendations.
- N. Corrective Actions: Replace or repair Work to eliminate defects, deficiencies, and irregularities.

3.2 CLEANING

- A. No pipe spalls, rocks, dirt, joint compounds, cement mortar and other trash or obstructions shall be left in a sewer pipe of any size or type.
- B. During the flushing operations, the manhole outlet shall be bagged or plugged so that debris will not be carried into or contaminate an existing or active line.
- C. Under all circumstances, the CONTRACTOR shall be required to remove all plugs prior to acceptance of the work.
1. The OWNER assumes no liability for damages caused by plugs inadvertently left in the line by the CONTRACTOR.
 2. The CONTRACTOR shall certify in writing to the OWNER the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal. Thoroughly clean the Work specified in this Section and adjoining surfaces and areas affected by installation.

3.3 FIELD QUALITY CONTROL

- A. Leakage Testing:
1. General:
 - a. Unless otherwise shown on the construction drawings or specifically deleted by the ENGINEER, all sanitary sewers shall be tested for leakage.
 - b. The CONTRACTOR may Air Test the sanitary sewer line before backfilling the trench to aid the CONTRACTOR in checking the installation for any defects.
 - 1) Such testing is at the option of the CONTRACTOR and shall not constitute an acceptance test under these specifications.
 - c. The test for acceptance and compliance with these specifications shall be performed after the pipe zone backfilling has been completed.

- 1) In the case of new sanitary sewer lines with house laterals included as an integral part of the project,

3.3.A.1.c.1.1 the test for acceptance and compliance with these specifications shall be performed after the house laterals or stubs have been completed and backfilled.

3.3.A.1.c.1.2 The CONTRACTOR has the option to leave the end of the service line exposed.

- d. If the leakage, as shown by the test, is greater than allowed by these specifications, the pipe shall be overhauled at the CONTRACTOR'S expense and, if necessary, re-laid until the pipe will satisfactorily pass the test.
- e. The CONTRACTOR shall, at no additional expense to the OWNER, furnish all water, material, tools, and labor for performing the required tests.
- f. All tests shall be made under observation of the ENGINEER or appointed OWNER Representative

2. Infiltration Test

- a. In addition, the Infiltration Test must be performed after backfilling, before any service connections are functioning and at a time when the ground water is over the entire section of pipe and at or near its maximum level
- b. An Infiltration Test shall be used in place of the Exfiltration Test or the Air test only when excessive ground water prevents satisfactory testing by either the Exfiltration Test or the Air Test. .
- c. The procedure for conducting an Infiltration Test shall be as follows:
 - 1) The pipe section shall be cleaned.
 - 2) The groundwater table shall be determined for each section of sanitary sewer tested.
 - 3) Plug the upstream pipe outlet from upstream manhole of the sections being tested with a plug. Assure the plus has a tight seal against flow from the upstream portion of the sewer system.
 - 4) Plug all house laterals and any other connections to the section being tested.
- d. Install a 90-degree V-notch weir in the downstream manhole of the section being tested. Weir must be installed plumb and sealed to the pipe wall surface.
 - 1) A sufficient period of time must be allowed to permit the infiltrated waters to collect and flow over the weir. Water shall flow over the weir for at least 30-minutes prior to taking measurements.
 - 2) The head (H) of water flowing over the weir must be measured accurately and the measurement taken at least 18-inches upstream from the crest of the weir.

- 3) Discharge over the 90-degree V-notch weir shall be calculated according to:

$$Q = 3240 H^{2.5}$$

- e. The allowable infiltration shall be 200-gallons per inch of pipe diameter per mile of pipe per day.
 - 1) When there is significantly more than two feet of groundwater above the top of the pipe at the highest point of the section being tested, ten percent additional infiltration above the permitted 200 gal/in.-dia/mi/day limit will be allowed for every 2-foot of additional head.
- f. Under all circumstances, the CONTRACTOR shall be required to remove all plugs prior to acceptance of the work. The OWNER assumes no liability for damages caused by plugs inadvertently left in the line by the CONTRACTOR. The CONTRACTOR shall certify in writing to the OWNER the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal.

3. Exfiltration Test

- a. An Exfiltration Test may be conducted wherever the groundwater level is below the crown of the pipe at the highest elevation of the section of sanitary sewer being tested.
 - 1) If the groundwater level is above the crown of the pipe either the Air Test, properly adjusted, or Infiltration Test should be used.
- b. The procedure for conducting an Exfiltration Test shall be as follows:
 - 1) The pipe section shall be cleaned.
 - 2) Plug the downstream pipe outlet to the manhole with a plug which will assure a tight seal against water leakage.
 - 3) Also plug all house laterals and any other connections to the section being tested.
- c. If the upstream manhole is to be used as a reservoir for maintaining the pressure head on the sewer pipe, the inlet sewer pipe or pipes must be plugged.
 - 1) If a standpipe is to be used as a reservoir for maintaining the pressure head on the sewer pipe, the standpipe must be connected to the sewer pipe in the upstream manhole by a tightly sealed connection.
 - 2) The volume of water (required to fill the section of sewer under test plus the manhole or standpipe) shall be calculated.
 - 3) Water shall then be introduced through the manhole or standpipe.
 - 4) The amount of water introduced shall be metered.
 - 5) The amount of water introduced to fill the sewer should be approximately equal to the calculated amount.

- 6) If the amount of water required to fill the sewer pipe is significantly greater than the calculated amount, it is an indication of a leak or leaks and consequent saturation of the backfill around the sewer pipe.
 - 7) Saturation of the backfill will invalidate the test.
 - 8) The level of water in the manhole or standpipe shall be at least two feet above the crown of the pipe at the highest section of the sanitary sewer being tested.
 - 9) After filling the pipe at least one hour shall be allowed for water absorption in the pipe.
 - 10) After the absorption period, the manhole or standpipe shall be refilled to the established measuring mark and the test begun.
- d. If the upstream manhole is used as a reservoir for maintaining the pressure head on the sewer pipe, the difference in water surface elevation from original to final level in a two-hour period shall be used to calculate the water lost.
- 1) The water lost in the two-hour period shall be converted into gallons per day.
 - 2) If a standpipe is used as a reservoir for maintaining the pressure head on the sewer pipe, the standpipe shall be refilled periodically during the two-hour test period to maintain an essentially constant head on the test section of pipe.
 - 3) The amount of water added shall be measured and shall be used to calculate the loss in gallons per day.
- e. The allowable exfiltration shall be computed based upon the average pressure head above the crown of the pipe for the section tested as follows:

$$\text{Allowable Leakage} = \frac{\sqrt{h}}{\sqrt{3}} \times 200$$

- 1) Allowable leakage in gallons per inch of pipe diameter per mile of pipe per day
 - 2) h = average pressure head above the crown of the pipe, in feet (elevation of water at center run)
- f. When the upstream manhole is used as a reservoir for maintaining the pressure head, the allowable leakage from the manhole shall be added to the allowable leakage calculated for the sewer pipe.
- g. If the sanitary sewer line fails to pass the Exfiltration Test, a re-test shall be permitted only after the groundwater conditions surrounding the pipe return to a condition similar to those existents at the beginning of the test period.
- 1) The groundwater elevation shall be determined prior to initiation of a second test.

4. Air Test:
- a. An Air Test may be conducted under all conditions of groundwater levels surrounding the sanitary sewer pipe.
 - b. Clean the pipe section (manhole to manhole reach of sewer) being tested by propelling a snug-fitting inflated ball, or other adequate method, through the pipe with water. Pipe shall be thoroughly wetted for consistent results.
 - c. Plug all pipe outlets with pneumatic plugs. The pneumatic plugs shall be able to resist internal testing pressures without requiring external bracing. Give special attention to house laterals.
 - d. Determine the groundwater level surrounding the section of sewer under test.
 - 1) If the groundwater level is above the crown of the pipe, the test pressures shall be increased by 0.43 psig for each foot of water above the average elevation of the crown of the pipe.
 - 2) If the average vertical height of groundwater above the pipe invert is more than 12.7 feet, the section shall be tested using 9.0 psig as the starting test pressure.
 - 3) In no case should the starting test pressure exceed 9 psig.
 - e. Introduce air slowly to the section of pipe under evaluation until the internal air pressure is raised to 4.0 psig plus any increase required by a high groundwater level.
 - f. Allow the air pressure to stabilize.
 - 1) Air may be added slowly to maintain a pressure in the range of 3.5 to 4.0 psig (plus groundwater allowance) for two minutes.
 - g. After the stabilization period, when the pressure reaches exactly 3.5 psig (plus groundwater allowance) the stopwatch is started and when the pressure reaches exactly 2.5 psig (plus groundwater allowance) the stopwatch is stopped.
 - 1) If the time required for a one-pound pressure drop is not less than the allowable time for the pipe section under test to lose air, the section shall pass the leakage test.
 - 2) If there has been no leakage (zero psi drop) after one hour of testing, the test section shall pass the leakage test.
 - h. In all cases where an air test is conducted, the manholes shall be tested separately as specified.
 - i. All persons conducting an Air Test must be aware that an Air Test may be dangerous if improperly conducted. It is extremely important and essential that all plugs be installed and braced by the CONTRACTOR in such a way that blowouts are prevented.
 - j. Air Testing Table: will be used to determine the required test duration for the section of line being tested. Explanation and use of Table 1:
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- 1) Column A: Nominal diameter of pipe (any pipe material)
- 2) Column B: Minimum duration of air test up to a maximum of length of line being tested (e.g., 0-feet through 298-feet of 8-inch PVC: Test Duration: 7 minutes 34 seconds)
- 3) Column C: Maximum length of line associated with minimum duration of time for the air test shown in Column B
- 4) Column D: L = length of line in feet; product of computation yields duration of air test (e.g., 250-feet of 12-inch PVC where ground water is not present)
- 5) Test Duration— $3.418 * (250) = 854.5 \text{ sec.} = 14 \text{ min. } 15 \text{ sec.}$
- 6) Column E: Duration of air test for given incremental lengths of line

Table 1: Low-Pressure Air Test Time Specification for a Non-Pressure Sewer Line

(A) Pipe Diameter (inches)	(B) Minimum Time (min:sec)	(C) Maximum Length for Minimum Time (feet)	(D) Time for Longer Length (seconds)	(E) Time for Length (L) Shown (min:sec)								
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	
4	3:46	597	.38*L	3:46	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	1.52*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	10.47*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	228:29	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

B. Trace Wire Testing Requirements

1. Contractor shall provide equipment for trace test and shall perform a trace test on all trace wire in the presence of the ENGINEER and WATER AUTHORITY INSPECTOR.
2. Trace test shall be performed by using a metallic locator with audible tone and numeric values for certification of the facility locations and shall be identifiable between access points.
3. Contractor is encouraged to test trace wire prior to backfill so any issues can be addressed prior to backfill.
4. If the trace wire is found to be not continuous upon testing, the CONTRACTOR shall repair or replace the failed segment of the wire, and shall be responsible for the cost of any trenching, backfill, repaving and other improvements necessary to complete the trace wire repair.
5. Passing test results shall be provided for all pipe segments within the Engineer of Record's as-built data and plan set.

C. Deflection Testing

1. Not less than thirty (30) days after the installation and backfilling of plastic or fiberglass sewers, including any service connections, the CONTRACTOR shall, in the presence of the ENGINEER, test deflection of the pipe with a mandrel.
 - a. The mandrel shall be hand pulled.
 - b. All pipe with deflections in excess of five (5) percent of the base internal diameter, as determined by ASTM D 3034, ASTM F 679, or ASTM F 794 shall be excavated, re-rounded, backfilled and retested after an additional period of at least thirty (30) days.
 - c. Mandrels shall have nine (9) ribs and be only hand pulled through the test section.
 - d. The CONTRACTOR shall furnish the mandrels.
 - e. The length of the minimum radius portion of the mandrel shall not be less than the one-third (1/3) of the nominal diameter of the pipe tested.

- f. The minimum mandrel diameter shall be no less than ninety (90) percent of the pipe inside diameter.
- g. The pipe shall be flushed and cleaned by the CONTRACTOR prior to testing.
- h. No flow will be permitted in the pipe while testing for deflections

D. Television Inspection:

- 1. All completed sewer lines shall be inspected by a television camera before lines become operational or final acceptance of the installation per STS 33 01 30.11
 - a. After the CONTRACTOR has cleaned, flushed, and retrieved all debris and plugs in the line, the CONTRACTOR will notify the project ENGINEER that the line is ready for television inspection.
 - b. The CONTRACTOR in the presence of the ENGINEER or the ENGINEER'S representative shall televise the line with televising equipment specifically designed and constructed for sewer line visual inspection.

