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CITY OF CHANDLER, ARIZONA

WATER SYSTEM UPGRADES PROGRAM
CITY PROJECT NO.: WA2100.402

CONSTRUCTION SERVICES AGREEMENT

(CONSTRUCTION MANAGER AT RISK)

Jeremy Abbott

Jeremy Abbott, P.E.
CIP City Engineer

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CITY OF CHANDLER, ARIZONA

WATER SYSTEM UPGRADES PROGRAM
CITY PROJECT NO.: WA2100.402

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CONSTRUCTION MANAGER AT RISK
CONSTRUCTION SERVICES AGREEMENT
PROJECT NO.: WA2100.402

This Agreement (the "AGREEMENT") is made and entered into on the _____day of _____, 2025, ("Effective Date") by and between City of Chandler, an Arizona municipal corporation, hereinafter called "City" and Archer Western Construction, LLC the "Construction Manager at Risk" or "CM@Risk" designated below (City and CM@Risk may individually be referred to as "Party" and collectively referred to as "Parties").

City and CM@Risk agree as follows:

ARTICLE 1 - PARTICIPANTS AND PROJECT

CITY: **CIP City Engineer: Daniel Haskins, P.E.**
Public Works & Utilities Department
P.O. Box 4008, Mail Stop 407 Chandler, AZ 85244-4008
Phone: 480-782-3335 Email: Daniel.haskins@chandleraz.gov

CITY: **Construction Project Manager: Gina Ishida-Raybourn**
Public Works & Utilities Department
P.O. Box 4008, Mail Stop 407 Chandler, AZ 85244-4008
Phone: 480-782-3584 Email: Gina.Ishida-Raybourn@chandleraz.gov

CM@RISK:

Legal Company Name:	Archer Western Construction, LLC
Mailing Address:	4710 East Elwood Street Suite 6, Phoenix, AZ 85040
Physical Address:	4710 East Elwood Street Suite 6, Phoenix, AZ 85040
Arizona Roc No.:	275896 & 275897
Federal Tax Id No.:	27-0887868
State Where Organized:	Illinois
Business Organization:	LLC
Statutory Agent Name:	Corporation Service Company
Statutory Agent Mailing Address:	7955 S Priest Dr, Suite 102, Tempe, AZ 85284
Statutory Agent Physical Address:	7955 S Priest Dr, Suite 102, Tempe, AZ 85284

@Risk's Authorized Project Representative:

Name:	Daniel P Walsh
Title:	President
Phone:	312-563-5400
Email:	dpwalsh@walshgroup.com

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PROJECT DESCRIPTION:

Early-works excavation and installation of under slab piping for the post-filter granular activated carbon contactors, and early procurement package for long lead equipment.

PROJECT LOCATION:

Pecos Surface Water Treatment Plant, 1475 East Pecos Road, Chandler AZ 85244

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ARTICLE 2 - AGREEMENT DOCUMENTS

2.1 **AGREEMENT DOCUMENTS**

The Agreement between City and CM@Risk will consist of the following Agreement Documents:

1. This Construction Services Agreement and all of its Exhibits, including Project Plans and Technical Specifications.
2. General Conditions and General Conditions Appendices, incorporated by reference.
3. Project Specific Special Provisions as set forth in **Exhibit A**, incorporated by reference.
4. Accepted GMP/Price Proposal as set forth in **Exhibit D**, incorporated by reference.

2.2 In the event of any inconsistency, conflict, or ambiguity between or among the Agreement Documents, the Agreement Documents will take precedence as described in Section 14.1.4 of the General Conditions.

2.3 **DEFINITIONS**

The definitions in Sections 2 and 15 of the General Conditions apply to all the Agreement Documents, including this Agreement.

ARTICLE 3 - PRE-CONSTRUCTION SERVICES

Although CM@Risk has performed Pre-Construction Services pursuant to a separate Agreement between City and CM@Risk, the completion, quality and accuracy of those services and the deliverables provided by City thereunder directly impact CM@Risk's performance of its obligations under this Agreement. Therefore, all of CM@Risk's obligations, duties, and warranties in relation to Pre-Construction Services and deliverables survive completion of the Pre-Construction Services Agreement and are incorporated herein. Any breach of any of CM@Risk's duties, obligations, or warranties under the Pre-Construction Services Agreement will likewise be considered a breach of this Agreement.

ARTICLE 4 - CONSTRUCTION SERVICES

4.1 **GENERAL**

4.1.1 CM@Risk agrees at its own cost and expense, to do all work necessary and required to fully, timely and properly complete the construction of the Project in strict accordance with the Agreement Documents in a good and workmanlike manner, free and clear of all claims, liens, and charges whatsoever, in the manner and under the conditions specified, and within the schedule, stated in attached **Exhibit A**.

4.1.2 CM@Risk must provide all of the labor and materials, and perform the Work in accordance with Section 4 of the General Conditions. Some, but not all, of the major

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components of the Construction Services and the corresponding subsections of Section 4 of the General Conditions are set forth below.

4.1.3 This is an Agreement for complete construction services in accordance with the Construction Manager at Risk method of delivery of construction services. CM@RISK has participated in the design process and been an active member of the Project Design Team and is fully aware of any issues and constraints involved in this Construction Project.

4.1.4 CM@RISK is the CITY's fiduciary responsible for undertaking all necessary action contemplated under the Agreement documents to construct the Project and ensure timely and quality completion of the Project at a cost within the Guaranteed Maximum Price (GMP).

4.1.5 At all times relevant to this Agreement and performance of the Work, the CM@Risk must fully comply with all Laws, Regulations, or Legal Requirements applicable to City, the Project and the Agreement, including, without limitation, those set forth on attached **Exhibit A**.

4.1.6 CM@Risk must perform the Work under this Agreement using only those firms, team members and individuals designated by CM@Risk consistent with the Statement of Qualifications dated July 11, 2024, the GMP Proposal, or otherwise approved by City pursuant to the General Conditions. No other entities or individuals may be used without prior approval of the Project Manager

4.1.7 CM@Risk will comply with all terms and conditions of the General Conditions.

4.1.8 In the event of a conflict between this Agreement and the General Conditions or an exhibit hereto or appendix thereto, the terms of this Agreement will control.

4.1.9 Ownership of Work Product. Notwithstanding anything to the contrary in this Agreement, all Work Product prepared or otherwise created in connection with the performance of this Agreement, including the Work, are to be and remain the property of City. For purposes of this provision, "Work Product" will include all designs, drawings, plans, specifications, ideas, renderings and other information or matter, in whatever form created (e.g., electronic or printed) and in all media now known or hereinafter created. All Work Product will be considered Work Made for Hire as defined in the United States Copyright Act 17 U.S.C. § 101 (Copyright Act). If for any reason, any such Work is found not to be a Work Made for Hire, CM@Risk hereby transfers and assigns ownership of the copyright in such Work to City. The rights in this Section are exclusive to City in perpetuity.

4.2 CM@RISK'S PRE-AGREEMENT AND PRE-WORK DELIVERABLES

4.2.1 The CM@Risk must provide the Deliverables in accordance with Section 4.2 of the General Conditions.

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4.3 **PRE-CONSTRUCTION CONFERENCE**

Refer to Section 4.3 of the General Conditions.

4.4 **PERFORMANCE OF THE WORK (INCLUDING FIELD MEASUREMENTS, SUBCONTRACTORS, AND SUPPLIERS)**

Refer to Section 4.4 of the General Conditions.

4.5 **CONTROL OF THE PROJECT SITE**

Refer to Section 4.5 of the General Conditions.

4.6 **PROJECT SAFETY**

Refer to Section 4.6 of the General Conditions.

4.7 **MATERIALS QUALITY, SUBSTITUTIONS AND SHOP DRAWINGS**

Refer to Section 4.7 of the General Conditions.

4.8 **PROJECT RECORD DOCUMENTS**

Refer to Section 4.8 of the General Conditions.

4.9 **WARRANTY AND CORRECTION OF DEFECTIVE WORK**

Refer to Section 4.9 of the General Conditions.

ARTICLE 5 - CITY RESPONSIBILITIES

5.1 City will have the responsibilities, and provide the information specified in, and subject to the conditions set forth in, Section 5 of the General Conditions.

ARTICLE 6 - AGREEMENT TIME

6.1 **GENERAL**

6.1.1 The Agreement Duration is 658 Calendar Days.

6.1.2 The Agreement Time will start with the Notice to Proceed (NTP) and end with Final Acceptance, as set forth in Article 6.4 below. The Notice to Proceed cannot be issued until approval and acceptance by City of the GMP or Fixed Price.

6.1.3 The Agreement Time will be as set forth in the Project Schedule. CM@Risk agrees that it will commence performance of the Work and complete the Project through Final Acceptance within the Agreement Time.

6.1.4 Time is of the essence of this Agreement for the Project, and for each phase and designated Milestone thereof.

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6.2 PROJECT SCHEDULE

6.2.1 The Project Schedule approved as part of the GMP Proposal and incorporated herein as part of the attached **Exhibit D** must be updated and maintained throughout CM@Risk's performance under this Agreement in accordance with Section 6.2 of the General Conditions.

6.2.2 Failure on the part of CM@Risk to adhere to the approved Project Schedule will be deemed a material breach and sufficient grounds for termination of this Agreement by City.

6.3 SUBSTANTIAL COMPLETION

Substantial Completion must be achieved no later than the Substantial Completion Date set forth in the Project Schedule. Substantial Completion will be determined in accordance with Section 6.3 of the General Conditions.

6.4 FINAL ACCEPTANCE

6.4.1 Final Acceptance will be obtained within the time period set forth in the Project Schedule.

6.4.2 Final Acceptance will be issued pursuant to Section 6.5 of the General Conditions.

6.5 LIQUIDATED DAMAGES

6.5.1 Substantial Completion Liquidated Damages. CM@Risk acknowledges and agrees that if CM@Risk fails to obtain Substantial Completion of the Work within the Agreement Time, City will sustain extensive damages and serious loss as a result of such failure. The exact amount of such damages will be extremely difficult to ascertain. Therefore, City and CM@Risk agree that if CM@Risk fails to achieve Substantial Completion of the Work within the Agreement Time, City will be entitled to retain or recover from CM@Risk, as liquidated damages and not as a penalty, the sum per calendar day as indicated in MAG § 108.9.

6.5.2 Final Acceptance Liquidated Damages. For the same reasons set forth in Article 6.5.1 above, City and CM@Risk further agree that if CM@Risk fails to achieve Final Acceptance of the Work within the Agreement Time, City will be entitled to retain or recover from CM@Risk, as liquidated damages and not as a penalty, the sum per calendar day as indicated in MAG § 108.9 commencing from the actual date of Substantial Completion or Final Acceptance as required under the Agreement.

6.5.3 MAG Liquidated Damages. If no liquidated damages are specified in Articles 6.5.1 or 6.5.2 above, then the liquidated damages provisions in MAG § 108.9 will apply.

6.5.4 City may deduct liquidated damages described in this Article 6.5 from any unpaid amounts then or thereafter due CM@Risk under this Agreement. Any liquidated damages

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not so deducted from any unpaid amounts due CM@Risk will be payable to City at the demand of City, together with interest from the date of the demand at the highest lawful rate of interest payable by CM@Risk.

6.6 MUTUAL WAIVER OF CONSEQUENTIAL DAMAGES ONLY

6.6.1 CM@Risk and City waive claims against each other for consequential damages arising out of or relating to this Agreement. This mutual waiver includes:

6.6.1.1 Damages incurred by City for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

6.6.1.2 Damages incurred by CM@Risk for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

6.6.2 This mutual waiver is applicable, without limitation, to all consequential damages due to either Party's termination of this Agreement. Nothing contained in this Article 6.6 will be deemed to preclude an award of liquidated damages, when applicable, in accordance with Article 6.5 above.

6.6.3 Nothing herein will be deemed to constitute a waiver of any other remedy available to City in the event of CM@Risk's default under this Agreement prior to full performance of the Work including, as applicable, specific performance or completion of the Work on behalf of CM@Risk, the cost and expense of which will be offset against any monies then or thereafter due to CM@Risk (if any) and otherwise immediately reimbursed to City by CM@Risk.

ARTICLE 7 - AGREEMENT PRICE

7.1 AGREEMENT PRICE

7.1.1 In exchange for CM@Risk's full, timely, and acceptable performances and construction of the Work under this Agreement, and subject to all of the terms of this Agreement, City will pay CM@Risk the "Agreement Price," which:

The sum of the CM@Risk's Fee and reimbursable Cost of the Work, as defined in Section 15 of the General Conditions, which the CM@Risk guarantees will not exceed the GMP set forth in **Exhibit D** in the amount of $12,909,632.07. Costs which would cause the GMP to be exceeded must be paid by CM@Risk without reimbursement from City.

7.1.2 The Agreement Price is all-inclusive and specifically includes all fees, cost, insurance and bond premiums, allowances, construction contingency, owner's contingency, and taxes of any type necessary to fully, properly and timely perform and construct Work.

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7.2 **CHANGES TO AGREEMENT PRICE**

Shall be determined under Section 9 of the General Conditions.

ARTICLE 8 - FORCED LABOR OF ETHNIC UYGHURS PROHIBITED

8.1 **FORCED LABOR OF ETHNIC UYGHURS PROHIBITED.** By entering into this Agreement, Contractor certifies and agrees Contractor does not currently use and will not use for the term of this Agreement: (i) the forced labor of ethnic Uyghurs in the People's Republic of China; or (ii) any goods or services produced by the forced labor of ethnic Uyghurs in the People's Republic of China; or (iii) any contractors, subcontractors or suppliers that use the forced labor or any goods or services produced by the forced labor of ethnic Uyghurs in the People's Republic of China.

SIGNATURE PAGE TO FOLLOW

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IN WITNESS WHEREOF, the Parties hereto have executed this Agreement through their duly authorized representatives and bind their respective entitles as of the effective date.

"CITY" CITY OF CHANDLER

MAYOR

RECOMMENDED BY:

Jeremy Abbott October 2, 2025

Jeremy Abbott, P.E.
CIP City Engineer

APPROVED AS TO FORM:

City Attorney

ATTEST:

City Clerk Seal

"CM@Risk"
ARCHER WESTERN CONSTRUCTION, LLC

Daniel P Walsh October 2, 2025

Signature Date

Daniel P Walsh

Print Name

President

Title

dpwalsh@walshgroup.com

Signer Email Address

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EXHIBIT A

PROJECT SPECIFIC SPECIAL PROVISIONS

Cyber Technology Liability Insurance

Cyber Technology Liability Insurance is not required for GMP 2. However, this insurance shall be provided by CMAR for future change orders that have a cyber risk component.

EXHIBIT B

GENERAL CONDITIONS



GENERAL CONDITIONS

Approved date: July 20, 2022

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SECTION 1 - SCOPE OF THESE GENERAL CONDITIONS

These General Conditions encompass provisions that apply, and are incorporated into all construction Agreements entered into by the City of Chandler, unless otherwise specifically excluded in the executed Agreement.

SECTION 2 - GENERAL DEFINITIONS

Allowance: A specific amount for a specific item of Work, if any, that City agrees has not been sufficiently designed, detailed, or selected (including design changes from 90% to 100% as authorized by and at the discretion of the City) at the time the Agreement Price is agreed to for Contractor to provide a definitive price.

Alternate Systems Evaluations or Alternative Analysis: Alternatives for design, means and methods or other scope considerations that are evaluated using value analysis principles and have the potential to reduce construction costs while still delivering a quality and functional Project that meets City requirements.

Change Order: A written instrument issued after execution of the Agreement Documents signed by City and Contractor, stating their agreement upon all of the following: the addition, deletion or revision in the scope of services or deliverables; the amount of the adjustment to the Agreement Price, the extent of the adjustment to the Agreement Time, or modifications of other agreement terms. The Agreement Price and the Agreement Time may be changed only by Change Order.

Consultant: Person or firm that provides professional services.

City (Owner or OWNER): City of Chandler, a municipal corporation, with whom Contractor has entered into the Agreement and for whom the Work or Services are to be provided pursuant to the Agreement(s).

Contingent Bid Items: This is a minor bid item which is likely, but not certain, to occur during the course of work. If the Engineer determines that this work is required, the Contractor will accomplish the work and payment will be made based on the contingent unit bid price included in the proposal. Since the quantity listed in the proposal is primarily for bid comparison, the amount of work required by the Engineer may vary materially from this.

Agreement: The written agreement executed between City and Contractor, including all of the Agreement Documents.

Agreement Documents: The documents which together form the Agreement between City and Contractor, as identified in Article 2 of the Agreement, or are otherwise incorporated into the Agreement, including the Agreement, the exhibits thereto, these General Conditions, any Notice to Proceed, and any Job Order (if applicable), the Plans and Specifications, Project Schedule, written and properly executed Change Orders, MAG Specifications and City's amendments thereto, and any other documents so designated in the Agreement.

Agreement Price: The agreed-upon price to be paid to Contractor for full, timely, and acceptable completion of the Work or Services under the terms of the Agreement.

Agreement Time(s): The number of calendar days or the dates related to the applicable phase, Substantial Completion, or Final Acceptance as stated in Agreement Documents. Agreement Time starts

with the Notice to Proceed (NTP) and ends with Final Acceptance. The Agreement Time is set forth in the Agreement and is based upon the Project Schedule agreed to by City in writing.

Contractor: The person or business association with whom City has entered into an agreement for construction related Work or Services in relation to the Project at issue.

Contractor Payment Request: The form that is accepted by City and used by Contractor in requesting progress payments or final payment and which must include such supporting documentation as is required by the Agreement Documents or City.

Construction Budget: The City's budget for construction of the Project.

Construction Documents: The Plans, Specifications, and Drawings prepared and issued by the Design Professional and approved by City for construction, meaning the documents are sealed by the Design Professional (as required), acceptable for permitting and incorporated into the Agreement by this reference. All amendments and modifications to the Construction Documents must be approved in writing by City prior to incorporation into the Agreement.

Cost of the Work: The term Cost of the Work will mean costs necessarily incurred by Contractor in the proper performance of the Work. Such costs will be at rates not higher than the standard paid at the place of the Project except with prior consent of City.

Critical Path Method (CPM): A scheduling technique which identifies the logical sequence of the activities occurring in a Construction Project, the anticipated time required to complete each activity in the Project, and the activities that must be completed on schedule to finish the Project within the anticipated time. Typically, activities are arranged in a network that shows both activities and their dependencies. CPM is also used as a management technique which enables contracting parties to predict when activities may occur so that resources can be effectively used and limitations can be identified.

Critical Path: Critical Path is the sequence of project network activities which add up to the longest overall duration. Once established in the Project Schedule, the Critical Path for the Project must not be changed without prior written approval of City.

Day: Calendar day(s) unless otherwise specifically stated in the Agreement Documents.

Design Professional: The qualified, licensed person, firm or corporation who furnishes design and construction administration services required under the Agreement Documents. These services may include, but are not limited to: development of Construction Drawings and Documents, review of Contractor Submittal(s), review of and response to Requests for Information, approval and certification of progress payment applications, construction administration, and construction agreement close out.

Differing Site Conditions: Concealed or latent physical conditions or subsurface conditions at the Site that, (i) materially differ from the conditions indicated in the Agreement Documents, or (ii) are of an unusual nature, differing materially from the conditions ordinarily encountered and generally recognized as inherent in the Work at the general area of the Site. Caliche, rock, hard-digging or sandy/silty soil encountered on a project is not considered a "Differing Site Condition."

Drawings (Plans): Documents, which visually represent the scope, extent and character of the Work to be furnished and performed by Contractor during the construction phase and which have been prepared

or approved by the Design Professional and City. These documents include Drawings that have reached a sufficient state of completion and released by Design Professional solely for the purposes of review and use in performing constructability or bid-ability reviews by Contractor and in preparing cost estimates (e.g. Master Planning and Programming, Schematic Design, Design Development, and Construction Drawings), but *"not for construction*." Shop Drawings are not Drawings as so defined.

Final Acceptance: The City's acceptance of the facility or project from the Contractor after all Work is completed, tested, and inspected in accordance with the Agreement requirements. Final Acceptance results in a Letter of Acceptance (LOA).

Fixed Price: A fixed price or amount for an Agreement Price, Scope of Work, materials, or other item under an Agreement, Change Order, or other agreement, which City agrees, in writing, to pay instead of the actual cost.

Float: The number of Days by which an activity can be delayed without lengthening the Critical Path and extending the Agreement Time. Unless otherwise expressly agreed in writing, all Float belongs to City.

Laws, Regulations, or Legal Requirements: Any and all applicable laws, rules, regulations, ordinances, codes and orders applicable to the Project of any and all governmental bodies, agencies, authorities and courts having jurisdiction and any applicable provisions of the Development Agreement for the Project (if any), including, without limitation, those provisions relating to the design and construction of the Project.

Line Item: The individual elements of Work identified on a bid or other schedule and associated with a price or a unit price and quantity particular to that individual element of the Work. Also refers to individual items of work within the Schedule of Values.

Liquidated Damages: Designated damages for the City to collect as compensation upon a specific breach (example: late delivery).

Long-Lead Item: Long-lead item refers to the equipment, product, or system that is identified at the earliest stage of a project to have a delivery time long enough to affect directly the Critical Path/the overall lead time of the project.

MAG: The Maricopa Association of Governments.

MAG Specifications: The most current version of the Uniform Standard Specifications for Public Works Construction published by MAG.

MAG Standard Details: The most current version of the Uniform Standard Details as published by MAG.

Minor change: A change in the Work having no impact on cost or time or the City-approved design intent, as determined by City.

Notice to Proceed (NTP): A written notice given by City to Contractor fixing the date on which Contractor will start to perform Contractor's obligations under the Agreement.

Project: The Project specified in the Agreement (including a Job Order).

Project Manager: The Project Manager designated in Article 1 of the Agreement, or any successor thereto

designated by City. The Project Manager has the authority to act on behalf of City, as delineated and limited by the Agreement Documents and applicable law. And City will communicate with Contractor through the Project Manager. However, the Project Manager has no authority to bind City or City Council in contravention of any City code, State or Federal statute or regulation, or these General Conditions.

Project Schedule: The schedule for the completion of the Project agreed to and required by City.

Project Specific Conditions: Additional conditions which apply to the specific Project and Scope of Work which are set forth in Exhibit D of the Agreement.

Project Team: The Project Team consisting of the Design Professional, Contractor, Project Manager, and such others as City may designate.

Punch List: The list initially prepared by Contractor pursuant to the Agreement Documents, reviewed and supplemented by the Project Manager (and at the sole option of the Project Manager, the Design Professional) and approved by City containing items of incomplete work not impacting Substantial Completion, if allowed for under the Agreement, and to be completed or corrected by Contractor after Substantial Completion and before Final Acceptance in accordance with the Agreement Documents.

Quality Assurance (QA) Testing: Testing performed to verify the accuracy and applicability of the QC testing results and to ascertain that the materials installed meet the specified levels of quality in accordance with the Agreement Documents.

Quality Control (QC) Testing: Testing performed to assure that the materials installed comply with the requirements in the Agreement Documents.

Requests for Information (RFIs): Formal written request from Contractor to City or Design Professional for the Project seeking clarification or additional information needed for Contractor to properly complete the Work or Services under the Agreement. City may require RFI's to be submitted on a specific form or in a specified format.

Schedule of Values (SOV): The specified document prepared by Contractor, and approved and accepted by City, which divides the Agreement Price into pay items, such that the sum of all pay items equals the Agreement Price for the construction phase Work, or for any portion of the Work having a separate specified Agreement Price.

Scope of Work: The scope of work agreed to or required by City and incorporated into the Agreement as Exhibit A.

Shop Drawings: All drawings, diagrams, schedules and other data specifically prepared for the Work by Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

Site: The land or premises on which the Project is located.

Specifications: The part(s) of the Agreement Documents for the construction phase consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto. Where specified, the Project must be constructed using the current Uniform Standard Specifications and Details for Public Works

Construction as furnished by the Maricopa Association of Governments, as amended by City.

Subconsultant: A person, firm or corporation having an Agreement with Consultant/Contractor to furnish services required as its independent professional associate or consultant with respect to the Project.

Subcontractor: An individual or firm having a direct Agreement with Contractor or any other individual or firm having an Agreement with the aforesaid contractors at any tier, who undertakes to perform a part of pre-construction services or construction phase Work at the Site for which Contractor is responsible. Subcontractors must be selected through the Subcontractor selection process described in the Agreement Documents, if any.

Substantial Completion: The date when the City determines that the Work (or separable units of Phases as provided in the Agreement Documents) is essentially and satisfactorily complete in accordance with the Agreement Documents such that the Project is ready for use by the City for its intended purpose, opening to the general public, full occupancy or use by City (including, without limitation, all separate units, or rooms, facilities, access, income-generating areas, and all areas serving the general public, as applicable, must be ready for full operation without material inconvenience or discomfort), including, to the extent applicable to the Work, the following: all materials, equipment, systems, controls, features, facilities, accessories, and similar elements are installed in the proper manner and in operating condition, inspected, and approved; surfaces have been painted; masonry and concrete cleaned with any sealer or other finish applied; utilities and systems connected and functioning; site work complete; permanent heating, ventilation, air conditioning, vertical transportation, and other systems properly operating with proper controls; lighting and electrical systems installed, operable and controlled; paving completed, signage installed, and other work as applicable, has been performed to a similar state of essential and satisfactory completion.

Supplier: A manufacturer, fabricator, distributor, or vendor having a direct Agreement with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the construction phase Work by Contractor or any Subcontractor.

Total Float: Number of Days by which pre-construction services or construction phase Work or any part of the same may be delayed without necessarily extending a pertinent Agreement Time or schedule milestone in the Project Schedule.

Work: The entire completion of construction or the various separately identifiable parts thereof, required to be furnished during the construction phase. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials, resources and equipment into the construction, and performing or furnishing services and documents as required by the Agreement Documents for the construction phase.

Writing: Typing, printing, photography and other modes of representing or reproducing words in a visible form, including email, and expressions.

SECTION 3 - STANDARD SPECIFICATIONS AND DETAILS

3.1 City operates under the latest revision of the MAG Specifications and MAG Standard Details as amended by City. City's current amendment to the MAG Specifications, part of the City's Unified Development Manual, may be found and downloaded from City's website at http://www.chandleraz.gov.

3.2 Copies of the MAG Specifications and MAG Standard Details are available at the Maricopa Association of Governments office, 302 N. 1st Avenue, Suite 300, Phoenix, Arizona. They may also be downloaded from their website at: http://www.azmag.gov/Newsroom/Publications

3.3 The MAG Specifications and Standard Details and City's amendments thereto are incorporated into the Agreement by this reference.

SECTION 4 - CONTRACTOR'S RESPONSIBILITIES FOR CONSTRUCTION SERVICES

4.1 **GENERAL**

4.1.1 Contractor must construct the Work in accordance with the Agreement Documents and as outlined in Exhibit A of the Agreement to the satisfaction of City, exercising the degree of professional care, skill, diligence, quality and judgment that a professional construction manager engaged, experienced and specializing in the construction management of construction and facilities of similar scope, function, size, quality, complexity and detail in urban areas throughout the United States comparable to Chandler, Arizona would exercise at such time, under similar conditions. Contractor must, at all times, perform the Work in conformance with sound and generally accepted engineering principles and construction management and construction contracting practices.

4.1.2 If Contractor observes errors, discrepancies or omissions in the Agreement Documents, Contractor must promptly notify the Design Professional and City and request clarification. If Contractor, with the exercise of reasonable care, should have recognized such error, inconsistency, omission, or difference and fails to report it to City, and if Contractor proceeds with the Work affected by such observed errors, discrepancies or omissions, without receiving such clarifications, Contractor does so at its own risk and will be liable to City for damages resulting from proceeding without clarification.

4.1.3 Project Team and agents of each of them, testing agencies and governmental agencies with jurisdictional interests will be provided access to the Work at reasonable times for their observation, inspection, and testing. Contractor must provide proper and safe conditions for such access.

4.1.4 Contractor must comply with, and require all Subcontractors to comply with, the Arizona Contractors' license laws, including all requirements with respect to being duly registered and licensed.

4.1.5 Contractor must ensure that all employees performing any Work for which Contractor is responsible have a legal right to live and work in the United States. In addition, all compensation of any such employee must meet all applicable requirements of the Fair Labor Standards Act (FLSA) and Federal Minimum Wage laws.

4.1.6 Contractor must comply with the Immigration Reform and Control Act of 1986 (IRCA). Contractor understands and acknowledges the applicability of the IRCA activities. Contractor agrees to comply with the IRCA while performing their work and to permit City inspection of Contractor personnel records to verify such compliance.

4.1.7 Pursuant to MAG Specifications §§ 107.4, Contractor must report immediately any discovery of archeological ruins or artifacts. Excavation must stop immediately so that City can decide on the pertinent steps to follow such discovery.

4.1.8 All property owners that may be affected by the proposed construction activities must be notified of the scope, duration of the construction activities and possible interference with their day-to-day activities by Contractor prior to start of construction. In addition, individual residential or commercial interferences, such as driveway restrictions, water outages, and all other Work adjacent to residence/business, require 48-hour notification in advance of specific adjoining Work. Notification may be through door hangers or other procedures approved by the City.

4.1.9 Access must be maintained to adjacent properties at all times during construction. Where property has more than one point of access, no more than one access will be restricted or closed at any one time. Access to adjacent private driveways will be maintained during all non-working hours.

4.1.10 Contractor must furnish and erect construction signs in accordance with Project Specifications. The signs must be professionally prepared and subject to approval by City, must be maintained by Contractor for the duration of the project, and must be removed by Contractor during the final project clean up.

4.1.11 The number of signs required, the size, shape, installation requirements and information to be included for construction signs is established on the detail sheet, provided, however, signs must be a minimum of 4 foot by 8 foot and must be installed so that the bottom of the sign is at least 4 foot above grade. No direct payment will be made for furnishing and erecting construction signs. The cost thereof must be included in other items for which direct payment is made. Sign locations will be determined by City.

4.1.12 All required construction signs must be installed by Contractor within 7 Days of Notice to Proceed.

4.1.13 The Work to be accomplished under these Agreement Documents has been designed for City by a Design Professional retained by City for this purpose. It is understood that normal construction Administration for the purpose of interpretation of the Agreement Documents is provided by City. Should any services of the Design Professional be required to assist in the corrections of errors or omissions by Contractor, or services of the Design Professional be required because of changes in structure or equipment where Contractor has requested approval of substitute methods or material, or any other items detailed herein below, those services will be provided by the Design Professional at the standard hourly rates previously negotiated with City and must be paid for by the Contractor.

4.1.14 Contractor must reimburse City for costs incurred by the Design Professional for additional services to the Project through no fault of City or the Design Professional including, but not limited to, the following conditions:

a. Additional Site visits, investigations, inspections, design work or reports by the Design Professional which are required due to damages to existing facilities or completed Work caused by the Contractor in his performance, Contractor's negligence, or Contractor's Work which is rejected as defective or as failing to conform to the Agreement Documents;

b. Design Professional construction phase services rendered on the project during the time the project remains incomplete after the Agreement date of final completion will be charged to Contractor at a rate previously negotiated City; and

c. All retesting required due to the failure of Contractor's Work to meet the requirements of the Agreement Documents will be at Contractor's expense. All standby and travel time by the City's testing lab, the Design Professional or City due to Contractor's inability to be prepared for testing at the agreed upon time will be at the Contractor's expense.

4.1.15 City may withhold from any payment otherwise due to Contractor any amounts necessary to pay the Design Professional for such additional services as provided herein above.

4.1.16 Contractor will not be required to bear additional costs incurred by City due to errors by the Design Professional.

4.2 **CONTRACTOR'S PRE-AGREEMENT AND PRE-WORK DELIVERABLES**

4.2.1 Prior to award of the Agreement, Contractor must execute Agreement and deliver to City. Failure to do so may delay Agreement award. Contractor must also provide to City its Contractor's License classification and number and its Federal Tax I.D. number.

4.2.2 Before beginning any Work under the Agreement, Agreement must be fully executed by City.

4.2.3 After Agreement award, City will issue to Contractor an award letter. At that time Contractor must deliver to City such bonds and certificates of insurance with endorsements in such amounts (and other evidence of insurance requested by City) required under Section 11 of these General Conditions, and as the Agreement requires.

4.2.4 As evidence of Workmen's Compensation Insurance, Contractor must, upon request, provide a letter of certification from the Industrial Commission of Arizona that Contractor is insured by the State Compensation Fund or is an authorized self-insurer or a certificate of insurance issued by an insurance company authorized by the Insurance Department of Arizona to write Workmen's Compensation and Occupational Disease Insurance in the State of Arizona.

4.2.5 Within 10 Days of the date of the executed Agreement letter issued by City, Contractor must submit to City for review and acceptance the following items:

4.2.5.1 Comprehensive construction Project Schedule including a Critical Path Method (CPM) diagram schedule as described in Section 6.2. Project Schedule must be in Microsoft Project standard file format. Within 10 Days of receipt of City's comments, Contractor must make all required corrections, adjustments, and additions to complete the Project Schedule and resubmit to City for review.

4.2.5.2 Preliminary schedule of submittals and Shop Drawings. Within 10 Days of receipt of City's comments, Contractor must submit the corrected and completed schedule of Shop Drawings submissions for approval. Contractor's schedule of Shop Drawings and sample submittals will be acceptable to City if it provides a workable arrangement for reviewing and processing the required submittals.

4.2.5.3 Schedule of Values in a form specified by City reflecting the subcontracts and other categories that will be used to submit Pay Applications for the Work. The total amount of the Schedule of Values must not be greater than the Agreement Price. The Schedule of Values will be reviewed at the Pre-Construction Conference and revised by Contractor within 10 Days after Pre-Construction Conference in response to comments and questions from

City. Once accepted by City in writing, the Schedule of Values for the Project must not be changed without the prior written approval of City.

4.2.6 Video Recording Requirement. Prior to performing any Work, Contractor must document the existing conditions of the Site, all other areas where Work will occur and all adjacent areas that may be impacted by the Work via digital video format. Contractor must video record and index all areas, features, buildings and other public and private improvements that could potentially be impacted by the Work. Video recording must be coordinated with City. When video recording private property, Contractor must also coordinate the video recording with the private property owner, if possible. Contractor must provide City with a copy of said digital video format prior to performing any Work.

4.2.7 Aerial Drone Construction Photography.

4.2.7.1 If Agreement duration is greater than 90 calendar days, Contractor must engage a professional unmanned aerial vehicle (UAV) aerial pilot to photograph the Site prior to construction mobilization, at three-month intervals during construction, and following final inspection. Drone camera specifications must meet the following minimum requirements:

a. 1-inch CMOS
b. Pixels: 20M
c. FOV 84 8.8 mm/24 mm (35 mm format equivalent) f/2.8-f/11 auto focus at 1 m-
d. For photographing: 16.9 Aspect Ratio: 5472x3078
e. For video shooting: MP4/MOV/H.264
f. FHD: 1920x1080 120p @100Mbps
g. File format: High Definition (HD) JPEG for digital photos and HD MPEG 4 for digital video.
h. All metadata to be recorded including GPS data and preserved with photographs provided.

Interval	**JPEG**
3 month intervals	At an altitude (AGL) between 70-90 ft.
3 month intervals	Images to be taken every 50-100 ft. to be determined based on project scope.

4.2.7.2 Drone photos to be taken in sequential geographical order and then organized and provided in the same manner unless otherwise specified.

4.2.7.3 Photos to be provided digitally via an online file share service and/or by a USB drive to contractor.

4.2.7.4 Drone pilots to obey ALL local (city, county, state) UAV regulations as well as FAA UAV guidelines including, but not limited to, conducting all flights during daylight hours, not exceeding maximum altitude ceilings (depending on area), not flying over people, yielding to other aircraft.

4.2.7.5 Drone pilots must fly drone within visual line of sight (VSOL) and have visual spotter when needed. Drone pilots only to operate in favorable weather conditions when minimum visibility is 3 miles or greater.

4.2.7.6 Drone pilots to conduct a preflight checklist and visually inspect the entire flight path prior to flying to ensure a safe flight.

4.2.7.7 Airspace Authorizations. Operations in Class G airspace are allowed without air traffic control (ATC) permission. Operations in Class B, C, D and E airspace need ATC authorization. Drone pilots to schedule each flight in advance and based on airspace if required will notify nearby airports/control towers, etc.

4.2.8 Government Approvals and Permits.

4.2.8.1 Contractor must obtain all necessary permits for the Work and pay all applicable fees, unless otherwise noted on the Plans and in the Specifications. City permit fees will be paid internally by City. For bidding purposes, an allowance for all permit fees is included in the bid schedule under the item "allowance for permit fees." The Contractor will be paid for the actual cost of the permit fees upon submitting a receipt showing the fee Contractor has paid. Excluded from the above allowance are items such as all costs incurred by the Contractor in securing the permit except for the actual permit fee established by the agency, cost for all shutdowns or outages, cost for pole bracing, cost of permits for construction water, cost of construction water, cost for any additional insurance requirements, cost for any licenses, and other similar type costs. Contractor is specifically notified of the need to obtain the necessary environmental permits or file the necessary environmental and regulatory permit notices.

4.2.8.2 Copies of all permits and the associated notices must be provided to City prior to starting the permitted activity.

4.3 PRE-CONSTRUCTION CONFERENCE

4.3.1 Prior to the commencement of any Work, City will schedule a Pre-Construction Conference.

4.3.2 The purpose of this Conference is to establish a working relationship between Contractor, the utility firms, and various City agencies. The agenda will include critical elements of the Work schedule, submittal schedule, cost breakdown of major lump sum items, Payment Requests and processing, coordination with the involved utility firms, and emergency telephone numbers for all representatives involved in the course of construction.

4.3.3 Minimum attendance by Contractor at any mandatory meeting with City must be (1) Contractor's Representative, who is authorized to execute and sign documents on behalf of the firm, (2) Contractor's on-site Superintendent, and (3) Contractor's Safety Office, or other employee responsible for safety.

4.4 PERFORMANCE OF THE WORK (INCLUDING FIELD MEASUREMENTS, SUBCONTRACTORS, AND SUPPLIERS)

4.4.1 Unless otherwise provided in the Agreement Documents to be the responsibility of City or a separate Contractor, Contractor must provide through itself or Subcontractors the necessary supervision, labor, inspection, testing, start-up, material, equipment, machinery, temporary utilities and other temporary facilities to permit Contractor to complete the Work consistent with the Agreement Documents.

4.4.2 Contractor must perform all construction activities efficiently and with the requisite expertise, skill and competence to satisfy the requirements of the Agreement Documents. Contractor must at all times exercise complete and exclusive control over the means, methods, safety, sequences and techniques of construction.

4.4.3 Contractor's Superintendent must be present at the Site at all times that material Work

under this Agreement is taking place. Contractor's Superintendent or designee must be present at the Site at all times any other Work under this Agreement is taking place. Superintendent must not be replaced without written notice to City. Whenever the Superintendent is not present at a particular part of the Work where the City or Design Professional may desire to inform the Contractor relative to interpretation of the Drawings and Specifications or to disapproval or rejection of materials or Work performed, the City or Design Professional may provide such information in writing to the foreman or other worker in charge of the particular part of the Work in reference to which the information is given. Information so given will be as binding as if given to the Superintendent.

4.4.4 All elements of the Work must be under the direct supervision of a foreman or his designated representative on the Site who must have the authority to take actions required to properly carry out that particular element of the Work.

4.4.5 Working Hours. Except in connection with the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise indicated, all Work at the Site must be performed during regular working hours, and Contractor will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without City's written consent given after prior written notice to City. If it will become absolutely necessary to perform Work at night or on Saturdays, Sundays or legal holidays, the City must be informed at least 24 hours in advance of the beginning of performance of such Work. Only such Work will be done at night as can be done satisfactorily as determined by the City. Good lighting and all other necessary facilities for carrying out and inspecting the Work must be provided and maintained at all points where such Work is being done. Further, unless such non-normal work hours are performed at City's request or required by the Agreement Documents, Contractor must pay to City all additional costs incurred by City by reason of such non-normal working hours. Expenses incurred by City for overtime compensation must be reimbursed by Contractor as follows: (i) City staff at the rate set forth in current City Fee Schedule as published on City website, (ii) Design Professional and staff at the standard hourly rates previously negotiated with City, and (iii) all others at actual cost plus ten percent administrative overhead. Such costs may be deducted by City from any payments due to Contractor. Provided, however, if overtime work or work during other than normal hours is at the request of City and not due to Contractor delay, City will pay the cost of City overtime expenses.

4.4.6 Where the Agreement Documents require that a particular product be installed or applied by an applicator approved by the manufacturer, it is Contractor's responsibility to ensure the Subcontractor employed for such work is approved by the manufacturer. All materials and equipment must be stored, applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, supplier or distributor, except as otherwise provided in the Agreement Documents; but no provisions of any such instructions will be effective to impose on City of Design Professional responsibility for the means, methods, techniques, sequences or procedures of construction or for safety precautions incident thereto.

4.4.7 Before starting the Work, Contractor must carefully study and compare the various Plans, Drawings, other Agreement Documents, and Specifications relative to that portion of the Work, as well as the information furnished by City, must take field measurements of any existing conditions related to that portion of the Work and must observe any conditions at the Site affecting it. The exactness of grades, elevations, dimensions, or locations given on any Drawings, or the Work installed by other contractors, is not guaranteed by City.

4.4.8 Before ordering materials or doing Work, Contractor and each Subcontractor must verify measurements at the Site and will be responsible for the correctness of such measurements. No extra charge or compensation will be allowed because of differences between actual dimensions and the dimensions indicated on the Agreement Documents, including the Drawings.

4.4.9 Ground Level Construction Photography.

4.4.9.1 The Contractor must furnish progress photographs of the project. The photographer selected by the Contractor must be approved by the City and must be either a commercial photographer or an individual experienced and equipped for such photography.

4.4.9.2 The Contractor must deliver to City all photographs taken during that period with each application for payment. If the current photographs do not accompany the application, the application will not be reviewed and will be returned to the Contractor as incomplete.

4.4.9.3 Photographs must be identified by use of typewritten labels affixed to the back of the photograph. The label must provide a description of the view, the direction from which the photograph was taken, the name of the project, City's project number, the name of Contractor and the date of the photography. The stationing must also be included for all pipeline installations.

4.4.9.4 Photographs must be taken during the construction period and must be of aesthetic composition and depict the progress of the Work from the beginning of construction through and including the finished product. City may vary the specified frequency so that significant progress or changes can be recorded on the photographs.

4.4.10 Underground Facilities.

4.4.10.1 The existence and number of facilities as shown on the Plans are estimated from information furnished by the particular utility. Contractor is responsible for field verification and location of all utilities prior to the start of construction. No field work will be allowed to start until Contractor has contacted Arizona 811 and all affected utilities have been located. In addition, Contractor must expose and physically locate all potentially conflicting utilities prior to construction. The actual locations of the utilities must be compared to locations shown on the Plans and any required changes in alignment and grade must be made at the time of construction in consultation with Project Manager. It is generally recognized and Contractor should anticipate that information from Arizona 811 or information from utility companies during project design, frequently fails to disclose all underground facilities. The fact that more utility lines or other underground facilities are located in the Project Site than shown on the Project Plans does not constitute an "unforeseen Condition" and such undisclosed underground facilities do not differ materially from the conditions which Contractor should expect. The provisions of Sections 105.4, 105.6, 107.11 and 109.8.1 of the MAG Uniform Standard Specifications for Public Works Construction apply and are incorporated herein by this reference.

4.4.10.2 Contractor is responsible for all coordination with utility companies. The provisions of Sections 105.4, 105.6, 107.11 and 109.8.1 of the MAG Uniform Standard Specifications for Public Works Construction strictly apply and no additional compensation will be paid to Contractor for delays due to utility work on the project.

4.4.11 Relocation of Existing Water Meters. When a service line has been extended and a line

setter installed in a meter box, City forces will re-install meter. No compression fittings will be utilized.

4.4.12 Water Turn-On or Turn-Off.

4.4.12.1 Contractor must coordinate all water line turn-ons and turn-offs through the City. Application must be made to the Municipal Utility Division and Contractor must pay the established charges. The City will close existing valves, but will not guarantee a bone-dry Shutdown.

4.4.12.2 Contractor must notify all customers affected by the turn-off not less than 48 hours in advance. Notification must be in writing, must give the reason for the turn-off and must give the estimated time and duration that water service will be interrupted. Contractor is also notified that water turn-off will not be permitted on the Day before and after Thanksgiving Day and Christmas Day.

4.4.12.3 No direct payment will be made to Contractor for turn-ons or turn-offs. Costs associated therewith will be included in other items for which direct payment is made.

4.4.13 Tests and Inspections.

4.4.13.1 Contractor must give City timely (at a minimum, twenty-four hours) notice of readiness of the Work for all required inspections, tests or approvals. Contractor must give timely notice to City in advance of backfilling or otherwise covering any part of the Work so that city representative may, if desired, observe such part of the Work before it is concealed. Whenever Contractor varies the normal period during which Work or any portion of it is carried on each Day, Contractor must give timely notice to City so that city representative may, if desired, be present to observe the Work in progress. If Contractor fails to give such timely notice, any Work done in the absence of city representative will be subject to rejection. If Contractor gives such notice to City, but then is not ready for such inspections, tests, approvals or observations at the time so noticed, Contractor must reimburse City for all costs incurred by the attendance of city representatives.

4.4.13.2 If any law, ordinance, rule, regulation, code, or orders of any public body having jurisdiction requires any Work (or part thereof) to be inspected, tested or approved, Contractor (unless another party is specified in the Agreement Documents) must assume full responsibility therefor, pay all costs in connection therewith and furnish City the required certificates of inspection, testing, or approval. Contractor must also be responsible for and must pay all costs in connection with any inspection or testing required by the Specifications in connection with City's acceptance of a manufacturer, fabricator, supplier or distributor of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. The cost of all other inspections, tests and approvals required by the Agreement Documents will be paid by City (unless otherwise specified).

4.4.13.3 All inspections, tests or approvals other than those required by law, ordinance, rule, regulation, code or order of any public body having jurisdiction must be performed by organizations acceptable to City and by the Design Professional if so specified.

4.4.13.4 Neither observations by City, the Design Professional nor inspections, tests or approvals by others will relieve Contractor from their obligations to perform the Work in accordance with the Agreement Documents.

4.4.14 Uncovering Work. If any Work that is to be observed, inspected, tested or approved is covered without written concurrence of City, it must, if requested by City be uncovered for observation. Unless Contractor has given City timely notice of Contractor's intention to cover such Work and City has not acted with reasonable promptness in response to such notice, Contractor must furnish all necessary labor, material and bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate deductive Change Order will be issued.

4.4.15 In all cases of interconnection of its Work with existing or other Work, Contractor must verify at the Site all dimensions relating to such existing or other Work. Any errors due to Contractor's failure to so verify all such grades, elevations, locations or dimensions must be promptly rectified by Contractor without any increase in the Agreement Price. Any design errors or omissions noted by Contractor during this review must be reported promptly to City.

4.4.16 Contractor must establish and maintain all construction grades, lines, levels, and benchmarks, and will be responsible for accuracy and protection of same. This Work must be performed or supervised by a licensed civil engineer or surveyor in the State of Arizona.

4.4.17 Contractor must photograph all buried piping of greater than four (4) inches in diameter prior to backfill.

4.4.18 Contractor is responsible for the proper performance of the work of Subcontractors and any acts and omissions in connection with such performance. Nothing in the Agreement Documents is intended or deemed to create any legal or contractual relationship between City and any Subcontractor or Sub-Subcontractor, including but not limited to any third-party beneficiary rights.

4.4.19 Contractor must coordinate the activities of all Subcontractors. Contractor must coordinate performance of the Work with City's Public Works & Utilities Department and other departments or agencies within City. The Design Professional and other contractors or parties involved in the Project. If City performs other work on the Project or at the Site with separate contractors under City's control, Contractor agrees to cooperate and coordinate its activities with those of such separate contractors so that the Project can be completed in an orderly and coordinated manner without unreasonable disruption.

4.4.20 Contractor will not substitute or change any Subcontractor or Supplier without the prior written approval of City. Any substitute or replacement Subcontractor or Supplier must be required to meet the same qualifications and selection criteria and process as the original Subcontractor or Supplier. If a Subcontract/Supplier selection plan has been approved by City, Contractor will follow that plan unless otherwise approved by City in writing.

4.4.21 Contractor must not change or replace any members of its Project team, including Contractor's Representative, Project Manager, or Superintendent, without an explanation for the change being given to City, and receiving prior written approval of the change from City, which approval will not be unreasonably withheld.

4.4.22 Subcontractors whose scope of work has a value greater than 15% of the total Agreement Price are required to furnish performance and payment bonds to Contractor, unless

otherwise approved in writing by City.

4.4.23 Contractor must comply with MAG Specification § 108.2 (E) unless otherwise specified in Agreement Documents.

4.5 **CONTROL OF THE PROJECT SITE**

4.5.1 Throughout all phases of construction, including suspension of Work, Contractor must keep the Site reasonably free from debris, trash and construction wastes to permit Contractor to perform its construction services efficiently, safely and without interfering with the use of adjacent land areas. Prior to Final Acceptance of the Work, or a portion of the Work, Contractor must remove all debris, trash, construction wastes, materials, equipment, machinery and tools arising from the Work or applicable portions thereof to permit City to occupy the Project or a portion of the Project for its intended use.

4.5.2 Contractor must take whatever steps, procedures or means necessary to prevent dust nuisance due to construction operations. The dust control measures must be maintained at all times to the satisfaction of City and in accordance with the requirements of the Maricopa County Bureau of Air Pollution Control Rules and Regulations.

4.5.3 Contractor must maintain Americans with Disabilities Act (ADA) and American National Standards Institute (ANSI) accessibility requirements during construction activities, including without limitation compliance with the 2010 regulations governing implementation of the ADA to the extent applicable. ADA and ANSI accessibility requirements must include, but not be limited to, parking, building access, areas of refuge, and emergency exit paths of travel. Contractor is responsible for the coordination of all Work to minimize disruption to residents and the public.

4.5.4 Only materials and equipment used directly in the Work will be brought to and stored on the Site by Contractor. When equipment is no longer required for Work, it must be removed promptly from the Site. Protection of construction materials and equipment stored at the Site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor.

4.5.5 Contractor agrees all persons working on the Site must act at all times in the best interest of the Project and will comply with all applicable rules and regulations reasonably set forth by City related to the Site. Notwithstanding the foregoing or anything in this Agreement to the contrary, City may remove from the Site any individual who City deems in their reasonable discretion to be creating a disturbance or causing any problem on the Site.

4.5.6 Contractor will be responsible to City for the acts and omissions of Contractor's employees, Subcontractors and their agents and employees, and any other person performing any of the Work under an Agreement with Contractor, or claiming by, through or under Contractor, for all damages, losses, costs and expenses resulting from such acts or omissions.

4.5.7 City may conduct criminal, drive history, and all other requested background checks of Contractor and Subcontractor personnel performing Work or who have access to City's information, data, or facilities in accordance with City's current background check policies, or the provisions of the Project Specific Conditions. Any officer, employee or agent that fails to background check must be replaced immediately.

4.5.8 City will have a final authority, based upon security reasons: (i) to determine when

security clearance of Contractor's and Subcontractor's personnel is required; (ii) to determine the nature of the security clearance, up to and including fingerprinting personnel; and (iii) to determine whether or not any individual or entity may provide Services or perform Work under the Agreement.

4.5.9 If City objects to any personnel for any reasonable cause, then Contractor must, upon notice from City, remove such individual from the Project.

4.6 **PROJECT SAFETY**

4.6.1 The Project and all Work performed in relation thereto is governed by applicable provisions of the federal laws, including but not limited to, the latest amendments of the following:

a. Williams-Steiger Occupational Safety & Health Act of 1970, Public Law, 91-596.

b. Part 1910 and Part 1926 – Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.

c. Part 1518 – Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

4.6.2 Contractor is responsible for safety of the job Site for employees of Contractor as well as for members of the general public and others who may drive or walk through or be at the Site.

4.6.3 Contractor recognizes the importance of performing the Work in a safe manner so as to prevent damage, injury or loss to: (i) all individuals at the Site, whether working or visiting; (ii) the Work, including materials and equipment incorporated into the Work and stored On-Site or Off-Site; and (iii) all other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction; and (iv) the owners or tenants of adjacent property and their patrons, employees and invitees.

4.6.4 Contractor assumes responsibility for implementing and monitoring all safety precautions and programs related to the performance of the Work.

4.6.5 Contractor must provide a "competent person' as required by O.S.H.A regulations. The "competent person" must be identified at the Pre-Construction Conference with City advised in writing of any changes.

4.6.6 The "competent person" must make routine daily inspections of the Site and must hold weekly safety meetings with Contractor's personnel, Subcontractors and others as applicable.

4.6.7 Contractor and Subcontractors must comply with all legal and regulatory requirements relating to safety, as well as any City specific safety requirements set forth in the Agreement Documents, provided that such City-specific requirements do not violate any applicable legal and regulatory requirements.

4.6.8 Contractor will immediately report in writing any safety-related injury, loss, damage or accident arising from the Work to Project Manager and, to the extent mandated by Legal Requirements, to all government or quasi-government authorities having jurisdiction over safety-related matters involving the Project or the Work.

4.6.9 Contractor's responsibility for safety under this Section is not intended in any way to relieve Subcontractors and Sub-Subcontractors of their own contractual and legal obligations and responsibility for (i) complying with all Legal Requirements, including those related to health and safety matters, and (ii) taking all necessary measures to implement and monitor all safety precautions and programs to guard against injury, losses, damages or accidents resulting from their performance of the Work.

4.6.10 As between City and Contractor, Contractor is responsible to City for any and all the safety issues relating to the Work on the Project. Contractor must administer and manage the safety program. This will include, but not necessarily be limited to review of the safety programs of each Subcontractor. Contractor must monitor the establishment and execution of compliance with all applicable regulatory and advisory agency construction safety standards. Contractor's responsibility for review, monitoring, and coordination of the Subcontractor's safety programs will not extend to direct control over execution of the Subcontractors' safety programs. Notwithstanding Contractor's safety obligations to City, it is agreed and understood that each individual Subcontractor will remain controlling employer responsible for the safety programs and precautions applicable to its own work and the activities of other's work in areas designated to be controlled by such Subcontractor for purposes of workers compensation insurance coverage.

4.6.11 Nothing in this agreement will relieve Contractor of his responsibility to maintain traffic, structures, etc., as noted on the Plans, Specifications, and Project Specific Conditions. Contractor is responsible to provide all necessary shoring, bracing and trench support as is necessary to maintain traffic structures, etc., as stipulated in the Plans, Specifications, and Special Provisions. If the stability of adjoining building, walls, roadways, etc., is endangered by Contractor's excavation, shoring, bracing, or under pinning must be provided as necessary to ensure project safety. Cost for shoring, bracing, underpinnings, and trench support will be included in the appropriate items listed in the Agreement Price, and no additional payment will be made for this work.

4.7 MATERIALS QUALITY, SUBSTITUTIONS, AND SHOP DRAWINGS

4.7.1 Quality Control and Quality Assurance Testing.

4.7.1.1 All construction materials to be used or incorporated in the Project are subject to inspection, Quality Control & Quality Assurance Testing, and approval or rejection by City. Any material rejected by City must be removed immediately and replaced in an acceptable manner to City at no additional cost to City. When QC/QA tests indicate noncompliance with the Agreement Documents, retesting must be performed by the same testing laboratory that performed the tests that indicated noncompliance.

4.7.1.2 The Contractor must establish, provide, and maintain an effective Quality Control Testing Program (QCTP). The Contractor must develop his own program or procure the services of a consultant. In either case, the party performing the tests must be currently certified by the National Bureau of Standards in the National Voluntary Laboratory Accreditation Program (NVLAP) for construction services or the AASHTO Accreditation Plan (AAP) for Soils, Asphalt and Concrete. The Contractor must provide all support necessary to perform QC and QA testing and sampling (i.e. shoring for testing trench backfill, backhoes, motor graders, loaders, etc. to facilitate testing and sampling). The City will perform the QA testing.

4.7.1.3 The Contractor must submit a written QCTP to the City as a required submittal. The Contractor must not begin Work until the Quality Control Program has been reviewed and

accepted by the City. Resumes of all personnel that will be associated directly or indirectly with the QCTP must be included.

4.7.1.4 The QCTP must include, but not be limited to, on-site/field and laboratory testing of all material delivered to the Site and any existing materials or conditions pertinent to the project.

4.7.1.5 All testing must be under the direction of a Professional Engineer registered in the State of Arizona, knowledgeable in Materials Testing. All "Test Report" forms must be stamped by said Engineer.

4.7.1.6 The written QCTP will set forth the responsibilities of the engineer, project manager, supervisory personnel and each technician assigned to this project. Substitutions or replacement of personnel must require prior written approval by the City. All personnel must be proficient within their assigned duties and possess certification(s) commensurate with their position and responsibilities. The minimum certification(s) for each technician must be NICET Level II, Arizona Technical Testing Institute, American Concrete Institute, or other nationally recognized program applicable to the project and approved by the City of Chandler. The written QCTP must include a description of the required field and construction materials laboratory tests, including required frequencies that meet the minimums established herein.

4.7.1.7 The Contractor must establish a system to record and report all material test results. The daily test reports must include, but not be limited to:

a. Test designation;
b. Date of test;
c. Name of tester;
d. Location of test/sample (station and offset);
e. Product suppliers and product codes (as applicable);
f. Depth/elevation of test/sample;
g. Test result;
h. Control requirement(s);
i. Cause of rejection (if applicable);
j. Results of retests (if applicable); and
k. Remedial action (if applicable).

4.7.1.8 The Contractor must submit test results to the designated City representative.

4.7.1.9 The Contractor must also submit a weekly report to the City summarizing the testing and construction activities completed by emailing the report to the email addresses noted above. All weekly reports must be submitted simultaneously to the Contractor and the City of Chandler. The report must include individual summary sheets for each utility line, structure, and portion of the pavement section. Cores must be numbered sequentially throughout the Project. Re-cores must reference the original core by number and must contain the averaged values for thickness and density. Total pavement thickness must be reported**.** Vertical location of tests for underground utilities must indicate the depth of the

excavation at the location of the test (i.e., cut to flow line [if applicable], depth to bottom or top of pipe, etc.). Density tests must be numbered sequentially. If the minimum number of tests has not been performed per the written QCTP, this must be stated in the weekly summary report with an explanation of the circumstances.

4.7.1.10 The City will maintain a copy of the Project test results and weekly reports in the Project file. In cases where quality control activities do not comply with the Agreement provisions, the City may:

a. Order the Contractor to replace ineffective or unqualified quality control personnel.

b. Order the Contractor to stop operations until appropriate corrective action is taken.

4.7.1.11 Although minimum testing requirements are specified herein, the Contractor bears full responsibility for the quality of the materials and their installation and may elect to perform additional testing beyond the requirements set forth herein to ensure compliance.

4.7.1.12 The Quality Control requirements contained in this Section are in addition to and separate from Quality Assurance Testing, which will be performed by the City of Chandler or its representative. If the Quality Assurance test results are not in agreement with the Quality Control test results, the Contractor will have the option to retain a third party consultant for referee tests. The third party consultant must meet the same requirements as the consultant performing the Quality Control Testing. The results of the third party will be binding. All cost incurred by the referee testing will be the Contractor's expense. If the Contractor elects not to retain a third party for referee testing, the City of Chandler test results will prevail.

4.7.1.13 Except as otherwise noted within this Section, Work or materials required by this Section are non- pay items. Per MAG Section 101, a non-pay item is an item of Work for which no separate payment will be made, the cost of which is to be included as an incidental cost for associated item(s) included on the Bid Schedule or Schedule of Values.

4.7.2 Trade Names and Substitutions.

4.7.2.1 Substitutions prior to bid will only be considered if in compliance with Arizona Revised Statute § 34-104.

4.7.2.2 Contractor, if requested by City, must submit Samples or any additional information that may be necessary to evaluate the acceptability of the substitution.

4.7.2.3 City will make the final decision and will notify Contractor in writing as to whether the substitution has been accepted or rejected.

4.7.2.4 If City does not respond within 15 working days, Contractor must continue to perform the Work in accordance with the Agreement Documents and the substitution will be considered rejected.

4.7.3 Shop Drawings.

4.7.3.1 Contractor must prepare and submit Shop Drawings which show details of all Work to insure proper installation of the Work using those materials and equipment specified under the approved Plans and Specifications.

4.7.3.2 Contractor must submit a schedule of Shop Drawing submissions, which avoids bulk submissions to the extent reasonably possible, with the Project Schedule for City approval. The schedule of Shop Drawing submissions must include all of the items for which Shop Drawings are required by the Agreement Documents, including the Specifications. Unless otherwise noted, Shop Drawings will not be required for items specified or detailed in the Uniform Standard Specifications and Details or the Technical Specifications.

4.7.3.3 Shop Drawings must be numbered consecutively for each Specification section and must accurately and distinctly present the following:

a. All working and erection dimensions.

b. Arrangements and sectional views.

c. Necessary details, including complete information for making connections between work under this Agreement and work under other Agreements.

d. Kinds of materials and finishes.

e. Parts list and description thereof.

4.7.3.4 Each Drawing or page must include:

a. Project Name, City of Chandler Project Number and descriptions.

b. Submittal date and space for revision dates.

c. Identification of equipment, product or material.

d. Name of Contractor and Subcontractor.

e. Name of Supplier and Manufacturer.

f. Relation to adjacent structure of material.

g. Physical dimensions clearly identified.

h. ASTM and Federal Specifications references.

i. Identification of and justification for deviations from the Agreement Documents.

j. Contractor's stamp, initialed or signed, dated and certifying the review of submittal, certification of field measurements and compliance with Agreement.

k. Location at which the equipment or materials are to be installed.

4.7.3.5 Location will mean both physical location and location relative to other connected or attached material. City will return unchecked any submittal, which does not contain complete data on the Work and full information on related matters.

4.7.3.6 Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.

4.7.3.7 Contractor must schedule, prepare and submit all Shop Drawings in accordance with a time-table that will allow its suppliers and manufacturers sufficient time to fabricate, manufacture, inspect, test and deliver their respective products to the project Site in a timely manner so as to not delay the complete performance of the Work.

4.7.3.8 If the Shop Drawings show departures from the Agreement requirements, Contractor must make specific mention thereof in the Letter of Transmittal; otherwise review of such submittals by City will not constitute review of the departure. Review of the Drawings will constitute review of the specific subject matter for which the Drawings were submitted and not of any other structure, material, equipment, or apparatus shown on the Drawings.

4.7.3.9 The review of Shop Drawings will be general and will not relieve Contractor of responsibility for the accuracy of such Drawings, nor for the proper fitting and construction of the Work, nor for the furnishing of materials or Work required by the Agreement. No construction called for by Shop Drawings will be initiated until such Drawings have been reviewed and approved by City.

4.7.3.10 The procedure in seeking review of the Shop Drawings will be as follows:

a. Contractor must submit complete sets of Shop Drawings and other descriptive data as specified in this Section.

b. After Contractor's submittal or resubmittal of Shop Drawings, if Contractor has submitted Shop Drawings in accordance with the City-approved submittal schedule, or upon resubmission, City will be provided with three (3) calendar weeks for review. Should City require additional review time above and beyond the three (3) calendar weeks, Contractor may ask for a time extension or monetary compensation, if they can present valid, factual evidence that actual damages were incurred by Contractor. City will determine the amount of the time extension or the monetary compensation to be awarded Contractor, if any, in accordance with City's Policy Statement for Calculating Delays and Damages, Appendix 1.

4.7.3.11 Contractor will be responsible for all extra costs incurred by City caused by Contractor's failure to comply with the procedure outline above.

4.7.4 Long Lead Time Items. Contractor must submit Shop Drawings, as required by the Engineer, on all long lead items to be furnished and installed as part of the project within 10 Days after the date of the executed Agreement letter issued by City. In addition, Contractor must order all long lead items to be furnished and installed as part of this Project within 3 Days after receiving approved Shop Drawings. For all long lead times for which Shop Drawings are not required, Contractor must order said long lead items within 15 Days after the date of the executed Agreement letter issued by City. Within 2 Days after ordering long lead items, Contractor must supply copies of all purchase orders, along with an accurate delivery schedule from the supplier.

4.7.5 Construction Water. If Contractor uses water from City's water system for construction water, Contractor must obtain a fire hydrant meter from City of Chandler Utility Services (480-782-2280) and all construction water must be obtained through the hydrant meter. Contractor must pay all fees related to the hydrant meter and all water bills for construction water. All cost for meters and construction water will be included in the Agreement Price.

4.8 PROJECT RECORD DOCUMENTS

4.8.1 During the construction period, Contractor must maintain at the jobsite a full-size set of prints of the Construction Document Drawings and Shop Drawings for Project Record Document purposes.

4.8.2 Contractor must mark these Drawings to indicate the actual installation where the installation varies from the original Construction Documents. Contractor must give particular attention to information on elements that will be concealed, which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:

a. Dimensional changes to the Drawings.

b. Revisions to details shown on Drawings.

c. Locations and depths of underground utilities.

d. Revisions to routing of piping and conduits.

e. Actual equipment locations.

f. Changes made by Change Order or Addendum.

g. Details not on original Agreement Drawings.

4.8.3 Contractor must mark completely and accurately Project Record Drawing sets of Construction Documents.

4.8.4 Contractor must mark Project Record Drawings sets with red erasable colored pencil.

4.8.5 Contractor must note Request for Information (RFI) Numbers and Change Order numbers, etc., as required to identify the source of the change to the Construction Documents.

4.8.6 Contractor must submit Project Record Drawing sets and Shop Drawings to City or its representative for review and comment.

4.8.7 Upon receipt of the reviewed Project Record Drawings from City, Contractor must correct any deficiencies and omissions to the Drawings and submit the final original of the Project Record Drawings to City prior to Final Payment.

4.8.8 Project Manager will review the Project Record Drawings monthly prior to the date established for the Payment Request and will be the sole judge of acceptance of these Drawings.

4.9 WARRANTY AND CORRECTION OF DEFECTIVE WORK

4.9.1 Contractor warrants to City that the construction, including all materials and equipment furnished as part of the Work, will be new unless otherwise specified in the Agreement Documents, of good quality, and free of defects in materials and workmanship. Contractor's warranty obligation excludes defects caused by abuse, alterations, or unreasonable failure to maintain the construction by persons other than Contractor, subcontractors, or others under Contractor's control. Nothing in this warranty will limit any manufacturer's warranty which provides City with greater warranty rights than set forth herein or in the Agreement. Contractor will provide City with all manufacturers' warranties and operation and maintenance manuals upon substantial completion of the Work. Contractor's warranty must be for one (1) year, in accordance with MAG Specification § 108.8, and will commence for all portions of the Work upon Final Acceptance of the entire Work as determined by City under the Agreement. All statutory or other warranties, express or implied, related to latent defects will remain in force and are not limited by this provision.

4.9.2 City May Stop the Work. If the Work is defective, or Contractor fails to supply sufficient skilled workmen or suitable materials or equipment, City may order Contractor to stop the

Work without cost to City, or any portion thereof, until the cause for such order has been eliminated; however, this right of City to stop the Work will not give rise to any duty on the part of City to exercise this right for the benefit of Contractor or any other party.

4.9.3 Correction or Removal of Defective Work.

4.9.3.1 If required by City, Contractor must promptly, without cost to City and as specified by City, either correct any defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by City, remove it from the Site and replace it with non-defective Work. Contractor must correct any Work which may be displaced in correcting, removing or replacing defective Work. No compensation will be allowed Contractor for such removal, replacement or remedial Work. Contractor must reimburse City for costs incurred by City due to such correction or removal including but not limited to additional expenses for inspection, testing or observation and for repeated reviews by the City or Design Professional.

4.9.3.2 Upon failure on the part of the Contractor to comply within a reasonably prompt time with any written order of City to correct or remove defective Work, City has authority to cause nonconforming materials or rejected Work to be remedied, removed, or replaced at the Contractor's expense and to deduct the costs from any moneys due or to become due the Contractor.

4.9.4 City May Correct Defective Work. If Contractor fails within a reasonable time after written notice of City to proceed to correct defective Work or to remove and replace rejected Work as required by City or if Contractor fails to perform the Work in accordance with the Agreement Documents (including any requirements of the progress schedule), City may, after 7 Days' written notice to Contractor, correct and remedy any such deficiency. To the extent necessary to complete corrective and remedial action, City may exclude Contractor from all or part of the Work, and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site and incorporate in the Work all materials and equipment stored at the Site or for which City has paid Contractor, but which are stored elsewhere. Contractor must allow City, city representatives, agents and employees such access to the Site as may be necessary to enable City to exercise City’s rights under this Section. All direct and indirect costs of City in exercising such rights will be charged against Contractor in an amount verified by City representative, and a Change Order will be issued incorporating the necessary revisions in the Agreement Documents and a reduction in the Agreement Price. Such direct and indirect costs will include, in particular but without limitation, compensation for additional professional services required and all costs of repair and replacement of Work or others destroyed or damaged by correction, removal or replacement of Contractor's defective Work. Contractor will not be allowed an extension of the Agreement Time because of any delay in Contractor’s performance of the Work attributable to the exercise by City or City's rights hereunder.

4.9.5 Correction or Removal of Unauthorized Work.

4.9.5.1 Any Work done beyond the lines and grades shown on the Drawings or established by the Design Professional or any changes in, additions to, or deductions from the Work done without written authority will be considered as unauthorized and will not be paid for. Work so done may be ordered remedied, removed, or replaced at the Contractor's expense.

4.9.5.2 Upon failure on the part of the Contractor to comply promptly with any order of the City,

City will have authority to cause unauthorized Work to be remedied, removed, or replaced at the Contractor's expense and to deduct the costs from any moneys due or to become due the Contractor.

4.9.6 Correction Period - One Year Guarantee.

4.9.6.1 If, within one year after the date of Final Acceptance, or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Agreement Documents, or by any specific provision of the Agreement Documents, any Work is found to be defective, Contractor must promptly, without cost to City and in accordance with City's written instructions, either correct such defective Work, or, if it has been rejected by City, remove it from the Site and replace it with non-defective Work. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, City may have the defective Work corrected or the rejected Work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, must be paid by Contractor. Such action by the City will not relieve the Contractor of the guarantees required by this Section or elsewhere in the Agreement Documents.

4.9.6.2 If, in the opinion of the City, defective Work creates a dangerous condition or requires immediate correction or attention to prevent further loss to the City or to prevent interruption of operation of the City, the City will attempt to give the notice required by this Section. If the Contractor cannot be contacted or does not comply with the City's request for correction within a reasonable time as determined by the City, the City may, notwithstanding the provisions of this Section, proceed to make such correction or provide such attention; and the costs of such correction or attention will be charged against the Contractor. Such action by the City will not relieve the Contractor of the guarantees required by this Section or elsewhere in the Agreement Documents.

4.9.6.3 This Section does not in any way limit the guarantee on any items for which a longer guarantee is specified or on any items for which a manufacturer or supplier gives a guarantee for a longer period. The Contractor agrees to act as co-guarantor with such manufacturer or supplier and must furnish the City all appropriate guarantee or warranty certificates upon completion of the Project. No guarantee period, whether provided for in this Section or elsewhere, will in any way limit the liability of Contractor or their sureties or insurers under the indemnity or insurance provisions of these General Conditions and the Project Specific Special Conditions.

4.9.7 Acceptance of Defective Work.

4.9.7.1 If, instead of requiring correction or removal and replacement of defective Work, City may accept Work when in the best interest of the City to do so with appropriate monetary credit from Contractor. If any such acceptance occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Agreement Documents, including appropriate reduction in the Agreement Price; or, if the acceptance occurs after final payment, an appropriate amount must be paid by Contractor to City.

4.9.7.2 Alternatively, City may require Contractor to furnish at Contractor's expense, a special performance guarantee or other surety prior to acceptance of defective work.

4.9.8 The Warranty period begins on the Final Acceptance date noted in the Certificate of Completion, irrespective of early completion by some Subcontractors of their work.

4.9.9 Contractor's warranty obligation must be in accordance with MAG Specifications.

4.9.10 Nothing in the warranties contained in the Agreement Documents are intended to limit any manufacturer's warranty which provides City with greater warranty rights than set forth in this Section or the Agreement Documents. Contractor must provide City with all manufacturers' warranties prior to Substantial Completion, if applicable, or Final Acceptance.

4.9.11 Contractor agrees that it will be responsible to manage and administer the correction of any Work that is not in conformance with the Agreement Documents during the warranty periods set forth in this Section, or during any longer periods to the extent required by the Agreement Documents. A progress payment, or partial or entire use or occupancy of the Project by City, will not constitute acceptance of Work not in accordance with the Agreement Documents.

4.9.12 When notified of a warranty issue, Contractor must respond in writing within 48-hours and must perform warranty Work as soon as material for said repairs are available (as judged solely by City), and in any event Contractor must, take immediate steps to commence and complete correction of nonconforming Work no later than the time period set forth in City's written notification in accordance with the Agreement Documents. This includes the correction, removal or replacement of the nonconforming Work and any damage caused to other parts of the Work affected by the nonconforming Work. If defects develop which are determined by City to be an emergency, City will notify Contractor, via the most expeditious means regarding the nature and condition of the defects. In turn, Contractor must immediately dispatch necessary forces to correct the defect or the emergency condition in accordance with Agreement Documents.

4.9.13 The time periods referenced in this Section apply only to Contractor's obligation to correct nonconforming Work and is not intended to constitute a period of limitations for any other rights or remedies that City may have regarding Contractor's other obligations under the Agreement Documents.

4.9.14 Without limiting the foregoing or anything in these General Conditions or the Agreement to the contrary, Contractor must obtain and provide to City all warranties for any portion of the Project offered by the manufacturer, installer or provider thereof. City and the user of the facility will have the right to the full value and benefit of all such warranties. Contractor must ensure all such warranties are fully transferrable to facilitate the full value of this Section.

4.9.15 Contractor's warranty excludes damages or defects caused by abuse, alterations to the Work not executed by or through Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage.

4.9.16 In the event of any noncompliance with this entire Section 4, City may require Contractor to stop or suspend the Work in whole or in part.

SECTION 5 - CITY RESPONSIBILITIES

5.1 CITY PROJECT MANAGER AND INSPECTORS

5.1.1 Project Manager is responsible for providing City-supplied information and approvals in a timely manner to assist Contractor to fulfill its obligations under the Agreement Documents.

5.1.2 Project Manager will also provide Contractor with prompt notice when it observes any failure on the part of Contractor to fulfill its contractual obligations, including any default or defect in the Project or non-conformance with the Drawings and Specifications.

5.1.3 City may utilize Field Inspectors to assist Project Manager during construction in observing performance of Contractor. City's use of Inspectors is for the purpose of assisting Project Manager.

5.1.4 The Inspectors are authorized to inspect all Work and materials furnished. Such inspections may extend to all or part of the Work and to preparation, fabrication or manufacture of the materials to be used. The Inspectors have the authority to issue instructions contrary to the Construction Documents if approved and coordinated with the directions of Project Manager.

5.1.5 The Inspectors have the authority to reject work or materials until any questions at issue can be decided by Project Manager.

5.1.6 The use of Inspectors by City will not make City responsible for or give City control over construction means, methods, techniques, sequences or procedures or for safety precautions or programs or responsibility for Contractor's failure to perform the Work in accordance with Agreement Documents. The Inspectors are not authorized to direct any of Contractor's activities, employees or Subcontractors.

5.2 **DESIGN PROFESSIONAL SERVICES**

City may contract separately with one or more Design Professionals to provide construction administration of the Project. The Design Professional's Agreement, as well as other firms hired by City may be furnished to Contractor. Contractor does not have the right to limit or restrict or reject any Agreement modifications that are mutually acceptable to City and Design Professional.

5.3 **CITY'S SEPARATE CONTRACTORS**

City is responsible for all work performed on the Project or at the Site by separate contractors retained by City. City will contractually require its separate contractors to reasonably cooperate with, and reasonably coordinate their activities so as not to interfere with Contractor in order to enable Contractor to timely complete the Work consistent with the Agreement Documents. Contractor must immediately notify the Project manager, and address the matter in the next monthly status report, if any activities of such separate contractors are expected to interfere, or are interfering, with Contractor and such interference will or could result in any delay in Contractor's performance of the Work.

5.4 **PERMIT REVIEW AND INSPECTIONS**

5.4.1 If requested by Contractor, Project Manager will provide assistance and guidance in obtaining necessary reviews, permits and inspections.

5.4.2 The regulating agencies of City, such as Development and Sustainability, Fire and Planning Departments, enforce legal requirements. The enforcement activities of City are independent and separate from this Agreement.

5.5 **PLANS AND SPECIFICATIONS TO THE CONTRACTOR**.

Contractor will be provided up to five copies of the Agreement Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished,

upon request, at the cost of reproduction.

SECTION 6 - AGREEMENT TIME

6.1 AGREEMENT TIME

6.1.1 The Agreement Time will start with the Notice to Proceed ("NTP") and end with Final Acceptance.

6.1.2 Beginning on the date of the NTP, Contractor must begin to fulfill Contractor's obligations under the Agreement. Contractor's obligations include providing City and other agencies with any submittals required by the Project Specific Special Provisions, including but not limited to, an approved Project Schedule, Traffic Control Plans, and a Stormwater Pollution Prevention Plan. Contractor must submit all such required submittals before any physical construction work commences on the Site. NTP does not authorize construction work until all agreement insurance, bonds, and schedules are submitted to and accepted by the City.

6.1.3 The Agreement Time will be as set forth in the Project Schedule. Contractor agrees that it will commence performance of the Work and complete the Project through both Substantial Completion and Final Acceptance within the Agreement Time.

6.1.4 Time is of the essence of this Agreement, for the Project, for the Work, and for each phase and designated Milestone thereof.

6.1.5 Failure of Contractor to perform any covenant or condition contained in the Agreement Documents within the time periods specified herein, will constitute a material breach of this Agreement entitling City to terminate the Agreement unless Contractor applies for and receives an extension of time, in accordance with the procedures set forth in the Agreement Documents.

6.1.6 Failure of City to insist upon the performance of any covenant or condition within the time periods specified herein, will not constitute a waiver of Contractor's duty to perform every other covenant or condition within the designated periods, unless a specific waiver is granted in writing for each such covenant or condition.

6.1.7 City's agreement to waive a specific time provision or to extend the time for performance will not constitute a waiver of any other time provisions contained in the Agreement Documents. Failure of Contractor to complete performance promptly within the additional time authorized in the waiver or extension of time agreement constitutes a material breach of this Agreement entitling City to all the remedies set forth herein or provided by law.

6.2 PROJECT SCHEDULE

6.2.1 The Project Schedule must be in Microsoft Project standard file format, must be updated and maintained throughout the Agreement Time, and must contain the following:

6.2.1.1 Detailed representation of all activities for the project, both on-site construction and major procurement. All significant activities together with the resource loading requirements for each and all items appearing on the schedule of values or bid schedule for progress payments must be shown on the Project Schedule or in attached transmittal letter as described in Section 6.2.8.

6.2.1.2 Dependencies between activities must be indicated so that it may establish as to the effect the progress of any one activity would have on other activities and on the Schedule.

6.2.1.3 Activities for submission, review, and approval of all required submittals.

6.2.1.4 An amount of time will be established prior to the final completion date for "punch list and cleanup". No other activities will be scheduled during this period. Punch list and cleanup must be shown on the Project Schedule and must be entirely completed prior to the expiration of the Agreement Time.

6.2.2 Within 10 Days of receipt of City's comments, Contractor must make all required corrections, adjustments, and additions to complete the Project Schedule and resubmit to City for review. City's review of and response to the Project Schedule is for the purpose of: (1) City planning and staffing for the Project as may be required from time to time; (2) ensuring Contractor's general conformance with the scheduling requirements of the Agreement Documents and completion of the Project within the Agreement Time; and (3) monitoring and evaluating the construction status for purposes of approving monthly progress payments. Acceptance of a submitted schedule by City should in no way be construed as an affirmation or admission that the schedule is reasonable or workable by Contractor. The responsibility for completing the Work on the Project within the Agreement Time remains the obligation of Contractor. City's review does not relieve Contractor from compliance with the requirements of the Agreement Documents or be construed as relieving Contractor of its complete and exclusive control over the means, methods, sequences and techniques for executing the work.

6.2.3 The Project Schedule must show milestones, including milestones for City-furnished information, and must include activities for City-furnished material and construction by other contractors when those activities are interrelated with Contractor activities.

6.2.4 The Project Schedule must be revised as required by conditions and progress of the Work, but such revisions do not relieve Contractor of its obligations to complete the Work within the Agreement Time, as adjusted in accordance with the Agreement Documents. No modification to the Agreement Documents or the Agreement Time will be effective unless approved in advance by City.

6.2.5 For all items of materials and equipment that are critical or may require long lead times to acquire, the Project Schedule must show dates for submission, review and approval of submittals, ordering, and delivery.

6.2.6 An updated Project Schedule must be submitted monthly to City as part of the Payment Request. The monthly submittal must include one full size plot of the entire schedule and one electronic copy containing the schedule in Microsoft Project standard file format. In addition, Contractor must, upon request by City, provide a copy of all submitted schedule data in electronic format which must be clearly labeled with the Project description, scheduling program name and version number, and schedule print/data date.

6.2.7 Contractor must provide City with a monthly status report with each Project Schedule detailing the progress of the Work, including: (i) if the Work is proceeding according to schedule, (ii) any discrepancies, conflicts, or ambiguities found to exist in the Agreement Documents that require resolution, and (iii) other information detailing items that require resolution so as not to jeopardize the ability to complete the Work in the Agreement Time.

6.2.8 With each Project Schedule submittal, Contractor must include a transmittal letter including the following:

a. Description of problem tasks, referenced to field instructions or requests for information (RFI's), as appropriate.

b. Current and anticipated delays including:

(i) Cause of the delay.

(ii) Corrective action and schedule adjustments to correct the delay.

(iii) Known or potential impacts and their delay on other activities, milestones, and their impact on the Substantial Completion and Final Acceptance dates.

(iv) Changes in construction sequence.

c. Pending items and status thereof including but not limited to:

(i) Time Extension requests;

(ii) Substantial Completion date status;

(iii) Final Acceptance date status.

d. If ahead of schedule, the number of calendar Days ahead.

e. If behind schedule, the number of calendar Days behind.

f. Other Project or scheduling concerns.

6.2.9 Critical Path Method (CPM).

6.2.9.1 Unless otherwise specified in the Agreement, the Project Schedule must include a Critical Path Method (CPM) diagram schedule showing the sequence of activities, the interdependence of each activity and identifies the Critical Path.

6.2.9.2 The CPM diagram schedule must be in calendar Days and indicate duration, earliest and latest start and finish dates for all activities, and total Float Times for all activities except critical activities. The CPM diagram must be presented in a time scaled graphical format for the Project as a whole.

6.2.9.3 The CPM diagram schedule must indicate all relationships between activities.

6.2.9.4 The activities making the Project Schedule must contain sufficient detail to assure that adequate planning has been done for proper execution of the Work and such that it provides an appropriate basis for monitoring and evaluation the progress of the Work. Individual activities must not exceed 30 Days in length, in most cases.

6.2.9.5 The CPM diagram schedule must be based upon activities, which coincide with the Schedule of Values.

6.2.9.6 The CPM diagram schedule must show all submittals associated with each work activity and the review time for each submittal.

6.2.10 Float Time.

6.2.10.1 The total Float Time within the overall schedule is for the exclusive use of City, but City may approve Contractor's use of Float as needed to meet Agreement Milestones and

the Project completion date.

6.2.10.2 Contractor will not be allowed to sequence, hide, or reallocate Float Time through such strategies, as extending activity duration estimates to consume available Float, using preferential logic, or using extensive crew/resource sequencing, tec. No time extensions will be granted nor delay damages paid until a delay occurs which extends the Work beyond the Agreement Time.

6.2.11 City-Caused Delays. City-caused delays on the Project, if any, may be offset by City-caused time savings (i.e., Critical Path submittals returned in less time than allowed by the Agreement, approval of substitution requests and credit changes which result in savings of time to Contractor, etc.) In such an event, Contractor will not be entitled to receive a time extension or delay damages until all City-caused time savings are exceeded and the Agreement Time is also exceeded.

6.2.12 Rain-Related Delays. Contractor is required, in preparing the Project Schedule to take into account all relevant weather conditions, including normal rainfall and distribution. No additional compensation will be given for any rain-related delays or impacts on the Work or the Project Schedule. No time extension will be granted in the Project Schedule unless the rainfall during the construction of Work is unusually severe, was not reasonably anticipated, and the total rainfall was significantly in excess of the normal rainfall for the Project Site location. Normal rainfall for the Project will be determined from the 10-year average rainfall for the Site as measured by the National Oceanic and Atmospheric Administration or comparable source of reliable information for rainfall in Chandler, Arizona. In addition, the excessive rainfall must have actually impacted Work activities on the Critical Path and caused delay beyond any remaining Float at the time of the rain- caused delay. The burden of documenting normal rainfall, the excessive rainfall and the impact on Critical Path activities is on Contractor. All other provisions in the Agreement Documents relating to claims, including without limitation notice requirements, apply to any claim by Contractor for a rain delay.

6.2.13 City's "Policy Statement for Calculating Delays and Damages," Appendix 1 to these General Conditions, will apply to all claims of delay and delay damages.

6.2.14 Force Majeure. If Contractor is delayed or prevented from the performance of any Work required under this Agreement by reason of acts of God or other causes beyond the control and without fault of Contractor (financial inability excepted), performance of that Work will be excused, but only for the period of the delay. The time for performance of the Work will be extended for a period equivalent to the period of delay. In addition, the parties agree if Contractor's delayed or suspended performance directly arises out of or directly results from the COVID-19 pandemic, Contractor's delayed or suspended performance may be excused as set forth in this clause. Provided, however; Contractor must give the City written notice within 30 days of the occurrence of the event giving rise to COVID-19 pandemic related delayed or suspended performance. For COVID-19 pandemic related delay or suspended performance, the parties must agree in writing to the length of the excused delay or suspended performance. Further, Contractor must obtain the City's written approval to use any allowance established as part of the project for delays and costs related to the COVID-19 pandemic.

6.3 SUBSTANTIAL COMPLETION

6.3.1 When Contractor considers that the Work, phase or a portion thereof, which City agrees in

writing to accept separately, is substantially complete, City will prepare and submit to Contractor a comprehensive Punch List of items to be completed or corrected prior to Final Acceptance and Final Payment. Failure to include an item on such Punch List does not alter the responsibility of Contractor to complete all Work in accordance with the Agreement Documents.

6.3.2 Upon receipt of Contractor's Punch List, Project Manager will make an inspection to determine whether the Work or designated portion thereof is substantially complete. Project Manager may, at Project Manager's sole option, be assisted in such inspection by the Design Professional for the Project. If the inspection by the Project Manager discloses any item, whether or not included on Contractor's Punch List, which is not sufficiently completed in accordance with the Agreement Documents so that City can occupy or utilize the Work, phase or designated portion thereof for its intended use, Contractor must, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by Project Manager. In such case, Contractor must then submit a request for another inspection by Project Manager to determine Substantial Completion.

6.3.3 Certificate of Substantial Completion.

6.3.3.1 The Project Manager will not issue a Certificate of Substantial Completion unless and until the Work (or separable units or Phases as provided in the Agreement Documents) is essentially and satisfactorily complete in accordance with the Agreement Documents, such that the Project is ready for use by City for its intended purpose, opening to the general public, full occupancy or use by City (including, without limitation, all separate units, or rooms, facilities, access, income-generating areas, and all areas serving the general public, as applicable, must be ready for full-operation without material inconvenience or discomfort), including, to the extent applicable to the Work, the following: all materials, equipment, systems, controls, features, facilities, accessories and similar elements are installed in the proper manner and in operating condition, inspected and approved; surfaces have been painted; masonry and concrete cleaned with any sealer or other finish applied; utilities and systems connected and functioning; site work complete; permanent heating, ventilation, air condition, vertical transportation and other systems properly operating with proper controls; lighting and electrical systems installed, operable and controlled; paving completed, signage installed, and other Work as applicable, has been performed to a similar state of essential and satisfactory completion. A minor amount of Work, as determined by and at the discretion of the Project Manager, such as installation of minor accessories or items, a minor amount of painting, minor replacement of defective work, minor adjustment of controls or sound systems, or completion or correction of minor exterior work that cannot be completed as a result of weather conditions, will not delay determination of Substantial Completion. If prior written approval is obtained from City for purposes of Substantial Completion, specified areas of the entire Work or Project may be individually certified as Substantially Complete. In no event will Substantial Completion be deemed to have occurred unless and until: (i) a temporary certificate of occupancy has been issued by the appropriate Governmental Authorities (as applicable) and (ii) all terms and Work required under this Agreement have been fulfilled by Contractor and same will have also been approved and accepted by City, subject only to the Punch List items.

6.3.3.2 If requested by City, Contractor must complete and turn-over to City the Project on a phased basis. Each phase will have a separate inspection by the Project Manager, a Punch List generated, and then an inspection by City with final approval and acceptance only after the

Project Manager's Punch List.

6.4 **PARTIAL UTILIZATION**

6.4.1 City at City's option may use and occupy any substantially completed parts of the Work which has specifically been identified in the Agreement Documents, or which City, the Design Professional and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by City for its intended purpose, without significant interference with Contractor's performance of the remainder of the Work, provided, however, if the portion of the Work to be used or occupied has not been found to be substantially complete, City must do so in accordance with Section 6.3 prior to such occupancy.

6.4.2 In lieu of the issuance of a Certificate of Substantial Completion as to part of the Work, City may take over operation of a facility constituting part of the Work whether or not it is substantially complete if such facility is functionally and separately usable; provided that prior to any such takeover, City and Contractor agree in writing as to the division of responsibilities between City and Contractor for security, operation, safety, maintenance, correction period, heat, utilities and insurance with respect to such facility.

6.4.3 Substantial Completion of or City's beneficial occupancy of a part of the Project will not alter the fact that the one-year warranty for the whole Project starts at the date of Final Completion of the whole Project.

6.5 **FINAL ACCEPTANCE**

6.5.1 Unless otherwise expressly agreed to in writing by City, Final Acceptance must be obtained by no later than 30 Days (60 Days for federally funded agreements) after the date of Substantial Completion. Failure to timely obtain Final Acceptance will be a material breach of the Agreement.

6.5.2 Upon receipt of written notice that the Work is ready for final inspection and acceptance, City and Contractor will jointly inspect to verify that the remaining items of Work have been completed. There will be no partial acceptance. Final Acceptance will not occur until all items of Work, including Punch List Items, have been completed to City's satisfaction as reflected in the written Final Acceptance.

6.5.3 Final Payment will not be due, owing, or paid by City until Final Acceptance is issued.

6.5.4 Landscape Establishment Period. Unless otherwise expressly agreed to in writing by City, the Landscape Establishment Period will begin on the date of Final Acceptance of the Project and will run 90 Calendar Days thereafter. Landscape Establishment Period requirements are detailed in General Conditions Appendices, attached herein.

6.6 **CONTINUATION OF WORK**

6.6.1 Permitting Contractor to continue and finish the Work or any part of it after the time fixed for its completion (whether milestone, phase, Substantial Completion or Final Acceptance) or after the date to which the time fixed for any completion may have been extended, does not operate as a waiver by City of any rights under the Agreement Documents, law or equity.

6.6.2 Furthermore, the timely completion of the Work being of the utmost importance under this Agreement, notwithstanding the existence of one or more disputes between the parties

concerning the scope of the Work, the Project Schedule, Agreement Time, payments or any other matter, and further notwithstanding a party's invocation of the Dispute Resolution provisions specified in Appendix 6 of these General Conditions, unless City suspends the Agreement or Contractor's performance pursuant to Section 10 of these General Conditions, Contractor will continue to prosecute the Work, including any Change Order work or Extra Work Orders, in a diligent and timely manner and not stop, slow down or impede by action or inaction the progress of the Work, including commencing performance of and thereafter completing any additional work called out in any Change Order or Extra Work Order issued by Project Manager with the approval of City, so long as City makes payment to Contractor in accordance with Section 8 of these General Conditions.

SECTION 7 - AGREEMENT PRICE

7.1 UNIT PRICE AGREEMENTS

7.1.1 The Agreement Price for all Unit Price Agreements will be the amount set forth in the Agreement or Change Order multiplied by the verified quantity provided.

7.1.2 Measurements of quantities to determine the total Agreement Price must be in accordance with MAG Specification §§ 109.1 and 109.2.

7.1.3 The Unit Price may only be changed as set forth in Section 9 below.

7.2 CHANGE ORDERS

7.2.1 Unit Price Change Orders. The Change Order Price for all Unit Price Change Orders will be the amount set forth in the Change Order multiplied by the verified quantity provided.

7.2.2 Measurements of quantities to determine the total Change Order Price must be in accordance with MAG Specifications §§ 109.1 and 109.2.

7.2.3 The Unit Price may only be changed as set forth in Section 9 below.

7.2.4 MAG Specification § 109.4.1 is modified as follows: Before § 109.4.1, the following is added: Any deduction or increase in the Agreement Price must be supported by a signed, written Change Order fully executed by City, and supported by such backup as the Project Manager may require.

7.3 SALES TAX

Contractor is required to pay all applicable sales tax in accordance with the law of the state of Arizona and this cost must be included in all Agreement Prices. When equipment, materials or supplies generally taxable to Contractor are eligible for a tax exemption due to the nature of the Project, Contractor must assist City in applying for and obtaining such tax credits and exemptions which will be paid or credited to City.

SECTION 8 - PAYMENT

8.1 PAYMENT FOR CONSTRUCTION SERVICES

8.1.1 Payment for the Work will be made in accordance with MAG Standard Specification § 109 as amended below.

8.1.2 Contractor must submit to City for review a completed Contractor Payment Request signed

by Contractor, covering the Work completed as of the date of the Request and accompanied by such supporting documentation as is required by the Agreement Documents and also as City may reasonably require. A Contractor Payment Request will not be considered complete unless it is accompanied by an updated Project Schedule and a certification that the on-site, red lined, as built Drawings are up to date. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably, securely stored at the Site or at another location (such as a bonded warehouse) agreed to in writing, the Contractor Payment Request must also be accompanied by such data, satisfactory to City, as will establish City's title to the material and equipment and protect City's interest therein, including applicable insurance. Each subsequent Contractor Payment Request must include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied to discharge in full all of Contractor's obligations reflected in prior Contractor Payment Requests.

8.1.3 Except for Work performed under a JOC Agreement, the Contracting Agency will retain 10 percent of all estimates as a guarantee for complete performance of the Agreement in accordance with Arizona Revised Statutes Section 34-221 or 34-607. The Contractor may elect to deposit securities in lieu of retention in accordance with Arizona Revised Statutes Section 34-221, Paragraph C.5. or 34-607, Paragraph B.5.

8.1.4 The payment process functions as follows: Prior to the payment cycle date, Contractor must send a draft Contractor Payment Request to Project Manager. The Project Team will review the Request and agree upon any necessary adjustments. Contractor must certify the final Request by signing and returning to Project Manager.

8.1.5 When construction of the Project is fifty percent (50%) completed, Contractor may request payment of one-half of the retention pursuant to A.R.S. § 34-609(B)(3), subject to all of City’s rights to withhold or offset payments, and other rights of City, under the Agreement.

8.1.6 City reserves the right under A.R.S. § 34-609(B)(3) to reinstate the ten percent (10%) retention if City determines that satisfactory progress is not being made.

8.1.7 Contractor’s Warranty of Title.

8.1.7.1 Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Contractor Payment Request, whether incorporated in the Project or not, will pass to City at the time of payment, free and clear of all liens, claims, security interests, and encumbrances, provided that this will not preclude the Contractor from installing metering devices or other equipment of utility companies or municipalities, the title of which is commonly retained by the utility company or municipality.

8.1.7.2 No materials, supplies, or equipment for the Work under this Agreement will be purchased subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest therein, or any part thereof, is retained by the seller or supplier.

8.1.7.3 Nothing contained in this Section will defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection, or any right under any law permitting such persons to look to funds due the Contractor in the hands of the City. The provisions of this Section must be inserted in all subcontracts and material agreements, and notices of its provision must be given to all persons furnishing materials for the Work when no formal agreement is entered into for such materials.

8.2 **PAYMENT UPON SUBSTANTIAL COMPLETION**

8.2.1 No payment will be made upon Substantial Completion, except for a regularly-scheduled monthly progress payment, as allowed by Section 8.2.2.

8.2.2 No further payments will be made to Contractor until Final Acceptance.

8.3 **FINAL PAYMENT**

8.3.1 Subject to all of City's rights to withhold or offset payment, and other rights under the Agreement, Final Payment including remaining retainage will be paid only after:

a. Work has been fully completed (including completion of all incorrect or incomplete work items) and the written Final Acceptance has been issued by City;

b. Necessary operating manuals, any excess materials and supplies necessary for matching materials and supplies incorporated into the Work, acceptable sewer video results (if applicable), and complete "as-built" Drawings (including the Building Information Model, if required by the Agreement Documents) have been delivered to City, as specified in this Section 8.3;

c. Full and unconditional lien waivers and releases by Contractor and any person performing labor or supplying material, machinery, fixtures, or tools for the Work have been delivered to Contractor;

d. All conditions and requirements imposed by City or any financing entity for the corresponding disbursement have been met; and

e. Contractor delivers to City a Contractor Payment Request requesting Final Payment.

8.3.2 Contractor must also submit a signed copy of Contractor's Affidavit Regarding Settlement of Claims, Appendix 3 to these General Conditions, and Certificate of Completion, Appendix 7 to these General Conditions, prior to Final Payment.

8.3.3 In addition, if required under the Project Specific Special Provisions, Contractor must compile a complete equipment list and maintenance manual to be submitted to City as a precondition to Final Payment. The list must include the following items for all equipment supplied under the Plumbing, Electrical, Air Conditioning, Elevator, and other Special Equipment Specifications:

a. Name, Model and Manufacturer.

b. Complete parts lists and Drawings.

c. Local source of supply for replacement parts along with suppliers' telephone numbers.

d. Local service organizations serving the equipment and their telephone numbers.

e. All tags, inspection slips, instruction packages, etc., removed from equipment must be properly identified as to pieces of equipment from which they were taken.

8.3.4 Contractor must also deliver to City, prior to Final Payment, one (1) digital (in the format specified by City), and if requested by City, one (1) hard copy, of any applicable Maintenance manuals. Each manual must include all manufacturer's operation and maintenance instructions and "as-built" Drawings with the list herein specified. It must also include all other diagrams and instructions necessary to properly operate and maintain the equipment, the name, address and telephone number of Contractor and all Subcontractors involved.

8.4 **CITY'S RIGHT TO WITHHOLD PAYMENT**

City may withhold payment to such extent as may be necessary in City's opinion to protect City from loss for which Contractor is responsible, including, without limitation, if any of the following conditions exist:

a. Defective Work not remedied;

b. Third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to City is provided by Contractor;

c. Failure of Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

d. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Agreement Price;

e. Damage to City or another Contractor;

f. Reasonable evidence that the Work will not be completed within the Agreement Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

g. Failure to carry out the Work in accordance with the Agreement Documents; or

h. Contractor is in default of any of its other obligations under the Agreement Documents.

8.5 **JOINT/DIRECT CHECKS**

To promote the timely completion and progress of the Work or when appropriate and necessary, payments to Contractor may be made jointly to Contractor and its employees, agents, Subcontractors and suppliers, or any of them. For federally funded agreements, see federal provisions for additional requirements for the joint check process.

8.6 **PAYMENT NOT A WAIVER**

No payment (nor use or occupancy of the Project by City) will be deemed acceptance or approval of the Work or as a waiver of any claims, rights, or remedies of City.

8.7 **LIENS AND BOND CLAIMS**

Contractor must make all payments, in the time required, of all labor and materials furnished to Contractor in the course of the Work and must promptly furnish evidence of such payments as City may require. Contractor must pay when due all claims arising out of performance of the Work covered by this Agreement for which a lien may be filed either against the real estate or leasehold interest of City, or against payments due from City to Contractor, or for which a claim may be made against any payment or performance bond or both. To the fullest extent permitted by law, Contractor agrees that no liens or other claims in the nature of a lien against the real estate, leasehold, or other interest of City,

against payment due from City to Contractor, or against any payment or performance bond, must be filed or made in connection with the Work by any party who has supplied professional services, labor, materials, machinery, fixtures, tools, or equipment used in or in connection with the performance of this Agreement, and Contractor agrees to remove or to cause to be removed any such liens or claims in the nature of a lien or bond claim within 10 Days upon receiving notice or obtaining actual knowledge of the existence of such liens or claim. In addition, Contractor agrees to defend, indemnify, and hold harmless City from and against any and all such liens and claims. This paragraph does not apply to claims and liens of Contractor due to non-payment for work performed.

8.8 **FINANCIAL RECORDKEEPING AND CITY'S AUDIT RIGHT**

8.8.1 Records for all Agreements between City and Contractor must, upon reasonable notice, be open to inspection and subject to audit, scanning, and reproduction during normal business working hours. Such audits may be performed by any City's representative or any outside representative engaged by City for the purpose of examining such records. City or its designee may conduct such audits or inspections throughout the term of this Agreement and for a period of five years after Final Payment or longer if required by law. City's representatives may (without limitation) conduct verifications such as counting employees at the Site, witnessing the distribution of payroll, verifying information and amounts through interviews and written confirmations with Contractor employees, field and agency labor, Subcontractors, and vendors.

8.8.2 Contractor's "records" must include any and all information, materials and data of every kind and character, including without limitation, records, books, papers, documents, subscriptions, recordings, agreements, purchase orders, leases, contracts, commitments, arrangements, notes daily diaries, superintendent reports, drawings, receipts, vouchers and memoranda, and any and all other agreements, sources of information and matters that may in City's judgment have any bearing on or pertain to any matters, rights, duties or obligations under or covered by any Agreement Document. Such records must include (hard copy, as well as computer readable data if it can be made available), written policies and procedures; time sheets; payroll registers; payroll records; cancelled payroll checks; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, negotiation notes, etc.); original bid estimates; estimating work sheets; correspondence; Change Order files (including documentation covering negotiated settlements); back-charge logs and supporting documentation; invoices and related payment documentation; general ledger, information detailing cash and trade discounts earned, insurance rebates and dividends; and any other Contractor records which may have a bearing on matters of interest to City or the Project in connection with Contractor's dealings with City or the Project (all foregoing hereinafter referred to as "records") to the extent necessary to adequately permit evaluation and verification of any or all of the following:

a. Compliance with Agreement requirements for deliverables;

b. Compliance with approved Plans and Specifications;

c. Compliance with § 14.9 below;

d. Compliance with Agreement provisions regarding the pricing of Change Orders;

e. Accuracy of Contractor representations regarding the pricing of invoices; or

f. Accuracy of Contractor representations related to claims submitted by

Contractor or any of their employees.

8.8.3 Contractor must require all payees (examples of payees include Subcontractors, Suppliers, Insurance Carriers, etc.) to comply with the provisions of this Section by including the requirements hereof in a written agreement between Contractor and payee. Contractor will ensure that all payees (including those entering into lump sum agreements) have the same right to audit provisions contained in this Agreement included in their agreements with Contractor.

8.8.4 City's authorized representative(s) (including, without limitation, Project Manager) must have reasonable access to Contractor's facilities, must be allowed to interview all current or former employees to discuss matters pertinent to the performance of this Agreement and must be provided adequate and appropriate work space, in order to conduct audits in compliance with this Section.

8.8.5 If an audit inspection or examination in accordance with this Section, discloses overpricing or overcharges to City (of any nature) by Contractor or Contractor's Subcontractors in excess of $100,000 in addition to making adjustments for the overcharges, the reasonable actual cost of City's audit must be reimbursed to City by Contractor. Any adjustments or payments which must be made as a result of any such audit or inspection of Contractor's invoices or records must be made within a reasonable amount of time (not to exceed 90 Days) from presentation of City's findings to Contractor.

8.8.6 In addition to the normal paperwork documentation Contractor typically furnishes to City, Contractor agrees to furnish, upon written request from City, any of the documentation necessary for City to exercise its audit rights under this Section 8.8 in computer readable file formats (Word, Excel, or .pdf), as City may designate.

8.8.7 City, its authorized representative, and the appropriate agency, reserve the right to audit Contractor's records in compliance with local, state or federal policies, statutes or at City's discretion, within three (3) years of Final Acceptance of the Work.

SECTION 9 - CHANGES TO THE AGREEMENT

9.1 **FIELD ORDERS**

City may authorize minor changes in the Work not involving an adjustment in the Agreement Price or the Agreement Times, which are consistent with the overall intent of the Agreement Documents. These may be accomplished by a written Field Order on the standard form approved and executed by City. Such Field Orders must be binding and Contractor must perform the change promptly. If Contractor believes that a Field Order justifies an increase in the Agreement Price or Agreement Time, Contractor may make a claim therefor as provided in Section 7.2.

9.2 **EXTRA WORK/CHANGES IN THE WORK**

9.2.1 City reserves the right to make such changes in the Plans and Specifications for the Work, as it may deem appropriate and any such change as set forth in a written Change Order must be deemed a part of this Agreement as if originally incorporated herein.

9.2.2 In the event City and Contractor cannot agree on the terms of a Change Order, or when circumstances otherwise require, the Project Manager has the authority to direct the Contractor to perform extra work, if the work in question is an item not provided for in the

Agreement as awarded. The Project Manager will have the authority to determine, based upon factual evidence presented by the Contractor, whether the work in question is an item not provided for in the Agreement as awarded. If the Project Manager directs the Contractor to perform extra work, the Project Manager's instructions will include a price that the Contractor cannot exceed in charging the City for the extra work. Upon receipt of the Project Manager's directions to perform extra work, the Contractor must promptly proceed with the extra work and document the actual cost thereof. Contractor's right to payment for extra work will be determined under Subsection 9.2.4 below. The Contractor is responsible to manage the extra work to ensure that the price limits set by the Project Manager are not exceeded. Contractor must perform the extra work and submit documentation for the actual cost of the extra work to the City. A Change Order will be issued to cover this work.

9.2.3 Contractor will not be entitled to payment for extra work unless a written Change Order, in form and content prescribed by City, has been executed by City. On all requests for Change Orders, Contractor must specify the increased or decreased costs and whether it believes any extensions of time will be necessary to complete its Work as modified by the Change Order. If extra work is performed under Subsection 9.2.2 above, a corresponding Change Order will be prepared, approved and processed by City before payment can be made to Contractor.

9.2.4 In general, pricing for Change Orders will include the same mark-up percentages that were in effect when the Agreement was awarded. The cost or credit to the City resulting from a change in the Work is subject to Appendix 1 (Policy Statement for Calculating Delays and Damages) and will be determined, based on the type of pricing for the Agreement involved, as follows:

a. By mutual acceptance of a lump sum properly itemized in a form acceptable to City;

b. By unit prices stated in the Agreement Documents;

c. When the City determines that a Unit Price Book Job Order associated with a Job Order Agreement requires a Change Order, by using the same Total Cost Data and CCI that are in effect when the Change Order is anticipated to be issued; or

d. By actual cost and a percentage fee covering overhead and profit, as follows:

(i) Contractor will perform the extra work and be compensated for actual cost of labor, materials and equipment.

(ii) Contractor will have the right to add the fee percentage applicable to the Work under the Agreement, or if no such fee has been agreed to by the parties, not more than five percent (5%) to the Subcontractor's prices for authorized extra work performed solely by Subcontractors. Such percentage will include all of Contractor's charges for overhead, profit, administration and supervision.

(iii) Contractor or Subcontractor will have the right to add the fee percentage applicable to Work under the Agreement for self-performed extra work, or if no such fee has been agreed to by the parties, Contractor's or Subcontractor's maximum total allowable additions for overhead, profit, administration and supervision will

not exceed ten percent (10%) of actual verifiable labor, materials and equipment for such self- performed extra work.

9.2.5 Any agreement which modifies the terms of the Agreement (including Change Orders) will be approved in writing by the Project Manager. Once properly executed by both parties, these modifications to the Agreement will have the same effect as if they had been included in the original Agreement.

9.3 **ACCURACY OF CHANGE ORDER PRICING INFORMATION**

9.3.1 Subject to Sections 9.3.2 through 9.3.4, signature by the contracting parties constitutes full accord and satisfaction between City and Contractor for all costs, damages, and expenses of whatever kind of nature, including delay, impact or acceleration damages, which may be occasioned by a Change Order of other modification of the Agreement agreed to in writing.

9.3.2 Accurate Change Order Pricing Information: Contractor agrees that it is responsible for submitting accurate cost and pricing data to City to support its Fixed Price, Unit Price, or Cost Plus Change Order Proposals or other Agreement Price adjustments under the Agreement. Contractor further agrees to submit Change Order proposals with cost and pricing data which is accurate, complete, current, and in accordance with the terms of the Agreement with respect to pricing of change orders. Contractor agrees that any "buy-out savings" on Change Orders will accrue 100% to Owner. "Buy-out savings" are defined as any savings negotiated by the Contractor with a Subcontractor or a Material Supplier after receiving approval of a Change Order amount that was designated to be paid to a specific Subcontractor or Supplier for the Approved Change Order work.

9.3.3 Right to Verify Change Order Pricing Information: Contractor agrees that City, through its designated representative, will have the right to examine, copy, and scan the records of the Contractor, Subcontractor or Sub-Subcontractor's records (during the Agreement period and up to three years after final payment is made on the Agreement) to verify the accuracy and appropriateness of the pricing data used to price all Change Order proposals or claims. Contractor agrees that if City determines the cost and pricing data submitted (whether approved or not) was inaccurate, incomplete, not current, or not in compliance with the terms of the Agreement regarding pricing of Change Orders, an appropriate Agreement Price adjustment will be made. Such post-approval Contact Price adjustments will apply to all levels of contractors and Subcontractors and to all types of Change Order proposals, specifically including Fixed Price, Unit Price, and Cost Plus Change Orders.

9.3.4 Requirements for Detailed Change Order Pricing Information: Contractor agrees to provide a detailed breakdown of allowable labor and labor burden cost (i.e., base wage rate of applicable classifications of workers, payroll taxes, and insurance and benefits costs). This information will be used to evaluate the potential cost of labor and labor burden related to Change Order work. It is intended that this information represent an accurate estimate of the Contractor's actual labor and labor burden cost components. Information is not intended to establish fixed billing or Change Order pricing labor rates. However, at the time Change Orders are priced, the submitted cost data for labor rates may be used to price Change Order work. The accuracy of any such agreed upon labor rate cost components used to price Change Orders will be subject to later audit. Approved Change Order amounts may be adjusted later to correct the impact of inaccurate labor cost components if the agreed upon labor cost components are determined to be inaccurate.

9.4 **EMERGENCIES**

In any emergency affecting the safety of persons or property, Contractor will act, at its discretion, to prevent threatened damage, injury or loss. Any change in the Agreement Price or Agreement Time resulting from emergency work will be determined as provided in this Section.

9.5 **DIFFERING SITE CONDITIONS**

9.5.1 If Differing Site Conditions are encountered at the Project Site, then notice by the observing party must be given to the other party promptly before conditions are disturbed (to the extent practicable) and in no event later than 14 Days after first observance of the conditions. City will promptly investigate such conditions and, if City determines that Differing Site Conditions exist and they materially cause an increase in the cost of, or time required for, performance of any part of the Work, Contractor will be entitled to equitable adjustment in the Agreement Price or Construction Schedule (and other time requirements), or both. If it is determined by City that the conditions at the Project Site are not Differing Site Conditions and no change is justified, then City will so notify Contractor in writing, stating the reasons. Claims in opposition to such determination must be made within 14 Days after City has given notice of its decision. If City and Contractor cannot agree on an adjustment in the Agreement Price or Construction Schedule (and other time requirements), the adjustment may be submitted to dispute resolution as provided these General Conditions.

9.6 **CHANGES IN LAWS, REGULATIONS, OR LEGAL REQUIREMENTS OR TAXES**

In the event of a material change in applicable Laws, Regulations, or Legal Requirements, or taxes subsequent to the date of the Agreement by the parties, Contractor may be entitled to a Change Order, in City's discretion, to the extent Contractor can document to the satisfaction of City that such change significantly increases Contractor's actual cost of performance of the Work.

SECTION 10 -SUSPENSION AND TERMINATION

10.1 **SUSPENSION**

City may suspend the Agreement and Contractor's performance in accordance with MAG Specifications § 105.1 and 108.7.

10.2 **TERMINATION BY THE CITY FOR CAUSE**

10.2.1 MAG Specifications § 108.11 applies to the Agreement.

10.2.2 City may also terminate the Agreement if City determines, in its sole discretion that Contractor has:

a. After prior written notice, refused or failed to supply enough properly skilled workers or proper materials;

b. After prior written notice, failed to make payment to Subcontractors for materials or labor in accordance with the respective agreements between Contractor and the Subcontractors;

c. After prior written notice, disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction;

d. After prior written notice, repeatedly failed to comply with written directives from City;

e. Is adjudged as bankrupt or insolvent;

f. Made a general assignment for the benefit of creditors;

g. Appointed a trustee or receiver for itself or any of its property;

h. Filed a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or similar laws; or

i. Otherwise breached a provision of the Agreement Documents or any other Agreement between City and Contractor.

10.2.3 When any of the above reasons exist, City may terminate the Agreement, without prejudice to any other rights or remedies of City, after giving Contractor and Contractors' surety, if any, 7 Days written notice of City's intent to terminate the Agreement and Contractor's failure to cure any such reasons. Upon such termination, City may: (1) take possession of the Site and of all materials thereon owned by Contractor; or (2) finish the Work by whatever reasonable method City may deem expedient. When City terminates the Agreement for one of the reasons state above, Contractor will not be entitled to receive further payment until the Work is finished. If the unpaid balance of the Agreement Price existing at the time of such termination exceeds the costs and expenses of finishing the Work and any other damages incurred by City, such excess will be paid to Contractor. If such costs, expenses and damages exceed such unpaid balance, Contractor must pay the difference to City. This obligation for payment will survive termination of the Agreement.

10.3 **TERMINATION BY CITY FOR CONVENIENCE**

City may also terminate the Agreement at any time for its convenience upon 7 Days written notice to Contractor specifying the termination date. In the event of termination which is not the fault, in whole or in part, of Contractor, City will pay to Contractor only such compensation, including reimbursable expenses, due for Work properly performed on the Project prior to the termination date. Upon any termination of the Agreement, no further payments will be due from City to Contractor.

10.4 **A.R.S. § 38-511**

The Agreement is subject to, and may be terminated by City in accordance with, the provisions of A.R.S. § 38-511.

SECTION 11 -INSURANCE AND BONDS

11.1 **INSURANCE REQUIREMENTS**

11.1.1 After Agreement award, the Contractor must furnish the City a certificate of insurance on a standard insurance industry ACORD form. The ACORD form must be issued by an insurance company authorized to transact business in the State of Arizona possessing a current A.M. Best, Inc. rating of A-7, or better and legally authorized to do business in the State of Arizona with policies and forms satisfactory to City. Provided, however, the A.M. Best rating requirement may not be deemed to apply to required Worker's Compensation coverage.

11.1.2 The Contractor and any of its Subcontractors must procure and maintain, until all of their obligations have been discharged, including any warranty periods under this Agreement are satisfied, the insurances set forth below.

11.1.3 The insurance requirements set forth below are minimum requirements for this Agreement and in no way limit the indemnity covenants contained in this Agreement.

11.1.4 The City in no way warrants that the minimum insurance limits contained in this Agreement are sufficient to protect Contractor from liabilities that might arise out of the performance of the Agreement services under this Agreement by Contractor**,** its agents, representatives, employees, or Subcontractors and the Contractor is free to purchase any additional insurance as may be determined necessary.

11.1.5 Failure to demand evidence of full compliance with the insurance requirements in this Agreement or failure to identify any insurance deficiency will not relieve the Contractor from, nor will it be considered a waiver of its obligation to maintain the required insurance at all times during the performance of this Agreement.

11.1.6 Use of Subcontractors: If any Work is subcontracted in any way, the Contractor must execute a written agreement with Subcontractor containing the same Indemnification Clause and Insurance Requirements as the City requires of the Contractor in this Agreement. The Contractor is responsible for executing the Agreement with the Subcontractor and obtaining Certificates of Insurance and verifying the insurance requirements.

11.2 **MINIMUM SCOPE AND LIMITS OF INSURANCE**

11.2.1 The Contractor must provide coverage with limits of liability not less than those stated below.

11.2.1.1 Commercial General Liability-Occurrence Form. Contractor must maintain "occurrence" form Commercial General Liability insurance with a limit of not less than $2,000,000 for each occurrence, $4,000,000 aggregate. Said insurance must also include coverage for products and completed operations, independent contractors, personal injury and advertising injury. If any Excess insurance is utilized to fulfill the requirements of this paragraph, the Excess insurance must be "follow form" equal or broader in coverage scope than underlying insurance.

11.2.1.2 Automobile Liability-Any Automobile or Owned, Hired and Non-Owned Vehicles. Contractor must maintain Business/Automobile Liability insurance with a limit of $1,000,000 each accident on Contractor owned, hired, and non-owned vehicles assigned to or used in the performance under this Agreement. If any Excess or Umbrella insurance is utilized to fulfill the requirements of this paragraph, the Excess or Umbrella insurance must be "follow form" equal or broader in coverage scope than underlying insurance.

11.2.1.3 Workers Compensation and Employers Liability Insurance. Contractor must maintain Workers Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of Contractor employees engaged in the performance of Work under this Agreement and must also maintain Employers' Liability insurance of not less than $1,000,000 for each accident and $1,000,000 disease for each employee.

11.2.1.4 Builders' Risk/Installation Floater Insurance. The Contractor bears all responsibility for loss to all equipment or Work under construction. Unless waived in writing by the City the Contractor will purchase and maintain in force Builders' Risk/Installation Floater insurance on the entire Work until completed and accepted by the City. This insurance will be Special Causes of Loss policy form, (minimally including perils of fire, flood, lightning, explosion, windstorm and hail, smoke, aircraft and vehicles, riot and civil commotion, theft, vandalism, malicious mischief, and collapse), completed value, replacement cost policy form equal to the Agreement Price and all subsequent modifications. The Contractor's Builders'

Risk/Installation Floater insurance must be primary and not contributory.

a. Builders' Risk/Installation Floater insurance must cover the entire Work including reasonable compensation for architects and engineers' services and expenses and other "soft costs" made necessary by an insured loss. Builders' Risk/Installation Floater insurance must provide coverage from the time any covered property comes under the Contractor's control and or responsibility, and continue without interruption during course of construction, renovation and or installation, including any time during which any Project property or equipment is in transit, off Site, or while on Site for future use or installation. Insured property must include, but not be limited to, scaffolding, false work, and temporary buildings at the Site. This insurance must also cover the cost of removing debris, including demolition as may be legally required by operation of any law, ordinance, regulation or code.

b. The Contractor must also purchase and maintain Boiler and Machinery insurance with the same requirements as Builders' Risk/Installation Floater insurance cited above if the Work to be performed involves any exposures or insurable property normally covered under a Boiler and Machinery insurance policy or made necessary as required by law or testing requirements in the performance of this Agreement. The Contractor will be responsible for any and all deductibles under these policies and the Contractor waives all rights of recovery and subrogation against the City under the Contractor- Builders' Risk/Installation Floater insurance described herein.

c. Builders' Risk/Installation Floater Insurance must be maintained until whichever of the following first occurs: (i) final payment has been made; or, (ii) until no person or entity, other than the City, has an insurable interest in the property required to be covered.

d. The Builders' Risk/Installation Floater insurance must be endorsed so that the insurance will not be canceled or lapse because of any partial use or occupancy by the City.

e. The Builders Risk/Installation Floater insurance must include as named insureds, the City, the Contractor, and all tiers of Subcontractors and others with an insurable interest in the Work who will be named as additional insureds unless they are able to provide the same level of coverage with the City and Contractor named as additional insureds. Certificates must contain a provision that the insurance will not be canceled or materially altered without at least 30 Days advance notice to the City. The City must also be named as a Loss Payee under the Builders' Risk/Installation Floater coverage.

f. The Builders Risk/Installation Floater insurance must be written using the Special Causes of Loss policy form, replacement cost basis.

g. All rights of subrogation under the Builders Risk/Installation Floater insurance are, by this Agreement, waived against the City, its officers, officials, agents and employees.

h. The Contractor is responsible for payment of all deductibles under the Builders' Risk/Installation Floater insurance policy.

11.2.1.5 Pollution Liability Insurance (Including Errors and Omissions). For Job Orders, Pollution Liability Insurance is only required if applicable and determined on a project specific basis. Contractor must maintain Pollution Liability Insurance with a limit of not less than $5,000,000 per loss, $5,000,000 aggregate for losses caused by pollution conditions including coverage for bodily injury, property damage, defense costs, clean-up costs, and completed operations that arise from the operations of Contractor as described in this Agreement.

a. The policy must provide for complete professional service coverage, including coverage for pollution liability that is a result of a breach of professional duties.

b. The policy must provide for protection again claims for third-party bodily injury, property damage, or environmental damage caused for pollution conditions resulting from general contracting activities for which Contractor is legally liable.

c. The policy must provide for cleanup costs when mandated by governmental entities, when required by law, or as a result of third-party claims.

d. Completed Operations Coverage must be kept in place for up to the statute of repose.

e. The policy must be endorsed to include the following additional insured language: “City, its elected officials, trustees, employees, agents, and volunteers must be named as additional insureds with respect to liability arising out of the activities performed by, or on behalf of Contractor”.

f. If Work under this Agreement requires the transportation of any hazardous material or regulated substances, Contractor must carry Auto Liability with a CA 9948 endorsement or equivalent.

g. If Work under this Agreement requires the disposal of any hazardous materials from the job site, Contractor must obtain a certificate of insurance for Pollution Legal Liability from the disposal site operator with a limit of not less than $5,000,000 per loss, $5,000,000 aggregate.

11.3 **ADDITIONAL POLICY PROVISIONS REQUIRED**

11.3.1 Self-Insured Retentions or Deductibles. Any self-insured retentions and deductibles must be declared and approved by the City. If not approved, the City may require that the insurer reduce or eliminate any deductible or self-insured retentions with respect to the City, its officers, officials, agents, employees, and volunteers.

11.3.2 The Contractor’s insurance must contain broad form contractual liability coverage.

11.3.3 The Contractor's insurance coverage must be primary insurance with respect to the City, its officers, officials, agents, and employees. Any insurance or self-insurance maintained by the City, its officers, officials, agents, and employees will be in excess of the coverage provided by the Contractor and must not contribute to it.

11.3.4 The Contractor's insurance must apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

11.3.5 Coverage provided by the Contractor must not be limited to the liability assumed under the

indemnification provisions of this Agreement.

11.3.6 The policies must contain a severability of interest clause and waiver of subrogation against the City, its officers, officials, agents, and employees, for losses arising from Work performed by the Contractor for the City.

11.3.7 The Contractor, its successors and or assigns, are required to maintain Commercial General Liability insurance as specified in this Agreement for a minimum period of 3 years following completion and acceptance of the Work. The Contractor must submit a Certificate of Insurance evidencing Commercial General Liability insurance during this 3 year period containing all the Agreement insurance requirements, including naming the required Additional Insureds set forth herein.

11.3.8 If a Certificate of Insurance is submitted as verification of coverage, the City will reasonably rely upon the Certificate of Insurance as evidence of coverage but this acceptance and reliance will not waive or alter in any way the insurance requirements or obligations of this Agreement.

11.3.9 Insurance Cancellation During Agreement Term.

11.3.9.1 If any of the required policies expire during the life of this Agreement, the Contractor must forward renewal or replacement Certificates to the City within 10 Days after the renewal date containing all the required insurance provisions.

11.3.9.2 Each insurance policy required by the insurance provisions of this Agreement must provide the required coverage and must not be suspended, voided or canceled except after 30 Days prior written notice has been given to the City, except when cancellation is for non-payment of premium, then 10 Days prior notice may be given. Such notice must be sent directly to Chandler Law-Risk Management Department, Post Office Box 4008, Mailstop 628, Chandler, Arizona 85225. If any insurance company refuses to provide the require notice, the Contractor or its insurance broker must notify the City of any cancellation, suspension, non-renewal of any insurance within 7 Days of receipt of insurers' notification to that effect.

11.3.10 City as Additional Insured. The above-referenced policies are to contain, or be endorsed to contain, the following provisions:

11.3.10.1 The Commercial General Liability and Automobile Liability policies are to contain, or be endorsed to contain, the following provisions: The City, its officers, officials, agents, and employees are additional insureds with respect to liability arising out of activities performed by, or on behalf of, the Contractor including the City's general supervision of the Contractor; Products and Completed Operations of the Contractor; and automobiles owned, leased, hired, or borrowed by the Contractor.

11.3.10.2 The City, its officers, officials, agents, and employees must be additional insureds to the full limits of liability purchased by the Contractor even if those limits of liability are in excess of those required by this Agreement.

11.4 BONDS AND OTHER PERFORMANCE SECURITY

11.4.1 After Agreement award, Contractor must provide a Performance Bond and a Payment Bond, each in an amount equal to the full amount of the Agreement Price.

11.4.2 Each such bond must be executed by a surety company or companies holding a Certificate

of Authority to transact surety business in the State of Arizona, issued by the Director of the Arizona Department of Insurance and must be named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. A copy of the Certificate of Authority must accompany the bonds. The Certificate must have been issued or updated within two (2) years prior to the execution of this Agreement. The bonds must be written or countersigned by an authorized representative of the surety who is either a resident of the state of Arizona or whose principal office is maintained in this state, as by law required.

11.4.3 The bonds must be made payable and be acceptable to City. The bond forms for the performance and payment bonds must be in the forms required under A.R.S. § 34-221, *et. Seq.,* as in Appendices 4 and 5 of these General Conditions.

11.4.4 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Agreement Documents, Contractor must promptly furnish a copy of the bonds or must permit a copy to be made.

11.4.5 All bonds submitted for this Project must be provided by a company which has been rated AM Best rating of A- or better for the prior four quarters by the latest edition of the 'Results Best's Key Rating Guide (Property/Casualty)" published by the A.M. Best Company.

11.4.6 Personal or individual bonds are not acceptable.

11.4.7 If the surety on any Bond furnished by Contractor is declared a bankrupt or becomes insolvent, or Contractor's right to do business is terminated in any state where any part of the Project is located, or it ceases to meet the requirements of this Section 11.4, Contractor must within 5 Days thereafter substitute another Bond and surety, both of which must be acceptable to City.

SECTION 12 - INDEMNIFICATION

12.1 To the extent permitted by law, the Contractor and its owners, officers, directors, agents, employees, and subconsultants (collectively "lndemnitor") must indemnify, save, and hold harmless the City and its officers, officials, agents, and employees (collectively "lndemnitee") from any and all claims, actions, liabilities, damages, losses, or expenses (including court costs, attorneys' fees, and costs of claim processing, investigation, and litigation) (collectively "Claims") caused or alleged to be caused, in whole or in part, by the negligent, reckless, wrongful, or willful acts, errors, or omissions of Indemnitor in connection with this Agreement. This indemnity includes any Claim or amount arising out of or recovered under workers' compensation laws or on account of Indemnitor's failure to conform to any federal, state, or local law, statute, ordinance, rule, regulation, or court decree. Indemnitor must indemnify lndemnitee from and against any and all Claims, except those arising solely from lndemnitee's own negligent, reckless, wrongful, or willful acts, errors, or omissions. Indemnitor is responsible for primary loss investigation, defense, and judgment costs where this indemnification applies. In consideration of the award of this Agreement, Indemnitor agrees to waive all rights of subrogation against lndemnitee for losses arising from or related to this Agreement. Indemnitor's obligations under this provision survive the termination or expiration of this Agreement.

SECTION 13 -DISPUTE RESOLUTION

13.1 All disputes arising out of or relating to the Agreement, the Work or the Project, other than termination under Section 10, will be resolved pursuant to the Dispute Resolution process set forth in Appendix 6 of these General Conditions, and not pursuant to MAG Specifications § 110.

13.2 Contractor agrees that during any dispute between the parties, Contractor will continue to perform its obligations under the Agreement until such dispute is resolved.

13.3 Notwithstanding any other provision in this Agreement, City has the right to immediately file in court and pursue an action for a temporary restraining order and injunctive relief against Contractor if City determines that such action is necessary to protect its interests under the Agreement, to obtain specific performance of any provision of the Agreement, to advance the completion of the Project, or to protect health, welfare and safety.

SECTION 14 - MISCELLANEOUS PROVISIONS

14.1 AGREEMENT DOCUMENTS

14.1.1 The Agreement Documents are intended to permit the parties to complete the Work and all obligations required by the Agreement Documents within the Agreement Times for the Agreement Price. The Agreement Documents are intended to be complementary and interpreted in harmony so as to avoid conflict, with words and phrases interpreted in a manner consistent with construction and design industry standards.

14.1.2 It is the intent of the Agreement Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Agreement Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Agreement Documents or from prevailing custom or trade usage as being required to produce the intended result must be provided by Contractor whether or not specifically called for at no additional cost to City.

14.1.3 The Agreement Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Agreement Documents), Contractor's Bid or Proposal (including documentation accompanying the Bid and any post-Bid documentation submitted prior to Agreement award) when attached as an exhibit to the Agreement, the accepted Project Schedule, the Notice to Proceed, the Performance Bond, the Payment Bond, Project Design, Engineering and Specifications, these General Conditions, the Project Specific Special Provisions, Technical Specifications, Agreement Drawings, as the same may be more specifically identified in the Agreement, Change Orders, Work Change Directives, Field Orders and the written interpretations and clarifications of the Design Professional or City representative and Modifications issued after execution of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Agreement Documents.

14.1.4 In the event of any inconsistency, conflict, or ambiguity between or among the Agreement Documents, the Agreement Documents will take precedence as follows from highest to lowest: Change Orders, Addenda, Agreement, Project Specific Special Provisions, General Conditions, Technical Specifications, Drawings/Plans, Chandler Amendments to MAG Standard Specifications and Chandler Standard Details, and MAG Uniform Standard Specifications and Details for Public Works Construction. If applicable to this Agreement, Federal Provisions prevail.

14.1.5 On the Drawings, given dimensions will take precedence over scaled measurements and large scale drawings over small-scale drawings.

14.1.6 Clarifications and interpretations of the Agreement Documents will be issued by the Design Professional through the City.

14.1.7 The headings used in this Agreement or any other Agreement Documents, are for ease of reference only and must not in any way be construed to limit or alter the meaning of any provision.

14.1.8 The Agreement Documents form the entire agreement between City and Contractor. No oral representations or other agreements have been made by the parties except as specifically stated in the Agreement Documents.

14.1.9 The Agreement Documents may not be changed, altered, or amended in any way except in writing signed by a duly authorized representative of each party in the form of a Change Order.

14.1.10 Re-Use of Documents. Neither Contractor nor any Subcontractor, manufacturer, fabricator, supplier or distributor will have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of the Design Professional; and they must not re-use any of them on extensions of the Project or any other project without written consent of City and the Design Professional and specific written verification or adaptation by the Design Professional.

14.2 **REFERENCE STANDARDS**

14.2.1 Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, will mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Agreement Documents.

14.2.2 The provisions of any such standard, specification, manual or code, or any instruction of a Supplier will not change the duties or responsibilities of City, Contractor, Design Professional or Project Manager, or any of their Subcontractors, consultants, agents, or employees from those set forth in the Agreement Documents, nor will any such provision or instruction assign to City, Contractor, Design Professional, or any of their agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Agreement Documents.

14.3 **COMPLIANCE WITH ARIZONA LAW AND FEDERAL LAW**

14.3.1 Compliance with A.R.S. § 41-4401. Pursuant to the provisions of A.R.S. § 41-4401, the Contractor hereby warrants to the City that the Contractor and each of its subcontractors ("Subcontractors") must comply with all Federal Immigration laws and regulations that relate to the immigration status of their employees and the requirement to use E-Verify set forth in A.R.S. §23-214(A).

14.3.2 A breach of the Contractor Immigration Warranty constitutes a material breach of this Agreement and subject to penalties up to and including termination of this Agreement.

14.3.3 The City retains the legal right to inspect the papers of any Contractor or Subcontractor employee who works on this Agreement to ensure that the Contractor or Subcontractor is complying with the Contractor Immigration Warranty. The Contractor agrees to assist the City in the conduct of any such inspections.

14.3.4 The City may, at its sole discretion, conduct random verifications of the employment records of the Contractor and any Subcontractors to ensure compliance with Contractors Immigration Warranty. The Contractor agrees to assist the City in performing any such random verifications.

14.3.5 The provisions of this Article must be included in any agreement the Contractor enters into with any and all of its subcontractors who provide services under this Agreement or any subcontract. "Services" are defined as furnishing labor, time or effort in the State of Arizona by a contractor or subcontractor. Services include construction or maintenance of any structure, building or transportation facility or improvement to real property.

14.4 HAZARDOUS ENVIRONMENTAL CONDITIONS

14.4.1 Contractor will not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Agreement Document to be within the scope of the Work. Contractor will be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

14.4.2 If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition. Contractor must immediately:

a. Secure or otherwise isolate such condition;

b. Stop all Work in connection with such condition and in any area affected thereby; and

c. Notify City and promptly thereafter confirm such notice in writing.

14.4.3 City will promptly retain a qualified expert to evaluate such condition or take corrective action, if any.

14.4.4 Contractor will be responsible for any and all civil or criminal penalties, fines, damages, or other charges imposed by any regulatory agency or court for sewage discharges that are in violation of applicable statutes and laws and that are a result, direct or indirect, of work performed under this Agreement. Contractor will also be responsible for reimbursement to City for administration, reporting, and tracking expenses required as a result of any spill event. In the event the regulatory agency or court imposes a probationary period, Contractor must post bond for the probationary period to ensure that all such costs are reimbursed to City. This responsibility will apply whether penalties are imposed directly on Contractor or any of its Subcontractors, or the City of Chandler. Contractor must defend and indemnify City against such penalties. Regulatory agencies may include, but are not limited to, the Arizona Department of Environmental Quality (ADEQ) and the United States Environmental Protection Agency (USEPA).

14.5 COOPERATION AND FURTHER DOCUMENTATION

Contractor agrees to provide City such other duly executed documents as may be reasonably requested by City to implement the intent of the Agreement Documents.

14.6 **ASSIGNMENT**

Neither Contractor nor City will, without the written consent of the other assign, transfer or sublet any portion of this Agreement or part of the Work or the obligations required by the Agreement Documents, any such assignment will be void, will transfer no rights to the purported assignee, and would be a material breach of the Agreement.

14.7 **SUCCESSORS**

Contractor and City intend that the provisions of the Agreement Documents are binding upon the parties, their employees, agents, heirs, successors and assigns.

14.8 **LAWFUL PRESENCE**

Pursuant to A.R.S. §§ 1-501 and 1-502, City is prohibited from awarding an agreement to any natural person who cannot establish that such person is lawfully present in the United States. To establish lawful presence, a person must produce qualifying identification and sign a City-provided affidavit affirming the identification provided is genuine. This requirement will be imposed at the time of agreement award. This requirement does not apply to business organizations such as corporations, partnerships, or limited liability companies.

14.9 **NO BOYCOTT OF ISRAEL CERTIFICATION**

By Contractor's signature on this Agreement, Contractor certifies under A.R.S. § 35-393.01 that Contractor is not currently engaged in and for the duration of this Agreement will not engage in a boycott of Israel.

14.10 **NO THIRD PARTY BENEFICIARY**

Nothing under the Agreement Documents will be construed to give any rights or benefits in the Agreement Documents to anyone other than City and Contractor, and all duties and responsibilities undertaken pursuant to the Agreement Documents will be for the sole and exclusive benefit of City and Contractor and not for the benefit of any other party, unless otherwise expressly set forth in the Agreement Documents.

14.11 **GOVERNING LAW AND VENUE**

The Agreement and all Agreement Documents will be deemed to be made under, and will be construed in accordance with and governed by the laws of the State of Arizona without regard to the conflicts or choice of law provisions thereof. Any court action to enforce any provision of the Agreement or to obtain any remedy with respect hereto must be brought in the Superior Court, Maricopa County, Arizona, and for this purpose, each party hereby expressly and irrevocably consents to the jurisdiction and venue of such Court.

14.12 **SEVERABILITY**

If any provision of the Agreement Documents or the application thereof to any person or circumstance will be invalid, illegal or unenforceable to any extent, the remainder of the affected provision, the remainder of the Agreement Documents, and the application thereof will not be affected and will be enforceable to the fullest extent permitted by law.

14.13 **LEGAL REQUIREMENTS**

At all times relevant to its entry into this Agreement and performance of the Services and the Work, Contractor must fully comply with all Laws, Regulations, or Legal Requirements applicable to City, the Project, and the Agreement, including, without limitation, those set

forth on Exhibit C of the Agreement.

14.14 **PARTIAL INVALIDITY**

If any provision of the Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force without being impaired or invalidated in any way.

14.15 **ATTORNEYS' FEES**

Should either party to the Agreement bring an action to enforce any provision of the Agreement, the prevailing party will be entitled to recover reasonable attorneys' fees and costs in connection therewith.

14.16 **CONFLICT OF INTEREST**

14.16.1 Contractor agrees to disclose any financial or economic interest with the Project property, or any property affected by the Project, existing prior to the execution of the Agreement. Further, Contractor agrees to disclose any financial or economic interest with the Project property, or any property affected by the Project, if Contractor gains such interest during the course of this Agreement. If Contractor gains financial or economic interest in the Project during the course of this Agreement, this may be grounds for terminating this Agreement. Any decision to terminate the Agreement must be at the sole discretion of City.

14.16.2 Contractor will not engage the services on this Agreement of any present City employee who was involved as a decision maker in the selection or approval processes, or who negotiated or approved billings or Agreement Modifications for this Agreement.

14.16.3 Contractor agrees that it will not perform services on this Project for a contractor, subcontractor, or any supplier, not covered under this Agreement.

14.17 **INDEPENDENT CONTRACTOR**

Contractor is and must be an independent contractor. Any provisions in the Agreement Documents that may appear to give City the right to direct Contractor as to the details of accomplishing the Work or to exercise a measure of control over the Work means that Contractor must follow the wishes of City as the results of the Work only. These results must comply with all applicable laws and ordinances.

14.18 **NOTICE OF INJURY**

Should City or Contractor suffer injury or damage to their person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim must be made in writing to the other party within 7 Days of the first observance of such injury or damage.

14.19 **CONFIDENTIALITY**

Contractor, for the benefit of City, hereby agrees it will not release or cause or permit to be released to the public any press notices, publicity (oral or written) or advertising promotion relating to, any statement regarding, or any other public announcement or disclosure or cause or permit to be publicly announced or disclosed, in any manner whatsoever, the specific terms and conditions of this Agreement or any comment relating to the Project or the Site. Notwithstanding the foregoing, Contractor will be entitled to disclose the terms of the Agreement to the extent required by law or in the course of enforcing or defending a claim or action hereunder. Contractor must give City reasonably prompt notice of any disclosure or statement made pursuant to this provision.

14.20 **DATA CONFIDENTIALITY**

14.20.1 As used in the Agreement, "data" means all information, whether written or verbal, including plans, specifications, renderings, photographs, studies, investigations, audits, analyses, samples, reports, calculations, internal memos, meeting minutes, data field notes, work product, proposals, correspondence and any other similar documents or information prepared by, obtained by, or transmitted to the City in the performance of this Agreement.

14.20.2 Contractor agrees that all data, regardless of form, including originals, images, and reproductions, prepared by, obtained by, or transmitted to City in connection with the Contractor's performance of this Agreement is confidential and proprietary information belonging to City.

14.20.3 Except as specifically provided in this Agreement, Contractor or its Subcontractors must not divulge data to any third party without prior written consent of City. Contractor or its Subcontractors must not use data for any purposes except to perform Work required under this Agreement. These prohibitions will not apply to the following data provided Contractor has first given the required notice to City:

a. Data which was known to Contractor or its Subcontractors prior to its performance under this Agreement unless such data was acquired in connection with Work performed for City;

b. Data which was acquired by Contractor or its Subcontractors in its performance under this Agreement and which was disclosed to Contractor or its Subcontractors by a third party, who to the best of Contractor's or its Subcontractor's knowledge and belief, had the legal right to make such disclosure and Contractor or its Subcontractors are not otherwise required to hold such data in confidence; or

c. Data which is required to be disclosed by virtue of law, regulation, or court order, to which the Contractor or its Subcontractors are subject.

14.20.4 In the event the Contractor or its Subcontractors are required or requested to disclose data to a third party, or any other information to which the Contractor or its Subcontractors became privy as a result of any other agreement with City, the Contractor must first notify City as set forth in this Section of the request or demand for the data. The Contractor or its Subcontractors must give City sufficient facts so that City can be given an opportunity to first give its consent or take such action that City may deem appropriate to protect such data or other information from disclosure.

