TABLE OF CONTENTS

Division 01 General Requirements

SECTION 012200
UNIT PRICES

PART 1 GENERAL 1.01 SECTION INCLUDES

A. List of unit prices, for use in preparing Bids.

B. Measurement and payment criteria applicable to Work performed under a unit price payment method.

C. Defect assessment and non-payment for rejected work.

1.02 COSTS INCLUDED

A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.03 UNIT QUANTITIES SPECIFIED

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

1.04 MEASUREMENT OF QUANTITIES

A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.

B. Assist by providing necessary equipment, workers, and survey personnel as required.

1.05 PAYMENT

A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is in Owner's Representative orated in or made necessary by the Work and accepted by the OWNER'S REPRESENTATIVE, multiplied by the unit price.

1.06 DEFECT ASSESSMENT

A. Replace Work, or portions of the Work, not complying with specified requirements.

B. If, in the opinion of OWNER'S REPRESENTATIVE, it is not practical to remove and replace the Work, OWNER'S REPRESENTATIVE will direct one of the following remedies:

1. The defective Work will be partially repaired to the instructions of the OWNER'S REPRESENTATIVE, and the unit price will be adjusted to a new unit price at the discretion of OWNER'S REPRESENTATIVE.

C. The authority of OWNER'S REPRESENTATIVE to assess the defect and identify payment adjustment is final. **PART 2 PRODUCTS - NOT USED**

PART 3 EXECUTION - NOT USED

END OF SECTION 012200

SECTION 012300
ALTERNATES

PART 1 GENERAL 1.01 SECTION INCLUDES

A. Procedures for pricing Alternates.

1.02 ACCEPTANCE OF ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012300

SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 GENERAL 1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Section 012200 - Unit Prices, for additional unit price requirements.

B. Section 012300 - Alternates, for product alternatives affecting this section.

C. Section 013000 - Administrative Requirements: Submittal procedures, coordination.

D. Section 016000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control. a. Unavailability.
      b. Regulatory changes.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
      a. Substitution requests offering advantages solely to the Contractor will not be considered.

PART 2 PRODUCTS - NOT USED PART 3 EXECUTION 3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. No specific form is required. Contractor's Substitution Request documentation must include the following:
      a. Project Information:
      b. Substitution Request Information:
         1) Indication of whether the substitution is for cause or convenience.
         2) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
         3) Description of Substitution.
         4) Reason why the specified item cannot be provided.
         5) Differences between proposed substitution and specified item.

6) Description of how proposed substitution affects other parts of work.

c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
   1) Physical characteristics.
   2) In-service performance. 3) Warranties.

d. Impact of Substitution:
   1) Savings to Owner for accepting substitution.
   2) Change to Contract Time due to accepting substitution.

D. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 RESOLUTION

A. Owner's Representative may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Owner's Representative will notify Contractor in writing of decision to accept or reject request.

3.03 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.04 CLOSEOUT ACTIVITIES

A. See Section 017800 - Closeout Submittals, for closeout submittals.

B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

END OF SECTION 012500

SECTION 013000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL 1.01 SECTION INCLUDES

A. General administrative requirements.

B. Preconstruction meeting.

C. Site mobilization meeting.

D. Progress meetings.

E. Construction progress schedule.

F. Contractor's daily reports.

G. Submittals for review, information, and project closeout.

H. Requests for Interpretation (RFI) procedures.

I. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Make the following types of submittals to the Owner’s Representative:
   1. Requests for Interpretation (RFI).
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for Substantial Completion.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED PART 3 EXECUTION 3.01 PRECONSTRUCTION MEETING

A. Schedule meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Engineer.
   3. Contractor.

C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   6. Scheduling.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

A. OWNER'S REPRESENTATIVE will schedule meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Engineer.
   4. Contractor's superintendent.
   5. Major subcontractors.

C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner's requirements.
   3. Construction facilities and controls provided by Owner.
   4. Temporary utilities provided by Owner.
   5. Survey and building layout.
   6. Security and housekeeping procedures.
   7. Schedules.
   8. Application for payment procedures.
   9. Procedures for testing.
   10. Procedures for maintaining record documents.
   11. Requirements for start-up of equipment.
   12. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the work at maximum monthly intervals.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Engineer.
   4. Contractor's superintendent.
   5. Major subcontractors.

C. Agenda:
   1. Review minutes of previous meetings.
   2. Review of work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Maintenance of progress schedule.
   7. Corrective measures to regain projected schedules.
   8. Planned progress during succeeding work period.
   9. Maintenance of quality and work standards.

10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to work.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.05 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to OWNER’S REPRESENTATIVE for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.06 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for OWNER’S REPRESENTATIVE's knowledge as contract administrator or for Owner.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:

1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.08 SUBMITTAL PROCEDURES

A. General Requirements:
1. Use a single transmittal for related items.
2. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
3. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.

END OF SECTION 013000

SECTION 013526
SAFETY REQUIREMENTS

PART 1 GENERAL 1.01 REFERENCE STANDARDS

A. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.

B. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

C. 29 CFR 1926.502 - Fall protection systems criteria and practices; Current Edition.

D. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NFPA 70B - Recommended Practice for Electrical Equipment Maintenance; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. NFPA 70E - Standard for Electrical Safety in the Workplace; 2024.

H. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.02 APPLICABLE PUBLICATIONS:

A. Latest publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.

B. American Society of Safety Engineers (ASSE):

1. A10.1-2011 ..... Pre-Project & Pre-Task Safety and Health Planning
2. A 10.34-2012 ..... Protection of the Public on or Adjacent to Construction Sites
3. A 10.38-2013 ..... Basic Elements of an Employer's Program to Provide a Safe and Healthful Work Environment American National Standard Construction and Demolition Operations

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

1. E84-2013 ..... Surface Burning Characteristics of Building Materials

D. The Facilities Guidelines Institute (FGI)

1. FGI Guidelines for Design and Construction of Hospitals, latest version
2. FGI Guidelines for Design and Construction of Outpatient Facilities, latest version E.

National Fire Protection Association (NFPA):

1. 10 ..... Standard for Portable Fire Extinguisher
2. 30 ..... Flammable and Combustible Liquids Code
3. 51 B ..... Standard for Fire Prevention During Welding, Cutting and Other Hot Work
4. 70 ..... National Electrical Code
5. 70B ..... Recommended Practice for Electrical Equipment Maintenance
6. 70E ..... Standard for Electrical Safety in the Workplace
7. 99 ..... Health Care Facilities Code
8. 101 ..... Life Safety Code

9. 241 ..... Standard for Safeguarding Construction, Alteration, and Demolition Operations

F. The Joint Commission (T JC)

1. T JC Manual ..... Comprehensive Accreditation and Certification Manual

G. U.S. Occupational Safety and Health Administration (OSHA):

1. 29 CFR 1910 ... . Safety and Health Regulations for General Industry 2.

29 CFR 1926 ..... Safety and Health Regulations for Construction Industry

1.03 DEFINITIONS:

A. Critical Lift. A lift with the hoisted load exceeding 75% of the crane's maximum capacity; lifts made out of the view of the operator (blind picks); lifts involving two or more cranes; personnel being hoisted; and special hazards such as lifts over occupied facilities, loads lifted close to power-lines, and lifts in high winds or where other adverse environmental conditions exist; and any lift which the crane operator believes is critical.

B. OSHA "Competent Person" (CP). One who is capable of identifying existing and predictable hazards in the surroundings and working conditions which are unsanitary, hazardous or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them (see 29 CFR 1926.32(f)).

C. "Qualified Person" means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

D. High Visibility Accident. Any mishap which may generate publicity or high visibility.

E. Accident/Incident Criticality Categories:

1. No impact - near miss incidents that should be investigated but are not required to be reported to the Owner;

2. Minor incident/impact - incidents that require first aid or result in minor equipment damage (less than $5000). These incidents must be investigated but are not required to be reported to the Owner;

3. Moderate incident/impact -Any work-related injury or illness that results in:

a. Days away from work (any time lost after day of injury/illness onset);

b. Restricted work;

c. Transfer to another job;

d. Medical treatment beyond first aid;

e. Loss of consciousness;

4. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (5) above or,

5. Any incident that leads to major equipment damage (greater than $5000).

F. These incidents must be investigated and are required to be reported to the Owner;

1. Major incident/impact - Any mishap that leads to fatalities, hospitalizations, amputations, and losses of an eye as a result of contractors' activities. Or any incident which leads to major property damage (greater than $20,000) and/or may generate publicity or high visibility. These incidents must be investigated and are required to be reported to the Owner as soon as practical, but not later than 2 hours after the incident.

G. Medical Treatment. Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.

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1.04 ACCIDENT PREVENTION PLAN (APP):

A. The APP (aka Construction Safety & Health Plan) shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and ensure it is site-specific. The Owner considers the Prime Contractor to be the "controlling authority" for all worksite safety and health of each subcontractor(s). Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. B. The APP shall be prepared as follows:

1. Written in English by a qualified person who is employed by the Prime Contractor articulating the specific work and hazards pertaining to the contract (model language can be found in ASSE A 10.33). Specifically articulating the safety requirements found within these Owner contract safety specifications. APP shall be made available in other languages as necessary to convey the contents of the plan.
2. Address both the Prime Contractors and the subcontractors work operations.
3. State measures to be taken to control hazards associated with materials, services, oF equipment provided by suppliers.
4. Address all the elements/sub-elements and in order as follows:
    a. SIGNATURE SHEET. Title, signature, and phone number of the following:
        1) Plan preparer (Qualified Person such as corporate safety staff person or contracted Certified Safety Professional with construction safety experience);
        2) Plan approver (company/Owner’s Corporate officers authorized to obligate the company);
        3) Plan concurrence (e.g., Chief of Operations, Corporate Chief of Safety, Industrial Hygienist, project manager or superintendent, project safety professional). Provide concurrence of other applicable Owner’s corporate and project personnel (Contractor).
    b. BACKGROUND INFORMATION. List the following:
        1) Contractor;
        2) Contract number;
        3) Project name;
        4) Brief project description, description of work to be performed, and location; phases of work anticipated (these will require an AHA).
    c. STATEMENT OF SAFETY AND HEALTH POLICY. Provide a copy of current corporate/company Safety and Health Policy Statement, detailing commitment to providing a safe and healthful workplace for all employees. The Contractor's written safety program goals, objectives, and accident experience goals for this contract should be provided.
    d. RESPONSIBILITIES AND LINES OF AUTHORITIES. Provide the following:
        1) A statement of the employer's ultimate responsibility for the implementation of the Safety and Occupational Health (SOH) program;

2) Identification and accountability of personnel responsible for safety at both corporate and project level. Contracts specifically requiring safety or industrial hygiene personnel shall include a copy of their resumes.

3) The names of Competent and/or Qualified Person(s) and proof of competency/qualification to meet specific OSHA Competent/Qualified Person(s) requirements must be attached.

4) Requirements that no work shall be performed unless a designated competent person is present on the job site;

5) Requirements for pre-task Activity Hazard Analysis (AHAs);

6) Lines of authority;

7) Policies and procedures regarding noncompliance with safety requirements (to include disciplinary actions for violation of safety requirements) should be identified;

e. SUBCONTRACTORS AND SUPPLIERS. If applicable, provide procedures for coordinating SOH activities with other employers on the job site:

1) Identification of subcontractors and suppliers (if known); 2)

Safety responsibilities of subcontractors and suppliers.

f. TRAINING.

1) Site-specific SOH orientation training at the time of initial hire or assignment to the project for every employee before working on the project site is required.

2) Mandatory training and certifications that are applicable to this project (e.g., explosive actuated tools, crane operator, rigger, crane signal person, fall protection, electrical lockout/NFPA ?OE, machine/equipment lockout, confined space, etc .. .) and any requirements for periodic retraining/recertification are required.

3) Procedures for ongoing safety and health training for supervisors and employees shall be established to address changes in site hazards/conditions.

4) OSHA 10-hour training is required for all workers on site and the OSHA 30-hour training is required for Trade Competent Persons (CPs) or equivalent trainings acceptable to the Owner.

g. SAFETY AND HEAL TH INSPECTIONS.

1) Specific assignment of responsibilities for a minimum daily job site safety and health inspection during periods of work activity: Who will conduct (e.g., "Site Safety and Health CP"), proof of inspector's training/qualifications, when inspections will be conducted, procedures for documentation, deficiency tracking system, and follow-up procedures.

2) Any external inspections/certifications that may be required (e.g., contracted CSP or CSHT)

h. ACCIDENT/INCIDENT INVESTIGATION & REPORTING. The Contractor shall conduct mishap investigations of all Moderate and Major as well as all High Visibility Incidents. The APP shall include accident/incident investigation procedure and identify person(s) responsible to provide the following to the Owner’s Representative:

1) Exposure data (man-hours worked);

2) Accident investigation reports;

3) Project site injury and illness logs.

i. PLANS (PROGRAMS, PROCEDURES) REQUIRED. Based on a risk assessment of contracted activities and on mandatory OSHA compliance programs, the Contractor shall address all applicable occupational, patient, and public safety risks in site-specific compliance and accident prevention plans. These Plans shall include but are not be limited to procedures for addressing the risks associates with the following:

1) Emergency response;
2) Contingency for severe weather;
3) Fire Prevention;
4) Medical Support;
5) Posting of emergency telephone numbers;
6) Prevention of alcohol and drug abuse;
7) Site sanitation (housekeeping, drinking water, toilets);
8) Night operations and lighting;
9) Hazard communication program
10) Welding/Cutting "Hot" work;
11) Electrical Safe Work Practices (Electrical LOTO/((NFPA 70E)));
12) General Electrical Safety;
13) Hazardous energy control (Machine LOTO);
14) Site-Specific Fall Protection & Prevention;
15) Excavation/trenching;
16) Asbestos abatement;
17) Lead abatement;
18) Respiratory protection;
19) Health hazard control program;
20) Heat/Cold Stress Monitoring;
21) Crystalline Silica Monitoring (Assessment);
22) Demolition plan (to include engineering survey);
23) Formwork and shoring erection and removal;
24) PreCast Concrete;
25) Public (Mandatory compliance with ANSI/ASSE A10.34-2012).

C. Submit the APP to the Owner’s Representative for review for compliance with contract requirements in accordance with Section 013300 SUBMITTALS 15 calendar days prior to commencement of on-site work. Work cannot proceed without an accepted APP.

D. Once accepted by the Owner’s Representative, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the Owner’s Representative in accordance with the Contract Documents and applicable safety requirements, until the matter has been rectified.

E. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the Owner’s Representative should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Owner’s Representative within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and

maintain safe working conditions in order to safeguard onsite personnel, visitors, the public and the environment.

1.05 ACTIVITY HAZARD ANALYSES (AHAS):

A. AHAs are also known as Job Hazard Analyses, Job Safety Analyses, and Activity Safety Analyses. Before beginning each work activity involving a type of work presenting hazards not experienced in previous project operations or where a new work crew or sub-contractor is to perform the work, the Contractor(s) performing that work activity shall prepare an AHA.

