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TECHNICAL SPECIFICATIONS

SPANISH SPRINGS 1 PRESSURE ZONE INTERTIE

TMWA Capital Project Number: 16-0017

PWP Number: PWP-WA-2022-402

SPANISH SPRINGS 1 PRESSURE ZONE INTERTIE
TECHNICAL SPECIFICATIONS
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SECTION 01 00 00
GENERAL CONSTRUCTION INFORMATION

PART 1: GENERAL

1.01 THE REQUIREMENT

A. The Work to be performed under this Contract shall consist of furnishing (with the exception of TMWA supplied items) all tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all Work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work described in these documents shall be conducted under a single prime contract. The following is a general description of the Work included.

B. Contractor shall furnish and install approximately 1,546 LF of 6-inch, 8-inch and 10-inch ductile iron water main; connection to existing water mains; construct pressure regulating station in below-grade precast concrete vault; retirement of existing below-grade booster pump station and water mains; construct reinforced concrete retaining wall and access road; permanent asphalt concrete pavement patching. The project highlights include but are not limited to the following items:

1. 1,546 LF of 6-inch, 8-inch, and 10-inch ductile iron water main
2. Construct pressure regulating station in below-grade precast concrete vault
3. Retirement of existing below-grade booster pump station & water mains
4. Construct reinforced concrete retaining wall
5. Construct access road
6. Permanent asphalt concrete pavement patching

C. The Work is located at the following location(s):

1. Martini Road (private)
2. 3425 Martini Road (APN: 035-160-08)
3. City of Sparks parcel APN: 035-301-54
4. Vintage Hills Community Association parcel APN: 514-160-02
5. Rio Alayne Court (City of Sparks right-of-way)
6. Teglia Drive (City of Spark right-of-way)
7. E Queen Way (City of Sparks right-of-way)
8. Spanish Springs Road (City of Sparks right-of-way)

1.03 PROJECT SEQUENCING

A. The retaining wall and access road must be constructed prior to installing the new 8-inch water main across the 3425 Martini Road parcel. The new water mains and pressure regulating station depicted on Drawings W2 through W5 must be constructed and placed into service prior to beginning the work depicted on Drawing W6. The new water mains depicted on Drawing W6 must be placed into service and connected to the existing water mains prior to retiring the existing Spanish Springs 1 Booster Pump Station.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 32 00 – Construction Management Software

B. Section 01 33 00 – Submittals

C. Section 01 40 00 – Safety Plan

D. Section 01 60 00 – Product Handling

E. Section 02 00 00 – Existing Facilities and Demolition

1.05 SUBMITTALS

SECTION 01 00 00 – Submittal Summary	
Project Schedule	7-Days Prior to the preconstruction meeting: A preliminary project schedule for TMWA approval in accordance with all requirements of this specification.
Personnel Contacts and Project Roles	7-Days Prior to the preconstruction meeting: A comprehensive list of all personnel names, phone numbers, and email addresses to include in project related communications, including that of Subcontractors.

1.06 SCHEDULE

A. The schedule provides a basis for determining the progress status of the project relative to the completion time, specific dates, and for determining the acceptability of the Contractor's progress payment estimates. No progress payments shall be made until the Engineer and TMWA's Representative have accepted the Contractor's construction schedule and schedule of values.

B. Ten (10) calendar days after the Award of Contract, the Contractor shall submit to Procore the Preliminary Project Schedule (PPS).

C. Within fourteen (14) days after issuance of the Notice to Proceed the Contractor shall submit to Procore the Baseline Project Schedule (BPS), including projected costs.

D. The Engineer considers the project schedule requirements to be of significant importance to both the Contractor and the Engineer. The following requirements shall be met for submitting the schedules.

1. Contractor shall use a commercial project scheduling software product to develop all schedules. Software shall be generally in use by the construction industry.
2. Schedule shall be a time-scaled logic diagram based on the critical path method on a GANTT chart or a time-scaled bar chart.
3. The schedule shall depict all significant construction activities and all items of Work listed in the breakdown of contract prices submitted by the Contractor. Assigned values for each part of the Work shall be indicated. The dependencies between activities shall be indicated so that it may be established what effect the progress of any one activity has on the schedule. Any milestone activities identified must be indicated. Critical dates for TMWA furnished Contractor installed materials shall be indicated showing reasonable delivery periods.
4. Completion time and all specific dates given in the Contract Documents shall be shown on the schedule. Activities making up the critical path shall be identified.

E. Revisions to the accepted cost-loaded construction schedule may be made only with written approval of the Engineer and TMWA. Changes in timing for activities which are not on the critical path may be modified within the available period of the activities' specific available float but not in a manner which shall place them on the critical path, without the written agreement of the Contractor and Engineer. A change affecting the contract value of any activity, the timing of any activity on the critical path, the completion time and specific dates may be made only in accordance with the General Conditions.

1.07 PROJECT MEETINGS

A. Preconstruction Conference:

1. Prior to the commencement of Work at the Site, a preconstruction conference shall be held at a mutually agreed time and place. The conference shall be attended by the Contractor's Project Manager, its superintendent, and its Subcontractors as the Contractor deems appropriate. Other attendees shall be:
    a. TMWA Project Manager/Engineer.
    b. TMWA Project Representative.
    c. TMWA's Designated Inspector.
    d. Representatives from Governing agencies; Washoe County, City of Reno, & City of Sparks, as applicable.
    e. Others as requested by Contractor, TMWA, or Engineer.
2. The purpose of the preconstruction conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination shall be discussed and procedures for handling such matters established. At a minimum, the Contractor should be prepared to discuss all of the items listed below.
    a. Status of Contractor's insurance and bonds.
    b. Contractor's tentative schedules.
    c. Transmittal, review, and distribution of Contractor's submittals.
    d. Requirements of the regulatory agencies.
    e. Critical Work sequencing.
    f. Field decisions and Change Orders.
    g. Invoicing and payment schedule.
    h. Major equipment deliveries and priorities.

B. Progress Meetings:

1. TMWA Engineer and Contractor shall coordinate, schedule and hold regular on-site progress meetings at times as requested by Engineer or as required by progress of the Work. The Contractor, Engineer, and all Subcontractors active on the Site shall attend each meeting. Contractor may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.

2. The purpose of each meeting is to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the Contractor shall present any issues which may impact its progress with a view to resolve these issues expeditiously.

PART 2: MATERIALS (NOT USED)

PART 3: EXECUTION

3.01 CONTRACTOR'S EQUIPMENT

A. Security: The Contractor shall at all times be responsible for the security of their equipment. TMWA will not take any responsibility for missing or damaged equipment, tools, or personal belongings.

1. Contractor's Field Office: A separate Contractor's Field Office shall not be required on this project.
2. TMWA Field Office: A separate TMWA Field Office shall not be required on this project.

B. Parking Facilities: Contractor shall provide temporary parking areas, at locations on the project site(s) approved by TMWA Engineer, for visitor parking, employee vehicles, and the vehicles used by the Contractor's construction employees.

3.02 CONTRACTOR'S UTILITIES

A. Power: The Contractor shall be responsible for all cost to provide power and other utilities as necessary.

B. Water: Potable and non-potable water is not available at the site(s). The Contractor shall be responsible to provide all construction water and drinking water needed for his/her employees.

C. Temporary Heating: The Contractor shall be responsible for providing temporary heating, covering and enclosures as necessary to protect all Work and material against damage by dampness and cold and to facilitate completion of the Work. The Contractor shall supply all the fuel, equipment and materials required for temporary heating, in accordance with manufacturer's recommendations.

3.03 LANDS PROVIDED BY TMWA

A. TMWA will provide all lands required for the Work under the contract, together with the right of access to such lands, as indicated. The Contractor shall not unreasonably encumber the premises with his equipment or materials. Periodic clean-up and debris removal may be requested by the Engineer as site maintenance at no extra cost to TMWA. Unless otherwise indicated, TMWA's facilities on the site must remain in operation throughout the duration of project construction.

3.04 LANDS PROVIDED BY CONTRACTOR

A. The Contractor shall provide, with no liability or additional cost to TMWA, any additional land and access thereto not shown or described that may be required for temporary construction facilities or storage of materials. The Contractor shall construct all access roads, detour roads or other temporary works as required by his/her

operations.

B. The Contractor shall confine his equipment, storage of materials and operation of his/her personnel to those areas shown and described and such additional areas as he/she may provide.

3.05 PRECONSTRUCTION PHOTOS

A. Provide documentation of existing facilities and current site conditions of all project extents in accordance with Section 02 00 00 – Existing Facilities and Demolition.

3.06 SHIPPING AND PROTECTION OF EQUIPMENT

A. Provide product handling and protection of the equipment and materials in accordance with Section 01 60 00 – Product Handling.

3.07 QUALITY ASSURANCE AND CODE COMPLIANCE

A. Design and install materials in accordance with best present-day installation and manufacturing practices.

B. Where specified, workmanship and materials shall conform with applicable sections of latest revisions of following codes and standards. Standards may be abbreviated in the specifications as follows:

1. ACI	American Concrete Institute
2. AISC	American Institute of Steel Construction, Inc.
3. AISI	American Iron and Steel Institute
4. ANSI	American National Standards Institute
5. API	American Petroleum Institute
6. ASTM	American Society for Testing and Materials
7. AWS	American Welding Society
8. AWWA	American Water Works Association
9. HI	Hydraulics Institute
10. IBC	International Building Code
11. IPC	International Plumbing Code
12. Local Code	Local Building, Health and Plumbing Codes
13. NBFU	National Board of Fire Underwriters
14. NBS	National Bureau of Standards
15. NEC	National Electrical Code
16. NEMA	National Electrical Manufacturers Association
17. NFPA	National Fire Protection Association
18. NSF	National Science Foundation
19. OSHA	Occupational Safety and Health Administration

20.	PCA	Portland Cement Association
21.	PS	Product Standards, U.S. Department of Commerce
22.	UBC	Uniform Building Code
23.	UL	Underwriters Laboratories Inc.
24.	UPC	Uniform Plumbing Code

3.08 TESTS AND INSPECTION

A. General Requirements: All materials, equipment, installation and workmanship included in this contract, if required by the Engineer and/or TMWA, shall be tested and inspected to prove compliance with the contract requirements. No tests specified herein shall be applied until the item to be tested has been inspected and approval given for the application of such test.

1. Tests and inspections shall include:
    a. The delivery acceptance test and inspections.
    b. The installed tests and inspections.
2. Tests and inspections, unless otherwise specified or accepted, shall be in accordance with the recognized standards of the industry.
3. The form of evidence of satisfactory fulfillment of delivery acceptance test and of installed test and inspection requirements shall be, at the discretion of TMWA, either by tests and inspections carried out in his/her presence or by certificates or reports of tests and inspections carried out by approved persons or organizations.

B. Delivery Acceptance Tests and Inspections: The delivery acceptance tests and inspections shall be at the Contractor's expense for any materials or equipment specified and shall include the following:

1. Test of items during the process of manufacture and/or on completion of manufacture, comprising material tests, hydraulic pressure tests, electric tests, performance and operating tests and inspections in accordance with the relevant standards of the industry and more particularly as detailed in individual sections of these specifications, or as may be required by the Engineer and/or TMWA.
2. Inspection of all items delivered at the site in order to satisfy the Engineer and/or that such items are of the specified quality and workmanship and are in good order and condition at the time of delivery.

C. Installed Tests and Inspection:

1. All mechanical and electrical equipment shall be tested by the Contractor to the satisfaction of the Engineer before any facility is put into operation. Tests shall be specified herein and shall be made to determine whether the equipment has been properly assembled, aligned, adjusted and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be carried out by the Contractor as part of the Work and be pre-approved by the manufacturer.

D. At least 30 days before the time allowed in the construction schedule for commencing testing and start-up procedures, the Contractor shall submit to the Engineer, through

Procore, details of the procedures he/she proposes to adopt for testing and start-up of all mechanical and electrical equipment to be operated independently and together as a system.

E. During the testing of equipment, the Contractor, if requested, shall make available experienced factory trained representatives of the manufacturers of all the various pieces of equipment, or other qualified persons who shall instruct TMWA personnel in the operation and care thereof. Instruction shall include step-by-step troubleshooting procedures with all necessary test equipment. All manufacturers' instructions shall be provided to TMWA personnel at this time in hardcopy and electronic format.

F. During the performance tests, data shall be taken and recorded to demonstrate that all equipment and systems comply with manufacturer's submitted data and other requirements of the contract.

G. If under test, any portion of the Work should fail to fulfill the contract requirements and is altered, renewed or replaced, tests on that portion when so altered, removed or replaced, together with all other portions of the Work as are affected thereby, shall, if so required by the Engineer, be repeated within reasonable time and in accordance with the specified conditions, and the Contractor shall pay to TMWA all expenses incurred by TMWA as a result of the carrying out of repeat tests.

H. If any doubt, dispute or difference should arise between the Engineer and/or TMWA and the Contractor regarding the test results or the methods or equipment used in the carrying out of a test, the Engineer and/or TMWA may order the test to be repeated using modified methods or equipment. If the repeat test substantially confirms the Engineer's and/or TMWA's position on the previous test, all costs in connection with the repeat test shall be paid by the Contractor, otherwise the costs shall be borne by TMWA. Where the results of any installed test fail to meet the contract requirements, repeat tests to achieve the contract requirements shall be made at the Contractor's expense.

3.09 RESTORATION OF STRUCTURES AND SURFACES

A. Structures, Equipment and Pipework: The Contractor shall remove such existing structures, equipment, and pipework as may be necessary for the performance of the Work and shall rebuild or replace the items thus removed to original or better condition. Contractor shall repair any existing structures which may be damaged as a result of their Work.

B. Roads and Streets: All roads and streets in which the surface is removed, broken or damaged, or in which the ground has caved or settled due to Work under this contract, shall be completely restored and brought to the original grade and crown section unless otherwise indicated. Before resurfacing material is placed, edges of pavements shall be trimmed back far enough to provide clean, solid, vertical faces, and shall be free of any loose material. Roadways used by the Contractor for hauling materials, equipment, supplies, etc., shall be cleaned and repaired if the condition of the roadway is damaged or otherwise affected due to the Contractor's operations.

C. Cultivated Areas and Other Surface Improvements: All cultivated and natural areas, either agricultural or lawns, and other surface improvements which are damaged by actions of the Contractor shall be restored, including roadside drainage ditches, as nearly as possible to their original condition or better.

3.10 SAFETY

A. The Contractor shall execute and maintain their Work so as to avoid injury or damage to any person or property. All Work shall be done in conformance with OSHA Standards.

B. Safety precautions as applicable shall include, but not be limited to, adequate life protection, and lifesaving equipment; adequate illumination for underground and night operations; instructions in accident prevention for all employees; such machinery guards, walkways, scaffolds, ladders, bridges, and other safety devices, equipment and wearing apparel as are necessary or lawfully required to prevent accidents or injuries, and the proper inspection and maintenance of all safety measures.

C. The Contractor shall develop and maintain a Safety Plan as stipulated in Section 01 40 00.

END OF SECTION 01 00 00

SECTION 01 20 00
MEASUREMENT AND PAYMENT

PART 1: GENERAL

1.01 PAYMENT

A. Bid items identified in the Bid Schedule, as further described herein, shall constitute full compensation to the Contractor for furnishing all labor, equipment, tools, supplies and materials to complete the Work in accordance with the Contract Documents, including the costs of permits and the costs of compliance with the regulations of public agencies having jurisdiction. Any item that is not specifically set forth in the Bid Schedule shall be considered incidental to the cost of the Work. The final pay quantities shall be by field measurement.

B. The bid items shown in the Bid Schedule shall include as incidental those efforts of similar magnitude and not limited to the following: obtaining permits; removing and replacing fences; removing and replacing landscaping; all rings and hardware required with structures; potholing; pavement saw-cutting; clean-up work; dewatering work; resetting disturbed property corners and survey monument replacement; casing adapters, flanged coupling adapters, couplings, pipe reducers; thrust blocks and concrete pads; removal of abandoned equipment; locating tape; tracer wire; bolts and nuts; polyethylene encasement; wax tape coating system; valve boxes, conductor riser pipes, and concrete collars; test fittings; disinfection, flushing, pressure testing, and sampling; ditches; drainage swales; grading disturbed areas; contract staging areas; miscellaneous code, law, or public health requirements; construction staking or grade setting; dust control; road maintenance and repair; protection of existing improvements; removal of existing surfaces; coordination with public, TMWA, utilities, and other affected agencies; removal of spoils; disposal costs; compliance with standard and manufacturer specifications; conforming to BMP's; overhead and profit; and all other items necessary to provide a complete project, but not specifically mentioned. Damage to existing properties or improvements resulting from the Contractor's operations shall be repaired and restored to a condition as good as or better than that encountered prior to construction activities at the expense of the Contractor.

1.02 MOBILIZATION / DEMOBILIZATION

A. **Description:** Mobilization shall consist of preparatory work and operations, including, but not limited to, those tasks necessary for the movement of personnel, equipment, supplies, and incidentals to the project site. For the establishment of offices, buildings and other facilities necessary for work on the project; for premiums on bonds and insurance for the project and for all other work and operations which must be performed, or costs incurred before beginning production work on the various contract items. Demobilization at the finish of the job shall include the removal of all construction equipment, restoration of the site, and removal of all miscellaneous construction debris.

B. **Inclusions:** The bid price for this item shall include all labor, materials, and equipment required to mobilize for the project as specified herein. This item shall also include all existing utility investigations, site preparation and cleanup, permits, and submittals.

1. Moving onto the site, including all of the Contractor's tools and equipment.

2. Coordinating and obtaining permissions for additional property use for staging of materials and equipment.
3. Obtaining all necessary bonds, insurance, and permits.
4. Provision of sanitary facilities.
5. Securing a source of construction water.
6. Preparation and submittal of project schedule.
7. Preparation and submittal of all project shop Drawings and Submittals.
8. Demobilization and cleanup of the site after the project is complete.

C. **Exclusions**: None

D. **Measurement**: No measurement shall be made for this item. This item is Lump Sum.

E. **Payment**: Reference Article 7.01 of the General Conditions.

1.03 TRAFFIC CONTROL

A. **Description:** Traffic control measures including barricades, traffic cones, and detour signs are required to complete this work. See Specification Section 01 55 26 for further details on traffic control requirements.

B. **Inclusions:** The bid price for this item shall include all labor, activities required to coordinate with City of Sparks, submittals, materials, and equipment required to provide traffic control during the project execution. This item shall include barriers, barricades, resident notification, flag persons, temporary markings, lights, and all other work needed to provide traffic control as necessary to comply with TMWA and City of Sparks permit requirements.

C. **Exclusions**: None

D. **Measurement**: No measurement shall be made for this item. This item is Lump Sum.

E. **Payment**: Payment shall be made at the Lump Sum price as indicated in the Bid Schedule.

1.04 6” DUCTILE IRON WATER PIPE

A. **Description:** Furnish and install 6-inch diameter ductile iron water pipe as depicted on the Drawings and described in the Specifications, restrained where specified.

B. **Inclusions:** The bid price for this item shall include all pipe, valves, fittings, test stations, joint restraints, connection to existing water mains, flushing and sampling taps, excavation, backfill, temporary asphalt concrete pavement patching.

C. **Exclusions**: TMWA to provide labor and equipment to perform actual Hot-Tapping of existing water mains.

D. **Measurement**: Field measurement per Linear Foot.

E. **Payment**: Payment shall be made per Linear Foot as indicated in the Bid Schedule.

1.05 8” DUCTILE IRON WATER PIPE

A. **Description:** Furnish and install 8-inch diameter ductile iron water pipe as depicted on the Drawings and described in the Specifications, restrained where specified.

B. **Inclusions:** The bid price for this item shall include all pipe, valves, fittings, test stations, joint restraints, connection to existing water mains, flushing and sampling taps, excavation, backfill, removal and replacement of concrete commercial driveway and curb and gutter, temporary asphalt concrete pavement patching.

C. **Exclusions**: TMWA to provide labor and equipment to perform actual Hot-Tapping of existing water mains.

D. **Measurement**: Field measurement per Linear Foot.

E. **Payment**: Payment shall be made per Linear Foot as indicated in the Bid Schedule.

1.06 10” DUCTILE IRON WATER PIPE

A. **Description:** Furnish and install 10-inch diameter ductile iron water pipe as depicted on the Drawings and described in the Specifications, restrained where specified.

B. **Inclusions:** The bid price for this item shall include all pipe, valves, fittings, test stations, joint restraints, connection to existing water mains, flushing and sampling taps, excavation, backfill, temporary asphalt concrete pavement patching.

