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PROJECT MANUAL FOR

Meadow Village Water Reclamation
Plant and Treated Water Pipeline

Bid Schedules 1 and 2
Big Sky County
Water and Sewer District 363

Volume 1 of 2

HKM ENGINEERING INC.

PROJECT NO. 6M357.120

SET NO. 18

BID SET

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to Work specified in this section.

1.02 DESCRIPTION OF WORK:

The extent of structural precast concrete work is shown on drawings.

1.03 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except as otherwise indicated:

ACI 301 "Specifications for Structural Concrete for Buildings".

ACI 318 "Building Code Requirements for Reinforced Concrete".

Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

Prestressed Concrete Institute MNL 116, "Manual for Quality Control for Plants and Production of Precast Concrete Products".

B. Fabricator Qualifications: Firms which have from 2 to 5 years successful experience in fabrication of precast concrete units similar to units required for this project will be acceptable. Fabricator must have sufficient production capacity to produce required units without causing delay in Work.

Fabricator must be producer member of the Prestressed Concrete Institute (PCI) and/or participate in its Plant Certification Program.

C. Fabrication Qualifications: Produce precast concrete units at fabricating plant engaged primarily in manufacturing of similar units.

D. Installation Tolerances: Install precast units without exceeding following tolerance limits:

Variations from Plumb: 1/4" in any 20' run or story height; 1/2" total in any 40' or longer run.

Variations from Level or Elevation: 1/4" in any 20' run; 1/2" in any 40' run; total plus or minus 1/2" at any location.

Variations from Position in Plan: Plus or minus 1/2" maximum at any location.

Offsets in Alignment of Adjacent Members at Any Joint: 1/16" in any 10' run; 1/4 maximum.

1.04 SUBMITTALS:

A. Product Data: Submit manufacturer's specifications and Instructions for manufactured materials and products. Include manufacturer's certifications and laboratory test reports as required.

B. Shop Drawings: Submit shop drawings showing complete information for fabrication and installation of precast concrete units. Indicate member dimensions and cross-section; location, size and type of reinforcement, including special reinforcement and lifting devices necessary for handling and erection.

Provide layout, dimensions, and identification of each precast unit corresponding to sequence and procedure of installation. Indicate welded connections by AWS standard symbols. Detail inserts, connections, and joints including accessories and construction at openings in precast units.

Provide location and details of anchorage devices that are to be embedded in other construction. Furnish templates if required for accurate placement.

Include erection procedure for precast units and sequence of erection.

Provide manufacturer's complete design calculations prepared by a registered engineer.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Deliver precast concrete units to project site in such quantities and at such times to assure continuity of installation. Store units at project site to ensure against cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at designated lift points.

B. Deliver anchorage items which are to be embedded in other construction before start of such Work. Provide setting diagrams, templates, instructions and directions as required for installation.

PART 2 - PRODUCTS:

2.01 FORMWORK:

A. Provide forms and, where required, form facing materials of metal, plastic, wood, and other acceptable material that is non-reactive with concrete and will produce required finish surfaces.

B. Accurately construct forms, mortar-tight, of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and when prestressed, pretensioning and detensioning operations. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated within specified fabrication tolerances.

Unless forms for plant-manufactured prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced in precast units due to deformation of concrete under prestress or to movement during detensioning.

2.02 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615, Grade 60, unless otherwise indicated.

B. Steel Wire: ASTM A 82, plain, cold-drawn, steel.

C. Welded Wire Fabric: ASTM A 185.

D. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing, complying with CRSI recommendations.

For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are hot-dip galvanized, plastic protected or stainless steel protected.

2.03 PRESTRESSING TENDONS:

Uncoated, 7-wire stress-relieved strand complying with ASTM A 416.

2.04 CONCRETE MATERIALS:

A. Portland Cement: ASTM C 150, Type I-II.

Use only one brand and type of cement throughout the project, unless otherwise acceptable to ENGINEER.

B. Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

Local aggregates not complying with ASTM C 33, but which have shown by special test or actual service to produce concrete of adequate strength and durability, may be used when acceptable to ENGINEER.

C. Water: Potable or free from foreign materials in amounts harmful to concrete and embedded steel.

D. Air-Entraining Admixture: ASTM C 260.

E. Water-Reducing Admixture ASTM C 494, Type A.

F. Calcium Chloride: Do not use calcium chloride in precast prestressed concrete.

2.05 CONNECTION MATERIALS:

A. Steel Plates: Structural quality, hot-rolled carbon steel, ASTM A 283, Grade C.

B. Steel Shapes: ASTM A 36.

C. Anchor Bolts: ASTM A 307, low-carbon steel bolts, regular hexagon nuts and carbon steel washers.

D. Finish of Steel Units: Exposed units galvanized per ASTM A 153; Others painted with rust-inhibitive primer.

E. Accessories: Provide clips, hangers, and other accessories required for installation of project units and for support of subsequent construction or finishes.

2.06 GROUT MATERIALS:

As specified in Section 03300.

2.07 PROPORTIONING AND DESIGN OF MIXES:

A. Prepare design mixes for each type of concrete required.

B. Design mixes to be prepared by an independent testing facility.

C. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each type of concrete required, complying with ACI 211.1 or ACI 211.2.

Produce standard-weight concrete consisting of specified Portland cement, aggregates, admixtures, and water to produce the following properties.