B. AHAs shall define the activities being performed and identify the work sequences, the specific anticipated hazards, site conditions, equipment, materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk.

C. Work shall not begin until the AHA for the work activity has been accepted by the Owner's Representative and discussed with all engaged in the activity, including the Contractor, subcontractor(s), and Owner on-site representatives at preparatory and initial control phase meetings.

1. The names of the Competent/Qualified Person(s) required for a particular activity (for example, excavations, scaffolding, fall protection, other activities as specified by OSHA and/or other State and Local agencies) shall be identified and included in the AHA. Certification of their competency/qualification shall be submitted to the Owner's Representative for acceptance prior to the start of that work activity.

2. The AHA shall be reviewed and modified as necessary to address changing site conditions, operations, or change of competent/qualified person(s).

    a. If more than one Competent/Qualified Person is used on the AHA activity, a list of names shall be submitted as an attachment to the AHA. Those listed must be Competent/Qualified for the type of work involved in the AHA and familiar with current site safety issues.

    b. If a new Competent/Qualified Person (not on the original list) is added, the list shall be updated (an administrative action not requiring an updated AHA). The new person shall acknowledge in writing that he or she has reviewed the AHA and is familiar with current site safety issues.

3. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change.

4. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. All activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier, or subcontractor and provided to the prime contractor for review and approval and maintained onsite for review by Owner's Representative.

1.07 PRECONSTRUCTION CONFERENCE:

A. Contractor representatives who have a responsibility or significant role in implementation of the accident prevention program, as required by 29 CFR 1926.20(b)(1), on the project shall attend the preconstruction conference to gain a mutual understanding of its implementation. This includes the project superintendent, subcontractor superintendents, and any other assigned safety and health professionals.

B. Deficiencies in the submitted APP will be brought to the attention of the Contractor within 14 days of submittal, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

1.08 "SITE SAFETY AND HEALTH OFFICER" (SSHO) AND "COMPETENT PERSON" (CP):

A. The Prime Contractor shall designate a minimum of one SSHO at each project site that will be identified as the SSHO to administer the Contractor's safety program and owner-accepted Accident Prevention Plan. Each subcontractor shall designate a minimum of one CP in compliance with 29 CFR 1926.20 (b)(2) that will be identified as a CP to administer their individual safety programs

B. Further, all specialized Competent Persons for the work crews will be supplied by the respective contractor as required by 29 CFR 1926 (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).

C. These Competent Persons can have collateral duties as the subcontractor's superintendent and/or work crew lead persons as well as fill more than one specialized CP role (i.e. Asbestos, Electrical, Cranes, & Derricks, Demolition, Fall Protection, Fire Safety/Life Safety, Ladder, Rigging, Scaffolds, and Trenches/Excavations).

D. The SSHO or an equally-qualified Designated Representative/alternate will maintain a presence on the site during construction operations in accordance with the Contract Documents and applicable safety requirements. CPs will maintain presence during their construction activities in accordance with above mentioned clause. A listing of the designated SSHO and all known CPs shall be submitted prior to the start of work as part of the APP with the training documentation and/or AHA as listed in Section 1.8 below.

E. The repeated presence of uncontrolled hazards during a contractor's work operations will result in the designated CP as being deemed incompetent and result in the required removal of the employee in accordance with the Contract Documents and applicable safety requirements.

1.09 TRAINING:

A. The designated Prime Contractor SSHO must meet the requirements of all applicable OSHA standards and be capable (through training, experience, and qualifications) of ensuring that the requirements of 29 CFR 1926.16 and other appropriate Federal, State, Tribal, and local requirements are met for the project. As a minimum the SSHO must have completed the OSHA 30-hour Construction Safety class, or equivalent training acceptable to the Owner, and have five (5) years of construction industry safety experience or three (3) years if he/she possesses a Certified Safety Professional (CSP) or certified Construction Safety and Health Technician (CSHT) certification or have a safety and health degree from an accredited university or college.

B. All designated CPs shall have completed the OSHA 30-hour Construction Safety course, or equivalent training acceptable to the Owner, within the past 5 years.

C. In addition to the OSHA 30 Hour Construction Safety Course, all CPs with high hazard work operations such as operations involving asbestos, electrical, cranes, demolition, work at heights/fall protection, fire safety/life safety, ladder, rigging, scaffolds, and trenches/excavations shall have a specialized formal course in the hazard recognition & control associated with those high hazard work operations. Documented "repeat" deficiencies in the execution of safety requirements will require retaking the requisite formal course.

D. All other construction workers shall have the OSHA 10-hour Construction Safety Outreach course and any necessary safety training to be able to identify hazards within their work environment or equivalent training acceptable to the Owner.

E. Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the SSHO or his/her designated representative. As a minimum, this briefing shall include information on the site-specific hazards, construction limits, Service Unit safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of Owner furnished equipment, emergency procedures, accident reporting etc ... Documentation

shall be provided to the Owner’s Representative that individuals have undergone contractor's safety briefing.

F. Ongoing safety training will be accomplished in the form of weekly documented safety meeting.

1.10 INSPECTIONS:

A. The SSHO shall conduct frequent and regular safety inspections (daily) of the site and each of the subcontractors CPs shall conduct frequent and regular safety inspections (daily) of the their work operations as required by 29 CFR 1926.20(b)(2). Each week, the SSHO shall conduct a formal documented inspection of the entire construction areas with the subcontractors' "Trade Safety and Health CPs" present in their work areas. Coordinate with, and report findings and corrective actions weekly to Owner’s Representative.

B. A Certified Safety Professional (CSP) with specialized knowledge in construction safety or a certified Construction Safety and Health Technician (CSHT) shall randomly conduct a monthly site safety inspection. The CSP or CSHT can be a corporate safety professional or independently contracted. The CSP or CSHT will provide their certificate number on the required report for verification as necessary.

1. Results of the inspection will be documented with tracking of the identified hazards to abatement.
2. The Owner’s Representative will be notified immediately prior to start of the inspection and invited to accompany the inspection.
3. Identified hazard and controls will be discussed to come to a mutual understanding to ensure abatement and prevent future reoccurrence.
4. A report of the inspection findings with status of abatement will be provided to the Owner’s Representative within one week of the onsite inspection.

1.11 ACCIDENTS, OSHA 300 LOGS, AND MAN-HOURS:

A. Prime contractor shall establish and maintain an accident reporting, recordkeeping, and analysis system to track and analyze all injuries and illnesses, high visibility incidents, and accidental property damage (both owner and contractor) that occur on site. Notify the~ Owner’s Representative as soon as practical, but no more than four hours after any accident meeting the definition of a Moderate or Major incidents, High Visibility Incidents, or any weight handling and hoisting equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation, or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the Owner’s Representative determine whether a owner investigation will be conducted.

B. Conduct an accident investigation for all Minor, Moderate and Major incidents as defined in paragraph DEFINITIONS, and property damage accidents resulting in at least $20,000 inch (508000 mm) damages, to establish the root cause(s) of the accident. Schedule a meeting within five (5) days with the OWNER’S REPRESENTATIVE and Facility Safety Officer to complete an 1ST AR incident report.

C. A summation of all man-hours worked by the contractor and associated sub-contractors for each month shall be available to the Owner’s Representative monthly.

D. A summation of all Minor, Moderate, and Major incidents experienced on site by the contractor and associated sub-contractors for each month will be provided to the Owner’s Representative monthly. The contractor and associated sub-contractors' OSHA 300 logs will be made available to the Owner’s Representative as requested.

1.12 PERSONAL PROTECTIVE EQUIPMENT (PPE):

A. PPE is governed in all areas by the nature of the work the employee is performing. For example, specific PPE required for performing work on electrical equipment is identified in NFPA 70E, Standard for Electrical Safety in the Workplace.

B. Mandatory PPE shall be defined by the AHAs and the work conditions in the space.

1.13 FIRE SAFETY

A. Fire Safety Plan: Establish and maintain a site-specific fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to Owner's Representative for review for compliance with contract requirements in accordance with 013300 SUBMITTALS. This plan may be an element of the Accident Prevention Plan.

B. Site and Building Access: Maintain free and unobstructed access to facility emergency service and for fire, police and other emergency response forces in accordance with NFPA 241.

C. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.

D. Means of Egress: Any changes to the Means of Egress shall be coordinated via a meeting with the Facility Safety Officer and Owner's Representative through a preconstruction risk assessment (PCRA).

E. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to Owner's Representative

F. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.

G. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Schedule interruptions in advance through a PCRA meeting. All existing or temporary fire protection systems (fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be record by the medical center and copies provided to the Facility Manager and Owner's Representative.

H. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with Owner's Representative.

I. HOT WORK PERMIT

1. Hot work is defined as operations including, but not limited to, cutting, welding, thermal welding, brazing, soldering, grinding, thermal spraying, thawing pipes, or any similar situation. If such work is required, whenever possible, the contractor must notify the CCR/ Project Manager no less than fourteen day in advance of such work. The Facility Safety Officer will inspect the work area and issue a Hot Work Permit, authorizing the performance of such work.

2. All hot work will be performed in compliance with the medical center's policy regarding Hot Work Permits and NFPA 241 and NFPA 518; and applicable OSHA Standards. A Hot Work Permit will only be issued to individuals familiar with these regulations.

3. A Hot Work Permit will be issued only for the period necessary to perform such work. A Hot Work Permit will apply only to the location identified on the permit. If addit ional areas involve hot work, then additional permits must be requested. All fire protection, detection and monitoring systems are to be returned to active status at the end of each work day. If this is not possible, the contractor will provide a continuous fire watch until the system(s) are reactivated.

4. Contractors will not be allowed to perform hot work processes without the appropriate permit.

5. Any work involving the medical center's fire protection system will require reasonable advance notification. Under no circumstance will the contractor or employee attempt to alter or tamper with the existing fire protection system. The Facility Safety Officer will be notified within 30 minutes of the completion of all hot work to perform an inspection of the area to confirm that sparks or drops of hot metal are not present.

6. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to Owner's Representative.

J. Smoking: The use of tobacco products is prohibited on all I HS-operated properties (IHM, Part 5, Chapter 3) The term "tobacco" includes cigarettes, e-cigarettes, cigars, pipes, chewing tobacco, smokeless tobacco, electronic nicotine device system, and any other tobacco products. Security personnel may ask visitors who refuse to comply with the policy to leave the property and may document the incident.

K. Contractor shall remove and dispose of excess materials, debris, or waste generated by this project at an approved off-site location in accordance with applicable Local, Tribal, State and Federal laws and regulations, and pay any related fees. Burning or burial of materials is not permitted. Contractor shall provide all required waste storage containers and coordinate their location on site with the OWNER'S REPRESENTATIVE or Facility Manager. Contractor shall remove and dispose of excess materials, debris, or waste generated by this project at an approved off-site location in accordance with applicable Local, Tribal, State and Federal laws and regulations, and pay and related fees. Burning or burial of materials is not permitted. Contractor shall provide all required waste storage containers and coordinate their location on site with the OWNER'S REPRESENTATIVE or Facility Manager.

1.14 ELECTRICAL

A. All electrical work shall comply with NFPA 70 (NEC), NFPA 70B, NFPA 70E, 29 CFR Part 1910 Subpart J - General Environmental Controls, 29 CFR Part 1910 Subpart S - Electrical, and 29 CFR 1926 Subpart K in addition to other references required by contract.

B. All qualified persons performing electrical work under this contract shall be licensed where required by applicable Tribal, State, or local law. All apprentice electricians performing under this contract shall be deemed unqualified persons unless they are working under the immediate supervision of a licensed electrician or master electrician.

C. All electrical work will be accomplished de-energized and in the Electrically Safe Work Condition (refer to NFPA 70E for Work Involving Electrical Hazards, including Exemptions to Work Permit). Any Contractor, subcontractor or temporary worker who fails to fully comply with this requirement is subject to immediate termination in accordance with the Contract Documents and applicable safety requirements. Only in rare circumstance where achieving an electrically safe work condition prior to beginning work would increase or cause additional hazards, or is infeasible due to equipment design or operational limitations is energized work permitted. The Owner's Representative with approval of the Facility Safety Officer will make the determination if the circumstances would meet th exception outlined above. An AHA specific to energized work activities will be developed, reviewed, and accepted by the Owner prior to the start of that activity

1. Development of a Hazardous Electrical Energy Control Procedure is required prior to deenergization. A single Simple Lockout/Tagout Procedure for multiple work operations can only be used for work involving qualified person(s) de-energizing one set of conductors or circuit part source. Task specific Complex Lockout/Tagout Procedures are required at all other times.

2. Verification of the absence of voltage after de-energization and lockout/tagout is considered "energized electrical work" (live work) under NFPA 70E, and shall only be performed by qualified persons wearing appropriate shock protective (voltage rated) gloves and arc rate personal protective clothing and equipment, using Underwriters Laboratories (UL) tested and appropriately rated contact electrical testing instruments or equipment appropriate for the environment in which they will be used.
3. Personal Protective Equipment (PPE) and electrical testing instruments will be readily available for inspection by the Owner's Representative.

D. Before beginning any electrical work, an Activity Hazard Analysis (AHA) will be conducted to include Shock Hazard and Arc Flash Hazard analyses (NFPA Tables can be used only as a last alterative and it is strongly suggested a full Arc Flash Hazard Analyses be conducted). Work shall not begin until the AHA for the work activity for energized work has been reviewed and accepted by the Owner's Representative and discussed with all engaged in the activity, including The Contractor, subcontractor(s), and the Owner's on-site representatives at preparatory and initial control phase meetings.

E. Ground-fault circuit interrupters. GFCI protection shall be provided where an employee is operating or using cord- and plug-connected tools related to construction activity supplied by 125- volt, 15-, 20-, or 30- ampere circuits. Where employees operate or use equipment supplied by greater than 125-volt, 15-, 20-, or 30- ampere circuits, GFCI protection or an assured equipment grounding conductor program shall be implemented in accordance with NFPA 70E, Chapter 1, Article 110.4(C)(2)e

1.15 FALL PROTECTION

A. The fall protection (FP) threshold height requirement is 6 feet (182.88 cm) for ALL WORK, unless specified differently or the OSHA 29 CFR 1926 requirements are more stringent, to include steel erection activities, systems-engineered activities (prefabricated) metal buildings, residential (wood) construction and scaffolding work.
1. The use of a Safety Monitoring System (SMS) as a fall protection method is prohibited.
2. The use of Controlled Access Zone (CAZ) as a fall protection method is prohibited.
3. A Warning Line System (WLS) may ONLY be used on floors or flat or low-sloped roofs (between O - 18.4 degrees or 4:12 slope) and shall be erected around all sides of the work area (See 29 CFR 1926.502(f) for construction of WLS requirements). Working within the WLS does not require FP. No worker shall be allowed in the area between the roof or floor edge and the WLS without FP. FP is required when working outside the WLS.
4. Fall protection while using a ladder will be governed by the OSHA requirements.

