TUBA CITY WWTP SEWER PIPE & BRIDGE REHABILITATION

NAVAJO NATION EPA CONSTRUCTION APPLICATION

NAVAJO TRIBAL UTILITY AUTHORITY

PROJECT # 0039.21

August 2023
Smith Project No.: 121110

"AN EQUAL OPPORTUNITY EMPLOYER"

TUBA CITY WWTP SEWER PIPE & BRIDGE REHABILITATION

BID DOCUMENTS

NEW MEXICO STATE PARKS DIVISION

PROJECT #2021-SP160007

The technical material and data contained in this document were prepared under the direction of the undersigned, whose seal as a professional engineer licensed to practice in the state of Arizona, is affixed below.

SUPPLEMENTAL TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS

The following revisions and/or additions to the Technical Specifications of the Standard Specifications are hereby made a part of the Contract Documents.

SUPPLEMENTAL TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS

The following revisions and/or additions to the Technical Specifications of the Standard Specifications are hereby made a part of the Contract Documents.

A. ALL WORK DETAILED IN THIS PROJECT IS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED IN THE SUPPLEMENTAL SPECIFICATIONS WHICH IS PROVIDED HEREIN, IN ACCORDANCE WITH THE MARICOPA ASSOCIATION OF GOVERMENTS UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORK CONSTRUCTION.

1. The Maricopa Assoication of Goverments Uniform Standard Specifications for Public Works Construction is available at https://azmag.gov/Programs/Public-Works/Specifications-and-Details.

B. If alternative manufacturers other than the pre-approved manufacturers are proposed for any specified equipment, the CONTRACTOR must supply a submittal; refer to STS 01 33 00 for requirements after the effective date of the agreement. Although the brands listed herein are the preferred brands, it is not the intent of the OWNER for these specifications to be proprietary; equals will be evaluated in accordance with comparable quality, construction, strength, durability, and suitability for the purpose intended, and are listed for the purpose of describing the standard of quality perfomance and characteristics.

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 11 00
SUMMARY OF WORK

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. The Work of this Contract is located just east of the Tuba City Wastewater Treatment Plant in Tuba City, Arizona and includes the following:

1. Removal and disposal of the existing 18-inch steel sewer pipe and insulation
2. Removal and disposal of the existing pipe bridge and support structures
3. Fabrication and erection of a new steel pipe bridge and support structures
4. Installation of a new 18-inch steel sewer line with coating, upstream and downstream manhole replacements

B. The work of this Contract generally consists of furnishing all labor, materials, equipment and incidentals required and performing all construction, installation of all improvements, modifications and additions, all as shown on the drawings and specified in these Specifications.

C. Owner: Navajo Tribal Utility Authority

D. Engineer: Smith Engineering Company

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. Where all or part of a Federal, American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction, etc., is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. The following definitions shall apply to the Work:

1. Technical Specifications shall refer to the Sections included under Divisions 1 through 48. The individual Technical Specifications may be referred to as “Supplemental Specifications,” “Specification Sections,” “Section,” “STS,” “Spec” or “Technical Specifications.”

2. Standard Specifications shall refer to the Uniform Standard Specifications for Public Works Construction by the Maricopa Association of Governments. The individual Technical Specifications may be referred to as "Standard Specifications," "Specification Sections," "Section," "Std. Spec," or "Technical Specifications."

B. NTUA: Navajo Tribal Utility Authority

C. EPA: Environmental Protection Agency

D. NPDES: National Pollution Discharge Elimination System

E. WWTP: Wastewater Treatment Plant

1.5 REGULATORY REQUIREMENTS

A. Comply with all federal and local laws, regulations, codes, and ordinances applicable to the Work, including stormwater pollution prevention requirements.

B. References in the Contract Documents to local codes shall mean the latest edition of the appropriate code having jurisdiction including the following:

1. International Building Code
2. International Mechanical Code
3. National Electrical Code
4. International Plumbing Code
5. International Existing Buildings Code
6. International Energy Conservation Code
7. International Fire Code

C. Other standards and codes, which apply to the work, are designated in the Contract Documents.

D. Soils: Best management practices (BMPs) shall be applied in order to curtail wind and water erosion of exposed soils during construction (see STS 01 74 00 – Cleaning and Waste Management). To avoid soil pollution impacts during construction, any polluting materials generated will not be dumped in the project area but will be managed in accordance with STS 01 74 00 and appropriate guidelines. Contractor shall submit to Engineer BMP intended to be used for review and approval, when applicable. BMPs may include, but are not limited to, the following:

1. Silt Fencing
2. Straw Bale Fencing
3. Sediment Traps

E. Water Quality: The EPA requires a NPDES Construction General Permit for all storm water discharges from construction permits that will result in the disturbance of one or more acres of total land. Provide a Storm Water Pollution Prevention Plan (SWPPP) and implement and maintain BMPs to the extent practicable to prevent pollutants such as sediment, oil and grease, and construction material from entering storm water runoff.

F. Air Quality – (see STS 01 74 00 – Cleaning and Waste Management) The following measures, but not limited to, are recommended to reduce disturbance of particulate matter, including emissions caused by strong winds as well as machinery and trucks tracking soil off the construction site.

1. Suppress dust on traveled paths which are not paved through wetting, use of water trucks, chemical dust suppressants, or other reasonable precautions to prevent dust entering ambient air;
2. Cover trucks when hauling soil;
3. Minimize soil track-out by washing or cleaning truck wheels before leaving construction site;
4. Stabilize the surface of soil piles;
5. Create windbreaks.
    a. Site restoration
    b. Remove un-used material;
    c. Remove soil piles via covered trucks.

1.6 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall coordinate use of the premises, for storage and the operations of the Contractor's workforce, with the Owner to minimize conflict and to facilitate Owner usage.

B. The Contractor shall maintain access and utilities to the existing structures and treatment units within the project area.

C. Contractor staging/laydown areas shall be as identified at the preconstruction meeting. Obtain written permission from Owner if additional storage or work areas are needed to perform the work.

D. The Contractor shall provide spill containment for all regulated materials and NFPA rated containment for all flammable materials.

E. Contractor shall assume full responsibility for security of all his own and his subcontractors, materials and equipment stored on the site.

F. If directed by the Owner, the Contractor shall move any stored items which interfere with operations of Owner or other Contractors.

G. Additional Contractors/Manufacturers may be onsite during construction of this project; Contractor shall coordinate with each other as needed.

H. The Contractor will have access to the site to conduct pre-construction potholing and dewatering investigations if needed. Contractor is required to coordinate with Owner prior to accessing the site.

I. Contractor shall continue to be allowed access to all facilities constructed to perform testing and adjustments as needed until final completion is issued.

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION [NOT USED]

END OF SECTION 01 11 00

Smith Engineering Company

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 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 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.

C. Work may be scheduled simultaneously but must be done under the requirements herein.

D. The Contractor shall submit and maintain construction progress schedules.

E. The Contractor's proposed progress schedule shall reflect all coordination efforts of the work of this contract. The progress schedule shall identify points in time when any utility service (sewer, water, gas, electric, etc.) shutdowns shall need to occur, and the duration of those shutdowns.

F. The Contractor shall modify the progress schedule as required, prior to the start of construction, to eliminate potential conflicts, delays, and disruption of utility service activities to the satisfaction of the Engineer and the Owner personnel.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. Where all or part of a Federal, American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction, etc., standard is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. 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.

B. Shut Down – component/equipment/system not in active service.

C. Start Up – a new component/equipment/system is placed into service per the specifications.

D. Restart – an existing component/equipment/system is placed back into service per the specifications.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and with Specification 01 33 00 – Submittal Procedure.

B. Construction Schedule: submit and maintain construction schedules pursuant to the General Conditions of the contract.

1. A detailed schedule shall be submitted, beginning with Notice to Proceed through Final Completion.
2. Show activities including, but not limited to, the following:
    a. Notice to Proceed.
    b. Permits.
    c. Submittals, with review time (in agreement with the submittal schedule).
    d. Early procurement activities for long lead equipment and materials.
    e. Initial site work.
    f. Earthwork.
    g. Specified work sequences and construction constraints.
    h. Contract Milestone and Completion Dates.
    i. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work.
    j. System startup and training summary.
    k. Substantial completion walkthrough.
    l. Final completion walkthrough.
    m. Project close-out summary.
    n. Demobilization summary.
3. Schedule shall conform with the work items identified in the contractor's schedule of values.
4. Format
    a. Gantt Chart format showing an orderly progression of work from start to finish.
    b. Critical path analysis showing critical work items to the completion of the project within the contract times.
    c. Chart shall show continuous activity form left to right.

d. The duration, start date, and end date shall be shown for each task.

C. Safety and Environmental Submittals:

1. Hazard Communication Program with information on labels, Safety Data Sheets, an inventory of hazardous chemicals on site, and employee training.

2. Chemical and Fuel Storage and Spill Response Plan, in the format of a Spill Prevention Control and Countermeasures Plan, including spill response supplies and spill response Personal Protective Equipment on site.

a. In the event of a chemical, fuel, or other accidental spill, refer to STS 01 35 29.13: Health, Safety, and Emergency Response for Contaminated Sites.

3. Site Specific Safety Plan, with special emphasis on Personal Protective Equipment to be used for construction activities.

D. Construction Schedule Constraints

1. No Work shall be done before 7:00 AM or after 7:00 PM, local time, Monday through Saturday, on Sunday, or on legal holidays, except as necessary for the proper care and protection of work already performed, or during emergencies.

2. Contractor may not begin to take any existing utilities out of service until the Engineer has given written permission to begin abandoning or removing existing utilities.

1.6 SUSPENSION OF WORK

A. The Owner may suspend work due to seasonal or other conditions unsuitable for construction work, for safety and health hazards, for violations of environmental law, or for violations of contract or specifications, for up to 90 days.

B. Prior to suspension for any cause, take necessary precautions to protect the work during the period of suspension from any factors which would contribute to its deterioration from weather conditions or vandalism.

C. Upon return of favorable conditions or remediation of hazards or environmental damage, Owner will issue a Notice to Proceed to resume work.

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION [NOT USED]

END OF SECTION 01 14 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 22 00
UNIT PRICES (MEASUREMENT AND PAYMENT)

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 RELATED SECTIONS

A. General, Supplemental General Conditions, Special Provisions, Supplemental Special Provisions of the Contract and Division 1.

1.3 REFERENCES

A. Where all or part of a Federal, American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), Arizona Maricopa Association of Governments Standard Specifications for Public Work Construction, etc., standard is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. Measurement: 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 and conditions of the Contract.

1. 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: 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.

1. 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: The Contractor's schedule of values is a detailed schedule apportioning the original contract sum and all change orders, among all cost code divisions or portions of the Work. The schedule of values shall be based on the approved budget or the approved fixed price or cost-plus contract type.

D. Typical units of measurements:

1. EA – Each
2. LS – Lump Sum
3. ALLOW - Allowance

1.5 SUBMITTAL

A. Schedule of Values: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Submit preliminary schedule of values within 10 calendar days after the Effective Date of the Agreement.

1. 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.
2. Revisions: With each Application for Payment, revise schedule to list approved Change Orders.
3. Contractor shall separate individual items within one bid item if partial payment is to be requested.

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. 104150 Project Signs (New)

   a. Description: Work includes furnishing, installing, maintaining and protecting the project information sign and shall include all posts, hardware, etc. to erect the sign(s) at the location determined by the Owner. Separate payment will not be made for screening of the project sign.

   b. Measurement: Project sign(s) will be measured by the numerical count of signs authorized to be installed.

   c. Payment Unit: Payment will be made at the unit price bid for each sign.

2. 105801: Construction Surveying

   a. Description: Contractor to perform all necessary surveying and construction staking, complete.

   b. Measurement: No measurement will be made for bid item.

   c. Payment: Payment will be made at the lump sum price provided upon the completion of the work or in accordance with the accepted schedule of values.

3. 105820: As-Builts (Including Survey)

   a. Description: Contractor to redline record drawings in accordance to the specifications, and an as-built survey of the improvements.

   b. Measurement: No measurement will be made for bid item.

   c. Payment: Payment will be made at the lump sum price provided upon the completion of the work or in accordance with the accepted schedule of values.

1. 107001: Permits and Fees
   a. Description: The Contractor is responsible for identifying the permits and fees applicable to the completion of the work, and shall cover costs associated with obtaining permits and fees.
   b. Measurement: No measurement will be made for bid item.
   c. Payment: Payment will be made at the lump sum price provided upon the completion of the work or in accordance with the accepted schedule of values.
2. 201005: Clearing and Grubbing
   a. Description: Clearing and grubbing shall include the removal of debris and obstructions, natural and manmade, in accordance with standard specification 201.
   b. Measurement: No measurement will be made for clearing and grubbing.
   c. Payment: Payment will be made at the lump sum price provided upon completion of work or in accordance with the accepted schedule of values.
3. 210001: Borrow
   a. Measurement: Measurement will be by the nearest cubic yard of material of in-place fill as determined from the preconstruction survey and as-built survey provided by the contractor's licensed surveyor, and reviewed by the engineer. No adjustments for shrink or swell will be made.
   b. Payment: Payment will be made at the unit price bid per cubic yard.
4. 220411 Plain Riprap
   a. Description: Furnish and Install loose type rap to be placed per plan. Includes filter fabric, excavation, backfill and placement.
   b. Measurement: Measurement shall be made to the nearest cube yard, as calculated by the Engineer.
   c. Payment: Payment will be made at the unit price bid per square yard.
5. 350201: Remove Pipes (Less than 24" Dia.)
   a. Description: Removal and disposal shall include trenching and compacted backfill, and all necessary materials, labor, and equipment, per Standard Specification 350. Disposal includes haul and any associated fees.
   b. Measurement: Measurement is made at the nearest lineal foot of pipe removed.
   c. Payment: Payment will be made at the unit price bid per lineal foot.

6. 350710: Remove Existing Utility Pipe Bridge

   a. Work includes the removal and disposal of existing steel bridge and coating.

   b. Measurement: No measurement will be made for the bid item.

   c. Payment: Payment will be made at the lump sum price provided upon the completion of the work or in accordance with the accepted schedule of values.

7. 350711: Remove Existing Pile Caps

   a. Work includes the removal and disposal of existing concrete pile caps, and shall include all equipment, labor, haul and disposal fees.

   b. Measurement: Pile cap removal will be measured by the numerical count each cap removed.

   c. Payment Unit: Payment will be made at the unit price bid for each removal.

8. 350712: Remove Existing Manholes

   a. Description: Remove and Dispose of existing manholes shall include all necessary labor and equipment. All excavation, replacement of any curb and gutter, pavement, valley gutter, base course shall be incidental to the removal.

   b. Measurement: Measurement shall be made to the numerical count of each manhole removed and disposed.

   c. Payment: Payment will be made at the unit price bid for each manhole.

9. 350713: Remove Asbestos Containing Material

   a. Description: Removal and disposal of hazardous materials including general information and execution for the transportation, disposal, and abatement of asbestos, lead paint, other hazardous materials. Disposal includes haul and any associated fees.

   b. Measurement: No measurement will be made for the removal and disposal of hazardous material.

   c. Payment: Payment will be made at a lump sum price provided upon completion or in accordance to the accepted schedule of values.

10. 350714: Remove Sewage from Pipe by Vactor

    a. Work shall include all equipment, labor haul and disposal of sewage vactored from pipe.

    b. Measurement: Measurement is made at the nearest lineal foot of pipe cleaned.

    c. Payment: Payment will be made at the unit price bid per lineal foot.

11. 515300: New Steel Bridge Fabrication

    a. Work shall include fabrication of the new steel bridge, hangers, and accessories.

    b. Measurement: In accordance with Specification 515.6.

    c. Payment: In accordance with Specification 515.7.

12. 515301: New Pile Cap Fabrication and Installation

    a. Measurement: Measurement shall be made to the numerical count of each pile cap installed.

    b. Payment: Payment will be made at the unit price bid for each pile cap.

13. 515302: Steel Bridge Erection and Mobilization

    a. Work shall include transport of equipment, fabricated bridge sections, and accessories to the site. Shall also include any coordination with land owners, staging yards, temporary supports, and other items required to erect the new bridge, including connections.

    b. Measurement: No measurement will be made for the erection of the bridge.

    c. Payment: Payment will be made at a lump sum price provided upon completion or in accordance to the accepted schedule of values.

14. 530001 Coatings for Steel Structures and Pipe

    a. Work includes preparation of surfaces, and application of coating system on the piping, bridge, new pile caps and existing piles.

    b. Measurement: No measurement will be made for the coatings.

    c. Payment: Payment will be made at the lump sum price provided upon the completion of the work or in accordance with the accepted schedule of values.

15. 611118: Sewer CCTV

    a. Description: Work shall include all labor, materials, and equipment necessary to provide post CCTV inspection of the installed sewer pipes.

    b. Measurement: Measurement shall be made to the nearest lineal foot of pipe videoed.

    c. Payment: Payment will be made at the unit price per lineal foot.

16. 615200

    a. Description: Work shall include all boring, materials, pipe, fusion of pipe, pressure testing, fittings, etc.

    b. Measurement: Measurement shall be made to the nearest lineal foot.

    c. Payment: Payment will be made at the unit price per lineal foot.

17. 615218: 18" PVC Sewer Line

    a. Measurement: In accordance with Specification 615.16.

    b. Payment: In accordance with Specification 615.16.

18. 615218: 18" DIP Sewer Line

    a. Measurement: In accordance with Specification 615.16.

    b. Payment: In accordance with Specification 615.16.

19. 615551: Sewer Bypass

    a. Description: Provide Sanitary Sewer Bypass pumping, equipment, generators, and other items to provide flow control during construction.

    b. Measurement: No measurement will be made for bid item.

    c. Payment: Payment will be made at the lump sum price provided upon the completion of the work or in accordance with the accepted schedule of values.

20. 625004: 6' Dia. Manhole to 10' Depth

    a. Description: Includes excavation, backfill, base, lid and ring to construction in accordance with the drawings and specifications. Shall include all costs associated with the testing of the manholes

    b. Measurement: Measurement shall be made at the numerical count of manholes installed.

    c. Payment: Per standard specification 920.8.1.2

21. 625100 Manhole Protective Lining

    a. Description: Installation of interior coating shall include all labor, materials, testing and equipment needed.

    b. Measurement: Measurement shall be made to the nearest square foot of interior coating installed as calculated by the Engineer.

    c. Payment: Payment will be made at the unit price bid per square foot.

22. 800001: Mobilization

    a. Measurement: No measurement for mobilization or demobilization will be made.

    b. Payment: Shall be in accordance to Standard Specification 109.10.

END OF SECTION 01 22 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1– GENERAL

1.1 SECTION INCLUDES

A. Section includes the procedures to be followed for substituting products specified in the contract documents.

1.2 RELATED SECTIONS

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

1.3 PERFORMANCE REQUIREMENTS

A. Formal requests from the Contractor will be considered by the Engineer for substitution of products and methods in place of those specified. Acceptance of substitute products and methods shall be only for the characteristics and use named in the acceptance and shall be interpreted neither as a modification to the Specification and Drawing requirements nor to establish acceptance of products and methods for other portions of the project. The Engineer shall judge the quality and suitability of the substitute product and method and his decision shall be final. Where use of a substitute product and method involves redesign of other parts of the Work, the cost and time required to affect that redesign will be considered in evaluating the suitability of the substitute product and method.

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. perform 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. Qualification Packages for Substitution Listings: The qualification package for the substitution of equipment items or products the Contractor proposes to furnish shall include but not be limited to, the following information appropriate for the particular item:

1. Manufacture's Experience: The manufacturers shall certify that their experience includes a minimum of ten installations where identical or similar equipment has been in operation successfully in a similar process for a minimum of five years.

2. Manufacture's Certification: As a minimum, the manufacturer shall certify that the supplier is the manufacturer of the equipment to be substituted.

3. Equipment Requirements: A complete set of drawings, specifications catalogue, cut-sheets, and detailed descriptive material of proposed major equipment items or products. This information shall identify all technical and performance requirements stipulated in the specifications.

4. Equipment Details: Detailed information shall be submitted for all items.

5. Materials of Construction: List showing materials of construction of all components.

6. Recommended Spare Parts: List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage for a minimum of one year.

7. Maintenance Materials: Provide, where applicable:

a. Lubrication for all equipment and facilities sufficient for three months' normal usage.

b. Any non-standard tool required to adjust, or service equipment supplied.

8. Erection Requirements: Information on equipment field erection requirements.
9. Maintenance Requirements: A maintenance schedule showing the required maintenance, frequency of maintenance, lubricants and other items required at each regular preventative maintenance period.
10. Electrical Requirements: Process equipment electrical requirements and schematic diagrams.
11. List of Deviations: Detailed written documentation with discussion of all deviations of equipment from the contract documents.
12. Operations & Maintenance Manual: One representative O & M Manual.
13. Installation List: Complete Past Experience Installation List complete with project location, design criteria, design engineer, firm, owners, manager, operator, superintendent, and telephone number for each. Identify which project on the installation list meet the experience requirements of the Specification.
14. Guarantee: Copy of the supplier's guarantee of the equipment for one year starting after successful completion of start-up.
15. Process Design Analysis

F. 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.

G. 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.

1.4 SUBMITTALS

A. Contractor to Submit written application to Engineer for review of a proposed product or method. (see section above)

B. Contractor to submit a Qualification Package for Substituting. (see section above)

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION [NOT USED]

END OF SECTION 01 25 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 26 13
REQUESTS FOR INTERPRETATION

PART 1– GENERAL

1.1 SECTION INCLUDES

A. This specification includes the procedures for reporting and resolving discrepancies of the contract documents though requests for interpretation.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. Where all or part of a Federal, American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), Maricopa Association of Governments Uniform Standard Specification for Public Works Construction, etc., standard is incorporated by reference in these specifications, the referenced specification shall be the latest edition and revision.

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. RFI: Request for Interpretation

1.5 REPORTING AND RESOLVING DISCREPANCIES

A. In the event Contractor, or Sub-Contractor or any Supplier, or other persons or entities performing portions of the Work determines, after exercising due diligence to determine the intent of the Contract Documents, that some portion of the Contract Documents require clarification or interpretation by Engineer, Contractor shall submit a Request for Interpretation (RFI) in writing to Engineer in a format provided by the Engineer, see Attachment A.

   1. RFIs may only be submitted by Contractor and shall only be submitted in the form required by Engineer.

B. An oral RFI or an RFI presented on an unapproved form may not be accepted. Any project delay caused by Engineer's refusal to accept an oral RFI or an RFI presented on an unapproved form will be attributed solely to Contractor.

C. Each RFI shall be limited to a single item.

D. Information that is discernable from the Contract Documents and issues concerning construction means, methods, techniques, sequences, or procedures; or construction site safety will not be addressed by Engineer in responding to an RFI.

E. The RFI process shall not be used by Contractor to seek approval for proposed "or-equal" or substitute materials or equipment.

F. Contractor shall clearly and concisely set forth the item for which clarification or interpretation is sought and why a response is needed. In the RFI, Contractor shall set forth its understanding or interpretation of the requirement, along with reasons why such and understanding or interpretation was reached.

G. Engineer's review of or responses to RFIs will not change any requirements of the Contract Documents. In the event Contractor believes that a response to an RFI will cause a change to the requirements of the Contract Documents, Contractor shall give written notice to Owner and Engineer before proceeding with the Work, stating that Contractor considers the response to be a change to the Contract Documents.

H. If Contractor wishes to make claim for an adjustment of the Contract Price of an extension of Contract Times, or both, written notice shall be given before proceeding to execute the Work. Failure to give such notice shall waive Contractor's right to seek an adjustment on the Contract Price or an extension of the Contract Times.

I. The Contractor shall not submit excessive RFIs, submit RFIs with the intent to create conflicting information to provide the grounds for changes in Work or an extension of the Contract Times, or both, submit incomplete RFIs, or submit RFIs that is apparent from field observations or can be reasonably inferred from the Contract Documents in the opinion of the Engineer.

J. The Contractor shall be liable to the Owner for all reasonable costs charged by the Engineer to the Owner for evaluating and responding to RFIs that are identified in paragraph 1.6 I of this specification.

K. Engineer will review and respond to RFIs within seven calendar days of receipt of the RFI or will provide written notice why the RFI cannot be responded to within seven days. RFIs marked urgent will be prioritized over other RFIs. In no case shall the Contractor be entitled to additional time for the Engineers review and response to an RFI.

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION [NOT USED]

END OF SECTION 01 26 13

Request for Interpretation (RFI) No. ____

Date Submitted:	**RFI Subject:**	
Project: Tuba City Sewer Pipe and Bridge Rehabilitation	**Owner:** Navajo Tribal Utility Authority	**Submitted To:** Smith Engineering Company **Attention:**
C**ontractor:**		U**rgent:** ☐ Yes ☐ No
Submitted By (*name & title)*:		**Number of Pages:**
Submitted Via: ☐ Email/ Electronic Copy ☐ USPS ☐ Facsimile		

REFERENCE:

Specification Reference:_____

Drawing/Detail Reference:_____

REQUEST: ☐ Interpretation ☐ Clarification ☐ Additional Information

Contractors Certification:

The undersigned Contractor certifies that (1) due diligence was used to determine the intent of the contract documents prior to submitting this RFI; (2) Contractor has read and understand the requirements set for in STS 01 26 13: Request for Interpretation; and (3) Contractor understands that the Engineer's written response to this RFI is a written decision and final decision.

Signature Name & Title (Printed) Date

Smith Engineering Company

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. Closeout meeting

B. Procedures for modification to contract times.

C. Procedures for notifying Engineer and Owner of events which may affect or be caused by construction activities.

1.2 RELATED SECTIONS

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

1.3 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. Contractor—The individual or entity with which Owner has contracted for performance of the Work.

B. Effective Date of the Contract—The date, indicated in the Agreement, on which the Contract becomes effective.

C. Engineer—The individual or entity named as such in the Agreement.

D. Notice of Award—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

E. Owner—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

F. 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.

G. 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 entity each represents.

1.5 PRECONSTRUCTION MEETING

A. Owner or Engineer may schedule and preside over a preconstruction 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. Location: TBD

D. Minimum Agenda:

1. Owner-Contractor Agreement, where applicable
    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 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. Construction facilities and controls
18. Temporary utilities provided by Owner
19. Survey and site layout
20. Procedures for maintaining record documents
21. Requirements for startup of equipment
22. Inspection and acceptance of equipment put into service during construction period

E. 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 utility companies when the Work affects their interests, and others necessary to agenda

B. Minimum Agenda:

1. Review of submittal schedule and status of submittals

2. Request for Interpretation (RFIs) status
3. Change order management status
4. Review of Schedule
5. Planned progress during succeeding work period
6. Field observations, problems, and decisions
7. Maintenance of quality and work standards
8. Action items
9. Next meeting

C. Engineer: Record minutes and distribute to participants within two business days after meeting and those affected by decisions made.

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 to 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 QUALITY CONTROL MEETINGS

A. Contractor will schedule and administer meetings throughout progress of the Work at maximum weekly intervals.

B. Contractor will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

C. Attendance Required: Construction Manager and staff, Contractor's Quality Control Manager and staff.

D. Agenda:

1. Review minutes of previous meetings
2. Review of Work progress and schedule
3. Review of out-of-compliance inspection or test results
4. Field observations, problems, and decisions

5. Review of offsite fabrication and delivery schedules
6. Planned progress during succeeding work period
7. Coordination of required inspections and tests
8. Review 3-week schedule report with upcoming inspections and special tests
9. Maintenance of quality and work standards
10. Other business relating to Work

E. Contractor will record minutes and distribute electronic copies within 7 calendar days after meeting to participants, and those affected by decisions made

1.9 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, Contractor's Project Manager, 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.

1.10 POST CONSTRUCTION MEETING

A. Meet with and inspect the Work for the 11th Month Warranty Walkthrough approximately 11 months after date of Substantial Completion with Owner and Engineer.

B. Notify Owner and Engineer at least 7 days before meeting.

C. Meet in Owner's office or project site.

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.