14.20.5 Unless prohibited by law, within 10 Days after completion of services for a third party on real or personal property owned or leased by City, the Contractor must promptly deliver, as set forth in this Section, a copy of all data to City. All data will continue to be subject to the confidentiality agreements of this Agreement.

14.20.6 Contractor or its Subcontractors assume all liability for maintaining the confidentiality of the data in its possession and agree to compensate City if any of the provisions of this Section are violated by Contractor, its employees, agents, or Subcontractors. Solely for the purposes of seeking injunctive relief, it is agreed that a breach of this Section will be deemed to cause irreparable harm that justified injunctive relief in court. Contractor agrees that the requirements of this Section will be incorporated into all subcontracts entered into by Contractor. A violation of this Section may result in immediate termination of this

Agreement without notice.

14.21 **SURVIVAL**

All warranties, representations and indemnifications by Contractor must survive the completion or termination of this Agreement.

14.22 **COVENANTS AGAINST CONTINGENT FEES**

Contractor warrants that no person has been employed or retained to solicit or secure this Agreement upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, and that no member of City Council, or any employee of City has any interest, financially, or otherwise, in the firm. For breach or violation of this warrant, City will have the right to annul the Agreement without liability or at its discretion to deduct from the Agreement Price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

14.23 **NO WAIVER**

The failure of either party to enforce any of the provisions of the Agreement Documents or to require performance of the other party of any of the provisions hereof must not be construed to be a waiver of such provisions, nor will it affect the validity of the Agreement Documents or any part thereof, or the right of either party to thereafter enforce each and every provision.

14.24 **NONEXCLUSIVE REMEDIES**

The remedies set forth in this Agreement are cumulative and not exclusive, and failure to exercise any remedy (including, without limitation, any right to terminate) will not preclude any party from exercising any other right in seeking any other remedy available to it at law or in equity.

14.25 **PROJECT COMMUNICATIONS**

14.25.1 All communications concerning the performance of the Work or the Project will be provided to the designated Project Manager and Contractor's Representative set forth in Article 1 of the Agreement. City may change the designated Project Manager and, subject to Section 4.4.20 of these General Conditions, Contractor may change Contractor Representative, by written notice to the other.

14.25.2 Project communications may be exchanged by e-mail, but email communications cannot change the terms of the Agreement or the Scope of Work, or effectuate any change that requires a written Change Order.

14.25.3 When any provisions of the Agreement Documents requires Contractor or the Design Professional to give written notice to City, it will be deemed to have been validly given if delivered in person or if delivered at or sent by registered or certified mail, postage prepaid, to the Parties indicated in Agreement Article 1, incorporated by reference.

14.25.4 When any provisions of the Agreement Documents requires City, Project Manager, or the Design Professional to give written notice to Contractor, it will be deemed to have been validly given if delivered in person to the person designated in the Agreement Documents as Contractor's Resident Superintendent, or if delivered at or sent by registered or certified mail, postage prepaid, to Contractor at the last address in the Agreement Documents or such substitute address which Contractor designates in writing, or to the business address known to the giver of notice.

14.26 **DRUG FREE WORKPLACE PROGRAM**

14.26.1 City has adopted a policy establishing a drug free workplace for itself and as a requirement for Contractors doing business with City, to ensure the safety and health of employees working on City projects.

14.26.2 Contractor must require a drug free workplace for all employees working under the Agreement. Specifically, all employees of Contractor who are working under an agreement with City must be notified, in writing, by Contractor that they are prohibited from the manufacture, distribution, dispensation, possession or unlawful use of a controlled substance in the workplace.

14.27 Failure to require a drug free workplace in accordance with the City's policy may result in termination of the Agreement and possible debarment form bidding on future City projects.

SECTION 15 - PROVISIONS APPLICABLE SOLELY TO GMP AND COST-BASED AGREEMENTS, CHANGE ORDERS, AND JOB ORDERS

15.1 **ADDITIONAL DEFINITIONS**

The definitions set forth in Section 2 apply to GMP and Cost-Based Agreements, Change Orders, and Job Orders, together with the additional definitions set forth below.

Baseline Cost Model –
A breakdown and estimate of the scope of the Project developed by CM@Risk pursuant to Section 17.5 of these General Conditions.

CM@Risk or Construction Manager at Risk –
The person or firm selected by City to provide pre-construction and/or construction services as detailed in a Construction Manager at Risk Agreement with City. In these General Conditions, the term "Contractor" includes CM@Risk under both Pre-Construction and Construction Services Agreements.

CM@Risk Fee or Contractor's Fee –
An agreed to percentage in an accepted GMP that represents the Contractor's fee for performance of the Work.

Agreement Documents –
Where compensation under the Agreement is based upon a GMP accepted by City, the term "Agreement Documents" also includes the accepted GMP Proposal.

Agreement Price –
Where compensation under the Agreement based upon a GMP accepted by City, the term "Agreement Price" refers to the GMP.

Cost-Based Agreement, Change Order, or Job Order –
A Agreement, Change Order, or Job Order where the Agreement Price is based upon the actual cost of performing the Work, subject to the terms of the Agreement Documents, including this Section 15. These would include those generally referred to as "Cost of the Work plus a Fee with a GMP," "Time and Materials," or "Cost Plus a Fee."

Cost of the Work –
The direct costs necessarily incurred by Contractor in the proper, timely, and complete performance on the Work. The Cost of the Work will include only those costs set forth in Section 15.2 of these

General Conditions.

Deliverables –
The work products prepared by Contractor in performing the scope of work described in the Agreement. Some of the major deliverables to be prepared and provided by Contractor during pre-construction may include but are not limited to: the Baseline Cost Model and Schedule that validate City's plan and budget, Construction Management Plan, Detailed Project Schedule, Schedule of Values, alternative system evaluations, procurement strategies and plans, Detailed Cost Estimates, construction market surveys, cash flow projections, GMP Proposals, Subcontractor procurement plan, Subcontractor agreements, Subcontractor bid packages, Supplier agreements, Constructability Review, Cost Control Log, Traffic control and phasing plans and others as indicated in this Agreement or required by the Project Team.

Pre-Construction Services Agreement –
The Agreement entered into between City and the CM@Risk for Pre-Construction Services to be provided by the CM@Risk, including, without limitation, the generation of a GMP Proposal. If the GMP Proposal is accepted by City and a Construction Agreement is entered into between City and CM@Risk, the duties, obligations and warranties of the CM@Risk under the Pre-Construction Services Agreement survive and are incorporated into the resulting Construction Agreement.

Pre-Construction Services –
The services to be provided under the Pre-Construction Services Agreement, including Section 17 of these General Conditions.

Detailed Project Schedule –
The Detailed Project Schedule developed by the CM@Risk for the review and approval of the Project Manager in accordance with Section 17.3 of these General Conditions, if applicable.

General Conditions Costs –
Those costs set forth in Section 4 of Appendix 9 to these General Conditions.

GMP Plans and Specifications –
The plan and specifications upon which the Guaranteed Maximum price Proposal is based.

GMP Proposal –
The proposal of Contractor submitted pursuant to Section 17.7 of these General Conditions for the entire Work and/or portion (phases) of the Work.

Guaranteed Maximum Price or GMP –
The Guaranteed Maximum Price set forth in the Agreement, Change Order, or Job Order if applicable.

15.2 **AGREEMENT PRICE**

15.2.1 The Agreement Price for all Agreements, Change Orders, and Job Orders based upon payment of the Cost of the Work plus a Fee with a GMP, time and materials, or cost-plus a fee will be the Cost of the Work incurred plus the Fee agreed to in writing by City, limited to the amount of the GMP, if agreed to. Unless otherwise expressly provided in the Agreement, Change Order, or Job Order, all Cost Based pricing will be subject to and limited to GMP.

15.2.2 The Agreement Price may only be changed as set forth in Section 9 above.

15.2.3 Only costs specifically designated as reimbursable costs are eligible for payment by City or may be charged against the Agreement Price. All other costs will not be paid by City and will not be chargeable against the Agreement Price.

15.2.4 Cost-Based Agreements. For Agreements, Change Orders, or Job Orders, reimbursable costs must be determined pursuant to Appendix 9 to these General Conditions, Cost of the Work, and not by MAG Specifications §109.5.

15.3 **ALLOWANCES**

15.3.1 Contractor must include in the Agreement Price all Allowances stated in the Agreement Documents and agreed to in writing by City. Items covered by these Allowances must be supplied for such amounts and by such persons as City may direct, provided Contractor will not be required to employ persons against whom Contractor makes a reasonable objection. Materials, labor, and equipment under an Allowance will be selected by City in accordance with a schedule to be mutually agreed upon by City, Design Professional and Contractor or otherwise in reasonably sufficient time to avoid delay in the Work.

15.3.2 Unless otherwise provided in the Agreement Documents:

15.3.2.1 These Allowances must cover the cost to Contractor, less any applicable trade discount, of the materials, labor, and equipment required by the Allowances, delivered at the Site, and all applicable taxes;

15.3.2.2 Contractor's costs for unloading and handling on the Site, labor, installation costs, overhead, profit and other expenses relating to materials, labor, and equipment required by the Allowance must be included in the Agreement Sum and not in the Allowance; and

15.3.2.3 Whenever the cost is more or less than the Allowance, the Agreement Sum must be adjusted accordingly by Change Order, the amount of which will recognize the difference between actual costs for an Allowance item and the amount of the Allowance item and changes, if any, in handling costs on the Site, labor, installation costs, overhead, profit and other expenses.

15.4 **CONTINGENCY**

An agreed to amount in the GMP that may only be used in accordance with the terms set forth in these General Conditions and with prior written approval by the City.

15.4.1 Construction Contingency. This GMP includes a dollar amount listed as a Construction Contingency which will be readily available for increased costs for subcontractors, material, and equipment subject to prior approval of City, which approval will not be withheld unreasonably. The Construction Contingency may also be used, at the discretion of City, to reimburse CM@Risk for unexpected costs due to (a) scope gaps between trade subcontractors; (b) agreement default by trade subcontractors; (c) unforeseen field conditions, but only as defined in Section 9.5 above; (d) work completed to meet the intent of the design, but which was not indicated on the plans; (e) costs overruns not covered by allowances; (f) costs of corrective work not provided for elsewhere; and (g) implementation of any Recovery Plan. Cost for which CM@Risk desires to be paid from the Construction Contingency must be documented by CM@Risk on a time and materials basis and are subject to verification by City. If agreed to by City, a "Use of Contingency" form will be executed by both parties authorizing the actual cost of the work to be paid and included in the Work Item Direct Costs. The Construction Contingency is not allocated to any particular

item of the Project but may be used for any portion of the work as determined above. Any amount not used in the Construction Contingency will belong to City and will reduce the GMP.

15.4.2 Owner's Contingency. This GMP also includes a dollar amount listed as an Owner's Contingency which may be used only by the City (owner department) for upgrades and changes in scope or other changes not already included within the intent of the Project Program. City will provide CM@Risk with a Work Change Directive authorizing CM@Risk to perform the additional work and to transfer funds from the Owner's Contingency to the Work Item Direct Costs category to be paid with such direct costs. These additional costs will be in an amount mutually agreed upon by CM@Risk and City or will be documented by CM@Risk on a time and materials basis and are subject to verification by City. Any amount not used in the Owner's Contingency will belong to the City and will reduce the GMP.

15.5 **REDUCTION IN RETENTION**

If the Agreement Price is based upon a GMP, in order to receive payment of one-half of the retention as set forth in Section 8.1.5 above, Contractor must also submit to the Project Manager a complete accounting of the Actual Reimbursable Cost of the Work to date, including all such documentation (including, without limitation, invoices, subcontract, subcontractor change orders, purchase orders, records of payment, etc.) as City may require, to establish whether the payments made to Contractor equal, exceed, or are less than the actual reimbursable Cost of the Work to date. Any excess payments by City, as determined by the Project Manager, will be deducted from the one-half retention payment to be made to Contractor, and any additional excess amounts paid to Contractor will be refunded by Contractor to City. The Project Manager's determinations as to Actual Reimbursable Cost of the Work will be the basis of payment until final Project Closeout and Final Payment under the Agreement.

15.6 **FINAL PAYMENT**

If the Agreement Price is based upon a GMP, as a further condition precedent to Final Payment by City, Contractor must submit to the Project Manager a complete final accounting of the Actual Reimbursable Cost of the Work, including all such documentation (including, without limitation, invoices, subcontracts, subcontractor change orders, purchase orders, records of payment, etc.) as City may require, to establish whether the payments made to Contractor equal, exceed, or are less than the Actual Reimbursable Cost of the Work to date. Any excess payments by City, as determined by the Project Manager, will be deducted from the one-half retention payment to be made to Contractor, and any additional excess amounts paid to Contractor will be refunded by Contractor to City. Disputes relating to the Final Cost of the Work will be subject to City's audit rights under Sections 8.8 above and 15.7 below, and the dispute resolution process under Section 13 above.

15.7 **OPEN BOOK**

On any GMP-based or Cost-Based Agreement, Job Order, or Change Order, City may attend any and all meetings or discussions pertaining to the Project, including bid openings, and must have access to all books, invoices, accounts, memoranda, correspondence, and written communications or records of any kind pertaining to the Project, including without limitation, those stored in electronic format.

15.8 **DIFFERING SITE CONDITIONS AND/OR CHANGE IN LAWS**

A Change Order for increased costs under Section 9.5 or 9.6 above will only be considered

or granted by City to the extent such actual, documented costs are justified.

SECTION 16 - PROVISIONS APPLICABLE SOLELY TO JOB ORDER AGREEMENTS (JOC)

16.1 **ADDITIONAL DEFINITIONS**

The definitions set forth in Sections 2 and below will apply to all Job Order Agreements and Job Orders. In addition, the definitions set forth in Section 15.1 above will apply to all Cost-Based Job Orders.

Agreement –
Includes the Job Order Master Agreement and Job Order Project Agreements issued and agreed to by City and JOC Contractor.

JOC Contractor's Coefficient –
A numerical factor that represents JOC Contractor total costs (indirect and direct costs, sales tax, profit, etc.) and other adjustments for market conditions.

Job Order Request for Proposal (RFP) –
The Request for Proposals issued by City for each Job Order Project Agreement relating to a specific Project.

Job Order Cost Proposal –
The Proposal submitted by JOC Contractor in response to a Job Order Request for Proposal (RFP) issued by City to develop a Job Order Project Agreement for a specific Project.

Guaranteed Maximum Price (GMP) Job Order –
Job Order under which JOC Contractor is compensated for actual costs incurred.

Job Order Project Agreement (Job Order) –
The agreement for a specific project, as it may be modified by all Change Orders, executed by the Parties, which incorporates the terms and conditions of the Job Order Master Agreement.

16.2 **ORDERING AND PROCESSING PROCEDURES FOR JOB ORDERS**

16.2.1 The process for developing and issuing a Job Order for a particular Project consists of three (3) procedures: (1) issuance of a RFP by City; (2) JOC Contractor's response to the RFP in the form of JOC Contractor's Job Order Cost Proposal; and (3) Issuance of a Job Order by City, as set for below.

16.2.2 RFP's For Job Orders

16.2.2.1 City will provide to JOC Contractor RFP with a Scope of Work (SOW) describing the Work to be performed, which may include special instructions and conditions, material submittal requirements, and, if applicable, a complete set of sketches, construction drawings and specifications for the Job Order.

16.2.2.2 Some Job Order RFP's will be issued by City without detailed sketches, drawing and specifications and will rely on JOC Contractor to produce them for City review and approval and is considered to be Pre-Construction and incidental design services included in JOC Contractor's overhead for GMP Job Orders. In addition JOC Contractor will not be reimbursed for any Pre-Job Order costs, including proposal preparation, attendance during negotiations, or site visits.

16.2.3 JOC Contractor's Job Order Cost Proposal

16.2.3.1 JOC Contractor must respond within ten (10) calendar days of the RFP date or site visit, whichever is later or as otherwise indicated on a case-by-case basis, by submitting JOC Contractor's Job Order Cost Proposal to the City representative.

16.2.3.2 Unless otherwise required under the terms of the RFP, JOC Contractor's Job Order Cost Proposal must include the following.

a. JOC Contractor's Job Order Cost Proposal in PDF and electronic format;

b. A Project Schedule and schedule of values that reflects the costs of each work element on the schedule. The schedule must show all milestones (e.g., permits, submittals, ordering materials, demolition, work phases, closeout and completion date); and

c. Necessary documentation will be required to indicate that adequate scoping, layout, setup and planning to accomplish the Work has been done. Examples of documentation that might reasonably be expected include sketches, drawings, calculations, catalog cuts and specifications produced to a level of detail and skill that could be expected of experienced, competent Project Managers with five or more periods experience in their respective trade.

16.2.3.3 JOC Contractor must select Subcontractors based on qualifications alone or on a combination of qualifications and price and must not select Subcontractors based on price alone. A qualifications and price selection may be a one-step selection based on a combination of qualifications and price or two-step selection. In a two-step selection, the first step must be based on qualifications alone and the second step may be based or a combination of qualifications and price or on price alone.

16.2.3.4 Upon request, JOC Contractor must provide City with copies of Subcontractor quotes and the basis for selection of each Subcontractor.

16.2.3.5 If City objects to a selected Subcontractor, City will make the objection and the reasons for the objection known to the JOC Contractor. JOC Contractor must then present an acceptable Subcontractor for the applicable discipline. City will not unreasonably object to or withhold approval of a Subcontractor.

16.2.3.6 For self-performed work, the City retains the right to have the JOC Contractor establish JOC Contractor's costs by bidding their costs against at least three (3) other interested trade Contractors. No self- performed work will be allowed to be performed on a lump sum basis.

16.2.4 Issuance of Job Order

16.2.4.1 City Representative will compare the JOC Contractor's Job Order Cost Proposal with the City's estimate, schedules and other requirements, and then, if the City Representative determines it is in the best interest of City, arrange a meeting with JOC Contractor, at which time the JOC Contractor's Job Order Cost Proposal will be discussed and negotiated.

16.2.4.2 If the City Representative determines that it is in the best interest of the City, City will then issue a Job Order to JOC Contractor for execution.

16.2.4.3 Specific Job Orders may vary, but unless agreed to by City in writing otherwise, the content

of Job Orders under the Agreement will generally be as follow, all of which will be signed and/or initialed by JOC Contractor's designated representative:

a. The description of the Scope of the Work and Project Schedule (attached as Exhibit A to the Job Order);

b. The address or location of the Work;

c. The Agreement Price for Work (Construction) included in the Project (attached as Exhibit B to the Job Order);

d. The name of the JOC Contractor representative for the Project;

e. The Drawings and Specifications for the Project;

f. If any shop drawings, project date and/or samples are required for the Job Order, the date for delivery of each required item (included in the Project Schedule, Exhibit A to the Job order); and

g. Project Specific Provisions, if any, in Exhibit A to the Job Order, including, without limitation, whether any of the following are required: Pre-Construction Conference, weekly progress meetings, field office, storage enclosure, materials and equipment handling facility, submittals, shop drawings, product data, equipment list, samples, project manual, schedule of values, Construction progress schedule, narrative reports, progress report, progress charts, progress photographs, materials status report, Construction diagram, Construction status report, operation and maintenance data, operating maintenance instructions and parts list, and as-build drawings.

16.2.5 Job Order Intent. Each Job Order will be interpreted to include all items reasonably necessary to complete the Project under that Job Order as described in the scope of the Work in that Job Order. All Work must be performed in a professional manner and all materials used must be new and of the highest quality and of the type best adapted to their purpose, unless otherwise specified. The Notice to Proceed date, and the award date established therein, will be deemed an integral part of the Job Order the same as if set forth therein.

16.3 **INCIDENTAL DESIGN SERVICES**

16.3.1 This effort includes all "extensions of design" for systems that are typically specified in a performance oriented manner by consultants and designers. Examples include: fire sprinkler systems, fire alarm and sprinkler systems, DDC controls, control systems, prefabricated metal building and similar situations. These designs are normally provided under submittals as a shop drawing with engineering backup and as appropriate, seals of registered engineers specializing in the particular system.

16.3.2 Incidental design includes all documents, sketches, schematic diagrams, floor plan layouts, equipment schedules and other documents produced by the JOC Contractor to define the work required for projects that the City does not develop formal or abbreviated designs requiring a seal by a registered engineer. Incidental design does not include preparation of designs requiring an architect or engineer seal.

16.3.3 JOC Contractor represents, covenants, and agrees, and contractually assumes the obligation to furnish, all of the required Design Services through properly licensed and

experienced Design Professionals in complete accordance with all of the duties imposed on a Design Professional under the Agreement Documents, Laws, Regulations, or Legal Requirements, and the common law.

16.3.4 All Design Documents (and all other Project-related documents, models, computer drawings and other electronic expression, photographs and other expressions CADD, and BIM files and images included) that JOC Contractor and/or JOC Contractor's Design Professional(s) prepare in connection with a Job Order and the copyrights therein (collectively, the "Instruments of Service") will be the property of City. JOC Contractor covenants and agrees to execute any additional document reasonably requested by City to confirm such assignment without any additional compensation.

16.4 **CONSTRUCTION SERVICES**

16.4.1 The following subsections of this Section 16.4 set forth requirements beyond those set forth in Section 4 above which apply to Construction Services performed under a Job Order.

16.4.2 JOC Contractor must perform the Work using only those firms, team members and individuals designated by JOC Contractor consistent with each Job Order or otherwise approved by City pursuant to the General Conditions. No other entities or individuals may be used without the prior written approval of the Project Manager.

16.4.3 Construction Phasing

16.4.3.1 City use of the facilities is anticipated while the Work is being performed. The Work must be planned and accomplished so that there will be a minimum of interference and inconvenience to occupants in the building and agencies in the vicinity and to other craftsmen who may have to do work in the affected facilities. Any blockage of building exits or driveways must be coordinated in advance.

16.4.3.2 If applicable, furniture, portable office equipment and wall appurtenances not rigidly fastened to the walls must be moved by JOC Contractor, protected from damage and replaced to the original position upon completion of the work. If the work required by the Job Order will not allow furniture and portable office equipment to be replaced to its original position, new locations will be designated by City. Incidental costs associated with moving one-piece furnishings up to approximately 150 pounds to perform such tasks as painting, carpet or tile replacement, etc., are considered a general cost of building renovation and must be included in the JOC Contractor's Coefficient. Costs for large scale or wholesale removal and replacement of large quantities of desks or modular workstations, copiers, multiple full file cabinets, etc. to another location or storage outside the work space, or disassembly and reassembly of modular furniture is not considered part of the JOC Contractor's Coefficient and will be priced separately.

16.4.3.3 The work must, so far as practicable, be done in definite sections or divisions and confined to limited areas which must be completed before work in other sections or divisions are begun.

16.4.4 Work Site Conflicts. In the event of a conflict between JOC Contractor and others in an occupied facility or where other Contractors are performing work on the same facility under other Agreements, City will decide to dispute and that decision will be final.

16.4.5 Ownership of Work Product. Work Product prepared or otherwise created in connection

with the performance of this Agreement, including the Work, are to be and remain the property of City. For purposes of this provision, "Work Product" will include all designs, drawings, plans, specifications, ideas, renderings and other information or matter, in whatever form created (e.g., electronic or printed) and in all media now known or hereinafter created. All Work Product will be considered Work Made for Hire as defined in the United States Copyright Act 17 U.S.C. §101 (Copyright Act). If for any reason any such Work is found not to be a work for hire, JOC Contractor hereby transfers and assigns ownership of the copyright in such Work to City. The rights in this Section are exclusive to City in perpetuity.

16.5 **OPTIONAL LIQUIDATED DAMAGES**

16.5.1 Specific Job Orders. City will have the right to assess liquidated damages in relation to any specific JOC Project Agreement as set forth below.

16.5.2 Substantial Completion Liquidated Damages. JOC Contractor acknowledges and agrees that if JOC Contractor fails to obtain Substantial Completion of the Work within the Agreement Time, City will sustain extensive damages and serious loss as a result of such failure. The exact amount of such damages will be extremely difficult to ascertain. Therefore, City and JOC Contractor agree that if JOC Contractor fails to achieve Substantial Completion of the Work within the Agreement Time, City will be entitled to retain or recover from JOC Contractor, as liquidated damages and not as a penalty, the sum per calendar day as indicated in MAG § 108.9.

16.5.3 Final Acceptance Liquidated Damages. For the same reasons set forth in Section 16.5.2 above, City and JOC Contractor further agree that if JOC Contractor fails to achieve Final Acceptance of the Work within the Agreement Time, City will be entitled to retain or recover from JOC Contractor, as liquidated damages and not as a penalty, the sum per calendar day as indicated in MAG § 108.9 commencing from the actual date of Substantial Completion or Final Acceptance as required under any specific JOC Project Agreement.

16.5.4 MAG Liquidated Damages. Liquidated damages provisions in MAG § 108.9 may apply to any specific JOC Project Agreement.

16.5.5 City may deduct liquidated damages assessed pursuant to this Section 16.5 from any unpaid amounts then or thereafter due JOC Contractor under the Agreement or any specific JOC Project Agreement between JOC Contractor and City. Any liquidated damages not so deducted from any unpaid amounts due JOC Contractor must be payable to City at the demand of City, together with interest from the date of the demand at the highest lawful rate of interest payable to JOC Contractor.

16.6 **PERFORMANCE MEASUREMENT**

16.6.1 Performance Assessment. After the Final Acceptance of Work under each Job Order, City will complete a written evaluation of the performance of JOC Contractor on the Job Order.

16.6.2 Consideration in Assignment of Work. JOC Contractor's record of cost, schedule and quality performance and comparative assessments will be significant considerations in City's determination whether to award future Job Orders. JOC Contractor agrees that any determination by City not to not award future Job Orders or Option periods based on performance will be at the sole discretion of City.

SECTION 17 - PROVISIONS APPLICABLE SOLELY TO PRE-CONSTRUCTION SERVICES FOR CONSTRUCTION MANAGER AT RISK

17.1 ADDITIONAL DEFINITIONS

The definitions set forth in Section 2 and 15.1 above will apply to all Pre-Construction Services Agreements.

17.2 GENERAL

17.2.1 CM@Risk must perform the Services required by, and in accordance with the Agreement Documents and as outlined in Exhibit A of the Agreement to the satisfaction of the Project Manager, exercising the degree of care, skill, diligence and judgment a professional construction manager experienced in the performance of such services for construction and/or facilities of similar scope, function, size, quality, complexity and detail to the Project in urban areas throughout the United States, would exercise at such time, under similar conditions. CM@Risk must, at all times, perform the required services consistent with sound and generally accepted engineering principles and construction management and construction contracting practices.

17.2.2 As a participating member of the Project Team, CM@Risk must provide to City and Design Professional a written evaluation of City's Project Program and budget, each in terms of the other, with recommendations as to the appropriateness of each. CM@Risk must prepare a Baseline Cost Model that validates City's budget. The Baseline Cost Model must include all assumptions and basis of estimates in enough detail so that the Project Team can compare future detail estimates to the Baseline Cost model for variances. City and Design Professional will provide all the reasonably required data that is available in order to reach agreement between the team members that the Baseline Cost Model is an accurate projection of the costs of the Project.

17.2.3 CM@Risk must attend Project Team meetings, which may include, but are not limited to, bi- weekly Project management meetings, Project workshops, special Project meetings, construction document rolling reviews, public meetings and partnering sessions. CM@Risk attendance at design or other meetings in which CM@Risk is provided the opportunity but does not actively participate and/or is not properly prepared is not acceptable. Repeated instances of non-participation and/or lack of preparedness will be grounds for termination of CM@Risk Agreement for default.

17.2.4 CM@Risk must provide Pre-Construction Services, described herein, in a timely manner and consistent with the intent of the most current Drawings and Specifications. CM@Risk must promptly notify City in writing whenever CM@Risk determines any Drawings or Specifications are inappropriate for the Project and/or cause changes in the scope of Work that deviates more than the allowed contingencies within the Baseline Cost Model or requires an adjustment in the Baseline Cost Model, Detailed Cost Estimate, Detailed Project Schedule, GMP Proposals and/or in the Agreement Time for the Work, to the extent such as established.

17.2.5 CM@Risk when requested by City, must attend, make presentations and participate as may be appropriate in public agency and or community meetings, relevant to the Project. CM@Risk must provide drawings, schedule diagrams, budget charges and other materials describing the Project when their use is required or appropriate in any such public agency meetings.

17.2.6 Ownership of Work Product. All Work Product prepared or otherwise created in connection with the performance of this Agreement, including the Work, are to be and remain the property of City. For purposes of this provision, "Work Product" will include all designs, drawings, plans, specifications, ideas, renderings and other information or material, in whatever form created (e.g., electronic or printed) and in all media now know or hereinafter created. All Work Product will be considered Work Made for Hire as defined in the United States Copyright Act 17 U.S.C.
§101 (Copyright Act). If for any reason any such Work is found not to be a work for hire, Contractor hereby transfers and assigns ownership of the copyright in such Work to City. The rights in this Section are exclusive to City in perpetuity.

17.2.7 CM@Risk represents to City in completing Pre-Construction Services and providing the reports and analysis required thereunder, that Work can be properly and timely constructed within the GMP Proposal, if accepted. CM@Risk does not assume any design responsibilities unless specifically called for in the scope of work, but CM@Risk will be responsible for their errors, omissions or inconsistencies included in the Work.

17.3 **DETAILED PROJECT SCHEDULE**

17.3.1 The fundamental purpose of the Detailed Project Schedule is to identify, coordinate and record the tasks and activities to be performed by all of the Project Team members and then for the Project Team to utilize that Deliverable as a basis for managing and monitoring all member's compliance with the schedule requirements of the Project. Each Project Team member is responsible for its compliance with the Detailed Project Schedule requirements. CM@Risk must, however, develop and maintain the Detailed Project Schedule on behalf of and to be used by the Project Team based on input from the other Project Team members. The Baseline Project Schedule must be developed as part of the Baseline Cost Model. The Detailed Project Schedule must use the Critical Path method ("CPM") technique, unless required otherwise, in writing by City. CM@Risk must use scheduling software acceptable to City to develop the Detailed Project Schedule. The Detailed Project Schedule must be presented in graphical and tabular reports as agreed upon by the Project Team. If Project phasing as described below is required, the Detailed Project Schedule must indicate milestone dates for the phases once determined. As part of construction phase, City may require CM@Risk to prepare a "resource loaded" schedule for all work, including work performed by Subcontractors, detailing each of the project tasks and the required/anticipated number of personnel per day for each task. CM@Risk must also indicate on the schedule its ability to meet said required/anticipated personnel requirements.

17.3.2 CM@Risk must include and integrate in the Detailed Project Schedule the services and activities required of City, Design Professional and CM@Risk including all construction phase activities based on the input received from City and the Design Professional. The Detailed Project Schedule must define activities as determined by City to the extent required to show: (a) the coordination between preliminary design and various pre-construction documents, (b) any separate long-lead procurements, (c) any permitting issues, (d) any land, right-of-way, or easement acquisition, (e) bid packaging strategy and awards to Subcontractors and Suppliers, (f) major stages of construction, (g) start-up and commissioning, and (h) occupancy of the completed Work by City. The Detailed Project Schedule must include by example and not limitation, proposed activity sequences and durations for design, procurement, construction and testing activities, milestone dates for actions and decisions by the Project Team, preparation and processing of shop drawings

and samples, delivery of materials or equipment requiring long-lead time procurement (if any), milestone dates for various construction phases, Total Float for all activities to the extent authorized by City, relationships between the activities, City's occupancy requirements showing portions of the Project having occupancy priority, and proposed dates for Final Acceptance.

17.3.3 A Baseline Project Schedule must be initiated with the project Baseline Cost Model and agreed to by the project team at the same time. CM@Risk must update and maintain a detailed Project Schedule throughout pre-construction such that it will not require major changes at the start of the construction phase to incorporate CM@Risk's plan for the performance of the construction phase Work. CM@Risk must provide updates and/or revisions to the Detailed Project Schedule for use by the Project Team, whenever required, but no less often than at the Project Team meetings. CM@Risk must include with such submittals a narrative describing its analysis of the progress achieved to-date vs. the Baseline Project Schedule, including any concerns regarding delays or potential delays, and any recommendations regarding mitigating actions.

17.3.4 If phased construction is deemed appropriate at the time of developing the Baseline Cost Model or during the development of the Detailed Project Schedule, and City approves, CM@Risk must review the design and make recommendations regarding the phased issuance of Construction Documents to facilitate phased construction of the Work, with the objective of reducing the Project Schedule and/or Cost of the Work. CM@Risk must take into consideration such factors as natural and practical lines of work severability, sequencing effectiveness, access and availability constraints, total time for completion, construction market conditions, labor and materials availability, and any other factors pertinent to saving time and cost.

17.3.5 Long Lead Time Items. As part of developing the Detailed Project Schedule, CM@Risk must identify all long lead time materials, fabrications, equipment, or other items which may impact the Project Schedule and may require early action on the part of the Project Team. Dates for selecting and ordering long lead time items will be included and highlighted in the Detailed Project Schedule

17.3.6 Equipment Plan. Contractor must develop an Equipment Plan that addresses all rental and owned equipment, regardless of whether such equipment will be provided by CM@Risk or subcontractor(s), that will be necessary to construct the Project and the cost of which will be included as a Cost of the Work in the GMP Proposal. The Equipment Plan will seek to minimize the cost of the equipment to City and maximize the efficient and coordinated use of the equipment for completion of the Project. The Equipment Plan will not only include the costs and allowable lease rates for the equipment, but will also include an equipment schedule that will be incorporated into the Detailed Project Schedule and the Schedule of Values submitted with the GMP Proposal.

17.4 DESIGN DOCUMENT REVIEWS

17.4.1 CM@Risk must evaluate periodically the availability of labor, materials/equipment, cost-sensitive aspects of the design; and other factors that may create an unacceptable variance to the Baseline Cost Model and/or Baseline Project Schedule.

17.4.2 CM@Risk must recommend, in conjunction with the Project Team, those additional surface and subsurface investigations that, in its professional opinion, are required to provide the necessary information for CM@Risk to construct the Project. These additional

investigations, if agreed to be necessary by the Project Manager and the Design Professional, will be acquired by City and copies of the reports will be provided to CM@Risk.

17.4.3 CM@Risk must meet with the Project Team as required to review designs during their development. CM@Risk must familiarize itself with the evolving documents through pre- construction. CM@Risk must proactively advise the Project Team and make recommendations on factors related to construction costs, and concerns pertaining to the feasibility and practicality of any proposed means and methods, selected materials, equipment and building systems, and, labor and material availability. CM@Risk must furthermore advise the Project Team on proposed site improvements, excavation and foundation considerations, as well as, concerns that exist with respect to coordination of the Drawings and Specifications. CM@Risk must use established value analysis principles in recommending cost effective alternatives.

17.4.4 CM@Risk must routinely conduct constructability and bid-ability reviews of the Drawings and Specifications as necessary to satisfy the needs of the Project Team. The reviews must attempt to identify all discrepancies and inconsistencies in the Construction Documents especially those related to clarity, consistency, completeness and coordination of Work of Subcontractors and Suppliers.

17.4.4.1 CM@Risk must evaluate whether: (a) the Drawings and Specifications are configured to enable efficient construction; (b) design elements are standardized; (c) construction efficiency is properly considered in the Drawings and Specifications; (d) module/preassembly design is prepared to facilitate fabrication, transport and installation; (e) sequences of Work required by or inferable from the Drawings and Specifications are practicable; (f) the design has taken into consideration efficiency issues concerning access and entrance to the site, laydown and storage of materials, staging of site facilities, construction parking, and other similar pertinent issues; and (g) the design maintains continued operation of the existing City systems and maintains traffic on adjacent roadways. CM@Risk must also review the Drawings and Specifications to ensure that what is depicted therein can be constructed as designed and must promptly inform the Project Team of any issues.

17.4.4.2 CM@Risk must check cross-reference and complementary Drawings and sections within the Specifications and in general evaluate whether: (a) the Drawings and Specifications are sufficiently clear and detailed to minimize ambiguity and to reduce scope interpretation discrepancies; (b) named materials and equipment are commercially available and are performing well, or otherwise, in similar installations; (c) Specifications include alternatives in the event a requirement cannot be met in the field; and (d) in its professional opinion, the Project is likely to be subject to Differing Site Conditions.

17.4.4.3 The results of the reviews must be provided to Project Team in formal, written reports clearly identifying all reviewed documents and the discovered discrepancies and inconsistencies in the Drawings and Specifications with notations and recommendations made on the Drawings, Specifications and other documents. CM@Risk must meet with Project Team to discuss any findings and review reports.

17.4.4.4 CM@Risk's reviews must be from a Contractor's perspective, and though it will serve to eliminate/reduce the number of RFIs) and changes during the construction phase, responsibility for the Drawings and Specifications will remain with the Design Professional and not CM@Risk.

17.4.5 It is CM@Risk's responsibility to assist the Design Professional in ascertaining that, in CM@Risk's professional opinion, the Construction Documents are in accordance with applicable Laws, Regulations, or Legal Requirements, building codes, sound engineering principle's rules and regulations. If CM@Risk recognizes that portions of the Construction Documents are at variance with applicable laws, statutes, ordinances, building codes, sound engineering principle's rules and regulations, it must promptly notify the Project Team in writing, describing the apparent variance of deficiency. However, the Design Professional is ultimately responsible for the compliance of the Drawings and Specifications with those laws, statutes, ordinances, building codes, rules and regulations.

17.4.6 The Project Team will routinely identify and evaluate using value analysis principles and alternate systems, approaches, design changes that have the potential to reduce Project costs while still delivering a high quality and fully functional Project consistent with the Project Program. If the Project Team agrees, CM@Risk in cooperation with the Design Professional, will perform a cost/benefit analysis of the alternatives and submit such in writing to the Project Team. City, through the Project Manager, will direct which alternatives will be incorporated into the Project. The Design Professional will have full design responsibility for the review and incorporation of CM@Risk suggested alternatives into the Drawings and Specifications. CM@Risk must analyze the costs and schedule impacts of the alternatives against the Baseline Cost Model and Schedule and provide a recommendation for the Project Team's consideration and City's approval prior to the establishment of the GMP.

17.5 **BASELINE COSTS MODEL, DETAILED COST ESTIMATES, AND SCHEDULE OF VALUES**

17.5.1 At the conclusion of the Master Planning and Programming, if required, CM@Risk will review all available information regarding the design and scope of the Project using CM@Risk's experience in performing similar work, knowledge of similar projects and current and projected construction costs and, based upon that review, must develop a Baseline Cost Model for review by the Project Team and approval by City. Once approved by City, the Baseline Cost Model will be continually referenced as detailed estimates are created as the design progresses throughout Pre-Construction until the final GMP for the entire Project is established. A final GMP for the entire Project must be established and approved by City prior to the start of construction. It is the responsibility of CM@Risk to ensure City has sufficient information to evaluate and approve a final GMP prior to the time necessary to start construction so construction can be completed within the Agreement Time. The Project Detailed Cost Estimate will be the best representation from CM@Risk of what the complete functional Project's construction costs will be as indicated by the most current available documents and will be constantly checked against the Baseline Cost Model. CM@Risk must communicate to the Project Team and assumptions made in preparing the Baseline Cost Model. The Baseline Cost Model must support CM@Risk's Detailed Cost Estimates and may be broken down initially as dictated by the available information, as required by City.

17.5.2 After receipt of the Design Professional's most current documents from certain specified pre- construction milestones, CM@Risk must provide a draft Detailed Cost Estimate including a detailed written report detailing any variances to the Baseline Cost Model and Baseline Project Schedule. The Design Professional and CM@Risk will reconcile any disagreements on the estimate to arrive at an agreed upon Detailed Cost Estimate for the construction costs based on the scope of the Project through that specified pre-construction milestone. Pre-Construction milestones applicable to this paragraph are:

Master Planning and Programming, Schematic Design, 50% Design Development, 100% Design Development, and 50% Construction Drawings, If no consensus is reached, City will make the final determination. If the Project Team requires additional updates of the Detailed Cost Estimate beyond that specified in this paragraph, CM@Risk must provide the requested information in a timely manner.

17.5.3 If at any point the Detailed Cost Estimate submitted to City exceeds the previously accepted Baseline Cost Model or previously approved Detailed Cost Estimate agreed to as set forth in Section 17.5.2 above, CM@Risk must make appropriate recommendations to project Team on means/methods, materials, and or other design elements that it believes will reduce the estimated construction costs, such that it is equal to or less than the established Project Team's Baseline Cost Model.

17.5.4 Unless other levels of completion are agreed to in writing in the Construction Documents, at 50% Construction Drawings and included with the associated report, CM@Risk must also submit to the Project Team for review and approval a Schedule of Values that complies with the following requirements. The Schedule of Values must be based on City standard bid schedule and highlight significant variances from any previously submitted Schedule of Values. The Schedule of Values must be directly related to the breakdowns reflected in the Detailed Project Schedule and CM@Risk's Detailed Cost Estimate. In addition, the Schedule of Values must: (a) detail unit prices and quantity take-offs, (b) detail all other contingencies and unit price Work shown and specified in the detailed design documents.

17.5.5 CM@Risk is to track, estimate/price and address the Project Team's overall project cost issues that arise outside of the Baseline Cost Model and the latest approved Detailed Cost Estimate such as: City generated changes, Project Team proposed changes, alternate system analysis, constructability items and value engineering analysis. The system used to implement this process will be referred to as the Design Evolution Log. This is to be addressed between the Baseline Cost Model and the Master Planning and Programming Detailed Cost Estimate, and then (unless other levels of completion are agreed to in writing in the Construction Documents) between the Detailed Cost Estimates for each of the pre-construction milestones thereafter, Schematic Design, 50% Design Development, 100% Design Development, and 50% Construction Documents, and the bid packages for all Phases.

17.5.6 Upon request by City, CM@Risk must submit to City a cash flow projection for the Project based on the current updated/revised Detailed Project Schedule and the anticipated level of payments for CM@Risk during the design and construction phases. In addition, if requested by City and based on information provided by City, CM@Risk must prepare a cash flow projection for the entire Project based on historical records for similar types of projects to assist City in the financing process.

17.5.7 Construction Water. CM@Risk must estimate the quantity of water to be used and include the cost thereof in each Detailed Cost Estimate and GMP Proposal provided by City.

17.6 SUBCONTRACTOR AND MAJOR SUPPLIER SELECTIONS

17.6.1 There are two ways to select Subcontractors and major Suppliers prior to submission of a GMP Proposal: (1) qualifications-based selection; or (2) a combination of qualifications and price. Except as noted below, the selection of Subcontractors/Suppliers is the sole responsibility of CM@Risk. In any case, CM@Risk is solely responsible for the performance of the selected Subcontractors/Suppliers, and for compliance with the requirements of

Title 34 of the Arizona Revised Statutes in the selection of a Subcontractors/Suppliers, to the extent applicable. CM@Risk must comply with its Subcontractor Selection Plan submitted with its Statement of Qualifications.

17.6.2 City may approve the selection of a Subcontractor(s) or Suppliers(s) based only on their qualifications when CM@Risk can demonstrate it is in the best interest of the Project. All Work that is performed, after such a qualifications-based selection, for a price that is negotiated by CM@Risk will be billed in accordance with the GMP for actual costs and may be subject to audit by City.

17.6.2.1 Qualifications based selection of a Subcontractor(s)/Supplier(s) should only occur prior to the submittal of the GMP Proposal.

17.6.2.2 If a Subcontractor/Supplier selection plan was submitted and agreed to by City, CM@Risk must apply the plan in the evaluation of the qualifications of a Subcontractor(s) or Supplier(s) and provide City with its review and recommendations.

17.6.2.3 CM@Risk must receive written City approval for each selected Subcontractor(s) and Supplier(s).

17.6.2.4 CM@Risk must negotiate costs for services/supplies from each Subcontractor/Supplier selected under this method.

17.6.3 All Work must be competitively bid unless a Subcontractor or Supplier was selected pursuant to Section 17.6.2 above.

17.6.3.1 CM@Risk must develop Subcontractor and Supplier interest, submit the names of a minimum of three qualified Subcontractors or Suppliers for each trade in the Project for approval by City and solicit bids for the various Work categories. If there are not three qualified Subcontractors/Suppliers available for a specific trade or there are extenuating circumstances warranting such, CM@Risk may request approval by City to submit less than three names. Without prior written notice to City, no change in the recommended Subcontractors/Supplies will be allowed.

17.6.3.2 If City objects to any nominated Subcontractor/Supplier or to any self-performed Work for good reason, CM@Risk must nominate a substitute Subcontractor/Supplier that is acceptable to City.

17.6.3.3 CM@Risk must distribute Drawings and Specifications, and when appropriate, conduct a Pre- Bid Conference with prospective Subcontractors and Suppliers.

17.6.3.4 If CM@Risk desires to self-perform certain portions of the Work, it must request to be one of the approved Subcontractor bidders for those specific bid packages. CM@Risk's bid will be evaluated in accordance with the process identified below. If events warrant and City concurs that it is necessary in order to ensure compliance with the Project Schedule and/or the most recent Detailed Cost Estimate, CM@Risk may be authorized to self-perform Work without bidding or rebidding the Work. When CM@Risk self-performs work without bidding, only the actual costs associated with performing the Work in accordance with the approved GMP will be billed and may be subject to audit by City.

17.6.3.5 CM@Risk must receive, open, record and evaluate the bids; provided, however, that if CM@Risk or one of its affiliates is bidding to self-perform the Work that is the subject of the bid, then the bids must be received, opened, recorded and evaluated by Project Manager

instead of CM@Risk. Bids for each category of Work must be opened and recorded at a pre-determined time. The apparent low bidders must be interviewed to determine the responsiveness of their proposals. In evaluating the responsiveness of bid proposals CM@Risk, in addition to bid price, may consider the following factors: past performance on similar projects, qualifications and experience of personnel assigned, quality management plan, approach or understanding of the Work to be performed, and performance schedule to complete the Work. The final evaluation of Subcontractor/Supplier bids must be done with Project Manager in attendance to observe and witness the process. CM@Risk must resolve any Subcontractor/Supplier bid withdrawal, protest or disqualification in connection with the award at no increase in the Cost of Work.

17.6.4 CM@Risk will be required to prepare two different reports on the subcontracting process.

17.6.4.1 Within fifteen days after each major Subcontractor/Supplier bid opening process; CM@Risk must prepare a report for City's review and approval identifying the recommended Subcontractors/Supplier for each category of Work. The report must detail: (a) the name of the recommended Subcontractor/Supplier and the amount of the Subcontractor/Supplier bid for each sub-agreement; (b) the sum of all recommended Subcontractor/Supplier bids received; (c) and trade work and its cost that CM@Risk intends to self-perform, if any.

17.6.4.2 Upon completion of the Subcontractor/Supplier bidding process, CM@Risk must submit a summary report to City of the entire Subcontractor/Supplier selection process. The report must indicate, by bid process, all Subcontractors/Suppliers contacted to determine interest, the Subcontractors/Suppliers solicited, the bids received and costs negotiated, and the recommended Subcontractors/Suppliers for each category of Work.

17.6.5 The approved Subcontractors/Suppliers will provide a Schedule of Values with their bid proposals, which will be used to create the overall Project Schedule of Values.

17.6.6 If after receipt of sub-bids or after award to Subcontractors and Suppliers, City objects to any nominated Subcontractor/Supplier or to any self-performed Work without any reasonable basis, CM@Risk must nominate a substitute Subcontractor or Supplier, preferably if such option is still available, from those who submitted Subcontractor bids for the Work affected. Once such substitute Subcontractors and Suppliers are consented to by City, CM@Risk's proposed GMP for the Work or portion thereof must be correspondingly adjusted to reflect any higher or lower costs form any such substitution.

17.7 **GMP PROPOSAL**

17.7.1 When a GMP Proposal is submitted for a phase of the Work, the GMP will have a Detailed Cost Estimate of the Costs of the Work (as set forth in Section 15.2) in each phase of the Work that is being proposed plus the current estimate for all other Work. City will not approve the GMP for the phase of work without a total estimate for the complete Project. City may request a GMP Proposal for all or any portion of the Project and at any time during pre-construction. Any GMP Proposals submitted by CM@Risk must be based on and consistent with Baseline Cost Model and the current update/revised Detailed Cost Estimate at the time of the request and include any clarifications or assumptions upon which the GMP Proposal(s) are based.

17.7.2 A GMP Proposal for the entire Project will be the sum of the Cost of the Work, CM@Risk Fee, and General Conditions Cost. CM@Risk guarantees to complete the Project at or less than

the final GMP Proposal amount plus approved Change Orders. CM@Risk will be responsible for any costs for expenses that would cause the Cost of the Work actually incurred, including the Construction Fee and General Conditions Costs, to exceed the GMP.

17.7.3 CM@Risk must prepare its GMP Proposal in accordance with City's request for GMP Proposal requirements based on the most current completed Drawings and Specifications at that time, which unless otherwise directed by City in writing, will be at 100% Construction Drawings. CM@Risk must mark the face of each document of each set upon which its GMP Proposal is based. These documents must be identified as the GMP Plans and Specifications. CM@Risk must send one set of those documents to the Project Manager, keep one set and return the third set to the Design Professional.

17.7.4 An updated/revised Detailed Project Schedule, Equipment Plan, and Schedule of Values must be included in any GMP Proposal(s), all of which must reflect the GMP Plans and Specifications the Detailed Project Schedule must be shown in relationship to the Project Schedule and identify any variance to the Baseline Project Schedule. Any such Detailed Project Schedule updates/revisions must continue to comply with the requirements of Section 17.3.1 through 17.3.5.

17.7.5 GMP Proposals(s) Review and Approval

17.7.5.1 CM@Risk must meet with the Project Team to review the GMP Proposal(s) and the written statement of its basis. In the event the Project Team discovers inconsistencies or inaccuracies in the information presented, CM@Risk must make adjustments as necessary to the GMP Proposal.

17.7.5.2 If during the review and negotiation of GMP Proposals design changes are required, City may authorize and cause the Design Professional to revise the GMP Plans and Specifications to the extent necessary to reflect the agreed-upon assumptions and clarifications contained in the final approved GMP Proposal. Such revised GMP Plans and Specification will be furnished to CM@Risk. CM@Risk must promptly notify the Project Team in writing if any such revised GMP Plans and Specifications are inconsistent with the agreed upon assumptions and clarifications.

17.7.6 All portions of or items comprising the GMP Proposal are subject to audit by City, as deemed appropriate by City, including, without limitation, any based upon unit prices or Work to be self- performed by CM@Risk, or its affiliates.

17.8 **PAYMENT PROCEDURE FOR PRE-CONSTRUCTION SERVICES**

17.8.1 Requests for monthly payments by CM@Risk for Pre-Construction Services must be submitted monthly and must be accompanied by a progress report, detailed invoices and receipts, if applicable. Any requests for payment must include, as a minimum, a narrative description of the tasks accomplished during the billing period, a listing of any Deliverables submitted, and copies of any Subconsultants' requests for payment, plus similar narrative and listings of Deliverables associated with their Work. Payment for services negotiated as a lump sum will be made in accordance with the percentage of work completed during the preceding month.

17.8.2 In no event will City pay more than seventy-five (75%) of the Agreement Price until acceptance of ALL Pre-Construction Services and award of the final approved Construction Services Agreement for the entire Project by City Council. If CM@Risk does not prepare a

GMP Proposal that is acceptable to City, or the GMP Proposal exceeds the City's Construction Budget, then CM@Risk understands and acknowledges that it will forfeit any right to receive the 25% of the Agreement Price being retained by City.

17.8.3 CM@Risk agrees that no charges or claims for costs or damages of any type will be made by it for any delays or hindrances beyond the reasonable control of City during the progress of any portion of Pre-Construction Services specified in this Agreement. Such delays or hindrances, if any, will be solely compensated for by an extension of time for such reasonable period and may be mutually agreed between the parties. It is understood and agreed, however, that permitting CM@Risk to proceed to complete any such Services, in whole or in part after the date to which the time of completion may have been extended, will in no way act as a waiver on the part of City of any of their respective legal rights herein.

17.8.4 No compensation to CM@Risk will be allowed contrary to Article I, Chapter I, Title 34 of the Arizona Revised Statutes.

17.8.5 If any service(s) executed by CM@Risk is abandoned or suspended in whole or in part, for a period of more than 180 days through no fault of CM@Risk, CM@Risk is to be paid for the services performed prior to the abandonment or suspension.

17.9 **SURVIVAL OF THE DESIGN SERVICES AGREEMENT, DUTIES, OBLIGATIONS AND WARRANTIES**

If the GMP Proposal is accepted by City and a Construction Agreement is entered into between City and CM@Risk, the duties, obligations and warranties of CM@Risk under the Pre- Construction Services Agreement survive and are incorporated into the resulting Construction Agreement.

SECTION 15 – APPENDICES

The following Appendices attached hereto are referenced in the General Conditions and are incorporated herein.

Appendix 1 – Policy Statement for Calculating Delays and Damages
Appendix 2 – Cost Reduction Incentive Proposals for Design Bid Build Agreements
Appendix 3 – Contractor's Affidavit Regarding Settlement of Claims
Appendix 4 – Forms of Performance Bond
Appendix 5 – Forms of Payment Bond
Appendix 6 – Dispute Resolution
Appendix 7 – Certificate of Completion
Appendix 8 – Construction Sign Detail
Appendix 9 – Cost of the Work (Applicable solely to Construction Manager at Risk and Job Order Contracting)
Appendix 10 Landscape Establishment Period

CALCULATING DELAYS AND DAMAGES

The purpose of this policy statement is to establish guidelines and procedures for negotiation between the Contractor and City of Chandler relating to compensation for delays pursuant to Arizona Revised Statutes (A.R.S.) 34-221(F). This policy statement contains notice requirements in addition to those set forth in the Agreement Documents, and will be the Agreement Provision contemplated by that statute.

NOTE: As used herein, the term "Engineer" will refer to the City of Chandler City Engineer or his/her designated representative. Nothing in this Policy Statement will be construed to void any provision in the Agreement which requires timely notice of delays or provides for arbitration or any other procedure for settlement or provides for liquidated damages.

I. TYPES OF DELAYS:

For the purposes of this document, there are essentially four types of delays encountered by City of Chandler Construction Contractors; excusable/compensable, excusable/non-compensable, non- excusable, and concurrent. Only delays that extend Agreement Completion Time set forth in the Agreement Document will be considered for issues relating to Agreement extensions or additional compensation. All other delays are considered to be activity delays and do not entitle the Contractor to either time extensions or additional compensation. Agreement Completion Time will be defined as the date set forth in Maricopa Association of Governments (MAG) Uniform Standard Specification Section 101 and as may be modified by the Agreement Documents.

A. Excusable/Compensable:

These are delays caused solely by the City's actions or inactions, are unreasonable under the circumstances, and which were not within the contemplation of the parties to the Agreement at or prior to the time of execution of the Agreement. Since the Contractor presumably has no control over the events causing the delay, he may be entitled to both Agreement time extensions and additional compensation for delay damages. Further, he/she may be entitled to additional compensation from the impact of that delay on other work. Examples of excusable/compensable (E/C) delays include: failure to properly locate an underground City-owned utility within 2 feet of the actual location; failure to relocate City-owned utilities far enough in advance of construction in an area where the Contractor is scheduled to work that it delays start or completion of the Contractor's regularly scheduled work; failure to provide City-furnished equipment or materials in a timely manner if required by the Agreement; failure to acquire necessary Right-of-Way or Public Utility Easements prior to the Contractor beginning Work in the area; failure to timely return Shop Drawings or other Agreement Submittals in accordance with the Agreement; unreasonable delay by the City in making decisions which affect critical activities; surveying errors when the City is contractually responsible for providing Project Surveying. This list is not meant to be all inclusive, but is intended merely as examples of the type of City action or inaction which can result in a Contractor's claim for additional time and compensation.

B. Excusable/Non-compensable:

These are delays over which neither the City nor the Contractor had control. Since both parties to the Agreement have been potentially damaged by the delay, but neither have caused it, only Time Extensions are warranted. Examples of excusable, non-compensable (E/N) delays include: unusually severe weather; fire; acts of God; failure of non-City owned utilities (SRP, CenturyLink, Cable TV, Southern Pacific Railroad, and Southwest Gas, etc.) to properly or timely locate accurately; failure of non-City owned utilities to relocate in advance of construction; the voluntary or involuntary filing for Bankruptcy protection by a Supplier or Subcontractor which causes the Supplier/Subcontractor to fail to meet a contractual deadline provided the Contractor can provide documentation that he/she executed the required Purchase Orders/Subcontract Agreements and received delivery schedules which, if met, would have eliminated the delay; delays as a result of an incomplete shutdown of a City or non-City owned utility main (the City does not guarantee a complete shutdown). This list also is not necessarily all inclusive but merely indicative of type and class of E/N delays.

C. Non-excusable/Non-compensable:

These are delays caused by the actions or inactions of Contractor or an officer, employee, agent, Subcontractor, Supplier or any other party for whom the Contractor is responsible. Since the Contractor has assumed responsibility for the risks associated with the events that caused the delay, he/she are not entitled to either time extensions or monetary delay damages. All non-excusable delays are also non-compensable. Examples of non- excusable, non-compensable (N/N) delays include: failure to perform by the Contractor, its Subcontractors and/or Suppliers (except as noted in section I.B above); failure to provide adequate labor, materials, and/or equipment on the Project; failure to perform contractually-required coordination with utilities, agencies and other Contractors; failure to notify the Engineer, in writing, of delay impacts within two working days, as required by MAG 104.2.3, or the next work day, as required by MAG 109.8.2; failure to timely submit Shop Drawings; failure to pothole or otherwise visually locate utilities sufficiently ahead of the Work to allow the Engineer to direct corrective action when necessary; delays due to retesting of previously failed work, re-inspection, and/or restaking resulting from faulty workmanship, poor quality control, or lack of compliance with Agreement Specifications. Again, this list is not necessarily all inclusive.

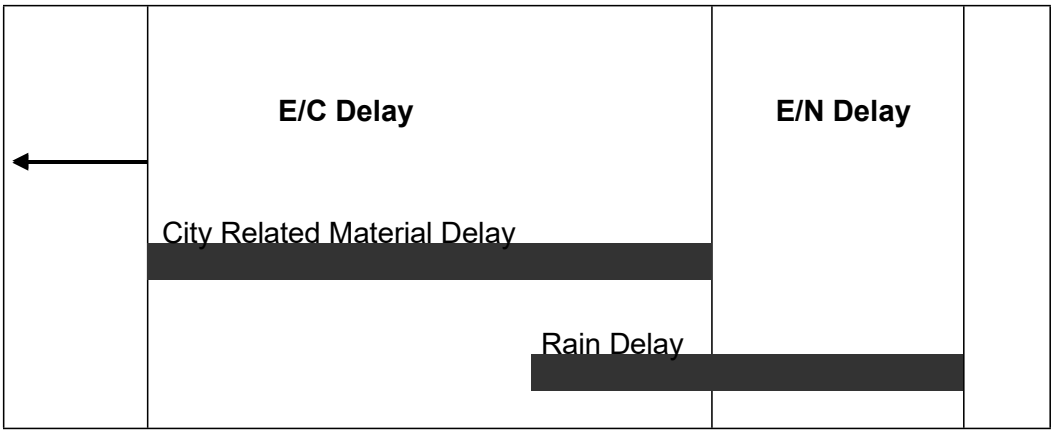
D. Concurrent:

When two or more delays occur simultaneously or overlap, each delay is analyzed separately to determine its impact on the overall project completion date based on when that delay started. Once again, only those delays which actually extend the Agreement completion time are considered as delays. The concurrent delay is considered an additional delay only to the extent it prolongs the delay to the Agreement Completion Time beyond the date that the one it is concurrent with had already delayed that date. For example, if two delays are concurrent, and one is five days long and the second is seven days long, the second concurrent delay will only extend the Agreement Completion Time by two days. The same method of analysis is

used when there are multiple concurrent delays. Only those extending the Project Completion Date are considered to be delays for the purposes of this policy. The portion of each concurrent delay that delays the completion of the work is classified in the same manner as described previously for individual delays and being either E/C, E/N or N/N.

An example of a concurrent delay is where the City delays furnishing material, but the Contractor could not have installed it anyway due to unusually severe weather. The effect of the first delaying activity will extend for the full duration and will be considered controlling on the Contractor's schedule. A subsequent, concurrent delay will thereafter only be considered to effect the project completion (if at all) once the first delaying activity has ceased to impact the project completion. In this case, if the unusually severe weather continued and delayed the work after the material was delivered, the first portion of the delay would be classified E/C (delay for material) and the second as E/N (delay due to unusually severe weather). Using the procedure set forth above, the entire concurrent portion would be considered E/C as shown in the chart which follows.

Example of a Concurrent Delay:



II. ANALYZING THE DELAY:

The Contractor must provide all documents required or requested by the Engineer to analyze the delay(s). It is important to understand that, prior to the delay analysis, delays and their impacts are alleged issues. The information the Contractor provides will be compared with the Inspector's Daily Log, Schedules and other available Project information and together they will support or refute that delays occurred and, if so, how they impact other work and the overall project completion. The Contractor's delay in providing these documents will be considered prima facie evidence that either the delay did not occur or it did not impact the Project Completion Date and any claim for time extension or damages will be denied.

The Engineer will accept delay analyses in CPM format, as these may demonstrate to his/her satisfaction whether or not Project Completion has been impacted by a specific event. If the Contractor chooses not to use CPM scheduling procedures, then the burden will be on the Contractor to prove to the Engineer's satisfaction that the Project Completion has been impacted. The procedures

below assume that the Contractor is using CPM scheduling methods. As a minimum the Contractor must provide the following materials to the Engineer:

A. As-Planned Schedule. The initial construction schedule, required by the Agreement Documents, will be considered the baseline schedule. It is to the Contractor's advantage that the As-Planned (baseline) Schedule be as detailed as possible in order for delays, as they occur, to be incorporated into the schedule in representative locations. It is also to the Contractor's advantage to use a computer software program to generate the schedule since updated schedules are required monthly by the Agreement Documents and since updated schedules are required to support delays and requests for additional compensation for delays. The As-Planned (baseline) Schedule must be presented in network format which clearly shows the interrelationships of the activities. The Contractor must also provide a printout of the activities showing early start, early finish, late start, late finish, duration and float. The activity list printout must also indicate predecessor and successor activities.

B. As-Built Schedules. The as planned (baseline) schedule must be updated with complete progress-to-date information (actualized) up to the date of the start of the alleged delay. Each updated schedule will serve as the as-built schedule for analyzing the alleged delay and provide a new baseline as-planned schedule for the next delay. This process must be repeated for each alleged delay as it occurs. In updating the baseline schedule, the alleged delay must be treated as an activity and inserted into the schedule as a predecessor to the impacted activity (ies). When an activity that has already started is impacted, it is preferable to divide this activity into two parts and show the impact affecting the second part. For schedules which incorporate a time line (or data date), the delay activity must be inserted at the time it actually occurred. Some software scheduling programs have a PAUSE-RESUME feature that can be used to facilitate the requirements. The updated schedule must also be accompanied by a listing of activities as with the baseline schedule. This activities list must contain the alleged delay as an activity showing the duration and the activities which are predecessors and successors to it. When computer generated schedules are used, the Contractor must provide, in electronic media format, the complete data files for the updated schedule that included the delay activity, preferably either in Suretrak or in Microsoft Project. Each electronic media must contain a label identifying the Project name, Contractor's name, program name and version number, data date and project finish date.

C. Other Documents: In order to determine the amount of the alleged delay and if it is compensable, the Contractor must provide all backup documentation relevant to the issue and as required by the Engineer. This documentation must include copies of such items as: purchase orders; delivery schedules; correspondence; memoranda of telephone calls; force account daily worksheets (initialed by the Inspector); payroll data; estimating (bid) worksheets; and any other materials which may be requested by the Engineer.

D. Procedure: Only after receipt of sufficient documentation will the Engineer analyze each alleged delay and determine if it is supported or refuted. If supported, the Engineer will determine if it is excusable or non-excusable, compensable or non-

compensable. If the Engineer determines that the delay did not affect the Project Completion, the as-planned schedule, which has been updated to the date of the alleged delay, must be revised to indicate this. If the Engineer determines the delay did occur but was N/N, then no time extension will be granted. It is imperative that an actualized schedule be submitted as soon as the occurrence of the alleged delay is known. In no event will the Contractor submit an actualized updated schedule later than 60 days after the occurrence of the alleged delay becomes known.

If the Engineer determines the delay did occur and was excusable but, due to a reason listed in section I.B. is non-compensable, he/she will determine the length of the E/N delay and prepare a Change Order to add that time to the Agreement. The Engineer's decision will be final.

If the Engineer determines the delay was excusable and compensable, he/she will determine the length of the E/C delay and proceed to review the Contractor's damage calculations in accordance with Section III. The Engineer will check the Contractor's calculations, review the backup documentation provided, and prepare a Change Order to cover both the additional compensation and the time extension. The Engineer's decision on both the time extension and additional compensation for the delay will be final.

If the issue involves a concurrent delay, the Engineer will analyze available data to determine the portions which are E/C, E/N, and/or N/N as described above. The Engineer will proceed to determine the length of E/C delay and verify the Contractor's delay damage calculations, if any are provided. Upon completion of this review, the Engineer will prepare a Change Order for the Contractor's review and signature. The Engineer's decision regarding excusable delay and additional compensation for the delay is final.

The amount of time the Engineer will require to analyze the alleged delay(s) will depend upon the Engineer's workload, the complexity of the delay analysis, availability of supporting data, extent of cooperation by the Contractor, and other factors beyond the Engineer's control. It is entirely possible other delay(s) may occur while the Engineer is analyzing particular claim for delay(s). The Engineer's failure to respond to the Contractor in a set period of time will not be used as the basis for a further delay claim or as justification for extending and existing delay claim. The time required for delay analysis by the Engineer will not be counted against the time allotted for processing Final Payment as required by (MAG Section 109.7(B)) or the release of retention and Final Payment as prescribed by A.R.S. Arizona Revised Statutes §34-221.

III. CALCULATING MONETARY DELAY DAMAGES:

Additional compensation for delay, when authorized by the Engineer, will be calculated in accordance with MAG Section 109.5 ACTUAL COST WORK with the following exceptions:

A. No additional compensation or other monetary damages will be awarded or paid for any loss of anticipated profits by the Contractor, Subcontractors or Suppliers.

B. No additional compensation or other monetary damages will be awarded for home office overhead or non-project general conditions of the Contractor, Subcontractors or Suppliers.

C. Equipment:

1. Contractor-owned equipment rate calculations must be computed in accordance with Section 109.04(D)(3), Arizona Department of Transportation "Standard Specifications for Road and Bridge Construction," 2008 or latest edition and as modified herein. Year and regional adjustment factors must be based on the most recent publications of the Rental Rate Blue Book for Construction Equipment, published by the Equipment Guide-Book Company, San Jose, CA, same as provided by ADOT and in print as of the date of alleged delay. In no event will the compensation for Contractor-owned equipment exceed the purchase price, including tax, paid by the Contractor for the equipment. Compensation will not be allowed for small tools or equipment that show a daily equipment rental rate of less than $5.00 per day or for unlisted equipment that has a value of less than for hundred dollars ($400.00).
2. For leased and rented equipment or equipment not otherwise listed in the Blue Book, rental contracts, or other supporting data will be used to establish the hourly rate. No hourly operating expense will be allowed for delay on standby equipment. In no case will equipment be considered for rental which exceeds the hourly rate for the first eight hours and the daily rate divided by eight for all additional hours as compared with similar equipment listed in the Blue Book. The hourly standby rate must be computed as the lesser of:

    a. Dividing the monthly invoice or rental value by 176 hours per month when the equipment is utilized by the Contractor for more than three weeks;

    b. Dividing the monthly invoice or rental value by 40 hours per week when the equipment is utilized by the Contractor for more than three days.

    In no event will compensation be paid for delay at more than 8 hours per day or 40 hours per week.

3. Except for vehicles used by supervisory personnel, all equipment will be paid at the "standby" rate during the delay period.

4. Equipment brought solely to mitigate the delay (such as pumps, light plants, etc.) may be paid in accordance with ADOT section 109.04(D) (3).

5. The Blue Book regional adjustment will apply in determining rental rates.

D. Material:

Allowable material charges may include, in addition to material incorporated in the

work material used to mitigate the delay such as barricades, plates, shoring, cold mix, etc. Except in emergencies the Contractor will not employ such material without the prior written approval of the Engineer.

E. Labor:

1. Except for Supervisory Personnel (Superintendent, Project Engineer, and Foremen), labor wages will not be paid after the first one-half day of claimed delay or impact. It is expected the Contractor will reassign or layoff unneeded employees.

2. For Foreman wages to be included, that Foreman must have been actively employed on the project prior to the commencement of the delay and be directly responsible for the activity being delayed.

3. Labor burden must be actual amounts incurred but must not exceed the ADOT approved rate.

F. All costs (equipment, material, and labor) must be substantiated by the City of Chandler's Daily Work Reports.

IV. DOCUMENT REQUIRED FOR CLAIM ANALYSIS:

For purposes of reviewing the Contractor's request for additional compensation, it will be required that the Contractor submit the following listed information. Information requested must be prepared on forms which are substantially similar to the City of Chandler's Daily Work Report form, a copy of which is attached as an exhibit.

A. Labor:

For each employee, laborer, and foreman, for which compensation is requested: Name, classification, dates of work performed, daily hours worked, total hours worked, labor rates, labor burden rates, overtime or premium time charges. Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Certified payroll reports for the period of work claimed.
2. Accounting of Fringe Benefits – certified by a CPA.
3. Contractor's and Subcontractor's daily field reports and daily diaries.

B. Materials:

For all materials for which compensation is requested, if any, total quantities of materials, prices, extensions and transportation costs must be provided on a daily basis. Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Invoices for all materials incorporated.
2. Weigh tickets.
3. Purchase orders.

4. Delivery schedules.
5. Quotes or proposals from manufacturers or supplier.
6. Freight bills, Bills of Lading, or other documentation to show transportation costs.
7. Restocking charges-invoices from vendor.

C. Equipment:

For all equipment, the Contractor must provide the Engineer with the designation, dates and hours of usage, dates and hours of standby, if any, daily hours, total hours, rental rates and extension for each unit of equipment and machinery. Rental rates will be as established in Section III. Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Owned:
   a. Purchase contracts(s).
   b. Depreciation schedule(s).
   c. Invoices for fuel, lube, repairs and other operating costs.

2. Leased:
   a. Lease agreement with hourly rate, overtime rate, double shift rate, etc.
   b. Invoices or other documentation showing hours worked on a daily basis.

D. Subcontractors/Owner-Operators:

In the event the Contractor submits a claim which includes requests for compensation for Subcontractors of Owner-Operators, the same information requested of the Contractor must be provided by the Subcontractor/Owner-Operator. Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Bid/Estimate work sheets and/or spreadsheets.
2. Subcontract Agreements or Agreements with Owner-Operator.
3. All invoices and billing statements received from the Subcontractor/Owner-Operator which relates to the amount requested.

E. Miscellaneous:

Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Evidence of payment for bonds and insurance premiums (MAG 109.5.6).
2. Taxes – unless the Contractor can show otherwise, taxes are reimbursable at 65% of the total cost (less bonds and insurance).

V. TIME LIMIT ON SUBMISSIONS OF CLAIM FOR DELAY OR IMPACT DAMAGES:

No claims for delay or impact damages will be considered or allowed more than 45 days after the event or occurrence which the Contractor claims gives rise to the delay or impact. In no event will a

claim for delay or impact damages be considered after submission by the Contractor of the Final Payment Request.

COST REDUCTION INCENTIVE PROPOSALS FOR DESIGN BID BUILD AGREEMENTS

The Contractor may submit to the Engineer proposals for modifying the Plans, Specifications, or other requirements of the Agreement for the sole purpose of reducing the total cost of Project construction. The proposals must not impair in any manner the essential functions or characteristics of the project; including but not limited to service life, economy of operations, ease of maintenance, desired appearance, compatibility with existing or planned equipment, standardization of systems, or design and safety standards.

It must not be inferred from this Policy that the Engineer is required to consider any proposal submitted.

Submissions that propose changes in the basic design of a bridge, propose changes in pipe line size, materials, bedding conditions, pipe specifications; or that propose any change in pavement design will not be considered.

Proposals submitted pursuant to this Policy will be identified as Cost Reduction Incentive Proposals. They must be submitted in writing and, at a minimum, contain the following.

1. Complete the attached or similar cost reduction incentive proposal form.

2. A description of both the existing Agreement Requirements for performing the work and the proposed changes.

3. All Engineering Drawings and computations necessary for the thorough and expeditious evaluation.

4. An itemization of the existing Agreement Requirements that must be changed if the Proposal is adopted and a recommendation as to the manner in which the change should be made.

5. A detailed estimate of the cost of performing the Work under the existing Agreement and under the proposed changes, including the cost of developing and implementing the changes.

6. The Agreement items affected by the proposed changes and any variations in quantities resulting from the changes.

7. An objective estimate of any effects the proposal will have on collateral cost to the City, costs of related items, and cost of maintenance and operation.

8. A statement as to the effect that the Proposal will have on the time for the completion of the Project.

9. A statement as to the time by which a Change Order adopting the Proposal must be executed or when the Engineer must have given verbal approval.

Proposals will be processed expeditiously; however, the City will not be liable for any delay in acting upon any Proposal nor for any failure to accept any Proposal pursuant to this Special Provision.

The Engineer will be the sole judge of the acceptability of a Proposal and of the estimated net savings in construction costs from the adoption of all or any part of the Proposal. The Contractor will be notified in writing by the Engineer as to whether his/her Proposal has been accepted. The decision by the Engineer is final.

When the City deems such action to be appropriate, it reserves the right to require the Contractor to share equally in the cost to the City of investigating, evaluating, and processing the proposal as a condition for the consideration of such Proposal. Such cost must be shared whether the Proposal is accepted or rejected. When such a condition is imposed, the City will estimate these costs and the Contractor must indicate his acceptance thereof in writing. Such acceptance will authorize the City to deduct the Contractor's share of the costs from any monies due or that may become due to the Contractor under the Agreement.

If the Contractor's Proposal is accepted in whole or in part, the necessary Agreement Modifications and Agreement Price Adjustments will be affected by the execution of a Change Order which will specifically state that it is executed pursuant to this Special Provision.

The Contractor must continue to perform the work in accordance with the requirements of the Agreement until a Change Order incorporating the Proposal has been executed or until he/she has been given verbal approval by the Engineer that his/her Proposal has been accepted. If the Change Order has not been executed or he/she has not been given verbal approval on or before the date specified on the attached cost reduction incentive proposal form or on or before such other date as the Contractor may have subsequently specified in writing, the Proposal may be deemed to be rejected.

The executed Change Order will incorporate the changes in the Plans, Specifications, or other requirements of the Agreement which are necessary to permit the Proposal, or such part of it which has been accepted, to be put into effect, and will include any condition – upon which the City's approval thereof is based, if such approval is conditional. The executed Change Order may also extend the time for the completion of the Agreement if such an extension has been deemed to be warranted by the Engineer as a result of his evaluation of the Proposal.

The executed Change Order will also establish the estimated net savings in the cost of performing the Work attributable to the Proposal effectuated by the Change Order. In determining the net savings, the right is reserved to the Engineer to disregard the Agreement bid prices if, in his/her judgment, such prices do not represent a fair measure of the value of the Work to be performed or to be deleted. The net savings will be established by determining the Contractor's cost of performing the Work, taking into account his/her cost of developing the Proposal and implementing the change, and reducing this amount by any ascertainable collateral costs to the City. The executed Change Order may provide that the Contractor be paid 50 percent of the estimated net savings amount.

The executed Change Order may also provide for the adjustment in Agreement prices. Agreement prices may be adjusted by subtracting the City's share of the accrued net savings.

The amount specified to be paid to the Contractor in the executed Change Order which effectuates a Cost Reduction Proposal will constitute full compensation to the Contractor for the Cost Reduction

Proposal and the performance of the work thereof pursuant to the said Change Order.

Upon acceptance of a Cost Reduction Incentive Proposal, any restrictions imposed by the Contractor on its use or on disclosure of the information will become void, and the City thereafter will have the right to use all or any part of the Proposal without obligation or compensation of any kind to the Contractor.

COST REDUCTION INCENTIVE PROPOSAL FORM

TO: CIP City Engineer

FROM:

PROJECT NAME: **WATER SYSTEM UPGRADES PROGRAM**

CITY PROJECT NUMBER: **WA2100.402**

DATE:

Summary of Change (Brief description of proposed change including advantages and disadvantages):

ESTIMATED COST SUMMARY (Attached detailed estimate):

A.	Original Cost:	$
B.	Proposed Cost:	$ _____
C.	Construction Savings (A-B):	$ _____
D.	Gross Savings (Included OH %, Bond %)	$ _____
E.	Contractor Implementing	$_____
F.	City Implementing Cost:	$_____
	Reduction in Agreement Price (C+D-E-F) x 50%:	$ _____

Date by which a Change Order must be issued so as to obtain maximum cost reduction:

CITY OF CHANDLER, ARIZONA
PUBLIC WORKS & UTILITIES DEPARTMENT

CONTRACTOR'S AFFIDAVIT REGARDING SETTLEMENT OF CLAIMS

_____, Arizona
Date _____

Project Name: Water System Upgrades Program
City Project No.: WA2100.402

To the City of Chandler, Arizona

Gentlemen:

This is to certify that all lawful claims for materials, rental of equipment and labor used in connection with the construction of the above project, whether by subcontractor or claimant in person, have been duly discharged.

The undersigned, for the total compensation of $_____, as set out in the final pay application, as full and complete payment under the terms of the Agreement, hereby waives and relinquishes any and all further claims or right of lien under, in connection with, or as a result of the above described project. The undersigned further agrees to indemnify and save harmless the City of Chandler against any and all liens, claims or liens, suits, actions, damages, charges and expenses whatsoever, which said City may suffer arising out of the failure of the undersigned to pay for all labor performances and materials furnished for the performance of said installation.

Signed and dated at _____, this _____ day of _____ 20_____.

_____
CONTRACTOR

By _____

STATE OF ARIZONA)
) SS
COUNTY OF MARICOPA)

The foregoing instrument was subscribed and sworn to before me this _____ day of _____ 20 _____.

_____
Notary Public

_____
My Commission Expires

PERFORMANCE BOND

ARIZONA STATUTORY PERFORMANCE BOND
PURSUANT TO TITLES 28, 34, AND 41, ARIZONA REVISED STATUTES
(Penalty of this bond must be 100% of the Agreement amount)

KNOW ALL MEN BY THESE PRESENTS THAT:_____

(hereinafter "Principal"), and _____ (hereinafter "Surety"), a corporation organized and existing under the laws of the State of _____ with its principal office in the City of _____, holding a certificate of authority to transact surety business in Arizona issued by the Director of Insurance pursuant to Title 20, Chapter 2, Article 1, as Surety, are held and firmly bound unto _____(hereinafter "Obligee") in the amount of _____ (Dollars) ($_____), for the payment whereof, Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Agreement with the Obligee, dated

the _____ day of _____, 20___ for construction of **WA2100.402, Water System Upgrades Program** which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copies at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal faithfully performs and fulfills all the undertakings, covenants, terms, and conditions of the Agreement during the original term of the Agreement and any extension of the Agreement, with or without notice of the Surety, and during the life of any guaranty required under the Agreement, and also performs and fulfills all the undertakings, covenants, terms, conditions, and agreements of all duly authorized modifications of the Agreement that may hereafter be made, notice of which modifications to the Surety being hereby waived, the above obligation is void. Otherwise it remains in full force and effect.

PROVIDED, HOWEVER that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, and all liabilities on this bond will be determined in accordance with the provisions of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, to the same extent as if it were copied at length in this Agreement.

The prevailing party in a suit on this bond may recover as part of the judgment reasonable attorney fees that may be fixed by a judge of the court.

Witness our hands this _____ day of _____, 20__.

_____
PRINCIPAL SEAL

_____
AGENT OF RECORD

By _____

_____
SURETY SEAL

_____
AGENT ADDRESS

PAYMENT BOND

ARIZONA STATUTORY PAYMENT BOND
PURSUANT TO TITLES 28, 34, AND 41, OF THE ARIZONA REVISED STATUTES
(Penalty of this Bond must be 100% of the Agreement amount)

KNOW ALL MEN BY THESE PRESENTS THAT:_____

(hereinafter "Principal"), as Principal, and _____(hereinafter "Surety"), a corporation organized and existing under the laws of the State of _____ with its principal office in the City of _____, holding a certificate of authority to transact surety business in Arizona issued by the Director of the Department of Insurance pursuant to Title 20, Chapter 2, Article 1, as Surety, are held and firmly bound unto _____ (hereinafter "Obligee") in the amount of _____ (Dollars) ($_____), for the payment whereof, the Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Agreement with the Obligee, dated the _____ day of _____, 20___ for construction of **WA2100.402, Water System Upgrades Program** which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal promptly pays all moneys due to all persons supplying labor or materials to the Principal or the Principal's subcontractors in the prosecution of the work provided for in said Agreement, this obligation is void. Otherwise it remains in full force and effect.

PROVIDED, HOWEVER that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2 Arizona Revised Statutes, and all liabilities on this bond will be determined in accordance with the provisions, conditions and limitations of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, to the same extent as if it were copied at length in this Agreement.

The prevailing party in a suit on this bond may recover as part of the judgment reasonable attorney fees that may be fixed by a judge of the court.

Witness our hands this _____ day of _____, 20__.

_____
PRINCIPAL SEAL

_____
AGENT OF RECORD

By _____

_____
SURETY SEAL

_____
AGENT ADDRESS

DISPUTE RESOLUTION

A. INFORMAL DISPUTE RESOLUTION

The parties to the Agreement agree that time is of the essence in relation to performance of the Agreement and completion of the Project, therefore any and all disputes in relation to the Agreement will initially be referred to the Project Manager, the Design Professional Representative and/or the Contractor Representative as applicable to the dispute, for immediate resolution. If, after good faith efforts to reach a resolution, none is reached, any party to the dispute may submit the dispute to the Dispute Resolution Representative ("DRR") process set forth below, which is intended to be an expedited process.

B. DISPUTE RESOLUTION REPRESENTATIVE ("DRR") PROCESS

1. The Parties under the Agreement agree that all claims and disputes in relation to the Project which are not resolved in the ordinary course of the Project ("Claim" or "Claims") will, as a prerequisite to any mediation, or litigation of the Claim, first be submitted for resolution between the designated Dispute Resolution Representatives of the Parties as set forth herein (the "DRR Process").

2. The DRR Process will be initiated through service of a DRR Notice as set forth below:

   a. For claims by the Contractor or the Design Professional, the DRR Process will be initiated by the party asserting the claim serving written notice on the City setting forth in detail: (i) the basis for the claim; (ii) the effect of the Claim upon the construction of, and/or Project Schedule for, the Project;
   (iii) the specific relief requested, the amount thereof, and how such was calculated; (iv) the parties involved in the Claim, and how they are involved; (v) the specific Agreement provisions in the Agreement Documents (including, if applicable, drawings and specifications) which apply; and (vi) efforts made to date to resolve the Claim.

   b. For claims by the City, the DRR process will be initiated by the City providing written notice to the other parties of the basis and amount of its claim, the parties involved in the Claim, and how they are involved, the provisions in the Agreement Documents that apply, and the relief requested.

   c. The DRR Notice will be hand-delivered and e-mailed to the other parties' designated Dispute Resolution Representatives.

3. The other parties will respond in writing to the DRR Notice ("DRR Response") within ten (10) calendar days of receipt of the DRR Notice, setting forth those items set forth in the DRR Notice that they agree with, dispute, and/or have questions concerning. The DRR Response will be hand-delivered and e-mailed to the other parties' Dispute Resolution Representatives.

4. The designated Dispute Resolution Representatives for the Parties to the

claim will then meet as soon as possible and in any event within twenty (20) calendar days of submission of the DRR Notice (regardless of whether a DRR Response has been submitted by all parties involved in the dispute), at a mutually agreed upon time and place, to attempt to resolve the Claim based upon the DRR Notice and DRR Response.

5. At any time after the first meeting required above, either party may terminate the DRR Process by written notice to the other party.

6. The parties may agree, in writing, to extend or modify the time limits or other provisions of the DRR process in relation to a specific pending Claim.

7. Unless otherwise designated in a written notice to the other parties, the City and the representatives of the Contractor and of the Design Professional will act as the parties' designated Dispute Resolution Representatives.

8. If a resolution of the Claim is reached, that resolution must be set forth in writing and must be signed by the Parties' designated Dispute Resolution Representative. If the resolution involves a change in any Agreement Documents, the Agreement Price, the Project Schedule, or any other change requiring a written Change Order or Amendment, the parties must execute an appropriate written Change Order or Amendment pursuant to the terms of the Agreement Documents.

C. MEDIATION

1. Unless extended by written agreement of the parties involved in the dispute, any Claim not resolved through the DRR process set forth above within five (5) calendar days after the meeting required under B (4) above, or after the DRR is terminated pursuant to B (5) above, whichever is earlier, will be submitted to mediation as a condition precedent to litigation by either party.

2. The mediation will be commenced by written demand upon the other party for mediation. If the parties cannot agree upon a mediator within ten (10) calendar days of the written demand, either party may make a request to the Civil Presiding Judge of the Maricopa County Superior Court to appoint a mediator. The mediation will occur within forth (40) calendar days of the written demand for mediation, unless the parties agree, in writing, to a longer period of time.

3. The qualifications for the mediator will be that he/she be: (a) an experienced mediator, arbitrator or litigator of construction disputes; and (b) having engaged a significant portion of his/her time involving and/or resolving construction disputes for at least the past five (5) years.

4. Each party will provide to the other party and the mediator all of the information and documentation required under B(1) and (2) above, together with any additional information and documentation which the party believes relevant. In addition, the parties will exchange, and provide to the mediator such additional memoranda, information and/or documentation, as the mediator may request, and in the form and at such times, as the mediator may

direct.

5. The parties will share the mediator's fee and any filing fees equally. The mediation will be held in Chandler, Arizona, unless another location is mutually agreed upon. Agreements reached in mediation will be specifically enforceable in any court having jurisdiction thereof.

D. LITIGATION

Any claim arising out of or related to the Agreement, except Claims relating to aesthetic effect and except those claims waived as provided for in the Agreement Documents, must be resolved through litigation in the Maricopa County, Arizona Superior Court.

CITY OF CHANDLER, ARIZONA
PUBLIC WORKS & UTILITIES DEPARTMENT

CERTIFICATE OF COMPLETION

PROJECT NAME:	**WATER SYSTEM UPGRADES PROGRAM**		
CITY PROJECT NO.:	**WA2100.402**		
If Federally Funded:			
FEDERAL NO.:		**ADOT NO:**	

(*This section to be completed by Prime*)
I HEREBY CERTIFY THAT ALL GOODS AND/OR SERVICES REQUIRED BY CITY OF CHANDLER FOR THIS PROJECT HAVE BEEN DELIVERED IN ACCORDANCE WITH THE AGREEMENT DOCUMENTS AND BID SPECIFICATIONS AND ALL ACTIVITIES REQUIRED BY THE AGREEMENTOR UNDER THE AGREEMENT HAVE BEEN COMPLETED AS OF THE COMPLETION DATE LISTED HERE:

FINAL ACCEPTANCE DATE:	

PRIME CONTRACTOR:

FIRM NAME:			
PRINCIPAL:			
TITLE:			
SIGNATURE:		DATE:	

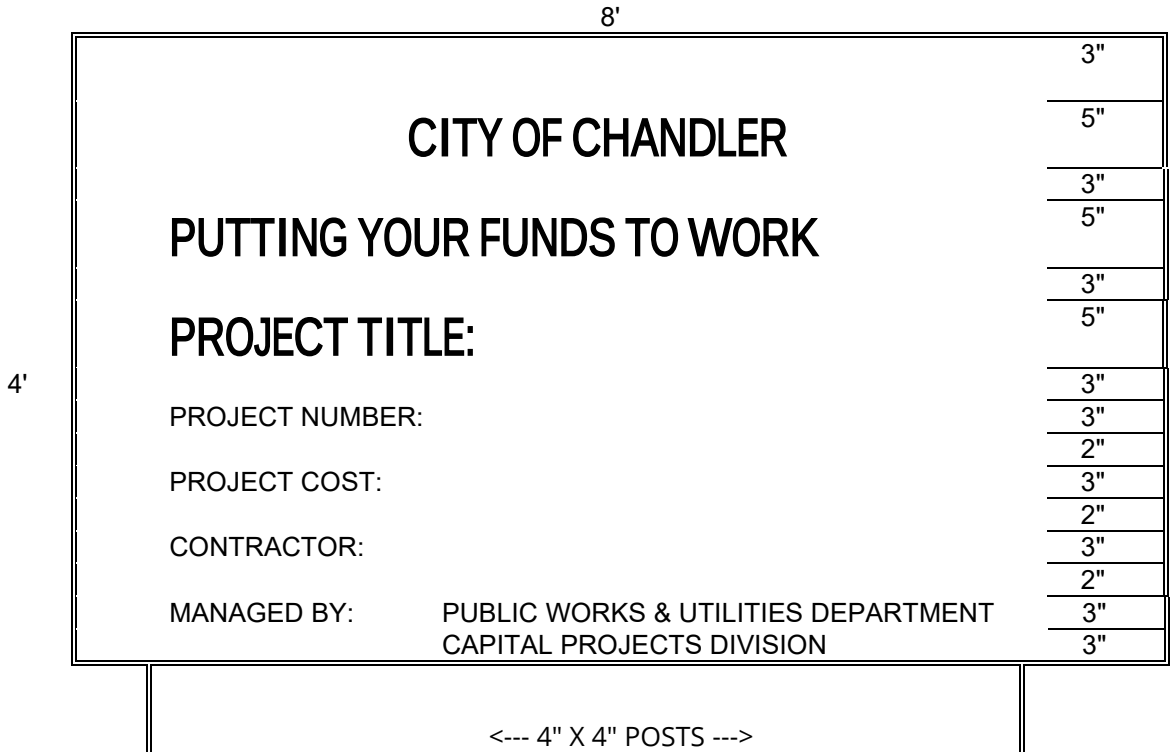
CERTIFIED BY [*INSERT NAME AND TITLE OF PARTY THAT OVERSEES CONSTRUCTION*]:

FIRM NAME:			
SIGNATURE:		DATE:	

PROJECT ACCEPTED BY CITY OF CHANDLER:

NAME:			
SIGNATURE:		DATE:	

CONSTRUCTION SIGN DETAIL



NOTES:

SIGN(S) MUST BE FURNISHED AND ERECTED PRIOR TO COMMENCEMENT OF CONSTRUCTION. POSTS MUST BE ANCHORED A MINIMUM OF TWO FEET INTO THE GROUND. BOTTOM OF SIGN MUST BE A MINIMUM OF FOUR FEET ABOVE THE GROUND.

TYPICAL PROJECT IDENTIFICATION SIGN FOR GENERAL PROJECTS MUST BE NON-REFLECTORIZED GREEN BACKGROUND, AND NON-REFLECTORIZED WHITE LETTERS AND NUMERALS.

ONE SIGN MUST BE ERECTED FOR BUILDINGS AND OTHER LIMITED AREA SINGLE SITES. FOR MULTIPLE SITES, ONE SIGN MUST BE ERECTED AT EACH SITE.

FOR LINEAR PROJECTS ONE HALF MILE OR LONGER, PLACE ONE SIGN AT EACH END OF THE PROJECT.

COST OF THE WORK

(APPLICABLE SOLELY TO CONSTRUCTION MANAGER AT RISK AND JOB ORDER CONTRACTING)

SECTION 1 – COSTS TO BE REIMBURSED

1.1 Cost of the Work

The term Cost of the Work will mean costs necessarily incurred by Contractor in the proper performance of the Work. Such costs must be at rates not higher than the standard paid at the place of the Project except with prior consent of City. The Cost of the Work will include only the items set forth in this Section 1.

1.2 Labor Costs

1.2.1 Wages of construction workers directly employed by the Contractor to perform the construction of the Work at the site or, with City's approval, at off-site workshops. Cost to be reimbursed will be the actual wages paid to the individuals performing the work.

1.2.2 Wages or salaries of the Contractor's supervisory and administrative personnel when stationed at the site with City's approval. No Contractor personnel stationed at the Contractor's home or branch offices will be charged to the Cost of the Work. Non-field office based Contractor management and support personnel are expected to provide service and advice from time to time throughout the job and his/her time devoted to Project matters is considered to be covered by the Contractor's Fee.

1.2.3 Wages and salaries of Contractor's supervisory or administrative personnel who would normally be stationed at the field office in accordance with Section 1.2.2 but who become engaged, at factories, workshops or on the road, in expediting the production or transportation of materials or equipment required for the Work, but only for that portion of his/her time required for the Work. Employee bonuses and/or costs associated with Employee Stock Ownership Plans ("ESOP") will not be considered reimbursable labor or labor burden costs and will be considered non-reimbursable costs considered to be covered by the Contractor's Fee.

1.2.4 Costs paid or incurred by Contractor for taxes, insurance, contributions, assessments and benefits required by law or collective bargaining agreements and, for personnel not covered by such agreements, customary benefits such as sick leave, medical and health benefits, holiday, vacations and pensions, provided such costs are based on wages and salaries included in the Cost of the Work under Subparagraphs 1.2.1 through 1.2.3.

1.2.4.1 Cost of the Work will include the actual net cost to Contractor for worker's compensation insurance attributable to the wages chargeable to the Cost of Work per this Agreement. The actual net cost of worker's compensation must take into consideration all cost adjustments due to experience modifiers, premium discounts, policy dividends, retrospective rating plan premium adjustments, assigned risk pool rebates, any applicable weekly maximums, etc. Contractor may charge an estimated amount for worker's compensation insurance costs, but will make appropriate cost adjustments to actual costs within 45 days of receipt of actual cost adjustments from the insurance carrier.

1.2.4.3 Overtime wages paid to salaried personnel (if approved in advance in writing by City) will be reimbursed at the actual rate of overtime pay paid to the individual. No time charges for overtime hours worked on the Project will be allowed if the individual is not paid for the overtime worked.

1.2.4.4 Any overtime premium or shift differential expense to be incurred by Contractor for hourly workers will require City's advance written approval before the incremental cost of the overtime premium or shift differential will be considered a reimbursable cost. If the Contractor is required to work overtime as a result of an inexcusable delay or other coordination problems caused by the Contractor or anyone he/she is responsible for, the overtime premium and/or shift differential expense portion of the payroll expense and related labor burden costs will be considered as cost not to be reimbursed.

1.2.4.5 Reimbursable labor burden costs will be limited to payroll taxes, worker's compensation insurance, the employer's portion of union benefit costs for union employees working on the Project, and the actual verifiable fringe benefit costs incurred by Contractor for non-union individuals working on the Project subject to the following maximum percentages for the following reimbursable non-union fringe benefit costs. The following maximums (as a percentage of reimbursable actual wages by individual) will apply for each of the following types of fringe benefit costs specifically attributable to each of the non-union personnel working on the Project:

- Medical Insurance, Dental, Life & AD&D Insurance: 12.00%
- Holiday, vacation and other paid time not worked: 10.00%
- Pension Plan Contributions to Vested Employee Account, Simplified Employee Pension Plans, or 401K matching plans (Note: ESOP related costs are covered by the Contractor Fee) 10.00%

For non-union personnel, no other fringe benefit costs (other than the three specific categories listed immediately above, will be considered reimbursable Cost of Work. Any labor burden costs that are in excess of the amounts considered reimbursable or are otherwise not considered reimbursable under the terms of this agreement are intended to be covered by the Contractor Fee.

1.3 Subcontract Costs

1.3.1 Payments made by Contractor to Subcontractors in accordance with the requirements of the subcontracts.

1.3.2 For Scope of Work Bid Packages typically performed by Subcontractors, Contractor may "self- perform" such work on an actual cost basis subject to an agreed upon Guaranteed Maximum Price for the "self-performed work". The Contractor must, unless agreed to by City in writing, bid his/her proposed guaranteed Maximum Price for the work to be "self-performed" against at least three other interested trade Contractors. All savings under any such Subcontract for "self-performed work" must be applied to reduce the Cost of Work under the Agreement and the Guaranteed Maximum Price. For purposes of defining "self-performed work" subject to this provision, any division of Contractor, or any separate Contractor or Subcontractor that is partially owned or wholly owned by the Contractor or any of his/her employees or employee's relatives will be considered a related party entity and will be subject to this provision regarding "self-performed work". No self-performed work will

be allowed to be performed on a Fixed Price basis.

1.3.3 Contractor (with respect to its Suppliers, Subcontractors and all lower tier Subcontractors) must provide City advance written notice and must obtain City's approval for any proposed Subcontract Change Order, Material Purchase Order, or other financial commitment in an amount in excess of $5,000 prior to placing such order or entering into such agreement (regardless of whether or not any such commitment will affect the prime Agreement Guaranteed Maximum Cost). It is agreed that sums applicable to any Subcontract Change Order, Purchase Order or other financial commitment entered into in violation of the above notice and approval requirement will not be included in the amounts owning to Contractor, Subcontractors or Suppliers whether as Costs of the Work or as reasonable termination costs in the event of termination.

1.4 Costs of Material and Equipment Incorporated in the Completed Construction

1.4.1 Costs, including transportation and storage, of materials and equipment incorporated or to be incorporated in the completed construction.

1.4.2 Costs of materials described in the preceding Subparagraph 1.4.1 in excess of those actually installed to allow for reasonable waste and spoilage. Unused excess materials, in any, will become City's property at the completion of the Work or, at City's option, may be sold by the Contractor. Any amounts realized from such sales must be credited to City as a deduction from the Cost of Work.

1.4.3 Proceeds from the sale of recyclable materials, scrap, waste, etc. will be credited to job cost.

1.5 Costs of Other materials and Equipment, Temporary Facilities and Related Items

1.5.1 Costs, including transportation and storage, installation, maintenance, dismantling and removal of materials, supplies, temporary facilities, machinery, equipment and hand tools not customarily owned by construction workers, that are provided by the Contractor at the site and fully consumed in the performance of the Work; and cost (less salvage value) of such items if not fully consumed, whether sold to others or retained by Contractor. Cost for items previously used by Contractor will mean fair market value.

1.5.2 Rental charges for temporary facilities, machinery, equipment, and hand tools not customarily owned by construction workers that are provided by Contractor at the site, whether rented from Contractor or others, and costs of transportation, installation, minor repairs and replacements, dismantling and removal thereof. Rates and quantities of equipment rented will be subject to City's prior written approval.

1.5.2.1 The Projected usage for each piece of equipment to be rented for use on the Project and the estimated total rentals must be considered by Contractor before the piece of equipment is rented so that an appropriate rent versus buy decision can be made. Purchased equipment must be considered "job owned". At the completion of the Project, Contractor must transfer title and possession of all remaining job-owned equipment to City, or Contractor may keep any such equipment for an appropriate fair market value credit to job cost, which will be mutually agreed to by City and Contractor.

1.5.2.2 Each piece of equipment to be rented must have hourly, daily, weekly and monthly rates and

the most economical rate available will be reimbursed based on the circumstances of actual need and usage of the piece of equipment while it is stationed at the jobsite. When the piece of equipment is no longer needed for the work, no rental charges will be reimbursed if the piece of equipment remains at the jobsite for the convenience of Contractor.

1.5.2.3 Equipment Rental Rates

1.5.2.3.1 Compensation for equipment used on the Project will be paid in accordance with the Equipment Plan submitted by Contractor in the accepted GMP Proposal and no payments will be made in excess of the rates set forth in the Equipment Plan, or actual documented costs, whichever is less.

1.5.2.3.2 All equipment rental rates and costs are subject to City's right to audit when submitted as part of Equipment Plan and/or at any time during the Project.

1.5.2.4 The aggregate rentals chargeable for each piece of Contractor owned tools or equipment must not exceed 50% of the fair market value of such equipment at the time of its commitment to the Work. The original purchase price and date of purchase of the equipment will be documented with a copy of the purchase invoice for the piece of equipment. Such aggregate limitations will apply and no further rentals will be charged even if a piece of equipment is taken off the job and is later replaced by a similar piece of equipment. For purposes of computing the aggregate rentals applicable to aggregate rental limitations, rental charges for similar pieces of equipment will be combined if the pieces of equipment were not used at the same time.

1.5.2.5 Fair market value for used material and equipment as referred to in the Agreement Documents will mean the estimated price a reasonable purchaser would pay to purchase the used material or equipment at the time it was initially needed for the job. Note: This is usually lower than the price a reasonable purchaser would pay for similar new construction material or construction equipment.

1.5.2.6 All losses resulting from lost, damaged or stolen tools and equipment will be the sole responsibility of Contractor, and not City, and the cost of such losses will not be reimbursable under the Agreement.

1.5.2.7 Contractor will be required to maintain a detailed equipment inventory of all job-owned equipment (either purchased and charged to job cost or job-owned through aggregate rentals) and such inventory must be submitted to City each month. For each piece of equipment, such inventory should contain at a minimum (1) original purchase price or acquisition cost (2) acquisition date (3) approved Fair Market Value at the time the piece of equipment was first used on the job and (4) final disposition.

1.5.2.8 All costs incurred for minor maintenance and repairs will be reimbursed at actual cost. Such costs include routine and preventative maintenance, minor repairs and other incidental costs. Repairs and/or replacement of a capital nature are considered to be covered by the rental rates. Major repairs and overhauls are not considered routine and ordinary; consequently such costs are not reimbursable and are intended to be covered by the rental rates.

1.5.3 Costs of removal of debris from the Site.

1.5.4 Costs of document reproductions, facsimile transmissions and long-distance telephone calls, postage and parcel delivery charges, telephone service at the site and reasonable petty cash expenses of the site office.

1.5.5 That portion of the reasonable expenses of Contractor's personnel incurred while traveling in discharge of duties connected with the Work.

1.5.5.1 No travel expenses will be reimbursed to Contractor's representatives unless Project related travel required them to travel to a destination more than 100 miles from the Project location. Any travel involving airfare will require advance written approval by an authorized City's representative.

1.5.6 Costs of materials and equipment suitably stored off the site at a mutually acceptable location, if approved in advance by the City.

1.5.7 Reproduction costs will be the actual costs of reproduction subject to a maximum of five cents ($.05) per square foot for prints and a maximum of five cents ($.05) per 8 ½ by 11-inch page for offset print or photo copied agreement documents, specifications, etc. Telephone costs will be the actual costs paid to the third party telephone company for the field office telephone.

1.6 Miscellaneous Costs

1.6.1 That portion of insurance and bond premiums that can be directly attributed to the Agreement. The City will reimburse Contractor for contractually required bond at time of first pay application for GMP and Cost-Based Agreements upon receipt of proof of payment from the Contractor. If the Contractor completes Work for less than the Agreement Price, Contractor must credit the City a pro- rated amount for the unused portion of the bond payment

1.6.1.1 Contractor's actual cost for insurance will be considered to be included within the Maximum limit for General Conditions Costs. All premiums for any insurance and bonds required for the Project must reflect the net actual costs to Contractor after taking into consideration cost adjustments due to experience modifiers, premium discounts, policy dividends, retrospective rating plan premium adjustments, assigned risk pool rebates, refunds, etc.

1.6.1.2 The amount to be reimbursed to Contractor for all contractually required insurance will be actual costs not to exceed a total of 2% of the Agreement Value, unless Contractor establishes to City's satisfaction that the actual cost is higher and City agrees to such actual higher cost in writing. If Contractor's cost of contractually required insurance is greater than the amount agreed to be reimbursed per this Agreement Provision, the difference will be considered to be covered by the Contractor's Fee. The City will reimburse Contractor for contractually required insurance on a monthly basis for GMP and Cost-Based Agreements. If Contractor can demonstrate substantial savings by paying for all insurance in advance, the City may agree to reimburse all insurance costs at time of first pay application for GMP and Cost-Based Agreements with proof of payment from Contractor.

1.6.2 Sales, use or similar taxes imposed by a governmental authority that are related to the Work.

1.6.3 Fees and assessments for the building permit and for other permits, licenses and inspections for which Contractor is required by the Agreement Documents to pay.

1.6.4 Fees of laboratories for tests required by the Agreement Documents, except those related to defective or nonconforming Work and which do not fall within the scope of ¶ 1.7.3 below.

1.6.5 Royalties and license fees paid for the use of a particular design, process or product required by the Agreement Documents; the cost of defending suites or claims for infringement of patent rights arising from such requirement of the Agreement Documents; and payments made in accordance with legal judgments against Contractor resulting from such suites or claims and payments of settlements made with City's consent. However, such costs of legal defenses, judgments and settlements must not be included in the calculation of the Contractor's Fee or subject to the Guaranteed Maximum Price.

1.6.6 Data processing costs related to the Work. However, any such data processing costs will be limited to the cost of personal computer hardware used at the field office in the normal day to day administration, management and control of the Project. The aggregate charges for any such hardware must not exceed the Fair Market Value of the hardware at the time it was brought to the field office. If the total charges for any particular piece of hardware reach an amount equal to the Fair Market Value, that particular piece of hardware must be turned over to City whenever it is no longer needed for the Project. If Contractor elects to keep the particular piece of hardware, the job costs must be credited with a mutually agreeable amount which will represent the Fair Market Value of the particular piece of hardware at the time it was no longer needed for the job. Software or other costs associated with the use of computer programs will not be considered to be a reimbursable cost and will be considered to be covered by the Contractor's Fee.

1.6.7 Deposits lost for causes other than Contractor's negligence or failure to fulfill a specific responsibility to City as set forth in the Agreement Documents.

1.6.8 Legal, mediation and arbitration costs, including attorneys' fees, other than those arising from disputes between City and Contractor, reasonably incurred by Contractor in the performance of the Work and with City's prior written approval; which approval will not be unreasonably withheld.

1.6.9 Expenses incurred in accordance with Contractor's standard personnel policy for relocation and temporary living allowances of personnel required for the Work, if pre-approved by City in writing. If City authorizes the reimbursement of relocation costs, the reimbursable relocation expenses will be limited to a maximum of $50,000 per person. Any relocation cost incurred by Contractor in excess of the amount reimbursed by City will be considered to be covered by the Contractor's Fee.

1.7 Other Costs and Emergencies

1.7.1 Other costs incurred in the performance of the Work if and to the extent approved in advance in writing by City.

1.7.2 Costs due to emergencies incurred in taking action to prevent threatened damage, injury or

loss in case of an emergency affecting the safety of persons and property.

1.7.3 Costs of repairing or correcting damaged or nonconforming Work executed by Contractor, Subcontractors or Suppliers, provided that such damaged or nonconforming Work was not caused by negligence or failure to fulfill a specific responsibility of Contractor and only to the extent that the cost of repair or correction is not recoverable by Contractor from insurance, sureties, Subcontractors or Suppliers.

1.8 Related Party Transactions

1.8.1 The term "related party" will mean a parent, subsidiary, affiliate or other entity having common ownership or management with Contractor; any entity in which any stockholder in, or management employee of, Contractor owns any interest in excess of ten percent in the aggregate; or any person or entity which has the right to control the business or affairs of Contractor. The term "related party" includes any member of the immediate family of any person identified above.

1.8.2 If any of the costs to be reimbursed arise from a transaction between Contractor and a related party, Contractor must notify City in writing of the specific nature of the contemplated transaction, including the identity of the related party and the anticipated cost to be incurred, before any such transaction is consummated or cost incurred. If City, after such notification, authorizes in writing the proposed transaction, then the cost incurred will be included as a cost to be reimbursed, and Contractor must procure the Work, equipment, goods or service from the related party, as a Subcontractor. If City fails to authorize the transaction, Contractor must procure the Work, equipment, goods or service from some person or entity other than a related party.

SECTION 2 – COSTS NOT TO BE REIMBURSED

2.1 The Cost of Work must not include:

2.1.1 Salaries and other compensation of Contractor's personnel stationed at Contractor's principal office or offices other than the site office, except as specifically provided in Subparagraphs 1.2.2 and 1.2.3.

2.1.2 Expenses of Contractors' principal office and offices other than the site office.

2.1.3 Overhead and general expenses, except as may be expressly included in Section 1.

2.1.3.1 Costs of Contractor's home office computer services or other outside computer processing services will be considered overhead and general expense. Accordingly, Contractor should not plan to perform any such computer related services or alternatives at the field office when such services or functions can be performed at Contractor's home or branch offices, or other outside service locations.

2.1.4 Contractor's capital expenses, including interest on Contractor's capital employed for the Work.

2.1.5 Rental costs of machinery and equipment, except as specifically provided in subparagraph 1.5.2.

2.1.6 Except as provided in Subparagraph 1.7.3 of the Agreement, costs due to the negligence or failure to fulfill a specific responsibility of Contractor, Subcontractors and Suppliers or anyone directly or indirectly employed by any of them or for whose acts of them may be liable.

2.1.7 Any cost not specifically and expressly described in Section 1.

2.1.8 Costs, other than costs included in Change Orders approved by City that would cause the GMP to be exceeded.

SECTION 3 – DISCOUNTS, REBATES, REFUNDS AND SAVINGS

3.1 Cash discounts obtained on payments made by Contractor will accrue to City if (1) before making the payment, Contractor included them in an Application for Payment and received payment therefore from City, or (2) City has deposited funds with Contractor with which to make payments; otherwise, cash discounts will accrue to Contractor. Trade discounts, rebates, refunds and amounts received from sales or surplus materials and equipment will accrue to City, and Contractor must make provisions so that they can be secured.

3.1.1 Cost of the Work will be credited with all insurance policy discounts, performance and payment bond rebates or refunds, refunds or return premiums from any Subcontractor default insurance, refunds or rebates from any Contractor controlled insurance programs applicable to the Project, merchandise rebates of any nature, refunds of any nature, insurance dividends; and a portion of any volume rebates or free material credits earned with purchase of material or other goods and services charged to the job.

3.1.2 "Cash" discounts which may accrue to Contractor will be limited to a maximum of 1.5% of invoice cost. Any portion of "Cash" discounts greater than 1.5% will automatically accrue to City if Contractor is eligible to take advantage of the discounts.

3.2 Amounts that accrue to City in accordance with the provisions of Paragraph 3.1 will be credited to City as a deduction from the Cost of the Work.

3.3 Any and all savings on the GMP, or any separately guaranteed items comprising the GMP, will belong to City, subject to any express right in the Agreement for Contractor to share in savings. Savings are subject to City's right to audit, and may be audited separately.

SECTION 4 – GENERAL CONDITIONS COSTS

4.1 General Conditions Costs may include, but are not limited to, the following types of costs incurred by Contractor during construction of the Work to the extent they are reimbursable Costs of the Work as delineated above: payroll costs for Work conducted at the site, payroll costs for the superintendent and full-time general foremen, payroll costs for management personnel resident and working on the site workers not included as direct labor costs engaged in support (e.g. loading/unloading, clean-up, etc.), administrative office personnel, costs of offices and temporary facilities including office materials, office supplies, office equipment, minor expenses, utilities, fuel, sanitary facilities and telephone services at the site, costs of liability insurance premiums not included in labor burdens for direct labor

costs, costs of bond premiums, costs of consultants not in the direct employ of Contractor or Subcontractors, fees for permits and licenses.

4.2 General Conditions Costs may be paid on a percentage of the Agreement Price or on a lump/stipulate sum basis as set forth in the Agreement. All costs included in the General Conditions Costs will not be separately invoiced to or paid by City.

4.3 The total amount of General Conditions Costs for the Work may be divided by the number of days allowed for performance of the Work, to determine a fixed daily rate for General Conditions Costs that may be used in computing the General Conditions Costs allocated to any period of time, or for any adjustments in the General Conditions Costs agreed to in writing by City.

LANDSCAPE ESTABLISHMENT PERIOD

Section 1 – Description and General

Contractor is in direct control of work performed under the Landscape Establishment Period. If work is subcontracted, a representative of the Contractor will be present at the site of the work for all hours that the subcontractor works. Subcontracting of Landscape Establishment work will be permitted for weed eradication with herbicides, because of special licensing. A licensed temporary service may be used to supply labor to Contractor if Contractor has received approval from City Representatives. Contractor will submit the required subcontract documentation.

Contractor must provide adequate personnel to accomplish the required maintenance of the plant materials at intervals acceptable to City Representatives.

If not healthy at the end of the maintenance period, the maintenance must be continued until the plant material is approved by City.

1.1 Time and Schedule

Unless otherwise expressly agreed to in writing by City, the Landscape Establishment Period will be per General Conditions Section 6.5.4.

1.2 Planted Stock and Seeding Establishment

1.2.1 Tree planting and staking must be per City of Chandler Standard Detail C-801.

1.2.2 All trees will stand erect on their own without stakes when brought to this site. If the tree cannot stand on its own when nursery stakes are removed, the tree will be removed and replaced.

1.3 Pre-Emergent Herbicide and Weed Control

1.3.1 Contractor will provide three applications of an approved pre-emergent herbicide on all unpaved areas of the project, as directed by City Representatives, to control weed growth in all areas of the project. The number of applications may be increased as directed by the City Representative, and at no additional cost to City, if the City Representative deems additional applications are required to control weed growth.

1.3.2 Application sequence will be approved in advance by City. The first application of pre-emergent will be completed prior to the application of Decomposed Granite and will be included with the cost of the Decomposed Granite as specified and part of the Construction Phase portion of work. The second application of pre-emergent will be completed after installation of the Decomposed Granit and no later than half-way through the Landscape Establishment Period. The third and final application of pre-emergent will be applied 15 days prior to completion of the Landscape Establishment portion of the project. The second and third pre-emergent applications will be included with the cost of Landscape Establishment. Watering will be completed in accordance with the manufacturer's recommendations, as included and as related to each application.

1.3.3 The pre-emergent herbicide will be applied in accordance with the Technical Specifications and the recommendations of the pre-emergent herbicide manufacturer, as approved by City Representatives.

1.3.4 The control of weeds will be accomplished by the use of herbicides. Manual removal of weeds will be required, after herbicides have taken affect.

1.3.5 Contractor is responsible for the removal and disposal of all trash and debris that during the Landscape Establishment Period. Contractor will keep the project in a neat and orderly manner during the duration of the Landscape Establishment Period.

1.4 Water

The water used during Landscape Establishment to properly maintain the plant material will be furnished by City, at designated sources from within the project limits, at no charge to Contractor. Contractor will be responsible for all equipment, materials and labor necessary to load, transport and unload water for watering purposes.

1.5 Plant Material Replacements

The plant material replacement will be considered as included in the work for Landscape Establishment, and will be made at no charge to the City.

1.5.1 Shrub and Plant Replacement - During the second half of the Landscaping Establishment period, Contractor will provide, where required, plant replacements as follows:

Original Size	**Replacement Size**
1 gallon	5 gallon
5 gallon	15 gallon
15 gallon	24-inch box
36-inch box	48-inch box

1.5.2 Tree Replacement – During the second half of the Landscape Establishment Period, Contractor will provide plant material replacements for existing plants that die as follows:

Existing Plant Material Sizes	**Replacement Size**
Trees:	
2-inch Caliper	24-inch box
4-inch Caliper	36-inch box
6-inch Caliper and greater	54-inch box
Shrubs:	
All Existing Shrubs	15 gallon

1.6 Measurement and Payment

See Technical Specifications for Measurement Payment provisions.

EXHIBIT C

TECHNICAL SPECIFICATIONS

City of Chandler

Pecos Surface Water Treatment Plant

PROJECT MANUAL

FOR

Chandler Water System Program

PSWTP Improvements

August 2025

GMP2

VOLUME 1 OF 1

SECTION 00 01 01

PROJECT TITLE PAGE

PROJECT MANUAL

FOR

Chandler Water System Program

PSWTP Improvements

August 2025

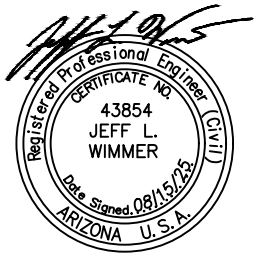
Professional Engineer Certifications



Expires: 09-30-2027

Jason Curl, PE

License No. 81592
Divisions 00, 01, 40



Jeff Wimmer, PE

License No. 43854
Divisions 02, 31, 32



Pouya Shahsana, PE

License No. 71538
Divisions 03



Exp. Date 12/ 31/ 27

Daniel Thompson, PE

License No. 74382
Divisions 26

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SECTION 01 11 00
SUMMARY OF WORK

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Summary
2. Location and Description of Work
3. Construction Contracts, This Project
4. Construction Contracts, Other Projects
5. Work by Others
6. Work by Owner - None
7. Owner Furnished Equipment and Materials - None
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1.02 LOCATION AND DESCRIPTION OF WORK

A. The Work is located at the following Site:

1. Pecos Surface Water Treatment Plant, 1475 E Pecos Rd, Chandler, AZ 85286

2. A new Post-Filter Granular Activated Carbon (PF-GAC) Facility, currently under design, will further reduce Total Organic Carbon (TOC) levels in treated water. The facility will include:

    a. Ten new concrete GAC contactors with a nominal total capacity of 30 MGD

    b. A new influent pump station

    c. Yard piping connections

    d. Site improvements

    e. Ancillary support systems

    f. A new electrical building

3. The PF-GAC system will divert a portion of the filtered effluent from facility filters (via post-filter seal water chamber) to the GAC contactors for additional TOC removal. The treated water will then blend with the remaining filter effluent prior to entry into the Finished Water Reservoirs, achieving target TOC levels.

4. This project represents an early works construction package for subsurface preparation for the PF-GAC Facility and procurement of long-lead electrical equipment required for multiple facilities.

B. The Work to be performed under this Contract includes, but is not limited to, constructing the Work described below and all appurtenances related to the Work. This includes the furnishing and installation of equipment, materials, superintendence, labor, skill and all other items necessary for the installation of each element described below. The CMAR Contractor shall perform all work required for such construction in accordance with the Contract Documents and subject to the terms and conditions of the Contract, complete and ready for use. Principal features of the work include, but are not limited to, the following

    1. Civil earthwork and subgrade preparation for the PF-GAC facility, influent pump station, seal weir structure, electrical facility, and relocation of the site retention basin in the PF-GAC footprint.

    2. Procurement and installation of PF-GAC underslab piping and below-grade yard piping, including GAC effluent, backwash waste, and waste-to-drain pipelines (WSP and DIP) encased in reinforced concrete under the footprint of the structure and backfilled with cementitious flowable fill..

    3. Procurement of rebar and ready-mix concrete (not installation)

    4. Demolition of sections existing 8-ft. high CMU wall in the PF-GAC footprint

5. Installation of temporary fencing and erosion control measures

6. Demolition and temporary rerouting of polymer lines serving Filters 1 -12

7. Relocation and partial replacement of site fiber optic infrastructure in the PF-GAC footprint

8. Additionally, the scope of work includes allowance for procurement of long-lead electrical equipment:

    a. Medium-voltage oil-filled transformers

    b. Panelboards

    c. Motor Control Centers (MCCs)

    d. Variable Frequency Drives (VFDs)

C. These early works are critical to advance the PF-GAC facility construction and support long-lead procurement necessary to maintain the project schedule and represent critical path activities for the overall PSWTP upgrade program.

1.03 CONSTRUCTION CONTRACTS, THIS PROJECT

A. The Contracts under which the Project will be constructed are:

1. Work specified in Divisions 01 through 46 (inclusive) of the Specifications.

2. Work shown on all Project Drawings sheets (inclusive).

1.04 CONSTRUCTION CONTRACTS, OTHER PROJECTS

A. This project utilizes the Construction Manager at Risk (CMAR) delivery method. The definitive package for this scope of work is GMP 2: Long Lead Package.

B. The final number of GMPs will be determined in coordination with the CMAR.

1.05 WORK BY OTHERS

A. All aspects of rerouted fiber optic lines and related integration shall be by Others. Contractor shall coordinate with the Owner for related coordination.

1.06 HAZEN AND SAWYER SHALL PERFORM ENGINEERING SERVICES DURING CONSTRUCTION.WORK BY OWNER

A. Owner will perform the following in connection with the Work: Operate all existing valves, gates, pumps, equipment, and appurtenances that will affect Owner's operation, unless otherwise specified or indicated.

1.07 OWNER-FURNISHED EQUIPMENT AND MATERIALS - NONE

1.08 OWNER ASSIGNED PROCUREMENT DOCUMENTS - NONE

1.09 OWNER PRE-SELECTED EQUIPMENT AND MATERIALS

A. Items of equipment and material to be provided by Contractor that have been pre-selected and with Bid Form price listed shall be as defined in applicable GMP bid forms:

B. Contractor shall provide equipment and material in accordance with the Contract Documents.

1.10 SEQUENCE AND PROGRESS OF WORK

A. Requirements for sequencing and coordinating with Owner's operations, including maintenance of plant operations during construction, and requirements for tie-ins and shutdowns, are in Section 01 14 00 – Coordination with Owner's Operations.

1.11 CONTRACTOR'S USE OF SITE

A. Contractors' use of the Site shall be confined to the areas shown. Contractors shall share use of the Site with other contractors and others specified in this Section.

B. Contractor shall move stored products that interfere with operations of Owner, other contractors, or others performing work for Owner.

1.12 EASEMENTS AND RIGHTS-OF-WAY

A. Refer to General Conditions Section 4.5 for restrictions on use of project site, rights-of-way, and adjacent properties. The following information supplements that requirement.

B. Easements and rights-of-way will be provided by Owner in accordance with the General Conditions. Confine construction operations to within Owner's property, public rights-of-way, easements obtained by Owner, and the limits shown. Use care in placing construction tools, equipment, excavated materials, and products to be incorporated into the Work to avoid damaging property and interfering with traffic. Do not enter private property outside the construction limits without permission from the owner of the property.

1.13 NOTICES TO OWNERS AND AUTHORITIES OF PROPERTIES ADJACENT TO THE WORK

A. Notify owners of adjacent property and utilities when execution of the Work may affect their property, facilities, or use of property.

B. When it is necessary to temporarily obstruct access to property, or when utility service connection will be interrupted, provide notices sufficiently in advance to enable affected persons to provide for their needs. Conform notices to Laws and Regulations and, whether delivered orally or in writing, include appropriate information concerning the interruption and instructions on how to limit inconvenience caused.

C. Notify utility owners and other concerned entities at least 48 hours prior to cutting or closing streets or other traffic areas or excavating near Underground Facilities or exposed utilities.

1.14 SALVAGE OF EQUIPMENT AND MATERIALS

A. Existing equipment and materials removed and not shown or specified to be reused in the Work will be Contractor’s property, except as noted on Contract Drawings.

B. Existing equipment and material removed by Contractor shall not be reused in the Work, except where specified or indicated.

C. Carefully remove in manner to prevent damage all equipment and materials specified or indicated to be salvaged and reused or to remain property of Owner. Store and protect salvaged items specified or indicated to be used in the Work. Replace in kind or with new items equipment, materials, and components damaged in removal, storage, or handling through carelessness or improper procedures.

D. Contractor may furnish and install new items, with Engineer’s approval, instead of those specified or indicated to be salvaged and reused, in which case such removed items will become Contractor’s property.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 14 00

COORDINATION WITH OWNER'S OPERATIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for coordinating with Owner's operations during the Work and included requirements for tie-ins to complete the Work without impact on Owner's operations except as allowed in this Section.

2. Contractor shall provide labor, materials, tools, equipment and incidentals shown, specified and required to coordinate with Owner's operations during the Work.

B. General Requirements:

1. Perform the Work such that Owner's facility remains in continuous satisfactory operation during the Project. Schedule and conduct the Work such that the Work does not: impede Owner's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, or cause odors or other nuisances.

2. Work not specifically covered in this Section or in referenced Sections may, in general, be completed at any time during regular working hours in accordance with the City General Conditions and requirements in this Section.

3. Contractor has the option of providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to Owner, provided such additional temporary facilities: do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect Owner's ability to comply with Laws and Regulations, permits, and operating requirements; that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.

4. Do not shut off or disconnect existing operating systems, unless accepted by Engineer in writing. Operation of existing equipment will be by Owner unless otherwise specified or indicated. Where necessary for the Work, Contractor shall seal or bulkhead Owner-operated gates and valves to prevent leakage that may affect the Work, Owner's operations, or both. Provide temporary watertight plugs,

bulkheads, and line stops as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of Engineer.

C. Continuous Treatment Provision:

1. Federal regulations prohibit bypassing of untreated or partially treated wastewater or sewage during construction Work.

2. Contractor shall provide labor, equipment, materials, and incidentals to provide continuous treatment to the level prior to construction Work.

3. Contractor shall be responsible for providing temporary pumping facilities, systems, piping, valve, appurtenances, equipment, materials, and temporary utilities necessary to complete the Work without treatment bypassing.

D. Related Sections:

1. Section 01 11 00 – Summary of Work

2. Section 01 25 00 – Substitution Procedures

3. Section 01 73 00 – Demolition and Execution of Work

1.02 REFERENCES - NONE

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review installation procedures under other Specification sections and coordinate Work that must be performed with or before the Work specified in this Section.

2. Notify other contractors in advance of Work requiring coordination with Owner's operations, to provide other contractors sufficient time for work included in their contracts that must be installed with or before Work specified in this Section.

B. Sequencing:

1. Perform the Work in the specified sequence. Certain phases or stages of the Work may require working 24-hour days or work during hours outside of regular working hours. Work may be accelerated from a later stage to an earlier stage if Owner's operations are not adversely affected by proposed sequence change, with Engineer's acceptance. Stages specified in this Section are sequential in performance of the Work.

C. Scheduling:

1. Work that may interrupt normal operations shall be accomplished at times convenient to Owner.

2. Furnish at the Site, in close proximity to tie-in work areas, tools, equipment, spare parts and materials, both temporary and permanent, necessary to successfully complete the work. Complete to the extent possible, prefabrication of piping and other assemblies. Demonstrate to Engineer's satisfaction that Contractor has complied with these requirements before commencing relocations and or tie-ins.

3. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.

4. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor if, in Engineer's opinion, Contractor did not conform to the requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in conducting the Work.

5. Temporary, short-term shutdowns of smaller piping, conduits, equipment, and systems may be required. Coordinate requirements for such shutdowns with Engineer and Owner.

1.04 SUBMITTALS

A. Action/Informational Submittals:

1. Substitute Sequence Submittal: When deviation from specified sequence is proposed, provide submittal explaining in detail the proposed sequence change and its effects, including evidence that Owner's operations will not be adversely affected by proposed change. List benefits of proposed sequence change, including benefits to Progress Schedule. Submit in accordance with Section 01 25 00 – Substitution Procedures.

1.05 SITE CONDITIONS

A. General Constraints: Specified in the Contract Documents are the sequence and shutdown durations, where applicable, for Owner's equipment, systems, and conduits that are to be taken out of service temporarily for the Work. New equipment, materials, and systems may be used by Owner after the specified field quality controls and testing are successfully completed and the materials or equipment are Substantially Complete.

B. The following constraints apply to coordination with Owner's operations:

1. Operational Access: Owner's personnel shall have access to equipment and areas that remain in operation.

2. Schedule and perform equipment and system start-ups for Monday through Thursday. Equipment and systems shall not be placed into operation on Friday, Saturday, and Sunday without prior approval of Owner.

3. Dead End Valves or Pipe: Provide blind flanges, watertight bulkheads, or valves at temporary and permanent terminuses of pipes and conduits. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required, or otherwise restrained as directed by Engineer. Temporary valves shall be suitable for their associated service. Where valve is provided at permanent terminus of pipe or conduit, also provide on downstream side of valve a blind flange with drain/flushing connection.

4. Electrical, Control, Communication, and Monitoring Systems:

    a. Owner's existing SCADA system and fiber optic network shall remain functional, subject to the constraints herein.

    b. Fiber optic communications and network connectivity to the Facility Electrical Building shall remain operational during construction. If this communication link is deemed necessary to take offline at any point during construction for relocation by the Contractor, the Contractor shall be responsible for notifying the Owner before taking the communication link offline. The Owner shall provide specific directions to the Contractor on when this communication link may be taken offline.

    c. Unless Contractor elects to use existing fiber and/or temporary fiber, at his/her discretion, at least one communication path through new dual redundant fiber optic ring to all communication points shall be in place at all times until substantial completion.

    d. Each process area shall be permitted to have a single, non-concurrent, scheduled outage for the purpose of making PLC panel hardware modifications, loading the associated PLC logic, and its field testing/demonstration. Field testing and demonstration shall immediately follow modifications.

1.06 SUGGESTED SEQUENCE OF WORK

A. CMAR shall perform the Work in the specified sequence approved by the Engineer. Certain phases or stages of the Work may require working 24-hour days or work during hours outside of regular working hours. Work may be accelerated from a later stage to an earlier stage if Owner's operations are not adversely affected by proposed sequence change, and with Engineer's acceptance.

1.07 TIE-INS

A. Contractor shall perform tie-ins required to complete the Work as defined in 01 11 00 Summary of Work.

B. Treatment Process Site Access Constraints:

1. Owner shall have the following unit processes and equipment operational at all times during the Project, unless specified herein:

a. All conveyance and existing treatment processes at the Pecos Surface Water Treatment Plant.

2. Owner shall have roadway access to all roadways required for ongoing operations and maintenance activities, including access to the chemical unloading station, residuals handling areas, and routine equipment servicing locations.

3. Contractor shall maintain clear access to a minimum 15-foot roadway for Owner access.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. In addition to requirements of this Section, conform to requirements of the General Conditions and Section 01 73 00 – Demolition and Execution of Work.

END OF SECTION

END OF SECTION

SECTION 01 20 00

MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Items listed in this Section refer to and are the same pay items listed in the Bid Form and constitute all pay items for completing the Work.

2. Compensation for all services, items, materials, and equipment shall be include in prices stipulated for lump sum and unit price pay items listed in this Section and included in the Contract. In the event of a conflict, refer to General Conditions Section 14.1 regarding precedence of Agreement Documents.

3. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, bonds, insurance, or other requirements of the Contract Documents, unless explicitly allowed under General Conditions Section 15 Appendix 9.

4. Each lump sum and unit bid price shall include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

B. Related Sections:

1. Payments to Contractor: Refer to General Conditions, Supplementary Conditions, and Agreement.

2. Changes to Contract Price: Refer to General Conditions, Supplementary Conditions, and Section 01 26 00 – Contract Modification Procedures.

3. Schedule of Values: Refer to General Conditions, Supplementary Conditions, and Section 01 29 73 – Schedule of Values.

1.02 ENGINEER'S ESTIMATE OF QUANTITIES

A. ENGINEER'S and OWNER's estimated quantities for unit price pay items, as listed in the Bid Form, are approximate only and are included solely for the purpose of comparison of Bids. Owner does not expressly or by implication agree that the nature of the materials encountered below the surface of the ground or the actual quantities of material encountered or required will correspond therewith and reserves the right to increase or decrease any quantity or to eliminate any quantity as Owner may deem necessary. Contractor will not be entitled to any adjustment in a unit bid price as a result of any change in an estimated quantity unless such adjustment is authorized per General Conditions 7.1 – Unit Price Agreements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Contractor shall include all additional Work items, services, goods, resources, and manpower necessary for installation of the Work to provide a completely functional system in accordance with the Contract Documents. Refer to General Conditions Section 4.4 – Performance of the Work. Contractor shall include these costs associated with providing a completely functional system within the listed items in the General Conditions Exhibit D CMAR GMP Summary and subsequent Detailed Cost Estimate Bid Form.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Procedural requirements for product substitutions.

2. Procedural requirements for substitute construction methods or procedures, when construction methods or procedures are specified.

B. Requests for substitutions of equipment and material shall conform to the requirements of the City of Chandler General Conditions, Section 4.7.2 – Trade Names and Substitutions. Where this Section differs from the General Conditions, the requirements of the General Conditions shall govern. This section supplements those requirements by identifying project-specific documentation and technical submittals required for substitution. References

C. Definitions: The following words or terms are not defined but, when used in this Section, have the following meaning:

1. “Acceptable Manufacturers” considered for substitution include Suppliers of equipment and material of proven reliability, and as manufactured by reputable manufacturers having experience in the production of specified equipment and material on projects of similar size and scope within the past 10 years. Equipment furnished shall be designed, constructed, and installed in accordance with the industry accepted practices and shall operate satisfactorily when installed in accordance with the Contract Documents.

2. “Products” includes materials, equipment, machinery, components, fixtures, systems, and other goods incorporated in the Work. Products do not include machinery and equipment used for preparing, fabricating, conveying, erecting, or installing the Work. Products include Owner-furnished goods incorporated in the Work where use of such goods is specifically required in the Contract Documents.

1.02 ADMINSTRATIVE REQUIREMENTS

A. Contractor’s Responsibilities: In submitting request for substitution, Contractor represents that:

1. Contractor has investigated proposed substitution and determined that it is equivalent to item, product, method, or procedure specified, as applicable.

2. Contractor will provide the same or better guarantees or warranties for proposed substitution as for the specified product, manufacturer, method, or procedure, as applicable.

3. Contractor waives all Claims for additional costs or extension of time related to proposed substitution that subsequently may become apparent.

4. Contractor shall submit a minimum of five (5) successful installations of the manufacturer's equipment of the same model, size, and type as specified in the Contract Documents.

5. All costs associated with incorporation of a substitution shall be borne by the Contractor, including but not limited to, the cost of redesign and construction provisions.

B. Engineer's Review: A proposed substitution will not be accepted for review if:

1. Approval would require changes in design concept or a substantial revision of the Contract Documents.

2. Approval would delay completion of the Work or the work of other contractors.

3. Substitution request is indicated or implied on a Shop Drawing or other submittal, or on a request for interpretation or clarification, and is not accompanied by Contractor's formal request for substitution.

4. If the substitution is not clearly substantiated by performance criteria as providing an equivalent or superior performing installation.

5. Engineer's review of a substitution will be conducted per General Conditions and may result in costs charged to Contractor.

C. If Engineer does not approve the proposed substitute, Contractor shall provide the specified product, manufacturer, method, or procedure, as applicable.

D. Approval of a substitution request will not relieve Contractor from requirement for submitting Shop Drawings as set forth in the Contract Documents.

E. Product Substitutions Procedure:

1. Requests for approval of substitute products or items will be considered for a period of thirty (30) days as defined in General Conditions Section 4.7.2. If not stated therein, request shall be thirty (30) days after the Effective Date of the Agreement. Requests submitted after this period will be considered only in case of unavailability of a specified product or other conditions beyond Contractor's control.

2. Submit copies of request for substitution.

3. Submit separate request for each substitution.

4. In addition to requirements of the General Conditions and information required on substitution request forms, include with request the following:

    a. Product identification, including manufacturer's name and address.

    b. Manufacturer's literature with product description, performance and test data, and reference standards with which product complies.

    c. Samples, if appropriate.

    d. Name and address of similar projects on which product was used, and date of installation.

    e. Certified tests, where applicable, by an independent laboratory attesting the proposed substitution is equal.

    f. Cost information for the proposed substitution and the specified products.

    g. Lead time information for the proposed substitution and specified products.

    h. All other submittal requirements indicated in the individual Specification Sections associated with the specified equipment and material.

F. Construction Methods Substitutions Procedures:

1. Where construction methods or procedures are specified, for a period of 30 days after the Effective Date of the Agreement, Engineer will consider Contractor's written requests for substitute construction methods or procedures specified.

2. Submit copies of request for substitution.

3. Submit separate request for each substitution.

4. In addition to requirements of the General Conditions and information required on substitution request forms, include with request the following:

    a. Detailed description of proposed method or procedure.

    b. Itemized comparison of the proposed substitution with the specified method or procedure.

    c. Drawings illustrating method or procedure.

d. Other data required by Engineer to establish that proposed substitution is equivalent to specified method or procedure.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. General requirements for preliminary and final Schedule of Values.

2. Schedule of Values and the Progress Schedule updates specified in Section 01 32 00 – Construction Progress Schedule, shall be basis for preparing each Application for Payment. Schedule of Values may be used as a basis for negotiating price of changes, if any, in the Work. See following City General Conditions:

   a. Section 8.1 Payment for Construction Services

   b. Section 9.2 Extra Work/Changes in the Work

1.02 ADMINSTRATIVE REQUIREMENTS

A. General Requirements:

1. Schedule of Values shall include breakdown of costs for materials and equipment, installation, and other costs used in preparing the Bid by Contractor and each Subcontractor. List purchase and delivery costs for materials and equipment for which Contractor may apply for payment as stored materials.

2. Include separate amounts for each Specification Section in the Contract Documents by structure, building, and work area.

3. Identify each line item with number corresponding to the associated Specification Section number. List sub-items of major products or systems, as appropriate or when requested by Engineer.

4. Include in Schedule of Values unit price payment items with their associated quantity. Provide in the Schedule of Values detailed breakdown of unit prices when required by Engineer. See City General Conditions 7.1 Unit Price Agreements.

5. Include in Schedule of Values itemized list of Work for each major part of the Contract, for each payment item specified in Section 01 20 00 – Measurement and Payment.

6. Sum of individual values shown on the Schedule of Values shall equal the total of associated payment item. Sum of payment item totals in the Schedule of Values shall equal the Contract Price. See City General Conditions 8.1 Payment for Construction Services.

B. Specific Requirements:

1. Include in each line item a directly proportional amount of Contractor's overhead and profit. Do not include overhead and profit as separate item(s).

2. Include separate line item for each allowance, and for each unit price item. See City General Conditions 15.3 Allowances and 7.1 Unit Price Agreements.

3. Include line item for bonds and insurance in amount not exceeding two percent of the Contract Price. This may be applied for in the first Application for Payment. See City General Conditions SECTION 11 – Insurance and Bonds (11.1–11.4).

4. Include items for the General Conditions, permits (when applicable), construction Progress Schedule, and other items required by Engineer. Include such items in Applications for Payment on schedule accepted by Engineer.

5. Line items for Site maintenance such as dust control, compliance with storm water pollution prevention plans and permits, spill prevention control and countermeasures plans, and for construction photographic documentation; temporary utilities and temporary facilities, field offices, temporary controls, field engineering, and similar Work shall be included in the Schedule of Values and proportioned in Applications for Payment throughout duration of the Work.

6. Include separate line items under each appropriate payment item for mobilization and demobilization. Document for Engineer the activities included in mobilization and demobilization line items.

    a. Mobilization will be limited to two percent of the Contract Price, and will be paid in two payments, each of 50 percent of total amount for mobilization.

    b. Demobilization shall be at least one percent of the Contract Price and shall be included with the Application for Payment following Substantial Completion, or other schedule accepted by Engineer.

7. Costs for submittals, operations and maintenance manuals, field testing, and training of operations and maintenance personnel shall be as follows, unless otherwise accepted by Engineer:

    a. Up to 5% percent of total cost of each item (including overhead and profit), including materials and equipment, and installation, may be apportioned to testing and included in the Application for Payment following Engineer's

acceptance of the associated written Site testing report(s). If different than General Conditions Section 9.2.4, General Conditions shall govern.

C. Preliminary Schedule of Values: Submit preliminary Schedule of Values to Engineer for initial review. Contractor shall incorporate Engineer's comments into the Schedule of Values and resubmit to Engineer. Engineer may require corrections and re-submittals until Schedule of Values is acceptable.

D. Time Frame for Submittals:

1. Submit preliminary Schedule of Values within ten (10) days of date that the Contract Times commence running in accordance with the Notice to Proceed. Coordinate with City General Conditions 4.2 Contractor's Pre-Agreement and Pre-Work Deliverables for any additional Schedule of Values timing requirements.

2. Submittal of the Schedule of Values shall be in accordance with the General Conditions. Engineer will not accept Applications for Payment without an acceptable Schedule of Values. See General Conditions 8.1 Payment for Construction Services and 17.5 Baseline Costs Model, Detailed Cost Estimates, and Schedule of Values.

3. When required by Engineer, promptly submit updated Schedule of Values to include cost breakdowns for changes in the Contract Price.

1.03 SUBMITTALS

A. Submit the following:

1. Seven copies of preliminary Schedule of Values.

2. Seven copies of Schedule of Values.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 31 19
PROJECT MEETINGS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pre-Construction Meeting:

a. Purpose of conference is to designate responsible personnel, establish working relationships, discuss preliminary schedules submitted by Contractor, and review administrative and procedural requirements for the Project. Matters requiring coordination will be discussed and procedures for handling such matters will be established. See City General Conditions Section 4.3 Pre-Construction Conference.

b. Date, Time and Location: Conference will be held after execution of the Contract and before Work starts at the Site. Engineer will establish the date, time, and location of conference and notify the interested and involved parties.

2. Progress Meetings:

a. These procedures supplement the General Conditions (Sections 4.3 Pre-Construction Conference and 14.25 Project Communications). In the event of a conflict, the General Conditions shall govern.

b. Progress meetings will be held throughout the Project. Contractor shall attend each progress meeting prepared to discuss in detail all items on the agenda. See City General Conditions Section 14.25 Project Communications.

c. Engineer will preside at progress meetings and will prepare and distribute minutes of progress meetings to all meeting participants and others as requested.

d. Date, Time and Location:

1) Regular Meetings: Every month on a day and time agreeable to Owner, Engineer, and Contractor.