1.16 SCAFFOLDS AND OTHER WORK PLATFORMS

A. All scaffolds and other work platforms construction activities shall comply with 29 CFR 1926 Subpart L.

B. The fall protection (FP) threshold height requirement is 6 feet (182.88 cm) as stated in Section 1.16.

C. The following hierarchy and prohibitions shall be followed in selecting appropriate work platforms.
1. Scaffolds, platforms, or temporary floors shall be provided for all work except that can bE performed safely from the ground or similar footing.
2. Ladders less than 20 feet (609.6 cm) may be used as work platforms only when use of small hand tools or handling of light material is involved.
3. Ladder jacks, lean-to, and prop-scaffolds are prohibited.

4. Emergency descent devices shall not be used as working platforms.

D. Contractors shall use a scaffold tagging system in which all scaffolds are tagged by the Competent Person. Tags shall be color-coded: green indicates the scaffold has been inspecteD and is safe to use; red indicates the scaffold is unsafe to use. Tags shall be readily visible, made of materials that will withstand the environment in which they are used, be legible and shall include:

1. The Competent Person's name and signature;
2. Dates of initial and last inspections.

1.17 EXCAVATION AND TRENCHES

A. All excavation and trenching work shall comply with 29 CFR 1926 Subpart P. Excavations less than 5 feet (152.4 cm) in depth require evaluation by the contractor's "Competent Person" (CP) for determination of the necessity of an excavation protective system where kneeing, laying in, or stooping within the excavation is required.

B. All excavations and trenches 24 inches (609.6 mm) in depth or greater shall require a written trenching and excavation plan; including a permit (NOTE - some States and other local jurisdictions require separate state/jurisdiction-issued excavation permits). The permit shall have two sections, one section will be completed prior to digging or drilling and the other will be completed prior to personnel entering the excavations greater than 5 feet (152.4 cm) in depth. Each section of the permit shall be provided to the Owner’s Representative prior to proceeding with digging or drilling and prior to proceeding with entering the excavation. After completion of the work and prior to opening a new section of an excavation, the permit shall be closed out and provided to the Owner’s Representative The permit shall be maintained onsite and the first section of the permit shall include the following:

1. Estimated start time & stop time. Specific location and nature of the work.
2. Indication of the contractor's "Competent Person" (CP) in excavation safety with qualification and signature. Formal course in excavation safety is required by the contractor's CP.
3. Indication of whether soil or concrete removal to an offsite location is necessary.
4. Indication of whether soil samples are required to determined soil contamination.
5. Indication of coordination with local authority (i.e. "One Call") or contractor's effort to determine utility location with search and survey equipment.
6. Indication of review of site drawings for proximity of utilities to digging/drilling.

C. The second section of the permit for excavations greater than five feet in depth shall include the following:

1. Determination of OSHA classification of soil. Soil samples will be from freshly dug soil with samples taken from different soil type layers as necessary and placed at a safe distance from the excavation by the excavating equipment. A pocket penetrometer will be utilized in determination of the unconfined compression strength of the soil for comparison against OSHA table (Less than 0.5 Tons/FT2 - Type C, 0.5 Tons/FT2 to 1.5 Tons/FT2 - Type B, greater than 1.5 Tons/FT2 - Type A without condition to reduce to Type B).
2. Indication of selected protective system (sloping/benching, shoring, shielding). When soil classification is identified as "Type A" or "Solid Rock", only shoring or shielding or Professional Engineer designed systems can be used for protection. A Sloping/Benching system may only be used when classifying the soil as Type B or Type C. Refer to Appendix B of 29 CFR 1926, Subpart P for further information on protective systems designs.

3. Indication of the spoil pile being stored at least 2 feet (60.96 cm) from the edge of the excavation and safe access being provided within 25 feet (762 cm) of the workers.

4. Indication of assessment for a potential toxic, explosive, or oxygen deficient atmosphere where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist. Internal combustion engine equipment is not allowed in an excavation without providing force air ventilation to lower the concentration to below OSHA PELs, providing sufficient oxygen levels, and atmospheric testing as necessary to ensure safe levels are maintained.

D. As required by OSHA 29 CFR 1926.651 (b)(1), the estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

1. The planned dig site will be outlined/marked in white prior to locating the utilities.

2. Used of the American Public Works Association Uniform Color Code is required for the marking of the proposed excavation and located utilities.

3. 811 and Tribal Utilities will be called two business days before digging on all local or State lands and public Right-of Ways.

4. Digging will not commence until all known utilities are marked.

5. Utility markings will be maintained.

E. Excavations will be hand dug or excavated by other similar safe and acceptable means as excavation operations approach within 5 feet (152.4 cm) of identified underground utilities. Exploratory bar or other detection equipment will be utilized as necessary to further identify the location of underground utilities.

F. Excavations greater than 20 feet (609.6 cm) in depth require a Professional Engineer designed excavation protective system.

1.18 CRANES

A. All crane work shall comply with 29 CFR 1926 Subpart CC.

B. Prior to operating a crane, the operator must be licensed, qualified or certified to operate the crane. Thus, all the provisions contained with Subpart CC are effective and there is no "PhasE In" date.

C. A detailed lift plan for all lifts shall be submitted to the Owner’s Representative 14 days prior to the scheduled lift complete with route for truck carrying load, crane load analysis, siting of crane and path of swing and all other elements of a critical lift plan where the lift meets the definition of a critical lift. Critical lifts require a more comprehensive lift plan to minimize the potential of crane failure and/or catastrophic loss. The plan must be reviewed and accepted by the General Contractor before being submitted to the Owner for review. The lift will not be allowed to proceed without prior acceptance of this document.

D. Crane operators shall not carry loads

1. over any personnel

2. over any occupied building unless

a. the top two floors are vacated

b. or overhead protection with a design live load of 300 psf is provided

1.19 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT.

A. All installation, maintenance, and servicing of equipment or machinery shall comply with 29 CFR 1910.147 except for specifically referenced operations in 29 CFR 1926 such as concrete

& masonry equipment 1 926.7020), heavy machinery & equipment 1 926.600(a)(3)(i), and process safety management of highly hazardous chemicals (1926.64). Control of hazardous electrical energy during the installation, maintenance, or servicing of electrical equipment shall comply with Section 1.15 to include NFPA ?OE and other Owner specific requirements discussed in the section.

1.20 CONFINED SPACE ENTRY

A. All confined space entry shall comply with 29 CFR 1926, Subpart AA except for specifically referenced operations in 29 CFR 1926 such as excavations/trenches 1926.651(9).

B. A site-specific Confined Space Entry Plan (including permitting process) shall be developed and submitted to the OWNER'S REPRESENTATIVE.

1.21 WELDING AND CUTTING

A. As specified in section 1.14, Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 518. Submit plan to Owner's Representative at least 5 working days in advance Designate contractor's responsible project-site fire prevention program manager to plan hot work.

1.22 LADDERS

A. All Ladder use shall comply with 29 CFR 1926 Subpart X.

B. All portable ladders shall be of sufficient length and shall be placed so that workers will not stretch or assume a hazardous position.

C. Manufacturer safety labels shall be in place on ladders

D. Step Ladders shall not be used in the closed position

E. Top steps or cap of step ladders shall not be used as a step

F. Portable ladders, used as temporary access, shall extend at least 3 feet (91.44 cm) above the upper landing surface.

1. When a 3 feet (91.44 cm) extension is not possible, a grasping device (such as a grab rail) shall be provided to assist workers in mounting and dismounting the ladder.

2. In no case shall the length of the ladder be such that ladder deflection under a load would, by itself, cause the ladder to slip from its support.

G. Ladders shall be inspected for visible defects on a daily basis and after any occurrence that could affect their safe use. Broken or damaged ladders shall be immediately tagged "DO NOT USE," or with similar wording, and withdrawn from service until restored to a condition meeting their original design.

1.23 FLOOR & WALL OPENINGS

A. All floor and wall openings shall comply with 29 CFR 1926 Subpart M.

B. Floor and roof holes/openings are any that measure over 2 inch (50.8 mm) in any direction of a walking/working surface which persons may trip or fall into or where objects may fall to the level below. Skylights located in floors or roofs are considered floor or roof hole/openings.

C. All floor, roof openings or hole into which a person can accidentally walk or fall through shall bE guarded either by a railing system with toeboards along all exposed sides or a load-bearing cover. When the cover is not in place, the opening or hole shall be protected by a removable guardrail system or shall be attended when the guarding system has been removed, or other fall protection system.

1. Covers shall be capable of supporting, without failure, at least twice the weight of the worker, equipment and material combined.

2. Covers shall be secured when installed, clearly marked with the word "HOLE", "COVER" or "Danger, Roof Opening-Do Not Remove" or color-coded or equivalent methods (e.g., red or orange "X"). Workers must be made aware of the meaning for color coding and equivalent methods.
3. Roofing material, such as roofing membrane, insulation or felts, covering or partly covering openings or holes, shall be immediately cut out. No hole or opening shall be left unattended unless covered.
4. Non-load-bearing skylights shall be guarded by a load-bearing skylight screen, cover, or railing system along all exposed sides.
5. Workers are prohibited from standing/walking on skylights.

PART 2 - PRODUCTS - (NOT USED.

PART 3 - EXECUTION - (NOT USED.)

END OF SECTION 013526

Submittals.

Testing and inspection agencies and services.

Contractor's design-related professional design services.

D. Control of installation.

E. Defect Assessment.

1.02 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.

C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
   1. Concrete Mix Design: As described in Section 033000 - Cast-in-Place Concrete. No specific designer qualifications are required.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Design Data: Submit for Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer and to Contractor.
   1. Test report submittals are for Engineer's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

1.04 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents. **PART 2 PRODUCTS - NOT USED**

PART 3 EXECUTION 3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

A. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents. 4. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Engineer.
   6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer.

E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.03 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION 014000

SECTION 016000 PRODUCT REQUIREMENTS

General product requirements.

Transportation, handling, storage and protection.

Product option requirements.

D. Substitution limitations.

1.02 RELATED REQUIREMENTS

A. Section 012500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

B. Section 014000 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS 2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. See Section 014000 - Quality Requirements, for additional source quality control requirements.

C. Use of products having any of the following characteristics is not permitted:
   1. Made outside the United States, its territories, Canada, or Mexico.
   2. Made using or containing CFC's or HCFC's.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named. **PART 3 EXECUTION**

3.01 SUBSTITUTION LIMITATIONS

A. See Section 012500 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause erosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 016000

SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS

Examination, preparation, and general installation procedures.

Cutting and patching.

Cleaning and protection.

D. Closeout procedures, including correction Punch List, except payment procedures.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.

B. Section 014000 - Quality Requirements: Testing and inspection procedures.

1.03 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022, with Errata (2021).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:

1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate Contractor. **PART 2 PRODUCTS**

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements. **PART 3 EXECUTION**

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the Owner’s correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work,

assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.04 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-complying work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.

I. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.

3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.05 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.06 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.07 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation. **3.08**

FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

D. Clean filters of operating equipment.

E. Clean site; sweep paved areas, rake clean landscaped surfaces.

F. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.09 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Owner.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Engineer when work is considered ready for Engineer's Substantial Completion inspection.

D. Submit written certification containing correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final correction Punch List containing Engineer's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Engineer.

F. Correct items of work listed in Final Owner’s correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Engineer when work is considered finally complete and ready for Engineer's Substantial Completion final inspection.

H. Complete items of work determined by Engineer listed in executed Certificate of Substantial Completion.

END OF SECTION 017000

SECTION 017123
FIELD ENGINEERING

PART 1 GENERAL 1.01 SECTION INCLUDES

A. Field engineering services by Contractor.

B. Land surveying services by Contractor.

C. Construction surveying by Contractor.

1.02 DESCRIPTION OF SERVICES

A. Specific services listed in this section are in addition to, and do not supersede, general Execution and Closeout Requirements.

B. Sole responsibility for establishing all locations, dimensions and levels of items of work.

C. Sole responsibility for provision of all materials required to establish and maintain benchmarks and control points, including batter boards, grade stakes, structure elevation stakes, and other items.

D. Keeping a transit, theodolite, or TST (total station theodolite with electronic distance measurement device); leveling instrument; and related implements such as survey rods and other measurement devices, at the project site at all times.

E. Provision of facilities and assistance necessary for Owner to check lines and grade points placed by Contractor.
   1. Performance of excavation or embankment work until after all cross-sectioning necessary for determining payment quantities for Unit Price work have been completed and accepted by OWNER'S REPRESENTATIVE.

F. Preparation and maintenance of daily reports of activity on the work. Submission of reports containing key progress indicators and job conditions to Owner.
   1. Number of employees at the Site.
   2. Number employees at the Site for each of Contractor's subcontractors.
   3. Major equipment and materials installed as part of the work.
   4. Major construction equipment utilized.
   5. Location of areas in which construction was performed.
   6. Materials and equipment received.
   7. Work performed, including field quality control measures and testing.
   8. Weather conditions.
   9. Safety.
   10. Delays encountered, amount of delay incurred, and the reasons for the delay.
   11. Instructions received from Owner, if any.

G. Preparation and maintenance of professional-quality, accurate, well organized, legible notes of all measurements and calculations made while surveying and laying out the work.

1.03 REFERENCE STANDARDS

A. FGDC-STD-007.1 - Geospatial Positioning Accuracy Standards - Part 1: Reporting Methodology; 1998.

B. FGDC-STD-007.2 - Geospatial Positioning Accuracy Standards - Part 2: Standards for Geodetic Networks; 1998.

C. FGDC-STD-007.4 - Geospatial Positioning Accuracy Standards - Part 4: Architecture, Engineering, Construction, and Facilities Measurement; 2002. D. State Plane Coordinate System: CA83-VF.

PART 2 PRODUCTS - NOT USED PART 3 EXECUTION

3.01 FIELD ENGINEERING

A. Maintain field office files, drawings, specifications, and record documents.

B. Coordinate field engineering services with Contractor's subcontractors, installers, and suppliers as appropriate.

C. Prepare layout and coordination drawings for construction operations.

D. Check and coordinate the work for conflicts and interferences, and immediately advise Owner of all discrepancies of which Contractor is aware.

E. Cooperate as required with Owner in observing the work and performing field inspections.

F. Review and coordinate work on a regular basis with shop drawings and Contractor's other submittals.

G. In general, match existing adjacent grades and maintain existing flow lines.

H. Check the location, line and grade of every major element as the work progresses. Notify the Owner when deviations from required lines or grades exceed allowable tolerances. Include in such notifications a thorough explanation of the problem, and a proposed plan and schedule for remedying the deviation. Do not proceed with remedial work without Owner’s concurrence of the remediation plan.