1.11 NOTIFICATIONS

A. Job site safety is the sole responsibility of the Contractor.

B. Immediately notify the Engineer and Owner of the following events in or near the construction area or related to construction.

1. Injury to employees, subcontractors, or visitors.
2. Accidents or hazardous natural events, such as flash floods, tornados, or other weather occurrences.
3. Fuel, oil, or chemical spills. See STS 01 35 29.13: Health, Safety, and Emergency Response for Contaminated Sites.
4. Incidents involving wildlife.
5. Any open burning. Burning of any construction material or debris on site is prohibited.
6. Any findings of an artifact. Work shall immediately stop to allow for archaeological evaluation.

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION [NOT USED]

END OF SECTION 01 31 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 32 36
VIDEO MONITORING AND DOCUMENTATION

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Work shall consist of video recording existing conditions of the construction area, and structures, and areas adjacent to the limits of construction before work commences and after construction work has been completed. Special attention shall also be paid to items such as structures, vegetation, and signage abutting the project limits, and watercourses and other areas subject to damage or erosion, and as directed by the Engineer.

B. The Contractor is directed to include video recording of existing fences, walls, landscaping, access roads, and other conditions along the project corridor.

C. The video records will be used to determine any impacts on structures and areas due to the Contractor's operations.

D. The Contractor shall furnish all labor, tools, equipment, material, and other appurtenances necessary to complete the work and shall be considered incidental to the completion of the project.

1.2 RELATED SECTIONS

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

1.3 SUBMITTALS

A. Pre-Construction video documentation for each area on the project shall take place not more than five (5) days prior to beginning construction in that area or as directed by the Engineer.

B. Post-Construction video documentation for each area on the project shall take place not more than five (5) days following the completion of construction activities in that area or as directed by the Engineer.

1.4 QUALITY ASSURANCE

A. Quality of Finished Video Documentation: The quality of the visual and audio portions of the video, and the method of indexing of locations on the recording media, shall be acceptable to the Engineer. Recordings or portions of recordings deemed defective or substandard shall be re-recorded. Failure to provide pre-construction video documentation that meets the standards identified in this supplemental specification will result in a $1,000.00 deduction to final project payment.

PART 2- PRODUCTS

2.1 MATERIALS

A. Recording Equipment: The Contractor shall furnish at least one video camera and appurtenances for the duration of the project. The color video camera equipment shall be equipped with audio capabilities and have the following minimum criteria:

1. EIA Standard: NTSC-type color, 1.0 volt, 75 ohms
2. Horizontal resolution of 350 lines at center
3. 8:1 zoom, minimum
4. Recording Media: The Contractor shall supply sufficient recording media to document the entire construction area and adjacent areas before construction commences and as required or directed by the Engineer during and after construction. Recording media shall be either high quality DVD or standard portable USB type hard drive.

PART 3 – EXECUTION

3.1 RECORDING

A. Equipment Operator Requirements: The video camera equipment operator shall be familiar with and have experience using the video recording equipment.

B. Features to be recorded: The Contractor shall video record the existing conditions, prior to commencing work, of the construction area including all drainage structure inlets and outlets, adjacent building structures, vegetation, signage, and areas and locations where construction will be performed. The Contractor shall record in both directions along the walking path corridor and along walking paths to be reconstructed. The Contractor shall ensure that these video records pick up existing utilities within the corridor as well as existing drainage patterns.

C. The maximum speed of camera movement shall not exceed 4 ft per second.

D. During all recording, the Contractor shall provide an audio explanation of significant features observed during recording.

E. Any notification to the Contractor of any damages or any concerns/remedies resulting from construction activities shall be relayed to the Engineer.

F. Building Structure Documentation: The Contractor shall record front and side views, including close-ups of each view both interior and exterior, for any features or facilities that may be affected by construction. Where cracks exist on building structures, the Contractor shall place a scale next to the crack and record to show existing crack size. Such building features may include, but are not limited to, all buildings, fences and landscaping adjacent to the project limits.

G. Drainage Documentation: The Contractor shall record the construction area immediately following rainfall over the area to ascertain drainage patterns. Video documentation shall take place before commencing construction when possible.

3.2 AVAILABILITY

A. Availability for Video Documentation: Recording equipment and operator shall be on-site within ½ hour at the Engineer's request.

B. Availability for Video Viewing: The video viewing system and the appropriate recording media shall be available for meetings as scheduled, and at the request of the Engineer.

END OF SECTION 01 32 36

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1- GENERAL

1.1 SUMMARY

A. Section includes procedures for preparing and transmitting submittals and resubmittals required by specification sections for a product, material, or construction method:

1. Shop drawings
2. Product data
3. Manufacturer's certificates
4. Design data and calculations
5. Manufacturer's instructions
6. Manufacturer's field service reports
7. Samples
8. Field Testing

B. It is the responsibility of the General 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.

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specification for Public Works Construction, etc., standard specification is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

A. Wherever submittals are required hereunder, all such documents shall be furnished to the Engineer.

B. 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.

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 with 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 or deviations 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.

E. Contractor responsibilities:

1. 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.
2. The Contractor shall be responsible for the accuracy, completeness, and coordination of all Submittals, including but not limited to, Submittals 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.
3. 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.
4. Coordinate submittals to avoid conflicts between items of work.
5. 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, as applicable.

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.

6. 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.

7. Incomplete, improperly packaged, and submittals from sources other than Contractor will not be accepted.

F. Transmittal: Where possible, transmit all submittals electronically. Where an 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 14 calendar 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 QUALITY ASSURANCE

A. Where required by Specification Sections, provide quality assurance submittals:

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.

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 after the Engineer’s billing to the Owner, including applicable miscellaneous expenses, so that Owner may reimburse Engineer for such reviews.

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.	
☐ Compliance acknowledged subject to the foregoing: Distribute	☐ Compliance acknowledged as noted and subject to the foregoing: Distribute
☐ Compliance acknowledged as noted and subject to the foregoing: Revise and Resubmit for record: Distribute	☐ Rejected – Revise and resubmit for review

C. If three copies of a Submittal are returned to the Contractor marked "COMPLIANCE ACKNOWLEDGED", 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 ACKNOWLEDGED AS NOTED", formal revision and resubmission of said Submittal will not be required.

E. If a Submittal is returned to the Contractor marked "COMPLIANCE ACKNOWLEDGED 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 ACKNOWLEDGED", "COMPLIANCE ACKNOWLEDGED AS NOTED", or "COMPLIANCE ACKNOWLEDGED 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. Any additional Submittals identified after the initial Submittal shall be included in the updates.

M. 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 DRAWINGS

A. Where required by specifications or otherwise needed, prepare drawings illustrating portion of Work for use in fabricating, interfacing with other work, and installing products. Contract Drawings shall not be reproduced and submitted as shop drawings.

B. When construction is complete, prepare and submit red-lined as-built copies of the Contract Drawings showing clearly how construction deviated from the design, along with the authority for the deviation or change.

C. Electronic Format:

1. Size printable to 8-1/2 by 11 inches minimum and 24 by 36 inches maximum.
2. Present in a clear and thorough manner. Title each drawing with Project name. Identify each element of drawing with reference number.
3. Plans, elevations, sections, and detail shop drawings shall be to scale with scale indicated.
4. Indicate field verified dimensions. Show relationship of products to adjacent work. Note coordination requirements.
5. Schematics and diagrams shall be logically arranged and presented in a clear understandable manner with all items labeled.

6. Internal wiring diagrams: Provide internal wiring and elementary ladder diagrams for factory pre-wired equipment.

7. Control diagrams: Show relative positions of each component as a system diagram.

1.8 SHOP DRAWINGS

A. Wherever called for in the Contract Documents, furnish to the Engineer for review, three copies or one electronic copy of each Shop Drawing Submittal. 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.

B. All Shop Drawing Submittals shall be accompanied by a Submittal transmittal form, Attachment A. Any Shop Drawing Submittal not accompanied by such form, or where all applicable items on the form are not completed, said Submittal will be returned to Contractor without Engineer's review for resubmittal.

C. Organization

1. A single Shop Drawing Submittal transmittal form shall be used for each technical specification section, item, 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.

2. 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.

3. Unless otherwise approved by Engineer, terminology and equipment names and numbers used in Submittal shall match the Contract Documents.

D. Format

1. Minimum sheet size shall be 8-1/2 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 or Engineer will not collate copies.

2. 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.

1.9 SUBMITTAL CHECKLIST

A. 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 and at the request of the Engineer. See Attachment B.

1.10 PRODUCT DATA

A. 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.

1. 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.

2. 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.

3. Modify manufacturer's standard schematic drawings, diagrams and supplement standard data to provide specific information applicable to project. Delete or cross-out information not applicable.

4. 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.

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

1.11 DESIGN DATA AND CALCULATIONS

A. 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.

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

C. 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 Arizona unless otherwise directed.

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

1.12 MANUFACTURER'S INSTRUCTIONS

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

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

C. 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.

D. 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.

1.13 SAMPLES

A. Whenever samples are required, submit not less than three samples of each item or material, including color charts, to the Engineer for acceptance at no additional cost to the Owner.

B. 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.

C. 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.

D. 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.

1.14 SURVEY DATA

A. Refer to STS 01 71 23: Field Engineering, if appliable.

1.15 UTILITY INVESTIGATION

A. The Contractor shall submit the findings of all utility investigations performed.

1.16 MANUFACTURER'S FIELD SERVICE REPORTS

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

B. Form:

1. Present complete information in clear concise manner.
2. Bind with titled cover in folder or binder.

C. Report shall include:

1. Time, location, conditions, and duration of activity.
2. Names of persons performing and witnessing activity.
3. Equipment used.
4. Description of activity, data recorded, and results.
5. Deficiencies found, corrective measures, and results of retesting.
6. Other pertinent data.

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

1.17 OPERATION AND MAINTENANCE DATA

A. See STS 01 78 23: Operations and Maintenance Data.

1.18 WARRANTIES AND BONDS

A. See Standard General Conditions of the Contract.

B. Submittals

1. Submit written warranties to the Engineer with original submittals for review and provide final warranties prior to Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Engineer.
2. When a special warranty is required to be executed by the Contractor, a sub-Contractor, supplier, or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Engineer for approval prior to final execution.
3. Refer to individual Sections for specific content requirements, and particular requirements for submittal of special warranties.
4. With the final application for payment, the Contractor shall compile copies of each required warranty and bond properly executed by the Sub-Contractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of these Specifications.

5. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents and sized to receive 8-1/2 by 11-inch paper.

    a. Table of Contents: Typed, in the sequence of the Table of Contents of these Specifications, with each item identified with the number and title of the Section in which specified and the name of the product or work item.

    b. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of the installer, supplier, and manufacturer.

    c. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", and the project title. On the front cover provide a listing of the name, address, and telephone number of the equipment supplier(s).

    d. When operation and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

C. Equipment

1. All equipment shall be warranted for a minimum period of one (1) year by the manufacturer and the Contractor. The warranty period shall commence upon Substantial Completion.

2. The equipment shall be warranted to be free from defects in workmanship, design, and materials. If any part of the equipment should fail during the warranty period, it shall be replaced at no expense to the Owner.

3. The manufacturer’s warranty period shall run concurrently with the Contractor’s warranty period.

4. The replacement or repair (including the cost of parts and labor) of those items normally consumed in service, such as pump packing, oil, grease, and the like, shall be considered as part of routine preventive maintenance.

D. Additional Requirements

1. See Standard Conditions of the Contract

2. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work, at no cost to the Owner.

3. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

4. Replacement Cost: Upon determination that work covered by a warranty has failed, replace, or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life. The replacement work shall be warranted as new.

5. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

6. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

7. The Owner reserves the right to refuse work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

E. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.19 SUBSTITUTIONS

A. See STS 01 25 00: Substitution Procedures.

1.20 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

Project Title:	Submittal No.:	
	Date:	
	Sub Nos. & Dates of Previous Subs:	
Contractor Name:	Sub: No.:	Date(s):
Contractor Street Address:	Sub: No.:	Date(s):
Contractor City, State, ZIP:	Sub: No.:	Date(s):
Supplier:	Manufacturer:	
Specification No.:	Bid Item No.:	
List Deviations to Contract Documents:		

CONTRACTOR COMMENTS

☐ NO EXCEPTIONS TAKEN ☐ COMMENTS ABOVE ☐ NOTE MARKING

- 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.

BY: _____ DATE: _____

_____
(Contractor)

Received On:	No. of Copies:

ENGINEER REVIEW

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.

☐ Compliance acknowledged subject to the foregoing: Distribute	☐ Compliance acknowledged as noted and subject to the foregoing: Distribute
☐ Compliance acknowledged as noted and subject to the foregoing: Revise and Resubmit for record: Distribute	☐ Reject - Revise and resubmit for review

Reviewed By: Date:

COMMENTS:

SUBMITTALS FOR:

Submittal No.	Submittal Description	Date Submitted to Engineer	Date Returned to Contractor	Engineer Review Comments	Other Notes

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 35 29.13
HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURE FOR CONTAMINATED SITES

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. This section is related to overflows of sanitary sewer outside of a septic tank, a manhole, cesspool, or pipeline.

B. This section is also related to overflows or accidental discharges of any chemical, fuel, or other spill waste, at the project site.

1.2 RELATED SECTIONS

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

1.3 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. SSO: Sanitary Sewer Overflow or Spillage

1.4 PERFORMANCE REQUIREMENTS

A. The Contractor shall immediately notify the Owner, of a sanitary sewer overflow or spillage 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 spill;
2. Time and date of the spill;
3. Source or cause of the spill; 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 Systems Superintendent, Owner, or Owner's Representative to provide the information required in paragraph A above. Voicemail or email messages are not considered acceptable means of compliance with the notification requirement specified.

C. Within 24 hours, the Contractor shall provide to the Engineer and Owner a detailed written initial report of the SSO or spillage event. The written report shall include, in addition to the required information set forth in paragraph A above, a detailed description of the source and cause, estimated quantity (including quantity contained and quantity uncontained), methods used for containment and clean up, and any other relevant information related to the incident. The Contractor shall also complete the OVERFLOW REPORT FORM (ATTACHMENT A).

D. Within 5 days, the Contractor shall provide to the Owner a detailed written final report of the SSO or spillage event. The written report shall include any additional information regarding the overflow. It shall also Include any steps taken or planned to prevent a recurrence. The Contractor shall also complete the remaining sections of the OVERFLOW REPORT FORM (ATTACHMENT A).

E. A penalty will be assessed per occurrence in the form of a deduction from the Contractors pay application if repeat SSOs are caused by the contractor or any sub-contractors under the Contractor. Below is the penalty assessment per occurrence as a deduct from the progress payment:

1. First Occurrence: $500 Penalty + COST OF ANY REPAIRS NECESSARY
2. Second Occurrence: $1000 Penalty + COST OF ANY REPAIRS NECESSARY
3. Third Occurrence: $3,000 Penalty + COST OF ANY REPAIRS NECESSARY
4. Fourth Occurrence: $9,000 Penalty + COST OF ANY REPAIRS NECESSARY

1.5 REPORTING

A. In addition to the required notifications set forth in this specification, Contractor shall also submit a full SSO or spillage report to the Arizona Department of Environmental Quality at (602) 390-7894.

PART 2 – PRODUCTS [NOT USED]

PART 3 – EXECUTION [NOT USED]

END OF SECTION 01 35 29.13

Appendix A

NAVAJO TRIBAL UTILITY AUTHORITY
TUBA CITY SEWER PIPE AND BRIDGE REHABILITATION
OVERFLOW REPORT FORM

1. General Information

Contractor Name: _____

Authorized representative filing this form:

Name: _____

Title: _____

E-mail Address: _____

Type of filing report: (check one)

☐ Initial
☐ Final

Date of filing report: (check one)

☐ Initial / /
☐ Final / /

2. Reporting of Spill/SSO Summary of Oral Report Provided to Owner IMMEDIATELY

Owner Contact: _____

Phone Number: _____

Date of phone notification: ____/____/____

Address or exact location of the SSO/spill _____

Time and date of the SSO/spill _____

Source or cause of the SSO/spill; _____

_____

Name of Contractor and individual providing the notification with contact phone number(s) _____

_____

Spill/SSO Location and Description

Address or Landmark: _____

_____

Discharge Location: *(check one)*

☐ *Directly to receiving ground water*

- ☐ *Ground*
- ☐ *Receiving water via storm drain*
- ☐ *Building*
- ☐ *Other* _____

_____

_____

_____

3. Reporting of Spill/SSO - OVERFLOW RESPONSE PLAN (SORP) 24 hours

Type of overflow *(check one)*

- ☐ *Gravity sewer manhole*
- ☐ *Pump Station*
- ☐ *Chemical/Fuel*
- ☐ *Other* _____

_____

_____

_____

Time of Spill/SSO Incident

- When did the incident begin? Date: ____/____/____

- Was the overflow/bypass event ongoing at the time of report: *(check one)*

☐ Yes ☐ No

If yes, how long is the incident expected to continue? _____

_____

If no, when did event end? Date: ____/____/____

Time: _____

Cause of overflow/bypass:

_____

_____

_____

General Information about Overflow at this Location

Estimated volume of overflow released at time of report: _____

_____

Method of estimating volume: _____

_____

Estimated total volume of overflow released at end of incident: _____

_____

Were photos taken: *(check one)* ☐ Yes ☐ No

Corrective measures taken: *(check one)*

- ☐ *No action*
- ☐ *Removed blockage*
- ☐ *Repair pump station*
- ☐ *Other* _____

_____

_____

_____

4. Reporting of Spill/SSO - FIVE DAY WRITTEN INCIDENT REPORT

Complete this notification form and use the space below to include any additional information regarding the overflow. Include any steps taken or planned to prevent a recurrence. Submit this form to the Owner office within five days of becoming aware of the incident. _____

_____

_____

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Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 41 26
PERMIT REQUIREMENTS

PART 1– GENERAL

1.1 SECTION INCLUDES

A. The CONTRACTOR shall comply with conditions of all permits issued by utility companies and regulatory agencies in connection with all work under the contract. Copies of all permits obtained by the OWNER will be available form the ENGINEER. All other permits are the responsibility of the CONTRACTOR to obtain.

B. This section includes permits associated with the project. It is the contractor's responsibility make sure all permits required are obtained. Permits included in this section does not give the CONTRACTOR relief from obtaining other permits not specified in this section.

1.2 RELATED SECTIONS

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

1.3 SUBMITTALS

A. CONTRACTOR to submit a copy of all associated permits for this project.

1.4 PERMITS

A. National Pollutant Discharge Elimination System Permit (NPDES)

1. CONTRACTOR to have at all time NPDES and Storm Water Pollution Prevention Plan SWPPP at all times

2. Refer to The Office of Wastewater Management, NPDES Storm Water Program: http://www.epa.gov/npdes/stormwater

B. Dredge and fill (Section 404) permits

1. Refer to U.S. EPA Office of Wetlands, Oceans, and Watersheds (OWOW): http://www.epa.gov/owow/

C. RCRA hazardous and non-hazardous solid waste requirements

1. Refer to EPA's Office of Solid Waste and Emergency Response: http://www.epa.gov/epawaste/inforesources/online/index.htm

D. Oil spill requirements for construction activities

1. Refer to EPA Oil Program web site: http://www.epa.gov/oilspill/

E. Hazardous substances (Superfund Liability) requirements for construction activities

1. Refer to EPA's Superfund website: http://www.epa.gov/superfund/index.htm

F. Polychlorinated Biphenyl (PCB) waste requirements

1. Refer to EPA's Polychlorinated Biphenyl (PCB) Homepage: http://www.epa.gov/pcb/

G. Air quality requirements for construction activities

1. Refer to EPA'S Air Program Mobile Sources Page: http://www.epa.gov/ebtpages/airmobilesources.html

H. Asbestos requirements for construction activities

1. Refer to EPA's Asbestos Management and Regulatory Requirements Website: http://www.epa.gov/asbestos/

I. National Environmental Policy Act (NEPA) requirements for construction activities

J. Endangered Species Act

1. Refer to The US Fish and Wildlife Service Endangered Species Program: http://endangered.fws.gov/

K. National Historic Preservation Act

L. State and Local Environmental Regulatory Requirements: Comply with applicable regulations.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION – NOT USED

END OF SECTION 01 41 26

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 57 23
TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. This section includes compliance with the U.S. Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES) Regulations for Storm Water Discharges Phase II Regulations from construction sites.

B. The Owner has in force an Ordinance for preventing water pollution on construction projects and also a Storm Water Management Plan (SWMP). Per General and Special Conditions of the Contract, the Contractor shall familiarize themselves with the requirements in the SWMP and the Ordinance and investigate the effects of the proposed project design with regard to downstream erosion and water quality improvements which may be required. This work shall be incorporated into the 50% design stage and refined into 100% design. In addition, the Contractor shall evaluate the feasibility of Low Impact Development (LID) features into the design and maintain a list of all LID features incorporated into the design.

C. The NPDES General Permit, issued by the EPA requires a SWPPP and submittal of NOI and NOT for construction projects with 1 acre or more of earth disturbance. The project will not require a SWPPP or an NOI if the Contractor will disturb less than 1 acre of earth and the project is not located in the vicinity of perennial streams.

D. This work consists of developing and implementing and maintaining this plan to control erosion, pollution, sediment and runoff throughout the entire construction of the project.

E. The Contractor shall be responsible for fulfilling all necessary NPDES requirements including, but not limited to, obtaining an NPDES permit prior to construction, filling out the Notice of Intent (NOI) application, and filling out the Notice of Termination (NOT) application.

F. The Contractor shall also be responsible for the implementation of inspection reports for the SWPPP.

G. The Contractor shall submit the SWPPP with the proposed construction staging area and temporary sanitary facilities clearly shown to the Engineer. Any check dams, silt fences, or other Best Management Practices (BMPS) that are required in the approved SWPPP shall be included in and are incidental to the SWPPP bid amount.

H. The Contractor shall maintain a copy of the approved SWPPP on-site at all times and shall comply with the requirements indicated on that plan.

I. The Contractor shall conform to all Arizona and Federal dust and erosion control regulations. The Contractor shall prepare and obtain any necessary dust or erosion control permits form the regulatory agencies.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

A. SWPPP: Storm Water Pollution Prevention Plan

B. BMP: Temporary sediment and erosion control best management practices

C. EPA: Environmental Protection Agency

D. NOI: Notice of Intent

E. NOT: Notice of Termination

F. NPDES: National Pollutant Discharge Elimination System

G. ADOT: Arizona Department of Transportation

H. TESCP: Temporary Erosion and Sediment Control Plan

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and with STS 01 33 00: Submittal Procedures.

B. Product Data: Submit product data, including manufacturer's specifications, installation instructions, and general recommendations for installation. Also include manufacturer's certification or other data substantiating that products comply with requirements of Contract Documents. Clearly identify product/model to be used.

C. Shop Drawings: Submit clear, concise drawing showing model number, size, arrangement and configuration of all products specified. Minimum sheet size is 8.5" X 11".

D. Reports: The Contractor shall submit one copy each of the SWPPP, the NOI, site inspection reports, rain event reports and the NOT to the Owner and Engineer as they are completed.

1.6 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall be 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 MATERIALS

A. General: Provide materials for erosion and sediment control measures that may consist of siltation fences, socks, rock, riprap, soil retention blankets, or other acceptable measures approved by the Engineer.

B. Slope Drains: Provide materials for slope drains that consist of pipe, flexible pipe, and riprap. The Engineer may approve the use of other materials.

C. Riprap: Provide riprap and rock plating in accordance with the standard specifications.

D. Mulch Socks or Composted Mulch Socks

1. Core Material (Mulch): See AZDOT's Section 805, "Seeding" for mulch and composted mulch specifications.

2. Core Material (woodchips): The Material must be 100% untreated wood chip and free of inorganic debris, such as plastic, glass, metal, etc. Manufacturer shall certify that the material is free of noxious weeds.

3. Woodchip size shall not be smaller than 1-inch and shall not exceed 3-inches in diameter; shavings shall not be more than 5% of the total mass.

4. Containment Mesh: Furnish containment mesh 100% biodegradable, photodegradable such as burlap, twine, UV photodegradable plastic, polyester, or other acceptable material as approved by the Engineer. The mesh should not exceed ½-inches in diameter.

5. Furnish biodegradable or photodegradable containment mesh when the socks will remain in place as part of the permanent or temporary vegetative plan. The containment mesh shall be greater than 9-inches in height after being packed; the containment mesh shall be densely packed so that the socks do not deform. The Engineer will determine the maximum allowable height for containment mesh.

PART 3– EXECUTION

3.1 EXAMINATION

A. Examine Project conditions and completed Work.

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 were determined to be acceptable prior to start of Work.

3.2 NOI/NOT

A. The Contractor shall complete an electronic EPA Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under a NPDES General Permit, Form 3510 9, or a Low Erosivity Waiver (LEW) form, if applicable, as directed on the EPA website:

https://www.epa.gov/npdes/stormwater-discharges-construction-activities#ereporting

B. A LEW is applicable to short-term (generally less than 8 months) construction projects that disturb an area of 1 to 5 acres during the dry season (mid-October to mid-June). Submission of a LEW exempts Contractors from preparation of a SWPPP. Contractors may use the calculation tool on the EPA website to determine whether or not the site is eligible for a LEW:

https://www.epa.gov/npdes/stormwater-discharges-construction-activities#waivers

C. Note that routine maintenance projects, regardless of size, are exempt from submission of either a LEW or NOI as well as preparation of a SWPPP. Routine maintenance projects are classified as those activities performed to maintain the original line and grade, hydraulic capacity, or original purpose of the site. Such activities include water/sewer line breaks, street millings and overlays, replacement of water meter boxes, replacement of curb and gutter, etc.

D. The Contractor shall also submit, at least seven days prior to ground disturbance, a hard copy of the completed NOI form or a hard copy of the LEW form and one (1) copy of the SWPPP to the Engineer and Owner.

E. By completing an NOI, the Contractor is certifying to the Owner that a SWPPP has been completed as per the NPDES Permit and is in the Contractor's possession and one copy has been submitted.

F. The Contractor is the designated "Operator" of the NPDES Permit and is solely responsible for execution of the project construction in conformance with NPDES Permit condition(s) and requirement(s), including work performed by any Subcontractor(s). The Contractor shall immediately correct conditions related to the project that are in violation of NPDES permit requirements.

1. Failure by the Contractor to correct such conditions in a timely manner may subject the Contractor to fines and/or penalties.

G. The Contractor shall be responsible for fines or penalties issued for violations of NPDES Permit conditions. Should the Owner be fined or penalized, an equitable amount will be deducted from payment or reimbursed to the Owner and shall cover any professional service fees, or legal fees that may have been incurred by the Owner.

H. In the event the Contractor fails to comply with NPDES Permit requirements, the Owner retains the right to enter upon the project site and perform corrective measures.

1. Any costs associated with corrective measures shall be the responsibility of, and shall be paid by, the Contractor.

2. The Owner shall be entitled to deduct such costs from remaining contract amounts, and if insufficient contract amounts exist, the Contractor shall reimburse the Owner for any deficiency.

I. An electronic EPA NOT of Coverage Under a NPDES General Permit for Storm Water Discharges Associated with Construction Activity, will be completed by the Contractor at the website above, and a copy to the addresses above after final acceptance of the project construction by the Owner.

J. Temporary Erosion and Sediment Control Plan: The Contractor shall develop a Temporary Erosion and Sediment Control Plan (TESCP) which depicts the location and type of temporary erosion control measures.

K. The Contractor shall construct the control facilities and maintain them until project completion.

3.3 SWPPP

A. Before disturbing any soil, submit to the Engineer a SWPPP based on the planned construction phasing and schedule.

B. Prepare amendments to the SWPPP as Work progresses or as phasing or scheduling changes are made. Specifically define control measures for each construction phase, comply with provisions of the NPDES General Permit.

C. Retention of Records: Retain and maintain SWPPP changes as required by the NPDES General Permit. Include copies of the permit language and inspection and maintenance reports in the SWPPP. Prepare inspection and maintenance reports from commencement of earthwork activities to project completion.

D. Deliver the final SWPPP to the Engineer at project completion. Ensure that these records are available to the public at all times.