END OF SECTION 33 31 11



SPECIAL CONDITIONS

IMMEDIATE NOTIFICATION OF SANITARY SEWER OVERFLOWS

1.1 GENERAL

- A. This section is related to overflows of sanitary sewer outside of manholes or pipelines. Disallowable Discharges are defined by the New Mexico Environment Department as, “any amount of any material in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property; or may unreasonably interfere with the public welfare or the use of property must be reported. This includes chemical, biohazardous, petroleum-product, and sewage spills and incidents. In addition to recent spills, the discovery of evidence of previous unauthorized discharges, such as contaminated soil or ground water, also must be reported.”

1.2 PERFORMANCE REQUIREMENTS

- A. The CONTRACTOR shall immediately notify the Water Authority, of a sanitary sewer overflow or spillage (SSO) event of any volume within the contractors work zone/area or resulting from the CONTRACTOR’S work or construction activities. At a minimum, the CONTRACTOR shall provide the following information at the time of notification:
1. Address or exact location of the SSO;
 2. Time and date of the SSO;
 3. Source or cause of the SSO; and
 4. Name of CONTRACTOR and individual providing the notification with contact phone number(s).
- B. The CONTRACTOR shall make direct verbal contact with the appropriate Collections Section Superintendent or Standby Supervisor to provide the information required above. Voicemail or email messages are not considered acceptable means of compliance with the notification requirement specified. Direct verbal contact shall be made to the appropriate Collections Section Superintendent or Standby Supervisor. CONTRACTOR shall immediately call the ABCWUA dispatch at (505)-842-WATR (9287) and give notice of a Sanitary Sewer Overflow with a contact number. The appropriate Collections Section Superintendent or Standby Supervisor will contact the CONTRACTOR as soon as possible. The CONTRACTOR shall assist and provide all known information to the ABCWUA personnel to complete the Field Division/Collection Report (ATTACHMENT A).
- C. Immediate Action Required If sewage is spilled onto public or private property,
1. That SSO shall immediately be contained and cleanup operations shall commence. The Contractor shall wash down, clean up, and disinfect the spillage at its own expense to the satisfaction of the property owner. Cleanup of sewage spills and notification shall be incidental to the project.
 2. The Contractor shall immediately stop work, contain the SSO and cleanup operations shall commence.

- D. A penalty will be assessed per occurrence in the form of a deduction from the CONTRACTOR'S pay application if repeat SSOs are caused by the contractor or any sub-contractors under the CONTRACTOR. Below is the penalty assessment per occurrence:
1. First Occurrence: No Penalty
 2. Second Occurrence: \$1000 Penalty
 3. Third Occurrence: \$3,000 Penalty
 4. Fourth Occurrence: \$9,000 Penalty

1.3 SUBMITTALS

- A. The Contractor shall provide a written report within 24 hours of the occurrence. At a minimum, the written report shall include the following information:
1. Contractor name, contact representative, and phone number;
 2. Time, date, address or exact location for the incident;
 3. Source and cause of the release or spill along with a detailed description of incident including any observed environmental impacts;
 4. Types of material(s) released or spilled;
 5. Quantity of materials released or spilled, including quantity contained, quantity uncontained;
 6. Methods used for containment;
 7. Medium (e.g. land, water) affected by release or spill;
 8. Danger or threat posed by the release or spill;
 9. Number and types of injuries or fatalities (if any);
 10. Weather conditions at the incident location;
 11. Name of the carrier or vessel, vehicle number/railcar, pipeline, or other identifying information;
 12. Whether an evacuation has occurred or was needed;
 13. Other agencies notified or about to be notified;
 14. Any other information that may help emergency personnel respond to the incident;
 15. Any known future remediation that will be required as a result.

END OF SECTION

ATTACHMENT A

 <p>Water Utility Authority</p>	<p>Albuquerque Bernalillo County Water Utility Authority Field Division/Collection Section Condition Report</p>	<p>SR# _____ WO# _____ Date Reported ____/____/____ Time Crew Notified ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM Time Crew Arrived ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM Supervisor _____ <input type="checkbox"/> AM <input type="checkbox"/> PM</p>																					
Name _____ <small>Property Owner or Reporter</small>		Phone Number _____																					
<p>Reported Location</p> <p>Address No. _____ Street Name _____ Intersecting Street _____ & _____ Quad _____</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: center;">From Manhole MAP# MH#</th> <th style="text-align: center;">To Manhole MAP# MH#</th> <th style="text-align: center;">Line Type</th> <th style="text-align: center;">Line Dia.</th> <th style="text-align: center;">Occupant Notified</th> </tr> <tr> <td style="text-align: center;"> <table border="1" style="width: 100%; height: 20px;"> <tr><td style="width: 25%;"></td><td style="width: 25%;"></td><td style="width: 25%;"></td><td style="width: 25%;"></td></tr> </table> </td> <td style="text-align: center;"> <table border="1" style="width: 100%; height: 20px;"> <tr><td style="width: 25%;"></td><td style="width: 25%;"></td><td style="width: 25%;"></td><td style="width: 25%;"></td></tr> </table> </td> <td></td> <td></td> <td style="text-align: center;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </td> </tr> </table>	From Manhole MAP# MH#	To Manhole MAP# MH#	Line Type	Line Dia.	Occupant Notified	<table border="1" style="width: 100%; height: 20px;"> <tr><td style="width: 25%;"></td><td style="width: 25%;"></td><td style="width: 25%;"></td><td style="width: 25%;"></td></tr> </table>					<table border="1" style="width: 100%; height: 20px;"> <tr><td style="width: 25%;"></td><td style="width: 25%;"></td><td style="width: 25%;"></td><td style="width: 25%;"></td></tr> </table>							<input type="checkbox"/> Yes <input type="checkbox"/> No				
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<input type="checkbox"/> 40 Sewer Backup Comments: _____ <input type="checkbox"/> cont. on back																							
<input type="checkbox"/> 42 AS – Manhole Overflow <small>ULTIMATE DISCHARGE LOCATION ACTION TAKEN</small> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top;"> Dispatch Time ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM Of Spill _____ Time Spill ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM Was Stopped _____ Duration of Spill ____ hrs. ____ mins. Amount Spilled _____ gallons </td> <td style="width: 33%; vertical-align: top;"> <input type="checkbox"/> Arroyo (Concrete) <input type="checkbox"/> Arroyo (Dirt) <input type="checkbox"/> Conservancy Ditch/Drain <input type="checkbox"/> Parking lot <input type="checkbox"/> Rio Grande <input type="checkbox"/> Storm Sewer <input type="checkbox"/> Street (Dirt) <input type="checkbox"/> Street (Pavement) <input type="checkbox"/> Yard <input type="checkbox"/> Other _____ </td> <td style="width: 33%; vertical-align: top;"> <input type="checkbox"/> Berned Area to Contain Spill <input type="checkbox"/> Captured Waste water <input type="checkbox"/> Clean-up On Back-up <input type="checkbox"/> Combination Cleaning <input type="checkbox"/> Inspect <input type="checkbox"/> Public Notification <input type="checkbox"/> Pump Out <input type="checkbox"/> Ref. To Eng./Contractor <input type="checkbox"/> Rem. Contaminated Soil <input type="checkbox"/> Removed Pool WW <input type="checkbox"/> Removed Solids <input type="checkbox"/> Treated with Chlorine Amount Used _____ Cups _____ lbs <input type="checkbox"/> Washed Down Area </td> </tr> </table> <p>ENVIRONMENTAL IMPACT</p> <input type="checkbox"/> Evidence Of Fish Kill <input type="checkbox"/> No Evidence Of Adverse Health/Env. Impact <input type="checkbox"/> Observed Or Evidence of Env. Impact <input type="checkbox"/> Observed Or Evidence of Human Contact			Dispatch Time ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM Of Spill _____ Time Spill ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM Was Stopped _____ Duration of Spill ____ hrs. ____ mins. Amount Spilled _____ gallons	<input type="checkbox"/> Arroyo (Concrete) <input type="checkbox"/> Arroyo (Dirt) <input type="checkbox"/> Conservancy Ditch/Drain <input type="checkbox"/> Parking lot <input type="checkbox"/> Rio Grande <input type="checkbox"/> Storm Sewer <input type="checkbox"/> Street (Dirt) <input type="checkbox"/> Street (Pavement) <input type="checkbox"/> Yard <input type="checkbox"/> Other _____	<input type="checkbox"/> Berned Area to Contain Spill <input type="checkbox"/> Captured Waste water <input type="checkbox"/> Clean-up On Back-up <input type="checkbox"/> Combination Cleaning <input type="checkbox"/> Inspect <input type="checkbox"/> Public Notification <input type="checkbox"/> Pump Out <input type="checkbox"/> Ref. To Eng./Contractor <input type="checkbox"/> Rem. Contaminated Soil <input type="checkbox"/> Removed Pool WW <input type="checkbox"/> Removed Solids <input type="checkbox"/> Treated with Chlorine Amount Used _____ Cups _____ lbs <input type="checkbox"/> Washed Down Area																		
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<input type="checkbox"/> 48 Property Damage – Risk Management <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> List Damages _____ _____ _____ </td> <td style="width: 50%; vertical-align: top;"> Claim Adjusters Name _____ Year of Home _____ Yes No <input type="checkbox"/> <input type="checkbox"/> Were Pictures Taken <input type="checkbox"/> <input type="checkbox"/> Does Home Have Basement <input type="checkbox"/> <input type="checkbox"/> Does Home Have Back Water Valve <input type="checkbox"/> <input type="checkbox"/> Is Floor Elevation Below Upstream Manhole </td> </tr> </table>			List Damages _____ _____ _____	Claim Adjusters Name _____ Year of Home _____ Yes No <input type="checkbox"/> <input type="checkbox"/> Were Pictures Taken <input type="checkbox"/> <input type="checkbox"/> Does Home Have Basement <input type="checkbox"/> <input type="checkbox"/> Does Home Have Back Water Valve <input type="checkbox"/> <input type="checkbox"/> Is Floor Elevation Below Upstream Manhole																			
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<p>1st Review Action To Be Taken</p> <input type="checkbox"/> Clean _____ Segments <input type="checkbox"/> Upstream _____ Downstream _____ Date ____/____/____ <input type="checkbox"/> Televis The Line Date ____/____/____ <input type="checkbox"/> Root Saw Date ____/____/____ <input type="checkbox"/> Root Foam Date ____/____/____ <input type="checkbox"/> Adjust PM Interval: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: center;">Freq. In weeks</th> <th style="text-align: center;">Seq. #</th> <th style="text-align: center;">Activity #</th> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/> 4 wks.</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/> 12 wks.</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/> 24 wks.</td> <td></td> <td></td> </tr> </table> Date Set ____/____/____ Int.: _____ <input type="checkbox"/> Notify Pretreatment Date ____/____/____ <input type="checkbox"/> No Further Action Date ____/____/____ Collection Sys. Eng.: _____ Date ____/____/____ YEH:yeh F10-42 Over/low-Property Damage BLUE Rev. 12 20 12	Freq. In weeks	Seq. #	Activity #	<input type="checkbox"/> 4 wks.			<input type="checkbox"/> 12 wks.			<input type="checkbox"/> 24 wks.			<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Agency</th> <th style="text-align: center;">Notification</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> E-MAIL – r6_npdes_reporting@epa.gov EPA U.S. Env. Protection Agency-Region 6 Hannah Branning </td> <td style="vertical-align: top;"> DATE ____/____/____ TIME ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM </td> </tr> <tr> <td style="vertical-align: top;"> Call 1 (505) 827-1041 1 (505) 827-0187 NMED – New Mexico Env. Dept. Sandra Gabaldon </td> <td style="vertical-align: top;"> DATE ____/____/____ TIME ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM </td> </tr> <tr> <td style="vertical-align: top;"> Call (505) 761-4709 U.S. Fish & Wild life Service Joel Lusk </td> <td style="vertical-align: top;"> DATE ____/____/____ TIME ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM </td> </tr> <tr> <td style="vertical-align: top;"> Call (505) 869-9623 (505) 869-5748 Pueblo of Isleta Cody B. Walker </td> <td style="vertical-align: top;"> DATE ____/____/____ TIME ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM </td> </tr> </tbody> </table>	Agency	Notification	E-MAIL – r6_npdes_reporting@epa.gov EPA U.S. Env. Protection Agency-Region 6 Hannah Branning	DATE ____/____/____ TIME ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM	Call 1 (505) 827-1041 1 (505) 827-0187 NMED – New Mexico Env. Dept. Sandra Gabaldon	DATE ____/____/____ TIME ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM	Call (505) 761-4709 U.S. Fish & Wild life Service Joel Lusk	DATE ____/____/____ TIME ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM	Call (505) 869-9623 (505) 869-5748 Pueblo of Isleta Cody B. Walker	DATE ____/____/____ TIME ____:____:____ <input type="checkbox"/> AM <input type="checkbox"/> PM
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SPECIAL CONDITIONS

WORK IN THE VICINITY OF THE SAN JUAN CHAMA LINES

1.1 GENERAL

- A. Any work affecting San Juan Chama Transmission Lines and appurtenances are subject to the requirements of Administrative Instruction No. 9, included as Attachment A to this section.

