Attachment 1

Specifications

DTFAEN-11-R-00021

THE CONSTRUCTION AND THE INSTALLATION OF TWO ANTENNA TOWERS AND CABLES

AT

THE REMOTE COMMUNICATIONS AIR GROUND (RCAG) TYNDALL AFB

TYNDALL, FLORIDA

FAA-PAM-1103196
10/20/2011

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

SOUTHERN REGION

SPECIFICATIONS

FOR

THE INSTALLATION OF TWO ANTENNA TOWERS

AND CABLING

AT

TYNDALL AFB

FLORIDA

TABLE OF CONTENTS

DIVISION 1 - GENERAL REQUIREMENTS

1-1 SUMMARY OF WORK 2
1-2 SITE ACCESS, CONSTRUCTION LIMITS, USE OF FACILITIES AND WORK HOURS. 2
1-3 COORDINATION, LOCAL PERMITS AND TESTING 2
1-4 SUBMITTALS. 2
1-5 TEMPORARY FACILITIES. 1
1-6 MATERIALS AND EQUIPMENT 2
1-7 CONTRACT CLOSEOUT 3

DIVISION 2 - SITEWORK

2-1 SITE WORK 1

DIVISION 3 - CONCRETE

3-1 CONCRETE FORM WORK 4
3-2 CONCRETE REINFORCEMENT. 5
3-3 CAST-IN-PLACE CONCRETE 7
3-4 FINISHING AND CURING 4

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

7-1 SEALANTS 3

DIVISION 13 - SPECIAL CONSTRUCTION

13-1 ANTENNA SUPPORT TOWER 2

DIVISION 16 - ELECTRICAL

16-1 ELECTRICAL WORK 1

1-1 SUMMARY OF WORK

1-1.1 General.- These specifications, together with referenced standard specifications and the contract drawings, cover the requirements of the Federal Aviation Administration, hereinafter referred to as the Government or FAA, for the installation of two free standing antenna tower and the heliax cables at the remote communications air/ground (RCAG) facility at Tyndall AFB, Florida.

1-1.2 Scope.- The work involved herein includes the installation of two new 70 foot free standing antenna towers, installation of the RF heliax cables from the towers to new fiberglass junction boxes located on the front exterior wall of the existing equipment shelter, counterpoise around each tower and related work as specified and indicated by the drawings and/or specifications, which are part of this contract.
The contractor must hand dig in areas as shown on the drawings in order to protect existing cables that are supporting this operational facility.
The antenna towers, junction boxes, heliax cable and other specialized associated materials are government furnished materials as listed in the Part III Section J of the contract documents.
The contractor must submit a construction schedule that shows the duration of the construction for each of the antenna towers, cable pulling and the tower counterpoise installation.

1-1.3 Intent of Specifications.- This specification identifies all labor, materials, plant and equipment to perform the work required to construct the facility. All work performed and all materials and equipment used will be subject to the approval of the Contracting Officer's Representative (COR). This shall include, but not be limited to, testing, inspection, scheduling, reporting, and submittals.

1-1.4 Contract Documents.- Documents identified in Attachment 2 of Part III, Section J, as Drawings for the Site Work, Architectural, Structural, Mechanical, and Electrical form a part of the construction requirements for this project.

1-1.4.1 Construction Per Drawings.- The construction of this facility must be in accordance with the lines shown on the drawings. The contractor must not use dimensions scaled from drawings.

1-1.5 Precedence of Contract Documents.- In the event of a difference between the following contract provisions, the order of precedence to determine which provision shall govern is as follows:

a. Project Specifications, FAA-PHK-701371, dated 12/16/09

b. Project Drawings, Section J, Attachment 2

Any discrepancies between the contract provisions, the specifications and the contract drawings must be referred to the COR for a written determination in accordance with FAR 52 236-21, Specification and Drawings for Construction (April 1984).

1-1.6 Document Sources

1-1.6.1 Federal Specifications.- The Federal specifications and standards, and supplements, amendments, and indices thereto are prepared and issued by the General Services Administration of the Federal Government. They may be obtained from the Specifications Activity, Printed Materials Supply Division, Building 197, Naval Weapons Plant, Washington, D.C. 20407.

1-1.6.2 Publications.- Drawings are available for review at the FAA regional offices.

Copies of military documents may be obtained from the Commanding Officer, Naval Supply Depot, 6801 Tabor Avenue, Philadelphia, Pennsylvania 19120, Attention: Code CDS.

Information on obtaining copies of Federal specifications and standards may also be obtained from General Services Administration offices in Atlanta; Boston; Chicago; Denver; Fort Worth; Houston; Kansas City, Missouri; Los Angeles; New York; Philadelphia; San Francisco; Seattle; and Washington, D.C.

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1-2 SITE ACCESS, CONSTRUCTION LIMITS, USE OF FACILITIES AND WORK HOURS

1-2.1 General

1-2.1.1 Existing Facility Operations.- For antenna tower replacement at the RCAG, it will be necessary to coordinate all construction activity so as not to interfere with the functions of the RCAG facility. The contractor shall perform all work with a minimum disruption to the FAA. Work performed requiring access inside the existing RCAG may require 24 hour notice. All work shall be coordinated through the COR.

1-2.1.2 Construction Limits and Access

1-2.1.2.1 Construction Limits.- The contractor shall confine operations, activities, storage of materials and employee parking within the RCAG site, as approved by the Contracting Officer. Additional space the contractor deems necessary shall be obtained off site, at no additional cost to the Government.

1-2.1.2.2 Access to Site.- Access to the site shall be as indicated on the drawings. The contractor shall maintain the security integrity of the site at all times. The facility access road shall be maintained by the contractor throughout the contract term and be brought to the condition at the time of the pre-construction meeting.

1-2.1.2.3 Damage to Site.- Damage to existing site caused by the contractor's activities shall be repaired. All costs of repairs shall be paid by the contractor. After notice to proceed and prior to the commencement of construction, the contractor and COR shall conduct joint inspections of the existing areas affected by the construction. Existing damage or defects shall be noted and will be used as the basis for determination of damages caused by the contractor's operations.

1-2.1.3 Inspection of Site by Contractor.- The contractor shall have carefully examined the premises to determine the extent of work and the conditions under which it must be done. On request to the COR, the contractor may obtain permission to make soil borings or probings.

1-2.1.4 Contractor's Use of Premises

1-2.1.4.1.- Contractor shall have shared use of the premises within the construction staging area limits for the execution of the work.

1-2.1.4.2.- Contractor shall assume full responsibility for the protection and safekeeping of products stored on the site.

1-2.1.4.3.- The contractor and subcontractors shall maintain the job site in a neat and orderly condition. This includes the daily removal of rubbish, waste and tools, equipment and materials not required for the work in progress.

1-2.1.5 Government Use and Access to Premises.- The Government reserves the right to enter the premises during the term of the contract for periodic work inspections. See Part I, Section F, FAR Clause 52.236.8 "Other Contracts" for work by other contractors.

1-2.1.6 Security Requirements

1-2.1.6.1 Personnel List.- Contractor shall provide the COR with a list of contractor's personnel who will require access to the site. The list shall be kept current during project work. In the case of construction which takes place on an airport, the contractor shall provide all personnel with readily identifiable numbered badges during the period their access to the site is required. Badges shall be shown to the FAA security guard to enter the site, and shall be worn on outer clothes while at work in the site.

1-2.1.6.2 Security Investigation.- Contractor's personnel may be subject to security investigation by FAA. Upon request by the Resident Engineer, the contractor shall promptly complete all security forms provided by the COR.

1-2.1.6.3 Communication.- The contractor will be required to have radio-equipped vehicles for communications with the air traffic control tower while working in controlled airport operation areas.

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1-3 COORDINATION, LOCAL PERMITS AND TESTING

1-3.1 General

1-3.1.1 Project Coordination.- The contractor shall prepare a schedule of work and work layout to resolve conflicts and to ensure coordination of the work by different trades. It shall be the duty of the contractor to resolve all coordination conflicts that arise among his subcontractors.

1-3.1.2 Local Permits.- The contractor should not be required to obtain any local permit(s).

1-3.2 Applicable Documents.- The current issues of the following documents in effect on the date of the invitation for bid form a part of this specification and are applicable to the extend specified herein.