E. Inspection Frequency: The Contractor must conduct inspections in accordance with one of the two schedules listed below and submit to the Engineer a report within 5 calendar days of each inspection. The Contractor must specify in your SWPPP which schedule you will be following.

1. At least once every 7 calendar days, OR

2. At least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

F. The Contractor shall either promptly remove any material excavated within the project site or install BMPS identified in the approved SWPPP to prevent discharge of excavated material within the project site during a rain or wind event.

G. Construction areas shall be watered for dust control in compliance with government ordinances.

1. The Contractor shall be responsible for locating and supplying water as required. Watering, as required for construction and dust control, shall be considered incidental to construction and no measurement or payment shall be made, therefore.

H. The Contractor shall implement the approved SWPPP and ensure that no soil erodes from the site into public right-of-way or onto private property.

3.4 INSTALLATION

A. General: Install temporary erosion and sediment control features for the duration of the construction period. Incorporate erosion and sediment control measures into the project at the earliest practical time.

B. Keep construction areas in an orderly condition and promptly dispose of refuse and discarded materials.

C. Repair damaged erosion and sediment control installations within three days of damage.

D. Maintain erosion and sediment control features until the project is completed.

E. Remove and dispose of erosion and sediment control installations at Substantial Completion of the project.

3.5 ADJUSTMENT AND CLEANING

A. Cleaning: Thoroughly clean the Work specified in this Section and adjoining surfaces and areas affected by installation and BMP maintenance.

END OF SECTION 01 57 23

Smith Engineering Company

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 one identification sign 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 and Division 1.

1.3 REFERENCES

A. Where all or part of a Federal, American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction, etc., standard is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. SWPPP: Storm Water Pollution Prevention Plan

B. EPA: Environmental Protection Agency

C. NOI: Notice of Intent

1.5 PERFORMANCE REQUIREMENTS

A. SWPPP Sign (incidental to construction)

1. If a SWPPP is required, a sign or other notice must be posted conspicuously near the main entrance of the construction site. If displaying near the main entrance is infeasible, the notice can be posted in a local public building such as the town hall or public library. The sign or other notice must contain the following information.

    a. A copy of the completed Notice of Intent as submitted to the EPA Stormwater Notice Processing Center; and

2. If the location of the SWPPP or the name and telephone number of the contact person for scheduling SWPPP viewing times has changed (i.e., is different than that submitted to EPA in the NOI), the current location of the SWPPP and name and telephone number of a contact person for scheduling viewing times.

3. For linear projects, the sign or other notice must be posted at a publicly accessible location near the active part of the construction projects (e.g., where a pipeline project crosses a public road).

B. 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

C. Project Sign

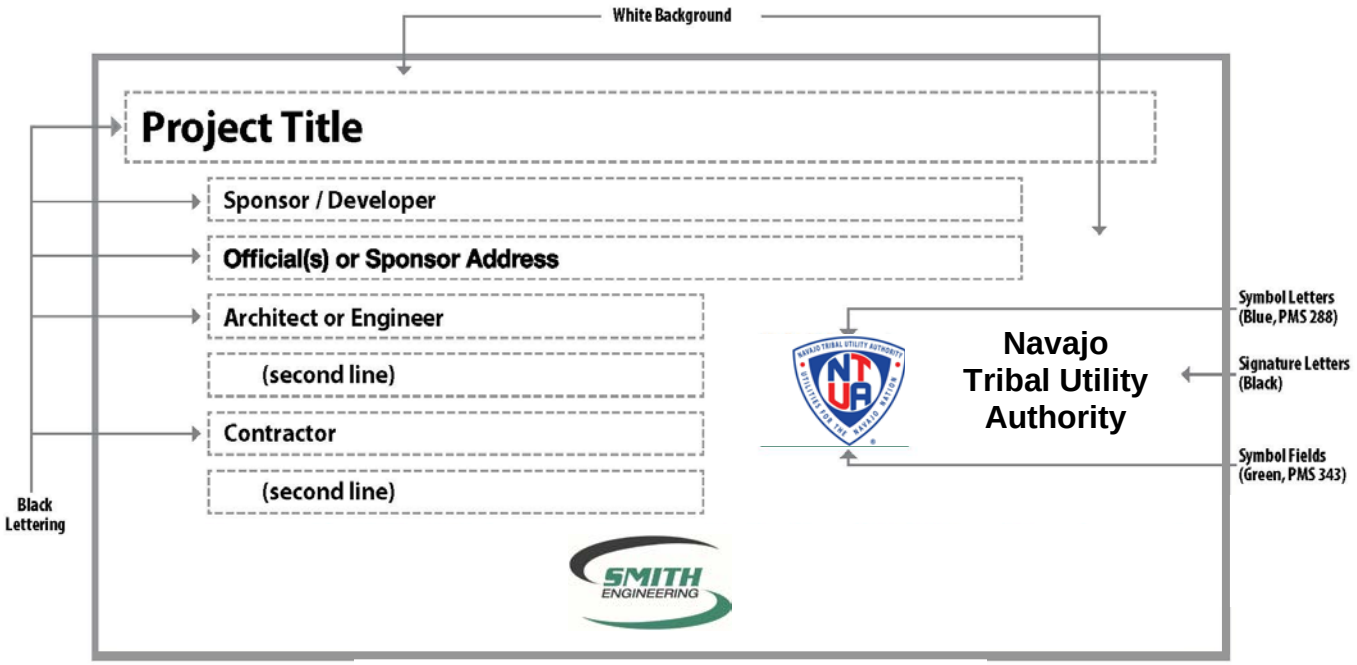
1. Sign Dimensions: 4’ x 8’ x ¾” (approx. 1200 mm x 2400 mm x 19 mm) Plywood Panel (APA RATED A-B GRADE–EXTERIOR)

2. Sign shall be white background with black letters.

3. Final information regarding Contractor will be supplied after the project has been awarded.

TEMPORARY CONSTRUCTION SIGN FOR
Navajo Tribal Utility Authority

Recommended Fonts: Helvetica, Arial, or Myriad Pro



SIGN DIMENSIONS: 4' X 8' X ¾" (approx. 1200 mm x 2400 mm x 19 mm)

PLYWOOD PANEL (APA RATED A-B GRADE-EXTERIOR

1.6 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and STS 01 33 00: Submittal Procedures.

B. Shop drawings: Submit clear, concise drawing showing model number, size, arrangement and configuration of all products specified. Minimum sheet size is 8.5" X 11".

1.7 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.

1.8 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 MATERIALS

A. The sign(s) shall be painted on one side with a background color of white not smaller than 4' x 8', marine grade plywood.

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 INSTALLATION

A. The sign shall be mounted on two 4" x 4" posts, with the bottom of the sign at least four feet above grade. The identification sign shall be mounted level and at the location designated by the Architect/Engineer or the Owner's Project Manager.

B. Keep sign and supports clean. Repair deterioration and damage.

C. 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.

D. The sign shall be salvaged to the Owner at the end of the construction project.

END OF SECTION 01 58 13

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 71 13
MOBILIZATION/DEMOBILIZATION

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. This work shall consist of preparatory and final work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to and from each work order project site; for the establishment of all offices, buildings and other facilities necessary for work on the project; and, for all other work and operations which must be performed, for costs incurred prior to beginning work on the project, and subsequent to the completion of such work.

B. Mobilization and demobilization shall consist of obtaining all required insurance, bonds and permits; preparatory Work and operations necessary for the movement of personnel, equipment, supplies, and incidentals to and from the Project site; this item shall also include the establishment of offices, buildings, and other facilities necessary for the Project, before beginning Work on the Project. It does not include mobilization and demobilization for specific items of Work for which payment is provided elsewhere in the Contract.

1.2 RELATED SECTIONS

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

PART 2– PRODUCTS [NOT USED]

PART 3 – EXECUTION [NOT USED]

END OF SECTION 01 71 13

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 71 23
FIELD ENGINEERING

PART 1– GENERAL

1.1 SECTION INCLUDES

A. This section defines and describes the proper construction staking procedures to be performed in the field during project construction activities.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Uniform Standard Specifications for Public Works Construction by the Maricopa Association of Governments etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. BOP: Beginning of Project

B. EOP: End of Project

C. PC: Point of Curvature

D. PI: Point of Intersection

E. POC: Point on Curve

F. PT: Point of Tangent

G. For the purposes of these specifications the terms "grade sheet", and "cut sheet" shall be used interchangeably.

1.5 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and with STS 01 33 00.

PART 2 – PRODUCTS – NOT USED

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine Project conditions and completed Work.

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 were determined to be acceptable prior to start of Work.

3.2 CONSTRUCTION STAKING BY ENGINEER

A. All surveys shall be based upon the horizontal and vertical control shown in the Construction Drawings or established in the field by the ENGINEER prior to or during construction.

3.3 CONSTRUCTION STAKING BY CONTRACTOR

A. The CONTRACTOR shall provide stakeout in accordance with the following:

1. The CONTRACTOR shall perform all stakeout from control points established on the drawings or as provided by the ENGINEER during construction. The CONTRACTOR shall employ only qualified and experienced personnel to provide the stakeout. The CONTRACTOR shall certify to the competency and qualifications of said employees and shall furnish such certification to the ENGINEER prior to starting the work.

2. The CONTRACTOR shall preserve and maintain in proper position all baselines and benchmarks provided by the ENGINEER. If any such are disturbed by vandalism, the CONTRACTOR's employees, equipment or his neglect to give them proper protection, those so disturbed shall be reset by the CONTRACTOR at his expense. If, in the opinion of the ENGINEER, the replacement of any disturbed control point necessitates the use of the ENGINEER's survey party, arrangements for such resetting will be made by the ENGINEER and the costs therefore will be deducted from monies due, or which may become due the CONTRACTOR.

3. If the CONTRACTOR finds that conditions in the field are not those indicated on the Drawings he shall notify the ENGINEER immediately and shall not proceed with the work until the ENGINEER authorizes him to do so.

4. For utility construction, the CONTRACTOR's minimum responsibilities shall also include the following:

   a. Stake out test pits and provide the ENGINEER with actual utility locations and elevations if required by the ENGINEER.

   b. Offset hub and cut-stake at 50-foot intervals along new storm sewer and liquid waste sewer lines between manholes, lift stations, drop inlets and/or ends of lines and two (2) offset hubs and cut-stakes at each manhole, lift station and drop inlet.

   c. Stake out centerlines at 250-foot intervals along new water, electrical or gas lines.

d. Stake out intermediate points (P.I., P.C., P.T., BOP, EOP, structures, topographic changes) as required to complete the construction or deemed necessary by the ENGINEER.

e. Prepare and submit grade sheets showing for each alignment, or each day's staking. As a minimum the grade sheets shall provide the following information at the top of the page: project name, CONTRACTOR name, location, sheet number, total number of sheets in the set, name of person performing the calculations, date. The information required in the body of the cut sheet shall include the following: station, ground elevation, hub elevation, grade, cut/fill, pay cut, % grade, offset distance, remarks. The cut sheets shall be provided to the ENGINEER in both hard copy format (paper) and electronic format (Microsoft Excel).

f. Provide flag stakes for protection of all stakes installed to aid in their preservation and maintenance.

5. For roadway construction and drainage ditches/ swales, the CONTRACTOR's minimum responsibilities shall also include the following:

a. Offset hub and cut-stake at 50-foot intervals along new curb and gutter and valley gutter. Three offset hubs shall be set at EACH curb return (PC, POC and PT).

b. Offset hubs and stakes to establish all vertical and horizontal curves shown on the drawings.

c. A subgrade and a finished base course blue top at 50' intervals along the centerline of the roadways to be improved.

d. Stake out centerlines at 50-foot intervals along new drainage ditches and swales for sufficient distances to properly drain, or as required on the drawings.

e. Stake out intermediate points (P.I., P.C., P.T., BOP, EOP, structures, topographic changes) as required to complete the construction or deemed necessary by the ENGINEER.

f. The CONTRACTOR shall also field survey the location of all permanent signage prior to installation. The Owner and/or ENGINEER will review the locations prior to installation and make changes, if required, prior to installation by the CONTRACTOR.

g. Prepare and submit grade sheets showing for each alignment, or each day's staking. As a minimum the grade sheets shall provide the following information at the top of the page: project name, CONTRACTOR name, location, sheet number, total number of sheets in the set, name of person performing the calculations, date. The information required in the body of the cut sheet shall include the following: station, ground elevation, hub elevation, grade, cut/fill, pay cut, % grade, offset distance, remarks. The cut sheets shall be provided to the ENGINEER in both hard copy format (paper) and electronic format (Microsoft Excel).

h. Provide flag stakes for protection of all stakes installed to aid in their preservation and maintenance.

6. For site excavations, open land leveling, embankments, and grading, the CONTRACTOR shall provide all engineering and stakeout necessary for the setting of batter boards, forms, string line and finished grade control, slope stakes and other controls which may be required for the proper construction of the work in this contract.

7. For site excavations and grading that have swales and embankments for dikes, dams or other retention or diverting structures, staking of the swales and embankment shall be in accordance to the requirements identified in 3.3.A.5 of this specification.

8. For site excavations and grading that have vertical tolerances less than 6", the CONTRACTOR will be required to stake the rough grade ("red tops") and the finished grade ("blue tops"). For site excavations and grading with tolerances 6" or greater, only "red tops" are required.

9. Prepare and submit grade sheets showing for each alignment, or each day's staking. As a minimum the grade sheets shall provide the following information at the top of the page: project name, CONTRACTOR name, location, sheet number, total number of sheets in the set, name of person performing the calculations, date. The information required in the body of the cut sheet shall include the following: station, ground elevation, hub elevation, grade, cut/fill, pay cut, % grade, offset distance, remarks. The cut sheets shall be provided to the ENGINEER in both hard copy format (paper) and electronic format (Microsoft Excel).

10. As a minimum as-built surveys for lagoons, borrow pits, and dikes (embankments) shall include the following:

a. The CONTRACTOR shall provide to the ENGINEER an electronic text file (.txt) of all the as-built points surveyed. This text file shall include the northing, easting, elevation, and description, either comma or space delimited to allow insertion into a CADD program. In addition, a hard copy (paper) print-out of the text file, the survey control data including coordinate system, etc., and a certification by the licensed responsible surveyor in charge shall be delivered to the ENGINEER.

b. If an alignment is provided for the construction of the lagoon, borrow pit, or dike, the as-built survey shall be completed by cross sections perpendicular to the alignment extending from daylight point to daylight point. For alignments that are less than 200 ft. in length a cross section shall be completed every 25 ft. as measured along the alignment. For alignments 200 ft. to 5,000 ft. in length a cross section shall be completed every 50 ft. as measured along the alignment. For alignments greater than 5,000' a cross section shall be completed every 100 ft. as measured along the alignment. For straight alignments that are over 5,000 ft. in length in terrain that has an average slope less than 2% in any direction the CONTRACTOR may, with the approval of the ENGINEER, survey a cross section every 200' as measured along the alignment. The daylight points, top of slopes, toe of slopes, and ground points with a spacing not to exceed 25 ft. shall be surveyed. as a minimum for cross sections less than 200 ft. in width (as measured from daylight to daylight). The daylight points, top of slopes, toe of slopes, and ground points with a spacing not to exceed 50 ft. shall be surveyed as a minimum for cross sections more than 200 ft. in width (as measured from daylight to daylight). Additional cross sections shall be completed at all PI, PT, PC and locations where there is a sudden change in the finished surface or alignment geometry as required by the ENGINEER.

c. If an alignment is not provided for the construction of the lagoon, borrow pit, or dike the as-built survey shall be completed by performing a survey grid on the bottom, top, and side slopes. Additionally, survey points along grade breaks (toes, tops), and along the daylight points shall be measured. For lagoons, borrow pits, and embankments, that the greatest dimension (as measured from daylight to daylight in any direction) is less than 200 ft., the spacing of survey points shall not exceed 25 ft. as measured by survey point to the closest neighboring survey point. For lagoons, borrow pits, and embankments, with the least dimension (as measured from daylight to daylight) less than 200 ft. and the greatest dimension (as measured from daylight to daylight) 200 ft. or greater the spacing of survey points shall not exceed 25 ft. in the direction of the least dimension, and 50 ft. in the direction of the greatest dimension. For lagoons, borrow pits, and embankments least dimension (as measured from daylight to daylight) is greater than 200 ft., the spacing of survey points shall not exceed 50 ft. as measured by survey point to the closest neighboring survey point.

d. If the ENGINEER cannot model the finished surface with the survey data as provided to the ENGINEER because of surface features, inconsistent grid pattern, or other items which may cause inaccuracies, the ENGINEER may require that the CONTRACTOR provide additional survey information to correct the problems at no additional cost to the Owner.

e. As-built surveys shall include all pipe locations, valves, inlets and outlets installed by the CONTRACTOR, that are defined in the area to be surveyed in the construction drawings.

11. For other types of construction, the CONTRACTOR shall provide necessary stakeout as required and as deemed necessary by the ENGINEER.

12. Construction shall not begin in any given area until grade sheets (if required) have been submitted to the ENGINEER and the ENGINEER has received one copy of all field notes.

13. Work done without lines and grades or without submittal of grade sheets, will not be measured or paid for.

14. Construction staking shall be completed under the responsible charge of a licensed surveyor in the State of Arizona.

END OF SECTION 01 71 23

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 71 33
PROTECTION OF ADJACENT CONSTRUCTION

PART 1– GENERAL

1.1 SECTION INCLUDES

A. Section includes requirements for protection of existing utilities and structures in and near the project area.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest editions and revision.

1.4 EXISTING UTILITIES AND IMPROVEMENTS

A. Notify Arizona 811 prior to excavating in the public right of way areas so that utility companies may be advised of the work and may field mark or otherwise protect and warn the Contractor of their existing utility lines. Contact Arizona 811, 1405 W Auto Dr, Tempe, AZ 85284, telephone (800) 782-5348, or refer to NM 811 website for more information at: http://www.arizona811.com.

1. Provide reasonable access and do not hinder or otherwise interfere with any company or agency having underground facilities in removing, relocating, or protecting such facilities.

B. Verify the actual locations and depths of all utilities indicated or field marked. Make a sufficient number of exploratory excavations up to a maximum of five potholes at Contractor's expense of all utilities that may interfere with the work sufficiently in advance of construction to avoid potential delays.

1. Notify the Engineer and Owner if such exploratory excavations show the utility location as shown or as marked to be in error.

2. When utility lines are encountered within the area of Contractor's operations, notify the Engineer, Owner, and owner(s) of the utility lines sufficiently in advance for the necessary protection measures to be taken to prevent interruption of service or delay to Contractor's operations.

C. The Contractor shall protect all existing utilities, facilities, and structures, public or private, and will be held responsible for all damages caused by the Contractor not exercising due care to avoid such damage.

D. Overhead Contract System: Work on or under the overhead contact system shall be performed with lines and feeders energized unless shutdown of the system is granted. Notify the Engineer and Owner at least 10 days prior to performing work on energized overhead trolley wires, feeder circuits, or at substations, to arrange for any necessary clearances and inspections.

1. Take precautions to avoid accidents and damage to the overhead contact wires, and risers and feeder cables.

E. Survey Monuments and Benchmarks: Contractor shall bring to the attention of the Engineer and Owner all survey monuments, benchmarks, property line marks and the like, encountered on the work. Survey monuments, benchmarks, or other survey marks or points shall not be removed or disturbed until referenced or relocated by the Owner or other agency or party having an interest herein, and then removed only at the time and in the manner specifically approved by the Owner. The Contractor shall bring all Owner monument frames within the limits of work to grade, with the express provision that any and all work associated with the removal and relocation of such frames with their covers, shall be under the direct supervision to the Owners representative, and all such work shall be considered Incidental Work. The cost of re-establishing and resetting survey monuments, benchmarks or other survey marks or points lost or destroyed through the carelessness or negligence of, or inadvertently by, the Contractor or his employees, shall be at the sole expense of the Contractor.

1.5 SAFEGUARDING OF EXISTING FACILITIES

A. The Contractor shall perform all work, including dewatering operations, if necessary, in such a manner as to avoid damage to existing fire hydrants, power poles, lighting standards, and all other existing utilities, facilities, trees and vegetation, and structures. The Contractor will be held responsible for any damage due to its failure to exercise due care.

B. All permanent work shall be performed in areas free from water. The Contractor shall construct and maintain all dikes and drainage ditches necessary for the elimination of water from work areas and shall furnish, install, maintain, and operate all necessary pumping and other dewatering equipment required for dewatering the various work areas. The Contractor is responsible for monitoring weather and sequencing work. Two (2) types of flow may be expected:

1. Continuous or intermittent flow through the Moenkopi Wash
2. Local sheet flow from adjacent properties or adjacent streets

C. The Contractor is responsible for the adequacy of the scheme or plans, or for furnishing all equipment, labor, and materials necessary for dewatering the work areas and breaking up and removing such ice or snow as may have formed or settled in the work area. The Contractor shall be fully responsible for all dewatering operations, and the cost of all dewatering operations shall be incidental to the work. The Contractor shall also be responsible for removal of any sediment deposited by storm and nuisance water, and the cost of sediment removal work shall be incidental to the work.

D. In the event that storm flow, snowmelt or other water flows overtop the Contractor's diversion method, the Contractor will be responsible for any and all damage, including damage to the existing channel and any damage to new work and is responsible for immediate resolution and repair in a manner acceptable to the Engineer and Owner.

    1. Diversion methods may be by use of sandbag diversion channels, sandbag dams, pumping or piping around or over the work areas, or any method or combination.

E. Broken concrete, debris, etc., shall be immediately removed from the property site as the Contractor's property and shall be disposed of in a legal manner. Refer to STS 01 74 00: Cleaning and Waste Management.

F. The Contractor shall take adequate measures to prevent the impairment of the sewer system and to prevent construction material, pavement concrete, earth, or other debris from entering the sewer, new manholes, or flowing to the existing wastewater treatment plant. The Contractor shall restore damaged utilities and facilities to a condition equal to or better than they were prior to such damage.

1.6 JOINT SURVEY TO ESTABLISH AUTHENTICITY OF POSSIBLE CLAIMS

A. The Contractor shall use such methods and shall take adequate precautions to prevent damage to existing buildings, structures, and other improvements during construction.

B. The Contractor shall perform a preconstruction examination and post-construction survey of all nearby structures. The survey shall be made using a video recording device. The survey shall be considered incidental work and no separate payment will be made therefore, see STS 01 32 36: Video Monitoring and Documentation.

C. After the Contract is awarded and before the commencement of work, the Engineer or Owner may arrange for a joint examination of existing utilities, structures, and other improvements in the vicinity of the work, as applicable, which might be damaged by the Contractor's operations. This examination may be combined with the Pre-Construction meeting.

D. The examination of the exterior of existing utilities, structures, and other improvements located within fifty (50) feet of the construction excavation will be made jointly by authorized representative of the Contractor, Engineer, and Owner. The scope of each examination shall include, but no limited to, recording of cracks in structures, settlement, leakage, and the like.

E. Records in duplicate of all observations will be prepared by the Contractor, including photographs when deemed necessary or prudent. Copies shall be provided to Engineer. The Contractor may be required to attest to the fact that he took the video/pictures; however, in no case, will the Contractor determine the cause for cracks, settlement, leakage, or like conditions nor be retained for the purpose of engineering evaluation.

F. The above records and documentation are intended for use as indisputable evidence in ascertaining the extent of any damage which may occur as a result of the Contractor's operations and are for the protection of the adjacent property owners, the Contractor, and the Owner, and will be a means of determining whether and to what extent damage, resulting from the Contractor operations, occurred during the Contract Work.

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION [NOT USED]

END OF SECTION 01 71 33

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 74 00
CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The Contractor shall clean during construction and at completion of the Work.

1.2 RELATED SECTIONS

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

B. STS 02 82 13.33: Asbestos Abatement for Utilities.

1.3 DISPOSAL AND CLEANING

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

1.4 DISPOSAL REQUIREMENTS

A. Dispose of all excess material, waste, vegetation, trash, debris, overburden, etc., off-site in an approved or permitted facility, unless otherwise indicated in the Construction Drawings or approved by the Engineer. Submit receipts, manifests, photographs, or other documentation to the Engineer to validate and record proper disposal.

B. Make arrangements for disposal. Contractor is fully responsible for the safe transportation and disposal of all waste.

1. The Contractor shall provide watertight conveyance of any liquid, semi-liquid, or saturated solids which tend to bleed or leak during transport. No liquid loss from transported materials will be permitted whether being delivered to the construction site or being hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at the selected disposal site.

C. The Contractor shall comply with all necessary permits, licenses and authorizations regarding the removal, transport, and disposal of waste as are required by all applicable Federal, State, Tribal, and local laws and regulations.

D. Burning is prohibited on the construction site.

E. Report and clean spills associated with the project in accordance with STS 01 35 29.13: Health, Safety, and Emergency Response for Contaminated Sites.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property, and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 – EXECUTION

3.1 DURING CONSTRUCTION

A. Execute daily cleaning at project site to ensure it is free from accumulations of waste materials, rubbish, and windblown debris, resulting from construction operations, at no additional cost to the Owner.

B. Provide on-site containers for the collection of waste materials, debris, and rubbish.

3.2 DUST CONTROL

A. Dust shall be minimized by the following:

1. Suppress dust on traveled paths which are not paved through wetting, use of water trucks, chemical dust suppressants, or other reasonable precautions to prevent dust entering ambient air
2. Cover trucks when hauling soil
3. Minimize soil track-out by washing or cleaning truck wheels before leaving construction site
4. Stabilize the surface of soil piles
5. Create windbreaks
    a. Site restoration
    b. Remove un-used material
    c. Remove soil piles via covered trucks

B. The operation of dumping rock and of carrying rock away in trucks shall be so conducted as to cause a minimum of noise and dust.

C. Vehicles carrying rock, concrete, or other material shall be routed over such streets as will cause the least annoyance to the public.

D. All unpaved streets, roads, detours, or haul roads used in the construction area shall be given an approved dust-preventative treatment or periodically watered to prevent dust as directed by the Engineer.

E. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

F. Schedule operations so that resulting from the cleaning process will not fall on wet or newly coated surfaces.

3.3 FINAL CLEANING

A. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.

B. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

C. Prior to final completion, or Owner occupancy, conduct an inspection of sight-exposed interior and exterior surfaces and all Work areas, to verify that the entire Work is clean.

END OF SECTION 01 74 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1– GENERAL

1.1 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings
2. Record Specifications
3. Record Product Data

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specification for Public Works Construction, etc., standard specification is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

A. Submit marked-up As-Built 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 in accordance with the Contract Documents.

B. Miscellaneous Record Submittals

1. 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.

PART 2– PRODUCTS [NOT USED]

PART 3– EXECUTION

3.1 RECORD DRAWINGS

A. Record 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, depending on the length of the contract.
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 record 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.

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 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 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
4. Note related change orders, field order notes, request for information (RFI) notes, record product data, and record drawings where applicable.

3.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to the Project site and changes in manufacturer's written instructions for installation.
3. Note related change orders, record specifications, and record drawings where applicable.

3.4 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. It is not advisable to use Project Record Documents for construction purposes. Provide access to Project Record Documents for Engineer's reference on the project site.

END OF SECTION 01 78 39

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 02 41 00
DEMOLITION

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. This section specifies demolition and removal or abandonment of existing buildings, portions of buildings, utilities, other structures as indicated on Drawings and/or required for completion of Work.

B. Contractor shall take extra care to ensure the protection of existing structures, utilities, and other items not scheduled for removal.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction 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 demolition and removal or abandonment plan as part of the project schedule. The plan shall indicate demolition and removal sequence and location of salvageable items, location of temporary work.

B. Contractor shall submit actual as-built locations of capped utilities and equipment abandoned in place.

C. Submit proposed fill material soil classifications, Proctor Analysis, as necessary for abandonment procedures.

PART 2- PRODUCTS [NOT USED]

PART 3 – EXECUTION

3.1 GENERAL

A. During demolition, Contractor must take extra care to protect all existing utilities and adjacent construction, see STS 01 71 33: Protection of Adjacent Construction.