2) At the Site or other location mutually agreed upon by Owner, Contractor, and Engineer.

e. Additional meetings may be conducted as progress of Work requires at a mutually agreed date, time and location.

1.02 ADMINSTRATIVE REQUIREMENTS

A. Pre-Construction Meeting:

1. Contractor shall provide pre-construction meeting submittals with sufficient number of copies for each attendee:

2. Required Attendees:

a. Contractor

1) Project manager.

2) Site superintendent.

3) Safety representative.

4) Major Subcontractors.

b. Owner.

c. Engineer.

d. Owner’s Site Representative (OSR) , when applicable.

e. Representatives of governmental or other regulatory agencies, when applicable.

3. Contractor shall prepare and submit a health and safety plan, including confined space entry plan, as specified in this Section prior to the pre-construction meeting.

4. Agenda, minimum:

a. Procedural requirements:

1) Designation of responsible personnel

2) Use of Site and Owner’s requirements, including general regards for community relations

3) Delivery of materials and equipment to the Site

4) Safety and first aid procedures

5) Confined space entry plan

6) Security procedures

7) Housekeeping procedures

b. Administrative requirements:

1) Distribution of Contract Documents.

2) Shop Drawing submittal procedures (see City General Conditions Section 4.7 Materials Quality, Substitutions, and Shop Drawings).

3) Maintaining record documents at the Site.

4) Contract modification procedures (see City General Conditions Section 9.1 Field Orders; 9.2 Extra Work/Changes in the Work; 9.3 Accuracy of Change Order Pricing Information).

5) Processing of Payment Application (see City General Conditions Section 8.1 Payment for Construction Services).

c. Site mobilization requirements:

1) Working hours, overtime, and holidays.

2) Field offices, trailers, and staging areas.

3) Temporary facilities and utilities, including usage and coordination.

4) Temporary controls, such as sediment and erosion control, noise, dust, storm water, and other measures.

5) Access to Site, access roads, and parking for construction vehicles.

6) Protection of traffic and existing property, including site barriers and temporary fencing.

7) Security

8) Storage of materials and equipment.

9) Reference points and benchmarks, surveys and layouts.

10) Site maintenance during the project, including cleaning and removal of trash and debris.

11) Site restoration.

d. Schedules

1) Preliminary construction schedule

2) Critical work sequencing

3) Preliminary Shop Drawing submittal schedule

4) Preliminary Schedule of Values

e. Coordination requirements specific to the City's project expectations.

B. Progress Meetings:

1. Progress meetings frequency shall be conducted as specified in this Section, unless modified and agreed upon by Owner, Contractor, and Engineer. Additional meetings may be conducted as progress of Work requires.

2. Contractor shall provide submittals specified in this Section prior to each progress meeting.

3. Attendance:

a. Contractor, including project manager, site superintendent, safety representative, and representatives of Subcontractors and Suppliers as required.

b. Engineer, including project manager (or designated representative), Resident Project Representative (if any), others as required by Engineer.

c. Owner, including Owner's Site Representative (if any).

d. Subcontractors, only with Engineer's approval or request, as required in the agenda.

4. Agenda, minimum:

a. Review, comment, and amendment (if required) of minutes of previous progress meeting.

b. Review of progress since the previous progress meeting.

c. Planned progress through next 30 – 60 days.

d. Review of Progress Schedule (see City General Conditions Section 6.2 Project Schedule)

1) Contract Times, including Milestones (if any)

2) Critical path.

3) Schedules for fabrication and delivery of materials and equipment.

4) Corrective measures, if required.

e. Submittals:

1) Review of status of critical submittals.

2) Review revisions to schedule of submittals.

f. Contract Modifications:

1) Requests for interpretation

2) Clarification notices

3) Field Orders

4) Proposal requests

5) Change Proposals

6) Work Change Directives.

7) Change Orders.

8) Claims.

g. Applications for progress payments.

h. Problems, conflicts, and observations.

i. Quality standards, testing, and inspections.

j. Coordination between parties.

k. Site management issues, including access, security, maintenance and protection of traffic, maintenance, cleaning, and other Site issues.

l. Safety.

m. Permits.

n. Record documents status.

o. Punch list status, as applicable.

p. Other business.

1.03 SUBMITTALS

A. Pre-Construction Meeting Submittals:

1. Prior to the conference, submit the following preliminary schedules in accordance with the General Conditions Section 6.2 Project Schedule:

    1) Progress schedule

    2) Schedule of submittals

    3) Schedule of values

2. Contractor’s safety and first aid procedures.

3. Confined space entry plan.

4. List of emergency contact information

B. Progress Meeting Submittals:

1. List of Work accomplished since the previous progress meeting.

2. Up-to-date Progress Schedule.

3. Up-to-date Schedule of Submittals.

4. Detailed “look-ahead” schedule of Work planned through the next progress meeting, with specific starting and ending dates for each activity, including shutdowns, deliveries of important materials and equipment, Milestones (if any), and important activities affecting the Owner, Project, and Site.

5. When applicable, list of upcoming, planned time off (with dates) for personnel with significant roles on the Project, and the designated contact person in their absence.

1.04 EMERGENCY CONTACT INFORMATION

A. Contractor shall provide list of emergency contact information for 24-hour use throughout the Project. Emergency contact information shall be updated and kept current throughout the Project. If personnel or contact information change, provide updated emergency contact information list at the next progress meeting (see City General Conditions Section 14.25 Project Communications).

B. Contractor's list of emergency contact information shall include:

1. Contractor's project manager's office, field office, cellular, and home telephone numbers.

2. Contractor's Site superintendent's office, field office, cellular, and home telephone numbers.

3. Contractor's foreman's field office, cellular (if available), and home telephone numbers.

4. Major Subcontractors' and Suppliers' office, cellular, and home telephone numbers of project manager and foreman (when applicable).

C. Additional Emergency Contact Information:

1. Owner's Project Manager: office, cellular, and home telephone numbers.

2. Owner's central 24-hour emergency telephone number.

3. Engineer's project engineer's office, cellular, and home telephone numbers.

4. Owner's Site Representative's office, field office, cellular, and home telephone numbers.

5. Emergency telephone numbers, including: "Emergency: Dial 911", and seven-digit telephone numbers for the hospital, ambulance, police, and fire department nearest to the Site. Provide names of each of these institutions.

6. Other involved entities as applicable.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 00
CONSTRUCTION PROGRESS SCHEDULE

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes: Detailed requirements and/or procedures for, including but not limited to, the Preliminary Project Schedule, Project Schedule Updates, Project Schedule development, Time Impact Analysis, and Recovery Schedules

B. The Contractor shall develop, revise, and provide all information and input required for the Project Schedule for the performance of the Work in accordance with the requirements of the Contract Documents in general and, in particular, this section. The Progress Schedule shall incorporate the requirements of General Conditions, City of Chandler General Conditions Section 6.2 – Project Schedule.

C. Except as otherwise provided herein or elsewhere in the Contract Documents, the planning, scheduling, coordination, and execution of the Work is the sole responsibility of the Contractor.

1.02 REFERENCES

A. Definitions:

1. Activity: An element of the construction work that has the following specific characteristics: consumes time, consumes resources, has a definable start and finish, is assignable, and is measurable.

2. Constraint: An imposed date on the Progress Schedule or an imposed tie between Activities. The Contract Times are Constraints.

3. CPM Progress Schedule: Computerized Progress Schedule in Critical Path Method (CPM) format which accounts for the entire Work, defines the interrelationships between elements of the Work, reflects the uncompleted Work, and indicates the sequence with which the Work has been completed, indicates the sequence in which uncompleted Work will be completed, and indicates the duration of each Activity.

4. Critical Path: The continuous chain of Activities with the longest duration for completion within the Contract Times.

5. Early Start: The earliest possible date an Activity can start according to the assigned relationships among Activities.

6. Early Finish: The earliest possible date an Activity can finish according to the assigned relationships among the Activities.

7. Late Finish: The latest possible date an Activity can finish without extending the Contract Times.

8. Late Start: The latest possible date an Activity can start without extending the Contract Times.

9. Total Float: The total number of days that an Activity (or chain of Activities) can be delayed without affecting the Contract Times. Total float for each Activity shall be calculated as the difference between Early Finish and Late Finish.

10. Network Diagram: A time-scaled logic diagram depicting the durations and relationships of the Activities.

11. Work Areas, Area, or System: A logical breakdown of the Project elements or a group of Activities which, when collectively assembled, are readily identifiable on the Project (for example, yard piping, a structure or building, a treatment process, or other logical grouping).

1.03 ADMINSTRATIVE REQUIREMENTS

A. Initial Progress Schedule:

1. Type and Organization of Progress Schedules:

a. Prepare one Progress Schedule covering the entire Project using Primavera Planner (P6 or newer), or Microsoft Project scheduling software.

b. Schedule submittals shall include the electronic native file format (i.e., scheduling software file), and a PDF file of the schedule's logic diagram.

c. Time Scale: Indicate first date of each work week.

d. Activity Designations: Indicate ~~title~~ concise description of the Work represented by the activity and related Specification Section number. The Work related to each activity shall be limited to one work trade and one construction area.

2. Submitted PDF files shall be in a Gantt Chart Format and shall show the following:

a. Activity identification number.

b. Activity description.

c. Activity duration (in workdays).

d. Activity percent complete

e. Start, Early Start, Late Start, Finish, Early Finish, and Late Finish Dates

f. Total Float for each Activity.

g. Critical Path denoted.

3. Organization:

    a. Group shop drawings, samples and other submittals into a separate sub-schedule that is part of the Progress Schedule.

    b. Group deliveries of materials and equipment into a separate sub-schedule that is part of the Progress Schedule.

    c. Group construction into Work Area sub-schedules (that are part of the Progress Schedule) by Activity.

    d. Clearly indicate the Critical Path on the Progress Schedule.

    e. Organize each Work Area sub-schedule by Specification Section number.

4. Preliminary Progress Schedule:

    a. Contractor shall submit to Engineer the Preliminary Progress Schedule in accordance with the following General Conditions:

        1) Section 4.2 Contractor’s Pre-Agreement and Pre-Work Deliverables

        2) Section 6.2 Project Schedule

5. Initial Acceptance of Progress Schedule:

    a. At least 10 days before submission of the first Application for Payment, Contractor shall schedule a conference at the Site for review of the Preliminary Progress Schedule.

        1) Attendees shall include Contractor, Engineer, Owner, and others as required.

        2) Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the Progress Schedule.

3) Engineer may recommend Owner withhold progress payment if an acceptable Progress Schedule and supporting documentation are not submitted.

b. Initially-accepted Progress Schedule shall be identified as the Baseline Progress Schedule. The Baseline Progress Schedule shall not be revised without Owner and Engineer approval.

B. Project Schedule Updates:

1. Project Schedule Updates shall be prepared on a monthly basis throughout the entire Contract Time and until Project Final Completion. The Contractor shall provide a complete Project Schedule Update (including Schedule Narrative Report) each month to support Engineer's payment recommendation to Owner.

2. The update to the Progress Schedule shall be based on retained logic. Progress override logic is not allowed.

3. Required scheduling software, and schedule organization, format, and content for updated Progress Schedules are identical to that required in this Section for initial Progress Schedules.

4. For all Project Schedule Updates, the percent complete reported for individual Activities shall be based on Work accepted and paid for the by Owner in monthly pay applications. Failure to comply with this requirement shall be result in rejection of the submitted update. Per General Condition Section 8.4 City's Right to Withhold Payment, rejection may result in withholding of payment.

5. Monthly Progress Schedule Updates shall be accompanied by a Schedule Narrative Report. The report shall:

a. Describe Work completed within the preceding month.

b. Describe Work planned for the following month (including a look-ahead schedule).

c. Identify proposed changes or revisions to the Baseline Progress Schedule.

d. Identify all Work performed out of sequence.

e. Identify problem areas.

f. Identify current or anticipated conditions which may delay the Work.

1.04 PROJECT SCHEDULE DEVELOPMENT

A. The schedule shall cover the entire Contact Time, and the Work shall be scheduled to complete the Project within the Contract Time.

B. The Schedule's Late Finish Date shall equal the Contract Completion Date.

C. All activities except for the NTP and Final Completion shall have a predecessor and a successor. No open-ended activities will be permitted. Note that NTP shall have a successor or successors and Final Completion shall have a predecessor or predecessors.

D. Proposed durations assigned to each activity shall be the Contractor's best estimate of time required to complete the activity, considering the scope and resources planned for the activity.

E. The durations of activities shall be expressed in whole working days, with a maximum duration of 20 workdays each, unless otherwise approved or directed by the Engineer or the Owner. The duration of non-construction activities including mobilization, shop drawings and sample submittals, fabrication of materials and equipment, and delivery of materials and equipment may exceed this limitation.

F. The Schedule shall incorporate in detail all elements of the Work contained within the Contract Documents. Specific elements of the Work to incorporate into the schedule include but are not limited to the following:

1. Notice to Proceed.

2. Mobilization and demobilization.

3. Submittals including O&M Manuals. Note that durations for Engineer review time shall be 30 working days unless specified elsewhere in these Contract Documents.

4. Fabrication and procurement activities.

5. Temporary construction activities and relocations

6. Permitting

7. Erosion control

8. Site clearing

9. Site restoration

10. All requirements for coordination with Owner operations

11. Concrete curing and form removal

12. All testing activities

13. Inspections as required by local authorities.

14. Interim Milestones as defined by this Contact or as deemed critical as the project progresses.

15. All requirements related to facility startup and commissioning.

16. Substantial Completion (including the period for performing the punchlist)

17. Final Completion

1.05 TIME IMPACT ANALYSIS

A. General:

1. Prepare and submit a time impact analysis when one or more of the following occurs:

    a. Change Order proposal is prepared.

    b. Work Change Directive is issued that will affect the Progress Schedule.

    c. When delays are experienced.

2. Time impact analysis shall illustrate the influence of each Change Order, Work Change Directive, or delay.

3. Each time impact analysis shall include a sketch (fragnet) demonstrating how Contractor proposes to incorporate the changes in the Project or, as applicable, delays into the Progress Schedule. Fragnet shall include all logic, and additions required as result of said Change Order, Work Change Directive, or delay.

4. Fragnet shall show all CPM logic revisions for the Work associated with the Change Order, Work Change Directive, or delay and its relationship to other Activities.

5. Timing of Time Impact Analysis:

    a. Submit each time impact analysis within 7 days after the following, as applicable:

        1) Start of the delay.

        2) After the submittal of Change Order proposal to Engineer

3) After Contractor's Receipt of Work Change Directive.

b. Failure to Submit Time Impact Analysis: When General Contractor does not submit time impact analysis for a specific change or delay under the General Contract, within the specified period of time for such submittal, such non-submittal shall be construed as a waiver of entitlement to time extension unless otherwise approved by the Owner.

B. Evaluation by Engineer and Acceptance:

1. Engineer's evaluation of each time impact analysis comprised of complete information will be completed in timely manner after Engineer's receipt. Changes in the Contract Times will be made only by Change Order.

2. When mutual agreement is reached between the parties, on effect of the change or delay in the Project, incorporate into the next Progress Schedule and update the associated fragnets illustrating the influence of changes and delays.

1.06 RECOVERY SCHEDULES

A. General:

1. When updated Progress Schedule indicates that the ability to comply with the Contract Times falls 30 or more days behind schedule, and there is no excusable delay, Change Order, or Work Change Directive to support an extension of the Contract Times, Contractor shall prepare and submit a Progress Schedule demonstrating Contractor's plan to accelerate the Project to achieve compliance with the Contract Times (i.e., "recovery schedule") for Engineer's acceptance.

2. Submit recovery schedule within 14 days after submittal of updated Progress Schedule where need for recovery schedule is indicated.

B. Implementation of Recovery Schedule:

1. At no additional cost to Owner, Contractor shall do one or more of the following:

a. Furnish additional labor and construction equipment.

b. Employ additional work shifts.

c. Expedite procurement of materials and equipment to be incorporated into the Work.

d. Other measures necessary to complete the Work within the Contract Times.

2. Upon acceptance of recovery schedule by Engineer, incorporate recovery schedule into the next Progress Schedule update.

C. Lack of Action: Contractor's refusal, failure or neglect to submit a recovery schedule, shall constitute reasonable evidence that Contractor is not prosecuting the Work or separable part thereof with the diligence that will ensure completion within the Contract Times. Such lack of action shall constitute sufficient basis for Owner to exercise remedies available to Owner under the Contract Documents

1.07 USE OF FLOAT

A. Total Float and Contract Float belong to the Project and may be used by Owner, Engineer, or Contractor to accommodate modifications, regardless of origination, in the Work or to mitigate the effect of events that may delay performance or completion of the Work. Use of float shall be coordinated with the Owner and documented in schedule updates.

B. Changes or delays that influence scheduled Work Activities with Float and that do not extend the critical path will not be justification for an extension in Contract Times.

1.08 SUBMITTALS

A. Action/Informational Submittals:

1. Initial Progress Schedules:

    a. Preliminary Progress Schedule

    b. Acceptable Progress Schedule (Baseline)

2. Progress Schedule Updates:

    a. Progress Schedule updates shall comply with requirements of this Section and shall include updated Progress Schedule and Schedule Narrative Report.

    b. Submit updated Progress Schedule at each progress meeting. If a Progress Schedule remains unchanged from one progress meeting to the next, submit a written statement to that effect.

3. Time Impact Analyses: Submit in accordance with this Section.

4. Recovery Schedule: Submit in accordance with this Section.

5. Qualifications: Progress Schedule preparer, and other personnel that will assist Progress Schedule preparer in preparing and maintaining the Progress Schedule.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Contractor shall provide submittals in accordance with the General Conditions as modified by the Supplementary Conditions, and this Section. In the event of conflict, the City of Chandler General Conditions shall take precedence.

2. Contractor is responsible to confirm and correct dimensions at the Site, for information pertaining to the fabrication processes and to techniques of construction, and for coordinating the work of all trades. Contractor's signature of submittal's stamp and letter of transmittal shall be Contractor's representation that Contractor has met their obligations under the Contract Documents relative to that submittal.

B. Related Sections:

1. Section 01 25 00 – Substitution Procedures.

2. Section 01 78 23 – Operation and Maintenance Data.

3. Section 01 78 39 – Project Record Documents.

4. Section 01 78 43 – Spare Parts and Extra Material.

5. Section 01 79 00 – Instruction of Owner's Personnel.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Types of Submittals: When type of submittal is not specified and is not specified in this Section, Engineer will determine type of submittal.

1. Action/Informational Submittals:

a. Shop Drawings.

b. Product data.

c. Delegated design submittals in accordance with the General Conditions and as modified by the Supplemental Conditions.

d. Samples.

e. Testing plans, procedures, and testing limitations.

f. Design data not sealed and signed by a design professional retained by Contractor, Subcontractor, or Supplier.

g. Pre-construction test and evaluation reports, such as reports on pilot testing, subsurface investigations, potential Hazardous Environmental Conditions, and similar reports.

h. Supplier instructions, including installation data, and instructions for handling, starting-up, and troubleshooting.

i. Sustainable design submittals (other than sustainable design closeout documentation).

j. Lesson plans for training and instruction of Owner's personnel.

2. Closeout Submittals:

a. Maintenance contracts.

b. Operations and maintenance data.

c. Bonds, such as maintenance bonds and bonds for a specific product or system.

d. Warranty documentation.

e. Record documentation.

f. Sustainable design closeout documentation.

g. Software.

3. Maintenance Material Submittals:

a. Maintenance materials schedule and checklist.

b. Spare parts.

c. Extra stock materials.

d. Tools.

4. Quality Assurance Submittals:

a. Performance affidavits.

b. Certificates.

c. Source quality control submittals (other than testing plans, procedures, and testing limitations), including results of shop testing.

d. Field or Site quality control submittals (other than testing plans, procedures, and testing limitations), including results of operating and acceptability tests at the Site.

e. Supplier reports.

f. Special procedure submittals, including health and safety plans and other procedural submittals.

g. Qualifications statements.

B. Submittal Requirements:

1. Contractor shall submit electronic copy of submittals for Engineer's review via Procore Document Management, unless otherwise specified in individual Specification Sections. Acceptable electronic formats are Adobe PDF, Microsoft Word, Autodesk DWF and AutoCAD.

2. Submittals shall be furnished in two dimensional PDF.

3. Submittal shall be accompanied by letter of transmittal containing date, project title, Contractor's name, number and title of submittal, list of relevant Specification Sections, notification of deviations from Contract Documents, and other material required for Engineer's review.

4. Electronic Submittal File Format Requirements:

a. Files shall be electronically searchable for submitted equipment and material.

b. Provide bookmarks within files in excess of 20 pages for submitted equipment and material including, but not limited to, the following:

1) Each chapter and subsection listed in the files table of contents

2) Each figure, table, and appendix.

3) Each drawing.

C. Scheduling:

1. Provide submittals well in advance of the Work following Engineer's approval or acceptance of the associated submittal. Work covered by a submittal will not be included in progress payments until approval or acceptance of related submittals has been obtained in accordance with the Contract Documents.

2. Submittals shall be provided by Contractor with at least fifteen (15) working days for review and processing.

1.03 SCHEDULE OF SUBMITTALS

A. Schedule of Submittals, as specified in this Section:

1. Timing:

a. Provide submittal within time frames specified in the Contract Documents. See the following for specific requirements:

1) Section 4.2 Contractor's Pre-Agreement and Pre-Work Deliverables

2) Section 4.7 Materials Quality, Substitutions, and Shop Drawings

3) Section 6.2 Project Schedule

b. Provide updated Schedule of Submittals with each submittal of the updated Progress Schedule.

2. Content: In accordance with the General Conditions as modified by the Supplementary Conditions, and this Section. Requirements for content of preliminary Schedule of Submittals and subsequent submittals of the Schedule of Submittals are identical.

a. Identify submittals required in the Contract Documents. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Indicate submittals that are on the Project's critical path.

b. Indicate the following for each submittal:

1) Date when submittals are requested and received from Supplier.

2) Date when certification is received from Supplier and when submitted to Engineer.

3) Date when submittals are submitted to Engineer and returned with disposition from Engineer.

4) Date when submittals are revised by Supplier and submitted to Engineer.

5) Date when submittals are returned with “Furnish as Submitted” (FAS) or “Furnish as Corrected” (FAC) disposition from Engineer.

6) Date when approved submittals are returned to Supplier.

7) Date of Supplier scheduled delivery of equipment and material.

8) Date of actual delivery of equipment and material.

9) Whether submittal will be for a substitution or “equal”. Procedures for substitutions and “or equals” are specified in the General Conditions and the Section 01 25 00 – Substitution Procedures.

10) For submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of other contractors.

3. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules.

4. Coordinate Schedule of Submittals with the Progress Schedule.

5. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate submittals on the Project’s critical path, or that places extraordinary demands on Engineer for time and resources, is unacceptable. Do not include submittals not required by the Contract Documents.

6. In preparing Schedule of Submittals:

a. Considering the nature and complexity of each submittal, allow sufficient time for review and revision.

b. Reasonable time shall be allowed for: Engineer’s review and processing of submittals, for submittals to be revised and resubmitted, and for returning submittals to Contractor.

c. Identify and accordingly schedule submittals that are expected to have long anticipated review times.

1.04 ACTION/INFORMATIONAL SUBMITTALS

A. Provide the following Submittals in accordance with the individual Specification Sections, including, but not limited to, the following:

1. Product Data:

a. Catalog cut-sheets

b. Descriptive bulletins/brochures/specifications

c. Material of construction data, including details on all components including applicable ASTM designations.

d. Lifting, erection, installation, and adjustment instructions, and recommendations.

e. Finish/treatment data, including interior and exterior shop coating systems.

f. Equipment/material weight/loading data, including total uncrated weight of the equipment plus the approximate weight of shipped materials. Support locations and loads that will be transmitted to bases and foundations following installation. Size, placement, and embedment requirements of anchor bolts.

g. Complete information regarding location, type, size, and length of all field welds in accordance with "Standard Welding Symbols" AWS A2.0 of the American Welding Society. Special conditions shall be fully explained by notes and details.

h. Motor data including horsepower; enclosure type; voltage; insulation class; temperature rise and results of dielectric tests; service-rating; rotative speed; motor speed-torque relationship; efficiency and power factor at ½, ¾, and full load; slip at full load; running, full load, and locked rotor current values; safe running time-current curves; motor protective devices; and interconnection diagrams.

i. Engineering design data, calculations, and system analyses

j. Digital system documentation

k. Operating sequence descriptions

l. Software/programming documentation

m. Manufacturer’s instructions

2. Shop Drawings:

a. Equipment and material layout drawings, including panel layout drawings.

b. System schematics and diagrams including, but not limited to, piping systems; HVAC and ventilation systems; process equipment systems; electrical operating systems; wiring diagrams; controls, alarm and communication systems.

c. Layout and installation drawings (interior and exterior) for all pipes, valves, fittings, sewers, drains, heating and ventilation ducts, all electrical, heating, ventilating and other conduits, plumbing lines, electrical cable trays, lighting fixture layouts, and circuiting, instrumentation, interconnection wiring diagrams, communications, power supply, alarm circuits, etc.

d. Layout and installation drawings shall show connections to structures, equipment, sleeves, valves, fittings, etc.

e. Drawings shall show the location and type of all supports, hangers, foundations, etc., and the required clearances to operate valves, equipment, etc.

f. Drawings for pipes, ducts, conduits, etc., shall show all 3 inch and larger electrical conduits and pressure piping, electrical cable trays, heating and ventilation ducts or pipes, structure, manholes or any other feature within four (4) feet (measured as the clear dimension) from the pipe duct, conduit, etc., for which the profile is drawn.

g. Equipment and material schedules.

3. Delegated design submittals, which include documents prepared, sealed, and signed by a design professional retained by Contractor, Subcontractor, or Supplier for materials and equipment to be incorporated into the completed Work. Delegated design submittals do not include submittals related to temporary construction unless specified otherwise in the related Specification Section. Delegated design submittals include: design drawings, design data including calculations, specifications, certifications, and other submittals prepared by such design professional.

B. Samples:

1. General Requirements:

a. Conform submittal of Samples to the General Conditions as modified by the Supplementary Conditions, this Section, and the Specification Section in which the Sample is specified.

b. Furnish at the same time Samples and submittals that are related to the same unit of Work or Specification Section. Engineer will not review submittals without associated Samples and will not review Samples without associated submittals.

c. Samples shall clearly illustrate functional characteristics of product, all related parts and attachments, and full range of color, texture, pattern, and material.

2. Submittal Requirements:

   a. Securely label or tag Samples with submittal identification number. Label or tag shall not cover, conceal, or alter appearance or features of Sample. Label or tag shall not be separated from the Sample.

   b. Submit number of Samples required in Specifications. If number of Samples is not specified in the associated Specification Section, provide at least one identical Samples of each item required for Engineer's approval. If Contractor requires Sample(s) for Contractor's use, notify Engineer in writing and provide additional Sample(s). Contractor is responsible for furnishing, shipping, and transporting additional Samples.

   c. Deliver one Sample to Engineer's field office at the Site. Deliver balance of Samples to location directed by Engineer.

1.05 CLOSEOUT SUBMITTALS

A. Provide the following Closeout Submittals in accordance with the individual Specification Sections, including, but not limited to, the following:

   1. Maintenance contracts

   2. Bonds for specific products or systems

   3. Warranty documentation

   4. Sustainable design closeout documentation.

   5. Software programming and documentation.

B. On documents such as maintenance contracts and bonds, include on each document furnished original signature of entity issuing the document.

C. Operations and Maintenance Data: Submit in accordance with Section 01 78 23 – Operations and Maintenance Data.

D. Record Documentation: Submit in accordance with Section 01 78 39 – Project Record Documents.

E. Disposition: Dispositions and meanings are the same as specified for Informational Submittals.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. For spare parts, extra stock materials, and tools, submit quantity of items specified in associated Specification Section. Furnish in accordance with Section 01 78 43 – Spare Parts and Extra Materials.

B. Disposition: Dispositions and meanings are the same as specified for Informational Submittals.

1.07 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall review, coordinate, and verify submittals with Subcontractors, Manufacturers, and Suppliers, including field measurements at Site, in accordance with the General Conditions and as modified by Supplemental Conditions prior to submitting material for Engineer's review.

B. Contractor shall clearly and concisely indicate and mark equipment and material being submitted to meet the intent of the Contract Documents. Equipment and material not being submitted shall be deleted, stricken through, or otherwise designated not being submitted. Equipment and material data sheets shall be included once with cross references throughout the submittal. Multiple equipment and material data sheets for the same item within a submittal may receive a rejected disposition until corrected.

C. Contractor shall provide Contractor's stamp of approval certifying submittal material has been reviewed and conform to the Contract Documents prior to submitting material for Engineer's review.

D. Contractor shall provide written notice of deviations or variations that submittal may have with the Contract Documents.

E. Contractor shall provide bound, dated, labeled, tabulated, and consecutively numbered submittals as specified in the individual Specification Section. Label shall contain the following:

1. Specification Section.

2. Referenced Drawing number.

3. Subcontractor or Supplier name.

4. Type of equipment and/or materials.

F. Contractor shall perform the following after receiving Engineer's review disposition:

1. Order, fabricate, or ship equipment and materials included in the submittal (pending Engineer's review of source quality control submittals) with the following disposition:

    a. "Furnish as Submitted" (FAS).

    b. "Furnish as Corrected" (FAC).

    c. "Furnish as Corrected – Confirm" (FACC), only portions of Work that do not require resubmittal for Engineer's review.

2. Resubmittal requirements:

    a. Partial resubmittal of "Furnish as Corrected – Confirm" (FACC) returned dispositions, until Engineer's disposition is either "Furnish as Submitted" (FAS) or "Furnish as Corrected" (FAC).

    b. Full resubmittal of material with Engineer's disposition of "Revise and Resubmit" (R&R), until Engineer's disposition is "Furnish as Submitted" (FAS), "Furnish as Corrected" (FAC), or "Furnish as Corrected – Confirm" (FACC) that requires a partial resubmittal.

    c. Contractor shall be responsible for Engineer's charges to Owner if submittals are not approved within the number of specified submittals in accordance with the General Conditions Section 8.4 City's Right to Withold Payment. Engineer's charges shall include, but not limited to, additional review effort, meetings, and conference calls with Contractor, Subcontractor, or Supplier.

1.08 ENGINEER'S REVIEW

A. Engineer's review of the Contractor's submittal shall not relieve Contractor's responsibility under the Contract Document in accordance with the General Conditions Section 4.7 Materials Quality, Substitutions, and Shop Drawings (refer to 4.9.4 City May Correct Defective Work).

B. . An acceptance of a submittal shall be intended to mean the Engineer does not have specific objection to the submitted material, subject to conformance with the Contract Drawings and Specifications.

C. Engineer's review of Contractor's submittal shall be confined to general arrangement and compliance with the Contract Documents, and shall not be for the purpose of checking dimensions, weights, clearances, fittings, tolerances, interferences, coordination of Subcontractor work, etc.

D. Review Dispositions:

1. “Furnish as Submitted” (FAS) – No exceptions are taken.

2. “Furnish as Corrected” (FAC) – Minor corrections are noted for Contractor’s correction.

3. “Furnish as Corrected – Confirm” (FACC) – Corrections are noted and partial resubmittal shall be made as noted.

4. “Revise and Resubmit” (R&R) – Corrections are noted and complete resubmittal shall be made. Submittal does not conform to applicable requirements of the Contract Documents and is not acceptable. Revise submittal and re-submit to indicate acceptability and conformance with the Contract Documents.

5. “Receipt Acknowledged” (RA) –

    a. Information included in submittal conforms to the applicable requirements of the Contract Documents and is acceptable. No further action by Contractor is required relative to this submittal, and the Work covered by the submittal may proceed, and products with submittals with this disposition may be shipped or operated, as applicable.

    b. Information included in submittal is for Project record purposes and does not require Engineer’s review or approval.

6. “Rejected” (R) – Information included in submittal does not conform to the applicable requirements of the Contract Documents and is unacceptable. Contractor shall submit products and materials as specified in the Contract Documents or provide required information for substitution as specified in the Contract Documents for consideration by Engineer.

E. Electronic Submittal Return to Contractor: Electronic submittals shall be returned electronically with dispositions provided.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 42 00

REFERENCES

PART 1 – GENERAL

1.01 SUMMARY

A. Definitions and terminology applicable to all the Contract Documents are included below . Where conflicts or ambiguities exist between this Section and the City of Chandler General Conditions (Exhibit B), the following shall govern:

1. City General Conditions Section 2 – General Definitions

2. Section 14.2 – Reference Standards

1.02 REFERENCES

A. Abbreviations and Acronyms: Common abbreviations that may be found in the Contract Documents are listed below:

alternating current	a-c
ampere	A
Architectural Barriers Act	ABA
Americans with Disabilities Act	ADA
Americans with Disabilities Act Accessibility Guidelines	ADAAG
ante meridian	a.m.
average	avg
biochemical oxygen demand	BOD
brake horsepower	bhp
British thermal unit	Btu
Centigrade (or Celsius)	C
chlorinated polyvinyl chloride	CPVC
Code of Federal Regulations	CFR
cubic inch	cu in
cubic foot	cu ft

cubic yard	cdu yd, or CY
cubic feet per minute	cfm
cubic feet per second	cfs
degree Centigrade (or Celsius)	degrees C or ºC
degrees Fahrenheit	degrees F or ºF
diameter	dia
direct current	d-c
dollars	$
each	ea
efficiency	eff
Fahrenheit	F
feet	ft
feet per hour	fph
feet per minute	fpm
feet per second	fps
figure	Fig
flange	flg
foot-pound	ft-lb
gallon	gal
gallons per hour	gph
gallons per minute	gpm
gallons per second	gps
gram	g
grams per liter	g/L
Hertz	Hz
horsepower	hp or HP
hour	hr
human-machine interface	HMI

inch	in.
inches water gage	in. w.g.
inch-pound	in.-lb
inside diameter	ID
iron pipe size	IPS
thousand pounds	kips
thousand pounds per square inch	ksi
kilovolt-ampere	kva
kilowatt	kw
linear foot	lin ft or LF
liter	L
maximum	max
mercury	Hg
milligram	mg
milligrams per liter	mg/l or mg/L
milliliter	ml
millimeter	mm
million gallons per day	mgd or MGD
million gallons	MG
minimum	min
national pipe threads	NPT
net positive suction head	NPSH
net positive suction head available	NPSHA
net positive suction head required	NPSHR
nominal pipe size	NPS
number	no.
operator interface terminal	OIT
ounce	oz

ounce-force	ozf
outside diameter	OD
parts per hundred	pph
parts per million	ppm
parts per billion	ppb
polyvinyl chloride	PVC
post meridian	p.m.
pound	lb
pounds per square inch	psi
pounds per square inch absolute	psia
pounds per square inch gauge	psig
pounds per square foot	psf
process control system	PCS
programmable logic controller	PLC
revolutions per minute	rpm
second	sec
specific gravity	sp gr or SG
square	sq
square foot	sq ft or sf
square inch	sq in.
square yard	sq yd or SY
standard	std
standard cubic feet per minute	scfm
total dynamic head	TDH

B. Definitions: Terminology used in the Specifications includes:

1. “Indicated” refers to graphic representations, notes, or schedules on the Drawings, or to other paragraphs or schedules in the Specifications and similar locations in the Contract Documents.

2. “Shown”, “noted”, “scheduled”, and “specified” are used to help the user locate the reference without limitation on the location.

3. “Installer”, “applicator”, or “erector” is Contractor or another entity engaged by Contractor, either as an employee or subcontractor, to perform a particular construction activity, including installation, erection, application or similar Work. Installers shall be experienced in the Work that installer is engaged to perform.

4. “Experienced”, when used with the term “installer” means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; being familiar with Laws and Regulations; and having complied with requirements of authorities having jurisdiction, and complying with requirements of the Supplier of the material or equipment being installed.

5. Trades: Use of a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter”, unless otherwise indicated in the Contract Documents or required by Laws or Regulations. Such terminology also does not imply that specified requirements apply exclusively to trade personnel of the corresponding generic name.

6. “Assigned specialists” and similar terms: Certain Sections of the Specifications require that specific construction activities be performed by specialists recognized as experts in those operations. Engage said specialists for those activities, and their engagement is a requirement over which Contractor has no option. These requirements do not conflict with enforcement of building codes and other Laws and Regulations. Also, such requirements are not intended to interfere with local trade union jurisdictional settlements and similar conventions. Such assignments shall not relieve Contractor of responsibility for complying with the requirements of the Contract Documents.

C. Reference Standards:

1. Refer to General Conditions to resolve discrepancies between reference standards and the Contract Documents. Provisions of reference standards are in effect in accordance with the Specifications and General Conditions Section 14.2 – Reference Standards.

2. Copies of Standards: Each entity engaged in the Work shall be familiar with reference standards applicable to its construction activity. Copies of applicable reference standards are not bound with the Contract Documents. Where reference standards are needed for a construction activity, obtain copies of standards from the publication source.

3. Abbreviations and Names: Where reference standards, specifications, codes, manuals, Laws or Regulations, or other published data of international, national, regional or local organizations are referred to in the Contract Documents, the organization issuing the standard may be referred to by their acronym or abbreviation only.

4. Following acronyms or abbreviations that may appear in the Contract Documents shall have the meanings indicated below. Listing is alphabetical by acronym.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACIFS	American Cast Iron Flange Standards
ACS	American Chemical Society
ADC	Air Diffusion Council
ADSC	International Association of Foundation Drilling.
AEIC	Association of Edison Illuminating Companies
AF&PA	American Forest and Paper Association
ABMA	American Bearing Manufacturers Association (formerly Anti- Friction Bearing Manufacturers Association (ABMA))
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHDGA	American Hot Dip Galvanizers Association
AI	Asphalt Institute
AIA	American Institute of Architects
AIChE	American Institute of Chemical Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standards Committee

AMA	Acoustical Materials Association
AMCA	Air Movement and Control Association
AMP	National Association of Architectural Metal Manufacturers, Architectural Metal Products Division
ANSI	American National Standards Institute
APA	The Engineered Wood Association
API	American Petroleum Institute
APHA	American Public Health Association
AREA	American Railway Engineering Association
ARI	Air Conditioning and Refrigeration Institute
ASA	American Standards Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASNT	American Society for Non-Destructive Testing
ASQ	American Society for Quality
ASSE	American Society of Safety Engineers
ASTM	American Society for Testing and Materials
AWCI	Association of the Wall and Ceiling Industry
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BAAQMD	Bay Area Air Quality Management District
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association
BOCA	Building Officials and Code Administrators

CBMA	Certified Ballast Manufacturers Association
CDA	Copper Development Association
CEMA	Conveyor Equipment Manufacturers Association
CGA	Compressed Gas Association
CISCA	Ceilings and Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CMAA	Crane Manufacturers Association of America
CPSC	Consumer Product Safety Commission
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DIN	Deutsches Institut fur Normung eV (German Institute for Standardization)
DIPRA	Ductile Iron Pipe Research Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ETL	Intertek Testing Services, Inc. (formerly ETL Testing Laboratories, Inc.)
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FM	Factory Mutual (FM Global)
FRPI	Fiberglass Reinforced Plastics Institute
FS	Federal Specification
GA	Gypsum Association
GANA	Glass Association of North America
HEW	United States Department of Health, Education and Welfare
HI	Hydraulic Institute
HMI	Hoist Manufacturers Institute

HUD	United States Department of Housing and Urban Development
IBC	International Building Code
ICC	International Code Council
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IFI	Industrial Fasteners Institute
IFCEA	Insulated Power Cable Engineers Association
IRI	Industrial Risk Insurers
ISA	Instrumentation, Systems, and Automation Society (formerly Instrument Society of America)
ISO	Insurance Services Office
IOS	International Organization for Standardization
LPI	Lightning Protection Institute
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
MSS	Manufacturers' Standardization Society
MMA	Monorail Manufacturers Association
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NAPF	National Association of Pipe Fabricators, Inc.
NARUC	National Association of Regulatory Utilities Commissioners
NBHA	National Builders Hardware Association
NBS	United States Department of Commerce, National Bureau of Standards
NCMA	National Concrete Masonry Association
NEC	National Electric Code
NELMA	Northeastern Lumber Manufacturers' Association

NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NETA	International Electrical Testing Association
NFPA	National Fire Protection Association
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NHPMA	Northern Hardwood and Pine Manufacturers Association
NIST	United States Department of Commerce, National Institute of Standards and Technology
NLGA	National Lumber Grades Authority
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	National Sanitation Foundation
NSSGA	National Stone, Sand, and Gravel Association
NTMA	National Terrazzo and Mosaic Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PEI	Porcelain Enamel Institute
PFI	Pipe Fabrication Institute
PPI	Plastics Pipe Institute
PGMC	Primary Glass Manufacturers Council
PS	Product Standards Section, United States Department of Commerce
RCSC	Research Council on Structural Connections (part of AISC)
RMA	Rubber Manufacturers Association
SAE	Society of Automotive Engineers
SBCCI	Southern Building Code Congress International, Inc.
SCAQMD	Southern California Air Quality Management District

SCPRF	Structural Clay Products Research Foundation
SCTE	Society of Cable Telecommunications Engineers
SDI	Steel Deck Institute
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturing Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractor’s National Association
SPI	Society of the Plastics Industry
SPIB	Southern Pine Inspection Bureau
SSPC	Society for Protective Coatings
SWI	Steel Window Institute
TCNA	Tile Council of North America
TEMA	Tubular Exchanger Manufacturers Association
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USAB	United States Access Board
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
USGBC	United States Green Building Council
USGS	United States Geological Survey
USPHS	United States Public Health Service
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association
WCMA	Wood Component Manufacturers Association
MDMA	Window and Door Manufacturers Association
WWEMA	Water and Wastewater Equipment Manufacturers Association
WWPA	Western Wood Products Association

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 23

TESTING SERVICES FURNISHED BY CONTRACTOR

PART 1 – GENERAL

1.01 SUMMARY

A. This specification addresses requirements for testing services specifically required to be provided by the Contractor. This section does not apply to any testing required to be provided by the Owner or Owner's representative.

B. This section does not apply to any Special Inspections as required by Section 01 45 33. Special Inspections cannot be provided by the Contractor in accordance with the Governing Building Code.

C. Contractor shall employ and pay for independent testing entity to perform specified services covered by this specification. Entity selected shall be subject to approval by Engineer and the City. All costs shall be borne by the Contractor, consistent with City General Conditions Section 4.7.

D. Inspection, sampling, and testing shall be as specified in the individual Specification Sections.

E. Related Sections, but not limited to, the following:

1. Section 01 45 33 – Special Inspections
2. Section 01 88 16 – Watertightness Testing of Concrete Structures
3. Section 31 00 01 – Earthwork
4. Section 31 05 16 – Aggregate Materials
5. Section 31 23 24 – Flowable Fill
6. Section 32 10 00 – Paving and Surfacing
7. Section 33 05 61 – Utility Structures
8. Section 33 41 13 – Foundation Drainage Systems
9. Section 03 21 00 – Reinforcing Steel
10. Section 03 30 00 – Cast-in-Place Concrete

11. Section 07 13 50 – Waterproofing

1.02 ADMINISTRATIVE REQUIREMENTS

A. Contractor's Responsibilities:

1. Provide to laboratory representative samples of materials to be tested, in required quantities.

2. Provide labor and facilities:

a. To provide access to the Work to be tested, and where required, to Suppliers' operations.

b. To obtain and handle samples at the Site.

c. To facilitate inspections and tests.

d. For testing entity's exclusive use for storage and curing of test samples.

e. Forms for preparing concrete test beams and cylinders.

3. Notify testing entity and Engineer sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests.

4. Arrange with testing entity and pay for additional services, sampling, and testing required for Contractor's convenience. (see City General Conditions Section 4.7 for related requirements).

5. Provide to testing entity the preliminary design mix proposed for concrete, and other material mixes that require testing by the testing laboratory.

B.

Testing Entity's Responsibilities:

1. Cooperate with Contractor and Engineer and provide qualified personnel promptly when notified.

2. Perform specified inspections, sampling, and testing of materials, and methods of construction; comply with applicable standards. Services shall be coordinated with City inspection requirements in accordance with City General Conditions Section 5.4 Permit Review and Inspections.

3. Promptly notify Engineer and Contractor of irregularities or deficiencies in the Work observed during performance of services.

4. Submit specified quantity of report copies of inspections and tests to Contractor and Engineer.

5. Perform additional tests and services as required to ensure compliance with the Contract Documents.

C. Report Requirements:

1. Electronic Submittal of testing reports.

2. Include the following information:

a. Date issued.

b. Project title, number, and name of the Site.

c. Testing laboratory name and address.

d. Name and signature of inspector or person obtaining samples.

e. Date of inspection or sampling.

f. Record of temperature and weather.

g. Date of test.

h. Identification of material or product tested and associated Specification Section.

i. Location in the Project.

j. Type of inspection or test.

k. Results of tests and observations regarding compliance with the Contract Documents.

1.03 SUBMITTALS

A. Submit copies of material and product test reports where required by the Contract Documents and as requested by Engineer.

B. Quality Assurance Submittals:

1. Qualifications statement indicating experience and facilities for tests required under the Contract Documents.

2. Copy of report of inspection of facilities during most recent NIST inspection tour. Include memorandum of remedies of deficiencies reported during inspection.

3. Copy of certificate of calibration for each instrument or measuring device proposed for use, by accredited calibration agency.

1.04 QUALIFICATIONS

A. Comply with applicable requirements of ASTM E329, Specification for Agencies Engaged in Construction Inspection and/or Testing.

B. Laboratory shall be authorized to operate in the same State or Commonwealth as the Site. Where applicable, laboratory shall be certified by the authority having jurisdiction for the types of testing required.

C. Testing equipment used by laboratory will be calibrated at maximum twelve month intervals by devices of accuracy traceable to either NIST's Standard Reference Materials (SRM), ISO 17025, General Requirements for the Competence of Testing and Calibration Laboratories, or certified by State, Commonwealth, or local bureau of weights and measures, or values of natural physical constants generally accepted in the engineering and scientific community.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 33
SPECIAL INSPECTIONS

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. This Section defines the requirements for Special Inspections as required by Section 1704 of the International Building Code (IBC) and any State or local amendments. In the event of a conflict between this Section and the City of Chandler General Conditions (Exhibit B), the City General Conditions shall govern.

B. Either the Engineer of Record (EOR) or Registered Design Professional in Responsible Charge (RDPIRC) will prepare a Statement of Special Inspections, which identifies the type and extent of required Special Inspections.

C. The Owner will retain one or more Special Inspections Agencies to perform Special Inspection services. These Agencies shall be independent from the Contractor. The EOR may perform Special Inspection services where qualifications for a specific inspection task are met. Retention of Agencies by the Owner does not modify Contractor obligations for access, notice, or correction of non-conforming Work per the following General Conditions Sections:

1. Section 4.4 Performance of Work

2. Section 4.7 Materials Quality, Substitutions and Shop Drawings

3. Section 4.9 Warranty and Correction of Defective Work

D. The Contractor shall plan and conduct operations as to schedule and allow Special Inspections, providing adequate time and safe access for inspections. The Contractor shall coordinate requirements for Special Inspections with the Special Inspections Agency.

E. Special Inspections shall be in addition to inspections performed by Building Officials that are specified in IBC Section 104.

F. Special Inspections shall be in addition to any Structural Observations required by IBC Section 1704.6.

G. Special Inspections do not supersede other inspections and testing required by the Contract Documents to satisfy the Contractor’s quality control responsibility. Contractor shall be responsible for all costs associated with quality control requirements as required by other Sections of the Specifications.

H. Special Inspections shall not relieve Contractor's obligation to perform and complete work in accordance with Contract Documents. Results of Special Inspections activities, including any discrepancies that are noted or not noted, shall never constitute an acceptance of work that is not in accordance with the Contract Documents.

I. This Section does not apply to construction equipment, shoring, earth retention systems, and temporary structures used by the Contractor in construction and not detailed in the Contract Documents. The Contractor shall be solely responsible for means, methods, techniques, sequences, or procedures of construction and any associated building code requirements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Special Inspections requirements apply to work detailed in other Sections of the Specifications. Special Inspections requirements shall be in addition to any other inspection or quality control requirements detailed in other Sections of the Specifications. See individual Specification Sections for type of work in question.

1.03 DEFINITIONS

A. Periodic Special Inspections: The part-time or intermittent observation of work requiring Special Inspection by a Special Inspector who is present in the area where the work has been or is being performed and at the completion of the work.

B. Continuous Special Inspections: The full-time observation of work requiring Special Inspection by a Special Inspector who is present in the area where the work is being performed.

C. Engineer of Record (EOR): The engineer of each system in responsible charge for the design of each specific building system including structural, mechanical, electrical, and architectural components

D. Registered Design Professional in Responsible Charge (RDPIRC): The RDPIRC in charge of Special Inspections during construction for each specific building system including structural, mechanical, electrical, and architectural components. The RDPIRC shall be a currently Registered Professional Engineer in the State or Commonwealth in which the project is located. The EOR may serve in this role.

E. Special Inspections Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, which has been approved by the Building Official and is retained by the Owner. The EOR may serve in this role where qualifications for specific inspection tasks are met.

F. Special Inspector: Individual employed by or retained by the Special Inspections Agency who is qualified in inspection of specific aspects or components of the construction and

conducts inspection activities in these specific aspects of the construction, as required by this Section. The EOR may serve in this role where qualifications for specific inspection tasks are met.

G. Statement of Special Inspections: Document prepared by the EOR or RDPIRC and submitted to the Building Official which identifies the type and extent of required Special Inspections.

H. Approved Fabricator: Fabricator who has been registered and approved by the Building Official to manufacture or fabricate specific components of the construction without Special Inspections.

1.04 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents and all other documents referenced in the Specifications. All referenced Specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. International Building Code
2. ACI 318 – Building Code Requirements for Structural Concrete
3. AISC – Code of Standard Practice
4. AISC 348 – Specification for Structural Joints Using High Strength Bolts
5. ADMI – Aluminum Design Manual: A Specification for Aluminum Structures

1.05 SUBMITTALS

A. The Contractor shall submit the following in accordance with Section 01 33 00 - Submittal Procedures. Submittal routing and communications shall also comply with General Conditions Sections

1. 4.7 Materials Quality, Substitutions and Shop Drawings and
2. 14.25 – Project Communications.

B. Where the Building Official requires direct submittal from the Special Inspections Agency, the Contractor remains responsible for coordination and schedule integration.

1. The Contractor shall submit qualifications of any fabricators they intend to use that may qualify as Approved Fabricators to the Special Inspections Agency for review.

C. The Special Inspections Agency shall submit the following in accordance with Section 01 33 00 – Submittal Procedures. Copies of all required submittals and reports shall also be

provided to the City per General Conditions Section 5.1 and 5.4, in addition to recipients listed herein.

1. The Special Inspections Agency shall provide a statement of qualifications showing relative experience, training, and certification(s) for each Special Inspector to the Building Official, if requested.

2. The Special Inspections Agency shall review fabricator qualifications and submit them to the Building Official for approval as an Approved Fabricator if requested.

3. Special Inspectors shall keep detailed inspection records, including all inspections, tests, similar services, and any discrepancies and corrections. Any discrepancies and corrections shall be reported to the Building Official, the EOR, and the RDPIRC in all required reports, unless otherwise required by the Building Official.

4. The Special Inspections Agency shall submit Interim Reports to the Building Official and the RDPIRC documenting required Special Inspections and correction of any discrepancies at the frequency specified in the Statement of Special Inspections.

5. The Special Inspections Agency shall submit to the Building Official and the RDPIRC a Final Report documenting required Special Inspections and correction of any discrepancies. The Final Report shall be submitted at a point in time agreed upon by the Owner and the Building Official at the Pre-inspection Meeting.

6. Where work is done by Approved Fabricators, the Special Inspections Agency shall coordinate the submittal of a certificate of compliance to the Building Official, the EOR, and the RDPIRC.

1.06 SPECIAL INSPECTOR QUALIFICATIONS

A. Special Inspectors shall meet minimum qualifications established by the Building Official and shall be approved by the Building Official.

1.07 OFF-SITE FABRICATIONS

A. When structural elements or assemblies are fabricated off site, Special Inspections shall be performed in the fabricator’s shop unless the fabricator is an Approved Fabricator. Special Inspections are not required if work is done on the premises of an Approved Fabricator.

B. Fabricators shall maintain detailed fabrication and quality control procedures to ensure workmanship and conformance with Contract Documents and reference standards. The Special Inspections Agency shall review the fabricator’s quality control procedures and coordinate required Special Inspections with the fabricator and the Contractor.

C. The Contractor shall submit qualifications of fabricators seeking Approved Fabricator status to the Special Inspections Agency for review. Approval as an Approved Fabricator shall be given by the Building Official upon the recommendation of the Special Inspections Agency or upon review of the fabricator's written fabrication procedures and quality control manuals that provide a basis for control of materials and workmanship, with periodic auditing of fabrication and quality control practices by an Approved Agency or the Building Official.

D. At completion of fabrication, the Approved Fabricator shall submit a certificate of compliance to the Owner or the RDPIRC for submittal to the Building Official stating that the work was performed in accordance with the approved Contract Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 PRE-INSPECTION MEETING

A. At least two weeks prior to beginning work, a Pre-inspection Meeting shall be held to discuss the Special Inspection procedures and submittals. The following parties shall participate: EOR, RDPIRC, Special Inspections Agency representative, Contractor, Subcontractors, Testing Agencies, and Building Official. The type of meeting (in-person or teleconference) and location of meeting shall be determined by the Building Official.

3.02 STATEMENT AND SCHEDULE OF SPECIAL INSPECTIONS

A. The Special Inspections Agency and all Special Inspectors are required to comply with all requirements of the Statement of Special Inspections and the Schedule of Special Inspections. Together, these documents identify materials, systems, components, and work that are required to have Special Inspections, the type and extent of Special Inspections, and whether they will be continuous or periodic. The Schedule of Special Inspections is included at the end of this Section. A form which may be used for the Statement of Special Inspections is also included at the end of this Section.

3.03 SPECIAL INSPECTIONS AGENCY REQUIREMENTS AND RESPONSIBILITIES

A. The Special Inspections Agency shall be an established and recognized agency regularly engaged in conducting tests or furnishing inspection services, which has been approved by the Building Official and is retained by the Owner. The Agency shall demonstrate competence, to the satisfaction of the Building Official, for the inspection of the specific aspects of construction or operation requiring Special Inspection.

B. The Special Inspections Agency shall maintain detailed inspection records, including a copy at the jobsite, and all records shall be available upon request by the EOR, RDPIRC or the Building Official. The Agency shall submit all required reports to the EOR, RDPIRC and Building Official. Where EOR approval is required for corrections, the Special Inspector shall maintain copies of all related correspondence and submit with all required reports. The Agency shall coordinate all required Special Inspection activities with the Special Inspectors, the Contractor, and any fabricators and shall coordinate designation of fabricators as Approved Fabricators when requested.

3.04 SPECIAL INSPECTORS' REQUIREMENTS AND RESPONSIBILITIES

A. All Special Inspectors shall meet the qualification requirements determined by the Building Official for the specific type of inspection services they will be providing and shall be approved by the Building Official. Special Inspectors shall submit written documentation demonstrating their competence and experience or training to the Building Official for approval of their qualifications.

B. Special Inspections shall be performed in accordance with all requirements of the Statement of Special Inspections, the Schedule of Special Inspections, the IBC, and any State or local amendments. Special Inspectors shall maintain detailed inspection records, including a copy at the jobsite, and all records shall be available upon request by the EOR, RDPIRC, or the Building Official. Special Inspectors shall submit all required reports to the RDPIRC and the Building Official. Where EOR approval is required for corrections, the Special Inspector shall maintain copies of all related correspondence and submit with all required reports. Special Inspectors shall coordinate inspection requirements and time when inspections can be conducted with the Contractor.

C. Any discrepancies in work noted by the Special Inspector shall be brought to the immediate attention of the Contractor for correction. Special Inspectors shall coordinate correction of discrepancies with the Contractor. Any corrections of discrepancies that result in changes to the work as shown on the Contract Documents shall be approved by the EOR. If noted discrepancies are not corrected, the Special Inspector shall notify the Contractor, the EOR, the RDPIRC and the Building Official. All noted discrepancies and corrections shall be documented in all inspection records and all required reports.

3.05 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall coordinate requirements of Special Inspections with the Special Inspections Agency and the Special Inspectors and shall provide adequate time and access to conduct inspections. The Contractor is solely responsible for providing safe access and any necessary safety equipment required to conduct inspections. The Special Inspector shall not supervise, direct, control, or have authority over or be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any

failure of the Contractor to comply with Laws and Regulations applicable to the performance of the Work.

B. Special Inspections shall not relieve the Contractor's obligation to perform and complete work in accordance with the Contract Documents. Results of Special Inspections activities, including any discrepancies that are noted or not noted, shall never constitute an acceptance of work that is not in accordance with the Contract Documents.

C. The Contractor shall provide advance notice of work to be conducted that will require Special Inspections. If the Special Inspector is delayed in inspecting the work due to inadequate notice or completion of the work, the Contractor shall reimburse the Owner for the cost of additional subsequent Special Inspections.

D. The Contractor shall promptly correct any discrepancies noted by the Special Inspectors. Any corrections of discrepancies that result in changes to the work as shown on the Contract Documents shall be approved by the EOR. Where EOR approval is required, the Contractor shall report the discrepancy to the EOR in accordance with provisions of the General Conditions. The EOR will authorize any changes to the Contract Documents required for the correction in accordance with provisions of the General Conditions. Copies of all correspondence related to the correction shall be submitted concurrently to the Special Inspections Agency.

3.06 BUILDING OFFICIAL OR AUTHORITY RESPONSIBILITIES

A. The Building Official will approve qualifications of the Special Inspections Agency, all Special Inspectors, and any Approved Fabricators. The Building Official will approve all forms submitted by the Contractor, any Approved Fabricators, the EOR, the RDPIRC, the Special Inspections Agency, and the Special Inspectors. The Building Official and the Special Inspections Agency shall agree to the frequency of Interim Reports and the submittal deadline for the Final Report.

3.07 RDPIRC RESPONSIBILITIES

A. The RDPIRC shall complete the Statement of Special Inspections and the Schedule of Special Inspections, unless previously completed by the EOR. The Statement of Special Inspections form included in this Section shall be used unless the Building Official has a preferred form for the Statement of Special Inspections, in which case the Building Official's form may be used and shall be completed by the RDPIRC.

B. The RDPIRC shall review and coordinate certain aspects of the project, as determined by the Building Official, for compatibility with the design of the building, structure or building system, including, but not limited to, submittal documents prepared by others, deferred submittal documents and phased submittal documents.

3.08 OWNER RESPONSIBILITES

A. The Owner will retain a Special Inspections Agency to perform Special Inspections during construction. The Special Inspections Agency will retain the RDPIRC.

3.09 MINIMUM INSPECTION REQUIREMENTS

A. Detailed requirements for Special Inspections are shown in the Statement of Special Inspections and the Schedule of Special Inspections, which references the IBC, applicable code standards, and any State or local amendments. Special Inspections shall be performed in accordance with all requirements of the Statement of Special Inspections, the Schedule of Special Inspections, the IBC, and any State or local amendments. Additional requirements for specific materials listed in other Sections of these Specifications shall also be satisfied. The frequency of inspections shall be continuous or periodic as indicated in the Schedule of Special Inspections and in accordance with applicable building codes.

3.10 REPORTS

A. Special Inspectors shall maintain detailed inspection records, including a copy at the jobsite, and all records shall be available upon request by the EOR, RDPIRC or the Building Official. The Special Inspections Agency shall submit all required reports to the Building Official, EOR, and RDPIRC as agreed upon with the Building Official. Reports shall indicate the inspections and testing performed and whether work inspected was or was not completed in conformance to Contract Documents and any corrective measures taken. Where EOR approval is required for corrections, the Agency shall maintain copies of all related correspondence and submit with all required reports.

3.11 SPECIAL INSPECTIONS FORMS

A. This Section includes forms which may be used to meet requirements for written documentation during the performance of Special Inspections in accordance with the IBC. These forms may be replaced with forms meeting IBC requirements provided by the Building Official if available.

SCHEDULE OF SPECIAL INSPECTIONS (IBC 2024 VERSION)

1 - SOILS (IBC 2024)

Inspection Task	Frequency		Applicable to Project	IBC Reference
	CONT	PER	Y/N	
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.		X	Y	
2. Verify excavations are extended to proper depth and have reached proper material.		X	Y	
3. Perform classification and testing of compacted fill materials.		X	Y	1705.6
4. During fill placement, verify use of proper materials and procedures in accordance with the Geotechnical Report. Verify densities and lift thicknesses during placement and compaction of compacted fill.	X		Y	
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.		X	Y	1705.6

STATEMENT OF SPECIAL INSPECTIONS

PROJECT: _____

LOCATION: _____

PERMIT APPLICANT: _____

APPLICANT'S ADDRESS: _____

STRUCTURAL ENGINEER OF RECORD: _____

MECHANICAL ENGINEER OF RECORD: _____

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE: _____

This Statement of Special Inspections is submitted in accordance with Section 1704 of the International Building Code. It shall be considered in conjunction with the Schedule of Special Inspections included in this Specification Section 01 45 33. If applicable, it includes *Requirements for Seismic Resistance and/or Requirements for Wind Resistance*.

Are Requirements for Seismic Resistance included in the Statement of Special Inspections? ☐ Yes ☐ No

Are Requirements for Wind Resistance included in the Statement of Special Inspections? ☐ Yes ☐ No

The Special Inspector(s) shall keep detailed records of all inspections, including a copy at the jobsite. All records shall be available upon request by the Engineer or the Building Official. Any discrepancies shall be brought to the immediate attention of the Contractor. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Engineer prior to completion of that phase of work. The Special Inspections Agency shall furnish Interim Reports to the Building Official and to the Engineer at the frequency indicated in the Statement of Special Inspections. A Final Report shall be submitted to the Building Official and the Engineer at the time agreed upon by the Owner and the Building Official.

Frequency of Interim Report submittals to the Building Official:

___ Weekly ___ Bi-Weekly ___ Monthly Other; specify:_____

Frequency of Interim Report submittals to the Engineer:

___ Weekly ___ Bi-Weekly ___ Monthly Other; specify:_____

Special Inspections do not relieve the Contractor of the obligation to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Statement of Special Inspections Prepared by:

_____
Type or print name

_____
Signature Date

Building Official's Acceptance:

_____
Type or print name

_____
Signature Date

Registered Design Professional's Seal

INTERIM REPORT OF SPECIAL INSPECTIONS

City/County of:							
Project Name/Address:				**Inspection Type(s) Coverage:**			
				☐ **Continuous**		☐ **Periodic**	
Describe Inspections Made, Including Locations:							
Tests Made:							
Total Inspection Time Each Day	**Date:**						
	Hours:						
List items requiring Special Inspection, and any discrepancies and corrections. If Engineer approval is required for any corrections, note this, and indicate that approval was obtained. Attach copies of all related correspondence.							
Comments:							

To the best of my knowledge, work inspected was in accordance with the Contract Documents and applicable standards except as noted above.

Signed: _____ Date: _____

Print Full Name: _____ I.D.: _____

Phone Number: _____

This report is to be submitted to the Building Official and the Engineer. A copy shall be maintained at the jobsite.

FINAL REPORT OF SPECIAL INSPECTIONS

PROJECT: _____

LOCATION: _____

PERMIT APPLICANT: _____

APPLICANT'S ADDRESS: _____

STRUCTURAL ENGINEER OF RECORD: _____

MECHANICAL ENGINEER OF RECORD: _____

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE: _____

To the best of my information, knowledge, and belief, Special Inspections required for this Project in accordance with Section 1704 of the International Building Code and any State or local amendments have been performed, and all work has been completed in accordance with the Contract Documents and all applicable standards, except as indicated.

The Special Inspection program does not relieve the Contractor of the obligation to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

This Final Report includes information submitted in previous Interim Reports numbered _____ to _____, as well as any Special Inspections, discrepancies, and corrections occurring since the last Interim Report, dated _____.

All items requiring Special Inspection are listed below. All inspections, tests, and similar services that were performed are listed and any discrepancies and corrections are indicated. If Engineer approval was required for any corrections, this is noted, and copies of all related correspondence are attached.

_____

_____

_____

_____

_____

(Attach 8 ½"x11" continuation sheet(s) if required to complete the description of corrections)

Prepared By:

Special Inspector's Seal

_____
Special Inspection Agency:

_____
Type or print name

_____
Signature Date

CONTRACTOR'S STATEMENT OF RESPONSIBILITY

Each Contractor responsible for the construction or fabrication of a main-wind- or seismic-force-resisting system, designated seismic system, or a wind- or seismic-resisting-component listed in the Statement of Special Inspections must submit this Statement of Responsibility prior to commencement of work on the system or component.

Project: _____

Contractor's Name: _____

Address: _____

License No.: _____

Description of building systems and components included in Statement of Responsibility:

_____

_____

_____

_____

_____

_____

_____

Contractor's Acknowledgement of Special Requirements

I hereby acknowledge that I have received, read, and understand the Statement of Special Inspections and its requirements.

_____
Name and Title (type or print)

_____ _____
Signature Date

FABRICATOR'S CERTIFICATE OF COMPLIANCE

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per Section 1704 of the International Building Code must submit this Fabricator's Certificate of Compliance at the completion of fabrication.

Project: _____

Fabricator's Name: _____

Address: _____

Description of structural members and assemblies that have been fabricated:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

I hereby certify that items described above were fabricated on my premises in strict accordance with the Contract Documents and applicable standards.

_____
Name and Title (type or print)

_____ _____
Signature Date

Attach copy of Building Official's approval of fabricator as an Approved Fabricator.

NOTIFICATION OF FAILURE TO CORRECT DISCREPANCY

City/County of:
Project Name/Address:
List discrepancies, proposed correction, and Contractor response. If Engineer approval is required for any corrections, note this, and indicate whether approval was obtained. Attach copies of all related correspondence.
Comments:

Signed: _____ Date: _____

Print Full Name: _____ I.D.: _____

Phone Number: _____

This report is to be submitted to the Building Official, the Contractor, and the Engineer.

END OF SECTION

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SECTION 01 51 00
TEMPORARY UTILITIES

PART 1 – GENERAL

1.01 SUMMARY

A. Contractor shall provide temporary utilities required for the Project, as shown in the drawing sheets and to complete the Work.

1. Make arrangements with utility service companies for temporary services and obtain required permits and approvals for temporary utilities.

2. Pay utility service costs, including connection fees, required for the Work as needed.

3. Continuously maintain adequate utilities for all purposes during the Project, until removal of temporary utilities and temporary facilities. At minimum, provide and maintain temporary utilities through Substantial Completion and removal of temporary field offices and sheds.

4. Should Owner occupy part of the Project prior to Substantial Completion of the entire Work, cost of utilities consumed via temporary utilities serving the portion occupied by Owner will be shared proportionately between Owner and Contractor as mutually agreed to by the parties.

5. Maintain, including cleaning, temporary utilities and continuously provide consumables as required.

6. Temporary utilities and temporary facilities shall be adequate for personnel using the Site and requirements of Project.

7. Provide temporary utilities and temporary facilities in compliance with Laws and Regulations and, when applicable, requirements of utility owners.

B. Provide the following temporary utilities:

1. Electricity and lighting.

2. Telephone and communications.

3. Sanitary facilities.

4. Water service.

5. First-aid facilities.

6. Fire protection.

1.02 ADMINSTRATIVE REQUIREMENTS

A. Use of Owner's System:

1. Existing Utility Systems: Do not use systems in existing buildings or structures for temporary utilities without Owner's written permission and mutually acceptable basis agreed upon by the parties for proportionate sharing of costs between Owner and Contractor.

2. Use of Permanent Utility Systems Provided Under the Project:

a. Permanent lighting, water, heating, ventilating, and fire protection systems and first-aid facilities may be used to provide temporary utilities and temporary facilities if the following are met:

1) Obtain Owner's written permission to use permanent systems.

2) Permanent systems to be used for temporary utilities or temporary facilities shall have achieved Substantial Completion, including complete functionality of all controls.

3) Contractor shall pay all costs while using permanent system, including operation, maintenance, replacement of consumables, and provide replacement parts.

b. Do not use the following permanent facilities:

1) Telephone and communication facilities.

2) Sanitary facilities.

1.03 SYSTEM DESCRIPTION

A. Electricity and lighting:

1. Contractor shall provide electrical and lighting service for construction field offices, sheds, storage containers, etc. and as required for the Work.

2. General 120/240 V service requirements:

a. Contractor shall provide 120/240 V, single phase, 3-wire temporary system for small power requirements and general lighting.

b. Contractor shall provide main disconnect, overcurrent protection, meter outlet, branch circuit breakers, and wiring for temporary service to the Contractor's field office service connections. Contractor shall provide equipment and appurtenances in accordance with electricity service provider and applicable standards and codes

c. Contractor shall register the 120/240 V electrical service meter in the Contractor's name and shall be responsible for electrical charges at no additional cost to the Owner.

d. Contractor shall provide electrical service other than 120/240 V, single phase, 3-wire service as required for the Work at the Contractor's own expense.

3. General lighting requirements:

a. Contractor shall provide a night lighting circuit for security. Light intensity shall be a minimum of 2 foot candles.

4. Contractor shall energize the electrical system 15-minutes prior to and following regular work day hours at the Site. Required from Monday through Friday, all inclusive.

5. Contractor shall energize the night lighting system at end of typical working day and de-energize at start of typical working day. System shall be continuously energized on Saturdays, Sundays, and holidays.

6. Contractor shall coordinate usage of temporary electrical system with Subcontractors, Suppliers, and Owner including the following:

a. Usage is suitable for 120V, single phase, 60 Hz operation with a maximum operating input of 1,500 volt-amperes.

b. One unit connected to a single outlet.

c. Restrict usage in case of overloading circuits to correct loading.

B. Telephone and communications: Contractor shall provide temporary telephone and communications required for its operations at the Site and for summoning emergency medical assistance.

C. Sanitary facilities:

1. Contractor shall provide suitably-enclosed chemical or self-contained toilets for Contractor's employees and visitors to the Site. Location of temporary toilets shall be acceptable to Owner and screened from public observation.

2. Facilities shall be maintained and provided in accordance with State or Commonwealth Labor Regulations and local ordinances. Contents shall be removed and disposed in accordance with local and state or commonwealth regulations as required.

3. Contractor shall be prohibited from committing nuisances within, on, or in the vicinity of the Site.

D. Water service:

1. Contractor shall provide temporary water service for the Work including for construction purposes, sanitary facilities, fire protection, field office, and cleaning purposes.

2. Contractor shall provide potable water for Contractor's personnel either by portable containers or drinking fountains.

3. Contractor shall provide temporary hose bibs, hoses, and watertight barrels for the distribution of water.

4. Contractor shall provide freeze protection for water service.

E. First-aid facilities:

1. Contractor shall provide temporary first-aid stations at or immediately adjacent to the Site's major work areas. Contractor shall provide temporary first-aid stations inside its temporary field office. Locations of first-aid stations shall be determined by Contractor's safety representative.

2. Contractor shall provide list of emergency telephone numbers at each hardwired telephone at the Site. List shall be in accordance with the list of emergency contact information required in Section 01 31 19 – Project Meetings.

F. Fire protection:

1. Contractor shall comply with NFPA 241, Safeguarding Building Construction, Alteration, and Demolition Operations, and requirements of fire marshals and authorities having jurisdiction at the Site.

2. Contractor shall provide temporary fire exits, fire extinguishers, hoses and safety devices as required by authorities having jurisdiction.

3. Contractor shall notify Engineer, Owner, and fire marshals in the event of fire at the Site including, but not limited to, fuel tanks and similar hazardous utilities and devices. Contractor shall cooperate with Owner of fuel tank and utilities to prevent occurrence of fire or explosion.

4. Contractor shall perform safety precautions and comply with fire marshal's instructions in the event of fire.

PART 2 – PRODUCTS

2.01 EQUIPMENT

A. Materials and equipment for temporary systems may be new or used but shall be adequate for purposes intended and shall not create unsafe conditions and shall comply with Laws and Regulations.

B. Provide required materials, equipment, and facilities, including piping, wiring, and controls.

C. Electrical system requirements: System shall consist of wiring, switches, insulated supports, poles, fixtures, sockets, receptacles, lamps, guards, cutouts and fuses as required for completion of the Work.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install temporary facilities in neat, orderly, manner, and make structurally, mechanically, and electrically sound throughout.

B. Location of Temporary Utilities and Temporary Facilities:

1. Locate temporary systems for proper function and service.

2. Temporary systems shall not interfere with or provide hazards or nuisances to: the Work under this and other contracts, movement of personnel, traffic areas, materials handling, hoisting systems, storage areas, finishes, and work of utility companies.

3. Do not install temporary utilities on the ground, with the exception of temporary extension cords, hoses, and similar systems in place for short durations.

C. Modify and extend temporary systems as required by progress of the Work.

3.02 MAINTENANCE

A. Maintain temporary systems to provide safe, continuous service as required.

B. Properly supervise operation of temporary systems:

1. Enforce compliance with Laws and Regulations.

2. Enforce safe practices.

3. Prevent abuse of services.

4. Prevent nuisances and hazards caused by temporary systems and their use.

5. Prevent damage to finishes.

6. Ensure that temporary systems and equipment do not interrupt continuous progress of construction.

C. At end of each work day, check temporary systems and verify that sufficient consumables are available to maintain operation until work is resumed at the Site. Provide additional consumables if the supply on hand is insufficient.

D. Contractor shall replace broken and burned out lamps, blown fuses, and damaged wiring and appurtenances as required to maintain adequate and safe operating conditions.

E. Contractor shall permit subcontractors and others at a mutually agreed arrangement to use temporary electrical system that meet the following requirements:

1. Equipment are suitable for 120 V, single phase, 60 Hz operation.

2. Operating input does not exceed 1,500 volt-amperes.

3. Single piece of equipment connected to one outlet.

4. Contractor shall restrict use of equipment as required to prevent overloading circuits.

3.03 CLOSEOUT ACTIVITES

A. Completely remove temporary utilities, facilities, equipment, and materials when no longer required. Repair damage caused by temporary systems and their removal and restore the Site to condition required by the Contract Documents; if restoration of damaged areas is not specified, restore to preconstruction condition.

B. Contractor is responsible for and shall return to original condition those portions of permanent electric system used in completing the Work.

C. Where temporary utilities are disconnected from existing utility, provide suitable, watertight or gastight (as applicable) cap or blind flange, as applicable, on service line, in accordance with requirements of utility owner.

D. When permanent utilities and systems that were used for temporary utilities, upon Substantial Completion replace all consumables such as filters and light bulbs and parts used during the Work.

END OF SECTION

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SECTION 01 61 00
PRODUCT REQUIREMENTS AND OPTIONS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Common requirements for products.

2. Contractor's options for selecting products.

3. Requirements for consideration of "or equal" products.

4. Warranty requirements of products.

1.02 REFERENCES

A. Definitions:

1. "Products" includes materials, equipment, machinery, components, fixtures, systems, and other goods incorporated in the Work. Products do not include machinery and equipment used for preparing, fabricating, conveying, erecting, or installing the Work. Products include Owner-furnished goods incorporated in the Work where use of such goods is specifically required in the Contract Documents.

2. "Special Warranties" includes additions or modifications to standard warranty requirements specified in the Contract Documents.

3. "Or-Equal" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. This definition is applied together with General Conditions Section 4.7 Materials Quality, Substitutions, and Shop Drawings. For the purposes of this Paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. In the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and

3) it has a proven record of performance and availability of responsive service.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

1.03 SUBMITTALS

A. Warranty Log Book:

1. Submit warranty log book consistent with General Conditions Section 4.9 Warranty and Correction of Defective Work. Submittal shall include a summary listing of all equipment and material warranties furnished in the Contract, date received, and start/end date of warranty period. Individual warranty documentation shall be provided in the submittal.

2. Submit prior to submittal of final application for payment.

B. Patent Documentation: Submit licensing arrangement and agreement documentation early enough to avoid procurement or installation delays for long-lead items identified in the work.

1.04 REQUIREMENT

A. Common Products:

1. Provide products that have not been previously incorporated into another project or facility unless otherwise indicated in the Contract Documents.

2. Provide products of the same generic kind from a single source.

3. Provide products complete with accessories, trim, finish, fasteners, and other items shown, indicated, or required for a complete installation for the indicated use and performance.

4. Standard Products: When available, and unless custom or nonstandard options are specified or indicated, provide standard products of types that have been produced and used successfully in similar situations on other projects.

5. Visual Matching: Where required in the Contract Documents, provide products that match referenced existing construction, approved mock-ups, or approved Sample, as determined by Engineer.

6. Where the Contract Documents include the phrase “as selected” for product color, finish pattern, option, or similar phrase, provide products selected by Engineer as follows:

    a. Standard Range: Where the Contract Documents include the phrase “standard range of colors, patterns, textures” or similar phrase, provide color, pattern, density, or texture selected by Engineer from manufacturer’s product line that does not include premium items.

    b. Full Range: Where the Contract Documents include the phrase “full range of colors, patterns, textures” or similar phrase, Engineer will select color, pattern, density, or texture from manufacturer’s entire product line, including standard and premium items.

B. Product Compatibility:

1. Similar products by the same Supplier shall be compatible with each other, unless otherwise indicated in the Contract Documents.

2. Provide products compatible with products previously selected or installed on the Project.

C. Product Options:

1. For products specified only by reference standard or description, without reference to Supplier, provide products meeting that standard, by a Supplier or from a source that complies with the Contract Documents.

2. For products specified by naming one or more products or Suppliers, provide the named products that comply with the Contract Documents, unless an “or equal” or substitute product is approved by Engineer.

3. For products specified by naming one or more products or Suppliers and the term, “or equal”, when Contractor proposes a product or Supplier as an “or equal”, submit to Engineer a request for approval of an “or equal” product or Supplier.

4. For products specified by naming only one product or manufacturer and followed by words indicating that no substitution is allowed, there is no option and no substitution will be allowed.

D. Concerning Patents:

1. Indemnity and licensing obligations here are in addition to requirements of General Conditions Section 12 Indemnification. Owner shall be provided a guarantee by Contractor and equipment Supplier that equipment and material furnished in accordance with the Contract Documents is not the subject of patent litigation.

2. Patent litigation or controversy shall include, but not limited to, the following:

    a. Actual furnished equipment and material the is subject or could be subject to patent litigation or is known to infringe on a patent.

    b. Furnished equipment and material that may result in a process that use of equipment and material in a manner that infringes upon or violates a patent.

3. When patent infringement may occur, Contractor and Supplier shall submit license arrangements among parties, including Contractor, Supplier, and patent owner (controller of patent) at a minimum, which shall permit use of equipment and material as specified in the Contract Documents.

4. Supplier shall indemnify and hold harmless Owner and Engineer against all claims, costs, losses, and damages arising out of or relating to any infringement or patent rights or copyrights incident to the use of equipment and material specified in the Contract Documents and as required in General Conditions and as modified in the Supplemental Conditions.

E. “Or Equal” Products:

1. Submit “or-equal” requests consistent with General Conditions Section 4.7. For proposed products not named in the Contract Documents and considered as an “or equal” as defined in the General Conditions, Contractor shall request in writing Engineer’s approval of the “or equal”. Request for approval of an “or equal” product shall accompany the Shop Drawing or product data submittal for the proposed product and shall include:

    a. Contractor’s request that the proposed product be considered as an “or equal” in accordance with the General Conditions, accompanied by Contractor’s certifications required in the General Conditions.

    b. Documentation adequate to demonstrate that proposed product does not require revisions to the Contract Documents, that proposed product is consistent with the Contract Documents, and that proposed product will produce results and performance required in the Contract Documents, and that proposed product is compatible with other portions of the Work.

    c. Detailed comparison of significant qualities of proposed product with the products and manufacturers named in the Contract Documents. Significant qualities include attributes such as performance, weight, size, durability,

visual effect, performance and specific features and requirements shown or indicated.

d. Evidence that proposed product manufacturer will furnish warranty equal to or better than specified, if any.

e. List of similar installations for completed projects with project names and physical addresses of installation along with the names, telephone numbers, email addresses and physical address of design professionals and owners associated with the referenced installation, if requested.

f. Samples, if requested.

g. Other information requested by Engineer.

1.05 WARRANTY

A. These warranty durations and start triggers supplement General Conditions Section 4.9. Warranties specified for products shall be in addition to, and run concurrent with, Contractor's general warranty and guarantee and requirements for the required correction period. Disclaimers and limitations in specific product warranties do not limit Contractor's general warranty and guarantee.

1. Product manufacturer's warranty is preprinted written warranty published by product manufacturer and specifically endorsed by product manufacturer to Owner.

2. Equipment and material shall be guaranteed to be free from defects in workmanship, design, and/or materials for a period of one (1) year unless otherwise specified in the individual Specification Section for a Special Warranty.

3. Warranty period shall start on the date of the particular equipment and material is substantially complete, which includes requirements specified in Section 01 75 00 – Checkout and Startup Procedures for start-up certification and specified elsewhere in the Contract Documents.

4. Warranty requirements may be added to or modified in the individual Specification Sections. Special warranty is written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by product manufacturer's warranty or to provide increased rights to Owner.

5. Special warranty information, if any, will be located in the Specification Section for that product.

B. Requirements for Special Warranties: Provide written special warranty document that contains appropriate terms and identification, ready for execution by product manufacturer and Owner. Submit draft warranty with submittals required for product.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed by product manufacturer and other parties as appropriate.

2. Specified Form: When specified forms are included in the Contract Documents, prepare written document, properly executed by product manufacturer and Owner, using appropriate form.

3. Refer to Specifications for content and requirements for submitting special warranties.

C. Submit product manufacturer's warranties and special warranties as submittals in accordance with Schedule of Submittals accepted by Engineer.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 65 00
PRODUCT DELIVERY REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. General requirements for preparing for shipping, delivering, and handling materials and equipment.

2. Contractor shall make all arrangements for transporting, delivering, and handling of materials and equipment required for prosecution and completion of the Work.

1.02 SUBMITTALS

A. Refer to individual Specification Sections for submittal requirements relative to delivery and handling materials and equipment.

1.03 SHIPMENT REQUIREMENTS

A. Comply with General Conditions Section 4.7 for submittal approval requirements; this Section adds shipment prerequisites including marking, packaging, and advance notice.

B. When practical, factory-assemble materials and equipment. Match mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable, protective coating.

C. Package materials and equipment to facilitate handling, and protect materials and equipment from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate the associated purchase order number, bill of lading number, contents by name, Owner's contract name and number, Contractor name, equipment number, and approximate weight. Include complete packing lists and bills of materials with each shipment.

D. Protect materials and equipment from exposure to the elements and keep thoroughly dry and dust-free at all times. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Lubricate bearings and other items requiring lubrication in accordance with manufacturer's instructions.

E. Advance Notice of Shipments:

1. Keep Engineer informed of delivery of all materials and equipment to be incorporated in the Work.

F. Do not ship materials and equipment until:

1. Related Shop Drawings, Samples, and other submittals have been approved or accepted (as applicable) by Engineer, including, but not necessarily limited to, Submittals associated with the materials and equipment being delivered.

2. Manufacturer's instructions for handling, storing, and installing the associated materials and equipment have been submitted to and accepted by Engineer in accordance with the Specifications.

3. Results of source quality control testing (factory testing), when required by the Contract Documents for the associated materials or equipment, have been reviewed and accepted by Engineer.

4. Facilities required for handling materials and equipment in accordance with manufacturer's instructions are in place and available.

5. Required storage facilities have been provided.

1.04 DELIVERY REQUIREMENTS

A. Scheduling and Timing of Deliveries:

1. The delivery limit and partial payment restrictions here supplement General Conditions Sections 4.4 and 4.5. Arrange deliveries of materials and equipment in accordance with the accepted Progress Schedule and in ample time to facilitate inspection prior to installation.

   a. Equipment and material shall not be delivered to the Site prior to 90 days in advance of scheduled installation.

   b. Partial payment requests will not be processed for materials delivered prior to 90 days before installation or for materials that are improperly stored.

2. Schedule deliveries to minimize space required for and duration of storage of materials and equipment at the Site or delivery location, as applicable.

3. Coordinate deliveries to avoid conflicting with the Work and conditions at Site, and to accommodate the following:

   a. Work of other contractors and Owner.

   b. Owner's operations and maintenance.

   c. Storage space limitations.

d. Availability of equipment and personnel for handling materials and equipment.

e. Owner's use of premises.

4. Deliver materials and equipment to the Site during regular working hours.

5. Deliver materials and equipment to avoid delaying the Work and the Project, including work of other contractors, as applicable. Deliver anchor system materials, including anchor bolts to be embedded in concrete or masonry, in ample time to avoid delaying the Work.

B. Deliveries:

1. The delivery limit and partial payment restrictions here supplement General Conditions Sections 4.5 and 4.7. Shipments shall be delivered with Contractor's name, Subcontractor's name (if applicable), Site name, Project name, and contract designation clearly marked.

2. Site may be listed as the "ship to" or "delivery" address; but Owner shall not be listed as recipient of shipment unless otherwise directed in writing by Engineer.

3. Provide Contractor's telephone number to shipper; do not provide Owner's telephone number.

4. Arrange for deliveries while Contractor's personnel are at the Site. Contractor shall receive and coordinate shipments upon delivery. Shipments delivered to the Site when Contractor is not present will be refused by Owner, and Contractor shall be responsible for the associated delays and additional costs, if incurred.

C. Containers and Marking:

1. Have materials and equipment delivered in manufacturer's original, unopened, labeled containers.

2. Clearly mark partial deliveries of component parts of materials and equipment to identify materials and equipment, to allow easy accumulation of parts, and to facilitate assembly.

D. Inspection of Deliveries:

1. Immediately upon delivery, Contractor shall inspect shipment to verify that:

a. Materials and equipment comply with the Contract Documents and approved or accepted (as applicable) submittals.

b. Quantities are correct.

c. Materials and equipment are undamaged.

d. Containers and packages are intact and labels are legible.

e. Materials and equipment are properly protected.

2. Promptly remove damaged materials and equipment from the Site and expedite delivery of new, undamaged materials and equipment, and remedy incomplete or lost materials and equipment to furnish materials and equipment in accordance with the Contract Documents, to avoid delaying progress of the Work.

3. Advise Engineer in writing when damaged, incomplete, or defective materials and equipment are delivered, and advise Engineer of the associated impact on the Progress Schedule.

1.05 HANDLING REQUIREMENTS

A. These procedures supplement General Conditions Sections 4.4 and 4.5. Provide equipment and personnel necessary to handle materials and equipment, including those furnished by Owner, by methods that prevent soiling or damaging materials and equipment and packaging.

B. Provide additional protection during handling as necessary to prevent scraping, marring, and otherwise damaging materials and equipment and surrounding surfaces.

C. Handle materials and equipment by methods that prevent bending and overstressing.

D. Lift heavy components only at designated lifting points.

E. Handle materials and equipment in safe manner and as recommended by the manufacturer to prevent damage. Do not drop, roll, or skid materials and equipment off delivery vehicles or at other times during handling. Hand-carry or use suitable handling equipment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 66 00
PRODUCT STORAGE AND PROTECTION REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. General requirements of storing and protecting equipment and materials.

1.02 STORAGE

A. Store and protect materials and equipment in accordance with manufacturer's recommendations and the Contract Documents.

B. Contractor shall make all arrangements and provisions necessary for, and pay all costs for, storing materials and equipment. Construction equipment, and materials and equipment to be incorporated into the Work shall be placed to avoid injuring the Work and existing facilities and property, and so that free access is maintained at all times to all parts of the Work and to public utility installations in vicinity of the Work. Store materials and equipment neatly and compactly in locations that cause minimum inconvenience to Owner, other contractors, public travel, and owners, tenants, and occupants of adjoining property. Arrange storage in manner to allow easy access for inspection.

C. Areas available at the Site for storing materials and equipment are shown or indicated in the Contract Documents, or as approved by Engineer.

D. Store materials and equipment to become Owner's property to facilitate their inspection and ensure preservation of quality and fitness of the Work, including proper protection against damage by freezing, moisture, and high ambient temperatures. Store in indoor, climate-controlled storage areas all materials and equipment subject to damage by moisture, humidity, heat, cold, and other elements, unless otherwise acceptable to Owner.

E. Contractor shall be fully responsible for loss or damage (including theft) to stored materials and equipment.

F. Do not open manufacturer's containers until time of installation, unless recommended by the manufacturer, directed by Engineer or otherwise specified in the Contract Documents.

G. Do not store materials or equipment in structures being constructed unless approved by Engineer in writing.

H. Do not use lawns or other private property for storage without written permission of the owner or other person in possession or control of such premises.

I. Contractor shall not store unnecessary equipment and materials at the Site.

J. Contractor shall prevent structures from being loaded with a weight that endanger its security and/or safety of persons.

K. Stored equipment and materials shall not be placed within 10 feet of fire hydrants.

L. Gutters, drainage channels and inlets shall be kept unobstructed at all times.

1.03 PROTECTION

A. Contractor shall provide temporary storage containers/facilities, if required, to protect equipment and materials at the Site.

B. Equipment to be incorporated into the Work shall be boxed, crated, or otherwise completely enclosed and protected during shipping, handling, and storage, in accordance with Section 01 65 00 – Product Delivery Requirements.

C. Store all materials and equipment off the ground (or floor) on raised supports such as skids or pallets.

D. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Painted equipment surfaces that are damaged or marred shall be repainted in their entirety in accordance with equipment manufacturer and paint manufacturer requirements, to the satisfaction of Engineer.

1.04 SPECIFIC STORAGE REQUIREMENTS

A. Fully Protected:

1. All materials and equipment shall be stored on supports in buildings or trailers that have concrete or wooden flooring, roof, and fully closed walls on all sides. Covering with plastic sheeting or similar material in space without floor, roof, and walls is not acceptable. Comply with the following:

    a. Provide heated storage for materials and equipment that could be damaged by low temperatures or freezing.

    b. Provide air-conditioned storage for materials and equipment that could be damaged by high temperatures.

    c. Protect mechanical and electrical equipment from being contaminated by dust, dirt, and moisture.

d. Maintain humidity at levels recommended by manufacturers of electrical and electronic equipment.

e. Energize space heaters for electrical equipment and material.

B. Maintenance of Storage: On scheduled basis, periodically inspect stored materials and equipment to ensure that:

1. Condition and status of storage facilities is adequate to provide required storage conditions.

2. Required environmental conditions are maintained on continuing basis.

3. Materials and equipment exposed to elements are not adversely affected.

1.05 RECORDS

A. Keep up-to-date account of materials and equipment in storage to facilitate preparation of Applications for Payment, if the Contract Documents provide for payment for materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 71 33
PROTECTION OF WORK AND PROPERTY

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Protection of existing utilities and structures.

2. Protection of installed equipment and materials.

3. Protection during inclement weather.

4. Reporting of accidents.

5. Barricades and warning signals.

B. Contractor shall be responsible for taking all precautions, providing all programs, and taking all actions necessary to protect the Work and all public and private property and facilities from damage, as specified in the General Conditions, Supplementary Conditions, and this Section.

C. To prevent damage, injury, or loss, Contractor's actions shall include the following:

1. Storing apparatus, materials, supplies, and equipment in an orderly, safe manner that does not unduly interfere with progress of the Work or work of other contractors or utility companies.

2. Providing suitable storage facilities for equipment and materials subject to damage or degradation by exposure to weather, theft, breakage, or other cause.

3. Placing upon the Work or any part thereof only loads consistent with the safety and integrity of that portion of the Work and existing construction.

4. Frequently removing and disposing of refuse, rubbish, scrap materials, and debris caused by Contractor's operations so that, at all times, the Site is safe, orderly, and workmanlike in appearance.

D. Contractor has full responsibility for preserving public and private property and facilities on and adjacent to the Site. Direct or indirect damage done by, or on account of, any act, omission, neglect, or misconduct by Contractor in executing the Work, shall be restored by Contractor, at their expense to condition equal to that existing before damage was done.

E. Contractor shall comply with safety regulations required by Owner or authorities having jurisdiction. Contractor shall comply with and correct unsafe conditions created or caused by Contractor's personnel. In the event Contractor fails to comply, Owner receives the right to take necessary measures to correct conditions or practices for reimbursement by Contractor.

1.02 REFERENCES

A. Definitions:

1. "Existing utilities" shall refer to both publicly-owned and privately-owned utilities such as, but are not limited to, electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers and all appurtenant structures.

2. "Surface structures" are existing buildings, structures, and other facilities at or above ground surface, including their foundations or any extension below ground surface. Surface structures include, but are not limited to, buildings, tanks, walls, channels, open drainage, exposed piping and utilities, poles, exposed wires, posts, signs, markers, curbs, walks, fencing, and other facilities visible at or above ground surface.

1.03 SITE CONDITIONS

A. Location of Existing Utilities and Structures:

1. Contractor shall confirm and verify location of existing utilities and structures at the Site prior to commencing the Work.

2. Contractor shall notify and obtain approval from authority having jurisdiction prior to performing the Work in the vicinity of the existing utilities and structures.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

A. General:

1. Contractor shall satisfy Engineer that methods and procedures for protection have been approved by authorities having jurisdiction prior to proceeding with the Work.

2. Contractor shall provide temporary support and protection, as required, to existing utilities and structures during the Work, including support of excavation.

a. Temporary support and protection of existing utilities shall be provided in accordance with requirements of the authority having jurisdiction.

b. Temporary support and protection of existing structures shall be provided as required to ensure structural integrity is not compromised.

3. Contractor shall be responsible for costs incurred for temporary support or protection provided by a third-party or authority having jurisdiction to insure safety of the existing utility, Owner, and public and private parties.

B. Existing Buried Utilities:

1. Contractor shall perform field investigate to identify conflicts or interferences between existing utilities and utility Work prior to excavation Work.

a. Investigation of conflicts and interferences shall be performed on Site locations, elevations, slopes, etc. of the existing utilities determined during the field investigations.

b. Contractor shall notify Engineer and Owner in writing of identified conflicts or interferences. Contractor shall not proceed with the Work until written authorization is provided by the Engineer.

c. Identified conflicts and interferences shall be handled in accordance with the Contract Documents

2. Contractor shall perform the Work to prevent disruption of existing service and damage to existing utilities.

a. Temporary connections shall be provided, as required, to provide un-interrupted service of existing utilities.

b. Contractor shall repair damage to existing utilities as directed by the Engineer or the authority having jurisdiction at Contractor’s own expense.

c. Contractor shall be responsible for damages and repair costs to the authority having jurisdiction if third-party or authority having jurisdiction personnel repair damaged existing utilities.

C. Protection of Existing Structures:

1. Contractor shall sustain existing surface structures in existing place and protect from direct or indirect injury located within or adjacent to the limits of the Work. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure or facility.

2. Contractor shall bear all risks attending the presence or proximity of all surface structures within or adjacent to limits of the Work, in accordance with the Contract Documents.

3. Contractor shall be responsible for damage and expense for direct or indirect injury caused by their Work to structures and facilities.

4. Contractor shall repair immediately damage caused by their Work, to the satisfaction of owner of damaged structure or facility at no cost to the Owner.

5. Contractor shall provide temporary weather protection for existing structures and buildings where exterior walls or roofs are modified or disturbed in the Work. Contractor shall be responsible for damages due to inadequate protection of existing structures and building.

D. Relocation of Surface Structures: Existing surface facilities, including but not limited to guard rails, posts, guard cables, signs, poles, markers, curbs, and fencing, that are temporarily removed to facilitate the Work shall be replaced and restored to their original condition at Contractor's expense.

3.02 PROTECTION OF INSTALLED EQUIPMENT AND MATERIALS

A. Contractor shall protect installed equipment and materials to prevent damage, injury or loss from subsequent operations. Remove protection facilities when no longer needed prior to completion of the Work.

B. Control traffic to prevent damage to equipment, materials, and surfaces.

C. Coverings: Provide coverings to protect materials and equipment from damage.

3.03 PROTECTION DURING INCLEMENT WEATHER

A. Contractor shall not perform Work during inclement or unsuitable weather that will affect the quality of the completed Work.

B. Contractor shall take necessary precautions in the event of impending inclement weather to protect equipment, materials and Work from damage or deterioration due to floods, driving rain, wind, or snow storms.

1. Owner reserves the right to require additional protection measures beyond Contractor's proposed protection measures to protect the Work.

2. Contractor shall not claim additional compensation for additional protection measures required by Owner nor for damages to equipment, material, or Work due to the inclement weather.

C. When directed by Engineer, Contractor shall stop Work and protect new Work by protective covering during rain storms for, but not limited to, the following:

1. Concrete mixing and placement.

2. Paving placement.

3. Masonry installation.

4. Buried piping, valve and appurtenance installation.

5. Additional inclement weather requirements and limitations are specified in individual Specification Sections.

3.04 REPORTING OF ACCIDENTS

A. Contractor shall immediately report, in writing, to Engineer and Owner accidents out of, or in conjunction with, the performance of Work.

1. Accident reporting includes on Site and adjacent to Site, which cause death, personal injury, or property damage.

2. Written report shall provide full details and witness statements.

3. If claim is made against Contractor, Supplier, or Subcontractor due to accident, Contractor shall promptly report facts, in writing, to Engineer and Owner, with full account of the claim.

B. Contractor shall immediately report death, serious injury, or serious damage caused by telephone or messenger to Engineer and Owner.

END OF SECTION

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SECTION 01 73 00
DEMOLITION AND EXECUTION OF WORK

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:

1. Contractor shall provide labor, materials, tools, equipment, and incidentals shown, specified, and required for execution of the Work as specified in this Section, including the following:

    a. Construction Electronic Documentation

    b. Demolition

    c. Cutting and Coring

    d. Patching

    e. Installation

2. Requirements for demolition, removal and disposal of existing buildings, structures, pavement, curbs, and sidewalks and electrical, plumbing, heating and ventilation equipment and materials as indicated in the Contract Documents for demolition.

3. General requirements for installation of equipment and material. Additional installation requirements are included in the individual Specification Sections.

4. General requirements for connections to existing facilities. Requirements for tie-ins and shutdowns necessary to complete the Work are included in Section 01 14 00 – Coordination with Owner's Operations.

    a. To extent possible, materials, equipment, systems, piping, and appurtenances that will be placed into service upon completion of connection to existing facilities shall be checked, successfully tested, and in condition for operation prior to making connections to existing facilities, if valves, gates, or similar watertight and gastight isolation devices are not provided at the connection point.

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5. Requirements for cutting and coring, and rough and finish patching of holes and openings in existing construction. Provide cutting, coring, fitting, and patching, including attendant excavation and fill, required to complete the Work, and to:

a. Remove and replace defective Work.

b. Remove samples of installed Work as specified or required for testing.

c. Remove construction required to perform required alterations or additions to existing work.

d. Connect to completed Work not performed in proper sequence.

e. Remove or relocate existing utilities and pipes that obstruct the Work in locations where connections must be made.

f. Make connections or alterations to existing or new facilities.

B. Related Sections:

1. Section 01 14 00 – Coordination with Owner's Operations

2. Section 01 51 00 – Temporary Utilities

3. Section 01 61 00 – Product Requirements and Options

4. Section 01 66 00 – Product Storage and Protection Requirements

5. Section 01 74 00 – Cleaning and Waste Management

6. Section 01 79 00 – Instruction of Owner's Personnel

7. Section 02 41 00 – Site Demolition

1.02 REFERENCES

A. Definitions:

1. "Manufacturer's installation instructions" includes manufacturer's written instructions; drawings; illustrative, wiring, and schematic diagrams; diagrams identifying external connections; and other such information pertaining to installation of equipment and materials. Installation instructions are printed instructions, including those attached to the equipment and materials, all inclusive.

2. "Salvage" items are equipment and materials shown on the Contract Documents for selective removal by the Contractor to furnish to the Owner. Contractor shall be responsible for removal, handling, and depositing of equipment and material to location designated by Owner.

B. Reference Standards:

1. 29 CFR 1910, OSHA.

2. ANSI A10, Construction and Demolition Operations

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review installation procedures under other Sections and coordinate Work that must be performed with or before the Work specified in this Section.

2. Notify other contractors in advance of Work for connections to existing facilities to prevent delay of the Work.

3. Remove and dispose of equipment and materials indicated for demolition on the Contract Documents, unless indicated as salvage items for the Owner. Contractor shall obtain ownership of removed equipment and materials following Engineer and Owner approval. Disposal of equipment and materials shall be in accordance with the Contract Documents

B. Sequencing:

1. Contractor shall remove and demolish equipment and materials in sequence specified in Section 01 14 00 – Coordination with Owner's Operation and following approval by Engineer and Owner.

2. Contractor shall replace equipment and materials removed without proper authorization from Engineer, which are necessary for the operation of the existing facilities. Re-installation of equipment and materials shall be to the satisfaction of the Engineer at no cost to the Owner

C. Title to Equipment and Materials:

1. Equipment and materials indicated for demolition and removal in the Contract Documents, and not designated as Owner's salvaged items, shall become the Contractor's property following removal from the Site. Contractor shall be responsible for legally disposing of the equipment and material.

2. Contractor shall have no right or title to any of the equipment, materials, or other items to be removed until the elements have been removed from the Site.

3. Contractor shall not sell or assign or attempt to sell or assign any interest in the equipment, materials, or other items until removal from Site.

4. Contractor shall have no claim against the Owner because of the absence of equipment, fixtures, and materials.

D. Salvage Equipment and Materials:

1. Contract Documents indicate equipment and materials that shall be retained by Owner. Owner has the right to request any demolished equipment and materials be retained at their discretion.

2. Contractor shall move salvaged equipment and materials to storage areas located at the Site as instructed by Owner.

3. Architectural equipment and materials may be salvaged for incorporation into the Work when approved by Engineer.

E. Use of Explosives: Contractor shall not use explosives or blasting equipment and material in the Work in accordance with the Contract Documents.

1.04 SUBMITTALS

A. Action/Informational Submittals:

1. Construction electronic documentation as specified in this Section.

2. Demolition Plan: Submit detailed description of methods, equipment, and sequence for demolition Work, including means of ensuring stability of structures during demolition activities.

3. Cutting and Patching Request:

a. Submit written request to Engineer, well in advance of executing cutting or alteration that affects one or more of the following:

1) Design function or intent of Project.

2) Work of Owner or other contractors.

3) Structural value or integrity of an element of the Project.

4) Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.

5) Efficiency, operational life, maintenance, or safety of operational elements.

6) Visual qualities of sight-exposed elements.

b. Request shall include:

1) Identification of Project and contract name and number.

2) Description of affected Work of Contractor and work of others (if any).

3) Necessity for cutting.

4) Effect on work of Owner, other contractors (if any), and on structural or weatherproof integrity of Project.

5) Description of proposed Work, including scope of cutting and patching; trades who will be executing the Work; products proposed to be used; extent of refinishing; schedule of operations; alternatives to cutting and patching, if any.

6) Designation of entity responsible for cost of cutting and patching, when applicable.

7) Written permission of other contractors (if any) whose work will be impacted.

4. Recommendation Regarding Cutting and Patching:

   a. Should conditions of work, or schedule, indicate a change of materials or methods, submit written recommendation to Engineer including:

      1) Conditions indicating change.

      2) Recommendations for alternative materials or methods.

      3) Items required with substitution request, in accordance with the substitution request requirements of the Contract Documents and Section 01 61 00 – Product Requirements and Options.

5. Product Data: Submit manufacturer's product data for the protective compound to be applied to core-drilled surfaces and cut concrete surfaces, as well as means of protecting exposed reinforcement or other metal embedments.

6. Informational Submittal: Submit written indication designating the day and time that the construction associated with cutting and patching will be uncovered, to allow observation. Do not begin cutting or patching operations until submittal is accepted by Engineer.

7. Comply with submittal requirements of individual Specification Sections for patching materials.

1.05 SITE CONDITIONS

A. Owner does not assume responsibility for the actual condition of structures and equipment to be demolished and removed.

B. Existing Site conditions shall be maintained to the greatest extent possible by the Owner to the time of Notice to Proceed.

C. Contractor shall perform investigations, explorations, and probes as necessary at the Site prior to initiating demolition Work to ascertain any required protective measures before proceeding with demolition and removal. Contractor shall give particular attention to shoring and bracing requirements to prevent damage to the Work and existing structures.

D. Contractor shall verify measurements, dimensions and other conditions of each existing structure, system, equipment, and material indicated in the Contract Documents for new Work prior to ordering equipment and materials.

PART 2 – PRODUCTS

2.01 MATERIALS

A. General:

1. Provide materials and products in accordance with the individual Specification Sections and the Contract Documents.

2. Provide materials and products that visually match existing adjacent surfaces to fullest extent possible for exposed surfaces.

3. If not indicated in the Contract Documents, provide materials and products that are identical to existing materials and products affected by the Work.

4. If identical materials and products are unavailable, provide materials and products that shall equal or exceed performance requirements of existing materials and products.

B. Protective Coating Applied to Core-Drilled Surfaces and Cut Concrete Surfaces:

1. All concrete surfaces exposed due to cutting or core drilling shall be coated with an epoxy resin coating such as Sikagard 62 by Sika Corporation, Durakote 240 by Tamms Industries or approved equal.

2. Reinforcement or other metal embedment exposed by concrete cutting or core drilling shall be burned back a minimum of ½ inch below surface and resulting void shall be filled with an epoxy resin binder.

PART 3 – EXECUTION

3.01 CONSTRUCTION ELECTRONIC DOCUMENTATION

A. Pre-Construction Documentation

1. Contractor shall take photographic and video documentation of the Site where Work is being performed. Engineer and Owner reserve the right to be present during documentation.

2. Contractor shall provide both photographic and video documentation at grade-level and aerial of the Site prior to commence Work.

3. Contractor shall submit pre-construction documentation to Engineer and Owner for review. Contractor, Engineer, and Owner shall visit Site to field verify electronic documentation prior to commencing the Work. Site visit verification shall establish existing conditions prior to commencing Work.

B. Construction Progress Documentation

1. Contractor shall document Work progress at locations and construction as directed by Engineer, at a minimum.

2. Contractor shall provide electronic documentation prior to and following any shutdown, switchover, demolition, de-commissioning, cutting, patching, repair, etc. Engineer and Owner reserve the right to be present during documentation.

3. Contractor shall document following exposure of buried utilities, piping, valve, appurtenances, and other underground elements.

4. Engineer reserves the right to provide construction progress documentation to confirm Contractor electronic documentation.

C. Post-Construction Documentation

1. Contractor shall take photographic and video documentation of the Site where Work has been completed and prior to Substantial Completion or partial utilization by Owner. Engineer and Owner reserve the right to be present during documentation.

2. Contractor shall provide both photographic and video documentation at grade-level and aerial of the Site following completion of the Work.

D. Submittal Requirements:

1. Documentation shall be time stamped for verification, including date and time.

2. Documentation shall be organized in a logical manner, such as by structure, building, physical site location, etc. for easy of comparison.

3. Photographic documentation shall be high resolution electronic versions.

4. Documentation shall be submitted to Engineer for review and approval prior to commence Work and at completion of the Work.

3.02 DEMOLITION

A. General:

1. Demolition Work shall comply with the applicable provisions and recommendation of ANSI A10, Construction and Demolition Operations standards, all governing codes, and as specified in this Section.

2. Contractor shall furnish competent and experienced personnel for the various type of demolition and removal Work. Demolition and removal Work shall be performed with regard to the safety of Owner employees, individuals at the Site, and the public.

3. Contractor shall confirm absence of embedded utilities prior to cutting, coring, or demolishing existing concrete and facilities. Verification shall be performed by portable x-ray, ground penetrating radar, or other non-invasive methods.

   a. Contractor shall notify Engineer and Owner if embedded utilities are located during the investigation. Contractor shall clearly mark and document location of embedded utilities prior to performing the Work.

   b. Contractor shall be responsible for repair and damages caused by exploration, investigation, and performance of the Work at no additional cost to Owner.

4. Contractor shall remove temporary work, such as enclosures, signs, guards, etc. when such temporary Work is no longer required or when directed at the completion of the Work.

5. Contractor shall perform patching, restoration and Work in accordance with individual Specification Sections and details shown on Contract drawings.

6. Contractor shall be responsible for damage caused by demolition Work to existing structures, equipment and materials indicated for reuse or to remain at no additional cost to Owner.

7. Contractor shall maintain a clean working environment during the demolition Work in accordance with Section 01 74 00 – Cleaning and Waste Management.

8. Contractor shall proceed with the demolition work in a sequence designed to maintain the plant in operation in accordance with Section 01 14 00 – Coordination with Owner's Operations.

9. Excavation caused by demolition shall be backfilled with fill free from rubbish and debris. Select fill or structural fill shall be used where specifically required on Contract Drawings.

10. All debris resulting from the demolition and removal work shall be disposed of by the Contractor at a properly permitted facility as part of the work of this Contract. All regulations covering material handling and disposal shall be followed. Material designated by the Engineer to be salvaged shall be stored on the construction site as directed. All other material shall be disposed of off-site by the Contractor at his expense. Burning of any debris resulting from the demolition will not be permitted at the site.

B. Protection during Demolition:

1. Contractor shall provide, erect, and maintain catch platforms, lights, barriers, weather protection, warning signs and other items as required for proper protection of the public, occupants of the building, personnel engaged in demolition Work, and adjacent construction.

2. Contractor shall provide and maintain weather protection at exterior openings to fully protect the interior premises against damage from the elements until such openings are closed by the Work.

3. Contractor shall provide and maintain temporary protection of the existing structure designated to remain where demolition, removal and Work is being done, connections made, materials handled, or equipment moved. Temporary protection shall be provided in accordance with Section 01 71 33 – Protection of Work and Property.

4. Contractor shall take necessary precautions to prevent dust from rising by wetting demolished masonry, concrete, plaster, and similar debris. Unaltered portions of the existing buildings affected by the operations in the Contract Documents shall be protected by dust proof partitions and other adequate means. Dust control shall be provided in accordance with Section 01 57 00 – Temporary Controls.

5. Contractor shall provide adequate fire protection in accordance with Section 01 51 00 – Temporary Utilities and authorities having jurisdiction.

6. Contractor shall perform the demolition Work with minimum traffic interference. Contractor shall not close or obstruct walkways, passageways, or stairways. Contractor shall not store or place materials in passageways, stairs, or other means of egress.

7. Contractor shall minimize disturbances to exterior walls and roofs to small sections that are readily repaired and patched to maintain watertight conditions in existing structures and buildings.

C. Performance of Demolition:

1. Equipment, piping, valves, and appurtenances:

a. Contractor shall drain equipment, piping, valves, and appurtenances prior to demolition Work. Contractor shall be responsible for collection, transport, and disposal of drained contents at no additional cost to the Owner.

b. Contractor shall provide line stops, plugs, blind flanges, etc. for equipment, piping, valves, and appurtenance required to remain in service during the Project. Contractor shall provide temporary or permanent supports in accordance with the Contract Documents.

c. Supports, pedestals and anchors shall be removed with the equipment and piping unless otherwise noted in the Contract Documents.

d. Concrete bases, anchor bolts and other supports shall be removed to approximately 1 inch below the surrounding finished area and the recesses shall be filled with epoxy resin binder.

e. Wall and roof openings shall be closed, and damaged surfaces shall be patched to match the adjacent areas, in accordance with the Contract Documents and as directed by the Engineer.

f. Wall sleeves, wall pipes, and wall castings shall be plugged or blanked off in accordance with the Contract Documents and as directed by the Engineer.

g. Openings in concrete shall be closed in accordance with the Contract Documents and as directed by the Engineer.

2. Reused and relocated equipment:

a. Contractor shall receive approval from Engineer prior to removal and relocation of equipment and material. Equipment and materials removed by Contractor prior to Engineer’s approval that is required for Owner’s operation of the facility shall be reinstalled at no cost to the Owner.

b. Prior to removal and relocation Work, equipment and materials indicated for reuse and relocation shall be operated by Owner with Contractor and Engineer present to witness existing functionality and operation.

c. Contractor shall provide personnel responsible for reinstallation of equipment and material for the removal Work.

d. Contractor shall be responsible and provide storage and protection of equipment and materials in accordance with Section 01 66 00 – Product Storage and Protection Requirements until relocation and reinstallation Work is performed.

e. Contractor shall provide replacement equipment and material that is damaged during the removal Work at new cost to the Owner. Contractor shall be responsible to provide same type, model, electrical components, etc. equipment and material as approved by Engineer and Owner.

3. Structural removal:

a. Contractor shall provide and install temporary shoring, struts, and bracing required for the demolition Work to ensure stability during entire demolition process.

b. Contractor shall cut and remove structural material at the interface of demolition Work and the existing structural element. Cutting and removal shall occur in small sections, including masonry units, to prevent instability of structural elements.

c. Contractor shall patch, repair, and refinish adjacent surfaces that remain following demolition Work.

1) Adjacent surfaces shall be repaired and refinished to the condition prior to the demolition Work and in accordance with the Contract Documents.

2) Adjacent surfaces shall be cleaned of dirt, grease, loose paint, etc., prior to refinishing.

d. Contractor shall limit cutting of existing roof areas designated to remain to the limits required for the proper installation of the Work.

1) Cut and remove insulation, joists, flashing, membranes, shingles, and metals, etc. in accordance with the Contract Documents and as directed by the Engineer for installation of the Work.

2) Provide temporary weather tight protection as required until new roofing and flashings are installed.

D. Maintenance during Demolition:

1. Contractor shall maintain the buildings, structures, and public properties free from accumulations of waste, debris and rubbish, generated by the demolition Work.

2. Contractor shall provide cleaning and waste management of demolition equipment and materials in accordance with Section 01 74 00 – Cleaning and Waste Management.

3.03 CUTTING AND CORING

A. General:

1. Contractor shall notify Engineer in writing and receiving Engineer's approval prior to cutting load bearing walls (concrete or masonry) and structural concrete floors.

2. Perform cutting and coring to limit extent of patching required.

3. Structural Elements: Do not cut or core structural elements in manner that would change structural element's load-carrying capacity or load deflection ratio.

4. Operating Elements: Do not cut or core operating elements in manner that would reduce capacity to perform as intended. Do not cut or core operating elements or related components in manner that would increase maintenance requirements or decrease operational life or safety.

5. Replace, patch, and repair materials and surfaces cut or damaged during cutting and coring Work. Contractor shall use methods that do not void required or existing warranties.

6. Provide temporary or permanent bypass provisions prior to cutting existing pipe, conduit, ductwork, or other utilities serving facilities scheduled to be removed or relocated in accordance with the Contract Documents.

7. Inspection: Examine and prepare surfaces prior to commencing Work. Contractor shall report unsatisfactory or questionable conditions to Engineer in writing. Contractor shall not proceed with the Work until unsatisfactory conditions are corrected.

8. Preparation:

   a. Provide temporary support required to maintain structural integrity, to protect adjacent Work from damage, and to support the element(s) to be cut or cored.

   b. Protection of Existing Construction During Cutting and Coring:

1) Protect existing structures, equipment, and materials during cutting and coring to prevent damage.

2) Provide protection from adverse weather conditions that will be exposed during cutting and coring Work.

3) Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

9. Restoration:

a. Clean equipment, materials, piping systems, valves, conduit and appurtenances that were damaged due to the Work prior to applying paint or other finishing materials.

b. Restore damaged pipe coverings, including insulation, to original condition.

B. Cutting:

1. General:

a. Cut existing structures and appurtenances that provide surfaces for installation or repair of the Work. Cut existing construction using methods to minimize damage and disturbance to retained and adjoining construction elements.

b. Cutting equipment used shall be hand or small power tools suitable for sawing or grinding. Avoid using hammering or chopping equipment for cutting Work.

c. Cut holes and slots as small as possible and to size required for incorporation of the Work and in accordance with the Contract Documents.

d. Cut or drill from exposed or finished side to concealed side to avoid marring finished surfaces.

e. Provide adequate bracing of area to be cut prior to cutting.

f. Provide equipment and material to remove cut spoils.

g. Provide temporary protection for cut openings where and when Work is not being performed.

2. Concrete and Masonry:

a. Cut through concrete and masonry using concrete wall saw with diamond saw blades.

b. Provide control for slurry generated during sawing on both sides of element being cut.

c. After cutting concrete and before installing new Work on or through the opening, coat exposed concrete and steel with protective coating material specified in this Section. Apply protective coating in accordance with manufacturer's instructions.

C. Coring:

1. Core-drill holes through concrete and masonry walls, slabs, or arches, in accordance with the Contract Documents, unless written authorization is furnished by Engineer.

2. Protection: Protect existing structures, equipment, materials, utilities, and adjacent areas from water and other damage by core-drilling Work.

3. Coring:

a. Perform coring with non-impact rotary tool using diamond core-drills.

b. Size holes for pipe, conduit, sleeves, equipment, or mechanical seals, as required, to be installed through the penetration and in accordance with the Contract Documents.

c. After core-drilling and before installing equipment and material through the penetration, coat exposed concrete and steel with protective coating material specified in this Section. Apply protective coating in accordance with manufacturer's instructions.

4. Cleaning: Vacuum or otherwise remove slurry and tailings from the work area following core-drilling.

3.04 PATCHING

A. General:

1. Construction shall be patched by filling, repairing, refinishing, closing-up, and similar methods at completion of the Work.

2. Provide equipment and materials in accordance with the Contract Documents for patching Work. Comply with manufacturer's installation instructions.

3. Provide airtight connections to pipes, sleeves, ducts, conduit, and other penetrations through surfaces when patching the Work. Provide durable patching seams that minimize visual appearance.

4. Patched areas shall be tested to demonstrate integrity of installation as directed by the Engineer. Contractor shall provide testing equipment, material, and services for patch testing.

B. Restoration:

1. Restore exposed finishes of patched areas to minimize evidence of patching and refinishing.

2. Contractor shall extend refinishing and restoration into adjoining areas to blend patched areas with existing adjacent areas.

a. Refinish to nearest intersection for continuous surfaces.

b. Refinish the entire assembly and system for equipment and materials.

c. Repair and rehang existing ceilings to provide an even-plane surface of uniform appearance.

d. Apply plaster and finishes to match adjacent interior walls and partition areas for openings sealed with brick and/or masonry block.

3.05 INSTALLATION

A. Install equipment and materials in accordance with the Contract Documents, approved Shop Drawings, and manufacturer's installation instructions. When manufacturer's installation instructions conflict with the Contract Documents, obtain interpretation or clarification from Engineer before proceeding.

B. Preparation of surfaces shall be performed prior to installation of equipment and material.

1. New floor finishes: Repair and patch with concrete, asphalt latex type emulsion and underlayment as required for existing surfaces or new flooring surfaces.

2. Ceramic tile flooring or bases installed over concrete floors: Grind away cove, if present, for installation of new Work.

C. Concrete surfaces shall achieve compression strength in accordance with the Contract Documents prior to installation of equipment and materials.

1. Anchor bolts and templates shall be provided by Contractor and as specified in the individual Specification Sections.

2. Concrete foundations shall be treated with sealer to prevent oil from seeping into concrete as specified in the individual Specification Sections.

D. Maintain the work area in a broom-clean condition while installing materials and equipment.

E. Contractor shall be responsible for equipment for hoisting, lifting, moving, rigging, etc. for installation of equipment and materials.

1. Contractor shall be responsible for design of temporary installation system used for the installation Work, unless otherwise indicated in the Contract Documents.

2. Contractor shall be responsible for damage to existing structure, equipment, and material caused prior, during, and following installation of the Work with the Contractor furnished temporary installation system at no cost to Owner. Repairs shall be in accordance with the Contract Documents, shall return to condition prior to installation Work, and as directed by the Engineer.

3. Owner's hoists, monorails, bridge cranes, rigging, etc. shall not be used by the Contractor unless written authorization is provided by Owner.

F. Alteration or repair of new equipment and materials shall not be permitted without written authorization from Engineer.

G. Field welding or burning of new equipment and materials shall not be permitted unless indicated in the Contract Documents or without written authorization from Engineer.

H. Contractors shall install temporary shoring and bracing where necessary during installation of the Work where required:

1. System shall be provided in accordance with the Contract Documents and code requirements.

2. Temporary system shall consist of adjustable sound timbers or rolled shapes easily removable following installation of the Work.

3. Contractor shall be responsible for damage to existing structures and new Work during installation, utilization, and removal of the temporary system at new additional cost to the Owner.

I. Manufacturer's Installation Services: Provide competent, qualified manufacturer's representatives of equipment and material for services specified in the individual Specification Sections, including, but not limited to:

1. Supervising installation

2. Checking the completed installation

3. Adjusting and testing of equipment and materials

4. Instructing Owner’s operations and maintenance in accordance with Section 01 79 00 – Instruction of Owner’s Personnel.

END OF SECTION

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SECTION 01 74 00
CLEANING AND WASTE MANAGEMENT

PART 1 – GENERAL

1.1 SUMMARY

A. Administrative and procedural requirements for progress and closeout cleaning at the Site.

1. Contractor shall execute cleaning during the Project, at completion of the Work, and as required by the General Conditions and this Section. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work in accordance with Section 4.5 Control of the Project Site.

2. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.

B. Administrative and procedural requirements for disposing of non-hazardous excavation and construction waste.

1. Contractor shall comply with the requirements and procedures for construction waste management and disposal, including developing and implementing a plan for construction waste management and disposal.

2. Extent of required construction waste management and disposal includes within the Project limits, as shown or indicated.

1.2 REFERENCES

A. Definitions:

1. “Waste Management Coordinator” is the person responsible for implementing, monitoring, and reporting the status of the Waste Management Plan. Although available for other assignments, the Waste Management Coordinator shall be present at the Site as required by the Contract Documents for the duration of the Work.

2. “Construction waste” is building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

3. “Demolition waste” is building and site improvement materials resulting from demolition or selective demolition operations.

4. “Disposal” is removal to an off-Site location of demolition and construction waste and subsequent sale, recycling, reuse, or disposal in a landfill or incinerator conforming to Laws and Regulations and acceptable to authorities having jurisdiction.

B. Reference Standards: NFPA 241, Safeguarding Construction, Alteration, and Demolition Operations

1.3 ADMINSTRATIVE REQUIREMENTS

A. Action/Informational Submittals:

1. Preliminary Waste Management Plan: Prepare in accordance with this Section and submit within 14 days of the Notice to Proceed and prior to removing waste from the Site.

2. Final Waste Management Plan: Submit within 14 days of receiving Engineer’s comments on the preliminary waste management plan.

B. Closeout Submittals:

1. Landfill and Incinerator Disposal Records: Provide copy of receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Submit manifests, weight tickets, receipts, and invoices.

1.4 DELIVERY, STORAGE AND HANDLING

A. Replace loaded containers with empty containers as demand requires.

B. Deposit recyclable materials in containers free from debris.

C. Transport and deposit waste in containers to minimize dust. Close container covers immediately after materials are deposited.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PROGRESS CLEANING

A. General: Clean the Site, work areas, and other areas occupied by Contractor at least weekly. Dispose of materials in accordance with the General Conditions and the following:

1. Comply with NFPA 241 for removing combustible waste materials and debris.

2. Do not hold non-combustible materials at the Site more than three days if the temperature is expected to rise above 80 degrees F. When temperature is less than 80 degrees F, dispose of non-combustible materials within seven days of their generation.

3. Provide suitable containers for storage of waste materials and debris.

4. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.

B. Work Areas:

1. Clean areas where the Work is in progress to level of cleanliness necessary for proper execution of the Work.

2. Remove liquid spills promptly and immediately report spills to Owner, Engineer, and authorities having jurisdiction.

3. Where dust would impair proper execution of the Work, broom-clean or vacuum entire work area, as appropriate.

4. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

C. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of material or equipment installed, using only cleaning agents and methods specifically recommended by material or equipment manufacturer. If manufacturer does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and property and that will not damage exposed surfaces.

D. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.

E. Cutting and Patching:

1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

2. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

F. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply

protective covering where required for protection from damage or deterioration, until Substantial Completion.

G. Clean completed construction as frequently as necessary throughout the construction period.

3.2 EXCAVATION WORK NEAR PUBLIC OR PRIVATE PROPERTY

A. Contractor shall provide cleaning and either temporary or permanent restoration where Work is located in or near streets, right of ways, easements, or private property. Restoration shall comply with General Conditions 4.5 and 6.5.

B. Contractor shall backfill, compact, grade, and restore excavation or disturbed area to functional condition to permit pedestrian or vehicular traffic and original use of the area as the Work progresses.

C. Temporary storage of excavation spoils, including earth, stones, boulders, and debris, shall be removed from the Site or area of disturbance.

3.3 CLOSEOUT CLEANING

A. Complete the following prior to requesting inspection for Substantial Completion:

1. Clean and remove from the Site rubbish, waste material, debris, and other foreign substances.

2. Sweep paved areas broom-clean. Remove petrochemical spills, stains, and other foreign deposits.

3. Hose-clean sidewalks and loading areas.

4. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

5. Repair pavement, roads, sod, and other areas affected by construction operations and restore to specified condition; if condition is not specified, restore to pre-construction condition.

6. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign substances.

7. Leave the Site clean, and in neat, orderly condition, satisfactory to Owner, Engineer and in accordance with the Contract Documents.

3.4 WASTE MANAGEMENT IMPLEMENTATION

A. General: Implement the waste management plan in accordance with General Conditions Sections 4.5 and 6.5. Provide handling, containers, storage, signage, transportation, and other items required to implement the waste management pan during the Project.

B. Training: Train all installers, Subcontractors, and Suppliers as required on proper waste management procedures required for the Work.

1. Distribute the waste management plan as required within three days of Engineer's approval.

2. Distribute the waste management plan to Contractor's personnel, Subcontractors, and Suppliers prior to these entities starting the Work. Review with installers, Subcontractors, and Suppliers the waste management plan's procedures and locations established for salvage, recycling, and disposal. Include documentation of training completion in compliance submittals.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent facilities. Designate and label specific areas of the Site necessary for separating materials to be disposed.

3.5 WASTE DISPOSAL

A. General: Except for items or materials to be recycled, or otherwise reused, remove waste materials from the Site and properly dispose of waste in facility such as permitted landfill or incinerator or other method acceptable to authorities having jurisdiction.

1. Except as otherwise specified, remove from the Site all waste and debris from the Work as it accumulates. Upon completion of the Work, remove materials, equipment, waste, and debris and leave the Site clean, neat, and orderly. Comply with the Contract Documents regarding cleaning and removal of trash, debris, and waste.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Properly dispose of waste materials, surplus materials, debris, and rubbish off the Site.

4. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into storm sewers or sanitary sewers.

5. Do not discharge wastes into surface waters or drainage routes.

B. Burying: Do not bury rubbish and waste materials at the Site.

C. Burning: Do not burn waste materials at the Site.

D. Disposal: Transport waste materials to proper location to an approved offsite location for disposal in accordance with Laws and Regulations. Contractor shall be solely responsible for complying with Laws and Regulations regarding storing, transporting, and disposing of waste.

END OF SECTION

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SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for recording changes to record documents.

2. Requirements for electronic files furnished by Engineer.

B. Contractor shall maintain and submit to Engineer with record documents in accordance with the Specifications and City General Conditions Section 4.8 Project Record Documents.

1.02 ADMINSTRATIVE REQUIREMENTS

A. Maintenance of Record Documents:

1. The following record documents shall be maintained in the Contractor's field office:

a. Drawings, Specifications, and Addenda.

b. Shop Drawings, Samples, and other Contractor submittals, including records of test results, approved or accepted as applicable, by Engineer.

c. Change Orders, Work Change Directives, Field Orders, photographic documentation, survey data, and all other documents pertinent to the Work.

2. Update record documents on a monthly basis, minimum.

3. Provide files and racks for proper storage and easy access to record documents.

4. Make record documents available for inspection upon request of Engineer or Owner.

5. Do not use record documents for purpose other than serving as Project record. Do not remove record documents from Contractor's field office without Engineer's approval.

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B. Submittal of Record Documents:

1. Submit to Engineer the following record documents: Drawings.

2. Prior to readiness for final payment, submit to Engineer one copy of final record documents. Submit complete record documents; do not make partial submittals.

3. Submit record documents with transmittal letter on contractor letterhead complying with letter of transmittal requirements in Section 01 33 00 – Submittal Procedures.

4. Record documents submittal shall include certification, with original signature of official authorized to execute legal agreements on behalf of Contractor.

C. Electronic Files Furnished by Engineer:

1. CADD files will be furnished by Engineer upon the following conditions:

a. Contractor shall submit to Engineer a letter on Contractor letterhead requesting CADD files and providing specific definition(s) or description(s) of how files will be used, and specific description of benefits to Owner (including credit proposal, if applicable) if the request is granted.

b. Contractor shall execute Engineer's standard agreement for release of electronic files and shall abide by all provisions of the agreement for release of electronic files.

c. Layering system incorporated in CADD files shall be maintained as transmitted by Engineer. CADD files transmitted by Engineer containing cross-referenced files shall not be bound by Contractor. Drawing cross-references and paths shall be maintained. If Contractor alters layers or cross-reference files, Contractor shall restore all layers and cross-references prior to submitting record documents to Engineer.

d. Contractor shall submit record drawings to Engineer in same CADD format that files were furnished to Contractor.

1.03 SUBMITTALS

A. Closeout Submittals: Provide record documentation as specified in this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS:

A. At the start of the Project, label each record document to be submitted as, "PROJECT RECORD" using legible, printed letters. Letters on record copy of the Drawings shall be two inches high.

B. Keep record documents current. Make entries on record documents within two working days of receipt of information required to record the change.

C. Do not permanently conceal the Work until required information has been recorded.

D. Accuracy of record documents shall be such that future searches for items shown on the record documents may rely reasonably on information obtained from Engineer-accepted record documents.

E. Marking of Entries:

1. Use erasable, colored pencils (not ink or indelible pencil) for marking changes, revisions, additions, and deletions to record documents.

2. Clearly describe the change by graphic line and make notations as required. Use straight-edge to mark straight lines. Writing shall be legible and sufficiently dark to allow scanning of record documents into legible electronic files.

3. Date all entries on record documents.

4. Call attention to changes by drawing a “cloud” around the change(s) indicated.

5. Mark initial revisions in red. In the event of overlapping changes, use different colors for subsequent changes.

3.02 RECORDING CHANGES TO DRAWINGS:

A. Record changes on copy of the Drawings. Submittal of Contractor-originated or -produced drawings as a substitute for recording changes on the Drawings is unacceptable.

B. Record changes on plans, sections, schematics, and details as required for clarity, making reference dimensions and elevations (to Project datum) for complete record documentation.

C. Record actual construction including:

1. Depths of various elements of foundation relative to Project datum.

2. Field changes of dimensions, arrangements, and details.

3. Changes made in accordance with Change Orders, Work Change Directives, and Field Orders.

4. Changes in details on the Drawings. Submit additional details prepared by Contractor when required to document changes.

3.03 RECORDING CHANGES FOR SCHEMATIC LAYOUTS:

A. In some cases, on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray physical layout. For such cases, the final physical arrangement shall be determined by Contractor subject to acceptance by Engineer.

B. Record on record documents all revisions to schematics on Drawings, including: piping schematics, ducting schematics, process and instrumentation diagrams, control and circuitry diagrams, electrical one-line diagrams, motor control center layouts, and other schematics when included in the Contract. Record actual locations of equipment, lighting fixtures, in-place grounding system, and other pertinent data.

C. When dimensioned plans and dimensioned sections on the Drawings show the Work schematically, indicate on the record documents, by dimensions accurate to within one inch in the field, centerline location of items of Work such as conduit, piping, ducts, and similar items

1. Clearly identify the Work item by accurate notations such as “cast iron drain”, “rigid electrical conduit”, “copper waterline”, and similar descriptions.

2. Show by symbol or note the vertical location of Work item; for example, “embedded in slab”, “under slab”, “in ceiling plenum”, “exposed”, and similar designations. For piping not embedded, also provide elevation dimension relative to Project datum.

3. Descriptions shall be sufficiently detailed to be related to Specifications.

D. Engineer may furnish written waiver of requirements relative to schematic layouts shown on plans and sections when, in Engineer’s judgment, dimensioned layouts of Work shown schematically will serve no useful purpose. Do not rely on waiver(s) being issued.

3.04 REQUIREMENTS FOR SUPPLEMENTAL DRAWINGS:

A. In some cases, drawings produced during construction by Engineer or Contractor supplement the Drawings and shall be included with record documents submitted by Contractor. Supplemental record drawings shall include drawings provided with Change Orders, Work Change Directives, and Field Orders and that cannot be incorporated into the Drawings due to space limitations.

B. Supplemental drawings provided with record drawings shall be integrated with the Drawings and include necessary cross-references between drawings. Supplemental record drawings shall be on sheets the same size as the Drawings.

C. When supplemental drawings developed by Contractor using computer-aided drafting/design (CADD) software are to be included in record drawings, submit electronic files for such drawings in AutoCAD (latest version) as part of record drawing submittal.

3.05 RECORDING CHANGES TO SPECIFICATIONS AND ADDENDA:

A. Mark each Section to record:

1. Manufacturer, trade name, catalog number, and Supplier of each product and item of equipment actually provided.

2. Changes made by Addendum, Change Orders, Work Change Directives, and Field Orders.

3.06 RECORDING CHANGES TO DRAWING MODELS

A. Record changes on Engineer supplied electronic models to generate record drawings.

B. Record changes on plans, sections, schematics, and details as required for clarity, making reference dimensions and elevations (to Project datum) for complete record documentation.

C. Record actual construction including:

1. Field changes of dimensions, arrangements, and details.

2. Changes made in accordance with Change Orders, Work Change Directives, and Field Orders.

3. Changes in details on the Drawings. Submit additional details prepared by Contractor when required to document changes.

D. When required, electronic models shall be updated with as-built asset information in accordance with the Contract Documents. Asset information shall be entered and coordinated with electronic model files. Asset information includes equipment, instrumentation, and appurtenance tagging, pipe and valve identification information, and Owner identified equipment and material.

END OF SECTION

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SECTION 01 78 43
SPARE PARTS AND EXTRA MATERIAL

PART 1 – GENERAL

1.01 SUMMARY

A. Contractor shall furnish spare parts data and extra materials for materials and equipment in accordance with the Contract Documents General Conditions Sections 4.7, 8.1, 8.3, 8.4, 8.7, 15.3.

B. Spare Parts and Extra Materials:

1. Provide spare parts, extra stock materials, maintenance supplies, and special tools required for maintenance (“spare parts and extra materials”) for one year of operation (unless otherwise specified in the individual Specification Section).

    a. Provide Supplier recommended lubricating oil and grease in accordance with this Section and the Contract Documents General Conditions.

2. Provide list of Supplier recommended spare parts and extra material.

    a. Include list of four standard lubricants, minimum, that shall be interchangeable for each type of lubricant required in the Contract Documents.

    b. Include unit prices in current United States funds

    c. Source(s) of supply for each.

C. Packaging and Labeling:

1. Furnish spare parts and extra materials in manufacturer’s unopened cartons, boxes, crates, or other original, protective covering suitable for preventing corrosion and deterioration for maximum length of storage normally anticipated by manufacturer.

2. Packaging of spare parts and extra materials shall be clearly marked and identified with name of manufacturer, applicable equipment, part number, part description, and part location in the equipment.

3. Protect and package spare parts and extra materials for maximum shelf life normally anticipated by manufacturer.

D. Finishes: Spare parts and extra material shall have painting, protective coating, and finishes identical to original installed equipment and material. Where painting, protective coating, or finishes are not specified, suitable provisions shall be furnished to protect from corrosion.

E. Special Tools: Contractor shall provide special tools necessary to operate, disassemble, service, repair, and adjust equipment and material in accordance with the manufacturer's operation and maintenance manual. Special tool requirements shall be the same as spare parts and extra material specified in this Section.

F. Storage Prior to Delivery to Owner: Prior to furnishing spare parts and extra materials to Owner, store spare parts and extra materials in accordance with the Contract Documents and manufacturers' recommendations.

G. Delivery Time and Eligibility for Payment:

1. Deliver to Owner spare parts and extra materials prior to date of Substantial Completion for equipment or system associated with the spare parts and extra materials. Do not deliver spare parts and extra materials before commencing start-up for associated equipment or system.

2. Spare parts and extra materials are not eligible for payment until delivered to Owner and Contractor's receipt of Owner's countersignature on letter of transmittal.

H. Procedure for Delivery to Owner:

1. Deliver spare parts and extra materials to Owner's permanent storage rooms at the Site or area(s) at the Site designated by Owner.

2. When spare parts and extra materials are delivered, Engineer and Owner will mutually inventory the spare parts and extra materials delivered to verify compliance with the Contract Documents regarding quantity and part numbers.

3. Additional procedures for delivering spare parts and extra materials to Owner, if required, will be developed by Engineer and complied with by Contractor.

I. Transfer Documentation:

1. Furnish on Contractor letterhead a letter of transmittal for spare parts and extra materials furnished under each Specification Section. Letter of transmittal shall accompany spare parts and extra materials. Do not furnish letter of transmittal separate from associated spare parts and extra materials.

2. Furnish three original, identical, signed letters of transmittal for each Specification Section. Upon delivery of specified quantities and types of spare parts and extra

materials to Owner, designated person from Owner will countersign each original letter of transmittal indicating Owner's receipt of spare parts and extra materials.

a. Owner will retain one fully signed original.

b. Contractor shall submit one fully signed original to Engineer.

c. Contractor shall retain one fully signed original for Contractor's file.

3. Letter of transmittal shall include the following:

a. Information required for letters of transmittal in Section 01 33 00 – Submittal Procedures.

b. Transmittal shall list spare parts and extra materials furnished under each Specification Section. List each individual part or product and quantity furnished.

c. Provide space for countersignature by Owner as follows: space for signature, space for printed name, and date.

J. Contractor shall be fully responsible for loss or damage to spare parts and extra materials until spare parts and extra materials are received by Owner.

1.02 SUBMITTALS

A. Action/Informational Submittals: Individual Specification Sections that require spare parts, extra material, or tools, Contractor shall submit inventory checklist for each individual Specification Section that includes the following information:

1. Specification Section number and title.

2. Name of spare parts, extra material, or tools.

3. Manufacturer, part number and description.

4. Quantity specified and furnished.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

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SECTION 02 41 00
SITE DEMOLITION

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, materials, and equipment in accordance with the requirements of applicable sections of Divisions 1 and 2.

B. In addition, the Contractor shall demolish and remove all concrete and asphalt paving, curbs, sidewalk, and miscellaneous yard piping, utilities, and structures as required and shown on the Contract Drawings during the construction work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 01 14 00 – Coordination with Owner's Operations

B. Section 01 42 00 – References

C. Section 01 73 00 – Demolition and Execution of Work

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. References shall be in accordance with reference standards, codes, and specifications as set forth herein and in Section 31 10 00 – Clearing, Grubbing, and Site Preparation.

1.04 SUBMITTALS

A. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures, the Contractor shall submit the following:

1. Copies of all photographs and other records from existing conditions surveys.

2. Provide pre-demolition documentation of existing conditions in accordance with General Conditions Sections 4.2.6 and 4.4.9; limit demolition-specific records to areas directly impacted by this Work.

PART 2 – EXECUTION

2.01 DEMOLITION

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A. Existing concrete and asphalt paving, curbs, sidewalk and miscellaneous yard piping, utilities, and structures within the areas designated for new construction work shall be

completely demolished and all debris removed from the site. Contractor shall inform the Owner and the Engineer of any unknown yard piping, utilities, and structures within the area that are not shown on the Contract Drawings.

B. Excavation caused by demolition shall be backfilled with fill free from rubbish and debris. Select fill or structural fill shall be used where specifically required on Contract Drawings.

C. Work shall be performed in such manner as not to endanger the safety of the workmen or the public or cause damage to nearby structures.

D. Provide all barriers and precautionary measures in accordance with Owner's requirements and other authorities having jurisdiction.

E. Where parts of existing pavements or structures are to remain in service, demolish the portions to be removed, repair damage, and leave the pavement or structure in proper condition for the intended use. Remove asphalt or concrete pavement, concrete, and masonry to the lines designated by saw-cutting, drilling, chipping, or other suitable methods. Leave the resulting surfaces reasonably true and even, with sharp straight corners that will result in neat joints with new construction and be satisfactory for the purpose intended. Where existing reinforcement extends into new construction, remove the concrete so that the reinforcing is clean and undamaged. Cut off other reinforcing 1/2-inch below the surface and fill with epoxy resin binder flush with the surface.

F. Prior to the execution of the work, the Contractor, Owner and Engineer shall jointly survey the condition of the adjoining and/or nearby pavements and structures. Survey and documentation shall be performed in accordance with General Conditions Section 4.2.6 and 4.4.9; demolition-specific observations shall be noted in the survey record.