Compressive strength; 5000 psi minimum at 28 days. Release strength for prestressed units: 3500 psi.

Cure compression test cylinders using the same methods as will be used for the precast concrete Work.

D. Submit written reports to ENGINEER of proposed mix for each type of concrete at least 15 days prior to start of precast unit production. Do not begin concrete production until mixes and evaluations have been reviewed by ENGINEER.

2.08 ADMIXTURES:

Use water-reducing admixtures in strict compliance with manufacturer's directions.

Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

2.09 FABRICATION:

A. General: Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-116, and as specified for types of units required.

B. Built-in Anchorages: Accurately position built-in anchorage devices and secure to framework. Locate anchorages where they do not affect position of main reinforcement or placing of concrete. Do not relocate bearing plates in units unless acceptable to ENGINEER.

C. Cast-in holes for openings larger than 10" diameter or 10" square in accordance with final shop drawings. Other smaller holes will be field cut by trades requiring them, as acceptable to ENGINEER.

D. Coat surfaces of forms with bond-breaking compound before reinforcement is placed. Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's instructions.

E. Clean reinforcement of loose rust and mill scale, earth and other materials which reduce or destroy bond with concrete.

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

G. Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

H. Pretensioning of tendons for prestressed concrete may be accomplished either by single strand tensioning method or multiple-strand tensioning method. Comply with PCI MNL-116 requirements.

I. Place concrete in a continuous operation to prevent formation of seams or planes of weakness in precast units, complying with requirements of ACI 304. Thoroughly consolidate placed concrete by internal and external vibration without dislocation or damage to reinforcement and built-in items.

J. Identification: Provide permanent markings to identify pick-up points and orientation in structure, complying with markings indicated on final shop drawings. Imprint date of casting on each precast unit on a surface which will not show in finished structure.

K. Curing by low-pressure steam, by steam vapor, by radiant heat and moisture or other similar process may be employed to accelerate concrete hardening and to reduce curing time.

L. Delay detensioning of prestressed units until concrete has attained at least 70% of design stress, as established by test cylinders.

If concrete has been heat-cured, perform detensioning while concrete is still warm and moist, to avoid dimensional changes which may cause cracking or undesirable stresses in concrete.

Detensioning of pretensioned tendons may be accomplished either by gradual release of tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.

M. Finish of Formed Surfaces: Provide finishes for formed surfaces of precast concrete as indicated for each type of unit, and as follows:

Standard Finish: Normal plant run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal form joint marks, and minor chips and spalls will be tolerated, but no major or unsightly imperfections, honeycomb, or structural defects will be permitted.

N. Finish of Unformed Surfaces: Apply trowel finish to unformed surfaces unless otherwise indicated. Consolidate concrete, bring to proper level with a straightedge, float, and trowel to a smooth, uniform finish.

PART 3 - EXECUTION

3.01 INSPECTION:

Erector must examine supporting structure and conditions under which precast concrete work is to be erected, and notify CONTRACTOR in writing of conditions detrimental to proper and timely completion of Work. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Erector.

3.02 INSTALLATION, GENERAL:

A. Welding: Perform welding in compliance with AWS D 1.0 and D 12.1, including qualification of welders.

B. Protect units from damage by field welding or cutting operations and provide non-combustible shield as required.

C. Repair damaged metal surfaces by cleaning and applying a coat of liquid galvanizing repair compound to galvanized surfaces and compatible primer to painted surfaces.

D. Powder-Actuated Fasteners: Do not use powder-actuated fasteners for surface attachment of accessory items in precast, prestressed unit unless otherwise accepted by precast manufacturer.

E. Grouting Connections and Joints: After precast concrete units have been placed and secured, grout open spaces at connection joints as follows:

Grout to conform to non-shrink, non-metallic or topping grout as specified in Section 03300.

Provide forms or other acceptable method to retain grout in place until sufficiently hard to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 3 days after initial set. Promptly remove grout material from exposed surfaces before it hardens.

3.03 PLANT QUALITY CONTROL EVALUATIONS:

A. The precast manufacturer shall allow OWNER's testing facility access to materials storage areas, concrete production equipment, and concrete placement and curing facilities. Cooperate with OWNER's testing laboratory and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.

B. Dimensional Tolerances: Units having dimensions smaller or greater than required, and outside specified tolerance limits, will be subject to additional testing as herein specified.

Precast units having dimensions greater than required will be rejected if appearance or function of the structure is adversely affected, or if larger dimensions interfere with other construction. Repair, or remove and replace rejected units as required to meet construction conditions.

C. Strength of Units: The strength of precast concrete units will be considered potentially deficient if the manufacturing processes fail to comply with any of the requirements which may affect the strength of the precast units, including the following conditions.

Failure to meet compressive strength tests requirements.

Reinforcement, and pretensioning and detensioning of tendons of prestressed concrete, not conforming to specified fabrication requirements.

Concrete curing, and protection of precast units against extremes in temperature, not as specified.

Precast units damaged during handling and erection.

D. Defective Work: Precast concrete units which do not conform to specified requirements, including strength, tolerances, and finishes, shall be replaced with precast concrete units that meet the requirements of this section. The CONTRACTOR shall also be responsible for the cost of corrections to any other Work affected by or resulting from corrections to precast concrete work.

END OF SECTION 03410