B. Document conditions of project area prior to start of work and after completion of work, see STS 01 32 36: Video Monitoring and Documentation.

C. Carry out demolition work to cause as little inconvenience to the ongoing use of the existing facilities as possible.

D. Remove and dispose all concrete debris, mechanical equipment, piping, and electrical equipment, as indicated in Drawings and required to complete the Work, unless otherwise shown in the Drawings or directed by the Engineer.

E. Plug all exposed pipelines remaining in place with grout.

F. Fill all structures and excavations with compacted, clean, in-situ material.

G. Leave site in a lean, orderly, neat-appearing manner.

H. Do not close or obstruct, City, County, Tribal, or AZDOT roadways without required permit(s).

I. Erect and maintain temporary barriers and security devices at locations indicated on traffic control plan, including warning signs and lights, and similar measures if required.

J. Protect existing landscaping materials, trees, appurtenances, and structures indicated to remain.

3.2 EXAMINATION

A. Prevent movement or settlement of adjacent structures. Provide bracing and shoring where required.

B. Examine existing buildings and structures indicated to be demolished before demolition.

C. Determine where removals may result in structural deficiency or unplanned structure collapse during demolition. Coordinate demolition sequence and procedures to prevent structures from becoming unstable.

D. Determine where demolition may affect structural integrity or weather resistance of adjacent structures indicated to remain.

1. Identify measures required to protect existing buildings and structures from damage.

2. Identify remedial work including patching, repairing, bracing, and other work required to leave structures indicated to remain in structurally sound, weathertight and watertight conditions.

E. Verify hazardous material abatement, if applicable, is complete before beginning demolition.

F. Cease operations immediately when adjacent structures appear to be in danger. Notify Engineer. Do not resume operations until directed.

G. Conduct operations with minimum interference to public or private access to occupied adjacent structures. Maintain ingress/ egress and access from adjacent structures and private properties at all times.

H. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.

3.3 ABANDON IN PLACE

A. Abandoned building sewer, disposal fields, or part thereof, shall be plugged or capped within five (5) feet of the property line using a cap or plug prescribed by the plumbing code.

B. After the successful capping or plugging of a sewer line, disposal field, etc., the unit may be abandoned in place or decommissioned.

3.4 DECOMMISIONING OF EXISTING SEWER INFRASTRUCTURE

A. For decommissioning of existing sewer infrastructure components, arrange for a licensed septic hauler to empty the tanks or piping. Properly dispose of the septage.

B. Plug any existing lines that will be abandoned.

C. The bottom of the unit shall be ruptured or opened, or the entire unit collapsed to prevent the unit from retaining water.

D. The unit shall be completely filled with earth, sand, gravel concrete, or other approved material. Fill material shall consist of material less than three inches in diameter and free of organic debris.

E. Remove or collapse the top cover or arch over the unit before filling.

F. The filling shall not extend above the top of the vertical portions of the sidewalls or above the level of any outlet pipe until inspection by the Owner's representative.

G. After such inspection, the unit shall be filled to the level of the top of the ground.

3.5 DEMOLITION

A. Use of explosives is prohibited.

B. Use of blasting is prohibited.

C. Demolish in an orderly and careful manner as required to accommodate the new Work.

D. Repair all demolition performed in excess of that required, at no additional cost to the Owner.

E. Onsite disposal or burning of materials shall not be permitted.

3.6 DEMOLITION OF EXISTING UTILITIES

A. Remove existing utilities as indicated or uncovered by work and terminate in a manner conforming to the national recognized code covering the specific utility and approved by the Engineer. When utility lines are encountered that are not indicated on the drawings, the Engineer shall be notified prior to further work in that area.

3.7 FIELD QUALITY CONTROL

A. If it is determined during demolition work that the existing structures, buildings, and/or utilities contain hazardous materials, Contractor shall notify Engineer immediately and stop demolition work.

B. Hazardous materials include, but are not limited to the following:

1. Asbestos

2. Lead Paint
3. Polychlorinate Biphenyl

3.8 REMOVAL OF DEBRIS

A. Remove demolished materials, debris, and rubbish from the site and dispose of in compliance with applicable Federal, State, Tribal, or local permits, rules and regulations.

B. Remove tools and equipment from the site upon completion of the Work. Leave site in a condition acceptable to the Owner.

C. Debris, including brick, concrete, stone, metals, and similar materials, unless otherwise stated, shall become property of Contractor and shall be disposed of by Contractor daily, off the site to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the Engineer. Break up concrete slabs below grade that do not require removal from present location into pieces not exceeding 24 inches square to permit drainage.

3.9 DISPOSAL

A. See Section 01 74 00: Cleaning and Waste Management for disposal requirements.

B. Conduct cleaning and disposal operation to comply with codes, ordinances, regulations, and anti-pollution laws.

C. Location and method for the disposal of refuse and abandoned equipment shall be at a permitted solid waste disposal facility.

D. Disposal of such matter is the Contractor's full responsibility.

3.10 PROTECTION

A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of General Conditions of the Contract Documents.

B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations.

C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.

D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.

E. Prevent spread of flying particles and dust. Sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

F. No wall or part of wall shall be permitted to fall outwardly from structures.

G. Wherever a cutting torch or other equipment that might cause a fire is used, provide, and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.

H. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 15 feet of fire hydrants.

I. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Owner; any damaged items shall be repaired or replaced as approved by Engineer.

J. The Contractor shall coordinate the work of this section with all other work and shall construct and maintain shoring, bracing, and supports as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this Contract. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal works. Repairs, reinforcement, or structural replacement must have Engineer's approval.

3.11 SALVAGE

A. Coordinate with Owner to identify components and equipment required to be removed and salvage/deliver to Owner.

B. Tag components and equipment Owner designates to salvage.

C. Protect designated salvage items from demolition operations until item can be removed.

D. Carefully remove components and equipment indicated to be salvaged.

E. Disassemble as required to permit removal.

F. Package small and loose parts to avoid loss.

G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.

H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attached to each disassembled salvaged item.

I. Deliver salvaged items to Owner in orderly and labelled packaging. Obtain signed receipt from Owner.

3.12 SCHEDULE

A. Existing items to be removed, stored, and protected for reinstallation include:

1. None

B. Existing items to be removed and salvaged/delivered to Owner include:

1. None

END OF SECTION 02 41 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 02 80 00
FACILITY REMEDIATION

PART 1– GENERAL

1.1 SECTION INCLUDES

A. This section includes general information and execution for the transportation, disposal, and abatement of asbestos, lead paint, PCB oil, PCB electrical equipment and other hazardous materials.

1.2 RELATED SECTIONS

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

B. Section 02 41 00: Demolition

C. Section 02 82 13.33: Asbestos Abatement for Utilities

1.3 REFERENCES

A. Contractor to follow all Local, State, Tribal and Federal regulation for the Transportation and Disposal of Hazardous Material.

B. Code of Federal Regulations (CFR):

1. 40 CFR Part 260 – Hazardous Waste Management System: General
2. 49 CFR Part 105 – Hazardous Material Transportation

C. Environmental Protection Agency (EPA):

1. Resource Conservation and Recovery Act (RCRA)
2. Toxic Substances Control Act (TSCA)

D. Occupational Safety and Health Administration (OSHA):

1. 29 CFR 1926.1101 – Asbestos
2. 29 CFR 1926.62 – Lead

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. Hazardous materials shall be defined as asbestos containing materials, lead-based paint, PCBs, bird waste, and other materials categorized as hazardous by the EPA.

B. PCB: Polychlorinate Biphenyl

C. HEPA: High Efficiency Particulate Air

D. PCS: Petroleum-Contaminated Soil

1.5 SUBMITTALS

A. Transporting and Disposal

1. Copy of State or local license for hazardous waste hauler.
2. Certificate of at least one on-site supervisor which has satisfactorily completed the OSHA 40-hour Health and Safety course for handling hazardous materials.
3. Certificates of workers which have successfully completed the OSHA 40-Hour Health and Safety Course for Hazardous Materials.
4. List of the employees and certificates scheduled to perform this work.
5. Schedule of start and finish times and dates for this work.
6. Name and address of landfill where these waste materials are to be deposited. Include contact person and telephone number.
7. Material Safety Data Sheet (MSDS) for all materials to be removed.
8. If contractor introduces any chemical into the work environment, a MSDS for that chemical must be presented to Engineer prior to use.
9. Transporter must have notified the EPA and/or other appropriate local government agency in advance of its intentions to transport hazardous materials and, if applicable, receive an identification number.
10. Contingency Plan for handling emergencies with spills or leaks.

B. Asbestos, Lead, and PCB Remediation

1. Contractor shall provide a copy of all the test performed for hazardous materials.
2. Hazardous Material Compliance Work Plan: Detailed, job-specific plan of the procedures proposed to remediate hazardous materials found on site.
    a. The plan shall be approved by the Engineer prior to the mobilization of equipment, supplies, or workers to the site.
3. Worker Certification: Current hazardous material worker certifications for personnel to be engaged in the work of this Section. Workers will not be permitted on the project site until the submittal is complete and has been accepted by the Engineer. Provide the following information for each worker:
    a. Employee quantitative respirator fit-test records that identify the testing agency, the individual fit test exercise fit factor results, and the overall fit factor result.
    b. Employee medical approval to wear respirator protection records.
    c. Current certified hazardous material contractor supervisor certificate(s) and training for the designated contractor supervisor only.
    d. Current certified hazardous material worker certificate(s) and training.

e. Employee picture identification matching names on records. Picture IDs can be photocopies of training cards; however, pictures of employee faces must be viewable vs. dark images from poor quality photo copying.

4. Subcontractor License: Submit proof of license for hazardous material related contracting from the State of Arizona.

5. Subcontractor Registration: Submit proof of registration with the Arizona Division of OSHA for hazardous material related work.

6. Carcinogen Registration: Submit proof of carcinogen registration (report of use) with OSHA.

7. Respiratory Protection Program: Submit company's Respiratory Protection Program.

8. Written record from negative air machine and HEPA vacuum cleaner challenge aerosol testing on the day of the testing.

C. Contaminated Soils

1. Refer to STS 01 74 00: Cleaning and Waste Management if petroleum contaminated soils are encountered.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Qualifications of Subcontractor:

a. Work performed under this Section shall be by a single Subcontractor.

b. The Subcontractor shall have a minimum of five (5) years' experience as an approved hazardous material abatement subcontractor. If requested, the Subcontractor shall provide the names and locations of five (5) projects of similar size and scope that he has completed within the previous five (5) years.

c. The Subcontractor must hold a current and valid hazardous material license issued by the State of Arizona.

d. The Subcontractor must hold a current and valid Certificate of Registration for hazardous material Work issued by the Arizona Division of OSHA.

e. The Subcontractor must hold all insurance and bonds as required by other sections of this specification and maintain as valid and current for the duration of the project.

2. Qualifications of Hazardous Material Abatement Personnel:

a. All work shall be completed utilizing fully qualified persons who are trained, experienced, and knowledgeable in the proper techniques and procedures for hazardous material abatement activities covered by this Section.

b. Workers: All workers performing asbestos related work shall be currently certified as AHERA asbestos workers.

c. Asbestos in Construction Contractor Supervisor: Currently certified as an AHERA Asbestos Contractor Supervisor.

3. Qualifications of Analytical Laboratory:

a. The Subcontractor shall submit asbestos air samples to an analytical laboratory that is accredited by the American Industrial Hygiene Association's (AIHA) Industrial Hygiene Laboratory Accreditation Program (IHLAP). The Subcontractor shall choose another AIHA accredited lab if their current AIHA accredited lab does not maintain accreditation throughout the duration of this project.

B. Regulatory Requirements: All hazardous material removal work shall be performed in accordance with requirements of Federal, State, Tribal, and local regulations.

1.7 PROJECT CONDITIONS

A. Existing Conditions:

1. Materials that may contain hazardous material are known to be present at the Project site.

a. If any other materials than those identified on the drawings are found which are suspected of containing hazardous materials, immediately stop work in the affected area and notify the Engineer. Handle suspected hazardous containing material according to this section.

2. The abatement subcontractor is responsible for notifying other subcontractors in writing regarding hazardous material work per OSHA requirements.

PART 2– PRODUCTS

2.1 EQUIPMENT

A. Clothing: Furnish the following for each worker and others as specified.

1. Coveralls:

a. Disposable full-body coveralls with attached head and foot covers conforming to requirements of OSHA Standards 29 CFR 1926.1101.

2. Respirators:

a. Full facepiece negative pressure respirators with an assigned protection factor of 50X the PEL, or equivalent, for hazardous material related work.

b. Respirators shall be equipped with HEPA (P-100) Filters.

c. Powered Air Purifying Respirators (PAPRs) with protection factors of 50X that have been quantitatively fit tested and equipped with HEPA (P-100) filters shall be acceptable substitutes for the respirator specified in 2.02(A)(2)(a) and must be worn for Class 1 work involving TSI or surfacing materials.

3. Goggles, safety glasses, face shields: Provide eye and face protection as required by OSHA.

4. Gloves:

   a. Leather work gloves.

   b. Compatible chemical resistant gloves for hazardous removal/solvent products.

5. Boots: Steel toed foot protective work boots with non-skid soles and steel shanks.

6. Hard Hats: Head protection (hard hats) approved by ANSI.

7. Soap and Towels.

B. Industrial Grade Vacuum and Negative Air Machines: High Efficiency Particulate Air (HEPA) filtered vacuum and negative air machines with appropriate HEPA filters and prefilters. Household type HEPA vacuum cleaners shall not be acceptable. Provide one spare negative air machine per work area at all times. Spare negative air machines shall be of the same size and capacity as the largest operating units onsite.

C. Pressure differential recorders shall be in working condition, calibrated, and operated continuously during the operation of the negative pressure enclosure and provide a pressure reading at least every 10 minutes, or more frequent, and provide a written documentation of the pressure readings that will be submitted to LBNL at the end of the project.

D. Temporary Shower Facility: A prefabricated or site-built temporary shower facility, with hot and cold water to shower head that can be controlled from inside shower, shall be installed and used by all workers.

PART 3 – EXECUTION

3.1 PREPARATION

A. All waste shall be transported and disposed of in accordance with all Federal, State, Tribal, and local guidelines and regulations. The contractor is to obtain all permits, licenses, etc., which are necessary for the transporting and disposal of hazardous waste.

B. Waste haulers shall maintain waste manifest and shipment record forms.

C. Contractor shall have all required labels per EPA and OSHA for handling, transportation, and disposal of hazardous waste.

D. Eating, smoking, drinking, or applying cosmetics shall not be permitted in abatement work areas. Personnel not engaged in abatement activities shall not be exposed at any time to airborne concentrations of lead dust or fumes in excess of the action level.

E. Medical requirements shall conform to 29 CFR 1926.62.

F. Respiratory protection shall conform to 29 CFR 1910.134.

G. Prior to commencement of work, each worker entering the work area or handling hazardous material containing wastes shall have successfully completed training in abatement as required by current EPA regulations and shall have completed a 2-hour training session. Workers who have received this training more than one year prior to commencement of work shall have successfully completed an annual refresher training course. All materials relating to the training program must be made readily available to all employees.

H. Removal work shall be performed in compliance with the Contractor's approved Work Plan without damage or contamination of adjacent work or areas. The Contractor shall stop work when the Industrial Hygienist, the Owner's Representative, or a representative of an applicable regulatory agency determines that the work is not in full compliance with the Contractor's approved work plan, these specifications, and applicable laws and regulations.

3.2 REMOVAL PROCEDURES

A. Removal: Remove hazardous containing material as described in the contractor's compliance work plan prior to disturbing the substrate. Modifications to this plan shall be reviewed and approved by the Engineer prior to work continuing.

1. Prohibited Removal Methods:

   a. Removing mastic material with methylene chloride-based products

   b. Uncontained abrasive blasting

   c. Uncontained power washing

   d. Dry sanding or scraping

   e. Power sanding without HEPA attachment

B. Abatement operations shall include all tasks necessary for the proper and complete abatement of the materials in the scope of work. Tasks include, but are not limited to, the following:

1. Preparation of work areas, including pre-cleaning, isolation of HVAC equipment, establishment of critical barriers and isolation barriers, establishment of negative pressure enclosures as needed, protection of building equipment, life safety systems, and electrical equipment and systems.

2. Providing water and waste services to work areas, including hot and cold-water supply for abatement-related work, and proper filtering of wastewater for disposal.

3. Maintaining adequate negative air pressure (minimum of – 0.02"w.g) and at least four air changes per hour as needed.

4. Protecting and maintaining active, as applicable, all life safety systems and building equipment operation.
5. Removing and decontamination of hazardous material contaminated surfaces, equipment, and areas.
6. Encapsulating hazardous materials and/or surfaces possibly contaminated using penetrating and/or bridging encapsulants.
7. Proper storage of contaminated waste, including packaging and labeling. Once a full 55-gallon drum of waste is generated, it must be moved into a 90-day Hazardous Waste Accumulation Area (WAA) within three days.
8. Cleaning work areas and surfaces as necessary to achieve acceptance by final visual inspection and final clearance air monitoring.
9. Coordinating work with other Subcontractors, Authority staff, inspectors, and representatives.
10. Upon completion of all work area preparation, and not less than four hours before abatement work is to begin, notify the Engineer that the work area is ready for inspection.
11. The Subcontractor shall not begin abatement work until the Engineer has inspected the area and deficiencies have been corrected.

C. Waste Disposal: HEPA vacuum and/or wet wipe to remove contaminated debris generated during the work. Do not allow hazardous material to accumulate. Place all hazardous material and contaminated debris in properly labeled plastic disposal bags at the end of each shift. This waste must be labeled with hazardous waste labels. Waste can be placed into a 55-gallon drum.

END OF SECTION 02 80 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 02 82 13.33
ASBESTOS ABATEMENT FOR UTILITIES

PART 1– GENERAL

1.1 SECTION INCLUDES

A. The Work of this Section includes the repair, demolition, and disposal of asbestos cement pipe (ACP) detailed in the task order 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

1.4 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specifications for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

B. American Water Works Association (AWWA): Work Practices for Asbestos-Cement Pipe

C. 810.2.2 Occupational Safety and Health Administration (OSHA): 29 CFR 1926.1101, Asbestos Standard for Construction; 29 CFR1910.1001, Occupation Safety and Health Standards, Toxic and Hazardous Substances, Asbestos

D. 810.2.3 Environmental Protection Agency (EPA): Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61, Subpart M.

E. All asbestos related Federal, State and Local Regulations

1.5 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 Arizona to perform repair, demolition, and disposal of asbestos cement pipe (ACP). 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 certified Asbestos Hazard Emergency Response Act (AHERA) building Inspector to complete an Asbestos Survey no more than 12 months before work is scheduled to occur. The survey report needs to remain on site during construction and a copy given to the OWNER and ENGINEER. The survey report is to include:

1. Details of the property surveyed including physical address and legal description.
2. Classification of Asbestos Containing Material (ACM) in categories of Regulated Asbestos Containing Material (RACM) (thermal system insulation, surfacing, Category I and II)
3. Description, location and quantity of RACM and non-friable Category I and II ACM present at the facility surveyed.
4. Condition of ACM, if present.
5. Type and details of any recommended remediation or removal.
6. Site plan of the exact locations where samples were collected during the inspection and where asbestos-containing materials are located, a description of the manner used to determine sample locations, the name and signature of each accredited inspector who collected the samples, and a copy of the AHERA Inspector certificate.
7. Name of accredited analytical laboratory, the laboratory's accreditations, methods of sample analysis, chain of custody records, chain of custody records and laboratory reports. C

E. The CONTRACTOR/sub-CONTRACTOR must utilize the services of a commercial hauler registered to transport asbestos with local, state, or federal agencies.

F. The CONTRACTOR/sub-CONTRACTOR, per local, state, federal and OSHA requirements, must train field personnel in the identification of asbestos containing material.

1.6 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.

E. Asbestos survey report to be completed by a current certified Asbestos Hazard Emergency Response Act (AHERA) building inspector.

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 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 EPA, Region 9 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 EPA Region 9. The CONTRACTOR must verify with the EPA 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. A viewing device must be available at facilities where asbestos is being abated, to allow inspector(s) to observe the abatement without entering the containment area.

3. Prepare asbestos waste bags and/or plastic for the disposal of contaminated PPCE and asbestos waste.

4. 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.

5. 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.

6. 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.

7. 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.

   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 Arizona Department of Environment Quality may authorize other proper methods of containment. All containment methods must satisfy all local, state, and federal requirements. All regulated asbestos containing material must be contained in transparent, leak-tight wrapping and labeled with:

   a. Name of Site Owner or Operator

   b. Name and address of the Site

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 EPA 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 EPA.

C. Asbestos Transport

1. Transport shall conform to all local, state, and federal requirements. The transporter is encouraged to coordinate with the Arizona Department of Environmental Quality 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 of the asbestos waste shall notify the landfill operator that the load contains asbestos.

2. The transporter must dispose of the asbestos at an approved landfill. Two landfills in Arizona authorized to receive asbestos-containing waste are the Pen-Rob Landfill (Painted Desert) in Joseph City, phone (602) 763-9222 and the Butterfield Station Landfill, Mobile (866) 909-4458. Call to determine if any additional disposal restrictions apply to the removed ACP and appurtenances.

3. The Contractor shall provide written proof of the total amount of asbestos received and buried by the landfill to the Owner and Engineer.

END OF SECTION 02 82 13.33

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 03 11 00
CONCRETE FORMING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Include materials, labor, services and incidentals necessary for completion of this Section of Work.

B. Include formwork for cast in place concrete as required by Concrete Contractor.

C. Include formwork for concrete bases for equipment of mechanical and electrical divisions. Contractors for those divisions of Work shall be responsible for size, location and required inserts.

D. Notify trades in ample time for each to install own work required in conjunction with formwork.

E. Inserts, sleeves and other miscellaneous embedded items required by mechanical, electrical or plumbing trades shall be supplied and installed by those respective trades.

F. Provide and install inserts, sleeves and other miscellaneous embedded items other than those required by mechanical, electrical or plumbing trades.

G. Supply, install and maintain shoring and re-shoring related to concrete formwork.

1.2 RELATED SECTIONS

A. Applicable provisions of Division 01 shall govern all work of this Section

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specification for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

B. Industry Standards, Specifications and Codes:

1. General:

   a. Comply with provisions of the following codes and standards except as modified herein.

   b. Referenced codes and standards including revisions and commentaries shall be the most currently adopted as of the date of these Contract Documents.

2. American Concrete Institute (ACI)

   a. ACI 301 Specifications for Structural Concrete for Buildings

b. ACI 318 Building Code Requirements for Structural Concrete

c. ACI 347 Guide to Formwork for Concrete

3. National Forest Products Association (NFPA)

a. NDS National Design Specification for Wood Construction including Design Values for Wood Construction

4. The Engineered Wood Association (APA)

a. Plywood Design Specification

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and with Specification 1502 and 01 33 00.

B. Product Data: Submit product data, including manufacturer's specifications, installation instructions, and general recommendations for installation. Also include manufacturer's certification or other data substantiating that products comply with the requirements of Contract Documents. Clearly identify product/model to be used.

1. Manufacturer's recommended procedures for jobsite storage and handling of equipment.

2. Equipment literature/cutsheets

C. Instructions: Submit manufacturer's instructions and recommendations for assembly and installation.

1.5 PERFORMANCE REQUIREMENTS

A. Design forms, shores and bracing. Include factors pertaining to safety of formwork structure such as live load, dead load, weight of equipment on formwork, concrete mix, height of concrete drop, vibration reactions and similar factors.

B. Design formwork to be readily removable without impact, shock or damage to cast in place concrete surfaces and adjacent materials.

1.6 ALLOWABLE TOLERANCES

A. Flatwork true to plane: 1/4-inch in 10 feet

B. Vertical surfaces true to plane: 1/4-inch floor to floor

C. Formwork displacement: Maximum 1/4-inch

D. Deviation of building dimensions indicated on drawings and position of columns, walls and partitions: 1/4-inch

E. Deviation in cross sectional dimensions of columns, piers or beams or in thickness of slabs and walls: plus/minus 1/4-inch

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work, include, but are not limited to, the following:

1. Specified herein.

B. Substitutions: If alternative manufacturers other than the pre-approved manufacturer are proposed for any specified equipment in this section, the CONTRACTOR/bidder must supply a submittal, refer to STS 01 33 00.

C. Although the brands listed herein are the preferred brands, it is not the intent of the OWNER for these specifications to be proprietary; equals will be evaluated in accordance with comparable quality, construction, strength, durability, and suitability for the purpose intended and are listed for describing the standard of quality performance and characteristics.

D. Manufacturers listed in this specification do not constitute approval. All equipment must have the capabilities and functions as specified herein.

2.2 FORM MATERIALS

A. General: Plywood, metal framed plywood faced or other acceptable panel type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practical sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

B. Formed Surfaces Exposed To View: New plywood complying with U.S. Standard PS 1 Plyform Class I, B B Concrete Form Plywood, B-Matte MDO Plywood by Simpson, 5/8 inch or 3/4 inch thick without defects, mill oiled and edge sealed or wood forms lined with 3/16 inch tempered pressed wood or 1/4 inch thick plywood B B conforming to EXT DFPA as large a size as possible to minimize joints.

C. Formed Surfaces Concealed from View: Clean straight lumber dressed on face and edges, nominal 1 inch thickness or plywood 5/8 inch or 3/4 inch thick conforming to EXT DFPA or metal forms smooth and as large a size as possible.

D. Reveals and Chamfers: Wood or purpose-made plastic or high-density plastic foam to achieve sharp, true lines.

2.3 FORMWORK ACCESSORIES

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

B. Form Ties:

1. For Unexposed Concrete: Adjustable length removable or snap off type which will leave holes no larger than 1 inch in diameter in face of concrete and when forms are removed no metal will be within 1 inch of finished concrete surface.

2. For Exposed Concrete: Ties shall be snap-off type (break point 1 inch or more from surface) with plastic cones added to form a 1-1/4-inch diameter, 1-1/2 inch deep recess around tie, which shall be grouted flush to match adjacent concrete surface.

3. No wire ties or site fabricated ties permitted.

2.4 CONCRETE ACCESSORIES

A. Waterstops: PVC or SBR type, purpose made, split serrated type, center bulb.

2.5 FORM COATINGS

A. Form coatings for exposed concrete shall consist of an approved non-staining form oil, lacquer or plastic. Plywood approved for reuse shall be recoated as directed by Engineer. When oil is used, excess shall be wiped off with rags. When lacquer is used, a light coating of form oil over lacquer will be permitted provided excess is wiped off. When factory applied plastic coatings are used, follow manufacturer's instructions. Contact surface of forms shall be free of foreign matter, including dust. Form oil shall be applied to forms before reinforcing is erected. Form oil shall be of type which will not affect bonding of specified exterior finish.

2.6 CONSTRUCTION JOINT MATERIALS

A. Solid Wood Lumber: Spruce-Pine-Fir (SPF) #2 or engineer approved equivalent.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Immediately correct all deficiencies and conditions which would cause improper execution of Work specified in this Section and subsequent Work.

B. 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.

3.2 PREPARATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure dimensions agree with Drawings.

3.3 COORDINATION

A. Coordinate work of other sections and cooperate with trades involved in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts. Do not perform work unless specifically indicated on Drawings or reviewed prior to installation.

3.4 FORMWORK ERECTION

A. Erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Form both faces of foundations. Earth forming of footings and vertical surfaces of concrete work is not permitted.

B. Construct forms to sizes, shapes, lines and dimensions shown on Drawings and to obtain accurate alignment, location and grades. Level and plumb work. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back up at joints to prevent leakage of cement paste.

C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crust plates or wrecking plates where stripping may damage concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses and like to prevent swelling and for easy removal.

D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

E. At all exposed corners of concrete walls, beams, columns, slab edges and miscellaneous items not specified or indicated, provide 3/4 inch, 45 degree chamfer.

F. Install ties so portion remaining within concrete after removal is at least 1 inch inside concrete. Remove so surrounding concrete is not disfigured and cleanout hole remains to be patched.