C. **Exclusions**: TMWA to provide labor and equipment to perform actual Hot-Tapping of existing water mains.

D. **Measurement**: Field measurement per Linear Foot.

E. **Payment**: Payment shall be made per Linear Foot as indicated in the Bid Schedule.

1.07 CUT AND CAP EXISTING 10” WATER MAIN

A. **Description:** Cut and Cap existing 10” water main at the location identified on Drawing W6.

B. **Inclusions:** The bid price for this item shall include all items specified in Sheet Keynote 17 on Drawing W6, including all fittings, connection to existing water main, thrust block, excavation, backfill, temporary asphalt concrete pavement patching.

C. **Exclusions**: Permanent Pavement Patch

D. **Measurement**: No measurement shall be made for this item. This item is Lump Sum.

E. **Payment**: Payment shall be made at the Lump Sum price as indicated in the Bid Schedule.

1.08 COMBINATION AIR RELEASE VALVE

A. **Description:** Furnish and install Combination Air Release Valve at the location identified on the Drawing W3 per TMWA Standard Detail 10L-4 and described in the Specifications.

B. **Inclusions:** The bid price for this item shall include all items depicted on TMWA Standard Detail 10L-4, excavation, backfill, and construction of a keystone-style block retaining wall surrounding the enclosure and vent riser assembly for slope retention and protection of the facility.

C. **Exclusions**: None

D. **Measurement**: Field measurement per Each.

E. **Payment**: Payment shall be made per Each as indicated in the Bid Schedule.

1.09 RIO ALAYNE PRESSURE REGUALTING STATION

A. **Description:** Construct a new below-grade pressure regulating station at the location identified in Drawing W4.

B. **Inclusions:** The bid price for this item shall include all items depicted and listed on Drawing WD2 and described in the Specifications, excavation, and backfill.

C. **Exclusions**: None

D. **Measurement**: No measurement shall be made for this item. This item is Lump Sum.

E. **Payment**: Payment shall be made at the Lump Sum price as indicated in the Bid Schedule.

1.10 DEMOLISH SPANISH SPRINGS 1 BPS

A. **Description:** Demolish and abandon in place existing below-grade Spanish Springs 1 Booster Pump Station at the location identified on Drawing W6.

B. **Inclusions:** The bid price for this item shall include all items specified in Sheet Keynote 18 on Drawing W6, including excavation, backfill, temporary asphalt concrete pavement patching.

C. **Exclusions**: Permanent Pavement Patch

D. **Measurement**: No measurement shall be made for this item. This item is Lump Sum.

E. **Payment**: Payment shall be made at the Lump Sum price as indicated in the Bid Schedule.

1.11 4" THICK ASPHALT CONCRETE PERMANENT PAVEMENT PATCH

A. **Description:** Placement and compaction of permanent asphalt concrete pavement patch within paved areas that have been disturbed to a depth of 4-inches.

B. **Inclusions:** Placement and compaction of hot-mix asphalt concrete as specified in the City of Sparks Encroachment/Excavation permit and as depicted in City of Sparks Standard Detail S-115 on Drawing WD3. Replacement of removed, disturbed, and/or damaged striping and pavement markings in type and kind (i.e. paint or thermoplastic).

C. **Exclusions**: None

D. **Measurement**: Field measurement per Square Foot.

E. **Payment**: Payment shall be made per Square Foot as indicated in the Bid Schedule.

1.12 5" THICK ASPHALT CONCRETE PERMANENT PAVEMENT PATCH

A. **Description:** Placement and compaction of permanent asphalt concrete pavement patch within paved areas that have been disturbed to a depth of 5-inches.

B. **Inclusions:** Placement and compaction of hot-mix asphalt concrete as specified in the City of Sparks Encroachment/Excavation permit and as depicted in City of Sparks Standard Detail S-115 on Drawing WD3. Replacement of removed, disturbed, and/or damaged striping and pavement markings in type and kind (i.e. paint or thermoplastic).

C. **Exclusions**: None

D. **Measurement**: Field measurement per Square Foot.

E. **Payment**: Payment shall be made per Square Foot as indicated in the Bid Schedule.

1.13 RETAINING WALL AND ORR DITCH ACCESS ROAD

A. **Description:** Construct reinforced concrete retaining wall and access road to the Orr Ditch at the location identified on Drawing C3.

B. **Inclusions:** The bid price for this item shall include all items specified and depicted on Drawings C1 through C4, S1 through S5, and described in the Specifications, including excavation, grading, backfill, and required BMP's.

C. **Exclusions**: None

D. **Measurement**: No measurement shall be made for this item. This item is Lump Sum.

E. **Payment**: Payment shall be made at the Lump Sum price as indicated in the Bid Schedule.

1.14 REMOVE AND REPLACE EXISTING ACCESS GATE

A. **Description:** Remove and replace existing chain link access gate at the location identified in Drawing W4.

B. **Inclusions:** The bid price for this item shall include all items specified in Sheet Keynote 28 on Drawing W4 and depicted and specified on Drawing WD4.

C. **Exclusions**: None

D. **Measurement**: No measurement shall be made for this item. This item is Lump Sum.

E. **Payment**: Payment shall be made at the Lump Sum price as indicated in the Bid Schedule.

1.15 UNIT COST ADJUSTMENT (UCA) OF CONTRACT VALUES

A. In the case of change or deletion of the unit quantity contract item (or items) in the Bid Schedule, the contract value shall be adjusted to reflect actual quantities installed versus the estimated quantities reflected in the contract price. Due to the nature of the Work performed on this project, any and all of the estimated quantities shown on the Bid Schedule may be adjusted up or down by any amount or may be deleted at the Engineer's request prior to or while the Work is in progress. Changes in quantities shall not change the unit price contract.

1. Rock Excavation
    a. Payment for Rock Excavation is contingent and shall be as defined in Article 4.06 of the General Conditions.
    b. Measurement and payment shall be made per Cubic Yard as indicated in the Bid Schedule.
2. Extra Trenching Depth
    a. Payment for this item is contingent and shall be based upon extra trenching depth, per foot of depth, within the range of 6 to 12 feet below finished grade. The extra trenching depth Bid Item is not applicable to conflicts that could be reasonably anticipated from existing facilities shown on the Drawings or from an inspection of the job site (such as valve covers, manholes, underground location markings, etc.). The cost of trenching 6 feet or less in depth shall be included in the applicable items shown on the Bid Schedule. The unit price for extra trenching depth shall include shoring, bracing, additional backfill, etc. Extra depth is rounded to the nearest foot. Measurement for this item shall be per Linear Foot of trench.
    b. Payment shall be made per Linear Foot as indicated in the Bid Schedule.
3. Additional 1” Depth Asphalt Concrete Permanent Pavement Patch for Patch Thickness Exceeding 5”
    a. Payment for this item is contingent and shall be based upon additional depth of asphalt concrete permanent pavement patch for thicknesses exceeding 5-inches. Payment shall be made for each additional 1-inch of depth required to match the existing adjacent contiguous pavement depth as stated in City of Sparks Standard Detail S-115 on Drawing WD3.
    b. Measurement and payment shall be made per Square Foot as indicated in the Bid Schedule.

PART 2: MATERIALS (NOT USED)

PART 3 : EXECUTION (NOT USED)

END OF SECTION 01 20 00

SECTION 01 32 00
CONSTRUCTION MANAGEMENT SOFTWARE

PART 1: GENERAL

1.01 DESCRIPTION

A. TMWA has incorporated the use of Procore, a construction management software for all TMWA construction projects. The tools found in Procore are common in typical construction management and are packaged together within one software. Contractors and construction managers shall be required to use many of the tools within Procore. Other tools available and not required by TMWA to be used may be used at the contractor's discretion. The required tools include: submittals, RFI's, and file management.

B. Following the Notice of Award, the contractor including all necessary users shall be sent an invitation email to the Procore project from TMWA construction manager. Each user shall need to create a password and login. Procore may be accessed through a computer or a smartphone/tablet using Procore's App.

C. The following shall give a brief description of each tool and a basic step by step introduction to using each tool. Within the software there are several tips, training videos, and tutorials to learn how the program Works and answer most questions.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section – 01 00 00 General Construction Information

B. Section – 01 33 00 Submittals

C. Section – 01 70 00 Contract Closeout

1.03 CORE TOOLS

A. Home Tool – The home tool is a general overview of the construction project. This page may be used to connect to the various tools or recently updated documents. The page includes the following:

1. Project team and contact information.
2. Important contract dates and milestones.
3. Visual graphic for the status of RFI's, Submittals, Schedule, Inspections, & Punch List.
4. Users' current open items.
5. Recently updated items from any user on the project team.
6. Daily schedule update.

B. Reports Tool – The reports tool has an extensive collection of pre-formatted reports for various functions. Types of reports include: project status, financial, schedule, daily and logs. This tool is not mandatory for use.

C. Documents Tool – The documents tool is a file share point for items related to the project but not including: contract documents, submittals, RFI's, and commitments. The tool Works in conjunction with Procore Drive (PD). PD can be downloaded separately and accessed using the same login information as Procore. PD shall share the exact same folder structure as the documents tool. Items uploaded through PD shall automatically

show up in the Procore Documents tool. This tool is recommended to ease clutter through email.

1.04 PROJECT MANAGEMENT TOOLS

A. Emails Tool – This tool replaces or supplements the need for standard email. The benefit is that it tracks all correspondence within the Procore project. Critical emails may have the best benefit from originating here. This tool is not required but may be used as necessary.

B. RFI's Tool – The RFI tool page displays a complete list of all RFI's related to the project. Information displayed includes details about the RFI and status. This tool is required to be used for each TMWA construction project. Below is a brief step-by-step tutorial to begin using the RFI tool.

1. Create an RFI
    a. Click the orange "Create RFI" button at the top right of the page.
    b. Populate fields – fill in as much information as possible. Certain fields are mandatory as indicated.
    c. Click grey "create" button at bottom right of the page.
    d. An automatic email shall be sent to the project team members indicated in the fields including the RFI manager.
    e. The RFI manager shall be TMWA construction manager. They shall then assign the RFI to the appropriate project team member for response. Once this has been assigned an automatic sequential number shall be assigned to the RFI. The "Ball in Court" shall be assigned to the responder until the response is received through Procore. At which point the "Ball" shall be in the RFI managers court.
    f. The typical RFI turnaround time is set for 3 days. Once this date is exceeded the responsible party shall be notified daily via email for a response.
    g. There are several filters and search tools for locating specific RFIs.

C. Submittals Tool – The Submittal tool page displays a complete list of all Submittals related to the project. Information displayed includes details about the Submittal and status. This tool is required to be used for each TMWA construction project. Below is a brief step-by-step tutorial to begin using the Submittal tool.

1. Create a Submittal
    a. Click the orange "Create Submittal" button at the top right of the page.
    b. Populate fields – fill in as much information as possible. Certain fields are mandatory as indicated.
    c. Submittals shall be arranged by Specification, no exception. A sequential number shall be automatically assigned for each new entry.
    d. Click grey "create and Send Emails" button at bottom right of the page.
    e. An automatic email shall be sent to the project team members indicated in the distribution field.
    f. The Submittal shall be sent to the approver for approval, the submittal shall follow through the Workflow as detailed by the originator of the submittal.

g. The typical Submittal turnaround time is set for 14 days. Once this date is exceeded the responsible party shall be notified daily via email for a response.
h. There are several filters and search tools for locating specific Submittals.

D. Meetings Tool – The Meetings tool can be utilized to coordinate meetings and have a stored log on the project database. This tool is not required but may be used at the contractor's discretion.

E. Schedule Tool – The Schedule tool is a supplement or replacement of common construction scheduling software. Procore works in conjunction with many third-party scheduling software companies for ease of use and ability to upload schedules from other software onto Procore. Use of this tool is strongly encouraged to provide the most current schedule for all project team members.

1. This tool Works in conjunction with Procore Drive (PD). Third party schedules may only be uploaded through PD. Navigate to the Schedule tab on PD and follow prompts to upload schedule. Once uploaded, schedule shall appear in Schedule tool in Procore. Schedule updates shall be made the same way. Copies of schedules shall be saved within Documents both in Procore and PD.

F. Photos Tool – The Photos tool is a share point for project related photos. This tool Works in conjunction with Procore Drive (PD). PD can be downloaded separately and accessed using the same login information as Procore. PD shall share the exact same folder structure as the Photos tool. Items uploaded through PD shall automatically show up in the Procore Photos tool. This tool is recommended to ease clutter through email.

G. Drawings Tool – The Drawing tool contains only the Conformed Contract Drawings approved for construction. TMWA's Construction Manager shall upload the Drawings into Procore for the Project Team's use. Drawings contained in this tool may be edited by approved users and linked to RFI's, submittals, inspections, punch lists, etc. Use of this tool is strongly encouraged to provide up-to-date record Drawings to TMWA Construction Manager.

1. The following is a brief step-by-step tutorial to begin using the Drawing tool:
    a. Click on a drawing.
    b. Menu at top has several tools for editing, sharing, tracking, and searching.
    c. Markup tool has common tools for editing, commenting, creating revisions, and linking construction documents.
    d. Text and Revision tools allow for notes and links to RFI's, Submittals, inspections, and punch lists. Upon completion of adding notes, revisions, and comments, editor can Publish changes and update project team.

H. Specifications Tool – The Specifications tool contains only the Conformed Contract specifications approved for construction. TMWA's Construction Manager shall upload the specifications into Procore for the Project Team's use. Use of this tool is strongly encouraged.

1.05 QUALITY AND SAFETY TOOLS

A. The tools contained here are intended for inspectors, materials testing specialists, and engineers/architects. The tools include Inspections, Observations, Punch List, and Daily Log. None of these tools are required for TMWA projects however the Punch List tool is strongly encouraged for ease of maintaining and tracking these items during construction.

1.06 CONSTRUCTION FINANCIAL TOOLS

A. The tools contained here are intended for contractors and TMWA Construction Managers. The tools include Budget, Commitments, Change Orders, and Direct Costs. These tools are strongly encouraged to be used for ease of maintaining and tracking these items during construction. TMWA Construction Manager shall upload/populate Bid Tab for limited Project Team viewing, (TMWA, Contractor, Design Engineer, Construction Manager). The contractor may request full use of these tools.

PART 2 : MATERIALS (NOT USED)

PART 3: EXECUTION (NOT USED)

END OF SECTION 01 32 00

SECTION 01 33 00
SUBMITTALS

PART 1 : GENERAL

1.01 DESCRIPTION

A. Where required by the Specifications, the Contractor shall submit descriptive information that will enable the Engineer to determine whether proposed materials, equipment, and work methods are in general conformance to the design concept and in accordance with the contract documents. The information submitted may consist of drawings, specifications, descriptive data, certificates, samples, test results, product data, and such other information.

B. Required submittals described in individual specifications are typically in this format:

SECTION 01 33 00 – Submittals Required by Contractor for this Work	
Submittal Name	Required Timeframe for Submission (default is 30 days prior to their need for approval): Description of information to include in submittal.

C. Unless otherwise specified, submittal information during project phases shall be as described in Table 01 33 00.A.

Table 01 33 00.A – General Submittal Information Required

PRIOR TO	Name	Description
Preconstruction Meeting	**Project Schedule**	A preliminary project schedule for TMWA approval in accordance with all requirements of these specifications.
	Personnel Contacts and Project Roles	A comprehensive list of all personnel names, phone numbers, and email addresses to include in project related communications, including that of Subcontractors. This project team will be established in Procore.
	Contract Requirements	All information required by the TMWA Contract Administrator before establishing a contract including, but not limited to, evidence of insurance and bonds and apprenticeship utilization act documents.
	Background Check Requests	For work involving routine access to the interior of secured TMWA facilities, Contractor background checks may be required.
	Submittal List and Schedule	A complete list of submittals required and dates of submission to Procore. No progress payment shall be made to the Contractor until this list is submitted, reviewed, and found acceptable to the TMWA Project Representative.
Mobilization	**Preconstruction Documentation**	Date stamped project photos and videos of the entire project area.
	Demolition and Disposal Plan	A demolition and disposal plan for all material requiring demolition.
	Traffic Control Plan and Schedule	A traffic control plan for all work activities conforming to the requirements of jurisdictional agencies for which the work is located or impacts.
	Approved Permits	All approved permits and conditions for completing the Work by the jurisdictional agencies for which the work is located or impacts.

Table 01 33 00.A – General Submittal Information Required, cont.

PRIOR TO	Name	Description
Product Ordering	**Requests for Substitutions**	Substitution request log including a list of each product that is different from what is required by these specifications.
	Shop, Layout, Fabrication, Assembly Drawings	Drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the Contractor to explain in detail specific portions of the Work.
	Certifications	Certificates from manufacturers, suppliers, or others certifying that materials or equipment being furnished under the Contract comply with the requirements of these specifications.
	Samples	Samples submitted for preference selection by TMWA shall be of sufficient size to clearly illustrate functional characteristics and full range of color, texture, and pattern. A completed submittal review transmittal form must accompany each submitted samples.
	Manufacturer's Documentation	Written manufacturer instructions and recommendations for transporting, storing, handling, and maintaining material or equipment until it is field tested.
	Product Maintenance Plan	A descriptive maintenance plan and schedule to ensure the project materials and equipment are in new condition until final acceptance.
	Factory and Witness Testing Schedule/Results	Where factory acceptance testing is required for equipment covered by these Specifications, notify the Engineer and TMWA in writing when the equipment is completed and ready for factory inspection and testing.
	Mix Design	Mix designs & certified test results verifying that the components and final products for all applicable products, sealed by a licensed engineer.
Project Closeout	**Project As-Built Drawings**	48-Hours Prior to Final Payment Request: Including a high quality scanned electronic file in sequential order depicting all neat and legible changes that have been recorded as deviations from original design.
	Guarantees and Bonds	48-Hours Prior to Final Payment Request: As specified in all Contract Documents and Project Conditions.
	Spare Parts and Materials	48- Hours Prior to Final Payment Request: Physical delivery of spare parts in new condition to TMWA, as specified in individual sections.
	Operating Handles and Special Tools	48-Hours Prior to Final Payment Request: Physical delivery of operating handles and special tools in new condition to TMWA, as specified in individual sections.
	Final Operating/ Maintenance Instructions	48-Hours Prior to Final Payment Request: Physical delivery of previously approved operating and maintenance manuals to TMWA, in the quantities and format specified.
	Testing and Startup Forms	48-Hours Prior to Final Payment Request: All testing certificates and startup documentation required by the project specifications.

Table 01 33 00.A – General Submittal Information Required, cont.

PRIOR TO	Name	Description
Project Closeout	**Training Materials**	72-Hours Prior to the First Training Session: Printed copies in quantities to provide all training attendees with their own, as required by this specification.
	Request for Substantial Inspection	After Project Meets all Substantial Completion Requirements: A written letter with company letterhead requesting a Substantial Completion TMWA inspection, requirements defined in the Supplementary Conditions.
	Punchlist Completion Schedule	72-Hours After Receiving Punchlist from TMWA: A comprehensive work schedule addressing each punchlist item and the corresponding completion date.
	Request for Final Completion	After Project Meets All Final Completion Requirements: A written letter with company letterhead and date requesting a Final Acceptance Project Status from TMWA.
	Warranty Information	48- Hours Prior to Final Payment Request: All product warranty data from manufacturers**.**
	Project Closeout Documents	After Project Meets All Final Completion Requirements: Evidence of payment and release of liens and stop payment notices and all other permit closeouts, contractor staging area signoffs, ect. required.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 00 00 – General Construction Information

B. Section 01 32 00 – Construction Management Software

1.03 SUBMITTAL PROCEDURE

A. All submittals shall be electronic and uploaded, processed, and tracked through TMWA provided Procore construction management software. Refer to Specification Section 01 32 00 for details and tutorials to the software.

B. At least 30 days prior to their need for approval, the Contractor shall upload to Procore forward each submittal required by the individual sections of the specifications. Contractor shall submit one (1) electronic copy of each submittal, shop drawing, and operation and maintenance manuals per specification Section 01 32 00. Hard copy submittals may be requested from the contractor at no additional cost to TMWA. Additionally, submit each large format shop drawing and one (1) specimen of each sample requested.

C. No hardcopy submittal review documents will be returned to the Contractor.

D. The contractor shall organize and submit the submittals per their respective specification section. The contractor shall make all attempts to submit the entire specification section in one submittal. If this cannot be achieved, the contractor may make a request to the Engineer and submit upon the Engineer's approval. Uncoordinated submittals shall be rejected. Do not combine unrelated (multiple spec sections) materials in the same submittal.

E. The Engineer reserves the right to require submittals in addition to those specifically

called for in individual sections when deemed necessary at no additional cost to TMWA.