3.02 LAND SURVEYING

A. General: Follow standards for geospatial positioning accuracy.
   1. FGDC-STD-007.1 as amended by Authority Having Jurisdiction.
   2. FGDC-STD-007.2 as amended by Authority Having Jurisdiction.
   3. FGDC-STD-007.4 as amended by Authority Having Jurisdiction.

B. Coordinate survey data with the State Plane Coordinate System of the State in which the Project is located.

C. Contractor is responsible for the restoration of all property corners and control monuments damaged or destroyed by construction-related activities. Any disturbed monuments must be replaced at Contractor’s expense by a surveyor licensed where required by applicable law and approved by the Owner.
   1. Temporarily suspend work at such points and for such reasonable times as the Owner may require for resetting monuments. The Contractor will not be entitled to any additional compensation or extension of time.

3.03 REPORTS

A. Submit two copies of Contractor’s daily reports at Owner’s field office (or electronically) by 9:00 AM the next working day after the day covered in the associated report. Daily report shall be signed by responsible member of Contractor’s staff, such as project manager or superintendent, or foreman designated by Contractor as having authority to sign daily reports.

3.04 REOWNER’S REPRESENTATIVEDS

A. Maintain at the Site a complete and accurate log of control and survey work as it progresses.
   1. Organize and record survey data in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in the State in which the Project is located. Record Contractor's surveyor's original field notes, computations, and other surveying data in Contractor-furnished hard-bound field books. Contractor is solely responsible for completeness and accuracy of survey work, and completeness and accuracy of survey records, including field books. Survey records,(including field books) may be rejected by Owner due to failure to

organize and maintain survey records in a manner that allows reasonable and independent verification of calculations, and/or allows identification of elevations, dimensions, and grades of the work.

2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by Owner.

B. Submit three copies of final property survey to Owner. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey. Include the following information:

1. Structure locations from property and/or fence lines, and distances to adjacent buildings.
2. Dimensions and locations of underground utilities, appurtenances, and major site features. **3.05 CLOSEOUT ACTIVITIES**

A. See Section 017800 - Closeout Submittals, for closeout submittals.

END OF SECTION 017123

SECTION 017800
CLOSEOUT SUBMITTALS PART

1 GENERAL 1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Owner with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.
   3. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period. **PART 2 PRODUCTS - NOT USED**

PART 3 EXECUTION 3.01 PROJECT REOWNER'S REPRESENTATIVED DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Drawings: Legibly mark each item to record actual construction including:
   1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

B. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

C. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS A.

For Each Item of Equipment and Each System:

B. Description of unit or system, and component parts.

C. Identify function, normal operating characteristics, and limiting conditions.

D. Include performance curves, with engineering data and tests.

E. Complete nomenclature and model number of replaceable parts.

F. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

G. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

H. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

I. Provide servicing and lubrication schedule, and list of lubricants required.

J. Include manufacturer's printed operation and maintenance instructions.

K. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

3.05 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch (216 by 279 mm) three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION 017800

CHEMEHUEVI INDIAN TRIBE

LAKE HAVASU CITY, ARIZONA

TECHNICAL SPECIFICATIONS

for the construction of the

ENTERPRISE MOBILE HOME PARK WATER IMPROVEMENTS

Project Number: D3887700

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FINAL

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JACOBS

JANUARY 2026

TABLE OF CONTENTS

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.

1.02 DEFINITIONS

A. Excavation is considered to include all materials including rocks and boulders.

1.03 WEATHER LIMITATIONS

A. Material excavated when frozen or when air temperature is less than 32 degrees F shall not be used as fill or backfill until material completely thaws.

B. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

1.04 SEQUENCING AND SCHEDULING

A. Excavation Support: Install and maintain Shoring, as necessary to support sides of excavations and prevent detrimental settlement and lateral movement of existing facilities and utilities, adjacent property, and completed Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Preserve and protect all buried pipes and conduits within excavation zone.

B. Use of explosives is prohibited.

3.02 UNCLASSIFIED EXCAVATION

A. Excavation is unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered.

3.03 TRENCH WIDTH

A. Minimum Width of Trenches: Comply with MAG Standard Specifications Section 601.2.2: Trench Widths.

3.04 STOCKPILING EXCAVATED MATERIAL

A. Stockpile excavated material that is suitable for use as fill or backfill until material is needed.

B. Confine stockpiles to within easements, rights-of-way, and approved work areas. Do not obstruct roads or streets.

C. Do not stockpile excavated material adjacent to trenches and other excavations, unless excavation side slopes and excavation support systems are designed, constructed, and maintained for stockpile loads.

D. Do not stockpile excavated materials near or over existing facilities, adjacent property, or completed Work, if weight of stockpiled material could cause damage by structural failure or settlement.

3.05 DISPOSAL OF SPOIL

A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or backfill, offsite.

END OF SECTION

SECTION 31 23 23.15

TRENCH BACKFILL

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
   2. MAG Uniform Standard Details for Public Works Construction, 2026 Edition.
   3. ASTM International (ASTM):
      a. C33/C33M, Standard Specification for Concrete Aggregates.
      b. C94/C94M, Standard Specification for Ready-Mixed Concrete.
      c. C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
      d. C150/C150M, Standard Specification for Portland Cement.
      e. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
      f. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
      g. D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
      h. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
      i. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
      j. D4832, Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
   4. National Electrical Manufacturers Association (NEMA): Z535.1, Safety Colors.

1.2 DEFINITIONS

A. Base Rock: Granular material upon which manhole bases and other structures are placed.

B. Bedding Material: Granular material upon which pipes, conduits, cables, or duct banks are placed.

C. Imported Material: Material obtained by Contractor from source(s) offsite.

D. Lift: Loose (uncompacted) layer of material.

E. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe, conduit, cable or duct bank.

F. Prepared Trench Bottom: Graded trench bottom after excavation and installation of stabilization material, if required, but before installation of bedding material.

G. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D698. Corrections for oversize material may be applied to either as-compacted field dry density or maximum dry density, as determined by Owner or Owner's Representative.

H. Relative Density: As defined by ASTM D4253 and ASTM D4254.

I. Selected Backfill Material: Material available onsite that Owner or Owner's Representative determines to be suitable for a specific use.

J. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes producing a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids. Satisfying both of the following requirements, as defined in ASTM D2487:
   1. Coefficient of Curvature: Greater than or equal to 1 and less than or equal to 3.
   2. Coefficient of Uniformity: Greater than or equal to 4 for materials classified as gravel, and greater than or equal to 6 for materials classified as sand.

1.3 SUBMITTALS

A. Action Submittals:
   1. Shop Drawings: Manufacturer's descriptive literature for marking tapes and tracer wire.
   2. Samples:
      a. Trench stabilization material.
      b. Bedding and pipe zone material.
      c. Granular drain.
      d. Granular backfill.
      e. Earth backfill.
      f. Sand(s).

B. Informational Submittals:
   1. Certified Gradation Analysis: Submit not less than 30 days prior to delivery for imported materials or anticipated use for excavated materials, except for trench stabilization material that will be submitted prior to material delivery to Site.

PART 2 PRODUCTS

2.1 MARKING TAPE

A. Nondetectable:
   1. Conform to MAG Standard Detail 399-1.
   2. Inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil.
   3. Thickness: Minimum 5 mils.
   4. Width: 3 inches.
   5. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted continuously over entire length.
   6. Manufacturers and Products:
      a. Reef Industries; Terra Tape.
      b. Mutual Industries; Non-detectable Tape.
      c. Presco; Non-detectable Tape.

2.2 TRACER WIRE

A. Conform to MAG Standard Specifications Section 632 – Water and Sewer Tracer Wire Installation.

2.3 TRENCH STABILIZATION MATERIAL

A. Aggregate Base Course conforming to MAG Standard Specifications Section 702 – Base Materials, Type A, with nominal aggregate size 3 inches.

2.4 BEDDING MATERIAL AND PIPE ZONE MATERIAL

A. Aggregate Base Course conforming to MAG Standard Specifications Section 702, except that Table 702-1 shall be modified to require 90-100 material passing the 3/4" sieve size.

2.5 FINAL BACKFILL

A. Conform to MAG Standard Specifications 601.4.5 – Final Backfill.

2.6 CONTROLLED LOW STRENGTH MATERIAL (CLSM)

A. Select and proportion ingredients to obtain compressive strength between 50 psi and 150 psi at 28 days in accordance with ASTM D4832.

B. Materials:
   1. Cement: ASTM C150/C150M, Type I or Type II.
   2. Aggregate: ASTM C33/C33M, Size 7.

3. Fly Ash (Pozzolan): Class F fly ash in accordance with ASTM C618, except as modified herein:
    a. ASTM C618, Table 1, Loss on Ignition: Unless permitted otherwise, maximum 3 percent.
4. Water: Clean, potable, containing less than 500 ppm of chlorides.

2.7 SOURCE QUALITY CONTROL

A. Perform gradation analysis in accordance with ASTM C136 for:
    1. Earth backfill, including specified class.
    2. Trench stabilization material.
    3. Bedding and pipe zone material.

B. Certify Laboratory Performance of Mix Designs:
    1. Controlled low strength material.

PART 3 EXECUTION

3.1 TRENCH PREPARATION

A. Water Control:
    1. Promptly remove and dispose of water entering trench as necessary to grade trench bottom and to compact backfill and install manholes, pipe, conduit, direct-buried cable, or duct bank. Do not place concrete, lay pipe, conduit, direct-buried cable, or duct bank in water.
    2. Remove water in a manner that minimizes soil erosion from trench sides and bottom.
    3. Provide continuous water control until trench backfill is complete.

B. Remove foreign material and backfill contaminated with foreign material that falls into trench.

3.2 TRENCH BOTTOM

A. Firm Subgrade: Grade with hand tools, remove loose and disturbed material, and trim off high areas and ridges left by excavating bucket teeth. Allow space for bedding material if shown or specified.

B. Soft Subgrade: If subgrade is encountered that may require removal to prevent pipe settlement, notify Owner or Owner’s Representative. Owner or Owner’s Representative will determine depth of overexcavation, if any required.

3.3 TRENCH STABILIZATION MATERIAL INSTALLATION

A. Rebuild trench bottom with trench stabilization material.

B. Place material over full width of trench in 6-inch lifts to required grade, providing allowance for bedding thickness.

C. Compact each lift so as to provide a firm, unyielding support for the bedding material prior to placing succeeding lifts.

3.4 BEDDING

A. Furnish imported bedding material where, in the opinion of Owner or Owner's Representative, excavated material is unsuitable for bedding or insufficient in quantity.

B. Place over full width of prepared trench bottom in two equal lifts when required depth exceeds 8 inches.

C. Hand grade and compact each lift to provide a firm, unyielding surface.

D. Minimum Thickness: 4 inches.

E. Check grade and correct irregularities in bedding material. Loosen top 1 inch to 2 inches of compacted bedding material with a rake or by other means to provide a cushion before laying each section of pipe, conduit, direct-buried cable, or duct bank.

F. Install to form continuous and uniform support except at bell holes, if applicable, or minor disturbances resulting from removal of lifting tackle.

G. Bell or Coupling Holes: Excavate in bedding at each joint to permit proper assembly and inspection of joint and to provide uniform bearing along barrel of pipe or conduit.

3.5 TRENCH BACKFILL

A. Conform to MAG Standard Specifications 601.4 – Foundation, Bedding, Haunching, Backfilling and Compaction.

B. Do not use power-driven impact compactors to compact pipe zone material. After full depth of pipe zone material has been placed as specified, compact material by a minimum of three passes with a vibratory plate compactor only over area between sides of pipe and trench walls.

3.6 MARKING TAPE INSTALLATION

A. Continuously install marking tape along centerline of buried piping, at depth of 2 feet.
   1. Detectable Marking Tape: Install with nonmetallic piping and waterlines.
   2. Nondetectable Marking Tape: Install with metallic piping.

3.7 TRACER WIRE INSTALLATION AND TESTING

A. Comply with MAG Standard Specifications Section 632: Water and Sewer Tracer Wire Installation.

B. Roadway Access Point with Green-single terminal lid, or approved equal, at each access point.

3.8 BACKFILL ABOVE PIPE ZONE

A. Conform to MAG Standard Specifications Section 601.4.5 – Final Backfill.

B. Maintain finished grade of topsoil even with adjacent area and grade as necessary to restore drainage.

3.9 MAINTENANCE OF TRENCH BACKFILL

A. After each section of trench is backfilled, maintain surface of backfilled trench even with adjacent ground surface until final surface restoration is completed.

B. Gravel Surfacing Rock: Add gravel surfacing rock where applicable and as necessary to keep surface of backfilled trench even with adjacent ground surface, and grade and compact as necessary to keep surface of backfilled trenches smooth, free from ruts and potholes, and suitable for normal traffic flow.

C. Topsoil: Add topsoil where applicable and as necessary to maintain surface of backfilled trench level with adjacent ground surface.

D. Asphaltic Pavement: Replace settled areas or fill with asphalt as specified in Section 32 12 16, Asphalt Paving.

E. Other Areas: Add excavated material where applicable and keep surface of backfilled trench level with adjacent ground surface.

3.10 SETTLEMENT OF BACKFILL

A. Settlement of trench backfill, or of fill, or facilities constructed over trench backfill will be considered a result of defective compaction of trench backfill.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
2. American Association of State Highway and Transportation Officials (AASHTO):
   a. M140, Standard Specification for Emulsified Asphalt.
   b. M156, Standard Specification for Requirements for Mixing Plants for Hot-mixed, Hot-laid Bituminous Paving Mixes.
   c. T166, Standard Method of Test for Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Mixtures Using Saturated Surface-Dry Specimens.
   d. T245, Standard Method of Test for Resistance to Plastic Flow of Asphalt Mixtures Using Marshall Apparatus.
   e. T283, Standard Method of Test for Resistance of Compacted Hot Asphalt Mixtures to Moisture-Induced Damage.
3. ASTM International (ASTM):
   a. D140/D140M, Standard Practice for Sampling Asphalt Materials.
   b. D979/D979M, Standard Practice for Sampling Asphalt Mixtures.
   c. D2041/D2041M, Standard Test Method for Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures.
   d. D2950/2950M, Standard Test Method for Density of Asphalt Mixtures in Place by Nuclear Methods.
   e. E329, Standard Specification for Agencies Engaged in Construction Inspection Testing, or Special Inspection.

1.02 DEFINITIONS

A. Combined Aggregate: All mineral constituents of asphalt concrete mix, including mineral filler and separately sized aggregates.

B. Maximum Aggregate Size: One sieve size larger than the nominal aggregate size.

C. Nominal Aggregate Size: One sieve size larger than the first sieve that retains more than 10 percent aggregate.

D. Prime Coat: Low viscosity cutback or emulsified asphalt applied to granular base in preparation of paving to coat and bond loose materials, harden the surface, plug voids, prevent moisture migration, and provide adhesion.