1.2 PERFORMANCE REQUIREMENTS

- A. If applicable, requirements will be listed in the General Notes of any Drawings for work near the San Juan Chama Transmission Line.
- B. A Water Authority Field Representative must be present at the job site during excavation in any roadway containing the San Juan Chama Transmission Line.
- C. The CONTRACTOR shall complete and submit to Water Authority the "Request Form for Work Affecting San Juan Chama Transmission Lines", Attachment B to this Section, at least one month prior to the start of work.
- D. Costs for the work in this Section shall not be paid for separately, but shall be considered incidental to the contract work to be accomplished

END OF SECTION

ATTACHMENT A
ADMINISTRATIVE INSTRUCTION NO. 9



Albuquerque Bernalillo County Water Utility Authority

ADMINISTRATIVE INSTRUCTION NO. 9

SUBJECT: Work Affecting San Juan Chama Transmission Lines

EFFECTIVE DATE: July 1, 2008

All designs and construction of any underground utilities will comply with the attached Request Forms for work affecting San Juan Chama transmission lines and appurtenances.

This Instruction applies to all projects, including private development, and Capital Improvement Projects of the Water Authority, City, County, and/or other agencies and utility companies.

Mark S. Sanchez
Executive Director

Date

**REQUEST FORM
FOR
WORK AROUND SAN JUAN CHAMA TRANSMISSION LINES**

The following information must be completely filled out by the Requestor (Consultant, Contractor, Developer, Agency, Department, Company, etc.) before consideration of and approval by the ABCWUA will be given for any work around the San Juan Chama (SJC) transmission lines. A small scale map of the location of the SJC transmission lines is included as Exhibit 1.

Please allow for extra time during the planning and construction phases of your project to take the extra steps necessary for the protection of the transmission lines and associated appurtenances (i.e., valve vaults, air relief locations, corrosion protection devices, etc.). The ABCWUA will only consider requests that are made one (1) month in advance of the scheduled/planned work. In addition to this completed form, the Requestor must provide the design/construction drawings, maps, water shut-off plans, etc. that define the work that is to be completed for your project. Requestor must also provide the potholing information that was obtained to spot the edges and centerline of the SJC transmission lines that will be affected by the work.

No work that requires either excavations directly underneath the SJC transmission lines or relocation of the lines will be permitted without written approval of the ABCWUA Field Division Manager. Additional requirements for protection of SJC transmission lines are included in Exhibit 2.

**REQUEST FORM FOR
WORK AROUND SAN JUAN CHAMA TRANSMISSION LINES**

A copy of this approved permit, including attachments must be maintained onsite by the contractor.	
Name of Requestor	
Phone No. of Requestor	
Requested for*	
Project/Work Order Name	
Project/Work Order No.	
Name of Project Superintendent/Foreman	
Phone No. of Superintendent/Foreman	
Name of Inspector for*	
Phone No. of Inspector for*	
ABCWUA Inspector **	Reuben Ortega (917-2904) or Angelo Martinez (505-382-0889)
Water Map No.(s)	
List of Record Drawings	
Project Name(s)	
Project No.(s)	
Design Engineer(s)	
Sheet No.(s)	
Name of Potholing Contractor***	

Date & Time of Request	
Date & Time of Work to be Completed****	

**REQUEST FORM FOR
WORK AROUND SAN JUAN CHAMA TRANSMISSION LINES**

Estimated Duration of Work	
ABCWUA Requirements:	
ABCWUA Engineer Approved:	
ABCWUA Inspector Signature:	

* Name of Company, Government Department/Agency, Consultant, etc.

** Contractor must contact ABCWUA inspector prior to any excavation

*** Also attach potholing information/data including GPS (xyz) coordinates of transmission line edges and centerline

**** Must be at least one month in advance of planned/scheduled work.

Refer to Exhibits 1 and 2 for map of SJC transmission lines and additional requirements for protection of them.

EXHIBIT 2

REQUIREMENTS FOR PROTECTION OF SAN JUAN CHAMA TRANSMISSION LINES

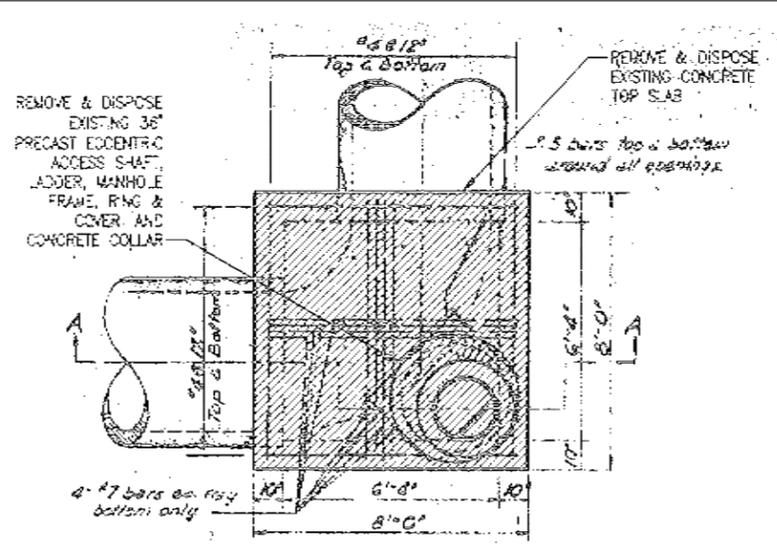
The San Juan Chama (SJC) transmissions lines are critical to the function of the surface water treatment plant. Due to the lines' sizes and configuration, protection of the lines from damage or events that can interrupt their serviceability is paramount. The SJC transmission system does not possess the same degree of redundancy as the existing production and distribution system so any disruptions can have severe impacts on the surface water treatment plant operations and long-term water supply strategy. The SJC transmission lines vary in size from 30-inches up to 72 inches in diameter. They are the largest lines in the Albuquerque Metro water service area. Ground cover over the tops of these lines vary from 4 feet up to 13 feet or more. They can be the same depth as other water lines in the system or much deeper.

Designers, engineers, and construction contractors are required to take additional precautions when work is planned around any of these lines to minimize any potential for damage. Be aware of the following:

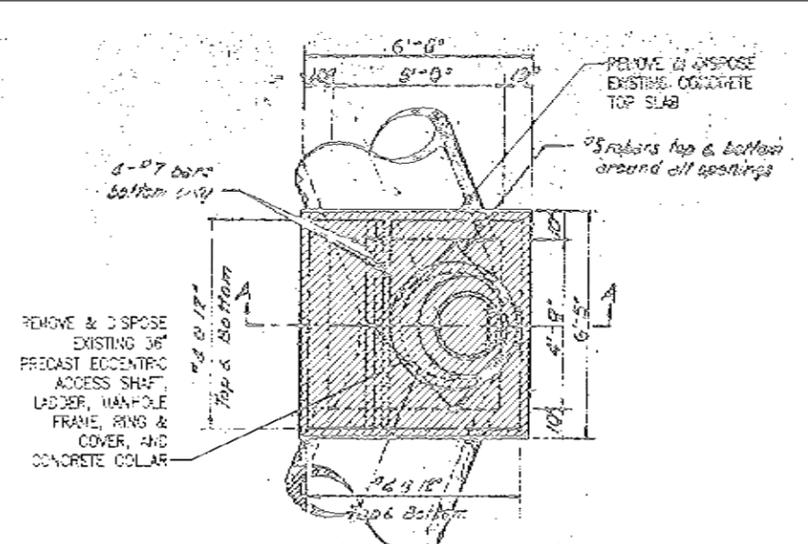
1. Use the most current "as built" information. Verify that the presence of the lines and appurtenances (valve vaults, air relief locations, corrosion protection, etc.) are clearly shown on all designs/utility plans. Heightened awareness can prevent poor planning and avoid negative outcomes (damage, schedule disruptions, litigation, etc.)
2. Not all line segments are constructed in the public right-of-way or well established streets. Some segments are constructed in undeveloped or other areas and these may be even more vulnerable since their presence may not be readily apparent.
3. Do **NOT** rely on the One-Call system for line locating requests. Problems with the One-Call system include: poor or vague location descriptions from the requestor, incomplete plans which do not show all the buried utilities, highly variable depths of cover, etc. If the presence of a large transmission line is suspected, specifically mark on the One-Call request: ***"San Juan Chama transmission line in the area; please have line locator contact and schedule field meeting with the Requestor"***. Allow extra time during planning and construction for the extra steps necessary to minimize any risk to these lines. Do not wait until the construction schedule is up against a 48 hour notice or use the "emergency" 2-hour response line location request. Such "short cuts" usually result in significant problems.
4. Use of boring tools/technology around these lines can be especially risky. The large pipe diameters and varying depths of cover make determination of the elevation dimension of the planned bore critical along with being able to carefully control the bore's progress. Designers and engineers should plan on using survey techniques and the as-built information to determine all coordinates and mitigate any potential three-dimensional conflicts. The ABCWUA does not perform surveying services and its existing line locating equipment may not be able to definitively determine location due to depth of cover and large diameter of some of the pipes. Again, do **NOT** rely on the One-Call system to solve this.
5. If any of these lines need to be taken out of service for either planned or emergency situations, the operational and engineering coordination, draining, repair, re-filling, etc. could take 10-30 days (or even longer), depending on the circumstances. These could be significant disruptions to work schedules. In

planning to take a line out of service, allow for a minimum of 30 days into the scheduling. Emergency repairs could also take weeks so avoidance of these damages is in everyone's best interest.

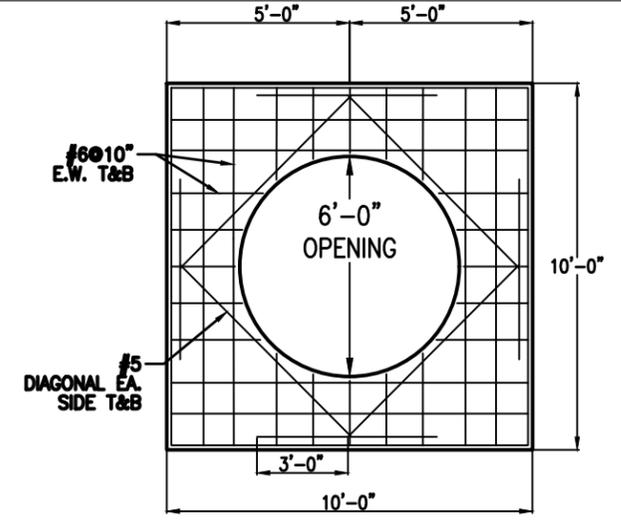
6. Any damage to the SJC transmission lines has the potential for causing significant collateral damage, including loss of life, severe property damage, loss of other infrastructure, loss of business, short- and/or long-term water shortages throughout the Albuquerque Metro service area, etc. which could result in stiff penalties, astronomical claims and possible criminal prosecution for negligence.
7. In the event of damage to or a break of a SJC transmission line, Control Center Control should be contacted immediately at 342-3001 or 342-3002. Do **NOT** attempt to do anything until a Control Center or a Plant/Field Superintendent of the ABCWUA provides direction/instruction.
8. The large valve vaults on the SJC lines are confined spaces. Anyone entering these facilities is doing so at his/her own risk. Confined space entry involves many safety precautions including, but not limited to: air monitoring, active ventilation, buddy system, harnesses, etc. All confined space entry must be in compliance with OSHA requirements. The ABCWUA will not be held responsible or liable for contractors, engineers, and other non-ABCWUA persons that enter these vaults.
9. An ABCWUA Field Representative will need to be present at the jobsite during excavation around any SJC transmission lines.