F. The Contractor shall schedule submittals to avoid concentration of submittals in a short time period. Scheduling of submittals shall be included in the Contractor's Progress Schedule.

G. If physical copies of submittals are requested, each major mechanical equipment submittal shall be bound in a three hole-punched binder, which is sized such that when all material is inserted, the binder is not over 3/4 full. Spiral ring type binders are not acceptable.

1. Each binder shall be appropriately labeled on the front cover with the project name, Contract number, equipment supplier's name, Specification Section(s), and major material contained therein. Any variations from the specified equipment shall also be noted.
2. An index shall be provided on the inside front cover. This index shall itemize the contents of each tab and sub-tab section. Also list the project name, Contract number, and equipment supplier's name, address, phone number, and contact person on the index page.

H. If the Contractor submits shop Drawings of equipment by manufacturers other than those listed in the specifications, he/she shall provide the following additional information with the submittal:

1. The name and address of at least three companies or agencies who are currently using the equipment.
2. The name and telephone number of at least one person at each of the above companies or agencies whom the Engineer may contact.
3. A description of the equipment that was installed at the above locations. The description shall be in sufficient detail to allow the Engineer to compare it with the equipment that is proposed to be installed in this project.
4. A copy of the specification section, and all referenced and applicable sections, with any addendum updates included, shall be submitted with each paragraph check-marked to indicated specification compliance or marked to indicate requested deviations from specification requirements.
    a. Check marks shall denote full compliance with a paragraph as a whole.
    b. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph.
    c. The remaining portions of the paragraph not underlined shall signify compliance on the part of the Contractor with the specifications. The submittal shall be accompanied by a detailed, written justification for each deviation. Failure to include a copy for the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

1.04 SHOP DRAWINGS

A. The Contractor shall coordinate all such drawings, and review them for legibility, accuracy, completeness, and compliance with contract requirements, and shall indicate their approval thereon as evidence of such coordination and review. Shop drawings submitted to the Engineer without evidence of the Contractor's approval shall be returned for resubmission.

B. Approval by the Engineer shall not relieve the Contractor from responsibility for any errors or omissions in such Drawings, nor from responsibility for complying with requirements of this Contract, except with respect to variations described and approved in accordance with Paragraph D below.

C. If Shop Drawings show variations from contract requirements, the Contractor shall describe such variations in writing, separate from the Drawings, at time of submission. All such variations must be approved by the Engineer.

1.05 ENGINEER'S APPROVAL

A. The Engineer shall indicate his/her acceptance or disapproval of each submittal, and reasons for disapproval (if applicable) through Procore. The submittal status options are as follows:

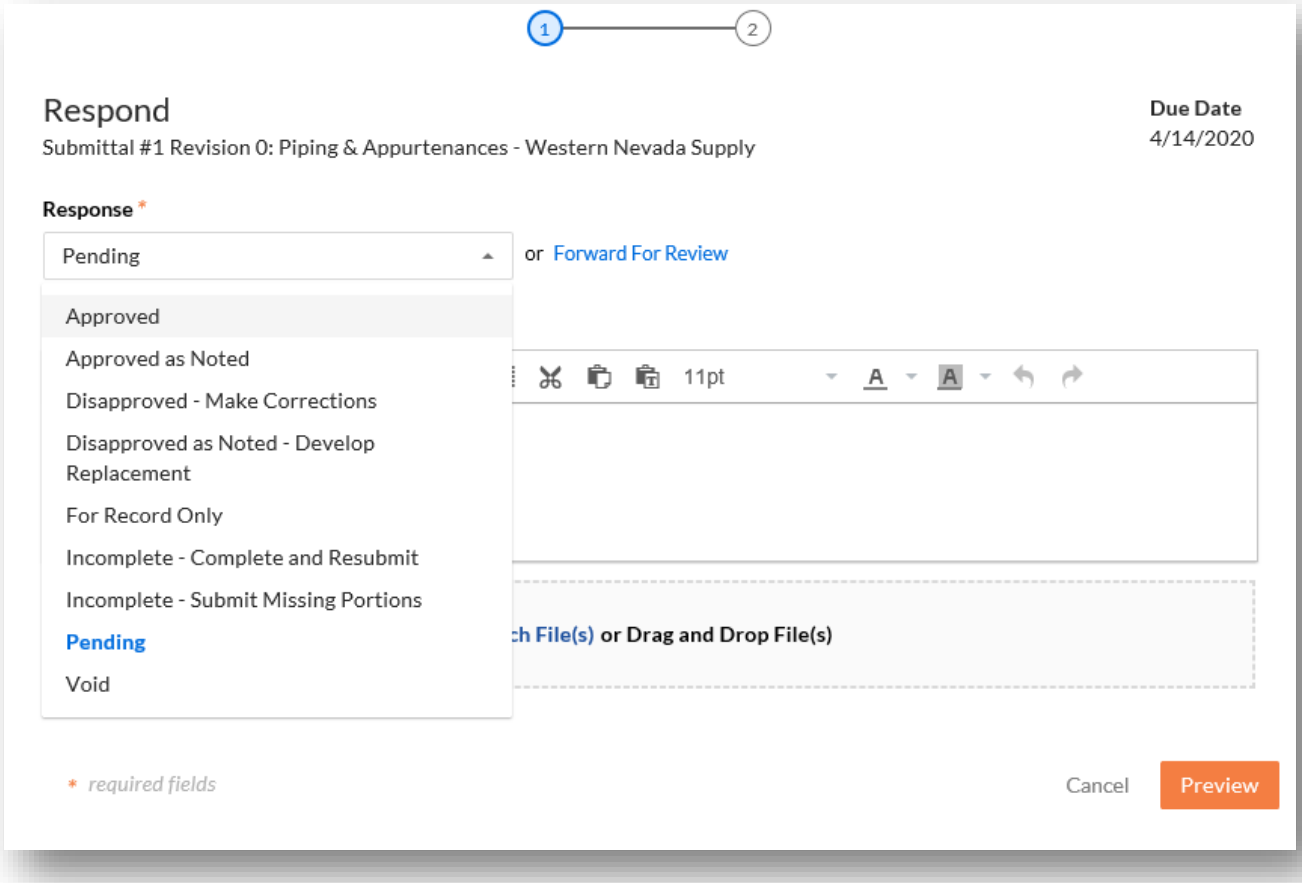

Figure 01 33 00-1. Reviewed Procore Submittal Status Options.

1. Approved – Work may begin immediately to incorporate the material and

equipment covered by the submittal into the project.

2. Approved as Noted – Work may begin immediately to incorporate the material and equipment covered by the submittal into the project and in accordance with the notes.

B. For all submittals not receiving a status of Approved or Approved as Noted, the Contractor shall coordinate with the Engineer to address the deficiencies in an expeditious manner. Submittal status requiring this coordination are as follows:

1. Disapproved – Make Corrections
2. Disapproved as Noted – Develop Replacement
3. For Record Only
4. Incomplete – Complete and Resubmit
5. Incomplete – Submit Missing Portions
6. Void

1.06 OPERATION AND MAINTENANCE MANUALS

A. Manufacturer's printed instructions shall include installation instructions, operating instructions, schematics for electrical and hydraulic systems, maintenance literature, lubrication requirements, and parts lists. O&M manuals may require physical copies at no additional cost to TMWA. Contractor shall coordinate with TMWA project representative to determine if O&M physical copies are required.

1.07 CERTIFICATES

A. For those items called for in individual sections, furnish certificates from manufacturers, suppliers, or others certifying that materials or equipment being furnished under the Contract comply with the requirements of these specifications.

1.08 SAMPLES

A. Samples submitted for preference selection by TMWA or Engineer shall be of sufficient size to clearly illustrate functional characteristics and full range of color, texture, and pattern. A completed submittal review transmittal form must accompany each submitted sample.

1.09 ELECTRICAL SUBMITTALS

A. Complete shop drawings showing dimensions, materials, arrangements, and other pertinent data shall be submitted.

B. Complete lists of materials and equipment shall be submitted. Full description catalog or other data shall be submitted.

C. Shop drawings and material lists shall be submitted for, but not limited to the following:

1. Conduit
2. Wire

3. Boxes, Fittings, and Wire Troughs
4. Cabinets
5. Wiring Devices
6. Panelboards
7. Safety Switches
8. Low Voltage Fuses
9. Enclosed Circuit Breakers
10. Lighting Fixtures and Components
11. Motor Starters
12. Automatic Transfer Switches
13. Emergency Generator
14. Emergency Lighting Equipment

As elsewhere indicated on the Drawings or in the Specifications.

PART 2 : MATERIALS (NOT USED)

PART 3 : EXECUTION

3.01 CONTRACTOR'S JOBSITE RECORD DRAWINGS

A. Provide and maintain on the jobsite one complete set of prints of all Drawings which form a part of the Contract. Immediately after each portion of the Work is installed, indicate all deviations from the original design shown on the Contract Drawings either by additional sketches or ink thereon. The Project Representative shall coordinate and review the jobsite record Drawings with the Contractor for accuracy on a weekly basis. Upon completion of the project, deliver this record set to the Project Representative for final approval. Upon final approval of the jobsite record Drawings by the Project Representative the Contractor shall submit the marked-up Drawings to the Engineer. It is strongly encouraged that the Contractor utilize the mark up tools in Procore for updating As-built Drawings, see specification Section 01 32 00 for details.

B. A condition of the processing of Progress Payments shall be the satisfactory maintenance and final submittal of the Contractor's record documents, as determined by the Engineer. The Contractor prepared progress payment estimates shall include an initial block for the Contractor's representative and the Engineer to acknowledge the satisfactory maintenance of the documents.

END OF SECTION 01 33 00

SECTION 01 40 00
SAFETY PLAN

PART 1 : GENERAL

1.01 SUMMARY
A. This Section includes development and maintenance of a Construction Safety Plan.

1.02 QUALITY ASSURANCE AND CODE COMPLIANCE
A. Nevada OSHA web site: http://dirweb.state.nv.us/OSHA/osha.htm

B. Federal OSHA web site: http://www.osha.gov/

1.03 RELATED WORK SPECIFIED ELSEWHERE
A. Section 01 33 00 – Submittals

1.04 SUBMITTALS

SECTION 01 40 00 – Submittal Summary	
Construction Safety Plan	14 Days Prior to Project Mobilization: A comprehensive safety plan containing all elements in accordance with this specification.
Accident Log	48-hours Subsequent to All Incidents: Reports and other non-confidential documents related to accidents or injuries encountered during construction.
Excavation in Excess of 5 ft	14 Days Prior to Beginning Excavations in Excess of 5 feet in Depth: A detailed plan for worker protection from the hazards of caving ground during the excavation of such trench in accordance with this specification.

1.05 CONSTRUCTION SAFETY PLAN
A. Detail the methods and procedures to comply with Nevada, Federal, and Local Health (including COVID-19 requirements) and Safety Laws, Rules and Requirements for the duration of the Contract Times. Include the following:

1. Identification of the individual or entity who shall prepare, initiate, maintain and supervise safety programs, and procedures.
2. Procedures for providing workers with an awareness of safety and health hazards expected to be encountered in the course of construction.
3. Safety equipment appropriate to the safety and health hazards expected to be encountered during construction. Include warning devices, barricades, safety equipment in public right-of-way and protected areas, and safety equipment used in multi-level structures.
4. Methods for minimizing employees' exposure to safety and health hazards expected during construction.
5. Procedures for reporting safety or health hazards.

6. Procedures to follow to correct a recognized safety and health hazard.
7. Procedures for investigation of accidents, injuries, illnesses and unusual events that have occurred at the construction site.
8. Periodic and scheduled inspections of general work areas and specific work locations.
9. Training for employees and workers at the jobsite.
10. Methods of communication of safe working conditions, work practices and required personal protection equipment.

B. Assume responsibility for every aspect of Health and Safety on the jobsite, including the health and safety of Subcontractors, suppliers, and other persons on the jobsite.

C. Forward available information and reports to the Contractor's representative who shall make the necessary recommendations concerning worker health and safety at the jobsite.

D. Employ additional health and safety measures specified by the Safety Consultant, as necessary, for workers in accordance with OSHA guidelines.

E. Nevada OSHA 10/30 Requirements: Contractors in Nevada are required to comply with the OSHA 10/30 requirements as follows:

1. Supervisory employees working on a construction site are required to complete a specified 30-hour health and safety course not later than 15 days after being hired; and
2. All other construction workers working on the construction site are required to complete a specified 10-hour course not later than 15 days after being hired.
3. Employers are required to suspend or terminate the employment of an employee on a construction site who fails to provide proof of obtaining the required training not later than 15 days after being hired. Regulations provide for administrative fines for employers who fail to suspend or terminate certain employees on a construction site after the 15-day period if those employees have not obtained the required training.
4. Provide documentation of compliance with NRS 618.987 regarding OSHA-10 and OSHA-30 training. Provide copies of certification cards for all construction Workers scheduled to Work on the project.

1.06 TRENCH SAFETY

A. Excavation for any trench 5 feet or more in depth shall not begin until the Contractor has submitted a detailed plan for worker protection from the hazards of caving ground during the excavation of such trench. Such plan shall be submitted in accordance with Section 01 33 00 and shall show the details of the design of shoring, bracing, sloping, or other provisions to be made for worker protection during such excavation. No such plans shall allow the use of shoring, sloping or a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety and if such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an Engineer who is registered as a Civil or Structural Engineer in the State of Nevada.

1.07 ELECTRIC WORK SAFETY PLAN REQUIREMENTS

A. Ensure all electrical installations conform to standards and regulations in place at the time of construction, renovation or repair including the National Electric Code (NEC), local electrical codes and OSHA.

B. Keep electrical equipment free from recognized hazards that are likely to cause death or serious physical harm.

A. Effectively close unused openings in boxes, raceways, cabinets, equipment cases or housings to afford protection that is substantially equivalent to the wall of the equipment.

B. Ensure the width and depth of the working space around electrical equipment complies with the National Electrical Code at the time of construction.

C. Ensure all 125V, single-phase, 15 & 20 ampere receptacles installed in restrooms or on rooftops have ground-fault circuit interrupter (GFCI) protection.

D. Ensure that all 125V, single-phase, 15 & 20 ampere receptacles exterior to the building have GFCI protection.

PART 2 : MATERIALS (NOT USED)

PART 3 : EXECUTION (NOT USED)

END OF SECTION 01 40 00

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 : GENERAL

1.01 DESCRIPTION

A. This Section includes requirements for complying with the National Sanitation Foundation/American National Standards Institute (NSF/ANSI) 61 regulations as set forth by NSF International and as required by federal, state and local governing agencies. The NSF/ANSI 61 certification process includes specific product testing by NSF International or several third-party testing laboratories. The tests include gathering chemical composition of products and submergence of products to determine leaching of harmful constituents into drinking water. Compliance with NSF/ANSI 61 does not equate to Certified. The State of Nevada and Washoe County review all water improvements for compliance with NSF/ANSI 61 and have the authority to enforce these requirements including assessment of fines for non-compliance.

1.02 QUALITY ASSURANCE AND CODE COMPLIANCE

A. NSF International web site: http://www.nsf.org/services/by-industry/water-wastewater/municipal-water-treatment/nsf-ansi-standard-61

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 – Submittals

1.04 SUBMITTALS

SECTION 01 41 00 – Submittal Summary	
NSF 61 Certifications	14 Days Prior to Any Material Ordering: All materials, linings, coatings, lubricants, adhesives, treatment media, and equipment that are in physical contact with potable water must be NSF61 certified. The NSF61 certification mark(s) must be present on all submittals as required. No exception shall be granted. A copy of the certificate as published by the accredited third-party testing Agency shall be submitted for all items in physical contact with potable water. No exception shall be granted.
Date of Manufacture	14 Days Prior to Any Material Ordering: Proof of the date of manufacture for all NSF61 certified items shall also be submitted.

PART 2 : MATERIALS (NOT USED)

PART 3 : EXECUTION (NOT USED)

END OF SECTION 01 41 00

SECTION 01 55 26
TRAFFIC CONTROL

PART 1: GENERAL

1.01 DESCRIPTION OF WORK

A. The Work to be performed in accordance with this section includes providing flagging services and pilot trucks, and furnishing, controlling, maintaining, moving and removing barricades, warning signs, lights, signals and pavement markings as required to provide a safe and efficient vehicular and pedestrian passage through the Work zone.

B. The Work shall include the furnishing of all labor, tools, equipment, materials, and performing all required operations to provide a complete item in accordance with the project plans and specifications.

1.02 QUALITY ASSURANCE AND CODE COMPLIANCE

A. State of Nevada, Department of Transportation, Standard Plans, latest edition.

B. Manual on Uniform Traffic Control Devices, latest edition. (MUTCD)

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 – Submittals

B. Section 00800 – Supplementary Conditions

SUBMITTALS

SECTION 01 55 26 – Submittal Summary	
Traffic Control Plan and Schedule	14 Days Prior to Project Mobilization: A comprehensive traffic control plan for all work activities conforming to the requirements of jurisdictional agencies for which the work is located or impacts.
List of Responsible Employees	48-Hours Prior to Each Instance of Traffic Control Activities: Two names and phone numbers for the employees responsible for implementation and maintenance of the traffic control plan to TMWA, all applicable jurisdictional agencies and local law enforcement agencies. They shall be available at all times.
Revisions to Traffic Control Plan and Schedule	7 Days Prior to Executing Changes in Traffic Control: A resubmittal comprising of a complete replacement of the original plan and schedule. No changes shall be implemented unless at the direction of TMWA or another jurisdictional agency.
Emergency Service Notification	48-Hours Prior to Each Instance of Traffic Control Activities: Provide a copy of Emergency Service Notification Form. Include date and person or persons to be notified.

PART 2: MATERIALS

2.01 GENERAL

A. All products, procedures and facilities shall be per MUTCD latest edition. All traffic control devices shall be high intensity.

1. Sign Posts:

a. MUTCD 6B-4, wood, steel or aluminum.

2. Signs, Barricades, Chanelizing Devices, and Lighting Devices:
   a. MUTCD, Part VI. Lighted barricades shall be properly maintained.

2.02 FLAG PERSONNEL

A. Competent, trained and supplied with a combination STOP and SLOW sign, orange vest, orange hard hat or orange cap. Provide adjacent barricading devices where required. Flag personnel shall be certified as required by State law and/or local codes and ordinances and hold current flagger certificates for the state of Nevada.

2.03 PILOT VEHICLES

A. Equip vehicle with at least one roof mounted flashing yellow light and appropriate vehicle signage which shall inform traffic that they are required to follow that vehicle.

2.04 DETOURS

A. Provide surfacing on detour routes as indicated on the traffic plan. Surface shall be smooth and adequately maintained to keep dust to a minimum.

PART 3: EXECUTION

3.01 GENERAL

A. Provide adequate protection of all vehicular and pedestrian traffic and workmen/ workwomen through any and all portions of the construction zone where the construction operations interfere with, obstruct or create a hazard to the normal movement of traffic.

B. Where possible, two (2) lanes of traffic shall remain open at all times unless otherwise indicated.

C. During emergency situations, TMWA may provide traffic control. The cost of any traffic control provided by TMWA will be borne by the Contractor.

D. In the event that any employees of TMWA are required to correct, repair, or modify any in-place traffic control provided by the Contractor, it shall be the responsibility of the Contractor to reimburse TMWA for any incurred costs.

3.02 PUBLIC NOTIFICATION

A. Services: Notify all Emergency and Public Services which may operate in the affected traffic area, in writing when traffic patterns are to be altered not less than 48 hours prior to street closure. Provide each service with the name of the employee(s) responsible for traffic control maintenance.

3.03 TRAFFIC CONTROL DEVICES

A. Place all necessary traffic control devices before any Work is started. Move devices as necessary to keep up with the advancing operation. Place devices at the locations indicated on the traffic plan and in accordance with plan details and the MUTCD and as specified herein. Maintain devices, keep free from dirt, mud and roadway grime. Promptly replace all damaged devices.

3.04 FLAG PERSONNEL

A. Locate flagmen as indicated on the traffic control plan. Provide flag personnel where

traffic is required to stop or slow. Provide additional flag personnel as required for site specific traffic control conditions.

3.05 STOPPING TRAFFIC

A. Traffic shall not be stopped and held longer than absolutely necessary. Traffic shall not be stopped long enough to interrupt traffic at the nearest intersection or longer than 5 minutes unless otherwise approved by TMWA.

3.06 ADJUSTMENT TO THE TRAFFIC CONTROL PLAN

A. At any time, TMWA may request that adjustments be made to the traffic control plan layout or signage. The Contractor shall immediately make all adjustments and provide all signage required. No additional payment shall be made for adjustments to the traffic control plan.