G. Coat contact surfaces of forms with form coating compound before reinforcement is placed.

H. Thin form coating compounds only with thinning agent of type and in amount and under conditions of form coating compound manufacturer's directions. Do not allow excess form coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.5 INSERTS, EMBEDDED PARTS AND OPENINGS

A. Plumbing, Heating and Electrical Items:

1. Premanufactured items including inserts, sleeves and other embedded items required by mechanical, electrical and plumbing trades shall be supplied, accurately located, and installed by respective trades.

2. Site fabricated box outs for chases, sleeves and other miscellaneous openings for mechanical, electrical and plumbing trades shall be supplied and installed by Formwork Contractor.

3. Location of mechanical, electrical and plumbing inserts, embedded parts, openings and recesses shall be coordinated with respective trades by General Contractor.

B. Other Items:

1. Other inserts, embedded parts, box outs for openings, chases, reveals and recesses except those specifically mentioned above by mechanical, electrical or plumbing trades, shall be installed by Formwork Contractor. Special inserts, embedded parts or other special requirements needed by specific trades shall be supplied by that respective trades to Formwork Contractor for installation. General Contractor shall have overall responsibility for coordinating location of inserts, embedded parts, openings and recesses.

2. Install concrete accessories in accordance with manufacturer's recommendations; straight, level and plumb. Ensure items are not disturbed during concrete placement.

3. Set and build into Work, anchorage devices and other embedded items required for other work attached to or supported by cast in place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached. Build in dovetail anchor slots vertically.

4. Build in wedge inserts indicated.

3.6 JOINTS AND EDGE FORMS

A. Locate construction joints as shown on Drawings or as approved by Engineer. Form with keyway. Place perpendicular to main reinforcement. Continue reinforcement through joint, except slabs-on-grade, and locate joint so as not to affect structural integrity or appearance of structure. Includes joint between wall and footing.

B. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units of sufficient strength to support types of screeds required. Align concrete surface to elevation of screed strips by use of strike off templates or accepted compacting type screeds.

3.7 CLEANING

A. Clean forms as erection proceeds to remove foreign matter. Remove cuttings, shavings and debris from within forms. Flush with water or use compressed air to remove remaining foreign matter. Ensure water and debris drain to exterior through clean out ports. Retighten forms after concrete placement if required to eliminate mortar leaks.

3.8 FIELD QUALITY CONTROL

A. Inspect and check completed formwork, shoring and bracing to ensure work is in accordance with formwork design and supports, fastenings, wedges, ties and parts are secured.

B. Clean and repair surfaces of forms to be reused in Work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact form surfaces as specified for new formwork.

C. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces. Do not use metal cover plates for repairing defects in forms for exposed concrete work.

D. Inform Engineer when formwork is complete and has been cleaned to allow for inspection. Obtain review prior to placing concrete.

E. For exposed to view concrete surfaces do not reuse plywood formwork.

F. Allow Engineer to inspect each section of plywood type formwork prior to reuse.

3.9 FORMWORK REMOVAL

A. Notify Engineer and Owner's field representative prior to removing formwork, centering, shoring and reshoring.

B. Remove forms in a manner to insure safety of structure at all times. Where entire structure is supported on shores; beam and girder sides, columns and similar vertical forms may be removed after 48 hours, providing concrete is sufficiently hard not to be injured thereby. In no case shall supporting forms or shoring be removed until members have acquired sufficient strength to support their weight and load safely. Coordinate removal with work of other trades.

C. Remove forms according to ACI 347. However, the following schedule shall govern the minimum waiting period after placing concrete before bottom forms and shores of similar falsework supporting flexural members such as girders, beams, joists, slabs, etc. may be disturbed or stripped:

Structural Members		Waiting Period
1.	Columns, walls and beam sides	2 days
2.	Spans less than 12 foot - slabs and beam bottoms	7 days
3.	Spans between 12 foot and 30 foot slabs and beam bottoms	14 days
4.	Spans greater than 30 foot - slabs and beam bottoms	28 days

D. The above schedule applies to daily curing temperatures above 50 degrees. For lower daily curing temperatures, increase waiting period. In addition to above requirements, do not remove forms until concrete has attained 80 percent of minimum design strength.

E. Reshore removed area before removing additional adjacent formwork.

F. Retain reshores in place for a minimum of 14 days and concrete has attained 100 percent of minimum design strength. Retain reshores in place until concrete construction above has attained sufficient strength to not require shoring below.

3.10 SCHEDULE

A. Not used

END OF SECTION 03 11 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 03 21 11
PLAIN STEEL REINFORCEMENT BARS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Include materials, labor, services and incidentals necessary for completion of this Section of Work.

B. Work includes fabrication and placement of reinforcement for cast in place concrete including bars, welded wire fabric, ties, dowels, stirrups, supports and accessories required.

C. Work also includes the addition of supplemental reinforcing to replace bar cross section loss due to corrosion.

1.2 RELATED SECTIONS

A. Applicable provisions of Division 01 shall govern all work of this Section

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specification for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

A. Submit in accordance with Division 01 requirements.

B. Submit information showing compliance with section 1.5.

C. Steel Properties:

1. Submit certification of grade, chemical analysis and tensile properties of steel furnished if requested.

D. Shop Drawings:

1. Show sizes and dimensions for fabrication and placing of reinforcing steel and bar supports.
2. Show type, size and location of accessories.
3. Indicate bar schedules, stirrup spacing and diagrams of bent bars, arrangements and assemblies.
4. Indicator for yield strength of bars being provided.
5. Show required bar laps and call out specific lap dimensions.

6. Lap splices shall develop the full strength of the bar unless lesser laps are permitted by Drawings.

E. Manufacturer's Literature:

1. Submit manufacturer's specifications, capacities and installation instructions for splice devices.

1.5 QUALITY ASSURANCE

A. Industry Standards, Specifications and Codes:

1. General:

a. Comply with provisions of the following codes and standards except as modified herein.

b. Referenced codes and standards including revisions and commentaries shall be the most currently adopted as of the date of these contract documents.

2. American Concrete Institute (ACI):

a. ACI 301 Specifications for Structural Concrete for Buildings

b. ACI 318 Building Code Requirements for Structural Concrete

c. ACI 315 Details and Detailing of Concrete Reinforcement

3. Concrete Reinforcing Steel Institute (CRSI):

a. Manual of Standard Practice

b. Recommended Practice for Placing Reinforcing Bars

4. American Society for Testing and Materials (ASTM):

a. Specific ASTM numbers are noted in later text.

5. Qualifications:

a. Acceptable Manufacturers:

1) Shall be regularly engaged in the manufacture of steel bar, welded wire fabric reinforcing and mechanical splicing devices.

b. Installer Qualifications:

1) Shall have 3 years experience in installation of steel bar and welded wire fabric reinforcing.

c. Source Quality Control:

1) Mill test certificates identifying chemical and physical analysis of each load of reinforcing steel delivered if requested.

PART 2 - PRODUCTS

2.1 REINFORCING STEEL

A. Reinforcing Bars:

1. Conform to ASTM A 615 "Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement".
2. Reinforcing bars shall be deformed, except that plain bars may be used for spirals.
3. Main reinforcing bars and other bars not listed above shall be Grade 60, unless noted otherwise on Contract Documents.

B. Welded Wire Fabric:

1. Conform to ASTM A 185 "Standard Specification for Welded Steel Wire Fabric, Plain for Concrete Reinforcement".
2. Welded wire fabric shall be electrically welded and 65,000 psi yield strength.

2.2 MECHANICAL SPLICES

A. Mechanical splicing devices are to be used where specifically noted on Drawings or at Contractor's option for any splice. Mechanical splicing devices shall develop 125 percent of designated yield strength of reinforcing being spliced.

B. Acceptable products and manufacturers are as follows:

C. COMPRESSION SPLICES:

1. Cadweld (compression only); Erico Products, Inc.
    a. Lenton; Erico Products, Inc.
    b. Speed Sleeve; Erico Products, Inc.
    c. G-Lock; Gateway
    d. Grip-Twist; Barsplice Products, Inc.

D. TENSION SPLICES:

a. Cadweld (tension only); Erico Products, Inc.
b. Lenton; Erico Products, Inc.
c. Grip-Twist; Barsplice, Inc.
d. Bar-Grip System, Barsplice Products, Inc.

E. Comply with manufacturer's instructions for bar preparation and installation of splicing devices.

2.3 ACCESSORIES

A. Supports For Reinforcement:

1. Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.
2. Use wire bar type supports complying with CRSI recommendations unless otherwise indicated. Do not use wood, masonry brick and other unacceptable materials, e.g., mortar blocks, coarse aggregates.
3. For exposed to view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected. For sandblasted or bush hammered concrete provide stainless steel protected or special stainless bar supports.
4. Where indicated on Drawings, slab on grade reinforcement shall be supported on individual high chairs with sand plates for soil bearing (HCP).
5. Over waterproof membrane, use chairs with plates to prevent penetration of membrane.

B. In areas of concrete removal, short lengths of reinforcing bar shall be used to provide support for bars on chipped or rough concrete surfaces using similar spacing of supports.

2.4 FABRICATION

A. Shop fabricate reinforcing bars to conform to required shapes and dimensions. In case of fabricating errors, do not re bend or straighten reinforcement in a manner that will injure or weaken materials.

B. Reinforcement shall be bent cold unless otherwise permitted by Engineer.

C. Unacceptable Materials:

1. Reinforcement with any of the following defects will not be permitted in Work:
   a. Bar lengths, depths and bends exceeding specified fabrication tolerances.
   b. Bends or kinks not indicated on Drawings or final Shop Drawings.
   c. Bars with reduced cross section due to excessive rusting or other cause.

2.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. General:

1. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size, lengths and other information corresponding to markings shown on placement drawings.
2. Handle and store materials to prevent dirt or excessive rust.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine formwork and other conditions under which concrete reinforcement is to be placed and notify Formwork Contractor of unsatisfactory conditions. Do not proceed with work until unsatisfactory conditions have been corrected in a manner to your satisfaction.

3.2 PLACEMENT

A. Comply with specified codes and standards and CRSI "Recommended Practice for Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as specified.

B. Clean reinforcement to remove loose rust and mill scale, earth, ice and other materials which reduce or impair bond with concrete.

C. Position, support and secure reinforcement against displacement by formwork, construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers as required.

D. Place reinforcement to obtain coverages for concrete protection as indicated on Contract Documents. Arrange, space and securely tie bars and bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so ends are directly away from exposed concrete surfaces.

E. Exposed or additional reinforcing shall be no closer than 3/4 inch measured radially from existing concrete. Elevation of exposed or additional reinforcing shall be maintained at original height.

F. At openings in structural slabs, provide two #4 bars top and bottom of slab at 45 degrees on all 4 corners, each bar 48 inch minimum length, unless noted otherwise on drawings.

G. At openings in concrete walls or slabs additionally provide a minimum of two #5 bars around opening.

H. Provide two #4 bars 3 inches apart on 4 sides of floor drains in slabs.

I. Unless permitted by Engineer, reinforcing shall not be bent after being embedded in hardened concrete.

J. Suspend footing reinforcement in place with wires to assure proper placement. Where applicable, solid concrete blocks may be utilized to position reinforcement in spread and strip footings.

K. Welded wire fabric shall lap one full mesh at side and end laps and must be wired together. Mesh for slabs-on-grade shall be raised at least 2 inches during concrete pour. Minimum requirement for concrete toppings and slabs-on-grade shall be WWF 6x6 - W1.4 by W1.4 unless specifically noted otherwise on Drawings. Where indicated on Drawings, slab on grade reinforcement shall be supported on individual high chairs with sand plates for soil bearing (HCP). Supports shall be a minimum of 2 inches high and maximum spacing shall be 48 inches o.c. each way. Supports shall be tied to reinforcement.

L. Provide sufficient number of supports and sizes as required to carry reinforcement. Maximum spacing of chairs is 48 inches on center. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

3.3 WELDING OF REINFORCEMENT

A. Welding of reinforcement covered by this Section is prohibited.

3.4 FIELD QUALITY CONTROL

A. Notify Engineer when reinforcing is in place so he or she may review reinforcing placement. Engineer shall have a minimum of 24-hour notice prior to placement of concrete.

B. Tend to reinforcing at all times during concrete placement and make necessary adjustments to reinforcing which has been dislodged by concrete placement or workmen.

C. Bar Placement Tolerances:

1. 1/4 inch (plus/minus) between bars
2. 1/4 inch (plus/minus) vertically for members 8 inches deep or less
3. 1/2 inch (plus/minus) vertically for members over 8 inches deep and less than 2 foot deep
4. 1 inch (plus/minus) vertically for members 2 foot or deeper

3.5 SCHEDULE

A. Not used

END OF SECTION 03 21 11

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Include materials, labor, services, and incidentals necessary for completion of this section of work.

B. Extent of cast in place concrete work is shown on Drawings.

C. Provide concrete bases for equipment of mechanical and electrical divisions. Coordinate size and location with HVAC, Plumbing, and Electrical Contractors.

D. Notify other trades of the date for concrete placement in ample time for each to install their own work.

E. Install anchor bolts, embedded plates, inserts and similar items furnished by other trades.

1.2 RELATED SECTIONS

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

B. STS 01 21 19 – Testing and Inspecting Allowances.

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specification for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

A. Submit in accordance with Division 1 requirements.

B. Mix Designs:

1. Prepare design mixtures for each class of concrete on the basis of laboratory trial mixtures or field test data, or both in accordance with ACI 301. Design mixtures shall meet the requirements listed in Table 33000-1. Submit material content per cubic yard of each class of concrete furnished including:

2. Weight of cementitious materials.

3. Saturated surface dried weights of fine and coarse aggregates.

4. Quantities, type and name of admixtures.

5. Weight of mixing water.

C. Submit to Engineer mix designs, certification that materials used in concrete mixtures meet ASTM and other applicable specifications, and documentation indicating proposed concrete proportions will produce an average compressive strength equal to or greater than the required compressive strength as specified in ACI 301. Obtain approval prior to placing concrete.

D. Test Reports:

1. Submit reports of concrete testing including, compressive strength, density (unit weight), air content, temperature and slump. Furnish copies to General Contractor, Consulting Engineer, Concrete Supplier and Owner Representative. Test results shall be reported in writing within 2 days that tests are made.

1.5 QUALITY ASSURANCE

A. Industry Standards, Specifications and Codes:

1. General:

a. Comply with provisions of the following codes and standards except as modified herein.

b. Referenced codes and standards including revisions and commentaries shall be the most currently adopted as of the date of these Contract Documents.

2. American Concrete Institute (ACI):

a. ACI 117 Standard Specifications for Tolerances for Concrete Construction and Materials.

b. ACI 301 Specifications for Structural Concrete.

c. Additional ACI sections are noted in later text.

3. American Society for Testing and Materials (ASTM):

a. Specific ASTM standards are noted in later text.

B. Contractor shall inform with the inspection/testing agency and Engineer at least 24 hours prior to major concrete pour.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work, include, but are not limited to, the following:

1. Specified herein.

B. Substitutions: If alternative manufacturers other than the pre-approved manufacturer are proposed for any specified equipment in this section, the CONTRACTOR/bidder must supply a submittal, refer to STS 01 33 00.

C. Although the brands listed herein are the preferred brands, it is not the intent of the OWNER for these specifications to be proprietary; equals will be evaluated in accordance with comparable quality, construction, strength, durability, and suitability for the purpose intended and are listed for describing the standard of quality performance and characteristics.

D. Manufacturers listed in this specification do not constitute approval. All equipment must have the capabilities and functions as specified herein.

2.2 MATERIALS

A. Hydraulic Cement:

1. For normal concrete, hydraulic cement shall meet requirements of ASTM C 150, ASTM C 595, or ASTM C 1157.

2. For air entrained concrete, cement shall meet requirements of ASTM C 150, Type 1A Portland Cement or cement specified for normal concrete may be used with an air entraining admixture conforming to ASTM C 260.

B. Fly Ash:

1. Fly ash shall meet the requirements of ASTM C 618.

C. Aggregates:

1. Normal weight aggregate shall comply with requirements of ASTM C 33. Lightweight aggregates shall comply with requirements of ASTM C 330.

D. Water:

1. Water used for batching concrete shall meet the requirements of ASTM C 1602.

2.3 ADMIXTURES

A. No other admixtures will be allowed, without Engineer's approval.

B. Air Entraining:

1. Shall Conform to ASTM C 260, certified by the manufacturer to be compatible with other required admixtures. The Entrained air content shall be controlled at 5 percent plus or minus 1 percent typical.

C. Water Reducing:

1. Shall conform to ASTM C 494, Type A

D. Mid-Range Water Reducing:

1. Shall conform to ASTM C 494, Type A or Type F

E. High-Range Water Reducing (Super Plasticizer):

1. Shall conform to ASTM C 494, Type F or Type G.

F. Water Reducing, Non-Chloride Accelerator:

1. Shall conform to ASTM C 494, Type C or Type E.

G. Water Reducing, Retarding:

1. Shall conform to ASTM C 494, Type D.

H. Silica Fume:

1. The Silica fume admixture shall be EMSAC F-100, manufactured by Elkem Chemicals, Inc., Pittsburgh, PA, Force 10,000 by W.R. Grace, Lafarge SF Cement by Lafarge Corporation or Rhemac SF100 by BASF Admixtures, Inc.

I. Corrosion Inhibitor:

1. Shall meet ASTM C 494 interim requirements for Type C, accelerating admixture placed at a rate of 1 gallon per cubic yard of concrete. Admixture shall contain a minimum of 30 percent calcium nitrite by weight. Approved product is DCI Corrosion Inhibitor by W.R. Grace or Rheocrete CNI by BASF Admixtures, Inc.

2. Admixtures shall not contain calcium chloride as an intentionally added ingredient. Calcium chloride as an admixture is not permitted. Admixtures containing more than ½ of 1 percent (0.5 percent) chloride ions by weight of admixture are not permitted.

2.4 BONDING AGENT

A. Shall be a poly-vinyl acetate emulsion.

B. Products: Subject to compliance with requirements, provide one of the following:

1. "Southcrete 45" – SGM

2. “Euco Weld” – Euclid Chemical Company

2.5 RELATED MATERIALS

A. Evaporation Retardant and Finishing Aid: Shall be "Confilm" by BASF Admixtures, Inc.

B. Non-Shrink Grout: Factory pre-mixed non-metallic grout, complying with ASTM C 1107.

1. Products: Subject to compliance with requirements, provide one of the following:

a. "Set Grout" - ChemRex

b. "Sonogrout" - Sonneborn

c. "Euco-NS" - Euclid Chemical Co.

d. "Sealtight 588" - W.R. Meadows

e. "Crystex" - L&M Cons. Chemical Co.

f. "Sure-Grip Grout" - Dayton Superior Corp.

g. "Horngrout" - A.C. Horn

h. "Five Star Grout" - US Grout Corp.

C. Absorptive Cover: Burlap cloth made from jute or Kenaf, weighing approximately 9 ounces per square yard, complying with AASHTO M182, Class 2.

D. Moisture-Retaining Cover: One of the following, complying with ASTM C 171, Type 1 or 2:

1. Polyethylene Film
2. Polyethylene Coated Burlap

E. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C 1315 “Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete”, Type I, Class A unless other type acceptable to Engineer. Moisture loss not more than 0.040 gr./square cm. In 72 hours when applied at 300 sq. ft./gal. Material must be compatible with resilient flooring and carpeting adhesives. Concrete contractor shall verify compatibility before applying curing compound.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. "Masterseal" - Master Builders
   b. "Kure-N-Seal" - Sonneborn
   c. "Tri-Kote 18 Clear CRECT" - TK Products, Inc.
   d. "Cure and Seal" - Symons Corp.

F. Low VOC, Dissipating Curing Compound: Resin-based liquid membrane-forming compound that provides initial cure for concrete and begins to break down and deteriorate upon exposure to traffic and UV light complying with ASTM C 309, Types 1 and 1D, Class A & B. Moisture loss not more than 0.055 gr./sq. cm in 72 hours when applied at 300 sq. ft/gal. VOC content not more than 95 gr./liter

1. Products: Subject to compliance with requirements, provide one of the following:
   a. “KUREZ DR-100”, The Euclid Chemical Company
   b. “L&M Cure R”, L&M Construction Chemicals
   c. “Day-Chem Rez Cure”, Dayton Superior
   d. “Certi-Vex Envio Cure-500”, Vexcon Chemicals, Inc.

G. Epoxy Adhesive: ASTM C 881, 2 component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. "Concresive LPL Liquid" - ChemRex
   b. "Epoxtite" - A.C. Horn
   c. "Edoco 2118 Epoxy Adhesive" - Edoco Technical Prod.
   d. "Sikadur Hi-Mod" - Sika Chemical
   e. "Euco Epoxy 452" - Euclid Chemical Co.
   f. "Patch and Bond Epoxy" - The Burke Co.
   g. "Sure Poxy" - Kaufman Products, Inc.

H. Sealer: Where concrete floors, new or existing call for "Sealer" in Room Finish Schedule, the following material shall be applied by licensed applicator. Furnish 5-year written guarantee.

I. Armorseal Floor-Plex 7100, a 2-part water-based epoxy floor coating, manufactured by the Sherwin Williams Company, or approved substitute.

J. Non slip Aggregate Finish: For stairs, landings, platforms and where otherwise noted, provide fused aluminum oxide grits, or crushed emery, as abrasive aggregate for nonslip finish with emery aggregate containing not less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory graded, packaged, rust proof, and non-glassing, and is unaffected by freezing, moisture, and cleaning materials. Submit samples for Engineers approval.

1. Products: Subject to compliance with requirements, provide one of the following:

a. "Frictex" - Sonneborn

b. "Euco Nonslip" - Euclid Chemical Co.

K. Isolation Joint Filler: Shall be bituminous (1/2 inch and ¼ inch thicknesses) conforming to ASTM D 994.

L. Control Joint Insert: Shall be hardboard or fiberboard.

M. Expansion Joint Filler: Shall be extruded polystyrene.

N. Underlayment Compound: Freeflowing, self-leveling, pumpable, cement-based compound for applications from 1-1/2-inch thick to feathered edges, minimum strength of 4000 psi.

1. Products: Subject to compliance with requirements, provide one of the following:

a. "Level-Right Plus" – Maxxon Great Lakes

b. "K-15" – Ardex, Inc.

c. "Stonecrete UL1" – Stonehard, Inc.

d. "Thoro SLU" – Thoro System Products

O. Dovetail Anchor Slots: Shall be #305 Hohman and Barnard, Inc. or equivalent 20 gage sheet metal in Eraydo Zinc with felt strip protector.

2.6 READY MIXED CONCRETE

A. Ready mixed concrete shall be measured, mixed and delivered according to ASTM C94, except as modified herein.

B. Prepare design mixtures for each class of concrete on the basis of laboratory trial mixtures or field test data, or both in accordance with ACI 301. Design mixtures shall meet the requirements listed in Table 33000-1

C. Addition of water is permitted for batches of material with insufficient slump at the job site but is limited to the lesser of; 1 gallon per cubic yard or the quantity of water indicated on the delivery ticket such that the mixing water content on approved mix design is not exceeded.

D. Ready Mixed Concrete Delivery Tickets:

1. Furnish 2 delivery tickets with each batch of concrete before unloading at site; 1 for Contractor and 1 for Engineer on which is printed, stamped or written the following information:
   a. Name of ready mix batch plant
   b. Serial number of ticket
   c. Date and truck number
   d. Name of Contractor
   e. Job name and location
   f. Specific class or designation of concrete
   g. Amount of concrete (cubic yards)
   h. Time loaded or of first mixing of cement and aggregates
   i. Type, name and amount of admixture
   j. Type, brand and amount of cement
   k. Total water content by producer (or W/C ratio)
   l. Maximum size of aggregate
   m. Weights of fine and coarse aggregates

E. Mix Proportioning:

1. Minimum amount of cementitious material identified in the following mix proportions shall apply for mixes for which field experience or trial mixture information required is not provided.

Table 33000-1

Class	Type of Construction	Specified Comp. Strength @ 28 Days (PSI)	Max. Agg. Size (inches)	Min. lbs. of Cement per C.Y.	Air Entrainment % +/- 1%	Notes
1	Footings	4000	0.75	560	5.0	(1)(4)(8)
2	Tank Bottoms & Walls	4000	0.75	560	5.0	(1)(4)(8)
3	Slab on Grade	4000	0.75	560	5.0	(1)(4)(8)

Notes:
(1) Air entrained concrete: Use for all concrete exposed to freezing and thawing.
(2) Minimum compressive strength at 5 days: 3000 psi.
(3) Maximum water cementitious ratio by weight shall be 0.42.
(4) Maximum water cementitious ratio by weight shall be 0.45.
(5) Maximum water cementitious ratio by weight shall be 0.50.
(6) Provide a non slip abrasive aggregate surface on all metal pan stairs and landings.
(7) Equilibrium dry weight of lightweight aggregate mix shall not exceed 115 pounds per cubic foot (as determined by Section 9.5 of ASTM C 567).

(8) A maximum of 20 percent total replacement of Portland cement with fly ash at a 1:1 ratio

PART 3 – EXECUTION

3.1 GENERAL

A. Clean all mixing and transportation equipment. Wet forms thoroughly. Remove all ice, excess water, mud and other debris from within forms and from reinforcement. Notify Engineer prior to placing in ample time for inspection of forms and reinforcing.

3.2 PLACEMENT OF CONCRETE

A. Pre Placement Inspection:

1. Before placing concrete, inspect and complete formwork installation, reinforcing steel and items to be embedded or cast in-place. Notify other Contractors to permit installation of their work; cooperate with other trades in setting such work as required. Thoroughly wet wood forms immediately before placing concrete as required where form coatings are not used. Notify inspection agency and Engineer 24 hours in advance of pouring.

B. Placing Concrete In Forms:

1. Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints. Maximum length of wall pour is 100 feet between construction joints.

2. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.

3. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding or tamping. Use vibrators designed to operate with vibratory element submerged in concrete, maintaining a speed of not less than 6000 impulses per minute. Alternate methods of consolidating concrete including the use of self-consolidating concrete may be submitted to the Engineer for approval.

4. Do not use vibrators to move concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

C. Placing Concrete Slabs:

1. Deposit and consolidate concrete slabs in a continuous operation until placing of a panel or section is completed.
2. Place interior slabs on grade using long strip construction techniques or other approved method.
3. Place suspended slabs in sections as large as practicable to complete finishing, within limits acceptable to Engineer.
4. Consult with Engineer with regard to limits of single placements prior to commencing work.
5. Consolidate concrete during placing operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
6. Bring slab surfaces to correct level with a straightedge and strikeoff. Use bull floats or darbies to smooth surface, leaving it free of humps or hollows. Do not sprinkle water on plastic concrete surface. Do not disturb slab surfaces prior to beginning finishing operations. “Wet Screed” placement of slabs is not allowed.
7. Maintain reinforcing in the proper position during concrete placement operations. mesh shall be lifted to 1/2 slab depth as pouring proceeds.

D. Cold Weather Placing:

1. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions or low temperatures in compliance with ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt or other materials containing anti freeze agents or chemical accelerators other than approved, non-chloride accelerating admixtures.
4. Do not allow carbon dioxide from heating units to contact freshly placed concrete surfaces for 48 hours. Vent heaters outside of enclosure.

E. Hot Weather Placing:

1. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 301.
2. Wet forms thoroughly before placing concrete.
3. Do not use retarding admixtures without the written permission of the Engineer.

3.3 CONCRETE JOINTS

A. Construction Joints:

1. Locate as directed by Engineer or as shown on Drawings. Form keyway. Place perpendicular to main reinforcement. Continue reinforcement through joint. Locate joint so as not to affect structural integrity or appearance of the structure. Includes joint between wall and footing.

B. Isolation Joints:

1. Form with keyway with bituminous (preformed filler, 1/4 inch or 1/2 inch (as called for) thick full depth of slab-on-grade. Reinforcement is non-continuous. Locate at points of contact between slab-on-grade and vertical structural concrete.