2.02 DISPOSAL OF MATERIAL

A. All debris resulting from the demolition and removal work shall be disposed of by the Contractor at a properly permitted facility as part of the work of this Contract. All regulations covering material handling and disposal shall be followed. Material designated by the Engineer to be salvaged shall be stored on the construction site as directed. All other material shall be disposed of off-site by the Contractor at the Contractor’s expense.

B. Burning of any debris resulting from the demolition will not be permitted at the site.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 03 11 00
CONCRETE FORMWORK

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. Provide materials, labor, and equipment required for the design and construction of all concrete formwork, bracing, shoring and supports in accordance with the provisions of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 21 00 - Reinforcing Steel

B. Section 03 30 00 – Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. International Building Code

2. ACI 318 – Building Code Requirements for Structural Concrete

3. ACI 301 – Specifications for Structural Concrete

4. ACI 347 – Recommended Practice for Concrete Formwork

5. U.S. Product Standard for Concrete Forms, Class I, PS 1

6. ACI 117 – Specification for Tolerances for Concrete Construction and Materials and Commentary

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.

1. Manufacturer's data on proposed form release agent

2. Manufacturer's data on proposed formwork system including form ties

1.05 QUALITY ASSURANCE

A. Concrete formwork shall be in accordance with ACI 301, ACI 318, and ACI 347.

PART 2 – PRODUCTS

2.01 FORMS AND FALSEWORK

A. All forms shall be smooth surface forms unless otherwise specified.

B. Wood materials for concrete forms and falsework shall conform to the following requirements:

1. Lumber for bracing, shoring, or supporting forms shall be Douglas Fir or Southern Pine, construction grade or better, in conformance with U.S. Product Standard PS20. All lumber used for forms, shoring or bracing shall be new material.

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine high density overlaid (HDO) plywood manufactured especially for concrete formwork and shall conform to the requirements of PS1 for Concrete Forms, Class I, and shall be edge sealed. Thickness shall be as required to support concrete at the rate it is placed, but not less than 5/8-inch thick.

C. Other form materials such as metal, fiberglass, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line and grade indicated may be submitted to the Engineer for approval, but only materials that will produce a smooth form finish equal or better than the wood materials specified will be considered.

2.02 FORMWORK ACCESSORIES

A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 7/8-inch, and all such fasteners shall be such as to leave holes of regular shape for reaming.

B. Form ties for water-retaining structures shall have integral waterstops. Removable taper ties may be used when acceptable to the Engineer. A preformed mechanical EPDM rubber plug shall be used to seal the hole left after the removal of the taper tie. Plug shall be X-Plug by the Sika Corporation or approved equal. Friction fit plugs shall not be used.

C. Form release agent shall be a blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms. It

shall not stain the concrete and shall leave the concrete with a paintable surface. Formulation of the form release agent shall be such that it would minimize formation of "bug holes" in cast-in-place concrete.

PART 3 – EXECUTION

3.01 FORM DESIGN

A. Forms and falsework shall be designed for total dead load, plus all construction live load as outlined in ACI 347. Design and engineering of formwork and safety considerations during construction shall be the responsibility of the Contractor.

B. Forms shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. The maximum deflection of facing materials reflected in concrete surfaces exposed to view shall be 1/240 of the span between structural members.

C. All forms shall be designed for predetermined placing rates per hour, considering expected air temperatures and setting rates.

3.02 CONSTRUCTION

A. The type, size, quality, and strength of all materials from which forms are made shall be subject to the approval of the Engineer. No falsework or forms shall be used which are not clean and suitable. Deformed, broken or defective falsework and forms shall be removed from the work.

B. Forms shall be smooth and free from surface irregularities. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Joints between the forms shall be sealed to eliminate any irregularities. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to a practical minimum.

C. Forms shall be true to line and grade and shall be sufficiently rigid to prevent displacement and sagging between supports. Curved forms shall be used for curved and circular structures. Straight panels joined at angles will not be acceptable for forming curved structures. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly placed concrete. Facing material shall be supported with studs or other backing which shall prevent both visible deflection marks in the concrete and deflections beyond the tolerances specified.

D. Forms shall be mortar tight to prevent the loss of water, cement and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete

footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1 to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form.

E. All vertical surfaces of concrete members shall be formed, and side forms shall be provided for all footings, slab edges and grade beams, except where placement of the concrete against the ground is called for on the Drawings. Not less than 1-inch of concrete shall be added to the thickness of the concrete member as shown where concrete is permitted to be placed against trimmed ground in lieu of forms. Such permission will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

F. All forms shall be constructed in such a manner that they can be removed without hammering or prying against the concrete. Wood forms shall be constructed for wall openings to facilitate loosening and to counteract swelling of the forms.

G. Adequate clean-out holes shall be provided at the bottom of each lift of forms. Temporary openings shall be provided at the base of column forms and wall forms and at other points to facilitate cleaning and observation immediately before the concrete is deposited. The size, number and location of such clean-outs shall be as acceptable to the Engineer.

H. Construction joints shall not be permitted at locations other than those shown or specified, except as may be acceptable to the Engineer. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. For flush surfaces at construction joints exposed to view, the contact surface of the form sheathing over the hardened concrete in the previous placement shall be lapped by not more than 1 inch. Forms shall be held against hardened concrete to prevent offset or loss of mortar at construction joints and to maintain a true surface.

I. The formwork shall be cambered to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads. Set forms and intermediate screed strips for slabs accurately to produce the designated elevations and contours of the finished surface. Ensure that edge forms and screed strips are sufficiently strong to support vibrating screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. When formwork is cambered, set screeds to a like camber to maintain the proper concrete thickness.

J. Positive means of adjustment (wedges or jacks) for shores and struts shall be provided and all settlement shall be taken up during concrete placing operation. Shores and struts shall be securely braced against lateral deflections. Wedges shall be fastened firmly in place after final adjustment of forms prior to concrete placement. Formwork shall be

anchored to shores or other supporting surfaces or members to prevent upward or lateral movement of any part of the formwork system during concrete placement. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

K. Runways shall be provided for moving equipment with struts or legs. Runways shall be supported directly on the formwork or structural member without resting on the reinforcing steel.

3.03 TOLERANCES

A. Unless otherwise indicated in the Contract Documents, formwork shall be constructed so that the concrete surfaces will conform to the tolerance limits listed in ACI 117.

B. The Contractor shall establish and maintain in an undisturbed condition and until final completion and acceptance of the project, sufficient control points and benchmarks to be used for reference purposes to check tolerances. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by Contractor's personnel and by the Engineer and shall be in sufficient number and properly installed. During concrete placement, the Contractor shall continually monitor plumb and string line form positions and immediately correct deficiencies.

C. Regardless of the tolerances specified, no portion of the structure shall extend beyond the legal boundary of the structure.

3.04 FORM ACCESSORIES

A. Suitable moldings shall be placed to bevel or round all exposed corners and edges of beams, columns, walls, slabs, and equipment pads. Chamfers shall be 3/4 inch unless otherwise noted.

B. Form ties shall be so constructed that the ends, or end fasteners, can be removed without causing appreciable spalling at the faces of the concrete. After ends, or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 2 inches from the formed face of the concrete that is exposed to water or enclosed surfaces above the water surface, and not less than 1 inch from the formed face of all other concrete. Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers to leave the surface of the holes clean and rough before being filled with mortar as specified in Section 03 35 00 – Concrete Finishes. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete member. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. No snap ties shall be broken off until the concrete is at least three days old. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste.

3.05 APPLICATION – FORM RELEASE AGENT

A. Forms for concrete surfaces that will not be subsequently waterproofed shall be coated with a form release agent. Form release agent shall be applied on formwork in accordance with manufacturer's recommendations.

3.06 INSERTS AND EMBEDDED ITEMS

A. Sleeves, pipe stubs, inserts, anchors, expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement prior to concreting. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.

3.07 FORM CLEANING AND REUSE

A. The inner faces of all forms shall be thoroughly cleaned prior to concreting. Forms may be reused only if in good condition and only if acceptable to the Engineer. Light sanding between uses will be required wherever necessary to obtain uniform surface texture. Unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the Engineer.

3.08 FORM REMOVAL AND SHORING

A. Forms shall not be disturbed until the concrete has attained sufficient strength. Sufficient strength shall be demonstrated by structural analysis considering proposed loads, strength of forming and shoring system, and concrete strength data. Shoring shall not be removed until the supported member has acquired sufficient strength to support its weight and the load upon it. Members subject to additional loads during construction shall be adequately shored to sustain all resulting stresses. Forms shall be removed in such manner as not to impair safety and serviceability of the structure. All concrete to be exposed by form removal shall have sufficient strength not to be damaged thereby.

B. Provided the strength requirements specified above have been met and subject to the Engineer's approval, forms may be removed at the following minimum times. The Contractor shall assume full responsibility for the strength of all such components from which forms are removed prior to the concrete attaining its full design compressive strength. Shoring may be required at the option of the Engineer beyond these periods.

Ambient Temperature (°F.) During Concrete Placement

	Over 95°	**70°-95°**	**60°-70°**	**50°-60°**	**Below 50°**
Edge Forms for Slabs on Grade	1 day	1 day	1 day	1 day	
Walls	5 days	2 days	2 days	3 days	

Ambient Temperature (°F.) During Concrete Placement

	Over 95°	70°-95°	60°-70°	50°-60°	Below 50°
Columns	7 days	2 days	3 days	4 days	Do not remove until directed by Engineer (7 days minimum)
Beam Soffits	10 days	7 days	7 days	7 days	
Elevated Slabs	12 days	7 days	7 days	7 days	

C. When, in the opinion of the Engineer, conditions of the work or weather justify, forms may be required to remain in place for longer periods of time.

D. An accurate record shall be maintained by the Contractor of the dates of concrete placings and the exact location thereof and the dates of removal of forms. These records shall always be available for inspection at the site, and two copies shall be furnished the Engineer upon completion of the concrete work.

3.09 RESHORING

A. When reshoring is permitted or required the operations shall be planned and subjected to approval by the Engineer.

B. Reshores shall be placed after stripping operations are complete but in no case later than the end of the working day on which stripping occurs.

C. Reshoring for the purpose of early form removal shall be performed so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no construction or live loads shall be permitted on the new construction. Reshores shall be tightened to carry their required loads but they shall not be overtightened so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified.

D. For floors supporting shores under newly placed concrete, the original supporting shores shall remain in place or reshores shall be placed. The shoring or reshoring system shall have a capacity sufficient to resist the anticipated loads and, in all cases, shall have a capacity equal to at least one-half of the capacity of the shoring system above. Reshores shall be located directly under a reshore position above unless other locations are permitted.

E. In multi-story buildings, reshoring shall extend over a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads so the design superimposed loads of the floors supporting shores are not exceeded.

END OF SECTION

SECTION 03 21 00
REINFORCING STEEL

PART 1 – GENERAL

1.01 THE REQUIREMENTS

A. Provide all concrete reinforcing including all cutting, bending, fastening and any special work necessary to hold the reinforcing steel in place and protect it from injury and corrosion in accordance with the requirements of this section.

B. Provide deformed reinforcing bars to be grouted into reinforced concrete masonry walls.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 11 00 – Concrete Formwork

B. Section 03 30 00 – Cast-in-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. International Building Code
2. CRSI - Concrete Reinforcing Institute Manual of Standard Practice
3. ACI MNL-66 - ACI Detailing Manual
4. ACI 315 - Details and Detailing of Concrete Reinforcing
5. ACI 318 - Building Code Requirements for Structural Concrete
6. WRI - Manual of Standard Practice for Welded Wire Fabric
7. ASTM A 615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
8. ASTM A706 – Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement

9. ASTM A 1064 - Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

10. ASTM E 3121 – Standard Test Methods for Field Testing of Anchors in Concrete or Masonry

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.

1. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (MNL-66), shall be furnished for all concrete reinforcing. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, spacing and splicing of the bars.

2. Detailed placing and shop fabricating drawings, prepared in accordance with ACI 315 and ACI Detailing Manual - (MNL-66), shall be furnished for all deformed bar reinforcing used in masonry. These drawings shall be made to such a scale as to clearly show joint locations, openings, and the arrangement, locations, spacing and splicing of the bars.

3. Mill test certificates - 3 copies of each.

4. Description of the reinforcing steel manufacturer's marking pattern.

5. Requests to relocate any bars that cause interferences or that cause placing tolerances to be violated.

6. Proposed supports for each type of reinforcing.

7. Request to use splices not shown on the Drawings.

8. Request to weld reinforcement.

9. Request to use mechanical couplers along with manufacturer's literature on mechanical couplers with instructions for installation, and certified test reports on the couplers' performance, including International Code Council–Evaluation Services Report (ICC-ES ESR).

10. Request for placement of column dowels without the use of templates.

11. Request and procedure to field bend or straighten partially embedded reinforcing.

12. International Code Council–Evaluation Services Report (ICC-ES ESR) for dowel adhesives.

13. Certification that all installers of dowel adhesive systems in horizontal to vertically overhead applications are certified as Adhesive Anchor Installers in accordance with the ACI-CRSI Anchor Installer Certification Program.

14. Adhesive dowel testing plan.

1.05 QUALITY ASSURANCE

A. If requested by the Engineer, the Contractor shall provide samples from each load of reinforcing steel delivered in a quantity adequate for testing. Costs of initial tests will be paid by the Owner. Costs of additional tests due to material failing initial tests shall be paid by the Contractor.

B. Provide a list of names of all installers who are trained by the Manufacturer's Field Representative on this jobsite prior to installation of products. Record must include the installer name, date of training, products included in the training and trainer name and contact information.

C. Provide a copy of the current ACI/CRSI "Adhesive Anchor Installer" certification cards, or equivalent, for all installers who will be installing adhesive anchors in the horizontal to vertically overhead orientation.

D. Special inspections for adhesive dowels shall be conducted in accordance with the manufacturer's instructions and Specification Section 01 45 33 – Special Inspections. Downward installations require periodic inspection and horizontal and overhead installations require continuous inspection.

PART 2 – PRODUCTS

2.01 REINFORCING STEEL

A. Bar reinforcing shall conform to the requirements of ASTM A 615 for Grade 60 deformed billet-steel reinforcing unless noted otherwise. All reinforcing steel shall be from domestic mills and shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type, and grade. All reinforcing bars shall be deformed bars. Smooth reinforcing bars shall not be used unless specifically called for on Drawings.

1. Reinforcement to be welded shall conform to the requirements of ASTM A706, Grade 60.

B. Welded wire fabric reinforcing shall conform to the requirements of ASTM A 1064 and the details shown on the Drawings.

C. A certified copy of the mill test on each load of reinforcing steel delivered showing physical and chemical analysis shall be provided, prior to shipment. The Engineer reserves the right to require the Contractor to obtain separate test results from an independent testing laboratory in the event of any questionable steel. When such tests are necessary because of failure to comply with this Specification, such as improper identification, the cost of such tests shall be borne by the Contractor.

D. Use of coiled reinforcing steel will not be allowed.

2.02 ACCESSORIES

A. Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcing during concrete placement. Wire bar supports shall be plastic protected (CRSI Class 1).

B. Concrete blocks (dobies), used to support and position bottom reinforcing steel, shall have the same or higher compressive strength as specified for the concrete in which it is located.

2.03 MECHANICAL COUPLERS

A. Mechanical couplers shall comply with ACI 318 Type 2 and develop a tensile strength which exceeds 100 percent of the ultimate tensile strength and 125 percent of the yield strength of the reinforcing bars being spliced. The reinforcing steel and coupler used shall be compatible for obtaining the required strength of the connection.

B. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be supplied by the same coupler manufacturer.

C. Hot forged sleeve type couplers shall not be used. Acceptable mechanical couplers are Dayton Superior Dowel Bar Splicer System by Dayton Superior, Dayton, Ohio, or approved equal. Mechanical couplers shall only be used where shown on the Drawings or where specifically approved by the Engineer.

D. Tension-compression mechanical splices may only be used where shown on the Drawings or where specifically approved by the Engineer. Tension-compression mechanical splices shall be shear screw coupling sleeve type. Acceptable mechanical couplers are Bar Lock L-series or XL-series couplers by Dayton Superior, Dayton, Ohio, or approved equal.

E. Dowel bar mechanical splices shall only be used at construction joints where shown on the Drawings or where specifically approved by the Engineer. Acceptable dowel bar mechanical couplers are the DBDI Splicing System by Dayton Superior, Dayton, Ohio, or approved equal.

F. Where the threaded rebar to be inserted into the coupler reduces the diameter of the bar, the threaded rebar piece and all components of the coupler system shall be provided by the same coupler manufacturer.

G. Mechanical couplers shall have a valid evaluation report from ICC-ES in accordance with the Building Code.

H. All mechanical couplers shall be installed in accordance with the manufacturer’s recommendations.

2.04 DOWEL ADHESIVE SYSTEM

A. Where shown on the Drawings, reinforcing bars anchored into hardened concrete with a dowel adhesive system shall use a two-component adhesive mix which shall be injected with a static mixing nozzle following manufacturer's instructions.

B. All holes shall be drilled in accordance with the manufacturer’s instructions except that core drilled holes shall not be permitted unless specifically allowed by the Engineer. Cored holes, if allowed by the manufacturer and approved by the Engineer, shall be roughened in accordance with manufacturer’s requirements.

C. Thoroughly clean drill holes of all debris, drill dust, and water in accordance with manufacturer’s instructions prior to installation of adhesive and reinforcing bar.

D. Degree of hole dampness shall be in strict accordance with manufacturer recommendations. Installation conditions shall be dry, or water saturated unless otherwise permitted by the engineer. If water saturated installation is approved, appropriate reduction factors in accordance with manufacturer’s design requirements should be considered. Water filled or submerged holes shall not be permitted unless specifically approved by the Engineer.

E. Injection of adhesive into the hole shall be performed in a manner to minimize the formation of air pockets in accordance with the manufacturer’s instructions.

F. Embedment Depth:

1. If the Contractor submits one of the other named dowel adhesives from the list below, the Engineer shall evaluate the required embedment and the Contractor shall provide the required embedment depth stipulated by the Engineer specific to the approved dowel adhesive.

2. Where the embedment depth is not shown on the Drawings, the embedment depth shall be determined to provide the minimum allowable bond strength equal to the tensile strength of the rebar according to the manufacturer's ICC-ES ESR.

3. The embedment depth shall be determined using design parameters listed below. In no case shall the embedment depth be less than the minimum, or more than the maximum, embedment depths stated in the manufacturer's ICC-ES ESR.

4. Design of adhesive anchor system shall be based on the following parameters:

   a. Actual compressive strength of concrete.

   b. Cracked concrete state.

   c. Dry or water saturated condition for installation.

   d. Base material temperature between 40- and 104-degrees Fahrenheit.

   e. Installation with either a hammer drill with carbide bit or hollow-drill bit system drilling methods.

   f. Minimum age of concrete of 21 days at time of installation.

G. Engineer's approval is required for use of this system in locations other than those shown on the Drawings.

H. The adhesive system shall be IBC compliant for use in both cracked and uncracked concrete in all Seismic Design Categories and shall be "HIT-HY 200 Adhesive Anchoring System" as manufactured by Hilti, Inc. "SET-3G Epoxy Adhesive Anchors" as manufactured by Simpson Strong-Tie Co. or "Pure 110+ Epoxy Adhesive Anchor System" by DeWalt. Fast-set epoxy formulations shall not be acceptable. No or equal products will be considered, unless pre-qualified and approved.

I. All individuals installing dowel adhesive systems in horizontal to vertically overhead applications shall be certified as an Adhesive Anchor Installer in accordance with the ACI-CRSI Anchor Installation Certification Program, or equivalent.

PART 3 – EXECUTION

3.01 FABRICATION

A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.

B. The Contractor shall fabricate reinforcing bars for structures in accordance with the bending diagrams, placing lists and placing Drawings.

C. No fabrication shall commence until approval of Shop Drawings has been obtained. All reinforcing bars shall be shop fabricated unless approved to be bent in the field. Reinforcing bars shall not be straightened or bent in a manner that will injure the material. Heating of bars will not be permitted.

D. Welded wire fabric with longitudinal wire of W9.5 size or smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10 inches. Welded wire fabric with longitudinal wires larger than W9.5 size shall be furnished in flat sheets only.

3.02 DELIVERY, STORAGE AND HANDLING

A. All reinforcing shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.

B. Reinforcing steel shall be stored above ground on platforms or other supports and shall always be protected from the weather by suitable covering. Reinforcing steel shall be stored in an orderly manner and plainly marked to facilitate identification.

C. Reinforcing steel shall always be protected from conditions conducive to corrosion until concrete is placed around it.

D. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar and other foreign substances immediately before the concrete is placed. Where delay in depositing concrete occurs, reinforcing shall be inspected again and if necessary recleaned.

3.03 PLACING

A. Reinforcing steel shall be accurately positioned as shown on the Drawings and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or plastic protected (CRSI Class 1) metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the reinforcing bars without settlement. In no case shall concrete block supports be continuous.

B. The portions of all accessories in contact with the formwork shall be made of plastic or steel coated with a 1/8-inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.

C. Tie wires shall be bent away from the forms to provide the specified concrete coverage.

D. Reinforcing bars additional to those shown on the Drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcing in position, shall be provided by the Contractor at no additional cost to the Owner.

E. Reinforcing placing, spacing, and protection tolerances shall be within the limits specified in ACI 318 except where in conflict with the Building Code, unless otherwise specified.

F. Reinforcing bars may be moved within one bar diameter as necessary to avoid interference with other concrete reinforcing, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed placing tolerances, the resulting arrangement of bars shall be as acceptable to the Engineer.

G. Welded wire fabric shall be supported on slab bolsters spaced not less than 30 inches on centers, extending continuously across the entire width of the reinforcing mat and supporting the reinforcing mat in the plane shown on the Drawings.

H. Reinforcing shall not be straightened or bent unless specifically shown on the drawings. Bars with kinks or bends not shown on the Drawings shall not be used. Coiled reinforcement shall not be used.

I. Dowel Adhesive System shall be installed in strict conformance with the manufacturer's recommendations and as required in Article 2.04 above. A representative of the manufacturer must be on site prior to adhesive dowel installation to provide instruction on proper installation procedures for all adhesive dowel installers. Testing of adhesive dowels shall be as indicated below. If the dowels have a hook at the end to be embedded in subsequent work, an approved mechanical coupler shall be provided at a convenient distance from the face of existing concrete to facilitate adhesive dowel testing while maintaining required hook embedment in subsequent work.

J. All adhesive dowel installations in the horizontal or overhead orientation shall be conducted by a certified Adhesive Anchor Installer as certified by ACI/CSRI Adhesive Anchor Installer Certification program, or equivalent, per ACI 318-19 26.7.2.E or ACI 318-19 17.2.3. Current AAI Certificates must be submitted to the Engineer for approval prior to commencement of any adhesive anchor installations.

K. Adhesive Dowel Testing

1. At all locations where adhesive dowels are shown on the Drawings, at least 10 percent of all adhesive dowels installed shall be tested to 80% of the yield load of the reinforcing bar, with a minimum of one tested dowel per group.

2. Contractor shall submit a plan and schedule indicating locations of dowels to be tested, load test values, and proposed dowel testing procedure (including a diagram of the testing equipment proposed for use) prior to conducting any testing. Proof testing procedures shall be in accordance with ASTM E 3121.

3. Where Contract Documents indicate adhesive dowel design is the Contractor's responsibility, the Contractor shall submit a plan and schedule indicating locations of dowels to be tested and load test values, sealed by a Professional Engineer currently registered in the State of Arizona. The Contractor shall also submit documentation indicating the Contractor's testing procedures have been reviewed and the proposed procedures are acceptable.

4. Adhesive Dowel shall have no visible indications of displacement or damage during or after the load test. Dowels exhibiting damage shall be removed and replaced. If more than 5 percent of tested dowels fail, then 100 percent of dowels shall be load tested.

5. When special inspections are not required for the installation, load testing of adhesive dowels shall be performed by an independent testing laboratory retained directly by the Contractor. The Contractor shall be responsible for costs of all testing, including additional testing required due to previously failed tests. If special inspections are required for installation, the independent testing laboratory shall be retained directly by the Owner.

3.04 SPLICING

A. Reinforcing bar splices shall only be used at locations shown on the Drawings. When necessary to splice reinforcing at points other than where shown, the splice shall be as acceptable to the Engineer.

B. The length of lap for reinforcing bars, unless otherwise shown on the Drawings shall be in accordance with ACI 318 for a class B splice.

C. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

D. Mechanical splices shall be used only where shown on the drawings or when approved by the Engineer. Splices shall also meet the requirements of Section 2.03.

E. Mechanical couplers for dowel bar mechanical splices at construction joints which are located at a joint shall be a type which can be set either flush or recessed from the concrete surface. The couplers shall be sealed during concrete placement to eliminate concrete, or cement paste from entering. After the concrete is placed, couplers intended for future connections shall be plugged and sealed to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged with plastic plugs which have an O-ring seal.

3.05 WELDING OF REINFORCEMENT

A. Welding of reinforcement shall only occur where shown on the Drawings or where specifically approved by the Engineer.

B. Welding shall comply with all requirements of AWS D1.4.

C. Welding shall be performed by certified welders in conformance with AWS D1.4.

D. Material of reinforcement to be welded shall be as specified in Section 2.01.A.1.

3.06 INSPECTION

A. The Contractor shall advise the Engineer of his intentions to place concrete and shall allow him adequate time to inspect all reinforcing steel before concrete is placed.

B. The Contractor shall advise the Engineer of his intentions to place grout in masonry walls and shall allow him adequate time to inspect all reinforcing steel before grout is placed.

3.07 CUTTING OF EMBEDDED REBAR

A. The Contractor shall not cut embedded rebar cast into structural concrete without prior approval.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. Provide all labor, equipment, materials, and services necessary for the manufacture, transportation, and placement of all plain and reinforced concrete work, as shown on the Drawings or as required by the Engineer.

B. The requirements in this section shall apply to the types of concrete listed below. See Article 2.11 for concrete mix design and properties of concrete.

1. Class A1 Concrete: Normal weight structural concrete to be used in all structures qualifying as environmental concrete structures designed in accordance with ACI 350 including any structures containing water, wastewater or any other fluid, process chemicals, or other materials used in treatment process.

2. Class A2 Concrete: Normal weight structural concrete in all structures other than structures as described above, and for all sidewalks and pavement.

3. Class A3 Concrete: Normal weight structural concrete to be used for interior slabs where a Type “D” Steel Troweled Finish or Type “G” Hardened Finish is required. Class A3 concrete shall not contain entrained air.

4. Class A4 Concrete: Normal weight structural concrete to be used where specifically called for on Contract Drawings or areas where specifically requested by Contractor and approved by Engineer. Class A4 concrete is identical to Class A2 concrete except that coarse aggregate specified in Article 2.08 below shall be Size #8 in accordance with ASTM C33.

5. Class B Concrete: Normal weight structural concrete used for duct bank encasements, catch basins, fence and guard post embedment, concrete fill, and other areas where specifically noted on Contract Drawings.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 11 00 – Concrete Formwork

B. Section 03 15 00 – Concrete Accessories

C. Section 03 15 16 – Joints in Concrete

D. Section 03 21 00 – Reinforcing Steel

E. Section 03 35 00 – Concrete Finishes

F. Section 03 39 00 – Concrete Curing

G. Section 03 60 00 – Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. International Building Code 2024
2. ACI 214 – Guide to Evaluation of Strength Test Results of Concrete
3. ACI 301 – Specifications for Structural Concrete
4. ACI 304 – Guide for Measuring, Mixing, Transporting, and Placing Concrete
5. ACI 305 – Specification for Hot Weather Concreting
6. ACI 306 – Standard Specification for Cold Weather Concreting
7. ACI 309R – Guide for Consolidation of Concrete
8. ACI 318 – Building Code Requirements for Structural Concrete and Commentary
9. ACI 350 – Code Requirements for Environmental Engineering Concrete Structures
10. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field
11. ASTM C33 – Standard Specification for Concrete Aggregates
12. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
13. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
14. ASTM C88 – Standard Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate
15. ASTM C94 – Standard Specification for Ready-Mixed Concrete

16. ASTM C114 – Standard Test Method for Chemical Analysis of Hydraulic Cement

17. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

18. ASTM C138 – Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

19. ASTM C143 – Standard Test Method for Slump of Hydraulic Cement Concrete

20. ASTM C150 – Standard Specification for Portland Cement

21. ASTM C157 - Standard Test Method for Length Change of Hardened Hydraulic Cement, Mortar and Concrete

22. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete

23. ASTM C192 – Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

24. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

25. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete

26. ASTM C295 – Standard Guide for Petrographic Examination of Aggregates for Concrete

27. ASTM C457 – Standard Test Method for Microscopical Determination of the Air-Void System in Hardened Concrete

28. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete

29. ASTM C595 – Standard Specification for Blended Hydraulic Cements

30. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

31. ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars

32. ASTM C1012 – Standard Test Method for Length Change of Hydraulic Cement Mortars Exposed to a Sulfate Solution

33. ASTM C1077 – Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

34. ASTM C1157 – Standard Performance Specification for Hydraulic Cement

35. ASTM C1260 – Test Method for Potential Alkali Reactivity of Aggregates (Mortar Bar Method)

36. ASTM C1567 – Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

37. ASTM C1579 – Standard Test Method for Evaluating Plastic Shrinkage Cracking of Restrained Fiber Reinforced Concrete (Using a Steel Form Insert)

38. ASTM C1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

39. ASTM C1609 – Standard Test Method for Flexural Performance of Fiber Reinforced Concrete (Using Beam with Third-Point Loading)

40. ASTM C1778 – Standard Guide for Reducing the Risk of Deleterious Alkali – Aggregate Reaction in Concrete

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.

1. Sources of all materials and certifications of compliance with specifications for all materials.

2. Certified current (less than 6 months old) chemical analysis (mill test report) of the Portland Cement or Blended Cement to be used. The chemical analysis must include the equivalent alkali content of the Portland Cement or Blended Cement. For Type IL cement, submit updated cement mill test reports every 6 months while active concrete work is being performed.

3. Certified current (less than 1 year old) chemical analysis of fly ash or slag cement to be used.

4. Aggregate test results showing compliance with required standards, i.e., sieve analysis, potential reactivity, aggregate soundness tests, petrographic analysis, mortar bar expansion testing, etc.

5. Manufacturer's data on all admixtures stating compliance with required standards.

6. Concrete mix design for each class of concrete specified herein.

7. Verification that concrete mix and individual constituents in concrete meet requirements for NSF 61 approval for potable water applications where required.

8. Field experience records and/or trial mix data for the proposed concrete mixes for each class of concrete specified herein.

9. Drying shrinkage test results for Class A1 concrete.

1.05 QUALITY ASSURANCE

A. Tests on materials used in the production of concrete shall be required as specified in Part 2 – Products. These tests shall be performed by an independent testing laboratory approved by the Engineer at no additional cost to the Owner.

B. Trial concrete mixes shall be tested when required in accordance with Article 3.01 at no additional cost to the Owner. Where field experience records are utilized for mix design verification, submit certified cement chemical analysis (mill test report) for the historical concrete.

C. Field quality control tests, as specified in Article 3.12, unless otherwise stated, will be performed by a materials testing consultant employed by the Owner. However, the Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the Specifications. Any individual who samples and tests concrete to determine if the concrete is being produced in accordance with this Specification shall be certified as a Concrete Field-Testing Technician, Grade I, in accordance with ACI CP-2. Testing laboratory shall conform to requirements of ASTM C1077.

1.06 CONCRETE COORDINATION CONFERENCE

A. Unless waived by the Engineer, prior to any concrete submittals and at least 35 days prior to the start of the concrete construction schedule, the Contractor shall conduct a meeting at the site. The purpose of the meeting is to review the proposed concrete mix designs, to discuss the proposed approaches and procedures for mixing, transporting, placing, testing, finishing, and curing of all aspects of concrete work to ensure the concrete construction is performed in accordance with the Specifications, and to clarify roles of the parties involved. The Contractor shall send a concrete coordination conference agenda to all attendees 20 days prior to a mutually agreed upon date for the conference.

B. As a minimum the agenda shall include:

1. Concrete Materials and Mix Designs

2. Inspection Responsibilities

3. Concrete Sampling and Testing Specification Requirements

4. Cylinder Storage and Transportation

5. Acceptance/Rejection Responsibility and Authority for Fresh Concrete

6. Concrete finishing

7. Concrete Curing

8. Test Report Distribution

9. Miscellaneous Items

C. The Contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:

1. Contractor's superintendent

2. Engineer

3. Owner's representative (if they chose to attend)

4. Laboratory retained for trial batching and construction quality control testing for the concrete.

5. Any subcontractors involved in placing, finishing, and curing of concrete.

6. Concrete supplier

7. Concrete pumping subcontractor (if pumping is being proposed)

D. Minutes of the meeting shall be recorded, typed, and printed by the Contractor and distributed to all attendees and any other concerned parties within five days of the meeting.

PART 2 – PRODUCTS

2.01 NSF/ANSI STANDARD 61 CERTIFIED CONCRETE

A. NSF/ANSI Standard 61 certified concrete is required only where the concrete is uncoated and in contact with potable water, the volume of water is less than 350,000 gallons, and the ratio of the concrete surface area in contact with potable water to the volume of water exceeds 0.8 square inches per liter for static water conditions or 0.08 square inches per liter for flowing water conditions. The following structures and utilities require this certification:

1. Rapid Mix Chamber

2. Sedimentation Basins

3. Flocculation Basins

B. Potable water is water at the start of flash mixing in drinking water treatment plants, and at all locations downstream of flash mixing in the water treatment, storage, and distribution system. Concrete surface area in contact with potable water shall include submerged surfaces and surfaces above the water where water can condense and drip back into the water.

C. Where NSF/ANSI certified concrete is required by the paragraphs above, certification of compliance with NSF/ANSI Standard 61 shall be included with the concrete mix design submittal(s) and shall be provided by either one of the following two options:

1. NSF/ANSI Standard 61 certified testing of concrete aggregates, hydraulic cement, and supplemental cementitious materials shall be provided individually for each constituent showing that each constituent complies with NSF/ANSI Standard 61

2. NSF/ANSI Standard 61 testing of concrete cylinders formed from the trial batch concrete containing all the proposed constituents of the concrete shall be provided showing that the concrete mix complies with NSF/ANSI Standard 61.

D. Regardless of whether NSF/ANSI Standard 61 certified concrete is required by the paragraphs above, all admixtures used in concrete where the concrete is uncoated and in contact with potable water shall be individually tested and confirm to follow NSF/ANSI Standard 61.

2.02 HYDRAULIC CEMENT

A. Portland Cement

1. Portland Cement shall be Type II conforming to ASTM C150. Type I cement may be used provided either fly ash or slag cement is also included in the mix in accordance with Articles 2.03 or 2.04, respectively.

2. The proposed Portland Cement shall not contain more than 8% tricalcium aluminate and more than 12% tetracalcium aluminoferrite.

3. Portland Cement shall also meet performance requirements of ASTM C1157.

B. Blended Cement

1. Blended cements shall be Type IP (Portland Fly Ash Cement), Type IS (Portland Slag Cement), or Type IL (Portland Limestone Cement) conforming to ASTM C595.

2. Type IP cement shall be an inter-ground blend of Portland Cement and fly ash in which the fly ash constituent is between 15% and 25% of the weight of the total blend.

3. Type IS cement shall be an inter-ground blend of Portland Cement and slag cement in which the slag cement constituent is between 30% and 40% of the weight of the total blend.

4. Type IL cement shall be an inter-ground blend of Portland Cement and limestone in which the limestone constituent is between 5% and 15% of the weight of the total blend.

5. Fly ash, slag cement, and limestone used in the production of blended cements shall meet the requirements of Articles 2.03, 2.04, and 2.05 respectively.

6. Cements meeting ASTM C1157 shall not be used in manufacture of blended cements.

7. Blended cement shall meet the Physical Requirements of Tables 2 and 3 of ASTM C595 including the requirements for high sulfate resistance in Table 3 as tested per ASTM C1012.

C. Different types of cement shall not be mixed, nor shall they be used alternately except when authorized in writing by the Engineer. For Type IP, Type IS or Type I/II cement, different brands of cement or the same brand from different mills may be used alternately. For Type IL cement, use of a different cement brand or same brand from a different mill requires resubmittal of the mix design with current mill test report for review. A resubmittal will be required if different cements are proposed during the Project.

D. Cement shall be stored in a suitable weather-tight building to prevent deterioration or contamination. Cement which has become caked, partially hydrated, or otherwise damaged will be rejected.

2.03 FLY ASH

A. Fly ash shall meet the requirements of ASTM C618 for Class F, except that the loss on ignition shall not exceed 4%. Fly ash shall also meet the optional physical requirements for uniformity as shown in Table 3 of ASTM C618. Fly ash shall be considered as a supplemental cementitious material.

B. For fly ash to be used in the production of Type IP cement, the Pozzolan Activity Index shall be greater than 75% as specified in Table 3 of ASTM C595.

C. Where reactive aggregates as defined in Article 2.08 are used in the concrete mix, the fly ash constituent shall be as needed to satisfy the concrete alkali loading requirements stipulated in Article 2.06. The percentage of fly ash shall also be set to meet the mean mortar bar expansion requirements in provisions of Article 2.08.G.2. Where fly ash is used, the minimum fly ash content shall be 15%.

D. For Type A1 concrete as required for use in environmental concrete structures, i.e., process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.

E. Additional fly ash shall not be included in concrete mixed with Type IS or IP cement.

2.04 SLAG CEMENT

A. Slag cement shall meet the requirements of ASTM C989 including tests for effectiveness of slag in preventing excessive expansion due to alkali-aggregate reactivity as described in Appendix X-3 of ASTM C989.

B. Where reactive aggregates as defined in Article 2.08 are used in concrete mix, the slag cement constituent shall be as needed to satisfy the concrete alkali loading requirements stipulated in Article 2.06. The percentage of slag cement shall also be set to meet the mean mortar bar expansion requirements in provisions of Article 2.08.G.2. Where Slag Cement is used, the minimum Slag Cement content shall be 30%, and the maximum Slag Cement content shall be 40%.

C. For Type A1 concrete as required for use in environmental concrete structures, i.e., process structures or fluid containing structures, inclusion of fly ash or slag cement in the concrete mix, is mandatory.

D. Additional slag cement shall not be included in concrete mixed with Type IS or IP cement.

2.05 PORTLAND LIMESTONE CEMENT (TYPE IL)

A. Portland Limestone Cement (Type IL) cement shall meet the requirements of ASTM C595.

B. Limestone used for blended cement Type IL shall be naturally occurring and meet the requirements of ASTM C33.

C. Fly ash or slag cement shall be used with Type IL cement to meet requirements for durability, ASR resistance, sulfate resistance, and use for environmental structures, as specified herein.

2.06 CONCRETE ALKALI LOADING

A. All concrete mixes containing potentially reactive aggregates shall have a maximum alkali loading of the concrete of 3.0 pounds per cubic yard.

B. The alkali loading of concrete is the Portland Cement equivalent alkali content multiplied by the Portland Cement content of the mix in pounds per cubic yard divided by 100. The Portland Cement equivalent alkali content shall be included in the certified chemical analysis of the Portland Cement.

C. Means of evaluating alkali loading of concrete and proportioning constituents of concrete to minimize alkali loading of content shall also conform to the guidelines of ASTM C1778.

2.07 WATER

A. Water used for mixing concrete shall be clear, potable, and free from deleterious substances such as objectionable quantities of silty organic matter, alkali, salts, and other impurities.

B. Water shall not contain more than 100 PPM chloride.

C. Water shall not contain more than 500 PPM dissolved solids.

D. Water shall have a pH in the range of 4.5 to 8.5.

E. Water shall meet requirements of ASTM C1602.

2.08 AGGREGATES

A. All aggregates used in normal weight concrete shall conform to ASTM C33.

B. Fine Aggregate (Sand) in the various concrete mixes shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the limits of ASTM C33.

C. Coarse aggregates shall consist of hard, clean, durable gravel, crushed gravel, or crushed rock. Coarse aggregate shall be size #57 or #67 as graded within the limits given in ASTM C33 unless otherwise specified.

D. For Class A4 and A7 concrete, coarse aggregate shall be Size #8 in accordance with ASTM C33.

E. Aggregates shall be tested for gradation by sieve analysis tests in conformance with ASTM C136.

F. Aggregates shall be tested for soundness in accordance with ASTM C88. The loss resulting after five cycles shall not exceed 10 percent for fine or coarse aggregate when using either magnesium sulfate or sodium sulfate.

G. All aggregates shall be evaluated in accordance with ASTM C1778 to determine potential reactivity. All aggregates shall be considered reactive unless they meet the requirements below for non-reactive aggregates. Aggregates with a lithology like sources in the same region found to be reactive in service shall be considered reactive regardless of the results of the tests above.

1. Non-reactive aggregates shall meet the following requirements:

a. A petrographic analysis in accordance with ASTM C295 shall be performed to identify the constituents of the fine and coarse aggregate. Non-reactive aggregates shall meet the following limitations:

1) Optically strained, micro-fractured, or microcrystalline quartz, 5.0%, maximum.

2) Chert or chalcedony, 3.0%, maximum.

3) Tridymite or cristobalite, 1.0%, maximum.

4) Opal, 0.5%, maximum.

5) Natural volcanic glass in volcanic rocks, 3.0%, maximum.

2. Concrete mixed with reactive aggregates shall meet the following requirements:

a. If aggregates are deemed potentially reactive as per ASTM C1778 and fly ash or slag cement is included in proposed concrete mix design, proposed concrete mix including proposed aggregates shall be evaluated by ASTM C1567. Mean mortar bar expansions at 16 days shall be less than 0.08%. Tests shall be made using exact proportion of all materials proposed for use on the job in design mix submitted.

b. If aggregates are deemed potentially reactive as per ASTM C1778 and a straight cement mix without fly ash or slag cement is proposed for concrete mix design, aggregates shall be evaluated by ASTM C1260. Mean mortar bar expansions at 16 days shall be less than 0.08%.

c. If the proposed aggregates are deemed potentially reactive, the concrete mix shall be evaluated and confirmed to meet the requirements for concrete alkali loading as stipulated in Article 2.06.

H. Contractor shall submit a new trial mix to the Engineer for approval whenever a different aggregate or gradation is proposed.

2.09 ADMIXTURES

A. Admixtures containing intentionally added chlorides shall not be used.

B. Air entraining admixture, if used, shall conform to ASTM C260. The admixture proposed shall be selected in advance so that adequate samples may be collected, and the required tests made. Air content of concrete, when placed, shall be within the ranges given in the concrete mix design.

C. The following admixtures are required or used for water reduction, slump increase, and/or adjustment of initial set, and enhancing durability. Admixtures permitted shall confirm to the requirements of ASTM C494. Admixtures shall be non-toxic after 30 days and shall be compatible with and made by the same manufacturer as the air-entraining admixtures.

1. Water reducing admixture shall conform to ASTM C494, Type A and shall contain no more than 0.05% chloride ions. Acceptable products are “Eucon Series” by the Euclid Chemical Company, “Master Pozzolith Series or Master Polyheed Series” by Master Builders Solutions, and “Plastocrete Series” by Sika Corporation.

2. High range water reducer shall conform to ASTM C494, Type F or G. The high range water reducer shall be added to the concrete at the batch plant and may be used in conjunction with a water reducing admixture. The high range water reducer shall be accurately measured, and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day’s operation of the job site system. Concrete shall be mixed at mixing speed for a minimum of 100 mixer revolutions after the addition of the high range water reducer. Acceptable products are “Eucon 37” or Plastol 5000 by the Euclid Chemical Company, “Master Rheobuild 1000 or Master Glenium Series” by Master Builders Solutions, and “Daracem 100 or Advaflow Series” by W.R. Grace.

3. A non-chloride, non-corrosive accelerating admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C494, Type C or E. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year’s duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Acceptable products are “MasterSet AC 534 or MasterSet FP 20” by Master Builders Solutions, “Accelguard 80/90 or NCA” by the Euclid Chemical Company and “Daraset” by W.R. Grace.

4. A retarding admixture may be used where specifically approved by the Engineer. The admixture shall conform to ASTM C494, Type B or D. Acceptable products are “Eucon NR or Eucon Retarder 100” by the Euclid Chemical Company,

"MasterSet R Series or MasterSet DELVO Series" by Master Builders Solutions, and "SikaTard®-440" by Sika Corporation.

5. Workability Retaining Admixture shall conform to ASTM C494, Type S. The admixture shall retain concrete workability without affecting time of setting or early-age strength development. Acceptable products are "MasterSure Z 60" by Master Builders Solutions, ViscoFlow-2020 by Sika Corporation, PLASTOL AMP-X3 by Euclid Chemical Company, or equal.

6. A crystalline permeability reducing admixture shall be used where specifically indicated on the Drawings or required herein. The admixture shall conform to ASTM C494, Type S. The admixture shall be of the crystalline type that chemically controls and permanently establishes a non-soluble crystalline structure throughout the capillary voids and cracks within the concrete. The crystalline structure shall assist in sealing the concrete to minimize both infiltration and exfiltration of liquids from any direction. The admixture shall be capable of sealing hairline cracks and resisting hydrostatic pressure. Acceptable products are "Xypex Admix C-500 NF" by Xypex Chemical Corporation, "MasterLife® 300 Series" by Master Builders Solutions, and "Krystol Internal Membrane (KIM)" by Kryton International Inc. Submit certified letter from manufacturer of crystalline admixture stating required dosage rate for job specific concrete mix. Concrete truck ticket shall confirm crystalline admixture was included in concrete being placed.

7. A shrinkage reducing admixture shall be used where specifically indicated on the Drawing or required herein. The admixture shall confirm to ASTM C494, Type S. Acceptable products include MasterLife SRA 035 by Master Builders, ECLIPSE 4500 by GCP Applied Technologies, Eucon SRA-XT by Euclid Chemical Company, SikaControl-75 by Sika Corporation, or equal.

D. Admixtures containing calcium chloride, thiocyanate or more than 0.05 percent chloride ions are not permitted. The addition of admixtures to prevent freezing is not permitted.

E. The Contractor shall submit manufacturer's data including the chloride ion content of each admixture and certification from the admixture manufacturer that all admixtures utilized in the design mix are compatible with one another and properly proportioned prior to mix design review.

2.10 CONCRETE MIX DESIGN

A. The proportions of cement, aggregates, admixtures, and water used in the concrete mixes shall be based on laboratory trial mixes in conformance with ACI 301. Trial mixes shall also conform to Article 3.01 of this Specification. Trial mix data used as the basis for the proposed concrete mix design shall be submitted to the Engineer along with the proposed mix.

B. Structural concrete shall conform to the following requirements. Cementitious materials refer to the total combined weight of all cement, fly ash, and slag cement contained in the mix.

1. Compressive Strength (28-Day)

Concrete Class A1, A2, A3, A4	4,500 psi (min.), 6,500 psi (max.)
Concrete Class B	3,000 psi (min.), 5,000 psi (max.)

2. Water/cementitious materials ratio, by weight

	Maximum	**Minimum**
Concrete Class A1, A2, A3, A4	0.42	0.39
Concrete Class B	0.50	0.39

3. Slump range

a. 4" nominal unless high range water reducing admixture is used.

b. 10” max if high range water reducing admixture is used.

4. Air Content

Concrete Class A1, A2, A4	3% ±1.5% (non-air - entrained)
Concrete Class A3, B	3% Max (non-air-entrained)

PART 3 – EXECUTION

3.01 TRIAL MIXES

A. Trial mixes shall be used to confirm the quality of a proposed concrete mix in accordance with ACI 301. An independent qualified testing laboratory designated and retained by the Contractor shall test a trial batch of each of the preliminary concrete mixes submitted by the Contractor. The trial batches shall be prepared using the aggregates, cement, supplementary cementitious materials, and admixtures proposed for the project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain enough samples to satisfy requirements stated below. Tests on individual materials stated in PRODUCTS should already be performed before any trial mix is done. The cost of laboratory trial batch tests for each specified concrete mix will be borne by the Contractor and the Contractor shall furnish and deliver the materials to the testing laboratory at no cost to the Owner.

B. The independent testing laboratory shall prepare a minimum of fifteen (15) standard test cylinders in accordance with ASTM C31 in addition to conducting slump (ASTM C143), air content (ASTM C231) and density (ASTM C138) tests. Compressive strength test on the cylinders shall subsequently be performed by the same laboratory in accordance with ASTM C39 as follows: Test 3 cylinders at age 7 days; test 3 cylinders at age 21 days; test 3 cylinders at age 28 days and test 3 cylinders at 56 days. The cylinders shall be carefully identified as "Trial Mix, Contract No. “. If the average 28-day compressive strength of the trial mix is less than that specified, or if any single cylinder falls below the required strength by more than 500 psi, the mix shall be corrected, another trial batch prepared, test cylinders taken, and new tests performed as before. Any such additional trial batch testing required shall be performed at no additional cost to the Owner. Adjustments to the mix shall be considered refinements to the mix design and shall not be the basis for extra compensation to the Contractor.

3.02 FIELD EXPERIENCE RECORDS

A. When field experience records are provided in lieu of trial mixes for proposed concrete mixes, field experience records shall meet the following criteria:

1. Field experience records shall have been obtained within the past 24 months from project Notice to Proceed and shall have occurred over a duration of no less than 45 calendar days.

2. Field experience records shall be based on data from a single group of at least 15 consecutive compressive strength tests or two groups of consecutive compressive strength tests totaling at least 30 tests with neither of the two groups consisting of fewer than 10 tests.

3. Concrete for field experience records shall have the same mix proportions and properties as the proposed concrete mix, including compressive strength and air content within a range of 4.5% to 7.5%.

4. Concrete for field experience records shall have identical material sources as the proposed concrete mix. These materials shall include cement, fly ash, slag cement, coarse aggregates, fine aggregates, and admixtures.

5. If all criteria for field experience records cannot be met, the contractor shall perform trial mixes for the proposed concrete mixes.

3.03 SHRINKAGE TESTS

A. Concurrent with the trial batch requirements stated in Article 3.01, the testing laboratory shall perform drying shrinkage tests for the trial batches as specified herein. Shrinkage testing is only required for concrete to be used for environmental concrete structures (Class A1).

B. Fabricate, cure, dry, and measure specimens in accordance with ASTM C157 modified as follows:

1. Remove specimens from molds at an age of 23 hours ± 1 hour after trial batching.

2. Place specimens immediately in water at 70 °F ± 3 °F for at least 30 minutes.

3. Measure within 30 minutes thereafter to determine original length, then submerge in saturated lime water at 73 °F ± 3 °F.

4. At age seven days, measure to determine expansion, expressed as a percentage of original length. This length at age seven days shall be the base length for drying shrinkage calculations (zero days' drying age).

5. Store specimens immediately in a humidity-controlled room maintained at 73 °F ± 3 °F and 50 percent ± 4 percent relative humidity for the remainder of the test.

6. Make and report separately measurements to determine shrinkage expressed as base length percentage for 7, 14, 21, and 28 days of drying after 7 days of moist curing.

C. Compute the drying shrinkage deformation for each specimen as the difference between the base length (at zero days' drying age) and the length after drying at each test age. Compute the average drying shrinkage deformation for the specimens to the nearest 0.0001 inch at each test age. If the drying shrinkage for any specimen departs from the average test age for that test by more than 0.0004 inch, disregard the results obtained from that specimen. Report results from the shrinkage test to the nearest 0.001 percent of shrinkage. Take compression test specimens in each case from the same concrete used for preparing drying shrinkage specimens. These tests shall be considered part of the normal compression tests for the project.

D. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-day drying age or at 28-day drying age, shall be 0.036 or 0.042 percent, respectively. Use a mix design for construction that has first met the trial batch shrinkage requirements.

E. If the trial batch specimens do not meet both the strength and shrinkage requirements, revise the mix designs and/or materials and retest.

3.04 PRODUCTION OF CONCRETE

A. All concrete shall be machine mixed. Hand mixing of concrete will not be permitted. The Contractor may supply concrete from a ready-mix concrete plant or from a site mixed plant. In selecting the source for concrete production, the Contractor shall carefully consider its capability for providing quality concrete at a rate commensurate with the

requirements of the placements so that well bonded, homogenous concrete, free of cold joints, is assured.

B. Ready-Mixed Concrete

1. At the Contractor's option, ready-mixed concrete may be used meeting the requirements for materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C94.

2. Truck mixers shall be equipped with electrically actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.

3. Each batch of concrete shall be mixed in a truck mixer for not less than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

4. Truck mixers and their operation shall be such that the concrete throughout the mixed batch, as discharged, is within acceptable limits of uniformity with respect to consistency, mix and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than one inch when the specified slump is 3 inches or less, or if they differ by more than 2 inches when the specified slump is more than 3 inches, the mixer shall not be used on the work unless the causing condition is corrected and satisfactory performance is verified by additional slump tests. All mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

5. Ready-mixed concrete shall be delivered to the site for the work and discharge shall be completed within the time requirements stated in Article 3.05 of this Section.

6. Every concrete delivery shall be accompanied by a delivery ticket containing at least the following information:

a. Date and truck number

b. Ticket number

c. Mix designation of concrete

d. Cubic yards of concrete

e. Cement brand, type, and weight in pounds

f. Weight in pounds of fine aggregate (sand)

g. Weight in pounds of coarse aggregate (stone)

h. Air entraining agent, brand, and weight in pounds and ounces

i. Other admixtures, brand, and weight in pounds and ounces

j. Water, in gallons, stored in attached tank

k. Water, in gallons, maximum that can be added without exceeding design water/cementitious materials ratio

l. Water, in gallons, used (by truck driver)

m. Time of loading

n. Time of delivery to job (by truck driver)

7. Any truck delivering concrete to the job site, which is not accompanied by a delivery ticket showing the above information will be rejected and such truck shall immediately depart from the job site.

8. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to inspection at the batching plant by the Engineer.

C. Site Mixed Concrete

1. Site Mixed Concrete shall only be used where specifically approved by the Engineer.

2. Scales for weighing concrete ingredients shall be accurate when in use within ±0.4 percent of their total capacities. Standard test weights shall be available to permit checking scale accuracy.

3. Operation of batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances:

a. Cement, fly ash, or slag cement ± 1 percent

b.	Water	± 1 percent
c.	Aggregates	± 2 percent
d.	Admixtures	± 3 percent

4. Each batch shall be so charged into the mixer that some water will enter in advance of the cement and aggregates. Water shall continue for a period which may extend to the end of the first 25 percent of the specified mixing time. Controls shall be provided to prevent batched ingredients from entering the mixer before the previous batch has been completely discharged.

5. The concrete shall be mixed in a batch mixer capable of thoroughly combining the aggregates, cement, and water into a uniform mass within the specified mixing time, and of discharging the concrete without harmful segregation. The mixer shall bear a manufacturer's rating plate indicating the rate capacity and the recommended revolutions per minute and shall be operated in accordance therewith.

6. Mixers with a rated capacity of one cubic yard or larger shall conform to the requirements of the Plant Mixer Manufacturers' Division of the Concrete Plant Manufacturers' Bureau.

7. Except as provided below, batches of one cubic yard or less shall be mixed for not less than one minute. The mixing time shall be increased 15 seconds for each cubic yard or fraction thereof of additional capacity.

8. Shorter mixing time may be permitted provided performance tests made in accordance with of ASTM C94 indicate that the time is sufficient to produce uniform concrete.

9. Controls shall be provided to ensure that the batch cannot be discharged until the required mixing time has elapsed. At least three-quarters of the required mixing time shall take place after the last of the mixing water has been added.

10. The interior of the mixer shall be free of accumulations that will interfere with mixing action. Mixer blades shall be replaced when they have lost 10 percent of their original height.

11. Air-entraining admixtures and other chemical admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured by volume if recommended by the manufacturer.

12. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.

13. Addition of retarding admixtures shall be completed within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Retarding admixtures shall not be used unless approved by the Engineer.

14. Concrete shall be mixed only in quantities for immediate use and within the time and mixing requirements of ASTM C94.

3.05 CONCRETE PLACEMENT

A. No concrete shall be placed prior to approval of the concrete mix design. Concrete placement shall conform to the recommendations of ACI 304.

B. Prior to concrete placement, all reinforcement shall be securely and properly fastened in its correct position. Formwork shall be clean, oiled and form ties at construction joints shall be retightened. All bucks, sleeves, castings, hangers, pipe, conduits, bolts, anchors, wire, and any other fixtures required to be embedded therein shall be in place. Forms for openings to be left in the concrete shall be in place and anchored by the Contractor. All loose debris in bottoms of forms or in keyways shall be removed and all debris, water, snow, ice, and foreign matter shall be removed from the space to be occupied by the concrete. The Contractor shall notify the Engineer in advance of placement, allowing sufficient time for a concurrent inspection and for any corrective measures required.

C. On horizontal joints where concrete is to be placed on hardened concrete, flowing concrete containing a high range water reducing admixture shall be placed with a slump not less than 8 inches for the initial placement at the base of the wall. Concrete or cement grout shall meet all strength and service requirements specified herein for applicable class of concrete. This concrete shall be worked well into the irregularities of the hard surface.

D. All concrete shall be placed during the daylight hours except with the consent of the Engineer. If special permission is obtained to carry on work during the night, adequate lighting must be provided.

E. When concrete arrives at the project with slump below that suitable for placing, as indicated by the Specifications, water may be added to bring the concrete within the specified slump range provided the design water-cementitious materials ratio is not exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. Water may be added only to full trucks. On-site tempering shall not relieve the Contractor from furnishing a concrete mix meeting all specified requirements.

F. Concrete shall be conveyed as rapidly as practical to the point of deposit by methods which prevent the separation or loss of the ingredients. The concrete shall be deposited so that additional handling will be unnecessary. Discharge of the concrete to its point of deposit shall be completed within 90 minutes after the addition of the cement to the aggregates unless workability-retaining admixtures are included and approved by the Engineer. In hot weather, or under conditions contributing to quick stiffening of the concrete, the time between the introduction of the cement to the aggregates and discharge shall not exceed the requirements stated in Article 3.11 of this Section.

G. Where concrete is conveyed to position by chutes, a continuous flow in the chute shall be maintained. The angle and discharge arrangement of the chute shall be such to prevent segregation of the concrete ingredients. The delivery end of the chute shall be as close as possible to the point of deposit and in no case shall the free pour from the delivery end of the chute exceed five feet, unless approved otherwise.

H. Special care must be exercised to prevent splashing of forms or reinforcement with concrete, and any such splashes or accumulations of hardened or partially hardened concrete on the forms or reinforcement above the general level of the concrete already in place must be removed before the work proceeds.

I. Placing of concrete shall be regulated so the pressure caused by the wet concrete shall not exceed that used in the design of the forms.

J. All concrete for walls shall be placed through openings in the form spaced at frequent intervals or through tremies (heavy duct canvas, rubber, etc.), equipped with suitable hopper heads. Tremies shall be of variable lengths so the free fall shall not exceed five (5) feet, and enough tremies shall be placed in the form to ensure the concrete remains level.

K. When placing concrete which will be exposed, sufficient illumination shall be provided in the interior of the forms so the concrete, at places of deposit, is visible from deck and runways.

L. Concrete shall be placed to thoroughly embed all reinforcement, inserts, and fixtures.

M. When forms are removed, surfaces shall be even and dense, free from aggregate pockets or honeycomb. Concrete shall be consolidated using mechanical vibration, supplemented by forking and spading by hand in the corners and angle of forms and along form surfaces while the concrete is plastic under the vibratory action. Consolidation shall conform to ACI 309.

N. Mechanical vibration shall be applied directly to the concrete, unless otherwise approved by the Engineer. The bottom of vibrators used on floor slabs must not be permitted to ride the form supporting the slab. Vibration shall be applied at the point of deposit and in freshly placed concrete by a vertical penetration of the vibrator. Vibrators shall not be used to move concrete laterally within the forms.

O. The intensity of vibration shall be sufficient to cause settlement of the concrete into place and to produce monolithic joining with the preceding layer. Vibration shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures with a vibrator transmitting not less than 7,500 impulses per minute. Since the duration of vibration per square foot of surface is dependent on the frequency (impulses per minute), size of vibrator, and slump of concrete, the length of time must therefore be determined in the field. Vibration shall not be continued in any one location to the extent that pools of grout are formed.

P. Care shall be taken to prevent cold joints when placing concrete in any portion of the work. The concrete placing rate shall ensure that each layer is placed while the previous layer is soft or plastic, so the two layers can be made monolithic by penetration of the vibrators. Maximum thickness of concrete layers shall be 18 inches. The surface of the concrete shall be level whenever a run of concrete is stopped.

Q. To prevent featheredges, construction joints located at the tops of horizontal lifts near sloping exposed concrete surfaces shall be inclined near the exposed surface, so the angle between such inclined surface and the exposed concrete surface will be not less than 50°.

R. In placing unformed concrete on slopes, the concrete shall be placed ahead of a non-vibrated slip-form screed extending approximately 2-1/2 feet back from its leading edge. The method of placement shall provide a uniform finished surface with the deviation from the straight line less than 1/8 inch in any concrete placement. Concrete ahead of the slip-form screed shall be consolidated by internal vibrators to ensure complete filling under the slip-form. Prior to placement of concrete on sloped walls or slabs, the Contractor shall submit a plan specifically detailing methods and sequence of placements, proposed concrete screed equipment, location of construction joints and water stops, and/or any proposed deviations from the stated requirements to the Engineer for review and approval.

S. Concrete shall not be placed during rains sufficiently heavy or prolonged to prevent washing of mortar from coarse aggregate on the forward slopes of the placement. Once placement of concrete has commenced in a block, placement shall not be interrupted by diverting the placing equipment to other uses.

3.06 PLACING FLOOR SLABS ON GROUND

A. The subgrade for slabs on ground shall be well drained and of adequate and uniform loadbearing nature. The in-place density of the subgrade soils shall be at least the minimum required by the specifications. No foundation, slab, or pavement concrete shall be placed until the depth and character of the foundation soils have been inspected and approved by the materials testing consultant.

B. The subgrade shall be free of frost before concrete placing begins. If the temperature inside a building where concrete is to be placed is below freezing, the temperature shall be raised and maintained above 50° long enough to remove all frost from the subgrade.

C. The subgrade shall be moist at the time of concreting. If necessary, the subgrade shall be dampened with water in advance of concreting, but no free water shall remain standing on the subgrade nor any muddy or soft spots when the concrete is placed.

D. Thirty-pound felt-paper shall be provided between edges of slabs-on-ground and vertical and horizontal concrete surfaces, unless otherwise indicated on the Drawings.

E. Contraction joints shall be provided in slabs-on-ground at locations indicated on the Drawings. Contraction joints shall be installed as per Section 03 15 16 – Joints in Concrete.

F. Floor slabs shall be screeded level or pitched to drain as indicated on the Drawings. Finishes shall conform with requirements of Section 03 35 00 – Concrete Finishes. Interior floor slabs shall be placed with non-air-entrained concrete (Class A3) if a steel troweled or hardened finish is required.

3.07 PLACING CONCRETE UNDERWATER (CLASS A5 CONCRETE)

A. Placing concrete underwater (tremie concrete) will be permitted only when shown on the Drawings. Concrete deposited under water shall be carefully placed in a compacted mass in final position by means of a tremie, a closed bottom dump bucket or other approved method. Care must be exercised to maintain still water at the point of deposit. Concrete shall not be placed in running water. Underwater formwork shall be watertight. The consistency of the concrete shall be regulated to prevent segregation of materials. The method of depositing concrete shall be regulated such that the concrete enters the mass of the previously placed concrete from within, displacing water with a minimum disturbance to the surface of the concrete.

B. Tremie shall consist of a tube having a diameter of not less than 10 inches and constructed in sections having flanged couplings fitted with gaskets. The tremie shall be supported to permit free movement of the discharge and over the entire top surface of the work and shall permit rapid lowering when necessary to choke off or retard the flow. The discharge end shall be sealed, and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised, but not out of the concrete at the bottom, until the batch discharges to the bottom of the hopper. The flow shall then be stopped by lowering the tremie. The flow shall be continuous until the placement has been completed.

3.08 PLACING CONCRETE UNDER PRESSURE

A. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall have the capacity for the operation. The operation of the pump shall

produce a continuous stream of concrete without air pockets. To obtain the least line resistance, the layout of the pipeline system shall contain minimum bends with no change in pipe size. If two sizes of pipe must be used, the smaller diameter should be used at the pump end and the larger at the discharge end. When pumping is completed, the concrete remaining in the pipelines shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients.

B. Priming of the concrete pumping equipment shall be with cement grout only. Use of specialty mix pump primers or pumping aids will not be allowed.

C. No aluminum parts shall be in contact with the concrete during the placing of concrete under pressure.

D. Prior to placing concrete under pressure, the Contractor shall submit the concrete mix design together with test results from a material's testing consultant proving the proposed mix meets all requirements. In addition, an actual pumping test under field conditions is required prior to acceptance of the mix. This test requires a duplication of anticipated site conditions from beginning to end. The batching and truck mixing shall be the same as will be used during construction, and the pipe and pipe layouts will reflect the maximum height and distance contemplated. All submissions shall be subject to approval by the Engineer.

E. If the pumped concrete does not produce satisfactory end results, the Contractor shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

F. The pumping equipment must have two cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the Contractor may have a standby pump on the site during pumping.

G. The minimum diameter of the hose (conduits) shall be four inches.

H. Pumping equipment and hoses (conduits) that are not functioning properly shall be replaced.

I. Concrete samples for quality control in accordance with Article 3.12 will be taken at the placement (discharge) end of the line.

3.09 ORDER OF PLACING CONCRETE

A. To minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints shown on the Drawings and maximum lengths as indicated on Drawings. Where required on the Drawings and wherever else practical, the placing of such units shall be done in a strip pattern in accordance with ACI 302.1. A minimum of 72 hours shall pass prior to placing concrete directly adjacent to previously placed concrete.

3.10 CONCRETE WORK IN COLD WEATHER

A. Cold weather concreting procedures shall conform to the requirements of ACI 306.1.

B. The Engineer may prohibit the placing of concrete at any time when air temperature is 40°F. or lower. If concrete work is permitted, the concrete shall have a minimum temperature, as placed, of 55°F. for placements less than 12" thick, 50°F. for placements 12" to 36" thick, and 45°F. for placements greater than 36" thick. The temperature of the concrete as placed shall not exceed these minimum values by more than 20°F, unless otherwise approved by the Engineer.

C. All aggregate and water shall be preheated. Precautions shall be taken to avoid the possibility of flash set when aggregate or water are heated to a temperature greater than 100°F. to meet concrete temperature requirements. The addition of admixtures to the concrete to prevent freezing is not permitted. All reinforcement, forms, and concrete accessories shall be defrosted by an approved method. No concrete shall be placed on frozen ground.

3.11 CONCRETE WORK IN HOT WEATHER

A. Hot weather concreting procedures shall conform to the requirements of ACI 305.1.

B. When air temperatures exceed 85°F., or when extremely dry or high wind conditions exist even at lower temperatures, the Contractor and the Contractor’s concrete supplier shall exercise special and precautionary measures in preparing, delivering, placing, finishing, curing, and protecting the concrete mix. The Contractor shall consult with the Engineer regarding such measures prior to each day's placing operation, and the Engineer reserves the right to modify the proposed measures consistent with the requirements herein. All necessary materials and equipment shall be in place prior to each placing operation.

C. Preparatory work at the job site shall include thorough wetting of all forms, reinforcing steel and, in the case of slab pours on ground or subgrade, spraying the ground surface on the preceding evening and again just prior to placing. No standing puddles of water shall be permitted in those areas which are to receive the concrete.

D. The temperature of the concrete mix when placed shall not exceed 95°F.

E. Temperature of mixing water and aggregates shall be carefully controlled and monitored at the supplier's plant, with haul distance to the job site being considered. Stockpiled aggregates shall be shaded from the sun and sprinkled intermittently with water. If ice is used in the mixing water for cooling purposes, the ice must be entirely melted prior to addition of the water to the dry mix.

F. Delivery schedules shall be carefully considered in advance to ensure concrete is placed as soon as practical after mixing. For hot weather concrete work (air temperature greater

than 85°F), discharge of the concrete to its point of deposit shall be completed within 60 minutes from the time the concrete is batched, unless workability-retaining admixtures are included and approved by the Engineer.

G. The Contractor shall arrange for an ample work force to be on hand to accomplish transporting, vibrating, finishing, and covering of the fresh concrete as rapidly as possible.

3.12 QUALITY CONTROL

A. Field Testing of Concrete

1. The Contractor shall coordinate with the Engineer's project representative the on-site scheduling of the materials testing consultant personnel as required for concrete testing.

2. Concrete for testing shall be supplied by the Contractor at no additional cost to the Owner, and the Contractor shall assist the materials testing consultant in obtaining samples. The Contractor shall dispose of and clean up all excess material.

B. Consistency

1. The consistency of the concrete will be checked by the materials testing consultant by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Engineer and/or the materials testing consultant may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for any delays, material, or labor costs due to such occurrences.

2. Slump tests shall be made in accordance with ASTM C143. Slump tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

3. Concrete with a specified nominal slump shall be placed having a slump within 1” (higher or lower) of the specified slump. Concrete with a specified maximum slump shall be placed having a slump less than the specified slump.

C. Density

1. Samples of freshly mixed concrete shall be tested for density by the materials testing consultant in accordance with ASTM C138.

2. Density tests will be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.

D. Air Content

1. Samples of freshly mixed concrete will be tested for entrained air content by the materials testing consultant in accordance with ASTM C231.

2. Air content tests will be performed as deemed necessary by the materials testing consultant and each time compressive strength samples are taken.

3. In the event test results are outside the limits specified, additional testing shall occur. Admixture quantity adjustments shall be made immediately upon discovery of incorrect air entrainment.

E. Compressive Strength

1. Samples of freshly mixed concrete will be taken by the materials testing consultant and tested for compressive strength in accordance with ASTM C172, C31, and C39, except as modified herein.

2. In general, one sampling shall be taken for each placement more than five (5) cubic yards, with a minimum of one (1) sampling for each day of concrete placement operations, or for each one hundred (100) cubic yards of concrete, or for each 5,000 square feet of surface area for slabs or walls, whichever is greater. If total volume of concrete is such that frequency of testing would provide fewer than five (5) strength tests for a given concrete class, strength test specimens shall be made from at least five (5) randomly selected batches or from each batch if fewer than five (5) batches are used.

3. Each sampling shall consist of at least five (5) 6x12 cylinders or (8) 4x8 cylinders. Each cylinder shall be identified by a tag, which shall be hooked or wired to the side of the container. The materials testing consultant will fill out the required information on the tag, and the Contractor shall satisfy themselves that such information shown is correct.

4. The Contractor shall be required to furnish labor to the Owner for assisting in preparing test cylinders. The Contractor shall provide approved curing boxes for storage of cylinders on site. The insulated curing box shall be of sufficient size and strength to contain all the cylinders made in any four consecutive working days and to protect the specimens from falling over, being jarred, or otherwise disturbed during the period of initial curing. The box shall be erected, furnished, and maintained by the Contractor. The box shall be equipped to provide the moisture conditions and to regulate the temperature necessary to maintain the proper curing conditions required by ASTM C31. The curing box shall be placed in an area free from vibration such as pile driving and traffic of all kinds and such that all cylinders are shielded from direct sunlight and/or radiant heating sources. No concrete requiring testing shall be delivered to the site until the storage curing box has been provided. Cylinders shall remain undisturbed in the curing box until ready for delivery to the testing laboratory, but not less than sixteen hours.

5. The Contractor shall be responsible for maintaining the temperatures of the curing box during the initial curing of cylinders with the temperature preserved between 60°F and 80°F as measured by a maximum-minimum thermometer. The Contractor shall maintain a written record of curing box temperatures for each day the curing box contains cylinders. Temperature shall be recorded a minimum of three times a day with one recording at the start of the day and one recording at the end of the day.

6. When transported, the cylinders shall not be thrown, dropped, allowed to roll, or be damaged in any way.

7. Compression tests shall be performed in accordance with ASTM C39. For 6x12 cylinders, two test cylinders will be tested at seven days and two at 28 days. For 4x8 cylinders, three test cylinders will be tested at seven days, three at 28 days. The remaining cylinders will be held to verify test results, if needed.

F. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 214, ACI 318, and ACI 350.

2. The strength level of concrete will be considered satisfactory if the following conditions are satisfied.

   a. Every arithmetic average of any three consecutive strength tests equals or exceeds the minimum specified 28-day compressive strength for the mix (see Article 2.11).

   b. No individual compressive strength test result falls below the minimum specified strength by more than 500 psi.

3. If any of the conditions listed above are not met, the mix proportions shall be corrected for the next concrete placing operation.

4. If condition 3.12.F.2.b is not met, additional tests in accordance with Article 3.12, Paragraph H shall be performed.

5. When a ratio between 7-day and 28-day strengths has been established by these tests, the 7-day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths. Should the 7-day test strength from any sampling be more than 10% below the established minimum strength, the Contractor shall:

   a. Immediately provide additional periods of curing in the affected area from which the deficient test cylinders were taken.

   b. Maintain or add temporary structural support as required.

c. Correct the mix for the next concrete placement operation, if required to remedy the situation.

6. All concrete which fails to meet the ACI requirements, and these specifications is subject to removal and replacement at no additional cost to the Owner.

G. When non-compliant concrete is identified, test reports shall be sent immediately to the Engineer for review.

H. Additional Tests

1. When ordered by the Engineer, additional tests on in-place concrete shall be provided and paid for by the Contractor.

2. If the 28-day test cylinders fail to meet the minimum strength requirements as outlined in Article 3.12, Paragraph F, the Contractor shall have concrete core specimens obtained and tested from the affected area immediately.

a. Three cores shall be taken for each sample in which the strength requirements were not met.

b. The drilled cores shall be obtained and tested in conformance with ASTM C42. The tests shall be conducted by a materials testing consultant approved by the Engineer.

c. The location from which each core is taken shall be approved by the Engineer. Each core specimen shall be located, when possible, so its axis is perpendicular to the concrete surface and not near formed joints or obvious edges of a unit of deposit.

d. The core specimens shall be taken, if possible, so no reinforcing steel is within the confines of the core.

e. The diameter of core specimens should be at least 3 times the maximum nominal size of the coarse aggregate used in the concrete but must be at least 2-inches in diameter.

f. The length of specimen, when capped, shall be at least twice the diameter of the specimen.

g. The core specimens shall be taken to the laboratory and when transported, shall not be thrown, dropped, allowed to roll, or damaged in any way.

h. Two (2) copies of test results shall be mailed directly to the Engineer. The concrete in question will be considered acceptable if the average compressive strength of a minimum of three test core specimens taken from

a given area equal or exceed 85% of the specified 28-day strength and if the lowest core strength is greater than 75% of the specified 28-day strength.

3. If the concrete placed by the Contractor is suspected of not having proper air content, the Contractor shall engage a materials testing consultant approved by the Engineer, to obtain and test samples for air content in accordance with ASTM C457.

3.13 CARE AND REPAIR OF CONCRETE

A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Care shall be exercised to avoid jarring forms or placing any strain on the ends of projecting reinforcing bars. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at no additional cost to the Owner.

B. Areas of honeycomb shall be chipped back to sound concrete and repaired as directed.

C. Concrete formwork blowouts or unacceptable deviations in tolerances for formed surfaces due to improperly constructed or misaligned formwork shall be repaired as directed. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and redressed as directed.

D. Areas of concrete in which cracking, spalling, or other signs of deterioration develop prior to final acceptance shall be removed and replaced or repaired as directed. This stipulation includes concrete that has experienced cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an approved epoxy injection system. Non-structural cracks shall be repaired using an approved hydrophilic resin pressure injected grout system unless other means of repair are deemed necessary and approved. All repair work shall be performed at no additional cost to the Owner.

E. Concrete which fails to meet the strength requirements as outlined in Article 3.12, Paragraph F, will be analyzed as to its adequacy based upon loading conditions, resultant stresses, and exposure conditions for the area of concrete in question. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Contractor at no additional cost to the Owner. The method of strengthening or extent of replacement shall be as directed by the Engineer.

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SECTION 03 39 00
CONCRETE CURING

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. Protect all freshly deposited concrete from premature drying and from the weather elements. The concrete shall be maintained with minimal moisture loss at a relatively constant temperature for a period necessary for the hydration of the cement and proper hardening of the concrete in accordance with the requirements specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 11 00 – Concrete Formwork

B. Section 03 30 00 – Cast-In-Place Concrete

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. ACI 301 – Specifications for Structural Concrete
2. ACI 304 – Guide for Measuring, Mixing, Transporting, and Placing Concrete
3. ACI 305.1 – Specification for Hot Weather Concreting
4. ACI 306.1 – Standard Specification for Cold Weather Concreting
5. ACI 308.1 – Specification for Curing Concrete
6. ASTM C171 – Standard Specifications for Sheet Materials for Curing Concrete
7. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
8. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00 – Submittal Procedures.

1. Proposed procedures for protection of concrete under wet weather placement conditions.

2. Proposed normal procedures for protection and curing of concrete.

3. Proposed special procedures for protection and curing of concrete under hot and cold weather conditions.

4. Proposed method of measuring concrete surface temperature changes.

5. Manufacturer's literature and material certification for proposed curing compounds.

PART 2 – PRODUCTS

2.01 LIQUID MEMBRANE-FORMING CURING COMPOUND

A. Clear curing and sealing compound shall be a clear styrene acrylate type complying with ASTM C 1315, Type 1, Class A with a minimum solids content of 30%. Moisture loss shall not be greater than 0.40 kg/m2 when applied at manufacturer’s recommended volume for square feet of area. Manufacturer’s certification is required. Acceptable products are Super Diamond Clear VOX by the Euclid Chemical Company.

B. Where specifically approved by Engineer, on slabs to receive subsequent applied finishes, compound shall conform to ASTM C 309. Acceptable products are “Kurez DR VOX” or “Kurez W VOX” by the Euclid Chemical Company. Install in strict accordance with manufacturer’s requirements.

2.02 EVAPORATION REDUCER

A. Evaporation reducer shall be "MasterKure ER 50” by Master Builders Solutions, or "Euco-Bar" by Euclid Chemical Company.

PART 3 – EXECUTION

3.01 PROTECTION AND CURING

A. All freshly placed concrete shall be protected from the elements, flowing water and from defacement of any nature during construction operations.

B. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provisions shall be made for maintaining the concrete in a moist

condition for at least a 7-day period thereafter, except for high early strength concrete, for which the period shall be at least the first three days after placement. Horizontal surfaces shall be kept covered, and intermittent, and localized drying will not be permitted.

C. Walls that will be exposed on one side with either fluid or earth backfill on the opposite side shall be continuously wet cured for a minimum of seven days. Use of a curing compound will not be acceptable for applications of this type.

D. The Contractor shall use one of the following methods to ensure that the concrete remains in a moist condition for the minimum period stated above.

1. Ponding or continuous fogging or sprinkling.

2. Application of mats or fabric kept continuously wet.

3. Continuous application of steam (under 150°F).

4. Application of sheet materials conforming to ASTM C171.

5. If approved by the Engineer, application of a curing compound in accordance with Article 3.04.

E. The Contractor shall keep absorbent wood forms wet until they are removed. After form removal, the concrete shall be cured by one of the methods in paragraph D.

F. Any of the curing procedures used in Paragraph 3.01-D may be replaced by one of the other curing procedures listed in Paragraph 3.01-D after the concrete is one-day old. However, the concrete surface shall not be permitted to become dry at any time.

3.02 CURING CONCRETE UNDER COLD WEATHER CONDITIONS

A. Suitable means shall be provided for a minimum of 72 hours after placing concrete to maintain it at or above the minimum as placed temperatures specified in Section 03 30 00 – Cast-In-Place Concrete, for concrete work in cold weather. During the 72-hour period, the concrete surface shall not be exposed to air more than 20°F above the minimum as placed temperatures.

B. Stripping time for forms and supports shall be increased as necessary to allow for retardation in concrete strength caused by colder temperatures. This retardation is magnified when using concrete made with blended cements or containing fly ash or slag cement. Therefore, curing times and stripping times shall be further increased as necessary when using these types of concrete.

C. The methods of protecting the concrete shall be approved by the Engineer and shall be such as will prevent local drying. Equipment and materials approved for this purpose

shall be on the site in sufficient quantity before the work begins. The Contractor shall assist the Engineer by providing holes in the forms and the concrete in which thermometers can be placed to determine the adequacy of heating and protection. All such thermometers shall be furnished by the Contractor in quantity and type which the Engineer directs.

D. Curing procedures during cold weather conditions shall conform to the requirements of ACI 306.

3.03 CURING CONCRETE UNDER HOT WEATHER CONDITIONS

A. When air temperatures exceed 85°F, the Contractor shall take extra care in placing and finishing techniques to avoid formation of cold joints and plastic shrinkage cracking. If ordered by the Engineer, temporary sunshades and/or windbreakers shall be erected to guard against such developments, including generous use of wet burlap coverings and fog sprays to prevent drying out of the exposed concrete surfaces.

B. Immediately after screeding, horizontal surfaces shall receive an application of evaporation reducer. Apply in accordance with manufacturer's instructions. Final finish work shall begin as soon as the mix has stiffened sufficiently to support the workmen.

C. Curing and protection of the concrete shall begin immediately after completion of the finishing operation. Continuous moist-curing consisting of method 1 or 2 listed in paragraph 3.01D is mandatory for at least the first 24 hours. Method 2 may be used only if the finished surface is not marred or blemished during contact with the coverings.

D. At the end of the initial 24-hour period, curing and protection of the concrete shall continue for at least six (6) additional days using one of the methods listed in paragraph 3.01D.

E. Curing procedures during hot weather conditions shall conform to the requirements of ACI 305.

3.04 USE OF CURING COMPOUND

A. Curing compound shall be used only where specifically approved by the Engineer. Curing compound shall never be used for curing exposed walls with fluid or earth backfill on the opposite side. A continuous wet cure for a minimum of seven days is required for these applications. Curing compound shall not be used on surfaces exposed to water in potable water storage tanks and treatment plants unless curing compound is certified in accordance with ANSI/NSF Standard 61.

B. When permitted, the curing compound shall maintain the concrete in a moist condition for the required time, and the subsequent appearance of the concrete surface shall not be affected.

C. The compound shall be applied in strict accordance with the manufacturer's recommendations after water sheen has disappeared from the concrete surface and after finishing operations. Coverage rates for the curing and sealing compound shall be in strict accordance with manufacturer’s requirements for the specific type of finish required. For rough surfaces, apply in two directions at right angles to each other.

END OF SECTION

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SECTION 26 05 00
BASIC ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, materials, tools, and equipment, and perform all work and services necessary for, or incidental to, the furnishing and installation of all electrical work as shown on the Drawings, and as specified in accordance with the provisions of the Contract Documents and completely coordinate with the work of other trades involved in the general construction. Although such work is not specifically shown or specified, all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation shall be furnished and installed as part of this work. The Contractor shall obtain approved Shop Drawings showing wiring diagrams, connection diagrams, roughing-in, and hook-up details for all equipment and comply therewith. All electrical work shall be complete and left in operating condition in accordance with the intent of the Drawings and the Specifications for the electrical work.

B. Reference Section 40 61 13 – Process Control System General Provisions and General Requirements in Division 01 for scope of work details as they relate to the Division 40

C. The electrical scope of work for this project primarily includes, but is not limited to, the following:

1. Demolition of electrical equipment and raceway systems as shown on the Drawings.

2. Modifications to existing electrical equipment as shown on the Drawings and as specified herein.

3. Furnish and install new medium voltage less-flammable liquid-filled, pad-mount style transformers.

4. Furnish and install low-voltage motor control equipment, including new MCC-mounted VFDs in existing motor control centers, new MCC-mounted VFDs in new motor control centers, and wall-mounted VFDs. Modify existing MCCs as required to accommodate new equipment. Provide harmonic mitigation as required to comply with IEEE 519.

5. Furnish and install power panelboards, lighting panelboards, 600 V dry-type transformers, and other low-voltage electrical power distribution equipment.

6. Furnish and install all aboveground raceway systems, including conduit, fittings, boxes, supports, and other pertinent components.

7. Furnish and install all underground raceway systems, including conduit, fittings, manholes, handholes and other pertinent components.

8. Furnish and install all low and medium voltage wire and cable resulting in a complete and operable electrical system.

9. Furnish and install new lighting systems and wiring devices.

10. Furnish and install grounding systems as specified and indicated on the Drawings.

11. For each new building, provide a lightning protection system if required based on a lightning risk assessment performed in accordance with NFPA 780. The Contractor shall retain a qualified subcontractor to perform the assessment. If the assessment indicates that a system is warranted, furnish and install a complete lightning protection system in compliance with NFPA 780.

12. Furnish and install a fire alarm system in accordance with Section 28 46 20. The Contractor shall retain a qualified fire alarm subcontractor to perform all design, installation, and commissioning work in compliance with applicable local and national codes and subject to approval by the Authority Having Jurisdiction (AHJ).

13. Other electrical work as specified herein and indicated on the Drawings.

D. All material and equipment shall be the product of an established, reputable, and approved manufacturer; shall be new and of first-class construction; shall be designed and guaranteed to perform the service required; and shall bear a UL Listing or UL Recognition mark, where such approval is available for the product of the listed manufacturer as approved by the Engineer.

E. When a specified or indicated item has been superseded or is no longer available, the manufacturer's latest equivalent type or model of material or equipment as approved by the Engineer shall be furnished and installed at no additional cost to the Owner.

F. Where the Contractor's selection of equipment of specified manufacturers or additionally approved manufacturers requires changes or additions to the system design, the Contractor shall be responsible for all engineering, coordination, and construction changes required to accommodate the substituted equipment, subject to approval of the Engineer. The Contractor's bid shall include all costs for all work of the Contract for all trades made necessary by such changes, additions or modifications or resulting from any approved substitution.

G. Furnish and install all stands, racks, brackets, supports, and similar equipment required to properly serve the equipment which is furnished under this Contract, or equipment otherwise specified or indicated on the Drawings.

H. All electrical components and systems (e.g., conduit and other raceways, freestanding equipment, etc.) and their anchorage,, including electrical equipment foundations, shall be designed to resist the controlling load combination “per ASCE 7” of gravity loads, operational forces, wind forces, seismic forces, thermal loads, and any other applicable forces required in accordance with the governing Building Code and Section 01 73 23 – Anchorage and Bracing of Nonstructural Components. Seismic design of electrical nonstructural components shall be in accordance with ASCE 7 Chapter 13 unless the nonstructural component meets the criteria to be exempt.

1.02 EQUIPMENT LOCATION

A. The Drawings show the general location of feeders, transformers, equipment, devices, conduits, and circuit arrangements. Because of the small scale of the Drawings, it is not possible to indicate all the details involved. The Contractor shall carefully investigate the structural and finish conditions affecting the work and shall arrange such work accordingly. The Contractor shall furnish and install such fittings, junction boxes, and accessories as may be required to meet such conditions. The Contractor shall refer to the entire Drawing set to verify openings, special surfaces, and the location of other equipment, or other special equipment prior to roughing-in for panels, switches, and other outlets. The Contractor shall verify all equipment dimensions against site conditions to ensure proper fit, code clearances, and serviceability of installed equipment within the space indicated.

B. Where outlets are shown near identified equipment furnished by this or other Contractors, it is the intent of the Specifications and Drawings that the outlet be located at the equipment to be served. The Contractor shall coordinate the location of these outlets to be near the final location of the equipment served, regardless of whether the outlet is shown accurately on the Drawings.

1.03 LOCAL CONDITIONS

A. The Contractor shall examine the site and become familiar with conditions affecting the work. The Contractor shall investigate, determine, and verify locations of any overhead or buried utilities on or near the site, and shall determine such locations by coordinating with all public and private utility companies and with all authorities having jurisdiction (AHJs).

1.04 SUBMITTALS

A. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures and the requirements of the individual Specification Sections, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Operation and Maintenance Manuals

3. Spare Parts List

4. Proposed Testing Methods and Reports of Certified Shop Tests

5. Reports of Certified Field Tests

6. Manufacturer’s Representative’s Certification

B. Submittals shall be sufficiently complete in detail to enable the Engineer to determine compliance with Contract requirements.

C. Submittals will be approved only to the extent of the information shown. Approval of an item of equipment shall not be construed to mean approval for components of that item for which the Contractor has provided no information.

D. Some individual electrical specification sections may require a Compliance, Deviations, and Exceptions (CD&E) letter to be submitted. If the CD&E letter is required and shop drawings are submitted without the letter, the submittal will be rejected.

1. The CD&E letter shall include all comments, deviations, and exceptions taken to the Drawings and Specifications by the Contractor AND Equipment Manufacturer/Supplier.

2. This letter shall include a copy of the applicable specification section(s).

3. In the left margin beside each and every paragraph/item, a letter "C", "D", or "E" shall be typed or written in.

a. The letter "C" shall be in full compliance with the requirement.

b. The letter "D" shall be for a deviation from the requirement.

c. The letter "E" shall be for taking exception to a requirement.

4. Provide a typewritten explanation of each item marked with "D" or "E." Handwritten explanation of the deviations/exceptions is not acceptable.

5. The CD&E letter shall also address deviations and exceptions taken to each Drawing related to the applicable specification section(s).

E. Submit design for all nonstructural electrical components and systems and their anchorage in accordance with the governing Building Code and Section 01 73 23 – Anchorage and Bracing of Nonstructural Components.

1.05 APPLICABLE CODES AND REQUIREMENTS

A. Conformance

1. Unless otherwise noted, all work, equipment, and materials furnished shall conform with the latest available version of the rules, requirements, and specifications of the following:

a. Insurance Rating Organization having jurisdiction.

b. The serving electric utility company.

c. The currently adopted edition of the National Electrical Code (NEC).

d. The National Electric Manufacturers Association (NEMA).

e. The Institute of Electrical and Electronics Engineers (IEEE).

f. The Insulated Cable Engineers Association (ICEA).

g. ASTM International (formerly the American Society of Testing Materials).

h. The American National Standards Institute (ANSI).

i. The requirements of the Occupational Safety Hazards Act (OSHA).

j. The National Electrical Contractors Association (NECA) Standard of Installation.

k. National Fire Protection Association (NFPA).

l. InterNational Electrical Testing Association (NETA).

m. All other applicable Federal, State/Commonwealth, and local laws and ordinances.

2. All equipment and materials shall be Listed by and shall bear the Label of a Nationally Recognized Testing Laboratory (NRTL), such as Underwriter's Laboratories Inc. (UL), if the material and equipment is of the type/class inspected by said laboratories.

B. Nonconformance

1. Any paragraph of requirements in these Specifications or Drawings deviating from the rules, requirements, and specifications of the above organizations shall be superseded by those codes and regulations. The Contractor shall be held responsible for adherence to all rules, requirements, and specifications as set forth

above. Any additional cost shall be included in the Bid and not considered a change order. Ignorance of any rule, requirement, or specification shall not be allowed as an excuse for nonconformity. Acceptance by the Engineer shall not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

C. Certification

1. Where applicable, upon completion of the work, the Contractor shall obtain certificate(s) of inspection and approval from the inspection organization or AHJ having jurisdiction and shall deliver same to the Engineer and the Owner.

1.06 PERMITS AND INSPECTIONS

A. The Contractor shall reference the General Conditions and Section 01 11 00 – Summary of Work.

1.07 TEMPORARY LIGHTING AND POWER

A. The Contractor shall reference the General Conditions and Section 01 51 00 – Temporary Utilities.

1.08 TESTS

A. Upon completion of the installation, the Contractor shall perform tests for operation, load (Phase) balance, overloads, short circuits ground fault protection. Tests shall be witnessed by and subject to the approval of the Owner and Engineer.

B. The Contractor shall perform all field tests and shall provide all labor, equipment, and incidentals required for testing and shall pay for electric power required for the tests. All defective material and workmanship disclosed shall be corrected by the Contractor at no cost to the Owner. The Contractor shall show by demonstration in service that all circuits and devices are in good operating condition. Test shall demonstrate that each item of control equipment operates correctly for a minimum of five (5) cycles.

C. Refer to each individual specification section for detailed test requirements.

D. The Contractor shall complete the installation and field testing of the electrical installation at least two (2) weeks prior to the start-up and testing of any equipment served by that electrical equipment. During the period between the completion of electrical installation and the start-up and testing of all other equipment, the Contractor shall make all components of the Work available as it is completed for their use in performing Preliminary and Final Field Tests.

E. Before each test commences, the Contractor shall submit a detailed test procedure and provide the test engineer's resume, personnel, and scheduling information (e.g., proposed testing schedule) for the approval by the Engineer. In addition, the Contractor shall furnish detailed test procedures for any electrical equipment required as part of the field tests of other systems. Submit procedures and qualifications at least two (2) weeks prior to testing.

1.09 INFRARED INSPECTION

A. Just prior to the final acceptance of each equipment assembly, the Contractor shall perform an infrared inspection to locate and correct all heating problems (i.e., thermal anomalies) associated with electrical equipment terminations. The infrared inspection shall be conducted by a qualified, independent, third-party testing company, not the Electrical Contractor.

B. Any issues detected with portions of existing equipment that were not modified under this Contract are not the responsibility of the Contractor. Despite the Contractor not being held responsible for these problems, the Contractor shall report them to the Owner and Engineer immediately for resolution.

C. The infrared inspection report shall include both digital photos and infrared (IR) photos positioned side by side. Both digital and IR photos shall be clear and of high quality. Fuzzy, grainy, or poorly illuminated photos are not acceptable. Each IR photo shall be provided with a temperature scale beside it, and an indication of the hot spot temperature in the photo. Submit printed and PDF copies of the report, with all pages printed in full color, with equipment assemblies separated by tabs.

1.10 PROTECTIVE DEVICE SETTING AND TESTING

A. The Contractor shall provide the services of a field services organization to adjust, set, calibrate, and test all new protective devices in the electrical system. Provide an optional bid item to test existing electrical protective devices lacking test date indication stickers from dates outside of the equipment at the site that lacks test stickers, in accordance with NFPA 70B recommended maintenance intervals. The organization shall be a subsidiary of, or have a franchise service agreement with, the primary new electrical equipment manufacturer. Submit the organization's qualifications and technician resumes or certifications (e.g., NETA), along with all data forms required for field testing.

B. All protective devices in the electrical equipment shall be set, adjusted, calibrated, and tested in accordance with the manufacturers' recommendations, the coordination study, NFPA, NETA, and best industry practice.

C. Proper operation of all equipment associated with the device under test and its compartment shall be verified, as well as complete resistance, continuity, and polarity tests of power, protective, and metering circuits. Any minor adjustments, repairs, and

lubrication necessary to achieve proper operation shall be considered part of this Contract.

D. All solid-state trip devices shall be checked and tested for setting and operation using manufacturers' recommended test devices and procedures.

E. Circuit breakers and contactors associated with the above devices shall be tested for trip and close functions with their protective device.

F. When completed, the Contractor shall provide a comprehensive report for all equipment tested, indicating condition, readings, and any faults or deficiencies identified. Inoperative or defective equipment shall be brought immediately to the attention of the Engineer.

G. Prior to placing any equipment in service, the correct operation of all protective devices associated with this equipment shall be demonstrated by field testing under primary injection or secondary/simulated injection for breakers with ratings less than 800 Amps.

1.11 POWER SYSTEM STUDIES

A. The Contractor shall provide power system studies performed by a licensed Professional Engineer (P.E.) in accordance with Section 26 05 73 – Power System Studies.

1.12 SCHEDULES AND FACILITY OPERATIONS

A. Become some testing will require equipment to be taken out of service, all testing procedures and schedules shall be submitted to the Engineer for review and approval at least thirty (30) days before any work begins. Coordinate testing with the owner well in advance of outages. Notify the Engineer and Owner at least 48-hours before any testing begins, to allow time for load transfer or system adjustments. In addition, all testing that requires temporary shutdown of facility equipment shall be coordinated with the Owner/Engineer so as not to affect proper facility operations.

B. At the end of the workday, all equipment shall be in place and ready for immediate use should a facility emergency arise. In addition, should an emergency condition occur during testing, at the request of the Owner, the equipment shall be placed in service immediately and turned over to Owner personnel.

C. In the event of accidental shutdown of Owner equipment, the Contractor shall notify Owner personnel immediately to allow for an orderly restart of affected equipment.

D. Maintaining the operation of these facilities during the duration of the construction period is essential and required. The Contractor shall furnish and install temporary equipment as required to maintain facility operation. Reference Section 01 14 00 – Coordination with Owner's Operations for construction sequencing and specific operational constraint information.

1.13 EQUIPMENT, MATERIALS, AND SPARE PARTS HANDLING AND STORAGE

A. Materials arriving on the job site shall be stored in such a manner as to keep materials free of rust and dirt and to keep materials properly aligned and true to shape. Rusty, dirty, or misaligned material will be rejected. Electrical conduits shall be stored to provide protection from the weather and accidental damage. Rigid non-metallic conduits shall be stored on even supports and in locations not subject to direct sun rays or excessive heat. Cables shall be sealed, stored, and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Adequate protection shall be always required for electrical equipment and accessories until installed and accepted. Materials damaged during shipment, storage, installation, or testing shall be replaced or repaired in a manner meeting the approval of the Engineer. If space heaters are provided in a piece of electrical equipment, they shall be temporarily connected to a power source during storage. The Contractor shall store equipment and materials in accordance with Section 01 55 00 – Contractor Access and Parking.

B. Spare parts lists, included with the shop drawing submittal for each Section, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

C. Spare parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

D. Spare parts shall be packed in containers suitable for long-term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.

E. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.

1.14 WARRANTIES

A. Unless otherwise specified in an individual specification section, all electrical equipment and electrical construction materials shall be provided with a warranty in accordance with the requirements of Section 46 00 00 – Equipment General Provisions and the General Conditions.

1.15 TRAINING

A. Unless otherwise specified in an individual specification section, all training for electrical equipment shall be provided in accordance with the requirements of Section 46 00 00 – Equipment General Provisions.

PART 2 – PRODUCTS

2.01 PRODUCT REQUIREMENTS

A. Unless otherwise indicated, the materials to be provided under this Specification shall be the products of manufacturers regularly engaged in the production of all such items and shall be the manufacturer's latest design. The products shall conform to the applicable standards of UL and NEMA, unless specified otherwise. International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and labeled in compliance with IEC standards is not acceptable.

B. All items of the same type or ratings shall be identical. This shall be further understood to include products with the accessories indicated.

C. All equipment and materials shall be new, unless indicated or specified otherwise.

D. The Contractor shall submit proof if requested by the Engineer that the materials, appliances, equipment, and devices that are provided under this Contract meet the requirements of Underwriters Laboratories, Inc. with regard to fire and casualty hazards. Documentation indicating Listing and Labeling by Underwriters Laboratories, Inc., will be accepted as meeting this requirement.

E. Where the above items are Labeled by (bearing the certification mark of) an OSHA Nationally Recognized Testing Laboratory (NRTL) other than UL, and the NRTL is authorized by the Occupational Safety and Health Administration (OSHA) to test and certify those items to the same standard(s), then the certification mark of that NRTL shall be accepted as equivalent to the ‘UL’ certification mark.

2.02 SUBSTITUTIONS

A. Unless specifically noted otherwise, any reference in the Specifications or on the Drawings to any article, service, product, material, fixture, or item of equipment by name, make, or catalog number shall be interpreted as establishing the type, function, and standard of quality and shall not be construed as limiting competition. The Contractor, in such cases may use any article, device, product, material, fixture, or item of equipment which the Engineer, in writing, confirms is equivalent in type, function, performance, and quality to that specified.

2.03 CONCRETE

A. The Contractor shall furnish all concrete required for the installation of all electrical work. Concrete shall be Class A (minimum 4,000 psi at 28 days) unless otherwise specified. Concrete and reinforcing steel shall meet the appropriate requirements of Cast-in-Place concrete found in Division 03 of the Specifications.

B. The Contractor shall provide concrete equipment pads for all free-standing electrical apparatus and equipment located on new or existing floors or slabs. The Contractor shall provide all necessary anchor bolts, channel iron sills, and other materials as required. The exact location and dimensions shall be coordinated for each piece of equipment well in advance of the scheduled placing of these pads. Equipment pads shall be 4 inches high unless otherwise indicated on the Drawings and shall conform to the Standard Detail for equipment pads shown on the Drawings. Equipment pads shall not have more than 3 inches of excess concrete beyond the edges of the equipment.

2.04 RUBBER INSULATING MATTING

A. Rubber insulating matting shall be furnished and installed for each piece of electrical equipment that is located indoors and installed under this Contract. Rubber insulating matting shall not be installed outdoors. Matting shall be installed in the front of all equipment and in the rear of equipment that is rear accessible. The mat shall be long enough to cover the full length of the equipment. The mat shall be ¼-inch thick with beveled edges, canvas back, solid type with corrugations running the entire length of the mat. The matting shall meet OSHA requirements and the requirements of ASTM D-178 for Type 2, Class 2 insulating matting. Matting shall be 36 inches wide, minimum. However, matting width shall be no less than the NEC working clearance for the equipment with which it is associated.

B. Matting shall be provided for the following equipment:

1. Motor Control Centers
2. Switchboard Assemblies
3. Variable Frequency Drives
4. Panelboards
5. Generator Control Panels
6. Harmonic Correction Equipment

PART 3 – EXECUTION

3.01 CUTTING AND PATCHING

A. Coordination

1. The Work shall be coordinated between all trades to avoid delays and unnecessary cutting, channeling, and drilling. Sleeves shall be placed in concrete for passage of conduit wherever possible.

B. Damage

1. The Contractor shall perform all chasing, channeling, drilling, and patching necessary to the proper execution of this Contract. Any damage to the building, structure, or any equipment shall be repaired by qualified personnel from the applicable trades involved at the Contractor's expense. If, in the Engineer's judgment, the repair of damaged equipment would not be satisfactory, then the Contractor shall replace damaged equipment at the Contractor’s expense.

C. Existing Equipment

1. Provide a suitable cover or plug for openings created in the existing equipment as the result of work under this Contract. For example, provide round plugs in equipment enclosures where the removal of a conduit creates a hole in the enclosure. Covers and plugs shall maintain the NEMA rating of the equipment enclosure. Covers and plugs shall be watertight when installed in equipment located outdoors.

3.02 EXCAVATION AND BACKFILLING

A. The Contractor shall perform all excavation and backfill required for the installation of all electrical work. All excavation and backfilling shall be in complete accordance with the applicable requirements of Division 31.

3.03 CORROSION PROTECTION

A. Wherever dissimilar metals, except conduit and conduit fittings, come into contact, the Contractor shall isolate these metals as required with neoprene washers, nine (9) mil polyethylene tape, or gaskets.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SCOPE

A. This Section includes identification for all electrical systems and components, including but not limited to raceways, conductors, junction boxes, panels, devices, and equipment. It applies to both field- and factory-installed components.

1.02 THE REQUIREMENT

A. All electrical equipment shall be properly identified in accordance with these Specifications and the Contract Drawings. All electrical equipment shall be identified in the manner described, or in an equally approved manner.

B. The types of electrical identification specified in this Section include, but are not limited to, the following:

1. Operational instructions and warnings.

2. Danger signs.

3. Equipment/system identification signs.

4. Nameplates.

5. Cable/conductor identification

6. Junction, device, and pull box labeling

1.03 SIGNS

A. Provide danger/warning signs at equipment and locations with multiple power sources, automatic start features, overhead power line exposure, or arc flash risk in accordance with ANSI Z535.4 and NFPA 70E. Signs shall include, but not be limited to, the following:

1. "DANGER - HIGH-VOLTAGE" signs shall be securely mounted on the entry doors of all electrical rooms.

2. "DANGER – ELECTRICAL SHOCK HAZARD – EQUIPMENT HAS MULTIPLE POWER SOURCES"

3. “WARNING – EQUIPMENT STARTS AUTOMATICALLY”

4. “DANGER – OVERHEAD POWER LINES – KEEP CLEAR”

1.04 LETTERING AND GRAPHICS

A. The Contractor shall coordinate names, abbreviations, and other designations used in the electrical identification work with the corresponding designations shown, specified, or scheduled. Provide numbers, lettering, and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of the electrical systems and equipment.

1.05 SUBMITTALS

A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit shop drawings. Each submittal shall be identified by the applicable Specification Section.

1.06 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include, but not be limited to:

1. Product data sheets for all identification products, including labels, nameplates, tags, signs, conduit markers, and operational signage. Include material composition, dimensions, mounting details, and environmental ratings. Clearly indicate compliance with UL 969 for adhesive products.

PART 2 – PRODUCTS

2.01 COMPLIANCE REQUIREMENTS

1. All identification materials and methods shall comply with the latest versions of the following:

a. NFPA 70 – National Electrical Code (NEC)

b. NFPA 70E – Standard for Electrical Safety in the Workplace (Arc Flash and Short Circuit Hazard Labeling)

c. ANSI Z535.4 – Product Safety Signs and Labels

d. IEEE C2 – National Electrical Safety Code (For MV systems)

e. UL 969 – Marking and Labeling Systems (Labeling and Marking Systems)

f. OSHA 29 CFR 1910.145 – Specifications for Accident Prevention Signs and Tags (applies to signage in accessible areas and operator interfaces.)

2.02 MANUFACTURERS

A. The material covered by these Specifications is intended to be standard material of proven performance as manufactured by reputable concerns. Material shall be fabricated, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as specified herein and shown on the Drawings.

2.03 NAMEPLATES

A. Nameplates shall be two-layer or three-layer engraved plastic laminate (e.g., Traffolyte or equivalent), with white background and black lettering unless otherwise indicated or as required to match existing identification. Provide a font and label size consistently and suitable for visibility in the installed location.

B. For NEMA 4X enclosures, secure nameplates using UL-recognized stainless steel mounting hardware that preserves the enclosure’s type rating. Use Hoffman Type AHK10324X mounting kits or an Engineer-approved equal. Do not penetrate the enclosure in a way that compromises rating.

2.04 HIGH VOLTAGE SIGNS

A. Provide standard "DANGER" signs with baked enamel finish on 20-gauge steel. Signs shall have red, black, and white graphics. Standard size is 14 in. by 10 in.; use 10 in. by 7 in. only where a larger size cannot be applied. Use larger signs where needed for visibility.

B. Mount signs at electrical rooms, switchgear, transformer vaults, substations, and other locations with conductors and terminations above 600 V.

2.05 CONDUIT IDENTIFICATION

A. Conduit identification shall comply with Section 26 05 33.13 – Conduit for Electrical Systems and shall meet ANSI A13.1 for label format and spacing. Labels shall include voltage and source panel/circuit identification.

2.06 WIRE AND CABLE IDENTIFICATION

A. Field-installed wire and cable identification shall be as specified in Section 26 05 19 – Low Voltage Conductors and Cable and Section 26 05 13 – Medium Voltage Cables.

B. Provide a plastic laminate nameplate at each panelboard, motor control center, switchgear assembly, and switchboard assembly. This nameplate shall be used to clearly convey the conductor identification means used at that piece of equipment (e.g., Phase A=Brown, Phase B=Orange, C = Yellow). Mount the nameplate on the inside of the door where it will be visible during maintenance.

C. Wiring identification for factory-installed wiring within equipment enclosures shall be as specified in the respective equipment Section and shall be documented in the equipment wiring diagram.

2.07 BOX IDENTIFICATION

A. Pull, junction, and device box identification shall include circuit source panel and circuit number(s), and the circuit's voltage rating. See Section 26 05 33.16 – Boxes for Electrical Systems for all requirements.

2.08 WEATHER RESISTANCE

A. Identification materials used outdoors or in damp, corrosive, or washdown areas shall be constructed of weather-resistant, UV-stable, and corrosion-resistant materials. Signs exposed to outdoor environments (e.g., overhead-line warnings, pad-mounted equipment) shall be rated for exterior use with a minimum 5-year durability.

PART 3 – EXECUTION

3.01 NAMEPLATES

A. Secure nameplates to equipment enclosures using stainless steel sheet metal screws. Use two screws for nameplates up to 2 inches wide; use four (4) screws (one in each corner) for nameplates over 2 inches wide. Adhesive-only mounting is not permitted.

B. Nameplates shall include both the equipment designation (e.g., EF-1) and a brief, descriptive label (e.g., "ELEC RM 210 CEILING EXHAUST FAN") to assist field personnel with identification and maintenance.

C. Descriptions shall include at a minimum description shown on the Contract Drawings.

3.02 OPERATIONAL IDENTIFICATION AND WARNINGS

A. Wherever reasonably required to ensure safe and efficient operation and maintenance of the electrical systems and electrically connected mechanical systems and general

systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install plastic signs or similar equivalent identification, instruction, or warnings on switches, outlets, and other controls, devices, and covers or electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for the intended purposes. Signs shall be mounted using mechanical fasteners or rivets where feasible; do not use adhesive-only methods except inside enclosures where permitted.

3.03 POWER SOURCE IDENTIFICATION

A. After installation of all field equipment (e.g., valves, motors, fans, unit heaters, instruments, etc.) install nameplates at each power termination. Nameplate data shall include equipment designation (tag number), power source (MCC number, panelboard, etc.), circuit number, conduit ID from schedule, and voltage/phase.

B. Where applicable, include supplemental information such as equipment description, served area, or room number to aid in identification, operation, and maintenance.

C. Contractor to coordinate with the Engineer and the Owner regarding exact nameplate placement during construction.

D. Nameplates shall be as specified herein.

3.04 DISCONNECTS

1. All disconnect means shall be clearly and durably labeled to indicate the source of power, including panel name and circuit number, in accordance with NEC 110.22.

3.05 PANEL AND SWITCHBOARD SCHEDULES

A. Panel schedules shall clearly indicate the room number and room name for all lighting and receptacle loads not associated with tagged equipment.

B. Use full, plain-language descriptions in panel schedules. Avoid abbreviations and acronyms except for equipment IDs (e.g., AHU-1, EF-2), room number references (e.g., “RM 214”), or where space constraints require. Pair each equipment ID with a clear, descriptive label to support positive identification, targeting clarity for the most junior field personnel.

C. Refer to Section 26 24 16 – Panelboards and Section 26 24 13 – Switchboards for additional labeling and schedule requirements specific to those assemblies.

END OF SECTION

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SECTION 26 05 73
POWER SYSTEM STUDIES

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide all power system studies for the project as specified herein. The following shall be performed:

1. Short Circuit Studies

2. Load Flow Analyses

3. Protective Device Coordination Studies

4. Equipment Evaluation

5. Arc Flash Risk Assessment

B. The scope of the work for these studies shall include all existing and new electrical equipment that is electrically connected to or affected by the scope of work under this Contract at the project site.

C. The studies shall include all electric utility protective devices, transformers, generators, cables, switchgear, switchboards, motor control centers, individual motor controllers, variable-frequency drives, panelboards, protective relays, busway systems, and control panels.

D. Prior to receiving final approval of the distribution equipment shop drawings for the equipment proposed under this Contract and/or prior to release of that equipment for manufacture, the Preliminary Report, as specified herein, shall be submitted and approved. Contractor shall expedite the completion of the Preliminary Report so that final approval of proposed equipment is not delayed.

E. The studies shall be performed with the aid of SKM Power Tools for Windows (PTW) software, Version 11.0 or newer. No other software analysis packages are acceptable.

1.02 CODES AND STANDARDS

A. All work shall be performed in accordance with the following Codes and Standards, as applicable (latest edition, unless otherwise specified):

1. Institute of Electrical and Electronic Engineers (IEEE):

a. Standard 141, Recommended Practice for Electric Power Distribution for Industrial Plants

b. Standard 241, Recommended Practice for Electric Power Systems in Commercial Buildings

c. Standard 242, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems

d. Standard 3002.2, IEEE Recommended Practice for Conducting Load Flow Studies and Analysis of Industrial and Commercial Power Systems

e. Standard 3002.3, IEEE Recommended Practice for Conducting Short-Circuit Studies and Analysis of Industrial and Commercial Power Systems

f. Standard 1584-2018, IEEE Guide for Performing Arc-Flash Hazard Calculations

g. IEEE 1584.1, Guide for the Specification of Scope and Deliverable Requirements for an Arc-Flash Hazard Calculation Study

2. American National Standards Institute (ANSI):

a. Standard C37.90, IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus

b. Standard C37.91, Guide for Protective Relay Applications to Power Transformers

c. Standard C37.95, Guide for Protective Relaying of Utility-Consumer Interconnections

d. Standard C37.96, Guide for AC Motor Protection

e. Standard C57.12.59, Guide Dry-Type Transformer Through-Fault Current Duration

f. Standard C.57.13, Standard Requirements for Instrument Transformers

g. Standard C57.109, Guide for Liquid-Immersed Transformer Through Fault-Current Duration

h. Standard Z535.4, Product Safety Signs and Labels

3. National Fire Protection Association (NFPA):

a. NFPA 70, National Electrical Code (NEC)

b. NFPA 70E, Standard for Electrical Safety in the Workplace

c. NFPA 70B; Recommended Practice for Electrical Equipment Maintenance

1.03 SUBMITTALS

A. The Contractor shall submit the following reports for review and approval:

1. One (1) printed copy and one (1) electronic copy of the Preliminary Report.

2. One (1) printed copy and one (1) electronic copy of the Pre-final Report.

3. Four (4) printed copies and one (1) electronic copy of the Final Report.

B. The Contractor shall submit one (1) complete electronic copy of the final power system model and all required database files generated by the software analysis package used, including .PTW, LIB, FMT, etc. Files shall be placed on portable storage media (USB 3.0 flash storage device) or be uploaded to a cloud-based file sharing service and be submitted with the Final Report. Furnish any necessary documentation requiring the Owner's signature to allow model to be transferred to the Owner.

1.04 QUALIFICATIONS

A. The studies shall be performed by a professional electrical engineer actively licensed in the state or commonwealth in which the project is located. The licensed professional electrical engineer shall have a minimum of five (5) years of direct experience performing short circuit, coordination, and arc flash studies for low and medium voltage AC power system.

B. The resume of the licensed professional electrical engineer shall be submitted for approval prior to the start of work. An experience table shall also be provided detailing the power system studies of similar scope to this Contract that have been performed by the proposed engineer over the last two (2) years. Projects listed shall be similar in voltage class, system complexity, and utility interface scope. At least one of the listed projects shall include arc flash risk assessment with final labeling deliverables. The table shall, at a minimum, list the facility owner's name, facility contact person with phone number and email address, and overall scope of work that was provided.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 DATA COLLECTION

A. The Contractor shall collect all required utility transformer impedance, X/R ratio, available short-circuit current (minimum and maximum),and service configuration information for use in these studies. The serving electric utility representative contact information can be found in Section 26 05 00, Basic Electrical Requirements.

B. Approved equipment shop drawings and product information for all equipment furnished under this Contract shall be used for these studies. Including data for equipment that is not yet approved is not acceptable.

C. One (1) field visit to the project site to collect pertinent data from existing equipment by the personnel performing the studies is permitted. The visit shall span as many days as required to collect all necessary information. This visit shall occur as soon after the Contract is awarded as possible and shall be coordinated with the Owner. The Contractor and personnel performing these studies are responsible for collecting all required data for these studies. If equipment is to be examined while energized parts are exposed, the examining personnel shall wear appropriate PPE in accordance with the requirements of NFPA 70E. All data collection shall be documented with date-stamped photos of nameplates and interior gear labels, and these shall be included in the Preliminary Report submittal.

D. Using data from record drawings, “as-built” drawings, or a previous power system study is not acceptable. All data for existing equipment shall be field verified.

3.02 STUDY PARAMETERS

A. The following parameters shall be used for all studies:

1. Transformers 75kVA (nominal) and larger shall be modeled with actual nameplate data including impedance data. Motors 30hp and larger shall be modeled with actual nameplate power factor and efficiency data.

2. Room heating and cooling loads are mutually exclusive. Only the larger of these two load types shall be configured as in-service in the model.

3. The sources that shall be used in these studies are the serving electric utility and the standby generators. The generators are capable of paralleling with each other AND with the utility source for extended periods of time. Therefore, each source shall be considered both independently and in parallel for the purposes of these studies.

B. Other parameters may apply for specific studies if noted in the respective study requirements herein.

3.03 SHORT CIRCUIT STUDIES

A. The short circuit studies shall be performed in accordance with IEEE Standard 3002.3.

B. The study input data shall include the short circuit contribution obtained from each source. Short circuit close and latch duty values and interrupting duty values shall be calculated on the basis of assumed three-phase bolted short circuits at each bus. Single-line diagrams shall show the results of the analysis by using datablocks constructed as shown in Appendix A. Provide the results of this study in a tabular format as well, included as an appendix to the report.

C. The short circuit study report shall include recommendations for equipment selection based on calculated short circuit values and all input and output data from the software model.

3.04 PROTECTIVE DEVICE COORDINATION STUDIES

A. A protective device coordination study shall be performed to provide the necessary calculations and logic decisions required to select or to check the selection of power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low voltage circuit breaker trip characteristics and settings.

B. The coordination study shall include all equipment from the serving electric utility company source protective devices down to and including all adjustable circuit protective devices. The phase and ground overcurrent protection shall be included as well as settings of all other adjustable protective devices.

C. The time-current characteristics of the proposed protective devices shall be printed on log-log scale coordination plots as specified below.

1. Each plot shall be accompanied by a representative single-line diagram. The coordination plot and single-line diagram shall each occupy one-half of the same printed sheet for ease of cross reference. Each printed sheet shall have a distinct title that identifies the portion of the electrical system it represents.

2. Each coordination plot shall include the following:

a. Sufficient number of separate curves shall be used to clearly indicate the coordination achieved

b. Identification of each curve with its respective component’s name

c. Complete operating bands for fuse and low voltage circuit breaker trip curves

d. Transformer magnetizing inrush and ANSI transformer withstand parameters

e. Cable thermal overcurrent withstand limits

f. Significant symmetrical and asymmetrical fault currents for the portion of the electrical system represented by the plot

3. Each accompanying single-line shall include datablocks as described in Appendix A.

4. All restrictions of the National Electrical Code shall be adhered to, and proper coordination intervals and separation of characteristic curves shall be maintained.

D. The selection and settings of all protective devices shall be provided separately in the report in a tabulated form listing circuit identification, IEEE device number, current transformer ratios and connections, manufacturer and type, range of adjustment and recommended settings.

3.05 LOAD FLOW ANALYSIS

A. The load flow analysis shall be performed in accordance with IEEE Standard 3002.2.

B. A load flow analysis shall be performed to determine the steady-state loading profile of the system(s) being studied. From the results of the load flow analysis, the report shall indicate areas of overloaded conductors, busses, or other equipment in the power distribution system. The load flow analysis results shall be presented in a tabular format as well as a single-line diagram format. Single-line diagrams shall show the results of the analysis by using datablocks constructed as shown in Appendix A. All assumptions associated with the analysis shall be documented in the report.

3.06 EQUIPMENT EVALUATION

A. An equipment evaluation shall be performed to determine the adequacy of existing circuit breakers, panelboards, motor control centers, automatic transfer switches, busses, etc. located at the facility by tabulating and comparing the short circuit ratings of these devices with the calculated fault currents that result from the short circuit study.

B. Appropriate multiplying factors based on system X/R ratios and protective device rating standards shall be applied. A table shall be provided in the report showing the calculated fault currents and the corresponding short circuit ratings of the existing equipment along with a pass or fail status for each piece of equipment.

3.07 ARC FLASH RISK ASSESSMENT

A. An arc flash risk assessment shall be performed in accordance with IEEE Std. 1584-2018, NFPA 70E, and OSHA 29-CFR, Part 1910 Subpart S. The assessment shall use the incident energy analysis method. The arc flash PPE category method shall not be used.

B. The following parameters shall be used for the arc flash risk assessment:

1. Working distance for all equipment: 18 inches

2. Arcing duration limit: 2 seconds, or higher (based on engineering judgement) for equipment locations where additional time may be required to exit the arc flash boundary.

3. Equipment box dimensions and electrode configuration shall be entered for each piece of equipment (existing and/or new) to be assessed. Using software default dimensions and electrode configuration is not acceptable.

4. For equipment operating at 240VAC or below, report incident energy as "<1.2 cal/cm^2" if the bolted fault current is calculated to be less than 2000A.

5. Any protective device settings changes that were recommended as part of these studies shall be included. For devices where settings changes are recommended, the "as-found" settings shall be documented separately in dedicated tables for record purposes.

6. Project specific operating scenarios shall be obtained from the customer, and documented in the final report or the following scenarios shall be used, with the worst-case values from each scenario being shown in the study report and on the arc flash labels:

a. Scenario 1: All tie circuit breakers at distribution equipment are open, all main circuit breakers are closed, and the facility is served by the electric utility source.

b. Scenario 2: All A-side main circuit breakers at distribution equipment are open, all tie circuit breakers are closed, all B-side main circuit breakers are closed, and the facility is served by the electric utility source.

c. Scenario 3: All B-side main circuit breakers at distribution equipment are open, all tie circuit breakers are closed, all A-side main circuit breakers are closed, and the facility is served by the electric utility source.

d. Scenario 4: All tie circuit breakers at distribution equipment are open, all main circuit breakers are closed, and the facility is served by the standby generator source.

e. Scenario 5: All A-side main circuit breakers at distribution equipment are open, all tie circuit breakers are closed, all B-side main circuit breakers are closed, and the facility is served by the standby generator source.

f. Scenario 6: All B-side main circuit breakers at distribution equipment are open, all tie circuit breakers are closed, all A-side main circuit breakers are closed, and the facility is served by the standby generator source.

C. The arc flash risk assessment report shall include but not be limited to the following:

1. A brief overview of what arc flash hazards are and how to avoid them.

2. Definitions of key terms used in the report.

3. Confirmation of all parameters and scenarios used in the report.

4. Documentation of any assumptions made for the report.

5. Serving electric utility information received. Copies of the information received shall be included in an appendix.

6. Any recommendations to reduce the arc flash incident energies via protective device settings changes where incident energies are found to exceed 12 cal/cm^2. Protective device settings change recommendations shall not negatively impact selective coordination.

7. A copy of the PPE information from Table 130.5 G in NFPA 70E.

8. Arc flash labels as specified herein.

9. An NFPA 70E energized electrical work permit for each location where an arc flash label is provided.

10. An arc flash evaluation summary sheet, based on the worst-case scenario, that contains the following minimum information:

a. Bus name

b. Protective device name

c. Bus line-to-line voltage

d. Bus bolted fault

e. Protective device bolted fault

f. Protective device arcing fault

g. Trip/delay time

h. Breaker opening time

i. Equipment type

j. Gap

k. Electrode configuration

l. Box height, width, and depth

m. Arc flash boundary

n. Working distance

o. Incident energy

p. Notes

D. Arc Flash Labels

1. Arc flash labels shall be provided for each piece of equipment that is likely to require examination, adjustment, servicing, or maintenance while energized. When opening an enclosure exposes energized parts on both the line and load side of a device, provide a label with the worst case (line versus load) incident energy printed. The following equipment, at a minimum, shall be provided with labels in the quantities specified:

   a. Switchgear/Switchboards – quantity of 1 label per section on front, 1 label per section on rear if rear is accessible. Provide second label at main circuit breaker sections where it is possible to open covers and separately expose line side and load side energized parts.

   b. Motor control centers – quantity of 1 label per section on front, 1 label per section on rear if rear is accessible. Provide second label at main circuit breaker sections where it is possible to open covers and separately expose line side and load side energized parts.

   c. Panelboards – quantity of 1

   d. Variable frequency drives – quantity of 1 label per section

e. Other stand-alone motor starters/controllers – quantity of 1 label per section

f. Automatic and manual transfer switches – quantity of 1

g. Enclosed circuit breakers – quantity of 1

2. Arc flash labels shall be thermal transfer type that is printed on adhesive backed polyester material. Labels shall be ANSI Z535.4 compliant, 4 inches tall by 6 inches wide, and provided with a 5-year warranty. For incident energy values of less than 40 cal/cm^2, the labels shall have an orange-colored header with the word "WARNING". For incident energy values equal to and above 40 cal/cm^2, the labels shall have a red-colored header with the word "DANGER". Each label shall include the following information:

   a. Equipment name

   b. Date of issue and name of firm performing assessment

   c. Incident energy

   d. Working distance

   e. Arc flash boundary

   f. Nominal system voltage

3. A generic arc flash label that has a red-colored header with the word "DANGER" and text in large letters that shows "ENERGIZED WORK NOT PERMITTED" shall be provided for the following equipment:

   a. Any equipment that requires an arc flash label (as specified above) that is located within a hazardous area.

   b. Any equipment found to be in poor working condition, where in the judgement of the engineer performing the study, energized work should not be performed at all, regardless of the outcome of the incident energy analysis at that equipment.

   c. Any equipment with a portable generator connection point.

3.08 STUDY REPORTS

A. The results of the studies shall be documented in a series of reports. A total of three (3) separate reports shall be provided as follows:

1. Preliminary Report – The Preliminary Report shall consist of all power systems studies as specified herein, with the following exceptions:

a. NFPA 70E energized electrical work permits shall not be included.

b. One (1) WARNING label and one (1) DANGER label shall be printed on plain paper for format review purposes only. Actual adhesive labels with calculated values shall not be included.

2. Pre-final Report – The Pre-final Report shall incorporate all comments received from the previous report review and shall include specific equipment data from the approved shop drawings of the proposed electrical equipment. The Pre-final Report shall consist of all power systems studies as specified herein, with the following exceptions:

a. NFPA 70E energized electrical work permits shall not be included.

b. Sample arc flash hazard warning labels one (1) WARNING label and one (1) DANGER label) shall be printed on the proposed adhesive material for review purposes.

3. Final Report – The Final Report shall consist of all power systems studies as specified herein, including final adhesive arc flash hazard warning labels. Final report shall incorporate all installed electrical equipment, including any field changes made during construction, and all comments received from the previous report review. All ‘as-left’ protective device settings shall be included in the report. The Final Report shall bear the signature and seal of the professional electrical engineer that performed the study.

B. Hard copies of reports shall be furnished in the quantities specified herein, neatly organized into properly identified 3-ring binders. Tabs shall clearly separate each section of the report.

C. Electronic copies of reports shall be provided in PDF file format. Electronic copies shall have searchable text and bookmarks for each section of the report.

D. Each report shall begin with a table of contents followed by an executive summary. The executive summary shall detail the configuration of the electrical system and summarize any concerns or recommendations for the electrical distribution system that resulted from the studies specified herein.

E. Reports shall include simplified single line diagrams with only the device name information displayed for all equipment, as well as single line diagrams with specific data displayed as specified herein for each study.

F. All data used in the reports such as conductor sizes and lengths, motor sizes, utility contribution information, fault analysis input, fault contributions, and the like shall be included in the appendices of the report.

G. All single line diagrams and time current curves shall be provided in the reports on 11x17 paper, properly folded to fit into the report binder. Use of standard 8.5x11 paper for these purposes is not permitted. Single line diagrams shall be appropriately split up between several sheets (if required) to allow the drawing scale to be adjusted as required to make text and symbols legible.

3.09 FIELD ADJUSTMENT

A. The Contractor shall adjust all relay and other protective device settings according to the recommended settings table provided in the approved Pre-Final Report.

B. The Contractor shall make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.

3.10 ARC FLASH LABEL PLACEMENT

A. The Contractor shall place approved adhesive arc flash labels on equipment after the Final Report is reviewed and approved.

3.11 TRAINING

A. The Contractor shall train the Owner’s qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment. The training shall be provided in two (2) separate sessions of no less than two (2) hours each. The training shall be certified for continuing education units (CEUs) by the International Association for Continuing Education Training (IACET), or equivalent. Training certificates shall be provided for all attendees.

END OF SECTION

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APPENDIX A – SUPPLEMENTARY INFORMATION

REQUIRED DATABLOCK CONTENTS FOR POWER SYSTEM STUDIES

Component Type	Input Data	Load Flow	Short Circuit	TCC Plots*
Utility	Nominal Voltage	Nominal Voltage Current (A) Power Factor Power (kW) Power (kVA)	Fault Contribution (3P RMS) and X/R Ratio Fault Contribution (SLG RMS) and X/R Ratio	N/A
Generator	Nominal Voltage Rating (kW) Power Factor	Voltage Drop (%) Power Factor Power (kW) Power (kVA)	Fault Contribution (3P RMS) Fault Contribution (SLG RMS)	FLA
Bus	Voltage Manufacturer SCCR	Voltage Drop (%) Study Voltage Current (A) Power Factor Power (kW) Power (kVA)	Fault Magnitude (3P RMS) Fault Magnitude (SLG RMS)	N/A
Cable	Size (AWG or kcmil) Parallel Sets Length Type (Cu/Al/Cu-Al)	Voltage Drop (%) Current (A) Power (kW) Power (kVA)	Upstream Contribution (3P RMS) Upstream Contribution (SLG RMS) Downstream Contribution (3P RMS) Downstream Contribution (SLG RMS)	N/A
Transformer	Rating (kVA) Impedance (%Z) X/R Ratio	Voltage Drop (%) Sec. Current (A) Power (kW) Power (kVA)	Upstream Contribution (3P RMS) Upstream Contribution (SLG RMS) Downstream Contribution (3P RMS) Downstream Contribution (SLG RMS)	N/A
Motor	Rating (hp) Rated Voltage FLA Power Factor	Voltage Drop (%) Study Voltage Power Factor Power (kW) Power (kVA)	Upstream Contribution (3P RMS) Upstream Contribution (SLG RMS)	FLA LRA/FLA ratio

Component Type	Input Data	Load Flow	Short Circuit	TCC Plots*
Non-Motor Load	Rating (A, kW, kVA) Rated Voltage Power Factor	Voltage Drop (%) Study Voltage Power Factor Power (kW) Power (kVA)	N/A	N/A
Fuse	Manufacturer Model Rating (A)	N/A	N/A	Same as Input Data
Relay**	Manufacturer Model CT Ratio Curve Elements & Settings	N/A	N/A	Same as Input Data
Disconnect Switch	Manufacturer SCCR (kA)	N/A	N/A	N/A
Circuit Breaker (no integral trip unit)	Manufacturer SCCR (kA)	N/A	N/A	N/A
Circuit Breaker*** (all others)	Manufacturer Model SCCR (kA) Frame/Sensor/Plug Ratings Settings*** LTPU [LTD Curve Shape] [LTD] [STPU] [STD and I^2T On/Off] INST [GFPU] [GFD and I^2T On/Off] [AF Maint. Setting/Curve]	N/A	N/A	Same as Input Data

Component Type	Input Data	Load Flow	Short Circuit	TCC Plots*
Motor Circuit Protector	Manufacturer Model SCCR (kA) Frame/Trip Ratings	N/A	N/A	Same as Input Data
Motor Overload Relay	Manufacturer Model SCCR (kA) Frame/Trip Ratings Settings	N/A	N/A	Same as Input Data

* TCC single line diagrams shall not display datablocks.

** Complex and/or non-overcurrent settings for multifunction relays (e.g. bus/winding differential, motor thermal model parameters, under/overvoltage, RTD alarm and trip setpoints, etc.) are excluded from the model.

*** Hide setting elements where not applicable for a given circuit breaker. Recommended settings for non-overcurrent settings for electronic trip circuit breakers (e.g. under/overvoltage, zone-selective interlocking, alarm setpoints, etc.) are excluded from the model.

SECTION 26 09 16
ELECTRIC CONTROLS AND RELAYS

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, test, and place in satisfactory operation all electric controls and relays as specified herein and indicated on the Drawings.

B. Electrical control and relay systems shall be assembled using NEMA rated components. Components designed and built to International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and Labeled in compliance with IEC standards is not acceptable.

C. Reference the following Specification Sections:

1. Section 26 05 00 – Basic Electrical Requirements

2. Section 26 05 53 – Identification for Electrical Systems

1.02 CODES AND STANDARDS

A. Products specified herein shall be designed, manufactured, and/or Listed to the following standards as applicable:

1. American National Standards Institute (ANSI)/International Society of Automation (ISA):

a. ANSI/ISA 12.12.01 – Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.

2. National Electrical Manufacturers Association (NEMA):

a. NEMA 250 – Enclosures for Electrical Equipment.

3. National Fire Protection Association (NFPA):

a. NFPA 70 – National Electrical Code (NEC).

4. Underwriters Laboratories (UL):

a. UL 508A – Standard for Industrial Control Panels.

b. UL-1203 – Standard for Explosion-proof and Dust-ignition-proof Electrical Equipment for use in Hazardous (Classified) Locations.

1.03 SUBMITTALS

A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Spare Parts List

B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings shall include but not be limited to:

1. Product data sheets.

D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 SPARE PARTS

A. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor. In addition to the manufacturer recommended spare parts, the following spare parts shall be provided for the local control stations:

1. One (1) contact block of each type furnished on the project

2. One (1) indicating light lens of each color furnished on the project

3. One (1) LED lamp of each color furnished on the project

B. Reference Section 26 05 00 – Basic Electrical Requirements for spare parts delivery and handling requirements.

PART 2 – PRODUCTS

2.01 CONTROL COMPONENTS

A. Manufacturers

1. Control components shall be manufactured by The Square D Company, Eaton, GE by ABB, Allen-Bradley, Siemens Energy and Automation, or Engineer approved equal.

B. Pilot Devices

1. General

a. All pilot devices shall be provided with a legend plate. Legend plates shall have a white background and black lettering and indicate the function of the respective pilot device. The text shown on the Drawings or indicated in the specifications shall be used as the basis for legend plate engraving (e.g., HAND-OFF-AUTO, RUN, EMERGENCY STOP, etc.).

b. All pilot devices shall be selected and properly installed to maintain the NEMA 250 rating of the enclosure in which they are installed. All pilot devices shall be UL 508 Listed.

c. All pilot devices shall be 30.5mm in diameter, unless otherwise indicated. 22mm devices are not acceptable.

d. Pilot devices for all electrical equipment under this Contract shall be of the same type and manufacturer unless otherwise specified herein or indicated on the Drawings.

e. In Class I Division 2 hazardous locations, pilot devices shall be the hermetically-sealed type, constructed in accordance with ANSI/ISA 12.12.01.

2. Pushbuttons

a. Pushbuttons shall be non-illuminated, black in color, and have momentary style operation unless otherwise indicated on the Drawings.

b. Pushbuttons shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each pushbutton. Contacts shall be rated

for 5A at 250VAC/DC (minimum), but no less than required for the application.

c. Pushbuttons shall be provided with a full guard around the perimeter of the button. Where a lockout style pushbutton is specified or indicated on the Drawings, provide a padlockable guard.

3. Selector Switches

a. Selector switches shall be non-illuminated, black in color, and have the number of maintained positions as indicated on the Drawings and as required. Handles shall be the extended type that provide a greater surface area for operation.

b. Selector switches shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each selector switch. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.

c. Where indicated in the Drawings or Specifications, provide spring return positions.

d. Selector switches shall be provided with an indexing component that fits into the keyed portion of the cutout for the device and prevents the switch from spinning when operated.

4. Indicating Lights

a. Indicating lights shall be LED type, with the proper voltage rating to suit the application, and push-to-test feature.

b. Indicating light lens colors shall be as required in equipment specifications and/or as indicated on the Drawings. If lens colors are not indicated, the following colors shall be used:

Color	Designation
Red	"Run", "On", “Open”
Green	"Off", “Closed”
Amber	"Alarm", "Fail"
White	“Control Power On”

5. Emergency Stop and Tagline Switches

    a. Emergency stop switches shall be non-illuminated, red in color, with a minimum 35mm diameter mushroom head. Once activated, switch shall maintain its position and require a manual pull to release/reset.

    b. Tagline switches shall have a plunger that activates upon tension from the associated safety cable. Once activated, switch shall maintain its position and require a manual release/reset.

    c. Emergency stop and tagline switches shall have the quantity of normally closed and/or normally open contacts as indicated on the Drawings and as required. In addition to the required contacts, one (1) spare normally open and one (1) spare normally closed contact shall be installed at each switch. Contacts shall be rated for 5A at 250VAC/DC (minimum), but no less than required for the application.

C. Relays and Timers

1. General

    a. Relays and timers shall be furnished with an integral pilot light for positive indication of coil energization.

    b. Relays and timers shall have tubular pin style terminals with matching 11-pin DIN rail mount socket. Spade or blade style terminals are not acceptable.

    c. Relays and timers for all electrical equipment under this Contract shall be of the same type and manufacturer unless otherwise specified herein or indicated on the Drawings.

2. Control and Pilot Relays

    a. Relays shall have a clear or translucent housing that allows the contacts to be visually inspected without disassembly.

    b. Relays shall have coil voltage as required to suit the application and/or as indicated on the Drawings.

    c. Relays shall be provided with contacts rated for 10A (resistive), minimum, at 120/240 VAC and 28 VDC. Relays shall have 3-pole, double-throw (3PDT) contact arrangement.

3. Time Delay Relays

a. Timers delay relays shall utilize electronic timing technology. Mechanical timing devices are not acceptable.

b. Relays shall have coil voltage as required to suit the application and/or as indicated on the Drawings.

c. Relays shall be provided with contacts rated for 10A (resistive), minimum, at 120/240 VAC and 28 VDC. Relays shall have double-pole double-throw (DPDT) contact arrangement.

d. Time delay ranges shall be as indicated on the Drawings and/or as required to suit the application. Timing range shall be adjustable from the front of the relay. On delay and off delay timer configurations shall be provided as indicated on the Drawings and/or as required to suit the application.

4. Elapsed Time Meters

a. Elapsed time meters shall be non-resettable type with no less than a four (4) digit display. Coil voltage shall be as required to suit the application and/or as indicated on the Drawings.

D. Control Terminal Blocks

1. Control terminal blocks shall be assembled on non-current carrying galvanized steel DIN mounting rails securely bolted to the enclosure or subpanel. Terminals shall be tubular screw type with pressure plate that will accommodate wire size range of #22 – #8 AWG.

2. Control terminal blocks shall be single tier with a minimum rating of 600 volts and 20A. Separate terminal strips shall be provided for each type of control used (e.g., 120VAC vs. 24VDC). Quantity of terminals shall be provided as required to suit the application. In addition, there shall be a sufficient quantity of terminals for the termination of all spare conductors.

3. Terminals shall be marked with a permanent, continuous marking strip, with each terminal numbered. One side of each terminal shall be reserved exclusively for incoming field conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal.

2.02 LOCAL CONTROL STATIONS

A. Local control stations shall be furnished and installed complete with pushbuttons, selector switches, indicating lights, and other devices as indicated on the Drawings.

B. Specific devices installed in local control stations shall be provided in accordance with the requirements specified elsewhere in this Section.

C. In non-hazardous locations, local control stations shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Type 304 Stainless Steel
Indoor Dry Process Area	NEMA 12, Die Cast Zinc
Indoor Dry Non-process Area	NEMA 12, Die Cast Zinc
Indoor Type 1 Chemical Storage/Transfer Area	NEMA 4X, Fiberglass or Thermoplastic Polyester
Indoor Type 2 Chemical Storage/Transfer Area	NEMA 4X, Type 304 Stainless Steel
All Outdoor Areas	NEMA 4X, Type 304 Stainless Steel

D. Local control stations for use in non-hazardous locations shall be UL-508 Listed.

E. Provide a nameplate on each local control station in accordance with Section 26 05 53 – Identification for Electrical Systems. The name and/or number of the equipment associated with each control station shall be engraved on the nameplate, followed by the words “LOCAL CONTROL STATION”.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Local control stations shall be provided in the enclosure type and material of construction required for the area in which it is installed. Reference the requirements in Part 2 herein, and the area designations indicated on the Drawings.

B. Local control stations shall be mounted, nominally, at 4ft 6in above finished floor or finished grade to the centerline of the enclosure, at the equipment height where appropriate and permitted by the NEC, or as shown otherwise on the Drawings.

C. All control components shall be mounted in a manner that will permit servicing, adjustment, testing, and removal without disconnecting, moving, or removing any other component. Components mounted on the inside of panels shall be mounted on removable plates and not directly to the enclosure. Mounting shall be rigid and stable unless shock mounting is required otherwise by the manufacturer to protect equipment from vibration. Component's mounting shall be oriented in accordance with the component manufacturer's and industries' standard practices.

D. Pilot devices shall be properly bonded to the equipment enclosure door where they are installed. If proper bonding cannot be achieved through the locknuts that affix the device

in place, a green colored bonding screw shall be provided on the pilot device. The device shall be bonded to the equipment enclosure with an insulated green bonding conductor.

E. Local control station covers shall be bonded to the local control station enclosure with an insulated green bonding conductor.

F. Wiring to devices at each local control station shall be provided with enough slack to permit the local control station cover to be removed and pulled at least 6 inches away from the enclosure.

G. Terminal strips, relays, timers, and similar devices shall not be installed on the rear of the panel/cabinet doors. Terminal strips, relays, timers, and similar devices shall not be installed on the side walls of panel/cabinet interiors without written permission from the Engineer.

END OF SECTION

SECTION 26 12 19

PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, and test liquid-filled, pad-mount transformers for power distribution systems as specified herein, as indicated on the Drawings, and as required for complete and operable electrical installation.