1-3.2.1 American Association of State Highway and Transportation Officials (AASHTO)

T99	Moisture Density Relations of Soils Using a 5.5-Pound Rammer and 12-Inch Drop
T191	Density of Soil in-Place by the Sand-Cone Method
T205	Density of Soil in-Place by the Rubber Balloon Method
T238	Density of Soil and Soil Aggregate by Nuclear Method (Shallow Depth)
M145	Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

1-3.3 Testing

1-3.3.1 Contractor's Responsibility.- Cooperate with the testing laboratory and make available, without cost, samples of all materials to be tested. Contractor shall furnish such normal labor as is necessary to obtain samples at the project site and to assist in making slump tests, casting and curing concrete cylinders. Contractor shall advise the testing laboratory of the identity of material sources and instruct these suppliers to allow inspections by the laboratory representatives, and notify the testing laboratory sufficiently in advance of operations to allow for completion of initial tests and assignment of

inspection personnel.

1-3.3.1.1 Selection and Payment.- The contractor shall select and pay for a qualified testing laboratory or laboratories to perform the requirements of this section.

1-3.3.1.2 Rejected Materials or Workmanship.- All materials or workmanship or both which have been rejected by the COR by reasons of failure to conform to the requirements of the Contract Documents shall be removed and replaced with new, acceptable materials by the contractor at contractor's own expense. Contractor shall pay for testing of new materials which have been installed in place of rejected materials.

1-3.3.2 Test Reports.- The testing laboratory shall furnish three copies of each report direct to the COR covering all of its determinations and all of its control services. Reports shall show all data customarily listed by the laboratory in reporting on quantities, qualities, and types of materials, together with their location in the project and applicable Specification Section. Form of reports shall be acceptable to the COR.

1-3.3.3 Testing Procedures

1-3.3.3.1 General.- All testing for material compaction in needed and concrete shall be the responsibility of the contractor. The FAA reserves the right to direct retesting in the event of failures and any retesting shall be at contractor's expense.

1-3.3.3.2 Maximum Density.- The maximum density of the soil types at the site shall be determined in accordance with AASHTO Designation T99 or another method approved by the COR.

1-3.3.3.2.2 Field Density.- The field density shall be determined in accordance with AASHTO Designation T191, T205, T238, or another method approved by the COR.

1-3.3.3.2.3 Soil Classification.- The classification of satisfactory soil materials shall be determined in accordance with AASHTO Designation M145 or another method approved by the COR.

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1-4 SUBMITTALS

1-4.1 General

1-4.1.1 Submittal Requirements.- This paragraph is written as an adjunct to Clause 52.235-2(g), Federal Acquisition regulation (48 CFR Chapter 1). The requirements contained in this paragraph take precedence over Clause 52.236-2(g) requirements.

1-4.1.2 Prior to Notice to Proceed.- Specific shop drawings and/or submittal data currently listed and required by the various sections of this specification shall be submitted to the COR for approval. The following submittal items must be approved by the FAA prior to the Notice to Proceed:

Construction schedule, concrete mix design, reinforcing steel, lightning protection and electrical material.

1-4.1.3 Procedure.- Five complete sets of all shop drawings or product data or both shall be submitted and two sets will be marked and returned to the contractor. Each shop drawing, submitted for approval, shall have in the lower right hand corner, just above the title block, a 4 inch by 4 inch open space in which the COR can indicate action taken. All submittals shall be accompanied by transmittal letters identifying the contents of the submittal. Transmittal letters shall consist of one original and one copy. Submittals shall be made in adequate time for FAA review (14 calendar days maximum) and FAA resubmittal review (7 calendar days maximum) before the work, which the respective submittal represents, is fabricated or delivered to the site. Work requiring approval shall not be initiated prior to approval of submittal. Submittals shall be checked by the contractor and coordinated with the work of other trades involved before they are submitted for approval. Submittals shall be complete, detailed, and assembled in sets. Lack of completeness or inadequate description will be justification for disapproval. Shop drawings shall bear the following information:

Number of contract drawings and latest revision; specification page and paragraph number; name of project or facility; name of contractor and subcontractor or supplier; clearly identified contents and location of work.

1-4.1.4.- By submitting shop drawings, the contractor thereby

represents that he has determined and verified the following:

Space limitations; coordination with equipment furnished under other specification sections; catalog numbers and similar data; compliance with requirements of the work and of the contract documents.

1-4.1.5 Shop Drawing Approval.- The checking, marking or approval of the shop drawings and/or product data by the COR shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. Approval will not relieve the contractor of the responsibility for any error which may exist. The contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.

1-4.1.5.1 Approved as Submitted.- If "approved as submitted" is marked by the COR, each copy of the shop drawings or product data will be identified as having received such approval by being stamped and dated. After submittal has been approved, no substitution will be permitted without written approval by the COR.

1-4.1.5.2 Approved as Noted.- If "approved as noted" is marked by the COR, the shop drawings or product data is satisfactory contingent upon contractor acceptance of corrections, notations, or both and, if accepted, does not require resubmittal.

1-4.1.5.3 Not Approved.- If "not approved" is marked by the COR, the shop drawing or submittal data does not meet job requirements and the contractor must resubmit. If shop drawings or submittal data are disapproved, the contractor shall resubmit the corrected material, in the same quantity as specified for the original submittal.

1-4.1.6 Samples.- The Government reserves the right to request samples of any products or materials proposed for use on this project. Specific samples currently listed under various sections of this specification will be required.

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1-5 TEMPORARY FACILITIES

1-5.1 General.- FAA shall provide the contractor one 20 amp 120 volt duplex outlet for use of any electrical equipment needed on site. Contractor shall coordinate this matter with the COR upon arriving on site. Contractor shall provide and pay for any other temporary services and facilities as specified below and as necessary for the proper and expeditious execution of the work. Contractor shall provide all labor, materials, equipment and appurtenances necessary for the complete installation, operation and maintenance of all temporary service systems and facilities. All work under this section shall comply with applicable laws, rules, regulations, codes, ordinances and orders of all federal, state and local authorities having jurisdiction for the safety of persons, materials and property. Contractor shall remove all such temporary installations and connections when no longer necessary for the project work.

1-5.2 Temporary Power.- Temporary electrical service is available on site. Contractor shall coordinate with the COR/RE to determine the non-critical source to be used.

1-5.3 Temporary Water.- Contractor shall make arrangements to furnish a potable water supply for project work, and pay for all temporary water and services.

1-5.4 Temporary Toilets and Sanitation.- Contractor shall provide ample and suitable onsite sanitary conveniences with proper enclosures for the use of the workers employed on the work. Such conveniences shall be kept clean, be properly ventilated and shall be installed and maintained in conformity with requirements of all laws and ordinances governing such installations. Locations shall be subject to COR approval. After completion of the work such conveniences shall be removed from the site. Toilets shall be portable chemical type with screened enclosures, each having a urinal and closet and mounted on skids. Not less than one unit shall be provided for every 25 full-time employees. Contractor shall be responsible for paying and arranging for each toilet unit to be serviced at least twice a week, including removal of waste matter, sterilizing, recharging tank, refilling tissue holders, and thorough cleaning and scrubbing of entire interior.

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1-6 MATERIALS AND EQUIPMENT

1-6.1 General.- Material and equipment incorporated into the work shall conform to applicable specifications and standards and comply with size, make, type and quality specified, or as specifically approved in writing by the COR. Manufactured and fabricated products shall be designed, fabricated and assembled in accordance with the best engineering and shop practices. Like parts of duplicate units shall be manufactured to standard sizes and gauges and shall be interchangeable. Two or more items of the same kind shall be identical and manufactured by the same manufacturer. Products shall be suitable for service conditions. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing. Do not use material or equipment for any purpose other than for which it is designed or specified. Furnish and install products specified, under options and conditions for substitution stated in this section.

1-6.1.1 Manufacturer's Instructions.- When contract documents require that installation of work shall comply with manufacturer's printed instructions, copies of such instructions shall be distributed to parties involved in the installation, including two copies to the COR. Maintain one set of complete instructions at the job site during installation and until completion. Products shall be handled, installed, connected, cleaned and conditioned in strict accordance with such instructions and in conformity with specified requirements. If job conditions or specified requirements conflict with manufacturer's instructions, the contractor shall consult with the COR for further instructions. All work shall be performed in accordance with manufacturer's instructions. No preparatory step or installation procedure shall be omitted unless specifically modified or exempted by contract documents.

1-6.1.2 Transportation and Handling.- Products shall be delivered in undamaged condition, in manufacturer's original containers or packing, with identifying labels intact and legible. Shipments shall be inspected to ensure compliance with requirements of contract documents and approved submittals, and that products are properly protected and undamaged immediately on delivery. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packing.