C. Control Joints:

1. Locate on grid lines or on lines as shown on Drawings or as directed by Engineer. Joint size shall be ¼-inch wide by 1/5 to 1/4 of slab depth. Continue reinforcement through joint. Contractor's option to tool or use insert. Do not tool joints in slabs to receive a finished flooring material. Control joints should be made within first 24 hours of concrete pour.

3.4 FINISHING

A. General:

1. Strike and level concrete. Allow to set before floating. Power float on disappearance of water sheen. Hand float areas inaccessible to power float. Applicable to flat work to obtain smooth, uniform, granular texture. Floors shall be flat and level within tolerances given in Part 1, except where drains occur or sloped floors are indicated, in which case tolerance applies to planes indicated.

B. Troweled Finish:

1. Power trowel to smooth finish. Hand trowel areas inaccessible to power trowel. Applicable to flatwork to receive finished flooring material.

C. Broom Finish:

1. Draw broom across surface after floating to form a regular, parallel pattern. Applicable to parking ramps, drives, ramps and stairs. Direction of brooming shall be perpendicular to traffic pattern.

D. Formed Concrete:

1. Top of concrete: Strike concrete smooth then float and trowel surface to texture comparable to formed surface.

2. Formed Surface: As cast finish, patch holes and defects after form removal. Remove fins.

3. Rubbed Surface: Rub with rubbing stone to remove all projections and round corners. Wet surface and brush evenly with cement grout mixture. Provide rubbed concrete surfaces in finished areas to be left to view in stairwells, where concrete is exposed to view in a finished area and wherever else a rubbed surface is called for on plans.

4. Slope exterior steps down 1/8 inch.

E. Exterior Walks:

1. Broom finish unless otherwise indicated. After floating, troweling and when water sheet has disappeared, brush lightly with approved steel or fiber broom not less than 18 inches wide at right angles to centerline to form a uniform roughened surface. Edge panel joints with metal tool to leave smooth border around each panel.

F. Nonslip Finish:

1. Apply to exterior concrete stair treads, stair platforms, sloped walks and elsewhere as indicated. After floating, surface shall be given a "dry shake" application of crushed ceramically bonded aluminum oxide. Rate of application of such material shall be not less than 25 pounds per 100 square feet. Tamp aggregate flush with surface using a steel trowel but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.

3.5 CURING

A. Comply with ACI 301.

B. Class A Concrete Curing:

1. Concrete items listed below shall be water cured per ACI 308.2.2 only for 5 days after placement. Curing system must be monitored and additional moisture added as required. During curing period surfaces of concrete surface shall be wet. Concrete requiring this class of curing includes all slabs on grade (slab on grades placed where ambient temperature is below freezing may be cured by Class C curing methods).

C. Class B Concrete Curing:

1. Concrete items listed below shall be sheet cured per ACI 308 2.3.1 Plastic Film or 2.3.2 Reinforced Paper only, for 7 days after placement. Curing system joints shall be sealed and moisture added daily to maintain concrete surface in a damp condition. Insulating blankets used during cold weather do not need sealed joints as long as concrete surface is damp. During cold weather (below 50 degrees F), curing may be terminated after stressing for post-tensioned elements.

2. Concrete requiring this class of curing includes parking deck slabs, suspended structural slab and selected slab on grade.

D. Class C Concrete Curing:

1. Concrete surfaces not specified to receive other curing shall be liquid membrane cured per ACI 308 2.3.3. If no rate of coverage is indicated by manufacturer, apply at a uniform rate of 200 square feet per gallon. Maximum rate of coverage, even if manufacturer's recommendation indicated greater coverage, shall be 300 square feet/gallon.

E. Formed Surfaces:

1. Cure formed concrete surfaces including walls, columns, underside of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by membrane curing.

F. Protection:

1. Protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration and from damage caused by rain or flowing water. Protect finished concrete surfaces from damage by subsequent construction operations.

3.6 REPAIRING AND PATCHING

A. Concrete Surface Repairs:

1. Comply with ACI 301 “Specifications for Structural Concrete”.

2. Remove and replace, at no additional cost, concrete not formed as shown on Drawings, concrete out of alignment, surfaces beyond required tolerances or defective surfaces which cannot be properly repaired or patched, including concrete failing to meet strength requirements as determined by testing laboratory.

3. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Engineer. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to concrete surface. Thoroughly clean, dampen with water and brush coat area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

4. For exposed to view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

5. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar or precast cement cone plugs secured in place with bonding agent.

6. Repair concealed formed surfaces, where possible, that contain defects that affect durability of concrete. If defects cannot be repaired, remove and replace concrete.

7. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

8. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects include crazing, cracks in excess of 0.01 inch wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets and other objectionable conditions.

9. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

10. Correct low areas in unformed surfaces during, or immediately after, completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary leveling compounds may be used when acceptable to Engineer.

11. Repair defective areas, except random cracks and single holes not exceeding 1 inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

12. Repair isolated random cracks and single holes not over 1 inch in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of 1 part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

13. Do not use repair methods not specified above and do not perform structural repairs, except with prior written approval of Engineer for method and procedure, using specified epoxy adhesive mortar.

3.7 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General:

1. Sample fresh concrete to conform to ASTM C 172.

B. Slump:

1. In accordance with ASTM C 143. One slump test at point of discharge from ready mix truck for each set of test cylinders taken, unless noted otherwise, with additional tests when concrete consistency seems to have changed. If measured slump falls outside limits specified, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, concrete will be considered to have failed to comply with Specifications. Slump tests, when taken, shall be conducted after site addition of superplasticizer, however a visual estimate of slump shall be recorded prior to site addition of superplasticizer to a mix. Visual slump should only be used after correlation has been established with actual slump tests.

C. Air Content:

1. Only for air entrained concrete, in accordance with ASTM C 231 pressure method for normal weight concrete and ASTM C 173 for lightweight concrete. One air content test for each set of strength test cylinders made unless noted otherwise. If measured air content falls outside limits specified, a check test shall be made immediately on another portion of the same sample. In the event of a second failure, concrete will be considered to have failed to comply with Specifications. In compliance with ASTM C 94, site addition of additional air entrainment admixture is permissible until plant adjustments have been made. For site added superplasticizer, air should only be checked after the addition of superplasticizer.

D. Concrete Temperature:

1. In accordance with ASTM C 1064 each time a set of compression test specimen is made.

E. Strength Tests:

1. Strength test for any class of concrete shall consist of 4 standard cylinders made from a composite sample secured from a single load of concrete in accordance with ASTM C 172, except when in the opinion of the Engineer, they may require additional specimens.

2. All Concrete: (Except Post Tensioned Concrete)

a. Make test cylinders in accordance with ASTM C 31. Each test shall consist of a minimum of 3 cylinders.

b. After 24 hours, 3 cylinders to be carefully transported to testing laboratory for moist curing.

c. 1 laboratory cured cylinder to be tested at 7 days and 2 laboratory cured cylinders to be tested at 28 days.

3. Test results at 28 days shall be the average strength of specimens determined in accordance with ASTM C 39.

4. Strength test shall be made for: each day's pour exceeding 5 cubic yards; each class of concrete; each change of supplies or sources; and for each 150 cubic yards of concrete or fraction thereof.

5. Strength of each concrete class shall be deemed satisfactory when both of the following criteria are met:

   a. The average of three consecutive compressive-strength tests equals or exceeds specified compressive strength.

   b. Any individual compressive-strength test result does not fall below specified compressive strength by more than 500 psi.

6. Testing shall be performed in compliance with Division 01 provisions by an approved testing laboratory at Owner's expense, which shall submit complete reports of tests to General Contractor, Concrete Supplier, Engineer and Owner's representative. Reports of compressive strength tests shall contain project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, weather at time of placement and compressive breaking strength and type of break. An individual having ACI Level 1 Technician certification shall complete testing, including test cylinder production. Site protection of test cylinders shall be made in compliance with ASTM C 31.

7. If Engineer has reason to believe cylinder strength tests are not representative of strength of concrete in place, he shall require drilled cores to be cut and tested at Contractor's expense. Coring and testing shall be in accordance with ASTM C 42 “Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete”. Acceptance or rejection of concrete shall be based on cylinders made from concrete sampled at point of discharge. Impact hammer, sonoscope or other nondestructive device may be permitted, but shall not be used as the sole basis for acceptance or rejection.

8. Extent of Testing:

   a. Class D: Air and slump tests shall be performed at a rate coinciding with strength tests. After 3 initial conforming sets of tests for each class of concrete, no additional tests are required. Individual reports need not be sent to A/E. A summary of test results shall be sent to A/E at completion of the Project. A/E shall be notified immediately by testing lab of non-conforming tests.

END OF SECTION 03 30 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work under this section includes labor, materials, equipment, and services to provide structural steel framing fabrication as shown on the Drawings and specified herein.

B. Structural steel includes elements defined as "Structural Steel" by the AISC "Code of Standard Practice for Steel Buildings and Bridges" plus field installed shear stud connectors and dowel bar anchors.

1.2 RELATED SECTIONS

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

B. Section 05 45 30: Supports and Anchors

C. Section 05 50 00: Metal Fabrication

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specification for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

B. Referenced codes and standards shall be those currently adopted by the Building Code enforced by the jurisdiction in which the Project is located, as of the date of these Contract Documents. Where no Building Code is enforced, referenced codes and standards shall be the most current published by the respective code bodies, unless noted otherwise.

C. General Building Code

1. International Building Code (IBC) 2015

D. American Institute of Steel Construction (AISC)

1. Specification for Structural Steel Buildings (2010)
2. Code of Standard Practice for Steel Buildings and Bridges (2010)
3. Manual of Steel Construction, Fourteenth Edition
4. Seismic Provisions for Structural Steel Buildings (2010)
5. Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications (2010)
6. Seismic Design Manual (2010)

E. Research Council on Structural Connections (RCSC)

1. Specification for Structural Joints Using High Strength Bolts (2009)

F. American Society for Testing and Materials (ASTM)

1. ASTM standards as noted in short form throughout the specification text.

G. American Welding Society (AWS):

1. AWS D1.1/D1.1M:2010 Structural Welding Code – Steel, except remove the following items from this reference:
   a. Section 7.5.5 in its entirety, including sub-sections, Table 7.2,
   b. Section 7.7.3, and other references to manual welding of shear stud connectors, headed concrete anchors, deformed bar concrete anchors and threaded base studs. Manual welding of these items is not permitted.
2. AWS D1.3/D1.3M:2008 Structural Welding Code - Sheet Steel
3. AWS A5.1/A5.1M:2004 Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding
4. AWS A5.5/A5.5M:2004 Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding
5. AWS A5.18/A5.18M-2005 Specification for Carbon Steel Electrodes and Rod for Gas Shielded Arc Welding
6. AWS A5.23/A5.23M:2007 Specification for Low-Alloy Steel Electrodes and Fluxes for Submerged Arc Welding

H. Steel Structures Painting Council (SSPC):

1. SSPC-SP 1 Solvent Cleaning
2. SSPC-SP 2 Hand Tool Cleaning
3. SSCP-SP 3 Power Tool Cleaning
4. SSPC-SP 6 Commercial Blast Cleaning
5. SSPC-SP 10 Near-White Blast Cleaning

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and with STS 01 33 00: Submittal Procedures.

B. Product Data: Submit product data, including manufacturer's specifications, installation instructions, and general recommendations for installation. Also include manufacturer's certification or other data substantiating that products comply with requirements of Contract Documents. Clearly identify product/model to be used.

C. Shop drawings: Submit clear, concise drawing showing model number, size, arrangement, and configuration of all products specified. Minimum sheet size is 8.5" X 11".

1. Include erection plans, setting diagrams, erection details showing work required for structural steel framing installation, type of steel, details of structural members including cuts, connections, camber, holes, and other modifications to base member. Indicate type, size, and length of bolts, distinguishing between shop and field bolts, and identifying pre-tensioned (PT) and slip-critical (SC) bolts. Indicate welds with standard AWS symbols, distinguishing between shop and field welds, and identifying size, length, and type of weld.
2. Approval will be for strength only and shall not relieve the Manufacturer of responsibility for proper fit of members and for supplying all material required by the Contract Documents.
3. Product data and installation instructions for Contractor proposed load indicator bolts or direct tension indicators.

D. Design Calculations: Prepared for review project design calculations; include design calculations for connections where design loads are noted on drawings or specifications.
   1. Design calculations shall bear the stamp and signature of a currently registered professional Engineer.

E. Test reports: Submit for acceptance, complete test reports from approved independent testing laboratories certifying that product conforms to performance characteristics and testing requirements specified herein. Include the result and evaluation of tests performed by a qualified testing agency on structural steel framing elements and on shear stud connectors and dowel bar anchors; applies to tests performed at the fabrication plant.
   1. Documentation of certification of the steel fabricator under the AISC Quality Certification Program.
   2. Mill certifications of structural steel shapes: prepared for review when specifically requested by Engineer; show heat number, chemical and mechanical properties and material test results of structural steel delivered to site.
   3. Mill certifications of high strength bolts, nuts and washers: prepared for review when specifically requested by Engineer; show chemical and mechanical properties, and bolt test results for fasteners delivered to site.
   4. Welder Certifications: prepared for review documents that structural steel welders performing work on Project are currently certified for welds and welding positions utilized in accordance with AWS D1.1 on the shop and field welding procedures to be used. Include welder and welding operator qualification test records, certifications
   5. Submit documentation showing conformance with Quality Assurance herein.

1.5 QUALITY ASSURANCE

A. Comply with the applicable provisions of the specifications, standards and documents listed under References, except as modified by this specification.

B. Testing Agency: Independent testing laboratory retained by the Owner and continuously engaged in testing similar that required for the Project for a period of not less than five years.

C. Welding: Qualify personnel and procedures according to AWS D1.1.

D. Source Quality Control

1. Structural steel shall be in accordance with the AISC Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design, including Supplement No. 1 and the Code of Standard Practice for Steel Buildings and Bridges, unless otherwise specified herein.

2. The steel fabricator shall be certified under the AISC Quality Certification Program.

3. Welds:

   a. Verify that welders performing work on the project are qualified according to AWS D1.1 for the welds being performed.

   b. Visually inspect fillet and partial penetration welds for appropriate size, length, and location. Perform appropriate non-destructive testing in accordance with AWS D1.1 on welds which appear defective.

   c. Perform one of the following inspection procedures on full penetration welds:

      1) Magnetic Particle Inspection: ASTM E709. Perform on root pass and on finished weld. Presence of cracks or zones of incomplete fusion or penetration shall be cause for rejection of weld.

      2) Ultrasonic Inspection: ASTM E164.

      3) Radiographic Inspection: ASTM E94.

4. Bolts:

   a. Visually inspect connection for proper number, size, and type of bolt, and for proper installation of hardened and plate washers.

   b. For bolted connections, inspection shall be made in accordance with the “Specification for Structural Joints Using High Strength Bolts”, paragraph 9.1. Where twist-off tension-control bolt assemblies are utilized in bolted connections not specifically identified as pre-tensioned (PT) or slip critical (SC), verify that splines have not been removed. If splines have been removed, bolts shall be removed, discarded, and replaced with properly tightened bolts.

   c. For bolts identified as pre-tensioned (PT), inspection shall be made in accordance with the “Specification for Structural Joints Using High Strength Bolts”, paragraphs 9.1 and 9.2.3. Additional inspection in accordance with paragraph 9.3 shall be made for bolts identified as slip critical (SC).

d. When pre-tensioning of high strength bolts is required, the Contractor shall provide a tension calibrator on site for pre-installation verification of fastener assemblies and bolt tensioning procedures. Where calibrated wrench pre-tensioning is used, each installation wrench shall be calibrated daily.

5. Shear Connectors, Headed/Deformed Bar Concrete Anchors and Threaded Base Studs:

a. Verify production test records for shear connectors, concrete anchors, and threaded studs.

b. A visual inspection shall be made of threaded studs prior to delivery. If visual inspection of a threaded stud reveals that a sound weld and a 360 degree flash has not been obtained for the threaded stud, the threaded stud shall be removed and replaced.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The Manufacture shall be responsible for the delivery of the equipment until it is incorporated in the completed project.

B. Handle materials to avoid bending, twisting or other damage resulting in permanent deformation.

C. Deliver materials to permit easy access for inspection and identification.

D. Deliver members off ground by placing on appropriate supports and spacers, adjusted to permit water to drain from parts. Provide protection of members from rust, corrosion and deterioration.

E. Deliver fasteners in sealed containers to protected items prior to installation.

F. Do not deliver material on completed or partially completed structure in a manner that might overload, cause distortion, or damage material or supporting structure.

1.7 WARRANTY

A. The Product and work shall be warranted against defects in material and workmanship for a period of one year. The warranty period shall begin after delivery, final inspection, and acceptance by the project Engineer and Owner.

PART 2 - PRODUCTS

2.1 SPECIFICATIONS

A. Design Criteria

1. Unless noted otherwise, steel to steel framing shall be designed for shear only and shall use standard framed beam connections (double clip angles) meeting the requirements of the AISC Manual of Steel Construction. Connections shall be symmetrical about the beam web.

2. Single plate shear tab connections meeting the requirements of the AISC Manual of Steel Construction may be substituted for standard framed beam connections (double clip angles) if and only if one of the following conditions are met:
    a. Connection is detailed as a single plate shear tab.
    b. Connections of beams to one side of a girder are matched by similar connections at similar spacing on the opposite side of the same girder.
3. Connections shall be designed for reactions shown on drawings. Where no reactions are shown, the connections shall be designed by the Manufacture to support 50 percent (for non-composite beams) or 50 percent times a multiplier (for composite beams) of the total uniform load capacity noted in the AISC Manual of Steel Construction for the given member size, span and grade of steel. Multipliers for composite beams are noted on drawings.
4. Provide a minimum of two ¾-inch diameter A325 or A490 bolts per connection.

B. Fabrication

1. Fabricate and assemble in shop to the greatest extent possible. Fabricate in accordance with AISC “Code of Standard Practice for Steel Buildings and Bridges”.
2. Fabricate items of structural steel according to approved Shop Drawings. Fabrication from Shop Drawings not approved by the Engineer is at the sole risk of the Fabricator.
3. Camber structural steel where noted. Where no camber is noted, beams shall be fabricated so that natural camber is upward in the erected condition.
4. Perform thermal cutting by machine. For cut edges to be welded, comply with AWS D1.1.
5. Combinations of bolts and welds on the same faying surface in the same connection are not permitted unless otherwise detailed.
6. Accurately finish ends of columns and other members transmitting bearing loads.
7. Required straightening of built-up sections shall be performed to minimize residual stresses.
8. Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members as shown on Structural Drawings or approved by Engineer.
9. Complete structural-steel assemblies before starting shop painting operations.
10. Properly mark materials for field assembly.
11. Welds:

a. Comply with AWS D1.1 for welding procedures, tolerances, appearance, and quality of welds, and for methods used in correcting welding work. Use only welders qualified in accordance with AWS D1.1 and possessing current valid welding certifications for the welds being performed.

b. Minimum fillet weld size shall be as specified by AISC for the thickness of the thinner part joined, but in no case less than 3/16 inch.

c. Perform welding to minimize residual stress and external distortion of welded assembly.

d. Provide backing bars and run-off tabs for full penetration welds. Remove backing bars and run-off tabs after completion of welds.

12. Bolts:

a. Provide drilled or punched holes perpendicular to surface for shop and field bolted connections. Oversize or slotted holes shall not be used for connections unless specifically noted.

b. Shop bolted connections shall use high strength bolts and nuts and shall be installed “snug tight” as defined by RCSC unless noted otherwise. Washers are required where the outer face of the joint slopes greater than 1:20 with respect to the axis of the bolt, or where a slotted hole occurs in an outer ply.

c. Twist-off tension-control bolt assemblies shall be used for connections designated as pre-tensioned or slip-critical and may be used for other connections. Unless connection is designated as pre-tensioned (PT) or slip-critical (SC), bolts shall be tightened only to “snug tight” condition as defined by RCSC, and spline shall not be removed from bolt assembly.

13. Shear Connectors, Headed/Deformed Bar Concrete Anchors and Threaded Base Studs:

a. Remove paint on surfaces to receive connectors/anchors/studs.

b. Install in accordance with manufacturers’ recommendations using automatically timed welding equipment as furnished by TRW, Nelson Division. Hand operated shielded metal arc welding is not permitted.

c. Adjust equipment on trial installations until sound anchorages are obtained. A minimum of two successive trial installations for each type of anchor used shall be successfully welded and tested by visual inspection and by bending approximately 30 degrees before beginning production. Record settings used during successful installation, including date and time of test and name of installer. Trials shall be conducted by each installer. Trial installations shall not be used for production.

d. If there is a change in the power source, gun lift and plunge settings, welding lead length, current settings or time settings in excess of 5%, equipment shall be re-adjusted by conducting new trials.

e. Ferrules shall be removed after installation to facilitate inspection.

C. Factory Finishes

1. Painting:

a. After inspection and before shipping, clean steel work to be painted to remove oil, grease and similar contaminates complying with SSPC SP 1. Further cleaning shall be in accordance with paint manufacturer's requirements, but in no case less than the following:

1) For interior members not exposed to view use SSPC SP 2 or SSPC SP 3.

2) For interior members exposed to view use SSPC S10.

3) For exterior members exposed to atmosphere, and for faying surfaces of members at connections designated as slip-critical (SC) use SSPC SP 6 or SSPC SP 10.

b. Shop paint structural steel except:

1) Embedded portion of member further than 2 inches from surface of concrete or mortar in which it is embedded.

2) Surfaces of members to receive field applied shear studs, dowel bar anchors, or similar welded attachments.

3) Contact surfaces which are to be field welded.

4) Faying surfaces of members where a slip-critical connection is required. Protect faying surfaces from overspray during painting operations.

c. Apply structural steel primer paint in accordance with manufacturer's instructions, but in no case at a rate less than that which provides a uniform dry film thickness of 1.0 mil minimum for interior unexposed and exposed steel and exterior steel.

d. Use painting methods which result in coverage of joints, corners, edges and exposed surfaces. Stripe paint corners, crevices, bolts, welds, and sharp edges. Stripe paint shall set to touch before applying primer coat.

2.2 MATERIALS

For all structural steel fabrication and construction, latest AISC handbooks and codes shall apply. all steel fabrication is required to be completed by an approved steel fabricator recognized by the building department.

ASTM A-36, except as follows: wide flange sections, ASTM A992 grade 50; pipe sections, ASTM A-53 grade B; tube sections, ASTM A-500 grade B.

Anchor bolts, ASTM F1554 grade 36 uno; high strength bolts, A-325-X or A-325-SC per schedules. minimum embedment of all bolts in grout or concrete shall be 8" including bolt head or 5" with a standard hook. Welded anchors and shear connectors shall be ICC approved.

Unless otherwise noted, minimum connection shall be: (2) 3/4"ø bolts or 3/16" fillet weld 4" long, using 1/4" connection material and detailed to minimize bending in the connection.

PART 3- EXECUTION

3.1 MANUFACTURER'S RESPONSIBILITY

A. The Manufacture is responsible for furnishing and delivering the Product including necessary storage recommendations for the proper installation and operation of Product.

3.2 EXAMINATION

A. Examine all products for compliance with this section prior to packing for delivery.

B. Proceed with shipping and packing requirements only after unsatisfactory conditions have been corrected.

C. Do not proceed with delivery until conditions not in conformance with the Contract Documents have been corrected.

END OF SECTION 05 12 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 05 45 30
SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Extent of supports and anchors required by this section is indicated on drawings and/or specified in other sections.

B. Types of supports and anchors specified in this section include the following:

1. Saddles and Shields
2. Miscellaneous Materials
3. Anchors
4. Equipment Supports

C. Supports and anchors furnished as part of factory-fabricated equipment are specified as part of equipment assembly in other sections.

1.2 RELATED SECTIONS

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

B. Section 01 78 39: Project Record Documents

C. Section 01 33 00: Submittal Procedures

1.3 REFERENCES

A. Code Compliance: Comply with applicable building, mechanical and plumbing codes pertaining to product materials and installation of supports and anchors.

B. UL and FM Compliance: Provide products which are UL-listed and FM approved.

C. MSS Standard Compliance:

1. Provide pipe hangers and supports of which materials, design, and manufacture comply with MSS SP-58.
2. Select and apply pipe hangers and supports, complying with MSS
3. Fabricate and install pipe hangers and supports, complying with MSS SP-89.
4. Terminology used in this section is defined in MSS SP-90.

D. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specification for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

A. General: Submit listed submittals in accordance with conditions of the Contract and with Specification 01 33 00.

B. Product Data: Submit product data, including manufacturer's specifications, installation instructions, and general recommendations for installation. Also include manufacturer's certification or other data substantiating that products comply with requirements of Contract Documents. Clearly identify product/model to be used.

C. Test Reports: Submit for acceptance, complete test reports from approved independent testing laboratories certifying that product conforms to performance characteristics and testing requirements specified herein.

D. Shop drawings: Submit clear, concise drawing showing model number, size, arrangement and configuration of all products specified. Minimum sheet size is 8.5" X 11".

1.5 DELIVERY, STORAGE AND HANDLING

A. The CONTRACTOR shall be responsible for the safe storage of the equipment until it is incorporated in the completed project.

1.6 WARRANTY

A. The PRODUCT and work shall be warranted against defects in material and workmanship for a period of one year. The warranty period shall begin after final inspection and acceptance by the project ENGINEER.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work, include, but are not limited to, the following:

1. Kin-Line, Inc.
2. Fee & Mason Mfg. Co.; Div. Figgie International
3. ITT Grinnel Corp.
4. B-Line Inc.
5. Ellen Metal Products
6. Or Engineer Approved Equal
7. Saddle and Shield Manufacturer: Subject to compliance with requirements, provide thermal hanger shields of one of the following:
    a. Elcen Metal Products Co.
    b. Pipe Shields, Inc.
    c. Or Engineer Approved Equal

B. Substitutions/or equal: If alternative manufacturers other than the pre-approved manufacturer are proposed for any specified equipment in this section, the CONTRACTOR/bidder must supply a submittal; refer to STS 01 33 00.

2.2 MATERIALS

A. Horizontal-Piping Hangers and Supports:

B. Vertical-Piping Clamps:

C. Hanger-Rod Attachments:

D. Saddles and Shields:

1. General: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

2. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.

3. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

4. Thermal Hanger Shields: Constructed of 360 degrees insert of high density, 100 psi, water-proofed calcium silicate, encased in 360 degrees sheet metal shield. Provide assembly of same thickness as adjoining insulation.

E. Metal Framing: Provide products complying with NEMA STD ML 1.

F. Steel Plates, Shapes and Bars: Provide products complying with ASTM A 36.

G. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration. Use Embeco grout (O.E.A.E) for non-shrink applications.

H. Heavy Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS standards.

I. Pipe Guides: Provide factory-fabricated guides, of cast semi- steel or heavy fabricated steel, consisting of bolted two-section outer cylinder and base with two-section guiding spider bolted tight to pipe. Size guide and spiders to clear pipe and insulation (if any), and cylinder. Provide guides of length recommended by manufacturer to allow indicated travel.

PART 3- EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

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. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed.

B. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

C. Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with CONTRACTOR, installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and ENGINEER for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.3 INSTALLATION

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.

B. Hangers and Supports:

C. Anchors:

1. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer for loading and stresses to connected equipment.

2. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.

3. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions, to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

4. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required accommodating both expansion and contraction of piping.

D. Equipment Supports:

1. Provide concrete housekeeping bases for all floor mounted equipment furnished. Size bases to extend a minimum of 4" beyond equipment base in any direction; and 4" above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer's templates. Chamfer top and edge corners.
2. Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands.
3. Furnish roof equipment supports to CONTRACTOR for installation as part of work.

E. Coating:

1. Paint as specified in STS 09 90 00.

3.4 ADJUSTMENT AND CLEANING:

A. Hanger Adjustment:

B. Support Adjustment: Provide grout under supports to bring piping and equipment to proper level and elevations.

C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.5 PROTECTION

A. High Humidity and Outside Areas: Use cadmium plated or galvanized hangers, channels, angle iron, attachments, rods, nuts, bolts and other accessories in press room, truck area, and other high humidity areas and for supports located exposed outside.