**DEMOLITION - TYPE A
TOP PLAN VIEW**



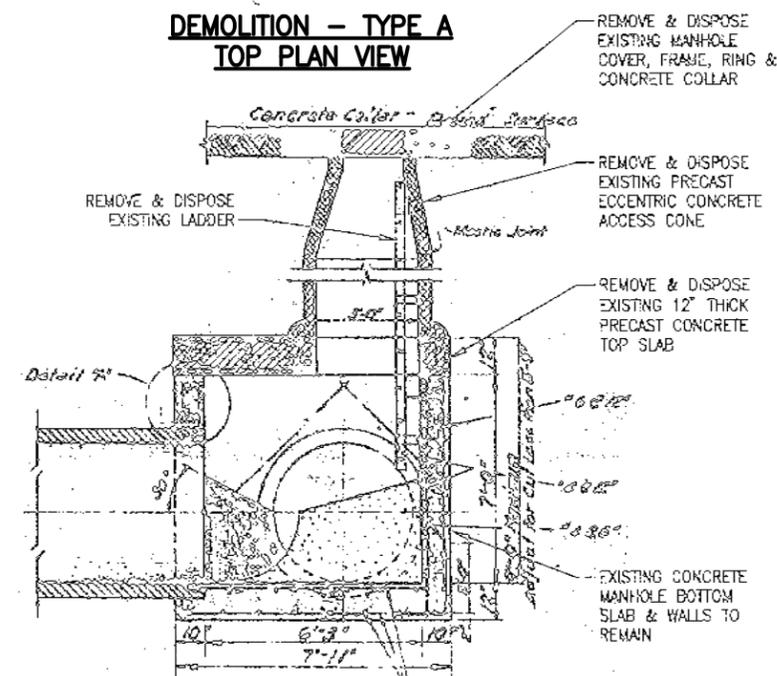
**DEMOLITION - TYPE B
TOP PLAN VIEW**



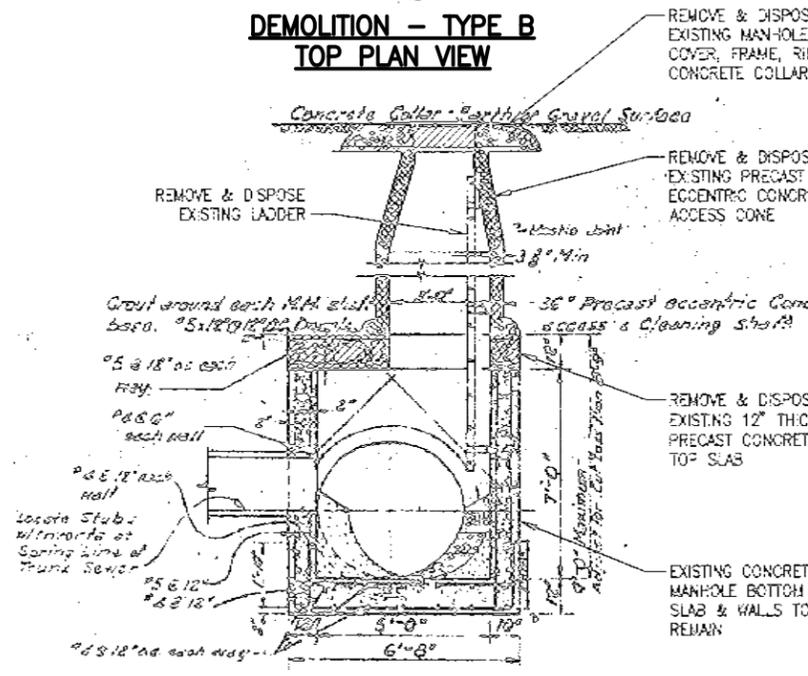
TOP SLAB PLAN VIEW

- GENERAL NOTES**
- EXISTING CONDITIONS FOR MANHOLES ARE BASED ON RECORD DRAWING DATA FURNISHED BY OWNER.
 - CLEAN MANHOLE PER PATCHING MIX MANUFACTURER'S SPECIFICATIONS. SEE STS 33 01 30.81 FOR PATCHING MIX REQUIREMENTS.

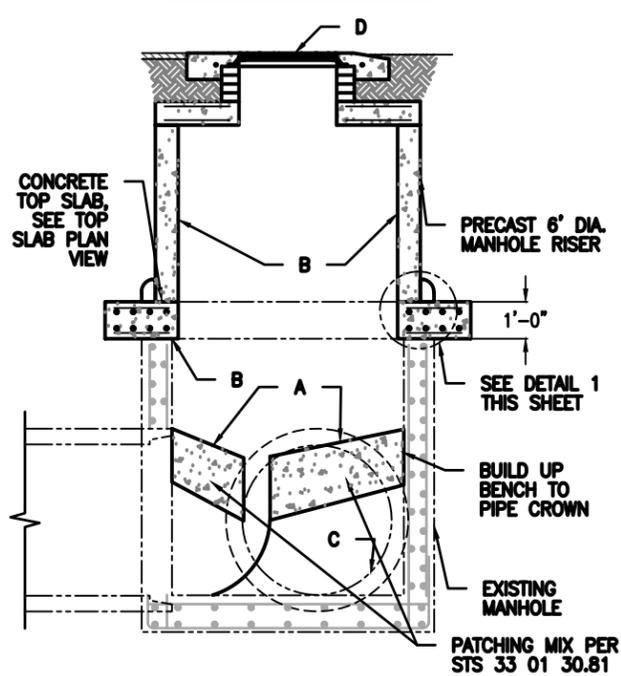
- CONSTRUCTION NOTES**
- SLOPE 1" PER FOOT FROM PIPE CROWN.
 - COAT INTERIOR OF MANHOLE RISER AND BOX LID WITH PROTECTIVE EPOXY OR POLYURETHANE COATING PER STS 33 01 30.81.
 - REHABILITATE EXISTING MANHOLE PER STS 33 01 30.81.
 - FURNISH AND INSTALL NEW MANHOLE FRAME, COVER, PCC COLLAR, AND PRECAST CONCRETE TOP SLAB PER STD. DWG. 2101.



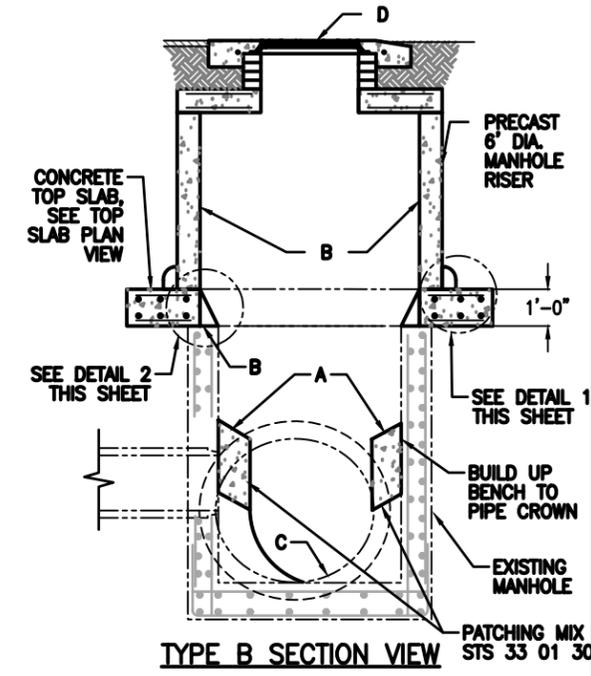
**DEMOLITION - TYPE A
SECTION VIEW**



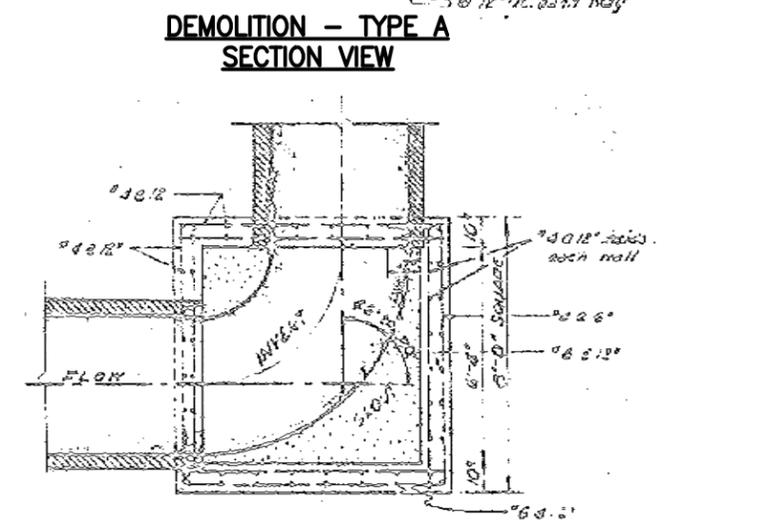
**DEMOLITION - TYPE B
SECTION VIEW**



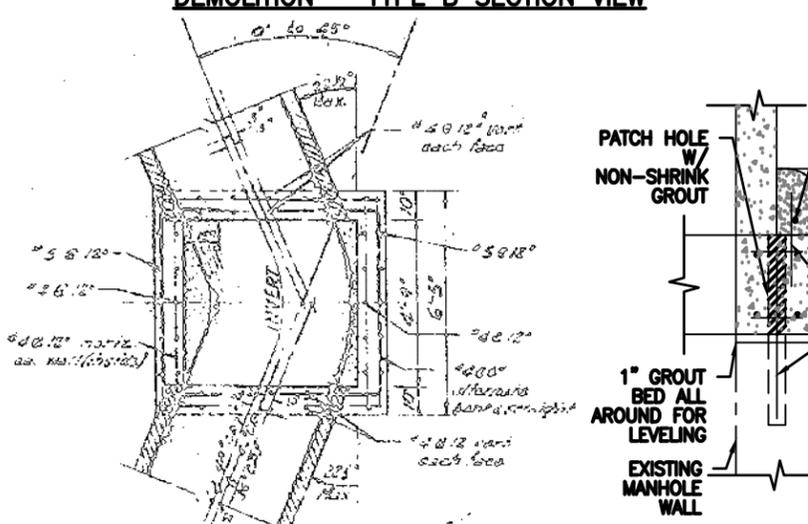
TYPE A SECTION VIEW



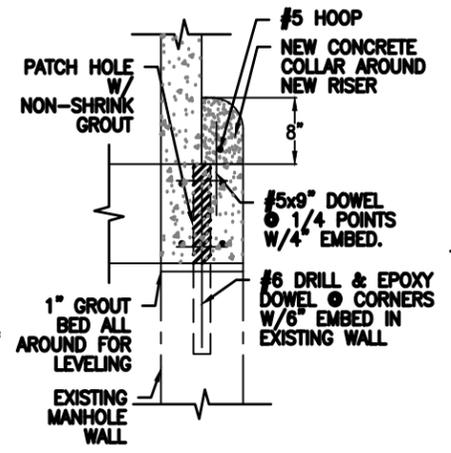
TYPE B SECTION VIEW



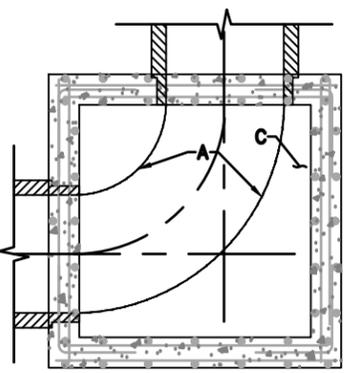
**DEMOLITION - TYPE A
BOTTOM SLAB PLAN VIEW**



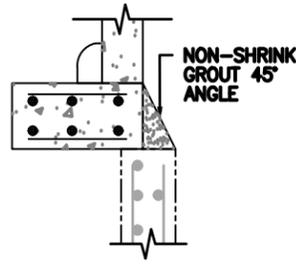
**DEMOLITION - TYPE B
BOTTOM SLAB PLAN VIEW**