1-6.1.3 Storage.- Products shall be stored in accordance with manufacturer's instructions, with seals and labels intact and legible. Products subject to damage by the elements shall be stored in weather-tight enclosures. Temperatures and humidity shall be maintained within the ranges required by the

manufacturers instructions. Fabricated the ranges required by the manufacturers instructions. Fabricated products shall be stored above the ground, on blocking or skids to prevent soiling or staining. Products which are subject to deterioration shall be covered with impervious sheet coverings adequate ventilation shall be provided to avoid condensation. Loose granular materials shall be stored in a well-drained area on solid surfaces to prevent mixing with foreign matter.

1-6.1.4 Substitutions.- A separate request for each substitution shall be submitted. Each request shall be supported with complete data substantiating compliance of proposed substitution with the requirements stated in the contract documents. Each request shall include product identification, manufacturer's literature including address, product description, reference standards and performance and test data. Samples shall be submitted as applicable. An itemized comparison of the proposed substitution with the product specified shall be included. The following information shall also be included: data relating to changes in the construction schedule; list of changes required in other work or products; and accurate cost data. Substitute products shall not be ordered or installed without written acceptance. In making a formal request for substitution, the contractor represents that he has investigated proposed products and has determined that the products are equal to or superior in all respects to those specified; that he will provide same warranties or bonds for substitutions as for product specified; that he will coordinate installation of accepted substitutions as for product specified; that he will coordinate installation of accepted substitution into work, complete in all respects; that he waives claims for additional costs caused by substitution which may subsequently become apparent; and that cost data is complete and includes related costs under the contract.

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1-7 CONTRACT CLOSEOUT

1-7.1 General.- The contractor shall require each subcontractor engaged upon the work to bear full responsibility for cleaning up during and immediately upon completion of his work. All rubbish, waste, tools, equipment and other apparatus caused by or used in the execution of his work shall be removed. This shall in no way be construed to relieve the contractor of his primary responsibility for maintaining the building and the site clean and free of debris, and leaving all work in a clean and proper condition acceptable to the COR. All exposed floor surfaces shall be protected against all mechanical damage, oil, grease, or other damage that will stain or soil the cement finish. Protection shall be maintained until all work has been completed.

1-7.1.1 Rubbish Removal.- Immediately after unpacking, all packing material, case lumber, wrappings, or other rubbish, flammable or otherwise, shall be collected and removed from the building and the premises.

1-7.1.2 Overall Cleaning.- Immediately before the final inspection, the entire exterior and interior of the building and the surrounding areas shall be thoroughly cleaned by the contractor, including but not limited to the following:

All construction facilities, debris and rubbish shall be removed from all buildings and the sites.

All finished surfaces within the buildings shall be swept, dusted, vacuumed, washed or polished as required.

All tools, scaffolding, temporary utility connections or buildings, belonging to the contractor or used under his direction shall be removed from the site.

1-7.2 Project Record Documents

1-7.2.1 Maintenance of Documents.- The following documents shall be maintained at the project site:

Contract drawings, contract specification, agenda, reviewed show drawings, change orders, field test reports, project correspondence, other modifications to contract.

1-7.2.2 Storage and Use of Documents.- Store record documents apart from documents used for construction; do not use record documents for construction purposes. Keep documents in clean,

dry, legible condition; provide file cabinets and racks for storage of drawings.

1-7.2.3 Marking Devices.- Use red colored pencil for all marking.

1-7.2.4 Recording and Labeling.- Label each document "Project Record" in 1-inch high printed block letters. Keep record documents current. Do not conceal or cover up any item of work until the information has been recorded.

1-7.2.5 Submittals.- At completion of project, deliver record documents to COR. Accompany submittal with transmittal letter, containing the following:
Date

Project title and number

Contractor's name and address

Title and number of each record document

Certification that each document as submitted is complete and accurate

Signature of contractor, of his authorized representative

1-7.2.6 Contract Documents

1-7.2.6.1 Contract Drawings.- Legibly mark to record actual construction:

Depths of various elements of foundation in relation to grade floor level

Horizontal and vertical location of underground and overhead utilities and appurtenances referenced to permanent surface improvements

Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure

Field changes of dimension and detail

Changes made by change order or field order

Details not on originally specified drawings.

1-7.2.6.2 Contractor Specifications and Addenda.- Legibly mark each section to record:

Manufacturer, trade name, catalog number, and supplier of each item of equipment actually installed.

Changes made by change order or field order.

Other matters not originally specified.

1-7.2.6.3 Shop Drawings.- Shop drawings shall be maintained as record documents; legibly annotate drawings to record changes made after review.

1-7.3 Completion Certificate.- When the work is complete, submit written certification that:

Contract documents have been reviewed; work has been inspected for compliance with contract; equipment and systems have been tested in the presence of the COR and are operational; required operation and maintenance manuals, data, and parts list have been submitted and approved; spare parts have been provided as required; and required instruction of maintenance personnel had been accomplished.

1-7.4 Final Inspection.- The COR will schedule the final inspection upon approval and endorsement of the contractor's Completion Certification.

1-7.5 Punch List.- The COR will furnish the contractor with a list of discrepancies in the work, material and equipment noted during the final inspection.

1-7.6 Acceptance of Work.- The contractor shall correct discrepancies noted during the final inspection, clean the premises and notify the COR that the work is ready for acceptance.

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2. SITE WORK

2.1 Excavation and Backfilling

2.1.1 Foundations.-Foundation excavation may be enlarged to permit forming for concrete or excavated to the exact size of concrete member. Sides of the unformed excavation shall be maintained to withstand sloughing during the placing of concrete. All foundations shall bear on undisturbed soil unless foundation material is rock. Any over excavation shall be backfilled with concrete.

2.1.2 Dewatering.- The Contractor shall employ methods to effectively dewater all excavations as required to allow placement of concrete on undisturbed dry subgrade.

2.1.3 Drainage.- Excavation shall be performed so that the area of excavation and the area immediately surrounding the excavation and affecting operations at site shall be continually and effectively drained. Water shall not be permitted to accumulate in the excavation. The excavation shall be drained to prevent the softening of the foundation bottom, undercutting of footings, or other actions detrimental to proper construction procedures.

2.1.4 Backfilling

2.1.4.1 Material.- Backfill shall be clean earth or well-graded, coarse granular material free of debris, organic, frozen, expanding, or shrinking material. Excess material shall be disposed of by the Contractor.

2.1.4.2 Cleanup.- Prior to commencing with the backfill operations excavated and fill areas shall be cleared entirely of formwork, debris, gravel, etc.

2.1.4.3 Compaction.- Backfill shall be placed in maximum 8-inch layers and shall be thoroughly consolidated by mechanical hand tampers or rollers to prevent subsequent settlement. Backfill shall be compacted to 95% density. Excavations and trenches shall be kept free of water during backfilling. No backfill shall be done when the subgrade is frozen, excessively wet, or when the weather conditions are wet or freezing.

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3-1 CONCRETE FORM WORK

3-1.1 General

3-1. 1.1 Scope.- Unless they are specified elsewhere, provide forms and related work required for cast-in-place concrete, including the following:

Structural concrete
Pads for site improvements

3-1.1.2 Related Work in Other Sections

Site Work: Division 2
Sleeves for pipes and ducts: Division 16

3-1.2 Applicable Documents

3-1.2.1 ACI 301.- "Specifications for Structural Concrete for Buildings," Chapters 1, 4 and 18.

3-1.2.2 ACI 347.- "Recommended Practice for Concrete Formwork," Chapter 1 regarding design requirements, Chapter 2 regarding construction requirements.

3-1.2.3 ACI Special Publications 4.- Formwork for Concrete, Chapters 6 and 7 regarding design and allowable stresses for forms, accessories, shores and bracing.

3-1.2.4 ACI 318.- "Building Code Requirements for Reinforced Concrete," latest edition.

3-1.2.5 CRSI.- "Manual of Standard Practice."

3-1.3 Materials

3-1.3.1 Form Framing.- Southern Yellow Pine or Douglas Fir, construction grade or better, dressed or rough.

3-1.3.2 Form Sheathing

3-1.3.2.1 Boards.- Southern Yellow Pine or Douglas Fir, construction grade or better, S4S, 1 x 6 boards. Use center matched boards where forms are unlined and concrete will be visible.