B. All equipment specified in this Section shall be furnished by the transformer manufacturer, who shall be responsible for the suitability and compatibility of all the equipment included.

C. Reference the following specifications:

1. Section 26 05 00 – Basic Electrical Requirements

2. Section 26 05 13 – Medium Voltage Cables

3. Section 26 05 19 – Low Voltage Conductors and Cables.

4. Section 26 05 53 – Identification for Electrical Systems

1.02 CODES AND STANDARDS

A. Transformers shall comply with the following codes and standards:

1. Institute of Electrical and Electronics Engineers (IEEE):

a. IEEE C57.12.00 – Latest Revision, IEEE Standard for General Requirements for Liquid Immersed Distribution, Power, and Regulating Transformers.

b. IEEE C57.12.28 – Latest Revision, IEEE Standard for Pad-mounted Equipment - Enclosure Integrity.

c. IEEE C57.12.34 - Latest Revision, IEEE Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers 10MVA and Smaller; High-Voltage, 34.5kV Nominal System Voltage and Below; Low-Voltage, 15kV Nominal System Voltage and Below.

d. IEEE C57.12.70 – Latest Revision, IEEE Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers.

e. IEEE C57.12.90 – Latest Revision, IEEE Standard Test Code for Liquid-Immersed Distribution Power, and Regulating Transformers

f. IEEE 386-Latest Revision, IEEE Standard for Separable Insulated Connectors for Power Distribution Systems Rated 2.5kV through 35kV.

g. IEEE C57.154 – Latest Revision – Guide for the Design, Testing, and Application of Liquid-Immersed Distribution, Power, and Regulating Transformers Using High-Temperature Insulation Systems and Natural Ester-Based Fluids

2. National Electrical Code (NEC)

3. National Electrical Manufacturers Association (NEMA)

a. ANSI/NEMA ST 20 Latest Revision, Dry-Type and Liquid-Immersed Distribution Transformers

b. NEMA 260-1996 (2019) – Safety Labels for Pad-Mounted Switchgear and Transformers Sited in Public Areas

4. US Department of Energy

a. 10 CFR Part 431 – Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule

5. Factory Mutual

a. FM 3990 – Approval Standard for Less-Flammable Electrical Insulation Liquids

1.03 SUBMITTALS

A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings (as specified in Section 1.04)

2. Operation and Maintenance Manuals (as specified in Section 1.05)

3. Spare Parts List (as specified in Section 1.06)

4. Special Tools List (as specified in Section 1.06)

5. Reports of Certified Shop Tests

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6. Reports of Field Tests including Oil Analysis

B. Each submittal shall be identified by the applicable Specification Section.

C. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

1.04 PARTIAL, INCOMPLETE OR ILLEGIBLE SUBMITTALS WILL BE RETURNED TO THE CONTRACTOR WITHOUT REVIEW FOR RESUBMITTAL.SHOP DRAWINGS

A. Shop drawings shall include but not be limited to:

1. Product data sheets.

2. Sample equipment nameplate diagram.

3. Drawings showing clearly marked overall dimensions for each transformer. Drawings shall show conduit stub-up area locations.

4. Weight of each transformer.

5. Proof of ISO 9001 registration.

6. Compliance, Deviations, and Exceptions (CD&E) letter: Submittal shall include a CD&E letter, or it will be rejected. Include all deviations comments, deviations, and exceptions taken to the Drawings and Specifications by both the Contractor and Equipment Manufacturer/Supplier. Attach a copy of this Specification Section. Mark the left margin beside each paragraph/item with:

a. "C" for full compliance

b. "D" for deviation

c. "E" for exception

d. Provide a typewritten explanation for each "D" or "E" item. Handwritten explanations are not acceptable. The CD&E letter shall also address drawing deviations or exceptions.

B. The submittal information shall reflect the specific equipment identification number as indicated on the Drawings.

C. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and

similar information which is "highlighted" or somehow identifies the specific equipment items that the Contractor intends to provide are acceptable and shall be submitted.

1.05 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.

1.06 TOOLS, SUPPLIES AND SPARE PARTS

A. The transformers shall be furnished with all special tools necessary to disassemble, service, repair and adjust the equipment. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor. In addition to the manufacturer's recommended spare parts, the Contractor shall furnish the following for each transformer.

No. Required	Description
1 set	Primary fuses of each size provided

B. Reference Section 26 05 00 – Basic Electrical Requirements for spare parts delivery and handling requirements.

1.07 IDENTIFICATION

A. Each transformer shall be identified with the identification number indicated on the Drawings (e.g. TX-DIS), the primary and secondary voltages, kVA rating, winding configurations, and the transformer impedance. A nameplate shall be securely affixed in a conspicuous place on the front of each transformer on the outside of the termination compartment doors. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

1.08 WARRANTY

A. The manufacturer's warranty shall be for a minimum of three (3) years from date of delivery, or two (2) years after overall Substantial Completion is awarded, whichever is longer and shall include repair labor, parts, travel expense necessary for repairs at the jobsite, and expendables used during the course of repair. Submittals received without written warranties as specified shall be rejected in their entirety.

B. The Contractor shall provide a complete warranty covering the transformer as well as all accessories and appurtenances that are furnished and installed with the transformer.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. The equipment covered by this Specification is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed per the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

B. All transformer manufacturers shall be registered as ISO 9001 manufacturers.

C. Transformers shall be by the following:
   1. Square D,
   2. Eaton,
   3. ABB, or
   4. an Engineer-approved equal.

2.02 TRANSFORMERS

A. General

   1. Transformers shall be of a compact design. All units shall be a pad-mounted compartmental type, which when assembled shall be an integral unit for mounting on a pad.

   2. The transformer kVA rating shall be as indicated on the Drawings. Units shall comply with the efficiency and thermal performance requirements applicable under DOE 10 CFR Part 431.

   3. All units shall be designed to comply with the short circuit capability requirements of IEEE C57.12.00.

   4. The transformer and associated termination compartments shall be so designed and constructed as to be tamper resistant per IEEE C57.12.28 and constructed to prevent unauthorized access. There shall be no screws, bolts, or other fastening devices which are externally removable.

   5. Transformers shall be suitable for outdoor installation without a fence or other area enclosure.

   6. All transformers shall be coated with a primer and finish coat to provide a tough, non-chalking weather resistant finish. The finish coat shall be dark green Munsell-7.5G.Y.3.29.1.5 (Olive Green). The paint thickness shall be a minimum of 2.5 mils.

   7. Transformers shall be designed for step-down use.

B. Tank

1. The transformer shall be of sealed-tank construction or sufficient strength to withstand a pressure of 10 psi without permanent distortion. A domed cover to aid water run-off shall be provided and shall be welded and the fastenings tamperproof. The transformer shall remain effectively sealed for a top liquid temperature range of up to 105°C. Cooling panels or fins shall be provided on the back and sides of the tank to meet the thermal performance and cooling class requirements.

2. Lifting provisions shall be permanently attached and arranged on the tank to provide a distributed, balanced lift in a vertical direction for the completely assembled transformer.

3. Terminal designations shall be as defined by IEEE C57.12.70. The high and low voltage terminal designations shall be indicated on the tank wall with oil resistant yellow paint or decals.

4. Tank grounding provisions shall be as stated in IEEE standards. The grounding provisions shall be capped before painting the unit. The unit shall be shipped with the caps in place.

5. The following tank accessories shall be provided:

    a. A liquid level indicator.

    b. A dial type liquid temperature gauge with Form C contacts.

    c. A 1-inch NPT upper plug (or cap) for filling and pressure testing.

    d. A pressure vacuum gauge with Form C contacts.

    e. A pressure relief valve.

    f. An automatic pressure relief device (self-resealing w/indicator).

C. Windings

1. The transformer shall carry its continuous rating with average winding temperature rise by resistance that shall not exceed 55 degrees C rise, based on an average ambient of 30 degrees C over 24 hours with a maximum of 40 degrees C. The insulation system shall allow an additional 12% kVA output at 65 degrees C average winding temperature rise by resistance, on a continuous basis, without any decrease in normal transformer life, as defined by IEEE C57.12.00. Impedance shall be 5.75% subject to NEMA/ANSI ± 7.5% impedance tolerance.

2. The transformer shall be designed to be capable of withstanding short circuits without damage on any winding, at a magnitude of fault current equal to the full rated voltage divided by the per unit impedance with full voltage maintained on all windings connected to the external source of power.

3. The internal high voltage leads of the transformer shall be adequately insulated and mechanically secured. Connection to the coil conductors shall be made by a process ensuring avoidance of damage to the coil insulation. All high voltage phase leads shall be installed rigidly and spaced to provide dielectric and mechanical strength and ensure phase isolation.

4. The high voltage windings shall be rated 12.47 kV and 95 kV BIL unless indicated otherwise on the Drawings for use on a solidly grounded system and shall have two (2) 2-1/2% full capacity taps above and below rated voltage.

5. The low voltage windings shall be rated 480Y/277 VAC and 30 kV BIL unless indicated otherwise on the Drawings.

6. High and low voltage windings shall be copper.

7. All high and low voltage windings shall be secured in place by use of B stage epoxy pattern paper. The epoxy shall be thermally cured under pressure to ensure the bonding of conductor and paper.

8. Bolted connections shall be acceptable only from lead to bushing connection. All other connections shall be welded or adequately crimped.

9. The transformer shall be equipped with padlockable tap changer. The tap changer shall be designed for deenergized operation. The operating handle shall give permanent visual indication of the voltage position and have a provision for securing it at the desired position. The tap changer shall be marked for deenergized operation, and the handle shall be easily accessible and located inside the high voltage compartment. By operating the handle, all three phases shall be operated simultaneously.

D. Core

1. Core laminations shall be annealed, free of burrs, and furnished with a heat-resistant insulating coating. All core sections shall be grounded to the core clamp.

E. Termination Compartment

1. Full height termination compartments with hinged doors shall be located side by side separated by a steel barrier, with the high voltage compartment on the left. The liftoff doors shall be equipped with stainless steel hinges to allow the doors to be removed and door stops to hold the doors open if not removed while working in

the compartments. The high voltage compartment shall be accessible only after the door to the low voltage compartment has been opened. To facilitate making connections and permit cable pulling, the doors shall be removable. The inside base of the transformer sill shall have a flange for anchoring the cabinet to the equipment pad. Removable door sill on compartments shall be provided to permit rolling or skidding of unit into place over conduit "stub-ups" in foundation.

2. High voltage termination compartment locking provisions shall be provided in accordance with IEEE C57.12.28 utilizing a captive hex-head bolt that is removeable with normal tools. Enclosure security shall conform with IEEE C57.12.20. Low voltage termination compartment door shall have a 3-point latch (top, bottom, middle) and be lockable with at least one padlock.

3. Unless otherwise indicated on the Drawings, termination compartments shall be designed for conduit entry from below.

4. Termination compartment depth shall be as required to accommodate all terminations and accessories specified herein and shown on the Drawings on both the primary and secondary sides. Provide extended-depth compartments where required.

5. Each transformer shall be provided with the following labels, designed for outdoor application, permanently affixed to the door of each termination compartment.

   a. Danger Hazardous Voltage decal
   (Shall be centered on the inside of the high voltage termination compartment door)

   b. Secondary Voltage label
   (Shall be centered 4-6 inches above the Danger Hazardous Voltage decal)

   c. kVA Rating label
   (Shall be centered 4-6 inches above the Secondary Voltage decal).

   d. “Non-PCB's" label in conformance with EPA 40 CFR Part 761 (installed on outside of the high voltage termination compartment door)

6. A permanently marked diagrammatic instruction nameplate shall be located inside the low voltage termination compartment door and be in accordance with all provisions contained in IEEE C57.12.34.

F. Terminations

1. High voltage terminations shall be dead front with universal bushing wells and dead front inserts. Bushings shall be rated for 200A load-break.

2. High voltage terminations shall be radial configuration.

3. The low voltage terminations shall be live front with spade type externally clamped bushings for phase connections and the neutral (if present). Spades shall be tin-plated with NEMA 2-hole spacing with holes spaced per IEEE C57.12.34. Spades shall be the appropriate horizontal length with the required hole pairs to support the number of cables to be terminated as shown on the Drawings. Low voltage bushings shall be supported with an insulating material in a manner designed to counteract any downward forces resulting from the connection of multiple cables to the bushings.

    a. Where a neutral termination is provided, the spade shall be fully insulated from all connections and the tank. A ground pad shall be provided on the outer surface of the tank with one or more externally removable ground straps suitably sized for the short circuit rating of the transformer provided and connected between the neutral bushing and the ground pad.

4. Cable terminations at the transformers shall be as specified in Section 26 05 13 – Medium Voltage Cables and Section 26 05 19 – Low Voltage Conductors and Cables.

G. Coolant and Insulating Fluid

1. Coolant and insulating fluid shall be less flammable/high fire point as defined per the NEC. The transformer shall be furnished and installed in accordance with the latest edition of Article 450 of the NEC and in accordance with the requirements of the testing and listing agency of the liquid.

2. All transformer insulating fluid shall be bulk tested for polychlorinated biphenyls (PCBs) per ASTM D 4059 and certified, upon request, as having no detectable level of PCB.

H. Fusing

1. The fusing on the primary for each transformer shall be BAY-O-NET type oil immersed fuses that are externally replaceable with a hot stick without opening the transformer tank.

I. Accessories and Appurtenances

1. Furnish and install the following for each transformer under this Contract:

    a. An oil drain valve located outside of the primary and secondary termination compartments. Valve shall be behind a hinged, lockable cover. Valve shall

be accessible from outside the transformer without the need to open the primary or secondary termination compartments.

b. 5kV distribution class lightning arresters for surge protection shall be provided. For radial feed systems, three (3) arresters shall be provided. Arresters shall be mounted in the high voltage compartment. Lightning arrester MCOV (Maximum Continuous Operating Voltage) shall be 5 kV rms.

c. Hot stick for operating internal switches and pulling fuses.

PART 3 – EXECUTION

3.01 INSTALLATION

A. The transformers shall be installed as shown on the Drawings and as recommended by the equipment manufacturer.

B. Prior to final completion of the work, all metal surfaces of the transformer shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same lacquer as used for shop finishing coats.

C. Adjust primary taps such that the secondary voltage is within two (2) percent of rated voltage.

3.02 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:

1. Witnessed Shop Tests

   a. None required.

2. Certified Shop Tests and Reports

   a. Submit description of proposed testing methods, procedures, and apparatus.

   b. Submit notarized and certified copies of all test reports.

   c. The transformers shall be given routine factory tests in accordance with the requirements of the IEEE and NEMA standards. Temperature rises may be certified from basic design. The tests shall be:

   d. Resistance measurements of all windings on the rated voltage connection of each unit and at the tap extremes of one unit only of a given rating.

1) Ratio tests on the rated voltage connection and on all tap connections.

2) Polarity and phase-relation tests on the rated voltage connections.

3) No-load loss at rated voltage on the rated voltage connection.

4) Exciting current at rated voltage on the rated voltage connection.

5) Impedance and load loss at rated current on the rated voltage connection of each unit and on the tap extremes of one unit only of a given rating.

6) Applied potential test.

7) Induced potential tests.

3. Field Tests

a. Field tests shall be performed in accordance with the requirements specified in the General Conditions, Division 01, and NETA Acceptance Testing Specifications, latest edition. All visual and mechanical inspections shall be performed. All electrical tests shall be performed, including optional tests.

b. Upon energization of each transformer, the Contractor shall take a sample of the transformer insulating liquid in accordance with ASTM D-923 to be analyzed and establish a baseline for future analysis. Analysis shall be performed by an independent testing laboratory that regularly engages in transformer insulating liquid testing. A report of the findings shall be submitted to the Engineer and Owner. The sample shall be tested for the following (minimum):

1) Dielectric breakdown voltage per ASTM D-877 and/or ASTM D-1816.

2) Acid neutralization number per ASTM D-974

3) Specific gravity per ASTM D-1298

4) Interfacial tension per ASTM D-971 or ASTM D-2285

5) Color per ASTM D-1500

6) Visual condition per ASTM D-1524

7) Measure dissipation factor or liquid power factor per ASTM D-924

8) Perform dissolved gas analysis per IEEE C57.104 or ASTM D-3612.

END OF SECTION

SECTION 26 24 13
LOW VOLTAGE SWITCHBOARDS

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, test, and place in satisfactory operation the low voltage switchboards (SWBDs) as specified herein and indicated on the Drawings.

B. Reference the following Specification Sections:

1. Section 26 05 00 – Basic Electrical Requirements

2. Section 26 05 53 – Identification for Electrical Systems

3. Section 26 29 20 – Low Voltage Active Harmonic Filter System

4. Section 26 09 16 – Electric Controls and Relays

5. Section 26 43 13 – Surge Protective Devices

C. The SWBD line-ups shall contain circuit breakers, power quality metering equipment, control devices, and all accessories as specified herein, indicated on the Drawings, and as required to result in a complete and operable power distribution equipment assembly.

D. The Contractor shall obtain the SWBDs from one manufacturer who shall also manufacture the structure and major equipment components, which includes, but is not limited to, circuit breakers, power monitoring equipment, relays, instrument transformers, controls, and other components of the equipment assembly. Sub-contracting of wiring is not acceptable.

E. The SWBDs shall be assembled using NEMA rated components. Components designed and built to International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and labeled in compliance with IEC standards is not acceptable.

F. Bid Options

1. Provide a separate optional deductive bid item for switchboard rated 42 kAIC in lieu of the base rating of 65 kAIC

1.02 CODES AND STANDARDS

A. All equipment shall be Listed by and shall bear the Label of Underwriter's Laboratories, Incorporated (UL).

B. The equipment shall be designed, manufactured, and/or Listed to the following standards as applicable:

1. National Electrical Manufacturers Association (NEMA):

a. NEMA PB 2 – Deadfront Distribution Switchboards.

2. National Fire Protection Association (NFPA):

a. NFPA 70 – National Electrical Code (NEC).

3. Underwriters Laboratories (UL):

a. UL 489 – Molded Case Circuit Breakers, Molded Case Switches, and Circuit Breaker Enclosures.

b. UL 891 – Switchboards.

1.03 SUBMITTALS

A. Per the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Operation and Maintenance Manuals

3. Spare Parts List

4. Proposed Testing Methods

5. Reports of Certified Shop and Field Tests

6. Manufacturer’s Representatives Installation Certification

7. Inspection and Test Plan (ITP)

B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submissions will be returned to the Contractor without review for resubmittal.

C. Shop drawings for each SWBD assembly shall include but not be limited to:

1. Compliance, Deviations, and Exceptions (CD&E) letter: Submittal shall include a CD&E letter, or it will be rejected. Include all deviations comments, deviations, and exceptions taken to the Drawings and Specifications by both the Contractor and Equipment Manufacturer/Supplier. Attach a copy of this Specification Section. Mark the left margin beside each paragraph/item with:

    a. "C" for full compliance

    b. "D" for deviation

    c. "E" for exception

    d. Provide a typewritten explanation for each "D" or "E" item. Handwritten explanations are not acceptable. The CD&E letter shall also address drawing deviations or exceptions.

2. Bill of material list for each SWBD assembly including each SWBD compartment.

3. Equipment specifications and product data sheets identifying all electrical ratings. This information shall include all equipment and devices comprising the SWBD.

4. Complete assembly, layout, anchoring, and installation drawings with clearly marked dimensions. Plan, front, and side view drawings, including overall dimensions of the SWBD assembly. Identify shipping splits and show conduit stub-up area locations on the Drawings.

5. Approximate total shipping weight of each shipping split and/or equipment assembly, and total assembled equipment line-up weight.

6. Complete, custom one-line diagram and complete three-line diagram for the SWBD line-up. The diagrams shall indicate the devices comprising the SWBD assembly including, but not limited to, circuit breakers, control power and instrument transformers, relays, control devices, and other equipment comprising the complete assembly. Clearly indicate electrical ratings of all devices.

7. Complete, custom internal wiring diagram of each SWBD compartment/assembly. Each wiring diagram shall include wire identification and terminal numbers.

8. Internal compartment-to-compartment interconnection wiring diagrams including wiring identification and terminal numbers.

9. Example equipment nameplate data sheet.

10. Nameplate schedule for each compartment.

11. Manufacturer's installation instructions.

12. Manufacturer's written warranty statement.

D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 OPERATIONS AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals per the procedures and requirements set forth in the General Conditions and Division 01. The manuals shall include:

1. Instruction books and/or leaflets.

2. Spare parts list.

3. Final as-built construction drawings (updated from those included in the shop drawings) incorporating all changes made in the manufacturing and installation process.

4. All other drawings, product information, and other materials originally included in the shop drawings, updated as necessary to reflect as-built conditions.

1.06 SPARE PARTS

A. The SWBDs shall be furnished with all spare parts as recommended by the equipment manufacturer. Spaces in SWBDs shall be furnished with installed spare circuit breakers where indicated on the Drawings.

B. In addition to the spare parts recommended by the manufacturer, the Contractor shall furnish the following minimum spare parts for each SWBD assembly:

Number Required	Description
1 set	Fuses of each size and type provided.
1	Control power transformer of each size and type provided.

C. Reference Section 26 05 00 – Basic Electrical Requirements for spare parts delivery and handling requirements.

1.07 IDENTIFICATION

A. Each SWBD line-up shall be identified with the identification name and/or number indicated on the Drawings (e.g., SWBD-GAC). A nameplate shall be securely affixed in a conspicuous place on the SWBD.

B. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

1.08 WARRANTY

A. Contractor and Manufacturer shall warrant that the material and workmanship of all components and the operation of the equipment is per the latest design practices and meets the requirements of this Specification.

B. Warranty shall include, but not be limited to the following:

1. Replace equipment/components found to be faulty, make changes in equipment arrangement, and/or make adjustments necessary to meet the equipment or functional requirements of this Specification.

2. System rewiring and component substitution/rebuild.

3. All accessories and appurtenances provided by the equipment manufacturer.

C. Warranty for each SWBD line-up shall be in effect for a period of 24 months following final acceptance of the SWBD.

1.09 INSPECTION AND TEST PLAN (ITP)

1. Submit an Inspection and Test Plan (ITP), including those testing requirements associated with switchboard assemblies. The ITP shall be prepared in accordance with the NETA Acceptance Testing Specifications (ATS), Section 26 05 00 – Basic Electrical Requirements, and the applicable provisions of the NEC.

2. The ITP shall specifically include, at a minimum:

a. Submission Timeline: The ITP shall be submitted to the Engineer for review and approval before commencement of field testing.

b. Test Program Content: Identification of test methods, test documentation forms, equipment to be used, approved device settings, and qualifications of testing personnel.

c. Specific System Testing Requirements: As indicated on the drawings, or otherwise required:

1) Ground Fault Protection System Testing: Verification of ground fault protection system using primary injection (per NEC 230.95(C))

2) Arc Energy Reduction Testing: Verification of arc energy reduction (maintenance mode) functionality using primary injection (per NEC 240.87(C))

d. Functional Testing: Confirmation of operation of control power, trip units, arc energy reduction activation indicators, and associated components.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Equipment shall be designed, constructed, and installed per the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

B. It is the intent of these specifications that the SWBDs be manufactured and assembled by a single manufacturer who shall be responsible for matching all components and providing equipment that functions together as a system. Subcontracting of wiring and/or third-party assembly is not acceptable.

C. The SWBDs shall be:
1. QED-2 LV Series as manufactured by Square-D by Schneider Electric
2. Pow-R-Line Xpert (PRLX) as manufactured by Eaton
3. Reliagear LVSB as manufactured by ABB

2.02 SWITCHBOARDS

A. General

1. The SWBD assemblies shall be UL 891 Listed and bear a UL label indicating the UL File Number. Where indicated on the Drawings, SWBD shall be suitable for use

as service equipment and shall be clearly marked as such on the enclosure exterior.

2. The SWBD manufacturer shall provide all the proper cable lugs for all cable connections as required for the cable sizes shown on the 1-line drawing to avoid field modifications. Cable lugs for connecting to SWBD bus and/or circuit breakers 1600A and larger shall be irreversible compression type. Lugs for all smaller bus connections shall be mechanical type lugs. Reference the Drawings for the quantity and size of conductors.

3. Circuit breakers shall be molded-case circuit breakers as specified herein.

B. Ratings

1. Voltage rating shall be as indicated on the Drawings. The entire assembly shall be suitable for 600 volts maximum AC service.

2. The equipment assemblies shall be suitable for operation at the available fault current, 65,000 amperes rms symmetrical (minimum), unless indicated otherwise on the Drawings. The equipment assemblies shall be labeled to indicate the maximum available fault current rating, considering the structure, bussing, main/tie circuit breaker(s), and feeder/branch circuit devices. The short circuit current rating shall not be less than that specified herein or indicated on the Drawings. All overcurrent protective devices in the SWBD assembly shall be fully rated, series rated systems are not acceptable.

3. Main breakers shall be 100% rated. Feeder circuit breakers shall be 100% rated where indicated on the Drawings.

C. Structures

1. SWBDs shall be deadfront type, completely metal enclosed, with self-supporting sections that are NEMA Type 1 industrial use enclosures. The sections shall be totally accessible from the front and the sides. Equipment assemblies requiring rear access are not acceptable. The framework shall be of UL gauge steel. Ventilation shall be provided as required.

2. Enclosure interior and exterior finish paint color shall be ANSI 49 or 61 grey, using the manufacturer’s standard painting process. The color of the back panels located within the enclosure shall be white.

3. All wire troughs shall have hinged doors.

4. Structure front covers shall not obscure any portion of the rating information or trip unit of any circuit breaker.

5. Main Circuit Breaker Section: The SWBD assembly shall include main circuit breaker section.

    a. Main sections shall have grounded steel barriers to provide separation and arc flash isolation from adjacent sections.

    b. Main circuit breakers shall be configured for top or bottom conduit entry as required. The Contractor is responsible for coordinating the structure top or bottom conduit entry requirements with the SWBD manufacturer.

6. The distribution sections shall include group-mounted and/or individually mounted feeder/branch circuit breakers which shall be fully front accessible and front connectable. Circuit breaker connections to the switchboard bussing shall be bolt-on, designed to firmly grip the bus bars under high-fault conditions.

D. IR Windows

1. Provide Infrared (IR) viewing windows for main and single-mounted draw out feeder devices. Manufacturer shall optimize the arrangement to maximize usable space, locating IR viewing windows in wireway, termination compartments, or on switchboard side to allow thermographic inspection of main and single-mounted draw out feeder terminations without removing covers.

E. Bus

1. All bus bars shall be tin-plated copper. The bussing shall have a sufficient cross-sectional area, as per UL 891, to limit the temperature rise on any current-carrying part to a maximum of 65 degrees C above a maximum ambient temperature of 40 degrees C. The fully rated main bus shall have an ampacity as indicated on the Drawings, be 100 percent rated, and extend the full length of the equipment. The ground bus shall be sized according to UL 891 and installed along the entire length of the equipment assembly.

2. Where a 3-wire bus is indicated on the Drawings, the SWBD shall be furnished with three-phase bus bar and a ground bus. In addition, if a transformer with a grounded wye secondary is shown on the Drawings to be supplying a 3-wire SWBD, a neutral landing pad shall be furnished within the SWBD for each incoming supply to provide a place to terminate the grounded conductor. Providing a 4-wire bus (3 phases plus neutral) for a 3-wire system is not acceptable.

3. The distribution SWBD bus shall be rated as required by the rating of the mounted feeder/branch devices, including spares or spaces. A full-height vertical bus shall be provided to accommodate future circuit breakers. Vertical bus that is less than full height or does not provide at least 20 percent spare mounting capacity shall not be acceptable.

4. Where required by the NEC, a bonding jumper, sized per the NEC, shall be installed between the SWBD ground bus and the neutral bus or neutral landing pad.

F. Molded-Case Circuit Breakers

1. Unless otherwise shown on the Drawings, circuit breakers shall be manually operated, molded-case type, UL 489 Listed, rated 480 VAC, three-pole, with 100 ampere or larger frames.

2. Overload protection shall be provided on all poles with trip settings as indicated on the Drawings. Where indicated on the Drawings, breakers shall have solid-state electronic trip units (ETUs) with features and adjustable segments as shown.

   a. Long-time, short-time, and ground fault segments shall have both adjustable pickup and adjustable delay.

   b. Instantaneous segments shall have an adjustable pickup in addition to any high-fault trip override.

   c. Trip units shall be Square D Micrologic 5.0A/6.0A, Eaton PXR25, or ABB Ekip Touch.

   d. For circuit breakers of frame size 250A or larger, ETUs shall be field interchangeable.

   e. All main circuit breaker trip units (regardless of size) as well as feeder circuit breaker trip units for circuit breakers 1200A frame or larger shall be provided with an arc energy reduction mode to reduce arc-flash energy. Arc energy reduction mode shall be activated by a factory-wired illuminated selector switch mounted on the SWBD door with lockable cover (or switch-and-cover with separate indicator light). Provide dry contact from the trip unit to make arc energy reduction mode status available for remote monitoring.

3. Circuit breakers shall be provided with permanently mounted hardware for padlocking the circuit breaker in the open position. Padlocking shall prevent operation of the circuit breaker handle.

G. Current Transformers (CTs)

1. Provide CTs and Bus Access Provisions as required for active front-end harmonic mitigation.

2. Current transformers (CTs) shall be dry type, for indoor service, insulated for 600 volts, 10 kV BIL. Design shall have a mechanical and thermal rating to withstand

short-circuit current, stresses, and heating effects equal to the rating of the circuit breaker of the application.

3. Identify the CTs for polarity with standard marking or symbols. The CTs shall be capable of carrying rated primary current continuously without damage.

4. Run secondary wiring from CTs in suitable wiring trough, or conduit, to proper short-circuiting type terminal blocks for connection to relays, instruments, and other devices.

5. Door-mounted test blocks for all CTs in the SWBD shall be provided.

H. Potential Transformers (PTs)

1. Any potential transformers (PTs) shall be indoor dry type, single-phase, 60 hertz.

2. PTs shall have a 10kV BIL and an accuracy classification determined according to ANSI Standards. The PTs shall be suitable for 0.3 metering accuracy at the burden to be served for the required devices plus 20 percent. Primary and secondary voltages shall be as indicated on the Drawings.

3. Connect secondaries to potential buses as required. Protect PTs with primary and secondary fuses. Protect primary side with current-limiting fuses.

4. Door mounted test switches for all PTs in the SWBD shall be provided. Test switch wiring shall be plainly marked to indicate the respective circuits to each pole of the switch.

I. Control Power Transformers (CPTs)

1. Provide 480 to 120 VAC control power transformers, as required for power quality meters, trip units, displays, and other control-related loads. Transformers shall be sized with sufficient capacity and inrush margin for all connected loads.

2. Protect control power transformers with both primary and secondary fuses.

3. The primary shall be protected with current-limiting fuses and preceded by a manual disconnect switch.

4. Each control power transformers shall be sized to support, at a minimum, the following control loads:

a. Constant power for all trip unit controls and displays in the assembly.

5. Provide separate control power transformers for any ancillary loads separate from those used for the control circuits identified above.

J. Control Wiring and Control Terminal Blocks

1. Wire and factory test the SWBD to verify compliance with the functional and operational requirements described in the Drawings and Specifications.

2. All control wiring shall be No. 14 AWG (minimum).

    a. Power wiring shall be sized for the maximum load rating of the connected unit; but not less than No. 12 AWG.

    b. For current transformer (CT) circuits, use No. 12 AWG. Where reduced resistance is required, No. 10 AWG or larger shall be used.

    c. All wiring shall be type MTW rated for 105°C.

3. Route control wires for outgoing or "compartment-to-compartment" interconnecting wiring to master terminal blocks with suitable numbering strips numbered in agreement with the manufacturer's detailed wiring diagrams. Provide a minimum of 10 percent (10%) spare terminal blocks for each circuit breaker and auxiliary compartment.

4. Terminal blocks for control wiring shall be provided per Section 26 09 16 – Electric Controls and Relays.

5. Number wiring with shrink-type tag devices at both ends consistent with the manufacturer's detailed wiring diagrams. Duplication of wire numbers and terminal block numbers is not acceptable.

6. All control wiring shall be neatly laced and include sufficient slack to maintain flexibility at hinge locations.

K. Power Monitoring, Instruments, and Control Devices

1. Where indicated on the Drawings, provide power monitors with door-mounted graphic display modules. Power monitors shall be one of the following:

    a. PowerLogic ION7650 as manufactured by Square D by Schneider Electric,

    b. PXM1300 Series as manufactured by Eaton

    c. EPM 9900P by GE Multilin.

    d. The power monitor manufacturer shall match the manufacturer of the circuit breakers and other components of the SWBD assembly.

e. Provide all associated potential transformers (PTs), current transformers (CTs), control power supplies, communication modules, and wiring necessary to deliver a complete and functioning power monitoring system, whether shown explicitly on the Drawings or required for proper operation.

2. Power monitors shall include:

a. Sufficient on-board memory to store up to 50,000 user-defined event files

b. An Ethernet network port supporting Modbus TCP/IP communications.

c. Any necessary gateways or interface hardware necessary to integrate with the control system.

d. Monitoring and communication of the following minimum parameters:

1) Current (all phases).

2) Voltage (all phases).

3) kW, kVAR, kVA.

4) Power Factor.

3. Furnish instruments, meters, control devices, and associated circuitry to perform all specified functions as specified per the drawings and these Specifications.

4. Furnish and install control devices as required and/or shown on the Drawings. The following control devices shall be provided as specified in Section 26 09 16 – Electric Controls and Relays:

a. Pilot devices (e.g., switches, LED indicating lights, etc.).

b. Relays and timers, if required.

L. Nameplates and Legend Plates

1. Provide engraved plastic nameplates to identify each SWBD, each compartment, and associated door mounted devices and internal components. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

2. Equipment names and/or numbers and device identification text shown on the Drawings shall be used as the basis to engrave the nameplates and legend plates. Where the equipment identification text would exceed the capacity of the SWBD manufacturer’s standard nameplate/legend plate size, the manufacturer shall provide larger nameplates and/or additional nameplates as necessary.

Abbreviating equipment names/numbers and device identification text is not acceptable.

3. Provide a master nameplate listing SWBD designation, voltage rating, ampere rating, short circuit rating, manufacturer's name, general order number, and item number.

4. Control components mounted as part of the assembly, such as fuse blocks, control relays, pushbuttons, switches, and similar devices, shall be suitably marked for identification corresponding to appropriate designations on the manufacturer's wiring diagrams.

M. Warning Signs

1. Provide a minimum of two (2) warning signs on the front of the SWBD line-up (and two (2) on the rear, where the rear of the line-up is accessible).

a. Signs shall be construction of red laminated plastic with white engraved lettering approximately ½-inch in height.

b. Signs shall read: "DANGER HIGH VOLTAGE"

c. Provide arc-flash hazard warning label in accordance with NFPA 70, Article 110.16(A).

d. Provide available fault current label in accordance with NFPA 70, Article 408.6, including calculation date.

N. Source Quality Control

1. Completely assemble, wire, and test SWBDs at the factory. Detailed inspections before and after assembly shall assure correctness of design and workmanship. Provide groups of wires leaving the shipping-assembled equipment with terminal blocks with suitable numbering strips.

2. After assembly, provide the SWBDs with lifting channels having eyebolts for attachment of crane slings to facilitate lifting and handling each shipping-assembly unit. These lifting channels shall be removable after equipment is placed on permanent foundations.

O. Accessories

1. SWBD accessories shall be provided as follows:

a. Provide an optional line item quote for a 4” infrared inspection port in the front door of each main circuit breaker section. IR ports shall be located to

allow IR observation of the cable terminations within the compartment. IR ports shall meet the requirements of IEEE C37.20.2, shall maintain the NEMA rating of SWBD enclosure when in use.

P. Surge Protective Devices

1. Surge protective devices (SPD) shall be provided integral to the SWBD enclosure, as indicated on the Drawings. See Section 26 43 13 – Surge Protective Devices for SPD requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Prior to equipment purchase, the Contractor shall verify by field measurement that the available space is sufficient to accommodate the switchboard, including all required working clearances, conduit entry locations, and installation tolerances. Equipment dimensions shall be coordinated with actual site conditions and the approved shop drawings. Notify the Engineer of any discrepancies prior to procurement.

B. The SWBD shall be furnished and installed as shown on the Drawings and per the manufacturer's installation instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment. The equipment shall be suitably protected until accepted by the Owner.

C. The equipment shall be installed and checked per the manufacturer's recommendations. This shall include but not limited to:

1. Checking to ensure that the pad location is level to within .125 inches over 3 feet in any direction.

2. Checking to ensure that all bus bars are torqued to the manufacturer's recommendations.

3. Assemble all shipping sections, remove all shipping braces, and connect all shipping split mechanical and electrical connections.

4. Secure assemblies to foundation or floor channels.

5. Inspect and install all circuit breakers in their proper places.

6. Install power cable lashing as outlined in the manufacturer’s installation instructions for the equipment.

3.02 PAINTING

A. Prior to final completion of the work, all metal surfaces of the equipment shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same coating as used for factory finishing coats.

3.03 TESTING AND FIELD QUALITY CONTROL

A. All tests shall be performed per the requirements of the General Conditions and Division 01. The following tests are required:

1. Witness Shop Tests

    a. Shop witness testing is not required.

2. Certified Shop Tests and Reports

    a. Submit description of proposed testing methods, procedures, and apparatus.

    b. Submit notarized and certified copies of all test reports, prior to shipment. At a minimum, the entire SWBD assembly must undergo a quality inspection before shipment. This inspection shall include, but is not limited to, the following:

        1) Physical inspection of the structure and the electrical conductors, including bussing, general wiring, and units.

        2) General electrical tests including power circuit phasing, control circuit wiring, instrument transformers, meters, ground fault system, and device electrical operation.

        3) AC dielectric tests of the power circuits and control circuits.

        4) Verify presence and legibility of all Markings and labels, including instructional, Underwriters Laboratory (UL), and inspector's stamps.

    c. The manufacturer shall use integral quality control checks throughout the manufacturing process to maintain the correctness of the SWBD.

3. Field Tests

    a. Field testing shall be performed in accordance with the General Conditions, Division 01, the latest edition of the NETA Acceptance Testing Specifications (ATS), and Section 26 05 00 – Basic Electrical Requirements.

    b.

3.04 FIELD ADJUSTMENTS

A. All adjustable protective device settings shall be set in the field by the entity responsible for protective device setting and testing as specified in Section 26 05 00 – Basic Electrical Requirements, per the settings designated in the contractor-completed coordination study per Section 26 05 73.

END OF SECTION

SECTION 26 24 19
LOW VOLTAGE MOTOR CONTROL CENTERS

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, test, and place in satisfactory operation, the motor control centers as specified herein and indicated on the Drawings.

B. The Contractor shall obtain the motor control centers from one manufacturer who shall also manufacture the enclosure and major equipment components, which includes, but is not limited to, motor starters, motor controllers, circuit breakers, power monitoring equipment, and other components of the equipment assembly as indicated on the Drawings. Subcontracting of wiring is not acceptable.

C. The motor control center shall be assembled using NEMA rated components. Components designed and built to International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured and labeled in compliance with IEC standards is not acceptable.

D. Confirm all motor horsepower ratings, equipment loads, and control requirements against approved shop drawings. Report any discrepancies to the Engineer.

E. Confirm all required instrumentation and control wiring for system completeness. Report any discrepancies to the Engineer.

F. Bid Options

1. Provide a separate optional deductive bid item for MCCs rated 42 kAIC in lieu of the base rating of 65 kAIC

2. Intelligent MCCs with associated expansion modules, as outlined below

G. Reference the following Specification Sections:

1. Section 26 05 00 – Basic Electrical Requirements

2. Section 26 05 19 – Low Voltage Conductors and Cables

3. Section 26 05 53 – Identification for Electrical Systems

4. Section 26 09 16 – Electric Controls and Relays

5. Section 26 43 13 – Surge Protective Devices

1.02 CODES AND STANDARDS

A. The equipment shall be designed, manufactured, and/or Listed to the following standards as applicable:

1. American National Standards Institute (ANSI)/Institute of Electrical and Electronic Engineers (IEEE):

a. ANSI/IEEE C12.1 – Code for Electricity Metering.

b. ANSI/IEEE C57.13 – Instrument Transformers.

2. National Electrical Manufacturers Association (NEMA):

a. NEMA 250 – Enclosures for Electrical Equipment.

b. NEMA ICS 1 – Industrial and Control Systems General Requirements.

c. NEMA ICS 2 – Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.

d. NEMA ICS 18 – Motor Control Centers.

3. National Fire Protection Association (NFPA):

a. NFPA 70 – National Electrical Code (NEC).

4. Underwriters Laboratories (UL):

a. UL 489 – Molded Case Circuit Breakers, Molded Case Switches, and Circuit Breaker Enclosures.

b. UL 845 – Motor Control Centers.

c. UL 508 – Standard for Industrial Control Equipment

1.03 SUBMITTALS

A. In accordance with the procedures and requirements set forth in the General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings.

2. Spare Parts List.

3. Proposed Testing Methods and Reports of Certified Shop and Field Tests.

4. Manufacturers Installation Certification

5. Operation and Maintenance Manuals.

B. Each submittal shall be identified by the applicable Specification Section.

1.04 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings for each motor control center shall include but not be limited to:

1. A compliance, Deviations, and Exceptions (CD&E) letter: Submittal shall include a CD&E letter, or it will be rejected. Include all deviations comments, deviations, and exceptions taken to the Drawings and Specifications by both the Contractor and Equipment Manufacturer/Supplier. Attach a copy of this Specification Section. Mark the left margin beside each paragraph/item with:

   a. "C" for full compliance

   b. "D" for deviation

   c. "E" for exception

   d. Provide a typewritten explanation for each "D" or "E" item. Handwritten explanations are not acceptable. The CD&E letter shall also address drawing deviations or exceptions.

2. Product data sheets for all equipment comprising each MCC.

3. Equipment nameplate data sheet.

4. Approximate total shipping weight of each shipping split.

5. Plan, front elevation, and side view drawings with overall dimensions. Identify shipping splits and conduit stub-up area.

6. Internal schematic and point-to-point wiring diagrams for each motor starter and/or motor control unit. Standard wiring diagrams that are not custom created by the manufacturer for the motor control centers for this project are not acceptable. One wiring diagram which is typical for an equipment group (e.g. screw pumps, equalization basin pumps, backwash pumps) is not acceptable. Each wiring

diagram shall include wire identification and terminal numbers. Indicate all devices, regardless of their physical location, on the diagrams. Identify on each respective wiring diagram specific equipment names and equipment numbers consistent with those indicated on the Drawings.

7. Complete single-line diagrams for each motor control center showing circuit breakers, motor starter units, motor controllers, and other equipment connected to the bus in the MCC. Indicate electrical ratings of equipment and devices on these single-line diagrams or in a tabular schedule format. Ratings shall include starter size and type, motor circuit protector continuous current rating, circuit breaker frame size and trip rating, instrument transformers, meters, relays, timers, control devices, motor horsepower and full load current, and similar information.

8. Bill of material schedule for each motor control center and each motor control unit (starter, feeders, and associated devices).

9. Nameplate schedule for each motor control center bucket.

10. Manufacturer's installation instructions.

11. Key interlock scheme drawing and sequence of operations.

12. Manufacturer’s Warranty Statement

13. Table listing all motor loads connected to the motor control center. Table shall include the full load amps and locked rotor amps of the APPROVED motors. Final approval of MCC shop drawings cannot be given until all motor loads for MCC have been reviewed, approved, and shown in this table.

D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "soft-cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01. The manuals shall include, but not be limited to:

1. Instruction books and/or leaflets.

2. Spare parts list.

3. Final as-built construction drawings (updated from those included in the Shop Drawings) incorporating all changes made in the manufacturing and installation process.

4. All other drawings, product information, and other materials originally included in the Shop Drawings, updated as necessary to reflect as-built conditions.

1.06 SPARE PARTS

A. MCCs shall be furnished with installed spare circuit breakers and/or motor starters/controllers where indicated on the Drawings.

B. Provide all manufacturer-recommended spare parts as an optional line item. Coordinate final spare parts purchased with the Owner. In addition, provide a separate line item cost adder for the following spare parts for each motor control center:

Number Required	Description
1	Circuit breaker of each type, size, and rating provided (except main circuit breakers).
1	Motor circuit protector (MCP) for each type, size, and rating provided.
1	Relay of each type and size provided.
1	Starter coil and complete set of contacts for each size and type of starter provided.
2 sets	Fuses of each size and type provided.
1	Control power transformers of each size and type provided.
1	Pilot device (e.g., pushbutton, selector switch, etc.) complete with contact blocks and legend plates for each type, color, size, and rating provided.

C. Reference Section 26 05 00 – Basic Electrical Requirements for spare parts delivery and handling requirements.

1.07 IDENTIFICATION

A. Each motor control center shall be identified with the identification number indicated on the Drawings (e.g., MCC-DF, etc.). A nameplate shall be securely affixed in a conspicuous place on each motor control center. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

1.08 WARRANTY

A. Contractor and Manufacturer shall warrant that the material and workmanship of all components and the operation of the equipment is in accordance with the latest design practices and meets the requirements of this Specification.

B. Warranty shall include, but not be limited to the following:

1. Replace equipment/components found to be faulty, make changes in equipment arrangement, and/or make adjustments necessary to meet the equipment or functional requirements of this Specification.

2. System rewiring and component substitution/rebuild.

3. All accessories and appurtenances provided by the equipment manufacturer.

C. Warranty for each MCC line-up shall be in effect for a period of 24 months following final acceptance of the MCC.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Provide factory-standard motor control center equipment with a documented record of reliable performance. Equipment shall be designed, constructed, and installed in accordance with recognized industry best practices, and shall function as intended when installed as shown on the Drawings.

B. All components of the motor control center shall be provided supplied by a single manufacturer. That manufacturer shall be solely responsibility for the integration and compatibility of all components to ensure complete and functional system performance. The motor control center manufacturer shall also be the manufacturer of the motor controllers. Third-party sourcing or assembly of these components is not acceptable.

C. Acceptable motor control centers products shall be:

1. Intelligent Model 6 with Modbus TCP/IP communications, manufactured by Square D by Schneider Electric

2. Freedom series, manufactured by Eaton

3. Centerline 2100, manufactured by Allen-Bradley

2.02 MOTOR CONTROL CENTER

A. General

1. The motor control centers shall be 600 VAC class suitable for operation on a three-phase, 60 Hz system. The motor control centers and their components shall conform to the requirements of applicable standards of NEMA ICS 2 and Underwriters' Laboratories, Inc. UL 845. Wiring shall be NEMA ICS 18 Class II, Type B. Each vertical section shall be a NEMA type 1 (gasketed) or NEMA 12 industrial use enclosure unless otherwise specified or indicated on the Drawings.

2. The enclosures shall be cleaned, primed, and finish coated in accordance with the manufacturer's standard process. The pre-treatment process shall be a zinc chromate primer followed by a "One Coat" paint process that is monitored to meet the manufacturer's specifications for paint color, texture, thickness, and durability. Enclosure interior and exterior finish color shall be ANSI 49 or ANSI 61. The color of the back panel/bucket located within the MCC enclosure shall be white.

3. The motor control centers shall be capable of withstanding the fault current available at its line terminals. Minimum bus bracing, withstand, and interrupting ratings are specified herein.

4. Unless otherwise specified or indicated on the Drawings, each vertical section shall be approximately 20 inches wide, and 90 inches high, 20 inches deep. No section shall contain more than six NEMA Size 1 starters. Motor control centers shown "back-to-back" on the Contract Drawings shall be complete motor control assemblies placed back-to-back in the location shown. Motor control center sections with common horizontal and/or vertical bus systems are unacceptable.

5. Continuous horizontal wiring troughs shall be provided at both the top and bottom of each section. These troughs shall line up to form a continuous wireway for the full length of the motor control center. Each section shall be provided with a large, continuous, full height vertical wiring trough in the right side of each section. Each vertical wiring trough shall be furnished complete with tie bars for conductor support.

6. All control wiring shall be No. 14 AWG (minimum) labeled at each end in accordance with the wiring numbers shown on the accepted shop drawings. Power wiring shall be sized to suit the maximum horsepower rating of unit; No. 12 AWG (minimum). Wiring shall be type MTW rated for 105°C. Wire color coding shall be red for control and black for power. Wire numbers shall not be repeated in a motor control center.

7. Starter units shall contain the number of auxiliary contacts, unit-mounted pilot devices and indicating lights, control relays, elapsed time meters, and other devices as shown on the Drawings and required for the applications. A minimum of two (2) normally open (NO) and two (2) normally closed (NC) spare contacts shall be provided for each magnetic starter. These spare contacts shall be shown on the submittal wiring diagrams.

8. The motor control centers shall be furnished with warning signs to notify maintenance personnel of multiple sources of power within the motor control units, as required.

B. Power

1. The motor control centers shall be supplied from a 480V, 3-phase, 3 or 4 wire as indicated on the Drawings, 60 Hz power source. The incoming power feeders shall be sized as shown on the Drawings.

C. IR Windows

1. Provide Infrared (IR) viewing windows for main and single-mounted drawout feeder devices. Manufacturer shall optimize the arrangement to maximize usable space, locating IR viewing windows in wireway, termination compartments, or on MCC side to allow thermographic inspection of main and single-mounted drawout feeder terminations without removing covers.

D. Bus

1. Main horizontal bus shall be installed through all MCC sections, be made of tin-plated copper, and have an ampacity rating as shown on the Drawings. Where a 4-wire bus is shown on the Drawings, a horizontal neutral bus shall also be installed through all MCC sections, be made of tin-plated copper, and have an ampacity to match the main horizontal bus.

2. Full-height vertical bus shall be installed in all sections including those containing spare units and "prepared" spaces. The vertical bus shall have an ampacity sufficient to accommodate the units in each section but shall be no less than 300A. Vertical bus for sections containing “prepared” spaces shall have an ampacity of no less than 600A. Vertical bus shall be tin-plated copper.

3. The bus shall be braced for 65,000A rms symmetrical at 480V unless otherwise indicated on the Drawings. The horizontal bus shall be effectively isolated from all wiring troughs and other working areas. Vertical bus extensions shall be isolated by rigid, UL recognized glass-polyester moldings to be a separate, self-supported assembly. No extra safety jacks or similar devices shall be required to obtain a dead-front condition, without the need for additional safety devices. Access shall be provided for inspection and maintenance from the front. Bus sizing shall be in accordance with UL 845 to limit the temperature rise on any current-carrying part to a maximum of 65 degrees C above a maximum ambient of 40 degrees C.

4. The horizontal ground bus shall be tin-plated copper and located in the bottom horizontal wireway. The minimum size of the horizontal ground bus shall be ¼-inch x 1 inch (6.35mm x 25.4mm) or 33% of the main horizontal bus ampacity, whichever is greater.

5. Compression lugs shall be mounted on the ground bus in each section, in the size and quantity as required for the termination of system and equipment grounding conductors.

6. The vertical ground bus shall be tin-plated copper and be solidly connected to the horizontal ground bus. This ground bus, in combination with the unit ground bus stab, establishes unit grounding before the plug-in power stabs engage the power bus. Conversely as the unit is withdrawn, grounding is maintained until after the plug-in power stabs are disengaged, per UL 845.

E. Incoming Line Units

1. Each incoming line unit shall contain a main circuit breaker or main lug-only connections as indicated on the Drawings. Main lug-only sections shall include all required buswork, fittings as required with UL-listed cable lugs sized for cables and quantities shown on the Drawings. For bus ratings 1600A and above, provide irreversible compression lugs. For smaller bus ratings, provide mechanical lugs. All cable lugs shall be UL listed and suitable for copper or aluminum conductors, as applicable.

2. Main circuit breaker and main lug sections shall be configured for top or bottom conduit entry as required. Unless otherwise noted, the Contractor is responsible for coordinating top or bottom conduit entry requirements with the MCC Manufacturer.

3. A neutral landing pad shall be furnished in the main circuit breaker section. A neutral landing pad is required to terminate the grounded conductor from the utility transformer in accordance with the NEC.

F. The Unit Compartments

1. Each unit compartment shall be provided with an individual front door hinged to the vertical structure. Each plug-in unit shall be supported and guided by a removable unit support pan, so that the unit rearrangement is easily accomplished. The rearrangement of the unit support pan from one location to the other shall be accomplished without use of tools. After insertion, each plug-in unit shall be held in place by at least one multi-turn latch, located at the front of the unit. The latch shall be located for front accessibility and installation convenience. An additional mechanical interlock shall be provided to prevent withdrawal of the unit from the stationary structure with the operating mechanism in the ON position.

2. The unit plug in power stabs shall be electromagnetically tin-plated copper to yield a low resistance connection and designed to tighten during heavy current surges and short circuits. The stab shall be backed by spring steel clips to provide and maintain a high pressure, two-point connection to the vertical bus. They shall be free floating and self-loading plug-in. Wiring from the unit disconnecting means to

the plug-in stab shall be exposed at the rear of the unit. The power cable terminations at the plug-in stab shall be mounted in a two-piece, glass polyester support assembly. This support assembly shall provide a separate isolated pathway for each phase, minimizing the probability of a unit fault condition reaching the power bus system.

3. NEMA Size 1 through Size 5 non-reversing starters shall be plug-in units. Size 1, 2, and 3 shall utilize stab assembly rated 100A. Stab assemblies for Size 4 and Size 5 starters shall be rated for the starters maximum output current rating.

4. An industrial, heavy-duty flange handle mechanism shall be supplied for the control of each disconnecting means. This mechanism shall be engaged with the disconnect device at all times as an integral part of the unit regardless of the unit door position. The operator handles shall have an up-down motion with the down position as off. The ON-OFF condition of the disconnecting means shall be permanently marked on the handle operator. It shall be possible to lock the handle in the "OFF" position with up to three (3) 3/8-inch diameter shackle padlocks and in the "ON" position with one (1) 3/8 inch diameter shackle padlock.

5. The operator handle of all units shall be interlocked with the door units so that the disconnect means cannot be switched unless the door unit is closed. A means shall be provided for purposely defeating the interlock during maintenance or testing. This interlock shall also prevent opening the unit door unless the disconnecting means is in the off position. An externally operated defeater requiring the use of a screwdriver shall provide access to the unit without interrupting service.

6. The overload relays shall be resettable from the outside of the enclosure by means of an insulated bar or button.

G. Isolation and Insulation

1. Horizontal bus access covers and vertical bus covers shall isolate the energized buses to guard against the hazard of accidental contact. These covers shall be molded of a glass polyester material.

2. The horizontal bus shall be isolated from the top horizontal wireway by a grounded steel barrier. This barrier shall be removable to allow access to the bus and connections for maintenance.

3. The vertical bus cover shall provide unit plug-in openings which shall permit unit plug-in stab assemblies to pass through and engage the vertical bus. The unit plug-in openings shall be sized to minimize the probability of inadvertent contact with the vertical bus.

4. Isolation of unused stab openings shall be accomplished by use of a manual shutter to close off the stab opening. These shutters shall be attached to the structure so that when they are removed (to allow a stab connection) they are retained in the structure and are readily accessible for use should a plug-in unit be removed from the motor control center.

5. All units shall be isolated from one another, above and below, by unit support pans or steel barriers, which can remain in place when the units are withdrawn.

6. Incoming line compartments shall be isolated from horizontal and vertical wireways by steel barriers.

7. A molded unit isolating barrier shall be provided to isolate the unit from the vertical wireway.

H. Combination Motor Control Units

1. Motor branch circuits shall be protected by motor circuit protectors (MCPs). MCP sizes shall be selected by the MCC manufacturer based on motor nameplate and full-load ampere (FLA) data shown on the one-line diagrams. The MCC manufacturer shall compile this information into a schedule of MCC components associated with each load, as required above. MCPs shall have an adjustable instantaneous trip range from 800% to 1200% of motor nameplate FLA.

2. The motor circuit protector shall be operated by a toggle type handle and shall have a quick make, quick break overcenter switching mechanism that is mechanically trip free from the handle, so that the contacts cannot be held closed against short circuits and abnormal currents. Tripping shall be clearly indicated by the handle automatically assuming a position midway between the manual ON and OFF positions. All latch surfaces shall be ground and polished. All poles shall be so constructed that they open, close, and trip simultaneously.

3. Each pole of these motor circuit protectors shall provide instantaneous short circuit protection by means of an adjustable magnetic only element. Contacts shall be of non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes, consisting of metal grids mounted in an insulating support.

4. The motor circuit protectors in combination with a contactor and overload relay shall have an interrupting rating that matches the motor control center short circuit rating at 480V.

I. Motor Starters

1. Motor starters shall conform to NEMA Standard ICS 1 and shall be for across-the-line starting, unless otherwise indicated. IEC rated equipment is not acceptable and shall be used as a basis for rejection of the equipment. The size of the starter

shall be as required for the particular load. Minimum starter size shall be NEMA Size 1. Size 1 and 2 starters shall be completely drawout type, so that units may be withdrawn without disconnecting any wiring. Size 3 and 4 full-voltage, non-reversing starters shall be drawout type after disconnecting power leads only. Starters over three-space units high may be bolt-on type. A positive guidance system shall be provided to assure proper alignment of wedge-shaped power stabs in deadfront openings in vertical power bus.

2. A suitable control disconnect device(s) to comply with the requirements of the NEC shall be provided.

3. Magnetic starters and contactors shall be electromagnetic vertical or horizontal lift design with double break cadmium oxide silver contacts. Design shall meet or exceed the requirements of UL and NEMA Standards. Coils shall be hot molded construction to protect the coils from mechanical and environmental damage.

4. Each starter shall be able to accommodate a minimum of three (3) auxiliary contacts in addition to the hold-in contact.

5. Each starter shall be supplied with a three-pole, manual test and reset overload relay. The relay shall meet the requirements specified in this Section. The relay shall be an:

    a. Tesys T LTMR as manufactured by Square D

    b. C440 as manufactured by Eaton

    c. E300 manufactured by Allen-Bradley

6. Each motor starter coil shall be equipped with a surge-suppression device for protection of the solid-state equipment (e.g. programmable logic controller) wired as part of the control circuit.

7. The Contractor and motor control center manufacturer shall review the Contract Documents for additional requirements for space heaters, power factor correction capacitors, and similar equipment which may not be specified in this Division or shown on the Drawings. Control power transformers shall be fused on both the primary and secondary sides. The minimum control power transformer VA requirements are shown below. Control power transformers shall be sized as required for the connected loads, plus 25% spare capacity.

    a. Size 1-75 VA

    b. Size 2-75 VA

    c. Size 3-200 VA

d. Size 4-300 VA

e. Size 5-500 VA

8. Provide cost and schedule impacts for intelligent MCCs equipped with the following expansion modules:

a. Expansion modules shall be supplied with four (4) input points and two (2) output points. The output points shall offer direct control of motor starter coils up to NEMA Size 5. The output points shall also provide direct control of other electrical devices within the electrical ratings limits of the module.:

b. Tesys T LMTE as manufactured by Square D Company,

c. C440 as manufactured by Eaton,

d. E300 as manufactured by Allen-Bradley.

J. Circuit Breakers

1. Where specified herein, indicated on the Drawings, or required, the main circuit breaker(s) shall be rated for service entrance and bear a service entrance label.

2. Circuit breakers shall be UL 489 Listed molded case type with trip and frame ratings as indicated on the Drawings. Unless otherwise indicated, circuit breakers shall be manually operable, with automatic trip-free operation, and shall provide inverse-time-limit overload and instantaneous short-circuit protection. Where indicated on the Drawings, circuit breakers shall be 100% rated.

3. Unless indicated otherwise on the Drawings, circuit breakers shall be rated 480 VAC, 3-pole, and shall have 100-ampere or larger frames. The interrupting rating shall match that of the MCC short circuit rating at 480V.

4. Unless indicated otherwise on the Drawings, circuit breakers with smaller than 225-ampere frames shall be the thermal-magnetic type. Thermal and magnetic trip elements may be fixed or adjustable. Horizontally mounted operator handles for feeder circuit breaker units up to 225A are permissible if accepted in writing by the Engineer.

5. All circuit breakers with 225-ampere frames and larger, and smaller frame circuit breakers where specifically indicated on the Drawings, shall have interchangeable electronic trip units (ETU) and adjustable trip elements and time delays. Provide electronic trip units with the adjustable functions indicated on the Drawings (e.g., Long, Short, Instantaneous, Ground, etc.).

6. The MCC manufacturer shall provide all of the proper lugs for all cable connections as required to avoid field modifications. Cable lugs for connecting to circuit breakers 1600A and larger shall be irreversible compression type, lugs for all smaller circuit breaker connections shall be mechanical type lugs. Reference the Drawings for the quantity and size of conductors.

7. For circuit breakers rated 1200A and larger, trip units shall be provided with a reduced energy let-thru mode to reduce arc-flash energy. Provide a lockable panel-mounted selector switch, normally open contacts, and a panel-mounted indicator light for control and indication of reduced energy let-thru mode. Provide all required appurtenances, factory wired, to enable the reduced energy let-thru feature.

K. Terminal Blocks

1. Terminal blocks associated with removable units within the motor control center shall be provided as follows:

   a. Terminal blocks shall be mounted within the unit insert and in the front for ease of accessibility.

   b. Pull-apart style terminal block assemblies shall be provided. Terminal block assembly shall consist of a male and female component held together with captive screws or positive retention clips. The terminal block assembly shall be designed to withstand the effects of vibration, yet be able to be pulled apart without difficulty. The terminals of the assembly shall be recessed to isolate them from accidental contact. Terminal markings shall be provided for the purpose of identifying terminations. Terminal strips shall be suitable for use as a disconnecting means of foreign interlock voltages.

   c. For starters, Size 2 and smaller, terminate all starter wiring (power and control) and external field wiring on terminal blocks provided in each unit.

   d. For starters, Size 3 and larger, terminate control wiring and external field control wiring on terminal blocks provided in each unit.

2. Terminal blocks associated with non-removable units within the motor control center shall be provided in accordance with Section 26 09 16 – Electric Controls and Relays.

3. Provide a minimum of four (4) spare terminals in each terminal block assembly.

L. Control Devices

1. Furnish and install control devices as required and/or shown on the Drawings. The following control devices shall be provided as specified in Section 26 09 16 – Electric Controls and Relays:

    a. Pilot devices (switches, indicating lights, etc.)

    b. Relays and timers

M. Nameplates

1. Provide engraved plastic nameplates to identify the motor control center, each unit compartment, door mounted devices, and internal components.

2. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems. Equipment names and numbers as indicated on the single line diagrams shall be used as the basis to engrave the nameplates.

3. Provide a master nameplate giving motor control center designation, voltage rating, ampere rating, short circuit rating, manufacturer's name, general order number and item number.

4. Control components mounted as part of the assembly, such as fuse blocks, control relays, pushbuttons, switches, and similar devices, shall be suitably marked for identification corresponding to appropriate designations on the manufacturer's wiring diagrams.

N. Future Space Requirements

1. Provide spaces for future combination starter and other units in the motor control centers. Furnish spaces with hardware to accommodate future plug-in control unit without modification of vertical sections. Provide the number of spaces required for future units as indicated on the Drawings, minimum.

2. Provide additional vertical sections to ensure total number of spaces as indicated on the Drawings. The number of vertical sections is contingent upon specific manufacturer's final proposed and Engineer-accepted configuration of motor control center units.

O. Motor Control Center Additions

1. The Contractor shall furnish and install complete motor control center sections or individual motor control center units to be added to existing motor control centers in accordance with these Specifications and as indicated on the Drawings.

2. These additions shall be of the same manufacturer, type, rating, and color as the existing motor control centers. Furnish and install all hardware necessary to

connect the buses of the new and existing motor control centers, including ground buses. Enclosures shall match existing.

P. Motor Control Center Modifications

1. The Contractor shall modify existing motor control centers and specific motor control center units as specified herein and indicated on the Drawings. These modifications include, but are not limited to, additions of door mounted pilot devices, modifications to existing motor control circuits and other work.

Q. Power Monitors

1. Where indicated on the Drawings, provide power monitors with door-mounted graphic display modules. Power monitors shall be PowerLogic ION7650 as manufactured by Square D Compnay, PXM1300 Series as manufactured by Eaton, or EPM 9900P by Multilin. Power monitor manufacturer shall match the manufacturer of the other components of the MCC assembly. All PTs and CTs, power supplies, wiring, and other devices indicated on the Drawings, and as required, shall be provided for a complete monitoring system.

2. Power monitors shall be provided with sufficient on-board memory to store up to 50,000 user-defined event files and a network communications port to communicate with the control system via Modbus TCP/IP protocol. Provide any necessary hardware gateways to provide this communication capability. The following parameters shall be communicated as a minimum:

a. Current (all phases).

b. Voltage (all phases).

c. KW, KVAR, KVA.

d. Power Factor.

R. Surge Protective Devices

1. Surge protective devices (SPD) shall be provided either integral to the MCC enclosure or as a separate unit external to the MCC enclosure, as indicated on the Drawings. See Section 26 43 13 – Surge Protective Devices for SPD requirements.

PART 3 – EXECUTION

3.01 INSTALLATION

A. The motor control centers shall be installed as shown on the Drawings and in accordance with the manufacturer's installation instructions.

B. Install motor control centers to allow complete unit door swing required for unit removal. This is specifically required where a vertical section of motor control center is installed next to a wall to the left of the motor control center section.

C. Where motor control center structures are located away from walls to allow bottom conduit entry, the Contractor shall furnish and install sheet metal coverings for openings along the sides and top of the motor control center line-up. The purpose of the coverings is to minimize dust, dirt, and undesirable materials from collecting behind the equipment. The sheet metal coverings shall be of the same material, gauge, and finish as the motor control center.

D. Motor control centers shall be furnished with anchor bolts as required for aligning and mounting. Floor channels with end covers shall be of type recommended by the manufacturer and shall be furnished for installation in a concrete pad.

E. All field wiring that is terminated directly to a unit within the motor control center shall be neatly routed in a manner that does not hinder the ability to service, adjust, or replace components within that unit. Field wiring shall be properly anchored to the motor control center and individual unit structures.

F. Prior to final completion of the work, all metal surfaces of the equipment shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same lacquer as used for shop finishing coats.

3.02 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:

1. Witnessed Shop Tests

    a. None required.

2. Certified Shop Tests and Reports

    a. Submit description of proposed testing methods, procedures, and apparatus. Submit notarized and certified copies of all test reports.

    b. As a minimum, the entire motor control center shall go through a quality inspection before shipment. This inspection shall include, but is not limited to, the following:

1) Physical inspection of the structure and the electrical conductors including bussing, general wiring, and units.

2) General electrical tests including power circuit phasing, control circuit wiring, instrument transformers, meters, ground fault system, and device electrical operation.

3) AC dielectric tests of the power circuits and control circuits.

4) Markings/labels, including instructional type, Underwriters Laboratory (UL), and inspector's stamps.

3. The manufacturer shall use integral quality control checks throughout the manufacturing process to maintain the correctness of the motor control center.

B. Field Tests

1. Field tests shall be performed in accordance with the requirements specified in the General Conditions, Division 01, and NETA Acceptance Testing Specifications, latest edition.

3.03 FIELD ADJUSTMENTS

A. All adjustable settings of circuit breakers shall be set in the field by the entity responsible for protective device setting and testing as specified in Section 26 05 00 – Basic Electrical Requirements, in accordance with the settings designated in the coordination study.

B. The settings of the motor circuit protectors and overload relays shall be developed and set by the entity responsible for protective device setting and testing as specified in Section 26 05 00 – Basic Electrical Requirements. The settings shall be in accordance with NEC requirements based on the motor nameplate data of the motors installed.

3.04 SERVICES OF MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall provide the services of a qualified, factory-trained manufacturer's technical representative who shall adequately supervise the installation and testing of all equipment furnished under this Contract. The manufacturer's representative shall certify in writing that the equipment has been installed in accordance with the manufacturer's recommendations. No further testing or equipment startup may take place until this certification is accepted by the Owner.

B. The manufacturer’s technical representative shall perform startup and functional testing of the equipment as specified herein.

C. The Contractor shall provide training for Owner personnel. Training shall be conducted by the manufacturer's factory-trained representative who shall instruct Owner personnel in operation and maintenance of all equipment provided under this Section. Training shall be provided for two (2) sessions of two (2) hours each. Training shall be at times coordinated with the Owner. Training shall be provided in accordance with the requirements of Section 46 00 00 – Equipment General Provisions.

D. The services of the manufacturer's representative shall be provided for a period of not less than as follows:

1. One (1) trip of one (1) working day during the installation and startup of the equipment.

2. One (1) trip of one (1) working day two (2) months before the warranty expiration to identify any issues to be corrected under warranty.

3. One (1) trip of one (1) working day to perform training as specified herein.

E. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.

END OF SECTION

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SECTION 26 29 23
LOW VOLTAGE VARIABLE FREQUENCY MOTOR CONTROLLERS

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, connect, test and place in satisfactory operating condition all variable frequency drives (VFDs) as specified herein and indicated on the Drawings.

B. Reference the following Specification Sections:

1. Section 26 05 00 – Basic Electrical Requirements

2. Section 26 05 53 – Identification for Electrical Systems

3. Section 26 43 13 – Surge Protective Devices

4. Section 26 29 13.13 – Low-Voltage Enclosed Motor Controllers-Full Voltage

5. Section 26 29 13.16 – Low-Voltage Enclosed Motor Controllers-Reduced Voltage

6. Section 26 09 16 – Electric Controls and Relays

C. The Contractor is responsible for coordinating with the driven equipment manufacturer and the VFD manufacturer to ensure that the VFD is sized properly to meet all the requirements herein. This includes, but is not limited to, accounting for motor RPM and variable or constant torque applications. Coordination shall occur prior to submittal. The Contractor is responsible for including any costs related to equipment upsizing, conduit and wire upsizing, etc. that results from selecting equipment with a higher full load amp rating than was specified or used as the basis for design.

D. The variable frequency drives shall be assembled using NEMA rated components. Components designed and built to International Electrotechnical Commission (IEC) standards are not recognized. Equipment designed, manufactured, and labeled in compliance with IEC standards is not acceptable.

1.02 CODES AND STANDARDS

A. VFDs shall be designed, manufactured, and/or listed to the following standards as applicable:

1. NEMA 250 – Enclosure for Electrical Equipment

2. IEEE 519 – Recommended Practice and Requirements for Harmonic Control in Electric Power Systems

3. NEMA ICS 7 – Adjustable-Speed Drives

4. NEMA 61800-2 – Rating Specifications for Low Voltage Adjustable Frequency AC Power Drive Systems

5. UL 489 – Molded Case Circuit Breakers, Molded Case Switches, and Circuit Breaker Enclosures

6. UL 508A – Standard for Industrial Control Panels (VFD Enclosure)

7. UL 508C – Standard for Power Conversion Equipment (VFD)

1.03 DEFINITIONS

A. The following definitions are provided for clarity regarding the language used in this Specification:

1. Variable Frequency Drive (VFD) –The complete factory-packaged or integrated assembly consisting of a VFD unit and all specified auxiliary components (e.g., disconnects, contactors, filters, and control devices) enclosed in a single enclosure.

2. VFD Unit –The solid-state power conversion device consisting of rectifier, DC bus, and inverter sections, which modulates output voltage and frequency to control the speed of an AC motor.

1.04 SUBMITTALS

A. In accordance with the procedures and requirements set forth in General Conditions and Section 01 30 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Operation and Maintenance Manuals

3. Spare Parts List

4. Reports of Certified Shop and Field Tests

5. Manufacturer’s Field Start-up Report

6. Manufacturer’s Representative’s Installation Certification

7. Pre- Equipment-Selection Harmonic Study Report

1.05 PRE-EQUIPMENT-SELECTION HARMONIC STUDY

A. A comprehensive pre-equipment-selection harmonic study shall be prepared by the Contractor. The results of this study shall be submitted to the Engineer as part of the required submittals. If this study indicate the need for additional tuned filters, line reactors, isolation transformers, or other harmonic mitigation equipment, these shall be supplied and included in the Bid. Indicate the proposed location of the harmonic mitigation equipment in the submittal data. Location is subject to acceptance by the Engineer.

B. The harmonic distortion values resulting from operation of all or any variable frequency drive-driven motor-load combinations operating at full load shall be as defined in latest edition of IEEE Standard 519.

C. System single line diagrams and field access to the plant site will be provided to the Contractor for the purpose of providing this study. The contractor shall obtain from others other information that may be necessary to complete this study. Input data and other pertinent information used in harmonic study shall be coordinated by the Contractor with the following:

1. Input data/information/results of the short circuit fault analysis specified herein.

2. Electrical system configuration and electrical equipment shop drawing submittal data including, but not being limited to new non-linear loads, new linear loads, and new capacitors.

1.06 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for resubmittal.

C. Shop drawings **for each VFD** shall include but not be limited to:

1. Compliance, Deviations, and Exceptions (CD&E) letter: Submittal shall include a CD&E letter, or it will be rejected. Include all deviations comments, deviations, and exceptions taken to the Drawings and Specifications by both the Contractor and Equipment Manufacturer/Supplier. Attach a copy of this Specification Section. Mark the left margin beside each paragraph/item with:

a. "C" for full compliance

b. "D" for deviation

c. "E" for exception

d. Provide a typewritten explanation for each "D" or "E" item. Handwritten explanations are not acceptable. The CD&E letter shall also address drawing deviations or exceptions.

2. Complete bill of material and catalog data sheets for all equipment and devices comprising the VFD.

3. Heat loss data for each VFD.

4. Manufacturer’s warranty information.

5. Product data sheets for **all** system components, including but not limited to:

a. VFD units

b. Harmonic correction devices and/or equipment, e.g. line reactors, passive filters, and phase-shifting transformers

c. Output reactors and/or output filters

d. Pilot lights and pilot devices

e. Control and timing relays

f. Enclosure fans

g. Contactors

h. Power supplies

i. Control power transformers

j. Current transformers

k. Potential transformers

l. Circuit breakers and/or motor circuit protectors

m. Fuses

n. Terminal blocks (power, control, and shorting)

o. Surge protective devices

6. Layout drawings of the VFD that include:

    a. All cabinet or enclosure dimensions, access details, and weights.

    b. Required clearances around the enclosure, e.g. ventilation.

    c. Conduit entry areas and/or stub-up locations.

    d. Nameplate sizes, colors, and locations.

    e. Physical arrangement of door mounted devices located on the variable frequency drive enclosure.

    f. Physical arrangement of **all** interior components, including DIN-rail-mounted devices.

        General "catalog data sheet" layout drawings which are not specific to the systems specified herein are not acceptable.

7. Custom schematic and interconnection wiring diagrams of all electrical work, including but not limited to, circuit breakers, motor circuit protectors, contactors, instrument transformers, meters, relays, timers, control devices, terminal blocks and identification numbers, wire numbers, and other equipment comprising the complete system.

    a. These drawings shall be circuit specific for each motor-load combination (e.g. Backwash Pumps, Equalization Basin Pumps, Screw Press, etc.). Specific equipment names consistent with the Drawings shall appear on each respective diagram.

    b. Indicate all devices, regardless of their physical location, on the schematic diagrams.

    c. Electrical ratings of all equipment and devices shall be clearly indicated on the schematic diagrams.

        Standard schematics and wiring diagrams that are not custom created by the manufacturer for the variable frequency drives for this project are not acceptable.

8. Confirmation of spare parts requirements as specified herein.

9. Table listing all motor loads connected to the VFD. The table shall include the full load amps of the APPROVED motors. Final approval of VFD shop drawings cannot be given until all motor loads for each VFD have been reviewed, approved, and shown in this table.

D. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.07 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions, Section 01 30 00 – Submittal Procedures and Section 46 00 00 – Equipment General Provisions.

B. Prior to completion and final acceptance of the project, the Contractor shall furnish and install "as-built" wiring diagrams for each VFD. These final drawings shall be included in the O&M manuals and an additional copy that is plastic laminated shall be securely placed inside each VFD.

C. The O&M manual shall include the “as-commissioned” parameters of each VFD in both print and digital formats.

D. If the VFDs require computer software or configuration, the O&M manual shall include copies of all programming guides/manuals.

1.08 SPARE PARTS

A. The VFDs and accessories shall be furnished with all spare parts as recommended by the equipment manufacturer. In addition to the manufacturer’s recommended spare parts, the Contractor shall furnish the following spare parts:

1. Two (2) sets of fuses for each size and type of fuse provided.

2. One (1) HMI per type of HMI provided.

3. One (1) set of enclosure air filters for each VFD.

4. For each VFD unit **without** field-replaceable internals, furnish one (1) spare VFD unit per size provided.

5. For each VFD unit **with** field-replaceable internals, furnish one (1) fully functional main control circuit board per VFD unit size provided.

B. The spare parts shall be packed in containers suitable for long-term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.

C. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the Work, at which time they shall be delivered to the Owner.

D. Spare parts lists included with the shop drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

E. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

1.09 WARRANTY

A. The contractor shall warrant that the material and workmanship of all components and the operation of the VFDs and auxiliary equipment is in accordance with the latest design practices and meets the requirements of this Specification.

B. Warranty shall include, but not be limited to the following:

1. Replace components found to be faulty and make changes in equipment arrangement or make adjustments necessary to meet the equipment or functional requirements or this Specification.

2. System rewiring and component substitution/rebuild.

3. All accessories and appurtenances provided by the VFD manufacturer.

C. The warranty shall be in effect for a period of 24 months following final acceptance of each VFD.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. The equipment covered by this Specification is intended to be equipment of proven performance. Equipment shall be designed, constructed, and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Drawings.

B. The Contractor shall obtain the VFDs from one manufacturer who shall also manufacture and assemble the enclosure and major equipment components including but not limited to the VFD unit and bypass starters. The manufacturer shall have five years minimum of experience in the manufacture of similar units and shall have a general distribution to the electrical trade. **Subcontracting of wiring and/or third-party assembly is not acceptable.** The VFD assembly shall be listed under UL 508A.

C. The VFDs shall be manufactured by Yaskawa, the Square D Company, Eaton or Rockwell Automation (Allen-Bradley).

D. The Contractor shall be responsible for the successful application and operation of the entire drive and control system serving the motor and driven equipment. This includes the responsibility for obtaining all load, torque, speed and performance requirements

from the appropriate sources and integrating these into a VFD that fulfills the requirements of this Specification.

2.02 VFD SYSTEMS

A. Operating Conditions

1. The following operating conditions are applicable for all equipment of this Specification.

   a. Humidity: 0-95%.

   b. Ambient Temperature: 0 degrees Celsius to 40 degrees Celsius.

   c. Altitude: up to 3,300 feet

B. Basic Design and Performance

1. Each VFD shall be a complete alternating current electric drive system including all the hardware and software necessary to accomplish variable speed operation of a motor and load combination. VFDs shall be provided in accordance with the requirements indicated on the Drawings and as described in these Specifications.

2. Each VFD shall be suitable for operation as part of a 480 VAC, 3-phase, 60 Hertz power distribution system. The complete VFD system shall have a minimum short circuit current rating of 65,000 amperes symmetrical at rated voltage.

3. **The Contractor** is fully responsible for the review of the full Contract Documents to determine specified motor speed, horsepower and full load ampere requirements for each motor-driven load. In addition, the Contractor shall size and select the VFD, and components as follows:

   a. Each VFD shall provide continuously, motor load current equal to 100% of the direct on-line motor nameplate full load current.

   b. Each VFD shall be selected for Variable Torque (Normal Duty) or Constant Torque (Heavy Duty) based on its respective load type served as shown in the Load Type tables below.

Variable Torque (Normal Duty) Load Types	Constant Torque (Heavy Duty) Load Types
Vertical Turbine Pumps	Rotary Lobe Pumps
Submersible Non-Clog Pumps	Progressive Cavity Pumps
	Dewatered Sludge Screw Conveyors

c. The Load Type tables above are intended to exhaustively cover all possible equipment controlled by VFDs to be provided under Division 26 for this Contract. If a piece of equipment is found that is not explicitly listed in these tables, this discrepancy shall be brought to the attention of the Engineer (in writing) immediately for resolution **prior to submitting the Bid for this Contract.**

4. Each VFD shall be suitable to operate, at times, on a limited power source engine-generator set. The VFD shall be provided with equipment and devices to prevent waveform distortion as specified herein.

5. Each VFD shall be provided with control and sequence logic as specified herein and indicated on the Drawings. Control and sequence logic shall be designed such that the motor-load combination can be operated in the manual mode upon control and sequence logic failure, including all necessary personnel and equipment safety interlocks. Each VFD shall be designed such that specific control and protection functions can be attained through simple programming by either factory engineers or Owner's trained operating personnel. In addition, refer to Section 40 61 96 – Process Control Descriptions, for a description of the operation of each VFD.

6. Unless otherwise accepted in writing by the Engineer, VFDs shall be provided with output reactors or filters to prevent elevated voltage levels at the motor terminals that exceed the ratings of the inverter duty rated motor winding insulation.

   a. **The Contractor** is responsible for providing the VFD manufacturer with estimated and field-verified cable lengths between each VFD and its respective motor. The VFD manufacturer shall select and size the output reactors or filters based on the cable lengths provided by the Contractor. Any change in output filter or reactor selection and/or size from the Bid shall be immediately brought to the attention of the Engineer in writing for resolution.

   b. The output filters or reactors shall be manufactured by TCI, MTE Corporation, Mirus International, or engineer approved equal and shall be sized by the manufacturer for IEEE 519 compliance

7. Motor control circuits shall be wired in accordance with the requirements specified herein and/or indicated on the Drawings.

C. Components

1. Each VFD shall contain the number of VFD units as shown on the Drawings and required for the applications.

2. Each VFD shall contain the harmonic correction equipment as shown on the Drawings and required for the applications. Harmonic correction equipment shall be as specified elsewhere in this Specification.

3. Each VFD shall contain the number of auxiliary contacts, control power transformer(s), pilot devices and indicating lights, control relays, elapsed time meters, and other devices as specified herein, shown on the Drawings and required for the applications. The following components shall meet the requirements of Section 26 09 16 – Electrical Controls and Relays:

    a. Pilot devices (switches, indicating lights, etc.)

    b. Relays and timers

    c. Terminal blocks

4. Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.

5. Electrical bus, including ground bus, shall be tin-plated copper. Power and control wiring shall be copper, color coded and identified in accordance with these Specifications.

6. Each VFD shall be of modular construction allowing normal maintenance and repair to be done with ordinary hand tools. Design and install power electronic component assemblies so that, where practicable, components can be individually removed and replaced.

7. Auxiliaries, including fans, that are required for a rated load operation at maximum ambient temperature, shall be 100% redundant. New and unused spare replacement fan(s) or air conditioning unit(s), shipped in original carton, may be provided in lieu of 100% redundant auxiliaries if accepted in writing by the Engineer.

8. Circuit boards and electrical components shall meet the corrosion protection requirements specified in these Specifications. Varnished or epoxy encapsulated circuit boards and tropicalized contactors suitable for corrosive environments shall be furnished.

9. Circuit Breakers

a. Where indicated on the Drawings, VFDs shall be protected by a UL 489 Listed circuit breaker.

b. Unless otherwise indicated, circuit breakers shall be manually operable and shall provide thermal-magnetic, inverse-time-limit overload, and instantaneous short-circuit protection.

c. Circuit breakers shall be molded case type, rated 480 VAC, 3 pole and have 100 ampere or larger frames. The interrupting rating shall match that of the VFD short circuit rating at 480V.

d. Overload protection shall be provided on all poles with trip settings as indicated on the Drawings. Breakers of 225-ampere frames and larger shall have interchangeable solid-state electronic trip units.

e. Where indicated on the Drawings, shunt trip devices shall be provided to trip a circuit from a remote location by means of a trip coil energized from a separate circuit. A 120V shunt trip shall be capable of operating at 55% or more of rated voltage. All other shunt trips shall be capable of operating at 75% or more of rated voltage.

D. Controls

1. Each VFD shall be provided with automatic and manual controls as shown on the Drawings and as required to comply with all Specifications. Controls and indicators to accomplish operation and maintenance shall be located on the variable frequency drive equipment assembly as specified herein and indicated on the Drawings.

2. The Elementary Control Schematics shown on the Drawings are **representative of design intent only.** The manufacturer shall be responsible for providing all additional components, controls, and internal wiring necessary to meet the design intent.

3. VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable. Fans that are used exclusively to provide cooling for the VFD unit (and not the overall enclosure) are permitted to run continuously if required by the VFD manufacturer’s design standards/practices.

E. Enclosures

1. Equipment within the VFD enclosure shall be arranged so that it does not interfere with the entry of conduits and cables into the enclosure.

2. All pilot devices (selector switches, pushbuttons, indicating lights, etc.) and the human machine interface (HMI, specified elsewhere herein) shall be door mounted on the exterior of each VFD enclosure. Manipulation of the pilot devices or HMI, viewing of the information on the HMI, or viewing that status of pilot devices shall not require the VFD enclosure door to be opened.

3. Unless otherwise indicated on the Drawings, VFDs in non-hazardous locations, shall be furnished with the following enclosure type and material of construction, dependent upon the designation of the area in which they are to be installed. Area designations are indicated on the Drawings.

Area Designation	Enclosure Type and Material
Indoor Wet Process Area	NEMA 4X, Type 304 Stainless Steel
Indoor Dry Process Area	NEMA 12, Painted Steel
All Outdoor Areas	NEMA 4X, Type 304 Stainless Steel

4. VFDs shall not be installed in hazardous locations.

5. NEMA 1 and NEMA 12 VFD enclosures shall be force ventilated with front accessibility and the following:

   a. Enclosures shall be provided with externally accessible (door-mounted) washable enclosure air intake filters that can be replaced while the enclosure door remains closed.

   b. Enclosures shall be designed for bottom or top entry of conduits and cables as required.

   c. Enclosures shall be finished in ANSI-61 gray enamel or in a color to match the complete line-up of equipment as indicated on the Drawings and accepted by the Engineer.

6. NEMA 4X VFD enclosures shall be air conditioned, dead-front, with front accessibility and the following:

   a. The air conditioning system shall utilize a heat-exchange method that allows for cooling of the enclosure interior without circulating outside air through the enclosure.

   b. Enclosures shall be furnished with tubular type enclosure space heaters. Space heaters shall be rated at 500V or 250V and operated at 240V or 120V, respectively.

c. VFDs shall be furnished with an additional control power transformer sized to provide power exclusively for the air conditioning system and enclosure space heater.

d. VFDs shall be furnished with a tamper-resistant hinged cover with a clear polycarbonate viewing window over the door-mounted pilot devices.

e. VFDs shall be designed for bottom entry of cables/conduits only.

7. Each VFD shall be designed such that rear access to the enclosure is not required for operations, maintenance, or repair tasks.

8. The Contractor shall reference the Drawings for maximum dimensions of the VFDs. The Engineer shall be notified prior to the initial shop drawing submittal if exceptions to the dimensions indicated on the Drawings are to be requested.

9. Integrating VFDs into a motor control center assembly is not permitted unless specifically shown as integrated on the Drawings.

10. Enclosure doors shall have full length piano type hinges and shall be braced to prevent sag when fully open.

11. Each VFD enclosure shall be supplied with an industrial, heavy-duty flange-mount handle mechanism for the operation of the VFDs disconnecting means as follows:

a. The mechanism shall be engaged with the disconnect device at all times as an integral part of the unit regardless of the unit door position.

b. The operator handle shall have an up-down motion with the down position as off. The ON-OFF condition of the disconnecting means shall be permanently marked on the handle operator.

c. It shall be possible to lock the handle in the "OFF" position with up to three (3) 3/8-inch diameter shackle padlocks and in the "ON" position with one (1) 3/8-inch diameter shackle padlock.

d. The operator handle shall be mechanically interlocked such that the disconnecting means cannot be closed with the enclosure door open, nor can the enclosure door be opened when the disconnecting means is closed. A defeater mechanism shall be provided so that qualified personnel can bypass these interlocks for maintenance and testing purposes. The defeater mechanism shall allow the enclosure door to be opened without interrupting the operation of the VFD.

F. Nameplates and Legend Plates

1. Provide engraved plastic nameplates and legend plates to identify each VFD and associated door mounted devices and internal components. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

2. Equipment names and/or numbers and device identification text shown on the Drawings shall be used as the basis to engrave the nameplates and legend plates. Where the equipment identification text would exceed the capacity of the VFD manufacturer's standard nameplate/legend plate size, the manufacturer shall provide larger nameplates and/or additional nameplates as necessary. Abbreviating equipment names/numbers and device identification text is not acceptable.

3. Control components mounted as part of the assembly, such as fuse blocks, control relays, pushbuttons, switches, and similar devices, shall be suitably marked with identification corresponding to appropriate designations on the manufacturer's wiring diagrams.

2.03 VFD UNITS

A. The VFD unit shall be the Yaskawa GA800/U1000, Square D Altivar 600 series, Eaton PowerXL DG1 series, or Rockwell Automation (Allen-Bradley) PowerFlex 750 series.

B. Basic Design and Performance

1. Each VFD unit shall be of adjustable frequency, adjustable voltage, pulse width modulated (PWM) design. The units shall be microprocessor controlled, fully digitally programmable, and capable of precise and repeatable speed regulation of three phase 480 VAC NEMA Design A or B induction motors. Units for other than NEMA Design A or B induction motors (e.g., NEMA Design C) shall be coordinated with the requirements of that respective load.

2. Each VFD unit shall consist of a semiconductor rectifier system, direct current link, and pulse width modulated inverter. The inverter shall invert the direct current voltage into an alternating current voltage at a frequency which shall be proportional to the desired speed. This alternating current voltage and frequency shall both vary simultaneously at a constant "Volts-Per-Hertz" ratio to operate the motor at the desired speed.

3. Each VFD unit shall operate the motor and produce full rated nameplate horsepower at the motor output shaft without exceeding motor nameplate full load current and with the motor not exceeding rated total temperature not including the additional temperature increment that constitutes the motor service factor. Motor shall retain its service factor when operated by the variable frequency drive.

4. The overall efficiency of each VFD unit shall be a minimum of 95% when operating the specified motor-load combination at rated voltage, frequency, and current.

5. Each VFD unit shall provide smooth, stepless changes in motor speed and acceleration over the entire operating speed range from minimum to maximum speed. The VFD unit shall be provided with adjustable maximum and minimum frequency limits.

6. Each VFD unit shall maintain a desired output frequency (setpoint) with a steady state accuracy of 0.5% of rated frequency of 60 Hertz for a 24-hour period and a repeatability of 0.1% of rated frequency of 60 Hertz.

7. Each VFD unit shall be capable of operating the specified load continuously at any speed within the operating speed range of 10% to 100% of rated speed. The minimum and maximum continuous operating speeds shall each be adjustable within this speed range. The variable frequency drive shall provide for field adjustment of these setpoints.

8. Each VFD unit shall be capable of controlled linear acceleration and deceleration. Each VFD unit shall be capable of ramping the speed of the motor-load combination from the minimum selected operating speed to the maximum selected operating speed in a minimum of 30 seconds. Each VFD unit shall have two (2) field-adjustable speed setpoints for the variable frequency drive to skip equipment resonant frequencies. The acceleration and deceleration time limits shall be field adjustable to values up to 120 seconds.

9. Voltage or current unbalance between phases of the VFD unit output voltage shall not exceed 3% of the instantaneous values. The VFD unit shall continuously monitor the output voltages and generate an alarm condition when the unbalance exceeds 3%. The system shall detect and generate a separate alarm for loss of any output phase voltage (single phasing). Phase unbalance shall be as defined by NEMA Standard MG-1.

10. Each VFD unit shall operate continuously without interruption of service or damage to equipment during transient input voltage variations of plus or minus 10% for a duration of 15 cycles. VFD unit output voltage regulation shall be plus or minus 2%.

C. Features and Characteristics

1. Each VFD unit shall be furnished with a Human Machine Interface (HMI) to provide controls and indication to accomplish maintenance and operational functions as specified herein and shown on the Drawings. The HMI shall be password protected after startup to prevent unauthorized personnel from making changes. The HMI shall at minimum provide indication of the following:

a. Input Voltage

b. Output Voltage

c. Output Current

d. Output Frequency

e. Output Speed from 0-100%

f. Alarm Read-out

2. Each VFD unit shall provide a 4-20 mADC output signal that is proportional to the drive output frequency for use as speed feedback/speed indication to external equipment.

3. Each VFD unit shall accept a 4-20 mADC speed input command signal to control the output frequency in the automatic and/or manual control modes as specified herein or indicated on the Drawings. The system shall accept the input increase/decrease command with a resolution that permits incremental changes in speed equal to or less than 0.1% of rated speed.

   a. Where shown on the Drawings, VFD units shall also accept a 0-10VDC input from a speed potentiometer for manual speed control. Each VFD unit shall be capable of automatically switching between the input speed command signals as shown on the Drawings.

4. Input Voltage Loss Handling

   a. The VFD unit shall shut down upon a loss of one or more input phases, a 3-phase complete input power loss, or a sustained input undervoltage event. A sustained input undervoltage event is defined as voltage that is less 75% of nominal, for more than 0.5 seconds.

   b. Upon restoration of 3-phase power that is at an acceptable voltage level, the VFD unit shall automatically reset (after an adjustable time delay, 0-2 minutes) and be capable of being restarted and ramping up to speed when remotely commanded through the control system or locally commanded at any local controls. Personnel shall not be required to reset the VFD unit manually after a shutdown caused by any input voltage loss event.

   c. Automatic reset of the VFD unit shall be achieved through programming/parameter setpoints, time delay relays, or a combination of both.

5. Each VFD unit shall have a multiple attempt restart feature.

6. Each VFD unit shall have an automatic current limit feature to control motor currents during startup and provide a "soft start" torque profile for the motor-load combination. The VFD unit shall also limit current due to motor winding or motor

lead phase-to-phase short circuit or phase-to-ground short circuit. The current limit protection setting shall be field adjustable.

7. Each VFD unit shall be furnished with programmable electronic overload and torque limits.

8. Each VFD unit shall have an automatic trip feature which will remove the drive output from the motor and allow it to decelerate safely. This automatic system shall lock-out the VFD unit and indicate the fault only upon the following conditions:

    a. Output voltage unbalance (trip threshold field set).

    b. Loss of phase on output.

    c. Motor overload.

    d. Motor stator winding fault (phase-to-ground, phase-to-phase).

    e. Unacceptable voltage variation.

    f. High variable frequency drive equipment temperature.

    g. VFD failure as determined by the manufacturer.

    h. Component failure.

    i. Overcurrent.

9. Provide each VFD unit with transmitted and received radio interference protection. In addition, provide protection against starting a rotating motor, both directions (coasting to zero speed and backspin). In the event that a motor automatic restart feature (catch the motor "on-the-fly") is provided in the VFD unit, this feature shall be capable of being disabled.

10. Each VFD unit shall include on-line diagnostics, with an automatic self-check feature that will detect a variable frequency drive failure.

    a. Diagnostics shall operate a visual alarm indicator on the HMI.

    b. Diagnostics shall provide an easily readable output that can be used to isolate a failure.

    c. Provide an event and diagnostic recorder to printout in narrative English of the specific fault(s) and the sequence in which the faults occurred. An indication of the "First Out" failure is a minimum for fault sequence detection.

d. Provide normally open and/or normally closed dry contacts as indicated on the Drawings for VFD failure conditions .

11. Each VFD unit shall communicate the following parameters to the control system via Modbus TCP/IP protocol. Provide any necessary hardware gateways to provide this communication capability. The following parameters, at a minimum, shall be communicated:

    a. Motor current (all phases)

    b. Motor voltage (all phases)

    c. Motor KW

12. Each VFD unit shall be provided with input/output (I/O) cards including expansion cards as necessary to facilitate connection of all I/O specified herein and shown on the Drawings.

2.04 HARMONIC CORRECTION

A. Harmonic correction devices for each VFD shall be as specified herein and located as shown on the Drawings.

B. Input Line Reactors

1. All VFDs shall be 6-pulse type with input line reactor and/or integral DC link reactor. Total reactor impedance shall be a minimum of 3% and shall not exceed 5%.

C. Passive Filters

1. Where indicated on the Drawings or where additional harmonic correction is required, 6-pulse VFD units shall be provided with a passive harmonic filter in addition to the integral DC link reactor specified above (if present.)

2. Passive harmonic filters shall be sized to attenuate harmonics resulting from operation of the VFD-driven motor load to no more than 5% THID when operating at full load, and no more than 8% THID when operating at 30% of full load. The filter shall be equipped with power contactors configured to remove the capacitors from the circuit when the VFD-driven loads are not in operation. The harmonic filters shall be as manufactured by TCI, MTE Corporation, Mirus International, or Engineer approved equal.

3. Passive filters shall be integrated into the VFD unless accepted in writing by the Engineer or shown as separately mounted from the VFD on the Drawings.

D. Active Front End (AFE) VFDs and 18-Pulse

1. Where indicated on the Drawings, AFE VFDs shall consist of a VFD unit with IGBT based active front end (AFE).

2. 18-pulse VFDs are not acceptable.

PART 3 – EXECUTION

3.01 INSTALLATION

A. The VFDs shall be installed as shown on the Drawings and in accordance with the manufacturer's installation instructions.

B. Install VFDs to allow complete door swing required for component removal.

3.02 TESTING

A. All tests shall be performed in accordance with the requirements of the General Conditions and Division 01. The following tests are required:

1. Witnessed Shop Tests

a. None required.

2. Certified Shop Tests and Reports

a. Submit description of proposed testing methods, procedures, and apparatus.

b. Factory test the complete VFD in accordance with IEEE and NEMA standards.

c. Submit factory bench-test data to indicate that the manufacturer's proposed equipment has been tested in the specified arrangement and found to achieve specified accuracy.

3. Field Tests

a. Field testing shall be done in accordance with the requirements specified in the General Conditions, Division 01, and NETA acceptance testing specifications referenced in Section 26 05 00 – Basic Electrical Requirements.

b. The Contractor shall field measure actual harmonic distortion with tests performed by an independent testing agency acceptable to the Owner after

satisfactory full-load operation. The Contractor shall provide the harmonic distortion reports with the O&M Manual.

c. Unless otherwise indicated on the Drawings, the harmonic distortion measurements shall be made at each load center where VFDs are present.

d. Harmonic distortion measurements shall be made after VFD installation. One set of measurements shall be made with the VFD loads inactive, and one set of measurements shall be made with the VFD loads running at design capacity.

B. Acceptance of a shop test does not relieve Contractor from requirements to meet field installation tests under specified operating conditions, nor does the inspection relieve the Contractor of responsibilities.

C. Certification on materials and records of shop tests necessary for the inspector to verify that the requirements of the Specifications are met, shall be made available to the inspector.

D. Submit signed and dated certification that all of the factory inspection and testing procedures described herein have been successfully performed by the Contractor prior to shipment.

3.03 SERVICES OF A MANUFACTURER'S REPRESENTATIVE

A. The Contractor shall provide the services of a qualified manufacturer's factory-trained technical representative who shall adequately supervise the installation and startup of all equipment furnished under this Contract. The manufacturer's representative shall certify in writing that the equipment has been installed in accordance with the manufacturer's recommendations. No further testing or equipment startup may take place until this certification is accepted by the Owner.

B. The manufacturer's technical representative shall perform all startup and field acceptance testing as specified herein.

C. The Contractor shall provide training for the Owner's personnel. Training shall be conducted by the manufacturer's factory-trained representative who shall instruct Owner's personnel in operation and maintenance of all equipment provided under this Section. Training shall be provided for two (2) sessions of four (4) hours each. Training shall not take place until after the VFDs have been installed and tested. Training shall be conducted at times coordinated with the Owner.

D. The services of the manufacturer's representative shall be provided for a period of not less than as follows:

   1. One (1) trip of one (1) working day during installation of the motor controllers.

   2. One (1) trip of one (1) working day to perform startup and field acceptance testing of the motor controllers.

   3. One (1) trip of one (1) working day to perform training as specified herein.

   4. One (1) trip of one (1) working day two (2) months before the expiration of the warranty to identify any issues to be corrected under warranty.

E. Any additional time required to achieve successful installation and operation shall be at the expense of the Contractor.

3.04 PAINTING

A. Prior to final completion of the work, all metal surfaces of the equipment shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same coating as used for factory finishing coats.

END OF SECTION

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SECTION 26 43 13
SURGE PROTECTIVE DEVICES

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish, install, and place in satisfactory operation the surge protective devices (SPD) as specified herein and indicated on the Drawings.

B. Provide Type PC1 for switchgear or PC3 at switchboards, motor control centers, or panelboards.

C. Reference the following Specification Sections:

1. Section 26 05 19 – Low-Voltage Conductors and Cables

2. Section 26 05 53 – Identification for Electrical Systems.

1.02 CODES AND STANDARDS

A. All SPDs shall be Listed to UL 1449, latest edition,and shall bear the Label of Underwriter's Laboratories, Incorporated (UL).

B. The equipment shall be designed, manufactured, and/or Listed to the following standards as applicable:

1. American National Standards Institute (ANSI)/Institute of Electrical & Electronic Engineers (IEEE):

a. C62.41.1 – IEEE Guide on the Surge Environment in Low-Voltage (1000 V and less) AC Power Circuits.

b. C62.41.2 – IEEE Recommended Practice on Characterization of Surges in Low -Voltage (1000 V and less) AC Power Circuits.

c. C62.45 – IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and less) AC Power Circuits.

d. C62.62 – IEEE Standard Test Specifications for Surge -Protective Devices (SPDs) for Use on the Load Side of the Service Equipment in Low Voltage (1000 V and less) AC Power Circuits.

2. National Fire Protection Association (NFPA):

a. NFPA 70 – National Electrical Code (NEC).

3. Underwriters Laboratories (UL):

a. UL 1283, latest edition – Electromagnetic Interference Filters.

b. UL 1449, latest edition – Surge Protective Devices.

1.03 SUBMITTALS

A. In accordance with the procedures and requirements set forth in General Conditions and Section 01 33 00 – Submittal Procedures, the Contractor shall obtain from the equipment manufacturer and submit the following:

1. Shop Drawings

2. Operation and Maintenance Manuals

1.04 SHOP DRAWINGS

A. Each submittal shall be complete in all respects, incorporating all information and data listed herein and all additional information required for evaluation of the proposed equipment's compliance with the Contract Documents.

B. Partial, incomplete, or illegible submittals will be returned to the Contractor without review for re-submittal.

C. Drawings submitted by the manufacturer shall be complete and documented to provide the Owner with operations and maintenance capabilities.

D. Shop drawings for each SPD shall include but not be limited to:

1. Product Data Sheets.

2. Detailed drawings showing weights and dimensions.

3. Wiring diagrams showing field connections, including all protection modes provided (L-N, L-G, L-L, N-G)

4. Manufacturer’s Warranty period and covered items

E. The shop drawing information shall be complete and organized in such a way that the Engineer can determine if the requirements of these Specifications are being met. Copies of technical bulletins, technical data sheets from "Soft Cover" catalogs, and similar information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable and shall be submitted.

1.05 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 01.

1.06 SPARE PARTS

A. All spare parts as recommended by the equipment manufacturer shall be furnished by the Contractor to the Owner.

B. If the SPD model provided includes field-replaceable modules, furnish one (1) spare module of each type and rating.

C. Reference Section 26 05 00 – Basic Electrical Requirements for spare parts delivery and handling requirements.

1.07 IDENTIFICATION

A. Each SPD shall be identified by the circuit number and equipment name as indicated on the Drawings. A nameplate shall be securely affixed in a conspicuous place on each SPD. Nameplates shall be as specified in Section 26 05 53 – Identification for Electrical Systems.

1.08 WARRANTY

A. All SPDs, associated hardware, and supporting components shall be warranted to be free from defects in materials and workmanship, under normal use and in accordance with the instructions provided, for a period of ten (10) years after acceptance of the equipment by the Owner.

B. Any component or subassembly contained within the surge protection system that shows evidence of failure or incorrect operation during the warranty period, shall be replaced by the manufacturer at no additional cost to the Owner.

PART 2 – PRODUCTS

2.01 GENERAL

A. The SPD units shall be UL 1449 Listed. Units that are “manufactured in accordance with” UL 1449 or “component recognized” SPDs are not acceptable and will be rejected.

B. Type II SPD units shall be UL 1283 Listed. Units that are “manufactured in accordance with” UL 1283 or “component recognized” SPDs are not acceptable and will be rejected.

2.02 PRODUCTS

A. Type I surge protective devices (SPD) shall be furnished and installed when shown without upstream overcurrent protection on the Drawings. Type II SPDs shall be provided in all other locations. Type II SPDs shall not require the use of a specific upstream overcurrent device. SPDs shall be provided in the location and quantity as shown on the Drawings.

B. Each SPD shall be rated for the voltage and configuration of the equipment to which it is connected.

C. Where specified, Type II SPD shall include UL 1283 listed EMI/RFI filtering with minimum attenuation of -50dB at 100kHz.

D. The short circuit current rating (SCCR) of each SPD shall be equal to or greater than the rating of the equipment to which it is connected. The Contractor shall reference the Drawings for the short-circuit current rating of each piece of equipment.

E. Each SPD system shall provide surge protection in all possible modes. Surge protection shall be as follows:

System Configuration	Modes of Protection	Number of Modes
3-Phase Wye (Solidly Grounded)	L-N (3), L-G (3), N-G	7
3-Phase Delta	L-L, L-G	6

F. Each SPD shall have a Maximum Continuous Operating Voltage (MCOV) of at least 115% of the nominal voltage of the equipment to which it is connected.

G. The Nominal Discharge Current (In) of each SPD shall be 20kA (per mode). The peak surge current ratings shall not be used as a basis for applying the SPD to the system.

H. The Voltage Protection Rating (VPR) of each SPD shall not exceed the following:

System Voltage	L-N	L-G	L-L	N-G
208Y/120	800V	800V	1200V	800V
480Y/277	1200V	1200V	1800V	1200V
480 DELTA	N/A	1800V	1800V	N/A

I. The surge current rating for each SPD shall be as indicated on the Drawings. Surge current ratings are indicated on single-line diagrams and in panel schedules. Surge current rating indicated is on a per phase basis.

J. SPDs indicated to be externally mounted (from the equipment that they protect) shall be provided in a separate enclosure. The enclosure shall have a NEMA rating equal to or greater than that of the equipment it serves (e.g., NEMA 1, NEMA 12, NEMA 4X, etc.).

K. Each SPD shall be provided with the following accessories:

1. Each individual module shall include an LED status showing weather all surge protection components are operational. Loss of protection in any component shall cause that module's LED to turn off and activate a system-level and individual component LED Fault indicator.

2. Surge counter and audible alarm with reset/silence switch.

3. One set of Form C (SPDT) dry contacts rated for at least 5A at 120VAC.

L. SPDs that are indicated to be installed integral to (within) the equipment that they protect shall be manufactured by the same manufacturer as the equipment. SPDs that are shown to be installed externally/separately mounted from the equipment they serve shall be manufactured by Square D (Schneider Electric), Eaton, ASCO(Emerson), Current Technologies, GE(by ABB), or Siemens

PART 3 – EXECUTION

3.01 INSTALLATION

A. The SPD units shall be furnished and installed as shown on the Drawings and in accordance with the manufacturer's installation instructions.

B. SPDs which are shown on the drawings to be located inside equipment component boundaries (e.g., panels, and switchgear) shall be installed within the enclosure for that equipment.

C. Prior to energizing, the following shall be performed for each SPD:

1. Verify that the SPD unit voltage and configuration is suitable for the system to which it is connected.

2. Verify that neutral-to-ground bonding jumpers are installed where required by the system design and applicable codes, and omitted where prohibited.

3.02 TESTING

A. All tests shall be performed in accordance with the General Conditions and Division 01 requirements. The following tests shall be conducted:

1. Shop Tests

a. Standard factory tests shall be performed on the equipment under this Section. All tests shall be in accordance with the latest version of NEMA, ANSI, and UL standards.

b. All surge protective devices, subassemblies, and components shall be 100% tested and certified by the manufacturer to meet their published performance parameters.

2. Field Tests

a. None required.

END OF SECTION

SECTION 31 00 01
EARTHWORK

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish all labor, equipment, and materials required to complete all work associated with excavation (including off-site borrow excavation), fill and backfill placement and compaction, coordinate testing of soil materials and compaction by an independent Materials Testing Consultant (Furnished by Contractor), constructing embankments, dewatering, construction of drainage layers, installing foundation and backfill aggregate, placing filter and separation fabrics, stockpiling topsoil and any excess suitable material, designing, installing, maintaining and removing excavation support systems, disposing of all excess and unsuitable materials, providing erosion and sedimentation control, encasing utility conduits, site grading, preparation of pavement and structure subgrades, and other related and incidental work as required to complete the work shown on the Drawings and as specified herein.

B. All excavations shall be in conformity with the lines, grades, and cross sections shown on the Drawings or established by the Engineer.

C. It is the intent of this Specification that the Contractor conduct the construction activities in such a manner that erosion of disturbed areas and off-site sedimentation be absolutely minimized.

D. Earthwork performed under this Contract shall be done in conformance with these specifications. Items and activities not addressed herein shall be subject to the limitations the latest editions of the City of Chandler Specifications and Standard Details and Maricopa Association of Governments (MAG) Standard Specifications and Details.

E. Erosion and Sediment Control shall be performed in accordance with Section 31 25 00 of these specifications and with the latest edition of the City of Chandler Civil Engineering Review Checklist section “EROSION AND SEDIMENT CONTROL PLAN (ESCP) REQUIREMENTS”.

F. All fill materials (soil, aggregate, topsoil, etc.) imported to the site and onsite materials to be reused as fill, backfill, or embankment shall be subjected to the testing requirements contained in Part 3.0 of this Section. The Contractor shall retain a Materials Testing Consultant who shall perform all testing. The test results shall be used to determine if a material meets the requirements included herein. The Contractor shall furnish all necessary samples for laboratory testing and shall provide assistance and cooperation

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during field tests. The Contractor shall plan their operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction.

G. Any costs for re-testing required as a result of failure to meet compaction requirements shall be borne solely by the Contractor, consistent with City of Chandler General Conditions Section 4.1.14(c).

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Requirements of related work are included in Divisions 02, 31, and 32 of these Specifications.

B. See City General Conditions Sections 3.1–3.3 for MAG and City standards applicability.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of the other requirements of the Specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced Specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. Maricopa Association of Governments Standard Details and Specifications as adopted and amended by the City of Chandler (in accordance with General Conditions Section 3.3).

2. Arizona Department of Transportation Materials Testing Manual, latest edition.

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

a. ASTM C 127 – Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

b. ASTM C 136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

c. ASTM D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft^3 (600 kN-m/m^3))

d. ASTM D 1140 – Standard Test Method for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing

e. ASTM D 1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand Cone Method.

f. ASTM D 1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/lb^3 (2,700 kN-m/m^3)).

g. ASTM D 1883 – Standard Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils.

h. ASTM D 2216 – Test for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.

i. ASTM D 2487 – Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

j. ASTM D 4253 – Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

k. ASTM D 4318 – Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

l. ASTM D 6913 - Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

m. ASTM D 6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil Aggregate by Nuclear Methods (Shallow Depth).

1.04 SUBSURFACE CONDITIONS

A. Information on subsurface conditions is referenced under Division 01, General Requirements. Also reference to City General Conditions Section 4.4.10 regarding underground facilities location and coordination.

B. Attention is directed to the possible location of water pipes, sanitary pipes, storm drains, and other utilities located in the area of proposed excavation. In the event excavation activities disrupt service, the Contractor shall perform all repairs at no additional cost to the Owner. The Contractor shall contact Arizona 811 (arizona811.com or 1-800-782-5348) to request underground utility location mark-out at least three (3) working days, not including the day the request is called in, but no more than ten (10) working days prior to the beginning of excavation. The Contractor shall also contact and request utility location mark-out from buried utility owners with utilities on the project site that are not participants of Arizona 811.

1.05 SUBMITTALS

A. Submittal timelines shall align with City General Conditions Section 4.2 Contractor's Pre-Agreement and Pre-Work Deliverables.

B. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures, the Contractor shall submit the following:

1. Evidence the Contractor has a minimum of five (5) years of experience performing excavation and backfill on projects similar in size to the work for this project.

2. Name and location of all material suppliers.

3. Certificate of compliance with the standards specified herein for each source of each material.

4. List of disposal sites for waste and unsuitable materials and all required permits for use of those sites.

5. Plans and cross sections of open cut excavations showing side slopes and limits of the excavation at grade.

6. Procedures for dewatering proposed by the Contractor shall be submitted to the Engineer for review and approval prior to any earthwork operations.

7. Samples of synthetic filter fabric and reinforced plastic membrane with manufacturer's certificates or catalog cuts stating the mechanical and physical properties. Samples shall be at least one (1) foot wide and four (4) feet long taken across the roll with the warp direction appropriately marked.

8. Construction drawings and structural calculations for any types of excavation support required. Drawings and calculations shall be sealed by a currently registered Professional Engineer in the in the State of Arizona.

9. Monitoring plan and pre-construction condition inspection and documentation of all adjacent structures, utilities, and roadways near proposed installation of excavation support systems and near areas where dewatering is required to facilitate construction.

10. A representative sample of the on-site or off-site source of each class of fill material weighing approximately 50 lbs. The sample shall be delivered to a location designated by the Engineer.

11. The Contractor shall be required to submit plans of open cut excavation for review by the Engineer before approval is given to proceed.

12. Submit excavation support installer qualifications with installation history.

13. Drawings and calculations on proposed excavation support systems sealed by a Professional Engineer currently registered in the in the State of Arizona.

14. Contractor shall also submit a monitoring plan developed by the excavation support design engineer.

15. Earthwork contractor qualifications.

16. All required permits and a list of disposal sites for unsuitable materials within thirty (30) consecutive days after Notice to Proceed. If the disposal site is located on private property, the submittal shall also include written permission from the owner of record.

17. Except where borrow is to be obtained from a commercial source, a borrow source development, use, and reclamation plan jointly developed by the Contractor and the property owner prior to engaging in any land disturbing activity on the proposed source (other than material sampling that may be necessary). The Contractor's plan shall address the following

    a. Drainage: The source shall be graded to drain such that no water will collect or stand and a functioning drainage system shall be provided. Surface drainage should not be permitted to drain towards structures, foundations, footings, or on paved areas. Positive drainage is defined as a slope of 2 percent or more for a distance of 5 feet or more from structures.

    b. Slopes: The source shall be dressed and shaped in a continuous manner to contours which are comparable to and blend in with the adjacent topography, but in no case will slopes steeper than 3:1 be permitted.

    c. Erosion Control: Except where borrow is to be obtained from a commercial source, the Contractor and the property owner shall jointly submit a Borrow Source Development, Use, and Erosion Control Plan to the appropriate State or Local permitting authority for approval and provide evidence of such to the Engineer for their approval prior to engaging in any land disturbing activity on the proposed source other than material sampling that may be necessary.

1.06 PRODUCT HANDLING

A. Soil and rock material shall be excavated, transported, placed, and stored in a manner so as to prevent contamination, segregation and excessive wetting. Materials which have become contaminated or segregated will not be permitted in the performance of the work and shall be removed from the site.

B. Refer to City of Chandler General Conditions Section 4.5 Control of the Project Site for site management requirements.

1.07 USE OF EXPLOSIVES

A. The use of explosives will not be allowed for the prosecution of this work.

B. Refer to General Conditions Section 4.4 Performance of the Work for safety compliance.

PART 2 – PRODUCTS

2.01 FILL MATERIALS

A. The contractor shall be responsible for providing fill materials meeting the gradation requirements included herein and with reference to General Conditions Section 4.5 for site storage and erosion control requirements.

B. All fill materials shall be free of organic material, environmental contaminants, snow, ice, frozen soil, or other unsuitable material.

C. Bedding material installed above and below the water table shall meet the requirements of the ADOT Standard Specifications and MAG Standard Details and Specifications as amended by the City of Chandler.

D. Below-grade walls shall be backfilled with Select Fill.

E. When the excavated material from required excavations meets the requirements of Select Fill or Common Fill, but is replaced with off-site borrow material for the Contractor's convenience, the costs associated with such work and material shall be borne by the Contractor.

F. Where excavated material does not meet requirements for Select Fill or Common Fill, the Contractor shall furnish off-site borrow material meeting the specified requirements herein. Determination of whether the borrow material will be paid for as an extra cost will be made based on the contract documents.

G. Contractor may stockpile excavated material to be used as Select Fill, Common Fill, Drainage Fill or Topsoil on site in areas designated in the Contract Documents. Soil materials may be stockpiled as necessary to sort, segregate, test, and transfer the materials. Excess material and materials considered unsuitable for reuse by the Engineer shall be removed from the site for off-site disposal. No stockpiling of excavated material is allowed in a manner or location that would permit erosion and its subsequent sedimentation in wetlands or other natural areas.

2.02 SELECT FILL

A. Select fill shall be used where shown on the Contract Drawings. MAG and City standards apply per General Conditions Section 3.3.

B. Select fill shall not include particles or lumps larger than 3 inches.

C. Select fill used as backfill against walls shall not contain any rock larger than 1½ -inches.

D. Select fill shall have a Plasticity Index (PI) of 15 or less. Soils with PI values up to 25 may be used as select fill within the trench backfill zone situated 1-foot above the pipe invert level and 3-feet below the new pavement surface.

E. Select fill shall consist of non-plastic materials classifying as GW, GW-GM, GP, SW, SW-SM, SP-SM, or SP per ASTM D-2487.

F. Select fill in contact with concrete should have a soluble sulfate content of less than 0.1 percent. Fill materials in contact with ferrous metals should also have low corrosion potential (minimum resistivity more than 2,000 ohm-cm, chloride contents less than 25 parts per million) if no corrosion protection techniques are implemented (e.g. cathodic protection, pipe wrapping, etc.).

G. Select fill shall be free of organic material, environmental contaminants, snow, ice, frozen soil, or other unsuitable material.

H. Open-graded and dense-graded aggregates meeting the gradation requirements above may be used as Select Fill.

I. Select Fill to be used as pavement subbase material shall be Aggregate Base Course per MAG Specifications 701 and 310.

J. Select Fill shall be placed in 8-inch-thick lifts, with the exception of Select Fill to be used as pavement subbase material, which shall be placed in 6-inch-thick lifts.

K. Select Fill shall be compacted to not less than 95 percent of the maximum dry density obtainable by ASTM D 698 and does not contain unsuitable material.

L. Select Fill shall be compacted at a moisture content within 20 percent of the optimum moisture content of the fill material in accordance with the ASTM D 698, Standard Proctor.

M. All materials used as Select Fill are subject to approval by the Engineer.

2.03 DRAINAGE FILL

A. Drainage Fill shall be used where shown on the Contract Drawings.

B. Drainage Fill shall consist of ADOT No. 57 aggregate or MAG ABC.

2.04 COMMON FILL

A. Common Fill shall be used where shown on the Contract Drawings. AG and City standards apply per City of Chandler General Conditions Section 3.3.

B. Common Fill shall consist of non-organic on-site soils classifying as CH, MH, CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW according to ASTM D 2487.

C. Common Fill shall be placed in 8-inch-thick loose lifts.

D. Common Fill shall be compacted to not less than 95 percent of the maximum dry density obtainable by ASTM D 698 and does not contain unsuitable material.

E. Common Fill shall be compacted at a moisture content within 2 percent of the optimum moisture content of the fill material in accordance with the ASTM D 698, Standard Proctor.

F. All material used as common fill is subject to approval by the Engineer. If there is insufficient suitable material onsite, import whatever additional material is required which conforms to the specifications, at no additional cost to the Owner.

G. Select Fill may be used as Common Fill, subject to approval by the Engineer. Select fill may be used as Common Fill at no change in the Contract Price.

2.05 GEOTEXTILES

A. The Contractor shall provide geotextiles as indicated on the Contract Drawings and specified herein. The materials and placement shall be as indicated under Section 31 05 19 - Geotextiles.

PART 3 – EXECUTION

3.01 STRIPPING OF TOPSOIL

A. In all areas to be excavated, filled, or paved, the topsoil shall be stripped to its full depth.

B. Topsoil may be stockpiled for subsequent reuse on site at locations shown on the Contract Drawings or designated by the Owner or Engineer. Topsoil shall be kept separated from other excavated materials and shall be piled free of roots and other undesirable materials. Topsoil shall not be stored in areas where it will interfere with surface drainage or with the conservation of trees, shrubs, and other vegetation to remain. No stockpile shall be placed within 50-feet of a pond, stream, wetland, or stormwater inlet.

3.02 EXCAVATION

A. Coordinate excavation activities per General Conditions 4.4.10 and 4.4.13. All material excavated, regardless of its nature or composition, shall be classified as UNCLASSIFIED EXCAVATION. Excavation shall include the removal of all soil, rock, weathered rock, rocks of all types, boulders, conduits, pipe, all other obstacles encountered, and all other obstacles shown to be removed within the limits of excavation shown on the Contract Drawings or specified herein. The cost of excavation shall be included in the Lump Sum Bid Price and no additional payment will be made for the removal of obstacles encountered within the excavation limits shown on the Drawings and specified herein.

B. All suitable material removed in the excavation shall be used as far as practicable in the formation of embankments, subgrades, and shoulders, and at such other places as may be indicated on the Drawings or indicated by the Engineer. No excavation shall be wasted except as may be permitted by the Engineer. Refer to the drawings for specific location and placement of suitable excavated materials in the formation of embankments, backfill, and structural and roadway foundations. THE ENGINEER AND/OR MATERIALS TESTING CONSULTANT WILL DESIGNATE MATERIALS THAT ARE UNSUITABLE. The Contractor shall furnish off-site disposal areas for the unsuitable material. Where suitable materials containing excessive moisture are encountered above grade in cuts, the Contractor shall construct above grade ditch drains prior to the excavation of the cut material when in the opinion of the Engineer and/or materials testing consultant such measures are necessary to provide proper construction.

C. All excavations shall be made in the dry and in such a manner and to such widths as will give ample room for properly constructing and inspecting the structures and/or piping they are to contain and for such excavation support, pumping and drainage as may be required. Excavation shall be made in accordance with the grades and details shown on the Drawings and as specified herein.

D. Excavation slopes shall be flat enough to avoid slides that will cause disturbance of the subgrade or damage of adjacent areas. Excavation requirements and slopes shall be as indicated in the Drawings.

E. The Contractor shall intercept and collect surface runoff both at the top and bottom of cut slopes. The intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, shall be uniformly rounded as shown on the Drawings or as may be indicated by the Engineer. Concurrent with the excavation of cuts the Contractor shall construct intercepting berm ditches or earth berms along and on top of the cut slopes at locations shown on the Drawings or designated by the Engineer. All slopes shall be finished to reasonably uniform surfaces acceptable for seeding and mulching operations. No rock or boulders shall be left in place which protrude more than 1 foot

within the typical section cut slope lines, and all rock cuts shall be cleaned of loose and overhanging material. All protruding roots and other objectionable vegetation shall be removed from slopes.

F. It is the intent of these Specifications that all structures shall bear on an aggregate base, crushed stone or screened gravel bedding placed to the thickness shown on the Drawings, specified in these Specifications, or not less than 6-inches. Bedding for process piping shall be as specified in Section 40 05 00 – Basic Mechanical Requirements, or as shown on the Drawings.

G. The bottom of all excavations for structures and pipes shall be examined by the Engineer and/or materials testing consultant for bearing value and the presence of unsuitable material. If, in the opinion of the Engineer and/or materials testing consultant, additional excavation is required due to the low bearing value of the subgrade material, or if the in place soils are soft, yielding, pumping or wet, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted select fill, and/or crushed stone or screened gravel as indicated by the Engineer. Payment for such additional work ordered by the Engineer shall be made as an extra by a Change Order in accordance with the General Conditions and Division 01. No payment will be made for subgrade disturbance caused by inadequate dewatering or improper construction methods.

H. All cuts shall be brought to the grade and cross section shown on the Drawings, or established by the Engineer, prior to final inspection and acceptance by the Engineer.

I. Slides and over-breaks which occur due to negligence, carelessness or improper construction techniques on the part of the Contractor shall be removed and disposed of by the Contractor as indicated by the Engineer at no additional cost to the Owner. If grading operations are suspended for any reason whatsoever, partially completed cut and fill slopes shall be brought to the required slope and the work of seeding and mulching or other required erosion and sedimentation control operations shall be performed.

J. Where the excavation exposes sludge, sludge contaminated soil or other odorous materials, the Contractor shall cover such material at the end of each workday with a minimum of 6 inches and a maximum of 24-inches of Common fill. The work shall be an odor abatement measure and the material shall be placed to the depth deemed satisfactory by the Engineer for this purpose.

3.03 EXCAVATION SUPPORT

A. The Contractor shall furnish, place, and maintain such excavation support which may be required to provide safe working conditions and support sides of excavation or to protect structures, pipes, and utilities from possible. The Contractor shall be exclusively

responsible for maintaining safe working conditions and structure integrity without overstressing or damaging existing structures, pipes, and utilities resulting from the Contractor temporarily placing, moving, or removing loads on or adjacent to existing structures, pipes, and utilities. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, the Engineer may order additional supports put in at the expense of the Contractor. The Contractor shall be responsible for the adequacy of all supports used and for all damage resulting from failure of support system or from placing, maintaining and removing the support system.

B. The selection of and design of any proposed excavation support systems is exclusively the responsibility of the Contractor. Contractor shall submit drawings and calculations to the Engineer on the proposed systems sealed by a Professional Engineer currently registered in the in the State of Arizona. Submittals shall comply with General Conditions 4.6.11 for shoring/bracing responsibilities, as applicable.

C. The excavation support system shall be installed by a specialized contactor with a minimum of five (5) years' experience installing the type of excavation support system proposed.

D. The Contractor shall exercise caution in the installation and removal of supports to ensure no excessive or unusual loadings or vibrations are transmitted to any new or existing structure. The Contractor shall promptly repair at their expense any and all damage that can be reasonably attributed to installation or removal of excavation support system.

E. Contractor shall monitor movement and vibration in the excavation support systems as well as movement and vibration at adjacent structures, utilities and roadways near excavation supports. Contractor shall submit a monitoring plan developed by the excavation support design engineer. All pre-construction condition assessment and documentation of adjacent structures on-site and off-site shall be performed by the Contractor. If any sign of distress such as cracking or movement occurs in any adjacent structure, utility or roadway during installation of supports, subsequent excavation, service period of supports, subsequent backfill and construction, or removal of supports, Engineer shall be notified immediately. The Contractor shall be exclusively responsible for repair of any damage to any roadway, structure, utility, pipes, etc. both on-site and off-site, as a result of their operations.

F. All excavation supports shall be removed upon completion of the work except as indicated herein. The Engineer may permit supports to be left in place at the request and expense of the Contractor. The Engineer may order certain supports left permanently in place in addition to that required by the Contract. The cost of the materials so ordered left in place, less a reasonable amount for the eliminated expense of the removal work omitted, will be paid as an extra by a Change Order in accordance with the General Conditions and Division 01. Vibrations of new and existing structures shall be considered

when the Contractor decides whether to remove excavation supports or leave them in place. Any excavation supports left in place shall be cut off at least two (2) feet below the finished ground surface or as directed by the Engineer.

3.04 PROTECTION OF SUBGRADE

A. To minimize the disturbance of bearing materials and provide a firm foundation, the Contractor shall comply with the following requirements:

1. Use of heavy rubber tired construction equipment shall not be permitted on the final subgrade unless it can be demonstrated that drawdown of groundwater throughout the entire area of the structure is at least 3 feet below the bottom of the excavation (subgrade). Even then, the use of such equipment shall be prohibited should subgrade disturbance result from concentrated wheel loads.

2. Subgrade soils disturbed through the operations of the Contractor shall be excavated and replaced with compacted select fill or crushed stone at the Contractor's expense as indicated by the Engineer.

3. The Contractor shall provide positive protection against penetration of frost into materials below the bearing level during work in winter months. This protection can consist of a temporary blanket of straw or salt hay covered with a plastic membrane or other acceptable means.

3.05 PROOF-ROLLING

A. The subgrade of all structures and all areas that will support pavements or select fill shall be proof-rolled. After stripping of topsoil, excavation to subgrade and prior to placement of fills, the exposed subgrade shall be carefully inspected by probing and testing as needed. Any topsoil or other organic material still in place, frozen, wet, soft, or loose soil, and other undesirable materials shall be removed. The exposed subgrade shall be proof-rolled with a heavily loaded tandem-wheeled dump truck to check for pockets of soft material hidden beneath a thin crust of better soil. Any unsuitable materials thus exposed shall be removed and replaced with an approved compacted material, as directed by the Materials Consultant.

3.06 DEWATERING

A. The Contractor shall do all dewatering as required for the completion of the work. Procedures for dewatering proposed by the Contractor shall be submitted to the Engineer for review prior to any earthwork operations.

B. All water removed by dewatering operations shall be disposed of in accordance with City of Chandler Standard Specifications and the Arizona Erosion and Pollution Control Manual, the more conservative of the two shall take precedence. Obtain all necessary

permits in accordance with General Conditions 4.2.8 prior to dewatering operations disposal/discharge.

C. The dewatering system shall be of sufficient size and capacity as required to control groundwater or seepage to permit proper excavation operations, embankment construction and reconstruction, subgrade preparation, and to allow concrete to be placed in a dry condition. The system shall include a sump system or other equipment, appurtenances and other related earthwork necessary for the required control of water. The Contractor shall drawdown groundwater to at least 2 feet below the bottom of excavations (subgrade), over the entire excavation area, at all times in order to maintain a dry and undisturbed condition.

D. The Contractor shall control, by acceptable means, all water regardless of source. Water shall be controlled, and its disposal provided for at each berm, structure, etc. The entire periphery of the excavation areas shall be ditched and diked to prevent water from entering the excavation. The Contractor shall be fully responsible for disposal of the water and shall provide all necessary means at no additional expense to the Owner. The Contractor shall be solely responsible for proper design, installation, proper operation, maintenance, and any failure of any component of the system.

E. The Contractor shall be responsible for and shall repair without cost to the Owner, any damage to work in place and the excavation, including damage to the bottom due to heave and including removal of material and pumping out of the excavated area. The Contractor shall be responsible for damages to any other area or structure caused by their failure to maintain and operate the dewatering system proposed and installed by the Contractor.

F. The Contractor shall be responsible for and shall repair, without cost to the Owner, any damage to work in place and nearby structures, roadways, and utilities which can be reasonably attributed to dewatering operations. This includes settlement of structures, roadways, and utilities due to dewatering of soils supporting the structures, roadways, and utilities.

G. The Contractor shall take all the steps that they consider necessary to familiarize himself with the surface and subsurface site conditions, and shall obtain the data that is required to analyze the water and soil environment at the site and to assure that the materials used for the dewatering systems will not erode, deteriorate, or clog to the extent that the dewatering systems will not perform properly during the period of dewatering. Copies of logs of borings and laboratory test results are available to the Contractor. This data is furnished for information only, and it is expressly understood that the Owner and Engineer will not be held responsible for any interpretations or conclusions drawn therefrom by the Contractor.

H. Prior to the execution of the work, the Contractor, Owner and Engineer shall jointly survey the condition of adjoining structures. Photographs and records shall be made of any prior settlement or cracking of structures, pavements, and the like, that may become the subject of possible damage claims.

3.07 FILL OR EMBANKMENTS

A. Contractor shall perform the construction of fill or embankments in such a manner that cut and fill slopes will be completed to final slopes and grade in a continuous operation. The operation of removing excavation material from any cut and the placement of embankment in any fill shall be a continuous operation to completion unless otherwise permitted by the Engineer.

B. Subgrades upon which fill or embankments are to be constructed shall be stripped of topsoil, organic material, rubbish and other extraneous materials. After stripping and prior to placing fill or embankment material, the Contractor shall compact the top 12 inches of in place soil as specified under Paragraph 3.09, COMPACTION.

C. Any soft or unsuitable materials revealed before or during placement fill or embankment placement shall be removed as indicated by the Engineer and/or materials testing consultant and replaced with select fill and compacted as required.

D. Fill subgrades on which fill or embankment is to be placed, shall be scarified or stepped in a manner which will permit bonding of the embankment with the existing surface. The fill or embankment soils shall be as specified under Part 2 - Products, and shall be deposited and spread in successive, uniform, approximately horizontal layers. The loose thickness of each lift shall not exceed the thickness for each fill type noted in Paragraph 3.09, COMPACTION.

E. Hauling shall be distributed over the full width of the embankment, and in no case will deep ruts be allowed to form during the construction of the embankment. Fill or embankment subgrades shall be properly drained at all times and kept free of flowing or ponding water, snow, ice and frozen soils. Saturated soils, snow, ice, or frozen soils shall be removed as recommended by the Engineer.

F. Each layer of the embankment shall be thoroughly compacted to the density specified under Paragraph 3.09, COMPACTION.

G. The embankment or fill material in the layers shall be of the proper moisture content before rolling to obtain the prescribed compaction. Moisture conditions and manipulation of the fill or embankment material, when necessary, shall be performed to maintain a uniform moisture content throughout the layer. Should the material be too wet or too dry to permit proper compaction, earthwork operations shall be delayed until the material is adequately moisture conditioned. Samples of all fill or embankment materials for testing, both before and after placement and compaction, will be taken at frequent intervals.

From these tests, corrections, adjustments, and modifications of methods, materials, and moisture content will be made to construct the embankment.

H. Where fill or embankments materials are to be placed and compacted on sloped subgrades steeper than 4:1 shall be benched. Benches shall be at least 6-feet wide.

I. When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portions of the embankments and the other material which meets the requirements for select fill shall be incorporated into the formation of the embankments. Stones or fragmentary rock larger than 4 inches in their greatest dimension will not be allowed within the top 6 inches of the final grade. Stones, fragmentary rock, or boulders larger than 12 inches in their greatest dimension will not be allowed in any portions of embankments and shall be disposed of by the Contractor as indicated by the Engineer. When rock fragments or stone are used in embankments, the material shall be brought up in layers as specified or directed and every effort shall be exerted to fill the voids with finer material to form a dense, compact mass which meets the densities specified for embankment compaction.

3.08 BACKFILLING

A. All structures and pipes shall be backfilled with the type of materials shown on the Drawings and specified herein. Fill placed as structure or utility backfill shall be deposited in successive, uniform, approximately horizontal lifts. The thickness of each lift shall not exceed the requirements of Paragraph 3.09, COMPACTION.

B. Each lift of fill placed backfill shall be thoroughly compacted to the density specified for each type of fill included in Paragraph 3.09, COMPACTION.

C. Where excavation support is used, the Contractor shall take all reasonable measures to prevent loss of support beneath and adjacent to pipes and existing structures when supports are removed. If significant volumes of soil cannot be prevented from clinging to the extracted supports, the voids shall be continuously backfilled as rapidly as possible. The Contractor shall thereafter limit the depth below subgrade that supports will be installed in similar soil conditions or employ other appropriate means to prevent loss of support.

D. Backfill against concrete or masonry structure shall not be performed until the Work has been reviewed and backfilling permitted. Backfill against walls shall also be deferred until the structural slab for floors above the top fill line have been placed and attained design strength or earlier at the discretion of the Engineer. Partial backfilling against adequately braced wall may be considered by the Engineer on an individual situation basis. Where walls are to be waterproofed, all Work shall be completed and membrane materials dried or cured according to the manufacturer’s instructions before backfilling.

E. Backfill against tanks and other structures which are to retain liquids shall not be performed until leakage tests are completed and accepted by the Engineer in accordance with the Section entitled “Water Tightness Testing”.

3.09 COMPACTION

A. The Contractor shall compact embankments, backfill, crushed stone, aggregate base, and in place subgrade in accordance with the requirements of this Section. The densities specified herein refer to percentages of maximum density as determined by the noted test methods. Compaction of materials on the project shall be in accordance with the schedule on the following page:

	Density % Standard Proctor (D 698)	Density % Mod. Proctor (D 1557)	Max. Lift Thickness as Compacted Inches
Embankments Beneath Structures, Roadways, and Sidewalks*	98	92	8
Common Fill Areas	95	90	8
Backfill Around Structures	95	90	8
Backfill in Pipe Trenches I within 2 feet below pavement	100	95	8
Backfill in Pipe Trenches – Deeper than 2 feet below pavement	95	90	8
Crushed Stone Beneath Structures	**	**	12
Select Sand	98	92	8
Aggregate Base Course (ABC) Beneath asphalt concrete pavement	100	95	6
Aggregate Base Course (ABC) Beneath Portland cement concrete pavements, driveways, curb & gutter, sidewalks, and roadway shoulders	95	90	6
Crushed Stone Backfill	**	**	12
Crushed Stone Pipe Bedding	**	**	12
In Place Subgrade Beneath Structures, Roadways, and Sidewalks	98	92	Top 12-inches

* Embankments beneath structures shall be considered to include a zone 10 feet out from the foundation of the structure extending down to the natural ground on a 45° slope.
** The aggregate shall be compacted to a degree acceptable to the Engineer by use of a vibratory compactor and/or crawler tractor.

B. Compaction Near Existing Structures

1. Vibratory equipment shall not be used with 25 feet of any existing structure.

2. Within 25 feet of any existing structure, non-vibratory compaction equipment such as a drum roller with a maximum weight of 4 tons should be used. Within 5 feet of any existing structure, a walk behind vibratory sled or roller shall be used.

C. Field density tests will be made by the Materials Testing Consultant to determine if the specified densities have been achieved, and these tests shall be the basis for accepting or rejecting the compaction. In-place density tests will be performed in accordance with

ASTM D 1556, ASTM D 1557, or ASTM D 6938. The Engineer, in conjunction with the Materials Testing Consultant, will be the judge as to which test method will be the most appropriate. Failure to achieve the specified densities shall require the Contractor to recompact the material or remove it as required. The Contractor shall, if necessary, increase the compactive effort by increasing the number of passes, using heavier or more suitable compaction equipment, or by reducing the thickness of the layers. The Contractor shall adjust the moisture contents of the soils to bring them within the optimum range by drying them or adding water as required.

D. Testing will be performed as frequently as deemed necessary by the Engineer and/or Materials Testing Consultant. As a minimum, one in place density test shall be performed for each 1000 cubic yards of embankment placed and 500 cubic yards of backfill placed or one test performed each day for either or as directed by the Engineer or recommended by Material Testing Consultant.

3.10 VIBRATION MONITORING

A. Vibration monitoring shall be performed at nearby structures when compaction work is ongoing. A single monitoring point using vibration monitoring equipment capable of detecting velocities of 0.1 inch/second or less and survey measurements shall be used for vibration monitoring at each of the nearest structures. An elevation measurement on nearby structures shall be taken before compaction work starts, and then at least twice a day during the work with one reading taken at the conclusion of the day's operations. Elevation measurements shall be recorded to an accuracy of 0.005 foot. If at any time the Contractor detects settlement or heave of 0.005-feet or more, or vibration levels of 1.0 inch/second or more, the vibratory compaction shall be stopped immediately, and the Engineer notified.

3.11 REMOVAL OF EXCESS AND UNSUITABLE MATERIALS

A. Disposal activities shall be performed in accordance with General Conditions 4.5.1 and 4.5.4. The Contractor shall remove and dispose of off-site all excess and unsuitable materials. Within thirty (30) consecutive days after Notice to Proceed, the Contractor shall submit to the Engineer for review all required permits and a list of disposal sites for the unsuitable materials. If the disposal site is located on private property, the submittal shall also include written permission from the owner of record.

B. All excess and unsuitable materials shall be disposed of in locations and under conditions that comply with federal, state/commonwealth and local laws and regulations.

C. The Contractor shall obtain an off-site disposal area prior to beginning demolition or excavation operations.

D. All excess and unsuitable materials shall be hauled in trucks of sufficient capacity and tight construction to prevent spillage. Trucks shall be covered to prevent the propagation of dust.

E. When all excess and unsuitable material disposal operations are completed, the Contractor shall leave the disposal sites in a condition acceptable to the Owner and Owner(s) of the disposal site(s).

3.12 BORROW EXCAVATION

A. Description

1. The work covered by this section consists of the excavation of approved material from borrow sources and the hauling and utilization of such material as required on the Drawings or directed by the Engineer. It shall also include the removing, stockpiling, and replacement of topsoil on the borrow source; the satisfactory disposition of material from the borrow source which is not suitable for use; and the satisfactory restoration of the borrow source and haul roads to an acceptable condition upon completion of the work.

2. Borrow excavation shall not be used before all available suitable unclassified excavation has been used for backfilling and incorporated into the embankments.

B. Coordination with Seeding Operations

1. The Contractor shall coordinate the work covered by this section with the construction of embankments and area fill so the requirements of Section 32 90 00 – Final Grading and Landscaping are met.

C. Borrow Materials

1. All material shall meet the requirements of Section 2 for Select Fill or shall meet the requirements of Common Fill and classify as SM or coarser according to ASTM D 2487.