E. Reclaimed asphalt pavement (RAP): Removed and/or processed pavement materials containing binder and aggregate.

F. Seal Coat: Term used for various applications of emulsified asphalt, with or without sand or aggregate, to protect the asphalt surface from aging due to wear, degradation from the sun, wind, and water. Also used to improve skid resistance and aesthetics. The term seal coat can be used to define fog seal, slurry seal, chip seal or sand seal, depending on application.

G. Tack Coat: Thin layer of emulsified asphalt applied to hard surfaces, including new pavement lifts, to promote adhesion and bonding.

H. Standard Specifications: Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.

1.03 DESIGN REQUIREMENTS

A. Prepare asphalt concrete mix design, meeting the following design criteria, tolerances, and other requirements of this specification.

B. Design Criteria:

1. Marshall Method, AASHTO T245
   a. Conform to Standard Specifications Section 710: Asphalt Concrete, Table 710-3: Marshall Mix Design Criteria for 3/8” Mix.

C. Furnished Mix Tolerances:

1. Conform to asphalt concrete mix formula within the following, plus or minus:
   a. Conform to aggregate size requirements included in Table 710-3 of MAG Standard Specifications.
   b. Bitumen Content: 0.3 percent of volume or batch weight of aggregate.
   c. Temperature Leaving Mixer: 20 degrees F.
   d. Temperature in Paving Machine Hopper: 20 degrees F.

1.04 SUBMITTALS

A. Action Submittals:

1. Samples:

a. Sample per ASTM D140.

B. Informational Submittals:

1. A: Asphalt Concrete Mix Formula:
   a. Submit minimum of 15 days prior to start of production.
   b. Submittal to include the following information:
      1) Gradation and portion for each aggregate constituent used in mixture to produce a single gradation of aggregate within specified limits.
      2) Bulk specific gravity for each aggregate constituent.
      3) Measured maximum specific gravity of mix at optimum asphalt content determined in accordance with ASTM D2041.
      4) Percent of asphalt lost due to absorption by aggregate.
      5) Index of Retained Strength (TSR) at optimum asphalt content as determined by AASHTO T283.
      6) Percentage of asphalt cement, to nearest 0.1 percent, to be added to mixture.
      7) Optimum mixing temperature.
      8) Optimum compaction temperature.
      9) Temperature-viscosity curve of asphalt cement to be used.
      10) Brand name of any additive to be used and percentage added to mixture.
2. Test Report for Asphalt Cement:
   a. Submit minimum 10 days prior to start of production.
   b. Show appropriate test method(s) for each material and the test results.
3. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for the following materials:
   a. Aggregate: Gradation, source test results as defined in Standard Specifications Section 710: Asphalt Concrete.
   b. Asphalt for Binder: Type, grade, and viscosity-temperature curve.
   c. Prime Coat: Type and grade of asphalt.
   d. Tack Coat: Type and grade of asphalt.
   e. Additives.
   f. Mix: Conforms to job-mix formula.
4. Statement of qualification for independent testing laboratory.
5. Test Results:
   a. Mix design.
   b. Asphalt concrete core.
   c. Gradation and asphalt content of uncompacted mix.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Independent Testing Laboratory: In accordance with ASTM E329.
2. Asphalt concrete mix formula shall be prepared by approved certified independent laboratory under the supervision of a certified asphalt technician.
3. Hot mix asphalt concrete shall be prepared by a mixing plant meeting the requirements of AASHTO M156.

B. Compaction Control Strip:

1. General:
   a. Construct to approximately 400 square yards in area and at location that will become a portion of completed paved area.
   b. Thickness: Typical of thickness to be paved on Project.
2. Rollers Used for Compaction:
   a. Steel Wheel Rollers: Minimum static weight 10 tons.
   b. Pneumatic Rollers: Capable of exerting pressure of 80 psi on bituminous surface.
   c. Vibratory Rollers: Static weight minimum 6 tons, capable of applying a 10-ton impact force equipped with amplitude and frequency control specifically designed for compaction of bituminous mixtures.
3. Compaction:
   a. Compact bituminous mat, using a standard rolling pattern that covers entire control strip. Request that Testing Agency performs final density test.
   b. Continue rolling until no further compaction can be obtained as determined by field density testing.
   c. Temperature and condition of bituminous mat shall be considered workable when further compaction can no longer be obtained.
4. Target Density Determination:
   a. Select test point near center of normal roller pass, but no closer than 2 feet from edge of mat and 50 feet from either end of control strip. Mat thickness at this point shall be at least depth of finished pavement.
   b. Point at which no further densification can be obtained.
5. Establish new target density if change is made in mix design, nominal depth of mat being placed, aggregate source, or material properties.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Temperature: Do not apply asphalt materials or place asphalt mixes when ground temperature is lower than 50 degrees F or air temperature is lower than

40 degrees F. Measure ground and air temperature in shaded areas away from heat sources or wet surfaces.

B. Moisture: Do not apply asphalt materials or place asphalt mixes when application surface is wet.

PART 2 PRODUCTS

2.01 MATERIALS

A. Prime Coat: Cutback asphalt, conform to Standard Specifications Section 710: Asphalt Concrete.

B. Tack Coat:

1. Emulsified Asphalt for Tack Coat or Seal Coat: conform to Standard Specifications Section 710: Asphalt Concrete.

C. Sand for Blotter Material or Sand Seal: As specified in Standard Specifications Section 710: Asphalt Concrete.

2.02 ASPHALT CONCRETE MIX

A. General:

1. Mix formula shall not be modified except with written approval of Owner or Owner’s Representative.
2. Source Changes:
   a. Should material source(s) change, establish new asphalt concrete mix formula before new material(s) is used.
   b. Perform check tests of properties of plant-mix bituminous materials on first day of production and as requested by Owner or Owner’s Representative to confirm that properties are in compliance with design criteria.
   c. Make adjustments in gradation or asphalt content as necessary to meet design criteria.

B. Mineral Filler: In accordance with Section 710 of the Standard Specifications.

C. Asphalt Cement: Performance Grade 70-10 as specified in Section 710 of the Standard Specifications.

PART 3 EXECUTION

3.01 GENERAL

A. Traffic Control:

1. In accordance with Section 01 50 00, Temporary Facilities and Controls.
2. Minimize inconvenience to traffic but keep vehicles off freshly treated or paved surfaces to avoid pickup and tracking of asphalt.

B. Driveways: Repave driveways from which pavement was removed. Leave driveways in as good or better condition than before start of construction.

3.02 LINE AND GRADE

A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness.

B. Shoulders: Construct to line, grade, and cross-section shown.

3.03 APPLICATION EQUIPMENT

A. In accordance with Section 321 of the Standard Specifications.

3.04 PREPARATION

A. Prepare subgrade as specified in Section 321 of the Standard Specifications.

B. Existing Roadway:

1. Modify profile by grinding, milling, or overlay methods as approved, to provide meet lines and surfaces and to produce smooth riding connection to existing facility.
2. Remove existing material to a minimum depth of 1 inch (25 millimeters).
3. Paint edges of meet line with tack coat prior to placing new pavement.

C. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.05 PAVEMENT APPLICATION

A. General: Place asphalt concrete mixture on approved, prepared base in conformance with Section 321 of the Standard Specifications.

B. Tack Coat:

1. Apply uniformly to clean, dry surfaces avoiding overlapping of applications.
2. Do not apply more tack coat than necessary for the day’s paving operation.
3. Touch up missed or lightly coated surfaces and remove excess material.
4. Application Rate:

a. 0.05 gallon per square yard to 0.20 gallon per square yard of asphalt (residual if diluted emulsified asphalt).

C. Pavement Mix:

1. Prior to Paving:
   a. Sweep primed surface free of dirt, dust, or other foreign matter.
   b. Patch holes in primed surface with asphalt concrete pavement mix.
   c. Blot excess prime material with sand.
2. Place asphalt concrete pavement mix in one single lift.
3. Compacted Lift Thickness:
   a. Minimum: 1 inch.
   b. Maximum: 3.5 inches.
4. Total Compacted Thickness: matching existing thickness.
5. Sequence placement so that meet lines are straight and edges are vertical.
6. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.
7. Joints:
   a. Offset edge of each layer a minimum of 6 inches so joints are not directly over those in underlying layer.
   b. Offset longitudinal joints in roadway pavements so longitudinal joints in wearing layer coincide with pavement centerlines and lane divider lines.
   c. Form transverse joints by cutting back on previous day's run to expose full vertical depth of layer.
8. Succeeding Lifts: Apply tack coat to pavement surface between each lift.
9. After placement of pavement, seal meet line by painting a minimum of 6 inches on each side of joint with cutback or emulsified asphalt. Cover immediately with sand.

D. Compaction:

1. Conform to Section 321 of Standard Specifications.
2. Joint Compaction:
   a. Cut back previously compacted mixture when Work is resumed to produce slightly beveled edge for full thickness of layer.
   b. Cut away waste material and lay new mix against fresh cut.

E. Seal Coat:

1. General: Apply seal coat of paving grade or emulsified asphalt to finished surface at longitudinal and transverse joints, joints at abutting pavements, areas where asphalt concrete was placed by hand, patched

surfaces, and other areas as directed by Owner or Owner's Representative.

2. Preparation:
   a. Surfaces that are to be sealed shall be maintained free of holes, dry, and clean of dust and loose material.
   b. Seal in dry weather and when temperature is above 35 degrees F.
3. Application:
   a. Fill cracks over 1/16 inch in width with asphalt-sand slurry or approved crack sealer prior to sealing.
   b. When sealing patched surfaces and joints with existing pavements, extend minimum 6 inches beyond edges of patches.

3.06 PATCHING

A. Preparation:

1. Remove damaged, broken, or unsound asphalt concrete adjacent to patches. Trim to straight lines exposing smooth, sound, vertical edges.
2. Prepare patch subgrade as specified in Section 321 of the Standard Specifications.

B. Application:

1. Patch Thickness: 2 inches or thickness of adjacent asphalt concrete, whichever is greater.
2. Place asphalt concrete mix across full width of patch in layers of equal thickness.
3. Spread and grade asphalt concrete with hand tools or mechanical spreader, depending on size of area to be patched.

C. Compaction:

1. Roll patches with power rollers capable of providing compression of 200 pounds per linear inch to 300 pounds per linear inch. Use hand tampers where rolling is impractical.
2. Begin rolling top course at edges of patches, lapping adjacent asphalt surface at least one-half the roller width. Progress toward center of patch overlapping each preceding track by at least one-half width of roller.
3. Make sufficient passes over entire area to remove roller marks and to produce desired finished surface.

D. Tolerances:

1. Finished surface shall be flush with and match grade, slope, and crown of adjacent surface.
2. Tolerance: Surface smoothness shall not deviate more than plus 1/4 inch or minus 0 inch when straightedge is laid across patched area between edges of new pavement and surface of old surfacing.

3.07 FIELD QUALITY CONTROL

A. General: Provide services of approved certified independent testing laboratory to conduct tests. Testing laboratory shall be certified meeting the requirements of ASTM E329.

B. Sampling for quality control shall conform to ASTM D979.

C. Field Density Tests:

1. Perform tests from cores or sawed samples in accordance with AASHTO T166.
2. Measure with properly operating and calibrated nuclear density gauge in accordance with ASTM D2950.
3. Maximum Density: In accordance with ASTM D2041, using sample of mix taken prior to compaction from same location as density test sample.

D. Testing Frequency:

1. Quality Control Tests:
   a. Asphalt Content, Aggregate Gradation: Once per every 500 tons of mix or once every 4 hours, whichever is greater.
   b. Mix Design Properties, Measured Maximum (Rice's) Specific Gravity: Once every 1,000 tons or once every 8 hours, whichever is greater.

2. Density Tests: Once every 500 tons of mix or once every 4 hours, whichever is greater.
   a. For trench patching, perform density tests every 200' feet on main line utilities and one test every fourth utility connection patch. If utility trench density is not achieved on two consecutive tests, perform density tests on every utility connection trench until density is achieved. Once density is achieved on utility connection trenches again, testing can be reduced to once every four trenches.

END OF SECTION

SECTION 33 05 01

CONVEYANCE PIPING—GENERAL

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
   2. MAG Uniform Standard Details for Public Works Construction, 2026 Edition.
   3. American Concrete Institute (ACI): 301, Specifications for Structural Concrete.
   4. American Water Works Association (AWWA):
      a. C110/A21.10, Ductile-Iron and Gray-Iron Fittings.
      b. C115/A21.15, Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
      c. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
      d. C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe.
   5. ASTM International (ASTM):
      a. C94/C94M, Standard Specification for Ready-Mixed Concrete.
      b. C150/C150M, Standard Specification for Portland Cement.
      c. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
   6. NSF International (NSF):
      a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
      b. NSF/ANSI 372, Drinking Water System Components - Lead Content.

1.2 SUBMITTALS

A. Action Submittals:
   1. Detailed pipe fabrication drawings showing pipe details, special fittings and bends, dimensions, coatings, and other pertinent information.
   2. Layout drawing showing location of each pipe section and each special length.
   3. Pipe pressure class.

   4. Wall thickness, reinforcing, and strength calculations.
   5. Product Data: Manufacturer’s data for couplings, saddles, gaskets, and other pipe accessories. Indicate maximum rated working pressure and test pressure for each item.

B. Informational Submittals: Manufacturer's Certificate of Compliance, in accordance with Section 01 6100 Common Product Requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

A. In accordance with manufacturer's recommendations and as specified in individual specification(s) following this section.

B. Marking at Plant: Mark each pipe and fitting at plant. Include date of manufacture, manufacturer's identification, specification standard, diameter of pipe, pipe class and other information required for type of pipe.

C. Pipe, specials, and fittings received at Project Site in damaged condition will not be accepted.

D. Gasket Storage: Store rubber gaskets in cool, well ventilated place, and do not expose to direct rays of sun. Do not allow contact with oils, fuels, petroleum, or solvents.

E. Store and support pipe securely to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials.

F. Handling:
   1. Pipe shall be handled with proper equipment in a manner to prevent distortion or damage. Use of hooks, chains, wire ropes, or clamps that could damage pipe, damage coating or lining, or kink and bend pipe ends is not permitted.
   2. Use heavy canvas, or nylon slings of suitable strength for lifting and supporting materials.
   3. Lifting pipe during unloading or lifting into trench shall be done using two slings placed at quarter point of pipe section. Pipe may be lifted using one sling near center of pipe, provided pipe is guided to prevent uncontrolled swinging and no damage will result to pipe or harm to workers. Slings shall bear uniformly against pipe.
   4. Pipe and fittings shall not be stored on rocks or gravel, or other hard material that might damage pipe. This includes storage area and along pipe trench.

PART 2 PRODUCTS

2.1 GENERAL

A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and

materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited.