3-1.3.2.2 Plywood.- American Plywood Association grade-marked B-B Plyform Class 1 exterior, 5/8" thick minimum.

3-1.3.3 Plastic Sheet.- Translucent white or black polyethylene film .006" thick and not less than 6 feet wide.

3-1.3.4 Form Ties.- Of the following types:

For concealed surfaces or surfaces to be coated with direct applied finishes - Rigid metal type designed to be removable to not less than 1" back of surface.

For visible surfaces - Rigid metal type designed to be removable to not less then 1" back of concrete surface. Fabricated of stainless steel for exterior surfaces.

3-1.3.5 Accessories.- Spreader, etc., of required type, size and finish.

3-1.3.6 Form Coating.- Nonstaining mineral oil compatible with any direct applied finishes required on concrete. Submit brand for approval.

3-1.3.7 Compressible Filler.- For visible joints not requiring sealant - Premolded rigid cane fiberboard impregnated throughout with between 35 percent and 50 percent by weight of asphaltic compound, fabricated in 1/2, 3/4 and 1" thickness as required, and in 10-foot lengths or longer.

The Philip Carey Manufacturing Company - Elastite Asphalt Expansion Joint
Celotex Corporation Flexcel
W.R. Meadows, Inc. - Sealtight Fiber Expansion Joint
Or approved equal

3-1.4 Installation

3-1.4.1 Relation With Other Trades.- Inserts, hangers, anchors, sleeves, bolts, plates, frames, bucks, nailer strips, reglets, and similar items required by other trades to be cast in concrete work shall be furnished and located by each such trade. Build such items into forms in a manner that will prevent displacement or damage to them during placing of concrete. Form openings required for ducts, chases, etc. Verify sizes and locations. Contractor shall be responsible for inspecting all construction documents to assure the proper installation of all imbedded items and provisions of openings and repressions.

Concrete paving and curbs - Information relative to paving and curbs is included in this section for reference only. Work required for concrete paving and curbs is specified in Division 2, Sitework.

3-1.4.2 Forms for Structural Concrete

3-1.4.2.1 Tolerances

General - Unless otherwise specified, shown, or required to accommodate abutting or adjacent materials, conform to ACE 301 Table 4-3.1 which shall be considered maximum and shall be reduced as necessary to conform to details and to permit the proper installation of adjacent and abutting materials.

Correction - Correct work outside of required tolerances as directed without limit to extent of work required.

3-1.4.2.2 Support of Forms

General - The total responsibility for the proper and adequate design, construction, support and bracing of forms to provide the required concrete sections and to support, without deflection, the wet concrete and other construction loads imposed on them rests entirely with the Contractor. The requirements of this specification are to be considered as minimum only. Rebrace, tighten, etc., and displace forms as necessary to bring them back to required line and level.

Wales and studding - Provide of adequate size and strength, spaced and braced to prevent bulging or sagging of forms. Space studding 1611 o.c. maximum.

3-1.4.3 Surface Appearance.- Cast concrete that will be visible shall be rubbed, unless noted otherwise.

3-1.4.4 Unlined Wood Forms.- Contact surface shall be free of warpage, cupping and large or loose knots. Break joints and double nail.

3-1.4.5 Ties and Spreaders.- Lengths shall be as required to provide proper concrete thickness. When practical, locate the space ties and spreaders symmetrically at approximately 31 centers both ways, in plumb tiers and level rows. Where concrete is to be visible, if location and spacing of ties is not shown, request direction before constructing forms.

3-1.4.6 Form Coating.- Coat the inside of forms to provide proper release. Wood forms for concealed concrete only may be wet with water just before placing concrete in lieu of coating.

3-1.4.7 Checking Forms.- As concrete is placed, make frequent checks on forms to detect any change in position. Replace, tighten, etc., any displaced forms as necessary to bring them back to required line and level.

3-1.4.8 Rubbed Concrete.- Where concrete surface is required to be rubbed, remove forms as soon as concrete has sufficiently set to support itself and any live loads, but not less than 24 hours after it was placed, and if possible, not more than 3 days after placing. Provide any necessary support and protection for such concrete until it has attained its full strength.

3-1.4.9 Equipment Pads.- Provide unlined forms for pads, slabs, bases and curbs required for electrical equipment at locations indicated on the drawings. Chamfer visible corners and round edges. Verify locations, sizes and heights required for the equipment to be installed by the respective trades.

3-1.5 Quality Assurance

3-1.5.1 Condition of Forms.- Formed surfaces for concrete that will be visible shall be rubbed, unless noted otherwise.

3-1.5.2 Construction of Forms.- Locate and construct forms accurately so that finished concrete will conform to shapes, lines, grades and dimensions shown on the drawings. Joints shall be horizontal or vertical unless otherwise specified, and sufficiently tight to prevent leakage.

3-1.5.3 Size of Forms.- Size forms so that all reinforcing, ties, etc., shall have the minimum coverage indicated. Thickness of concrete coverage shall be measured from face of vertical bars in walls and face of stirrups in beams. Coverage not indicated shall conform to ACI 318, "Building Code Requirements of Reinforced Concrete," latest edition.

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3-2 CONCRETE REINFORCEMENT

3-2.1 General

3-2.1.1 Scope.- Fabricate and install reinforcing steel and the related accessories required for concrete work not specified elsewhere.

3-2.1.2 Related Work in Other Sections

Testing: Division 1
Site work: Division 2
Cast-in accessories and inserts: Furnished and located under various other sections.

3-2.2 Applicable Documents

3-2.2.1 ASTM A615

3-2.2.2 ASTM A185

3-2.2.3 FS QQ-W-461

3-2.2.4 ACI 301.- Specifications for Structural Concrete for Buildings, Chapters 1 and 5.

3-2.2.5 ACI 315.- Manual of Standard Practice for Detailing Reinforced Concrete Structures for Location, Placing, Splicing, etc., of Reinforcing.

3-2.2.6 AWS D12.1.- For Welding of Reinforcement.

3-2.3 Materials

3-2.3.1 General.- All of the following materials shall be produced and fabricated in the U.S.A.

3-2.3.2 Bars.- Carrying rolled-on identifying marks to denote the mill designation, bar size and type of steel. Grade 60 shall also be marked to indicate minimum yield. Deformed billet steel - ASTM A615 of the following grades:

Grade 60 - No. 4 size and larger
Grade 40 - No. 3 size and smaller

3-2.3.3 Mesh.- ASTM A185 cold drawn steel wire welded fabric, galvanized. See structural drawings for size of wires and mesh

sizes.

3-2.3.4 Dowel, Stirrups and Ties.- Conform to Section 1-3.2.

3-2.3.5 Accessories.- Spacers, chairs, wire ties, etc., fabricated of standard bright basic wire.

Special Requirement - Chairs placed on earth, porous fill shall have 16 gauge steel base pads or plates to prevent them from penetrating the supporting surface. Minimum size shall be 3" x 3".

3-2.3.6 Tie Wire.- For bars - FS QQ-W-461, 16 gauge minimum annealed black steel.

3-2.4 Installation

3-2.4.1 Relation With Other Trades

Mechanical and plumbing - Reinforced openings in concrete for ducts, chases, etc. Where such openings exceed 10 inches in maximum dimension and reinforcing is not shown, submit prompt notification and reinforce opening as directed.

Site drainage - Provide reinforcing required for site concrete work in conformance with Division 2, Sitework.

3-2.4.2 Extent of Work.- Provide reinforcing for all concrete unless it is definitely specified or noted to be plain or unreinforced. See structural and sitework drawings.

3-2.4.3 Marking.- Use standard waterproof tags. Mark steel for beams with the same designation as the member in which it occurs. All designations shall coordinate with the structural drawings.

Special Requirements - Reinforcing fabricated of high strength billet steel must be physically marked for identification in an approved manner or it will be rejected.

3-2.4.4 Tolerance.- Following are maximum allowable tolerances:

3-2.4.4.1 Fabrication

Sheared length: Plus or minus 1 inch.

Depth of truss bars: Plus 0, minus 1/2 inch.

Stirrups, ties, spirals: Plus or minus 1/2 inch.

All other bends: Plus or minus 1 inch.

3-2.4.4.2 Placement

Concrete cover to form surfaces: Plus or minus 1/4 inch.

Minimum spacing between bars: 1/4 inch.

Top bars in slabs and beams:
Members 8 inches or less deep: Plus or minus 1/4 inch.
Members over 8 inches but not more than 2 feet deep: Plus or minus 1/2 inch.