D. Construction Methods

1. General

a. The surface of the borrow area shall be thoroughly cleared and grubbed and cleaned of all unsuitable material including all organics, topsoil, etc., before beginning the excavation. Disposal of material resulting from clearing and grubbing shall be in accordance with Section 31 10 00 – Clearing, Grubbing, and Site Preparation.

b. Each borrow operation shall not be allowed to accumulate exposed, erodible slope area in excess of 1 acre at any one given time without the Contractor's beginning permanent seeding and mulching of the borrow source or other erosion control measures as may be approved by the Engineer.

c. The topsoil shall be removed and stockpiled at locations that will not interfere with the borrow operations and that meet the approval of the Engineer. Temporary erosion control measures shall be installed as necessary to prevent the erosion of the stockpile material. Once all borrow material has been removed from the source or portion thereof, the stockpiled topsoil shall be spread uniformly over the source.

d. Where it is necessary to haul borrow material over existing roads, the Contractor shall use all necessary precautions to prevent damage to the existing roads. The Contractor shall also conduct hauling operations in such a manner as to not interfere with the normal flow of traffic and shall always keep the traffic lanes free from spillage.

2. Owner Furnished Sources

a. Where borrow sources are furnished by the Owner the location of such sources will be as designated on the Drawings or as directed by the Engineer.

b. The Owner will furnish the necessary haul road right-of-way at locations designated by the Engineer. All haul roads required shall be built, maintained, and when directed by the Engineer, obliterated, at no cost to the Owner. Where the haul road is to be reclaimed for cultivation the Contractor shall plow or scarify the area to a minimum depth of 8 inches, or to the depth requested by the property owner.

c. The borrow sources shall be left in a neat and presentable condition after use. All slopes shall be smoothed, rounded, and constructed not steeper than 3:1. Where the source is to be reclaimed for cultivation the source shall be plowed or scarified to a minimum depth of 8 inches, disc harrowed, and terraces constructed. The source shall be graded to drain such that no water will collect or stand, and a functioning drainage system shall be provided.

d. All sources shall be seeded and mulched in accordance with Section 32 90 00 – Final Grading and Landscaping.

3. Contractor Furnished Sources

a. Prior to the approval of any off-site borrow source(s) developed for use on this project, the Contractor shall obtain certification from the

State/Commonwealth Historic Preservation Officer of the State/Commonwealth Department of Cultural Resources certifying that the removal of the borrow material from the borrow source(s) will have no effect on any known district, site building, structure, or object that is included or eligible for inclusion in the National Register of Historic Places. A copy of this certification shall be furnished to the Engineer prior to performing any work on the proposed borrow source.

b. The approval of borrow sources furnished by the Contractor shall be subject to the following conditions:

1) The Contractor shall be responsible for acquiring the right to take the material and any rights of access that may be necessary; for locating and developing the source; and any clearing and grubbing and drainage ditches necessary.

a) Such right shall be in writing and shall include an agreement with the Owner that the borrow source may be dressed, shaped, seeded, mulched, and drained as required by these Specifications after all borrow has been removed.

2) The Contractor and the property owner shall jointly submit a borrow source development, use, and reclamation plan to the Engineer, as described in Paragraph 1.05, for approval prior to engaging in any land disturbing activity on the proposed source other than material sampling that may be necessary.

4. Maintenance

a. During construction and until final acceptance the Contractor shall use any methods approved by the Engineer which are necessary to maintain the work covered by this Section so that the work will not contribute to excessive soil erosion.

END OF SECTION

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SECTION 31 10 00
CLEARING, GRUBBING, AND SITE PREPARATION

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. Includes all labor, material, equipment and appliances required for the complete execution of any additions, modifications, or alterations to existing building(s) and new construction work as shown on the Drawings and specified herein.

B. Principal items of work include:

1. Coordinate with utility owners per General Conditions 4.4.10 and provide additional notifications as required for project-specific sequencing.Clearing the site within the Contract Limit Lines, including removal of grass, brush, shrubs, trees, loose debris and other encumbrances except for trees marked to remain.

2. Boxing and protecting all trees, shrubs, lawns and the like within areas to be preserved. Relocating trees and shrubs, so indicated on the Drawings, to designated areas.

3. Repairing all injury to trees, shrubs, and other plants caused by site preparation operations shall be repaired immediately. Work shall be done by qualified personnel in accordance with standard horticultural practice and as approved by the Engineer.

4. Removing topsoil to its full depth from designated areas and stockpiling on site where directed by the Engineer for future use.

5. Disposing from the site all debris resulting from work under this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 00 01 – Earthwork

B. Section 31 25 00 – Erosion and Sedimentation Control

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Latest Edition of City of Chandler Specifications and Standards, and Maricopa Association of Governments (MAG) Standard Specifications Section 201.

1.04 STREET AND ROAD BLOCKAGE

A. Closing of streets and roads during progress of the work shall be in compliance with the requirements of the Owner and other authorities having jurisdiction. Access shall be provided to all facilities remaining in operation.

1.05 PROTECTION OF PERSONS AND PROPERTY

A. Perform work in accordance with General Conditions 4.6 and supplement with these section-specific requirements.

B. All work shall be performed in such a manner to protect all personnel, workmen, pedestrians and adjacent property and structures from possible injury and damage.

C. All conduits, wires, cables and appurtenances above or below ground shall be protected from damage.

D. Provide warning and barrier fence where shown on the Drawings and as specified herein.

PART 2 – EXECUTION

2.01 CLEARING OF SITE

A. Before removal of topsoil, and start of excavation and grading operations, the areas within the clearing limits shall be cleared and grubbed. Per MAG Standard Specifications Section 201.

B. General Conditions 4.5 and 4.4.10 provide requirements for site control and utility protection when developing the clearing/grubbing plan. Clearing shall consist of cutting, removal, and satisfactory disposal of all trees, fallen timber, brush, bushes, rubbish, sanitary landfill material, fencing, and other perishable and objectionable material within the areas to be excavated or other designated areas.. Should it become necessary to remove a tree, bush, brush or other plants adjacent to the area to be excavated, the Contractor shall do so only after permission has been granted by the Engineer.

C. Excavation resulting from the removal of trees, roots and the like shall be filled with suitable material, as approved by the Engineer, and thoroughly compacted per the requirements contained in Section 31 00 01 – Earthwork.

D. Unless otherwise shown or specified, the Contractor shall clear and grub a strip at least 15-ft. wide along all permanent fence lines installed under this Contract.

E. In temporary construction easement locations, only those trees and shrubs shall be removed which are in actual interference with excavation or grading work under this

Contract, and removal shall be subject to approval by the Engineer. However, the Engineer reserves the right to order additional trees and shrubs removed at no additional cost to the Owner, if such, in their opinion, are too close to the work to be maintained or have become damaged due to the Contractor's operations.

2.02 STRIPPING AND STOCKPILING EXISTING TOPSOIL

A. Erosion and sedimentation control measures shall be installed as per the Federal, State or Locally approved Erosion and Sedimentation Control Plan for the project and Specification Section 31 25 00 – Erosion and Sedimentation Control before any stripping and stockpiling of topsoil can occur.

B. Existing topsoil and sod on the site within areas designated on the Drawings shall be stripped to whatever depth it may occur and stored in locations directed by the Engineer.

C. The topsoil shall be free of stones, roots, brush, rubbish, or other unsuitable materials before stockpiling the topsoil.

D. Care shall be taken not to contaminate the stockpiled topsoil with any unsuitable materials.

2.03 GRUBBING

A. Grubbing shall consist of the removal and disposal of all stumps, roots, logs, sticks and other perishable materials to a depth of at least 6-inches below ground surfaces.

B. Large stumps located in areas to be excavated may be removed during grading operations, subject to the approval of the Engineer.

2.04 DISPOSAL OF MATERIAL

A. Dispose of debris per General Conditions 4.5 debris control requirements and supplement with these project-specific provisions. . Material designated by the Engineer to be salvaged shall be stored on the construction site as directed by the Engineer for reuse in this Project or removal by others.

B. Burning of any debris resulting from the clearing and grubbing work will not be permitted at the site.

2.05 WARNING AND BARRIER FENCE

A. The fence shall be made of a visible, lightweight, flexible, high strength polyethylene material. The fence shall be Guardian Visual Barrier as manufactured by TEMAX, or equal.

B. Physical Properties

Fence	
Color	International Orange
Roll Size	4' x 100'
Roll weight	9 lbs.
Mesh opening	1-3/4" x 1-3/4"
Posts	
ASTM Designation:	ASTM 702
Length:	6 feet long (T-Type)
Weight:	1.25 #/Foot (min)
Area of Anchor Plate:	14 Sq. In.

C. Drive posts 18 inches into ground every 8'. Wrap fence material around first terminal post allowing overlap of one material opening. Use metal tie wire or plastic tie wrap to fasten material to itself at top, middle and bottom. At final post, cut with utility knife or scissors at a point halfway across an opening. Wrap around and tie at final post in the same way as the first post.

D. Use tie wire or tie wrap at intermediate posts and splices as well. Thread ties around a vertical member of the fence material and the post and bind tightly against the post. For the most secure fastening, tie at top, middle and bottom. Overlap splices a minimum of four fence openings, tie as above, fastening both edges of the fence material splice overlap.

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SECTION 31 23 13
FOUNDATION PREPARATION

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The work included in this Section comprises cleaning and preparing the foundation and abutments of appurtenant structures including but not limited to concrete pads prior to placement of embankment fill, drainage materials, or structural concrete. The Contractor shall provide all supervision, labor, materials, equipment, tools, instruments and supplies required for the completion of foundation preparation in accordance with these Specifications and the Contract Documents, including the City of Chandler General Conditions..

B. The work shall include but not be limited to:

1. Provide required submittals.

2. Smooth and prepare excavated soil surfaces as specified.

3. Smooth rock surfaces by removing promontories, overhangs, and loose blocks of rock as specified.

4. Clean sound rock surfaces and exposed rock joints with hand tools and water and air jets, as specified.

5. Slush grout rock surfaces as specified.

6. Fill deep depressions in the rock surface with concrete, as specified.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 00 01 – Earthwork

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. C144 – Standard Specification for Aggregate or Masonry Mortar

2. C150 – Standard Specification for Portland Cement

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1.04 SUBMITTALS

A. The Contractor shall prepare and submit to the Engineer all necessary data and certifications listed below in accordance with Section 01 33 00 and General Conditions Section 4.2.5.2.

1. Certificates of conformance: Submit certificates from manufacturers attesting that grout materials used meet specified requirements.

2. Contractor-furnished grout mix design: The Contractor shall submit his mix design for each type of grout proposed for approval by the Engineer.

3. As-built information: After completion of the foundation preparation, the Contractor shall submit as-built information. At a minimum, the information shall consist of a plan of the embankment dam and spillway foundation showing the limits of soil and rock materials exposed at subgrade, the location and widths of major rock joints, and the extent of slush grouting within the foundation.

B. The Contractor shall provide the Engineer with the submittals and as-built drawings no later than the number of calendar days given below:

Item	Days
Certificates of conformance	28 days prior to slush grouting
Grout mix design	28 days prior to slush grouting
As-built drawings	At completion of work

1.05 DELIVERY AND STORAGE OF MATERIALS

A. Cement: Store bagged cement upon delivery in a weatherproof structure. Elevate bags above ground. Store bulk materials in air tight and weatherproof containers. All cement shall be free of lumps at its time of mixing in compliance with General Conditions Section 4.5.4.

B. Aggregate: Store fine aggregate on a clean hard surface and cover to prevent dusting.

C. Admixture: Store approved admixtures in a protected area.

PART 2 – PRODUCTS

2.01 PRODUCTS AND MATERIALS

A. Slush grout material shall meet the following specifications:

1. Portland Cement – ASTM C 150, Type II, fine ground to pass in wet mix through a mechanically vibrated 100 mesh screen.

2. Water – Potable

3. Fine Aggregate – Masonry Aggregate, ASTM C 144.

4. Admixtures – Only those approved will be permitted.

B. Grout Mix shall be a workable slush grout mix using cement and fine aggregate. A plasticizer admixture shall be used to reduce the water-cement ratio of the mix. The following typical mix is suggested for initial slush grouting:

Component	**Proportion by Weight**
Cement	1
Water and Plasticizer	As required to produce a workable mix
Sand	2

C. The grout shall be mixed in a concrete or grout mixer and used in the work within 1/2 hour after mixing.

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor shall smooth and prepare the soil and weathered rock foundation to provide a foundation surface such that the uppermost foundation materials will be compact, impervious and well bonded to the first layer of fill placed, and such that the first layer of fill, particularly the embankment core, will be well compacted and free of loose zones in contact with the foundation.

B. The Contractor shall smooth and prepare the foundation surface for appurtenant structures prior to placing structural concrete or drainage material. Bedrock subgrade for the diversion conduit and footings for spillway retaining walls shall be slush grouted to seal surface joints.

C. The Contractor shall not slush grout the rock surface within 50 feet of the grout curtain until the pressure grouting for the cutoff curtain has been completed.

D. Proof rolling shall consist of four coverages of all portions of the soil and weathered rock subgrade with a rubber-tired roller with minimum wheel loads of 15 kips per wheel and a minimum tire inflation pressure of 65 psi.

E. No material shall be placed in any portion of the embankment dam or appurtenant structures until the foundation has been suitably prepared and slush grouted as required and has been approved by the Engineer and in compliance with inspection requirements of General Conditions Section 4.4.13.

F. The foundation surface downstream of the core shall be upgraded to provide drainage towards the drainage collection system.

G. The embankment dam foundation and appurtenant structure foundations shall be free of organic material, topsoil, and other objectionable or disturbed materials.

3.02 FOUNDATION FOR TYPE 1 FILL

A. Soil Foundation Preparation: Soil shall be excavated to a smooth surface and the foundation surface shall be dewatered, moistened or dried as required, proofrolled, and scarified so that the uppermost materials of the foundation will be as impervious, compact, and as well bonded with the first layer of fill as specified herein for the subsequent layers of fill. Any soft zones in the subgrade shall be removed and replaced with compacted Type 1 Fill.

B. Weathered Rock Foundation Preparation: Weathered rock, if sufficiently soft to be excavated with earth moving equipment, shall be excavated to a smooth surface. If isolated weathered rock blocks at foundation level are loosened or disturbed during excavation, they shall be removed and replaced with hand tamped Type 1 fill. The foundation surface shall be dewatered, moistened or dried as required, and proof rolled so that the uppermost foundation materials will be compact and well bonded to the first layer of fill. Any soft zones in the subgrade shall be removed and replaced with compacted Type 1 Fill.

C. Sound Rock Foundation Preparation: Rock promontories and overhangs on the foundation surface shall be carefully removed by hand tools or blasting with small charges. Explosives shall be of such quantity and power as will neither open seams nor otherwise disturb the foundation rock.

1. The rock surface shall be cleaned using hand tools and water and air jets to remove all loose or objectionable material. Any open joints or seams shall be cleaned to a depth not less than three times the width of the cleaned joint or seam.

2. The foundation surface shall receive a complete coverage of slush grout, and deep depressions shall be filled with backfill lean concrete, as directed by the Engineer. Slush grouting shall be scheduled, as directed by the Engineer. Slush grouting shall be scheduled so that at least 2 days, but no more than 7 days, will elapse between the application of slush grout and the covering of the slush grout with the dam embankment. Where slush grout or concrete backfill is damaged before or while being covered with the dam embankment, all affected portions of the work shall be removed and replaced. Foundation surfaces shall be moist at the time of

slush grouting, and surplus water shall be removed from pockets and depressions. The grout shall be broomed or compacted onto foundation surfaces in such a manner as to fill thoroughly all joints, cracks, crevices and minor imperfections in the rock. The slush grout layer shall have a minimum thickness of 1/8 to 1/4 inches over the rock surface and the slush grouted rock surface shall have a maximum relief of 4 inches in a local area.

3. The slush grout shall be water cured by placing moist burlap or other approved material on the slush grouted rock surface. All slush grouted surfaces shall be kept continually (not periodically) wet until fill is placed. Slush grouting will be permitted only when the air temperature is between 50°F and 80°F.

3.03 FOUNDATION FOR TYPES 2 AND 2A FILL

A. Foundation preparation for Types 2 and 2A embankment fill shall be the same as for Type 1, excepting that slush grouting will not be required on rock foundations. However, joints greater than one-half inch in width that appear to be continuous or a possible source of water from the pool shall be cleaned and grouted. Depressions in the rock surface in which fill cannot be adequately compacted with the Contractor's compaction equipment, in the judgement of the Engineer, shall be filled with lean backfill concrete.

3.04 FOUNDATION FOR TYPES 3, 3A, 4, 4A, 4B, AND 4C FILL

A. Foundations for Types 3, 3A, 4, 4A, 4B, and 4C embankment fill shall be made smooth and cleaned to the extend required to remove all loose, disturbed, or other objectionable material. Soil and weathered rock exposed at subgrade shall be proof rolled prior to placing fill. The foundation surface shall be free of water immediately prior to placing fill.

3.05 FOUNDATION FOR SPILLWAY RETAINING WALLS

A. Remove loose rock and slush grout the rock surface within the limits of the spillway retaining wall footings as in Section A. Fill large depressions with structural concrete. Where subgrade is weathered rock or soil, smooth its surface and proofroll as in Section A.

3.06 FOUNDATION FOR SPILLWAY SLAB

A. Remove loose rock and smooth and proofroll soil and weathered rock surfaces as in Section A prior to placement of drainage blanket. The excavation surface shall provide for an average thickness of the drainage blanket that is at least 6 inches. Where the subgrade material is rock, isolated projections of rock will be acceptable, provided a minimum stone cover of 3 inches is obtained and the overall average depth of stone is 6 inches. No slush grouting of rock shall be performed. Clean rock surfaces as in Section A.

3.07 FOUNDATION FOR OGEES AND CUTOFF WALLS

A. The trench for the cut-off key beneath the ogees and cut-off walls shall be excavated with vertical sides to the elevations shown on the drawings. Where sound bedrock is encountered above the drawing elevations the excavation shall be terminated provided a minimum 5 ft. depth of key is obtained. Sound bedrock shall be drilled and blasted only where necessary to obtain this minimum 5 ft. depth of key. Any sheeting required for the excavation of the cut-off key shall be removed prior or during the placing of the concrete so that continuous contact is obtained between the poured concrete and the soil and rock of the trench walls.

3.08 FOUNDATION FOR OTHER APPURTENANT STRUCTURES

A. Treat footing subgrades as in Section B, excepting that depressions in the rock surface shall be filled with structural concrete. Treat subgrades for slabs without underdrainage similarly.

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SECTION 31 23 24
FLOWABLE FILL

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The Contractor shall furnish all labor, equipment, materials and services, including pumping equipment and application, necessary for the manufacture, transportation and placement of all cementitious flowable fill as shown on the Contract Drawings or as ordered by the Engineer, except for the work specifically included under other items.

1.02 RELATED WORK

A. Division 03 - Concrete

1.03 SUBMISSIONS

A. In accordance with the procedures and requirements set forth in City General Conditions Section 4.7 – Materials Quality, Substitutions, and Shop Drawings, and Division 01, the Contractor shall submit the following:

1. Shop Drawings
2. Certifications of specification compliance for all sources of each material
3. Manufacturer’s data on all admixtures
4. Mix design and trial mix test results
5. Aggregate gradation

1.04 QUALITY CONTROL

A. The Contractor shall engage the services of a testing laboratory, with the qualifications required by Section 03 30 00 – Cast-in-Place Concrete, and experienced in the design and testing of flowable fill materials and mixes, to perform material evaluation tests and to design mixes for flowable fill. A trial mix shall be performed to verify the flowable fill mix design. The trial mix shall also report slump, air content, yield, cement content, and dry unit weight per ASTM C143 and ASTM D6023.

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PART 2 – MATERIALS

2.01 CEMENTITIOUS FLOWABLE FILL

A. Flowable fill (controlled low strength material) shall be a uniform mixture of sand, Type II Portland cement or Type IL blended cement, fly ash, admixtures and water. The mix design shall produce a flowable material with little or no bleed water, which produces a minimum compressive strength of 50 psi and maximum compressive strength of 100 psi at 56 days. The cured material shall be excavatable and have a maximum dry weight of 100 pounds per cubic foot. Slump of mix at the point of application shall be 7-inches to 10-inches.

B. Admixtures specifically designed for flowable fill shall be used to improve flowability, reduce unit weight, control strength development, reduce settlement and reduce bleed water. Admixtures shall be Mastercell 25 by BASF Construction Chemicals; Darafill by Grace Construction Products; or approved equal. Cement and all other materials shall be as specified in Section 03 30 00 - Cast-in-Place Concrete.

C. Fine Aggregate (Sand) shall consist of natural or manufactured siliceous sand, clean and free from deleterious substances, and graded within the following limits:

Sieve Size	Percent Passing by Weight
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100*	2 to 10

*For manufactured sand, the percent passing the No. 100 Sieve may be increased up to 20%.

PART 3 – EXECUTION

3.01 PLACEMENT OF FLOWABLE FILL

A. Flowable fill shall be batched and premixed by an approved producer, dispensed from ready-mix trucks, and placed by approved methods and equipment in accordance with General Conditions Section 4.4 – Performance of the Work.

B. Flowable fill shall be placed as needed to completely fill the space to receive it with no trapped air pockets or other voids. Positive means of allowing the air to escape shall be provided where necessary and after approval of the Engineer. Where placed against, around and inside existing structures, lift heights shall be limited so as not to overload the structure. The Engineer shall approve lift heights and procedures. Specific procedures and methods shall be included in the Contractor's shop drawing submittals.

C. Where flowable fill is placed around piping and other elements subject to floating within the fill space, positive means shall be taken to provide temporary balancing loads to prevent uplift or fill lift heights shall be limited to prevent uplift.

D. Application of loads or placement of other fill materials or concrete on top of flowable fill shall not occur until the flowable fill surface is determined to be suitable for loading per ASTM D6024 subject to the approval of the Engineer.

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SECTION 31 23 25
DYNAMIC COMPACTION

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. Furnish all labor, equipment and materials required to complete all work associated with dynamic compaction required for the in-place densification of the subgrade soils as indicated on the Drawings. The effect of the process shall create a known and verifiable, uniform condition and a subgrade soil bearing capacity of at least 3500 psf, which limits total settlement to 1-inch and differential settlements to 1/2-inch.

B. All work under this Contract shall be done in conformance with and subject to the limitations of the latest editions of the Maricopa Association of Governments Standard Details and Specifications as adopted and amended by the City of Chandler.

1.02 RELATED SECTIONS

A. Requirements of related work are included in Division 01 and Division 02 of these Specifications.

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The current editions and addenda of the following publications are made part of the Specifications and are applicable to the extent indicated by the specific reference. Testing performed shall conform to the following applicable standards:

1. Maricopa Association of Governments Standard Details and Specifications as adopted and amended by the City of Chandler.

2. Arizona Department of Transportation Materials Testing Manual, latest edition.

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

a. ASTM D2049 – Test Method for Relative Density of Cohesionless Soils.

b. ASTM D2167 – Test for Density of Soil in Place by the Rubber-Balloon Method.

c. ASTM D2922 – Test for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

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1.04 SUBSURFACE CONDITIONS

A. Information on subsurface conditions is referenced under Division 01, General Requirements.

B. Attention is directed to the fact that there may be water pipes, storm drains and other utilities located in the area of proposed dynamic compaction. Perform all repairs to same in the event that excavation activities disrupt service.

1.05 SUBMITTALS

A. In accordance with the procedures and requirements set forth in Section 01 33 00 – Submittal Procedures, the Contractor shall submit the following:

1. Name and qualification of specialty subcontractor performing dynamic compaction.

2. Name and qualification of geotechnical engineer who will monitor dynamic compaction, provide supervision of the operation and perform required testing to substantiate compaction results.

3. Program and plan to monitor vibrations associated with dynamic compaction operations.

4. Work plan for dynamic compaction.

1.06 CONTRACTOR'S QUALIFICATIONS

A. The Contractor shall obtain the services of an approved specialty subcontractor who is regularly engaged and experienced in dynamic compaction work. The subcontractor shall have at least five (5) years of experience in performing dynamic compaction and have completed at least fifteen (15) projects of similar scope, difficulty, and comparable size.

B. The Contractor or specialty subcontractor shall have on his staff or shall obtain the services of a geotechnical engineer to provide constant field supervision to monitor and record daily activities and performance of work. The geotechnical engineer shall perform appropriate tests to determine the depth of compaction and density of the subgrade soils prior to excavation operations in advance of final subgrade preparations.

C. The specialty subcontractor and geotechnical engineer shall be approved by the Engineer prior to construction. Engineer's approval will be based on the minimum experience criteria designated herein.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

A. Following clearing and topsoil stripping operations, the site shall be graded at a grade not exceeding 4 percent.

B. Dynamic Compaction shall be performed over the designated area utilizing a crane suitably powered and dimensioned for the work. The crane's mechanism shall allow a weight (pounder) to free fall from a height of 50 to 60 feet impacting the earth with high compactive energy. A minimum weight of 10 tons shall be used. The number of drops per impact point shall be field determined after performing initial drops. A minimum of 6 drops per impact point shall be performed, unless conditions and acceptable results allow fewer drops. The geotechnical engineer shall constantly monitor the operation recommending modifications as necessary. The spacing of drops shall be established in a square pattern over the entire area. The spacing shall be no more than 8 feet unless approved otherwise by the Engineer. Multiple passes may be required to apply the total energy necessary to achieve the specified compaction results.

C. After the dynamic compaction operation is complete and the densities of the subgrade soils have been determined to be satisfactory, the grading and excavation of the site shall proceed which will include cut and fill placement to fill the craters created by the dynamic compaction operation and to reach the specified subgrades. Excavation and embankment operations shall be performed in accordance with Section 31 00 01 – Earthwork. Placement of structural fill and select fill shall be as indicated on the Drawings. If the required densification of the deeper soils has not be attained as determined by the Engineer after the site has been graded to the required subgrade elevations, the Contractor shall perform additional compaction procedures acceptable to the Engineer at no additional cost to the Owner.

D. The Contractor shall furnish the Engineer a technical work plan two weeks prior to the start of the operation indicating his proposed plan to dynamically compact the subgrade soils. The submittal shall include crane data, proposed weight (pounder), drop height, impact spacing, number of passes and work sequence.

E. The Contractor shall be responsible to monitor the site to document vibrations leaving the site during the dynamic compaction operation. Vibrations shall be monitored utilizing a seismograph capable of providing a record of particle velocity along three mutually perpendicular axes utilizing internal calibration. A pre-construction condition inspection and documentation of adjacent structures on-site and off-site shall be performed by the Contractor. The Contractor shall exercise the utmost care not to damage property on-site and off-site. The Contractor shall notify each adjoining property owner within 500 yards of the proposed work of the anticipated vibrations and noise which will occur due to his operation. This notice shall be given sufficiently in advance to enable the adjacent

property owners to take whatever precautions they may consider necessary. The Contractor shall limit his operations to minimize any disturbance to the adjacent property owners if necessary. The Contractor shall be responsible for any damage to any structure or utility line, pipes, etc., on-site and off-site as a result of his operations.

END OF SECTION

SECTION 32 11 00
SURFACE RESTORATION

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. Provide all labor, equipment, and materials necessary for final grading, topsoil placement, and miscellaneous site work not included under other Sections but required to complete the work as shown on the Drawings and specified herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 31 00 01 – Earthwork

B. Section 31 25 00 – Erosion and Sedimentation Control

PART 2 – MATERIALS

2.01 TOPSOIL

A. Topsoil shall meet the requirements of Section 31 00 01 – Earthwork.

PART 3 – EXECUTION

3.01 FINAL GRADING

A. Following approval of rough grading the subgrade shall be prepared as follows:

1. For riprap, bare soil 24 inches below finish grade or as directed by Engineer.

2. For topsoil, scarify 2-inches deep at 4 inches below finish grade.

3.02 TOPSOIL PLACEMENT

A. Topsoil shall be placed over all areas disturbed during construction under any contract except those areas which will be paved, graveled or rip rapped.

B. Topsoil shall be spread in place for lawn and road shoulder seed areas at a 4-inch consolidated depth and at a sufficient quantity for plant beds and backfill for shrubs and trees.

C. Topsoil shall not be placed in a frozen or muddy condition.

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D. Final surface shall be hand or mechanically raked to an even finished surface to finish grade as shown on Drawings.

E. All stones, roots over 4-inches,rubbish, and other deleterious materials shall be removed and disposed of.

END OF SECTION

SECTION 32 31 13
STEEL FENCING

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall furnish and install steel fencing, posts, gates, etc., where shown on the Drawings and in compliance with these Specifications.

B. Fencing shall be of the chain link type topped with barbed wire. The 6-foot high fabric shall clear the final grade by 3 inches and shall be topped with three strands of barbed wire. The barbed wire shall be angled outward at the top. All components which are to be galvanized shall be hot dipped galvanized, coating to be 1.8 ounces per square foot of surface. Alternate coatings which employ a zinc coating of less than 1.8 ounces per square foot are not acceptable.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 03 30 00 – Cast-in-Place Concrete.

1.03 SUBMITTALS

A. Shop Drawings shall be furnished in accordance with Section 01 33 00 – Submittal Procedures.

PART 2 – PRODUCTS

2.01 CHAIN LINK FABRIC

A. Fabric shall be 9-gauge aluminum coated wire woven in a 2-inch diamond mesh conforming to ASTM A491. Top and bottom selvage to have a barbed finish. Minimum weight of coating shall be 0.40 ounce per square foot of wire surface. The coated wire shall have a minimum tensile strength of 80,000 lbs. per square inch.

B. Install fabric 3 inches above ground level. Fence shall be stretched tight and securely fastened to posts at points spaced 12 inches apart maximum.

2.02 POSTS

A. Posts and rails shall be galvanized standard weight pipe conforming to the requirements of ASTM F1083.

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1. Line Posts: Line posts shall be Schedule 40, 2-7/8 inch O.D. galvanized pipe with minimum bending strength of 201 pounds under a 6-foot cantilever load. Line posts shall be spaced at a maximum 10-foot O.C.

2. Terminal Posts: All end, corner, intermediate, and pull posts and gate leaves 6'0" wide and less shall be 3-½ inch O.D. galvanized Schedule 40 pipe with minimum bending strength of 381 pounds on 6-foot cantilever load. Gate posts for gate leaves shall be Schedule 40 pipe complying with ASTM F1083 of diameters as follows:

Gate Leaf Width	Pipe O.D.	Weight per Ft.
0' to 6'	3-1/2"	9.11 lbs.
Over 6' to 13'	4"	10.79 lbs.
Over 13' to 18'	6-5/8"	18.97 lbs.
Over 18'	8-5/8"	24.7 lbs.

2.03 TENSION WIRE

A. Top and bottom tension wire shall be No. 7 gauge aluminum coated steel wire. Fabric shall be securely tied to tension wire at intervals not to exceed 24-inches.

2.04 POST TOPS AND BARBED WIRE SUPPORTS

A. Gate, end, corner and line post tops shall be malleable iron or pressed steel and shall be hot dipped galvanized conforming to ASTM A153.

B. Extension arms for supporting the three (3) strands of barbed wire for line posts shall be of pressed steel with malleable iron base, or solid aluminum alloy castings.

C. Angles for line post extension arms shall be approximately 45 degrees from the vertical and the top slot for barbed wire shall be a minimum of 12 inches above the fabric and a minimum of 10 inches from the fence line.

2.05 BARBED WIRE

A. Barbed wire shall consist of three strands of 12-1/2 gauge aluminum coated steel wire with 4-point barbs of 14 gauge aluminum wire spaced 5 inches apart, conforming to ASTM A585.

B. Additional strands of barbed wire shall be added beneath the chain link fabric at all ditch crossings to maintain the security of the fence installation.

2.06 BRACES AND TOP RAILS

A. Braces and top rails (where shown on the Drawings) shall be 1.66-inch O.D., Schedule 40 galvanized pipe with minimum vertical bending strength of 202 pounds on 10-foot span.

B. Top rails shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion. Brace rails shall be provided at all terminal posts, located between the top and grade lines and extend from the terminal post to the first adjacent post. Braces shall be securely fastened at both ends. Brace ends for receiving brace rails shall be malleable iron or castings of 356.0 (formerly SG70A) alloy, or equivalent of ASTM B26 or B108.

C. Truss and stretcher bands shall be 1/8-inch x 7/8-inch pressed steel, supplied with carriage bolts and nuts. Bolts shall be 5/16-inch by 1 1/4-inch. Truss rods shall be 3/8-inch nominal diameter.

2.07 FABRIC TIES

A. Wire ties shall be pre-formed 0.148-inch diameter (9 gauge) aluminum. Flat band type ties shall be 1100-H18 or 3003-H14, .064-inch thick by 1/2-inch wide.

B. Hog rings for attaching tension wire to fabric shall be 0.105-inch diameter, Alloy 1100-H14.

2.08 GATES

A. Gate frames shall be made of 2-inch O.D. ASTM F1083 pipe, 2.72 lbs. per foot hot dipped galvanized. Fabric shall match fence. Gate frames shall be welded or assembled with riveted corner castings. Gate frames shall be equipped with 3/8-inch diameter adjustable truss bars. Hinges shall be ball and socket.

B. Gate shall be equipped with positive latching device with provision for padlocking. Personnel gates shall be minimum 36-inch clear opening.

PART 3 – EXECUTION

3.01 INSTALLATION

A. All line posts shall be spaced equidistant in the fence line on a maximum of 10-foot centers. Posts shall be set plumb in concrete bases as detailed on Drawings. The top of the posts shall be brought to a smooth grade line. The wire fence shall be set accurately to line and grade and shall be plumb.

B. End, corner, pull or intermediate posts shall be placed in the following locations: corners; changes in direction; abrupt changes in grade; intervals no greater than 500 feet in the fence line. Each end or gate post shall have one brace assembly and each corner or intermediate post shall have two brace assemblies.

C. Horizontal braces shall be provided at all terminal posts, corner posts, and intermediate posts between top rail and ground and shall extend from the above-mentioned posts to the first adjacent line posts. Braces shall be securely fastened to the line posts by brace ends and brace bands and to the terminal posts by approved rail end connectors. Diagonal brace rods shall be trussed from the brace end on the line post back to the terminal post, corner post or intermediate post and fastened to it by an approved connector.

3.02 POST FOUNDATIONS

A. Post holes shall be in true alignment and of sufficient size to provide a permanent foundation of concrete. Holes shall be well centered on the posts. A minimum diameter of 12 inches shall be required for all posts.

B. Post foundations shall be carefully rodded or tamped into place. The top of concrete shall extend 2 inches above ground line and shall be neatly troweled and leveled up from edges to the posts so as to have a pitch outward in all directions.

C. No materials shall be installed on the posts, nor shall any load be applied to the posts within 3 days after the individual post foundation is completed.

D. All concrete shall be Class "B" in conformance with Section 03 30 00 – Cast-in-Place Concrete.

3.03 RESETTING OF EXISTING FENCE

A. Where shown on the Drawings that resetting of existing fence is required, the fence, after resetting, shall be in a condition that is equal to or better than before the fence was removed.

B. The Contractor shall replace any of the fence components which have been unnecessarily damaged by him.

3.04 PADLOCK AND KEYS

A. One solid brass padlock shall be furnished with each gate. Padlocks shall be master keyed to the system specified under Section 08 71 00 – Finish Hardware.

3.05 TEMPORARY FENCING

A. The Contractor shall furnish and install all temporary fencing and appurtenances as shown on the Drawings or as required during construction to adequately secure the site prior to installation of the permanent fence.

END OF SECTION

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SECTION 40 05 24.23A
STEEL PIPE FOR WATER AND WASTEWATER SERVICE

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall submit certification that the steel pipe has been designed to resist all loads implied and reasonably anticipated for the means and methods of installation applied by the Contractor.

B. Design pipe layout in accordance with AWWA M11

1. Use base stationing and elevation convention as shown on Drawings.

2. Include at minimum:

a. Specific number, location, and direction of each pipe, joint, and fitting. Number each pipe in installation sequence.

b. Station and centerline elevation at changes in grade or horizontal alignment.

c. Location of mitered pipe sections, beveled ends for alignment conformance, butt straps, and temperature stress control joints.

C. Welding Procedure Specification (WPS)

1. Qualified by testing in accordance with ASME Boiler Pressure Vessel Code (BPVC) SEC IX for shop welds and ASME B31.1 and B31.3.

2. Procedure Qualifications Records conducted on unlisted base metal to be production welded as required in the referenced welding Code shall be traceable to heat lots.

3. Written WPS required for welds, both shop and field.

D. Stulling: Design for pipe and fittings such that over-deflection and damage is avoided during handling, storage, and installation, including backfill and compaction.

E. The AWWA Specifications referenced in this Section are supplemented as follows:

1. An affidavit of compliance is required from the pipe manufacturer stating the pipe material is manufactured to the requirements of the Specifications and referenced standards.

2. The pipe manufacturer shall include mill specifications on coil steel used in the production of the pipe. The steel manufacturer's certification that the material meets the ASTM Specification will be accepted in lieu of tests on specimens taken from the fabricated pipe. The manufacturer may purchase steel plates on the chemical basis and shall submit certified test reports.

1.02 DESIGN REQUIREMENTS

A. Contractor shall be responsible for all aspects of installation and testing of welded steel pipe.

B. Pipe and fittings shall be designed by Supplier where thickness is not indicated on the drawings.

C. Design criteria for pipe and pipe fittings: In accordance with AWWA Manual M11 with the following modifications:

1. Wall thickness: As designed, as shown on the drawings, or minimum specified thickness, whichever is thicker.

2. Inside diameter of unlined pipe: Nominal.

3. Inside diameter of lined pipe: As measured from face to face of liner, but not less than nominal.

4. Working stress of steel: Maximum 50 percent of yield stress.

1.03 SUBMITTALS

A. Shop Drawings showing pipe layout including all fittings and straight sections in one complete package from the main pipe supplier.

B. Material list and steel reinforcement schedules for materials specified.

C. Fabrication Information

1. Pipe and fitting details for temporary and permanent facilities indicating:

a. Cylinder thickness

b. Manufacturing tolerances

2. Welded joint details including:

a. Butt Joints

b. Miter-cut ends for alignment conformance

c. Fittings

D. Welding Data (Shop and Field Welding)

1. Show on a weld map, complete information regarding base metal specification designation location, type, size, and extent of welds with reference called out for WPS and nondestructive examination numbers in tail of welding symbol.

2. Indicate, by welding symbols or sketches, details of welded joints and preparation of base metal. Provide complete joint welding details showing bevels, groove angles, and root openings for all welds.

3. Submit welding data together with Shop Drawings as a complete package.

4. Fittings: Provide a joint weld beveling diagram. Refer to ASME B31.1 and B31.3.

E. Product data for the following:

1. Material data

2. Chemical and physical test reports showing data consistent with specified requirements for each heat of steel proposed for use.

F. Certificates

1. Lining Materials: Certificate that lining system is currently approved for potable water contact in accordance with NSF 61 and satisfies current applicable governmental health and safety requirements for use in potable water.

G. Pipe Manufacturer’s written Quality Assurance/Control Plan

H. Statements of Qualification

1. Pipe Manufacturer

2. Fittings and specials fabricator

3. Welder Logs

a. Name of welder

b. Welding procedure/positions for which welder is qualified to weld

c. Assigned certification stamp number

d. Certification Date

e. Current certification status

4. Contractor’s Shop Inspector

5. Contractor’s Field Inspection Firm and Personnel

6. Nondestructive Testing Quality Control Firm and Personnel

I. Procedures

1. Shop and field welding information; at a minimum include complete welding code paper trail with linkage to Shop Drawings.

a. Written WPS and Procedure Qualification Record.

b. Written Nondestructive Testing procedures.

c. Current Welder Performance Qualifications.

d. Written weld repair procedures for Work.

J. Reports

1. Source Quality Control Test Reports: Nondestructive weld testing (shop and field)

K. Design calculations prepared by a Professional Engineer, licensed in the State or Commonwealth in which the construction of the project is occurring, for fittings, including opening reinforcement details of collars, wrappers, crotch plates; and harnessed joint assemblies.

1.04 QUALIFICATIONS

A. Pipe Manufacturer

1. Steel Plate Fabricators Association (SPFA) Certification of ISO 9000 Certification.

2. Experienced in fabricating pipe of similar diameters, lengths, and wall thickness required for the Work.

3. Demonstrate current production capability for volume of work required for this project.

4. Experience shall be applicable to fabrication plant facilities and personnel; not company or corporation that currently owns fabrication facility or employs personnel.

B. Pipe and Fittings Fabricator

1. Pipe: Successful fabrication of at least 100,000 lineal feet of the same diameter (or larger) and same wall thickness (or greater) within the past five years with the type of joint specified.

2. Fittings: Successful fabrication to AWWA C200 and AWWA C208 standards of at least 25 fittings of the same diameter or larger pipe, with wall thickness 3/16-inch or greater, within the past five years.

C. Welders and Welding Operators

1. Shop Welders: In accordance with ASME BPVC SEC IX

2. Field Welders: In accordance with ASME B31.1 and B31.3

D. Contractor's Shop Inspector

1. In accordance with AWWA C200

2. Responsibilities

a. Monitor conformance to approved WPS

b. Monitor conformance to approved Nondestructive Testing procedure specifications.

c. Monitor conformance of Welder Performance Qualifications.

d. Provide 100 percent visual inspection before, during, and after shop welding.

e. Coordinate Nondestructive Testing work and review test results.

f. Maintain records and prepare report confirming results of inspection and testing.

E. Pipe Manufacturer Field Representative: The field service representative shall have a minimum of 5 years' experience installing pipe with joints, linings, and coatings of the pipe to be furnished.

1.05 DELIVERY, HANDLING, AND STORAGE

A. Fittings shall be marked at each end with "TOP FIELD CENTERLINE".

B. Securely bulkhead or otherwise seal ends of pipe and fittings prior to loading at manufacturing site.

C. Pipe ends shall remain sealed until installation.

D. The Contractor shall ensure the proper protection of piping materials during shipment, handling, storage, and installation as directed by the pipe manufacturer.

E. Damage to pipe and fittings, including linings and coatings shall be repaired to Engineer's satisfaction or removed from Site and replaced.

F. Support pipe securely to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials.

G. Support on sand or earth berms free of rock exceeding 3-inches in diameter.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Steel pipe and fittings shall be under direction of the main pipe supplier. All straight pipe sections shall be manufactured by the same manufacturer. Fittings may be manufactured by a different manufacturer. Main pipe supplier shall be responsible for coordinating work of other suppliers for either fittings or pipe.

B. All steel pipe shall be supplied by American Spiralweld Pipe Company or Northwest Pipe Company or approved equal.

2.02 STEEL PIPE

A. General:

1. Steel pipe and fittings shall be manufactured, tested, inspected, and marked to comply with AWWA C200 and additional requirements of these Contract Documents.

2. Materials in contact with internal conveyed liquid shall be NSF 61 approved for use with potable water.

3. Pipe shall be furnished principally in 40-feet net laying lengths with shorter lengths, field trim pieces and closure pieces as required by the Drawings for locations of fittings, or as required for construction.

B. Pipe Barrel

1. The steel pipe shall be mill type, smooth wall, spiral welded, or steel plate for straight seam welded steel pipe per AWWA for nominal pipe sizes 6-inches and larger. Steel pipe shall be new and shall meet or exceed the manufacturer and material requirements of ASTM A139, Grade C, or D, or ASTM A1011/ASTM A1018 Grade 40 or 45. Plates used for reinforcement collars, anchor rings, and crotch plates shall meet or exceed the requirements of ASTM A36 or A572 Grade

50. Steel pipe shall be designed for embankment (wide-trench) conditions and in accordance with AWWA M11 Steel Pipe – A Guide for Design and Installation, latest edition, as supplemented by this Section. and as follows:

a. Minimum Yield Strength of 42,000 psi

b. Minimum Tensile Strength of 60,000 psi

2. The inside diameter, including the lining, shall be a minimum of the nominal diameter of the pipe specified.

C. Buried steel pipe shall be manufactured to the nominal pipe sizes as shown on the drawings and shall have the following minimum wall thicknesses:

Buried Steel Pipe Schedule

Nominal Inside Diameter (inches)	Interior Lining Type	Thickness of Mortar Lining (inches)	Minimum Sheet or Plate Thickness (inches)
16	Cement Mortar Lined	0.500	0.250
48	Cement Mortar Lined	0.500	0.375

2.03 FITTINGS

A. Fittings shall be fabricated in accordance with AWWA C208. Pipe material used in fittings shall be of the same material and pressure class as the adjoining pipe. The minimum radius of elbows shall be 2 ½ times the pipe diameter and the maximum miter angle on each section of the elbow shall not exceed 11 ¼-degrees (one cut elbow up to 22 ½-degrees). If elbow radius is less than 2 ½ times the pipe diameter, per the approval of the Engineer, stresses shall be checked per AWWA M11 and the pressure class increased if necessary.

B. Specials and fittings: unless otherwise shown on the Drawings, shall be made of segmental welded sections from hydrostatically tested pipe, with ends compatible with the type of joint or coupling specified for the pipe.

C. Laterals and outlets shall be reinforced in accordance with ASME Pressure Vessel Code, Section VIII, Paragraph G-37 or the latest version of AWWA M11.

D. Fabricate collar or wrapper reinforcement using same steel as specified for main pipe barrel.

2.04 INTERIOR LINING

A. Cement Mortar Lining

1. All steel pipe shall be manufactured to include cement mortar lining. Cement mortar lining conforming to AWWA C602 for in-place lining, or AWWA C205 for shop lined applied lining shall be provided. The minimum thickness of the mortar lining shall be as indicated in the pipe schedule. Shop lining of welded joint pipe shall be held back as shown on the Drawings to facilitate welding.

2. Holdbacks shall receive a prime coat and be provided as shown on the approved shop drawings. Holdbacks shall be filled with cement mortar after joint completion per AWWA C205.

3. Defective linings as identified in AWWA C205 shall be removed from the pipe wall and shall be replaced to the full thickness required. Defective linings shall be cut back to a square shoulder in order to avoid feather edged joints.

4. Fittings shall be cement-mortar lined per AWWA C205.

2.05 EXTERIOR COATING

A. Tape Wrap for Buried Steel Pipe and Fittings

1. The outside of all buried steel pipe and fittings shall receive a prime coat per the exterior tape system manufacturer's recommendations, except for areas of pipe to be field welded.

2. The outside of buried steel pipe shall receive, over the prime coat, a multi-layered, cold-applied tape wrap system which shall be shop applied and consist of a rubber and synthetic resin primer, one (20 mils) layer of inner wrapping and two (30 mils each) layer of outer wrap for a total system thickness of 80 mils. The cold applied tape wrap shall operate satisfactorily at a temperature of 150°F.

3. The wrap shall be applied in accordance with AWWA C214 and as specified herein.

4. Windings shall be spiral wrapped with at least 1" of overlap. All fittings shall be wrapped in accordance with AWWA C209 and C214. Successive layers shall be applied such that windings are staggered and overlay the midpoints of previous tape widths. The wrapping shall terminate 6" from outside field weld sites.

5. Polyethylene backed coatings shall be protected from sunlight at all times.

6. The tape wrap system shall be the YG III system as manufactured by the Polyken Division of Kendall Co., Boston MA, or equal.

7. Interior Welded Pipe: Finish wrap or heat shrink sleeves per AWWA C216 shall be applied to each joint of the pipe for continuous wrapping of all steel piping.

Contractor shall complete internal welding prior to applying heat shrink sleeve and prior to backfilling.

8. Any tape wrap damaged during installation shall be repaired in accordance with AWWA C214 to the Engineer's satisfaction prior to backfilling operations.

B. Exterior Painting for Exposed Steel Pipe (Indoor and Outdoor)

1. Prepare surface to be coated in accordance with the coating manufacturers recommendations immediately prior to applying any coating.

2. Except for areas of pipe to be welded, the exterior of exposed steel pipe shall receive a prime coat of 5 to 10 mils (dry) of inorganic zinc primer rated for 300°F continuous service and shall be Carbozinc 11 as manufactured by Carboline, Tnemec-zinc Series 90-97, or equal.

3. Areas of pipe to be welded shall receive 1 mil (dry) of weldable primer as manufactured by Carboline, Tnemec, or equal. After welding and pressure and leakage testing are completed, welded joints shall be thoroughly cleaned of all foreign matter and any scale or rust and primed as previously specified.

4. Over the prime coat shall be a finish coat of 3 to 5 mils (dry) of a polyurethane coating and shall be Carbothane 133 HB, Tnemec Series 1075, or equal.

5. Field touch-ups shall be electrically inspected by the use of a holiday detector in accordance with AWWA C209.

2.06 JOINTS

A. All unwelded pipe joints shall be bonded for electrical continuity in accordance with the Pipe Manufacturer's recommendations unless otherwise specified in the Drawings.

B. Flanges, Flange Gaskets, and Bolting Materials

1. Flanged joints shall be used as shown on the Drawings. Flanges shall be AWWA C207, standard ring type, slip-on welding flanges.

2. Bolts and nuts shall be per the requirements of AWWA C207. The bolts shall have hexagonal heads and nuts. No washers shall be used.

3. All gaskets shall be the "Ring-Gasket" type, 1/8-inch minimum thickness. Segmented gaskets will not be acceptable. Gaskets for flanged joints must follow AWWA C207.

4. Where isolation is required between dissimilar metals or for cathodic protection, insulating joints shall be provided using isolation gasket kits. Isolating sleeves for bolt holes shall be mylar, and isolating washer material shall be GRE-G10.

5. Shop lining and coating shall be continuous to the end of the pipe or back of the flange. Flange faces shall be shop coated with a soluble rust preventive compound.

C. Lap and Butt-strap Welds

1. Lap welds or butt-strap welds shall be in accordance with AWWA C200, AWWA C206 (for field welding) and AWWA M11.

2. Lap and butt-strap field welded joints shall be used where restrained joints are required or indicated on the Drawings. The minimum lap shall be 1-inch.

3. Lap welded joints shall be welded as shown on the drawings. Holdbacks for coating and linings shall be provided as shown on the approved shop drawings.

4. If pipe restraint is not required, lap or butt-strap or butt welding may be used at the Contractors option.

D. Butt Weld Joints

1. Butt welded joints shall conform to AWWA C200, AWWA C206 (for field welding), and AWWA M11.

2. Butt welded joints shall be used where indicated on the Drawings, or at the Contractor’s choice in lieu of lap and butt-strap welds. Butt welds shall be complete joint penetration welds (applies to single and double welded joint), and the ends of the pipe shall be appropriately beveled for an acceptable butt weld.

3. Butt welds shall be accurately aligned and retained in position during the welding operation so that in the finished joint the abutting pipe sections shall not be misaligned by more than 20 percent of the pipe wall thickness or a maximum of 1/8”, whichever is less.

4. Holdbacks for coating and linings shall be provided as shown on the approved shop drawings.

E. Rolled Groove Rubber Gasket Joints

1. The standard joint for unrestrained steel pipe shall be a rolled groove rubber gasket joint unless otherwise noted on the Drawings. Rolled groove rubber gasket joints shall conform to AWWA C200 and AWWA M11.

2. The O-ring gasket shall have sufficient volume to approximately fill the area of the groove and shall conform to AWWA C200.

3. The joint shall be suitable for a working pressure equal to the class of pipe furnished and shall operate satisfactorily with a deflection angle, the tangent of which is not to exceed 1.00/D where D is the outside diameter of the pipe in inches with a pull-out of 1-inch.

F. Mechanical Couplings

1. Mechanical couplings (unrestrained applications) where indicated on the Drawings shall be Smith Blair Style 411, Baker Style 200, Romac Industries, Inc. Style 400, or equal.

2. Restrained mechanical couplings where indicated on the Drawings shall be Smith Blair Style 414, Baker Style 216, Victaulic Style 232, or equal. Rodded connections may also be used to restrain couplings where approved by the Engineer.

3. Where two different pipe materials are joined, insulating mechanical couplings shall be provided and shall be double insulated Smith Blair Style 416, Baker Style 216, Romac Industries Inc. Style IC400, or equal for working pressures up to 150 psi only.

4. Couplings for buried service shall have all metal parts fusion epoxy coated in accordance with AWWA C213.

5. Pipe ends for mechanical couplings shall conform to AWWA C200 and AWWA M11. The shop applied outside coating shall be held back as required for field assembly of the mechanical coupling or to the harness lugs or rings. Harness lugs or rings shall be fusion epoxy coated in accordance with AWWA C213 and pipe ends shall be painted with one shop coat of polyurethane conforming to AWWA C222.

6. Pipe for use with sleeve-type couplings shall have plain ends at right angles to the axis.

G. The piping layout shown on the Drawings is based upon standard fittings available in ductile iron pipe. Welded joints will not be acceptable where such joints would interfere with the removal of valves or equipment or create sections of piping too large for removal from structures as determined by the Engineer.

H. Harnessed flexible couplings may also be used in lieu of flanges at locations approved by the Engineer. Lugs or retainer rings shall be welded to the pipe in accordance with the requirements of AWWA Manual M11 for Steel pipe where required for harnessing of flexible couplings.

2.07 WELD TESTING AND INSPECTION

A. All welding procedures used to fabricate pipe shall be qualified under the provision of AWS B2.1 or ASME Section IX.

B. All welds made after hydrostatic testing of the straight sections and fittings of pipe shall be tested per the following paragraphs.

C. Shop Non-Destructive Testing

a. 100 percent visually examined by Contractor's Shop Inspector

b. Hydrostatic testing 100 percent of straight pipe sections per AWWA C200

D. Field Non-Destructive Testing

a. All field welds shall be performed by AWS certified welders in conformance with standard procedures and shall be visually inspected and tested by an approved quality assurance testing firm in accordance with ASME B31.1 and B31.3.

b. The Contractor shall be responsible for contracting with an approved testing firm. Nondestructive testing methods shall be used unless otherwise approved by the Engineer.

c. At minimum, all field welds shall be inspected in accordance with the following:

d. Visual: 100 percent of all welds.

1) Magnetic particle or Ultrasonic: 100 percent of all butt welds.

2) Magnetic particle: 100 percent of all lap and butt-strap welds.

3) Hydrostatic testing 100 percent of pipeline per AWWA C200.

PART 3 – EXECUTION

3.01 GENERAL

A. Furnish feeler gauges of proper size, type, and shape for use during installation.

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

3.02 INSTALLATION

A. General

a. Install pipe in accordance with the requirements included in AWWA M11.

b. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.

3.03 MANUFACTURER'S FIELD SERVICES

A. The services of an experienced, competent and authorized field service representative acceptable to the Owner shall be provided for a period of not less than 3 days to perform all field services specified herein.

B. The field service representative shall visit the site to advise and consult with the Contractor and to review and instruct the Contractor in procedures for pipe handling, laying, and jointing at the start of pipe installation for each crew and shall coordinate his services with the Contractor. The field services representative shall not directly supervise the Contractor's personnel. The Contractor shall remain responsible for the piping installation work.

END OF SECTION

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SECTION 40 06 20A

PROCESS PIPE, VALVE, AND GATE SCHEDULES

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Reference Section 40 05 00 - Basic Mechanical Requirements.

1.02 PIPING SCHEDULES

A. Piping requirements for this Section are outlined on the Drawings and in the Piping Schedules. In the absence of a specified test pressure, pipe shall be tested at the greater of: 1) 150 percent of working pressure as determined by the Engineer or 2) 10 psig, unless the Schedule indicates no test is required.

B. If the pipe material is not shown on the Piping Schedule or otherwise specified, the following materials shall be used.

PIPE SIZE	MATERIAL	TYPE OF JOINT	CLASS/DESIGN	TEST PRESSURE
4-IN AND LARGER	DIP	FLANGED (EXPOSED)	CLASS 53	(1)
		RESTRAINED (BURIED)	PRESSURE CLASS 350	
LESS THAN 4-IN	PVC/CPVC (2)	SOCKET	SCH 80	(1)

(1) Test at 150 percent of working pressure or 10 psi, whichever is greater.
(2) For all PVC / CPVC designations, if piping is exposed to direct sunlight or if heat tracing is required, CPVC shall be used. Otherwise, PVC shall be used.

1.03 VALVE SCHEDULES

A. All valves shall be tagged by the manufacturer according to the control valve designations listed in this Section.

B. Valves not listed in this Section shall be manually operated, unless otherwise shown on the Drawings

11-03-21

1.04 GATE SCHEDULES

A. Gates shall be tagged by the manufacturer according to locations listed in this Section.

WATER TREATMENT PLANT PIPING SCHEDULE

SERVICE	FLOW STREAM ID	SIZE (IN)	OPERATING PRESSURE (PSIG)	TEST PRESSURE (PSIG) AND TYPE	EXPOSURE	PIPE TYPE	MATERIAL	COATING	LINING	JOINTS
GAC EFFLUENT	GE	16, 48	20	30	BURIED	AWWA C200 FABRICATED WELDED STEEL	CARBON STEEL	SECTION 40 05 24.23a	CEMENT-MORTAR: AWWA C205	WELDED
					ENCASED	AWWA C200 FABRICATED WELDED STEEL		SECTION 40 05 24.23a	CEMENT-MORTAR: AWWA C205	WELDED
					EXPOSED	AWWA C200 FABRICATED WELDED STEEL		SECTION 40 05 24.23a	CEMENT-MORTAR: AWWA C205	WELDED/ FLANGED[4]
CONTACTOR TO WASTE	CTW	16	20	30	BURIED	AWWA C200 FABRICATED WELDED STEEL	CARBON STEEL	SECTION 40 05 24.23a	CEMENT-MORTAR: AWWA C205	WELDED
					ENCASED	AWWA C200 FABRICATED WELDED STEEL		SECTION 40 05 24.23a	CEMENT-MORTAR: AWWA C205	WELDED
					EXPOSED	AWWA C200 FABRICATED WELDED STEEL		SECTION 40 05 24.23a	CEMENT-MORTAR: AWWA C205	WELDED/ FLANGED[4]

1) Surge pressure is the maximum pressure in the system during a surge event. Restraint pressure shall be used to determine pipe joint design and if required, the size, number, material, and dimensions of tabs and threaded-rods and thrust blocking for thrust restraint of piping and piping system components specified.
2) Provide heat tracing and insulation as specified in Section 40 41 13 on all exposed outdoor piping indicated.
3) For all PVC / CPVC designations, if piping is exposed to direct sunlight or if heat tracing is required, CPVC shall be used. Otherwise, PVC shall be used.
4) Flanges shall be provided as shown on the drawings or as approved by the Engineer.

EXHIBIT D

ACCEPTED GMP/PRICE PROPOSAL

FINAL SUBMITTAL FOR REVIEW

CITY OF CHANDLER
WATER SYSTEMS UPGRADE PROGRAM
WA2100.251

SUBMITTAL TASK #17.7
GMP-2 PROPOSAL

SUBMITTED BY: ARCHER WESTERN CONSTRUCTION, LLC
PHOENIX, AZ

DATE SUBMITTED: SEPTEMBER 30, 2025

SECTION A

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SECTION B

PROJECT DESCRIPTION

1. PROJECT DESCRIPTION

The Pecos Surface Water Treatment Plant (PSWTP) Improvement Project will provide both pre-construction and construction services to implement a series of upgrades to the facility's liquid and solid treatment processes. These improvements are designed to enhance water quality, operational efficiency, and long-term reliability throughout the City of Chandler's water system. Planned improvements include:

- Replacement of GAC (granular activated carbon) media in existing filters
- Concrete repair and rehabilitation of existing filters
- Installation of new post-filter GAC, pump station, and seal weir structure
- Construction of new dewatering equipment and associated building
- Construction of a new chlorine dioxide generation facility
- Replacement and reconfiguration of EQ submersible pumps
- Miscellaneous electrical and yard piping improvements

Identified Projects to Meet Program Goals:

- 42.1 – Filter 9–12 Rehabilitation
- 43.1 – Post-Filter GAC Contactors
- 86.1 – Chlorine Dioxide (pending pilot test results)
- 65.1A – EQ Pumps
- 75.1D – Dewatering Building

Project Delivery and Schedule:

The program will be delivered through multiple design and construction packages over the period of Q3 2024 through Q2 2028. Pre-construction services began in Q3 2024, with construction anticipated to start in Q1 2025 and continue through Q2 2028.

Guaranteed Maximum Price (GMP) Packages:

1. Filters 9 to 12 construction
2. Long Lead Procurement and Early Construction Work
3. Remaining Construction

2. SCOPE OF WORK

This GMP covers the work related to Long Lead Procurement and Early Construction Work. The work under this project will address new and/or rehabilitated tertiary granular filters, concrete repair and rehabilitation of existing Filters 9-12.

The scope of work includes the following:

- 01 Civil Work
    - 02D Demolition:
        - CMU Wall

        - Concrete Slab
        - Asphalt Pavement
        - Curb & Gutter
        - Relocate Conex Boxes
        - Polymer Structure
        - Polymer Piping
        - Remove fiber optic lines and structures
    - 31E Erosion Control
        - Install and Maintain Silt Fence
        - Install and Maintain Inlet Protection
        - Install Construction Exits
        - Street Sweeping
    - 31EW Earthwork
        - Remove and Stockpile DG
        - Construct Temp Access Berms
        - Construct Stormwater Bypass Ditch (rough cut only)
    - 32FN Fencing
        - Install 8-ft Chain Link Temporary Fence w/ Privacy Screen
    - 33UT Utilities
        - Relocate PD Line
        - Install Temp Polymer Lines
        - Support Existing Utilities (inside excavation zone)
        - Install WSP 48-in GAC Effluent (GE) (below GAC slab)
        - Concrete Encasement for 48-in GE
        - Install 16-in WSP Contactor to Waste (CTW) (below GAC slab) with CLSM backfill
        - Concrete Encasement for 16-in CTW
- 43 Post Filter GAC Contactors
    - 26E EI&C
        - Procure Long Lead Electrical Gear
            - One (1) Eaton Gear Package Based on GMP2 Final Drawings and GMP2 Final Specifications
                - One (1) TX-DIS,
                - One (1) PWTP-GAC-SWBD1,
                - One (1) AHF-GAC,
                - One (1) PWTP-DWT-MCC1,
                - VFD-4321,
                - VFD-4322,
                - VFD-4323,
                - VFD-4311,
                - VFD-4312,
                - VFD-4313,
                - VFD-4314,
                - Start-Up, Training, ArcFlash/Power Study, Harmonic Analysis, and Spare Parts.

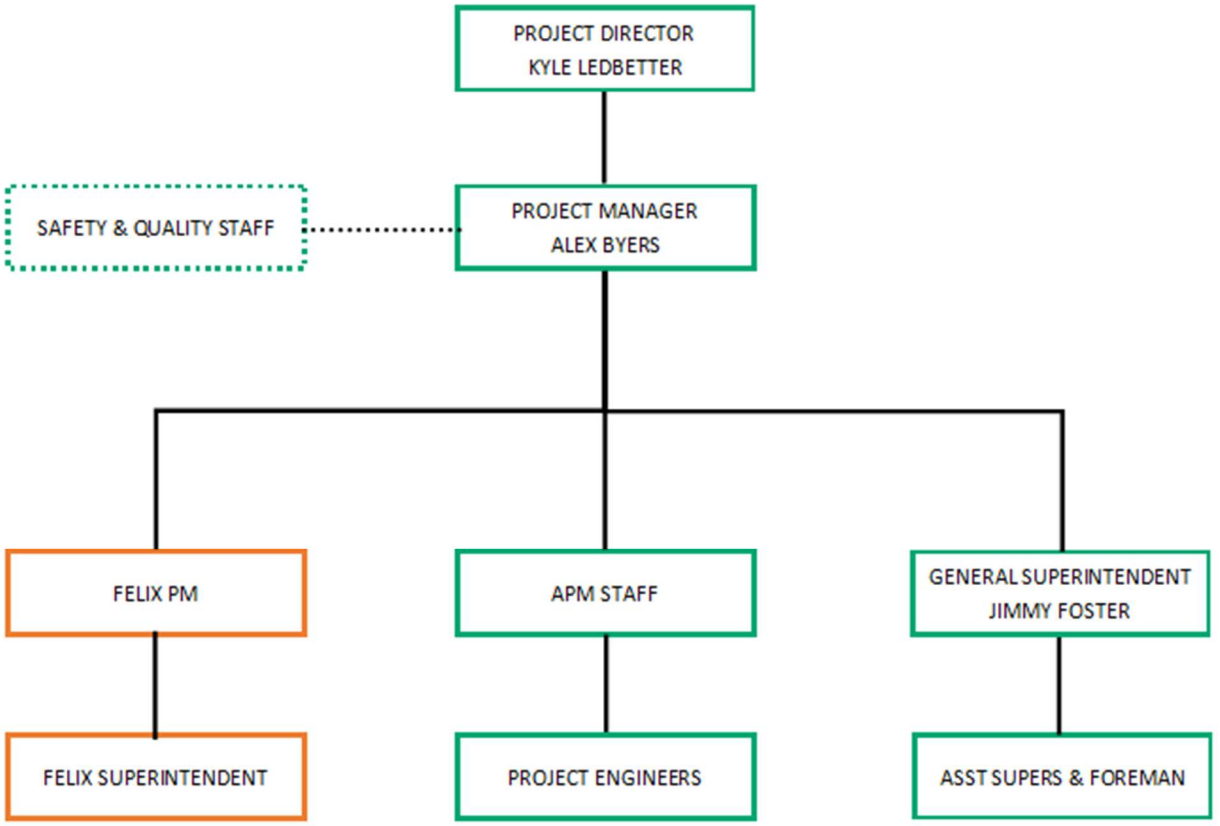
    - 31EW Earthwork
        - Excavate GAC, Weir and Pump Station (including shoring on two sides)
        - Excavate Access Ramp for Construction
        - Backfill Access Ramp
    - 99 Construction Management / General Conditions
        - Construction Management Supervision
        - Construction Equipment

Because of the schedule implications of performing the work with an expected GMP-3 in July 2026, Archer Western has also included the additional work in the direct cost. Since there isn't any final design completed for this work, this is budgetary in nature and we expect to reconcile the final cost as the design is completed in GMP-3.

- 01 Civil Work
    - 33UT Utilities
        - Duct bank installation in GAC area
        - Additional underground piping in GAC area
- 43 Post Filter GAC Contactors
    - 03C Concrete
        - Construct GAC Chamber SOG Elev 1227.17
        - Construct GAC Pipe Gallery Walls Elev 1247.17
        - Construct GAC Chamber Exterior Walls Elev 1247.67

3. ORGANIZATIONAL CHART

The following individuals and their reporting system will be used during the construction phase of the project:



4. ROLES & RESPONSIBILITIES

Several supervision staff are included in the project. Descriptions of their roles and responsibilities are provided below.

1.1 Project Director

1.1.1 Purpose:

Responsible for the overall direction, completion, financial outcome, technical success and quality of a very large, complex construction project or multiple projects simultaneously. The Project Director also establishes and manages strategic client relationships. Identifies opportunities to expand company relationships and business opportunities.

1.1.2 Major Responsibilities:

- Plans, organizes, coordinates and controls projects in accordance with established policies, procedures, systems and requirements approved by the Company. Creates and manages processes for tracking projects and associated deliverables, collects and analyzes data, and works closely with field personnel, designers, engineers, vendors and subcontractors to manage various programmatic and project processes.
- Leads interdisciplinary teams, such as preconstruction, to deliver projects that reside within a major business group or function. Determines staffing needs, personnel development, performance management and training for the project team. Provides leadership, guidance and direction to the project team members. Ensures projects are completed, tracked and reported on in accordance with all compliance regulations and goals. Completes and/or approves Performance Reviews for subordinates.
- Maintains exceptional relationships with owners, subcontractors, design partners and unions. Responsible for day-to-day contact as well as contact of a multifaceted nature.
- Assists with bid package development, pre-qualification activities and budget preparation. May draft budget/estimate documents and provide oversight for the estimating process.
- Leads efforts to analyze risk and define schedule-related issues, including analysis of long lead materials or equipment which may impact project cost or scheduled delivery.
- Analyzes and presents project delivery approaches, develops alternative approaches and facilitates implementation, ensuring compliance with corporate, federal and state regulations.
- Serves as the primary contact for senior department managers relative to critical business issues. Helps allocate regional assets and resources to projects within business group. Maintains vehicle/equipment database in online management tool in conjunction with EOG/Project Engineer. Assists with obtaining vehicle registrations and vehicle repairs. Tracks and monitors vehicle assignments to ensure vehicle availability and mitigate risk.
- Participates in the design and execution of project safety planning activities to ensure that projects are completed within established safety goals.

1.2 Assistant Project Manager

1.2.1 Purpose:

Responsible for assisting the Project Manager with the overall direction, completion and financial outcome of a construction project.

1.2.2 Major Responsibilities:

- Prepare, review and negotiate project contracts, subcontractor agreements, subcontractor services agreements, purchase orders, quality acceptance agreements, etc.
- Responsible for procurement of materials. From contract execution, through submittal phase, release for fabrication, and tracking of deliveries to ensure schedule of the project is maintained.
- Review owner contracts. Draft and articulate argument/positions on owner contracts. Negotiate owner change orders and claims for extra work. Develop change management and allowance/contingency controls. Review and prepare time and material allowance/contingency usage for execution. Aid in preparation of revenue forecasts.
- Records equipment and material deliveries to ensure accuracy and to ensure that project remains on schedule.
- Coordinate the purchase/renewal of insurance policies on the project. Pursue or aid in pursuing insurance claims on the projects.
- Establish and administer document control procedures.
- Work with Operations team on a daily basis on risk management, and contractual and commercial issues.
- Plans, organizes, coordinates and controls project(s) in accordance with established policies, procedures, systems and requirements approved by the Company.
- Supervises work of project administration, superintendents, and engineers to ensure that work is accomplished in an efficient, effective, profitable and safe manner and meets all quality standards.
- Reviews cost-coding of timesheets and invoices, reviews daily production reports and supervises forecasted final cost/revenue reporting to ensure that profitability goals are met.
- Reviews submittal of change orders and analyzes impact on project schedules. Participates in work planning of self-performed activities.
- Gathers and records subcontractor log and weather conditions and makes recommendations accordingly. May coordinate and schedule subcontractors.
- May coordinate with owners and engineers for project scheduling and issue resolution.
- Assists with the development and review of detailed MOPO plans.
- Manages allowance and contingency tracking and gathering supporting documentation.
- Attend weekly owner progress meetings and support the Project Manager as required.

1.3 Project Superintendent

1.3.1 Purpose:

In conjunction with Project Management, responsible for the direct supervision of field forces, and the efficient scheduling of the physical completion of all project work.

1.3.2 Major Responsibilities:

- The superintendent will be the day-to-day contact on the project for any site activities taking place under the contract.

- Coordinates subcontracts, drawings, and specifications to ensure conformity. Examines drawings and specifications for various work tasks and ensures current information is passed down to front line supervision and trades personnel. Carries out inspections as needed.
- Responsible for daily planning, creation and maintenance of project schedules, including subcontractor specialty schedules and short interval schedules. Involved in creating work plans for each specific work activity.
- Supervises and organizes workers; ensures workers are available and fully qualified to perform assigned duties. Reports on labor and materials. Schedules crews according to available work packages for the project and all required equipment and materials necessary to complete tasks. Monitors timely delivery of necessary materials to assure continued productivity.
- Responsible for controlling costs, adhering to budgets and managing equipment-related expenses. Ensures staff is aware of production rates for assigned items of work.
- Conducts regular safety meetings; maintains a safe work environment with the goal of keeping accidents and injuries to a minimum and complying with company and regulatory safety procedures. Complies with EPA requirements for hazardous materials.
- Coordinates subcontractors through a regular and disciplined series of meetings, questioning and verifying their plans and efforts, changing or augmenting as needed.
- Assists project management team ensuring compliance with the legal and regulatory requirements of the city, state and federal government applicable to the project. Alerts management to any potential concerns.
- Participates in the development and implementation of appropriate portions of the jobsite quality, safety and production plans; ensures maintenance of all records in accordance with project standards.
- Coordinates with internal staff to build professional and productive relationships with owners, architects, engineers and subcontractors.

SECTION C

GMP PROPOSAL

EXHIBIT D
CM@RISK GMP SUMMARY

EXHIBIT D
CMAR GMP SUMMARY

Project Name: Pecos Surface Water Treatment Plant Improvements	Date: 9/30/2025		
Project Location: 1475 E Pecos Rd			
City of Chandler Project No WA2100.251			
GMP-2			
A. Cost of Work			
A.1 Cost of Work (self-perform, no mark-ups)		$	3,594,763.63
A.2. Cost of Work - Subcontracts		$	3,023,841.12
A.3. Escalation on Subs & Material (0%)			
	TOTAL COST OF WORK:	**$**	**6,618,604.75**
B. General Conditions		**$**	**1,624,772.26**
	SUBTOTAL 1 (Cost of Work) (A+B)	***$***	***8,243,377.01***
C. CMAR's Fee (8.0%)		**$**	**659,470.16**
	SUBTOTAL 2 (A+B+C):	***$***	***8,902,847.17***
D. Bonds and Insurance			
D.1. Bonds (Payment and Performance)		$	98,720.49
D.2. Insurance		$	191,952.92
	TOTAL BONDS & INSURANCE:	**$**	**290,673.41**
	SUBTOTAL 3 (SUBTOTAL 2 + BONDS & INS):	***$***	***9,193,520.58***
E. Sales Tax			
E.1. Sales Tax (5.07%)		$	466,111.49
E.2. Tax Credits		$	-
	TOTAL SALES TAX:	**$**	**466,111.49**
	TOTAL BASELINE ESTIMATE WITHOUT ALLOWANCES/CONTINGENCIES:	**$**	**9,659,632.07**
F. Approved Allowances			
F.1. Concrete Work (To be Reconciled in GMP 3)		$	2,750,000.00
F.2. GAC Media Purchase			
	TOTAL ALLOWANCES:	**$**	**2,750,000.00**
G. Contingencies			
G. 1. Design Evolution		$	500,000.00
G. 2. Construction Contingency		$	-
G. 3. Owner Contingency		$	-
	TOTAL CONTINGENCIES:	**$**	**500,000.00**
	TOTAL BASELINE PROPOSAL:	***$***	***12,909,632.07***
H. Previously Approved GMPs			
H. 1. N/A			
	TOTAL PREVIOUS APPROVED GMPS:	$	-
	TOTAL PROPOSAL:	*$*	*12,909,632.07*

Establishment of Values:

a. Cost of Work (A) and Allowances (F) to be submitted with GMP Proposal.

b. General Conditions Cost (B) to be established in Baseline Cost Model.

c. CMAR Fee as set forth in Section 3.7.3. of this Agreement.

EXHIBIT D: ALLOWANCE DESCRIPTIONS

One allowance is included for concrete work. This allowance will only in the event Archer Western completes work included in GMP-2 and prior to the final GMP-3 is being developed and approved.

EXHIBIT D: CONTINGENCY DESCRIPTIONS

G.1. Design Evolution Contingency

The Design Evolution Contingency will be set at $500,000 and will be used to address design changes.

G.2. Construction Contingency

The Construction Contingency will be set at $0.

G.3. Owner Contingency

Owner contingency is to be determined by the City and will be used as directed by General Conditions 15.4.2.

GENERAL NOTE

The GMP Worksheet includes bonds, insurance, and taxes for the full value of the project. Any allowance and contingency usage will only have fee added beyond the cost of work shown.

DETAILED COST ESTIMATE

CITY OF CHANDLER
PECOS SWTP IMPROVEMENTS WA2100.251
COST MODEL SUMMARY- GMP 2

DETAILED COST SUMMARY

FACILITY	AREA	DESCRIPTION	QTY	UNIT	MANHOURS	LABOR	MATERIAL	SUBCONTRACTOR	EQUIPMENT	TOTAL
01		SITE WORK	1	LS	12,197	$ 909,960	$ 1,247,030	$ 1,170,454	$ 262,798	$ 3,590,242
		DEMO	1	LS	373	$ 22,467	$ -	$ 33,685	$ 16,708	$ 72,860
	02.01.100	DEMO 8' CMU WALL	537	LF	129	$ 7,853		$ 23,667	$ 6,128	$ 37,648
	02.01.113	DEMO CONCRETE SLAB	2,235	SF	54	$ 3,268		$ 7,036	$ 2,553	$ 12,858
	02.01.114	DEMO ASPHALT PAVEMENT	1,101	SF	24	$ 1,462		$ 1,605	$ 627	$ 3,695
	02.01.115	REMOVE EX. CURB & GUTTER	70	LF	24	$ 1,462		$ 397	$ 98	$ 1,957
	02.01.120	RELOCATE CONEX BOXES	2	EA	24	$ 1,462			$ 1,217	$ 2,679
	02.01.121	DEMO/SALVAGE POLYMER STRUCTURE-7' DIA.	1	EA	48	$ 2,925		$ 850	$ 2,434	$ 6,209
	02.01.122	DEMO/REMOVE EX. POLYMER LINES	280	LF	70	$ 4,034		$ 129	$ 3,651	$ 7,814
		EROSION CONTROL	1	LS	327	$ 18,265	$ 17,066	$ 14,400	$ 12,608	$ 62,339
	31.01.100	INSTALL SILT FENCE	1,000	LF	60	$ 3,351	$ 550		$ 2,853	$ 6,754
	31.01.101	MONTHLY MAINTENANCE OF SILT FENCE	8	MO	120	$ 6,703	$ 4,000		$ 2,113	$ 12,816
	31.01.103	INLET PROTECTION	10	EA	48	$ 2,681	$ 650		$ 2,853	$ 6,184
	31.01.104	MONTHLY MAINTENANCE OF INLET PROTECTION	8	MO	24	$ 1,341	$ 1,200		$ 1,141	$ 3,682
	31.01.106	INSTALL CONSTRUCTION EXITS	2	EA	75	$ 4,189	$ 10,666		$ 3,648	$ 18,504
	31.01.108	STREET SWEEPING	8	MO				$ 14,400		$ 14,400
		EARTHWORK	1	LS	1,340	$ 135,072	$ 20,480	$ -	$ 53,279	$ 208,830
	19020	SELF-PERFORM SUPERVISION	1	LS	693	$ 92,883	$ 18,584			$ 111,467
	31.01.120	REMOVE/STOCKPILE 3" DG	880	CY	118	$ 7,672	$ 440		$ 9,717	$ 17,829
	31.01.121	CONSTRUCT TEMPORARY ACCESS BERMS	128	CY	48	$ 3,131	$ 64		$ 3,953	$ 7,148
	31.01.122	CONSTRUCT STORMWATER BYPASS DITCH	802	LF	481	$ 31,385	$ 1,392		$ 39,609	$ 72,386
		FENCING	1	LS	-	$ -	$ -	$ 72,076	$ -	$ 72,076
	32.101.114	8' CHAIN LINK FENCE W/ PRIVACY SCREEN	965	LF				$ 72,076		$ 72,076
		UTILITIES	1	LS	10,158	$ 734,156	$ 1,209,484	$ 1,050,294	$ 180,203	$ 3,174,137
	19020	SELF-PERFORM SUPERVISION	1	LS	2,080	$ 278,863	$ 55,796			$ 334,659
	33.01.400	RELOCATE 4" PVC PD LINE	155	LF	90	$ 4,999	$ 3,603	$ 7,000	$ 2,727	$ 18,329
	33.01.401	INSTALL TEMP POLYMER LINES (ASSUMED 3" CPVC)	595	LF	370	$ 20,639	$ 29,204	$ 8,750	$ 12,997	$ 71,590
	33.01.402	SUPPORT EX. UTILITY LINE IN EXCAVATION	7	EA	84	$ 4,692	$ 17,500	$ 1,875	$ 2,545	$ 26,612
	33.43.100	48" WSP GAC EFFLUENT (GE) UNDER STRUCTURE	144	LF	3,069	$ 190,671	$ 392,696	$ 163,667	$ 112,369	$ 859,403
	33.43.101	CONCRETE ENCASEMENT FOR 48" WSP (GE) UNDER STRUCTURE	144	LF	1,044	$ 52,217	$ 66,427	$ 47,830		$ 166,474
	33.43.102	FLOWABBLE FILL AROUND PIPE/UNDER SLAB	4,528	CY	1,006	$ 42,965	$ 591,363	$ 181,129		$ 815,457
	33.43.200	16" WSP CONTRACTOR TO WASTE (CTW) UNDER STRUCTURE	281	LF	1,798	$ 108,180	$ 19,715	$ 9,671	$ 49,565	$ 187,131
	33.43.201	CONCRETE ENCASEMENT FOR 16" WSP (CTW) UNDER STRUCTURE	281	LF	617	$ 30,930	$ 33,180	$ 5,372		$ 69,482
	33.43.300	ALLOWANCE: DUCTBANK	1	LS				$ 100,000		$ 100,000
	33.43.305	ALLOWANCE: ADDITIONAL PIPE TO GET OUT OF EXCAVATION	1	LS				$ 525,000		$ 525,000
43		POST FILTER GAC CONTACTORS	1	LS	6,808	$ 467,293	$ 63,010	$ 1,796,997	$ 174,426	$ 2,501,726
		EI&C	1	LS	-	$ -	$ -	$ 1,196,508	$ -	$ 1,196,508
	26.43.801	LONG LEAD ELECTRICAL WORK	1	LS				$ 1,196,508		$ 1,196,508
		EARTHWORK	1	LS	6,808	$ 467,293	$ 63,010	$ 600,489	$ 174,426	$ 1,305,218
	19020	SELF-PERFORM SUPERVISION	1	LS	2,080	$ 278,863	$ 55,796			$ 334,659
	31.43.300	EXCAVATE GAC, WEIR, & PUMP STATION	14,027	CY	4,412	$ 167,771	$ 7,014	$ 587,989	$ 162,733	$ 925,506
	31.43.301	EXCAVATE ACCESS RAMP FOR CONSTRUCTION	500	CY	167	$ 10,874	$ 100	$ 12,500	$ 6,160	$ 29,634

CITY OF CHANDLER
PECOS SWTP IMPROVEMENTS WA2100.251
COST MODEL SUMMARY- GMP 2

DETAILED COST SUMMARY

FACILITY	AREA	DESCRIPTION	QTY	UNIT	MANHOURS	LABOR	MATERIAL	SUBCONTRACTOR	EQUIPMENT	TOTAL
	31.43.302	BACKFILL ACCESS RAMP FOR CONSTRUCTION	500	CY	150	$ 9,786	$ 100		$ 5,533	$ 15,419
99		**CONSTRUCTION MANAGER GENERAL CONDITIONS**	**1**	**LS**	**12,274**	**$ 1,600,511**	**$ 261,477**	**$ 56,390**	**$ 233,031**	**$ 2,151,409**
		CONSTRUCTION MANAGER GENERAL CONDITIONS	**1**	**LS**	**8,754**	**$ 1,306,906**	**$ 261,477**	**$ 56,390**	**$ -**	**$ 1,624,772**
	19010	CONSTRUCTION MANAGEMENT SUPERVISION	1	LS	8,754	$ 1,306,906	$ 261,477	$ 56,390		$ 1,624,772
		SITE-WIDE EQUIPMENT	**1**	**LS**	**3,520**	**$ 293,605**	**$ -**	**$ -**	**$ 233,031**	**$ 526,636**
	19030	SITE WIDE EQUIPMENT	1	LS	3,520	$ 293,605			$ 233,031	$ 526,636
		SUBTOTAL COST OF WORK	**1**	**LS**	**31,280**	**$2,977,764**	**$1,571,516**	**$3,023,841**	**$670,255**	**$ 8,243,377**

LIST OF SUBCONTRACTORS

SEE EXHIBIT G FOR LIST OF SUBCONTRACTORS AND BACKUP QUOTES

SECTION D

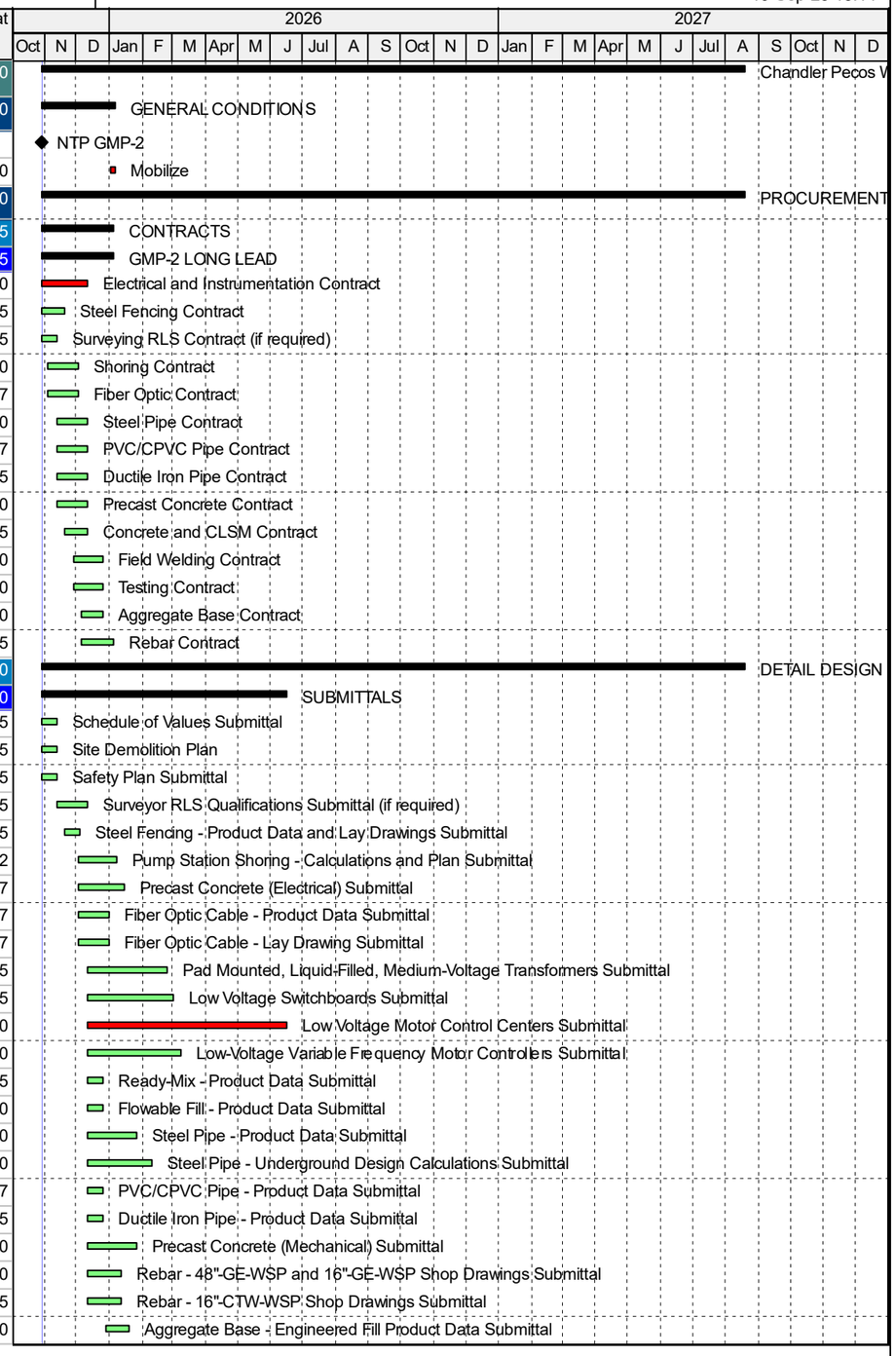
SCHEDULE OF VALUES

TO BE ADDED UPON APPROVED GMP

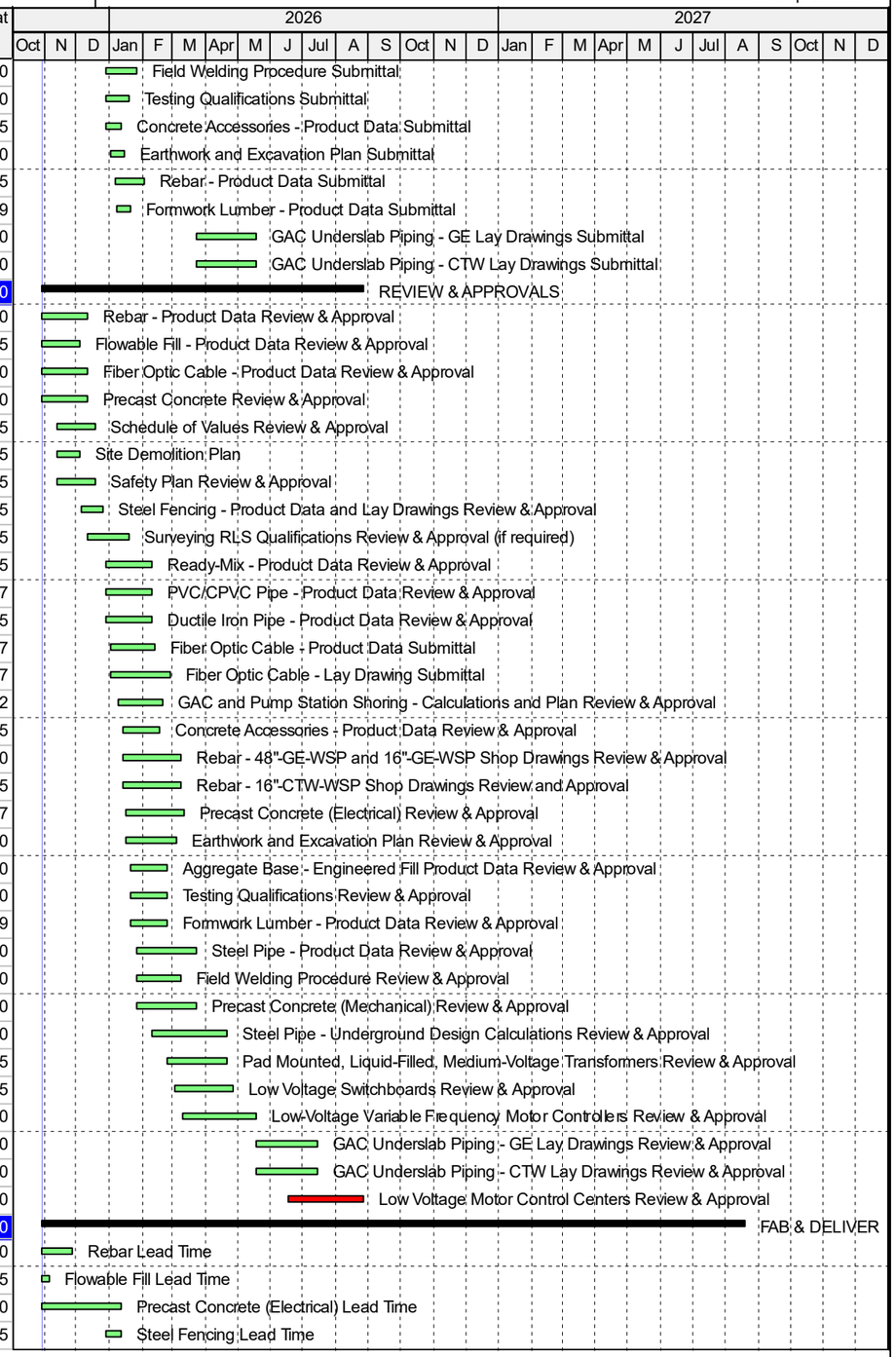
SECTION E

PROJECT SCHEDULE

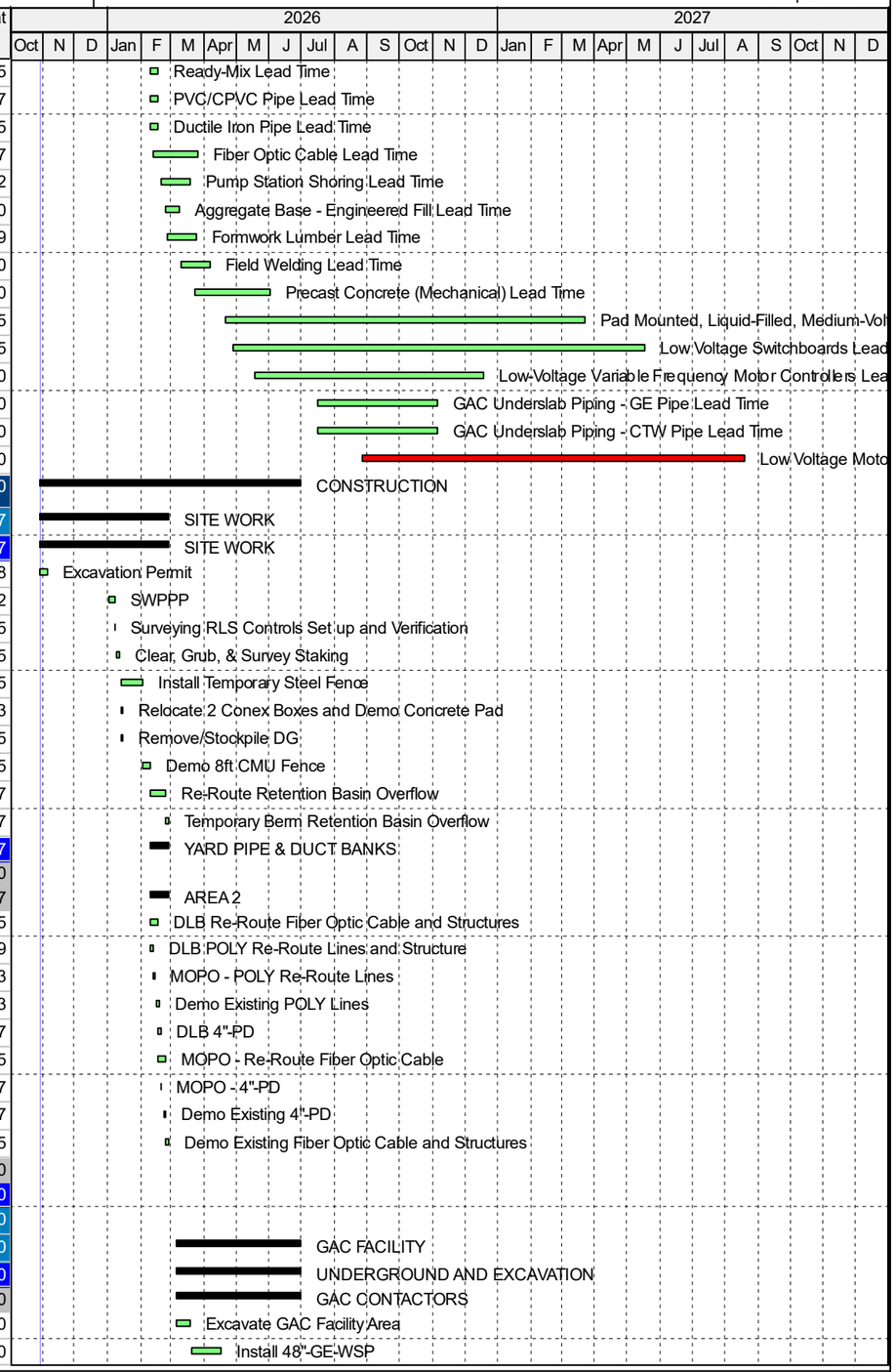
Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Total Float
Chandler Pecos WTP GMP2 60% Schedule		460	460	30-Oct-25 A	19-Aug-27	0
GENERAL CONDITIONS		3	3	30-Oct-25 A	06-Jan-26	0
A1010	NTP GMP-2	0	0	30-Oct-25 A		
A1200	Mobilize	3	3	02-Jan-26*	06-Jan-26	0
PROCUREMENT		460	460	30-Oct-25	19-Aug-27	0
CONTRACTS		45	45	30-Oct-25	05-Jan-26	395
GMP-2 LONG LEAD		45	45	30-Oct-25	05-Jan-26	395
Contract 260000	Electrical and Instrumentation Contract	30	30	30-Oct-25	11-Dec-25	0
Contract 323113	Steel Fencing Contract	15	15	30-Oct-25	19-Nov-25	295
Contract 312343	Surveying RLS Contract (if required)	10	10	30-Oct-25	12-Nov-25	405
Contract 312333	Shoring Contract	20	20	04-Nov-25	02-Dec-25	310
Contract 261000	Fiber Optic Contract	20	20	04-Nov-25	02-Dec-25	357
Contract 400524	Steel Pipe Contract	20	20	13-Nov-25	11-Dec-25	200
Contract 400531	PVC/CPVC Pipe Contract	20	20	13-Nov-25	11-Dec-25	297
Contract 400519	Ductile Iron Pipe Contract	20	20	13-Nov-25	11-Dec-25	385
Contract 034000	Precast Concrete Contract	20	20	13-Nov-25	11-Dec-25	310
Contract 033000	Concrete and CLSM Contract	15	15	20-Nov-25	11-Dec-25	385
Contract 400529	Field Welding Contract	20	20	28-Nov-25	26-Dec-25	350
Contract 014523	Testing Contract	20	20	28-Nov-25	26-Dec-25	380
Contract 310516	Aggregate Base Contract	15	15	05-Dec-25	26-Dec-25	370
Contract 032100	Rebar Contract	20	20	05-Dec-25	05-Jan-26	395
DETAIL DESIGN		460	460	30-Oct-25	19-Aug-27	0
SUBMITTALS		160	160	30-Oct-25	16-Jun-26	300
Submittal 012973	Schedule of Values Submittal	10	10	30-Oct-25	12-Nov-25	425
Submittal 024100-01	Site Demolition Plan	10	10	30-Oct-25	12-Nov-25	335
Submittal 010000	Safety Plan Submittal	10	10	30-Oct-25	12-Nov-25	425
Submittal 312343	Surveyor RLS Qualifications Submittal (if required)	20	20	13-Nov-25	11-Dec-25	405
Submittal 323113	Steel Fencing - Product Data and Lay Drawings Submittal	10	10	20-Nov-25	04-Dec-25	295
Submittal 312333	Pump Station Shoring - Calculations and Plan Submittal	25	25	03-Dec-25	08-Jan-26	332
Submittal 034000-01	Precast Concrete (Electrical) Submittal	30	30	03-Dec-25	15-Jan-26	367
Submittal 261000-01	Fiber Optic Cable - Product Data Submittal	20	20	03-Dec-25	31-Dec-25	357
Submittal 261000-02	Fiber Optic Cable - Lay Drawing Submittal	20	20	03-Dec-25	31-Dec-25	377
Submittal 261219	Pad Mounted, Liquid-Filled, Medium-Voltage Transformers Submittal	50	50	12-Dec-25	23-Feb-26	105
Submittal 262413	Low Voltage Switchboards Submittal	55	55	12-Dec-25	02-Mar-26	65
Submittal 262419	Low Voltage Motor Control Centers Submittal	130	130	12-Dec-25	16-Jun-26	0
Submittal 262923	Low-Voltage Variable Frequency Motor Controllers Submittal	60	60	12-Dec-25	09-Mar-26	170
Submittal 033000-01	Ready-Mix - Product Data Submittal	10	10	12-Dec-25	26-Dec-25	385
Submittal 312324	Flowable Fill - Product Data Submittal	10	10	12-Dec-25	26-Dec-25	420
Submittal 400524-01	Steel Pipe - Product Data Submittal	30	30	12-Dec-25	26-Jan-26	200
Submittal 400524-02	Steel Pipe - Underground Design Calculations Submittal	40	40	12-Dec-25	09-Feb-26	340
Submittal 400531	PVC/CPVC Pipe - Product Data Submittal	10	10	12-Dec-25	26-Dec-25	297
Submittal 400519	Ductile Iron Pipe - Product Data Submittal	10	10	12-Dec-25	26-Dec-25	385
Submittal 034000-02	Precast Concrete (Mechanical) Submittal	30	30	12-Dec-25	26-Jan-26	310
Submittal 032100-02	Rebar - 48"-GE-WSP and 16"-GE-WSP Shop Drawings Submittal	20	20	12-Dec-25	12-Jan-26	320
Submittal 032100-03	Rebar - 16"-CTW-WSP Shop Drawings Submittal	20	20	12-Dec-25	12-Jan-26	345
Submittal 310516	Aggregate Base - Engineered Fill Product Data Submittal	15	15	29-Dec-25	19-Jan-26	370



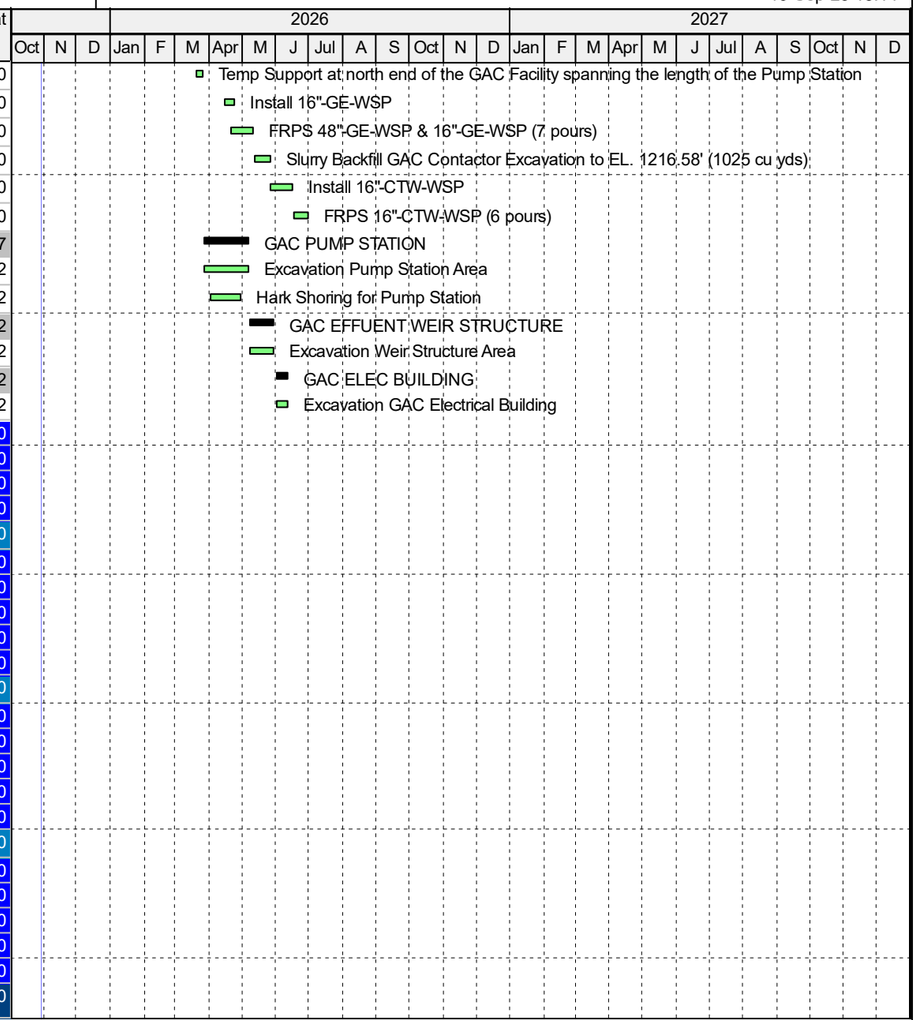
Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Total Float
Submittal 400524-05	Field Welding Procedure Submittal	20	20	29-Dec-25	26-Jan-26	350
Submittal 014523	Testing Qualifications Submittal	15	15	29-Dec-25	19-Jan-26	380
Submittal 031500	Concrete Accessories - Product Data Submittal	10	10	29-Dec-25	12-Jan-26	385
Submittal 310001	Earthwork and Excavation Plan Submittal	10	10	02-Jan-26	15-Jan-26	290
Submittal 032100-01	Rebar - Product Data Submittal	20	20	06-Jan-26	02-Feb-26	395
Submittal 031100-01	Formwork Lumber - Product Data Submittal	10	10	07-Jan-26	20-Jan-26	359
Submittal 400524-04	GAC Underslab Piping - GE Lay Drawings Submittal	40	40	24-Mar-26	18-May-26	200
Submittal 400524-03	GAC Underslab Piping - CTW Lay Drawings Submittal	40	40	24-Mar-26	18-May-26	200
REVIEW & APPROVALS		210	210	30-Oct-25	26-Aug-26	250
Rev & Apr 032100-01	Rebar - Product Data Review & Approval	30	30	30-Oct-25	11-Dec-25	320
Rev & Apr 312324	Flowable Fill - Product Data Review & Approval	25	25	30-Oct-25	04-Dec-25	435
Rev & Apr 260000	Fiber Optic Cable - Product Data Review & Approval	30	30	30-Oct-25	11-Dec-25	430
Rev & Apr 034000	Precast Concrete Review & Approval	30	30	30-Oct-25	11-Dec-25	430
Rev & Apr 012973	Schedule of Values Review & Approval	25	25	13-Nov-25	18-Dec-25	425
Rev & Apr 024100-01	Site Demolition Plan	15	15	13-Nov-25	04-Dec-25	335
Rev & Apr 010000	Safety Plan Review & Approval	25	25	13-Nov-25	18-Dec-25	425
Rev & Apr 323113	Steel Fencing - Product Data and Lay Drawings Review & Approval	15	15	05-Dec-25	26-Dec-25	295
Rev & Apr 312343	Surveying RLS Qualifications Review & Approval (if required)	25	25	12-Dec-25	19-Jan-26	405
Rev & Apr 033000-01	Ready-Mix - Product Data Review & Approval	30	30	29-Dec-25	09-Feb-26	385
Rev & Apr 400531	PVC/CPVC Pipe - Product Data Review & Approval	30	30	29-Dec-25	09-Feb-26	297
Rev & Apr 400519	Ductile Iron Pipe - Product Data Review & Approval	30	30	29-Dec-25	09-Feb-26	385
Rev & Apr 261000-01	Fiber Optic Cable - Product Data Submittal	30	30	02-Jan-26	12-Feb-26	357
Rev & Apr 261000-02	Fiber Optic Cable - Lay Drawing Submittal	40	40	02-Jan-26	26-Feb-26	377
Rev & Apr 312333	GAC and Pump Station Shoring - Calculations and Plan Review & Approval	30	30	09-Jan-26	19-Feb-26	332
Rev & Apr 031500	Concrete Accessories - Product Data Review & Approval	25	25	13-Jan-26	16-Feb-26	385
Rev & Apr 032100-02	Rebar - 48"-GE-WSP and 16"-GE-WSP Shop Drawings Review & Approval	40	40	13-Jan-26	09-Mar-26	320
Rev & Apr 032100-03	Rebar - 16"-CTW-WSP Shop Drawings Review and Approval	40	40	13-Jan-26	09-Mar-26	345
Rev & Apr 034000-01	Precast Concrete (Electrical) Review & Approval	40	40	16-Jan-26	12-Mar-26	367
Rev & Apr 310001	Earthwork and Excavation Plan Review & Approval	35	35	16-Jan-26	05-Mar-26	290
Rev & Apr 310516	Aggregate Base - Engineered Fill Product Data Review & Approval	25	25	20-Jan-26	23-Feb-26	370
Rev & Apr 014523	Testing Qualifications Review & Approval	25	25	20-Jan-26	23-Feb-26	380
Rev & Apr 031100-01	Formwork Lumber - Product Data Review & Approval	25	25	21-Jan-26	24-Feb-26	359
Rev & Apr 400524-01	Steel Pipe - Product Data Review & Approval	40	40	27-Jan-26	23-Mar-26	200
Rev & Apr 400524-05	Field Welding Procedure Review & Approval	30	30	27-Jan-26	09-Mar-26	350
Rev & Apr 034000-02	Precast Concrete (Mechanical) Review & Approval	40	40	27-Jan-26	23-Mar-26	310
Rev & Apr 400524-02	Steel Pipe - Underground Design Calculations Review & Approval	50	50	10-Feb-26	20-Apr-26	340
Rev & Apr 261219	Pad Mounted, Liquid-Filled, Medium-Voltage Transformers Review & Approval	40	40	24-Feb-26	20-Apr-26	105
Rev & Apr 262413	Low Voltage Switchboards Review & Approval	40	40	03-Mar-26	27-Apr-26	65
Rev & Apr 262923	Low-Voltage Variable Frequency Motor Controllers Review & Approval	50	50	10-Mar-26	18-May-26	170
Rev & Apr 400524-04	GAC Underslab Piping - GE Lay Drawings Review & Approval	40	40	19-May-26	15-Jul-26	200
Rev & Apr 400524-03	GAC Underslab Piping - CTW Lay Drawings Review & Approval	40	40	19-May-26	15-Jul-26	200
Rev & Apr 262419	Low Voltage Motor Control Centers Review & Approval	50	50	17-Jun-26	26-Aug-26	0
FAB & DELIVER		460	460	30-Oct-25	19-Aug-27	0
Lead 032100	Rebar Lead Time	20	20	30-Oct-25	26-Nov-25	440
Lead 312324	Flowable Fill Lead Time	5	5	30-Oct-25	05-Nov-25	455
Lead 034000-01	Precast Concrete (Electrical) Lead Time	50	50	30-Oct-25	12-Jan-26	410
Lead 323113	Steel Fencing Lead Time	10	10	29-Dec-25	12-Jan-26	295



Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Total Float
Lead 033000	Ready-Mix Lead Time	5	5	10-Feb-26	16-Feb-26	385
Lead 400531	PVC/CPVC Pipe Lead Time	5	5	10-Feb-26	16-Feb-26	297
Lead 400519	Ductile Iron Pipe Lead Time	5	5	10-Feb-26	16-Feb-26	385
Lead 261000	Fiber Optic Cable Lead Time	30	30	13-Feb-26	26-Mar-26	357
Lead 312333	Pump Station Shoring Lead Time	20	20	20-Feb-26	19-Mar-26	332
Lead 310516	Aggregate Base - Engineered Fill Lead Time	10	10	24-Feb-26	09-Mar-26	370
Lead 031100	Formwork Lumber Lead Time	20	20	25-Feb-26	24-Mar-26	359
Lead 400524-05	Field Welding Lead Time	20	20	10-Mar-26	06-Apr-26	350
Lead 034000-02	Precast Concrete (Mechanical) Lead Time	50	50	24-Mar-26	02-Jun-26	310
Lead 261219	Pad Mounted, Liquid-Filled, Medium-Voltage Transformers Lead Time	235	235	21-Apr-26	23-Mar-27	105
Lead 262413	Low Voltage Switchboards Lead Time	270	270	28-Apr-26	18-May-27	65
Lead 262923	Low-Voltage Variable Frequency Motor Controllers Lead Time	150	150	19-May-26	18-Dec-26	170
Lead 400524-04	GAC Underslab Piping - GE Pipe Lead Time	80	80	16-Jul-26	05-Nov-26	200
Lead 400524-03	GAC Underslab Piping - CTW Pipe Lead Time	80	80	16-Jul-26	05-Nov-26	200
Lead 262419	Low Voltage Motor Control Centers Lead Time	250	250	27-Aug-26	19-Aug-27	0
CONSTRUCTION		170	170	30-Oct-25	30-Jun-26	290
SITE WORK		83	83	30-Oct-25	26-Feb-26	377
SITE WORK		83	83	30-Oct-25	26-Feb-26	377
A2850	Excavation Permit	5	5	30-Oct-25	05-Nov-25	338
A1020	SWPPP	5	5	02-Jan-26	08-Jan-26	412
A2920	Surveying RLS Controls Set up and Verification	2	2	07-Jan-26	08-Jan-26	295
A1030	Clear, Grub, & Survey Staking	2	2	09-Jan-26	12-Jan-26	295
A1040	Install Temporary Steel Fence	15	15	13-Jan-26	02-Feb-26	295
A1060	Relocate 2 Conex Boxes and Demo Concrete Pad	2	2	13-Jan-26	14-Jan-26	313
A2930	Remove/Stockpile DG	2	2	13-Jan-26	14-Jan-26	395
A1080	Demo 8ft CMU Fence	5	5	03-Feb-26	09-Feb-26	295
A2900	Re-Route Retention Basin Overflow	10	10	10-Feb-26	23-Feb-26	377
A2910	Temporary Berm Retention Basin Overflow	3	3	24-Feb-26	26-Feb-26	377
YARD PIPE & DUCT BANKS		13	13	10-Feb-26	26-Feb-26	377
AREA 1		0	0			0
AREA 2		13	13	10-Feb-26	26-Feb-26	377
A1320	DLB Re-Route Fiber Optic Cable and Structures	5	5	10-Feb-26	16-Feb-26	295
A1110	DLB POLY Re-Route Lines and Structure	3	3	10-Feb-26	12-Feb-26	299
A1300	MOPO - POLY Re-Route Lines	1	1	13-Feb-26	13-Feb-26	383
A1310	Demo Existing POLY Lines	3	3	16-Feb-26	18-Feb-26	383
A1050	DLB 4"-PD	3	3	17-Feb-26	19-Feb-26	297
A1330	MOPO - Re-Route Fiber Optic Cable	5	5	17-Feb-26	23-Feb-26	295
A1100	MOPO - 4"-PD	1	1	20-Feb-26	20-Feb-26	297
A1090	Demo Existing 4"-PD	2	2	23-Feb-26	24-Feb-26	297
A1340	Demo Existing Fiber Optic Cable and Structures	3	3	24-Feb-26	26-Feb-26	295
AREA 4		0	0			0
SURFACE FINISHES		0	0			0
SEAL WEIR STRUCTURE		0	0			0
GAC FACILITY		82	82	06-Mar-26	30-Jun-26	290
UNDERGROUND AND EXCAVATION		82	82	06-Mar-26	30-Jun-26	290
GAC CONTACTORS		82	82	06-Mar-26	30-Jun-26	290
A2860	Excavate GAC Facility Area	10	10	06-Mar-26	19-Mar-26	290
A1350	Install 48"-GE-WSP	20	20	20-Mar-26	16-Apr-26	290



Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Total Float
A1360	Temp Support at north end of the GAC Facility spanning the length of the Pump Stati	5	5	20-Mar-26	26-Mar-26	290
A2870	Install 16"-GE-WSP	8	8	15-Apr-26	24-Apr-26	290
A1530	FRPS 48"-GE-WSP & 16"-GE-WSP (7 pours)	15	15	21-Apr-26	11-May-26	290
A1540	Slurry Backfill GAC Contactor Excavation to EL. 1216.58' (1025 cu yds)	10	10	12-May-26	26-May-26	290
A2880	Install 16"-CTW-WSP	15	15	27-May-26	16-Jun-26	290
A1520	FRPS 16"-CTW-WSP (6 pours)	10	10	17-Jun-26	30-Jun-26	290
GAC PUMP STATION		30	30	27-Mar-26	07-May-26	317
A1420	Excavation Pump Station Area	30	30	27-Mar-26	07-May-26	302
A1070	Hark Shoring for Pump Station	20	20	03-Apr-26	30-Apr-26	322
GAC EFFUENT WEIR STRUCTURE		15	15	08-May-26	29-May-26	302
A1790	Excavation Weir Structure Area	15	15	08-May-26	29-May-26	302
GAC ELEC BUILDING		10	10	01-Jun-26	12-Jun-26	302
A1860	Excavation GAC Electrical Building	10	10	01-Jun-26	12-Jun-26	302
STRUCTURAL		0	0			0
MECHANICAL		0	0			0
ELECTRICAL		0	0			0
START-UP AND COMMISSIONING		0	0			0
EQ BASINS		0	0			0
UNDERGROUND AND EXCAVATION		0	0			0
CONCRETE		0	0			0
MECHANICAL		0	0			0
STRUCTURAL		0	0			0
START-UP AND COMMISSIONING		0	0			0
DEWATERING FACILITY		0	0			0
UNDERGROUND AND EXCAVATION		0	0			0
STRUCTRUAL		0	0			0
MECHANICAL		0	0			0
ELECTRICAL		0	0			0
START-UP AND COMMISSIONING		0	0			0
CHLORINE DIOXIDE GENERATION FACILITY		0	0			0
UNDERGROUND AND EXCAVATION		0	0			0
STRUCTURAL		0	0			0
MECHANICAL		0	0			0
ELECTRICAL		0	0			0
START-UP AND COMMISSIONING		0	0			0
COMPLETE COMMISSIONING		0	0			0



CITY OF CHANDLER
PECOS SWTP IMPROVEMENTS WA2100.251
SUPERVISION SCHEDULE - GMP-2

ACTIVITY / DATE	2025				2026												2027						
	GMP-2																GMP-3						
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
PROCUREMENT - SES AND DISTRIBUTION	CONTRACT/SUBMITTAL						APPROVAL		LEAD TIME														
PROCUREMENT - MCCS AND VFDS	CONTRACT/SUBMITTAL								APPROVAL			LEAD TIME											
PROCUREMENT - GENERATORS	CONTRACT/SUBMITTAL				APPROVAL				LEAD TIME														
PROCUREMENT - HW EQUIPMENT	CONTRACT/SUBMITTAL				APPROVAL				LEAD TIME (NEED TO CONFIRM STILL)														
CONSTRUCTION GMPS		GMP 2									GMP 3												
DEMO/SWPPP																							
EXCAVATION AND SHORING																							
UTILITIES																							
GAC CONRETE SLAB																							
EARTHWORK / YARD PIPE EQUIPMENT																							
01 - SITE WORK																							
Work Package Lead/APM					1.0																		
Working FM/Assitant Super					1.0																		
Survey Lead					1.0																		
Field Engineer					1.0																		
01 - YARD PIPE																							
Work Package Lead/APM									1.0	1.0	1.0												
Working FM/Assitant Super									1.0	1.0	1.0												
Survey Lead									1.0	1.0	1.0												
Field Engineer									1.0	1.0	1.0												
43 - GAC PUMP STATION & GAC CONTACTOR FACILITY																							
Work Package Lead/APM						1.0	1.0	1.0															
Working FM/Assitant Super						1.0	1.0	1.0															
Survey Lead						1.0	1.0	1.0															
Field Engineer						1.0	1.0	1.0															
CONCRETE																							
43 - GAC CONTACTOR FACILITY																							
Work Package Lead/APM												1.0	1.0	1.0									
Working FM/Assitant Super												1.0	1.0	1.0									
Survey Lead												1.0	1.0	1.0									
Field Engineer												1.0	1.0	1.0									

CITY OF CHANDLER
PECOS SWTP IMPROVEMENTS WA2100.251
SUPERVISION SCHEDULE - GMP-2

ACTIVITY / DATE	2025				2026												2027						
	GMP-2																GMP-3						
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
PROCUREMENT - SES AND DISTRIBUTION	CONTRACT/SUBMITTAL						APPROVAL		LEAD TIME														
PROCUREMENT - MCCS AND VFDS	CONTRACT/SUBMITTAL								APPROVAL		LEAD TIME												
PROCUREMENT - GENERATORS	CONTRACT/SUBMITTAL				APPROVAL				LEAD TIME														
PROCUREMENT - HW EQUIPMENT	CONTRACT/SUBMITTAL				APPROVAL				LEAD TIME (NEED TO CONFIRM STILL)														
CONSTRUCTION GMPS		GMP 2									GMP 3												
DEMO/SWPPP																							
EXCAVATION AND SHORING																							
UTILITIES																							
GAC CONRETE SLAB																							
CONSTRUCTION MANAGEMENT SUPERVISION																							
Project Director					0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2									
Project Manager				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0									
General Superintendent					1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0									
Procurement Manager	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0														
Safety Manager					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5									
Quality Manager					0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5									
Jobsite Admin					0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.0									

*Yellow Highlight means in Allowance for Concrete Work

CITY OF CHANDLER
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EQUIPMENT SCHEDULE - GMP-2

ACTIVITY / DATE	2025				2026												2027						
	GMP-2																GMP-3						
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
PROCUREMENT - SES AND DISTRIBUTION	CONTRACT/SUBMITTAL						APPROVAL		LEAD TIME														
PROCUREMENT - MCCS AND VFDS	CONTRACT/SUBMITTAL								APPROVAL		LEAD TIME												
PROCUREMENT - GENERATORS	CONTRACT/SUBMITTAL				APPROVAL				LEAD TIME														
PROCUREMENT - HW EQUIPMENT	CONTRACT/SUBMITTAL				APPROVAL				LEAD TIME (NEED TO CONFIRM STILL)														
CONSTRUCTION GMPS		GMP 2									GMP 3												
DEMO/SWPPP																							
EXCAVATION AND SHORING																							
UTILITIES																							
GAC CONRETE SLAB																							
EARTHWORK / YARD PIPE EQUIPMENT																							
01 - SITE WORK																							
Excavator (Cat 330)-TOTAL					1																		
Backhoe Loader (Cat 430) -TOTAL					1																		
Loader (Volvo L90)-TOTAL					1																		
Rammax Roller-TOTAL																							
Crew Truck-TOTAL					1																		
01 - YARD PIPE																							
Excavator (Cat 330)-TOTAL																							
Backhoe Loader (Cat 430)-TOTAL									1	1	1												
Loader (Volvo L90)-TOTAL									1	1	1												
75 Ton Picker Hydraulic Crane-TOTAL									1	1	1												
Rammax Roller-TOTAL									1	1	1												
Crew Truck-TOTAL									1	1	1												
43 - GAC PUMP STATION & GAC CONTACTOR FACILITY																							
Excavator (Cat 330)-TOTAL						1	1	1															
Backhoe Loader (Cat 430) -TOTAL						1	1	1															

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EQUIPMENT SCHEDULE - GMP-2

ACTIVITY / DATE	2025				2026												2027						
	GMP-2																GMP-3						
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
PROCUREMENT - SES AND DISTRIBUTION	CONTRACT/SUBMITTAL						APPROVAL		LEAD TIME														
PROCUREMENT - MCCS AND VFDS	CONTRACT/SUBMITTAL								APPROVAL			LEAD TIME											
PROCUREMENT - GENERATORS	CONTRACT/SUBMITTAL				APPROVAL				LEAD TIME														
PROCUREMENT - HW EQUIPMENT	CONTRACT/SUBMITTAL				APPROVAL				LEAD TIME (NEED TO CONFIRM STILL)														
CONSTRUCTION GMPS		GMP 2									GMP 3												
DEMO/SWPPP																							
EXCAVATION AND SHORING																							
UTILITIES																							
GAC CONRETE SLAB																							
Loader (Volvo L90)-TOTAL						1	1	1															
Rammax Roller-TOTAL						1	1	1															
Crew Truck-TOTAL						1	1	1															
CONCRETE EQUIPMENT																							
43 - GAC CONTACTOR FACILITY																							
75 Ton Picker Hydraulic Crane-TOTAL												1	1	1									
Forklift 12K-TOTAL												1	1	1									
Crew Truck-TOTAL												2	2	2									
CONSTRUCTION MANAGEMENT EQUIPMENT																							
Forklift 12K*					1	1	1	1	1	1	1	1	1	1									
Water Truck*					1	1	1	1	1	1	1	1	1	1									

*Yellow Highlight means in Allowance for Concrete Work

SECTION F

CONSTRUCTION PHASING

1. CONSTRUCTION PHASING

The phasing will consist of the following activities:

Phase 1: Mobilization

Phase 2: Demolition, clear and grub work

Phase 3: Excavation, shoring, and erosion control

Phase 4: Underground utility installation, testing, and backfill

Phase 5: Concrete slabs and walls (if allowance approved)

SECTION G

LIST OF GMP PLANS & SPECIFICATIONS

1. LIST OF PLANS AND SPECIFICATIONS

Archer Western utilized the following plans and specifications issued by Hazen to complete this GMP Proposal. All files reside on the ACC site uploaded on September 5, 2025.

- 2025.08.01 GMP2 Electrical Specs (115 pages)
- 2025.08.15 GMP2 Final Drawings (24 pages)
- 2025.08.15 GMP2 Final Specifications (404 pages)
- Alpha Final Geotechnical Report dated August 1, 2025 (91 pages)

SECTION H

ASSUMPTIONS AND CLARIFICATIONS

CITY OF CHANDLER
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ASSUMPTIONS & CLARIFICATIONS LOG - GMP-2

Item	Design Stage	Facility	Work Package	Assumption or Clarification
1	100 Pct	01-Site Work	02-Demo	Assume no work with solar field (by COC)
2	100 Pct	01-Site Work	26-EI&C	For duct banks, assuming concrete encasement under structures and roads. Assuming native / sand backfill in other areas.
3	100 Pct	01-Site Work	26-EI&C	Excludes Antenna Pole, Antenna Pole Calculations, Antenna, Antenna Accessories, Radio, and Radio Path Study.
4	100 Pct	01-Site Work	26-EI&C	Excludes Automatic Transfer Switch, Manual Transfer Switch, and/or Standby Generator
5	100 Pct	01-Site Work	26-EI&C	Excludes Lightning Protection for Existing Buildings and Structures
6	100 Pct	01-Site Work	31-Earthwork	All landscaping is currently excluded from this cost model.
7	30 Pct	01-Site Work	32-Flatwork	Assumed all existing asphalt on site is 4" Thick.
8	100 Pct	01-Site Work	33-Utilities	For yard pipe, assuming CLSM encasement for all WSP, native backfill above bedding zone for all pipe with a 2-ft CLSM cap if utility is within the roadway. Reinforced concrete encasement for pipe under all structures. Assumed native backfill is suitable for utilities above pipe zone of trench.
9	100 Pct	01-Site Work	33-Utilities	Metal pipe and fittings located below grade will be polywrapped.
10	100 Pct	01-Site Work	33-Utilities	Assume cathodic protection will not be required. Metallic pipe will be encased in CLSM or bagged. Hazardous existing conditions or materials are not anticipated and this GMP does not include any provisions if they are encountered.
11	100 Pct	01-Site Work	99-GC/GR	All demo material generated assumed to be hauled to off-site landfill and is not hazardous.
26	100 Pct	01-Site Work	32-Flatwork	Temp fencing will be chain link fencing without barbed wire.
12	100 Pct	43-Post Filter GAC	40-Process Pipe & Valves	Spec 40 05 24.23A-2. Item 1.03 A. Assume contractor may submit lay drawings per the specifications by area per system for clarity and shorter review durations.
13	100 Pct	43-Post Filter GAC	40-Process Pipe & Valves	Spec 40 05 24.23A-7. Item 2.03 Assume contractor may use 1.5D elbows versus 2.5D elbows.
14	100 Pct	43-Post Filter GAC	40-Process Pipe & Valves	Spec 40 05 24.23A-9. Item 2.06 B.1. Assume contractor may add flanges as needed for constructability, if needed.
15	100 Pct	99-GC/GR	99-GC/GR	Excluding engineer's trailer at this time, assuming the Hazen & City team will operate out of City facility
16	100 Pct	99-GC/GR	99-GC/GR	Carrying part time quality and safety staff per Supervision Schedule in 30% cost model.
17	100 Pct	99-GC/GR	99-GC/GR	Constrution water meter and backflow preventer will be installed and rented by the City of Chandler. Metered water will be invoiced to City.
18	100 Pct	XX-Numerous	03-Concrete	Assuming no supplemental air entrainment will be required for ready-mix.
19	100 Pct	XX-Numerous	03-Concrete	A concrete curb has been added to each building as a starter wall.
20	100 Pct	XX-Numerous	03-Concrete	Ready-mix per the Cal-Portland proposal.
21	100 Pct	XX-Numerous	03-Concrete	Excluding petrographic analysis of the aggregate.
22	100 Pct	XX-Numerous	26-EI&C	Assume PVC-SCH 40 for underground conduit
23	100 Pct	XX-Numerous	XX-Numerous	Provisions for differential settling have not been included but may be added into the design at a later time.
24	100 Pct	XX-Numerous	XX-Numerous	See suplemental support documents for additional assumptions and clarifications.
25	100 Pct	XX-Numerous	XX-Numerous	Assume factory witness testing, if required, will not be paid for by CMAR.