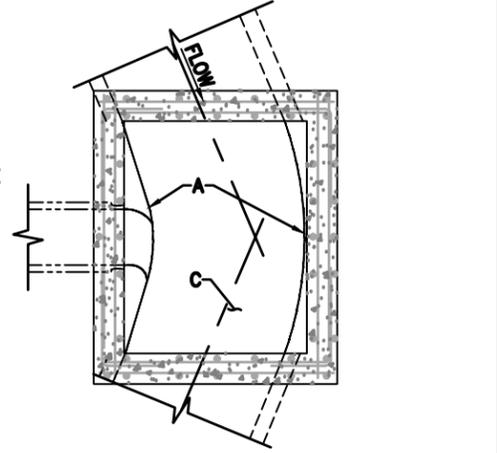
DETAIL 1



**TYPE A BOTTOM SLAB
PLAN VIEW**

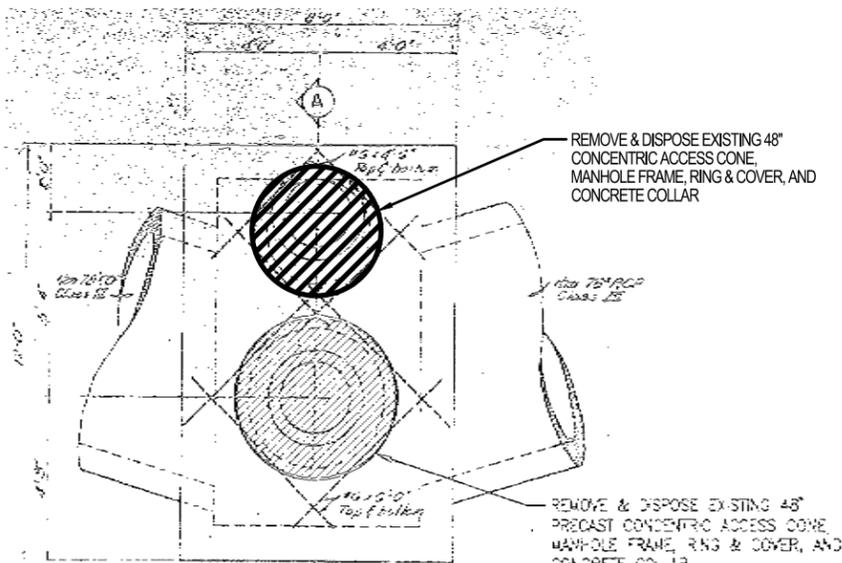


DETAIL 2

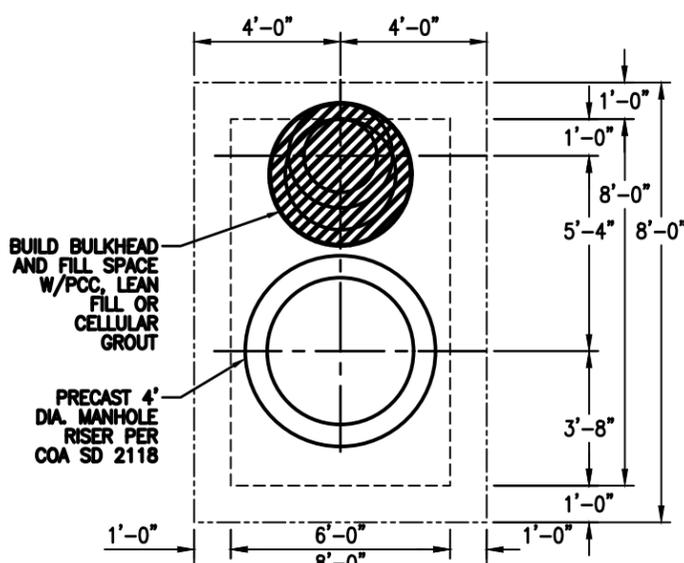


TYPE B BOTTOM SLAB PLAN VIEW

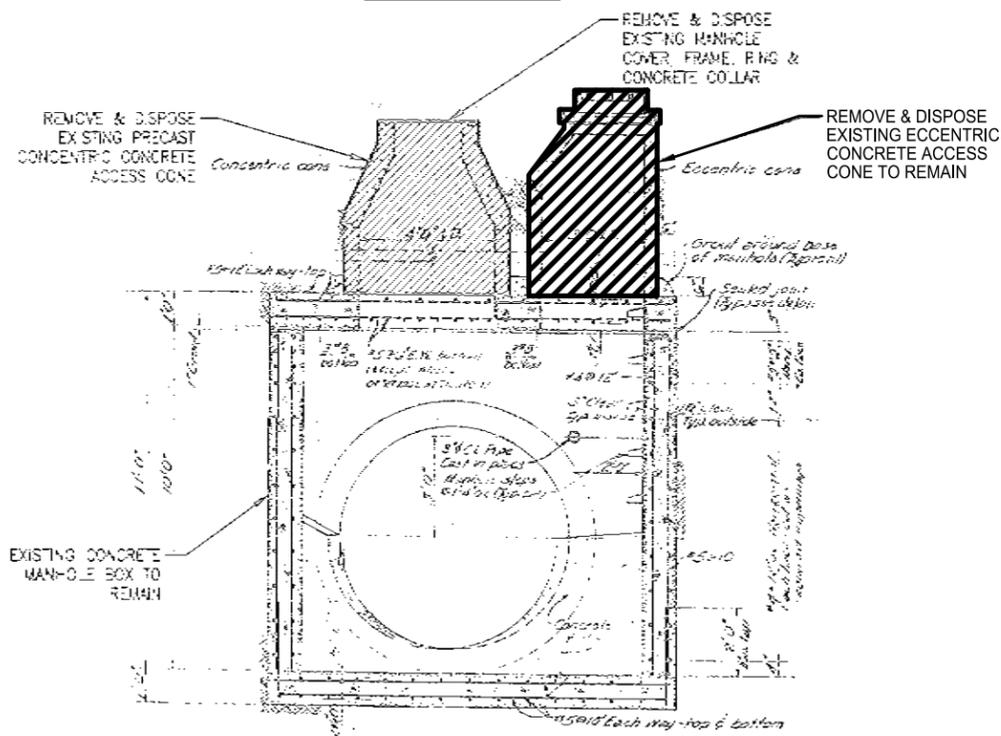
REVISIONS	WATER AUTHORITY
MMM. YYYY	TYPE A & B MANHOLE REHABILITATION DETAILS
DWG. -----	MMM. YYYY



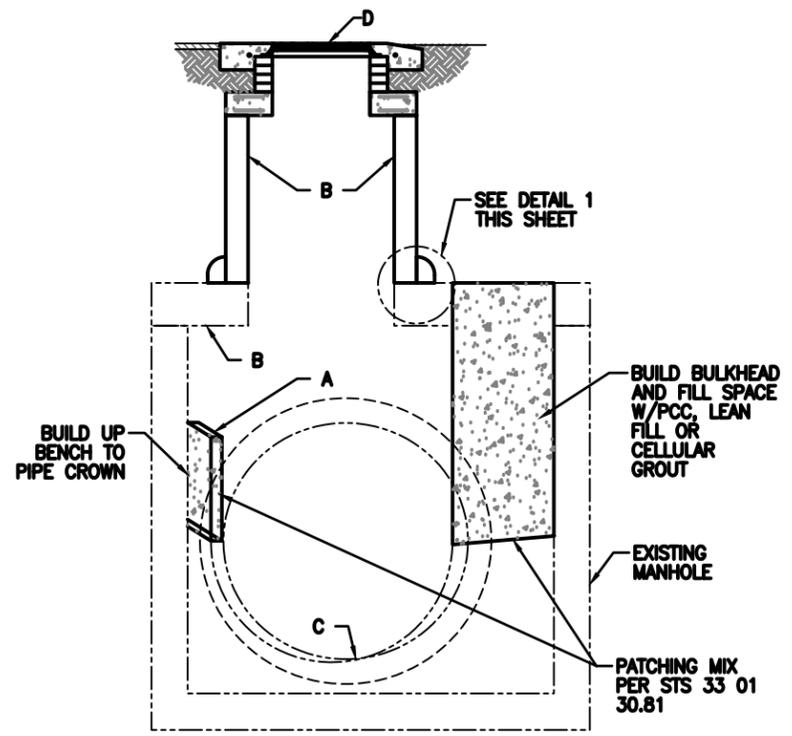
**DEMOLITION - TYPE D
TOP PLAN VIEW**



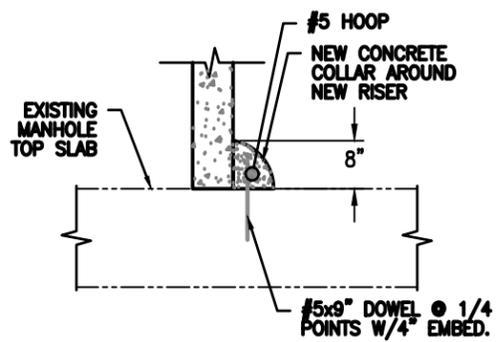
TYPE D TOP SLAB PLAN VIEW



**DEMOLITION - TYPE D
SECTION VIEW**



TYPE D SECTION VIEW



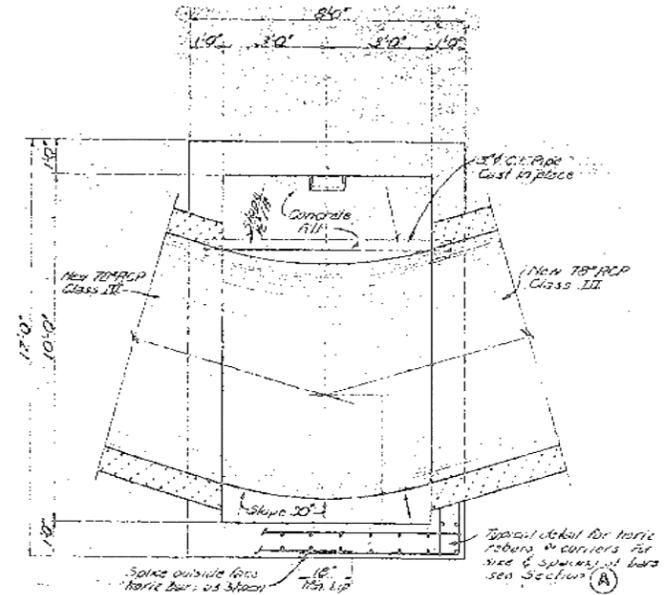
DETAIL 1

GENERAL NOTES

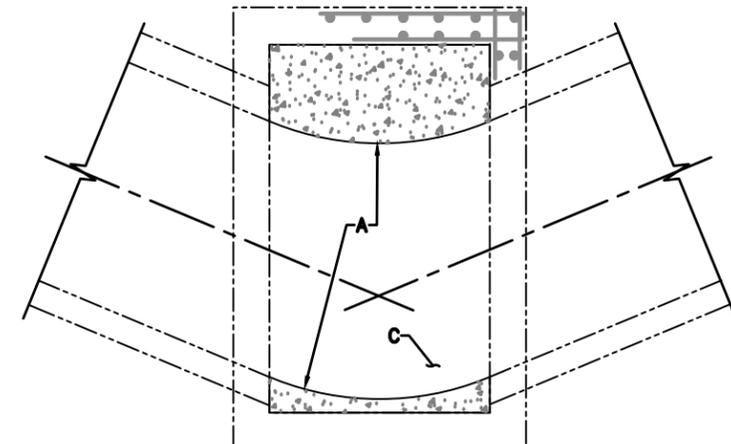
- EXISTING CONDITIONS FOR MANHOLES ARE BASED ON RECORD DRAWING DATA FURNISHED BY OWNER.
- CLEAN MANHOLE PER PATCHING MIX MANUFACTURER'S SPECIFICATIONS. SEE STS 33 01 30.81. FOR PATCHING MIX REQUIREMENTS.