2.2 PIPE

A. As specified in the individual specification(s) following this section.

2.3 JOINTS

A. As specified in the individual specification(s) following this section.

2.4 COUPLINGS

A. General:
   1. Coupling linings for use in potable water systems shall be in conformance with NSF/ANSI 61.
   2. Couplings shall be rated for appropriate operating pressure and hydrostatic test pressure.
   3. Exposed, bolted, sleeve-type couplings shall be lined and coated with fusion bonded epoxy in accordance with AWWA C213.
   4. Buried, bolted, sleeve-type couplings shall be lined and coated with fusion-bonded epoxy in accordance with AWWA C213.

B. For Pipe with Plain-Ends:
   1. Bolted, sleeve-type coupling, in accordance with AWWA C219.
      a. Manufacturer of couplings shall observe same quality control requirements as specified in AWWA C221 for fabrication of pipe expansion joints.
      b. Unless thrust restraint is provided by other means, bolted, sleeve-type couplings shall be harnessed. Harness details shall be in accordance with requirements of appropriate reference standard or as shown on Drawings.

C. For Pipe with Flanged Ends:
   1. Flanged coupling adapters, in accordance with AWWA C219.

2.5 SERVICE SADDLES

A. Conform to Section 33 12 13: Water Service Connections.

2.6 FLANGES, FLANGE GASKETS, AND BOLTING MATERIALS

A. As specified in individual specifications following this section.

B. Flanges, bolting materials, and flange gaskets for steel flanges shall conform to AWWA C207.

C. Flanges, bolting materials, and flange gaskets for ductile iron flanges shall conform to AWWA C110 and AWWA C115.

D. If the flanges are coated, provide two washers for each bolt on each side of the flange to minimize damage to the coating as the nuts are tightened. Provide bolts of the proper length to accommodate the washers.

2.7 THRUST BLOCKS AND ANCHOR BLOCKS

A. Thrust Block Concrete: As specified in MAG Standard Specifcation Section 610.

B. Reinforcing Steel: Conform to MAG Standard Detail 381.

2.8 PIPE LOCATING TAPE AND TRACER WIRE

A. As specified in Section 31 23 23.15, Trench Backfill.

2.9 PIPE BEDDING AND PIPE ZONE MATERIAL

A. Granular material as specified in Section 31 23 23.15, Trench Backfill.

2.10 TRENCH STABILIZATION MATERIAL

A. As specified in Section 31 23 23.15, Trench Backfill.

2.11 CHECK VALVE ENCLOSURE

A. As shown on plans.

PART 3 EXECUTION

3.1 GENERAL

A. Distributing Materials: Place materials along trench only as will be used each day, unless otherwise approved by Owner or Owner’s Representative. Placement of materials shall not be hazardous to traffic or to general public, obstruct access to adjacent property, or obstruct others working in area.

3.2 EXAMINATION

A. Verify size, material, joint types, elevation, and horizontal location of existing pipeline to be connected to new pipeline or new equipment.

B. Inspect size and location of structure penetrations to verify adequacy of wall pipes, sleeves, and other openings.

C. Damaged Coatings and Linings: Repair using coating and lining materials in accordance with manufacturer's instructions.

3.3 PREPARATION OF TRENCH

A. Prepare trench as specified in Section 31 23 16, Excavation.

B. Unless otherwise permitted by Owner or Owner's Representative, maximum length of open trench shall not exceed 50 feet.

3.4 INSTALLATION

A. General:
   1. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.
   2. Install individual pipe lengths in accordance with approved lay diagram. Misplaced pipe shall be removed and replaced.
   3. Inspect pipe and fittings before installation, clean ends thoroughly, remove foreign matter and dirt from inside.

B. Buried Pressure Pipe:
   1. Placement:
      a. Keep trench dry until pipe laying and joining is completed.
      b. Exercise care when lowering pipe into trench to prevent twisting or damage to pipe.
      c. Measure for grade at pipe invert, not at top of pipe.
      d. Excavate trench bottom and sides of ample dimensions to permit proper joining, welding, visual inspection, and testing of entire joint.
      e. Prevent foreign material from entering pipe during placement.
      f. Close and block open end of last laid pipe section when placement operations are not in progress and at close of day's work.
      g. In general, lay pipe upgrade with bell ends pointing in direction of laying.
      h. Deflect pipe at joints for pipelines laid on a curve using unsymmetrical closure of spigot into bell. If joint deflection of standard pipe lengths will not accommodate horizontal or vertical curves in alignment, provide:
         1) Shorter pipe lengths.
         2) Special mitered joints.

3) Standard or special fabricated bends.

i. Check gasket position with feeler gauge to assure proper seating.

j. After joint has been made, check pipe alignment and grade.

k. Place sufficient pipe zone material to secure pipe from movement before next joint is installed.

l. Prevent uplift and floating of pipe prior to backfilling.

2. Tolerances:

a. Joint Deflection: Maximum 2 degrees in any direction. Joint deflection is not allowed at mechanical or flange joints.

3. Cover Over Top of Pipe: Minimum 3 feet, unless otherwise shown.

4. Disposal of Excess Excavated Material: As specified in Section 31 23 16, Excavation.

3.5 THRUST RESTRAINT

A. Location: At pipeline tees, plugs, caps, bends, and locations where unbalanced forces exist.

B. Thrust Blocking:

1. Conform to MAG Standard Detail 380.
2. Place only where shown on Drawings.
3. Place blocking so pipe and fitting joints are accessible for repairs.

3.6 ANCHOR BLOCK

A. Conform to MAG Standard Detail 381.

3.7 PLACEMENT OF PIPE LOCATING TAPE

A. Place pipe locating tape in accordance with Section 31 23 23.15, Trench Backfill.

3.8 PIPE BEDDING AND ZONE MATERIAL

A. Place pipe bedding and pipe zone material in accordance with Section 31 23 23.15, Trench Backfill.

3.9 FIELD QUALITY CONTROL

A. Pressure Leakage Testing: As specified in the individual specification(s) following this section.

3.10 CLEANING AND DISINFECTION

A. Following assembly and testing, and prior to final acceptance, flush pipelines with water at 2.5 fps minimum flushing velocity until foreign matter is removed. Dispose of water and flushed foreign matter.

B. Disinfection: As specified in Section 33 13 00, Disinfection of Water Utility Distribution Facilities.

END OF SECTION

SECTION 33 05 01.02

DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
2. American Association of State Highway and Transportation Officials (AASHTO): T99, Standard Method of Test for the Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop.
3. American Society of Mechanical Engineers (ASME):
   a. B16.21, Nonmetallic Flat Gaskets for Pipe Flanges.
   b. B16.42, Ductile Iron Pipe Flanges and Flanged Fittings Classes 150 and 300.
4. American Water Works Association (AWWA):
   a. C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
   b. C110/A21.10, Ductile-Iron and Gray-Iron Fittings.
   c. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   d. C115/A21.15, Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Fittings.
   e. C116/A21.16, Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service.
   f. C150/A21.50, Thickness Design of Ductile-Iron Pipe.
   g. C151/A21.51, Ductile-Iron Pipe. Centrifugally Cast, for Water.
   h. C153/A21.53, Ductile-Iron Compact Fittings for Water Service.
   i. C600, Installation of Ductile-Iron Water Mains and Their Appurtenances.
   j. C606, Grooved and Shouldered Joints.
   k. C651, Disinfecting Watermains.
5. ASTM International (ASTM):
   a. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
   b. A563, Standard Specification for Carbons and Alloy Steel Nuts.
   c. A746, Ductile Iron Gravity Sewer Pipe.

d. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
e. D1330, Standard Specification for Rubber Sheet Gaskets.
f. D1922, Standard Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method.
g. D2000, Standard Classification System for Rubber Products in Automotive Applications.
h. D4976, Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.

6. International Organization for Standardization (ISO):
   a. 9001, Quality Management Systems—Requirements.
   b. 8179-1: Ductile iron pipes, fittings, accessories and their joints—External zinc-based coating—Part 1: Metallic zinc with finishing layer.
   c. Part 2: Zinc Rich Paint.
7. NSF/ANSI 61: Drinking Water System Components – Health Effects.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Marking plan and details of standard pipe section showing dimensions, pipe joints, fitting and special fitting pressure rating and thickness, size, coating, and lining data.

B. Informational Submittals:

1. Manufacturer's certification of facility's experience.
2. Confirmation of manufacturer's ISO registration or names of proposed independent agency for factory quality assurance.
3. Manufacturing inspection report from ISO certified manufacturer or independent inspection agency.
4. Field Hydrostatic Testing Plan: Submit at least 15 days prior to testing and at minimum, include the following:
   a. Testing dates.
   b. Piping systems and section(s) to be tested.
   c. Method of isolation.
   d. Method of conveying water from source to system being tested.
   e. Calculation of maximum allowable leakage for piping section(s) to be tested.
5. Certifications of Calibration: Approved testing laboratory certificate if pressure gauge for hydrostatic test has been previously used. If pressure gauge is new, no certificate is required.
6. Test documentation form and results.

1.03 QUALITY ASSURANCE

A. Pipe Manufacturer: If not ISO 9001 registered, provide services of an independent inspection agency.

B. Independent inspection agency requirements for manufacturer's not ISO 9001 registered:

1. Submit names of at least two independent inspection agencies for approval minimum of 2 weeks prior to start of manufacturing.
2. Approved Inspection Agency Daily Responsibilities: Sample monitoring of chemical and mechanical tests, sample visual inspection of quality assurance tests performed on in-process pipe and fittings, and sample visual and dimensional inspection on finished products.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. Ductile Iron Pipe: Manufactured, lined, coated, and tested domestically in the United States of America.
2. Ductile Iron Fittings: Manufactured, lined, coated, and tested domestically or, for fittings produced outside of the United States of America, bearing the name of the domestic manufacturer supplying the pipe.
3. Source Manufacturing Facility Experience: Certify production of ductile iron pipe of specified diameters, pressure, dimensions, and standards for a period of not less than 10 years.

B. Pipe:

1. General:
   a. Pipe: New and recently manufactured. Refurbished pipe is not acceptable.
   b. Lined and coated as specified.
2. Meet requirements of AWWA C150/A21.50, AWWA C151/A21.51, and AWWA C111/A21.11.
3. Centrifugally cast, grade 60-42-10 iron.
4. Pressure Rating of Pipe: 200 psi.

C. Joints:

1. Mechanical Wedge Action Type Joint.

D. Fittings:

1. Joints, fittings and valve bodies shall be wrapped in 30 mil polyethylene and coated with fusion-bonded epoxy.
2. New and recently manufactured. Refurbished fittings will not be accepted.
3. Mechanical, Push-On, Flanged, or Restrained Joint: In accordance with the following table:

Minimum Pressure Ratings for AWWA C110/A21.10 and C115/A21.15 Ductile Iron Fittings		
Diameter (inches)	Rubber Gasket Joints (Push-on, Mechanical, Restrained) (psi)	Flanged Joints (psi)
3 to 24	350	250
Minimum Pressure Ratings for AWWA C153/A21.53 Ductile Iron Fittings		
Diameter (inches)	Rubber Gasket Joints (Push-on, Mechanical, Restrained) (psi)	Flanged Joints
3 to 24	350	Not included in C153/A21.53 (refer to the C110/A21.10 Standard)

4. Rubber Gasket Joints Including Mechanical Joints, Push-On Joints, and Flanged Joints: In accordance with AWWA C111/A21.11.
5. Mechanical Joint Fittings: In accordance with AWWA C110/A21.10 and AWWA C153/A21.53.
6. Couplings:
    a. Manufactured in accordance with the requirements of AWWA C219.
    b. Minimum pressure rating: 200 psi.
    c. Gaskets are EPDM rubber in accordance with ASTM D2000, certified and listed to ANSI/NSF61.Center ring, end rings and bolt guides shall be cast Ductile Iron meeting or exceeding ASTM A536.
    d. Fusion bonded epoxy coating in accordance with ANSI/NSF 61.
    e. Bolts and Nuts shall be Type 304 stainless steel.
    f. Manufacturers:
        1) Romac, Model Macro HP, or approved equal.

E. Welded Outlet: Only weld to pipe in manufacturer’s shop.

F. Coating: Asphaltic type, 1 mil thick, in accordance with AWWA C151/A21.51, AWWA C115/A21.15, AWWA C110/A21.10, and AWWA C153/A21.53.

G. Bolting:

1. Flanged Connection Bolts: Carbon steel, ASTM A307, Grade A hex bolts and ASTM A563, Grade A hex head nuts.
2. Grooved End Connections Bolts: Manufacturer's standard.

H. Gaskets:

1. Flat Faced Flange Gaskets:
   a. Pipe Smaller Than 54 Inches: Rated for working pressure 150 psi to 250 psi, 1/8 inch thick, red rubber (SBR), hardness 80 (Shore A), rated to 200 degrees F, conforming to ASME B16.21, AWWA C207, and ASTM D1330, Grade 1 and Grade 2.
2. Grooved End Joint Gaskets: Halogenated butyl, conforming to ASTM D2000 and AWWA C606.

2.02 SOURCE QUALITY CONTROL

A. Factory Tests:

1. General:
   a. Perform tests on pipe with metal thickness equal to that specified.
   b. Confirm that pipe passes hydrostatic test prior to shipment.
2. Hydrostatic Proof Test:
   a. Pipe: Perform at 500 psi for a minimum duration of 10 seconds.
   b. Pipe 30 Inches and Larger:
      1) Additionally test to 75 percent of minimum yield strength
      2) Minimum Test Duration: 10 seconds.
   c. Record each test cycle on a strip chart.
   d. Inspect pipe during testing for leaks.
   e. Reject pipe which shows evidence of leaks.
   f. Repair welding of leaks is not permitted.
3. Perform 15-psi air test on welded-on outlet pipe.
4. Measure pipe ends (spigot end, bell, and socket) with suitable gauges at sufficiently frequent intervals to confirm compliance to standard dimensions of AWWA C151/A21.51.
   a. Inspect each socket and spigot in well-lighted area for significant defects which could affect joint performance.
   b. Remove defects by cutting pipe ends.
   c. Reject pipe with significant defects in the bell.
   d. Document measurement of each end of each 18-inch diameter and larger pipe, including pipe number, and approval by manufacturer's quality assurance inspector to meet tolerances.

5. Document successful testing of restrained joints in the sizes specified to at least twice the specified pressure rating of the joint without leakage or failure.
6. Submit a certified inspection report of witnessed tests within 10 days of the inspection.
7. In accordance with AWWA C104, C111, C115, C151, C153.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect pipe and fittings to confirm no cracked, broken, or otherwise defective materials are used.

3.02 PREPARATION

A. Trench Grade:

1. Grade bottom of trench by hand to specified line and grade with proper allowance for pipe thickness and pipe base. Prepare trench bottom to form a continuous and uniform bearing and support for pipe between bell holes.
2. Before laying each section of pipe, check grade and correct irregularities found. Grade may be disturbed for removal of lifting tackle.

B. Bell (Joint) Holes: At each joint, dig bell holes of ample dimensions in bottom of trench, and at sides where necessary, to permit joint to be made properly and to permit easy visual inspection of entire joint.