END OF SECTION 01 55 26

SECTION 01 60 00
PRODUCT HANDLING

PART 1 : GENERAL

1.01 DESCRIPTION

A. General requirements for delivery, storage, handling, and protection of materials and products used in the work.

1.02 QUALITY ASSURANCE AND CODE COMPLIANCE

A. Include within the Contractor's quality assurance program such procedures as are required to assure full protection of Work and materials.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 - Submittals

1.04 SUBMITTALS

SECTION 01 60 00 – Submittal Summary	
Manufacturer Instructions	14 Days Prior to Any Material Ordering: Written manufacturer instructions and recommendations for transporting, storing, handling, and maintaining material or equipment until it is field tested.
Product Maintenance Plan	14 Days Prior to Any Material Ordering: A descriptive maintenance plan and schedule to ensure the project materials and equipment are in new condition until final acceptance.
Delivery Logs	72-Hours Prior to All Project Status Meetings: Delivery status of all products required for the Work. Equipment delivery tags indicating equipment number, item description, model number, and serial number shall be included in the delivery logs.

1.05 MANUFACTURERS' RECOMMENDATIONS

A. Properly store and handle each item in accordance with manufacturer's recommendations and supplemental requirements included in other sections of these specifications. Store materials and equipment in a neat and orderly manner to facilitate locating, inspecting, maintaining, and removing when needed. The Contractor shall be responsible for any damage to items during handling and storage.

B. Temperature Requirements: Store mechanical and electrical equipment, instrumentation, valves, gaskets, rubber material, caulking, sealants, paint, seeds, and any other items manufacturer recommends be stored above 50°F on an appropriate surface on a wooden or concrete floor in a wooden or metal enclosed structure(s). Structure is to be clean, dry, and heated. Protect structure and subsequent work areas from dirt, dust, water, rain, snow, condensation, freezing conditions, and any other conditions detrimental to the life of equipment and material, from date of delivery to the time control of equipment is assumed by TMWA. This date may be substantial completion or final acceptance as determined by TMWA. Maintain temperature within enclosure above 50°F and below maximum recommended temperature of items stored within.

C. Exterior Storage: Pipe, fittings, and steel may be openly stored, on wooden platforms. Schedule delivery of primed steel so as not to be exposed directly to sunlight for over two months and will be installed and finished painted within five months of priming. If above requirement is not met, blast clean primer and re-prime steel.

1.06 ROTATING EQUIPMENT

A. Rotating equipment storage shall include recommended manual rotation frequency with a log prepared by the Contractor and submitted in the maintenance plan to demonstrate specification compliance. The Contractor shall contact the Engineer prior to performing the scheduled rotation. An Inspector may accompany the Contractor's personnel during the required rotation.

1.07 ELECTRICAL EQUIPMENT

A. All materials and equipment shall be properly and effectively protected by the Contractor during the execution of the work and shall be maintained in accordance with Manufacturer requirements.

B. All electrical equipment to be used in the construction shall be properly stored and protected against the elements. All equipment shall be stored under cover and shall not be stored at the construction site on the ground, in mud, water, snow, rain, sleet or dust. Large diameter cables may be stored on reels outside, however, all cable ends shall be waterproofed, and the reels covered with weatherproof materials. Such weatherproof materials shall be heavy-duty, securely fastened and made impervious to the elements.

C. Conventional electrical construction materials such as building wire, outlet and junction boxes, wiring devices, conduit, lighting fixtures, fittings, etc., shall be stored in construction buildings, covered trailers or portable covered warehouses. Any equipment subject to damage or corrosion from excessive moisture shall be stored in dry, heated areas. Any equipment containing plastic or material subject to damage caused by excessive heat or sunlight shall be stored to prevent such damage. This includes plastic ducts and lenses.

D. All gear and equipment, if delivered to the construction site before the building is under cover and the equipment site prepared shall be warehoused and protected. All gear and equipment shall be covered and protected from the elements and other damage and shall be stored in a clean, dry, heated atmosphere, under cover at the Contractor's expense.

E. All gear and equipment delivered to the construction site after the building is under cover shall be protected as described above and in addition shall be provided with auxiliary heat to prevent condensation damage. The gear shall also be protected against damage caused by carelessness of workmen who are installing equipment connected to or adjacent to the above electrical equipment.

F. Equipment damaged as a result of the above conditions shall be properly repaired at the Contractor's expense or shall be replaced at the Contractor's expense, if, in the opinion of the Engineer the equipment has been damaged to such an extent it cannot operate properly after repairs are made.

G. All electrical enclosures exposed to construction damages such as paint spots, spackling or plaster spatter, grout splashes, waterproofing compound, tar spots or runs and pipe covering compound splashes, shall be completely covered and protected

against damage.

H. In the event leakage into the building of any foreign material or fluid occurs or may occur, the Contractor shall take all steps as described above to protect any and all equipment.

I. After connections to electrical equipment are complete and the equipment is ready for operation, all construction debris shall be removed from all enclosures. Such debris includes dust, dirt, wire clippings, tape and insulation removed in order to make connections.

1.08 PAINTINGS AND COATINGS

A. All materials shall be brought to the job site in original sealed containers. Each container shall bear the manufacturer's name, coating type, batch number, date of manufacture, storage life, and special directions. They shall not be used until TMWA has inspected contents and obtained data from information on containers or label. Materials exceeding storage life recommended by the manufacturer shall be rejected.

B. All coatings and paints shall be stored in enclosed structures to protect them from weather and excessive heat or cold. Flammable coatings or paints must be stored to conform with City, County, State and Federal safety codes for flammable coatings or paint materials. At all times coatings or paints shall be protected from freezing.

1.09 PACKAGING

A. Deliver products to the job site in manufacturer's packaging material with seals unbroken and labels intact until time of use. Promptly remove damaged material and unsuitable items from the job site, and replace with material meeting the specified requirements expeditiously, at no additional cost to TMWA.

B. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to manufacturer, grade, quality, and other pertinent information.

1.10 PROTECTION

A. Protect finished surfaces, including jambs and soffits of openings used as passageways, through which equipment and materials are handled.

B. Provide protection for finished floor surfaces in traffic areas prior to allowing equipment or materials to be moved over such surfaces.

C. Maintain finished surfaces clean, unmarred, and suitably protected until accepted by TMWA.

D. Protect materials and equipment from the effects of weather, sunlight, extreme temperatures, etc., when exposure of the materials or equipment to the elements would cause degradation of, or damage to, the material, equipment, or coating system. Progress payments for materials and equipment stored on-site shall only be made when the materials or equipment are suitably stored.

E. Exercise installed equipment and maintain per manufacturer’s recommendations until the project is accepted by TMWA.

F. Store pipe on suitable supports as recommended by the fabricator. Maintain protective endcaps until such time as the pipe is ready for installation.

1.11 DELIVERY, REPAIRS, AND REPLACEMENTS

A. The Contractor shall check material and equipment at the time of delivery to ensure it conforms to the Contract Documents and Shop Drawings and has not been damaged during shipment. Any materials or equipment not in compliance with the Contract Documents and Shop Drawings will be directly returned to the manufacturer. Report damaged items to the attention of the Engineer and TMWA, who will decide whether the item can be repaired in the field or must be returned to the manufacturer.

B. In event of damage, promptly make replacements and/or repairs to the approval of the Project Representative and Engineer and at no additional cost to TMWA.

C. Additional time required to secure replacements and to make repairs shall not be considered by the Engineer to justify an extension in the Contract Time of Completion.

1.12 RIGHTS OF INSPECTION

A. TMWA and Engineer have the right to inspect all storage sites and preventative maintenance records at any time. The Contractor shall immediately correct any deficiencies. Failure to note a deficiency on the part of TMWA or Engineer does not relieve responsibility for proper storage and maintenance of materials and equipment.

PART 2 : MATERIAL (NOT USED)

PART 3 : EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 70 00
CONTRACT CLOSEOUT

PART 1 : GENERAL

1.01 DESCRIPTION

A. This Section covers miscellaneous requirements for contract closeout.

1.02 SUBMITTALS

SECTION 01 70 00 – Submittal Summary	
Project As-Built Drawings	48-Hours Prior to Final Payment Request: Including a high quality scanned electronic file in sequential order depicting all neat and legible changes that have been recorded as deviations from original design.
Guarantees and Bonds	48-Hours Prior to Final Payment Request: As specified in all Contract Documents and Project Conditions.
Spare Parts and Materials	48- Hours Prior to Final Payment Request: Physical delivery of spare parts in new condition to TMWA, as specified in individual sections.
Warranty Information	48- Hours Prior to Final Payment Request: All product warranty data from manufacturers.
Operating Handles and Special Tools	48-Hours Prior to Final Payment Request: Physical delivery of operating handles and special tools in new condition to TMWA, as specified in individual sections.
Operating and Maintenance Instructions	48-Hours Prior to Final Payment Request: Physical delivery of previously approved operating and maintenance manuals to TMWA, in the quantities and format as specified in individual sections.
Testing and Startup Forms	48-Hours Prior to Final Payment Request: All testing certificates and startup documentation required by the project specifications.
Training Material	72-Hours Prior to the First Training Session: Printed copies in quantities to provide all training attendees with their own, as required by this specification.
Request for Substantial Inspection	After Project Meets all Substantial Completion Requirements: A written letter with company letterhead requesting a Substantial Completion TMWA inspection, requirements defined in the Supplementary Conditions.
Punchlist Completion Schedule	72-Hours After Receiving Punchlist from TMWA: A comprehensive work schedule addressing each punchlist item and the corresponding completion date.
Request for Final Completion	After Project Meets All Final Completion Requirements: A written letter with company letterhead and date requesting a Final Acceptance Project Status from TMWA.
Project Closeout Documents	After Project Meets All Final Completion Requirements: Evidence of payment and release of liens and stop payment notices and all other permit closeouts, contractor staging area signoffs, ect. required.

PART 2 : MATERIAL

2.01 CLEANING MATERIALS

A. As recommended by the manufacturer of the surface to be cleaned.

PART 3 : EXECUTION

3.01 CLEANING

A. Exterior Cleaning: Sweep paved surfaces; rake other surfaces or grounds.

B. Final Cleaning: Remove all tools, equipment, surplus materials, and rubbish. Refinish surfaces of existing facilities that are marred, scratched, or damaged to match original condition. Remove grease, dirt, stains, foreign materials, and labels from interior and exterior finished surfaces. Do any required waxing and polishing. At time of final inspection, project shall be thoroughly clean and ready for use.

C. Restoration of Surface: The conditions of the pipeline corridor shall be restored to a condition that is substantially undisturbed from initial condition including drainage patterns and vegetation. All restoration shall be in full accordance with all special permits.

3.02 SUBSTANTIAL COMPLETION AND FINAL INSPECTION

A. Submit written certification that project, or designated portion of project, is substantially complete, and request, in writing, a final inspection. The Engineer shall make an inspection within ten (10) working days of receipt of request.

B. When Engineer and/or Project Representative determine that the Work is substantially complete, either shall prepare a list of deficiencies that need to be corrected before final acceptance and issue a Notice of Substantial Completion with the deficiencies noted.

C. If the Engineer and/or Project Representative determine that the Work is not substantially complete, he/she shall immediately notify Contractor, in writing, stating reasons. After completing Work, the Contractor shall resubmit certification and request a new final inspection.

3.03 FINAL ACCEPTANCE OF THE WORK

A. After all deficiencies have been corrected, a Letter of Final Acceptance shall be issued.

B. Acceptance may be given before correction of deficiencies that do not prevent operation and use of the facility; however, final payment shall be withheld until all deficiencies are corrected.

C. Until receipt of Letter of Final Acceptance, Contractor shall be responsible for the Work of this Contract.

3.04 OPERATING INSTRUCTIONS, STARTUP, AND TRAINING

A. Following Engineer's approval of the O&M submittal, the Contractor shall work with TMWA to schedule training sessions for TMWA's personnel.

B. Training shall be scheduled according to and be inclusive of the following:

1. Two (2) separate training sessions shall be scheduled over a period of two (2) weeks at times and dates as agreed upon by TMWA.

2. Each training session shall be limited to one (1) consecutive hour.
3. All questions for which the individual conducting the training cannot provide a complete and accurate answer to TMWA's personnel shall be answered in writing to TMWA not more than one (1) week following the training session.
4. The following written training materials shall be provided as reference to TMWA's staff at the beginning of each training session:
    a. The Contractor shall verify with TMWA the number of attendees participating in each training session and shall prepare copies of training materials, other than the two copies of the O&M manuals, to allow each attendee to receive their own training documents. Engineer approved hard copies of O&M manuals shall be shared by attendees.
5. TMWA may request additional information be covered during the training sessions at any time and these requests shall be accommodated by the Contractor.
6. The training shall include a presentation of the following:
    a. An overview of the system, including any animations, drawings, sketches, and the like, that effectively describe typical operations.
    b. Checklists to be completed during typical operations and frequency of checks.
    c. Placing the unit into service and taking the unit out of service for both short-term and long-term shutdowns.
    d. Routine, preventative maintenance procedures and frequency of PMs.
    e. Review of spare parts inventory.
    f. Description of corrective actions and troubleshooting.
    g. Proper de-energization procedures (LOTO) for safe maintenance on the unit, both for preventative maintenance and for corrective maintenance or troubleshooting.
    h. An overview of troubleshooting procedures for all potential failures.
    i. An allowance for 15 minutes within the training for questions and answers about the system.
7. At least one training session shall be video recorded by TMWA to be made available to TMWA's staff in perpetuity with or without editing. The Contractor has no rights to the training video and it will be the sole property of TWMA.

3.05 POST CONSTRUCTION INSPECTION

A. Before expiration of guaranty period, TMWA will schedule a post-construction inspection meeting. Representatives of TMWA, Engineer, Project Representative, and Prime Contractor shall attend the inspection. The PR shall generate a punch list of all deficiencies noted, which shall be repaired by Contractor at no additional cost to TMWA.

END OF SECTION 01 70 00

SECTION 02 00 00
EXISTING FACILITIES AND DEMOLITION

PART 1: GENERAL

1.01 DESCRIPTION

A. The Contractor shall perform all demolition, salvage, and abandonment of existing facilities, equipment, and materials as required by the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 – Submittals

B. Section 31 00 00 – Earthwork

1.03 SUBMITTALS

SECTION 02 00 00 – Submittal Summary	
Preconstruction Documentation	7 Days Prior to Project Mobilization: Date stamped project photos and videos of the entire project area. The electronic photo files shall be provided in JPEG format at the highest quality compression setting with a camera resolution of 10 megapixels.
Demolition and Disposal Plan	7 Days Prior to Project Mobilization: A comprehensive demolition and disposal plan for all material requiring demolition, in accordance with these specifications.
Salvaged Material Log	7 Days After Demolition Work: Delivery status of all salvaged items. TMWA shall approve the log indicating receipt of salvaged material in acceptable condition.

1.04 OWNERSHIP OF MATERIAL AND EQUIPMENT

A. Materials and equipment not designated for reuse or salvage shall become the property of Contractor. However, material removed may be retained by TMWA (salvaged to TMWA), and Contractor shall allow TMWA to inspect material and salvage materials such as valves and fittings before Contractor removes such material from the site.

1.05 CLEARING, GRUBBING, STRIPPING

A. Remove and dispose of trees, snags, stumps, shrubs, brush, limbs, and other vegetative growth to the limits defined on the construction plans. Remove all evidence of branches greater than 1-inch in diameter of thickness. Remove and dispose of trash piles and rubbish. Protect structures and piping above and below ground, trees, shrubs, and vegetative growth and fencing which are not designated for removal or which exist outside project limits.

B. After clearing, remove and dispose of wood or root matter, including stumps, trunks, roots, or root systems greater than 1-inch in diameter to the limits defined on the construction plans.

C. After grubbing, strip the organic material to the limits defined on the construction plans to a depth of not less than 2-inches. Upon completion of the stripping operation, the remaining material, if utilized for structural fill, shall not exceed a concentration of organics in excess of 5 percent by dry weight. Dilution shall be accomplished by means of disking.

1.06 DEMOLITION AND DISPOSAL PLAN

A. Prior to demolition, the Contractor shall develop and submit demolition and disposal plan for TMWA approval. The plan shall incorporate the following elements:

1. High-quality preconstruction photos depicting the baseline condition of existing structures and other facilities adjacent to the items designated for demolition.
2. Identification of all existing equipment to be salvaged or to remain in place as the property of TMWA in the field through tags or marks.
3. Equipment to be used for demolition.
4. Delineated extents of demolition for connecting piping, electrical facilities, and other related facilities.

B. The Contractor shall not proceed with demolition operations until after the submitted Demolition and Disposal Plan has been approved. The Contractor shall not deviate from the approved plan without written authorization by TMWA and/or the Engineer.

PART 2: MATERIALS

2.01 EQUIPMENT AND MATERIALS FOR DEMOLITION

A. Only equipment and materials submitted and approved shall be used for demolition.

B. Fires shall not be used for disposal of demolished items or refuse.

C. Drop hammers, impact hammers, or other types of impact devices shall not be used under circumstances that may cause or allow damage to existing underground utilities.

PART 3: EXECUTION

3.01 SALVAGE OF EXISTING FACILITIES

A. Existing materials and equipment removed by the Contractor under the provisions of the Contract, and not reused in the work or retained by TMWA, shall become the Contractor's property and shall be removed from the work site upon completion of the Work.

B. Contractor shall carefully remove, in a manner to prevent damage, any and all materials and equipment specifically designated in the Contract Documents to be removed and salvaged, or to remain the property of TMWA. The Contractor shall store and protect all salvaged items specified or indicated in the Contract Documents to be reused in the Work.

C. Salvaged items not designated for reuse in the work but identified as items to be retained as TMWA's property, shall be delivered to TMWA by the Contractor in good condition at a location within the project site designated by Construction Manager.

D. Any items damaged during the removal, storage, or handling as a result of carelessness, negligence, or improper procedures shall be replaced by Contractor with corresponding items of equal or greater value.

E. Contractor may at its option furnish and install new items in lieu of those indicated to be salvaged or reused, in which case the original items shall become the property of Contractor and shall be removed from the site after completion of the work.

F. Existing materials and equipment removed by Contractor shall not be reused in the work, except where otherwise called for in the Contract Documents.

3.02 ENVIRONMENTAL CONTROLS

A. Contractor shall minimize the generation of dust and other airborne particles. If required by Laws and Regulations, temporary enclosures and other suitable measures shall be used to prevent the spread of dust, dirt, airborne particles, and debris.

B. Noise generated by the demolition activities shall be limited to levels allowed by Laws and Regulations. Demolition equipment shall have noise suppression devices.

C. Water shall not be used in a manner that creates dangerous or objectionable conditions such as flooding, erosion, overspray, or sedimentation in nearby ditches or streams. Stormwater shall be contained and managed as required by Laws and Regulations.

D. If underground fuel storage tanks, asbestos, PCBs, contaminated soils, or any other hazardous materials are encountered, the affected demolition Work shall be stopped and Engineer and TMWA notified promptly.

E. Promptly remove equipment and materials not designated for reuse or salvage and all waste and debris resulting from demolition operations. Dispose of removed equipment, materials, waste, and debris in a manner that conforms to applicable Laws and Regulations.

3.03 PROTECTION OF PROPERTY

A. The Contractor shall provide safe access to adjacent properties, facilities, and buildings at all times. Roadways, sidewalks, and passageways shall not be obstructed.

B. Demolition shall be performed using procedures that prevent damage to adjacent property. The Contractor shall promptly repair damage to TMWA's property and property owned by others.

C. The Contractor shall be responsible for integrity of adjacent structures, facilities, and shall be liable for any damage due to movement or settlement. Suitable shoring for support of adjacent structures shall be installed and maintained.

D. If adjacent structures or facilities appear to be in danger by demolition operations, the Contractor shall take additional steps to prevent damage.

E. The Contractor shall erect and maintain enclosures, barriers, warning lights, and other required protective devices.

3.04 UTILITY SERVICES

A. The Contractor shall comply with the operating rules and regulations of utility companies that have jurisdiction over utilities affected by the demolition operations.

B. Notify and coordinate with the utility companies and adjacent building occupants when temporary interruptions of utility services are required.

3.05 BACKFILL OF STRUCTURES AND EXCAVATIONS

A. Backfill of excavations and structures shall be in accordance with Section 31 00 00 - Earthwork.

B. Materials from the demolition work shall not be used for backfill unless approved by the Engineer.

3.06 DEMOLITION OF STRUCTURES

A. Structures shall be demolished to the lines and grades indicated.

B. Structures shall be demolished beginning at the top of the structure and proceeding to the ground. Concrete and masonry shall be removed in small sections.