CONSTRUCTION NOTES

- SLOPE 1" PER FOOT FROM PIPE CROWN.
- COAT INTERIOR OF MANHOLE RISER AND BOX LID WITH PROTECTIVE EPOXY OR POLYURETHANE COATING PER STS 33 01 30.81.
- REHABILITATE EXISTING MANHOLE PER STS 33 01 30.81.
- FURNISH AND INSTALL NEW MANHOLE FRAME, COVER, PCC COLLAR, AND PRECAST CONCRETE TOP SLAB PER STD. DWG. 2101.



**DEMOLITION - TYPE D
BOTTOM SLAB PLAN VIEW**



**TYPE D BOTTOM
SLAB PLAN VIEW**

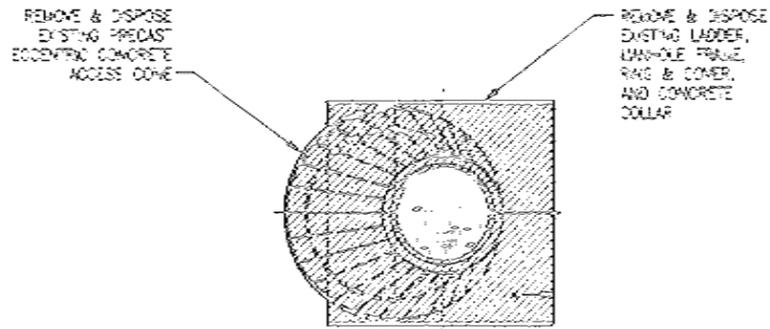
REVISIONS	WATER AUTHORITY
MMM. YYYY	TYPE D MANHOLE REHABILITATION DETAILS
DWG. -----	MMM. YYYY

GENERAL NOTES

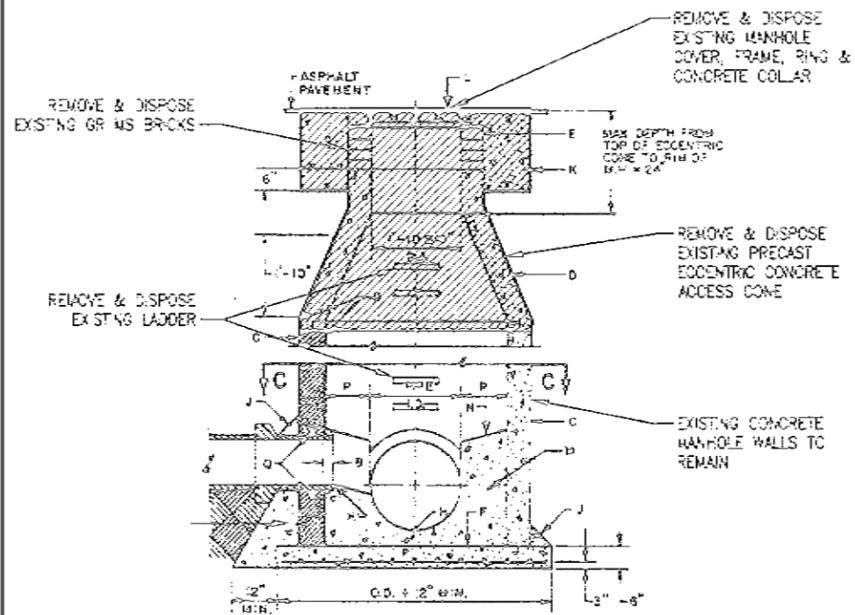
- EXISTING CONDITIONS FOR MANHOLES ARE BASED ON RECORD DRAWING DATA FURNISHED BY OWNER.
- CLEAN MANHOLE PER PATCHING MIX MANUFACTURER'S SPECIFICATIONS. SEE STS 33 01 30.81 FOR PATCHING MIX REQUIREMENTS.

CONSTRUCTION NOTES

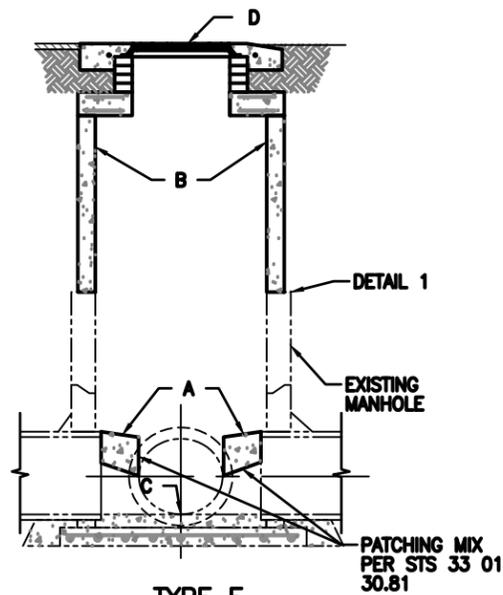
- SLOPE 1" PER FOOT FROM PIPE CROWN.
- COAT INTERIOR OF MANHOLE RISER AND BOX LID WITH PROTECTIVE EPOXY OR POLYURETHANE COATING PER STS 33 01 30.81.
- REHABILITATE EXISTING MANHOLE PER STS 33 01 30.81.
- FURNISH AND INSTALL NEW MANHOLE FRAME, COVER, PCC COLLAR, AND PRECAST CONCRETE TOP SLAB PER STD. DWG. 2101.



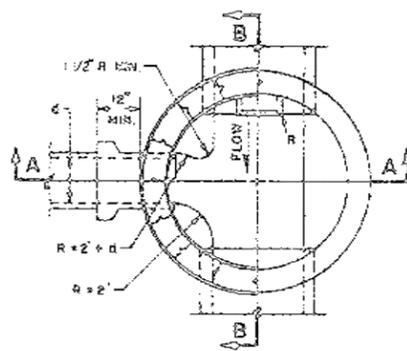
**DEMOLITION - TYPE E
TOP PLAN VIEW**



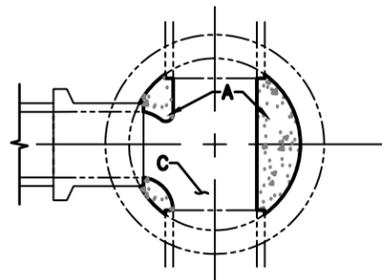
**DEMOLITION - TYPE E
SECTION VIEW**



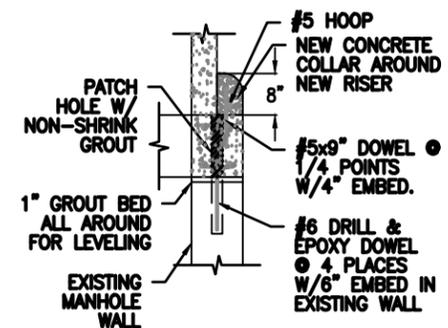
**TYPE E
SECTION VIEW**



**DEMOLITION - TYPE E
BOTTOM SLAB PLAN VIEW**

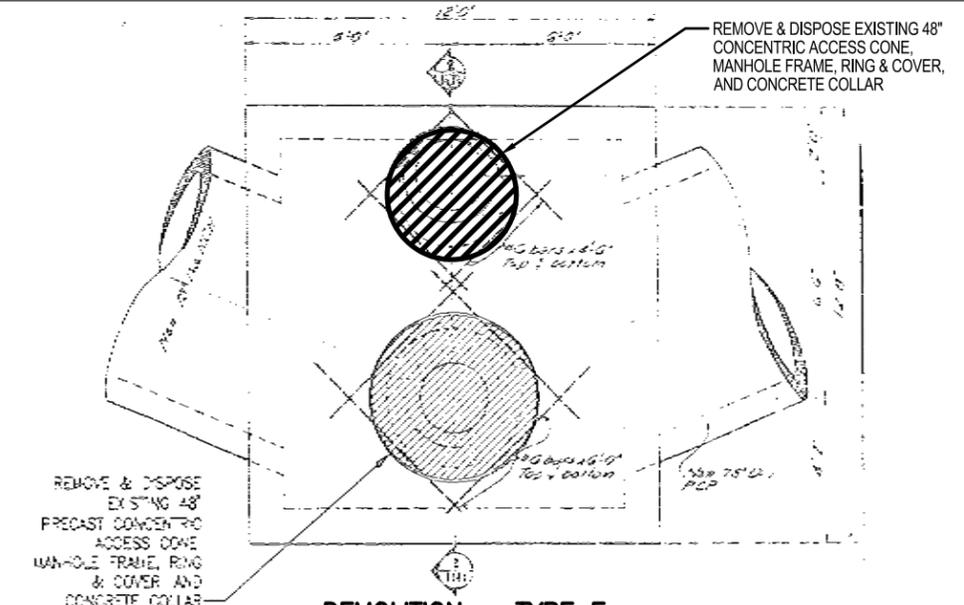


**TYPE E BOTTOM SLAB
PLAN VIEW**

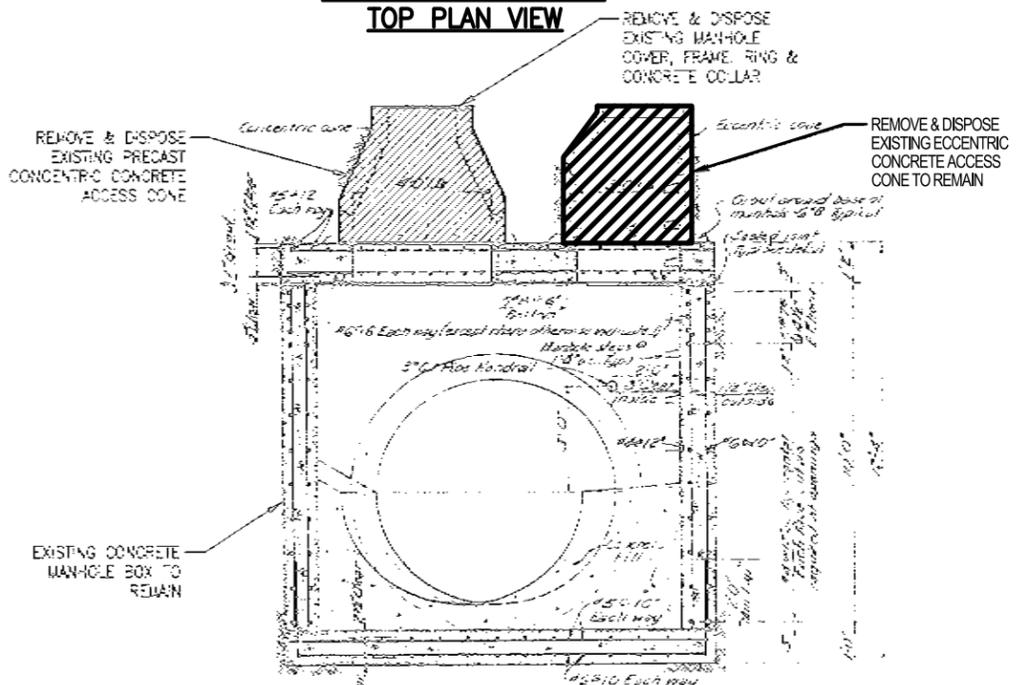


DETAIL 1

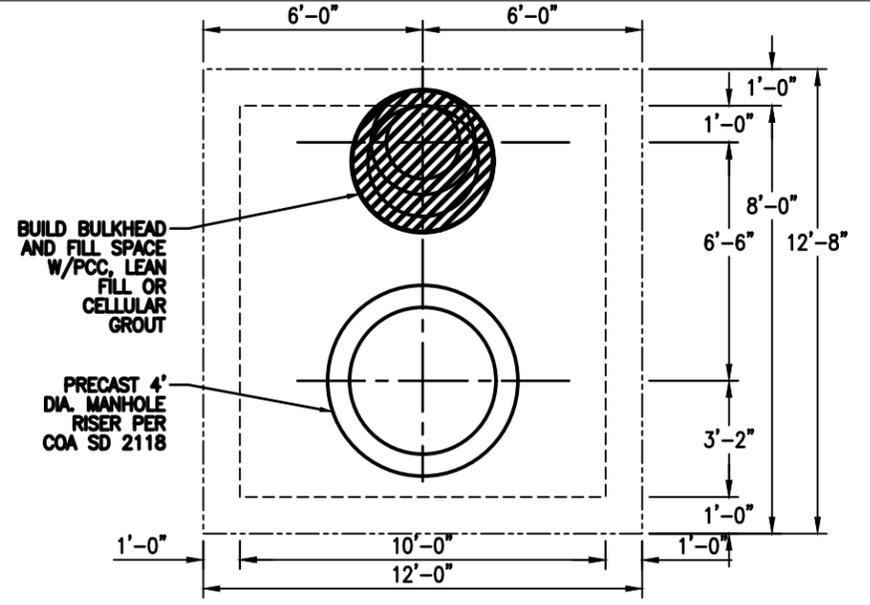
REVISIONS	WATER AUTHORITY
MMM. YYYY	TYPE E MANHOLE REHABILITATION DETAILS
	DWG. -----
	MMM. YYYY