END OF SECTION 05 45 30

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 05 50 00
METAL FABRICATIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. The work under this section includes all labor, materials, equipment and services to provide complete installation as shown on the Drawings and specified herein.

B. Metal fabrications include elements defined as "Other Steel, Iron or Metal Items" by the AISC "Code of Standard Practice for Steel Buildings and Bridges", including anchorages and attachments, and not otherwise included in the Project specifications.

C. Includes:

1. Industrial-type stairs with steel grating treads
2. Floor grating and Walkways
3. Guardrails and Handrails

1.2 RELATED SECTIONS

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

B. Section 03 11 00: Concrete Forming

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Governments Uniform Standard Specification for Public Works Construction etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

B. Referenced codes and standards shall be those currently adopted by the building code having jurisdiction over the Project as of the date of these Contract Documents. Where no building code exists, referenced codes and standards shall be the most current standard, unless specifically noted otherwise below.

C. Comply with provisions of the following standards except as modified by these specifications.

D. General Building Code.

E. American Institute of Steel Construction (AISC) Specification for Structural Steel Buildings (1989) Code of Standard Practice for Steel Buildings and Bridges Seismic Provisions for Structural Steel Buildings.

F. Research Council on Structural Connections Specification for Structural Joints Using ASTM A325 or A490 Bolts.

G. American Society for Testing and Materials (ASTM) standards as noted throughout the specification text.

1. American Welding Society (AWS): AWS D1.1 Structural Welding Code – Steel, except remove the following from this reference: Section 7.5.5 in its entirety, including all sub-sections, Table 7.2, Section 7.7.3, and all other references to manual welding of shear stud connectors and similar items such as dowel bar anchors. Manual welding of these items is not permitted.

2. AWS D1.3 Structural Welding Code - Sheet Steel

3. Additional AWS specifications as noted throughout the specification text

H. National Association of Architectural Metal Manufacturers (NAAMM) Metal Stairs Manual

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. Refer to ASTM E985 for railing-related terms that apply to this section.

B. Refer to the NAAMM publications listed in Article 1.02 "References" for definition of terms that apply to this section.

1.5 SUBMITTALS

A. Product Data: prepared for review and approval; include manufacturer's data for each product.

B. Shop Drawings: prepared for review and approval; prepared under supervision of a Professional Engineer licensed in New Mexico; include erection plans, setting diagrams, erection details showing work required for complete structural steel framing installation, type of steel, details of structural members including cuts, connections, camber, holes, and other modifications to base member. Indicate type, size and length of bolts, distinguishing between shop and field bolts, and identifying fully tensioned bolts. Indicate welds with standard AWS symbols, distinguishing between shop and field welds, and identifying size, length and type of weld.

C. Instructions: Submit manufacturer's instructions and recommendations for assembly of Metal Fabrications.

1. Include erection drawings, elevations and details where applicable.

2. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories.

3. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

D. Field Reports: Structural welding shall be inspected if not completed in an approved fabricators shop.

E. Calculations: prepared for review; include design calculations for connections where design loads are noted on drawings, signed and sealed by a Professional Engineer licensed in Arizona.

F. Mill certifications of structural steel shapes: prepared for review; show heat number, chemical and mechanical properties and material test results of structural steel delivered to site.

G. Mill certifications of high strength bolts, nuts and washers: prepared for review; show chemical and mechanical properties, and bolt test results for fasteners delivered to site.

H. Welder Certifications: prepared for review; document that structural steel welders performing work on Project are currently certified for welds and welding positions utilized.

I. Weld Procedure Qualification Test Records: prepared for review; document record of successful testing by welder performing welds for joints used which are not pre-qualified by AISC.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Industrial-Type Stairs: Industrial class.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE AND HANDLING

A. Handle materials to avoid bending, twisting or other damage resulting in permanent deformation.

B. Store materials to permit easy access for inspection and identification.

C. Store members off ground by placing on appropriate supports and spacers, adjusted to permit water to drain from parts. Protect members from rust, corrosion and deterioration.

D. Store fasteners in a protected place. Clean and re-lubricate bolts and nuts that become dirty or dry before use.

E. Do not store material on completed or partially completed structure in a manner that might overload, cause distortion, or damage material or supporting structure.

1.8 PROJECT CONDITIONS

A. Environmental Requirements: Comply with environmental requirements and recommendations of manufacturer for proper installation of products.

B. Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than minus 15 degrees C 5 degrees F above the dew point of the surrounding air, or when surface temperature is below 7 degrees C or over 35 degrees C 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

C. Field Measurements and Conditions: 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.

1.9 SEQUENCING AND SCHEDULING

A. Sequencing and Scheduling. General: Refer to sequence requirements specified in Section 01 11 00 – Summary of work and construction progress schedule requirements specified in Section 01 33 00 – Submittals Procedures.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Grout

1. Subject to compliance with requirements, products which may be incorporated into the work include, but are not limited to the following:
   a. "Masterflow 928 Grout" by Master Builders.
   b. "Crystex" by L & M Construction Chemicals, Inc.
   c. "Supreme Grout" by Gifford-Hill Company.
   d. "Non-Ferrous, Non-Shrink Grout" by the Burke Company
   e. ENGINEER approved equal

2.2 MATERIALS

A. Rolled steel plates, shapes and bars, tubular steel and bolts shall be of domestic manufacture and shall be clean and free of rust and pitting.

B. Raised-Pattern Floor Grating

1. NAAMM MBG 531, band edges of grating with bars of the same size as the bearing bars. Weld banding in accordance with the manufacturer's standard for trim, unless otherwise indicated. Design tops of bearing bars, cross or intermediate bars to be in the same plane and match grating finish.
2. Anchor gratings to structural members with bolts, toggle bolts, or expansion shields and bolts.
3. Slip resistance requirements must exceed both wet and dry a static coefficient of friction of 0.6.
   a. Surface: Serrated

C. Steel Structural Shapes:

1. Shall conform to ASTM A 6 and A 36.

D. Pipe:

1. Shall Be Welded And Seamless Steel Pipe Conforming To ASTM A 53, Type S, Grade B, Schedule 40, plain finish.

E. Structural Tubing:

1. Shall be size indicated, 3/16 inch minimum wall thickness conforming to ASTM A 500, Grade B.

F. Bolts, Nuts and Washers:

1. Shall be high strength steel type conforming to ASTM A 325 unless noted otherwise.

G. Welding Materials:

1. Shall be applicable AWS D1.1, type required for materials being welded.

H. Sleeve Nuts:

1. Shall be comparable strength to ASTM A 325 bolts (heat treated Grade 12 to 115,000 PSI is acceptable).

I. Primer Paint:

1. Exterior Exposure: Shall be "4-55, Versare" by Tnemec Company, Inc.

J. Non-Shrink Grout:

1. General: ASTM C1107.
2. Use: For grouting column baseplates, equipment mounted on concrete foundations and elsewhere as shown or specified.
3. Expansion: Submit manufacturer's certification and test results that proposed material is expansive at water contents proposed for use.
4. Grout thickness: 2 inches unless shown otherwise.

2.3 FABRICATION

A. Any fabrications from Shop Drawings that have not been approved by Engineer are at fabricator's own risk.

B. Verify dimensions on site prior to shop fabrication.

C. Fit and shop assemble sections in largest practical sizes.

D.

PART 3– EXECUTION

3.1 EXAMINATION

A. Examine Project conditions and completed Work.

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.

D. Obtain Engineer's permission prior to site cutting or making adjustments which are not part of scheduled work.

3.2 INSTALLATION

A. Perform field welding in accordance with AWS D1.1.

B. Supply to appropriate sections, items requiring to be cast into concrete or embedded in masonry complete with necessary setting templates.

C. Accurately form and fit components and connections. Grind exposed edges and welds smooth and flush.

D. Install items square and level, accurately fitted and free from distortion or defects.

E. Make provision for erection stresses by temporary bracing. Keep work in alignment.

F. Accurately form components required for proper anchorage of stairs and landings and integral railings to each other and to building structure.

G. Grind exposed welds smooth and flush with adjacent finished surfaces.

H. Make exposed joints flush butt type hair line joints where mechanically fastened.

I. Supply components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication unless otherwise specified in Schedule.

J. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to prime painting.

K. Prime paint items as scheduled. Do not shop prime surfaces in contact with concrete or requiring field welding. Shop prime 1 coat at a rate to provide a uniform dry film thickness of 2.0 mils.

3.3 FIELD QUALITY CONTROL

A. Field Testing and Inspection: Field inspection will be performed as specified in Structural Drawing General Notes.

B. Corrective Actions: Replace or repair Work to eliminate defects, deficiencies and irregularities.

3.4 ADJUSTMENT AND CLEANING

A. Labels and Coverings: Remove all labels and protective coverings from completed Work.

B. Adjustment: Check operation of functioning components and make adjustments for proper operation.

C. Cleaning: Thoroughly clean the Work specified in this Section and adjoining surfaces and areas affected by installation.

D. After installation, touch up field welds and scratched and damaged prime painted surfaces. Use a primer consistent with shop coat.

E. Replace items damaged in course of installation.

3.5 SCHEDULE

A. Carpenter's iron work

END OF SECTION 05 50 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 09 97 00
SPECIAL COATINGS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. This section includes materials and application of painting and coating systems for the following interior and exterior surfaces:

1. Exposed metal.
2. Buried metal.
3. Metal in contact with concrete.

1.2 RELATED SECTIONS

A. STS 05 12 00: Structural Steel Framing

B. STS 33 05 24: Steel Utility Pipe

C. Standard Specification 530

1.3 REFERENCES

A. Where all or part of a Federal, American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), Standard Specifications, etc., standard is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1. ASTM:
   a. ASTM D 520: Standard Specification for Zinc Dust Pigment
   b. ASTM D 4417: Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel
   c. ASTM E 337: Standard Practice Test Method for Measuring Humidity with a Psychrometer
   d. ASTM D2200: Standard Methods of Evaluating Degree of Rusting on Painted Surfaces
   e. ASTM D6386: Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
2. ANSI (American National Standards Institute)
   a. ANSI/ASC 29.4 Exhaust Systems: Abrasive Blasting Operations – Ventilation and Safe Practice
   b. ANSI/NSF Standard 61: Drinking Water Components

3. AWWA (American Water Works Association)
    a. AWWA D 102: Coating Steel Water Storage Tanks
    b. AWWA C 203: Coal-Tar Protective Coatings and Linings for Steel Water Pipelines—Enamel and Tape—Hot Applied
    c. AWWA C 210: Liquid- Epoxy Coatings Systems for the Interior and Exterior of Steel Water Pipelines
    d. AWWA C 213: Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
    e. AWWA C 214: Tape Coating Systems for the Exterior of Steel Water Pipelines
4. Consumer Product Safety Act, Part 1303
5. ICRI (International Concrete Restoration Institute)
    a. Technical Guideline No. 310.2-1997: Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays
6. NACE International
    a. NACE Publication TPC2: Coatings and Linings for Immersion Service: Chapter 1 Safety, Chapter 2 Surface Preparation, Chapter 3 Curing, and Chapter 4 Inspection.
    b. NACE Standard SP0178: Standard Recommended Practice- Fabrication Details, Surface Finish Requirements and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service.
    c. NACE Standard SP0188: Standard Recommended Practice – Discontinuity (Holiday) Testing of Protective Coatings.
    d. NACE Standard RP0287: Field Measurement of Surface Profile of Abrasive Blast-Cleaned Steel Surfaces Using a Replica Tape.
    e. NACE Standard RP0288: Standard Recommended Practice, Inspection of Linings on Steel and Concrete.
7. OSHA (Occupational Safety & Health Administration)
    a. 1915.35: Standards – 29 CFR – Painting
8. SSPC (Society for Protective Coating)
    a. SSPC-SP2: Hand Tool Cleaning
    b. SSPC-SP3: Power Tool Cleaning
    c. SSPC-SP11: Power Tool Cleaning to Bare Metal
    d. SSPC-SP13: Surface Preparation of Concrete
    e. SSPC-PA-1: Shop, Field and Maintenance Painting

f. SSPC-PA-2: Measurement of Dry Film Thickness with Magnetic Gages

g. SSPC-PA-3: Guide to Safety in Paint Application

h. SSPC-Guide 12: Guide for Illumination of Industrial Painting Project

i. SSPC-VIS 1-89: Pictorial Surface Preparation Standards for Painting Steel Surfaces

j. SSPC Paint Spec 36: Two Component Weatherable Aliphatic Polyurethane Topcoat, Performance-Based

9. SSPC/NACE Joint Standards

a. SSPC-SP5/NACE 1: White Metal Blast Cleaning

b. SSPC-SP6/NACE 3: Commercial Blast Cleaning

c. SSPC-SP7/NACE 4: Brush-Off Blast Cleaning

d. SSPC-SP10/NACE 2: Near-White Metal Blast Cleaning

e. SSPC-SP13/NACE 6: Surface Preparation of Concrete

10. NAPF (National Association of Pipe Fabricators)

a. NAPF 500-03-01: Solvent Cleaning

b. NAPF 500-03-04: Abrasive Blast Cleaning for Ductile Iron Pipe

c. NAPF 500-03-05: Abrasive Blast Cleaning for Cast Ductile Iron Fittings

B. The ENGINEER'S decision shall be final as the interpretation and/or conflict between any of the referenced specifications and standards contained herein.

1.4 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. SSPC: Society for Protective Coatings (formerly Structural Steel Paint Council).

B. SP-XX: Surface preparation requirement where XX is a number from 1 to 13 that establishes a minimum degree of cleanliness and surface profile of the material being coated. See paragraph 3.02.E.

C. SSPC SP-XX: Same as SP-XX.

D. Corrosive Environment: For the purposes of this specification, a corrosive environment is one that is exposed to swage, septage, and is exposed to repeated wet/ dry cycles such as wet wells or valve vaults.

1.5 SUBMITTALS

A. Product Data: Submit product data, including manufacturer's specifications, instillation instructions, and general recommendations for installation. Also include manufacturer's certification or other data substantiating that products comply with requirements of Contract Documents. Clearly identify product/model to be used. Manufacturer's data sheet shall include the following:

1. Percent solids by volume.
2. Minimum and maximum recommended dry-film thickness per coat for prime, intermediate, and finish coats.
3. Recommended surface preparation.
4. Recommended thinners.
5. Statement verifying that the specified prime coat is recommended by the manufacturer for use with the specified intermediate and finish coats.
6. Application instructions including recommended equipment and temperature limitations.
7. Curing requirements and instructions.

B. Shop drawings: Submit clear, concise drawings showing model number, size, arrangement and configuration of all products specified. Minimum sheet size is 8.5" x 11".

C. Manufacturer's Samples: Submit color swatches for all paints and coatings.

D. Submit certificate identifying the type and gradation of abrasives used for surface preparation.

E. Submit material safety data sheets for each coating.

1.6 QUALITY ASSURANCE

A. General: Quality assurance procedures and practices shall be utilized to monitor all phases of surface preparation, application and inspection throughout the duration of the project. Procedures or practices not specifically defined herein may be utilized provided they meet recognized and accepted professional standards and are approved by the ENGINEER.

B. Surface Preparation: Surface preparation will be based upon comparison with: "Pictorial Surface Preparation Standards for Painting Steel Surfaces: SSPC-VIS 1-89", ASTM Designation D2200-95, "Pictorial Surface Preparation Standards for Painting Steel Surfaces", ASTM D 4419-91, Method A and/or Method C "Field Measurement of Surface Profile of Blast Cleaned Steel" or NACE Standard RP0287-87 "Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape". Surface preparation of concrete will be based on comparison with ICRI Technical Guideline 310.2-1997 comparators in conjunction with SSCP-SP13. In all cases the written standard shall take precedence over the visual standard. In addition, NACE Standard SP0178, "Fabrication Details, Surface Finish Requirements, and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service", along with the Visual Comparator, shall be used to verify the surface preparation of welds.

C. Coating Thickness: Thickness of coatings and paint shall be measured checked according to the procedures outlined in SSPC-PA 2 “Measurement of Dry Film Thickness with Magnetic Gages”, May 2012 Edition. Dry film thickness shall be a Level 2 as defined in Paragraph 9.2, excepting that no single gage reading shall be less then 80% of the specified dry film thickness. Areas that fail to meet these criteria shall be corrected at no expense to the OWNER. Use of an instrument such as a Tooke Gauge, precision groove grinder, etc. is permitted if a destructive test is deemed necessary by the ENGINEER and the total DFT is less than 50 mils.

D. Holiday (Pinhole) Testing: The integrity of coated surfaces scheduled for immersion shall be tested for holidays in accordance with NACE Standard SP0188. For dry films less than 20 mils, a non-destructive holiday detector shall not exceed 67.5 volts, nor shall destructive holiday detector exceed the voltage recommended by the manufacturer of the coating system. A solution of 1 ounce non-sudsing type wetting agent, such as Kodak Photo-Flo, and 1 gallon of tap water shall be used to perform the holiday testing. For coating thickness at 20 mils and greater, a high voltage Tinker & Rasor AP/W holiday tester shall be used. Contact coating manufacturer for voltage recommendations and curing parameters.

E. All pinholes and/or holidays shall be marked and repaired in accordance with the manufacturer’s printed recommendations and retested. No pinholes or other irregularities will be permitted in the final coating.

F. Inspection Devices: The CONTRACTOR shall furnish, until final acceptance of coating and painting is accepted, inspection devices in good working condition for detection of holidays and measurement of dry film thickness of coating and paint. The CONTRACTOR shall also furnish US Department of Commerce, National Bureau of Standards certified thickness calibration plates and/or plastic shims, depending upon the thickness gauge used, to test the accuracy of dry film thickness gauges and certified instrumentation to test the accuracy of holiday detectors. Dry film gauges and holiday detectors shall be make available for the ENGINEER’S use at all times until final acceptance of application. Holiday detection devices shall be operated in the presence of the ENGINEER.

G. Inspection: Inspection for this project shall consist of “hold point” inspections. The ENGINEER or ENGINEER’S Representative shall inspect the surface prior to abrasive blasting, after abrasive blasting but prior to application of coating materials, and between subsequent coats of material. Final inspection shall take place after all coatings are applied, but prior to placing the tank in service. CONTRACTOR will insure that sufficient rigging is in place so that the ENGINEER or ENGINEER’S Representative shall be able to conduct the required inspections.

H. Warranty Inspection: Warranty inspection shall be conducted during the eleventh month following acceptance of all coating and painting work. All defective work shall be repaired in accordance with this specification and to the satisfaction of the ENGINEER and/or OWNER.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Acceptance at Site: All materials shall be brought to the jobsite in original sealed containers. They shall not be used until the ENGINEER or ENGINEER'S Representative has inspected the contents and obtained data from information on containers or labels. Materials exceeding storage life recommended by the manufacturer shall be rejected.

B. Storage and Protection: All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings and paints must be stored to conform with City, County, State and Federal safety codes for flammable coatings or paint materials. At times coatings and paints shall be protected from freezing.

1.8 PROJECT CONDITIONS

A. Temperature and Weather Conditions: No coating or paint shall be applied when:

1. The surrounding air temperature or the temperature of the surface to be coated or painted is below the minimum surface temperature for the products specified herein.
2. Rain, snow, fog or mist is present.
3. The surface temperature is less than 5F above the dew point.
4. Do not apply paint when the relative humidity is above 85%.
5. Do not paint when temperature of metal to be painted is above 120°F.
6. Do not apply alkyd paints if air or surface temperature is below 40°F or expected to be below 40°F within 24 hours.
7. Do not apply epoxy on an exterior or interior surface if air or surface temperature is below 60°F or expected to drop below 60°F in 24 hours.
8. The air temperature is expected to drop below the minimum temperature for the products specified within six hours after application of coating.
9. Dew point shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with US Department of Commerce Weather Bureau Psychometric Tables. If any of the above conditions are prevalent, coating or painting shall be delayed or postponed until conditions are favorable. The day's coating or painting shall be completed in time to permit the film sufficient drying time prior to damage by atmospheric conditions.

PART 2– PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturer's to be considered who offering products that may be incorporated into the work, including but not limited to the following:

1. Tnemec Company

2. Sherwin Williams

3. Engineer Approved Equal

B. Substitutions/or Equals: If alternative manufacturer's other than the pre-approved manufacturer are proposed for any specified coating or paints in this section, the CONTRACTOR/bidder must follow the substitution process in STS 01 25 00 and the General Conditions.

C. Although the brands listed herein are the preferred brands, it is not the intent to the OWNER for these specifications to be proprietary; equals will be evaluated in accordance with comparable quality, construction, strength, durability, and suitability for the purpose intended and are listed for describing the standard of quality performance and characteristics.

2.2 MATERIALS

A. The following index lists the various painting and coating systems by service and generic type: Paint Coating System Index

1. Submerged Metal Coating System

a. Submerged Metal, Potable or Non-Potable Water

1) Epoxy

2) Or as otherwise indicated in the construction drawings

b. Exposed Metal, Corrosive Environment:

1) High-build epoxy (two-coat system) with polyurethane top coat

2) Or as otherwise indicated in the construction drawings

2. Buried Metal Coating Systems

a. Buried Metal

1) Epoxy

2) Or as otherwise indicated in the construction drawings

B. These systems are specified in detail in the following paragraphs. For each coating, the required surface preparation, prime coat, intermediate coat (if required), topcoat, and coating thicknesses are described. Mil thicknesses shown are minimum dry-film thicknesses.

2.3 SUBMERGED METAL COATING SYSTEMS

A. Submerged Metal, Potable or Nonpotable Water:

1. Type: Epoxy.

2. Service Conditions: For use with structures, valves, piping, or equipment immersed in potable or nonpotable water.

3. Surface Preparation: SSPC SP-10.

4. Coating System: Apply the manufacturer's recommended number of coats to attain the specified minimum coating thickness. Products: Tnemec Series N140, Carboline Carboguard 891R, Sherwin Williams Macropoxy 646 PW, or equal; 20 mils total. Color of topcoat: white. Each coat shall be different color than the one preceding it.

B. Exposed Metal, Corrosive Environment:

1. Type: High-build epoxy intermediate coat having a minimum volume solid of 60%, with an inorganic zinc prime coat and a pigmented polyurethane finish coat having a minimum volume solids of 52%.

2. Service Conditions: For use with metal structures or pipes subjected to water condensation; chemical fumes, such as hydrogen sulfide; salt spray; and chemical contact.

3. Surface Preparation: SSPC SP-10.

4. Prime Coat: Self-curing, two-component inorganic zinc-rich coating recommended by the manufacturer for overcoating with a high-build epoxy finish coat. Minimum zinc content shall be 12 pounds per gallon. Apply to a thickness of 3 mils. Products: Tnemec 90-97, Carboline Carbozinc 11 HS, Sherwin-Williams Zinc Clad II Plus, or equal.

5. Intermediate Coat: Tnemec 104, Carboline Carboguard 888 or 890, Sherwin-Williams Macropoxy 646, or equal; 5 mils.

6. Finish Coat: Two-component pigmented acrylic or aliphatic polyurethane recommended by the manufacturer for overcoating a high-build epoxy coating. Apply to a thickness of at least 2 mils. Products: Tnemec Series 1075, Carboline Carbothane 134 HG, Sherwin-Williams Hi-Solids Polyurethane, or equal.

2.4 BURIED METAL COATING SYSTEMS

A. Buried Metal:

1. Type: High solids epoxy or phenolic epoxy having a minimum volume solids of 80% (ASTM D 2697).

2. Service Conditions: Buried metal, such as valves, flanges, bolts, nuts, structural steel, and fittings.

3. Surface Preparation: SSPC SP-10.

4. Coating System: Apply three or more coats of Tnemec 104 HS, Carboline Carboguard 890LT, Sherwin-Williams Tank Clad HS, or equal; 30 mils total. Maximum thickness of an individual coating shall not exceed the manufacturer's recommendation.

2.5 ABRASIVES FOR SURFACE PREPARATION

A. Abrasives used for preparation of ferrous (excluding stainless steel) surfaces shall be one of the following:

1. 16 to 30 or 16 to 40 mesh silica sand or mineral grit.
2. 20 to 40 mesh garnet.
3. Crushed iron slag, 100% retained on No. 80 mesh.
4. SAE Grade G-40 or G-50 iron or steel grit.

B. In the above gradations, 100% of the material shall pass through the first stated sieve size and 100% shall be retained on the second stated sieve size.

2.6 MIXES

A. Store and mix materials only in areas designated for that purpose by the Owner's Representative. The area shall be well-ventilated, with precautionary measures taken to prevent fire hazards. Post "No Smoking" signs. Storage and mixing areas shall be clean and free of rags, waste, and scrapings. Tightly close containers after each use. Store paint at an ambient temperature from 50°F to 100°F.

B. Prepare multiple-component coatings using all of the contents of the container for each component as packaged by the paint manufacturer. Do not use partial batches. Do not use multiple-component coatings that have been mixed beyond their pot life. Provide small quantity kits for touch-up painting and for painting other small areas. Mix only the components specified and furnished by the paint manufacturer. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine surfaces scheduled to receive paint and coatings for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into an acceptable condition through preparatory work. Report unsatisfactory conditions to the ENGINEER.

B. Do not proceed with surface preparation or coating application until conditions are suitable.

C. Immediately correct all deficiencies and conditions which would cause improper execution of Work specified in this Section and subsequent Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

1. 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. Remove oil and grease from metal surfaces in accordance with SSPC SP-1. Use clean cloths and cleaning solvents and wipe dry with clean cloths. Do not leave a film or greasy residue on the cleaned surfaces before abrasive blasting.

B. Remove weld spatter and weld slag from metal surfaces and grind smoothly rough welds, beads, peaked corners, and sharp edges including erection lugs in accordance with SSPC SP-2 and SSPC SP-3. Grind 0.020 inch (minimum) off the weld caps on pipe weld seams. Grind outside sharp corners, such as the outside edges of flanges, to a minimum radius of 1/4 inch.

C. Do not abrasive blast or prepare more surface area in one day than can be coated in one day; prepare surfaces and apply coatings the same day. Remove sharp edges, burrs, and weld spatter.

D. For carbon steel, do not touch the surface between the time of abrasive blasting and the time the coating is applied. Apply coatings within two hours of blasting or before any rust bloom forms.

E. Surface preparation shall conform with the SSPC specifications as follows:

1. Solvent Cleaning: SP-1
2. Hand Tool Cleaning: SP-2
3. Power Tool Cleaning: SP-3
4. White Metal Blast Cleaning: SP-5
5. Commercial Blast Cleaning: SP-6
6. Bush-Off Blast Cleaning: SP-7
7. Pickling: SP-8
8. Near-White Blast Cleaning: SP-10
9. Power Tool Cleaning to Bare Metal: SP-11
10. Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultrahigh Pressure Water Jetting Prior to Recoating: SP-12
11. Surface Preparation of Concrete: SP-13

F. Wherever the words “solvent cleaning,” “hand tool cleaning,” “wire brushing,” or “blast cleaning” or similar words are used in these specifications or in paint manufacturer’s specifications, they shall be understood to refer to the applicable SSPC (Steel Structure Painting Council), surface preparation specifications listed above.

G. For carbon steel surfaces, after abrasive blast cleaning, the height of the surface profile shall be 2 to 3 mils. Verify the surface profile by measuring with an impresser tape acceptable to the Owner’s Representative. Perform a minimum of one test per 100 square feet of surface area. Testing shall be witnessed by the Owner’s Representative. The impresser tape used in the test shall be permanently marked with the date, time, and locations where the test was made. Test results shall be promptly presented to the Owner’s Representative.

H. Do not apply any part of a coating system before the Owner's Representative has reviewed the surface preparation. If coating has been applied without this review, if directed by the Owner's Representative, remove the applied coating by abrasive blasting and reapply the coat in accordance with this specification.

I. Abrasive Blast Cleaning

1. Use dry abrasive blast cleaning for metal surfaces. Do not use abrasives in automatic equipment that have become contaminated. When shop or field blast cleaning with handheld nozzles, do not recycle or reuse blast particles.