C. Hoists, derricks, cranes, other suitable devices shall be used to carefully remove structural members.

D. Temporary coverings shall be provided for openings in roofs or walls to prevent water damage to portions of structures that are to remain in place.

E. Perform the following work where new construction must be installed against existing concrete or masonry:

1. Make an initial cut using a concrete saw, but do not cut the underlying reinforcement steel.
2. After removal of the concrete or masonry, cut the exposed reinforcing steel, leaving lengths of reinforcement for use as dowels or splices as required for connection to the new work.
3. Where a portion of existing concrete or masonry shall remain in place without connection to new Work, cut the existing material completely through its section with a concrete saw, unless indicated otherwise.
4. Demolish structures to a minimum of 3' below the adjacent finished grade, unless otherwise indicated. Remove all existing concrete footings and foundations. Backfill the remaining structure and demolition excavations to the level of the adjacent finished grade.

3.07 DEMOLITION OF MECHANICAL FACILITIES

A. Mechanical demolition consists of dismantling and removal of existing piping, pumps, motors, water tanks, equipment, and other mechanical items. It includes cutting, capping, and plugging as required to preserve the operation of existing facilities to remain in service.

B. Existing process, water, chemical, gas, fuel oil, and other piping not required for the new facility shall be removed.

1. Piping shall be removed to the limits shown, or to a point where it shall not interfere with the new facilities. Piping not indicated to be removed, or which does not interfere with the new construction, shall be removed to the nearest solid support, capped, and left in place.
2. Chemical, fuel piping, and tanks shall be emptied of contents and cleaned before removal. Fuels, chemicals, and other contents from the demolition Work shall be removed and disposed of at a location that is in compliance with all local, state, and federal Laws and Regulations. Contractor shall verify that the remaining piping and tanks are in a safe condition prior to removal or capping.
3. Where piping passes through existing walls, the piping shall be cut and capped on each side of the wall.
4. Pipe and tank capping materials shall be suitable for the types of pipe and tank to be capped.
5. Where underground piping associated with mechanical facilities is to be altered or removed, cap the remaining piping that is to be abandoned. Abandoned

underground piping may be left in place unless it interferes with new work or is shown to be removed. Piping less than 6" in size may be capped and abandoned in place. Piping equal or greater than 6" in size shall be filled with slurry and plugged prior to abandonment.

C. Where existing piping is to be cut and capped, but a portion shall remain in service, Contractor shall do the following.

1. Capping and plugging materials and installation work shall be in accordance with the applicable building codes, standards, and specifications that govern the remaining piping.
2. Remaining piping shall be pressure tested and disinfected before being returned to service in accordance with the applicable building codes, and as approved by Engineer.

3.08 DEMOLITION OF ELECTRICAL FACILITIES

A. Demolition of electrical facilities shall be in accordance with applicable codes and standards for electrical construction.

B. Electrical removals consist of disconnecting and removing existing switchgear, distribution switchboards, control panels, bus ducts, conduits and wires, panelboards, lighting fixtures, and associated electrical equipment.

C. Where existing electrical facilities are to be removed, but a portion shall remain in service, Contractor shall do the following:

1. Remove the facilities as required, and provide terminations consisting of new conduit caps, junction boxes, and panel modifications required to maintain the remaining facilities in service and maintain the integrity of the grounding systems.
2. Remove wiring in underground duct systems. Verify the functions of wiring before disconnecting and removing and cap ducts that shall not be continued in service.
3. Work required for facilities that remain in service shall be in accordance with applicable codes and standards for electrical construction and the specifications.

3.09 DEMOLITION OF PIPELINES AND YARD PIPING

A. Piping shall be removed to the limits shown, or to a point where it shall not interfere with the new facilities. Where limits are not shown, piping, including the water well, shall be removed to a point that is at least 5' outside of the limits of new construction.

B. Normally, piping shall be removed to the first joint outside of the limits required. Where sections of pipe exceed 16' in length the piping may be cut using saws, cutting torches, or other approved methods to provide clean, unbroken, end points.

C. Where underground piping is to be removed, plug the remaining piping that is to be abandoned. Abandoned underground piping may be left in place unless it interferes with new Work or is shown to be removed. Piping less than 6" in size shall be plugged and abandoned in place. Piping equal or greater than 6" in size shall be filled with slurry and plugged prior to abandonment.

D. Where existing piping is to be demolished, but a portion shall remain in service, Contractor shall do the following:

1. Capping and plugging materials and installation Work shall be in accordance with the specifications. If the pipe materials are not in the specifications, the applicable building codes, standards, and specifications that govern the remaining piping shall be used for installation of capping and plugging materials.
2. Remaining piping shall be pressure tested and disinfected before being returned to service in accordance with the applicable building codes, and as approved by Engineer.
3. Plugs for abandoned piping shall consist of solid concrete plugs installed for a length of at least 12 inches. As an alternative, Contractor may install approved plugs or caps that are of the same material as the pipe.

3.10 CLEARING AND GRUBBING

A. Area to be Cleared & Grubbed:

1. The Contractor shall restrict clearing and grubbing to the areas designated for new construction or adjustment of grades on the plans. Surrounding trees shall be protected from damage.
2. Where limbs or roots of trees designated to remain extend into Work areas, the limbs or roots shall be trimmed in accordance with the provisions of this section.

B. Felling of Trees:

1. Use all necessary care to protect the roots and branches of trees designated to remain, and to prevent damage to persons and properties.
2. Immediately after felling a tree, remove the branches, cut trunk and limbs as necessary for removal, and clear the debris.

C. Trimming of Trees:

1. In company with the Engineer, ascertain the limbs and roots which are to be trimmed and clearly mark them to designate the approved point of cutting.
2. Cut evenly, using proper tools and skilled Workmen to achieve neat severance with the least possible damage to the tree.
3. Promptly coat the cut area with the approved pruning paint in strict accordance with the manufacturer's recommendations.
4. In the case of root cuts, apply wet burlap or other protection approved by the Engineer, as required, to prevent drying out.

D. Grubbing:

1. Remove all surface rocks and all stumps, roots, and vegetation within the limits of construction. Roots shall be removed to at least 2.5 feet below proposed finish grade.

3.11 DISPOSAL OF STRIPPINGS

A. The stripped materials shall be removed from the project site and disposed of by the Contractor, at no additional cost to TMWA.

END OF SECTION 02 00 00

SECTION 03 30 00
CAST IN PLACE CONCRETE

PART 1 : GENERAL

1.01 DESCRIPTION

A. The work of this section consists of furnishing and placing concrete, including forming, reinforcement, integral concrete coloring (where occurs) and curing in accordance with the Standard Specifications and as specified herein.

1.02 QUALITY ASSURANCE AND CODE COMPLIANCE

A. International Building Code, 2018 edition.

B. Comply with ACI 301, "Specification for Structural Concrete"; ACI 117, "Specifications for Tolerances for Concrete Construction and Materials"; and CRSI's "Manual of Standard Practice."

C. Standard Specifications for Public Works Construction, 2018.

1.03 SUBMITTALS

A. Mix designs and certified test results verifying that the components and final products for all classes of concrete meet these specifications. Mix designs shall be sealed by a Nevada-licensed engineer. Proportioning of the concrete materials shall be based on trial mixtures or field experience in accordance with ACI 318 Section 5.3. Mix designs which do not meet ACI 318 Section 5.3 will be rejected.

B. Reinforcing steel shop drawings.

C. Epoxy adhesive ICC report. See the Structural Notes for requirements.

D. Color chart for integral concrete colors for placement in the retaining wall concrete. Prepare mock-ups of the colored concrete for review by TMWA.

SECTION 03 30 00 – Submittal Summary	
Mix Design	14 Days Prior to Concrete Work: Mix designs and certified test results verifying that the components and final products for all classes of concrete meet these specifications. Mix designs shall be sealed by a Nevada-licensed engineer.
Metal Reinforcement	14 Days Prior to Concrete Work: Literature and evidences of compliance with referenced standards and these Specifications.
Concrete Delivery Tickets	Immediately Prior to Concrete Pour: When air temperature is above 90°F, reduce mixing and delivery time to 60 minutes. Concrete must be poured within 90 minutes of mixing. Produce ticket to Construction Manager.

PART 2 : MATERIALS

2.01 CONCRETE

A. Materials shall conform to the Standard Specifications Section 202.

B. Portland cement shall conform to the Standard Specifications, Type II.

C. Water for washing aggregates and for mixing and curing concrete shall be clean, free from oil, acid, alkalis, vegetable matter, or other deleterious substances. No salt or sea water or water containing excessive amount of sodium sulfate, magnesium sulfate or magnesium chloride shall be used.

D. Coarse aggregate shall consist of clean, hard, dense, tough and durable natural gravel, crushed gravel, or crushed rock, conforming to the Standard Specifications. It shall be free from oil, organic matter or other deleterious substances.

E. Fine aggregate shall consist of hard, durable, uncoated natural sand or other approved material, conforming to the Standard Specifications. It shall be free from oil or other deleterious substances.

F. Fly ash shall conform to ASTM A-618, Class F or N, except that the loss on ignition shall be limited to 1%.

G. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

H. Only the specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted.

I. Admixtures:

1. A water reducing agent such as Pozzolith, WRDA, or equal shall be used in all concrete. The admixture shall conform to ASTM Specification C494. Proportioning and mixing shall be as recommended by the manufacturer.
2. Admixtures causing accelerated setting of cement in concrete shall not be used.

Materials shall conform to Standard Specifications Section 202.

2.02 MIXES

A. Concrete shall consist of Portland cement, fine aggregate, coarse aggregate, water, and admixtures. Concrete shall conform to the requirements of Section 202.00 of the Standard Specifications, as modified herein.

Type of Use	Minimum Cement Content lb/cy	Minimum Compressive Strength, psi	Slump Inches
Foundations & Walls	**564**	**5,000**	**4 ± 1”**

B. The Contractor may at his option substitute up to 15 percent by weight of fly ash for the Portland cement required herein.

C. Aggregate Sizing:

1. Coarse aggregate maximum grading shall be 3/4 inch. Grading shall be as set forth

in Section 200.05 of the Standard Specifications.

2.03 REIFORCING BARS

A. Deformed Bars, ASTM A615, Grade 60, free from rust, scale, oil, or frost.

B. Smooth steel dowels, if used, shall conform to ASTM A36 or approved equal.

C. Reinforcement supported from formwork shall rest on Class 1 (plastic protected) bar supports, as specified in Manual of Standard Practice by the Concrete Reinforcing Steel Institute (CRSI).

D. Reinforcement supported from the ground shall rest on 3 inch high precast concrete blocks not less than 4 inches square, and having a compressive strength equal to the specified compressive strength of the concrete being placed.

1. The precast blocks shall have been cured as specified for concrete and shall contain soft steel wires imbedded therein for fastening to the reinforcing.

E. Details of concrete reinforcement not shown on drawings shall be in accordance with CRSI Manual of Standard Practice.

2.04 INTEGRAL CONCRETE COLOR

A. Dry powder iron oxide pigments or liquid iron oxide pigments specifically manufactured to be added as a coloring agent to concrete mixtures. Pigments shall be non-fading, non-bleeding inert products meeting ASTM C979 and which produces a permanent, uniform and stable color.

2.05 PATCHING GROUT

A. Neat Portland cement, water, and fine sand passing a No. 30 mesh sieve.

2.06 NONSHRINK GROUT

A. Masterflow 713, as manufactured by Master Builders Company, Cleveland, OH.

B. Upcon by Upco Co., Cleveland, OH, or equal.

2.07 CURING MATERIALS

A. Sheet Materials: ASTM C171, 4 mil polyethylene film or waterproof paper.

B. Spray Applied Membrane Forming Liquids: Meet or exceed requirements of ASTM C309, Type 1-D, Class B, except that the loss of water, when tested, shall be not more than 0.15 kilograms per square meter in 24 hours, nor more than 0.45 kilograms per square meter in 72 hours. Shall be a water-base, resin cure with a fugitive dye. Products by Burke, W.R. Meadows, Inc., or equal.

2.08 CURING MATERIALS

A. Premolded joint filler (expansion joint material) shall be asphalt impregnated fiberboard meeting the requirements of ASTM D1751, ½" thick.

PART 3 : EXECUTION

3.01 GENERAL

A. Concrete construction shall conform to the requirements of Section 311 of the Standard Specifications.

3.02 CONCRETE MIXING AND DELIVERY

A. Concrete shall be delivered to the site by transit mixers.

B. No concrete shall be placed in the work after it has begun to set or more than one hour after it has been mixed.

C. The rate of delivery, haul time, mixing time and hopper capacity shall be such that all mixed concrete delivered shall be placed in the forms within one hour from the time of introduction of cement and water to the mixer. All concrete shall be kept continuously agitated until discharged in the hopper at the job site.

D. Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94 and Chapter 7 of ACI 301. Plant equipment and facilities shall conform to the "Check List for Certification of Ready Mixed Concrete Production Facilities" of the National Ready Mixed Concrete Association.

E. Add integral coloring pigment in accordance with the manufacturer's instructions.

3.03 CONCRETE HANDLING AND PLACEMENT

A. Excavations And Formwork:

1. Excavations shall be kept free from water while concrete is being placed, cured and finished therein. Fresh concrete shall be protected at all times from running water.
2. Before placing concrete, all form work shall be cleaned of dirt and construction debris, water-drained, reinforcement securely and properly fastened in its correct position, forms at construction joints re-tightened, all bucks, sleeves, hangers, pipes, conduits, bolts, wires, etc., installed. No concrete shall be placed before the forms and all work that is to be embedded have been set and observed by the Project Representative and the Special Inspector.

B. Concrete Placement:

1. Concrete shall be conveyed from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent the separation or loss of the materials. The concrete shall be deposited in the forms as nearly as practicable in its final position to avoid rehandling.
2. Concrete shall be placed and consolidated by methods that will not cause segregation of the aggregates and will result in a dense homogeneous concrete which is free of voids and rock pockets. All concrete shall be used while fresh and before it has taken an initial set. Retempering any partially hardened concrete with additional water will not be permitted.
3. Surfaces on which concrete is to be placed shall be thoroughly moistened with water immediately before placing concrete.

4. Concrete shall not be deposited on frozen or ice-coated ground nor on ice-coated forms, reinforcing steel, embedded items or construction joints.
5. In vertical sections, concrete shall be deposited continuously in horizontal layers of 24 inches maximum depth so as to maintain a horizontal plastic surface until the completion of the unit. No concrete shall be deposited on concrete which has hardened sufficiently to cause the formation of seams and planes of weakness within the section.
6. Concrete for horizontal members or sections shall not be placed until the concrete in the supporting vertical members or sections is no longer plastic and has been in place at least two hours.
7. Concrete mixed or placed while the atmospheric temperature surrounding the work is at or below 35 degrees F., or when there is indication that the temperature may drop below 35 degrees F. within 24 hours shall comply with the provisions of ACI 306, latest edition.
8. Admixtures, hot water, heaters, blankets, enclosures, etc. required to meet the requirements of ACI 306 shall be at the Contractor's expense.

3.04 FORMWORK

A. Lumber, prefabricated wood panels, metal, or plastic-lined panels shall be sound and free from any defects that will mar or detract from the surface of the finished concrete. Construct forms sufficiently tight to prevent loss of mortar. Treat forms with a nonstaining material to eliminate absorption of water and to act as a form release agent.

B. Thoroughly remove all dirt, mortar, and foreign matter before each use. Where the bottom of the form is inaccessible from within, provide access panels to permit thorough removal of extraneous material before placing concrete.

C. Chamfer all exposed horizontal and vertical edges of structures ¾-inch, both interior and exterior of structures.

D. Earth trench forms for walls and footings below existing and final grades may be used, if approved after inspection of the trenches, provided the sides are clean, even, vertical, true, and provided the bottoms are level, clean, and without fill, and the width is increased two inches.

3.05 REIFORCEMENT

A. Reinforcement shown on drawings shows only the necessary information for detailing the reinforcement and preparation of placing and bending details. It is the Contractor's responsibility to detail the reinforcement.

B. Bending shall be in accordance with CRSI Manual of Standard Practice, Chapter 7.

C. Place reinforcement accurately as shown. Adequately secure metal reinforcement in position by concrete or metal chairs and spacers, in accordance with CRSI Manual of Standard Practice. Distance between the steel and the surface, as shown; otherwise, in accordance with International Building Code requirements. In walls, use bolsters between form and reinforcement to prevent lateral displacement of reinforcement and to ensure proper concrete cover.

D. After reinforcement has been placed, it shall be inspected and approved by the Project Representative and Special Inspector before placing concrete.

E. At time concrete is placed, all metal reinforcement shall be free from rust, scale, frost, or other coatings that would destroy or reduce the bond.

3.06 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from drying, excessively hot and cold temperatures and mechanical injury. Keep moisture loss to a minimum until cement has hydrated and concrete is hard.

B. Protection:

1. In cold weather, the recommendations of ACI 306 shall be followed. In general, maintain the moisture conditions but also, by heating or covering, maintain the temperature of the concrete between 50°F and 60°F for entire curing period.
2. In hot weather the recommendations of ACI 305 shall be followed. Take immediate steps to protect newly finished concrete from drying effects of wind and sun. Concrete temperature at time of placement shall not exceed 90°F.
3. During curing period, protect concrete from mechanical damage, loading, shock and vibration.

END OF SECTION 03 30 00

SECTION 31 00 00
EARTHWORK

PART 1 : GENERAL

1.01 DESCRIPTION

A. This Work shall consist of performing all operations necessary to excavate earth and rock or other material, of whatever nature, including removing water, regardless of character and subsurface conditions necessary for the construction of the project facilities; to place backfill for all project facilities, including site grading, structures, ditch and channel excavation, culverts, minor concrete structures, roadwork, removal and replacing unsuitable material and other Work all as shown on the plans and indicated in the specifications. This Work includes excavation and backfill of all structures, trenches and depressions resulting from the removal of obstructions; removal and replacement of unsuitable material and slide material which has come into trenches; all Work as shown on the plans and as specified in these specifications and as directed by the Engineer; and furnishing all labor, materials, tools, equipment and incidentals, and for doing all the Work that may be required to construct and maintain excavation and backfill until it is accepted by TMWA.

1.02 DEFINITIONS

A. Trench – Excavation in which the depth is greater than the width of the bottom.

B. Foundation – Material on which pipe bedding or structure is to be directly placed.

C. Bedding – Granular material which surrounds pipe or structure. Pipe bedding shall extend 12 inches above the pipe.

D. Maximum Density – The maximum dry density determined by ASTM D1557 for the soil or aggregate under consideration.

E. Backfill – Material from top of bedding to finish subgrade or finish grade

F. Well Graded – A mixture of soil particle sizes that have no specific concentration or lack thereof of one or more sizes. Well graded is used to help define a material that, when properly compacted, produces a strong and relatively incompressible soil.

G. Relative Compaction – The ratio, in percent, of the as-compacted dry density to the laboratory maximum dry density. The laboratory maximum dry density is defined in accordance with ASTM D1557, latest edition.

H. Standard Specifications – Standard Specifications for Public Works Construction (SSPWC).

1.03 SUBMITTALS

SECTION 31 00 00 – Submittal Summary	
Material Quality Certification	30 Days Prior to Transportation to the Work Site: Certification that the material conforms to the Specification requirements along with description of the material source and copies of the test results from a qualified commercial testing laboratory.

1.04 QUALITY ASSURANCE AND CODE COMPLIANCE

A. Compaction testing of bedding, fill, and backfill materials shall be performed by a representative of TMWA. The Contractor shall provide all material analyses (gradations, Proctor curves, etc.) necessary to perform field tests on all materials used. Areas where test results indicate noncompliance shall be corrected before placing additional materials.

B. The Contractor shall cooperate with the geotechnical testing representative in taking the tests. If a test fails, the area shall be reworked to the satisfaction of the tester. A minimum of two tests shall be allowed at any location of Work, and the Contractor shall be responsible for the costs of any additional testing required after the second test due to test failures.

C. In connection with these specifications, tests shall be made in accordance with the test methods required by Table 31 00 00.A.

Table 31 00 00.A – Geotechnical Test Methods

Test Description	ASTM	Test Method NDOT
Relative Compaction	D-1557, D-2922	T103F
Sand Equivalent		T227
Resistance (R-Value)		T115D
Sieve Analysis		T206F

1.05 SAFETY

A. General

1. To ensure the safety of Workmen and to protect and facilitate the Work, sufficient bracing and shoring shall comply with rules, orders and regulations of OSHA. TMWA or Engineer shall in no way be responsible for supervising shoring installation or maintenance. Insofar as possible, sheeting shall not extend below the bottom of pipe barrel. All sheeting, timbering, lagging, and bracing shall be removed during backfilling in such a manner as to prevent any movement of the ground or damage to the piping or structures, unless otherwise approved or required by the Engineer. When the Engineer requires or allows that sheet piling, lagging, and bracing shall be left in place, such materials shall be cut off where designated and the upper part withdrawn. If steel sheet piling is utilized, it may be withdrawn; compacting is to proceed as it is removed.