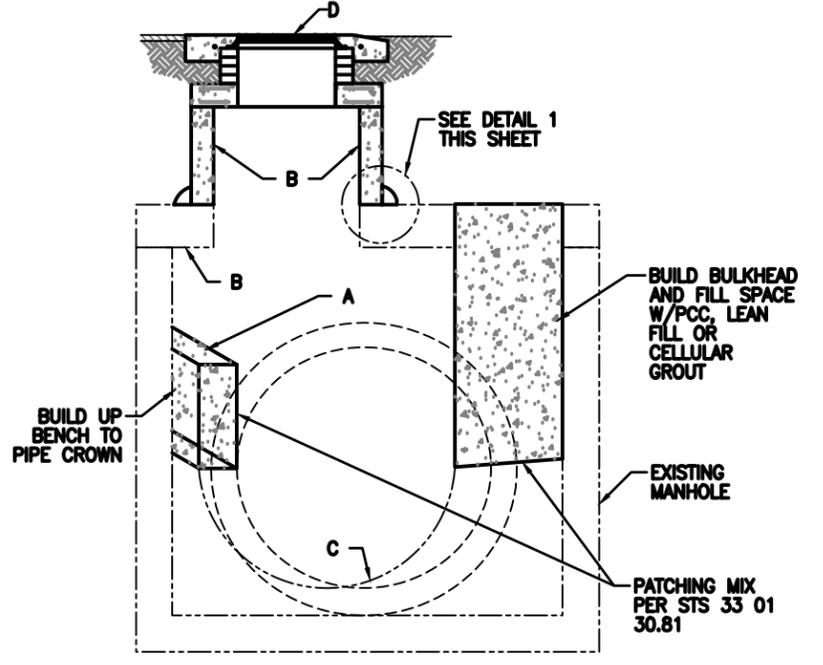
**DEMOLITION - TYPE F
TOP PLAN VIEW**



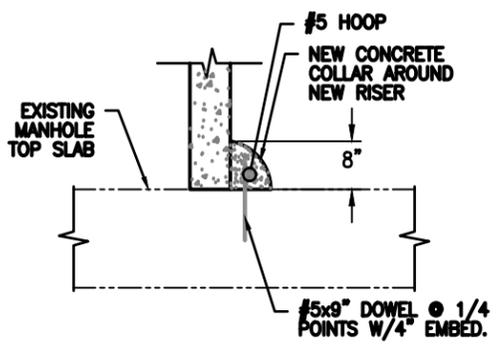
**DEMOLITION - TYPE F
SECTION VIEW**



TYPE F TOP SLAB PLAN VIEW



TYPE F SECTION VIEW



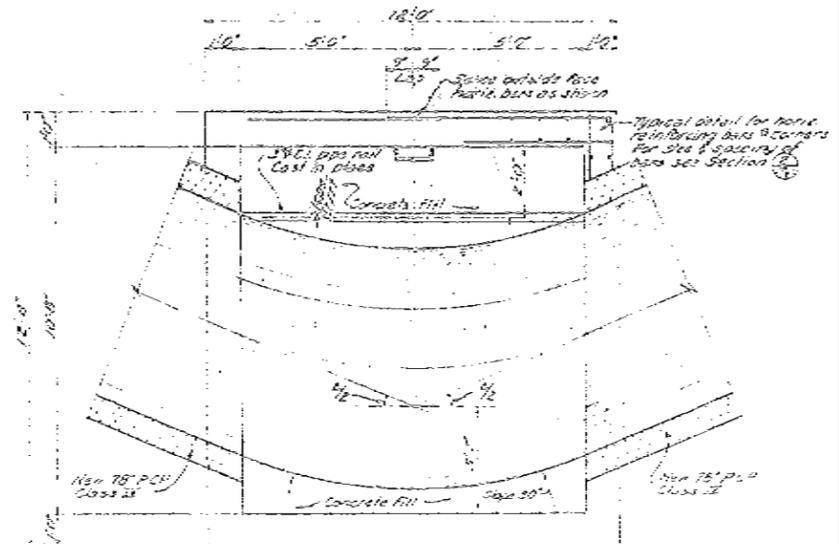
DETAIL 1

GENERAL NOTES

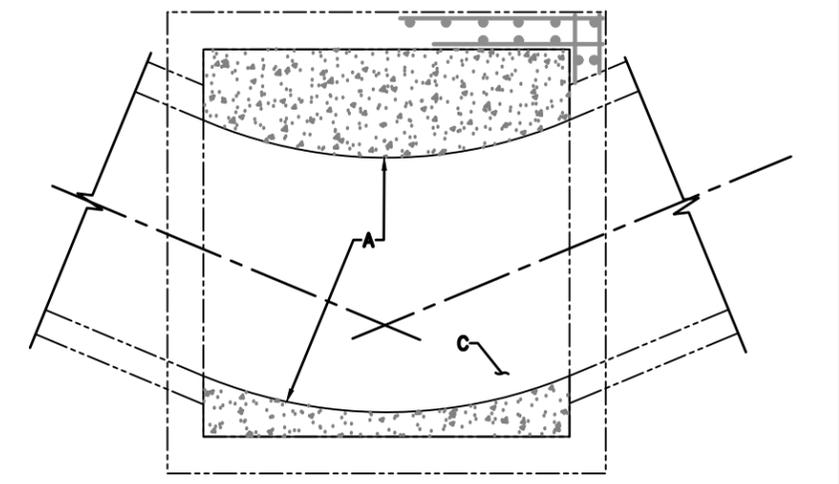
- EXISTING CONDITIONS FOR MANHOLES ARE BASED ON RECORD DRAWING DATA FURNISHED BY OWNER.
- CLEAN MANHOLE PER PATCHING MIX MANUFACTURER'S SPECIFICATIONS. SEE STS 33 01 30.81. FOR PATCHING MIX REQUIREMENTS.

CONSTRUCTION NOTES

- SLOPE 1" PER FOOT FROM PIPE CROWN.
- COAT INTERIOR OF MANHOLE RISER AND BOX LID WITH PROTECTIVE EPOXY OR POLYURETHANE COATING PER STS 33 01 30.81.
- REHABILITATE EXISTING MANHOLE PER STS 33 01 30.81.
- FURNISH AND INSTALL NEW MANHOLE FRAME, COVER, PCC COLLAR, AND PRECAST CONCRETE TOP SLAB PER STD. DWG. 2101.

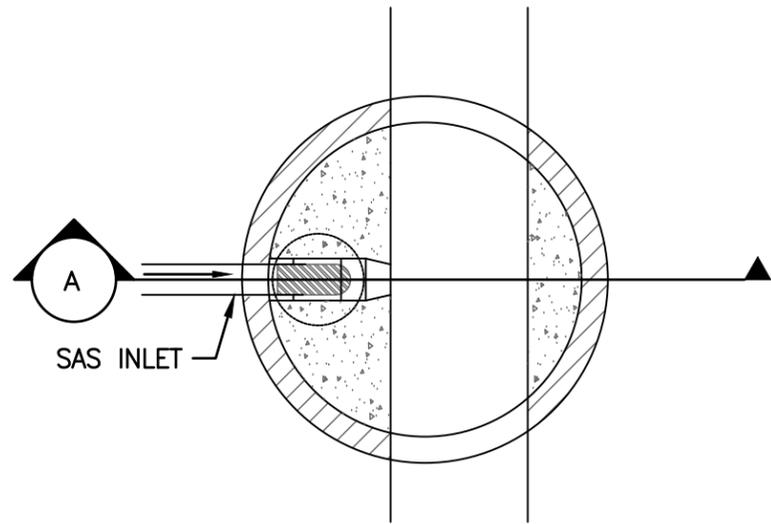


**DEMOLITION - TYPE F
BOTTOM SLAB PLAN VIEW**

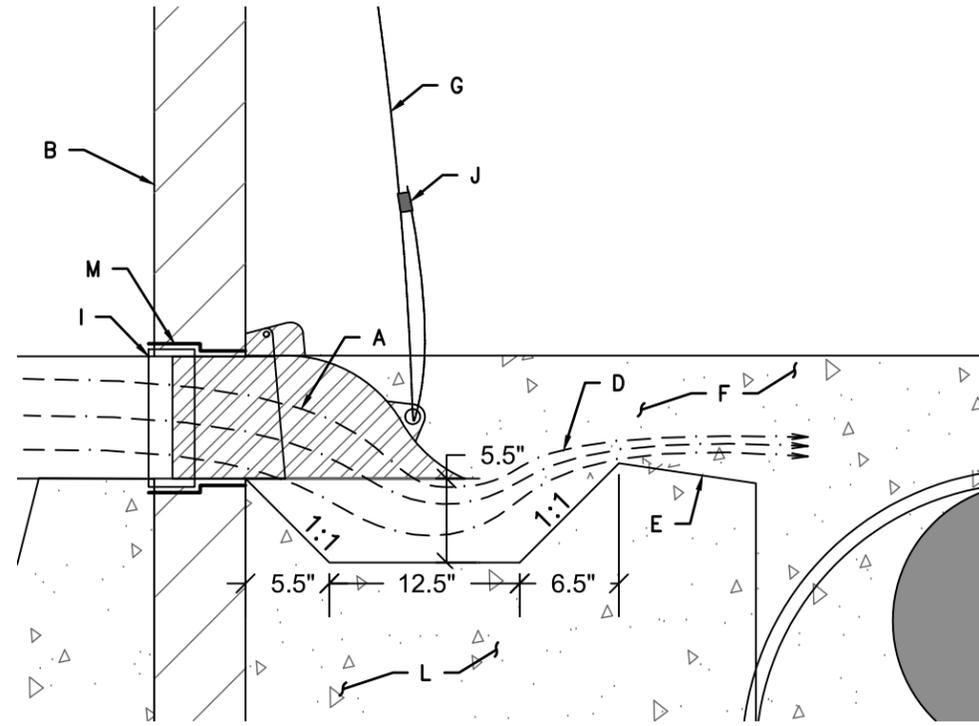


**TYPE F BOTTOM SLAB
PLAN VIEW**

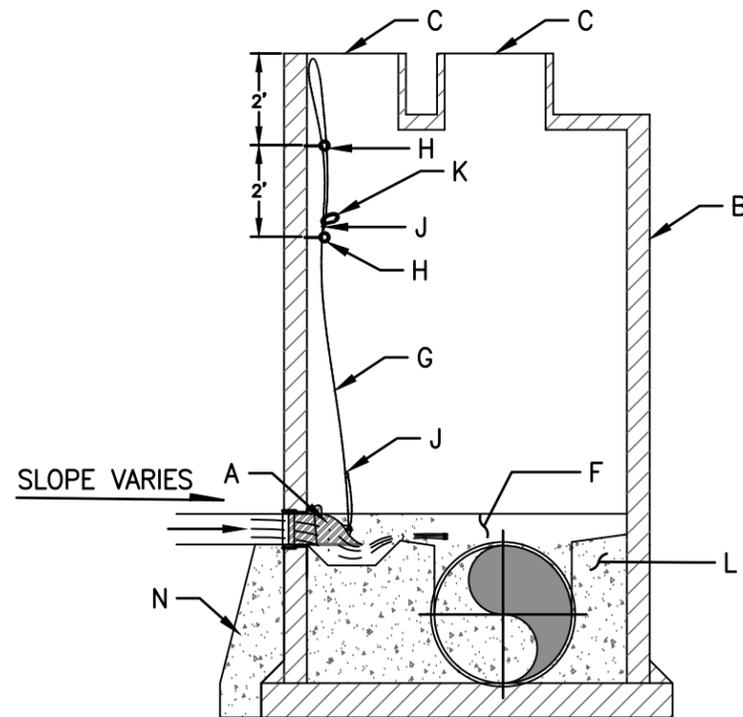
REVISIONS	WATER AUTHORITY
MMM. YYYY	TYPE F MANHOLE REHABILITATION DETAILS
	DWG. -----
	MMM. YYYY