Crosswise of members: Space evenly within 2 inches of stated separation.

Length of members: Plus or minus 2 inches.

Maximum bar movement to avoid interference with other reinforcing steel, conduit or other embedded work: 1 bar diameter.

3-2.4.6 Fabrication of Reinforcing Bars

3-2.4.6.1 Material.- Use deformed bars unless otherwise specified or shown.

3-2.4.6.2 Forming.- Unless noted otherwise, bend bars cold. Do not straighten or rebend without specific approval. Torch cutting at the job will be acceptable only for minor correction of shop fabricated bars and for fabrication of slab reinforcing.

3-2.4.6.3 Joints.- As indicated - interrupt reinforcing.

3-2.4.6.4 Laps and Splices.- Splices shall conform to the details and notes on the structural drawings. Splices, whether indicated or not, shall be in conformance with the requirements of ACI 318.

3-2.4.7 Placement

3-2.4.7.1 Preparation.- Remove from reinforcing any scale, heavy rust, mortar, mud, oil, and other coatings which would reduce bond.

3-2.4.7.2 Accessories.- Provide spacers, chairs, wire ties, etc., necessary to properly assemble, space and support the reinforcing in place during placement of concrete, as recommended by the Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice. Accessories shall be sized to provide required concrete coverage. Position and support bolts, anchors, and other cast-in items with appropriate accessories.

3-2.4.7.3 Anchor Bolts.- If reinforcing conflicts with location of anchor bolts, inserts, etc., required to be cased in concrete, submit prompt notifications so that revisions can be made before concrete is placed. No cutting of reinforcing will be permitted without prior approval from the Contracting Officer.

3-2.5 Quality Assurance

3-2.5.1 Submittals

3-2.5.1.1 Shop Drawings.- Shop drawings, in accordance with the submittal requirements of Division 1, are required for all items under this section. No part of the structure shall be installed for which shop drawings have not been submitted and approved by the Contracting Officer. Placing drawings and bar lists for all reinforcing shall conform to ACI Manual of Practice for Detailing Reinforced Concrete Structures, ACI 315. Drawings shall indicate location, general spacing and sizes of the reinforcing members, together with all slots, chases, recesses and openings required for installation of other items of work. The diagrams and general schedules shall indicate the bonds, sizes and lengths of reinforcing member and they shall clearly indicate by diagram or other easily recognizable mark exactly where the steel is to be placed in the work.

3-2.5.1.2 Certificates.- Submit three copies of steel mill certificates of compliance with the requirements herein specified for steel reinforcement. Mill certificates shall be furnished to Resident Engineer at time of steel delivery.

3-2.5.2 Delivery and Storage.- Bundle and tag reinforcing steel and wire mesh in accordance with CRSI Standards. Deliver, handle and store reinforcing steel and wire mesh in a manner which will prevent damage and excessive rust accumulations. Materials stored onsite longer than one week shall be placed on raised platforms or skids and protected with acceptable covers., as approved by the Resident Engineer.

3-2.5.3 Protection and Inspection

3-2.5.3.1 Protect.- Protect reinforcement from damage and displacement after placing and during concreting operations. Do not support runways and chutes on reinforcing. Do not permit conveying equipment to be wheeled directly on reinforcing.

3-2.5.3.2 Inspection.- The Contractor shall have as many qualified men as necessary to check the reinforcement as the concrete pouring is in progress. Their job shall be to make sure that there are no changes in the positioning of the steel and to keep the personnel who are pouring the concrete from walking on or otherwise dislocating the steel. At least one qualified person shall be present at all times to check reinforcement during any pour.

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3-3 CAST-IN-PLACE CONCRETE

3-3.1 General

3-3.1.1 Scope.- This section covers all concrete work except precast concrete.

3-3.1.2 Related Work in Other Sections

Testing: Division 1
Site work: Division 2
Pipe and conduit in concrete: Division 16
Bolts, anchors, frames and other work required to be into concrete: Furnished and located under various other sections.

3-3.2 Applicable Documents

3-3.2.1 ASTM C150.- Type I Grey Portland Cement.

3-3.2.2 ASTM C33

3-3.2.3 ASTM C494.- Type A or D.

3-3.2.4 ASTM C260

3-3.3 Material

3-3.3.1 Grey Cement.- ASTM C150, Type I Grey Portland Cement. The use of Type III permitted only with specific approval. Submit brand name and mill reports for approval. Use only approved brand for all concrete.

3-3.3.2 Stone Aggregate.- Conforming to ASTM C33.

Fine - Natural sand
Coarse - Gravel or crushed stone, Graded No. 67 or 57

3-3.3.3 Water.- Potable.

3-3.3.4 Chemical Admixture.- ASTM C494 Type A or D (Type E may be used in cold weather upon written approval) polymer type compound (lignin compounds not acceptable) in liquid form, manufactured by one of the following firms:

Gifford-Hill & Co., Inc.
W.R. Grace & Company

Master Builders
Sika Chemical Corporation
Or other approved manufacturer

Submit name of manufacturer or product proposed for use, as determined by weather conditions during time of concrete placement, as well as recommended quantity.

3-3.3.5 Air Entraining Admixture.- ASTM C260 liquid vinsol resin compound compatible with chemical admix used.

Master Builders - MB-VR
Protex Industries, Inc. - Protex Air Entraining Solution
Sika Chemical Corporation - Sika AER
Or approved equal

3-3.4 Installation

3-3.4.1 Relation With Other Trades.- Check other trades prior to placing concrete to ascertain that their work is in place. Where other work is required to be applied to concrete, provide satisfactory surface to receive it.

3-3.4.2 Cast-in Anchors and Accessories.- Carefully place items required to be cast into concrete at locations set by trade which furnishes them.

3-3.4.3 Testing.- Provide materials and cooperate with testing laboratory.

3-3.4.4 Retempering.- Concrete or mortar that is partially hardened may not be retempered.

3-3.4.5 Strength Tests.- The strength tests representing each class of concrete as well as the average of any 5 consecutive strength tests representing each class of concrete shall be equal to or greater than the specified strength and not more than 1 test in 10 may have an average of less than 90 percent of the specified strength.

3-3.4.6 Strength Requirements

3-3.4.6.1 Minimum Compressive Strength.- 3000 psi.

3-3.4.6.1.1 Structural Stone Concrete.- Provide strengths as required in structural general notes.

3-3.4.6.1.2 Nonstructural Concrete.- Unless shown on or specified otherwise, use 3000 psi test Stone Aggregate Working Stress Type.

3-3.4.6.1.3 Surfacing Concrete.- See Division 2, Sitework.

3-3.4.7 Structural Concrete - Proportioning

3-3.4.7.1 General.- Conform to ACI Standards. The mix design is intended to produce concrete which, when cured, will have a 28-day compressive strength equal to or greater than that required. If the strength required for the class of concrete being produced is not secured with the minimum cement content, additional cement shall be used or other aggregate provided at the Contractor's expense.

3-3.4.7.2 Proportioning of Ingredients.- Determine mix proportions in conformance with standards using Method 2 to determine water cement ratios. Prior to commencing operations, submit a statement indicating the mix proportions of the ingredients and maximum nominal coarse-aggregate size that will be used in each class of concrete proposed for use. Proportions shall indicate weights of aggregates in saturated surface-dry condition. Accompany the statement with satisfactory evidence attesting that the proportions furnished will produce concrete of the qualities indicated. Submit design for each strength of concrete to be used in time to conduct 7-day strength tests and to redesign and retest if necessary before any concrete is ordered.

3-3.4.7.3 Air-Entraining Admixture.- Required in structural concrete to produce 5 $\pm$ 1% entrained air. Conform to manufacturer's directions for quantity, preparation and mixing.

3-3.4.7.4 Slump.- The maximum slump of concrete mixtures shall not exceed 3 1/2" for slabs on grade and mass concrete; 5" for walls less than 10" thick, and 4", for all other conditions.

3-3.4.7.5.- The use of admixtures other than air-entraining admixture will be considered under conditions listed below:

a. When proper workability is not being attained.
b. When checking and/or cracking occurs.
c. When outside air temperature is below 50 degrees F.
d. When outside air temperature is above 90 degrees F.
e. When concrete pumping is requested.

No admixtures, except air-entraining, shall be used in cast-in-place concrete mixtures unless approved by the Contracting Officer.