B. Use of Explosives

1. Use of explosives, if required, shall be performed in accordance with the conditions in the General Conditions.

1.06 PROJECT CONDITIONS

A. A geotechnical investigation report was prepared for this project and has been made available for reference. Any geotechnical reports made available are for information purposes only, without representation or warranty of any kind with respect to its accuracy or completeness, and are not intended to and shall not be relied upon as a substitute for, or a supplement to, the independent investigation by the Bidder of site conditions. Geotechnical reports made available by TMWA are not part of the Contract Documents.

1.07 EXISTING UTILITIES

A. In general, the locations of some existing utilities are indicated on the Plans. This information has been obtained from maps, as-built Drawings, and is not guaranteed as to accuracy or completeness.

B. The Contractor shall notify Underground Services Alert North (USA North, 811) a minimum of 48 hours in advance of the start of construction. If USA markings deteriorate during construction, the Contractor shall re-notify USA as necessary.

C. Unless otherwise indicated on the Plans or specified herein, the Contractor shall maintain service of all water, gas or sewer lines; lighting, power, or telephone conduits; and other surface or subsurface structures of any nature that may be affected by the Work. Should it be necessary in the performance of the Work to disconnect or reroute any such facility, the Contractor shall make satisfactory arrangements with TMWA. Satisfactory arrangements shall include at least forty-eight (48) hours notice prior to disruption. The Contractor shall be held liable for any damage or interference with service resulting from his operations, and all expenses of whatever nature arising from disconnection rerouting, damage or replacement of such facilities shall be borne by the Contractor.

PART 2 : MATERIALS

2.01 UNSUITABLE MATERIALS

A. Materials not to be incorporated in the Work include:

1. Organic matter such as peat, mulch, organic silt or sod
2. Expansive clays
3. Material containing excessive moisture
4. Poorly graded coarse material
5. Particle size in excess of 4 inches
6. Material which shall not achieve density and/or bearing requirements
7. Construction debris such as asphalt or broken concrete

B. Materials that are unsuitable due to moisture content can be incorporated into the project provided the material is appropriately conditioned by the Contractor, at no additional cost to TMWA.

2.02 ENGINEERED OR STRUCTURAL FILL

A. All engineered fill soils shall be nearly-free (less than 5% by volume) of organic or other deleterious debris, essentially non-plastic, and less than 4-inches in maximum dimension. Materials stripped from the surface at the site containing organic materials should be removed from the site and not incorporated into engineered fill.

B. All imported fill materials to be used for engineered fill shall be sampled and tested by the project Geotechnical Engineer prior to being transported to the site.

C. Unless noted otherwise, soils used for engineered fill within 5 feet of finished grade shall by uniformly moisture-conditioned to between 3 and 5 percent above the optimum moisture content, placed in horizontal lifts not greater than 8-inches in loose thickness, and compacted to at least 90 percent relative compaction.

D. Engineered fills and structure backfills deeper than 5 feet below finished grade shall be compacted to at least 90 percent relative compaction to within 5 feet of finished grade. Embankments for earthen basins shall be compacted to at least 90 percent relative compaction.

E. Engineered fill material shall be utilized in the construction of earthen embankments, structure backfill, access roadways, facilities pad, areas designated as 'Excess Spoils Area', and all other areas identified on the contract Drawings. Engineered fill shall meet the minimum requirements in Table 31 00 00.B.

Table 31 00 00.B – Engineered Fill Requirements

Gradation	**Sieve Size**	**Percent Passing**	**ASTM Test**
	4-inch	100	C136
	3/4-inch	70-100	C136
	No. 40	15-70	C136
	No. 200	5-25	C136
Plasticity	**Liquid Limit**	**Plasticity Index**	**ASTM Test**
	≤35	≤10	D 4318
Other Compounds	**Constituent**	**% by Weight**	**ASTM Test**
	Organic Content	≤5.0%	D 2974
	Soluble Sulfates	≤0.10%	

2.03 BEDDING MATERIAL

A. Bedding shall be a graded material conforming to one of the grading requirements in Table 31 00 00.C.

B. If the pipeline is at or below the water table, drain rock should be used as bedding material. Drain rock should be placed to at least the current groundwater level. To minimize groundwater flow when using Drain Rock material, construct ground water barriers consisting of a bentonite/soil mixture every 500 feet minimum. Place a geotextile or a filter layer between the drain rock and trench backfill material.

C. Drain rock shall be placed in a maximum 12-inch thick lift and densified with a vibratory plate or similar equipment until further downward movement of particles is not observed.

D. The Contractor may use any aggregate material that is free from unsuitable material for pipe foundation provided that a suitable foundation can be constructed with the material provided.

Table 31 00 00.C – Bedding Material Gradations

	Sieve Size	**Percent Passing**
Class A	3/8-inch	100
	No. 4	90-100
	No. 50	10-40
	No. 100	3-20
	No. 200	0-15
	Sieve Size	**Percent Passing**
Drain Rock	1-inch	100
	3/4-inch	90-100
	3/8-inch	10-55
	No. 4	0-10

2.04 CLASS E MATERIAL

A. Class E Intermediate backfill shall consist of native excavated material or approved import material free from unsuitable materials defined herein.

2.05 TYPE 2, CLASS B AGGREGATE BASE

A. Type 2, Class B Aggregate Base shall be free from organic matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm stable base.

B. Aggregate shall conform to the grading and quality requirements in Table 31 00 00.D.

2.06 DRAIN ROCK

A. Drain rock shall consist of clean, angular to sub-rounded, durable rock. Volcanic cinder is not allowed. Drain rock shall meet the gradation in Table 31 00 00C.

2.07 CRUSHED ROCK

Crushed rock base and gravel are defined as natural or crushed rock, free from organic matter, and meeting the gradation in Table 31 00 00.E.

Table 31 00 00.D – Type 2, Class B Aggregate Base Requirements

	Sieve Size	Percent Passing (3/4-inch max)	Contract Compliance
Gradation	2-inch	-	-
	1-1/2-inch	-	-
	1-inch	100	100
	3/4-inch	90-100	87-100
	No. 4	35-60	30-65
	No. 30	10-30	5-35
	No. 200	2-9	0-12
	Tests	**Operating Range**	**Contract Compliance**
Quality	Resistance, R-value	-	78 min
	Durability Index	-	35 min
	Sand Equivalent	25 min	22 min

Table 31 00 00.E – Crushed Rock

	Sieve Size	Percent Passing by Weight
Durability Index > 40 ASTM D 3744	1-1/2-inch	100
	3/4-inch	90-100
	No. 4	35-60
	No. 30	10-30
	No. 200	2-9

2.08 WATER FOR COMPACTION/DUST CONTROL

A. Water for compaction and dust control shall be clean and free of oil, acids, salts, and other deleterious substances. The Contractor shall make provisions for all transport and application of the water. See Section 01 00 00 for additional information.

2.09 IMPORTED MATERIAL ACCEPTANCE

A. All tests necessary for the Contractor to locate acceptable imported material shall be made by the Contractor. Certification that the material conforms to the Specification requirements along with copies of the test results from a qualified commercial testing laboratory shall be submitted to the Engineer for approval at least 30 days before the materials are required for use. All aggregate samples shall be furnished by the Contractor, at the Contractor's sole expense. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project. Sampling of the aggregate source shall be done by the Contractor under the

supervision of the Engineer in accordance with ASTM D75. Tentative acceptance of the aggregate source shall be based on an inspection of the source by the Engineer and the certified test results submitted by the Contractor to the Engineer. No imported materials shall be delivered to the site until the proposed source and materials tests have been tentatively accepted in writing by the Engineer.

B. Final acceptance shall be based on the tests made on samples of material taken from the completed and compacted course. The completed course is defined as a course or layer that is ready for the next layer or the next phase of construction. All testing for final acceptance shall be performed by TMWA's representative.

C. If tests conducted by the Contractor or TMWA's representative indicate that the material does not meet Specification requirements, material placement shall be terminated until corrective measures are submitted and accepted by the Engineer. Material which does not conform to the Specification requirements and which is placed in the Work shall be removed and replaced at the Contractor's sole expense. Sampling and testing performed by the Contractor shall be done at the Contactor's sole expense. Retesting of failed test sections shall be charged to the Contractor in accordance with the Geotechnical Engineer's current rate schedule.

PART 3 : EXECUTION

3.01 GENERAL

A. The Contractor shall do all grading, filling in or excavating as required to completely grade the site to lines and grades shown, and to provide for the indicated drainage. Where finish grade corresponds approximately with existing grade, the ground shall be Worked-up and graded-off evenly with existing grade.

3.02 STRIPPING

A. Perform clearing, grubbing, and stripping in accordance with Section 02 00 00.

3.03 ORIGINAL GROUND PREPARATION

A. Perform all excavation of every description, regardless of the type, nature, or condition of material encountered as specified, shown on the contract Drawings, or required to accomplish the construction.

B. Clearing and Preparation: Prior to construction, soils with organics or deleterious materials within the improvement areas should be stripped and disposed of outside the construction limits. It is estimated that the average depth of stripping shall be less than one foot. Following site stripping and clearing, the exposed surfaces, including those to receive engineered fill, shall be scarified in place to a minimum depth of 6 inches. Following scarification, the material shall be water conditioned to within 2% to 5% above optimum and compacted to 90% relative compaction minimum.

C. All cleared material shall become the property of the Contractor and shall be legally disposed of at a location off the site in a manner satisfactory to the Engineer at the Contractor's expense.

3.04 REMOVAL OF OBSTRUCTIONS

A. The Contractor shall remove at his expense all rock, stone, debris, and obstructions of all kinds and character, natural or artificial, as and when required by the plans or where required for the proper prosecution of Work. Such material shall be disposed of by the Contractor at his expense unless it is designated on the plans to be saved or is obviously part of a structure or improvement installed for some purpose. All fences, posts, mail and paper boxes, culverts, structures, pipe lines and miscellaneous improvements which are required to be removed shall be replaced by the Contractor to at least their original condition, unless otherwise indicated on the plans. Where items are so indicated to be removed and saved, they shall be carefully removed and stockpiled as directed by the Engineer. Lawns, hedges, shrubs, trees, etc., encountered in the line of Work shall be carefully removed, kept moist and returned to their former location and kept moist until well established, unless the plans indicate such items are to be removed permanently or unless some other satisfactory arrangement is made with TMWA. Unless indicated on the plans, no trees, plants, or other ornamental vegetation shall be removed without the written permission of the Engineer.

3.05 GENERAL FILL COMPACTION

A. Soils used for engineered fill shall be uniformly moisture-conditioned and placed in 8-inch maximum loose lifts. Unless otherwise noted on the Drawings, compaction shall be as follows in Table 31 00 00.F.

Table 31 00 00.F – General Fill Compaction Requirements

Area	Location of Subgrade	Relative Compaction
Structures	Upper 12-inches	95%
	Below 12-inches	90%
Access Roadways	Upper 12-inches	95%
	Below 12-inches	90%

3.06 OVER-EXCAVATION

A. Over-excavate loose native soils and unacceptable fill as determined by TMWA or their representative, and/or as identified on the Plans or in the Specifications. Prior to placement of engineered fill, TMWA or their representative shall inspect the excavation to determine if unacceptable materials are sufficiently removed. The zone of over-excavation shall extend laterally a minimum of 5 feet outside areas to receive structural improvements such as building, retaining walls, slabs, curbs, pavement, engineered fill, etc.

B. All excavated material that cannot be used on-site, shall become the property of the Contractor, and shall be legally disposed of at a location on or off the site in a manner satisfactory to the Engineer at the Contractor's expense.

3.07 EXISTING VEGETATION

A. Work shall be performed with the utmost care. Under no circumstances are trees to be removed unless so noted on the plans, without express written permission from TMWA and/or Engineer. Equipment used in easement areas shall be limited to the smallest practical size necessary for the job. Trucks delivering pipe and other

materials shall be of the minimum practical size and shall be restricted to areas where they shall not damage existing vegetation and foliage. All operations within easements shall be subject to prior approval of Engineer to the end that a minimum disturbance to the existing terrain and culture results.

B. The Contractor must take extreme care to prevent permanent damage to root systems of trees to be saved.

C. Major roots (four (4) inches or greater in diameter) encountered in the course of excavation from trees that are not to be removed shall be exposed but not severed and they shall be wrapped in burlap as a protective measure while exposed. Minor roots (two (2) to four (4) inches in diameter) that are severed in the course of excavation, and major roots that are accidentally cut, shall be neatly trimmed back to an undamaged area and coated with a heavy coat of approved tree seal.

3.08 OPEN TRENCH

A. The maximum length of open trench in the aggregate at any one location is not to exceed 500 feet. The trench is open until fill is completed to adjacent finish grade elevation.

B. No trenches shall be left open overnight.

3.09 EXCAVATION

A. Trench Excavation: Trench excavation shall include the removal of all materials or obstructions of any nature, except as otherwise specified to be protected, the installation and removal of all sheeting and bracing and the control of water, necessary to construct the Work as shown. Unless otherwise indicated on the Plans or permitted by the Engineer, excavation shall be by open cut. Trenching machines may be used except where their use shall result in damage to existing facilities or where hand trenching is required to prevent damage to trees, tree roots, or other utilities.

B. Structural Excavation: All excavation for structures shall be done to the dimensions and levels indicated on the Plans or specified herein. Under all structures and drive areas the Contractor shall:

1. Scarify the surface a minimum depth of 12 inches, bring the moisture content to within 2 percent of optimum and compact to a minimum of 95 percent relative compaction.
2. If necessary, place engineered fill in maximum un-compacted 8-inch lifts to obtain subgrade elevations. Density of compacted engineered fill shall be a minimum of 92 percent of maximum dry density.
3. Excavation shall be made to such width outside the lines of the structure to be constructed therein as may be required for proper Working methods, the erection of forms and the protection of the Work. Care shall be taken to preserve the foundation surfaces shown on the Plans in an undisturbed condition. If the Contractor excavates or disturbs the foundation surfaces shown on the Plans or specified herein without written authorization of the Engineer, the Contractor shall replace at his expense such foundations with compacted gravel foundation fill or other material approved by the Engineer in a manner which shall show by test an equal bearing strength with the undisturbed foundation material.

C. Bracing, Sheeting, and Shoring: The Contractor shall provide suitable sheeting and shoring, where necessary, for protection of the excavations. All such sheeting and shoring shall be removed unless otherwise specifically authorized.

D. Unsuitable Materials: To suit field conditions, excavation below the depths shown may be ordered, but changes may only be made as directed. Soft, spongy, or unsuitable bearing material of any kind shall be entirely removed down to solid bearings and replaced with an engineered fill as specified herein. In such event only the excess excavation and fill shall be paid for as extra Work.

E. Approval of Excavation: The Contractor shall notify the Engineer when excavation for a structure is complete and no forms, reinforcing steel or concrete, shall be placed until the excavation has been approved by the Engineer.

F. Disposal of Waste Excavation: Excavated material determined by the Engineer to be unsuitable, or in excess of the amounts required for backfill shall be disposed of legally by the Contractor on-site or off site at no additional cost to TMWA.

3.10 SPECIAL FOUNDATION TREATMENT

A. Whenever the bottom of an excavation is soft, yielding, or in the opinion of the Engineer, otherwise unsuitable as a foundation for the structure or pipe, the unsuitable material shall be removed to a depth such that when replaced with bedding material or drain rock, as determined by the Engineer, it shall provide a stable and satisfactory foundation. When drain rock is used, it shall be wrapped in fabric to prevent the migration of fines.

B. Whenever the excavation bottom is in rocky material, the excavation shall be over-excavated to 12 inches below the bottom of the pipe or structure and backfilled with bedding material as herein specified for pipe applications and engineered fill for structure applications.

C. Trench conditions are related to the support of structures or support and bedding of pipe and may be adversely affected by improper dewatering of trenches or excess traffic by Workmen on wet or improperly dewatered trenches. To prevent unnecessary problems and expense, the Contractor shall make every effort to dewater trenches that encounter groundwater and shall avoid unnecessary traffic by Workmen on wet trench bottoms. Unsatisfactory trench conditions caused by unnecessary Workmen traffic or improper dewatering, as determined by the Engineer, shall be corrected by the Contractor at the Contractor's expense.

3.11 TRENCH BACKFILL

A. General

1. Backfill for pipelines shall be done as set forth on the plans and as specified herein. Compaction of backfill by ponding or jetting shall not be permitted.

B. Compaction of Backfill

1. Compaction of backfill shall be performed in layers not exceeding 8 inches in loose thickness (unless otherwise approved by the Engineer) and shall be compacted to a density as shown on the plans within 2 percent of the optimum moisture content for the specific material. Equipment to be used for compaction

shall be approved by the Engineer. Wheel rolling is not a suitable means for compaction.

2. When mechanical means are used to obtain the required compaction, the Contractor must exercise extreme caution so as not to damage or disturb the pipe. This is particularly true when compacting directly over top of pipe in the placing of initial backfill.
3. When in the opinion of the Engineer, compacting equipment is adversely affecting the pipe, the Contractor shall be required to change his method of compaction and restore or replace any defective pipe at his sole expense.
4. The Contractor's attention is directed to the type of material used for initial backfill: if crushed rock of the specified gradation is used, compaction by small vibratory equipment is recommended.
5. Compaction testing for the project shall be provided by TMWA.

3.12 ENGINEERED AND STRUCTURAL FILL AND BACKFILL

A. General: All soil under structures, retaining walls, pavements, embankments, sidewalks, curbs, vaults, and at other locations where indicated on the Plans shall be made using engineered fill, carefully controlled and compacted on a prepared surface.

B. Surface Preparation: The surface on which fill is to be placed shall be free of all vegetation, debris, or other objectionable material, and all large roots shall be grubbed out to a depth of at least 2 feet below footing, slab, or pavement elevations and 5 feet beyond the limits of the proposed improvements. The surface shall be scarified to a depth of 12 inches and recompacted to 95 percent of maximum dry density. It may be necessary to adjust the moisture content of the subgrade soil by watering or aeration to bring the moisture content of the soil near optimum in order that the specified densities can be obtained.

C. Placement of Fill and/or Aggregate Base:

1. Fill materials and aggregate base shall be spread in a maximum loose lift thickness of 8 inches and shall have a uniform moisture content that shall provide the specified dry density after compaction. If necessary to obtain uniform distribution of moisture, water shall be added to each layer by sprinkling and the soil disced, harrowed, or otherwise manipulated after the water is added. If the material is too wet, the moisture content shall be reduced as necessary by spreading and aerating. The layers of the fill material shall be compacted with suitable compaction equipment to provide the specified dry densities and a firm unyielding surface. Moisture content of fill shall be within plus or minus three percent (3%) of optimum moisture, as determined by the moisture-density relationship test results (ASTM D1557). Moisture contents greater than 3% of optimum moisture are acceptable if the soils lift is stable and required relative compaction can be attained in the soil lift and the succeeding soil lifts. Grading should not be performed with frozen soils or on frozen soils.
2. The dry density of the compacted engineered fill shall be a minimum of 90 percent of the maximum dry density per ASTM D1557, unless otherwise noted.
3. The dry density of the compacted Class 2 aggregate base shall be the minimum specified on the plan set or 95 percent of the maximum dry density per ASTM

D1557.

4. No fill or aggregate base shall be placed during weather conditions that shall alter the moisture content of the fill materials sufficiently to make adequate compaction impossible. After placing operations have been stopped because of adverse weather conditions, no additional fill material shall be placed until the last layer compacted has been checked and found to be compacted to the specified densities.

3.13 BACKFILL AGAINST STRUCTURES

A. Material for filling and backfilling around structures shall be free from clay, sod, large lumps, boulders, or rocks, roots, brush or other objectionable material, and shall be obtained from required excavations insofar as practicable. Should the material available from excavation be insufficient or unsuitable for the required use, the Contractor shall furnish and place suitable material. Do not place backfill against newly constructed concrete structures or concrete masonry unit (CMU) structures for a period of 14 days unless authorized by the Engineer. Hand held compactors shall be used for backfill against concrete or CMU walls.

3.14 COMPACTION TESTS

A. Unless noted otherwise, TMWA will provide and pay for a qualified Geotechnical Engineer for all compaction testing. The contractor shall be responsible for scheduling the construction testing directly with TMWA's Geotechnical Engineer. The Contractor shall provide 24 hours' notice to the Engineer prior to requiring compaction tests as listed below.