3.03 INSTALLATION

A. General:

1. Provide and use proper implements, tools, and facilities for safe prosecution of the Work.
2. Lower pipe, fittings, and appurtenances into trench, piece by piece, with a crane, slings, or other suitable tools and equipment, taking care to prevent damage to pipe materials, protective coatings, and linings.
3. Do not drop or dump pipe materials into trench.

B. Cleaning Pipe and Fittings:

1. Remove lumps, blisters, and excess coal tar coating from bell and spigot ends of each pipe. Wire brush outside of spigot and inside of bell and wipe clean, dry, and free from oil and grease before pipe is laid.
2. Wipe ends of mechanical joint pipe and fittings and of rubber gasket joint pipe and fittings clean of dirt, grease, and foreign matter.

C. Laying Pipe:

1. Direction of Laying: Lay pipe with bell end facing in direction of laying. For lines on an appreciable slope, face bells upgrade at discretion of Owner or Owner's Representative .
2. Mechanical Joint, Push-On Joint, and Restrained Joint Pipe: After first length of pipe is installed in trench, secure pipe in place with approved backfill material tamped under and along sides to prevent movement. Keep ends clear of backfill. After each section is jointed, place backfill as specified to prevent movement.
3. Take precautions necessary to prevent floating of pipe prior to completion of backfill operation.
4. When using movable trench shield, prevent pipe joints from pulling apart when moving shield ahead.
5. Do not allow foreign material to enter pipe while it is being placed in trench.
6. Close and block open end of last laid section of pipe to prevent entry of foreign material or creep of gasketed joints when laying operations are not in progress, at close of day's work, and whenever workers are absent from Job.

D. Joining Push-On Joint Pipe and Mechanical Joint Fittings:

1. Join pipe with push-on joints and mechanical joint fittings in accordance with manufacturer's recommendations.
2. Provide special tools and devices, such as special jacks, chokers, and similar items required for installation.
3. Lubricate pipe gaskets using lubricant furnished by pipe manufacturer. No substitutes will be permitted.
4. Clean ends of fittings of dirt, mud, and foreign matter by washing with water and scrubbing with a wire brush, after which, slip gland and gasket on plain end of pipe. If necessary, lubricate end of pipe to facilitate sliding gasket in place, then guide fitting onto spigot of pipe previously laid.

E. Ball Joint Pipe:

1. Assemble and install in accordance with manufacturer's recommendations.
2. Hydrostatic Test:
   a. Conduct on ball joint pipe independent of other pipe systems/type being installed.
   b. Conduct test in accordance with requirements of these Specifications and manufacturer's recommendations.

F. Cutting Pipe:

1. General: Cut pipe for inserting valves, fittings, or closure pieces without damaging pipe or lining and leaving a smooth end, at right angles to axis of pipe.
2. Pipe: Cut pipe with milling type cutter or saw. Do not flame cut.
3. Dressing Cut Ends: Dress cut end of mechanical joint pipe to remove sharp edges or projections which may damage rubber gasket. Dress cut ends of push-on joint pipe by beveling, as recommended by manufacturer.

G. Field Welding:

1. Use of field welded outlets will not be allowed. Perform welding for outlets only in pipe manufacturer's shop.
2. Field installed outlets may be installed with saddle approved by Owner or Owner's Representative .
    a. Machine cut pipe opening, do not use a cutting torch.
3. Field welding of bars for restrained joint systems will not be allowed. Perform welding in pipe manufacturer's shop.

H. Line and Grade:

1. Minimum Pipe Cover: 3 feet, unless otherwise indicated.
2. No high points will be allowed between air valves.
3. Maintain pipe grade between invert elevations to provide minimum clearance at air valve locations of 4 feet from existing ground surface to top of pipe.
4. Install air valves as shown and field verify intervening low points. When field conditions warrant, exceptions may be made upon approval of Owner or Owner's Representative .
5. Deviations exceeding 6 inches from specified line or 1 inch from specified grade will not be allowed without express approval of Owner or Owner's Representative .
6. Reinstall pipeline sections that are not installed to elevations shown or otherwise approved by Owner or Owner's Representative to proper elevation.

I. Thrust Restraint:

1. Primary Method of Restraint: Restrained joint pipe. Thrust blocking shall be used where detailed on Drawings and as approved by Owner or Owner's Representative.

J. Backfill for Pipe Zone:

1. Place and compact pipe zone material as follows:
    a. After pipe bedding is in place, place imported granular material at approximately same rate on each side of pipe.
    b. Place such that backfill elevation is equal on each side of pipe.

c. Place to 6-inch depth.
d. Compact material to top of pipe zone in 6-inch lifts.

3.04 HYDROSTATIC TESTING

A. Pipeline Hydrostatic Test:

1. General:
   a. Notify Owner or Owner's Representative in writing 5 days in advance of testing. Perform testing in presence of Owner or Owner's Representative.
   b. Successful final hydrostatic test with water is required for newly installed pipelines prior to acceptance.
   c. Conform to MAG Uniform Specifications Section 611.2.

END OF SECTION

SECTION 33 05 01.09

POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
2. MAG Uniform Standard Details for Public Works Construction, 2026 Edition.
3. American Water Works Association (AWWA):
   a. C110, Ductile-Iron and Gray-Iron Fittings.
   b. C153, Ductile-Iron Compact Fittings, for Water Service.
   c. C605, Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
   d. C900, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inches Through 12 Inches (100 mm Through 300 mm), for Water Transmission and Distribution.
   e. C905, Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 Inches through 48 Inches (350 mm through 1,200 mm) for Water Transmission and Distribution.
   f. C907, Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 Inches through 12 Inches (100 mm Through 300 mm), for Water, Wastewater, and Reclaimed Water Service.
4. ASTM International (ASTM):
   a. D2241, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
   b. D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   c. D2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
   d. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
   e. D2672, Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement.
   f. D2855, Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

g. D3139, Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

5. NSF International (NSF).

1.02 SUBMITTALS

A. Action Submittals: Drawings showing pipe diameter, pipe class, dimension ratio (DR) and fitting details.

B. Informational Submittals:

1. Manufacturer's Certificate of Compliance, in accordance with MAG Standard Specifications Section 106: Control of Materials.
2. Hydrostatic Testing Plan: Submit at least 15 days prior to testing and at minimum, include the following:
   a. Testing dates.
   b. Piping systems and section(s) to be tested.
   c. Method of isolation.
   d. Method of conveying water from source to system being tested.
   e. Method of disposing of test water.
   f. Calculation of maximum allowable leakage for piping section(s) to be tested.
3. Certification of Calibration: Approved testing laboratory certificate if pressure gauge for hydrostatic test has been previously used. If pressure gauge is new, no certificate is required.
4. Test report documentation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipe:

1. PVC, conforming to requirements of AWWA C900.
2. Pipe pressure class as shown on Drawings.
3. Pipe to be used for potable water conveyance shall be manufactured from National Sanitation Foundation (NSF) approved compounds.

B. Joints:

1. Rubber gasketed.
2. Conform to AWWA C900.

C. Fittings: Ductile iron, conforming to AWWA C153 or AWWA C110.

D. Service Saddles:

1. Conform to Section 33 12 13: Water Service Connections.

E. Restrained Joints:

1. Fittings for pipe size 4” and greater shall use Megalug, or approved equal, mechanical joints or flange joints in combination, as shown on drawings by system designed specifically for use with PVC pipe using wedges. Do not use systems with set screws, gripper rings, or gripper gaskets.
2. Minimum Pressure Rating: 200 psi.

PART 3 EXECUTION

3.01 INSTALLATION

A. In accordance with MAG Standard Specifications Section 610, Water Line Construction.

B. In accordance with MAG Standard Detail 340.

C. In accordance with AWWA C605.

D. Joints:

1. Rubber Gasketed: In accordance with manufacturer’s written instructions.
2. Restrained Joint Systems: In accordance with manufacturer’s written instructions.

E. Maximum Joint Deflection: 2 degrees. No deflections shall be made at mechanical or flange joints.

3.02 HYDROSTATIC TESTING

A. Pipeline Hydrostatic Test:

1. General:
   a. Notify Owner or Owner’s Representative in writing **5** days in advance of testing. Perform testing in presence of Owner or Owner’s Representative.
   b. Successful final hydrostatic test with water is required for newly installed pipelines prior to acceptance.
   c. Conform to MAG Standard Specification Section 611.2.

END OF SECTION

SECTION 33 12 13

WATER SERVICE CONNECTIONS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
   2. American Association of State Highway and Transportation Officials (AASHTO).
   3. American Water Works Association (AWWA):
      a. C800, Underground Service Line Valves and Fittings.
      b. C906, Polyethylene (PE) Pressure Piping and Fittings, 4 in. through 65 in. for Waterworks.
      c. Manual M55, PE Pipe - Design and Installation.
   4. ASTM International (ASTM):
      a. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
      b. B32, Standard Specification for Solder Metal.
      c. B88, Standard Specification for Seamless Copper Water Tube.
      d. D3035, Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
      e. D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Material.
   5. NSF International (NSF):
      a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
      b. NSF/ANSI 372, Drinking Water System Components - Lead Content.

1.2 SUBMITTALS

A. Action Submittals:
   1. Shop Drawings:
      a. Product Data:
         1) Pipe material data.
         2) Materials of construction for corporation stops, curb stops, and meter stops.
         3) Fitting types.
      b. Details with dimensions and fabricating tolerances for component ends.

      c. Drawing showing how components of water service connection will fit together.

d. Operating pressure and allowable test pressure for components making up the service connection.
e. Allowable test pressure for connected components.
f. Proposed thrust restraint data for restraining joints including drawing details, materials, assembly ratings, and pipe attachment methods.
g. Factory test results of components.

B. Informational Submittals:
1. Manufacturer's Certificate of Compliance, in accordance with AWWA C800.
2. Manufacturer's Certificate of Compliance, in accordance with NSF/ANSI 61.
3. Statement of Qualifications:
a. Piping manufacturer.
b. Fitting and specials manufacturer.
4. Procedure for field testing water mains and service connections, including disinfection.

PART 2 PRODUCTS

2.1 GENERAL

A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.
1. Use or reuse of components and materials without a traceable certification is prohibited.

2.2 SERVICE CONNECTION

A. Furnish components same size as nominal designation of service pipe. For example, 3/4-inch connection consists of:
1. 3/4-inch corporation stop.
2. 3/4-inch curb stop.
3. 3/4-inch angle valve.
4. 3/4-inch meter coupling.
5. Refer to MAG Standard Details and coordinate product names and requirements with these Specifications.

2.3 SERVICE SADDLES

A. Provide in accordance with the following:

1. MAG Standard Specifications Section 631: Water Taps and Meter Service Connections.
2. Bronze service saddle with bronze full circle clamp for PVC pipe.
3. Minimum Pressure Rating: 200 psi.
4. Manufacturers:
    a. Smith-Blair.
    b. JCM Industries.
    c. Romac Industries.
    d. Or approved equal.

2.4 CORPORATION STOPS

A. Characteristics:
1. Accommodate piping being connected.
2. Meet criteria promulgated by Owner.
3. Service Size: As shown on Drawings..
4. Connecting Piping: As shown on Drawings.

B. Manufacturers and Products:
1. Ford Meter Box Company Model F800 or approved equal.

2.5 COUPLINGS

A. Characteristics:
1. Accommodate piping being connected.
2. For use in water service connections.
3. Same nominal size as service.
4. Meet criteria promulgated by the Owner.
5. Service Size: 1-inch.
6. Connecting Piping: HDPE.
7. Ford Meter Box Company Pack Joint, or approved equal.

2.6 FITTINGS

A. Characteristics:
1. Comply with NSF61.
2. Pressure rated for 200 psi minimum.
3. For use in water service connections.
4. Same nominal size as service.
5. Material: brass.

2.7 CURB STOPS

A. To be supplied with meter setting, Ford 70 Series Coppersetter.

B. Conform to MAG Standard Detail 390.

C. Characteristics:
   1. Same nominal size as service, see plans for service size.
   2. Material: Bronze.

2.8 METER BOXES, VAULTS, AND COVERS

A. Characteristics:
   1. Rectangular body.
   2. Polymer concrete lid, removable for meter reading.

B. Manufacturers and Products:
   1. Oldcastle Duralite Model 1118, 18” height, with Tier 22 polymer concrete lid, or approved equal.

2.9 METER SETTING

A. Characteristics:
   1. Size to match associated service.
   2. Connections to match adjacent piping.
   3. Meet criteria promulgated by governing agency.
   4. Rated for working pressure of adjacent piping.
   5. Service Size:
      a. Domestic service: 1-inch.
      b. Irrigation service: 2-inch.
   6. Connecting Piping: PE.
   7. Includes meter stop.

B. Manufacturers and Products:
   1. Ford 70 Series Coppersetter, or approved equal.

2.10 METERS

A. Characteristics:
   1. Size to match associated piping service and flow requirements.
   2. Magnetic drive, positive displacement.
   3. Connections to match adjacent piping.
   4. Frost protection bottom.
   5. Rated for working pressure of adjacent piping.
   6. Meters will be furnished as part of this Contract.
   7. Meter installation by Contractor’s forces.
   8. Meter Size:
      a. Domestic service: 5/8” X 3/4”.
      b. Irrigation service: 2”.

B. Manufacturers and Products:
   1. Zenner Water Meters; Model 17163 or approved equal.

C. Characteristics:
   1. Manufactured from ultra-high molecular weight, high-density polyethylene.
   2. Conforming to ASTM D3350, PE 355434C.
   3. Working Pressure 200 psi.
   4. Standard dimension ratio (SDR) of 11 or smaller.

PART 3 EXECUTION

3.1 GENERAL

A. Install service connections, excluding meters, during or after construction of the main.

B. Install water meters after entire water system is ready for operation.

C. Depth of cover over the pipe shall be minimum 18 inches.

D. Install service connection in accordance with Standard Details in Drawings.

3.2 TRENCH EXCAVATION AND BACKFILL

A. In accordance with Sections 31 23 16, Excavation and Section 31 23 23.15, Trench Backfill.

3.3 CONNECTION TO MAIN

A. Clean exterior of main of dirt and other foreign matter that may impair the quality of the completed connection.

B. Place service clamp (saddle) at desired location.

C. Clamp by tightening alternate nuts progressively.

D. Do not place service clamp within 1 foot of pipe joint, or another clamp.

E. Make taps with adapters for the size main being tapped.

3.4 UNDERCROSSING OF HARD SURFACE ROADS

A. Bore or jack undercrossings.

3.5 POLYETHYLENE PLASTIC PIPE FOR SERVICE LINES

A. Install in conformance with manufacturer's recommendations.

B. Pipe shall comply with the following:

1. Material: PE4710 high-density polyethylene meeting ASTM D3350, cell classification 445474C or better.
2. Standards: ASTM D3350, ASTM D3035, NSF/ANSI 61, NSF/ANSI 372.
3. Pressure Rating: Minimum 200 psi.
4. Joints: Use AWWA C800-compatible compression/service fittings; do not use thermal butt-fusion or electrofusion for 1-inch service lines.
5. Identification: Blue stripe or other potable-water marking per manufacturer's standard.
    a. Provide tracer wire and/or locating tape in accordance with Section 31 23 23.15, Trench Backfill.
    b. Handle and install to avoid kinks or gouges; replace any segment with gouges exceeding 10 percent of wall thickness. Allow slight snaking for thermal movement; avoid torsion during placement.