3-3.4.7.6 Mixing.- Concrete may be proportioned and mixed on the job, dry-batched for mixing on the job, or procured from an approved "ready-mixed" concrete plant as follows:

Transit or shrink-mixed mixing and delivery operations - Conform to ASTM C94. Do not add water at the job unless prior approval is given. Record the amount of any added water on each copy of the delivery ticket. If water is added, mix batch and additional 1 minute per yard of concrete, at slow speed, before placing it. Use no concrete which has been held in a mixer truck longer than 1-1/2 hours.

Dry-batched to the jobsite - Transport the dry materials in such a manner as to prevent loss, segregation, or contamination of the ingredients. Batch plant operations shall conform to standards specified above.

3-3.4.8 Structural Concrete - Placement

3-3.4.8.1 Preliminary Work

General - Verify that forms are clean and wet or oiled, and that reinforcing, pipes, conduit, sleeves, thimbles, hangers, anchors, flashing and other work required to be cast in concrete have been properly installed. Such work must be inspected and approved before concrete mixture is delivered to the jobsite.

Concrete on grade or fill - Wet subsurface prior to placing concrete on it unless a membrane or sheeting has been installed to cover it.

3-3.4.8.2 Protection

3-3.4.8.2.1 Cold Weather Protection.- Concrete shall not be placed when the atmospheric temperature is below 40 degrees F or when the concrete is likely to be subjected to freezing temperatures within 24 hours after it has been deposited.

In no case shall concrete be exposed to freezing temperatures for 72 hours after placing. The use of calcium chloride is not permitted. Cold weather protection in accordance with ACI 306 shall apply to all concrete placements made on this project when atmospheric temperatures are below 50 degrees F.

3-3.4.8.2.2 Hot Weather Protection.- Concrete shall not be placed when the atmospheric temperature is above 95 degrees F. Fresh concrete temperature shall be not more than 100 degrees F. for the first three days after placing, and shall be protected from temperatures over 100 degrees F. for the next five days. Dry surfaces shall be thoroughly wetted down before concreting. Hot weather protection in accordance with ACI 305 shall apply to all concrete placements made on this project when atmospheric temperatures are above 85 degrees F.

3-3.4.8.3 Method.- Place concrete in the forms as rapidly as practical by methods that will prevent loss or separation of the ingredients. Deposit it as nearly as practicable in its final position in such a manner as to maintain a plastic surface which is approximately horizontal. If necessary to accomplish this, provide additional chutes or hoppers.

Place concrete continuously, in layers not over 24" high at deep sections and not over 10" in height at beams and shallow sections, in thinner layers if necessary so that fresh concrete will be placed against a layer that is still soft, except at approved joints. Vibrator shall not be used to push concrete laterally in the forms. Remove any wood spreaders as concrete rises in the forms.

3-3.4.8.4 Compaction.- Thoroughly compact concrete during and immediately after placement by means of mechanical vibrators. Demonstrate working condition of vibrator before concrete is ordered from the batch plant. Avoid overvibrating concrete to an extent which might cause segregation of aggregate. At least one spare vibrator shall be available at the place of deposit of concrete mixtures.

3-3.4.8.5 Bond.- Before depositing new concrete against set concrete, inspect forms and have them tightened if necessary. Thoroughly clean reinforcing and surface of set concrete to remove foreign matter and laitance. Saturate surface with water. Slush vertical or inclined surface of set concrete with grout coating composed of 1:1-1/2 cement: sand, and place new concrete before grout has attained its initial set. Cover place new concrete before grout has attained its initial set. Cover horizontal surfaces of set concrete with the cement-sand grout to a depth of 1 inch immediately before depositing new concrete.

3-3.4.8.7 Forms.- If forms become displaced in any way during placing of concrete, immediately stop the operation and do not resume placing until forms have been rebraced and brought back to

required lines and levels.

3-3.4.9 Structural Concrete - Special Requirements - Excavated Areas.- Excavation must be inspected and approved before concrete is placed. If excavations have been carried beyond the level shown on the drawings without approval, fill the extra depth with concrete of the same strength as that required for footings without added cost to the Government. Do not place concrete on wet or soggy ground without first laying and compacting a bed of broken stone or gravel of sufficient thickness, or as indicated on the drawings, to keep the mud from mixing with the concrete. Where water is present, it must be kept below the level of the newly placed concrete continuously during placing and for at least 24 hours thereafter. The excavated area must be so prepared that at least 24 hours thereafter. The-excavated area must be so prepared that the water will easily drain to the pump without carrying any cement with it.

3-3.5 Quality Assurance

3-3.5.1 Submittals.- Submittals shall be in accordance with the requirements of Section 1-1, paragraph 1-1.6.

3-3.5.1.1 Samples.- Provide samples of all concrete materials proposed for use on this project to approved Testing Laboratory. Provide sufficient quantities for testing and determining mixes to produce concrete classes specified.

3-3.5.1.2 Mix Designs.- Submit concrete mix designs for each different concrete strength with aggregate grades as required. Secure confirmatory laboratory tests on proposed mix designs prior to submittal to Contracting Officer for review. Use only mix designs approved in writing by the Contracting Officer. In addition to proposed mix designs, provide Contracting Officer with certified mill reports on cement and sieve analysis on aggregates.

3-3.5.1.3 Delivery Tickets.- The concrete producer shall include the following information on delivery tickets.

(1) Number of cubic yards in load.
(2) Class of concrete with any variations to design mixture being listed.
(3) Date and time of day load was batched.
(4) Identification of truck delivering load.

3-3.5.2 Tests and Inspections

3-3.5.2.1 Concrete Mix Designs.- The Testing Laboratory shall establish or certify that all concrete mix designs used on this project are in accordance with this Section.

3-3.5.2.2 Job Requirements

3-3.5.2.2.1.- Test Cylinders shall be taken, stored onsite away from work areas for at least 3 days and tested at 7 and 28 days. Six cylinders are required to complete each test with two cylinders tested at 7 days and at least three cylinders tested at 28 days. The spare cylinder shall be tested at 28 days if one of the three tested cylinders provides a questionable result. Six cylinders are required for each 50 cubic yards of each concrete class poured on given day. Resident Engineer shall determine when cylinders are to be made. When test cylinder results do not meet strength requirements, all in-place concrete represented by the test cylinders shall be removed and replaced at no cost to the Government.

3-3.5.2.2.2.- Slump tests in accordance with ASTM C143 from each trunk or batch of concrete shall be performed by the Testing Laboratory as requested by the Resident Engineer.

3-3.5.2.2.3.- Air content test measured at point of discharge from mixer in accordance with ASTM C231 from each truck or batch of concrete shall be performed by the Testing Laboratory.

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3-4 FINISHING AND CURING

3-4.1 General

3-4.1.1 Scope.- Finish and cure the cast-in-place concrete required for the following work:

Structural concrete
Site improvements

Provide grout required for structural steel and other specified areas.

3-4.1.2 Related Work in Other Sections

Site concrete work: Division 2
Other work required to be cast or set in concrete: Furnished and located under various other sections.

3-4.2 Applicable Documents

3-4.2.1 ACI 302.- Specifications for Structural Concrete for Buildings, Chapters 1, 4, 9, 10, 11 and 18.

3-4.2.2 ACI 302.- Recommended Practice for Concrete Floor and Slab Construction.

3-4.2.3 Federal Specification UU-B-790

3-4.2.4 U.S. Commercial Standard CS238

3-4.3 Materials

3-4.3.1 Curing Compound.- Chlorinated rubber base compound in neutral color.

Preco-Armor Cure
Or approved equal

3-4.3.2 Waterproof Paper.- ASTM C171, Type I, or Federal Specification UU-B-790 reinforced kraft paper.

Glas-Kraft, Inc. - Glas-Kraft Grade A
St. Regis Paper Company - Sisalkraft SK-10
Or approved equal

3-4.3.3 Hardener Compound.- Portland cement with special flint-like aggregates bonded to alkali resistant mineral coloring combine in a redi-mixed formulation. Color shall be neutral (grey).

Preco-Dense Top
Or approved equal

3-4.3.4 Plastic Sheet.- U.S. Commercial Standard CS238 polyethylene sheet in a 4 mil minimum thickness.

3-4.3.5 Grey Cement.- ASTM C150, Type I, all of one standard brand.

3-4.3.6 Non-shrinking Grout.- A premixed nonmetallic formula having the following characteristics:

By ASTM C827 test method - No shrinkage after placement or expansion after set.

By ASTM C109 test method - 1 day compressive strength of at least 3,000 psi.