B. Frequency of Tests. Request a minimum of the following number of tests:

1. At any structure, provide one compaction test for every 10 cubic yards of import material placed, and a minimum of four tests in each one foot lift at the structure and associated pad. Tests in which either the moisture content requirements are not achieved or which yield relative compaction results below the required minimum compaction requirements shall constitute failure. Areas failing to meet the specified moisture content limits and/or minimum specified relative compaction shall be immediately reworked until such time as the minimum compaction requirements are achieved.
2. For paved areas, request a minimum of four tests in the aggregate base material around the structure.
3. For pipelines located within street right of ways, request a minimum of one test per fifty feet.
4. For pipelines located in native material or landscaped areas, request a minimum of one test per five hundred feet.

3.15 SURFACE RESTORATION

A. Surface restoration shall be defined as that Work necessary to restore the excavated area above intermediate backfill and the scarred surrounding Work areas to a condition equivalent or better than existing prior to the construction. This may include pavement replacement as shown on the plans, or mentioned in these specifications, seeding, shrub and plant replacement, and restoration of ditches and drainage areas. All surface restoration shall be done to the satisfaction of the Engineer.

B. All curbs, gutters, driveways, sidewalks, road shoulders, and pavement that are broken or damaged by the installing of the Work shall be reconstructed by the Contractor. Reconstruction shall be of the same kind of material and at least the same dimensions as the original Work, or as specified herein, or shown on plans. All Work shall match the appearance of the existing improvements as nearly as practical.

C. All concrete pavement crossings shall be neatly sawed with a pavement saw. Asphalt pavement crossings shall be trimmed to neat lines parallel and perpendicular to the trench prior to pavement replacement. The width shall be minimum width necessary to excavate the required trench depth. Pavement replacement shall be made flush to the saw line. The saw lines shall receive a final bituminous seal coat, material, and application rate to be approved by the Engineer.

D. The restoration of trench surfaces shall include measures to prevent surface erosion of the trench. This shall include seeding, cutoff walls, surface header board, interceptor dike, gravel filter dike, or rip rap energy dissipater. These measures shall be used as required or as directed by the Engineer to prevent surface erosion.

3.16 REPAIRS REQUIRED FOR TRENCH SETTLEMENT

A. If at any time during a period of two years from the date of final acceptance of the project, there shall be any settlement of the trenches requiring repairs to be made, the Engineer shall notify the Contractor to immediately make such repairs as may be deemed necessary. If the Contractor fails to undertake the repairs with due diligence TMWA is authorized to make said repairs at the Contractor's expense.

3.17 ROCK EXCAVATION

A. Rock excavation is defined as excavation of all solid rock in place that cannot be removed by power equipment equivalent to a CAT 350 Trackhoe Excavator, or larger, having a two cubic yard rock bucket with “tiger teeth” operating at full power, or all boulders or detached pieces of rock greater than 54 cubic feet in volume.

B. If rock, as defined above, is encountered, the Contractor shall notify the Project Representative in writing.

C. If the Project Representative agrees that rock has been encountered, excavation shall be paid for per the unit cost submitted in the Bid Proposal.

D. Where blasting is required; blasting operations shall be carried out by person’s duly licensed and insured to Work with explosives and shall be in compliance with all applicable laws and ordinances.

E. Blasting shall be permitted only when proper precautions are taken for protection of persons, Work, and existing structures.

F. The Contractor shall be responsible for any damage to persons, private property, the

Work or existing structures.

G. The Contractor shall be responsible for all permits required for blasting and shall furnish TMWA with current copies of Blaster's license and insurance.

3.18 EROSION CONTROL

A. Temporary erosion control facilities shall be in place prior to the start of construction or grading and shall remain in place and be maintained until slope stabilization has been completed. Temporary erosion control facilities shall be a type and configuration approved by the Engineer and shall be one or a combination of the following:

1. Impermeable storage dike
2. Filter blanket dike
3. Diversion dike
4. Settling basins with controlled outlet
5. Up gradient material storage for excavations

B. During construction, soil disturbances shall be minimized and limited to those areas specifically required for the project as shown on the plans. Disturbed areas shall be stabilized as soon as completed. Stockpiled materials shall be centralized in an area free from potential flooding or washout and able to be protected from scattering by the elements in anticipation of a storm or temporary cessation of construction activities.

C. Upon completion of the improvements, all soils disturbed by construction activities shall be stabilized as called out on the plans or within these specifications. Stabilization shall be accomplished by one or more of the following methods in lieu of specific instructions to the contrary:

1. Revegetation
2. Mechanical stabilization
3. Structures as approved by the Engineer
4. Alternative measures when approved by the Engineer
5. The Contractor shall not deposit surplus or waste material in street or highway right-of-way without written permission from TMWA.

END OF SECTION 31 00 00

SECTION 31 22 00
SITE GRADING

PART 1 : GENERAL

1.01 DESCRIPTION

A. The Work of this Section consists of excavation, fill placement, and removal and disposal of excess and unsuitable material all as required to establish site grades as shown on the plans. Excavation includes excavation and grading for roadways, areas adjacent to structures, parking areas, slope rounding, benching, waterways, furrow and interception ditches, embankments, unsuitable material from the roadbed and beneath fill areas.

B. Imported fill shall meet the requirements of engineered fill as specified in Section 31 00 00.

1.02 QUALITY ASSURANCE AND CODE COMPLIANCE

A. Testing required to determine compliance for the Work of this section shall be the responsibility of TMWA and at TMWA's expense. The Contractor shall cooperate by rerouting equipment or by temporarily closing the immediate Work area being tested. Areas where test results indicate noncompliance shall be corrected before placing additional fill.

1.03 PROJECT CONDITIONS

A. Maintain fills, slopes, and ditches within the limits of the new construction until final acceptance. Repair areas damaged as a result of storms or construction. Take necessary precautions to prevent the entrance of soils and other materials into streambeds, lakes or water courses.

1.04 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 00 00 – Earthwork

1.05 RELATIVE COMPACTION TEST

A. Where relative compaction densities are specified in these specifications, the maximum density shall be determined in accordance with the latest revision of ANSI/ASTM D1557.

PART 2 : MATERIALS

2.01 GENERAL

A. All fill material shall be subject to approval by the Engineer.

B. Material shall be free from detrimental quantities of organic materials and free of all debris, muck, and other unsuitable materials. Frozen material shall not be permitted as fill.

C. Imported Fill Material shall meet the requirements of "Engineered Fill" as specified in Section 31 00 00.

2.02 EROSION CONTROL

A. Submit a specific plan for controlling runoff from the site. Control shall be by means of silt fences, straw waddling, detention basins, straw bales, earthen berms, or other approved means.

2.03 RIPRAP

A. See Specification Section 31 37 00 – Riprap.

PART 3 : EXECUTION

3.01 GENERAL

A. Finish grades and existing or natural grades in the area adjacent to the structures are indicated on the plans. The Contractor shall do all grading, filling in or excavating as required to completely grade the site to lines and grades shown, and to provide for the indicated drainage. Where finish grade corresponds practically with existing grade, the ground shall be Worked up and graded off evenly with existing grade. The grading operation shall generally consist of moving and transporting materials within the area; however, the Contractor shall provide any additional fill material if necessary to complete the site grading to the elevations shown, or to uniformly spread any excess material on-site which may result as directed by the Engineer at no cost to TMWA.

B. Before commencing any Earthwork operations:

1. Verify existing grades and conditions are as indicated on the Drawings prior to commencing.
2. Should indicated conditions conflict with actual conditions and contours, notify the Engineer immediately.

3.02 GROUND SURFACE PREPARATION

A. Before excavating or placing fill material, complete all clearing and grubbing, and scarify ground surface to provide ample bond between old and new material. Site preparation and grading for all improvements and structures shall be as specified in Section 31 00 00.

3.03 PLACEMENT OF FILL AND DENSITY REQUIREMENTS

A. See Specification Section 31 00 00 – Earthwork

3.04 DITCHES

A. Construct drains and channels as shown or as directed. Round and trim ditch slopes neatly to line. Final flow line grade shall be reasonably uniform to provide free drainage without puddling.

3.05 SLOPE FINISHING

A. Leave earth slopes with a roughened but reasonably uniform surface without noticeable breaks. The final surface shall be similar to that obtained by using a farm disk or harrow parallel to the roadway. Blend slopes smoothly with the adjacent terrain. Grading shall provide for drainage away from all sides of structures. Exposed exteriors of dikes shall be topped with jute fabric for erosion control.

3.06 DISPOSAL OF EXCESS MATERIAL

A. Excess material shall be legally disposed of offsite at the Contractor's expense, unless specifically approved by Engineer for disposal on site.

3.07 DISPOSAL OF UNSUITABLE MATERIAL

A. Unsuitable material shall be legally disposed of offsite at the Contractor’s expense.

END OF SECTION 31 22 00

SECTION 31 37 00
RIPRAP

PART 1 : GENERAL

1.01 DESCRIPTION

A. This section includes materials and installation of riprap over properly prepared subgrade and geotextile fabric for the protection of channels, structures, and embankments.

B. All Work and materials shall be in accordance with these technical specifications and the latest edition of the Standard Specifications for Public Works Construction (Orange Book). In cases where there is a conflict between these technical specifications, the Project Geotechnical Engineering Report, and the Orange Book, the more stringent shall apply.

1.02 SUBMITTALS

SECTION 31 37 00 – Submittal Summary	
Material Quality Certification	30 Days Prior to Transportation to the Work Site: Certification that the material conforms to the Specification requirements along with description of the material source and copies of the test results from a qualified commercial testing laboratory showing specific gravity, adsorption, and durability of stone.

PART 2 : MATERIALS

2.01 STONE

A. The riprap shall conform to the requirements in Table 31 37 00.A.

B. Stone for riprap shall be hard, durable, angular in shape; resistant to weathering and to water action; free from overburden, spoil, shale and organic material; and shall meet the gradation requirements specified. The largest dimension of a single riprap stone shall be no larger than three (3) times the smallest dimension. Rounded stone or boulders shall not be accepted. Shale and stone with shale seams are not acceptable.

C. Control of gradation shall be by visual inspection. If directed by the Engineer, provide two (2) samples of rock of at least five (5) tons each, meeting the gradation specified. Provide one sample at the construction site, which may become part of the finished riprap covering. Provide the other sample at the quarry. These samples shall be used as a frequent reference for judging the gradation of the riprap supplied. Any difference of opinion between the Contractor and the Engineer shall be resolved by dumping and checking the gradation of two (2) random truck loads of stone. The Contractor shall provide mechanical equipment, a sorting site, and labor needed to assist in checking the gradation.

D. Unless noted otherwise on the plans, riprap placement depths shall be as follows: Class 150 riprap shall be placed to a depth of 6 inches. Class 150 riprap bedding shall be placed to a depth of 6 inches. Class 300 riprap shall be placed to a depth of 1 foot. Class 300 riprap bedding shall be placed to a depth of 6 inches.

2.02 RIPRAP BEDDING

A. This aggregate shall conform to the requirements in Table 31 37 00.B.

A. Material for riprap bedding shall be hard, durable, angular in shape; resistant to weathering and water action; free from overburden, spoil, shale, and organic material; and shall meet the gradation requirements specified.

B. Control of gradation shall be by visual inspection. If directed by the Engineer, provide two (2) samples of material of at least five (5) tons each, meeting the gradation specified. Provide one sample at the construction site, which may become part of the finished riprap bedding layer. Provide the other sample at the quarry. These samples shall be used as frequent reference for judging the gradation of the riprap bedding supplied. Any difference of opinion between the Contractor and the Engineer shall be resolved by dumping and checking the gradation of two (2) random truck loads of material. The Contractor shall provide mechanical equipment, sorting site, and labor needed to assist in checking gradation. Bedding requirements for Class 150 and 300 are in Table 31 37 00.C.

Table 31 37 00.A – Riprap Gradations (inches)

% Passing by Weight	Class 150	Class 300
100	10	20
35-50	6	12
0-15	2	4

Table 31 37 00.B – Riprap Bedding Aggregate Requirements

Source Test	Test Method	Requirements
Percentage of Water (500 Rev.)	AASHTO T96	45 Percent Max
Specific Gravity	Nev. T111	2.5 Min

Table 31 37 00.C – Riprap Bedding Gradation Requirements		
Class 150	**Sieve Size**	**Percent Passing**
	1-1/2-inch	100
	3/4-inch	35-100
	1/2-inch	15-80
	3/8-inch	5-60
	No. 4	0-35
	No. 16	0-5
Class 300	**Sieve Size**	**Percent Passing**
	4-inch	100
	1-1/2-inch	30-100
	1-inch	15-80
	1/2-inch	0-50
	No. 4	0-20
	No. 8	0-5

Table 31 37 00.D – Minimum Average Roll Strength Properties for Geotextile Fabric		
Description	**Test Method**	**Requirements**
Trapezoid Tear Strength	ASTM D 4533	80 lbs.
Puncture Strength	ASTM D 4833	100 lbs.
Grab Strength	ASTM D 4632	200 lbs.
Burst Strength	ASTM D 3786	400 psi
Permittivity	ASTM D 4491	0.5 sec^{-1}
Apparent Opening Size	ASTM D 4751	0.43 mm (max)

PART 3 : EXECUTION

3.01 INSTALLATION

A. Riprap shall be installed in accordance with Nevada Department of Transportation placement methods, unless otherwise noted or approved.

B. Prior to placing rip-rap, geotextile fabric shall be placed against native ground and anchored per manufacturer's recommendations for the application.

C. Unless otherwise indicated, minimum thickness of rip rap shall be the D_{50} with respect to each class.

END OF SECTION 31 37 00

SECTION 33 14 00
WATER UTILITY TRANSMISSION AND DISTRIBUTION

PART 1: GENERAL

1.01 SCOPE

A. This Section covers the materials, methods of installation, tests, and other requirements for all proposed water mains, connection to existing water facilities, and miscellaneous appurtenances as delineated in the Improvement Plans.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 33 00 – Submittals

B. Section 01 41 00 – Regulatory Requirements

C. Section 31 00 00 - Earthwork

1.03 REFERENCES

A. This section references the appropriate American Water Works Association (AWWA) Standards relating to gate valves; manufacturing, linings, coatings, pipe joints, and fittings for Ductile Iron and PVC water pressure pipe; and miscellaneous pipe and fittings. The AWWA Standards are a part of this specification as specified and shall reflect the Standard's latest edition.

1. Ductile Iron Pipe and Fittings:

C104/A21.4	Cement-Mortar lining for Ductile-Iron Pipe and Fittings for Water
C105/A21.5	Polyethylene Encasement for Ductile-Iron Pipe Systems
C110/A21.10	Gray Iron and Ductile-Iron fittings, 3-48 inches for Water
C111/A21.11	Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
C115/A21.15	Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
C150/A21.50	Thickness Design of Ductile-Iron Pipe
C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast for Water or Other Liquids
C153/A21.53	Ductile-Iron Compact Fittings for Water Service
C600	Installation of Ductile-Iron Water Mains and Appurtenances

2. PVC and PE Pipe:

C605	Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4-12 inches for Water Distribution
C901	Polyethylene (PE) Pressure Pipe and Tubing, ½-inch through 3-inch

3. Valves

C509	Resilient-Seated Gate Valves
C515	Reduced-Wall, Resilient-Seated Gate Valves for Water Supply

Service

4. Disinfection of Water Mains:

C651 Disinfecting Water Mains

1.04 SUBMITTALS

SECTION 33 14 13 – Submittal Summary	
Layout Drawings	30 Days Prior to Product Transportation to Work Site: Including all necessary dimensions, details, pipe joints, fittings, special, valves, appurtenances, anchors, guides, and material lists.
Fabrication Drawings	30 Days Prior to Product Transportation to Work Site: Including all spool pieces, spacers, adapters, connectors, fittings, and supports to accommodate the equipment and valves in a complete and functional system.
Manufacturer's Cut Sheets	30 Days Prior to Product Transportation to Work Site: Literature and certificates of compliance with the reference standards for pipe, fittings, and couplings.
Pipe Certifications	30 Days Prior to Product Transportation to Work Site: All necessary certificates, test reports, and affidavits of compliance shall be obtained by the Contractor

PART 2: MATERIALS

2.01 DUCTILE IRON PIPE

A. Ductile Iron Pipe shall meet the requirements of AWWA standards C151, C104 and C111, with pressure class as specified in the Improvement Plans, standard cement lining, and bituminous coating. All ductile iron pipe shall be polyethylene encased per AWWA C105. Ductile Iron Pipe shall be equipped with Tyton type bell and spigot joints. Ductile Iron Pipe shall be as manufactured by U.S. Pipe and Foundry Co.; or equal.

2.02 COPPER PIPE

A. Copper pressure pipe shall be Type "K" and meet the requirements of AWWA C800 and rated for a design Working pressure of 200 psi.

B. Fittings shall be mechanical compression type.

C. All connections and compression nuts shall be installed in accordance with manufacturer's specifications.

2.03 CTS WATER SERVICE POLYETHYLENE TUBING

A. Polyethylene water service tubing shall be pressure class 200 (SDR 9) PE 3608 copper tubing size (CTS) polyethylene flexible plastic water service tubing or approved equivalent meeting AWWA C901.

B. Tubing shall be installed in continuous manner from service tap compression nut to water service enclosure. No joints shall be allowed between the service tap and service enclosure.

C. All connections and compression nuts shall be installed in accordance with manufacturer's specifications.

2.04 POLYETHYLENE ENCASEMENT

A. Polyethylene encasement shall comply with ISO 8180, ANSI A21.5, AWWA C105, and ASTM A674. Polyethylene encasement shall consist of three layers of co-extruded linear low-density polyethylene (LLDPE) film fused into one. The inside surface shall be infused with an anti-microbial compound to mitigate microbiologically influenced corrosion ("MIC") and a volatile corrosion inhibitor ("VCI") to control galvanic corrosion. Polyethylene encasement shall be V-BIO as provided by U.S. Pipe and Foundry Co.; or equal.

2.05 FITTINGS

A. Fittings shall be ductile iron and meet the requirements of AWWA standards C110/C153 and C104 with end configurations as specified in the Improvement Plans. All fittings shall be polyethylene encased per AWWA C105. Fittings shall be asphaltic coated with cement-mortar lining per AWWA C110/C153 and C104. For fittings where cement-mortar linings are not normally supplied, such as caps, plugs, and sleeves, the inside of these fittings shall be asphaltic coated per AWWA C110/C153 conforming to all appropriate requirements for seal coat per AWWA C104.

2.06 RESTRAINED-JOINT PIPE AND FITTINGS

A. All restrained joint piping shall be ductile iron pipe, unless otherwise specified in the Improvement Plans. Bell and spigot push-on type ductile iron Tyton joints shall be restrained using styrene butadiene rubber (SBR) gaskets with stainless steel locking segments vulcanized into the rubber gaskets. Restrained joint rubber gaskets shall be Field Lok 350 Gaskets as manufactured by U.S. Pipe and Foundry Co.; Piranha Restraint Gaskets as manufactured by Romac Industries, Inc.; or equal.

B. Restrained joint fittings shall be mechanical joint (MJ) ductile iron with mechanical joint wedge action restraint glands compatible with all mechanical joints conforming to ANSI/AWWA C111/A21.11. Gland body, wedges, and wedge actuating components shall be cast from grade 65-45-12 ductile iron in accordance with ASTM A536. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN. Wedge assemblies shall be xylan fluoropolymer coated. Casting bodies shall be coated with a polyester based powder that is electrostatically applied and heat cured to provide corrosion protection. All mechanical joint wedge action restraint glands shall be coated with the Wax Tape Coating System. Mechanical joint wedge action restraint glands shall be Megalug Series 1100 for ductile iron pipe as manufactured by Ebaa Iron, Inc.; Stargrip Series 3000 with Starbond Coating for ductile iron pipe as manufactured by Star Pipe Products; or equal.

2.07 FLANGE AND MECHANICAL JOINT BOLTS AND NUTS

A. Flange bolts and nuts shall be carbon steel with a minimum 60,000 psi tensile strength conforming to ASTM A307, Grade A. Bolts shall be standard ANSI B1.1, Class 2A coarse threads. Nuts shall conform to ASTM A563 and be standard ANSI B1.1, Class 2A coarse threads. All bolt heads and nuts shall be hexagonal. Identification on the head of the bolt shall be: A 307 A

B. Mechanical joint bolts shall be T-head bolts and be made from ASTM A242 weathering steel with a minimum yield strength of 45,000 psi. All mechanical joint T-head bolts and nuts shall be threaded in accordance with ANSI B1.1, Class 2A coarse threads. Heavy hex nuts shall be used. Bolt heads shall be in accordance with the dimensions of AWWA/ANSI C111/A21.11-95.