CITY OF CHANDLER
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DESIGN REVIEW LOG GMP-2

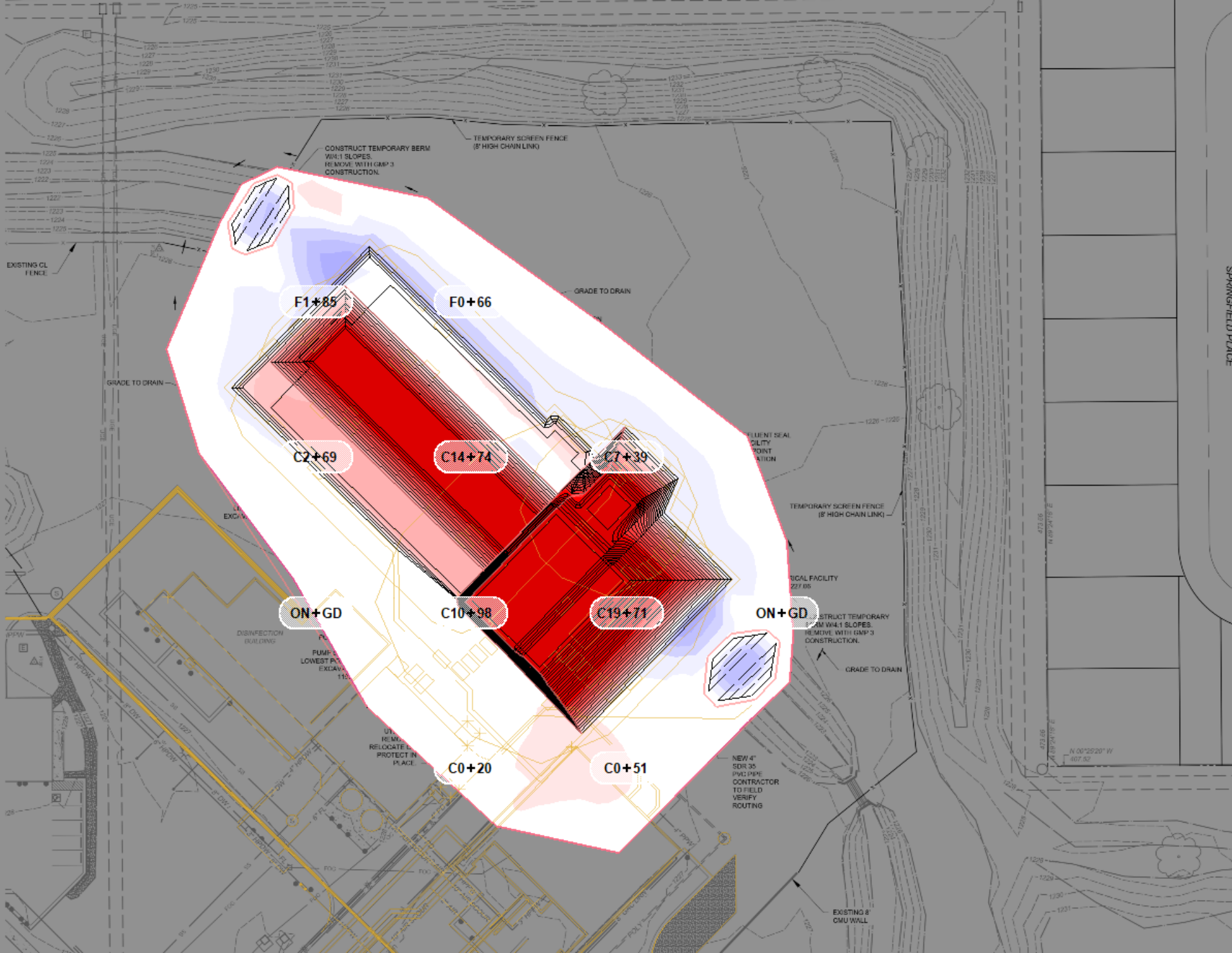
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301	GMP-2	Final Drawings	7	[7] M43-01	08/21/25	dpost	This will require dimensions and coordinates for the centers of the pipe at the turn ups through the slab in order for the shop drawings and the installation of the pipe.	Note to Hazen			Medium	08/29/25	Noted. Dimensions and coordinates for pipe turn-ups through the slab can be included in the next submittal.		Deran Pursoo	8/25/25
302	GMP-2	Final Drawings	3	[3] G-03	08/21/25	dpost	This note may be a difficult task to accomplish based on the work required for the GAC and pump station structures	CON			Low	08/29/25	The note reflects a City grading and drainage requirement. The contractor shall include a phasing or temporary drainage approach as part of their erosion and sediment control plan submission for review.		Deran Pursoo	8/25/25
303	GMP-2	Final Drawings	11	[11] S43-03	08/21/25	Ed Kluber	I think this will open up on us and be closer to a 2:1	RR			Medium	08/29/25	Noted. If the assumption of flatter slopes (closer to 2:1) is based on on-site experience, then the need for anticipated shoring will need to be defined by Archer in GMP estimate.		Deran Pursoo	8/25/25
304	GMP-2	Final Drawings	10	[10] S43-02	08/21/25	Ed Kluber	I think this will open up on us and be closer to a 2:1	RR			Medium	08/29/25	Noted. If the assumption of flatter slopes (closer to 2:1) is based on on-site experience, then the need for anticipated shoring will need to be defined by Archer in GMP estimate.		Deran Pursoo	8/25/25
305	GMP-2	Final Drawings	6	[6] C-03	08/21/25	Ed Kluber	We will need to construct an access ramp for materials and proof rolling. This will need to be about a 10:1 slope.	CON			High	08/29/25	Archer to submit alternative means, methods and/or approaches for review and communication with the City and Hazen.		Scott Williamson	8/25/25
306	GMP-2	Final Drawings	6	[6] C-03	08/21/25	Ed Kluber	It has been my experience, in these soil conditions, even though we try to slope at a 1.5:1, the material will open up more than that and slopes will end up being closer to a 2:1. We need to discuss this further with the engineer.	RR			High	08/29/25	If the request is to use slopes flatter than 1.5H:1V, this is acceptable to Alpha. Please confirm the anticipated duration that the excavation will remain open. As slopes dry, they may tend to flatten further. Moisture conditioning (e.g., periodic wetting) may be implemented to reduce raveling and maintain slope stability. If steeper slopes are being considered, please clarify the proposed inclination (e.g., 2H:1V) and the height of excavation. Based on this information, Alpha will evaluate slope stability and determine if a formal slope analysis is required.		Alpha Geotech	8/29/25
307	GMP-2	Final Drawings	6	[6] C-03	08/21/25	Ed Kluber	RFI: What elevation are these water lines? Unless they are deep, they will need to be relocated.	RFI			High	08/29/25	We need to high priority potholing performed.		Scott Williamson	8/25/25
308	GMP-2	Final Drawings	6	[6] C-03	08/21/25	Ed Kluber	RFI: What elevation is this 4" PD line? Unless it's super deep, this will be in the air ~10' and very expensive to support.	RFI			High	08/29/25	Hazen does not anticipate this line is being "super deep". It daylights into the existing retention basin and is a Pump Storm Water line. There could be bends on the line, however, there is minimal information available on its construction.		Scott Williamson	8/25/25
309	GMP-2	Final Drawings	24	[24] E-11	08/19/25	Brad Fransen	A/C: BECAUSE OF THE SMALL HP OF THESE DRIVES AND THE LARGE TRANSFORMER FEEDING THEM, A HARMONIC FILTER WILL NOT BE REQUIRED HERE. RECOMMEND A 3% LINE REACTOR.	VE			Medium	08/29/25	Per note #1: "VFD VENDOR SHALL PROVIDE HARMONIC MITIGATION AS REQUIRED TO COMPLY WITH IEEE 519 RESULTING IN NO MORE THAN 5% THD," the intent is to indicate that the final harmonic mitigation design is pending completion of the harmonic study. Thanks for the recommendation. We anticipate refining the design based on the study results and will ensure compliance with the harmonic performance requirements outlined in the specification. A 3% line reactor is a form of passive harmonic mitigation. If the study confirms that IEEE 519 limits for TDD and THDV are met using only line reactors, the design will be updated accordingly. Final submittals should include the harmonic study verifying compliance. Per meeting 08/26 - cut a 10' wide hole and see how it behaves, if shoring is needed. Include as a separate allowance item instead of in risk register.		Michael Laub	8/25/25
310	GMP-2	Final Drawings	6	[6] C-03	08/19/25	AMinerva	RR: Slope for excavation needs to be more than 1.5/1	RR			High	08/29/25	If steeper slopes are being considered, please clarify the proposed inclination (e.g., 2H:1V) and the height of excavation. Based on this information, Alpha will evaluate slope stability and determine if a formal slope analysis is required.		Alpha Geotech	8/29/25
311	GMP-2	Final Drawings	11	[11] S43-03	08/19/25	AMinerva	A/C: Scope of Work for GMP 2 is under slab pipe, flowable fill, and concrete pipe encasement up to EL 1219.67	A/C			Medium	08/29/25	TBA		Pouya Shahsana	
312	GMP-2	Final Drawings	5	[5] C-02	08/19/25	AMinerva	A/C: Any curb or asphalt replacement will be in GMP 3	A/C			Low	08/29/25	If alternation effects City operation, the contractor is responsible to restore under GMP2. GMP3 may include planned new/replacement paving, but it doesn't relieve performing needed repairs now without approval from the City/Engineer.		Deran Pursoo	8/25/25
313	GMP-2	Final Drawings	12	[12] S43-04	08/19/25	AMinerva	A/C: Everything outside Flowable fill/pipe encasement will be GMP 3	A/C			Medium	08/29/25	TBA		Pouya Shahsana	
314	GMP-2	Final Drawings	11	[11] S43-03	08/19/25	AMinerva	A/C: Any backfill material outside of flowable fill material will be in GMP 3	A/C			Medium	08/29/25	Applicable in most cases; however, incidental backfill required to restore areas around GMP2 excavations (even if outside of flowable fill zones) remains a GMP2 responsibility. Excavations performed under this GMP must be backfilled in a manner suitable for ongoing operations and/or preparation for GMP3 work. Please confirm this is maintained within the limits of the attached GMP2 scope of work.		Deran Pursoo	8/25/25
315	GMP-2	Final Drawings	23	[23] E-10	08/19/25	Brad Fransen	A/C: ONE LINE SHOWS A ACTIVE HARMONIC FILTER SO THIS COULD BE A 3% LINE REACTOR.	VE			Medium	08/29/25	Per note #1: "VFD VENDOR SHALL PROVIDE HARMONIC MITIGATION AS REQUIRED TO COMPLY WITH IEEE 519 RESULTING IN NO MORE THAN 5% THD," the intent is to indicate that the final harmonic mitigation design is pending completion of the harmonic study. Thanks for the recommendation. We anticipate refining the design based on the study results and will ensure compliance with the harmonic performance requirements outlined in the specification. A 3% line reactor is a form of passive harmonic mitigation. If the study confirms that IEEE 519 limits for TDD and THDV are met using only line reactors, the design will be updated accordingly. Final submittals should include the harmonic study verifying compliance.		Michael Laub / Nick Shor	8/25/25
316	GMP-2	Final Drawings	23	[23] E-10	08/19/25	Brad Fransen	A/C: NORMALLY DO NOT SEE THIS UNLESS THERE IS A VFD OR THE MOTOR IS MUCH LARGER. CONSIDER REMOVING.	VE			Medium	08/29/25	Our understanding is that most of these motors are provided with temperature switches. As this is a 60% design submittal and the final vendor is not yet selected, we plan to retain these. These temperature switches are typically included in our scope. In the worst case, the relay becomes a spare.		Michael Laub / Nick Shor	8/25/25
317	GMP-2	Final Drawings	23	[23] E-10	08/19/25	Brad Fransen	RFI: CONFIRM THE CONVEYOR WILL HAVE THIS. NORMALLY SEE THIS FOR BELT DRIVEN EQUIPMENT.	RFI			Medium	08/29/25	Thanks for checking, but we have confirmed this with the vendor.		Michael Laub / Nick Shor	8/25/25
318	GMP-2	Final Drawings	23	[23] E-10	08/19/25	Brad Fransen	CONSIDER ADDING A MOTOR HIGH TEMPERATURE SWITCH LIKE SHOWN ON THE PREVIOUS SCHEMATIC	VE			Medium	08/29/25	Agree. Added TSH-757X to a "High Motor Temp."		Michael Laub / Nick Shor	8/25/25

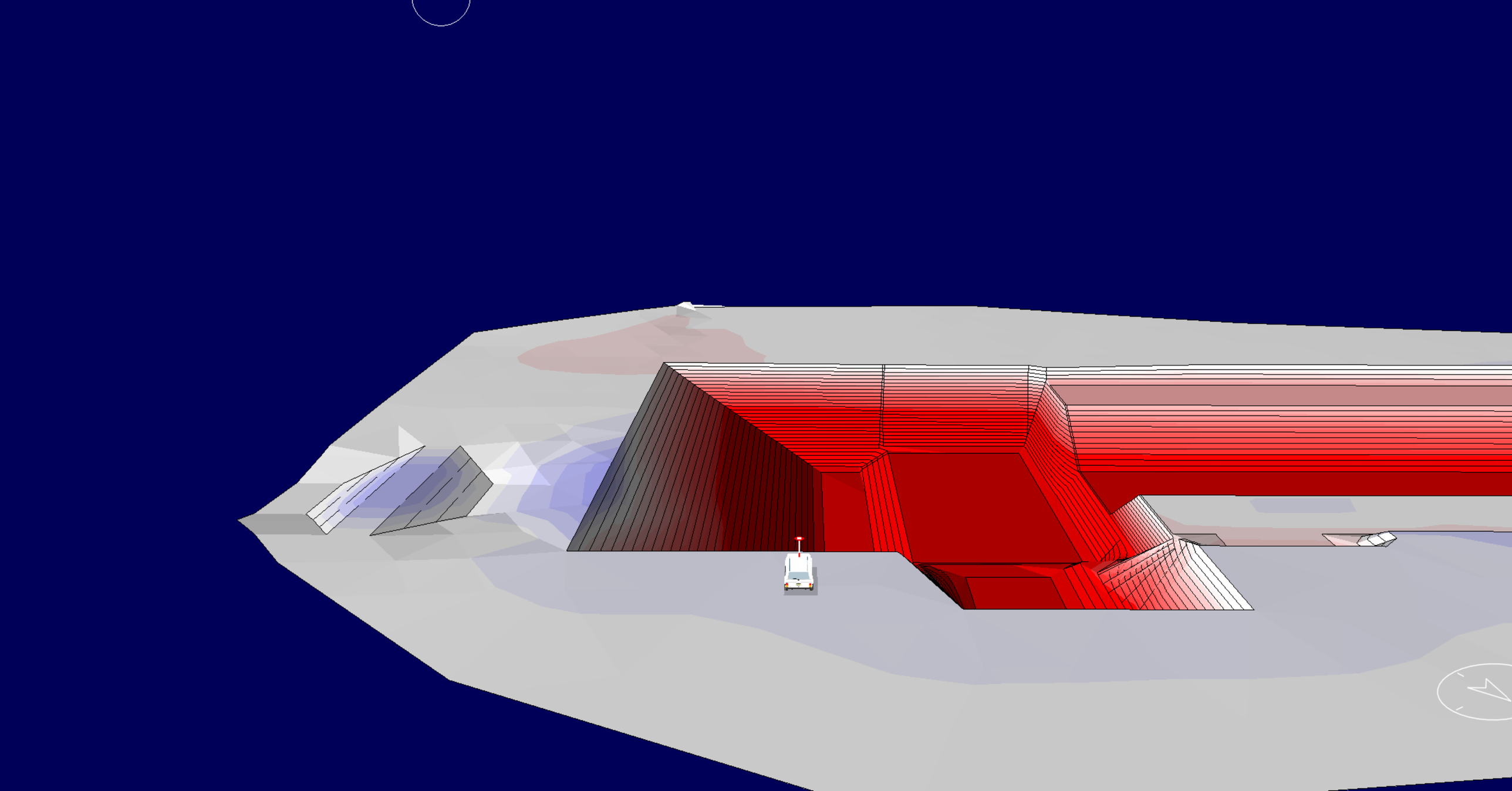
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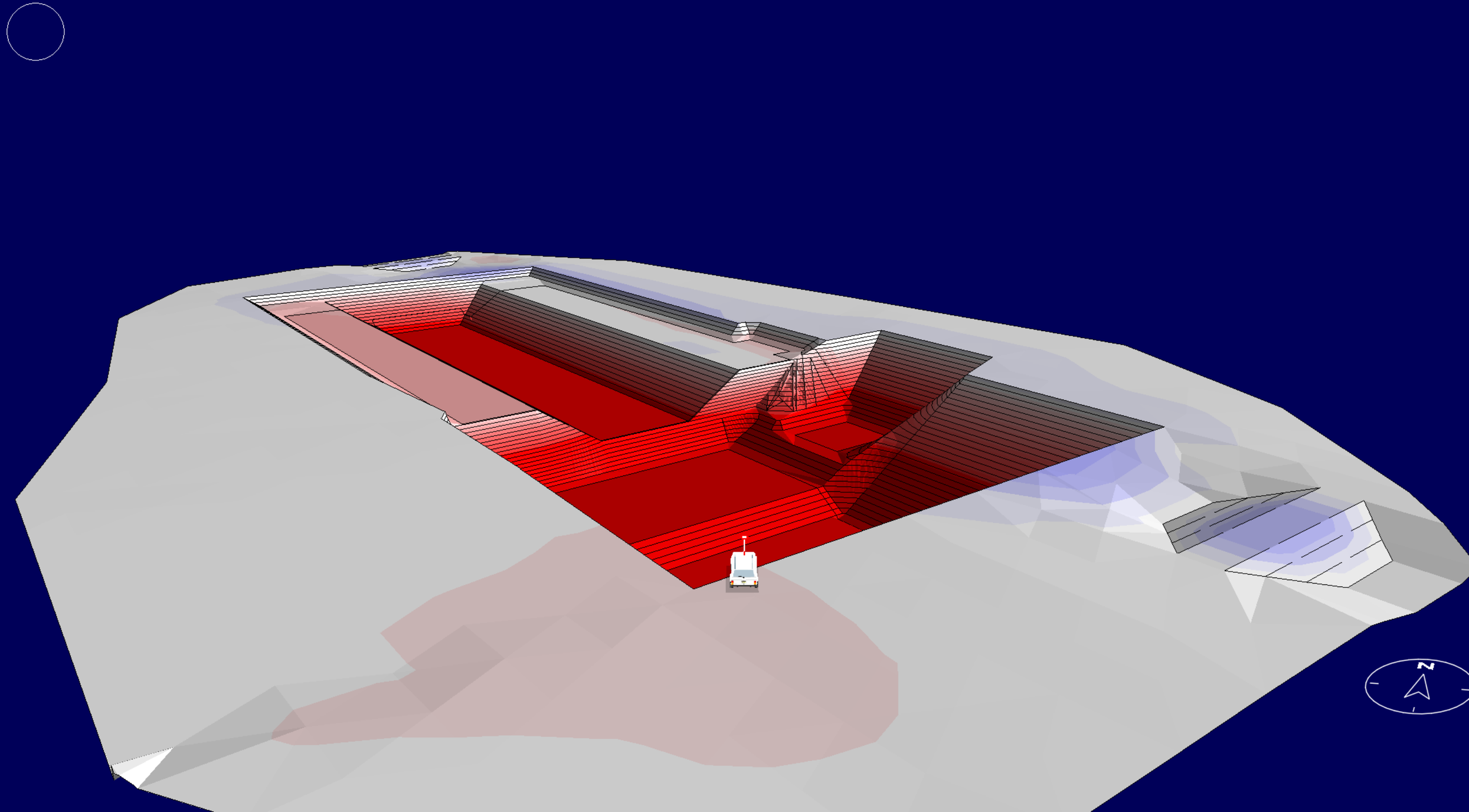
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319	GMP-2	Final Drawings	23	[23] E-10	08/19/25	Brad Fransen	A/C: IS THIS MOTOR TEMP OR PUMP TEMP?	RFI			Medium	08/29/25	It is the "High Motor Temp." I double checked with Nick and he confirmed that this will be from the motor.		Michael Laub / Nick Shor	8/25/25
320	GMP-2	Final Drawings	22	[22] E-09	08/19/25	Brad Fransen	A/C: SHOULD THIS BE LOCATED IN THE FIELD?	RFI			Medium	08/29/25	We are planning on matching the existing basins which have their LOR and Start Buttons on the VFDs.		Michael Laub	8/25/25
321	GMP-2	Final Drawings	22	[22] E-09	08/19/25	Brad Fransen	A/C: THE LINES ARE NOT NUMBERED.	Note to Hazen			Medium	08/29/25	Agree. The lines will be put back. The lines were previously on top of the table. When we asked to have the lines removed from the table the designers went too far.		Michael Laub	8/25/25
322	GMP-2	Final Drawings	21	[21] E-08	08/19/25	Brad Fransen	VE: CONSIDER GOING WITH 4/0 CU CONDUCTORS.	VE			Medium	08/29/25	Conductors were based from a 150HP motor, will update to 4/0 CU Conductors		Daniel Thompson	8/25/25
323	GMP-2	Final Drawings	21	[21] E-08	08/19/25	Brad Fransen	IT DOESN'T LOOK LIKE THESE CONDUCTORS CAN FIT INTO A 3" CONDUIT AND MEET THE NEC.	CON			Medium	08/29/25	Agreed, provide parallel feed (3) 5KV MV-105 #3/0 AWG and (1) #3 GND		Daniel Thompson	8/25/25
324	GMP-2	Final Drawings	19	[19] E-06	08/19/25	Brad Fransen	A/C: CONFIRM THIS IS CORRECT. PER PREVIOUS DWGS BUCKET 4C HAS AN EXISTING 90AT BREAKER.	RFI			Medium	08/29/25	Agreed, breaker to be 60A. Will update to plot black to indicate new		Daniel Thompson	8/25/25
325	GMP-2	Final Drawings	19	[19] E-06	08/19/25	Brad Fransen	A/C: CONFIRM THIS IS CORRECT. PER PREVIOUS DWGS BUCKET 4B HAS AN EXISTING 90AT BREAKER.	RFI			Medium	08/29/25	Agreed, breaker to be 60A. Will update to plot black to indicate new		Daniel Thompson	8/25/25
326	GMP-2	Final Drawings	19	[19] E-06	08/19/25	Brad Fransen	A/C: CONFIRM THIS IS CORRECT. PER PREVIOUS DWGS BUCKET 3E HAS AN EXISTING 60AT BREAKER.	RFI			Medium	08/29/25	Agreed, breaker to be 25A. Will update to plot black to indicate new		Daniel Thompson	8/25/25
327	GMP-2	Final Drawings	19	[19] E-06	08/19/25	Brad Fransen	A/C: CONFIRM THIS IS CORRECT. PER PREVIOUS DWGS BUCKET 3C HAS AN EXISTING 60AT BREAKER.	RFI			Medium	08/29/25	Agreed, breaker to be 25A. Will update to plot black to indicate new		Daniel Thompson	8/25/25
328	GMP-2	Final Drawings	19	[19] E-06	08/19/25	Brad Fransen	A/C: CONFIRM THIS IS CORRECT. PER PREVIOUS DWGS THE EXISTING DISCONNECT SWITCH IS 100 AMP.	RFI			Medium	08/29/25	Agreed, disconnect to be replace with new 60A. Will update to plot black to indicate new		Daniel Thompson	8/25/25
329	GMP-2	Final Drawings	19	[19] E-06	08/19/25	Brad Fransen	A/C: CONFIRM THIS IS CORRECT. PER PREVIOUS DWGS THE EXISTING DISCONNECT SWITCH IS 100 AMP.	RFI			Medium	08/29/25	Agreed, disconnect to be replace with new 60A. Will update to plot black to indicate new		Daniel Thompson	8/25/25
330	GMP-2	Final Drawings	13	[13] S43-05	08/18/25	AMinerva	A/C: Soil underneath the Weir Structure and Pump Station is assumed to be desirable and will not be over excavated/replace with any additional backfill.	A/C			Medium	08/29/25	This assumption is correct based on current geotechnical recommendations. If unsuitable material is encountered during excavation, then requirements for over-excavation and replacement will brought up at that time.		Deran Pursoo	8/25/25
331	GMP-2	Final Drawings	13	[13] S43-05	08/18/25	AMinerva	STRUCTURE OUTLINE INFORMATION SHOWN ON THIS SHEET IS FOR REFERENCE ONLY AND NOT INTENDED FOR CONSTRUCTION. THE PURPOSE OF THIS SHEET IS TO INDICATE THE REQUIRED DIMENSIONS FOR EXCAVATION EXTENTS ONLY.	Note to Hazen			Medium	08/29/25	DISREGARD per Archer		Deran Pursoo	8/25/25
332	GMP-2	Final Drawings	6	[6] C-03	08/18/25	AMinerva	RFI: Geotech says any slopes larger than 10' need to be evaluated by Alpha to confirm that they can be excavated at 1.5 to 1. Please confirm that it is acceptable to excavate at 1.5 to 1 for the GAC/Pump Station.	RFI			High	08/29/25	Please confirm the anticipated excavation depth. Based on our review, depths may extend to approximately 27 feet. At this depth, a slope stability evaluation will be required to assess excavation slope.		Alpha Geotech	8/29/25
333	GMP-2	Final Drawings	6	[6] C-03	08/18/25	AMinerva	A/C: Assuming 1.5/1 ratio for excavation does not need to have shoring.	A/C			High	08/29/25	Our assumption was this slope ratio was for anything less than 10' depth only. Depths greater than 10' require concurrence from Alpha Geotech.		Deran Pursoo	8/25/25
334	GMP-2	Final Drawings	19	[19] E-06	08/18/25	Brad Fransen	A/C: CONFIRM THIS IS CORRECT. PER PREVIOUS DWGS THE EXISTING DISCONNECT SWITCH IS 60 AMP.	RFI			Medium	08/29/25	Agreed, disconnect to be replace with new 30A. Will update to plot black to indicate new		Daniel Thompson	8/25/25
335	GMP-2	Final Drawings	19	[19] E-06	08/18/25	Brad Fransen	A/C: CONFIRM THIS IS CORRECT. PER PREVIOUS DWGS THE EXISTING DISCONNECT SWITCH IS 60 AMP.	RFI			Medium	08/29/25	Agreed, disconnect to be replace with new 30A. Will update to plot black to indicate new		Daniel Thompson	8/25/25
336	GMP-2	Final Drawings	18	[18] E-05	08/18/25	Brad Fransen	A/C: IT IS DOUBTFUL THESE WILL FIT INTO 6" BUCKETS. MORE LIKELY THEY WILL BE 12" BUCKETS.	CON			Medium	08/29/25	MCC elevations are based on layouts prepared by the Square D design team as part of the procurement package. IJ and IL were shown in 6" buckets based on initial vendor-provided elevations and will be confirmed once final vendor details are available.		Michael Laub	8/25/25
337	GMP-2	Final Drawings	18	[18] E-05	08/18/25	Brad Fransen	A/C: RECOMMEND TO CALL OUT THE WIDTH OF EACH SECTION	Note to Hazen			Medium	08/29/25	Agree. I have asked our design team to "Please call out the width of each section as well as the overall width, based on Square-D documents."		Michael Laub	8/25/25
338	GMP-2	Final Drawings	18	[18] E-05	08/18/25	Brad Fransen	A/C: THE ASSUMPTION IS THESE ARE ALL NEMA STARTERS WHICH MEANS THEY SHOULD ALL BE SZE 1. REPLACE THE AMPERAGE CALL OUTS WITH "SIZE 1".	A/C			Medium	08/29/25	Agree		Michael Laub	8/25/25
339	GMP-2	Final Drawings	18	[18] E-05	08/18/25	Brad Fransen	VE: THIS COULD BE A 6" BUCKET.(TYP FOR ALL 100AF BREAKERS)	VE			Medium	08/29/25	MCC elevations are based on layouts prepared by the Square D design team as part of the procurement package. To be conservative and ensure sufficient space, 100AF breakers are currently shown in 12" buckets instead of 6". Elevations will be updated as the design is finalized.		Michael Laub	8/25/25
340	GMP-2	Final Drawings	18	[18] E-05	08/18/25	Brad Fransen	A/C: THIS SHOULD BE A LINE REACTOR(TYP OF 4). A FILTER IS NOT NEEDED SINCE THERE IS AN ACTIVE HARMONIC FILTER SPECIFIED.	Note to Hazen			Medium	08/29/25	At the 60% design stage, our intent is to remain open to multiple compliant approaches for meeting harmonic requirements. Based on current cost considerations, we expect that a combination of 6-pulse drives with input filtering and a shared bus-connected active filter may prove to be the most economical. As you noted, an alternative is to use upgraded drives with integrated AFE, which we also consider a valid solution. Our goal at this stage is to preserve flexibility so that both options remain viable until a final decision is made by the 90% design milestone. Refer to Construction Note #2 on the drawings, which states: "VFD vendor shall provide harmonic mitigation as required to comply with IEEE 519, resulting in no more than 5% THD." In hindsight, we could have clarified that the 90% documents will specify either AFE or individual harmonic filters—but this will be resolved as part of the upcoming design development.		Michael Laub	8/25/25
341	GMP-2	Final Drawings	18	[18] E-05	08/18/25	Brad Fransen	A/C: THIS SHOULD BE REMOVED.	Note to Hazen			Medium	08/29/25	See above. We wanted to be conservative, and flexible.		Michael Laub	8/25/25
342	GMP-2	Final Drawings	17	[17] E-04	08/18/25	Brad Fransen	A/C: IF 6P REFERS TO 6 PULSE, THEN "6P' SHOULD BE REMOVED. THE CHOICES AVAILABLE ARE 6 PULSE, 18 PULSE , AND AFE. IT LOOKS LIKE THE ENGINEER HAS DECIDED ON AFE SO 6P SHOULD BE REMOVED.	Note to Hazen			Medium	08/29/25	At the 60% design stage, our intent is to remain open to multiple compliant approaches for meeting harmonic requirements. Based on current cost considerations, we expect that a combination of 6-pulse drives with input filtering and a shared bus-connected active filter may prove to be the most economical. As you noted, an alternative is to use upgraded drives with integrated AFE, which we also consider a valid solution. Our goal at this stage is to preserve flexibility so that both options remain viable until a final decision is made by the 90% design milestone. Refer to Construction Note #2 on the drawings, which states: "VFD vendor shall provide harmonic mitigation as required to comply with IEEE 519, resulting in no more than 5% THD." In hindsight, we could have clarified that the 90% documents will specify either AFE or individual harmonic filters—but this will be resolved as part of the upcoming design development.		Michael Laub	8/25/25

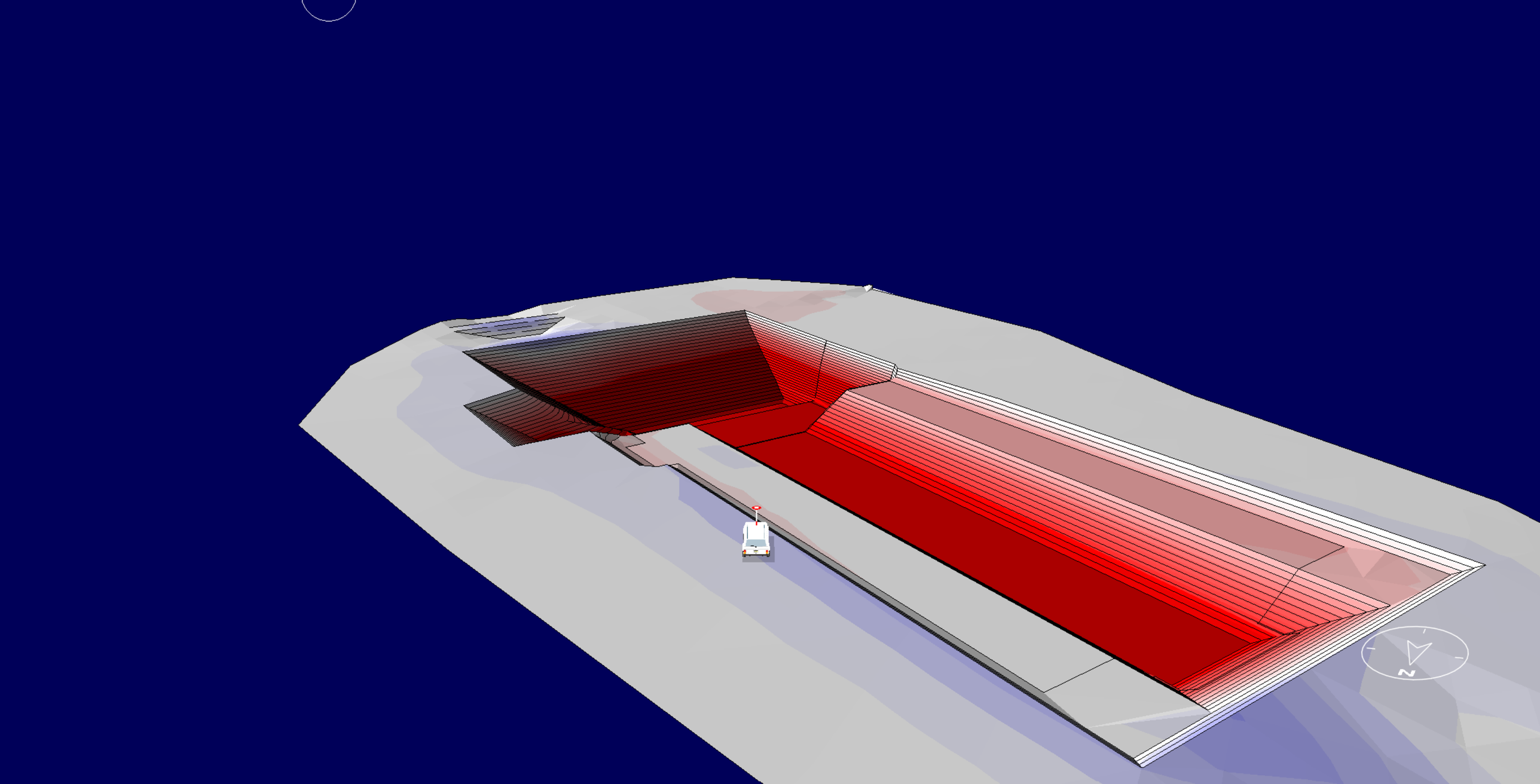
CITY OF CHANDLER
PECOS SWTP IMPROVEMENTS WA2100.251
DESIGN REVIEW LOG GMP-2

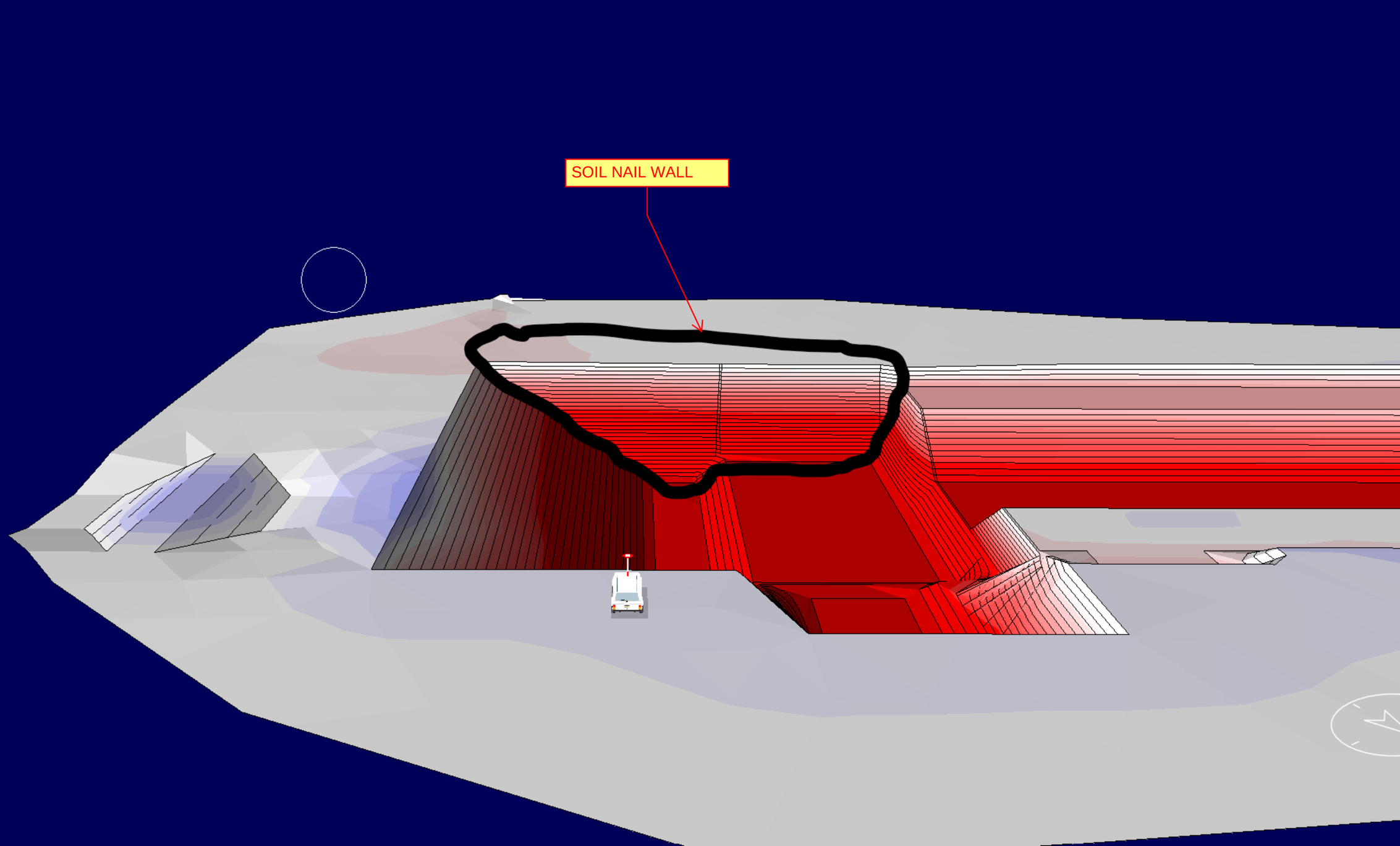
ID	Design Stage	Document	Page Index	Page Label	Comment Date	CMAR Author	CMAR Comment	Comment Type	Cost Impact?	Schedule Impact?	Priority?	Hazen Due Date	Hazen Response	Discipline	Hazen Author	Response Date
343	GMP-2	Final Drawings	17	[17] E-04	08/18/25	Brad Fransen	A/C: HARMONIC FILTER WILL NOT BE NEEDED WITH ACTIVE FRONTEND(AFE) DRIVES.	Note to Hazen			Medium	08/29/25	See the comment above.		Michael Laub	8/25/25
344	GMP-2	Final Drawings	17	[17] E-04	08/18/25	Brad Fransen	A/C: THIS SHOULD BE REMOVED.	Note to Hazen			Medium	08/29/25	See the comment above.		Michael Laub	8/25/25
345	GMP-2	Final Drawings	17	[17] E-04	08/18/25	Brad Fransen	A/C: PREVIOUS DWG CALLS FOR THIS TO BE 1200AT	Note to Hazen			Medium	08/29/25	Will modify trip to be 1600A		Daniel Thompson	8/25/25
346	GMP-2	Final Drawings	16	[16] E-03	08/18/25	Brad Fransen	A/C: THIS SHOULD BE BLACK TO REPRESENT NEW	Note to Hazen			Medium	08/29/25	Agree		Michael Laub	8/25/25
347	GMP-2	Final Drawings	16	[16] E-03	08/18/25	Brad Fransen	A/C: THIS FUSE AMPERAGE RATING IS TOO HIGH	CON			Medium	08/29/25	Will modify fuse size to 400A		Daniel Thompson	8/25/25
348	GMP-2	Final Drawings	17	[17] E-04	08/18/25	Brad Fransen	ACTIVE HARMONIC FILTER WILL NOT BE NEEDED WITH ACTIVE FRONTEND(AFE) DRIVES.	Note to Hazen			Medium	08/29/25	See the comment above.		Michael Laub	8/25/25
349	GMP-2	Final Drawings	16	[16] E-03	08/18/25	Brad Fransen	VOLTAGE	Note to Hazen			Medium	08/29/25	Agree		Michael Laub	8/25/25
350	GMP-2	Final Specs	377	377	08/21/25	Ed Kluber	Section 31 23 25: Dynamic Compaction RFI: Will this be required? It is my understanding this has not been required on other portions of this project. This will be very costly and we will need to work with a specialty geotechnical contractor who are typically 6+ months from availability.	RFI			Medium	08/29/25	No recommendation of dynamic compaction.		Alpha Geotech	8/29/25
351	GMP-2	Final Specs	348	348	08/21/25	Ed Kluber	SECTION 31 00 01 EARTHWORK, Section 3.05 Proof-Rolling: RFI: This is going to be very challenging at the GAC and the Wet Well. We will need to construct a ramp to access the 30' deep wet well and this will be much longer than the 1.5:1 slope. We need to modify this requirement for other methods that will be cheaper.	CON			Medium	08/29/25	The Hazen spec proof-rolling requirement in Section 3.05 applies to subgrade areas that will directly support structures, pavements, or select fill. At deep excavations, subgrade evaluation methods (e.g., density/moisture testing, plate load testing, or other geotechnical consultant–approved methods) may be submitted for review. Alternative approaches must be approved by Alpha Geotech, Engineer and Owner for proof-rolling to be omitted for deep structure excavations.		Alpha Geotech	8/29/25
352	GMP-2	Final Specs	345	345	08/21/25	Ed Kluber	RFI: Per the soils report, native materials are not suitable, are we to assume they are and use native?	RFI			Medium	08/29/25	On our Hazen/Archer/Alpha Geotech Meeting on morning of 07/03, Alpha Geotech Andrew Walton recommended the following: • On-site soils with <3% swell acceptable under slabs. • For mat foundations: swell allowance can increase to 3.3% (reinforced). • Above 10 ft depth → use engineered fill (2 ft min). • Below 10 ft → native clay soils may be left in place (moist, undisturbed). • No aggregate base (can worsen swell by wicking moisture). • No recompaction needed for deep native clay.		Alpha Geotech	8/29/25
353	GMP-2	Final Geotech Report	34	34	08/21/25	Ed Kluber	Onsite soils do not meet these requirements	Note to Hazen			Medium	08/29/25	Based on available data, most soils within the upper 10 feet appear to meet the specified requirements. Final confirmation should be obtained by the materials testing firm during construction.		Alpha Geotech	8/29/25
354	GMP-2	Final Geotech Report	30	30	08/21/25	Ed Kluber	RFI: Has this evaluation been completed for the GAC/Wet Well structures? In these soil conditions, it has been my experience that the hole will open up wider than our sloped 1.5:1.	RFI			Medium	08/29/25	Similar to earlier question. See response to ID 306.		Alpha Geotech	8/29/25
355	GMP-2	Final Geotech Report	18	18	08/18/25	AMinerva	or the wet well at the Post Filter GAC Contactors structure, the deeper mat-type foundations founded at depths greater than 20 feet bgs can be supported by dense or stiff, undisturbed natural soils.	RFI			Medium	08/29/25	DISREGARD per Archer		n/a	n/a
356	GMP-2	Final Geotech Report	30	30	08/18/25	AMinerva	Within this system, the classification of the on-site soils is considered to be Type C. Unsupported temporary cut slopes in these soils be made no steeper than 1.5H to 1V (1.5 Horizontal to 1 Vertical) for excavations less than 10 feet deep. Deeper excavations or taller temporary slopes should be evaluated on an individual basis by Alpha.	A/C			Medium	08/29/25	DISREGARD per Archer		n/a	n/a
357	GMP-2	Final Geotech Report	18	18	08/18/25	AMinerva	foundations should be founded on at least 2.0 feet of properly compacted engineered fill	A/C			Medium	08/29/25	DISREGARD per Archer		n/a	n/a
358	GMP-2	Final Geotech Report	18	18	08/18/25	AMinerva	If the sides are too large for this approach, then the engineered fill materials beneath the sides of the structure should be sloped / benched down on the interior sides with no vertical faces greater than 1.5 feet.	A/C			Medium	08/29/25	DISREGARD per Archer		n/a	n/a


F1+85
F0+66
C2+69
C14+74
C7+39
ON+GD
C10+98
C19+71
ON+GD
C0+20
C0+51
CONSTRUCT TEMPORARY BERM W/4:1 SLOPES. REMOVE WITH GMP 3 CONSTRUCTION.
TEMPORARY SCREEN FENCE (8' HIGH CHAIN LINK)
EXISTING CL FENCE
GRADE TO DRAIN
GRADE TO DRAIN
TEMPORARY SCREEN FENCE (8' HIGH CHAIN LINK)
GRADE TO DRAIN
NEW 4" SDR 35 PVC PIPE CONTRACTOR TO FIELD VERIFY ROUTING
EXISTING 8' CMU WALL
SPRINGFIELD PLACE




N


N


SOIL NAIL WALL

LOWEST POINT OF EXCAVATION 1210.85

N: 832931.29
E: 729845.50

N: 832948.95
E: 729854.37

N: 832916.53
E: 729871.91

N: 832934.98
E: 729868.69

N: 832947.51
E: 729880.91

N: 832957.21
E: 729911.59

N: 832961.47
E: 729866.59

OF EXCAVATION 1207.33

LIMITS OF EXCAVATION

TEMPORARY SCREEN FENCE (8' HIGH CHAIN LINK)

GAC ELECTRICAL FACILITY FFE = 1227.06

CONSTRUCT TEMPORARY BERM W/4:1 SLOPES. REMOVE WITH GMP 3 CONSTRUCTION.

GRADE TO DRAIN

N: 832859.37
E: 729919.23

N: 832866.02
E: 729923.69

N: 832906.70
E: 729963.37

DISINFECTION BUILDING

POST FILTER GAC PUMP STATION LOWEST POINT OF EXCAVATION 1197.67

EXISTING UTILITIES, REMOVE & RELOCATE OR PROTECT IN PLACE.

4" PD

LIMITS OF EXCAVATION

NEW 4" SDR 35 PVC PIPE CONTRACTOR TO FIELD VERIFY ROUTING

EXISTING 8' CMU WALL

Calculated top of Slope

Lots of Ex. Utility Conflicts

EXHIBIT E

SUBCONTRACTOR DOCUMENTS WITH CM@RISK

Any subcontractor assumptions, clarifications, exclusions, terms & conditions, signature blocks, etc. included are strictly between the CM@RISK and their subcontractors, and do not apply to the Agreement between the CM@RISK and the City.

SUBCONTRACTOR'S LIST FORM

If CM@Risk intends to subcontract any portion of this Agreement, the CM@Risk must submit the name, address, and contractor's license number (if applicable) of each subcontractor, including the work component of such subcontracting. Include the form with the bid submittal documents. CM@Risk may make multiple copies of this form as needed.

Company Name:	Elevate GEO 3D
Contact Name:	Gene Feickert
Contact Email:	gfeickert@eg3d.com
Contact Phone:	707-338-6086
Work Component:	Surveying
Percentage of Total Work Performed:	<1%

Company Name:	Certerra
Contact Name:	Taylor Scott
Contact Email:	taylor@bigapplegroupny.com
Contact Phone:	718.767.2900
Work Component:	Vibration Monitoring
Percentage of Total Work Performed:	1.1%

Company Name:	A-Core
Contact Name:	Jeff Frehner
Contact Email:	jeff.frehner@a-core.com
Contact Phone:	(480) 964-8662
Work Component:	Concrete Saw Cutting
Percentage of Total Work Performed:	<1%

Company Name:	Tyler Reinforcing
Contact Name:	Scott Pasternak
Contact Email:	scott@tylerreinforcing.com
Contact Phone:	602-321-3638
Work Component:	Rebar
Percentage of Total Work Performed:	<1%

Company Name:	Felix Construction
Contact Name:	Zachary Watts
Contact Email:	zachw@felixconstruction.com
Contact Phone:	602-814-3877
Work Component:	Electrical
Percentage of Total Work Performed:	15.7%

Company Name:	Hark Drilling
Contact Name:	Bobby Fletcher
Contact Email:	bobby.fletcher@harkdrilling.com
Contact Phone:	623-434-3105
Work Component:	Shoring
Percentage of Total Work Performed:	3.7%

EXHIBIT E

SUBCONTRACTOR DOCUMENTS WITH CM@RISK

Any subcontractor assumptions, clarifications, exclusions, terms & conditions, signature blocks, etc. included are strictly between the CM@RISK and their subcontractors, and do not apply to the Agreement between the CM@RISK and the City.

SUBCONTRACTOR'S LIST FORM

If CM@Risk intends to subcontract any portion of this Agreement, the CM@Risk must submit the name, address, and contractor's license number (if applicable) of each subcontractor, including the work component of such subcontracting. Include the form with the bid submittal documents. CM@Risk may make multiple copies of this form as needed.

Company Name:	Hurricane Fence Co.
Contact Name:	Matthew Mitchell
Contact Email:	mattm@hurricanefenceco.com
Contact Phone:	(480) 640-7750
Work Component:	Fences & Gates
Percentage of Total Work Performed:	<1%

Company Name:	Professional Piping Systems
Contact Name:	Eric Johnson
Contact Email:	ejohnson@ppsphx.com
Contact Phone:	602-510-2638
Work Component:	Welding
Percentage of Total Work Performed:	<1%

Company Name:	Crosspoint Testing & Inspection Services
Contact Name:	Brent Couch
Contact Email:	brent.couch@crosspointtesting.com
Contact Phone:	480-988-6602
Work Component:	Welding Inspection
Percentage of Total Work Performed:	1.6%

Company Name:	
Contact Name:	
Contact Email:	
Contact Phone:	
Work Component:	
Percentage of Total Work Performed:	

Company Name:	
Contact Name:	
Contact Email:	
Contact Phone:	
Work Component:	
Percentage of Total Work Performed:	

Company Name:	
Contact Name:	
Contact Email:	
Contact Phone:	
Work Component:	
Percentage of Total Work Performed:	

EXHIBIT F

GIS / GPS DATA DELIVERY REQUIREMENTS

N/A

EXHIBIT G

SUBCONTRACTOR DOCUMENTS WITH CM@RISK

Any subcontractor assumptions, clarifications, exclusions, terms & conditions, signature blocks, etc. included are strictly between the CM@Risk and their subcontractors, and do not apply to the Agreement between the CM@Risk and the City.

LIST OF SUBCONTRACTORS

C.5 LIST OF SUBCONTRACTORS

Archer Western will utilize the following subcontractors:

- Quality Control: Ninyo & Moore
- Surveying: Elevate Geo 3D LLC
- Vibration Monitoring: Certerra
- Concrete Ready-Mix: Cal-Portland
- Asphalt Saw Cutting: A-Core
- Rebar supply and installation: Tyler Reinforcing
- Electrical material supply and installation: Felix Construction Company
- Shoring: Hark Drilling
- Trucking & Hauling: TBD
- Fencing: Hurricane Fence Co
- Pipe, General – Ferguson
- Pipe, Carbon Steel: TBD
- Welding: PPS
- Weld Inspection: CrossPoint Testing

BACK-UP
QUOTES

SURVEYING QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	SURVEYING
ESTIMATOR INITIALS	EK

BID QUANTITIES					ELEVATE GEO 3D LLC	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**
99	19010	SITE SURVEY	1	LS	$ 7,264.00	$ 7,264.00

ELEVATE GEO 3D LLC

18521 E QUEEN CREEK RD. SUITE
105-458 QUEEN CREEK, AZ 85142

September 2, 2025

REF: Pecos Water System GMP 2, Chandler, AZ
ATTN: Ed Kluber

Construction Staking Proposal AZ306

1. **Project Control and Verification:**

1.1 Project Control: Verify existing control and set additional control as necessary for layout. Control work needs to be performed before demolition.

Provide one set of stakes for each of the following:

2. **Rough Grade:**

2.1 Limits: Provide stakes or marks at all angle points and at 50ft intervals.

2.2 Excavation: Provide offset stakes at 50ft intervals along perimeter: Provide grade stakes for bottom at 50ft intervals.

2.3 Temp Fence: Provide offset stakes at 100ft intervals.

3. **Utilities:**

3.1 Under Slab Piping: Provide offset stakes at 25ft intervals.

3.2 Electrical: Provide offset stakes at 50ft intervals, two offset stakes per box.

4. **Final As-Builts: Per City Standards.**

Total = $7,264.00

- **Conditions of Proposal:**
- **EG3D, LLC. Requests Electronic Payments via ACH, whenever available.**
-

Please contact Gene Feickert on his cell at 707-338-6086 or at gfeickert@eg3d.com should you have any questions regarding this proposal.

Thank you for the opportunity to bid on this project.
Sincerely,
Gene Feickert

VIBRATION MONITORING QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	VIBRATION MONITORING
ESTIMATOR INITIALS	EK

BID QUANTITIES					CERTERRA	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**
43	31.43.300	PRECONSTRUCTION SURVEY, MONITORING PLAN, INSTALLATION OF REMOTE SYSTEM	1	LS	$ 15,950.00	$ 15,950.00
		VIBRATION MONITORING & REPORTING (ASSUMED 21 WD/MO)	11	MO	$ 6,500.00	$ 71,500.00

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Materially Better™

CONFIDENTIAL PRICING

MONITORING PROPOSAL

City of Chandler – Water System Program, Phase 1 – City Project No. PW3-925-4631, GMP 2

Ed Kluber
Archer Western Construction
4710 East Elwood Street, Suite 6 Phoenix, AZ 85040
Date: September 2, 2025



CERTERRA
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Materially Better™

Ed Kluber
Archer Western Construction
4710 East Elwood Street, Suite 6 Phoenix, AZ 85040

September 2, 2025

Proposal No. 15-XXXXXX-P

Re: City of Chandler – Water System Program, Phase 1 – City Project No. PW3-925-4631, GMP 2

Thank you for the opportunity to provide our proposal. We appreciate your interest in our company and look forward to working with you.

At Certerra, we are committed to providing our clients with exceptional service. It is our priority to assess each individual project's need and provide a comprehensive proposal for all the quality assurance services identified as required.

Please let us know if you have any questions or need any guidance throughout any stage of your project's life cycle. We attribute the success of our company directly to the satisfaction of our customers – Thank You.

We hope you will think of us as your partner.

Respectfully,
Certerra



Taylor Scott

Business Development Manager

taylor@bigapplegroupny.com

T : 718.767.2900

D : 856.229.1012

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Scope of Services

Pre-Construction Condition Survey

- ✓ Pre- & Post-Condition Survey will include a non-invasive visual observation by digital photography and/or video (if-required) highlighting evidence of structural faults cometic faults, deficiencies, cracks, settlement, water, damage, and/or repairs.
- ✓ Survey will include all areas available for observation at time of visit. This includes walls & slabs. No destructive or non-destructive testing will be performed. No objects or movable building features (e.g., furniture, inventory, storage items, interior partitions, suspended ceiling tiles, etc.) will be moved to evaluate or identify nonvisible existing conditions.
- ✓ Pre/Post-Construction Condition Surveys areas of inspection to include exterior of the structures to the roofline, interior of first floor, basement, all common areas and commercial areas, if allowed.
- ✓ The reports will be submitted to the contractor for review prior to the start of any demolition or construction activities. The reports will be in an 8 1/2 x 11-inch format with an index and property listing. Respective photographs or video shall be in digital format and sent via cloud-based platform or flash drive. Each photograph on the cloud-based platform or flash drive will be date stamped and attached within the formal report. Actual prints of the photographs can be provided at an additional administrative charge. Certerra will generate a complete formal report and submit in a timely manner. If an additional report is required on a specific property, it can be prepared at the rate for secretarial office time and report preparation.
- ✓ Certerra will make no assessment and provide no opinion as to the nature, cause, or character of any detected change in condition, nor will it provide any assessment or opinion as to repairs or other actions to be taken in connection with such change in condition.

Structures Included (Adjacent to project)

- Disinfectant Buildings adjacent to vibration generating activities

Monitoring Plan

- ✓ Construction methods and equipment will be analyzed to determine the vibration generation potential of operations. A list of equipment and their specs to be used on the project will be submitted by the contractor.
- ✓ The Monitoring Plan represents the instrumentation requirements, monitoring procedures, and locations of monitoring points that are recommended to be implemented for the protection and safeguarding of the structures adjacent to the project site and is to be reviewed by the project's structural engineer.
- ✓ Certerra's Licensed New York PE will sign and seal the plan.

Might be an issue in AZ

Vibration Monitoring

- ✓ Certerra will furnish and install required remote vibration monitoring systems housed in a secure lockbox at locations per the project plans/specifications, monitoring plan, or as directed by client in writing. Installed locations of equipment will be added to the monitoring plan.
- ✓ Systems will be equipped with internal battery power with AC charger and modems linked real-time via cellular account to our central database.
- ✓ Client shall be responsible to provide power for units unless solar power is specified prior to installation (pricing available upon request).
- ✓ Upon receipt of any notifications indicating vibrations have exceeded the predetermined threshold, cellular and/or email notification, as specified, will be provided to the contractor immediately.
- ✓ Certerra will use Instantel Micromate™ Plus portable field seismographs capable of recording three independent particle-velocity channels and A-weighted sound levels continuously for 24-hours (if necessary).

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Optical Monitoring

- ✓ Certerra will install and maintain optical monitoring points and station locations, and/or Automated Robotic Total Station (AMTS).
- ✓ Station, control points, and optical monitoring points locations will be established during installation and a baseline reading will be recorded.
- ✓ Settlement monitoring points will be installed with a minimum of three (3) per structure up to 16' high at a maximum of twenty-five (25) foot spacing. Locations of equipment/stations will be added to the monitoring plan.
- ✓ Certerra will return to the site to obtain horizontal and vertical measurements for the settlement prisms as frequently as specified in the specifications/plans, monitoring plan, or as directed by client in writing.
- ✓ The values of the points will be compiled into a tabular format illustrating the new values, as well as any settlement from the previous site visit. If any reading shows settlement, client will be emailed a notification to the email address(es) or phone numbers specified.
- ✓ Certerra will complete the monitoring of Optical Monitoring points under the supervision of a NY State Professional Engineer, in accordance with Article 145 Section 7208.e. of the New York Educational Law.
- ✓ Servicing AMTS and Associated Equipment Maintenance can include leveling the AMTS to ensure accurate readings, checking and fixing control points for stability and precision, inspecting and repairing settlement prisms as needed, verifying the functionality and calibration of the AMTS system, cleaning lenses and sensors to remove debris or obstructions, updating or troubleshooting software and firmware if necessary, securing equipment mounts to prevent shifts or misalignments, and documenting any adjustments, repairs, or updates performed during servicing for recordkeeping and reporting.

Might be an issue in AZ

Crack Monitoring

- ✓ Certerra will furnish and install crack gauges on any open joints in the permanent structures on neighboring properties in locations on a sight-as-seen basis specified by client and the engineer on record (EOR).
- ✓ Certerra will also install crack gauges where we observe cracks up to 16' high on a building. We assume no duty, however, to identify all cracks that exist or may exist.
- ✓ Any locations where we install crack gauges will be added to our Monitoring Plan

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Fee Schedule

Pre-Construction Condition Survey	
Pre-Construction Condition Survey	**$2,000.00 (Lump Sum)**
Post-Construction Condition Survey	**$2,000.00 (Lump Sum)**
Monitoring Plan	
Development/Implementing of Monitoring Plan	**$2,000.00 (Lump Sum)**
Vibration/Noise Monitoring	
Remote Vibration Monitoring	
Vibration/Noise Monitor Installation/Programming	**$ 400.00 per Monitor**
Vibration/Noise Monitor Removal	**$ 250.00 per Monitor**
Vibration/Noise Monitor Relocation/Equipment Check	**$ 500.00 per Visit**
Remote Vibration Equipment Rental & Monitoring	**$ 500.00 Per Unit Per Month**
Solar Power	**$ 50.00 Per Unit Per Month**
Optical Monitoring	
Automated Remote Monitoring	
Installation/Positioning of Automated Motorized Total Stations and Target Prisms	**$ 7,000.00 Per Installed Total Station**
Removal of Automated Motorized Total Stations and Target Prisms	**$ 1,000.00 Per Removed Total Station**
Automated Motorized Total Station Monitoring and Report Preparation	**$4,500.00 per Month per Total Station**
Relocation of Automated Motorized Total Station	**$ 2,500.00 per Relocation**
Servicing ATMS/Equipment Maintenance	**$ 700.00 per Visit**
Crack Monitoring	
Option 1: Manual Crack Monitoring	
Installation of Avongard Crack Monitors	**$ 700.00 (Lump Sum)** *Includes up to five (5) installed crack gauges. Additional gauges are $70.00 each*
Manual Reading of Crack Monitoring Points by Field Technician	**$ 500.00 per Visit**
Option 2: Automated Crack Monitoring	
Installation of Automated Crack Monitors	**$ 700.00 per Installed Crack Monitor**
Automated Crack Monitor Monitoring and Equipment Rental	**$ 250.00 per Monitor per Month**
Weekly Reports/Instrumentation Website	
Preparation of Weekly Reports/Instrumentation Website for Vibration Monitoring, Optical Monitoring, Crack Monitoring	**$100.00 per Week**

CERTERRA
INSTRUMENTATION & MONITORING

Certerra Engineering Services (if necessary)			
Hourly Rates			
Item No.	Description	Unit Price	Unit
1	Principal Engineer	$ 325.00	per hour
2	Senior Engineer (P.E.)	$ 250.00	per hour
3	Senior Technician	$ 200.00	per hour
4	Project Manager	$ 150.00	per hour
5	Staff Engineer (E.I.T.)	$ 100.00	per hour
6	Field Technician	$ 75.00	per hour
7	Administrative/Office	$ 60.00	per hour

Clarifications:

- The following estimation is an approximate of what the client will be charged based on Certerra's experience with projects of similar size and scope
- M-F Regular Business Hours. OT/Nights/SAT will be billed at 1.5x the listed rate. SUN/Holidays will be billed at 2.0x the listed rate.
- Client will be responsible for any damages to equipment, including, but not limited to, theft, abuse, damage, negligence, vandalism, or unexplained disappearances.
- Client shall be responsible for repair charges due to accidents or mishandling, including, but not limited to, power surges, water damage, construction activities, etc

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Estimation of Scope of Services

Estimation - One Time Charges				
Service	**Quantity**	**Units**	**Unit Price**	**Extended Price**
Condition Surveys				
Pre-Construction Condition Survey	1	Lump Sum	$2,000.00	$2,000.00
Post-Construction Condition Survey	1	Lump Sum	$2,000.00	$2,000.00
Monitoring Plan				
Development/Implementing of Monitoring Plan	1	Lump Sum	$2,000.00	$2,000.00
Vibration/Noise Monitoring				
Vibration/Noise Monitoring Install	3	per Monitor	$400.00	$1,200.00
Vibration/Noise Monitoring Removal	3	per Monitor	$250.00	$750.00
Optical Monitoring				
Installation/Positioning of Automated Motorized Total Stations and Target Prisms	1	per Installed Total Station	$7,000.00	$7,000.00
Removal of Automated Motorized Total Stations and Target Prisms	1	per Removed Total Station	$1,000.00	$1,000.00
Total (One Time Charges)				**$15,950.00**

Estimation - per Month				
Service	**Quantity**	**Units**	**Unit Price**	**Extended Price**
Vibration/Noise Monitoring				
Vibration Monitoring and Equipment Rental	3	per Unit per Month	$500.00	$1,500.00
Optical Monitoring				
Automated Motorized Total Station Monitoring and Report Preparation	1	per Month per Total Station	$4,500.00	$4,500.00
Weekly Reports/Instrumentation Website	5 ~~4~~	per Week	$100.00	~~$400.00~~ $500.00
Total (Per Month)				~~**$6,400.00**~~ $6,500.00

Pricing Summary - Estimated 6 Month Span				
Service	**Quantity**	**Units**	**Unit Price**	**Extended Price**
One Time Charges	1	Lump Sum	$15,950.00	$15,950.00
Monthly Charges	11 ~~6~~	per Month	~~$6,400.00~~ $6,500.00	~~$38,400.00~~ $71,500.00
Total (6 Months)				~~**$54,350.00**~~ $87,450.00

CERTERRA
INSTRUMENTATION & MONITORING

Project: City of Chandler – Water System Program, Phase 1 – City Project No. PW3-925-4631, GMP 2

By signing below, you hereby authorize Certerra to proceed with services outlined in this proposal or requested by you and agree that all services and anything arising out of or in any way related to this proposal will be governed by Certerra's Fee Schedule and General Conditions which are attached hereto and are incorporated herein by reference. This authorization to proceed constitutes an agreement between you and Certerra and is made in consideration of the mutual promises and covenants contained herein and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged.

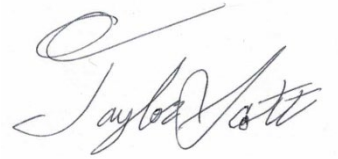
Thank you for the opportunity to submit this proposal. We look forward to working with you on this project. If you have any questions regarding this proposal, please contact the undersigned.

Authorized By:

Client
*Name:*_____
Contact
*Printed:*_____
Contact
*Signature:*_____

Respectfully submitted,

Certerra
Taylor Scott
Business Development Manager



taylor@bigapplegroupny.com
T : 718.767.2900
D : 856.229.1012

CERTERRA
INSTRUMENTATION & MONITORING

GENERAL CONDITIONS

AGREEMENT. This agreement is made by and between Certerra Instrumentation and Monitoring, LLC ("CERTERRA") and the party that accepted CERTERRA's proposal or requested that CERTERRA perform Services ("Client"). CERTERRA shall mean the aforementioned entity, any of its affiliates or subsidiaries to the extent same are performing any of the Services under this Agreement, and their respective engineers and employees. This "Agreement" includes CERTERRA's proposal and any exhibits or attachments noted in the proposal or incorporated by reference including but not limited to these General Conditions. Requesting Services from CERTERRA shall constitute acceptance of the terms of these General Conditions.

1. **SCOPE OF SERVICES.** Services means the service(s) performed by CERTERRA for Client or at Client's direction. CERTERRA's findings, opinions, and recommendations are based upon data and information obtained by and furnished to CERTERRA at the time of the Services. CERTERRA may rely upon information provided by the Client or third parties. Client may request additional work or changes beyond the scope of Services described in CERTERRA's Proposal. If any alteration or addition of Services are requested by the Client ("Additional Services"), CERTERRA may provide a proposal detailing the additional scope of work, time extension and associated fees for Client's review. Client shall provide written acceptance of such. CERTERRA shall not be obligated to perform the Additional Services, if Client does not follow these procedures, but instead directs, authorizes, or permits CERTERRA to perform the Additional Services without written acceptance. To the extent CERTERRA does perform the Additional Services without written acceptance, CERTERRA will be paid for this work according to its proposal for same or current fee schedule.

2. **DELAYS. CERTERRA** shall be entitled to an equitable adjustment to the project schedule and compensation to compensate CERTERRA for any increase in time or costs necessary to perform the Services under this Agreement due to any cause beyond CERTERRA's reasonable control. All promises related to the time of the Services are approximations by CERTERRA and are subject to the Client and contractor's schedules, weather conditions, travel conditions, disputes with workmen or parties, accidents, strikes, natural disasters, health emergencies, discovery of hazardous materials, differing or unforeseeable site conditions or project conditions, acts of governmental agencies or authorities, or other causes. In no event shall CERTERRA be responsible for any damage or expense due to delays from any cause, other than to the extent the damage or expense is directly caused by CERTERRA's own proven negligence after having been warned in writing by the Client of the damage or expense which may result from the delay.

3. **CERTERRA RESPONSIBILITIES.** Services performed by CERTERRA under this Agreement will be conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the same profession currently providing the same or similar services under similar circumstances in the same locality and in accordance with applicable standards in effect at the time the Services are performed. CERTERRA MAKES NO OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Testing or inspection Services may require the destruction of a sample or sample location. Client understands that, in the normal course of performing the Services, some damage may occur, and understands that CERTERRA is not responsible for the correction of any such damage or for replacing samples. Client acknowledges that opinions, data, interpretations and recommendations prepared by CERTERRA are based on limited data and recognizes that subsurface conditions or other actual conditions may vary from those encountered at the location where inspections, tests, borings, surveys, or explorations are made by CERTERRA and may vary from those depicted on logs of discrete borings, test pits, or other exploratory Services or from information provided to CERTERRA by Client. There is an inherent risk that samples or observations may not be representative of materials or locations not sampled or seen and that conditions may change over time. Variations between inspected or tested discrete locations may occur and the risk of such occurrence is understood and accepted by Client. Client is responsible for notifying the appropriate party or professional regarding the correction of any deviations or deficiencies noted by CERTERRA and CERTERRA accepts no liability in connection therewith. CERTERRA shall not be responsible for the interpretation by others of information developed by CERTERRA and makes no guarantee that CERTERRA's recommendations are properly implemented by any party. CERTERRA shall not be held liable for problems that may occur if CERTERRA's recommendations are not followed. To the fullest extent permitted by law, Client shall indemnify and hold harmless the Indemnitees (as defined below) from any and all Losses (as defined below) arising from or related to interpretations made by others.

4. **SUBSURFACE EXPLORATIONS.** Client understands CERTERRA's layout of boring and test locations is approximate and that CERTERRA may deviate a reasonable distance from those locations. Client acknowledges that it is impossible for CERTERRA to know the exact composition of a site's subsurface, even after conducting a comprehensive exploratory program. There is a risk that drilling and sampling may result in contamination of certain subsurface areas. To the fullest extent permitted by law, Client waives any claim against, and agrees to defend, indemnify and save the Indemnitees harmless from any Losses which may arise as a result of subsurface contamination caused by drilling, sampling, or monitoring well installation. Client also agrees to adequately compensate CERTERRA for any time spent and expenses incurred in defense of any such claim.

5. **CLIENT PARTICIPATION.** Client will make available to CERTERRA all information in its possession regarding existing and proposed conditions at the site, of which CERTERRA may rely on to perform its Services. Such information shall include, but not be limited to engineering reports, plot plans, topographic surveys, hydrographic data, soil data including borings, field and laboratory tests and written reports. Client shall immediately transmit to CERTERRA any new information concerning site condition which becomes available, and any change in plans or specifications concerning the project. CERTERRA shall not be liable for any inaccurate or incorrect advice, judgment or decision which is based on any inaccurate information furnished by Client and Client, to the fullest extent permitted by law, shall indemnify the Indemnitees against any and all Losses arising out of, or contributed to, by such inaccurate information. In the event Client, the project owner, or other party makes any changes in the plans and specifications, Client agrees, to the fullest extent permitted by law, to indemnify and hold the Indemnitees harmless from any and all Losses arising out of such changes, and Client assumes full responsibility unless Client has given CERTERRA prior notice and has received CERTERRA's written consent for such changes. CERTERRA does not assume responsibility for any conditions at the Client's site(s) that may present a danger, either potential or real, to health, safety, or the environment. Client hereby agrees that it is the Client's responsibility to notify any and all appropriate federal, state, or local authorities, as required by law, of the existence of any such potential or real danger and otherwise to disclose to all appropriate or affected individuals or entities, in a timely manner, any information that may be necessary to prevent any danger to health, safety, or the environment. Client assumes sole responsibility for determining whether the quantity and the nature of Services ordered by Client is adequate and sufficient for Client's intended purpose.

6. **THIRD PARTIES.** To the fullest extent permitted by law and to the extent not resulting from CERTERRA's proven negligence, Client agrees to defend, indemnify, and hold harmless CERTERRA and all of its agents, affiliates,

subsidiaries, officers, directors, representatives, and employees and their successors (collectively the "Indemnitees") from any and all claims, losses, causes of action, demands, suits, losses, charges, liability, expenses, costs, defense costs, disbursements (including attorney fees and costs at trial and appeal), and/or allegations of responsibility ("Losses") by any and all third parties including but not limited to, contractors, subcontractors, agents, employees (including without limitation Client's employees), assignees transferees, successors, invitees, neighbors, and the public relating in any way to this Agreement, the Services, or the project. It is expressly understood and agreed that the enforcement of these terms and conditions shall be reserved to the Client and CERTERRA. Nothing contained in this Agreement shall give or allow any claim or right of action whatsoever by any third person. It is the express intent of the Client and CERTERRA that any such person or entity, other than Client or CERTERRA, receiving services or benefits under this Agreement shall be deemed an incidental beneficiary. Neither party may assign this Agreement or any right or obligation hereunder without the prior written consent of the other party, which shall not be unreasonably withheld or delayed; provided, however, that no consent shall be necessary in the event of an assignment to a successor entity resulting from a merger, acquisition or consolidation by or of CERTERRA or an assignment to an affiliate or subsidiary of CERTERRA.

7. **SAMPLE DISPOSAL.** Samples are consumed in testing or disposed of upon completion of tests or upon report completion (unless stated otherwise in the Services). Client acknowledges that contaminated drill cuttings, sample spoils, wash water, and other materials may be produced as a result of encountering hazardous materials at the site. In such event, Client shall be responsible for their proper transportation and disposal. CERTERRA may be able to arrange for the transportation and disposal of hazardous materials at Client's request. In no event shall CERTERRA be required to sign a hazardous waste manifest or take title to any hazardous materials. Contaminated samples delivered to or taken to CERTERRA's laboratory for testing shall remain the property of Client and Client is responsible for ultimate disposal of any samples which are found to be contaminated. On request, Client shall retrieve contaminated samples from CERTERRA's laboratory and dispose of them in an approved manner.

8. **DISCOVERY OF UNANTICIPATED HAZARDOUS MATERIALS.** Client shall furnish to CERTERRA all documents and information known or available to Client that relate to the identity, location, quantity, nature, or characteristic of any hazardous waste, toxic, radioactive, or contaminated materials prior to commencement of the Services. Client warrants that it has made reasonable efforts to disclose known or suspected hazardous materials on or near the project site. Client agrees that the discovery of such unanticipated hazardous materials constitutes a changed condition which may require either a re- negotiation of the scope of CERTERRA's Services, time for completion, and compensation or termination of such Services or this Agreement. Client recognizes that the discovery of hazardous materials may necessitate immediate protective measures to safeguard the public health and safety and agrees to compensate CERTERRA for measures that in CERTERRA's professional opinion are justified to preserve and protect the health and safety of site personnel and the public. Client agrees to compensate CERTERRA for any equipment decontamination or other costs incident to the discovery of unanticipated hazardous materials. Client agrees that in the event of the discovery of hazardous materials at the site it will report such discovery to the proper authorities as required by federal, state, and local regulations. Client also agrees to inform the project site owner in the event that hazardous materials are encountered at the site. Notwithstanding any other provision of the agreement, to the fullest extent permitted by law, Client waives any claim against CERTERRA and agrees to defend, indemnify, and save the Indemnitees harmless from any and all Losses arising from the presence of hazardous materials on the project site.

9. **SITE CONDITIONS.** Client shall secure all necessary approvals, notices, permits, licenses, and consents from all owners, lessees, contractors, and other possessors of the project, necessary to commence and complete the Services, and will provide CERTERRA access to the project site for all equipment and personnel necessary for the performance of the Services. CERTERRA shall be allowed free access to the site. Client understands and agrees that CERTERRA shall only be responsible for losses which directly result from CERTERRA's negligence. Client is responsible for the accuracy of locations for all subterranean structures and utilities. To the fullest extent permitted by law, Client waives any claim against CERTERRA, and agrees to defend, indemnify, and hold the Indemnitees harmless from any and all Losses arising from damage done to subterranean structures and utilities not identified or accurately located. In addition, Client agrees to compensate CERTERRA for any time spent or expenses incurred by CERTERRA in defense of any such claim.

10. **ENVIRONMENTAL LIABILITY.** Neither this Agreement nor the providing of Services will operate to make CERTERRA an owner, operator, generator, transporter, treater, storer, or arranger for disposal or treatment within the meaning of the Resource Conservation Recovery Act, Comprehensive Environmental Response Compensation and Liability Act, or within the meaning of any other law governing the handling, treatment, storage, or disposal of hazardous materials. To the fullest extent permitted by law, Client will indemnify, defend and hold the Indemnitees harmless from and against any and all Losses arising or claimed to arise from violations by Client of any and all environmental laws, rules and regulations relating to the existence, generation , current or future ownership, storage, transport or disposal of pre-existing hazardous substances and wastes, but this indemnity shall not cover such loss, damage, cost or expense to the extent caused by CERTERRA's proven negligence in performing the Services under this Agreement. For purposes of this Agreement, a pre-existing hazardous substance is any hazardous substance or hazardous waste having been generated by Client or existing on Client's premises prior to the date of this Agreement.

11. **OWNERSHIP AND LEGAL USE OF DOCUMENTS.** All notes, data, reports, original final reproducible drawings, plans, specifications, calculations, and studies memoranda assembled or prepared by CERTERRA are instruments of service with respect to the subject project, and CERTERRA shall retain an ownership and property interest therein, whether or not the project is completed. The Client may make and retain copies for information and reference in connection with the subject project; however, such documents are not intended or represented to be suitable for re-use by the Client or others. Any modification, changes, or reuse without written verification or adaptation by CERTERRA for the specific purpose intended will be at the Client's sole risk and without liability or legal exposure to CERTERRA, and the Client, to the fullest extent permitted by law, agrees to indemnify and hold harmless the Indemnitees against any and all Losses whatsoever arising out of or resulting therefrom.

12. **ALLOCATION OF RISK AND LIMITATION OF LIABILITY.** The parties have evaluated the respective risks and remedies under this Agreement and agree to allocate the risks and restrict the remedies to reflect that evaluation. Notwithstanding any other provision to the contrary in this Agreement and to the fullest extent permitted by law, Client agrees to restrict its remedies under this Agreement against CERTERRA, its parents, affiliates and subsidiaries ("CERTERRA Covered Parties"), so that the total aggregate liability of CERTERRA Covered Parties shall not exceed $50,000 or the actual paid compensation for the Services performed by CERTERRA under this Agreement, whichever is greater. This restriction of remedies shall apply to any and all Losses of any nature arising from or related to this Agreement without regard to the legal theory under which such liability is imposed. Claims must be brought within one calendar year from performance of the Services.

13. **LIABILITY FOR OTHERS.** CERTERRA shall not be responsible for supervising, overseeing, or controlling the Client's contractors or for their means and methods, procedures, performance, or site safety. CERTERRA shall not be responsible for the acts or omissions of the Client, owner,

architect, architect's other consultants, contractor, subcontractors, other third parties or their respective agents, employees, assigns, successors, or any other persons ("Others"). CERTERRA shall have no authority to control Others regarding their work or their safety practices. CERTERRA does not control or guarantee the work of Others. CERTERRA has no duty to inspect or correct health and safety deficiencies of Others. CERTERRA will not be responsible for the failure of Others to perform in accordance with their undertakings and the providing of CERTERRA's Services shall not relieve Others of their responsibilities to the Client or Others. CERTERRA reserves the right to report to the Client any unsafe conditions observed at the project without altering the foregoing.

14. **CONSEQUENTIAL DAMAGES WAIVER.** Notwithstanding anything to the contrary in this agreement and to the fullest extent permitted by law, Client and CERTERRA waive against each other any and all claims for or entitlement to special, incidental, indirect, consequential, delay, punitive, or similar losses or damages arising out of, resulting from, or in any way related to the project or this Agreement.

15. **INSURANCE.** CERTERRA will maintain the following insurance coverages and amounts: (1) Workers Compensation insurance as required by law, (2) Employer's Liability insurance with coverage of $1,000,000 per each accident/employee, (3) Commercial General Liability insurance with coverage of $1,000,000 per occurrence/aggregate, (4) Automobile Liability insurance with coverage of $1,000,000 combined single limit, and (5) If CERTERRA is providing professional services, Professional Liability insurance with coverage of $1,000,000 per claim/aggregate. Client shall name CERTERRA as additional insured on its Builder's Risk policy. Client shall require any general contractors working on the project site to include CERTERRA in any indemnity that the Client requires such contractors to provide to the Client and as an additional insured under any such contractor's general liability insurance policy. Client shall provide CERTERRA with a certificate of insurance evidencing the required insurance.

16. **RESOLUTION OF DISPUTES.** Client shall not be entitled to assert a Claim against CERTERRA based on any theory of professional negligence unless and until Client has obtained the written opinion from an independent and reputable Professional Engineer (P.E.), licensed architect (A.I.A.), or Registered Geologist (R.G.) that CERTERRA has violated the standard of care applicable to CERTERRA's performance of the Services. Such party shall be currently practicing in the same discipline as CERTERRA and be licensed in the state where the project is located. This written opinion shall specify the acts or omissions that the independent engineer, architect, or geologist contends are not in conformance with the standard of care for professional services performed by local consultants under similar circumstances; and state in detail the basis for their independent opinion that such acts or omissions do not conform to that standard of care. Client shall provide this opinion to CERTERRA and the parties shall endeavor to resolve the dispute within 30 days. This Agreement shall be governed by and construed in accordance with the laws of the state where the CERTERRA office originating the work or proposal is located. Exclusive of lien claims, any legal action or proceeding brought to enforce or otherwise arising out of or relating to this Agreement shall be brought in the county where the CERTERRA office originating the work or proposal is located. Each party waives its right to a jury trial in any court action arising between the parties, whether under this Agreement or otherwise related to the work being performed under this Agreement.

17. **COMPENSATION AND PAYMENT TERMS.** Client agrees that an invoice amount is due when received unless otherwise agreed. A service charge of one and one-half percent (1-½%) per month (but not exceeding the maximum allowable by law) will be added to any account not paid within 30 days after the invoice date. In the event that any portion of the account remains unpaid 30 days after the invoice date, CERTERRA may immediately discontinue Services on any and all projects for Client, or withhold any final report or instrument of service, or demand prepayment of fees at CERTERRA's option. Client shall pay all costs incurred by CERTERRA in collecting any delinquent amount, including staff time, court costs and attorney fees. To the fullest extent permitted by law, failure to make payment within sixty (60) days of invoice shall constitute a release of CERTERRA from any and all claims which Client may have, either in tort or contract, and whether known or unknown at the time. Should Services based on a fee schedule be performed beyond the end of the calendar year, CERTERRA's current fee schedule shall apply unless otherwise negotiated in advance.

18. **TERMINATION.** This Agreement may be terminated without cause by either party upon thirty (30) days written notice, and at any time by either party if the other party defaults in the performance of any material provision of this Agreement and such default continues for a period of seven (7) days after written notice thereof. In the event of termination, CERTERRA will be paid for Services performed through the date of termination, plus reasonable termination expenses, including the cost of completing analyses, demobilization, records and reports necessary to document job status at the time of termination.

ENTIRE AGREEMENT. This Agreement constitutes the entire agreement between the parties and shall supersede other prior agreements and representations. No amendments to this Agreement shall be valid unless made in writing and signed by the parties. If Client uses its standard business forms, all pre-printed terms and conditions contained in or on such forms shall be deemed stricken and null and void. If the terms and conditions of this Agreement conflict with the terms and conditions of any other agreement or document this Agreement shall govern and control over any such conflict. The invalidity or unenforceability of any portion(s) of this Agreement shall in no way affect the validity or enforceability of any other portion(s) hereof. Any invalid or unenforceable portion shall be severed from the Agreement and the balance of the Agreement shall be construed and enforced as if the Agreement did not contain a particular portion held to be invalid or unenforceable. This Agreement may be executed in several counterparts, each of which shall be deemed an original having identical legal effect. The titles, captions and headings of this Agreement are included for ease of reference only and will be disregarded in interpreting or construing this Agreement. CERTERRA shall not be bound by any language incorporating by reference any contract or term of any contract unless the term or terms incorporated by reference are specifically furnished to CERTERRA and are expressly agreed to in a writing signed by CERTERRA.

CONCRETE READY MIX QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	CONCRETE READY-MIX
ESTIMATOR INITIALS	EK

BID QUANTITIES					ROCK SOLID (DOESN'T MEET SPECS)		CAL PORTLAND		DESERT READY MIX (WRONG MIX)	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**
01	33.43.101	4500 PSI READY MIX	134.29	CY	$ 151.75	$ 20,378.51	$ 157.00	$ 21,083.53	$ 144.00	$ 19,337.76
01	33.43.101	4500 PSI READY MIX	285.02	CY	$ 151.75	$ 43,251.79	$ 157.00	$ 44,748.14	$ 144.00	$ 41,042.88
01	33.43.102	1/2 SAK PHCLSM SLURRY	4528.22	CY	$ 103.75	$ 469,802.83	$ 113.00	$ 511,688.86	$ 105.00	$ 475,463.10
		ENVIRONMENTAL CHARGE	551	LD	$ -	$ -	$ 25.00	$ 13,775.00	$ 29.25	$ 16,116.75
		TECH ADMIN FEE	551	LD	$ -	$ -	$ -	$ -	$ -	$ -
		PARTIAL LOAD DELIVERY FEE (3.5-6.5 CY; 2 EA FOR 4500 PSI & 3 EA FOR CLSM)	5	LD	$ 200.00	$ 1,000.00	$ 200.00	$ 1,000.00	$ 200.00	$ 1,000.00
		DIESEL FUEL SURCHARGE (PER EIA PUBLISHED RATES; BASED ON $4.50 - $5.00/GAL)	551	LD	$ 20.00	$ 11,020.00	$ 20.00	$ 11,020.00	$ 20.00	$ 11,020.00
		ESCALATION ON MATERIALS	4947.53	CY	$ 10.00	$ 49,475.30	$ 10.00	$ 49,475.30	$ 10.00	$ 49,475.30

ROCK SOLID
6741 W. Rock Solid Way, Box 5062, Chandler, AZ 85226
480 496-9633 (office); 480-496-4511 (dispatch)
www.rocksolidconcrete.com

Quote Number **Acct Pending**

MATERIAL PRICE QUOTE

Quote Date	*8/19/25*
Prices Expire on:	*3/1/2026*

Customer Name *Archer Western Construction*
Project Name *Pecos Water Supply Phs 1 GMP 2*
Project Address *1475 east Pecos, Chandler*
Contact Name Ed Kluber
Contact Phone 385-237-7704
Contact email ekluber@walshgroup.com

Source Plant: 2

Quantity	*Product Code*	Description	Application	Price	*U of M*	*Notes*
TBD	*A4040*	*Mag AA 4000 PSI Ash*	*SITE*	*$151.75*		
	A3040	*Mag A 3000 PSI Ash*		*$146.75*		
	A1050	*1/2 Sack ABC CLSM*		*$103.75*		
	A1100	*1 Sack ABC CLSM*		*$108.75*		
	NOTE	*THIS IS AN ALTERNATE QUOTE ONLY*				
		AS IT DOSNT MEET THE NSF/ANSI SPEC.				
	P40	***Environmental Fee***		*$0.00*	CY	
	P16	***Tempered Water***		*$0.00*	CY	
	FSC	***Fuel Surcharge***	***See Attached Letter***			
Price Escalation:						

General Terms and Conditions:

Pricing above is based on Monday-Friday Delivery.

Customer is responsible for safe access to project point-of-delivery and mixer wash out area for all shipments.

Quote is valid for 30 days. Pricing is confirmed only upon receipt of signed acceptance (below) within 30 days of quote date.

Rock Solid Is not responsible for hardened concrete color and color variations between shipments of concrete containing color granules

Payment Terms: Net 30 days; **2% discount allowed if payment received by the 10th of the month following delivery.**

Prices do not include sales taxes. If Sales Tax Exemption Documents are not received prior to first delivery, sales taxes will be charged.

Cancellation of orders within 24 hours of shipment will result in a charge of $10 per cubic yard, minimum $250.

Standby Charges: Allowance of 6 min per cy to unload concrete. Thereafter, subject to fee of $1.50/minute to unload.

Delivery Charges: Less than 5 cy--$200

Saturday Plant Opening Fee: $2500

Non-Chloride Accelerator: $1.00/unit, 4 units= 1%;

Hydration Stabilizer: $1.10/level (approximately 30 min. per level)

Color washout Charge: $50 per load

Rock Solid mix designs include low alkali cement and fly ash to help mitigate potential for Alkali-Silica Reactivity (ASR) in concrete mixes. Purchaser assumes ASR liability for mixes requested without fly ash or low alkali cement. Rock Solid is not currently bidding any air entrained concrete mixes.

Quoted by: Frank Campbell
email: fcampbell@rocksolidconcrete.com

Accepted by: _____
Date: _____

CALPORTLAND®

Price Expiration:
04/01/2026
See acceptance clause below

Customer Name	ARCHER WESTERN CONSTRUCTION	Attention	
Project Name	CITY OF CHANDLER PECOS WATER SYSTEM	City	CHANDLER
Project Address	1475 EAST PECOS ROAD	C/St	
Office Phone		Fax	
Email			

Date	09/03/2025	Sales	WIL WITTMANN	Cell #	(480) 978-7820	Email	wwittmann@calportland.com	Quote #	153748
Customer #	1029364	Job Start	09/03/2025	Job End	04/01/2026				

Volume	Product Number	Description	Unit Price	UOM	Comments
5000.00	PHCLSM	0.5 SK ABC SLURRY (PHCLSM 1/2)	$113.00	CY	
	W42257F1	4500 PSI 1" 0.42 W/C ASH FLOWABLE	$157.00	CY	
5000	**Total Volume**		$ 25.00	LOAD	Environmental Fee
			$ 20.00	LOAD	Energy Fee
Fly ash and lightweight mixes subject to daily availability / All aggregates meet ASTM C 33.					

Comments : PRICE INCLUDES 10/1/25 INCREASE, PRICE INCREASE $10CY 4/1/26, PRICE INCREASE $10CY 10/1/26, PRICE EXPIRES 12/31/26
*NOT BID TO SPEC, AIR ENTRAINMENT NOT INCLUDED.

This will be prior to us purchasing

Subject to availability. CalPortland warrants that the concrete as delivered to this project will meet or exceed the design strength specified on the delivery ticket when evaluated in accordance with applicable ACI and ASTM standards. CalPortland does not provide Contractor Quality Control. CalPortland guarantees ticketed mix designs of less than 5,000psi for load of three yards or more. Mix strength for loads less than three yards is not guaranteed. Ticketed mix designs of 5,000psi or greater require a four-yard minimum. Three-yard minimum for all colored concrete. Concrete is a natural product. Seller cannot be responsible for variations in color, surface discoloration, popouts or variations in the finished product caused by finishing techniques or job site conditions. Due to potential reactive aggregates in Arizona, CalPortland recommends the use of a Class F Fly Ash to mitigate Alkali Silica Reactivity (ASR). Purchaser shall assume the liability for the use of a cement-only mix. On-site addition of allowable water per ASTM C94. CalPortland cannot guarantee single source materials.
CalPortland reserves the right to postpone or cancel any quotes, current jobs or accepted deliveries if unable to perform due to raw material shortages, allocations or government regulations. Prices subject to change due to drastic cost changes of the major components of concrete or Fees.
Concrete is batched and delivered at current ambient temperatures. Buyer is responsible for temperature controlled concrete (Ice/Tempered Water). Prices for temperature controlled concrete are available upon request.
Contractor is responsible for providing safe access to the point of delivery. CalPortland accepts no responsibility for damages to the premises beyond the curb line.
Customer shall provide and assume responsibility for an area or container for clean out of the concrete truck chutes. Additional color added by Buyer on-site subject to wash out fees.
All products quoted per Buyers request. Additional products or services ordered are subject to applicable charges.
The Energy and Environmental Fees charged herein may be more or less than the actual environmental or energy costs incurred by Seller in the production, storage and/or delivery of materials and are not designed nor intended to represent the specific environmental and/or energy costs incurred for any individual order.

Standard Operating hours	Loads batched outside Standard Operating Hours subject to applicable charges. Summer: 3:00AM – 2:00PM Winter: 5:00AM – 3:00PM Saturday: 5:00AM – 12:00PM
Standing Time:	$2.00 per minute beyond 5 minutes per CY.
Minimum Load Charges:	One Minimum Load Charge waived on orders of 1 full load or more. Under 6 CY = $200.00
Excessive Trucking Fee:	Split Loads or multiple Order Backs subject to Excessive Trucking Fees.
Energy Fee:	Variable Energy Fee based on U.S. Energy Information Administration On-Highway Diesel Energy Price Index and is adjusted weekly. https://www.eia.gov/petroleum/gasdiesel/
Terms:	All pricing is net 30 days with a valid credit application on file. All applicable sales taxes will be added to price.
Financing:	All invoices are due and payable within 30 days of the original billing date. A Finance Charge of 1.5% per month on a pro-rated portion thereof (12% Annual Percentage Rate) will be charged upon all balances not paid within 30 days or first appearance on a Statement. We impose a Fee of 2.25% on the transaction amount on all credit card products, which is not greater than our cost of processing. We do not Fee debit cards.
General Terms & Conditions of Sale:	CalPortland Co. Terms and Conditions are applicable and included as page two of this quote. If you did not receive a copy, please contact CalPortland Sales Department at (602) 817-6950.
Acceptance:	For this job quotation to be effective, written acceptance must be received no later than 30 days after quote date.

NRMCA NATIONAL READY MIXED CONCRETE ASSOCIATION MATERIALS DIVISION MEMBER

Buyer Acceptance: _____

Name / Title: _____

Date: _____

Ready Mix Terms and Conditions

Customer #	1029364	**Customer Name**	ARCHER WESTERN CONSTRUCTION
Quote #	153748	**Project Title**	CITY OF CHANDLER PECOS WATER SYSTEM

Tempered Water:	Heated Water $2.00 per cubic yard.
Ice:	$0.50 per pound (Requires 3 – 5 business days notice).
Non-Chloride Accelerator:	$0.09 per ounce.
Recover Set Delay Admixture:	$0.20 per ounce.
Micro Fiber:	$6.50 per pound.
Macro Fiber:	(Structural) Priced individually
	Please see manufacturer recommendation / specifications for suggested dosage rate.
Standard Liquid Color:	See mix detail for per yard pricing. Actual color of concrete may vary due to differences in cement, aggregates, job site conditions and finishing methods. Three-yard minimum load required.
Color Washouts:	$25.00 per load
Standby Charges:	$2.00 per minute beyond 5 minutes per cubic yard.
Minimum Load:	Under 6 CY = $200.00
Excessive Trucking:	One Excessive Trucking Fee of $200 will be assessed for each additional load required due to load sizes or multiple Order Backs.
Saturday Service:	$10.00 per cubic yard Saturday operating hours 5:00am – 12:00pm Loads delivered outside of operating hours subject to additional charges
Split Load Charges:	$250.00 per load.
Cancellation Charges:	All orders cancelled within 24 hours of scheduled delivery will be charged $10.00 per cubic yard or $250.00. Whichever is greater.
Return Concrete:	All loads returned with 5 cubic yards or more will be charged a Return Concrete Fee of $300.00 per load.

Special Provisions:

DESERT READY MIX

READY MIX CONCRETE SALES AND SERVICE
4011 PRESIDO STREET
MESA, AZ 85215
OFFICE: 480-428-2280 FAX: 480-985-4248

Begin Date:	September 5, 2025	Quote # :	29092
Expiration Date:	December 31, 2025	MAP/GRID	

Customer: **ARCHER WESTERN CONSTRUCTION, LLC**
Customer Code: ARCH001
Address:
PHOENIX, AZ 85040
Contact: HANNAH EPPS
Phone: 602-246-1485
Fax:
Project: **CITY OF CHANDLER PECOS WATER PHASE 1**
Job Address: 1475 EAST PECOS ROAD
Terms Description: **2% 10TH NET 30**

These are the wrong mix designs, should be 4500 PSI

Item Code	Item Description	Est. Qty	Price
A203051	MAG A 3000 NAT POZZ	420	$142.00
F203051	MAG A 3000 FLOW NAT POZZ		$144.00
S500501	PHCLSM.5 (1/2 SK SLURRY COP)	4530	$105.00
TC	TEMPERATURE CONTROL		$1.00

Additional Fees

Fee ID *	UOM	Price
ENV	PER YARD	$3.25
FSC	PER LOAD	TBD

Minimum Load Fee

Less than or equal to	UOM	Price
2	Load	0
3.5	Load	0
5.5	Load	0

- Normal operating hours are Mon-Fri, Sat, Sun or Holidays are subject to surcharges.
- Color added at no expressed guarantee.
- Drivers do not accept cash or make change.
- Desert Ready Mix reserves the right to increase prices due to RAW Material cost increases such as Cement, Fly Ash, Aggregates or unexpected Fuel increases.
- All specialized aggregate sales are based on availability.
- Deliveries less than 6 Cubic yards are subject to our minimum load charges.
- This quote does not guarantee product or service availability
- All Aggregates and Concrete deliveries include a per load fuel surcharge.

Quoted By: Kristopher Kepler

* E – Environmental | S – Saturday Fee | F – Fuel Surcharge

CONCRETE SAW CUTTING QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	CONCRETE SAW CUTTING
ESTIMATOR INITIALS	EK

BID QUANTITIES					A-CORE		ADVANCED GPR		COPPER VALLEY CONTRACTORS		SWB PAVING	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**
01	02.01.114	SAWCUT ASPHALT-04" THICK	70	LF	$ 5.00	$ 350.00	$ 13.28	$ 929.60	$ 1.20	$ 84.00	$ 6.43	$ 450.10
		MOBILIZATION	1	EA	$ 100.00	$ 100.00	$ -	$ -	$ 385.00	$ 385.00	$ -	$ -
SUBTOTAL						$ 450.00		$ 929.60		$ 469.00		$ 450.10
BOND TOTAL					0.00%	$ -	0.00%	$ -	0.00%	$ -	0.00%	$ -
TEXTURA TOTAL					0.24%	$ 1.08	0.24%	$ 2.23	0.24%	$ 1.13	0.24%	$ 1.08
BID AMOUNT TOTAL						$ 451.08		~~$ 931.83~~		~~$ 470.13~~		~~$ 451.18~~

Quote: 34299

Date: 28 Aug 2025
Expires: 27 Sep 2025
Quoted By: Jeff Frehner
(480) -
jeff.frehner@a-core.com

A-Core Concrete Cutting, Inc. | 605 Drew St Mesa AZ 85210
Phone# (480) 964-8662 | Fax # | License# 196637 CR-5

Customer	Contact	Job Information
ARCHER WESTERN CONTRACTORS 4710 E. Elwood St. PHOENIX, AZ 85040 (602) 246-1485	Ed Kluber (385) 237-7704 ekluber@walshgroup.com	Chandler Pecos Water System 1475 East Pecos Road Chandler, AZ 85225

Qty	Description			Price	Adj	Total
1	Flat Saw	Linear Feet: Depth: Material:	70' 4" Asphalt	350.00	Min	350.00
1	Mobilization	Description:	Service truck	100.00	Each	100.00

Total 450.00

General Terms & Conditions

This document is to be accepted before the expiration date listed above; otherwise, price is subject to change.

- Protection of existing conditions by others
- If we hit extra heavy amounts of rebar/steel or anything else unforeseen buried in the concrete that would cause excessive wear or damage to our diamond bits, blades or equipment, we will charge you accordingly for this.
- A-Core Inc. will not be responsible for repairs from cutting buried utilities or structures.
- Contractor is responsible for all layout of cut lines & holes.
- A-Core Payments terms are Net 30 with 0% retention, for current account holders.
- Price subject to change if conditions and scope on job vary from this quotation.
- If a bond is required there will be a 3% charge of the bond amount.
- A-Core reserves the right to have an escalation clause as part of this estimate.
- Finance charge of 1.5% per month (APR 18%) on invoices unpaid 30 days from billing date. In event of default of payment, buyer agrees to pay collection costs, lien fees, and reasonable attorney fees. Lien(s) may be filed in accordance with prevailing state lien law on any unpaid invoice or amount. We do not assume responsibility for layout or damage caused by buried pipe, conduit, voids, and steel beams. Customer has 30 (thirty) calendar days to dispute any charge. After the 30-day period, all charges are considered valid and must be paid in full.

Job Exclusions

- All layout to be completed by contractor
- All shoring to be installed and provided by contractor (when applicable)
- X-Raying or scanning by contractor or can be provided by A-Core at an additional charge
- All traffic control, barricades, message boards etc. is to be provided by Contractor
- Contractor to provide all Blue staking & add A-Core Inc. as a duplicate permit holder/rental agreement
- Contractor to provide all access via scaffold,lifts, hoists, etc. to work areas when applicable

Special Instructions

Clarifications:

Minimum trip to project for one truck is $350.00 plus mobilization or lineal ft/mob charge, whichever is more
**Stand-by for layout, engineering, access, etc. billed at $175.00 per hour

Excludes:
- Layout with string line by others prior to our arrival
- Additional depth at additional cost
- Water Control
- Traffic Control
- Load/unload saw for multiple locations at additional cost

Exclusions
-All Layout is to be completed by Contractor
-All access to work areas via. ladders, lifts, cranes, shoring etc.to be provided by Contractor when applicable
-All shoring to be provided by and installed by Contractor (when applicable)
-All Traffic control, barricades, flaggers, message boards, Highway Patrol etc. is to be provided by Contractor
-Any Slurry / water control is to be provided by and disposed of by Contractor
-Double time will apply for work on Sundays and holidays
-A-Core can provide slurry / water control at an additional charge
-Contractor to provide Eco-Pans and dispose of the slurry / water
-Any X-Raying / GPR / Scanning to be provided by Contractor or A-Core can provide for an additional charge
-Any standby time waiting for access, layout, traffic control, engineer's decision, public,
-Transportation operations etc. will be charged the same hourly / unit rate of that task
-Contractor to provide all 811 & add A-Core Inc. as a duplicate permit holder & on a rental agreement that covers it.
-Price is subject to change due to inclement weather.

As of January 1, 2025, all payments made by credit card will be assessed a convenience fee of 2.75%.
Please contact your local branch to discuss alternative payment options that do not include fees.

Accepted By: _____

ADVANCED GPR
Construction Locating Services

September 3, 2025

NAICS: 541370, 561990, 541330, 238910, 238310, 238910, 238110
ROC: 347764 & 354905 & 356070 (Page 6)
SBE Certified & TPT License (Page 6) Master COI & License (Page 7)

Archer Western Construction
Ed Kluber
4710 East Elwood Street, Suite 6
Phoenix, AZ 85040
385-237-7704

Re: PROPOSAL
Site Address: City of Chandler Pecos Water System Program, Phase 1 (GMP 2)- 1475 East Pecos Road, Chandler, AZ 85286
Thank you for your interest in Advanced GPR Corporation. Please forward all communication to your assigned representative. The representative that has been assigned to your project is:
Advanced GPR Corporation
Attn: Kevin Pine
Office: (602) 875 - 0909
Email: kevinpine@advancedgpr.com

SCOPE OF WORK
We understand the scope of this project will be for **Asphalt Cutting not to exceed 70' long by 15' wide by 4" thick.** Client will provide any lifts, ladders, or scaffolds for access. Areas should be clear of any obstructions and layout marked by client prior to technician arrival.

COST TO CONDUCT SCANNING
Asphalt Cutting charged flat $929 including trip fee not to exceed 70' long by 15' wide by 4" thick. If any additional locations or wait time occurs this will be charged $555 for up to 3 hours, portal-to-portal, and then $185 per hour thereafter, per technician. This includes all expenses, written report, and time onsite. After 8hrs, overtime hours will be charged at $277.50 per hour thereafter portal to portal, per technician. Final payment is due within 30 days. Interest will be charged on any unpaid amounts after 30 days at the annual rate 18%. Confirmation of services, additional services, etc. either orally, verbal, or written will also bind client to this contract upon receipt.

Advanced GPR Corporation:

Sign:_____

Date:_____

Client:

Sign:_____

Print:_____

Date:_____

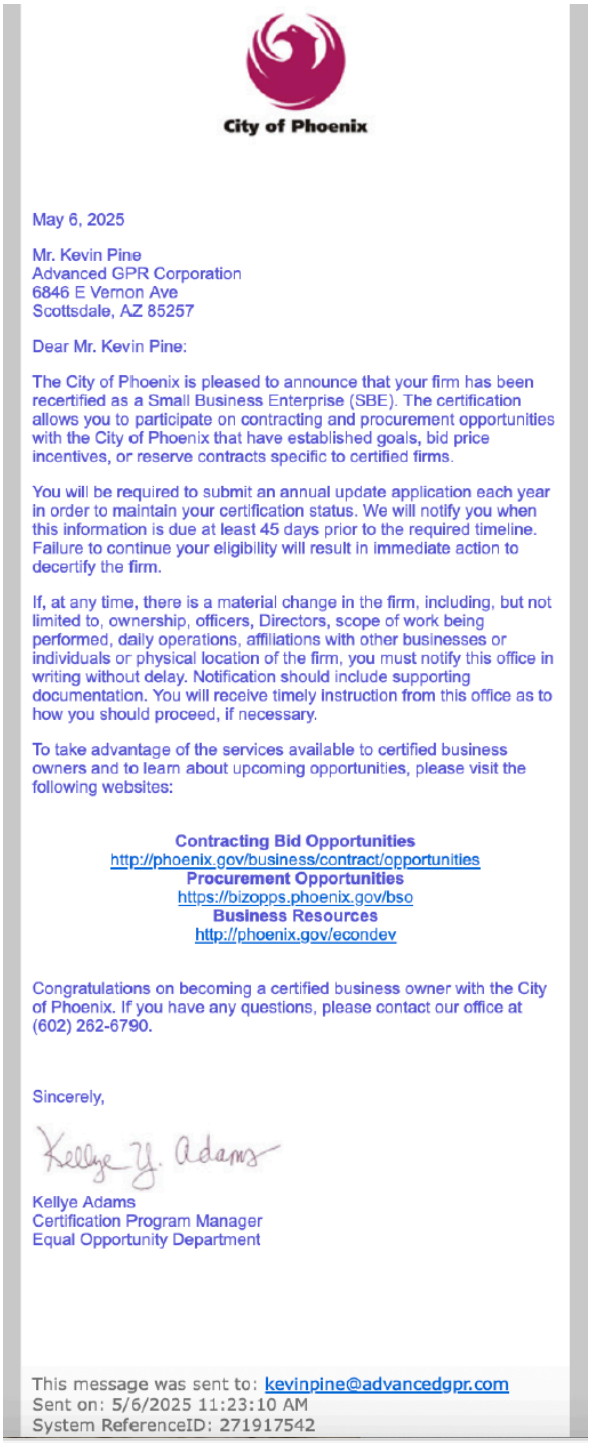
Purchase Order Number: _____

Job Number: _____

Advanced GPR Corporation assumes no liability or obligation, except as expressly provided herein. In no event shall the liability of Advanced GPR Corporation to customer for claims under warranty or negligence be greater than fees paid by the customer for the actual services provided. The customer hereby agrees to defend, indemnify, and hold harmless Advanced GPR Corporation and its shareholders, directors, officers, employees, agents, successors and assigns from and against any and all liabilities, losses, fines, damages, penalties, costs, or expenses, including reasonable attorney's fees, from claims by anyone other than customer that they may sustain, incur or be required to pay arising out of, or in any way related to, services provided to customer by Advanced GPR Corporation. Any additional insurance above and beyond Advanced GPR's current coverage will be charged above and beyond Advanced GPR's total service fees.

Advanced GPR 6846 E Vernon Ave Scottsdale AZ 85257

ARIZONA: 602.875.0909 NEW YORK: 646.849.4141 NEW JERSEY: 551.258.4300



City of Phoenix

May 6, 2025

Mr. Kevin Pine
Advanced GPR Corporation
6846 E Vernon Ave
Scottsdale, AZ 85257

Dear Mr. Kevin Pine:

The City of Phoenix is pleased to announce that your firm has been recertified as a Small Business Enterprise (SBE). The certification allows you to participate on contracting and procurement opportunities with the City of Phoenix that have established goals, bid price incentives, or reserve contracts specific to certified firms.

You will be required to submit an annual update application each year in order to maintain your certification status. We will notify you when this information is due at least 45 days prior to the required timeline. Failure to continue your eligibility will result in immediate action to decertify the firm.

If, at any time, there is a material change in the firm, including, but not limited to, ownership, officers, Directors, scope of work being performed, daily operations, affiliations with other businesses or individuals or physical location of the firm, you must notify this office in writing without delay. Notification should include supporting documentation. You will receive timely instruction from this office as to how you should proceed, if necessary.

To take advantage of the services available to certified business owners and to learn about upcoming opportunities, please visit the following websites:

Contracting Bid Opportunities
http://phoenix.gov/business/contract/opportunities
Procurement Opportunities
https://bizopps.phoenix.gov/bso
Business Resources
http://phoenix.gov/econdev

Congratulations on becoming a certified business owner with the City of Phoenix. If you have any questions, please contact our office at (602) 262-6790.

Sincerely,

Kellye Y. Adams

Kellye Adams
Certification Program Manager
Equal Opportunity Department

This message was sent to: kevinpine@advancedgpr.com
Sent on: 5/6/2025 11:23:10 AM
System ReferenceID: 271917542

PROJECT SCHEDULE

An Advanced GPR Technician will arrive on site for service call each day of scheduled services and scan every 4”-6” where coring is specified by the client. GPR cannot see through metal at all. GPR cannot see through raised floors, stucco or where roof drainage, conduit, mechanical, etc. that are attached to the slab face or within 3” from walls, pipe, or impediment. GPR must be directly on the concrete/asphalt or soil. Diameters of reinforcement cannot be given. Metal vs PVC can be given when possible. Data is not kept unless requested in advance and additional charges would apply. Rebar/wire mesh, conduit, or telephone lines closer together than 5” on-center or offset mats will not allow for full penetration depth. Each day of services will be no more than one - 8 hour day or overtime rates will be charged. We require the areas of investigation to be cleared of all moveable surface obstructions prior to our arrival. "Typical scenarios" are: smooth concrete, wide open areas, all demo completed and marked out prior to technician's arrival, typical slab on grade with no mounds of soil, equipment, or materials blocking path. If excavator or demo operator comes in contact with anything not depicted within the report they must stop and not cut through, demo, or drill through or damage data lines, duct banks, water lines, gas lines, or conduit. A written report, with camera pictures of locations marked for trenching, as best as possible, will be created during each service call and provided with this investigation as requested by the client.

Equipment and Limitations

Concrete will be scanned to a depth of 12” thick using a a1600MHz. Live Conduit that can be located within the areas marked by the client will be marked in red permanent marker directly on the soil/asphalt/concrete. The antenna to be utilized for this project will be a 400 MHz antenna. The 400 MHz antenna will allow a maximum possible depth penetration of approximately 9’ within dry soil. Conduit not live and pulling current at the time of services will not be locatable by GPR. A live conduit locator will be used to find only live conduit pulling current while the technician is using that device while on-site over the area being scanned. GPR cannot see through wire mesh, vapor barriers, rebar spacing less than 12” with the 400 MHz, voids, or metal of any kind. Live Conduit near EMF emitting sources such as transformers or Communications panels can create a bad data situation. Telephone lines may or may not be differentiated or detectable using live conduit locator. Bad data areas will still require payment. Advanced GPR cannot work in wet conditions or during any rain. Conduit must be live and pulling alternating current during the time of services for location; data and fiber optic lines may not be detectable due to size or shielding. GPR cannot see through air gaps, metal or wood bottom plate studs, or air gaps. Advanced GPR cannot guarantee the utility’s orientation will allow for the core path proposed by the client and may take additional time to reroute around existing reinforcement if necessary. Time Spent due to lifts, required training, meetings, etc will be charged at the same daily rate as indicated in the Cost to Conduct Scanning within this proposal. Any locations that will not work for your intended purposes will be explained to the on-site contact and additional locations scanned at daily cost. Moved locations, if that is required due to reinforcement layout, is charged per hour in excess

GENERAL TERMS AND CONDITIONS

1 SERVICES

1. Advanced GPR Corporation (“AGPR”) will perform services for Client. “Services” means non-destructive testing services, utilizing ground penetrating radar to assess subsurface conditions to form and provide an opinion as to the suitability of drilling, cutting, coring, or otherwise disturbing a specific area. "Client" refers to the person or business entity ordering the services.
2. The term AGPR services may be further defined in addendum to this Agreement or the Proposal or Statement of Work (“SOW”) more specifically detailing services on a project basis. Upon receipt of written approval of Client in the form of email or other written modes of communication, AGPR may provide additional services that are not included in this SOW.

2. PAYMENT TERMS

2.1. Price. Client will pay AGPR in accordance with the price terms for the AGPR services listed on an addendum to this Agreement Proposal, SOW or invoice. If additional services are requested outside the proposal, scope of the addendum or SOW, AGPR standard rate will apply, unless the parties agree otherwise in writing.

2.2. Taxes. Client is responsible for the payment of all applicable sales, use and/or other similar taxes (except for taxes based on AGPR’s income or personnel costs) which may be levied or assessed in connection with this Agreement.

2.3. Payment. Client will pay AGPR within 30 days of the date of each invoice submitted for all AGPR services. AGPR’s acceptance of payment of any amount less than the full amount due will not be a waiver of the remaining amount due. AGPR may apply any overpayment on any invoice or proposal to any other amount due from Client. Past due obligations will bear interest at the rate of 18% per annum, or the maximum rate allowed by law, whichever is less. Any interest charged or received greater than the maximum amount allowed by law will be applied to the principal obligations, or if none is owed, will be refunded to Client. If any Client payment becomes past due, AGPR will have the right to retain possession of any Client property in AGPR’s possession, and any Images produced by AGPR, and AGPR may suspend performance on any work in process. Client will pay AGPR all attorneys’ fees, collection agency charges, court costs and all other expenses incurred by AGPR in connection with any Client defaults on its obligations to AGPR.

2.4. Disputed Amounts. Client may dispute any amounts invoiced provided that the dispute is made in good faith. Any amounts disputed may be deducted from the invoice; however, a disputed amount does not relieve the Client from payment obligations for the remainder of the invoice. The remainder amount of any invoice containing a disputed amount must be paid within 30 days of the date of the invoice. The disputed amount and the reasons for disputing the amount must be submitted to AGPR in writing within 15 days of receipt of the invoice. AGPR will work together with Client in good faith to resolve such disputes in a mutually acceptable manner. Client agrees to pay any disputed amounts within 5 business days once the dispute has been resolved.

3. GENERAL REQUIREMENTS

3.1. Commencement of Work. AGPR will begin scheduling of Client work upon receipt of a signed Proposal, SOW or email approval from the Client.

3.2. The services set forth in AGPR’s Proposal or SOW will be accomplished in a timely, workmanlike, and professional manner by an AGPR technician at the price quoted. If AGPR is required to delay commencement of the work or if, upon embarking upon its work, AGPR is required to stop or interrupt the progress of its work as a result of changes in the scope of the work requested by Client, to fulfill the requirements of third parties, interruptions in the progress of construction, or other causes beyond the direct reasonable control of AGPR, additional charges will be applicable and payable by Client.

3.3. Access to Site. Client will arrange and provide such access to the site as is necessary for AGPR to perform the work. AGPR shall take reasonable measures and precautions to minimize damage to the site and any improvements located thereon as the result of its work or the use of its equipment. AGPR has not included in its fee the cost of restoration of damage that may occur during the ordinary course of work.

3.4. Sample Disposal. Unless otherwise agreed in writing digital scans will be deleted from the hard drive of the equipment before leaving the site, concrete core samples will be disposed of after being tested.

3.5. Limited Responsibility. AGPR's work shall not include determining, supervising or implementing the means, methods, techniques, sequences or procedures of construction. AGPR shall not be responsible for evaluating, reporting, or affecting job conditions concerning health, safety or welfare. AGPR's services or failure to perform shall not excuse any contractor, subcontractor, supplier, or other party from performance of its own contractual obligations.Advanced GPR does not take liability for severed conduit. Coring operator must have at minimum 1 year experience and be competent to know when conduit has been detected by coring or drilling equipment.

3.6. Cancelation. Scheduled services may be cancelled by either party upon seven (7) day’s prior written notice. In the event Client cancels scheduled work, Client shall pay a charge for the reimbursement of any expenses incurred by AGPR before or after the dates of services, including but not limited to, airline tickets, rental car agreements, hotel reservations, or equipment shipping charges. Client shall be charged for costs incurred, including but not limited to, reimbursable expenses and administrative costs associated with the cancellation, which are reasonably necessary to place AGPR's files in order and/or protect its professional reputation. In the event of work

3.7. cancellation, AGPR shall be compensated by Client for all services rendered up to and including the cancellation date. Cancellations made within 24 hours of the date of services will also incur an additional half-day charge of the quoted daily rate as noted in the SOW, proposal, email, or other written agreement. Cancellations not rescheduled within 90 days shall be deemed a Termination.

3.8. Personnel. The work that AGPR performs is highly technical in nature and requires significant time, resources and cost to hire, train, and provide continuous education to its employees. Client shall make no offers of employment to any of AGPR’s staff for any reason without the express written consent of one of AGPR’s owners or managers.

3.9. Ground Penetrating Radar Service. AGPR's services will be performed, its findings obtained and any agreed upon reports prepared in accordance with the Proposal or SOW. In performing its services, AGPR will use the appropriate standard of care, including the skill and judgment that is reasonably expected by similarly situated technical professionals. Differentiations of embedded materials made on site or on AGPR reports are opinions based upon technical judgment and experience and are not to be construed as representations of fact. It is the Client's responsibility to use the data provided by AGPR to determine whether the drilling, cutting, or coring through any embedded material within concrete is safe and appropriate. AGPR only recommends drilling, cutting, or coring through areas completely clear of any embedded materials when dealing with a Post Tensioned Cable and/or embedded conduit slab. Drilling, Cutting, and Coring through Post Tensioned Cable is extremely dangerous, possibly fatal, and can damage the facade or structure of the building, additionally, a severed cable may be propelled out of the concrete slab and travel airborne up to ¼ mile away causing injury and/or death to surrounding persons or damage to surrounding structures and personal property. In the event that during drilling, cutting, or coring Client or third party comes in contact with an unmarked embedded member, within an area previously scanned by an AGPR technician, that individual shall immediately stop all actions to avoid cutting though that embedded material. AGPR is not liable for severed embedded materials or any subsequent resulting damages. Client agrees that the individual drilling, cutting, coring, or digging shall be a competent person in their field, having a minimum of 3 years of experience, and trained to recognize when an embedded material is struck or encountered and contact AGPR to investigate immediately.

4. CONFIDENTIALITY

4.1. Confidential Information. "Confidential Information" shall mean any non-public information of the other Party that is designated as confidential, or that the receiving Party knew or reasonably should have known was confidential because it derives independent value from not being generally known to the public. Without limiting the generality of the foregoing, the terms and conditions of this Agreement shall be considered Client and AGPR Confidential Information. Confidential Information shall not include any information which: (a) a Party can demonstrate was rightfully in its possession prior to the date of disclosure to it by the other Party; (b) at the time of disclosure or later, is published or becomes part of the public domain through no act or failure to act on the part of a Party; (c) a Party has developed independently without reference to any Confidential Information of the other Party; or (d) a Party can demonstrate came into its possession from a third party who had a bona fide right to make such information available.

4.2. The Party receiving Confidential Information will not at any time disclose to any person or use for its own benefit or the benefit of anyone, Confidential Information of the other Party without the prior written consent of said Party. Each Party shall limit disclosure of Confidential Information to its employees or agents who have a need to know related to the Parties' business relationship.

4.3. Upon termination of a services or this Agreement, the recipient of Confidential Information shall promptly deliver to the other Party or destroy any and all such information in its possession or under its control, and any copies made thereof which the recipient of said information may have made, except as the Parties by prior express written permission have agreed to retain.

4.4. Neither Party shall be liable for disclosure of Confidential Information if made in response to a valid order of a court or authorized agency of government; provided that, if available, five (5) days' notice first be given to the other Party so a protective order, if appropriate, may be sought by such Party. The Parties acknowledge and agree that a breach of its obligations under this Section may cause harm to the other Party for which monetary damages are not a sufficient remedy. In such event the Parties understand and agree that the non-defaulting Party shall be entitled to seek to obtain from a court of appropriate jurisdiction immediate injunctive or other equitable relief to which it may be entitled under the circumstances in addition to other remedies allowed under this Agreement and under applicable law.

5. REPRESENTATIONS, WARRANTIES & COVENANTS.

5.1. Compliance with Laws. AGPR warrants that the services will not violate, and AGPR will obtain all permits required to comply with, any applicable law, rule, regulation, ordinance, order, direction and regulation (as they may be amended from time to time) of the applicable government agencies having jurisdiction over the provision and use of the services.

5.2. Mutual Obligations. Each party represents, warrants, and covenants that: (a) it has the requisite power and authority to execute, deliver and perform its obligations under this Agreement; (b) it is in compliance with all applicable laws related to such performance, including it having obtained all necessary permits and licenses; and (c) it is authorized to perform requested services.

5.3. Loss or Damage. Client assumes all risk or loss or damage related to Client's documents or other materials provided to AGPR, except as provided in this Agreement. AGPR will use reasonable care when any documents or other materials are provided to AGPR by Client or at the request or direction of Client; during the time such documents and materials are in AGPR' offices.

5.4. Client Indemnity. Client will indemnify AGPR against all claims for damages made by any third party arising out of Client's construction activity, and/or related to AGPR providing services to Client or to any other party at Client's request, and Client will defend AGPR against all such claims (using counsel approved by AGPR, which approval may be made in AGPR's sole discretion) and Client will indemnify AGPR for its attorney's fees and other expenses related to any such claim, even if such loss or damage, or any portion thereof, is caused by AGPR's negligence.

5.5. Limited Warranty. AGPR shall perform the services in good faith and in a timely and professional manner. AGPR shall exercise the same level of professional care that is reasonably expected by similarly situated technical professionals. THE FOREGOING LIMITED WARRANTY IS AGPR'S SOLE WARRANTY FOR ANY SERVICES AND/OR PRODUCTS PROVIDED HEREUNDER OR ARISING OUT OF THIS AGREEMENT, AND IS IN LIEU OF ALL OTHER REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, NONINFRINGEMENT AND FITNESS FOR A PARTICULAR PURPOSE, ALL SUCH WARRANTIES BEING HEREBY FULLY DISCLAIMED.

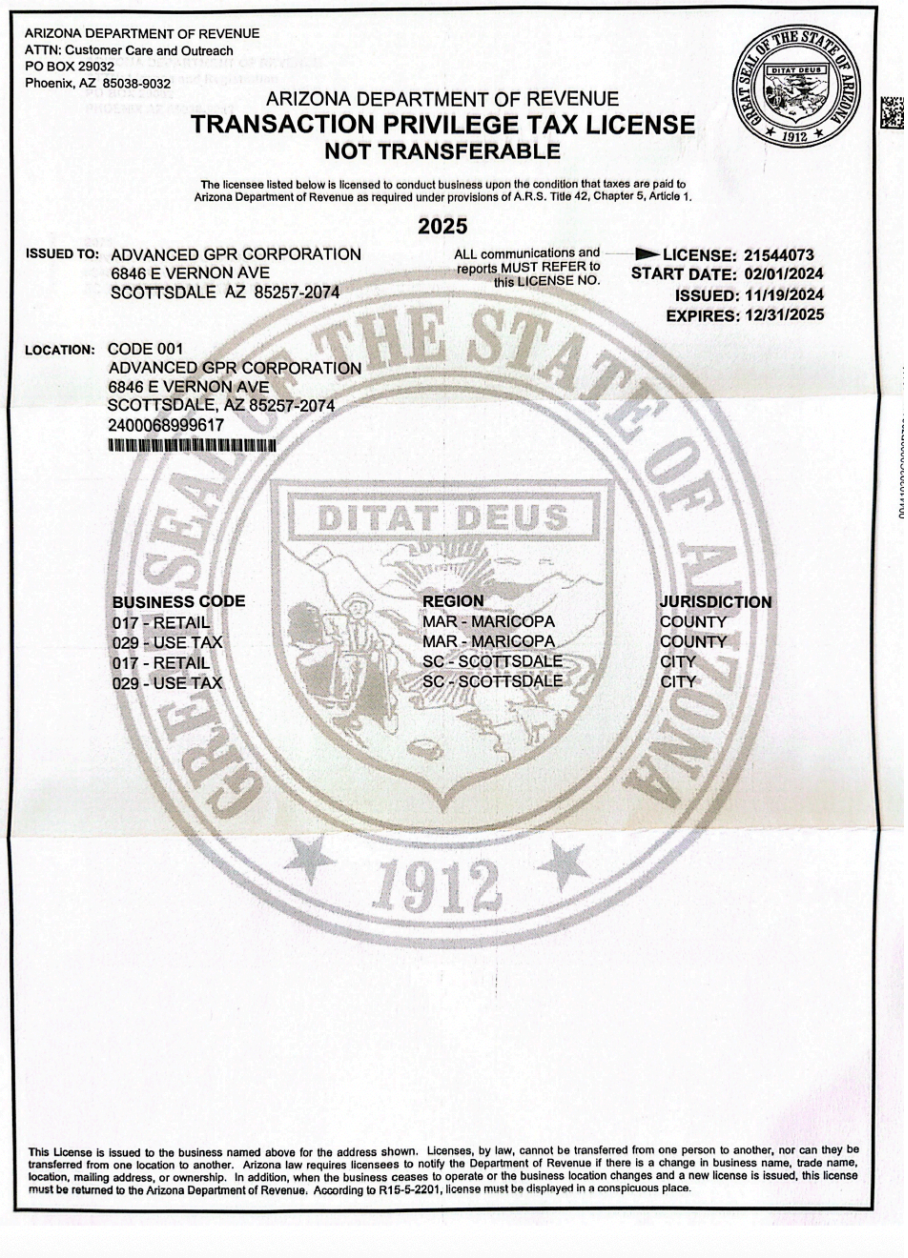
5.6.Limitation of Liability. Regardless of any other provision, AGPR liability for damages to Client for any cause whatsoever, and regardless of the form of action, whether in contract, tort or other theory of liability, including negligence, will be limited to the aggregate sum of payments made to AGPR by Client for the AGPR services directly related to any claim. AGPR will never be liable for any damage caused wholly or partially by Client's drilling, cutting, coring or other construction activity. Furthermore, AGPR will never be liable to Client or any other person for any indirect, special or consequential damages, including without limitation, lost profits, business revenue or goodwill, however caused and whether arising under contract, tort or other theory of liability. The foregoing limitations shall apply notwithstanding the failure of the essential purpose of any limited remedy.

6. TERMINATION

6.1 Either party may elect to terminate this Agreement by providing written notice to the other party. This Agreement's Termination Date is defined as the date that notice of termination is received by the non-terminating party. Should Client elect to terminate this Agreement, Client will still be charged and responsible for all services performed by AGPR prior to the date of termination, in addition to, any cancellation charges, plus a termination charge which shall be equal to 10% (ten percent) of the contract price. The termination charge is a contractual option available to Client, it is not a liquidated damages formula. No liquidated damages are contemplated herein.

7.0 COMMUNICATIONS

7.1Notices. Notices of default shall be sent by e-mail and overnight mail to the parties contacts provided below. All certificates, reports, records, subordinate agreements (and their applicable amendments), notices, requests, demands and other communications under this Agreement shall be in writing and sent by e-mail and shall be deemed to have been duly given: (a) on the date of service if served personally on the party hereto to whom notice is to be given; (b) on the date of confirmed transmission if sent via facsimile to the number given below, and telephonic confirmation of transmission is obtained promptly after completion of transmission, and followed by mail delivery; (c) on the day after delivery to commercial or postal overnight carrier service; or (d) on the fifth day after mailing, if mailed to the party to whom such notice is to be given, by first class mail, registered or certified, postage prepaid and properly addressed, to the party as follows:



ARIZONA DEPARTMENT OF REVENUE
ATTN: Customer Care and Outreach
PO BOX 29032
Phoenix, AZ 85038-9032

ARIZONA DEPARTMENT OF REVENUE

TRANSACTION PRIVILEGE TAX LICENSE

NOT TRANSFERABLE

The licensee listed below is licensed to conduct business upon the condition that taxes are paid to Arizona Department of Revenue as required under provisions of A.R.S. Title 42, Chapter 5, Article 1.

2025

ISSUED TO: ADVANCED GPR CORPORATION
6846 E VERNON AVE
SCOTTSDALE AZ 85257-2074

ALL communications and reports MUST REFER to this LICENSE NO.

LICENSE: 21544073
START DATE: 02/01/2024
ISSUED: 11/19/2024
EXPIRES: 12/31/2025

LOCATION: CODE 001
ADVANCED GPR CORPORATION
6846 E VERNON AVE
SCOTTSDALE, AZ 85257-2074
2400068999617

BUSINESS CODE	REGION	JURISDICTION
017 - RETAIL	MAR - MARICOPA	COUNTY
029 - USE TAX	MAR - MARICOPA	COUNTY
017 - RETAIL	SC - SCOTTSDALE	CITY
029 - USE TAX	SC - SCOTTSDALE	CITY

This License is issued to the business named above for the address shown. Licenses, by law, cannot be transferred from one person to another, nor can they be transferred from one location to another. Arizona law requires licensees to notify the Department of Revenue if there is a change in business name, trade name, location, mailing address, or ownership. In addition, when the business ceases to operate or the business location changes and a new license is issued, this license must be returned to the Arizona Department of Revenue. According to R15-5-2201, license must be displayed in a conspicuous place.

ARIZONA: 602.875.0909 NEW YORK: 646.849.4141 NEW JERSEY: 551.258.4300

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 06/01/2024

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Jodie R. Kramer Cole
Nexus Partners Insurance 1475 South Price Road Chandler AZ 85286	PHONE (A/C, No, Ext): 480 376 0894 FAX (A/C, No): E-MAIL ADDRESS: jodie.cole@nexuspartnersinsurance.com
	INSURER(S) AFFORDING COVERAGE — NAIC #
	INSURER A : Sentinel Insurance Compnay Ltd
INSURED Advaned G.P.R. Corporation 6846 E Vernon Ave Scottsdale AZ 85257	INSURER B : Hartford Accident and Indemnity Company INSURER C : Hartford Fire Insurance Company INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT LOC	Y	Y	59 SBA BH4012	06/01/2024	06/01/2025	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 1,000,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
B	AUTOMOBILE LIABILITY ANY AUTO X ALL OWNED AUTOS X HIRED AUTOS SCHEDULED AUTOS X NON-OWNED AUTOS	Y	Y	59 UEC BB6025	06/01/2024	06/01/2025	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000
A	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $	Y	Y	59 SBA BH4012	06/01/2024	06/01/2025	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	Y	59 WEC AL9DBC	06/01/2024	06/01/2025	X WC STATU-TORY LIMITS OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, If more space is required)

CERTIFICATE HOLDER

Advanced G.P.R Corporation
6846 E Vernon Ave
Scottsdale, AZ 85257

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Jodie R Kramer Cole

ACORD 25 (2010/05)

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The ACORD name and logo are registered marks of ACORD



STATE OF ARIZONA

License No. ROC 347764

Office of the
Registrar of Contractors

This is to certify that:
ADVANCED G.P.R. CORPORATION
DBA (if any)

Having been shown to possess all the necessary qualifications, and having complied with all the requirements of the law, is by order of the Registrar of Contractors duly licensed and admitted to engage in and pursue the business of

C-9 Concrete

Contractor in the State of Arizona. Given my hand and the seal of the Registrar of Contractors in my office, City of Phoenix, on September 21, 2023

CYNTHIA D. CASAUS, INTERIM DIRECTOR
ARIZONA REGISTRAR OF CONTRACTORS

City of Chandler Pecos Water System Program, Phase 1 (GMP 2)

1475 East Pecos Road, Chandler, AZ 85286, United States of America

Sent proposal: $469

Submitted Aug 22, 2025 at 1:11 PM MST

Copper Valley Contractors LLC
510 S Lewis, Mesa, AZ 85210, United States of America

Colin O'Brien | +1 602-568-3084 | colin@coppervalleycontractors.com

Line Items

Description	Quantity		Unit Cost	Total Cost
Asphalt - Saw Cutting @ 4" Thick	70	×	$1.20 /linear foot	$84
Mobilization	1	×	$385 /each	$385
Base Bid				**$469**

Scope-Specific Clarifications

Work will begin on the early release package late 2025/early 2026.

This project is not federally funded so no Davis Bacon Wages.

PROPOSAL

ROC 325429

22425 N. 16th St. Suite 1
Phoenix, AZ 85024

Phone 602-228-3027 Office - 602-788-2222
Estimating - Ext. 217 Karl@swbarricades.com

CUSTOMER

Archer Western

ESTIMATE NO

25K-0042

DATE

8/28/2025

PROJECT

Chandler pecos Water System Program

PROJECT LOCATION

1475 E. Pecos Rd, Chandler AZ

QUANTITY	Units	DESCRIPTION	UNIT PRICE	AMOUNT
70	LF	4" Asphalt Saw Cutting - Includes (1) Mobilization	Min Charge	**$450.00**
		Paving Includes Preparation Work (Such as moving trench plates), Tack Oil and Crack Seal.		
		Excludes Any Grading, Demo, Concrete, Night & Weekend Work, Micro Seal/ Slurry Seal, Special Hot Mix Asphalt, Manhole or Valve Adjustments, Striping and Traffic Control Unless Specifically Called Out in Above Scope Of Work		
		Any additional mobilization for reasons out of SWB Paving control will be charged at the quote rates		

SUBTOTAL	**$450.00**
TAX RATE	
SALES TAX	
OTHER	
TOTAL	**$450.00**

UNIT PRICES ABOVE EXCLUDE THE FOLLOWING:

Davis-Bacon Wages, Survey, Quality Control, SWPP, Dust Control, Traffic Control, Bonds, Sales Tax, Testing and Permits.

Our bid is based on the following conditions;
Construction water supplied by others within 500' of job site.
Quantities are estimates only. Final billing will reflect actual field quantities used.
SWB Paving is not responsible for any issues with the grade, including but not limited to drainage issues, handicap issues, ponding of water. Paving will follow the grade.
If a passing compaction test is not available before paving then SWB Paving will not warranty the asphalt paving work.
Fuel Surcharges and Standby may apply.
Important Note: Paving minimum charge is $1,850 : Saw Cutting minimum charge is

PREPARED BY:

Karl Thorpe

Sign Below to Accept Quote:

Authorized Rep Date

REBAR QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	REBAR
ESTIMATOR INITIALS	EK

BID QUANTITIES					NUCOR REBAR & FABRICATION		TYLER REINFORCING	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**
01	33.43.101	#6 REBAR IN 20' LENGTHS	205	EA	$ 18.03	$ 3,696.15	INCLUDED BELOW	
		#5 U BAR-4.5'X4.5'	316	EA	$ 13.15	$ 4,155.40	INCLUDED BELOW	
		#5 REBAR-20' LENGTHS	70	EA	$ 12.52	$ 876.40	INCLUDED BELOW	
		#5 U BAR-2'X2'	240	EA	$ 5.71	$ 1,370.40	INCLUDED BELOW	
01	33.43.201	#5 REBAR-20' LENGTHS	175	EA	$ 12.52	$ 2,191.00	INCLUDED BELOW	
		#5 U BAR-2'X2'	620	EA	$ 5.71	$ 3,540.20	INCLUDED BELOW	
		FREIGHT	1	LS	$ 400.00	$ 400.00	INCLUDED BELOW	
		FURNISH & INSTALL REBAR FOR PIPE ENCASEMENT	496	LF	INCLUDED ABOVE		$ 73.27	$ 36,341.92
		AWC INSTALLATION	1	LS	$ 25,000.00	$ 25,000.00	INCLUDED ABOVE	

NUCOR® REBAR FABRICATION

Nucor Rebar Fabrication Southwest Inc
2101 W. Jackson St
Phoenix, AZ 85005
Ph (602) 254-0091 Fax (602) 340-0977

Lic No. AZ ROC092145 L62

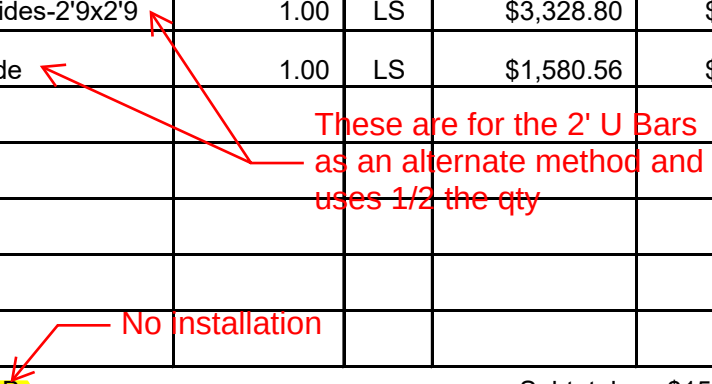
Quote No: LMRET-079
Date: 9/3/2025
Quoted by: LJM
Retail No:

To: **Archer Western**
Address:
City, St:
Attn: **Ed Kluber**
Ph: 385 237 7704
Fax: ekluber@walshgroup.com

Project: **Chandler Pecos Water Sys. P1**
Ref. No.:
Address: 1475 E. Pecos Rd
City, St: Chandler, AZ 85286

PLEASE INDICATE BELOW IF MILL CERTS ARE REQUIRED*

Item #	Description	Qnty	UOM	Unit Price	Total
1	205 #6- 20'0" Bars	1.00	LS	$3,694.80	$3,694.80
2	245 #5- 20'0" Bars	1.00	LS	$3,066.60	$3,066.60
3	316 #5 U Bars- 6'x6'x6' Encasement	1.00	LS	$4,153.10	$4,153.10
4	430 #5 U Bars W/Hooks @ Top- 3 Sides-2'9x2'9	1.00	LS	$3,328.80	$3,328.80
5	430 #5 Cap Bars W/Hooks For- 1 Side	1.00	LS	$1,580.56	$1,580.56



Notes: Material Fabricated, Shipped To Jobsite FOB.
Price Based Off Of Quantities Provide From Bid List.
Current Lead Time- 7 Days For Detailing: 10 Days For Fabrication

Subtotal= $15,823.86
Misc=
Freight= $400.00

TERMS:

Sales Tax Value **Subtotal=** **$16,223.86**

1. Payment Terms….. **Net 30**
2. Cost of Sales or Use Taxes excluded. (Unless noted otherwise)
3. **10** day notice required for fabrication and delivery.
4. All Loads assumed to be verified by Buyer, no shortages will be accepted after 24 hours from delivery.
5. Buyer to provide hoisting for unloading of material if required by Seller.
6. Prices based on **1** truck load(s) of material to jobsite. Additional loads will be at **$400.00** per load.
7. Quote valid for 10 days from dated listed above.
8. Indeminfication will be per AIA Document A401, 1987 Edition, Section 4.6

Sales Tax $16,223.86 @ 8.60% = $1,395.25
Total= **$17,619.11**

CUSTOMER
Please fill out and fax back to number above.

Deliver to:
Ship Date:
Contact Name:
Phone No:

Customer Approval:
☐ Approved at above price.
☐ Mill Certs Required
By:
Title:
Date:
PO #:

TYLER REINFORCING LLC
"We Reinforce Confidence"

PO Box 6520
Phoenix, AZ 85005
(888) 70-REBAR
Lic No: AZ ROC #296786

Bid Proposal

Proposal No: **250817**
Proposal Date: 09/03/2025

This proposal is valid for
10 days from date shown above.

SECTION I - GENERAL INFORMATION

Proposal to: **Archer-Western Construction**
Attn: **Ed Kluber**
4710 E. Elwood, Ste 6
Phoenix, Arizona 85040

Project Name: **Chandler Pecos Water System Ph1**
Ref. No.:
1476 E Pecos Rd
Tempe, AZ 85288

Drwgs Quoted: S43-01 August 2025
Specs: Provided
Addendums: None

SECTION II - SCOPE OF WORK

> Concrete Deformed Reinforcing Steel Detailed, Furnished & Installed per ACI & CRSI Standards.

Includes supply and installation.

SECTION III - PRICES

SUPPLY & INSTALL

Bid Item	Description	Quantity	Unit	Unit Price	Extended
1	Pipe Encasement	496	LF	$73.27	$36,341.92
				Grand Total=	**$36,341.92**

Notes:

1. Taxes are Excluded from prices shown.
2. Prices shown are for the complete project and no single bid item price or group of bid item prices are valid alone without the consent of the Seller.

SECTION IV - SPECIAL CONDITIONS, EXCLUSIONS AND/OR CLARIFICATION FOR THIS PROJECT

1 Prices are based on a StartDate of not later than 10/01/25 and shall remain valid through 12/31/25. Any material shipped AND/OR installed after that date will be subject to and increase of $40.00/ton every 2 months.
2 Prices based on 1 truck load(s) of material to jobsite. Additional load(s) will be at $450.00 per load. Truck Loads are based on 38,000 lbs per Load. Reduction in weight on loads will be an Extra to Contract.
3 Proposal based on Prevailing Wages: No
4 Above prices based on NO RETENTION for contracts of $50,000 or less.
5
6
7
8

SECTION V - CONTRACTOR TO PROVIDE AT NO COST TO SELLER

1. All lines, grades, racks, forms, layout and rigid templates accurately in place before installation, except those forms or other materials that will hinder the installation.
2. Firm, level, subgrade at elevation shown on drawings including all levels, datum lines, elevations, openings and dowel outs for concrete &/or masonry.
3. Clear access roads & ramps for unloading of trailer/truck deliveries to within 50 feet of point of installation, and reasonable storage and lay-down areas.
4. Cages for drilled piers, shafts, caissons, and light pole standards will be tied and stockpiled by Subcontractor.

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5. Suitable equipment fully operated for hoisting/lowering reinforcing steel, personnel, wire mesh, etc, including unloading trucks, staging of reinforcing to points of installation (into foundations, and onto elevated decks, etc) setting columns, wall cages and/or any other pre-tied assemblies including power placing of individual bars as required.
6. Copies of all contract documents in quantities as reasonably requested.
7. Parking area and/or cost of parking for field crews and provide area for jobsite office including utility hookup.
8. Furnish design information, location of pour joints and construction schedules in sufficient time to allow for the preparation and approval of detail drawings plus a minimum of seven (7) working days for fabrication and delivery. 48 hours notice is required for cancellation of previously scheduled deliveries and two (2) weeks notice of job requirements.
9. This proposal is based on pouring the walls and top slabs in all reinforced concrete box culverts monolithically.
10. 24 hour notice for workman at jobsite and placement to be done on normal 8 hour shift excluding weekends and holidays.

SECTION VI - STANDARD EXCLUSIONS BY SELLER & FURNISHED BY BUYER

1. Cost of Inspections, crane inspections, testing, bonds, permits, penalties or Liquidated Damages.
2. Inserts, sleeves, rubatex, water stops, smooth dowels and /or dowel baskets, galvanized or epoxy coated dowels, threaded rebar, stud rails and placing of stud rails.
3. Cleaning, cutting, straightening, locating or rework of existing reinforcing steel, reinforcing extending from piles, or precast
4. Cutting, drilling of holes, grouting, field bending or dry-packing of reinforcing steel.
5. Burning, cutting, or drilling of structural steel/miscellaneous iron to pass reinforcing steel.
6. Protection and/or cleaning of others work, covering, painting, greasing or wrapping of reinforcing steel or smooth dowels.
7. Rebar Safety Caps or devices for covering rebar ends.
8. All welding and rebar welded to structural/miscellaneous iron.
9. Blocking, chairing, wrapping and/or pulling of welded wire fabric.
10. All dead men, cables, labor and engineering of system for guying of rebar, if required.
11. Cleaning of tie wire clippings, tags and other spoils from work areas, cost of dumpster and composite crew cleanup, except as mutually agreed.
12. Lines, grades, steel racks, templates, scaffolding, safety rails, work platforms & ramps, sanitary facilities and jobsite access to drinking water.
13. Removal, grinding &/or patching of staples, nails, bolts and/or any other device used for the placement of concrete reinforcing accessories.
14. Reinforcing for Anchor Points (and the Anchor Points) for Shotcrete, Precast, Closure Pours, Precast Connections and Prestressing Items.
15. Sand Plated Chairs.
16. Test bars and test couplers. (except those specifically called out in specs)
17. Adequate power and lighting when necessary.
18. Cost of reworking or replacing reinforcing steel damaged or lost due to flood, actions of buyer, other subcontractors or other acts of God.
19. Blocks, inspection tubes, wheels or spacers for clearances in drilled shafts or caissons.
20. Tie wire, accessories and field placing aids for F.O.B. materials.
21. Prevailing Wage Rates or Job Specific Labor Agreement Rates. Proposal based on Open Shop wages.
22. Design Engineering, Engineer stamping of drawings, Field Measurements and As-Built drawings.
23. Sitework, Masonry Rebar, Mock Ups, MSE Walls, Electrical Duct Bank, Equipment Pads, Pipe Encasement &/or Supports. (Unless specifically stated as included)
24. Supply & Installation of reinforcing for stair landings and treads.
25. Layout of TOW, TOF, EOW, expansion/construction joints, corners, doorways, blockouts and/or openings of any kind and Masonry Dowels.
26. Separate Pour Watchman, Fire Watchman, Safety Manager, QC Mgr, Traffic Control or Onsite Security.
27. Trim reinforcing for openings, penetrations, and inserts not specifically located on Structural Drawings.
28. Double handling costs, including costs to transport material from an unreasonably located area.
29. Unloading, handling &/or setting of FOB materials. (including Prebuilt Drilled Shaft Cages)
30. Dust control, Storm Water management and/or similar enviromental programs.
31. Third party invoicing processing fees or enrollment in third party invoicing services.
32. Re-Detailing of shop drawings & reviewing/processing of changes will be at $110.00/Hr.
33. Building Information Modeling (BIM), 3D Modeling and similar, unless specifically stated otherwise. (TRLLC retains ownership of any 3D model it creates)
34. Non-standard work week and/or special work hours. (This bid proposal based on M-F, 8hrs/workday, daylight hours, unless specifically stated otherwise.)
35. LEED (or similar) certifcation.

SECTION VII - TERMS AND CONDITIONS

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1. **Terms of Sale:** Payment Terms - Subject to on-going credit approval: Net 30 days from date of invoice. Interest will be charged on all past due balances per the maximum rate allowed by law. Legal fees and costs will be paid as awarded to the prevailing party in the event of a legal dispute. Seller reserves the right to stop Work or demand security as required. Buyer agrees to pay Seller in accordance with the escalation policy as specifically identified in this proposal. "Work" is hereby defined as the performance of all work as listed above and included in any accepted Agreement, plus any changes, acceleration/out of sequence work, damages, escalation and costs incurred for the cause or benefit of Buyer or others.
2. **Acceptance:** Prices of individual bid items are subject to renegotiation if Buyer elects not to accept this complete proposal as presented. If Seller is requested to proceed with the work prior to the execution of a mutually agreed Contract, or if the work is completed prior thereto, the Terms and Conditions herein shall govern pending said Agreement. No assignment of this proposal shall be made without our prior written consent. We reserve the right to sublet portions of our Work.
3. **Schedule:** Seller's price is based upon detailing, fabrication, and placing on a normal 5-day, Monday to Friday, 40 hour work week, daylight hours unless explicitly noted on the face hereof. Performance will be based on bid documents as provided for tender and industry standards/CRSI. Schedule and schedule changes to be mutually agreed. Buyer to provide Seller (48) hours' notice of cancellation or modifications to schedule deliveries, Buyer agrees to provide adequate notice for workmen required at the jobsite and sufficient work for at least one full shift. Detailing submittals will be sequenced in a manner appropriate to the construction schedule. Working schedules to be made by mutual agreement of the Contractor and Subcontractor to conform to Contractor's master schedule. In event duration times are provided by Subcontractor, it is agreed that time starts only when work areas are provided ready to receive installation in all respects, in accordance with OSHA and State safety regulations.
4. **Back Charges/Shipping Discrepancies:** No charges for labor or materials furnished by the Buyer shall be allowed as a credit unless authorized in writing by Seller within five (5) days of said occurrence. After a twenty four (24) hour period, all loads will be assumed to be verified.
5. **Safety:** Buyer will provide at no cost to Seller, general jobsite conditions conforming to OSHA standards and local governing authorities, including, but not limited to, adequate protection to ensure the safety of those working above reinforced steel as required, furnishing and installation of rebar safety caps or other OSHA compliant impalement hazard protection as required; Detection of/protection from underground and other utilities; Safe access, signage and other required warnings, flagging, barriers/barricades, general site and task lighting as required; Shoring, fall-protection anchorage points, walkways, approved scaffolding and staging in place as required, trenches, rails, snow and ice removal, all weather truck access; safe access to points of storage and work, etc. all as required.
6. **Insurance:** General Liability insurance will be provided solely for work performed by Seller and/or its engaged parties. Seller is not providing insurance for any liabilities that exceed Seller's responsibilities and/or liabilities. Additional Insured Endorsements may limit liabilities to those assumed under the Agreement and exclude Professional Liabilities. XCU, subsidence, Professional Liability, Aircraft, Pollution Liability and mold coverage are excluded as not applicable to this trade. Additional coverage or alternate requirements not set forth herein and mutually agreed are subject to availability and any additional costs. Seller excludes Builders Risk Insurance and return receipt requested notices for all certificates of insurance. Compliance requirements for any hired sub-subcontractors are subject to availability. This bid proposal is based on Seller providing General Liability insurance of $5,000,000.00. Any additional coverage may result in additional costs.

SECTION VIII - CONDITIONS OF SALE EXCLUDED:

1. Pay if paid or "Pay when paid" conditions precedent for all properly completed work, including base scope of work, changes, acceleration/out of sequence work, damages, escalation and costs incurred for the cause or benefit of Buyer or others("Work"); Retention exceeding the rate withheld by Owner; Retention on F.O.B. items.
2. Indemnification, claim, and defense liabilities, responsibilities or damages exceeding any proportionate extent of cause by Seller's active negligence or willful misconduct.
3. Minority, DBE, DVBE, SBE, WBE and other special hiring status content, affiliation, or contribution to such requirements.
4. Risk, liabilities and responsibilities arising from existing conditions and preceding work exceeding visual inspection, including, but not limited to, field measurements, surveying, layout, forming and materials supplied by others; Costs arising from differing conditions and/or requirements from plans or drawings or bar lists provided for performance.
5. Design engineering and related Professional Liabilities and responsibilities; Costs and damages due to varying conditions and requirements.
6. Waiving any rights of dispute or redress; Costs/risks of claims against Owner for undisputed portions of our Work.
7. Forms and information requirements not mutually agreed; Unconditional forms of release in advance of receipt of funds; Releases that fail to exclude pending changes, unpaid balances, and retention as applicable; Releases for claims unrelated to payment for work performed; Non-conforming forms of waivers and releases within States that provide Statutory release language.
8. Reports, waivers, and other forms and contractual obligations related to bulk suppliers to our inventory stock who do not have lien rights.
9. Warranties exceeding Seller's scope of responsibilities or one (1) year; Guaranties of work performed by others; any forms of warranties, express or implied, of merchantability or fitness for purposes intended.

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10. Risks and responsibilities for equipment and/or employees of Buyer or others providing services, or manning equipment used in connection with, but not within, Seller's scope of Work.
11. Liquidated and delay damages exceeding actual damages incurred, our scope of responsibility and/or our proportionate extent of cause, and for Force Majeure; Property damage, remedial work and/or replacement of Work and the work of others to the extent made necessary by others or Force Majeure.
12. Increased labor and material costs and/or damage in the event of project suspension or delay.
13. General Liability credits for any wrap-up insurance programs.
14. Prime contract terms, conditions, and scope in addition to, and/or in conflict with, a mutually agreed contract and Seller's scope of work and responsibilities as described herein.
15. Reports, submittals and data requirements not applicable to our trade, reasonably required or mutually agreed; Release of proprietary or other confidential information.
16. Any portion of fines or penalties exceeding the extent of cause by Seller; Any increased, surcharged or escalated portion of fines incurred by Buyer.
17. Enrollment/contributions to unions to which Subcontractor is not signatory; compliance with any additional or conflicting term, condition, or rate of pay, etc. between Seller's labor agreement and others affiliated with the Project.
18. Guarantors.
19. Site security.

SECTION IX - ACCEPTANCE

The above proposal including all attached and referenced documents shall constitute a contract or shall be part of a contract is subject to on-going credit approval. Prices shown are for the complete project and NO single item price or group of prices are valid alone without the consent of the Seller. We reserve the right to modify/negotiate amendments to any Contractor issued forms of Agreement, as required to properly describe scope of work, pricing and mutually agreed terms and conditions.