U.S. Grout Corporation - Five Star Grout or approved equal.

3-4.4 Installation

3-4.4.1 Relation With Other Trades.- Level slab surfaces which are unsuitable for the work of other trades. Fill voids and grind off high spots under resilient flooring. Verify requirements for various finishes in Division 9 that are required to be applied or installed over concrete to be sure the curing method used on the concrete subsurface is compatible with the finish and its application.

Resilient flooring - Comfort to requirements of floor material manufacturer for curing methods.

3-4.4.2 Tolerance - Horizontal Surfaces

3-4.4.2.1 Standards.- Conform to ACI 301, Chapter 11, unless modified or exceeded by the following requirements:

3-4.4.2.2 General.- Edges of areas shall be level and true to line against forms. Screed surface using specially fabricated straightedges (not lengths of lumber) and wet screeds.

3-4.4.2.3 Class A Tolerance.- In addition to the standard, limit deviation to slope of 1/8" in 5 running feet. Required for the following surfaces:

Interior slabs having troweled or floated finish, whether of structural concrete or concrete on metal decking - Visible surface and where covered with resilient flooring or carpet.

3-4.4.2.4 Special Tolerance.- 1/16" deviation in 3 lineal feet. Required for the following surfaces:

Interior slabs covered with thin-set tile.

3-4.4.3 Finishes.- Conform to ACI 301, Chapter 11, unless modified or exceeded by the requirements of this specification.
Floated finish for wearing surface - Provide even gritty non-slip finish. Provide tolerance specified for type of surface involved.
Round unchamfered visible edges using 1/2" radius edger.

3-4.4.4 Repair of Defects.- Concrete surfaces that are visible, that receive another material as finish or that require rubbed or grout finish shall be free of defects and shall be smooth. Immediately after removal of forms, cut off metal ties, chip out adjacent surface to permit proper patching, cut out honeycomb areas, and remove fins. At holes and cracks, wet surface and point areas flush using 1:3 cement:sand mortar. Cure patch to provide permanent bond.

3-4.4.5 Curing

3-4.4.5.1 General Requirements.- Protect concrete from loss of moisture, rapid drying or temperature changes, injurious action by the sun, rain, flowing water or frost, and mechanical injury, at a temperature not less than 50 degrees F. from the time of placing until the end of the time of curing. Keep wood forms, left in place during curing, damp at all times to prevent opening at the joints and drying of concrete. No period during which moisture or warmth is lacking shall be counted effective for curing.

3-4.4.5.2 Methods

Duration - Cure concrete for at least 7 days.

Moist Curing - Use one of the following methods:

Impervious Sheet Curing - Wet surface with fine spray then cover it with plastic sheet or waterproof paper. Lap joints at least 4" and seal with tape. Weight sheeting to prevent displacement. Repair tears and other damage.

Curing Compound - Apply by roller or spray when surface water has disappeared after final finishing operation, or the following day while concrete is still green.

3-4.4.6 Grouting

3-4.4.6.1 Non-Metallic Non-Shrink Grout.- Mix according to its manufacturer's directions for intended use. Provide for the following work:

Structural Steel - Grout to provide bearing surface for structural members such as column base plates.

3-4.4.6.2 Cement Grout. - Mix 1 part cement to 2 parts sand with water as required for workability. Provide for the following work:

Site Drainage and Utility Structures - Shape inverts as required.

3-4.4.6.3 Patching Grout.- Mix 5 parts cement and 2 parts Mason's sand with 1 part water. An approved premixed patching compound applied according to its manufacturer's directions may be substituted for this grout. Provide for the following work:

Abutted dissimilar floor finishes - Where visible concrete slab finish fails to be flush with subsequently placed dissimilar finishes, grind off high spots and fill low spots with grout. Chip out -low spots as necessary to avoid a "feather edge" and to provide at least 1/4" thickness of grout. Trowel grout so as to leave the surface smooth and level.

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7.1 SEALANTS

7.1.1 Silicone Sealant.- Shall conform to FS TT-S-230. One part compound in the formulation recommended by the manufacturer for the substrate materials involved. Color shall match surrounding surfaces.

Tremco - "Mono" Sealant
Dow-Corning Corp. - 790 Building Sealant
General Electric Co. - Silpruf
Pecora Chemical Corp. - 862 Silicone Sealant
Or approved equal.

7.1.2 Installation

7.1.2.1 Location.- In addition to that which is shown, the following minimum work is required.:

7.1.2.1.1 Perimeter Joints.- Close exposed exterior and visible interior perimeter joints between dissimilar materials.

7.1.2.1.2 Special Sealant.- Use special sealant to fill joints over 1/2" wide.

7.1.2.2 Preparation of Joint

7.1.2.2.1 General.- Provide joint filler or joint backing under sealant and under caulk where joint is over 1/2" deep. Position material to provide for specified depth of compound.

7.1.2.2.2 Joint Backing.- Required under sealant where depth of joint will not accept joint filler. Cover surface at back of joint with joint backing to form a continuous bond breaker between sealant and the back surface of the joint.

7.1.2.2.3 Caulk.- The surfaces of joints to be sealed with caulking compound shall be cleaned of particles of mortar, dust, and other foreign matter and shall be brushed out just prior to caulking. Where necessary to provide a suitable backstop, the joint shall be packed tightly with rope yarn to the depth of the joint indicated. Clean non-porous surfaces with oil-free solvents such as Tuluol, methyl ethyl ketone, or a mixture of equal parts of xylol and acetone.

Remove lacquer from aluminum surfaces in contact with sealant if necessary to achieve adhesion. Do not use soap, detergent, or any water based cleaner.

7.1.2.2.4 Concrete and Masonry Surfaces.- Concrete and masonry surfaces in contact with sealant shall be dry, sound, and well brushed and wiped dust free. Oil or grease shall be removed with solvents, and surfaces shall be wiped with clean rags. Where surfaces have been treated, curing compounds, oil, or other such materials shall be removed by sand blasting or wire brushing. Laitance and mortar shall be removed from the joint cavity. Where a backstop is required, backup material shall be inserted in the joint cavity to the required depth.

7.1.2.3 Application

7.1.2.3.1 Caulk.- The ambient temperature shall be between 40 and 100 degrees F. when the sealant is applied. Compound shall be gun-applied with a nozzle of proper size to fit the width of joint indicated, and shall be forced into grooves with sufficient pressure to expel air and fill the groove solidly. Caulking shall be uniformly smooth and free of wrinkles, and shall be left sufficiently convex to result in a flush joint when dry. One coat of sealer shall be applied over joint after compound has dried sufficiently to develop a surface skin so as not to deform the surface of the joint.

7.1.2.3.2 Sealants.- The ambient temperature shall be between 40 and 100 degrees F. when the sealant is applied.

7.1.2.3.2.1 Joints.- Joints shall be tooled slightly concave after sealant is installed. When tooling white or light-color sealant, dry or water-wet tool shall be used.

7.1.2.3.3. Colors.- Sealants shall be colored with dye, colorfast and compatible with the material. Colors shall reasonably match the adjacent surfaces. Colors shall reasonably match the adjacent surfaces. Colored caulking batches shall cover the total area to be caulked. Where colors of adjacent surfaces (except such small items as window frames) differ, the darker color shall be matched. In larger areas which shall later be painted, caulking shall be gray or transparent.

7.1.2.3.4 Cleaning.- The surfaces adjoining the caulked and sealed joints shall be cleaned of smears or other soiling resulting from the caulking and sealing application.

7.1.3 Quality Assurance

7.1.3.1 Submittals.- Conform to the procedures specified.

7.1.3.1.1 Manufacturer's Literature.- Literature shall state the procedures for pre-treatment of joint surfaces, and list approved joint surface materials as well as application instructions. Include a list showing the product proposed for use in each type of joint to be sealed.

7.1.4 Special Guarantee.- Duration 2 years.

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13.1 SPECIAL CONSTRUCTION - Antenna Support Towers

13.1.1 Scope.- This section covers the requirements for the erection of the Government furnished antenna support tower manufactured by Antenna Products Corporation. Full site erection drawings are provided in the invitation for bid set of drawings.

13.1.2 Requirements

13.1.2.1 Protection of Materials.- All material shall be handled, stored and protected in a manner to assure its maintenance in good condition.

13.1.2.2 Methods of Erection.- Construction procedures and erection sequence shall be consistent with the plans and specifications and shall be designed to result in safe and expeditious completion of the work. Any method of erection which results in permanent deformation or warpage of members will be disallowed. Refer to shop drawings furnished with tower.