C. For nut and bolt installations on fusion bonded epoxy or other coated valves, fittings, and appurtenances, washers shall be installed on both the bolt head and nut side of the flanges to protect the coating.

D. All flange bolts and nuts; mechanical joint T-head bolts and nuts; and washers shall be finished using a multi-step process to chemically clean, abrasive blast, and prime with zinc/nickel phosphate primer prior to application of xylan fluoropolymer to significantly reduce the effects of corrosion. Wear resistance (K-factor) shall be in the range of 6 to 8 (excellent) and minimal effects should be seen after a 3,000 hour salt spray test conforming to ASTM B-117. All flange bolts and nuts and mechanical joint T-head bolts and nuts shall be finished with the Tripac 2000 Blue Coating System; or equal. Bolts and nuts finished with the Tripac 2000 Blue Coating System do not require coating with mastic.

2.08 FLANGE GASKETS

A. Gaskets for flanged joints shall be full face type SBR elastomer per ANSI/AWWA C111/A21.11 and shall be 1/8" thickness. Flange gaskets shall be the high-performance type satisfying the special requirements of ANSI/AWWA C111/A21.11 Appendix C, Section C.2, and have a minimum of one bulb type ring molded into both faces of the gasket. Flange gaskets shall be Ring Flange-Tyte Gasket as manufactured by U.S. Pipe and Foundry Co.; Toruseal Flange Gasket as manufactured by the American Cast Iron Pipe Company; or equal.

2.09 MECHANICAL JOINT GASKETS

A. Mechanical joint gaskets shall be made of vulcanized styrene butadiene rubber (SBR) in accordance with ANSI/AWWA C111/A21.11. Gasket markings shall include size, manufacturer's mark/name, country of origin, and product identification.

2.10 TAPPING SLEEVE

A. Tapping sleeves shall be full-circle ASTM A 240, Type 304 stainless steel with full circumference gaskets throughout sleeve length with AWWA C207 Class D ANSI 150 lb. drilling ASTM A 240, Type 304 stainless steel flange. Type 304 stainless steel stud bolts, heavy hex nuts, and washers shall be included. Heavy hex nuts and stud bolts shall be coated to prevent galling. Type 304 stainless steel test plug shall be included with threads coated to prevent galling. Tapping sleeve shall be rated for a test pressure of 300 psi and working pressure of 200 psi. Tapping sleeve shall be Style SST Stainless Steel Tapping Sleeve as manufactured by Romac Industries, Inc.; 663 All Stainless Steel Tapping Sleeve as manufactured by Smith-Blair, Inc.; or equal.

2.11 SERVICE SADDLE

A. Service saddle body shall be cast from ductile iron meeting or exceeding ASTM A536, with a fusion bonded nylon coating, or coated with an impact and corrosion resistant fusion bonded epoxy, min. 10-12 mils thick, and equipped with double Type 304 stainless steel straps. Service saddles shall have a NPT threaded inlet. For installations on C900 PVC pipe, maximum O.D. of service saddle's O.D. range shall be equivalent to the O.D. of the C900 PVC pipe for which service saddle will be installed. Service saddle shall be 317 Service Saddle Double Stainless Steel Strap as manufactured by Smith-Blair, Inc.; Style 202NS Double Strap Service Saddles as manufactured by Romac Industries, Inc.; or equal.

2.12 GATE VALVES

A. Gate valves for sizes up to and including 12-inches shall meet AWWA C515, ductile

iron body, non-rising stem, resilient-seated valves. Gate valves shall be equipped with a 2-inch operating nut for buried service or shall be equipped with a handwheel operator for vault and interior installations. Valve ends shall be as specified in the Improvement Plans. All gate valves shall be fusion epoxy lined and coated. All gate valves for buried service shall be coated with the Wax Tape Coating System and shall be polyethylene encased per AWWA C105. Gate valves up to and including 12-inches shall be Mueller A-2361 Resilient Wedge Gate Valves; American AVK Company Series 65 AWWA C515 Ductile Iron Gate Valves; or equal.

2.13 VALVE BOXES, TEST STATION BOVES, AND CONDUCTOR PIPE

A. Valve boxes with covers shall be provided for all buried valves. Valve and Test Station boxes shall be 6-inch, designed to fit around the conductor pipe defined below. Valve boxes shall be constructed of cast iron with cover marked "WATER". Test Station boxes shall be constructed of cast iron with cover marked "TEST STATION".

B. Conductor pipes for valve boxes and Test Station boxes shall be 6-inch diameter SDR-35 PVC gravity sewer pipe (O.D. = 6.275") meeting the requirements of ASTM D 3034.

2.14 WARNING TAPE

A. Warning tape shall be non-metallic, 4 mils thick, 3-inches wide, blue-colored with black text clearly stating "CAUTION: BURIED WATER LINE BELOW" or similar.

2.15 TRACER WIRE

A. Tracer wire shall be #12 AWG fully annealed, high carbon 1055 grade steel, high strength solid copper-clad conductor rated at 30 volts with a 30 mil blue-colored HDPE insulation rated for direct burial use at 30 volts. Tracer Wire shall be High Strength – 1230 CCS Tracer Wire as manufactured by Copperhead Industries; or equal.

2.16 ANODE

A. Packaged magnesium anodes shall have a high potential alloy composition according to ASTM B 843.

B. The magnesium casting shall be centered in a biodegradable cardboard container of sufficient durability to permit normal handling without appreciable damage.

C. The anode casting shall be surrounded on all sides with a selected packaging having the following properties:

1. Component Approximate % by Volume
    a. Gypsum.....75%
    b. Bentonite.....20%
    c. Sodium Sulphate.....5%

D. The sacrificial anode shall be supplied with 10 feet of No. 12 TWU insulated copper silver soldered to the galvanized steel core of the anode casting. Minimum weight of the anode shall be 3 lb.

2.17 VAULT ALUMINUM ACCESS COVER

A. Access Cover shall have double hatches with lockable hasp; be self-draining with drain pipe connection outlet; provided with 4" rigid foam insulation with plate of same material as hatch welded over structural beams to prevent insulation movement or

damage; provided with spring assisted two-piece extruded aluminum covers. Hatches shall be designed for H-20 loading and equipped with heavy-duty hinges with stainless steel pins, automatic hold open arm with release handle, and compression spring operators for ease of operation and to act as a check in retarding downward motion. Hardware shall be zinc plated and chromate sealed. Access Cover shall be sized to accommodate the specified opening in the vault cover slab. Access Cover shall be as manufactured by US Fabrication; EJCO; or equal.

PART 3: EXECUTION

3.01 HAULING UNLOADING AND DISTRIBUTING PIPE

A. Per specifications Section 01 60 00.

B. During loading, transportation, and unloading, every precaution shall be taken to prevent injury to the pipe or pipe lining. No pipe shall be dropped from cars or trucks or allowed to roll down slides without proper retaining ropes. Each pipe shall rest on suitable pads, strips, skids, or blocks during transportation and installation and shall be securely wedged or tied in place. Padding shall be used on car or truck stakes, skids, etc., to prevent damage to the pipe during transportation and handling. Any pipe damaged shall be replaced.

C. Each section of pipe shall be delivered in the field as near as practicable to the place where it is to be installed. Pipes shall be distributed along the side of trench opposite to the spoil bank within easy reach of the installing crew. Where it is necessary to move the pipe longitudinally along the trench, it shall be done in such a manner as not to injure the pipe. Pipe shall not be rolled or dragged on the ground.

D. Where pipe is placed on stockpiles, it shall be neatly piled and blocked with strips between tiers.

3.02 TRENCH EXCAVATION & BACKFILL

A. Per specification Section 31 00 00.

3.03 REPAIRS REQUIRED BY TRENCH SETTLEMENT

A. If at any time during a period of two years dating from the date of final acceptance of the project, there shall be any settlement or erosion of the trenches requiring repairs to be made, or should any other defect appear in the system due to negligence or carelessness on the part of the Contractor, the Engineer may notify the Contractor to immediately make such repairs as may be deemed necessary at the Contractor's expense.

3.04 MINIMUM COVER

A. Measure minimum cover from existing or proposed finish grade of pavement or natural ground, whichever is deeper. Place to depth as shown on the Improvement Plans.

3.05 INSTALLATION OF PIPELINES (GENERAL)

A. All piping and appurtenances shall be installed in the position and to accurate lines, elevations, grades, and locations as shown on the plans or herein specified.

B. Pipes shall be cleaned of dirt and scale prior to installation and all joints swabbed clean before jointing. Ends of all pipes shall be closed or plugged at the end of each day's Work and otherwise as necessary to prevent the entrance of foreign materials.

C. All fittings necessary for the satisfactory alignment and arrangement of piping shall be

furnished by the Contractor.

D. On curved alignment of piping, the maximum pull or deflection recommended by the pipe manufacturer for the given type and size pipe shall not be exceeded. Provide fittings as necessary to meet this requirement.

E. Concrete thrust blocks (Class 3,000 psi) shall be provided at all unrestrained bends and fittings in water mains. Thrust blocks shall be poured between the pipe or fitting and the undisturbed trench walls and shall be as shown on plans. Joints and face of plugs shall be kept clear of concrete.

F. Joints in pipes or fittings shall be made as follows:

1. Push-on Joints: Push-on joints shall be assembled in accordance with the manufacturer's recommendations for water lines.
2. Flanged Joints: Flanged joints shall be made up square, with even pressure on the gaskets, and shall be watertight. All gaskets shall be the full width of the flanges to which they are applied.
3. Threaded Joints: Threaded joints shall be made up with non-leaded pipe joint compound, or Teflon tape carefully and smoothly placed on the male threads only. All screwed joints shall be made tight with tongs and wrenches but do not over-tighten PVC threads, particularly the female end.
4. Solvent Weld: In accordance with the recommendations of the pipe manufacturer and the following supplementary requirements:
    a. Do not solvent weld joints if it is raining, or if the atmospheric temperature is below 32°F.
    b. Test fit dry pipe and fittings before applying cement. Pipe should enter socket without forcing at least 1/3 but not more than 2/3 the depth of socket. Fittings that are looser or tighter shall not be used. Thoroughly clean and dry the pipe end and socket of fitting with methyl ethyl ketone, acetone, or similar primer. Apply cement evenly to outside surface and end of pipe and inside surface of socket. Avoid excess application of cement but ensure complete coverage of all bonding surfaces. Mark depth of socket on pipe to guide application of cement and ensure full insertion of pipe. Insert pipe in socket, twisting pipe or fitting approximately ½ turn, or amount as recommended by the pipe or solvent manufacturer, as pipe is being seated in socket. Make sure pipe is fully seated providing a bond between end of pipe and shoulder of socket. Immediately wipe excess cement form pipe leaving no more than an 1/8 inch fillet at fitting end. Hold assembled joint in place for approximately 15 seconds and allow to set for 30 minutes before moving.

3.06 CUTTING PIPE

A. The Contractor shall perform all Work of cutting the pipe and special castings necessary to the assembly, erection, and completion of the Work. All pipes shall be cut to fit accurately with smooth edges and faces. The Contractor shall be responsible for the correctness of cutting and shall stand the loss for any materials which are injured or incorrectly cut.

3.07 EXISTING FACILITIES AND SERVICES

A. All existing structures or facilities broken or damaged shall be replaced or repaired to their original condition at the expense of the Contractor.

B. Existing underground services are shown as accurately as available data permit. These data are approximate as to location and do not necessarily show all lines which may be encountered in excavation for Work of this project.

C. The Contractor shall be responsible to call Underground Service Alert 811 and verify the location of all existing underground facilities prior to starting excavation, and shall be responsible to repair or replace all such facilities damaged due to Work of this project.

D. Where existing pipe or culverts are found to be on grade with the Work of this project, the Contractor shall, as part of this Contract, lower the grade of the new pipe over a suitable distance so as to clear the existing pipe by a minimum of six inches.

E. Potholing involving exploratory excavation at connection to existing water facilities, marked utility crossings, and other areas is required. The Contractor will be required to acquire the following information from these investigations

1. Verification of pipe type, size (i.e., outside diameter), depth to existing surface, and location for all connections to existing water facilities.
2. Verification of type, size, and location for all known utility crossings.
3. Information required for surveying and staking of pipe alignment.

3.08 POLYETHYLENE PIPE WRAP

A. Tube size shall be as listed in Table 1 of AWWA Standard C105. Place poly wrap on each section of ductile iron or steel pipe prior to joining. Cut polyethylene tube 2 feet longer than length of pipe. Fold back excess over top of pipe and secure with tape at quarter points along the length of the pipe. Secure to previous section with 360 degree tape wrap.

3.09 WAX TAPE

A. All buried valves, fittings, and mechanical joint wedge action restraint glands shall be coated with the wax tape coating system per specification Section 40 46 16.

3.10 CONNECTING TO EXISTING MAINS

A. Expose existing pipe to be connected and verify location, size and type prior to constructing new mainline. The locations, sizes and depths of existing mains indicated on the plans are approximate only. Coordinate connection to existing main with TMWA at least 48 hours in advance. The connection is to be completed without shutting down the main using tapping sleeve and appropriate appurtenances to complete the connection.

B. When shutdown of an existing water main is necessary in order to connect to the new lines, the Contractor's representative, the project inspector, and Water Distribution personnel shall meet to establish the time and procedures to ensure that the shutdown shall be for the shortest possible time. It may be necessary to schedule the shutdown before or after normal Working hours in order to minimize the inconvenience to some customers. The water supply to some customers, such as hospitals, cannot be shut off at any time. Provisions to furnish a continuous supply of water to such establishments shall be required. After the procedures and the time for a shutdown are agreed upon, it

shall be the Contractor's responsibility to notify all customers that the water shall be turned off. When possible, notify customers 24 hours in advance and in no case, except in emergency, shall notification be less than 30 minutes. Notification shall be in writing, giving the reason for the shutdown and the time and duration the water service shall be shut off.

3.11 ANCHOR AND THRUST BLOCKING

A. Place anchor and thrust blocking to the dimensions and with the strength of concrete as indicated on the plans for all tees, plugs, caps, bends, and other locations where unbalanced forces exist. Place blocking against undisturbed ground surfaces. Do not place blocking until polyethylene wrap is secured in place. Place blocking neatly with straight sides and so joint bolts are accessible for future repairs.

3.12 TEMPORARY FLUSH ASSEMBLIES

A. Contractor shall provide all material, labor, and incidentals necessary for the installation and removal of temporary flush assemblies necessary for the testing and flushing of new water mains. Providing all material, labor, and incidentals necessary for the installation and removal of temporary flush assemblies shall be considered incidental to other work being performed with NO DIRECT PAYMENT to the Contractor.

3.13 PRESSURE TESTING OF WATER MAINS

A. All pressure pipe testing shall be accomplished with water pressure. Air-pressure testing will NOT be permitted. Test pressure will be 1.5 times the working pressure and shall not be less than 1.25 times the working pressure at the highest point along the test section. Working pressure is 100 psi. Test pressure shall not vary more than ± 5 psi for the duration of the test. Test pressure shall not exceed pipe or thrust restraint design pressures. The hydrostatic test shall be at least 2-hour duration.

B. Before applying the specified test pressure, air shall be completely expelled from the sections of piping under test.

C. Allowable leakage shall be measured in gallons per hour as defined in AWWA C600 for ductile iron pipe and C605 for PVC pipe. Waterlines which do not comply with the specified leakage requirements shall be rejected, and the Contractor shall, at his own expense, locate and repair the defective joints or pipe sections until the leakage is within the specified allowance. ALL VISIBLE LEAKS SHALL BE REPAIRED REGARDLESS OF TEST RESULTS.

3.14 DISINFECTION OF WATER MAINS

A. Pressure testing shall be completed and acceptable before final disinfection is approved.

B. Disinfection shall be accomplished by using calcium hypochlorite tablets as outlined in AWWA C651, latest edition.

C. It is imperative that the pipeline be kept clean and dry during construction to ensure proper disinfection of the pipeline and to allow adequate flushing of the pipeline. If excessive debris is discovered in the pipeline during disinfection and testing, the Contractor will be responsible for removal of the debris and retesting, flushing, and disinfection of the entire pipeline.

D. Disposal of chlorinated water shall be the responsibility of the Contractor. Chlorinated water shall be disposed of in a manner conforming to all local, state, and federal

regulations. The Contractor will be required to designate a disposal site or method and shall coordinate the disposal of chlorinated water with the TMWA Inspector and local/state authorities. Disposal of water into storm drain and/or sanitary sewer facilities shall only be allowed when permitted by the authority having jurisdiction over said storm drain and/or sanitary sewer facilities. Water shall be completely de-chlorinated prior to discharge into any storm drain and/or sanitary sewer facility. Testing of the discharge water for chlorine residual will be required to document that discharge water has been completely de-chlorinated.

3.15 BATERIOLOGICAL (BACTI) TESTING OF WATER MAINS

A. Bacteriological (Bacti) Testing in accordance with AWWA C651 is required of all new water mains.

B. Bacteriological testing will be coordinated by the TMWA Inspector and TMWA lab personnel, at no cost to the Contractor. Two (2) consecutive sets of acceptable samples, taken a minimum of 24 hours apart, shall be collected from new water mains.

C. Results of bacteriological testing are available a minimum of 24-hours after each sample was collected. Absolutely no standby time will be paid to the Contractor during this period.

D. Connections to existing water mains, service tie-overs, and/or new water services may only be installed after the TMWA Inspector has been notified of satisfactory bacteriological test results.

E. Bacteriological test samples will NOT be collected on Fridays, weekends, TMWA observed Holidays, or the day before a TMWA observed Holiday, unless authorized by the TMWA Inspector.

F. Contractor shall submit a flushing and bacteriological sampling plan to the TMWA Project Representative for approval prior to construction. The plan shall identify sampling locations, type and size of temporary flush assemblies and/or sample taps, and method of disposal of chlorinated and dechlorinated water.

END OF SECTION 33 14 00

SECTION 40 46 16
WAX TAPE COATING SYSTEM

PART 1 : GENERAL

1.01 DESCRIPTION
A. This Section covers the materials required and application procedure for corrosion protection coating utilizing the Wax Tape Coating System. The intent of applying a wax tape coating system is to prevent water from contacting the metallic surface being coated.

1.02 RELATED WORK SPECIFIED ELSEWHERE
A. Section 01 33 00 – Submittals

1.03 SUBMITTALS

SECTION 40 46 16 – Submittals Required by Contractor for this Work	
Manufacturer's Cut Sheets	30 Days Prior to Product Transportation to Work Site: Literature and manufacturer's application procedures

PART 2 : MATERIALS

2.01 WAX TAPE
A. Wax-Tape #1 as manufactured by Trenton Corporation of TMWA approved equal.

2.02 PRIMER
A. Wax-Tape Primer (Brown) as manufactured by Trenton Corporation of TMWA approved equal.

2.03 PROTECTIVE OUTER WRAP
A. Poly-Ply Outerwrap as manufactured by Trenton Corporation of TMWA approved equal.

2.04 PROVIDE MATERIALS FROM SAME MANUFACTURER
A. Wax tape, primer, and protective outer wrap shall all be supplied by the same manufacturer. Mixing of product manufacturers will not be permitted.

PART 3 : EXECUTION

3.01 GENERAL
A. Apply the wax tape coating system to all identified metallic pipe, fittings, valves, and appurtenances.

3.02 SURFACE PREPARATION
A. Adhere to manufacturer's recommendation for surface preparation. Minimum surface preparation shall consist of wire brush and scrape the surface clean of loose rust, scale, paint, and other foreign matter. Wipe surface as dry as possible.

3.03 PRIMER APPLICATION
A. Apply primer to all surfaces to be coated with wax tape.

B. If the surface to be coated is wet, cold, or rusty, rub and press-on primer firmly to displace the moisture and ensure adhesion.

3.04 WAX TAPE APPLICATION

A. Apply wax tape in accordance with manufacturer's application instructions. Wax tape shall be applied with a minimum 1-inch overlap.

B. Wax tap shall be cut and contoured to provide a smooth wrinkle free surface without any bulges or edges protruding.

C. While wrapping, press and mold the wrap into conformity, ensuring that there are no air pockets or voids, so that the wrap is in intimate contact with the surface. Press and smooth out lap seams to ensure that they are sealed.

D. Unacceptable surface appearance shall result in the removal and complete reinstallation to the satisfaction of the TMWA Inspector.

3.05 PROTECTIVE OUTER WRAP APPLICATION

A. After application of the wax tape, install the protective outer wrap over all surfaces.

B. Wrap securely to adhere to the wax tape without any loose material or bulges present.

END OF SECTION 40 46 16