PLAN
TRAP INLET AT
INTERCEPTOR MANHOLE



DETAIL
GAS TRAP INLET

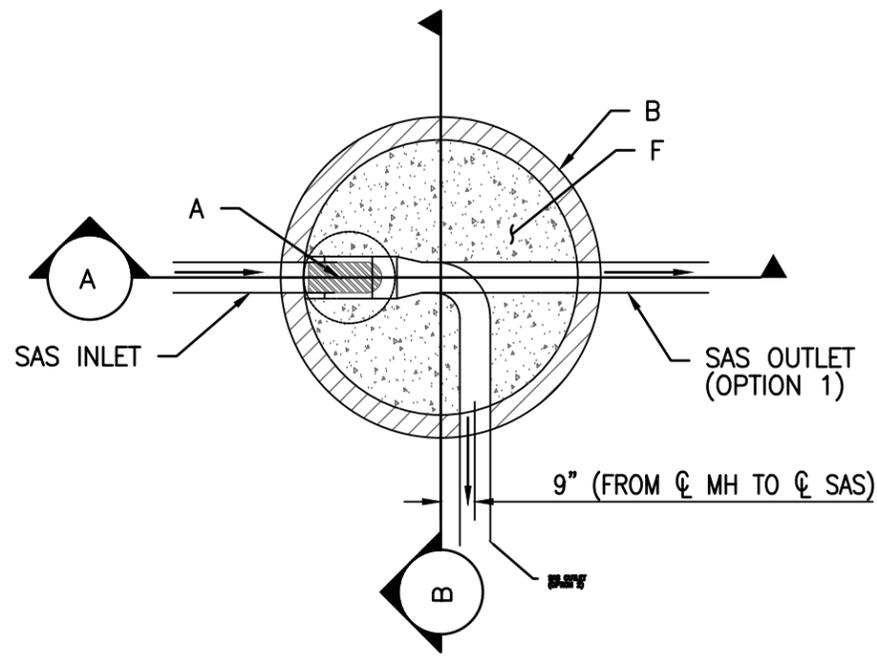


SECTION A
TRAP INLET AT
INTERCEPTOR
MANHOLE

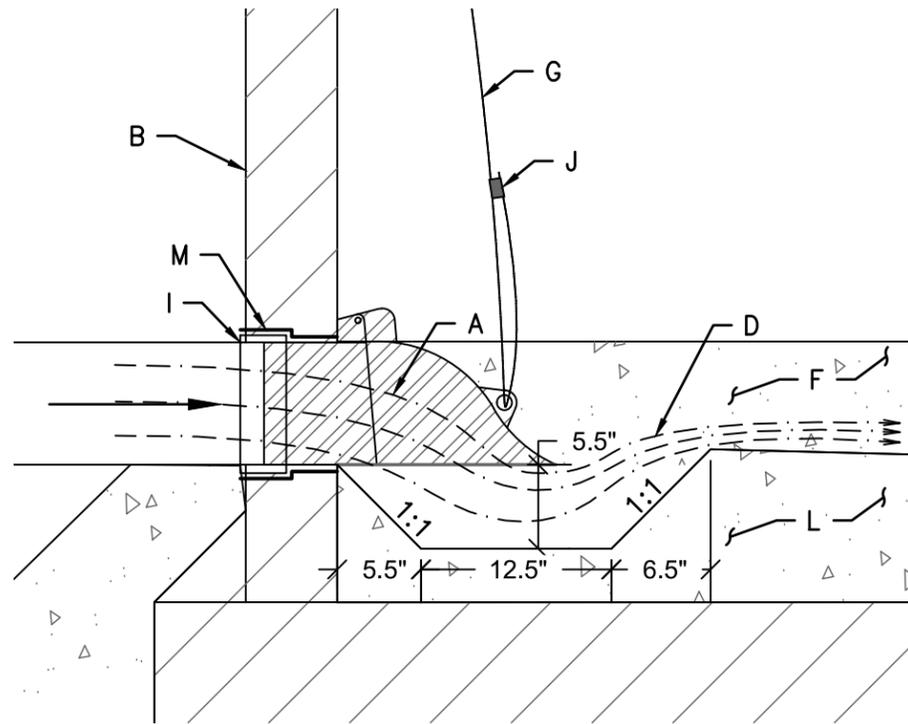
CONSTRUCTION NOTES

- A. 8-INCH STAINLESS STEEL GAS TRAP (LBIW INC. PRODUCT LB S-2017). ITEM MAY BE PROVIDED BY OWNER, REFER TO BID SCHEDULE.
- B. TYPE C MANHOLE - STANDARD DRAWING 2101 WITH DUAL OPENINGS, ONE CONCENTRIC, ONE ECCENTRIC ABOVE TRAP INLET (DIAMETER AS DIRECTED IN PLANS, DEPENDENT ON INTERCEPTOR DIAMETER).
- C. FRAME, COVER, AND COLLAR - STANDARD DRAWING 2110.
- D. WATER SURFACE WHEN FLOWING
- E. SLOPE 1-INCH PER FOOT FROM PIPE CROWN.
- F. CONCRETE FILL SHELF (3000 PSI).
- G. TYPE 316 STAINLESS STEEL 1/8-INCH WIRE ROPE. SUFFICIENT LENGTH TO EXTEND FROM TRAP TO TOP OF MANHOLE WITH 4-FT LOOP FOR HANDLE AT TOP (AS SHOWN).
- H. 2-TYPE 316 STAINLESS STEEL 1/2-INCH X 4-INCH EYEBOLTS (1/4-INCH 20 THREAD) ANCHORED TO MANHOLE SIDE AT LOCATION SHOWN.
- I. TRANSITION COUPLING (FIELD VERIFY EXISTING PIPE CONFIGURATION, SIZE, TYPE, AND OTHER FIELD CONDITIONS IN ADVANCE OF CONSTRUCTION TO ESTABLISH CORRECT ADAPTERS AND FITTINGS).
- J. 2-COMPRESSION SLEEVES OR CLAMPS.
- K. STAINLESS STEEL SPRING SNAP ATTACHED TO ROPE AS SHOWN FOR FASTENING TO EYEBOLT FOR HOLDING TRAP OPEN DURING MAINTENANCE.
- L. TRAP AND CHANNEL BASE (3000 PSI CONCRETE).
- M. GROUT SEAL.
- N. PIPE SUPPORT (SEE STANDARD DRAWING 2101).

REVISIONS	WATER AUTHORITY
MMM. YYYY	TRAP INLET AT INTERCEPTOR MANHOLE
	DWG. XXXX
	MMM. YYYY



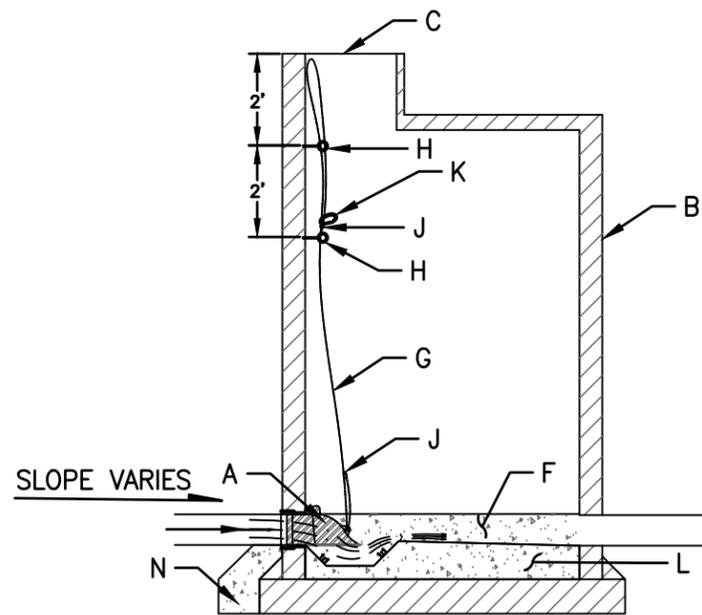
PLAN
TRAP MANHOLE



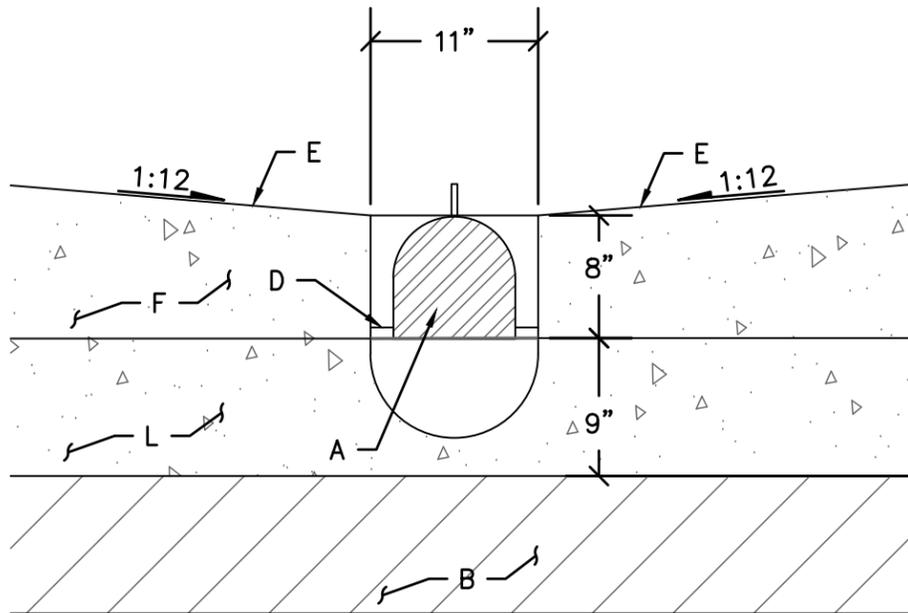
DETAIL
GAS TRAP

CONSTRUCTION NOTES

- A. 8-INCH STAINLESS STEEL GAS TRAP (LBIW INC. PRODUCT LB S-2017). ITEM MAY BE PROVIDED BY OWNER, REFER TO BID SCHEDULE.
- B. TYPE C MANHOLE - STANDARD DRAWING 2101 (DIAMETER AS DIRECTED). USE 4-FT DIAMETER FOR USE ONLY WITH STRAIGHT THROUGH PIPE (OPTION 1). USE MINIMUM 6-FT DIAMETER WITH (ANY ANGLE) BEND AT MANHOLE (OPTION 2).
- C. FRAME AND COVER - STANDARD DRAWING 2110.
- D. WATER SURFACE WHEN FLOWING
- E. SLOPE 1-INCH PER FOOT FROM PIPE CROWN.
- F. CONCRETE FILL SHELF (3000 PSI).
- G. TYPE 316 STAINLESS STEEL 1/8-INCH WIRE ROPE. SUFFICIENT LENGTH TO EXTEND FROM TRAP TO TOP OF MANHOLE WITH 4-FT LOOP FOR HANDLE AT TOP (AS SHOWN).
- H. 2-TYPE 316 STAINLESS STEEL 1/2-INCH X 4-INCH EYEBOLTS (1/4-INCH 20 THREAD) ANCHORED TO MANHOLE SIDE AT LOCATION SHOWN.
- I. TRANSITION COUPLING (FIELD VERIFY EXISTING PIPE CONFIGURATION, SIZE, TYPE, AND OTHER FIELD CONDITIONS IN ADVANCE OF CONSTRUCTION TO ESTABLISH CORRECT ADAPTERS AND FITTINGS).
- J. 2-COMPRESSION SLEEVES OR CLAMPS.
- K. STAINLESS STEEL SPRING SNAP ATTACHED TO ROPE AS SHOWN FOR FASTENING TO EYEBOLT FOR HOLDING TRAP OPEN DURING MAINTENANCE.
- L. TRAP AND CHANNEL BASE (3000 PSI CONCRETE).
- M. GROUT SEAL.
- N. PIPE SUPPORT (SEE STANDARD DRAWING 2101).



SECTION A
TRAP MANHOLE



SECTION B
GAS TRAP

REVISIONS	WATER AUTHORITY
MMM. YYYY	TRAP MANHOLE FOR 8-INCH SAS
	DWG. 2120
	MMM. YYYY