13.1.2.3 Bases and Base Plates

13.1.2.3.1.- All anchor bolt locations and base elevations shall be carefully checked and any errors reported to the Government Representative.

13.1.2.4 Bolting and Plumbing Up

13.1.2.4.1 Alignment.- True alignment must be maintained as the work progresses and on completion the tower shall be plumb and true. If the error in alignment and true shape does not exceed 1 part in 200, the structure will be considered in alignment.

13.1.2.4.2 Bolt Bearing.- All required bolts and fasteners shall be installed and on completion of the structure shall be tight when structural alignment is attained.

13.1.2.4.3 Orientation.- Normally, nuts will be to the outside of vertical members and on the bottom of horizontal members.

13.1.2.4.4 Lock Nuts.- Lock nuts, where required, shall be

properly installed.

13.1.3 Error and Damage Correction.- Members which have suffered damage shall be repaired to "as new" condition before use in the structure. Minor damage shall be repaired by the Contractor. Damage to Government furnished material not considered minor shall be immediately reported to the Government Representative and repairs made as directed. Field welding, unless shown on the drawings, will not be permitted without the approval of the Government Representative.

13.1.4 Cold Galvanizing.- Upon completion of assembly of tower, but before erection, any and all areas which have had the galvanized finish damaged or otherwise abraided, shall be thoroughly cleaned and sprayed with two coats of cold galvanized spray.

13.2 Grounding New Tower.- Except as otherwise provided on the drawings, at least two legs of the tower shall be grounded by ten-foot ground rods connected to the tower with a minimum #4/0 bare copper wire. Wire shall be exothermically welded to the ground rod below grade and clamped to the tower legs. The ground wire shall be protected by a PVC conduit, in the footing. The ground wires shall be connected to the facility grounding system with the 4/0 BSDC counterpoise to be installed with the coaxial cables as specified elsewhere. Refer to drawings.

13.3 Lightning Protection.- Lightning protection system for new tower shall be furnished and installed as shown on the contract drawings.

13.4 Cable Installation

13.4.1 Scope.- Contractor shall install multiple runs of Government furnished heliax coaxial cable from junction box on exterior wall of building, to base of tower, thence up tower to junction box on top of tower. Cable ends shall at all times be protected from the weather and sharp bends in cable shall be avoided. Cable shall be installed inside Government-furnished junction box as shown on the drawings. Coaxial cable shall be run in three 4" diameter PVC conduits and the conduit attached to the antenna tower by unistrut supports as shown on the drawings. All hardware shall be stainless steel as per the drawings.

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13.1 SPECIAL CONSTRUCTION - Antenna Support Towers

13.1.1 Scope.- This section covers the requirements for the erection of the Government furnished antenna support tower manufactured by Antenna Products Corporation. Full site erection drawings are provided in the invitation for bid set of drawings.

13.1.2 Requirements

13.1.2.1 Protection of Materials.- All material shall be handled, stored and protected in a manner to assure its maintenance in good condition.

13.1.2.2 Methods of Erection.- Construction procedures and erection sequence shall be consistent with the plans and specifications and shall be designed to result in safe and expeditious completion of the work. Any method of erection which results in permanent deformation or warpage of members will be disallowed. Refer to shop drawings furnished with tower.

13.1.2.3 Bases and Base Plates

13.1.2.3.1.- All anchor bolt locations and base elevations shall be carefully checked and any errors reported to the Government Representative.

13.1.2.4 Bolting and Plumbing Up

13.1.2.4.1 Alignment.- True alignment must be maintained as the work progresses and on completion the tower shall be plumb and true. If the error in alignment and true shape does not exceed 1 part in 200, the structure will be considered in alignment.

13.1.2.4.2 Bolt Bearing.- All required bolts and fasteners shall be installed and on completion of the structure shall be tight when structural alignment is attained.

13.1.2.4.3 Orientation.- Normally, nuts will be to the outside of vertical members and on the bottom of horizontal members.

13.1.2.4.4 Lock Nuts.- Lock nuts, where required, shall be

properly installed.

13.1.3 Error and Damage Correction.- Members which have suffered damage shall be repaired to "as new" condition before use in the structure. Minor damage shall be repaired by the Contractor. Damage to Government furnished material not considered minor shall be immediately reported to the Government Representative and repairs made as directed. Field welding, unless shown on the drawings, will not be permitted without the approval of the Government Representative.

13.1.4 Cold Galvanizing.- Upon completion of assembly of tower, but before erection, any and all areas which have had the galvanized finish damaged or otherwise abraided, shall be thoroughly cleaned and sprayed with two coats of cold galvanized spray.

13.2 Grounding New Tower.- Except as otherwise provided on the drawings, at least two legs of the tower shall be grounded by ten-foot ground rods connected to the tower with a minimum #4/0 bare copper wire. Wire shall be exothermically welded to the ground rod below grade and clamped to the tower legs. The ground wire shall be protected by a PVC conduit, in the footing. The ground wires shall be connected to the facility grounding system with the 4/0 BSDC counterpoise to be installed with the coaxial cables as specified elsewhere. Refer to drawings.

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16-1 ELECTRICAL WORK

16-1.1 General

16-1.1.1 Scope.- Furnish and install interior and exterior electrical equipment and materials as per the guide specification FAA-C-1217e, dated 1/25/91 as needed.

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PART III - SECTION J
LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS

J.1 52.236-4 PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) The indications of physical conditions on the drawings and in the specifications are the result of site investigations by visual observations by the designers.

(b) Weather conditions shall have been investigated by the Contractor so as to become familiar with the locally prevailing weather conditions under which he/she will be required to perform this work. Complete weather records are available from the nearest office of the National Weather Service.

(c) Transportation facilities are by public highway. Contractor shall familiarize himself/herself with existing conditions and limitations applicable to construction site access.

J.2 LIST OF SPECIFICATIONS AND DRAWINGS FOR THE INSTALLATION OF TWO ANTENNA TOWERS AND CABLES AT THE REMOTE COMMUNICATIONS AIR GROUND (RCAG), TYNDALL AFB, FLORIDA.

Specifications (Attachment 1)

Number	Date	Title
FAA-PAM-1103196	10/20/2011	Installation of Two Antenna Towers and Cables At The Remote Communication Air Ground (RCAG), Tyndall AFB, Florida

Drawings (Attachment 2)

PAM-D-1103196-G01	6/8/2011	ARSR/RCAG Cover Sheet
PAM-D-1103196-G02	6/8/2011	ARSR/RCAG Index Sheet

PAM-D-1103196--C01	6/8/2011	ARSR/RCAG Add Antenna Towers Plot Plan
PAM-D-1103196--C02	6/8/2011	ARSR/RCAG Floor Plan and Cable Entry
PAM-D-1103196--S01	6/8/2011	ARSR/RCAG New Antenna Tower Foundation Details
PAM-D-1103196--E01	6/8/2011	ARSR/RCAG New Antenna Tower Lightning Protection Details
PAM-D-1103196--E02	6/8/2011	ARSR/RCAG New Antenna Towers Lightning Details

Reference Drawings - Young Manufacturing – Tower Drawings and Details (7 sheets)

J3. LIST OF GOVERNMENT-FURNISHED MATERIAL FOR THE INSTALLATION OF TWO ANTENNA TOWERS AND CABLES AT THE REMOTE COMMUNICATIONS AIR GROUND (RCAG), TYNDALL AFB, FLORIDA

(Attachment 3).

J.4 WAGE RATE DETERMINATION Building/Heavy, Bay County, Tyndall, Florida (Attachment 4).

LIST OF GOVERNMENT-FURNISHED MATERIALS

FOR

THE INSTALLATION OF TWO ANTENNA TOWERS

AND CABLES

AT THE REMOTE COMMUNICATIONS

AIR GROUND (RCAG)

TYNDALL AFB, FLORIDA

Item	Description	Quantity
1.	70 FT Freestanding Antenna Tower (Unassembled)	2 EA
2.	Safety Climbing Sleeve	2 EA
3.	Heliax Cable	5000 FT
4.	Strain Relief Connectors w/Lockwashers	20 EA
5.	Junction Boxes	6 EA

Only those items shown on Attachment 3 shall be Government-furnished. All other items shall be furnished by the contractor.

Note: The above listed items of Government-furnished material are stored at the Remote Communications Air/Ground (RCAG) facility, Austell, Georgia..