Buyer:			Seller:	**Tyler Reinforcing LLC**	
By:			By:	*Scott Pasternak*	
Title:		Date:	Title:	**Heavy Sales Manager**	Date: **09/02/2025**

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ELECTRICAL I&C QUOTES

Felix Construction Company
License # L11 - 172036

Project **City of Chandler - Pecos Water System Improvements - GMP-2** **Date** **8/27/2025**

Quoted Scope of Work

Number	Description	By Felix E/I&C	By Others
1	NOTE 1: This bid is based on City of Chandler - Pecos Water System Upgrades - Long Lead GMP Bid Package, Construction Plans and Specifications.	NOTE	NOTE
2	CIVIL (100) -	N/A	N/A
3	CONDUIT (200) -	N/A	N/A
4	CABLE & WIRE (300) -	N/A	N/A
5	LIGHTING (400) -	N/A	N/A
6	GEAR (500) - One (1) Eaton Gear Package Based on GMP2 Final Drawings and GMP2 Final Specifications. Please See Attached Quote and Bill of Materials for Details.	Provided by Felix E/I&C	N/A
7	GENERATOR (500) -	N/A	N/A
8	INSTRUMENTATION (600) -	N/A	N/A
9	CONTROL AND PUMP PANELS (600) -	N/A	N/A
10	FABRICATION (700) -	N/A	N/A
11	OTHER MISC. (800) - Felix EI&C to Provide Electronic Submittals and O&Ms for All Long Lead Procured Equipment, Project Management Labor to Procure Electrical Equipment, Manage Submittals and Electrical Equipment Vendors, Track Submittals and Electrical Equipment Status, and Attend Progress Meetings and Submittal/Design Workshops.	Provided by Felix E/I&C	N/A
12	**Programming - Not Included in Bid.**	N/A	N/A
13	**Spare Parts - Not included in bid.**	N/A	N/A

ARCHER WESTERN CONSTRUCTION NOTES

Number	Description	By Felix E/I&C	By Others
14	Private Locating and Blue Stake		√
15	Painting and Coatings		√
16	Shade Structures SES or other Exterior Locations		√
17	Coordination / Arc Flash Study	√	
18	As-Built / Red Lines		√
19	Start-up/Calibrate Felix supplied Controls and Instruments	√	
20	Testing and Commissioning		√
21	Plant MOPO's		√
22	Owner Site Training		√
23	Concrete Pad's, Foundations, Curb's		√
24	Concrete embed sill's and custom specialty items		√
25	Concrete Coring, Saw cutting and Surface Restoration		√
26	Painting and Surface Restorations		√
27	Accelerated Schedules / Off Shift and Overtime Work	**Excluded**	**Excluded**
28	Trash Receptacles		√
29	Sanitary Facilities		√
30	Temporary Power		√
31	Construction Water		√
32	Permits / Permit Fees		√
33	Utility & Utility Fees		√
34	Taxes		√
	Long Lead Switchgear - One (1) TX-DIS, One (1) PWTP-GAC-SWBD1, One (1) AHF-GAC, One (1) PWTP-DWT-MCC1, VFD-4321, VFD-4322, VFD-4323, VFD-4311, VFD-4312, VFD-4313, VFD-4314, Start-Up, Training, Arc-Flash/Power Study, Harmonic Analysis, and Spare Parts.	**$ 999,500.00**	
	Submittals & O&Ms - Electronic Submittals and O&Ms for All Long Lead Procured Equipment.	**$ 28,110.00**	
	Project Management - Project Management Labor to Procure Electrical Equipment, Manage Submittals and Electrical Equipment Vendors, Track Submittals and Electrical Equipment Status, and Attend Progress Meetings and Submittal/Design Workshops, and Project Manager Truck.	**$ 42,250.00**	
	OH&P - 10% Markup	**$ 109,662.47**	
	Per Bid Scope, Construction Plans & Specifications	**$ 1,179,522.47**	
Signature:		**Date:**	
			
Estimator:	Zachary Watts (602) 814-3877		
	zachw@felixconstruction.com		

BOND=$14,113.53
TEXTURA= $2,872
TOTAL=$1,196,508

Proposal Clarifications

Project: City of Chandler - Pecos Water System Upgrades - Long Lead GMP
Date: 8/27/2025
Revision: Rev 0

Felix Construction:

#	Includes:
1	One (1) Eaton Gear Package Based on GMP2 Final Drawings and GMP2 Final Specifications. Please See Attached Quote and Bill of Materials for Details: One (1) TX-DIS, One (1) PWTP-GAC-SWBD1, One (1) AHF-GAC, One (1) PWTP-DWT-MCC1, VFD-4321, VFD-4322, VFD-4323, VFD-4311, VFD-4312, VFD-4313, VFD-4314, Start-Up, Training, Arc-Flash/Power Study, Harmonic Analysis, and Spare Parts.
2	Felix EI&C to Provide Electronic Submittals and O&Ms for All Long Lead Procured Equipment, Project Management Labor to Procure Electrical Equipment, Manage Submittals and Electrical Equipment Vendors, Track Submittals and Electrical Equipment Status, and Attend Progress Meetings and Submittal/Design Workshops.

#	Excludes:
1	All General Conditions - Provided by Archer Western.
2	Installation Labor for All Long Lead Provided Electrical Equipment - Installation Labor Provided in Later GMP.
3	All Other Material and Labor for Project Requirements, Such As: Concrete Encased Duct Banks, Underground and Above Ground Conduit, Cable, Grounding, Lighting and Trim Devices, Gear and Generator Installation, Local Control Panels and Remote Terminal Units, Instrumentation, Antenna or Fiber Optic Requirements, Programming, Fabrication Materials, Additional Submittals and O&Ms, As-Builts, MOPOs, Testing and Start-Up Services - Provided in Later GMP
4	480VAC Panelboards, 120VAC Panelboards, Dry-Type Transformers, and Disconnects - Provided in Later GMP.
5	Any Electrical Equipment on E-06.
6	VFD-6513 & VFD-6523, and their Associated Breakers - Not Enough Information to Provide at This Time.
7	New Utility Transformers, Primary Conduits and Cable, Secondary Conductors, and Switchgear/Control Transformer.
8	Tax's, Bonds, Insurance, and Permits - Provided by Archer Western.
9	Anything Not Listed Includes or Quoted Scope of Work.

#	Clarifications:
1	Due to current market volatility, material pricing is subject to the terms stated on the included material quotes, some of which may establish that final pricing will be determined at the time of shipment.

#	Price Assumes:
1	Normal Working Hours
2	Other Material and Labor for Project Requirements Provided in Later GMP.

#	Assumes Owner to Provide:
1	Access to Site.

#	Project Contingency Usage:
1	N/A

#	Project Allowance Details:
1	N/A

Eaton:

#	General Comments:
1	MCC: 6-Pulse Drives, 15HP, No Passive Filter, Line Reactor and DVDT Filter Included. 120K Active Harmonic Filter Built into MCC.
2	Drives 125HP NEMA 1 Per James Hayes Call with Engineer.
3	200A AHF Separate Off Switchboard.
4	NOTE: $39K of Spare Parts Included.

Hitachi:

#	General Comments:
1	Orders with an agreed ship date(s) less than 52-weeks from the original PO acceptance date will not be subject to price adjustment prior to shipment.
2	This quotation is based solely on the following: - e-mail correspondence entitled: CITY OF CHANDLER PECOS WATER IMPROVEMENTS : EATON NEG PX500805X5K3 ALT 0000 New RFQ - CITY OF CHANDLER PECOS IMPROVEMENTS. - Specification: SECTION 26 12 19 PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS.
3	Standard Hitachi Energy 3-year warranty is provided. Warranty period is 36 months from shipment or 30 months from energization, whichever comes first. Hitachi Energy is not responsible for ""In/Out"" charges.

Clarifications:

1 Unless stated otherwise in the quoted bill of materials, routine production/quality tests ONLY are included. ROUTINE TESTS INCLUDED:
- Transformer turns ratio, all tap positions
- Polarity (and Phase Relation)
- No-load loss and exciting current test at rated voltage
- Resistance, load loss, and impedance test at rated voltage
- Low frequency test
- Induced voltage (Applied potential, Induced Potential)
- Impulse/ Lightning Impulse
- Leaks

2 600 A bushings are not directly compatible with dead front elbow arresters. A separate T-OP connector is necessary to make this connection. T-OP connector is not supplied by Hitachi Energy and is the responsibility of others.

Exceptions:

1 Reference Sections were not provided and therefore are not taken into consideration.

2 Hitachi Energy Jefferson City takes exception to all documentation other than the standard submittal documents listed below:
- General Arrangement Drawing
- Nameplate Drawing
- Control Wiring Diagram (if applicable)
- Fuse Coordination Curve (if applicable)
- Spare Parts List (if applicable. No pricing included)

Transformer test reports will be provided when available. All documents are provided in electronic format (.PDF) only. Drawings are available in 2-D format only. The documents listed above will follow Hitachi Energy standard format. Exception is taken to any template or format from the customer. Electronic format transformer O&M manuals are available upon request. Manuals are not shipped with transformers.

3 Section 01 33 00 was not provided and therefore is not taken into consideration.

4 General Conditions and Division 01 was not provided and therefore is not taken into consideration.

5 Section 26 05 00 was not provided and therefore is not taken into consideration.

6 Section 26 05 13 and Section 26 05 19 were not provided and therefore are not taken into consideration.

7 No field services provided or available. All field services, including installation, field testing and training, are to be provided by others.

8 Witness testing / source inspections are not included.

Lead Times:

1 **Medium Voltage Transformer:**
- Submittals: 6-8 Weeks
- Shipment After Release: 38-45 Weeks

2 **Switchboard:**
- Submittals: 6-9 Weeks
- Shipment After Release: 49-52 Weeks

3 **MCC:**
- Submittals: 24 Weeks
- Shipment After Release: 45-48 Weeks

4 **Stand Alone VFDs:**
- Submittals: 6-8 Weeks
- Shipment After Release: 25-28 Weeks

5 **Active Harmonic Filter:**
- Submittals: 6-8 Weeks
- Shipment After Release: 12-16 Weeks

Project Name:	CITY OF CHANDLER PECOS WATER IMPROVEMENTS	**Negotiation No:**	PX500805X5K3
General Order No:		**Alternate No:**	0000

Item No.	Qty	Product	Description
	1	EESS SAT	

See Approval Drawings for Comments and Clarifications
Site Contact: Contractor
PHILLIP FULMER
Estimated Testing Date:
A Coordination Study does not exist.

Catalog No U0210-104
Designation EATON STARTUP AND TRAINING

Qty	List of Materials
1	EESS Office: Phoenix, AZ, quote as of 8/27/2025 5:20:01 PM
1	Jobsite: , CHANDLER, Arizona 85295
1	Drive Time: 0.27 Hours
1	1 Test Equipment Setup Location(s)
4	Customer Training Provided by EESS: 4 Hours
1	Service Entrance Ground Fault / ARMS Testing
1	Power Transformers
7	Drives - Enclosed
1	PRLX Switchboard
1	Freedom MCC
1	Harmonic Correction Unit

Item No.	Qty	Product	Description
	1	EESS Services	EESS Short Circuit and Coordination Studies: Arc Flash Hazard Analysis, Arc Flash Labels - Standard, PE Review / Stamp Required - Arizona

See Approval Drawings for Clarifications and Exceptions
PHILLIP FULMER

Catalog No U0130-107
Designation EATON ARC - COOR STUDY

Qty	List of Materials
1	EESS Study - Bid Manager
1	Initial Modeling and Data Request
1	PE Review Stamp Required (Arizona)
1	Arc Flash Study
1	Arc Flash Labels - Standard

Item No.	Qty	Product	Description
	1	Engineering Services	HARMONIC STUDY PRELIM-TEST- FINAL REPORT, HARMONIC STUDY PRELIM ,TEST , FINAL REPORT

Catalog No HARMONIC STUDY PRELIM-TES
Designation HARMONIC STUDY PRELIM ,TEST , FINAL REPORT

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Item No.	Qty	Product	Description
	1	Power Transformers	Power Transformer, 1, 72215 - Hitachi Liquid Filled Padmount, 2000 KVA

Catalog No CN_72215_2000
Designation 2000 KVA TX-DIS

Catalog No	Qty	List of Materials
CN_72215_2000	1	Tamper-Resist, Pad Mount, Liquid Filled, 2000KVA

Notes

Neg # QT-25-01071461
CHAMPS QUOTATION – NCC 8/27/2025
We are pleased to offer you this quote.

Project: Eaton Corp / CITY OF CHANDLER PECOS WATER IMPROVEMENTS

General Comments and Exceptions

- Orders with agreed ship dates less than 52-weeks from the original PO acceptance date will not be subject to price adjustment prior to shipment.
- This quotation is based solely on the following:

- e-mail correspondence entitled: CITY OF CHANDLER PECOS WATER IMPROVEMENTS : EATON NEG PX500805X5K3 ALT 0000
New RFQ - CITY OF CHANDLER PECOS IMPROVEMENTS - Due 08/20/2025; Dated: 08/06/2025
- Specification: SECTION 26 12 19 PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS; Dated: 8/4/2025

- 1.01.C; Exception, refference Sections were not provided and therefore are not taken into consideration.

1.03; Hitachi Energy Jefferson City takes exception to all documentation other than the standard submittal documents listed below:

1. General Arrangement Drawing
2. Nameplate Drawing
3. Control Wiring Diagram (if applicable)
4. Fuse Coordination Curve (if applicable)
5. Spare Parts List (if applicable. No pricing included)

Transformer test reports will be provided when available.
All documents are provided in electronic format (.PDF) only. Drawings are available in 2-D format only. The documents listed above will follow Hitachi Energy standard format. Exception is taken to any template or format from the customer. Electronic format transformer O&M manuals are available upon request. Manuals are not shipped with transformers.

1.03.A; Exception, Section 01 33 00 was not provided and therefore is not taken into consideration.

1.05.A; Exception, General Conditions and Division 01 was not provided and therefore is not taken into consideration.

1.06.B; Exception, Section 26 05 00 was not provided and therefore is not taken into consideration.

1.08; Standard Hitachi Energy 3-year warranty is provided. Warranty period is 36 months from shipment or 30 months from energization, whichever comes first. Hitachi Energy is not responsible for ""In/Out"" charges.

2.02.F.4; Exception, Section 26 05 13 and Section 26 05 19 were not provided and therefore are not taken into consideration.

2.02.I.1.b; Clarification, 600 A bushings are not directly compatible with dead front elbow arresters. A separate T-OP connector is necessary to make this connection. T-OP connector is not supplied by Hitachi Energy and is the responsibility of others.

PART 3; Exception taken to entirety of Part 3. No field services provided or available. All field services, including installation, field testing and training, are to be provided by others.

3.02; Clarification, unless stated otherwise in the quoted bill of materials, routine production/quality tests ONLY are included.
ROUTINE TESTS INCLUDED:

- Transformer turns ratio, all tap positions
- Polarity (and Phase Relation)
- No-load loss and exciting current test at rated voltage
- Resistance, load loss, and impedance test at rated voltage
- Low frequency test
- Induced voltage (Applied potential, Induced Potential)
- Impulse/ Lightning Impulse
- Leaks

Witness testing / source inspections are not included. (see following pages for pricing)
**Required to be added prior to order processing.

• Shipping terms are FCA, Jefferson City MO, Freight prepaid and allowed. DAP (customer's desired shipping location-USA mainland only) is available for an additional 3%.

Item	Alt	Qty	Description	Price Each (USD)
1		1	2000/2240 KVA Liquid Filled Padmounted Transformer	
2401 - Distribution Transformers, Jefferson City, USA (8DAG301441), PDC: 9AAC30400623, DTAN-L3M135				130,500

ITEM	QTY	kVA	EACH (USD)	Conductor %Z
1	1	2000/2240	130,500 Cu/Cu	5.75

Description:

Type		:	Liquid-Filled MTR Padmounted Transformer
Fluid	:	Natural Ester Fluid	
Core	:	Grain Oriented Steel	
Phase		:	3 Phase
Frequency	:	60 Hz	
Average Winding Rise		:	55/65 °C
Ambient Temperature	:	30 °C	
High Voltage	:	4160 Delta	
High Voltage Taps	:	+2 -2 2.5%	
High Voltage BIL	:	60kV BIL	
Low Voltage	:	480Y/277	
Low Voltage BIL	:	30kV BIL	
Low Voltage Neutral	:	X0 bushing with ground strap	
Feed Configuration	:	Radial feed	
Color	:	Bell Green (Munsell 7GY 3.29/1.5)	
Customer Specification		:	SECTION 26 12 19, 8/4/2025

Features (included in price):

TANK & CABINET

- Dry Nitrogen Blanket
- Hex-head cabinet handle bolt

BUSHINGS

- 600 amp dead-break bushings (dead front) x 3
- ANSI C57.12.34 Fig 9&10 dead front/radial (minimum)
- 10-hole Integral Spade Bushings x 4
- Spade Supports
- ANSI C57.12.26 Fig 3&4a minimum stgrd LV bushing pattern

ARRESTERS

- 6 kV MCOV 5.10 elbow arrester - 15 kV interface x 3

FUSES

- Bayonet high-amp expulsion fuse w/ integral cartridge x 3
- Parallel oil-immersed partial range current limiting fuse x 6
- Spare expulsion fuses (silver contacts) x 3

MONITORING

- Pressure vacuum gauge with 2 contacts 1 NO & 1 NC each Qualitrol 148-013-01
- Thermometer w 2 alarm contacts 1 NO & 1 NC each Qualitrol 167-288-01 p/n 30C6637H01
- Schrader valve
- Large pressure relief device 208-60E p/n1B25045031
- Liquid level Gauge Q 020-555-01 2B12840H01
- Pressure Relief Valve

FITTINGS

- Drain valve and sampler
- Upper Filter Press Connection (1.0" Fill Coupling)
- External drain valve padlockable box

MARKINGS

- Three (3) DANGER HIGH VOLTAGE Signs
- UL Listed on Nameplate
- Factory Mutual Nameplate - FM Outdoor Approved
- Tap Changer Warning Sign
- "Non-PCB" on Nameplate
- Factory Mutual Nameplate
- Internal KVA Stencil

OTHER

- GO###, Item #### (On Title block)
- 9.5" x 17.5" Tank Handhole Cover
- 24" deep cabinet
- 4ft hot stick
- DOE Efficiency (2016)
- RTE tap changer (300 amp)
- Factory Mutual

TESTS

- Impedance and load loss rated voltage and extreme tap
- Winding resistance test at rated tap and extreme tap

Contains less-flammable biodegradable natural ester fluid with no detectable level of PCB, less than 1PPM, at the time of manufacture.

For information about natural ester fluid, go to: http://www.cargill.com/products/industrial/dielectric-ester-fluids/envirotemp-fr3/index.jsp

Lead Times:

Drawing Submittal : 3-4 Weeks after receipt of order. after receipt of order.

Orders requiring drawing approval (i.e. Approval orders): The shipping date from our Jefferson City Factory will be confirmed after we receive approved drawings back from the customer.

Orders NOT requiring drawing approvals (i.e. Firm Orders): 36-38 Weeks after the acceptance of order.

Quoted lead times are based on current production levels. Actual lead times are dependent on available production space at time of firm order entry and/or release to manufacturing.

** GENERAL TERMS AND CONDITIONS OF SALE **

This quotation is effective for 60 days from 8/19/2025, unless otherwise authorized by Hitachi Energy USA Inc..

Unless stated otherwise in the quotation, the following terms and conditions of sale will apply.

1. Payment Terms: Due in 30 days invoice date.
2. Freight Terms: Shipment is FCA - Free Carrier.
3. Warranty: 24 months from delivery.
4. Terms and conditions of sale are based upon Hitachi Energy USA Inc. General Terms and Conditions of Sale.
5. Approval Orders: Prices are valid for units released for shipment within 60 days from the initial mailing date of approval drawings (typically 2 weeks ARO). Prices are valid for quoted shipment or best available lead-time at time of release. Orders on hold pending drawing approval beyond 60 days of initial drawing date are subject to price adjustment every 30 days. Pricing will be determined at time of release for agreed upon delivery.
6. Lead times for orders subject to drawing approval will be confirmed upon receipt of approval and release to manufacturing.
7. Transformers are designed, built, and tested to ANSI/IEEE C57 Transformer Standards for distribution class transformers. No other Codes/Standards apply unless noted on quote.

Russia-Ukraine Situation

For the purpose hereof,

(i) “Russia-Ukraine Situation” means (1) the conflict between Russia and Ukraine which began on or around 24 February 2022 and/or (2) any other or further conflict which may arise out of or in connection with the same and/or (3) any economic and other sanctions imposed by, amongst others the United Nations, U.S., EU, UK, Japan Switzerland or any agency or authority against Russia, Russian entities and individuals, Russian goods, products, services, technology which may arise out of or in connection therewith, and/or (4) any economic and other sanctions imposed by, amongst others the United Nations, U.S., EU, UK, Japan Switzerland or any agency or authority thereof against any other country, entities and individuals, Russian goods, products, services, technology which may arise out of or in connection therewith;

(ii) “Electronic Component Shortage” means the continuing global shortage of microchips or apparatus or components which include microchips.

The Parties acknowledge that the Russia-Ukraine Situation and/or the Electronic Component Shortage is affecting or may have an adverse impact on [Hitachi Energy’s] ability to perform the [offer] including but not limited to price increases, transportation and logistics constraints, shortages and price increases in the procurement of products and commodities (e.g. copper, aluminum, steel, oil and gas).

If the Russia-Ukraine Situation and/or the Electronic Component Shortage continue affecting, will or may have any adverse impact, whether direct or indirect, on [Hitachi Energy’s] ability to perform the [offer] in accordance with its terms [and/or the [Law]], the Parties shall, if so requested in writing by [Hitachi Energy /], negotiate in good faith and agree without delay reasonable amendments to the terms and conditions of the [offer], including, but not limited to, revisions of the [Schedule] and/or any increase in the [Contract Price].

In the absence of such agreement, [Hitachi Energy] shall, if it suffers delay and/or incurs additional [Costs] due to any direct or indirect impact of the Russia-Ukraine Situation and/or the Electronic Component Shortage, in any case be entitled to an extension of the [Time for Completion] and compensation for any additional [Costs].

Change in Laws

Hitachi Energy shall comply with all federal, state and local laws, rules, regulations, ordinances, statutes, orders, codes and practices ("Applicable Laws"). If there is a change in any of the Applicable Laws after a purchase order is issued, Hitachi Energy shall notify Customer, and the parties agree to meet in good faith to discuss such change. The price and time to perform the work, shall be increased or decreased, based on the change and consistent with the time and price to perform the original scope of work. For purposes of this provision, "Change in Law" means any change in any Applicable Laws or Applicable Codes and Standards as in effect on the Effective Date, including the enactment, adoption, promulgation, implementation of laws passed but not yet effective or imposition of any new Applicable Laws with substantively different terms, or change in the application or in the interpretation by any governmental authority of any Applicable Laws after the Effective Date. Any tariffs/custom duties, import/export restrictions or embargoes that may result from any executive orders, proclamations or other Applicable Laws that have been or will be issued after January 20th, 2025 shall be considered a 'Change in Law' event and entitle Hitachi Energy to equitable adjustment of cost and price and extension of time of performance.

Transportation/Delivery

Purchaser has the responsibility to guarantee clear access to the delivery point. If Seller encounters obstructions preventing or hindering delivery, Purchaser shall be responsible for removal and replacement to permit Seller's clear access. Seller shall not be responsible for any added costs or delivery delays caused by such obstructions, nor any state or local regulations that impede or restrict the ability of the originally planned shipping vehicle to reach Purchaser's destination.

In the event the Purchaser does not collect and/or agree to accept shipment of the products at delivery (unless otherwise stipulated in the contract), Seller will locate local storage facilities to which the products will be delivered, at which point contractual delivery will be deemed complete. Storage at such facilities will be at the Purchaser's expense. The Purchaser shall be liable for costs arising from such delay, including the Supplier's costs relating to storage, insurance, and handling of the products.

Storage Fees

Transformer Rating	Weekly Storage Fee
750KVA and below	$375 per week per transformer
Above 750KVA	$425 per week per transformer

Handling Fees

Transformer Rating	Crane Charge Per Move
750KVA and below	$750
Above 750KVA	$1250

Factory Acceptance Testing (FAT)

- Witness Testing can be added for $5,000 per transformer. Only two (2) transformers can be witness tested per day.
- Final Inspection can be added for $2,000 per day of inspection. Dependent upon availability of product at time of inspection.
- Please confirm intent to witness testing and/or perform final inspection by the time of release to manufacture otherwise FAT services will be considered waived.

Price Adjustment Policy (PAC)

To facilitate order acceptance, please reference this quote number and acknowledge acceptance of this PAC, on the order document.

Due to extended delivery dates, pricing is not held constant between order placement and shipment. The price shall be adjusted per the price adjustment clause described below 3 months prior to shipment.

A weighted index WPU117409 will be used for price adjustment. If the percentage change is less than +/-2%, then no change will apply.

Should the specified indices be discontinued, proper indices shall be submitted by mutual agreement of both parties.

The Index Baseline will be the month and year in which the proposal is issued.

Cancellation Fees

Approval Orders
- 20% after order entry
- 50% after submittal of approval drawings
- 80% after procurement of major materials
- 100% 6 weeks prior to planned start of manufacture

Firm Orders
- 50% after order entry
- 80% after procurement of major materials
- 100% 6 weeks prior to planned start of manufacture

We appreciate the opportunity to quote on this business. Hitachi Energy USA Inc. has had many years of experience building reliable, high quality transformers and we look forward to supplying this equipment.

Price Validity - Eaton

Prices are valid for units released for manufacture within 60 days from initial mailing date of approval drawings. Price validity applies to shipment within quoted leadtime, or best available shipment at time of release. For extended order validity, add 2% per month up to a maximum of 120 days from initial approval drawing mailing date (2% adder for 90 day validity, 4% adder for 120 day validity). Orders not released within the validity period may be subject to price escalation at time of release.

Minimum Order Charge

A minimum order charge of $250 USD applies to all orders.

KVA	FEED	A	B	C	D	E	F	WT	
2000	Radial (Dead)		72	96	82.8	68.8	70	24	12800

All weights and dimensions are approximate. Dimensions may change to meet specific customer requirements. Weights are in pounds. Dimensions are in inches.

Cooling fins may be required on the back and/or side of the tank if necessary. Maximum cooling fin depth is 16".

Hitachi Energy USA Inc.
GENERAL TERMS AND CONDITIONS OF SALE

1. General. The terms and conditions contained herein, together with any additional or different terms contained in Hitachi Energy USA Inc.'s Proposal, if any, submitted to Purchaser (which Proposal shall control over any conflicting terms), constitute the entire agreement (the "Agreement") between the parties with respect to the order and supersede all prior communications and agreements regarding the order. Acceptance by Hitachi Energy USA Inc. of the order, or Purchaser's acceptance of Hitachi Energy USA Inc.'s Proposal, is expressly limited to and conditioned upon Purchaser's acceptance of these terms and conditions, payment for or acceptance of any performance by Hitachi Energy USA Inc. being acceptance. These terms and conditions may not be changed or superseded by any different or additional terms and conditions proposed by Purchaser to which terms Hitachi Energy USA Inc. hereby objects. Unless the context otherwise requires, the term "Equipment" as used herein means all of the equipment, parts, accessories sold, and all software and software documentation, if any, licensed to Purchaser by Hitachi Energy USA Inc. ("Software") under the order. Unless the context otherwise requires, the term "Services" as used herein means all labor, supervisory, technical and engineering, installation, repair, consulting or other services provided by Hitachi Energy USA Inc. under the order. As used herein, the term "Purchaser" shall include the initial end use of the Equipment and/or services; provided, however, that Paragraph 13(a) shall apply exclusively to the initial end user.

2. Prices.
(a) Unless otherwise specified in writing, all Proposals expire thirty (30) days from the date thereof.
(b) Unless otherwise stated herein, Services prices are based on normal business hours (8 a.m. to 5 p.m. Monday through Friday). Overtime and Saturday hours will be billed at one and one-half (1 1/2) times the hourly rate; and Sunday hours will be billed at two (2) times the hourly rate; holiday hours will be billed at three (3) times the hourly rate. If a Services rate sheet is attached hereto, the applicable Services rates shall be those set forth in the rate sheet. Rates are subject to change without notice.
(c) The price does not include any federal, state or local property, license, privilege, sales, use, excise, gross receipts, or other like taxes which may now or hereafter be applicable. Purchaser agrees to pay or reimburse any such taxes which Hitachi Energy USA Inc. or its suppliers are required to pay or collect. If Purchaser is exempt from the payment of any tax or holds a direct payment permit, Purchaser shall, upon order placement, provide Hitachi Energy USA Inc. a copy, acceptable to the relevant governmental authorities of any such certificate or permit.
(d) The price includes customs duties and other importation or exportation fees, if any, at the rates in effect on the date of Hitachi Energy USA Inc.'s Proposal. Any change after that date in such duties, fees, or rates, shall increase the price by Hitachi Energy USA Inc.'s additional cost.

3. Payment.
(a) Unless specified to the contrary in writing by Hitachi Energy USA Inc., payment terms are net cash, payable without offset, in United States Dollars, 30 days from date of invoice by wire transfer to the account designated by Hitachi Energy USA Inc. in the Proposal.
(b) If in the judgment of Hitachi Energy USA Inc. the financial condition of Purchaser at any time prior to delivery does not justify the terms of payment specified, Hitachi Energy USA Inc. may require payment in advance, payment security satisfactory to Hitachi Energy USA Inc., or may terminate the order, whereupon Hitachi Energy USA Inc. shall be entitled to receive reasonable cancellation charges. If delivery is delayed by Purchaser, payment shall be due on the date Hitachi Energy USA Inc. is prepared to make delivery. Delays in delivery or nonconformities in any installments delivered shall not relieve Purchaser of its obligation to accept and pay for remaining installments.
(c) Purchaser shall pay, in addition to the overdue payment, a late charge equal to the lesser of 1 1/2% per month or any part thereof or the highest applicable rate allowed by law on all such overdue amounts plus Hitachi Energy USA Inc.'s attorneys' fees and court costs incurred in connection with collection.

4. Changes.
(a) Any changes requested by Purchaser affecting the ordered scope of work must be accepted by Hitachi Energy USA Inc. and resulting adjustments to affected provisions, including price, schedule, and guarantees mutually agreed in writing prior to implementation of the change.
(b) Hitachi Energy USA Inc. may, at its expense, make such changes in the Equipment or Services as it deems necessary, in its sole discretion, to conform the Equipment or Services to the applicable specifications. If Purchaser objects to any such changes, Hitachi Energy USA Inc. shall be relieved of its obligation to conform to the applicable specifications to the extent that conformance may be affected by such objection.

5. Delivery.
(a) All Equipment manufactured, assembled or warehoused in the continental United States is delivered F.O.B. point of shipment. Equipment shipped from outside the continental United States is delivered F.O.B. United States port of entry. Purchaser shall be responsible for any and all demurrage or detention charges.
(b) If the scheduled delivery of Equipment is delayed by Purchaser or by Force Majeure, Hitachi Energy USA Inc. may move the Equipment to storage for the account of and at the risk of Purchaser whereupon it shall be deemed to be delivered.
(c) Shipping and delivery dates are contingent upon Purchaser's timely approvals and delivery by Purchaser of any documentation required for Hitachi Energy USA Inc.'s performance hereunder.
(d) Claims for shortages or other errors in delivery must be made in writing to Hitachi Energy USA Inc. within ten days of delivery. Equipment may not be

returned except with the prior written consent of and subject to terms specified by Hitachi Energy USA Inc.. Claims for damage after delivery shall be made directly by Purchaser with the common carrier

6. Title & Risk of Loss. Except with respect to Software (for which title shall not pass, use being licensed) title to Equipment shall remain in Hitachi Energy USA Inc. until fully paid for. Notwithstanding any agreement with respect to delivery terms or payment of transportation charges, risk of loss or damage shall pass to Purchaser upon delivery.

7. Inspection, Testing and Acceptance.
(a) Any inspection by Purchaser of Equipment on Hitachi Energy USA Inc.'s premises shall be scheduled in advance to be performed during normal working hours.
(b) If the order provides for factory acceptance testing, Hitachi Energy USA Inc. shall notify Purchaser when Hitachi Energy USA Inc. will conduct such testing prior to shipment. Unless Purchaser states specific objections in writing within ten
(10) days after completion of factory acceptance testing, completion of the acceptance test constitutes Purchaser's factory acceptance of the Equipment and its authorization for shipment.
(c) If the order provides for site acceptance testing, testing will be performed by Hitachi Energy USA Inc. personnel to verify that the Equipment has arrived at site complete, without physical damage, and in good operating condition. Completion of site acceptance testing constitutes full and final acceptance of the Equipment. If, through no fault of Hitachi Energy USA Inc., acceptance testing is not completed within thirty (30) days after arrival of the Equipment at the site, the site acceptance test shall be deemed completed and the Equipment shall be deemed accepted.

8. Warranties and Remedies.
(a) Equipment and Services Warranty. Hitachi Energy USA Inc. warrants that Equipment (excluding Software, which is warranted as specified in paragraph (d) below) shall be delivered free of defects in material and workmanship and that Services shall be free of defects in workmanship. The Warranty Remedy Period for Equipment (excluding Software, Spare Parts and Refurbished or Repaired Parts) shall end twelve (12) months after installation or eighteen (18) months after date of shipment, whichever first occurs. The Warranty Remedy Period for new spare parts shall end twelve (12) months after date of shipment. The Warranty Remedy Period for refurbished or repaired parts shall end ninety (90) days after date of shipment. The Warranty Remedy Period for Services shall end ninety (90) days after the date of completion of Services.
(b) Equipment and Services Remedy. If a nonconformity to the foregoing warranty is discovered in the Equipment or Services during the applicable Warranty Remedy Period, as specified above, under normal and proper use and provided the Equipment has been properly stored, installed, operated and maintained
and written notice of such nonconformity is provided to Hitachi Energy USA Inc. promptly after such discovery and within the applicable Warranty Remedy Period, Hitachi Energy USA Inc. shall, at its option, either (i) repair or replace the nonconforming portion of the Equipment or re-perform the nonconforming Services or (ii) refund the portion of the price applicable to the nonconforming portion of Equipment or Services. If any portion of the Equipment or Services so repaired, replaced or re-performed fails to conform to the foregoing warranty, and written notice of such nonconformity is provided to Hitachi Energy USA Inc. promptly after discovery and within the original Warranty Remedy Period applicable to such Equipment or Services or 30 days from completion of such repair, replacement or re-performance, whichever is later, Hitachi Energy USA Inc. will repair or replace such nonconforming Equipment or re-perform the nonconforming Services. The original Warranty Remedy Period shall not otherwise be extended.
(c) Exceptions. Hitachi Energy USA Inc. shall not be responsible for providing working access to the nonconforming Equipment, including disassembly and re-assembly of non-Hitachi Energy USA Inc. supplied equipment, or for providing transportation to or from any repair facility, all of which shall be at Purchaser's risk and expense. Hitachi Energy USA Inc. shall have no obligation hereunder with respect to any Equipment which (i) has been improperly repaired or altered; (ii) has been subjected to misuse, negligence or accident; (iii) has been used in a manner contrary to Hitachi Energy USA Inc.'s instructions; (iv) is comprised of materials provided by or a design specified by Purchaser; or (v) has failed as a result of ordinary wear and tear. Equipment supplied by Hitachi Energy USA Inc. but manufactured by others is warranted only to the extent of the manufacturer’s warranty, and only the remedies, if any, provided by the manufacturer will be allowed.
(d) Software Warranty and Remedies. Hitachi Energy USA Inc. warrants that, except as specified below, the Software will, when properly installed, execute in accordance with Hitachi Energy USA Inc.'s published specification. If a nonconformity to the foregoing warranty is discovered during the period ending one (1) year after the date of shipment and written notice of such nonconformity is provided to Hitachi Energy USA Inc. promptly after such discovery and within that period, including a description of the nonconformity and complete information about the manner of its discovery, Hitachi Energy USA Inc. shall correct the nonconformity by, at its option, either (i) modifying or making available to the Purchaser instructions for modifying the Software; or (ii) making available at Hitachi Energy USA Inc.'s facility necessary corrected or replacement programs. Hitachi Energy USA Inc. shall have no obligation with respect to any nonconformities resulting from (i) unauthorized modification of the Software or (ii) Purchaser-supplied software or interfacing. Hitachi Energy USA Inc. does not warrant that the functions contained in the software will operate in combinations which may be selected for use by the Purchaser, or that the software products are free from
errors in the nature of what is commonly categorized by the computer industry as "bugs".

(e) THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF QUALITY AND PERFORMANCE, WHETHER WRITTEN, ORAL OR IMPLIED, AND ALL OTHER WARRANTIES INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USAGE OF TRADE ARE HEREBY DISCLAIMED. THE REMEDIES STATED HEREIN CONSTITUTE PURCHASER'S EXCLUSIVE REMEDIES AND Hitachi Energy USA Inc.'S ENTIRE LIABILITY FOR ANY BREACH OF WARRANTY.

9. Patent Indemnity.
(a) Hitachi Energy USA Inc. shall defend at its own expense any action brought against Purchaser alleging that the Equipment or the use of the Equipment to practice any process for which such Equipment is specified by Hitachi Energy USA Inc. (a "Process") directly infringes any claim of a patent of the United States of America and to pay all damages and costs finally awarded in any such action, provided that Purchaser has given Hitachi Energy USA Inc. prompt written notice of such action, all necessary assistance in the defense thereof and the right to control all aspects of the defense thereof including the right to settle or otherwise terminate such action in behalf of Purchaser.
(b) Hitachi Energy USA Inc. shall have no obligation hereunder and this provision shall not apply to: (i) any other equipment or processes, including Equipment or Processes which have been modified or combined with other equipment or process not supplied by Hitachi Energy USA Inc.; (ii) any Equipment or Process supplied according to a design, other than an Hitachi Energy USA Inc. design, required by Purchaser; (iii) any products manufactured by the Equipment or Process; (iv) any patent issued after the date hereof; or (v) any action settled or otherwise terminated without the prior written consent of Hitachi Energy USA Inc..
(c) If, in any such action, the Equipment is held to constitute an infringement, or the practice of any Process using the Equipment is finally enjoined, Hitachi Energy USA Inc. shall, at its option and its own expense, procure for Purchaser the right to continue using said Equipment; or modify or replace it with non-infringing equipment or, with Purchaser's assistance, modify the Process so that it becomes non-infringing; or remove it and refund the portion of the price allocable to the infringing Equipment.
THE FOREGOING PARAGRAPHS STATE THE ENTIRE LIABILITY OF Hitachi Energy USA Inc. AND EQUIPMENT MANUFACTURER FOR ANY PATENT INFRINGEMENT.
(d) To the extent that said Equipment or any part thereof is modified by Purchaser, or combined by Purchaser with equipment or processes not furnished hereunder (except to the extent that Hitachi Energy USA Inc. is a contributory infringer) or said Equipment or any part thereof is used by Purchaser to perform a process not furnished hereunder by Hitachi Energy USA Inc. or to produce an article, and by reason of said modification, combination, performance or production, an action is brought against Hitachi Energy USA Inc., Purchaser shall defend and indemnify Hitachi Energy USA Inc. in the same manner and to the same extent that Hitachi Energy USA Inc. would be obligated to indemnify Purchaser under this "Patent Indemnity" provision.

10. Limitation of Liability.
(a) In no event shall Hitachi Energy USA Inc., its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, whether in contract, warranty, tort, negligence, strict liability or otherwise, including, but not limited to, loss of profits or revenue, loss of use of the Equipment or any associated equipment, cost of capital, cost of substitute equipment, facilities or services, downtime costs, delays, and claims of customers of the Purchaser or other third parties for any damages. Hitachi Energy USA Inc.'s liability for any claim whether in contract, warranty, tort, negligence, strict liability, or otherwise for any loss or damage arising out of, connected with, or resulting from this Agreement or the performance or breach thereof, or from the design, manufacture, sale, delivery, resale, repair, replacement, installation, technical direction of installation, inspection, operation or use of any equipment covered by or furnished under this Agreement, or from any services rendered in connection therewith, shall in no case (except as provided in the section entitled "Patent Indemnity") exceed one-half (1/2) of the purchase price allocable to the Equipment or part thereof or Services which gives rise to the claim.
(b) All causes of action against Hitachi Energy USA Inc. arising out of or relating to this Agreement or the performance or breach hereof shall expire unless brought within one year of the time of accrual thereof.
(c) In no event, regardless of cause, shall Hitachi Energy USA Inc. be liable for penalties or penalty clauses of any description or for indemnification of Purchaser or others for costs, damages, or expenses arising out of or related to the Equipment and/Services.

11. Laws and Regulations. Hitachi Energy USA Inc. does not assume any responsibility for compliance with federal, state or local laws and regulations, except as expressly set forth herein, and compliance with any laws and regulations relating to the operation or use of the Equipment or Software is the sole responsibility of the Purchaser. All laws and regulations referenced herein shall be those in effect as of the Proposal date. In the event of any subsequent revisions or changes thereto, Hitachi Energy USA Inc. assumes no responsibility for compliance therewith. If Purchaser desires a modification as a result of any such change or revision, it shall be treated as a change per Article 4. Nothing contained herein shall be construed as imposing responsibility or liability upon Hitachi Energy USA Inc. for obtaining any permits, licenses or approvals from any agency required in connection with the supply, erection or operation of the Equipment. This Agreement shall be governed by the laws of the State of New York, but excluding the provisions of the United Nations Convention on Contracts for the International Sale of Goods and excluding New York law with respect to conflicts of law. Purchaser agrees that all causes of action against Hitachi Energy USA Inc. under this Agreement shall be brought in the State Courts of the State of New York, or the U.S. District Court for the Southern District of New York. If any provision hereof, partly or completely, shall be held invalid or

unenforceable, such invalidity or unenforceability shall not affect any other provision or portion hereof and these terms shall be construed as if such invalid or unenforceable provision or portion thereof had never existed.

12. OSHA. Hitachi Energy USA Inc. warrants that the Equipment will comply with the relevant standards of the Occupational Safety and Health Act of 1970 ("OSHA") and the regulations promulgated thereunder as of the date of the Proposal. Upon prompt written notice from the Purchaser of a breach of this warranty, Hitachi Energy USA Inc. will replace
the affected part or modify it so that it conforms to such standard or regulation. Hitachi Energy USA Inc.'s obligation shall be limited to such replacement or modification. In no event shall Hitachi Energy USA Inc. be responsible for liability arising out of the violation of any OSHA standards relating to or caused by Purchaser's design, location, operation, or maintenance of the Equipment, its use in association with other equipment of Purchaser, or the alteration of the Equipment by any party other than Hitachi Energy USA Inc..

13. Software License.
(a) Hitachi Energy USA Inc. owns all rights in or has the right to sublicense all of the Software, if any, to be delivered to Purchaser under this Agreement. As part of the sale made hereunder Purchaser hereby obtains a limited license to use the Software, subject to the following: (i) The Software may be used only in conjunction with equipment specified by Hitachi Energy USA Inc.; (ii) The Software shall be kept strictly confidential; (iii) The Software shall not be copied, reverse engineered, or modified; (iv) The Purchaser's right to use the Software shall terminate immediately when the specified equipment is no longer used by the Purchaser or when otherwise terminated, e.g. for breach, hereunder; and (v) the rights to use the Software are non-exclusive and non-transferable, except with Hitachi Energy USA Inc.'s prior written consent.
(b) Nothing in this Agreement shall be deemed to convey to Purchaser any title to or ownership in the Software or the intellectual property contained therein in whole or in part, nor to designate the Software a "work made for hire" under the Copyright Act, nor to confer upon any person who is not a named party to this Agreement any right or remedy under or by reason of this Agreement. In the event of termination of this License, Purchaser shall immediately cease using the Software and, without retaining any copies, notes or excerpts thereof, return to Hitachi Energy USA Inc. the Software and all copies thereof and shall remove all machine readable Software from all of Purchaser's storage media.

14. Inventions and Information. Unless otherwise agreed in writing by Hitachi Energy USA Inc. and Purchaser, all right, title and interest in any inventions, developments, improvements or modifications of or for Equipment and Services shall remain with Hitachi Energy USA Inc.. Any design, manufacturing drawings or other information submitted to the Purchaser remains the exclusive property of Hitachi Energy USA Inc.. Purchaser shall not, without Hitachi Energy USA Inc.'s prior written consent, copy or disclose such information to a third party. Such information shall be used solely for the operation or maintenance of the Equipment and not for any other purpose, including the duplication thereof in whole or in part.

15. Force Majeure. Hitachi Energy USA Inc. shall neither be liable for loss, damage, detention or delay nor be deemed to be in default for failure to perform when prevented from doing so by causes beyond its reasonable control including but not limited to acts of war (declared or undeclared), Acts of God, fire, strike, labor difficulties, acts or omissions of any governmental authority or of Purchaser, compliance with government regulations, insurrection or riot, embargo, delays or shortages in transportation or inability to obtain necessary labor, materials, or manufacturing facilities from usual sources or from defects or delays in the performance of its suppliers or subcontractors due to any of the foregoing enumerated causes. In the event of delay due to any such cause, the date of delivery will be extended by period equal to the delay plus a reasonable time to resume production, and the price will be adjusted to compensate Hitachi Energy USA Inc. for such delay.

16. Cancellation. Any order may be cancelled by Purchaser only upon prior written notice and payment of termination charges, including but not limited to, all costs identified to the order incurred prior to the effective date of notice of termination and all expenses incurred by Hitachi Energy USA Inc. attributable to the termination, plus a fixed sum of ten (10) percent of the final total price to compensate for disruption in scheduling, planned production and other indirect costs.

17. Termination. No termination by Purchaser for default shall be effective unless, within fifteen (15) days after receipt by Hitachi Energy USA Inc. of Purchaser's written notice specifying such default, Hitachi Energy USA Inc. shall have failed to initiate and pursue with due diligence correction of such specified default.

18. Export Control.
(a) Purchaser represents and warrants that the Equipment and Services provided hereunder and the "direct product" thereof are intended for civil use only and will not be used, directly or indirectly, for the production of chemical or biological weapons or of precursor chemicals for such weapons, or for any direct or indirect nuclear end use. Purchaser agrees not to disclose, use, export or re-export, directly or indirectly, any information provided by Hitachi Energy USA Inc. or the "direct product" thereof as defined in the Export Control Regulations of the United States Department of Commerce, except in compliance with such Regulations.

Project Name:	CITY OF CHANDLER PECOS WATER IMPROVEMENTS	**Negotiation No:**	PX500805X5K3
General Order No:		**Alternate No:**	0000

(b) If applicable, Hitachi Energy USA Inc. shall file for a U.S. export license, but only after appropriate documentation for the license application has been provided by Purchaser. Purchaser shall furnish such documentation within Hitachi Energy USA Inc. a reasonable time after order acceptance. Any delay in obtaining such license shall suspend performance of this Agreement by Hitachi Energy USA Inc.. If an export license is not granted or, if once granted, is thereafter revoked or modified by the appropriate authorities, this Agreement may be canceled by Hitachi Energy USA Inc. without liability for damages of any kind resulting from such cancellation. At Hitachi Energy USA Inc.'s request, Purchaser shall provide to Hitachi Energy USA Inc. a Letter of Assurance and End-User Statement in a form reasonably satisfactory to Hitachi Energy USA Inc..

19. Assignment. Any assignment of this Agreement or of any rights or obligations under the Agreement without prior written consent of Hitachi Energy USA Inc. shall be void.

20. Nuclear Insurance – Indemnity. For applications in nuclear projects, the Purchaser and/or its end user customer shall have complete insurance protection against liability and property damage resulting from a nuclear incident to and shall indemnify Hitachi Energy USA Inc., its subcontractors, suppliers and vendors against all claims resulting from a nuclear incident.

21. Resale. If Purchaser resells any of the Equipment, the sale terms shall limit Hitachi Energy USA Inc.'s liability to the buyer to the same extent that Hitachi Energy USA Inc.'s liability to Purchaser is limited hereunder.

22. Entire Agreement. This Agreement constitutes the entire agreement between Hitachi Energy USA Inc. and Purchaser. There are no agreements, understandings, restrictions, warranties, or representations between Hitachi Energy USA Inc. and Purchaser other than those set forth herein or herein provided.

Item No.	Qty	Product	Description
	1	Switchboards	Pow-R-Line Xpert Switchboard, Front Access/ Front and Rear Align, Type 1, 480V 3-Phase 3-Wire, 1600 Tin Plated Copper, Minimum Interrupting Rating: 65kA, Bus Bracing Rating: 65kA, Depth: 30 In
		Catalog No	XSBAFENNNCS10SNN6F1D1A2CX
		Designation	PWTP-GAC-SWBD1
Structure	**1**	**1600 Amp Tin Plated CU Main Structure**	
		Compartment 1 - Metering And Surge Protective Device (SPD) PXE2 Meter, 1600 Amp CTs, Comm. Exp Card, with Display, PXM1K-ETHMULT-NW (Modbus RTU, Modbus TCP, HTTP, BACnet-IP, EtherNet/IP)	
		SPD Series 250kA SPD, Standard w/ Surge Counter, w/ Fusible Disconnect	
		Compartment 2 - Breaker 1600A 3P PDG63M Breaker [1600A Frame]	
		Mechanical (5) 3/0-750 kcmil	
		PXR20 LSIG Trip Unit w/ ARMS Option M no control wiring	
		Trip Unit Amps 1600A, Sensor 1600A	
		ARMS (Local using breaker interface)	

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Structure **2** **1600 Amp Tin Plated CU Distribution Structure**

Compartment 1 - Breaker 300A, 3P PDG33M Breaker [400A Frame]
Mechanical (1) 2/0-500 kcmil
Thermal Mag Trip - Standard

Compartment 2 - Breaker 300A, 3P PDG33M Breaker [400A Frame]
Mechanical (1) 2/0-500 kcmil
Thermal Mag Trip - Standard

Compartment 3 - Breaker 300A, 3P PDG33M Breaker [400A Frame]
Mechanical (1) 2/0-500 kcmil
Thermal Mag Trip - Standard

Compartment 4 - Breaker 300A, 3P PDG33M Breaker [400A Frame]
Mechanical (1) 2/0-500 kcmil
Thermal Mag Trip - Standard

Compartment 5 - Breaker 300A, 3P PDG33M Breaker [400A Frame]
Mechanical (1) 2/0-500 kcmil
Thermal Mag Trip - Standard

Compartment 6 - Breaker 300A, 3P PDG33M Breaker [400A Frame]
Mechanical (1) 2/0-500 kcmil
Thermal Mag Trip - Standard

Compartment 7 - Breaker 300A, 3P PDG33M Breaker [400A Frame]
Mechanical (1) 2/0-500 kcmil
Thermal Mag Trip - Standard

Compartment 8 - Breaker 400A, 3P PDG33M Breaker [400A Frame]
Thermal Mag Trip - Standard
Mechanical (1) 2/0-500 kcmil

Compartment 9 - Breaker 400A, 3P PDG33M Breaker [400A Frame]
Thermal Mag Trip - Standard
Mechanical (1) 2/0-500 kcmil

Compartment 10 - Breaker 3P PD3-P

Compartment 11 - Breaker 200A, 3P PDG23M Breaker [225A Frame]
Mechanical (1) #4-4/0
Thermal Mag Trip - Standard

Compartment 12 - Breaker 200A, 3P PDG23M Breaker [225A Frame]
Mechanical (1) #4-4/0
Thermal Mag Trip - Standard

Compartment 13 - Breaker 3P PD2-P

Compartment 14 - Breaker 200A, 3P PDG23M Breaker [225A Frame]
Mechanical (1) #4-4/0
Thermal Mag Trip - Standard

Qty	List of Materials
1	1600 Amp Tin Plated CU Main Structure
1	Mechanical (5) 3/0-750 kcmil
16	Screw On Nameplate - White with Black letters
13	Padlockable lockoff device
1	PXE2 Meter, 1600 Amp CTs, Comm. Exp Card, with Display, PXM1K-ETHMULT-NW (Modbus RTU, Modbus TCP, HTTP, BACnet-IP, EtherNet/IP)
1	SPD Series 250kA SPD, Standard w/ Surge Counter, w/ Fusible Disconnect
2	Tin Plated Copper Ground Bus
1	1600 Amp Tin Plated CU Distribution Structure
9	Mechanical (1) 2/0-500 kcmil
3	Mechanical (1) #4-4/0

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Qty	List of Materials
1	1600A 3P PDG63M Breaker [1600A Frame], Trip 1600 A, PXR20 LSIG/A w/ ARMS, (5) 3/0-750 kcmil, Mechanical, Bottom
7	300A, 3P PDG33M Breaker [400A Frame], Trip 300 A, Thermal Mag, (1) 2/0-500 kcmil, Mechanical
2	400A, 3P PDG33M Breaker [400A Frame], Trip 400 A, Thermal Mag, (1) 2/0-500 kcmil, Mechanical
3	200A, 3P PDG23M Breaker [225A Frame], Trip 200 A, Thermal Mag, (1) #4-4/0, Mechanical
1	3P PD3-P
1	3P PD2-P

Item No.	Qty	Product	Description
	1	Power Factor Correction	Harmonic Correction Unit

Catalog No HCU2200D5N1
Designation AHF-GAC (200AMP ACTIVE HARMONIC FILTER)

Catalog No	Qty	List of Materials
HCU2200D5N1	1	HCU 200A 380-480V 3PH WallMounted NEMA1
TX2	3	3000:5 MultiTap SpltCore Current Xformer

Item No.	Qty	Product	Description
	1	Motor Control Centers	60 Hz, Class 2B wiring, 480V 3-Phase Service, 65,000 Bracing, 65 Short Circuit Rating, Bottom Incoming, NEMA 1 Gasketed 21" Front Mt Only enclosure, 600A Copper Main Horizontal Bus, No Neutral, Main Breaker. Used X-Space: 79, Blank X-Space: 29, Future X-Space: 0, MCC Lead Time Code: U.

Designation PWTP-DWT-MCC1

Qty	List of Materials
1	PXE2 MTR DISP 1A/5A 415AC/ 300DC, 4CT
1	LGH Main Bkr (400A trip), Lugs: 2-#2-500 kcmil
1	PXE2MB1A4
3	600A Current transformer
1	120A Active Harmonic Correction Unit (EESS startup services required.Price/sched services separately)
5	FVR Starter Size 1 [HMCP]
4	DG1 VFD, Constant torque, 23 FLA, 480V, HMCP
3	E125HCompact Bkr (40A trip)
1	J250HCompact Bkr (200A trip)
5	Size 1, STARTER-100VA Typical, w/extra 50VA
8	D15 Timer w/C-H C320 10-180 Sec
9	3 Pos. Sel. Sw. (Hand-Off-Auto)
9	Terminal Block - Latching Pull-Apart, Std.
5	Solid State Overload Relay (Standard C440)
4	2 Unit PB 10250T (Start/Stop)
9	1 Unit PB (Reset)
32	Other Specify
5	1 Unit PB (Emerg)
9	Wiremarkers at Each End
5	2 Unit PB 10250T (Fwd/Rev)

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Qty	List of Materials
5	D15 On/Off Delay Timer
63	D7 4P 120V Relay
9	#16awg, MTW Control Wire
13	Standard Trip
4	Blank Device Panel
4	DG1 Dv/Dt Output Filter - FR2
1	RMS 310+ LSI Trip
1	250KA, SPD Standard + Surge Counter Features Package, with Circuit Breaker
1	6" Door
8	12" Door
4	18" Door
9	Fire Wall Barriers between each section
9	600A Vertical Bus (Tin-plated cu)
1	2B Wiring
9	Bottom Vertical Bus Barrier
9	Labyrinth, Isolated/Insulated vertical bus barrier with shutters
9	300A Horiz. Cu Gnd Bus, 1/4" x 1" Bar
9	65KA Bus Bracing
1	PXM1K-ETHMULTI - PXM 1K COMMS - IPV6, ModbusTCP, BACNET IP, ETHERNET IP, NON-WIFI
9	Tin Plated horizontal bus
9	600A 50Deg C, Copper Frnt Mtd 21" NEMA 1 Gasketed
4	3 % LINE REACTOR 15HP DRIVES (PMP-7521,22,23,24)

Item No.	Qty	Product	Description
	1	MCC Aftermarket	SPEC 26 24 19 - 1.06-B MCC SPARE PARTS

SPEC 26 24 19 - 1.06-B MCC SPARE PARTS

B. Provide all manufacturer-recommended spare parts as an optional line item. Coordinate
final spare parts purchased with the Owner. In addition, provide a separate line item cost
adder for the following spare parts for each motor control center:

Number Required Description
1 Circuit breaker of each type, size, and rating provided (except main circuit breakers).
1 Motor circuit protector (MCP) for each type, size, and rating provided.
1 Relay of each type and size provided.
1 Starter coil and complete set of contacts for each size and type of starter provided.
2 sets Fuses of each size and type provided.
1 Control power transformers of each size and type provided.
1 Pilot device (e.g., pushbutton, selector switch, etc.) complete with contact blocks and legend plates for each type, color, size, and rating provided.

Catalog No SPEC 26 24 19 - 1.06-B M
Designation SPEC 26 24 19 - 1.06-B MCC SPARE PARTS

Item No.	Qty	Product	Description
	1	Drives - Enclosed	RGX High Performance Regenerative Enclosed Drive, 125 HP (93 KW) High Overload (IH) Rated, 480VAC Three Phase Input, NEMA 1 FILTERED Enclosure

Catalog No RGX1564G650GC10900+
Designation PMP-4321 BACKWASH PUMP NO. 1 156 FLA

Catalog No	Qty	List of Materials
Isolation Fuses	1	Isolation Fuses
Engineered Options	1	Engineered Options
Circuit Breaker	1	Circuit Breaker
SPD (40KA per phase)	1	SPD (40KA per phase)
Output Contactor	1	Output Contactor
DV/DT Filter	1	DV/DT Filter
Reset Button	1	30mm Reset Button - 10250T Series
Timer Relay	1	Timer Relay
Heavy Duty Control Relay	5	Heavy Duty Control Relay
Start/Stop Buttons	1	30mm Start (Green) & Stop (Red) Buttons - 10250T Series
HOA Switch	1	30mm HOA Switch - 10250T Series
Spare Terminal Block	4	Spare Terminal Block
Light Kit	1	30mm Power On (White), Drive Run (Green), & Drive Fault (Red) Push-To-Test Light Kit - 10250T Series
CA Drawings by Plant	1	CA Drawings by Plant
Modbus TCP/IP	1	Exp Comm - Modbus TCP/IP
Standard freight	1	Standard freight
	1	Special: Price Adjustment
	1	Special: nameplate white background and black letters Secure nameplates to equipment enclosures using stainless steel sheet metal screws.
	1	Special: relays, timers and contactor must be nema rated (D15 relays, TRF timers and nema rated contactors)
	1	Special: Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.
	1	Special: Electrical bus, including ground bus, shall be tin-plated copper
	1	Special: varnish boards
	1	Special: VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable
	1	Special: phase relay
	1	Special: Motor space Heater CKT

Item No.	Qty	Product	Description
	1	Drives - Enclosed	RGX High Performance Regenerative Enclosed Drive, 125 HP (93 KW) High Overload (IH) Rated, 480VAC Three Phase Input, NEMA 1 FILTERED Enclosure

Catalog No RGX1564G650GC10900+
Designation PMP-4322 BACKWASH PUMP NO. 2 156 FLA

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Catalog No	Qty	List of Materials
Isolation Fuses	1	Isolation Fuses
Engineered Options	1	Engineered Options
Circuit Breaker	1	Circuit Breaker
SPD (40KA per phase)	1	SPD (40KA per phase)
Output Contactor	1	Output Contactor
DV/DT Filter	1	DV/DT Filter
Reset Button	1	30mm Reset Button - 10250T Series
Timer Relay	1	Timer Relay
Heavy Duty Control Relay	5	Heavy Duty Control Relay
Start/Stop Buttons	1	30mm Start (Green) & Stop (Red) Buttons - 10250T Series
HOA Switch	1	30mm HOA Switch - 10250T Series
Spare Terminal Block	4	Spare Terminal Block
Light Kit	1	30mm Power On (White), Drive Run (Green), & Drive Fault (Red) Push-To-Test Light Kit - 10250T Series
CA Drawings by Plant	1	CA Drawings by Plant
Modbus TCP/IP	1	Exp Comm - Modbus TCP/IP
Standard freight	1	Standard freight
	1	Special: Price Adjustment
	1	Special: nameplate white background and black letters Secure nameplates to equipment enclosures using stainless steel sheet metal screws.
	1	Special: relays, timers and contactor must be nema rated (D15 relays, TRF timers and nema rated contactors)
	1	Special: Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.
	1	Special: Electrical bus, including ground bus, shall be tin-plated copper
	1	Special: varnish boards
	1	Special: VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable
	1	Special: phase relay
	1	Special: Motor space Heater CKT

Item No.	Qty	Product	Description
	1	Drives - Enclosed	RGX High Performance Regenerative Enclosed Drive, 125 HP (93 KW) High Overload (IH) Rated, 480VAC Three Phase Input, NEMA 1 FILTERED Enclosure

Catalog No RGX1564G650GC10900+
Designation PMP-4323 BACKWASH PUMP NO. 3 (STANDBY) 156 FLA

Catalog No	Qty	List of Materials
Isolation Fuses	1	Isolation Fuses
Engineered Options	1	Engineered Options
Circuit Breaker	1	Circuit Breaker
SPD (40KA per phase)	1	SPD (40KA per phase)
Output Contactor	1	Output Contactor

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Catalog No	Qty	List of Materials
DV/DT Filter	1	DV/DT Filter
Reset Button	1	30mm Reset Button - 10250T Series
Timer Relay	1	Timer Relay
Heavy Duty Control Relay	5	Heavy Duty Control Relay
Start/Stop Buttons	1	30mm Start (Green) & Stop (Red) Buttons - 10250T Series
HOA Switch	1	30mm HOA Switch - 10250T Series
Spare Terminal Block	4	Spare Terminal Block
Light Kit	1	30mm Power On (White), Drive Run (Green), & Drive Fault (Red) Push-To-Test Light Kit - 10250T Series
CA Drawings by Plant	1	CA Drawings by Plant
Modbus TCP/IP	1	Exp Comm - Modbus TCP/IP
Standard freight	1	Standard freight
	1	Special: Price Adjustment
	1	Special: nameplate white background and black letters Secure nameplates to equipment enclosures using stainless steel sheet metal screws.
	1	Special: relays, timers and contactor must be nema rated (D15 relays, TRF timers and nema rated contactors)
	1	Special: Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.
	1	Special: Electrical bus, including ground bus, shall be tin-plated copper
	1	Special: varnish boards
	1	Special: VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable
	1	Special: phase relay
	1	Special: Motor space Heater CKT

Item No.	Qty	Product	Description
	1	Drives - Enclosed	RGX High Performance Regenerative Enclosed Drive, 125 HP (93 KW) High Overload (IH) Rated, 480VAC Three Phase Input, NEMA 1 FILTERED Enclosure

Catalog No RGX1564G650GC10900+
Designation PMP-4311 CONTACTOR FEED PUMP NO. 1 156 FLA

Catalog No	Qty	List of Materials
Isolation Fuses	1	Isolation Fuses
Engineered Options	1	Engineered Options
Circuit Breaker	1	Circuit Breaker
SPD (40KA per phase)	1	SPD (40KA per phase)
Output Contactor	1	Output Contactor
DV/DT Filter	1	DV/DT Filter
Reset Button	1	30mm Reset Button - 10250T Series
Timer Relay	1	Timer Relay
Heavy Duty Control Relay	5	Heavy Duty Control Relay
Start/Stop Buttons	1	30mm Start (Green) & Stop (Red) Buttons - 10250T Series

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Catalog No	Qty	List of Materials
HOA Switch	1	30mm HOA Switch - 10250T Series
Spare Terminal Block	4	Spare Terminal Block
Light Kit	1	30mm Power On (White), Drive Run (Green), & Drive Fault (Red) Push-To-Test Light Kit - 10250T Series
CA Drawings by Plant	1	CA Drawings by Plant
Modbus TCP/IP	1	Exp Comm - Modbus TCP/IP
Standard freight	1	Standard freight
	1	Special: Price Adjustment
	1	Special: nameplate white background and black letters Secure nameplates to equipment enclosures using stainless steel sheet metal screws.
	1	Special: relays, timers and contactor must be nema rated (D15 relays, TRF timers and nema rated contactors)
	1	Special: Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.
	1	Special: Electrical bus, including ground bus, shall be tin-plated copper
	1	Special: varnish boards
	1	Special: VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable
	1	Special: phase relay
	1	Special: Motor space Heater CKT

Item No.	Qty	Product	Description
	1	Drives - Enclosed	RGX High Performance Regenerative Enclosed Drive, 125 HP (93 KW) High Overload (IH) Rated, 480VAC Three Phase Input, NEMA 1 FILTERED Enclosure

Catalog No RGX1564G650GC10900+
Designation PMP-4312 CONTACTOR FEED PUMP NO. 2 156 FLA

Catalog No	Qty	List of Materials
Isolation Fuses	1	Isolation Fuses
Engineered Options	1	Engineered Options
Circuit Breaker	1	Circuit Breaker
SPD (40KA per phase)	1	SPD (40KA per phase)
Output Contactor	1	Output Contactor
DV/DT Filter	1	DV/DT Filter
Reset Button	1	30mm Reset Button - 10250T Series
Timer Relay	1	Timer Relay
Heavy Duty Control Relay	5	Heavy Duty Control Relay
Start/Stop Buttons	1	30mm Start (Green) & Stop (Red) Buttons - 10250T Series
HOA Switch	1	30mm HOA Switch - 10250T Series
Spare Terminal Block	4	Spare Terminal Block
Light Kit	1	30mm Power On (White), Drive Run (Green), & Drive Fault (Red) Push-To-Test Light Kit - 10250T Series
CA Drawings by Plant	1	CA Drawings by Plant
Modbus TCP/IP	1	Exp Comm - Modbus TCP/IP

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Catalog No	Qty	List of Materials
Standard freight	1	Standard freight
	1	Special: Price Adjustment
	1	Special: nameplate white background and black letters Secure nameplates to equipment enclosures using stainless steel sheet metal screws.
	1	Special: relays, timers and contactor must be nema rated (D15 relays, TRF timers and nema rated contactors)
	1	Special: Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.
	1	Special: Electrical bus, including ground bus, shall be tin-plated copper
	1	Special: varnish boards
	1	Special: VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable
	1	Special: phase relay
	1	Special: Motor space Heater CKT

Item No.	Qty	Product	Description
	1	Drives - Enclosed	RGX High Performance Regenerative Enclosed Drive, 125 HP (93 KW) High Overload (IH) Rated, 480VAC Three Phase Input, NEMA 1 FILTERED Enclosure

Catalog No RGX1564G650GC10900+
Designation PMP-4313 CONTACTOR FEED PUMP NO. 3 156 FLA

Catalog No	Qty	List of Materials
Isolation Fuses	1	Isolation Fuses
Engineered Options	1	Engineered Options
Circuit Breaker	1	Circuit Breaker
SPD (40KA per phase)	1	SPD (40KA per phase)
Output Contactor	1	Output Contactor
DV/DT Filter	1	DV/DT Filter
Reset Button	1	30mm Reset Button - 10250T Series
Timer Relay	1	Timer Relay
Heavy Duty Control Relay	5	Heavy Duty Control Relay
Start/Stop Buttons	1	30mm Start (Green) & Stop (Red) Buttons - 10250T Series
HOA Switch	1	30mm HOA Switch - 10250T Series
Spare Terminal Block	4	Spare Terminal Block
Light Kit	1	30mm Power On (White), Drive Run (Green), & Drive Fault (Red) Push-To-Test Light Kit - 10250T Series
CA Drawings by Plant	1	CA Drawings by Plant
Modbus TCP/IP	1	Exp Comm - Modbus TCP/IP
Standard freight	1	Standard freight
	1	Special: Price Adjustment
	1	Special: nameplate white background and black letters Secure nameplates to equipment enclosures using stainless steel sheet metal screws.
	1	Special: relays, timers and contactor must be nema rated (D15 relays, TRF timers and nema rated contactors)
	1	Special: Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Catalog No	Qty	List of Materials
	1	Special: Electrical bus, including ground bus, shall be tin-plated copper
	1	Special: varnish boards
	1	Special: VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable
	1	Special: phase relay
	1	Special: Motor space Heater CKT

Item No.	Qty	Product	Description
	1	Drives - Enclosed	RGX High Performance Regenerative Enclosed Drive, 125 HP (93 KW) High Overload (IH) Rated, 480VAC Three Phase Input, NEMA 1 FILTERED Enclosure

Catalog No RGX1564G650GC10900+
Designation PMP-4314 CONTACTOR FEED PUMP NO. 4 (STANDBY) 156 F

Catalog No	Qty	List of Materials
Isolation Fuses	1	Isolation Fuses
Engineered Options	1	Engineered Options
Circuit Breaker	1	Circuit Breaker
SPD (40KA per phase)	1	SPD (40KA per phase)
Output Contactor	1	Output Contactor
DV/DT Filter	1	DV/DT Filter
Reset Button	1	30mm Reset Button - 10250T Series
Timer Relay	1	Timer Relay
Heavy Duty Control Relay	5	Heavy Duty Control Relay
Start/Stop Buttons	1	30mm Start (Green) & Stop (Red) Buttons - 10250T Series
HOA Switch	1	30mm HOA Switch - 10250T Series
Spare Terminal Block	4	Spare Terminal Block
Light Kit	1	30mm Power On (White), Drive Run (Green), & Drive Fault (Red) Push-To-Test Light Kit - 10250T Series
CA Drawings by Plant	1	CA Drawings by Plant
Modbus TCP/IP	1	Exp Comm - Modbus TCP/IP
Standard freight	1	Standard freight
	1	Special: Price Adjustment
	1	Special: nameplate white background and black letters Secure nameplates to equipment enclosures using stainless steel sheet metal screws.
	1	Special: relays, timers and contactor must be nema rated (D15 relays, TRF timers and nema rated contactors)
	1	Special: Power terminal blocks for VFD output to the motor shall be fixed-mounted to a backplane or the enclosure. Mounting the terminal blocks on DIN rails is not acceptable.
	1	Special: Electrical bus, including ground bus, shall be tin-plated copper
	1	Special: varnish boards
	1	Special: VFD circuitry shall be designed such that the enclosure cooling fans only run when the VFD unit is producing output power. Designs that allow the enclosure cooling fans to run continuously when the VFD unit is energized but not producing output power are not acceptable
	1	Special: phase relay
	1	Special: Motor space Heater CKT

Project Name: CITY OF CHANDLER PECOS WATER IMPROVEMENTS
Negotiation No: PX500805X5K3
General Order No:
Alternate No: 0000

Item No.	Qty	Product	Description
	1	Adjustable Frequency Drive	SPEC 26 29 23 - 1.08--A-E VFD SPARE PARTS

SPEC 26 29 23 - 1.08--A-E VFD SPARE PARTS

1.08 SPARE PARTS
A. The VFDs and accessories shall be furnished with all spare parts as recommended by
the equipment manufacturer. In addition to the manufacturer's recommended spare
parts, the Contractor shall furnish the following spare parts:
1. Two (2) sets of fuses for each size and type of fuse provided.
2. One (1) HMI per type of HMI provided.
3. One (1) set of enclosure air filters for each VFD.
4. For each VFD unit without field-replaceable internals, furnish one (1) spare VFD
unit per size provided.
5. For each VFD unit with field-replaceable internals, furnish one (1) fully functional
main control circuit board per VFD unit size provided.
B. The spare parts shall be packed in containers suitable for long-term storage, bearing
labels clearly designating the contents and the pieces of equipment for which they are
intended.
C. Spare parts shall be delivered at the same time as the equipment to which they pertain.
The Contractor shall properly store and safeguard such spare parts until completion of
the Work, at which time they shall be delivered to the Owner.
D. Spare parts lists included with the shop drawing submittal shall indicate specific sizes,
quantities, and part numbers of the items to be furnished. Terms such as "1 lot of
packing material" are not acceptable.
8/4/2025 26 29 23 70048-013
GMP2 NOT FOR CONSTRUCTION PECOS SWTP IMPROVEMENTS
E. Parts shall be completely identified with a numerical system to facilitate parts inventory
control and stocking. Each part shall be properly identified by a separate number. Those
parts which are identical for more than one size, shall have the same parts number.

Catalog No SPEC 26 29 23 - 1.08--A-
Designation (15HP) SPEC 26 29 23 - 1.08--A-E VFD SPARE PARTS

Project Name:	CITY OF CHANDLER PECOS WATER IMPROVEMENTS	**Negotiation No:**	PX500805X5K3
General Order No:		**Alternate No:**	0000

Item No.	Qty	Product	Description
	1	Adjustable Frequency Drive	SPEC 26 29 23 - 1.08--A-E VFD SPARE PARTS

SPEC 26 29 23 - 1.08--A-E VFD SPARE PARTS

1.08 SPARE PARTS
A. The VFDs and accessories shall be furnished with all spare parts as recommended by
the equipment manufacturer. In addition to the manufacturer's recommended spare
parts, the Contractor shall furnish the following spare parts:
1. Two (2) sets of fuses for each size and type of fuse provided.
2. One (1) HMI per type of HMI provided.
3. One (1) set of enclosure air filters for each VFD.
4. For each VFD unit without field-replaceable internals, furnish one (1) spare VFD
unit per size provided.
5. For each VFD unit with field-replaceable internals, furnish one (1) fully functional
main control circuit board per VFD unit size provided.
B. The spare parts shall be packed in containers suitable for long-term storage, bearing
labels clearly designating the contents and the pieces of equipment for which they are
intended.
C. Spare parts shall be delivered at the same time as the equipment to which they pertain.
The Contractor shall properly store and safeguard such spare parts until completion of
the Work, at which time they shall be delivered to the Owner.
D. Spare parts lists included with the shop drawing submittal shall indicate specific sizes,
quantities, and part numbers of the items to be furnished. Terms such as "1 lot of
packing material" are not acceptable.
8/4/2025 26 29 23 70048-013
GMP2 NOT FOR CONSTRUCTION PECOS SWTP IMPROVEMENTS
E. Parts shall be completely identified with a numerical system to facilitate parts inventory
control and stocking. Each part shall be properly identified by a separate number. Those
parts which are identical for more than one size, shall have the same parts number.

Catalog No SPEC 26 29 23 - 1.08--A-
Designation (125HP) SPEC 26 29 23 - 1.08--A-E VFD SPARE PARTS

Eaton Selling Policy 25-000 applies.

Project Name:	CITY OF CHANDLER PECOS WATER IMPROVEMENTS	**Negotiation No:**	PX500805X5K3
General Order No:		**Alternate No:**	0000

NET CONTRACTOR $$ 999,500.00

NOTES TO CONTRACTOR

1) MCC:; 6 PULSE DRIVES 15HP NO PASSIVE FILTER , LINE REACTOR AND DVDT FILTER INCLUDED. 120KA ACTIVE HARMONIC FILTER BUILT IN TO MCC
2) DRIVES 125HP NEMA 1 PER JAMES HAYES CALL TO ENGINEER
3) 200 AMP AHF SEPARATE OFF SWB
4) NOTE THERE IS $39K PLUS OF SPARE PARTS INCLUDED,

SUBMITTALS :

2000KVA 6-8 WEEKS SHIPMENT AFTER RELEASE 38-45 WEEKS

SWITCHBOARD PWTP-GAC-SWBD1 SUBMITTALS 6-9 WEEKS SHIP AFTER RLEASE 49-52-WEEKS

MCC 24 WEEKS SHIPMENT AFTER RELEASE 45 -48 WEEKS SHIP AFTER RELEASE

DRIVES SUBMITTALS 6-8 WEEKS SHIP AFTER RELEASE 25-28-WEEKS

ACTIVE HARMONIC FILTER SUBMITTALS 6-8 WEEKS SHIP AFTER RLEASE 12-16 -WEEKS

Project Name:	CITY OF CHANDLER PECOS WATER IMPROVEMENTS	**Negotiation No:**	PX500805X5K3
General Order No:		**Alternate No:**	0000

If Eaton and the buyer entity listed on this purchase order have a separate executed written agreement for the products/services herein, then that agreement applies. Otherwise, Eaton's Selling Policy 25000 (https://www.eaton.com/ca/en-gb/support/terms-conditions.html) controls and supersedes all prior correspondence or communications between Eaton and the buyer, and any additional or different terms proposed by the buyer are rejected.

All orders must be released for manufacture within 90 days of date of order entry. If approval drawings are required, drawings must be returned approved for release within 60 days of mailing. If drawings are not returned accordingly, and/or if shipment is delayed for any reason, the price of the order will increase by 1.0% per month or fraction thereof for the time the shipment is delayed.

Seller shall not be responsible for any failure to perform, or delay in performance of, its obligations resulting from the COVID-19 pandemic or any future epidemic, and Buyer shall not be entitled to any damages resulting thereof.

SHORING QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	SHORING
ESTIMATOR INITIALS	EK

BID QUANTITIES					HARK DRILLING INC.	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**
43	31.43.301	MOBLIZATION	1	LS	$ 6,000.00	$ 6,000.00
		ENGINEERING	1	LS	$ 5,000.00	$ 5,000.00
		SOIL NAIL SHORING	4884	SF	$ 55.00	$ 268,620.00

HARK DRILLING INCORPORATED

12225 W Peoria Ave. Suite A
El Mirage, AZ 85335
Phone: 623-434-3105 Fax: 623-434-3175

210 West 5th Avenue
Murray, UT 84107
Phone: 833-918-1234

Date: Sep 3, 2025
To: Ed Kluber / Archer Western

Project: Chandler Pacos GMP 2
RE: Temp Shoring

Hark Drilling is pleased to present the following proposal for the installation of temp shoring for the GMP 2 shoring.

Pricing may vary depending on the final stamped design.

If there are any questions related to this scope of work, feel free to contact Brandon Larsen with Hark Drilling.

Bid Item	Quantity	Units of Measure	Unit Price	ESTIMATED COSTS
1. Mobilization	1	EA	$6,000.00	$6,000.00
2. Engineering	1	EA	$5,000.00	$5,000.00
3. GMP 2 Shoring	4884	SF	$55.00	$268,620.00

Scope Clarifications & Exclusions

- Pricing assumes – This proposal becomes part of the contract, or that all exclusions, inclusions, and clarifications make it in the contract.
- Location, removal, and protection of utilities interfering with platform pile installation to be performed by others.
- Access to site for a drill rig, truck, crane, manlift accessible and maintained by others.
- Pricing Includes – Calc package and Engineering.
- Pricing Includes – Nail testing.
- Pricing Excludes – Any and All excavation and spoil haul off.
- Pricing Excludes – Any Material testing or inspections.
- Pricing Excludes – Any and all utility locating, removal and relocation.
- Pricing Excludes – Traffic/Pedestrian control.
- Pricing Excludes – Surveying of any kind.
- Pricing Excludes - Movement monitoring and vibration monitoring.
- Pricing Excludes - Storm water control and planning.

- Pricing Excludes – Railroad, road, and traffic protection / control.
- Pricing Excludes – Any and all removals of work beyond proposed.
- Pricing Excludes – Bonds; can be added for approximately 2%.
- Pricing Excludes – Certified payroll unless specified at time of bidding.
- Purchaser to obtain easements / permits required for system installation.
- Potable water to be provided at drill site by client at a rate not to hinder operations.

This is all required to perform the work stated in the proposal. This proposal will be valid for 5 days.

Payment Terms: Full payment without retention is due within 30 days of invoice. Unpaid amounts shall accrue interest at rate of 1.5% per month. Customer shall be liable for all costs of collecting amounts due and unpaid, including reasonable attorney's fees. This proposal is based on today's market prices for materials, certain materials, and goods (oil/diesel, cement, concrete, steel, and wood) have experienced rapid changes in pricing. The contract will be executed based on market prices at time of construction.

Once Hark Drilling, Inc.'s work has commenced and the project happens to delay to no fault of Hark Drilling, a standby rate of $525 per hour will be applied to the invoice.

Hark Drilling, Incorporated appreciates your business and will do everything within control to meet your needs and make your project a success.

Sincerely,

HARK DRILLING, INC

FENCES & GATES QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	FENCES & GATES
ESTIMATOR INITIALS	EK

BID QUANTITIES					ADAMS FENCE LLC		HURRICANE FENCE CO.	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**
01	32.101.114	MOBILIZATION	1	EA	$ 1,500.00	$ 1,500.00	$ -	$ -
		INSTALL 8' CHAINLINK FENCE W/ PRIVACY SCREEN	965	LF	$ 108.00	$ 104,220.00	$ 74.51	$ 71,900.00

QUOTE

ROC 224210
Licensed, Bonded & Insured Since 2006

503 W Watkins St.
Phoenix, AZ 85003
PHONE: (602) 256-7800
FAX : (602) 256-7801

DATE September 3, 2025

Contractor Archer Western Construction
4710 E. Elwood St., Ste. 6
Phoenix, AZ 85040
Attn: Ed Kluber
385-237-7704
ekluber@walshgroup.com

PROJECT City of Chandler Pecos Water P1 (GMP2)
Job Address 1475 E. Pecos Rd.
Chandler, AZ 85286

Addenda(s) noted	Base Bid	Alternate	Total
NONE	$105,720.00		$105,720.00

QTY	DESCRIPTION	UNIT PRICE	LINE TOTAL
1	EA Mobilization	$1,500.00	$1,500.00
965	LF install 8' H chain link fence w/privacy screen	$108.00	$104,220.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00

EXCLUSIONS: grading, staking taxes, permits, bonds, fire dept., locks, boxes, signs, mow curbs, saw cutting, and core drilling.

Contact Person: Steve Adams
602-399-2486/steve@adamsfence.net

SUBTOTAL	**$105,720.00**
SALES TAX	$0.00
TOTAL	**$105,720.00**

BID PROPOSAL

P.O. BOX 18166
PHOENIX, AZ 85005
OFFICE: (602) 484-9005
www.hurricanefenceco.com
WO & WOSB CERTIFIED

COMMERCIAL / INDUSTRIAL CHAIN LINK & ORNAMENTAL IRON - GATE AUTOMATION

CUSTOMER: **ARCHER WESTERN CONSTRUCTION**	ATTN: **ED KLUBER**	DATE: **9/2/25**
EMAIL: ekluber@walshgroup.com	PHONE: **385-237-7704**	
PROJECT: **CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM, PHASE 1 (GMP 2)**		
PROJECT ADDRESS: **1475 EAST PECOS ROAD**		
CITY: **CHANDLER**	STATE: **ARIZONA**	ZIP: **85286**

HURRICANE FENCE AGREES TO PROVIDE THE FOLLOWING:

BASE BID - $71,900.00

TEMPORARY CHAIN LINK FENCE

965 LF - 8' + 1' HIGH GALVANIZED CHAIN LINK FENCE WITH PRIVACY WINDSCREEN SCREEN & BARB WIRE (PER SPECIFICATION)

ALTERNATE

TEMPORARY CHAIN LINK FENCE (POUNDED POSTS - WIRE TOP) - $61,660.00

965 LF - 8' + 1' HIGH GALVANIZED CHAIN LINK FENCE WITH PRIVACY WINDSCREEN SCREEN & BARBWIRE
- TERMINAL / PULL POSTS SET IN CONCRETE FOUNDATIONS
- LINE POSTS DRIVEN INTO GROUND - NO CONCRETE FOUNDATIONS
- 1-5/8" BRACE & TRUSS AT TERMINAL / PULL POSTS
- 7 GAUGE WIRE TOP & BOTTOM

NOTES AND CLARIFICATIONS:

SPOILS TO BE STOCK PILED ON SITE, NO REMOVAL.
PROPOSAL ASSUMES NORMAL DIGGING CONDITIONS
PROPOSAL ASSUMES SURVEY BY OTHERS
PROPOSAL ASSUMES FENCE LINE, END, CORNER, GATE POST LOCATIONS TO BE STAKED BY OTHERS
PROPOSAL ASSUMES PRIVATE LOCATE OF UTILITIES BY OTHERS
PROPOSAL ASSUMES UNDERGROUND UTLITIES LOCATED BY OTHERS
PROPOSAL ASSUMES POSTS & FENCING TO BE INSTALLED PRIOR TO FINISH LANDSCAPE AND/OR CONCRETE FLATWORK
PROPOSAL ASSUMES AREAS OF FENCE & GATES WILL BE CLEARED, GRADED & GRUBBED BEFORE INSTALLATION
PROPOSAL ASSUMES GRADE WILL BE SET BY OWNER BEFORE POSTS ARE INSTALLED
PROPOSAL ASSUMES POTHOLING / HYDRO-VAC EXCAVATION OF HOLES BY OTHERS
PROPOSAL ASSUMES ALL CONCRETE / ASPHALT SAW CUTTING BY OTHERS
PROPOSAL ASSUMES ALL CONCRETE / ASPHALT CORING BY OTHERS
ALL ACCESS CONTROL & POWER / CONDUITS / WIRE BY OTHERS
ALL HARDWARE AND PANIC HARDWARE BY OTHERS
FIRE DEPARTMENT PERMIT NOT INCLUDED IN BID / CAN BE OBTAIN BY HURRICANE FENCE FOR ADDITIONAL COSTS
ALL FIRE DEVICES AND SIGNS PROVIDED BY OTHERS, HFC TO INSTALL ONLY
PROPOSAL DOES NOT INCLUDE STRUCTURAL ENGINEERING OR DEFERRED SUBMITTAL AS PART OF BASE BID

ADDENDUM NOTED:

NONE

EXCLUSIONS:

GRADING, STAKING, PERMITS, SURVEY, CONCRETE OTHER THAN POST FOOTINGS, CORE DRILLING, REMOVAL OF SPOILS OR VEGETATION, BONDS, KNOX BOXES, HARDWARE OTHER THAN GATE HINGES, SECURITY CLEARANCES, LANDSCAPE DAMAGE OR REPAIRS, ELECTRICAL, SIGNAGE, DUST CONTROL, BACKFILL, MULTIPLE MOBILIZATIONS, GROUNDING, DEFERRED SUBMITTALS, DELEGATED DESIGNS, ENGINEERING AND CONDUITS.

CERTIFIED WO & WOSB BUSINESS

PLEASE CALL WITH ANY QUESTIONS,

MATTHEW MITCHELL
(480) 640-7750
mattm@hurricanefenceco.com

PIPE – GENERAL QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	PIPE - GENERAL
ESTIMATOR INITIALS	EK

BID QUANTITIES					CORE & MAIN		FERGUSON WATERWORKS		STRUCTURAL STEEL & PLATE FABRICATION		HD FOWLER	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**	**UNIT AMOUNT**	**BID**
01	31.01.100	SILT FENCE	1000	LF	$ 0.562	$ 562.00	$ 0.55	$ 550.00	$ 0.60	$ 600.00	$ 0.60	$ 600.00
01	31.01.103	INLET PROTECTION	10	EA	$ 147.50	$ 1,475.00	$ 65.00	$ 650.00	$ 150.00	$ 1,500.00	$ 150.00	$ 1,500.00
01	31.01.106	MIRAFI FABRIC	1	RL	$ 311.43	$ 311.43	$ 466.36	$ 466.36	$ 475.00	$ 475.00	$ 475.00	$ 475.00
01	33.01.400	4" PVC	160	LF	$ 2.28	$ 364.80	$ 2.51	$ 401.60	$ 3.00	$ 480.00	$ 2.83	$ 452.80
01	33.01.400	4" PVC 45 BEND	2	EA	$ 14.72	$ 29.44	$ 30.07	$ 60.14	$ 30.00	$ 60.00	$ 27.85	$ 55.70
01	33.01.400	4" PVC CONNECTION COUPLING	1	EA	$ 6.21	$ 6.21	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00
01	33.01.401	6" CPVC	600	LF	$ 47.19	$ 28,314.00	$ 31.55	$ 18,930.00	$ 50.00	$ 30,000.00	$ 50.00	$ 30,000.00
01	33.01.401	6" CPVC 90 BEND	10	EA	$ 129.20	$ 1,292.00	$ 139.14	$ 1,391.40	$ 140.00	$ 1,400.00	$ 140.00	$ 1,400.00
01	33.01.401	6" CPVC CONNECTION COUPLING	4	EA	$ 75.43	$ 301.72	$ 297.68	$ 1,190.72	$ 300.00	$ 1,200.00	$ 300.00	$ 1,200.00
01	33.43.100	48" WSP & 16" WSP GE LINES	144	LF	EXCLUDED	$ 250,000.00		$ 345,223.00		$ 662,150.00		$ 566,283.00
01	33.43.200	16" WSP CTW LINES	281	LF	EXCLUDED	$ 100,000.00	INCLUDED ABOVE		INCLUDED ABOVE		INCLUDED ABOVE	

Bid Proposal for City of Chandler Pecos Water System

CUSTOMER

ARCHER WESTERN PIPELINE
4710 E ELWOOD STREET SUITE 6
PHOENIX, AZ 85040

Job
City of Chandler Pecos Water System
chandler, AZ
Bid Date: 08/26/2025
Bid #: 4412325

CONTACT

Sales Representative
Christopher Harrison
(T) 602-268-8781
(F) 602-268-8973
Chris.Harrison@coreandmain.com

Core & Main
1410 W Harvard Ave
Gilbert, AZ 85233
(T) 4809267003

NOTES

Bid Proposal for City of Chandler Pecos Water System

ARCHER WESTERN PIPELINE
Job Location: chandler, AZ
Bid Date: 08/26/2025
Core & Main Bid #: 4412325

Core & Main
1410 W Harvard Ave
Gilbert, AZ 85233
Phone: 4809267003
Fax: 4809267050

Seq#	Qty	Description	Units	Price	Ext Price
10		**ALL PRICING GOOD FOR 30 DAYS**			
20		**FROM ORIGINAL BID DATE**			
30					
40		**QUOTED TO:ED**			
50	140	4 PVC SDR35 SWR PIPE (G) 20'	FT	2.28	319.20
60	2	4 PVC SDR35 SWR 45 GXG	EA	14.72	29.44
70	1	1056-44 4 CI/PVCXCI/PVC CPLG	EA	6.21	6.21
80	600	6 SCH80 CPVC PIPE SWB	FT	47.19	28,314.00
90	10	6 CPVC S80 90 HXH 806-060C	EA	129.20	1,292.00
100	4	6 CPVC S80 CPLG HXH 829-060C	EA	75.43	301.72
110	10	36"X100'ROLL SILT FENCE W/POST	RL	56.20	562.00
120	1	MIRAFI 3XT 12'X150' GEOGRID 200SY	EA	311.43	311.43
130	10	3X3 DANDY CURB BAG	EA	147.50	1,475.00
				Sub Total	**32,611.00**
				Tax	0.00
				Total	**32,611.00**

UNLESS OTHERWISE SPECIFIED HEREIN, PRICES QUOTED ARE VALID IF ACCEPTED BY CUSTOMER AND PRODUCTS ARE RELEASED BY CUSTOMER FOR MANUFACTURE WITHIN THIRTY (30) CALENDAR DAYS FROM THE DATE OF THIS QUOTATION. CORE & MAIN LP RESERVES THE RIGHT TO INCREASE PRICES TO ADDRESS FACTORS, INCLUDING BUT NOT LIMITED TO, GOVERNMENT REGULATIONS, TARIFFS, TRANSPORTATION, FUEL AND RAW MATERIAL COSTS. DELIVERY WILL COMMENCE BASED UPON MANUFACTURER LEAD TIMES. ANY MATERIAL DELIVERIES DELAYED BEYOND MANUFACTURER LEAD TIMES MAY BE SUBJECT TO PRICE INCREASES AND/OR APPLICABLE STORAGE FEES. THIS BID PROPOSAL IS CONTINGENT UPON BUYER'S ACCEPTANCE OF SELLER'S TERMS AND CONDITIONS OF SALE, AS MODIFIED FROM TIME TO TIME, WHICH CAN BE FOUND AT: https://coreandmain.com/terms-of-sale/

THIS BID MAY INCLUDE GLOBALLY SOURCED (IMPORTED) MATERIALS THAT ARE SUBJECT TO CHANGING TARIFFS. PRICES ARE SUBJECT TO CHANGE DUE TO POTENTIAL ADDITIONAL TARIFFS IMPOSED BY THE U.S. GOVERNMENT. IF IMPOSED, PRICES WILL INCREASE BY THE SAME PERCENTAGE AND WILL BE EFFECTIVE ON THE DATE THAT THE NEW TARIFFS ARE IMPLEMENTED. THESE ITEMS SHOULD BE PURCHASED WITH HASTE TO AVOID ANY ADDITIONAL RISING TARIFF COSTS.

Project **COC Pecos Water System Phs1 GMP2 DB100**

Chandler, AZ
USA

Bid Date 9/3/2025
Bid Time 5:00 PM

Sales Contact

Rick Chavez
Outside Sales
Ferguson Waterworks
C:(480) 619-2550
E: rick.chavez@ferguson.com

PLEASE FOLLOW LINK BELOW TO MARKED UP DRAWINGS USED IN PREPARING THIS INTIAL SCOPE. (Small and Misc. Items may not be marked)
Click to view marked up drawings

Click to view Misc Job Site Materials and Safety Equipment catalog
Click to View Geo-Synthetics Material
Click to View Ferguson Terms and Conditions of Sale

CONTACT YOUR SALES REPRESENTATIVE IMMEDIATELY FOR ASSISTANCE WITH DBE/MBE/WBE/SMALL BUSINESS REQUIREMENTS
Click to View US Distributor Alliance Program Policy

Ferguson WW Quote Total: $345,634.38

Project Manager James Nelson

Estimator James Nelson

Notes

ATTENTION

QUALIFICATIONS & DELIVERY SCHEDULE

The Ferguson Plant Division Qualifications and Delivery Schedule for this project are shown in separate worksheets within this document. See corresponding tab titles below. Please review these documents thoroughly prior to acting upon this proposal. Both documents are required in order for this quotation to be considered complete.

ESCALATION

The following suggested escalation terms are offered for consideration and applied at Bidder's discretion and risk to pricing contained within this quotation.

A.) 2.5% price escalation every 30-days for all volatile commodity product outlined in the Qualifications Page.
B.) 5% price escalation every 90-days for all other products.

Suggested escalation terms are not guaranteed and meant for budgetary puposes only. Manufacturer excalation terms, if applicable, will be verified post-bid once Buyer's written commitment is received.

DRAWINGS

The Ferguson Plant Division is pleased to offer line drawing services for supplied exposed ductile iron systems, 3" and larger, at a cost of $1,000 per sheet, including up to two (2) revisions. Drawing services for underground piping and other exposed systems can be quoted upon request. Please contact your Ferguson sales representative for more information.

TERMS

This quotation is offered contingent upon the Buyer's acceptance of Seller's terms and conditions which are incorporated into the project qualifications sheet referenced above, or on the web at https://www.ferguson.com/content/website-info/terms-of-sale. This scope, the terms and conditions herein, and all supplemental attachments shall be incorporated as part of a purchase agreement should this proposal be accepted.

In providing this proposal, we appreciate the opportunity to support you in the successful pursuit of this project.

Thank you!

Ductile Iron Pipe Package	$	-
Carbon Steel Fabrication Package	$	345,223
Stainless Steel Fabrication Package	$	-
Fiberglass Reinforced Pipe Package	$	-
Process Valve Package	$	-
Pipe Support Package	$	-
Project Misc Package	$	412
Additional Packages	$	-

PACKAGE TOTALS	**$**	**345,634**

ID	DESCRIPTION	AMOUNT
1170.000	PVC SEWER PIPE - GASKETED BELL JOINT	351
1180.000	PVC SEWER FITTINGS - GASKETED / SOLVENT WELD	60
1495.000	CARBON STEEL PACKAGE	345,223
	Total	345,634

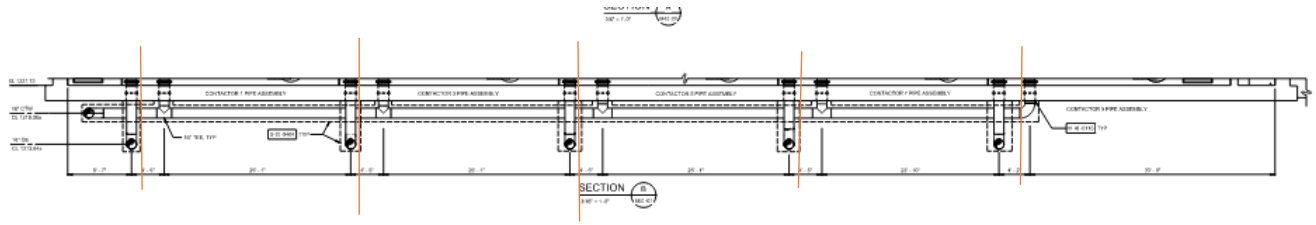
Structural Steel & Plate Fabrication
The Industrial Fabricator

125 West 500 North, North Salt Lake, UT 84054 | www.ssandpf.com | Phone 801.292.8484

Proposal No: 251289 **| Budgetary Quote**

To: Ed Kluber| Archer Western Construction
Re: City of Chandler Pecos Water System
Location: Chandler, Arizona

Budgetary Scope / Customer Provided Drawings:



- Underslab Piping Plan per drawings M43-01 thru M43-02
  - 48” and 16” Cement lined pipe
  - Pipe Supplied in 30 ft sections (Segments shown in by orange line)

General Notes:

- Price is based on the awarding of all items included.
- All fabrication will be in strict accordance with the AISC Steel Construction Manual and Code of Standard Practice, latest edition, including all supplements and Commentary.
- All audits required by the customer will be an additional cost to the contractor.
- All engineering and engineering stamp costs are not included in our price if required.
- Schedule, pricing, and material are in effect and to be confirmed at time of order.
- Welding procedures can be submitted for approval upon request.
- SS&PF Standard Tolerances of plus or minus 1/8”
- **48” pipe material has a 13 week Lead time**

Inclusions:

- Structural Steel per the above drawings and/or Scope.
- SSPC6 blast Profile.
- Painted per specification:
  - One coat of Tnemec Tneme-zinc 90-97, 5.0 mils DFT.
  - One Topcoat Tnemec 73,3-5 mils DFT. (Color TBD)
- Up to 1 Gallon of Touch up Paint.

- Permits and transportation FOB: **Chandler, Arizona**
- Structural detailed drawings for submittal.
    - One redline/drawing approval submittal – thereafter cost will be validated based on hours spent on changes ($110.00 per hour).
- Dimensional & Visual Inspection.

Exclusions:

- Unloading at delivery site.
- Misc. bolts wood to wood, wood to concrete and masonry.
- Grout or dry packing, & Concrete fill.
- Costs of tests and inspections (shop and field) beyond inclusion list.
- Cost of bonds, permits or special insurance.
- All items shown on Architectural, Mechanical, Electrical, Plumbing, Civil or Landscape drawings (UNO).
- All material 1/8” (10ga.) or lighter (UNO).
- All Sleeves and Anchor bolts.
- Fasteners for other trades.
- Rebar and mesh, including welding of same.
- Liquidated damages.
- Steel Erection and Field measurements.
- Openings for other trades not shown on structural drawings.
- All demolition and onsite work.
- Connection design, & all engineering in its entirety.
- Stamped Drawings.
- Any and all materials not specifically listed in above drawings/scope

Sequential Schedule:

- Detailed Drawings Weeks 0-2
- Customer Approval Weeks 2-3
- Materials Procurement Weeks 12-14
- Fabrication Weeks 15-17 (After receipt of Customer Approved Fabrication IFC Drawings)
- Painting Weeks 2-3
- Allow 32-35 Weeks for normal delivery *(Negotiable)*

This schedule is subject to the following:

a. Shop load at time of order placement.
b. Receipt of Approved Fabrication Drawings.
c. Supply chain and Production is not impacted by shelter in place.
d. A 2-5 Day scrub of drawings after receipt of approval drawings, but prior to release to shop. (Not included in schedule as it varies depending on project)
e. 24 Hour RFI turnaround times.

An expedited schedule can be negotiated depending on customer needs.

Terms:

50% NET 30 upon receipt of order. 50% NET 30 upon completed fabrication in monthly progress payments.

Quote Pricing is based on above "Payment Terms". Any Adjustments to these terms can/will change total amount of proposal pricing.

Budgetary Pricing:

Fabrication (66,414 lbs)	**$649,150.00** (excludes tax & freight)
Freight	$13,000.00

Bid Validity: Material price to be confirmed at time of order. Not to exceed 10% of material cost, in increases from today 9-4-25 to 10-4-25

Respectfully,

Nathan Parker
Estimator
Nathan@ssandpf.com
Main Office: (801) 292-8484 Ext. 151

H.D. FOWLER COMPANY

Salt Lake Branch
1980 S 900 W
Salt Lake City, UT 84104
(801) 896-8800

Date: 09/05/25

QUOTATION

Project: CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM, PHASE
Location: CHANDLER, AZ 85225

Engineer: HAZEN & SAWYER (JASON CURL)
Owner/Agency: CITY OF CHANDLER

Quote #: Q603168
Bid Date: 09/03/25 @ 1:00pm
Estimator: Steve Quiroz
stevequ@hdfowler.com

TO CONTRACTORS:

Attached is the HD Fowler Company quotation for materials we are offering on the above-listed project. This quotation is based on our interpretation of the plans and specifications. To accurately bid any project, it is necessary for the contractor to perform his own item and quantity take-off. We also strongly suggest that the contractor confirm the material list before ordering. Please carefully review the Terms & Conditions of Sale which also accompany this bid.

All products quoted are furnished with the factory's standard shop coating, unless otherwise stated in our quote. The provisions for field startup and the technical service of a manufacturer's representative are not included, unless otherwise stated in our quote.

Prices quoted are based on quantities shown and are subject to revision if quantities ordered vary substantially.

Due to unstable market conditions, rising fuel and raw materials costs, HD Fowler Company requests that you carefully evaluate material costs and the duration of price protection we are able to offer and plan accordingly. We value your business and will do our best to communicate changes in market conditions while assisting you through this difficult situation. Due to current unstable price conditions, unless specifically stated otherwise, the prices in this proposal are subject to change and material will be invoiced at the prices in effect at the time of shipment.

Required drawings of any kind are not included in this proposal unless specifically stated as a line item.

Prices of fabricated piping are based on lengths shown. Contractor is advised to verify lengths, tap and seep ring locations prior to ordering. All products from our fabrication shop are made by non-union employees.

Bolt, nut, stud, gasket and other fastener products are for estimating purposes only. Required fasteners need to be determined by the contractor.

The prices quoted on pipe are based on shipping full truckloads direct from the factory. In the event quantity ordered is less than truckload, shipment would have to be combined with others to make full truck and delivery time would depend on our ability to do so.

Prices on copper tubing are extremely volatile and subject to change. They will be billed at the price in effect at time of shipment.

Due to varying trench depths and pumper thread specifications, we advise confirmation on fire hydrant requirements prior to ordering.

FOB: Our Yard
PIPE - FOB factory with freight prepaid and allowed on full truckload shipments, buyer to

Payment Terms: Net 10th Prox.
(subject to Credit approval)

unload. Balance - FOB our yard. Contech: FOB factory with freight allowed to jobsite and unloading by others at a truck accessible location. Deliveries made by H.D. Fowler Company may include a truck charge. Contractor to provide all rigging, equipment and personnel to offload material onsite.

Delivery: PLEASE NOTE: Our industry continues to experience supply chain disruptions beyond our control. Raw material shortages, manufacturing backlogs, imported cargo delays and availability of domestic freight carriers are all impacted. Any lead times given or implied are subject to change without notice. Please carefully consider these realities in your bidding and procurement processes for this project.

Addenda Received for this project:

H.D. FOWLER COMPANY

Customer: ARCHER WESTERN CONSTRUCTION LLC
Estimator: Steve Quiroz
Job Name: CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM, PHASE 1
Location: CHANDLER, AZ 85225

Quote #: Q603168
Bid Date: 9/3/2025

Line	Qty	UoM	Description	Unit Price	Extended Price	
			GENERAL BID NOTES:			
1						
2			**THE PRICES OF THIS QUOTE ARE SUBJECT TO CHANGE FOLLOWING ANY NEW OR INCREASED TARIFFS, DUTIES, OR OTHER GOVERNMENT-IMPOSED COSTS ON MATERIALS. PRICES FOR IMPACTED MATERIALS WILL BE REVISED AT TIME OF SHIPMENT TO REFLECT THE ACTUAL INCREASED COSTS TO HD FOWLER.**			
3						
			Subtotal		**0.00**	
			Fabricated Steel Pipe			
4	1	EA	LOT OF 16" AND 48" FABRICATED STEEL PIPE THAT IS SHEET M43-01 AND M43-02. LIMITS OF PIPE WILL BE THE FLANGE AT 1221 AND WITH A FLANGED CONNECTION WHERE THE PIPE LEAVES THE STRUCTURE ON SHEET M43-01. THERE ARE FLANGED CONNECTIONS ON THE MAIN RUN TO AVOID ANY FIELD WELDING AND WALL RINGS ARE WELDED AT ALL THE PIECES GOING THROUGH THE FLOOR. DRAWINGS AND FREIGHT ARE INCLUDED. THE PIPE IS BEING QUOTED AS CEMENT MORTAR LINED AND POLYURETHANE COATED.	566,283.00	566,283.00	
5			TAPE WRAP TO BE PROVIDED AND APPLIED BY OTHERS.		Note	Not quoted per spec
6			THE SPECS CALL FOR A CONCRETE ENCASEMENT OF STEEL PIPE. EVEN THOUGH WE HAVE INCLUDED A POLYUREHTANE COATING - IT MAY NOT BE REQUIRED		Note	
7	2	EA	48" STEEL FLANGE BOLT KIT, 316 STAINLESS STEEL, 44 EACH 1 1/2" X 8" BOLT WITH NUT	1,834.86	3,669.72	Not part of GMP 2
8	2	EA	48" TORUSEAL 1/8" DUAL BULB FULL FACE GASKET, NSF-61 SBR BLACK	632.86	1,265.72	Not part of GMP 2
9	15	EA	16" STEEL FLANGE BOLT KIT, 316 STAINLESS STEEL, 16 EACH 1" X 4 1/2" BOLT WITH NUT	164.78	2,471.70	Not part of GMP 2
10	15	EA	16" TORUSEAL 1/8" DUAL BULB FULL FACE GASKET, NSF-61 SBR BLACK, 350PSI RATED DOMESTIC	179.08	2,686.20	Not part of GMP 2
			Subtotal		**576,376.34**	
			Fabricated Steel Pipe Subtotal		**576,376.34**	
			Relocate 4" Drain Pipe			
11	140	FT	4" SDR35 3034 GASKETED PVC SEWER PIPE 14' LENGTH	2.83	396.20	
12	2	EA	4" PSM 45 ELBOW GASKETED FOR SEWER OR DRAIN	27.85	55.70	
13	1	EA	4" RODENT SCREEN W/ SET SCREWS	176.48	176.48	Not Needed
			Subtotal		**628.38**	
			Relocate 4" Drain Pipe Subtotal		**628.38**	
			Misc Project Costs			

14	1	ESTIMATED SUBMITTAL PACKET FEE	200.00	200.00	
15	1	ESTIMATED OUTBOUND FREIGHT CHARGE	1,000.00	1,000.00	
		Subtotal		**1,200.00**	Added this to the WSP
		Misc Project Costs Subtotal		**1,200.00**	
		Approximate Total		**578,204.72**	
		Estimated Tax		**45,099.99**	
		Approximate Grand Total		**623,304.71**	

HD Fowler Company TERMS AND CONDITIONS OF SALE

1. This H.D. FOWLER COMPANY itions with respect to the sale and purchase of the material ordered by Purchaser and sold by HD Fowler Company (Fowler). This Agreement constitutes the entire agreement between Fowler and Purchaser; it will not be amended, altered, or changed except by a written agreement signed by both parties. Purchasers acceptance of the material shall conclusively evidence Purchasers acceptance of these terms and conditions.

2. **SHIPPING AND DELIVERY.**

Shipment or delivery dates are estimates only. Fowler will not be liable for any failure or delay in making shipment or delivery caused by any contingency beyond Fowlers control, or the control of Fowlers vendors, with whom Fowler has contracted to cover this offer to sell materials to Purchaser. Such contingencies include but are not limited to: labor conditions, material shortages, carrier delays, acts of God, fire, weather, accidents, embargoes, war, insurrection, riots, government regulations, pandemics, or other causes beyond the control of Fowler and its vendors. Any time periods for Fowlers performance under this Agreement shall be extended accordingly. When materials are sold freight on board (FOB) shipping point or FOB shipping point freight allowed, Fowlers responsibility for loss or damage in transit terminates upon acceptance of material by the carrier. When sold FOB destination, Fowlers responsibility for loss or damage terminates upon tender of delivery by the carrier. Upon receipt of shipments, it shall be the Purchasers responsibility to inspect materials and secure written acknowledgement from the delivering carrier for any loss or damage. Claims for incorrect materials or shortages (other than loss in transit), must be made to Fowler in writing within five (5) calendar days after receipt of shipment. Following Fowlers receipt of notice of incorrect materials, Fowler will promptly arrange for pickup of such items at Purchasers location (Purchaser shall load the materials to be returned). As Purchasers sole remedy, Fowler will, at its election, either replace the incorrect materials or refund the purchase price paid for the incorrect materials. Notwithstanding the foregoing, Fowler shall have no responsibility for incorrect materials after installation of such items.

3. **RETURNS**.

Except as otherwise provided herein, material may not be returned without Fowlers prior written consent, in its sole discretion. If a return is approved by Fowler, standard items normally carried in Fowlers stock, returned in a new condition, will be credited less fifteen percent (15%) to cover handling costs. Special items manufactured to order may not be returned. All returned material must be shipped freight prepaid and the risk of loss will remain with the Purchaser until Fowler receives the materials.

4. **TAXES**.

Purchaser shall be responsible for the payment of all federal, state, provincial, county, local, or government taxes, including but not limited to, sales tax, use tax, value added tax, goods and services tax, or other excise tax that may be applied on the material (Taxes), and shall defend, indemnify and hold Fowler harmless from those Taxes. Fowler shall be responsible for any tax based solely upon its net income. Purchaser may supply Fowler with a valid Resale Certificate or other form certifying an exemption from the payment of Taxes from the taxing authority having proper jurisdiction over the order.

5. **PAYMENT TERMS**.

Fowler will submit invoices to Purchaser upon the shipment of materials. Invoices shall be paid by Purchaser on or before the tenth (10^{th}) day of the following month. Late payments shall accrue interest at the rate of one percent (1%) per month until paid, commencing on the first (1^{st}) day of the month after the month in which payment was due. Prices are based on current published freight rates and are subject to adjustment if freight rates are increased. Prices include domestic packing for commercial truck shipment only. Fowlers offer herein is subject to approval by Fowlers Credit Department after Purchasers acceptance.

If Purchaser fails to comply with terms of payment or sale, or if Purchasers financial responsibility becomes impaired or unsatisfactory to Fowler, Fowler reserves the right to withhold further deliveries on partially filled orders and to require payment in advance or satisfactory security or guarantee that invoices will be paid when due. Purchaser agrees to accept and pay for partial shipments.

6. **LIMITED WARRANTY; LIMITATION OF LIABILITY**.

The materials supplied hereunder are subject to the relevant third-party manufacturers warranties, which shall pass to Purchaser to the extent assignable. When provided reasonable notice, Fowler agrees to use commercially reasonable efforts to assist Purchaser with pursuing remedies under the manufacturers warranties for up to one (1) year from the date of sale, provided that Fowler shall not be required to incur any expenses. FOWLER EXPRESSLY DISCLAIMS ALL WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. FOWLER SHALL HAVE NO LIABILITY OR RESPONSIBILITY FOR THE DESIGN OF THE PROJECT IN WHICH THE MATERIALS WILL BE INSTALLED. FOWLER SHALL NOT BE REQUIRED TO HOLD THE MATERIALS FREE OF THE CLAIM OF ANY THIRD PERSON BY WAY OF PATENT OR TRADEMARK INFRINGEMENT, PROVIDED THAT THE FOREGOING SHALL NOT BE DEEMED TO AFFECT ANY REMEDIES AVAILABLE TO PURCHASER UNDER APPLICABLE THIRD-PARTY MANUFACTURERS WARRANTIES.

IN NO EVENT SHALL FOWLER BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY, OR OTHER DAMAGES AND/OR LOSS OF PROFITS BASED ON PRODUCT LIABILITY, STRICT LIABILITY, TORT (INCLUDING NEGLIGENCE), BREACH OF CONTRACT, OR OTHERWISE. FOWLERS TOTAL LIABILITY FOR ANY AND ALL LOSSES, DAMAGES, LIABILITIES, AND/OR INDEMNITIES ARISING UNDER OR RELATING TO THIS AGREEMENT, UNDER ANY THEORY OF LIABILITY, SHALL BE LIMITED TO THE PURCHASE PRICE PAID TO FOWLER FOR THE APPLICABLE MATERIALS THAT ARE THE SUBJECT OF THE CLAIM.

7. **INDEMNIFICATION**.

Purchaser agrees to defend, indemnify, and hold Fowler harmless from any and all claims, demands, losses, and liabilities to or by third parties arising from, resulting from, or connected with the material to be finished under this Agreement, even though such claims may prove to be false, groundless, or fraudulent, to the fullest extent permitted by law and subject to the limitations provided below. Purchasers duty to indemnify Fowler shall not apply to liability for damages arising out of bodily injury to persons or damage to property caused by, or resulting from, the sole negligence of Fowler. Purchasers duty to indemnify Fowler for liability for damages arising out of bodily injury to persons or damage to property caused by, or resulting from, the concurrent negligence of Fowler and Purchaser, shall apply only to the extent of negligence of Purchaser. Further, the indemnification obligation under this Agreement shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable to or for any third party under workers compensation acts, disability benefits acts, or other employee benefits acts; provided, Purchasers waiver of immunity by the provisions of this paragraph extends only to claims against Purchaser by Fowler, and does not include, or extend to, any claims by Purchasers employees directly against Purchaser. Subject to Purchasers duty to defend Fowler, if applicable, Fowlers right to recovery of its defense costs shall include all fees (of attorneys and experts), costs, and expenses. In addition, Fowler shall be entitled to recover compensation for all of its in-house expenses (including materials and labor) consumed in its defense.

8. **TERM AND TERMINATION**.

The terms within this Agreement shall survive the completion, suspension or termination of this Agreement and the exchange of material governed under this Agreement.

9. **Successors and Assigns**.

Fowlers successors and assigns shall be entitled to assume the liabilities and obligations, and succeed to the rights and interests, of Fowler under this Agreement at any time and without limitation. This Agreement may not be assigned by Purchaser without Fowlers prior written consent, in Fowlers sole discretion.

10. **MEDIATION AND BINDING DISPUTE RESOLUTION**.

In the event of any dispute relating to this Agreement, the parties agree to enter into mediation under the Construction Industry Rules of the American Arbitration Association. The costs of the mediator shall be paid equally. The parties agree that mediation shall occur in Seattle, Washington. In the event mediation fails to resolve the dispute, the parties agree to submit any and all disputes to binding arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association. The parties agree that arbitration shall occur in Seattle, Washington. In any arbitration proceeding between Fowler and Purchaser, the prevailing party shall be awarded its reasonable attorneys fees and costs. The parties shall mutually agree upon the mediator or arbitrator, as applicable, to be used for the dispute resolution procedures set forth above. If the parties do not mutually agree to a mediator or arbitrator, either party may apply to the King County Superior Court, requesting the appointment of a mediator or arbitrator.

11. **APPLICABLE LAW**.

This Agreement shall be governed by and enforced in accordance with the laws of the State of Washington without giving effect to principles regarding conflict of laws.

12. **Delays or Omissions**.

No delay or omission to exercise any right, power, or remedy accruing to either party upon any breach or default of the other party hereto shall impair any such right, power, or remedy of such non-defaulting party, nor shall it be construed to be a waiver of any such breach or default or an acquiescence therein, or of any similar breach or default thereafter occurring. A waiver of a breach or default by a party shall not be deemed to be a waiver of any other breach or default.

13. **SEVERABILITY**.

In the event any provision herein should be held unenforceable, such provision shall be deemed to be amended so that it will be enforceable to the fullest extent permitted by law, and all remaining provisions shall continue in full force without being affected, impaired, or invalidated thereby in any way.

14. **Rules of Construction**.

The parties acknowledge that they have been represented by, or had an opportunity to consult with, competent counsel with respect to this Agreement and therefore waive the application of any law, regulation, holding, or rule of construction providing that ambiguities in an agreement will be construed against the party drafting such agreement.

15. **Effect of Headings**.

The section headings herein are for convenience only and shall not affect the construction or interpretation of this Agreement.

WELDING QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	WELDING
ESTIMATOR INITIALS	EK

BID QUANTITIES					PROFESSIONAL PIPING SYSTEMS	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**
01	33.43.100	WELD 48" WSP	5	EA	$ 3,360.00	$ 16,800.00
01	33.43.100	WELD 16" WSP	12	EA	$ 804.00	$ 9,648.00
01	33.43.100	WELD PASS THROUGH HOLES	3	EA	$ 1,150.00	$ 3,450.00
01	33.43.100	CONCRETE LINING PATCH FOR 48"	5	EA	$ 950.00	$ 4,750.00
01	33.43.100	CONCRETE COATING PATCH FOR 48"	5	EA	$ 795.00	$ 3,975.00
01	33.43.100	CONCRETE COATING PATCH FOR 16"	12	EA	$ 695.00	$ 8,340.00
01	33.43.200	WELD 16" WSP	12	EA	$ 804.00	$ 9,648.00
01	33.43.200	CONCRETE COATING PATCH FOR 16"	12	EA	$ 695.00	$ 8,340.00
01	33.43.100	CONFINDED SPACE MONITORING	1	LS	$ 6,000.00	$ 6,000.00

ATTEN: Ed Kluber
Archer Western

PECOS WATER SYSTEM PROGRAM PHASE 1
QUOTE: PPS 25-1263

ERIC JOHNSON
Estimator
Professional Piping Systems LLC
319 E. Pioneer Street
Phoenix, AZ 85040
C: 602-510-2638
www.ppsphx.com

PROFESSIONAL PIPING SYSTEMS
738 S 52ND STREET
Tempe, AZ 85281

Professional Piping Systems, LLC
738 S 52nd Street
Tempe, AZ 85281
www.ppsphx.com
9/3/2025

Attachment 1
Scope of work

Drawings Provided for Estimating

- NONE PROVIDED

Material Grades

- A53 B STD

Procedures

- Inspection criteria
    - 100% Visual Inspection

Coatings

- NONE QUOTED

Clarifications and Assumptions

- *IN THE EVENT THAT TARIFFS, DUTIES, OR OTHER GOVERNMENT-IMPOSED FEES ARE ENACTED, MODIFIED, OR INCREASSED AFTER THE DATE OF THIS PROPOSAL AND SUCH TARIFFS DIRECTLY IMPACT THE COST OF RAW MATERIALS REQUIRED FOR THE PERFORMANCE OF THE WORK, THE QUOTED PRICE SHALL BE SUBJECT TO ADJUSTMENT. THE ADJUSTMENT SHALL REFLECT THE ACTUAL INCREASE IN MATERIAL COSTS INCURRED BY PPS DUE TO THE TARIFF CHANGES. PPS SHALL PROVIDE REASONABLE DOCUMENTATION TO SUBSTANTIATE THE ADDITIONAL COSTS. THE CUSTOMER AND PPS AGREE TO NEGOTIATE IN GOOD FAITH TO EQUITABLY ADJUST THE CONTRACT PRICE TO ACCOUNT FOR SUCH INCREASED COSTS.*
- NDT OTHER THAN VISUAL INSPECTION IS ONLY INCLUDED IF IT IS SPECIFICALLY NOTED IN THIS PROPOSAL.
- THIS PRICING IS GOOD FOR 15 DAYS FROM THE DATE ON THIS PROPOSAL. IF PO OR NOTICE TO PROCEED IS GIVEN 15 DAYS AFTER THE DATE OF THIS PROPOSAL.
- PPS WILL NOT BE BOUND TO ANY SCHEDULE IN WHICH WE HAVE NOT FULLY PARTICIPATED. FURTHER, WE WILL NOT ALLOW OUR WORK ACTIVITIES TO BE COMPRESSED DUE TO THE SCHEDULE SLIPPAGE OF OTHER TRADES OF SUPPLIERS FOR WHICH WE ARE NOT RESPONSIBLE.
- PPS SHALL NOT BE LIABLE FOR DELAYS RESULTING FROM INDUSTRY CONDITIONS CONSTRICTING THE SUPPLY OF ESSENTIAL COMPONENTS OF MATERIALS, INCLUDING THE INTERRUPTION IN THE SUPPLY OF STEEL PRODUCTS.
- ALL PRICING IS CALCULATED WITH STRAIGHT TIME BEING WORKED.
- PPS WILL PROVIDE CONFINED SPACE ENTRY WATCH WHILE WELDING THE 48” PIPE.
- PPS PRICED THIS PROJECT AS WELDING ONLY. NO INSTALLATION EQUIPMENT WAS INCLUDED.
- PPS HAS ADDED OPTIONAL PRICING FOR CONCRETE PATCH OF THE WELD AREAS.
- ALL LABOR AND MATERIAL HAS A ONE YEAR WARRANTY.

Professional Piping Systems, LLC
738 S 52nd Street
Tempe, AZ 85281
www.ppsphx.com
9/3/2025

DESCRIPTION OF WORK

- **WELD 24 EACH 16” LAP WELDS**
- **WELD 5 EACH 48” LAP WELDS**
- **WELD 3EA 5” PASS THROUGH HOLES**

Attachment 2

Proposed Schedule and Pricing

Leadtime

- TBD by job schedule

Shipping

- Not included

Total Proposal

Weld Total = $36,096.00 (16” $804 ea) (48” $3,360 ea)
Hole watch for confined space = $6,000.00
Concrete lining patch for 5ea 48” = $4,750.00
Concrete coating patch for 5ea 48” = $3,975.00
Concrete coating patch for 24ea 16” = $16,680.00
Pass through welds inside and outside 3ea 5” $3,450.00

Terms

- PAID WHEN COMPLETE
- NET-30

Attachment 3

PPS HAS INCLUDED THE FOLLOWING:

- 1ea fit and 1ea Butt Weld per Joint
- Confined entry watch, 1 man 1 week. (during the 48” pipe welding)
- Optional pricing for concrete lining and coating patch.
- 1 YEAR WARRANTY ON ALL LABOR.

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Tempe, AZ 85281
www.ppsphx.com
9/3/2025

Attachment 4

PPS HAS SPECIFICALLY EXCLUDED FROM THIS PROPOSAL THE FOLLOWING:

- FIELD INSTALLATION.
- Any material.
- Any equipment necessary to set or move the pipe.
- Pressure testing the pipe after welding.
- Any NDT weld testing.
- TAXES OR BONDS.
- ANYTHING NOT SPECIFICALLY ADDRESSED IN THIS PROPOSAL.

Attachment 5

Terms & Conditions

The following terms and conditions (these "Terms & Conditions") apply to the sale of goods, materials or products (collectively, "Products") or provision of services (collectively, "Services") by Professional Piping Systems, LLC, an Arizona limited liability company ("PPS"), to the customer identified on the Purchase Order to which these Terms & Conditions are attached (the "Customer") and all purchase orders and the provision of all Products or Services by PPS are subject to the Terms & Conditions.

1. Prices. Except as provided herein, prices offered by PPS for Services or Products in any written quote or estimate (“Quote”) will remain in effect for a period of fifteen (15) days after the date of the Quote (the "Quote Date"). After said fifteen (15) day period, prices are subject to change. Prices for Products to be used in any Work (hereafter defined) which are obtained by PPS from a third party, are subject to change at any time to account for any fluctuations in the market price after the Quote Date.

2. Purchase Orders. All Services or Products to be provided by PPS to Customer shall be pursuant to a written purchase order executed by PPS and the Customer (a "Purchase Order"), referencing the scope of work described on the Quote, which will, at a minimum, include a description of the Services or Products to be provided by PPS (collectively, the "Work"), and the compensation to PPS therefor. PPS shall have no obligation to proceed with any Work until such time that it has received a fully executed Purchase Order and any initial deposit required there under.

3. Change Orders. The parties may only modify or add to the Work described in the Purchase Order by executing a written change order describing in reasonable detail the modified or additional Work to be completed and any adjustments to the schedule or the compensation to PPS therefore (a "Change Order"). PPS shall have no obligation whatsoever to commence or complete any additional or modified Work unless and until Customer and PPS have executed a Change Order.

4. Plans and Specifications; Scheduling. PPS shall complete or provide all Work in substantial conformity with written specifications, drawings and descriptions provided by Customer to PPS (collectively, "Customer Specifications"). PPS shall have no liability to Customer for any delays, damages or claims of any kind arising from defects, omissions, errors or deficiencies in the Customer Specifications and Customer shall defend, indemnify and hold PPS harmless for, from and against any and all liability, damages, claims, losses and expenses, including attorneys' fees and costs, arising therefrom or related thereto. PPS will furnish detailed joint design, pipeline layouts and manufacturing drawings for Customers' approval prior to commencing pipe manufacture at no extra cost. Drawings will be provided one (1) week after receipt of the approved layout.

5. Shipping. Shipping rate and delivery date will be arranged by mutual written agreement between PPS and Customer upon receipt of approved drawings. Any revised delivery schedule will be negotiated between PPS and Customer and will take into account PPS' current schedules of work on hand as well as current availability and prices of materials. Any delays on the project resulting in production or delivery delays longer than thirty (30) days may result in an escalation charge in an amount determined by PPS in its sole discretion. Prices are based on delivers in full truckload lots. Deliveries requested for material in quantities less than truckload lots will be billed to Customer at the full truck load rate. Internal bracing, stulling, and shoring are placed in pipe at the time of manufacture for the purpose of limited pipe deflection during hauling and handling. PPS is not responsible for internal bracing required for the installation or grouting of the pipe. Any special requirements, i.e. vertical elongation etc., will be the sole responsibility of Customer. Shipping Cradles and stull are the property of PPS and are to be grouped and reloaded on trucks, at Customer's expense, for reuse by PPS, if requested. Any bunks or stulls not returned in reusable condition will be billed to the Customer's account at full replacement cost. Risk of loss or damage shall pass to Customer when Products are delivered to Customer or delivered to or picked up by the shipping company.

6. Payment Terms. Payment terms are net thirty (30) days from the date that PPS sends an invoice to Customer for the amounts due. Any amounts not paid within such thirty (30) day period shall accrue interest thereafter until paid in full at a rate which is the lesser of eighteen percent (18%) per annum or the highest rate allowed under applicable laws, computed on a 365/360 day year basis. In addition, in the event that the Customer fails to pay the full amount due within thirty (30) days after PPS has sent Customer an invoice, PPS shall be entitled to exercise any of its available remedies under applicable law, which include suspension of any further work by PPS and retention of any equipment or other personal property owned by the Customer and in PPS' possession, until all past due amounts owing to PPS have been paid in full. PPS will invoice Customer for 100% of raw material (no retention) upon its arrival at PPS' facility. PPS will invoice

Customer monthly for progress payments (less retention) per a PPS supplied schedule of values. PPS will invoice for all final amounts including retention amounts, after completion of the Work.

6. Warranty. PPS warrants that Products and Services provided by PPS to Customers are free from defects in material and workmanship. PPS' obligation under this warranty is limited to correction of defects in Products or Services which were provided by PPS. Within ten (10) calendar days after discovery of any defective Services or Products provided by PPS, Customer shall provide PPS written notice of such defect. This warranty does not cover any repairs or replacement required due to a Customer or third parties' accident, abuse, misuse, failure to maintain, disassembly, repair, modification, negligence, fault, or natural or man-made disaster. PPS shall have no liability to Customer for any: (a) consequential, special, indirect, incidental, punitive, or liquidated damages; or, (b) damages to or from products or services not furnished by PPS; or, (c) repair, replacement or other expenses incurred by Customer in correcting defective Products or Services provided by PPS. PPS' warranty will remain in effect for a period of twelve (12) months from the date the Products or Services were provided or completed. Notwithstanding the foregoing, with respect to new equipment, PPS' warranty will remain in effect until the earlier of: (i) twelve (12) months from the time the new equipment is placed into service; or, (ii) eighteen (18) months from the date of delivery to the Customer. PPS' warranty for new equipment shall apply only if Customer properly stores, maintains and operates said equipment in accordance with the original equipment manufacturer's procedures and specifications. EXCEPT FOR PPS' EXPRESS WARRANTY CONTAINED HEREIN, PPS IS NOT MAKING AND HEREBY EXPRESSLY DISCLAIMS ANY OTHER IMPLIED OR EXPRESS WARRANTIES WITH RESPECT TO THE SERVICES AND PRODUCTS. WITHOUT LIMITING THE FOREGOING, PPS EXPRESSLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

7. Indemnification. PPS will indemnify and hold Customer harmless for, from and against any and all claims, damages, liability, losses, or expenses, including reasonable attorneys' fees and costs pursuant to Arizona statutes, arising from or relating to PPS' breach of the Purchase Order or the Terms & Conditions. Customer will indemnify and hold PPS harmless for, from, and against any and all claims, damages, liability, losses or expenses, including reasonable attorneys' fees and costs pursuant to Arizona statutes, arising from or relating to Customer's breach of the Purchase Order or the Terms & Conditions. Notwithstanding anything to the contrary, under no circumstances will either party be liable to the other party for consequential, special, indirect, incidental, punitive, or liquidated damages.

8. Shortages, Defects or Errors. Customer shall give prompt written notice to PPS of any shortages, defects or errors in any Products or Services, which notice shall be given to PPS no later than ten (10) business days of Customer's receipt of the Product or the provision of Services.

9. Title. Title to Products provided by PPS shall not pass to Customer until PPS has received full payment of all amounts due for all Services performed and Products provided by PPS.

10. Cancellation. Customer may cancel a Purchase Order by providing written notice to PPS, provided, however, Customer will be obligated for all unpaid Work completed up to and including the date that PPS receives written notice of cancellation, plus PPS' reasonable profit for uncompleted Work under the Purchase Order.

11. Force Majeure. Neither PPS nor the Customer shall be liable for any damages, claims or liability of any kind arising from delay in performance caused by a "Force Majeure Event". As used herein, "Force Majeure Event" shall mean acts of God; acts of terrorism; explosion; fire; extreme weather conditions; flood; drought; epidemic; pandemic; earthquake; riot; insurrection; blockade; war or other hostilities; strike, lockout or other industrial disturbance; act or restraint of governmental authority whether valid or invalid; the refusal or failure of any governmental authority to promptly issue or grant any necessary governmental authorizations, permits, licenses, certificates or approvals or the action or inaction of any governmental authority which causes the lapse or expiration of any of the foregoing; shortages of materials or Products to be incorporated in the Work, and any other cause or event which is reasonably beyond the control of the party and which the party is not able to overcome by the exercise of reasonable diligence, provided, however, that neither party shall be required to settle any strike, work stoppage or other labor dispute on terms which, in its opinion, are unsatisfactory. If any delay in PPS' performance is attributable to a Force Majeure Event, the time for performance shall be extended for a period equal to the time of the delay caused by the Force Majeure Event. Notwithstanding the foregoing, the occurrence of a Force Majeure Event shall not excuse or delay any payment obligation under the Purchase Order or the Terms & Conditions.

12. Access and Cooperation. Customer shall provide PPS access to the Work site at all times during PPS' normal hours of business to enable PPS to complete the Work and shall otherwise cooperate with PPS so that the Work may be completed on a timely and efficient basis. Such cooperation shall include providing information to PPS necessary to obtain permits or other required governmental approvals for the Work and coordination with Customer's other contractors or employees to enable PPS to complete the Work without interference or interruption.

13. Jurisdiction, Venue and Waiver of Jury Trial. These Terms & Conditions and all Purchase Orders between PPS and Customer shall be interpreted and enforced according to Arizona substantive laws, without regard to Arizona's choice of law provisions. Any disputes between the parties arising from these Terms & Conditions or the Purchase Order shall be brought and maintained in a court of competent jurisdiction in Maricopa County, Arizona. PPS and Customer hereby irrevocably waive any and all rights they have to demand that any action, proceeding or counterclaim arising out of or in any way related to these Terms & Conditions or any Purchase Order be tried by jury.

14. Attorney Fees. In the event that either party hereto institutes an action or other proceeding to enforce any rights arising under these Terms & Conditions or any Purchase Order, the party prevailing in such action or other proceeding shall be paid all reasonable costs and reasonable attorneys’ fees by the other party pursuant to Arizona statutes.

15. Entire Agreement. Incorporation and Modification. These Terms & Conditions and the applicable Purchase Order contain the entire agreement between the parties. These Terms & Conditions and the Purchase Order have been negotiated among the parties and,

if there is any ambiguity, no presumption construing these Terms & Conditions or the Purchase Order shall be imposed because the same were prepared by such party or its attorney. These Terms & Conditions are hereby incorporated in and as a part of all Purchase Orders. To the extent that there is any conflict in the terms of these Terms & Conditions and the terms of a Purchase Order, these Terms & Conditions shall control, unless the Purchase Order, by its express terms, supersedes these Terms & Conditions by specific reference to the provision of these Terms & Conditions so modified. No modification of these Terms & Conditions or any Purchase Order shall be of any force or effect unless such modification is in writing and executed by both of the parties. These Terms & Conditions shall control over all additional or conflicting terms and conditions that may appear on Customer written documents, including purchase orders, delivery tickets, service order tickets, invoices or any other document and PPS' signature on any Customer written document shall not constitute PPS' consent to any terms and conditions set forth in such document. Notwithstanding the foregoing, the terms of the Purchase Order shall control over any conflicting Customer Specifications.

16. Notices. All notices or other communications required or provided to be given by either party shall be in writing and shall be hand delivered, transmitted by email or by United States first class mail, postage prepaid. Notices shall be deemed given upon hand delivery, or if sent via email, upon transmission provided the same is also sent on the date of transmission by first class mail, postage prepaid, or if mailed, three (3) calendar days after such notice is deposited in the mail, in each case, addressed to the parties to the addresses set forth in the Purchase Order. Any party may change the address to which notice shall be delivered or mailed or emailed by written notice duly given.

17. Severability and Waiver. The invalidity or unenforceability of any provision hereof shall in no way affect the validity or enforceability of any other provision hereof. Any waivers must be in writing and signed by the party sought to be charged. The waiver by any party of a right provided thereunder shall not be deemed to be a continuing waiver of that right or a waiver of any other right.

18. Miscellaneous. In these Term & Conditions: (i) the singular includes the plural and vice versa and reference to any gender includes each other gender; (ii) reference to any person includes such person’s successors and assigns but only if such successors and assigns are not prohibited by these Term & Conditions; (iii) “hereunder,” “hereof,” “hereto,” and words of similar import shall be deemed references to these Terms and Conditions as a whole; (iv) reference to any agreement, document or instrument means such agreement, document or instrument as amended or modified and in effect from time to time in accordance with the terms thereof; (v) references to documents, instruments or agreements shall be deemed to refer as well to all addenda, exhibits, schedules, restatement, supplements or amendments thereto; (vi) references to “day” or “days” mean calendar days; (vii) “including” (and with correlative meaning “include”) means including without limiting the generality of any description preceding the word “including”; (viii) where specific language is used to clarify by example a general statement contained herein, such specific language shall not be deemed to modify, limit or restrict in any manner; (ix) “or” is used in the inclusive sense of “and/or”; (x) with respect to the determination of any period of time, “from” means “from and including” and “to” means “to but excluding”; (xi) references to amounts of money expressed in Dollars are references to United States Dollars; and (xii) any action required hereunder to

be taken within a certain number of days shall, except as may otherwise be expressly provided herein, be taken within that number of days excluding the day on which the counting is initiated and including the final day of the period.

WELDING INSPECTION QUOTES

PROJECT NAME	CITY OF CHANDLER PECOS WATER SYSTEM PROGRAM PHASE I (GMP 2)
BID DATE	9/11/2025
OWNER	CITY OF CHANDLER
ENGINEER	HAZEN & SAWYER
SCOPE	WELDING INSPECTION
ESTIMATOR INITIALS	EK

BID QUANTITIES					CROSSPOINT TESTING & INSPECTION SERVICES, LLC	
FACILITY	**AREA**	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**UNIT AMOUNT**	**BID**
01	33.43.100	VERIFICATION OF FIT-UP, IN-PROCESS, & COMPLETE WELDING OF FABRICATED PIPE SPOOLS	1	LS	$ 23,455.00	$ 23,455.00
01	33.43.100	VERIFICATIONS OF FIT-UP, IN-PROCESS, & COMPLETE WELDING UNDER SLAB PIPING SPOOL & TIE-IN LOCATIONS-OUTSIDE OF PIPE	1	LS	$ 44,195.00	$ 44,195.00
01	33.43.100	VERIFICATIONS OF FIT-UP, IN-PROCESS, & COMPLETE WELDING UNDER SLAB PIPING SPOOL & TIE-IN LOCATIONS-INSIDE OF PIPE	1	LS	$ 52,300.00	$ 52,300.00

CrossPoint Testing
and Inspection Services, LLC.

VOSB

7931 E Pecos Rd. Suite 203
Mesa, AZ 85212
www.crosspointtesting.com

Quotation

Project & Location:
City of Chandler Pecos Surface Water Treatment Plant GMP 2 Improvements

Date: 08/27/2025

Client: Archer-Western
Prepared by: Brent Couch
Quotation Valid until: 03/27/26
Quote #001

Comments or Special Instructions:
This quotation is based on the contract drawings and specifications provided. Any additional hours required to complete the required to complete the project will be billed at the quoted rates below. Quotation is based on an 8 hour work day. Overtime and Saturday work will be billed at 1.25 times the quoted rate. Holiday and Sunday work will be billed at 1.5 times the quoted rate unless otherwise agreed on prior to the start of the project. Billing is from portal to portal. No re-inspection costs have been included in this bid. All re-inspection costs are the responsibility of the contractor.

Project Requirements: Perform verification of fit-up, in-process and completed welding for fabricated pipe spools as required by project specification Section 40 05 24.23A Part 1- 1.04D.						Terms- Net 15
Date	**Service**	**Service Description**	**Hrs.**	**Rate**	**Miles**	
Continuous Shop Inspection						
TBD	CWI-VT	Daily shop verification of fit-up, in-process	185	$95.00		$17,575.00
		and completed welding of pipe spools as				
		required per ASME B31.1, B31.3				
		Mobilization- 18		$55.00		$990.00
TBD	HYDRO	Hydrostatic testing of straight pipe	48	$95.00		$4,560.00
		sections as required.				
		Mobilization- 6				$330.00
Notes: All access to areas of inspection shall be provided by the contractor. CTIS is not responsible for providing lifts, ladders, scaffolding or other types of inspection access. Contractor to provide special safety equipment and requirements if applicable for confined space, fall protection, lock-out tag out procedures.					**Sub-Total**	-
					Total	$23,455.00

We will have this

480-988-6602 Office
Info@crosspointtesting.com

CrossPoint Testing and Inspection Services, LLC.

7931 E Pecos Rd. Suite 203
Mesa, AZ 85212
www.crosspointtesting.com

Quotation

Project & Location:
City of Chandler Pecos Surface Water Treatment Plant GMP 2 Improvements

Date: 08/27/2025

Client: Archer-Western
Prepared by: Brent Couch
Quotation Valid until:
12/31/2025 Quote #002

Comments or Special Instructions:
This quotation is based on the contract drawings and specifications provided. Any additional hours required to complete the required to complete the project will be billed at the quoted rates below. Quotation is based on an 8 hour work day. Overtime and Saturday work will be billed at 1.25 times the quoted rate. Holiday and Sunday work will be billed at 1.5 times the quoted rate unless otherwise agreed on prior to the start of the project. Billing is from portal to portal. No re-inspection costs have been included in this bid. All re-inspection costs are the responsibility of the contractor.

Project Requirements: Perform verification of fit-up, in-process and completed welding under slab piping spool and tie in locations as required by project specification Section 40 05 24.23A Part 2- 2.07D						Terms- Net 15
Date	**Service**	**Service Description**	**Hrs.**	**Rate**	**Miles**	
Field Inspection						
TBD	CWI-VT	Field verification of fit-up, in-process and	215	$95.00		$20,425.00
		completed welding as required per				
		ASME B31.1, B31.3				
		Mobilization- 22		$55.00		$1,210.00
TBD	HYDRO	Hydrostatic testing of completed	32	$95.00		$4,560.00
		piping spools as required.				
		Mobilization- 4		$55.00		$220.00
TBD	NDE	Magnetic Particle or Ultrasonic	175	$95.00		$16,625.00
		Testing of completed weldments as				
		required.				
		Mobilization- 21		$55.00		$1,155.00
Notes: All access to areas of inspection shall be provided by the contractor. CTIS is not responsible for providing lifts, ladders, scaffolding or other types of inspection access. Contractor to provide special safety equipment and requirements if applicable for confined space, fall protection, lock-out tag out procedures.					**Sub-Total**	-
					Total	$44,195.00

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CrossPoint Testing
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VOSB

7931 E Pecos Rd. Suite 203
Mesa, AZ 85212
www.crosspointtesting.com

Quotation

Project & Location:
City of Chandler Pecos Surface Water Treatment Plant GMP 2 Improvements

Date: 08/27/2025

Client: Archer-Western
Prepared by: Brent Couch
Quotation Valid until: 03/27/2026
Quote #003

Comments or Special Instructions:
This quotation is based on the contract drawings and specifications provided. Any additional hours required to complete the required to complete the project will be billed at the quoted rates below. Quotation is based on an 8 hour work day. Overtime and Saturday work will be billed at 1.25 times the quoted rate. Holiday and Sunday work will be billed at 1.5 times the quoted rate unless otherwise agreed on prior to the start of the project. Billing is from portal to portal. No re-inspection costs have been included in this bid. All re-inspection costs are the responsibility of the contractor.

Not sure if this will be required. The specs did not specifically state this was needed, but included the price in GMP .

Project Requirements: Perform verification of fit-up, in-process and completed welding under slab piping spool and tie in locations as required by project specification Section 40 05 24.23A Part 2- 2.07D						Terms- Net 15
Date	**Service**	**Service Description**	**Hrs.**	**Rate**	**Miles**	
Field Inspection – Inside diameter verification and testing, if required.						
TBD	CWI-VT	Field verification of fit-up, in-process and	278	$95.00		$26,410.00
		completed welding as required per				
		ASME B31.1, B31.3				
		Mobilization- 24		$55.00		$1,320.00
TBD	HYDRO	Hydrostatic testing of completed	32	$95.00		$4,560.00
		piping spools as required.				
		Mobilization- 4		$55.00		$220.00
TBD	NDE	Magnetic Particle or Ultrasonic	195	$95.00		$18,525.00
		Testing of completed weldments as				
		required.				
		Mobilization- 23		$55.00		$1,265.00
Notes: All access to areas of inspection shall be provided by the contractor. CTIS is not responsible for providing lifts, ladders, scaffolding or other types of inspection access. Contractor to provide special safety equipment and requirements if applicable for confined space, fall protection, lock-out tag out procedures.				**Sub-Total**		-
				Total		$52,300.00

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Info@crosspointtesting.com