2. After abrasive blast cleaning and prior to application of coating, dry clean surfaces to be coated by dusting, sweeping, and vacuuming to remove residue from blasting. Apply the specified primer or touch-up coating within the period of an eight-hour working day. Do not apply coating over damp or moist surfaces. Reclean prior to application of primer or touch-up coating any blast cleaned surface not coated within said eight-hour period.

3. Keep the area of the work in a clean condition and do not permit blasting particles to accumulate and constitute a nuisance or hazard.

4. During abrasive blast cleaning, prevent damage to adjacent coatings. Schedule blast cleaning and coating such that dust, dirt, blast particles, old coatings, rust, mill scale, etc., will not damage or fall upon wet or newly coated surfaces.

J. Procedures for Items Having Shop-Applied Prime Coats

1. After application of primer to surfaces, allow coating to cure for a minimum of two hours before handling to minimize damage.

2. When loading for shipment to the project site, use spacers and other protective devices to separate items to prevent damaging the shop-primed surfaces during transit and unloading. If wood spacers are used, remove wood splinters and particles from the shop-primed surfaces after separation. Use padded chains or ribbon binders to secure the loaded items and minimize damage to the shop-primed surfaces.

3. Cover shop-primed items 100% with protective coverings or tarpaulins to prevent deposition of road salts, fuel residue, and other contaminants in transit.

4. Handle shop-primed items with care during unloading, installation, and erection operations to minimize damage. Do not place or store shop-primed items on the ground or on top of other work unless ground or work is covered with a protective covering or tarpaulin. Place shop-primed items above the ground upon platforms, skids, or other supports.

K. Field Touch-Up of Shop-Applied Prime Coats

1. Remove oil and grease surface contaminants on metal surfaces in accordance with SSPC SP-1. Use clean rags wetted with a degreasing solution, rinse with clean water, and wipe dry.

2. Remove dust, dirt, salts, moisture, chalking primers, or other surface contaminants that will affect the adhesion or durability of the coating system. Use a high-pressure water blaster or scrub surfaces with a broom or brush wetted with a solution of trisodium phosphate, detergent, and water. Rinse scrubbed surfaces with clean water.

3. Remove loose or peeling primer and other surface contaminants not easily removed by the previous cleaning methods in accordance with SSPC SP-7. Take care that remaining primers are not damaged by the blast cleaning operation. Remaining primers shall be firmly bonded to the steel surfaces with blast cleaned edges feathered.

4. Remove rust, scaling, or primer damaged by welding or during shipment, storage, and erection in accordance with SSPC SP-10. Take care that remaining primers are not damaged by the blast cleaning operation. Areas smaller than 1 square inch may be prepared per SSPC SP-11. Remaining primers shall be firmly bonded to the steel surfaces with cleaned edges feathered.

5. Use repair procedures on damaged primer that protects adjacent primer. Blast cleaning may require the use of lower air pressure, smaller nozzles, and abrasive particle sizes, short blast nozzle distance from surface, shielding, and/or masking.

6. After abrasive blast cleaning of damaged and defective areas, remove dust, blast particles, and other debris by dusting, sweeping, and vacuuming; then apply the specified touch-up coating.

L. Painting Systems

1. All materials of a specified painting system, including primer, intermediate, and finish coats, shall be produced by the same manufacturer. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer for the particular coating system.

2. Deliver paints to the jobsite in the original, unopened containers.

3.3 APPLICATION

A. Conform to the requirements of SSPC PA-1. Follow the recommendations of the coating manufacturer including the selection of spray equipment, brushes, rollers, cleaners, thinners, mixing, drying time, temperature and humidity of application, and safety precautions.

B. Stir, strain, and keep coating materials at a uniform consistency during application. Power mix components. For multiple component materials, premix each component before combining. Apply each coating evenly, free of brush marks, sags, runs, and other evidence of poor workmanship. Use a different shade or tint on succeeding coating applications to indicate coverage where possible. Finished surfaces shall be free from defects or blemishes.

C. Do not use thinners unless recommended by the coating manufacturer. If thinning is allowed, do not exceed the maximum allowable amount of thinner per gallon of coating material. Stir coating materials at all times when adding thinner. Do not flood the coating material surface with thinner prior to mixing. Do not reduce coating materials more than is absolutely necessary to obtain the proper application characteristics and to obtain the specified dry-film thicknesses.

D. Remove dust, blast particles, and other debris from blast cleaned surfaces by dusting, sweeping, and vacuuming. Allow ventilator fans to clean airborne dust to provide good visibility of working area prior to coating applications. Remove dust from coated surfaces by dusting, sweeping, and vacuuming prior to applying succeeding coats.

E. Apply coating systems to the specified minimum dry-film thicknesses as determined per SSPC PA-2.

F. Apply primer immediately after blast cleaning and before any surface rusting occurs, or any dust, dirt, or any foreign matter has accumulated. Reclean surfaces by blast cleaning that have surface colored or become moist prior to coating application.

G. Apply a brush coat of primer on welds, sharp edges, nuts, bolts, and irregular surfaces prior to the application of the primer and finish coat. Apply the brush coat prior to and in conjunction with the spray coat application. Apply the spray coat over the brush coat.

H. Before applying subsequent coats, allow the primer and intermediate coats to dry for the minimum curing time recommended by the manufacturer. In no case shall the time between coats exceed the manufacturer's recommendation.

I. Each coat shall cover the surface of the preceding coat completely, and there shall be a visually perceptible difference in applied shade or tint of colors.

J. Applied coating systems shall be cured at 75°F or higher for 48 hours. If temperature is lower than 75°F, curing time shall be in accordance with printed recommendations of the manufacturer, unless otherwise allowed by the Owner's Representative.

K. Assembled parts shall be disassembled sufficiently before painting or coating to ensure complete coverage by the required coating.

3.4 FIELD QUALITY CONTROL

A. Dry-Film Thickness Testing

1. Test the finish coat of metal surfaces (except zinc primer and galvanizing) for holidays and discontinuities with an electrical holiday detector, low-voltage, wet-sponge type. Provide measuring equipment. Provide certification that the gauge has been calibrated by a certified laboratory within the past six months. Provide detector as manufactured by Tinker and Rasor or K-D Bird Dog.

2. Check each coat for the correct dry-film thickness. Do not measure within eight hours after application of the coating.

3. For metal surfaces, make five separate spot measurements (average of three readings) spaced evenly over each 100 square feet of area (or fraction thereof) to be measured. Make three readings for each spot measurement of either the substrate or the paint. Move the probe or detector a distance of 1 to 3 inches for each new gauge reading. Discard any unusually high or low reading that cannot be repeated consistently. Take the average (mean) of the three readings as the spot measurement. The average of five spot measurements for each such 100-square-foot area shall not be less than the specified thickness. No single spot measurement in any 100-square-foot area shall be less than 80%, nor more than 120%, of the specified thickness. One of three readings which are averaged to produce each spot measurement may underrun by a greater amount as defined by SSPC PA-2.

4. Perform tests in the presence of the Owner's Representative.

3.5 ADJUSTMENT AND CLEANING

A. Repair of Improperly Coated Surfaces

1. If the item has an improper finish color or insufficient film thickness, clean and topcoat the surface with the specified paint material to obtain the specified color and coverage. Sandblast or power-sand visible areas of chipped, peeled, or abraded paint, feathering the edges. Then prime and finish coat in accordance with the specifications. Work shall be free of runs, bridges, shiners, laps, or other imperfections.

B. Cleaning

1. During the progress of the work, remove discarded materials, rubbish, cans, and rags at the end of each day's work.

2. Thoroughly clean brushes and other application equipment at the end of each period of use and when changing to another paint or color.

3. Upon completion of painting work, remove masking tape, tarps, and other protective materials, using care not to damage finished surfaces.

3.6 PROTECTION

A. Remove, mask, or otherwise protect hardware, lighting fixtures, switch plates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not intended to be painted. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process. Mask openings in motors to prevent paint and other materials from entering the motors.

B. Surfaces Not to be Coated

1. Do not paint the following surfaces unless otherwise noted in the drawings or in other specification sections. Protect during the painting of adjacent areas:

a. Mortar-coated pipe and fittings.

b. Fencing.

c. Buried pipe, unless specifically required in the piping specifications.

C. Surfaces to be Coated

1. The exact coating to be applied in any location is not designated by the descriptive phrases in the coating system titles such as “corrosive environment,” “buried metal,” or “submerged metal.” Coat surfaces with the specific coating systems as described below:

a. Coat aboveground and exposed piping or piping in vaults and structures as described in the corrosive exposed metal or the various piping specifications. Color of finish coat shall be white or as selected by the OWNER.

b. Coat above ground structural steel and exposed steel connections as described in the exposed steel corrosive environment . Color of finish coat shall be grey or as selected by OWNER.

END OF SECTION 09 97 00

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 33 30 11
TELEVISION INSPECTION OF SEWERS

PART 1– GENERAL

1.1 SECTION INCLUDES

A. The work specified in this section of the specifications provides the requirements for closed circuit television (CCTV) inspection of gravity pipelines. 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. STS 33 01 30.41: Sewer Line Cleaning

B. STS 33 01 30.51: Sewer Flow Control and Bypass Pumping

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Uniform Standard Specification for Public Works Construction by the Maricopa Association of Governments, etc., standard specification is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

A. Copy of the personnel's certification for NASSCO's PACP.

B. Specifications of the CCTV inspection system to be utilized.

C. Each CCTV inspection.

1. Naming convention shall be:
    a. upstream manhole ID "to" downstream manhole ID
2. A submittal shall consist of the following digital documents:
    a. PDF of the report
    b. JPEG photos (snapshots) of each observation identified during the inspection.
    c. Digital video (*.wmv) of the inspection
3. Transmittal of CCTV Inspection data to the ENGINEER/OWNER for review shall be:
    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 within 14 days of approval from ENGINEER and OWNER.

1.5 CCTV VIDEO FORMAT

A. CCTV video inspections shall be recorded on a digital storage device prepared and submitted in *.wmv format with data encoded onto video as enabled.

B. Post SAS installation or rehab CCTV must be performed

C. The video recording shall include an audio portion describing the condition of the sewer with the video image.

1. 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.

2. 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.

3. 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.

4. The audio shall also note the location of the connections to the nearest foot, clock positions of the connections, condition of connections (i.e. voids, protruding) and whether the connection is in service.

1.6 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 inspection camera shall be mounted on a skid, floatable raft system, or transporter based on the conditions of the pipeline to be televised.

1.7 CCTV INSPECTION

A. GENERAL

1. The CCTV inspection camera shall be moved through the pipeline in a downstream direction at a uniform rate, stopping when necessary to ensure proper documentation of the condition, but in no case, shall it be moved through the pipeline at a speed greater than 30 feet per minute. A clear picture shall be provided looking into each service connection. If the quality of the digital recording is deemed to be unacceptable by the ENGINEER or OWNER, the pipeline shall be re-televised.

2. Each CCTV inspection shall be assessed using the PACP program based on five standard levels of pipeline structural defect coding and five standard levels of pipeline operation and maintenance defect coding. CONTRACTOR is solely responsible for depth of flow, manhole depth, air quality in the sewers, accessibility of manholes, traffic conditions, and other safety considerations. No inspection shall be performed where flow depths exceed 50% of the pipe diameter without prior approval from the OWNER. The OWNER'S allowable maximum flow depth during an inspection is less than 33% of the pipe diameter. The CONTRACTOR may be required to perform inspections during off-peak hours (night inspections) if specifically requested by the OWNER to achieve its maximum depth of flow standard. The OWNER makes no guarantees that all of the pipelines proposed to be CCTV inspected after the cleaning, are clear for the passage of the camera setup.

B. PRE-REHABILITATION: CCTV inspection shall be completed immediately after cleaning to confirm cleaning, location of service 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.

C. 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.

PART 2– PRODUCTS – NOT USED

PART 3– EXECUTION – NOT USED

END OF SECTION 33 30 11

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 33 01 30.41
CLEANING OF SEWERS

PART 1– GENERAL

1.1 SECTION INCLUDES

A. The work specified in this section of the specifications provides the requirements for pipeline cleaning and pre-rehabilitation point repairs to be performed prior to closed circuit television (CCTV) inspection and pipeline rehabilitation/replacement.

1. The CONTRACTOR shall protect the manholes to withstand forces generated by equipment, water, and air pressure.

2. The CONTRACTOR shall be responsible for the removal of debris from the pipeline.

1.2 RELATED SECTIONS

A. Special Condition: Immediate Notification of Sanitary Sewer Overflows

B. STS 33 01 30.11 Television Inspection of Sewers

C. STS 33 01 30.51 Sewer Flow Control and Bypass Pumping

1.3 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Uniform Standard Specification for Public Works Construction by the Maricopa Association of Governments, etc., standard specification is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.4 SUBMITTALS

A. Sewer cleaning plan describing methodology to be used from manhole to manhole.

B. Odor and noise mitigation plans during cleaning operations.

1.5 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.

1.6 CLEANING

A. The CONTRACTOR shall seal 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 per 940.8. Upon removal of the obstruction, the CONTRACTOR shall complete the cleaning operation.

B. 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.

C. 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.

1.7 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.

1.8 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 shall not be allowed to accumulate debris, and/or liquid waste, sludge, etc. on the site except in enclosed containers approved by the Arizona Department of Environmental Quality. All waste shall be disposed of at a legally permitted disposal site.

PART 2– PRODUCTS – NOT USED

PART 3– EXECUTION – NOT USED

END OF SECTION 33 01 30.41

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 33 01 30.51
SEWAGE FLOW CONTROL

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials, equipment, and appurtenances required to provide temporary sanitary sewage flow control as necessary.

B. The primary purpose of sewage flow control is to provide reliable sewer service to the users of the sanitary sewer at all times, and to prevent backup and/or overflow into adjacent ditches, storm sewers, manholes, and waterways during construction. The secondary purpose of sewage flow control is to divert existing flows around the work area to facilitate certain construction efforts.

1.2 REFERENCES

A. Where all or part of a Federal, ASTM, ANSI, AWWA, Maricopa Association of Uniform Standard Specification for Public Works Construction, etc., standard specification is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.3 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

A. GPD: Gallons per Day

B. GPM: Gallons per Minute

C. PSI: Pounds per Square Inch

1.4 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 CONTACTOR; CONTRACTOR's design, construction and operation of the bypass system shall account for this contingency.

1. Estimated Flow Rates:

a. Average Daily Flow: 345 gpm

b. Peak Hourly Flow: 1,115

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 minimum 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.

1.5 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.

G. Sewage flow control procedures shall not begin until Contractor has received approval from Engineer to proceed.

PART 2– PRODUCTS [NOT USED]

PART 3 – EXECUTION

3.1 PREPARATION

A. Contractor shall maintain on site, sufficient equipment, materials, and personnel to ensure continuous and successful operation of the sewage flow control system.

B. The sewage flow control system shall not impede or prevent access to private residences, public facilities, or businesses, except by prior agreement with Owner.

C. The discharge location shall be protected against any scour, erosion, or damage due to the sewage flow control 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.

3.4 FIELD QUALITY CONTROL

A. The Contactor shall inspect the entire sewage flow control and piping system for leaks or spills on an hourly basis.

1. In the event sewage spills out of the sewer system the Contractor shall immediately stop the overflow, notify the Engineer, and take the necessary action to clean up and disinfect the spillage to the satisfaction of the Engineer.

2. If sewage is spilled onto public or private property, the Contractor shall wash down, clean up and disinfect the spillage to the satisfaction of the Engineer.

3. Any and all overflows shall be reported to the Owner and the Arizona Department of Environmental Quality by the Contractor within 24 hours. Refer to STS 01 35 29.13: Health, Safety, and Emergency Response for Contaminated Sites.

END OF SECTION 33 01 30.51

Smith Engineering Company

SUPPLEMENTAL TECHNICAL SPECIFICATION
SECTION 33 05 23.13
HORIZONTAL DIRECTIONAL DRILLING

PART 1– GENERAL

1.1 SECTION INCLUDES

A. The horizontal directional drilling (HDD) method is a multi-stage process that involves site preparation and restoration; equipment set-up; drilling a pilot hole as shown on an approved pilot bore plan, then enlarging the pilot hole to not larger than 1.5 times the outer diameter of the pullback pipe or pipe joint/coupling; and then pulling the product back through the drilled space.

B. This specification covers Poly-Vinyl Chloride (PVC) pipe, Ductile Iron (DI) pipe, and High Density Polyethylene pipe (HDPE) in nominal size(s) four-inch through 30-inch installed in accordance with the approved NASTT “HDD Good Practices Guideline”. Pipe is intended for use as a pressure-rated potable water, reclaimed water, or wastewater delivery system.

C. The Contractor is responsible for all the work, whether self-performed or performed by a sub-contractor.

1.2 REFERENCES

A. AZMAG Uniform Standard Specifications and Details for Public Works Construction, as updated.

B. Where all or part of a Federal, ASTM, ANSI, AWWA, AASHTO, standard specification, etc. is incorporated by reference in these specifications, the reference standard shall be the latest edition and revision.

1.3 SUBMITTALS

A. Statement of Qualifications and Experience. This must include a list of all equipment to be used and a list of personnel and their qualifications and experience. The equipment listing must include the directional drilling equipment, guidance system, drilling fluid system, and all other equipment to be used.

B. Horizontal Directional Drilling Plan. The plan must show the finished grade along the bore path, the deflection and radii of the pilot bore, the length of each bore, and the vertical and horizontal clearances between the bored pipe and any existing and proposed conflicting pipes, conduits, or obstructions. Clearances must not be less than the guidance system’s accuracy tolerance.

C. Product Data

1. Pipe;
2. Drilling Fluids;
3. Additives;

4. Trace Wire;

D. Design Data

1. Secondary Containment Plan

E. Certificates

1. Drill Rod
2. Fusion Technician Qualifications

F. Closeout Submittals

1. Construction Drawing Redlines
2. Complete Work Logs of Guided Directional Drill Operations

1.4 QUALIFICATIONS

A. Ensure that the field supervisor and workers assigned to this project are experienced in work of this nature and have successfully completed similar projects of similar length, pipe type, pipe size, and soil type using directional drilling in the last three (3) years. As part of the bid submission, submit project descriptions which include, at a minimum, a listing of the location(s), date of project(s), owner, pipe type and material, size installed, length of installation, manufacturer of equipment used, and other information relevant to the successful completion of the project.

PART 2– PRODUCTS

2.1 EQUIPMENT

Drill Rod - Select the appropriate drill rod to be used. Submit certified statement that the drill rod has been inspected and is in satisfactory condition for its intended use.

2.2 MATERIALS

A. Pipe

1. Ductile Iron Pipe and Fittings

a. Products delivered under this specification must be manufactured only for water distribution pipe and couplings conforming to ANSI/AWWA C151/A21.51. Restrained joint pipe must also meet all performance requirements ANSI/AWWA C151/A21.51.

b. Nominal outside diameters and wall thickness of thrust-restrained pipe must conform to the requirements of ANSI/AWWA C151/A21.51. Restrained pipe must be CL50 minimum. Pipe must be furnished in standard laying lengths of 20 feet one inch.

c. Ductile Iron Fittings: Fittings for bends, tees, etc., must be ductile iron fittings as specified in Specification 801 (ANSI/AWWA C153/A21.53).

2. Fusible PVC

a. Install six-inch to 30-inch (nominal) diameter fusible polyvinyl chloride pipe [with a dimension ratio of 14 (DR 14) conforming to AWWA C900. Provide pipe made from PVC compound meeting or exceeding cell classification 12454 per ASTM D1784. Provide fusible polyvinyl chloride pipe with plain ends. Blue pipe must be supplied for the potable water system, purple pipe must be supplied for the reclaimed water system, and green pipe must be supplied for wastewater system.

b. Use butt fusion jointing method for plain end PVC pipe. Comply with AWWA C900 AWWA C605 and ASTM F1674 for butt fusion joints.

3. HDPE

a. Install 4-inch to 30-inch (nominal) diameter high density polyethylene pipe (HDPE) PE4710 with a standard dimension ratio of 11 (SDR11) or less (e.q. SDR9). Provide pipe conforming to ASTM D3350, ASTM F714, ASTM D2513, AWWA C906. Pipe is Black in color.

b. Use butt fusion jointing method for plain end HDPE pipe. Comply with AWWA C906 and ASTM F2620 for butt fusion joints. Electro Fusion coupling shall be used per the manufacturers instruction where called out in the plans.

c. Use PE4710 HDPE molded and mechanical joint fittings conforming to ASTM 3261, AWWA C901, and C906.

B. Drilling Fluids

1. Use a high quality bentonite slurry drilling fluid to ensure hole stability, cuttings transport, bit and electronics cooling, and hole lubrication to reduce drag on the drill pipe and the product pipe. Use only fluid with a composition which complies with all Federal, State, and local environmental regulations.

C. Additives

1. Use admixtures as required to address soil conditions and water conditions such as water hardness, acidity, and alkalinity.

D. Trace Wire

1. Use a continuous sheathed solid conductor copper wire line, #12AWG high strength copper clad steel wire with a minimum 1,150 lb break load minimum 45 mil HDPE insulation thickness. Sheathing shall be color coded to match the utility.

PART 3– EXECUTION

3.1 INSTALLATION

A. Ensure all utilities are located and clearly marked prior to start of excavation or drilling.

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 DRILL SET-UP

A. Design and construct the drill entrance and exit pits.

3.3 DRILLING FLUIDS

A. Mix the bentonite slurry drilling fluid with potable water (of proper pH) to ensure no contamination is introduced into the soil during the drilling, reaming, or pipe installation process. Make any required additive adjustments.

3.4 DRILL ENTRANCE AND EXIT PITS

A. Drill entrance and exit pits are required. Maintain at minimum size to allow only the minimum amount of drilling fluid storage prior to transfer to mud recycling or processing system or removal from the site.

B. Do not allow drilling mud to flow freely on the site or around the entrance or exit pits. Remove spilled mud and restore ground to original condition. Provide shore pits in compliance with OSHA Standards, 29 CFR 1926.652.

C. Drilling near wetlands or water courses requires secondary containment to prevent drilling fluids from entering the wetlands. Secure written approval of a secondary containment plan from the Engineer.

3.5 DRILL ENTRANCE AND EXIT ANGLE

A. Ensure entrance and exit angles and elevation profile maintains adequate cover to reduce risk of drilling fluid breakouts and ground exit occurs as specified herein. Ensure that entrance and exit angles generate pullback forces that do not exceed 5 percent strain on the high density polyethylene or fusible polyvinyl chloride pipe.

3.6 PILOT HOLE

A. The type and size of the pilot string cutting head and the diameter of the drill pipe are at the Contractor's discretion.

B. Drill the pilot hole along the path shown on the plan and profile drawings. Pilot hole tolerances are as follows:

1. Vertical Tolerance: Pilot hole may go deeper if necessary to prevent breakout. Elevations: Plus or minus six inches as shown in planset.
2. Horizontal Tolerance: Plus or minus six inches centerline of the product pipe.
3. Curve Radius: No curve is acceptable with a radius less than 330 feet.
4. Mandatory pipeline cover requirements are as shown on the drawings or as specified.

3.7 GUIDANCE SYSTEMS

A. The Guidance system must use an electronic “walkover” tracking system, a Magnetic Guidance System (MGS), or a proven gyroscopic probe and interface for a continuous and accurate determination of the location of the drill head during the drilling operation.

B. The guidance system must be capable of tracking in any soil condition, including hard rock. It must enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The system must be capable to be remotely steered and permit electronic monitoring of tunnel depth and location.

C. The guidance system must be accurate and calibrated to the manufacturer’s specifications of the vertical depth. The system must be accurate to within 2% vertically and one foot horizontally.

3.8 REAMING

A. Conduct reaming operations at the Contractor's discretion. Determine the type of back reamer to be utilized by the type of subsurface soil conditions that are encountered during the pilot hole drilling operation. The reamer type is at the Contractor's discretion.

3.9 PULL BACK

A. Fully assemble the entire pipeline to be installed via direction drill prior to commencement of pull back operations. Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe in accordance with ANSI Z535.1. Attach wire to top of pipe in such a manner that it will not be displaced during construction operations.

B. Support the pipeline during pullback operations in a manner to enable it to move freely and prevent damage. Install the pipeline in one continuous pull.

C. Minimize torsion stress by using a swivel to connect the pull section to the reaming assembly. Maximum allowable tensile force imposed on the pull section is not to exceed 90 percent of the pipe manufacturer's safe pull (or tensile) strength. If the pull section is made up of multiple pipe size or materials, the lowest safe pull strength value governs and the maximum allowable tensile force is not to exceed 90 percent of this value.

D. Minimize external pressure during installation of the pullback section in the reamed hole. Replace damaged pipe resulting from external pressure at no cost to the Government. Buoyancy modification is at the discretion of the Contractor.

3.10 DRILLING FLUIDS DISPOSAL

A. Collect drilling fluid returns in the entrance pit, exit pit, or spoils recovery pit. Immediately clean up any drilling fluid spills or overflows from these pits.

B. Dispose of fluids in a manner that is in compliance with all permits and applicable Federal, State, and local regulations. Disposal of the drilling fluids may occur on approved land owned by the Government subject to written approval from the Engineer. Spread the drilling slurry over the Government-approved disposal area and plow into the soil.

C. Conduct disposal in compliance with all relative environmental regulations, right-of-way and workspace agreements, and permit requirements.

3.11 CONNECTION OF PRODUCT PIPE TO PIPELINE

A. After the product pipe has been successfully installed, allow the product pipe to recover for 24 hours prior to connection of the pipeline. Ensure that a sufficient length of the product pipe has been pulled through the hole so that the pull-nose is not pulled back into bore hole due to stretch recovery of the product pipe.

PART 4– QUALITY CONTROL

4.1 DAILY WORK LOG

A. Maintain a work log of construction events and operations including, but not limited to, the following for each day's work:

1. Hours worked.
2. Log of each drill rod added or withdrawn during drilling, reaming, and pull back.
3. Groundwater control operations.
4. Description of soil conditions encountered.
5. Tools and equipment in use, drilling fluid, fluid pumping rate, and drilling head location.
6. Any unusual conditions or events.
7. Reasons for operational shutdown in event work is halted.

4.2 DRILL LOGS

A. Maintain drilling logs that accurately provide drill bit location (both horizontally and vertically) at least every 5.1 cm 2 inches along the drill path. In addition, keep logs that record, as a minimum the following, every 15 minutes throughout each drill pass, back ream pass, or pipe installation pass:

1. Drilling Fluid Pressure
2. Drilling Fluid Flow Rate
3. Drill Thrust Pressure
4. Drill Pullback Pressure
5. Drill Head Torque

B. Make all instrumentation, readings, and logs available to the Engineer at all times during operation.

4.3 FIELD TESTS

A. Perform field tests and provide labor, equipment, and incidentals required for testing. Submit test results, identifying any results that do not meet requirements, to the Engineer within four days of test completion. Provide corrective action and retest pipe not meeting requirements. Provide corrective action as recommended by the pipe manufacturer and subject to approval by the Engineer.

4.4 ACCEPTANCE OF WORK

A. Immediately upon completion of work, remove all rubbish and debris from the job site. Remove all construction equipment and implements of service leaving the entire area involved in a neat condition acceptable to the Engineer.

B. Immediately clean "blow holes" or "breakouts" of drilling fluid to the surface and return the surface area to its original condition. Dispose of all drilling fluids, soils, and separated materials in compliance with Federal, State, and local environmental regulations.

C. Provide a post-construction fusion report including the following data for each fusible connection:

1. Pipe Size and Thickness
2. Machine Size
3. Fusion Technician Identification
4. Job Identification
5. Fusion Joint Number
6. Fusion, Heating, and Drag Pressure Settings
7. Heat Plate Temperature
8. Time Stamp
9. Heating and Cool Down Time of Fusion
10. Ambient Temperature

D. Submit an electronic copy and three hard copies of the record drawings to the Engineer within five days after completing the pull back. Include in the record drawings a plan, profile, and all information recorded during the progress of the work. Maintain, and submit upon completion, signed complete work logs of guided directional drill operations.

END OF SECTION 33 05 23.13