3.6 METER BOXES AND METERS

A. Installation:
1. Construct enclosures plumb and flush with existing ground surface unless shown otherwise.
2. Use standard extension sections to adjust to grade.
3. Place lightly compacted earth backfill inside meter box to depth shown.
4. Backfill around meter vaults as specified in Section 31 23 23.15, Trench Backfill.
5. Install meter in horizontal position with dial at required depth below cover.
6. Corporation Stops: OPEN position.
7. Angle Stops: CLOSED position.

3.7 TESTING

A. Test in accordance with Sections 33 05 01.02 and 33 05 01.09.

B. Service lines shall be tested as part of the mainline hydrostatic test.

3.8 DISINFECTION OF SERVICE CONNECTIONS

A. Make connection to the main, which has been pressure tested as specified in Section 33 05 01.09, Polyvinyl Chloride Pressure Pipe and Fittings, and disinfected as specified in Section 33 13 00, Disinfecting of Water Utility Distribution.

END OF SECTION

SECTION 33 12 16

WATER UTILITY DISTRIBUTION VALVES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
2. American Water Works Association (AWWA):
   a. C509, Resilient-Seated Gate Valves for Water Supply Service.
   b. C511, Reduced-Pressure Principle Backflow Prevention Assembly.
   c. C550, Protective Interior Coatings for Valves and Hydrants.
3. NSF International (NSF):
   a. NSF/ANSI 61, Drinking Water System Components—Health Effects.
   b. NSF/ANSI 372, Drinking Water System Components—Lead Content.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
   a. Product data sheets for each make and model. Indicate service where used.
   b. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
   c. Product data sheets for coating and lining products.
   d. Certification for compliance to NSF/ANSI 61 for valves used for drinking water service.

B. Informational Submittals:

1. Manufacturer’s Certificate of Compliance, in accordance with MAG Standard Specifications Section 106: Control of Materials.
   a. Resilient-seated gate valves, full compliance with AWWA C509.
   b. Reduced-wall, resilient-seated gate valves, full compliance with AWWA C515
2. Method for hydrostatic testing.
3. Tests and inspection results.

4. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.
5. Required clear distance for proper operation of butterfly valve disc.

PART 2 PRODUCTS

2.01 GENERAL

A. Conform to MAG Standard Specifications Section 630: Tapping Sleeves, Valves and Valve Boxes on Water Lines.

B. Valve same size as adjoining pipe, unless otherwise indicated.

C. Valve ends to suit adjacent piping.

D. Valves shall have no leakage (drip tight) in either direction at valve rated design pressure, unless otherwise allowed for in this section or in referenced valve standard.

E. Valve to open by turning counterclockwise, unless otherwise specified.

F. Valve materials in contact with or intended for drinking water service shall comply with requirements of NSF/ANSI 61 and other applicable federal, state, and local requirements.

G. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited.

2.02 GATE VALVES

A. General:

1. AWWA gate valves to be in compliance with referenced AWWA standard.
2. Provide 2-inch operating nut for buried valves.
3. Provide totally enclosed spur or bevel gear operator with indicator for AWWA gate valves 14 inches and larger.
4. Mark AWWA gate valves with manufacturer’s name or mark, year of valve casting, valve size, and working water pressure.
5. Repaired AWWA gate valves will not be allowed.

B. Resilient-Seated Ductile Iron Gate Valve 3 Inches to 36 Inches:

1. Ductile-iron body, resilient seat, bronze stem and stem nut, mechanical joint ends, nonrising stem, full port in accordance with AWWA C509.
2. Minimum Design Working Water Pressure: 200 psig.
3. Manufacturers:
   a. M&H Valve; AWWA C509.
   b. U.S. Pipe.

C. Factory Finishing:

1. Lining and Coating:
   a. Interior Lining:
      1) Manufacturer's standard.
      2) In accordance with AWWA C550.
      3) Formulated from materials deemed acceptable to NSF/ANSI 61.
   b. Exterior Coating:
      1) Fusion bonded epoxy coating.
      2) In accordance with AWWA C550.
      3) Dry Film Thickness: Minimum 10 mils.

2.03 PRESSURE REDUCING BACKFLOW PREVENTERS

A. General:

1. Pressure reducing backflow prevention assemblies shall comply with AWWA C511.
2. Assemblies shall include two resilient seated check valves with an independent relief valve between the check valves.
3. Assemblies shall include two resilient-seated isolation valves.
4. Assemblies shall include test cocks.
5. Rated Maximum Working Pressure: 175 psig.
6. Assemblies shall meet the requirements of the USC Foundation for Cross-Connection Control and Hydraulic Research.

B. Manufacturers:

1. Wilkins Model 975XLSE or approved equal.

C. Factory Finishing:

1. Interior and exterior coatings shall be in accordance with AWWA C550.
2. Coating materials shall be formulated from materials acceptable to NSF/ANSI 61.

PART 3 EXECUTION

3.01 INSTALLATION

A. Mount buried valves such that operating nut is accessible and operable from above.

B. Install in accordance with manufacturer’s written instructions.

C. Corp stop for service laterals shall be polyethylene wrapped and secured with 30 mil pipe wrap tape to prevent contact with native earth and bedding material.

3.02 DISINFECTION

A. Valves used for potable water service shall be disinfected in accordance with Section 33 13 00, Disinfecting of Water Utility Distribution.

3.03 FUNCTIONAL AND HYDROSTATIC TESTING

A. Functional Test:

1. Test that valves open and close smoothly under operating pressure conditions.
2. Test that two-way valves open and close smoothly under operating pressure conditions from both directions.
3. Count and record number of turns to open and close valve; account for discrepancies with manufacturer’s data.

B. Hydrostatic Testing:

1. Valve may be tested while testing pipeline or as a separate step after pipeline has been tested.
2. Apply test pressure to one side of valve and measure the pressure on the opposite side to determine if there is an increase in pressure caused by leakage. Then apply test pressure to the other side and measure the pressure on the opposite side.

END OF SECTION

SECTION 33 12 19

WATER UTILITY DISTRIBUTION FIRE HYDRANTS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
2. MAG Uniform Standard Details for Public Works Construction, 2026 Edition.
3. American Water Works Association (AWWA):
   a. C502, Dry-Barrel Fire Hydrants.
   b. C600, Installation of Ductile-Iron Mains and Their Appurtenances.
4. ASTM International (ASTM): C94, Standard Specification for Ready-Mixed Concrete.
5. FM Global Approved.
6. NSF International (NSF):
   a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
   b. NSF/ANSI 372, Drinking Water System Components - Lead Content.
7. Underwriters Laboratories, Inc. (UL): 246, Standard for Hydrants for Fire-Protection Service.

1.02 SUBMITTALS

A. Action Submittals: Catalog cuts of system components.

1. Include calculations for thrust blocks for high-pressure installations (if required).

B. Informational Submittal:

1. Certificate of Compliance: Upon completion of the system installation, verify all fire department hose connections, and check all fire safety devices to ensure their readiness for emergency connection and operation.

PART 2 PRODUCTS

2.01 GENERAL

A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited, excluding existing hydrant assemblies on site to be reused.

2.02 HYDRANTS

A. Hydrant:

1. Waterous Model WB67-250 per MAG Standard Specification Section 756.
2. Conform to MAG Standard Detail 360-1.

B. Main Valve:

1. Equip with O-ring seals.
2. Valve opens on counterclockwise rotation.

2.03 PRECAST CONCRETE PIER BLOCK

A. Nominal dimensions of 8-inch thickness by 16-inch square base.

B. Compressive Strength: 3,000 psi at 28 days.

2.04 GRAVEL FOR DRAINAGE

A. Washed 3/4-inch drainage gravel. Free of organic matter, sand, loam, clay, and other small particles that will restrict water flow through gravel.

2.05 FOUNDATION STABILIZATION MATERIAL

A. Furnish when existing trench material or imported pipe base material will not support soft or flooded spots in excavated trench.

B. Maximum 3-inch hard rock free from excessive clay material, but enough fines to bind larger fragments.

2.06 CONCRETE FOR THRUST BLOCKING

A. Ready-mix meeting ASTM C94, Alternative 2.

B. Compressive Strength: 2,500 psi at 28 days.

C. Aggregate Size: 1-1/2 inches.

D. Slump: 2 inches to 4 inches.

2.07 THRUST TIES

A. 3/4-inch-diameter steel rods.

B. Duc-Lugs Manufacturer: Romac.

PART 3 EXECUTION

3.01 GENERAL

A. Install hydrants in accordance with MAG Standard Specifications Section 756: Dry Barrel/Fire Hydrants.

B. Install hydrants in accordance with Section 3.7 and Section 3.8 of AWWA C600, unless specified otherwise.

3.02 EXCAVATION

A. Excavate to subgrade. Fill over excavated areas with foundation stabilization material. Tamp to provide firm foundation.

3.03 BASE BLOCK

A. Place on firm, level subgrade to ensure uniform support.

B. Conform to MAG Standard Detail 360-3.

3.04 INSTALLATION OF HYDRANTS

A. Locate hydrants to provide accessibility and to minimize potential damage from vehicles.

1. Relocate improperly set hydrants.
2. Set hydrants so safety flange is a minimum of 2 inches above finished ground or sidewalk level.

B. Place hydrant on base block carefully to prevent the base block from breaking.

C. Joints shall conform to Section 3.4 of AWWA C600 when cast or ductile iron pipe is used.

D. Maintain hydrant in a plumb position during subsequent Work.

3.05 GRAVEL FOR DRAINAGE

A. Place gravel around base block and hydrant bottom in accordance with MAG Standard Detail 360-1.

3.06 CONCRETE THRUST BLOCKING

A. Conform to MAG Standard Detail 380.

B. Place blocking after hydrant is set in final position and join to pipe.

C. Concrete thrust block shall have a minimum of 4 square feet of bearing area against undisturbed earth for a standard pressure installation.

1. Calculate required bearing area for high pressure installation.

3.07 THRUST TIES

A. Install thrust ties in lieu of concrete thrust blocking when ground surface behind hydrant is less than 2 feet above top of hydrant base.

1. Install two tie rods between main valve and hydrant, water main tee and main valve.

END OF SECTION

SECTION 33 13 00

DISINFECTION OF WATER UTILITY DISTRIBUTION FACILITIES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, 2026 Edition.
2. American Water Works Association (AWWA):
   a. B300, Hypochlorites.
   b. B301, Liquid Chlorine.
   c. C651, Disinfecting Water Mains.
   d. C652, Disinfection of Water Storage Facilities.
   e. C653, Disinfection of Water Treatment Plants.
   f. C655, Field Dechlorination.
3. Standard Methods for the Examination of Water and Wastewater, as published by American Public Health Association, American Water Works Association, and the Water Environment Federation.

1.02 SUBMITTALS

A. Informational Submittals:

1. Plan describing and illustrating conformance to appropriate AWWA standards and this specification.
2. Procedure and plan for cleaning system.
3. Procedures and plans for disinfection and testing.
4. Proposed locations within system where Samples will be taken.
5. Type of disinfecting solution and method of preparation.
6. Method of disposal for highly chlorinated disinfecting water.

1.03 QUALITY ASSURANCE

A. Independent Testing Agency: with 10 years' experience in field of water sampling and testing. Agency shall use calibrated testing instruments and equipment and documented standard procedures for performing specified testing.

1.04 SEQUENCING

A. Commence disinfection after completion of following:

1. Hydrostatic and pneumatic testing, pressure testing, functional and performance testing and acceptance of pipelines, pumping systems, structures, and equipment.

PART 2 PRODUCTS

2.01 WATER FOR DISINFECTION AND TESTING

A. Clean, uncontaminated, and potable.

2.02 DISINFECTANT

A. Provide disinfectant product conforming to AWWA standards and MAG Standard Specification 611.3.

PART 3 EXECUTION

3.01 GENERAL

A. Conform to AWWA C651 for pipes and pipelines and MAG Standard Specification 611.3, except as modified in these Specifications.

B. Contractor's Equipment:

1. Furnish chemicals and equipment, such as pumps and hoses, to accomplish disinfection.

C. Disinfect the following items installed or modified under this Project, intended to hold, transport, or otherwise contact potable water:

1. Pipelines: Disinfect new pipelines that connect to existing pipelines up to point of connection.
2. Disinfect surfaces of materials that will contact finished water, both during and following construction, using one of the methods described in AWWA C652 and AWWA C653. Disinfect prior to contact with finished water. Take care to avoid recontamination following disinfection.

D. Prior to application of disinfectants, clean pipelines of loose and suspended material.

E. Allow freshwater and disinfectant solution to flow into pipe or vessel at a measured rate so chlorine-water solution is at specified strength. Do not place concentrated liquid commercial disinfectant in pipeline or other facilities to be disinfected before it is filled with water.

3.02 TURBIDITY

A. Cleaning of equipment and facilities shall include removal of materials that result in a turbidity exceeding limits stated in Article Testing.

3.03 DISPOSAL OF CHLORINATED WATER

A. Do not allow flow into a waterway without neutralizing disinfectant residual.

B. Dechlorination Procedure: In accordance with AWWA C655, unless herein modified.

3.04 TESTING

A. Collection of Samples:

1. Coordinate activities to allow Samples to be taken in accordance with this specification.
2. Provide valves at sampling points.
3. Provide access to sampling points.

B. Chlorine Concentration Sampling and Analysis:

1. Collect and analyze Samples in accordance with AWWA 651 and MAG Standard Specification 611.3.
2. Collect Samples in accordance with applicable AWWA Standard.
3. Analyze Samples for coliform concentrations in accordance with latest edition of Standard Methods for the Examination of Water and Wastewater.
4. Obtain and analyze a minimum of two Samples on each of 2 consecutive days from each separable 1,000 feet of pipeline by standard procedures outlined by state and local regulatory agencies.

C. Turbidity Sampling and Analysis:

1. After facilities or piping have been cleaned, disinfected, and refilled with potable water, an independent laboratory will take water Samples and have them analyzed for conformance to turbidity limitations for public drinking water supplies. Turbidity shall not exceed 0.3 NTU.
2. If turbidity is in excess of the limit, dispose of the water in accordance with this Specification and applicable regulations, take action to remove source of turbidity, refill system, and retest.

D. If minimum Samples required above are bacterially positive, disinfecting procedures and bacteriological testing shall be repeated until bacterial limits are met.

END OF SECTION